ANNUAL
FISHERIES PROGRESS REPORT
ON THE 1999 WORK SCHEDULE

REGIONAL / STATEWIDE
AQUATIC WILDLIFE MANAGEMENT

REGIONAL / STATEWIDE
AQUATIC HABITAT MANAGEMENT

WILDLIFE HABITAT PROTECTION

WYOMING GAME AND FISH DEPARTMENT
FISH DIVISION
CHEYENNE WYOMING
AUGUST 2000

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Regional Aquatic Wildlife Management Progress Report

Casper Regional Fisheries Management Crew

Calendar Year 1999

Work Not Associated With A Particular Basin

HI - Habitat Improvement and Maintenance

- North Platte River Flushing Flow Transects FX-CR-EP1-234

In 1997, three sediment monitoring transects were established on the North Platte River between Gray Reef Dam and Casper. The goal was to document the effectiveness of flushing flows over time. The original transects were located at the Game & Fish office, Sechrist PFA and Lusby PFA. Substrate size and depth were quantified at one yard intervals along each transect. The scale with 10 different substrate sizes required diving and visually estimating substrate composition.

In 1998, high turbidity and flows precluded completion of the transects. We have modified the methods to allow for transects to be quantified even in relatively high turbidities and flows. In 1999, ten substrate sizes were simplified to seven (Table 1). This allowed for quantification by feel with feet rather than having to see the substrate. We also moved the Sechrist PFA transect to Speas. The Sechrist PFA area is in an area that is unwadable at flows above 700 cfs.

Table 1. Substrate size classes.

Size Class	*Definition*
1	Vegetation
2	Silt
3	Sand
4	Gravel (<0.5 - 1.5 inches)
5	Cobble (1.6 - 12.0 inches)
6	Boulder (>12.0 inches)
7	Bedrock

Results from 1999 show the largest percentage of silt is in the downstream most transect (Game & Fish office). This is the result we expected with flushing flows moving the fine substrates down through the system. Gravel and cobble make up the largest percentage of all three transects (Table 2). It appears the substrate sizes are getting larger (losing the fine sediments) in all transects (Figure 1).

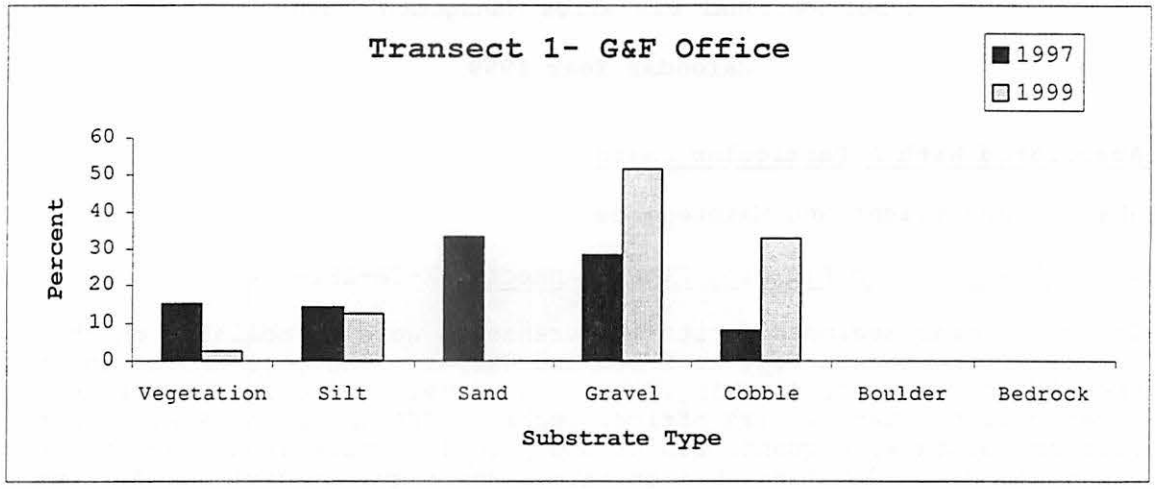
Table 2. Transect results for 1999 at a discharge of 1,500 cfs. Numbers for substrate size class represents a percentage of the total measurements.

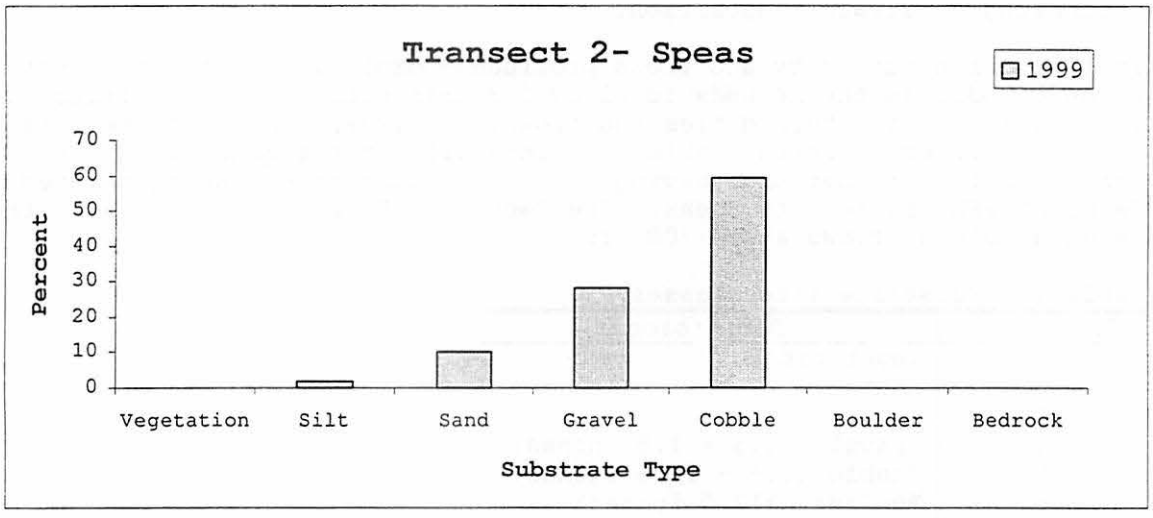
	Average		*Substrate Size*						
	N	Depth (in.)	1	2	3	4	5	6	7
G&F Office	78	28.3	2.5	12.8	-	51.8	32.8	-	-
Speas	52	18.3	-	1.9	10.2	28.5	59.2	-	-
Lusby PFA	53	28.3	7.5	5.7	14.5	16.6	23.2	31.5	0.9

Management Recommendations

This is trend data and not immediate indicators of habitat quality. Information from this year will be compared to future data. This information is a useful monitoring method and demonstrates to the Bureau of Reclamation the flushing flows they provide are an important management tool for improving fish habitat. Data should be collected annually for

trend analyses.





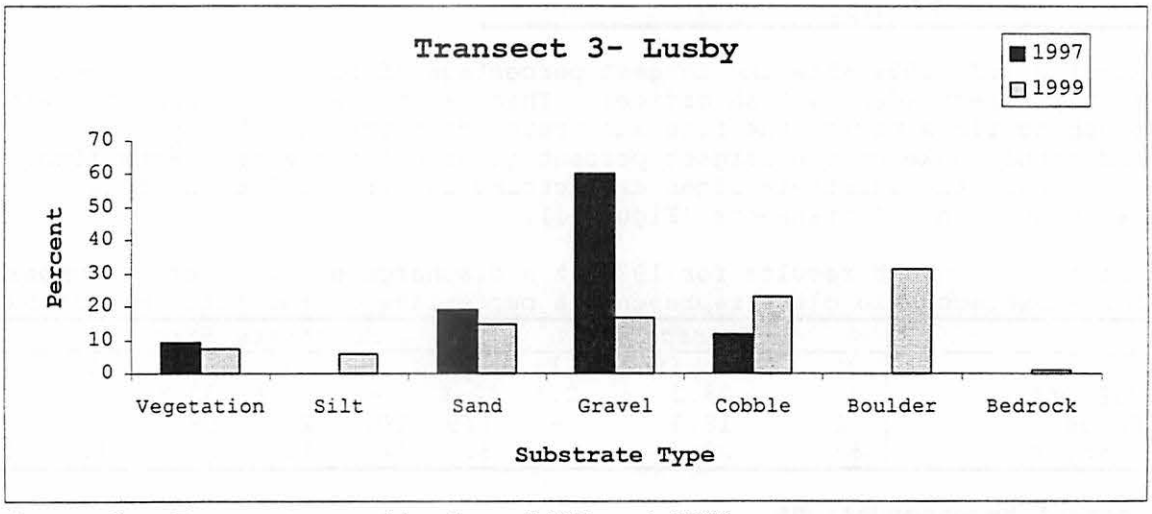


Figure 1. Transect results from 1997 and 1999.

HP - Habitat Protection

- BP Amoco Joint Powers Board Meetings FX-CR-1MG-240

  Joe Deromedi served as a wetlands committee member on the BP Amoco Joint Powers Board. Comments were provided for wildlife concerns from proposed plans to establish wetlands on the old Amoco Refinery site. BP Amoco proposed establishing a business loop with an associated wetland and walking path. The primary reasoning for the wetlands was to reuse re-mediated water, rather than sending re-mediated water to the wastewater treatment plant. The primary concern was protection of wildlife in the artificial wetlands. Plans included PVC liner and shallow depths that provided distance between contaminated sediments and wetland water. Maximum wetland depth that ensured protection was 5 feet. It was unlikely that these wetlands would support fish communities during harsh years. The wetlands complex plans were changed to reduce size of the wetlands and spread ponds throughout a golf course.

- Pathfinder Modification FX-CR-EP1-540

  The proposed modification of Pathfinder Dam may be part of Wyoming's contribution to develop water for Nebraska to address habitat issues for T&E species. The modification will result in impacts to the entire North Platte River System, particularly reservoir habitats. Additional alternatives to develop water as part of the Platte River EIS may also impact fisheries in Wyoming and no information is currently available on additional alternatives. The planned Glendo Reservoir creel survey will address one major fisheries data gap for the Platte EIS.

Management Recommendations

We recommend requesting funding necessary to support a Wyoming Game and Fish Department project biologist. A project biologist would address information requests, function as the Department's liaison to the BOR, WWDC and FWS, develop methodologies and conduct impact analyses for the existing and yet to be determined alternatives. We will continue our efforts to obtain information on the river fishery below Douglas and provide information as requested to the process.

PA - Planning and Administration

- Strain Report FX-CR-PA5-512

  The strain report has been reviewed, revised and is near completion.

PR - Public Relations

- North Platte Angler Newsletter FX-CR-EP1-160

  Following the example from the Cody Region, we produced an angler newsletter in 1999. The newsletter is geared towards getting information to anglers about the area fisheries and fishery issues. We distributed nearly 1,000 copies through the Game and Fish office, several sporting goods stores in the region and angling clubs. The newsletter was also posted on the Game and Fish website.

  We received several positive comments about the newsletter. The totals were 17 phone calls, 20 e-mails and 16 comments in person. All the

comments except one were positive. The only negative comment was from an angler in Colorado who wanted the newsletter to be a monthly publication.

Once the Progress Report is completed, the newsletter takes about one week to compile. Angling clubs in Casper have expressed interest in paying for the copying charges that may ease pressure on the budget in the future.

TM - Tools and Methods

- Channel Catfish Evaluation FX-CR-EP1-510

CCF work in 1999 again focused on how to effectively sample for these fish. The three major sites of CCF work were the North Platte River (NPR) from PP&L to Bixby, NPR above Glendo and Glendo Reservoir. In the river sections, trotlines and baited hoopnets were used. Sinking and floating gill nets were used in Glendo Reservoir.

The variation in effectiveness of the different gear types exemplifies the challenges in sampling CCF (Table 3). Overall, trotlines had better catch rates than hoopnets in rivers. We found trotlines worked best in areas with little to no water velocity and deep areas. These were usually backwaters or flooded side channels. Hoopnets worked best on outside bends with deep (~3 feet) fairly fast water (thalweg area).

In Glendo Reservoir, overnight FG worked better for CCF than short-duration daylight EG (Table 3). Presumably, CCF were up in the water column at night pursuing forage fish (likely GZS).

Although angler returns are a good source of spines as well as public contacts, it is difficult to collect a representative sample from anglers. Anglers tend to keep older fish and release smaller ones.

Pectoral spines were collected for aging. Spines taken from angler-harvested fish were also included in the aging. Growth was similar between the river sections and Glendo Reservoir (Figure 2). Age distributions show gill nets in Glendo Reservoir catch most sizes of CCF. The hoopnets and trotlines appear to select for larger fish and do not sample small CCF.

Table 3. Gear type and CCF catch by area, 1999.

Area	*Number and Type*	*CCF Catch*	*Catch per net/line*
NPR- PP&L to Bixby	4 Hoopnets	3	0.75
	3 Trotlines	3	1.00
	Anglers	5	
NPR- Above Glendo Reservoir	6 Hoopnets	1	0.17
	6 Trotlines	20	3.33
	Anglers	11	
Glendo Reservoir	3 FG	20	6.67
	12 EG	16	1.33
	Anglers	11	

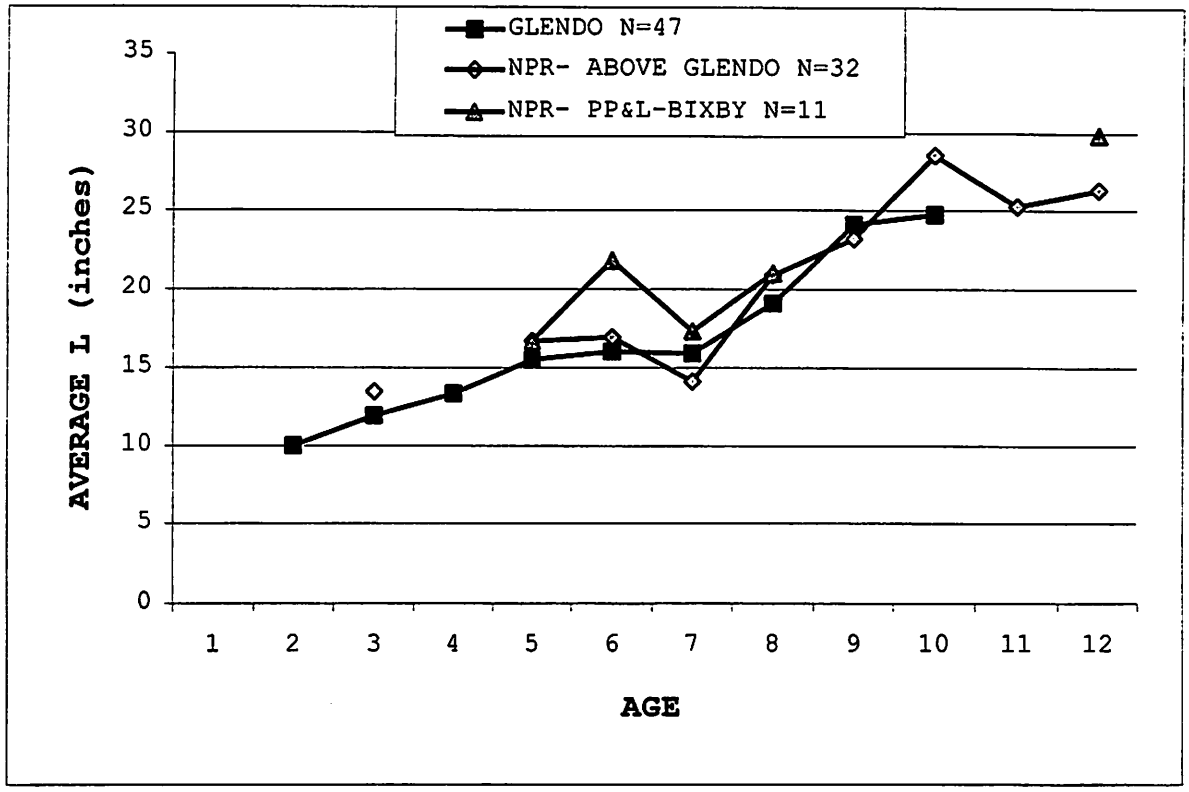


Figure 2. Age at size for CCF in 1999.

We will continue to refine techniques to better sample CCF. In rivers, we will try different areas to improve trotline and hoopnet placement. Before we can establish a standard sampling regime, we have to be confident we are sampling in an effective manner.

Contrary to angler reports, no blue catfish were sampled in 1999. We will continue to try to confirm the presence of blue cats in Wyoming through angler contacts and future sampling trips for CCF.

Spines will continue to be collected for age distributions. Adipose fins will be taken in 2000 to be used in genetic analyses.

- Potential Maximum Biomass (PMB) Evaluation FX-CR-EP1-576

PMB analyses were done on five stream sections in 1999. PMB uses only 4 variables to estimate the maximum trout biomass a stream can support; elevation, channel gradient, wetted width and percent cover. Population estimates were obtained using a backpack electrofisher and multiple pass removals.

PMB underestimated the observed biomass in all five streams (Table 4). PMB predictions were close on Big Bear, Sage and Bates creeks. South Fork of LaBonte and Curtis Gulch PMB estimates were far below observed levels. Reasons for the discrepancies between PMB and observed values are unknown. The cover attribute, which is highly subjective, is the likely cause of the differences.

If time allows in 2000, we will do the PMB on more streams and try to reach a consensus on what we deem cover.

Table 4. Observed biomass & PMB information.

	Population Estimate			
Stream	Type	Observed Biomass (lbs/ac)	PMB (lbs/ac)	Diff. (lbs/ac)
S. Fork LaBonte Creek	2P	383.8	152.5	231.3
Big Bear Creek	2P	140.3	131.5	8.8
Curtis Gulch	3P	238.9	114.8	124.1
Sage Creek	2P	66.0	42.3	23.7
Bates Creek	2P	79.0	63.3	15.7

NPR - Miracle Mile - 1MM

North Platte River - Miracle Mile CR851017CN

AS - Aquatic Resource Survey

- Fish Population Survey FX-CR-1MM-512

Two sites were again shocked with the backpack electrofisher to monitor YOY trout in late July. Due to extremely high water levels downstream in Pathfinder Reservoir, the established Site 1 was not electrofished because it was no longer river habitat. The site was essentially the top end of Pathfinder Reservoir. Site 2 was electrofished and the alternate site from 1998 (Site 3) was also included. Flows were much lower in 1999 during sampling (~500 cfs) than in 1998 (1,641 cfs) and 1997 (1,442 cfs).

At Site 2, 8 RBT and 2 BNT were captured (Table 5). RBT averaged 1.6 inches and BNT averaged 2.2 inches. At Site 3, 8 RBT and 33 BNT were captured. RBT averaged 1.8 inches and BNT averaged 2.1 inches.

In the afternoon following completion of the sites, discharge increased from 500 cfs to around 2,000 cfs. We again electrofished Site 2 to see the influence water level had on catch. At the higher water levels, we only captured 3 RBT and 1 BNT.

Variability in daily catch at different flows may indicate habitat for YOY trout changes on a daily basis. YOY likely have to expend a lot of energy to find suitable habitat at changing flows. This may be a limiting factor to wild trout recruitment at the Miracle Mile.

Management Recommendations

This sampling is good for presence/absence of YOY BNT and RBT as well as average size at the end of July. To make the sampling more comparable from year to year, the sample areas will be based on flow. If flows are 500 - 1,500 cfs, the established sites will be electrofished. At these flows, habitat at the established sites is less than 2 feet deep with relatively slow water. Substrate is rocky with some emergent vegetation. If flows exceed 1,500 cfs, sites with similar habitat to the established sites will be selected. We will shock for a total of 30 minutes so we can compare CPUE from year to year.

None of the YOY RBT or BNT showed any clinical signs of whirling disease.

Table 5. Results from YOY sampling in the Miracle Mile.

	Species	*1999*	*1998*	*1997*
Site 2	RBT	8	1	41
	BNT	2	54	70
Site 3	RBT	8	-	-
	BNT	33	-	-

Seminoe, Kortes, Pathfinder, Alcova and Gray Reef Basin - 1UR

Seminoe Reservoir CR450405NA

CA - Coordination and Assistance

- EMS Provided to Colorado DOW FX-CR-1UR-730

  Approximately 30,000 EMS were captured and transported to holding ponds at Colorado State University. These fish will be used to develop a brood source of EMS for CDOW's efforts to improve forage in WAE reservoirs.

AS – Aquatic Resource Survey

- Trend Gill Netting FX-CR-1UR-512

  Trout in Seminoe Reservoir continue to concentrate in upper reservoir regions during the fall. Factors leading to trout distributions are still unknown.

  Relative abundance of RBT increased considerably from 1998, based on September gill netting data (Table 6). Only 13% of the RBT caught in FG were captured between the Dam and Saylor Creek Bay. RBT abundance was highest in Saylor Creek and Cole Creek bays and in the North Platte River arm. Average size of RBT and Wr of RBT > 16-in (n=27) has also increased in 1999 (Table 6 and Figure 3).

Table 6. Seminoe gill net summary, September 1999 and (1998).

Gear & Number		*Spec. &* Number		CPUE	*Mean L* (in.)	*Mean Wt* (lbs)	*Mean* C
FG	16	RBT	148(70)	0.46(0.22)	14.1(13.3)	1.07(0.99)	37.9(37.5)
FG	16	BNT	9(3)	0.03(0.01)	14.6(16.0)	1.21(1.71)	34.8(35.1)
FG	16	SRC	13(13)	0.04(0.04)	14.9(12.1)	1.32(0.67)	38.9(36.8)
FG	16	WAE	50(27)	0.15(0.08)	13.8(14.3)	1.10(1.64)	31.9(31.3)
FG	16	WHS	17(7)	0.05(0.02)			
FG	16	LNS	3(1)	0.01(0.00)			
EG	8	RBT	16(30)	0.11(0.20)	14.4(12.9)	1.18(0.98)	38.6(38.0)
EG	8	BNT	7(4)	0.05(0.03)	19.2(17.3)	2.56(2.16)	34.6(37.7)
EG	8	SRC	1(5)	0.01(0.03)	15.0(12.8)	1.31(0.83)	38.8(36.6)
EG	8	WAE	82(140)	0.55(0.94)	14.9(15.5)	1.82(2.44)	33.9(34.3)
EG	8	WHS	241(266)	1.62(1.78)			
EG	8	LNS	62(54)	0.46(0.36)			
EG	8	CRP	12(0)	0.08(0.00)			

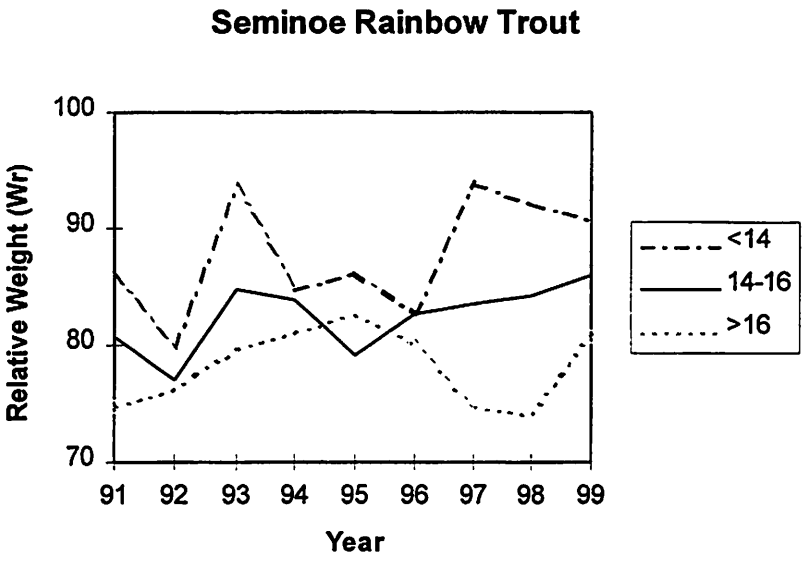


Figure 3. Relative weight for different size groups of RBT at Seminoe from 1991 through 1999.

On August 3, six FG were set to help identify trout distributions during the summer. Trout distribution during August was similar to September showing higher abundance in Saylor Creek and upper reservoir regions than Red Hills regions (Table 7).

Table 7. Comparison of trout abundance in FG during August and September at Seminoe Reservoir.

	Across from Boat Club	*Miller Bay*	*Saylor Creek Bay*	*Sand Mountain*	*Across from South Red hills*	*North Red Hills*
August	19	6	11	24	1	3
September	-	-	22	18	0	4

- indicates that no FG were set in the same location

Netting abundance of BNT and SRC still remain low but consistent with 1998 (Table 6). Average size of BNT decreased slightly while average size for SRC increased from 1998.

Netting abundance of WAE decreased from 1998 (Table 6). Average size and condition also decreased in 1999. Comparison of FG and EG netting suggests that WAE were more dispersed in open water in 1999, resulting in higher WAE abundance in FG during 1999. Average size of walleye in FG was smaller than EG. Possibly smaller walleye are attracted to open water habitat because of the high abundance of emerald shiners found in open water this year at Seminoe Reservoir, thus reducing CPUE.

On May 5, spawning WAE were collected to obtain eggs for Colorado State University for toxicity testing. GN, FG and EG nets were set during the day and caught one ripe female WAE and few males. Nets were then set overnight and two more females were captured with many males. The FG set parallel with the shoreline in water 5 to 8 feet deep worked best overnight for capturing spawning WAE. Netting perpendicular to shore worked better during the day catching WAE in deeper water. In effort to catch WAE, 23 RBT averaging 16.7 inches in FG and 17.3 inches in EG were captured.

Non-game fish netting abundance remained similar to 1998 abundance.

Slightly greater abundance of WHS and LNS were captured in FG compared to 1998.

Several species of fish were captured with the minnow seine in shallow bays. Emerald shiners were more abundant than in the past few years. Other species seined were CRP, WHS, FHM, JDT and YOY WAE.

Sonar assessment

GFRR sampled Seminoe Reservoir with sonar during the daylight hours of 16 and 17 September to quantify trout distribution patterns and estimate trout numbers. Yule (In review) showed acoustic estimates of trout densities to be correlated ($r = 0.87$) with purse seine catches across 11 Wyoming reservoirs and lakes. Whitworth (1986) showed trout densities from mark-recapture were correlated ($r^2 = 0.77$) with purse seine catch across 9 small and medium size reservoirs. Both seining and sonar are well suited for RBT stock assessment offshore.

Interpreting sonar data at Seminoe is more challenging than most waters because this impoundment supports EMS that can occupy offshore waters. Fortunately, by analyzing sonar targets, shiners (<4 inches) can be discerned from trout (>12 inches) with minimal classification error.

During September 1999, very low fish densities were tracked over most of the surface area of the reservoir, but densities rapidly increased in the North Platte and Medicine Bow River Arms. On 29 September, GFRR and FMCR purse seined the North Platte Arm to ground truth sonar sampling.

Sonar Survey Results

A total of 33 sonar transects (Figure 4) were conducted under ideal water conditions. The reservoir was stratified into two regions, with 15 sonar transects in the Main Body (transects 1-15) and 18 in the River Arms (transects 16-33) (Figure 5). Transects 16 and 33 were added in 1999.

Offshore fish numbers were estimated at 496,000, or 26.3 per acre. Fish densities in offshore areas were ten times higher in the River Arms (38.9/acre) than the Main Body (3.3/acre). Sonar indicated that most fish in the Main Body were large averaging 16.1 inches ($n = 90$), while most fish in the River Arms were small (mean = 6.1 inches, $n = 1,117$).

Shiners and trout were found offshore in purse seine samples, but no other species were captured. The decision was made to report densities of small fish (<4 inches) as shiners, and large fish (>4 inches) as trout.

Densities of shiners were very low in the Main Body (0.9/acre) during daylight, but higher in the River Arms (33/acre). Small fish were typically found schooling with densities ranging from a high of 327/acre to 0.1/acre by transect depending on the numbers of schools that were encountered.

One-way ANOVA showed that the mean density of trout tracked with sonar during daylight in the Main Body during 1999 (2.4/acre, N=15) did not vary significantly ($P = 0.63$) from the mean density tracked during September 1998 (mean = 2.1/acre, $N = 14$). Compared to other trout reservoirs and lakes in Wyoming (Yule, In review), densities of trout in the offshore zone of Seminoe Reservoir are low.

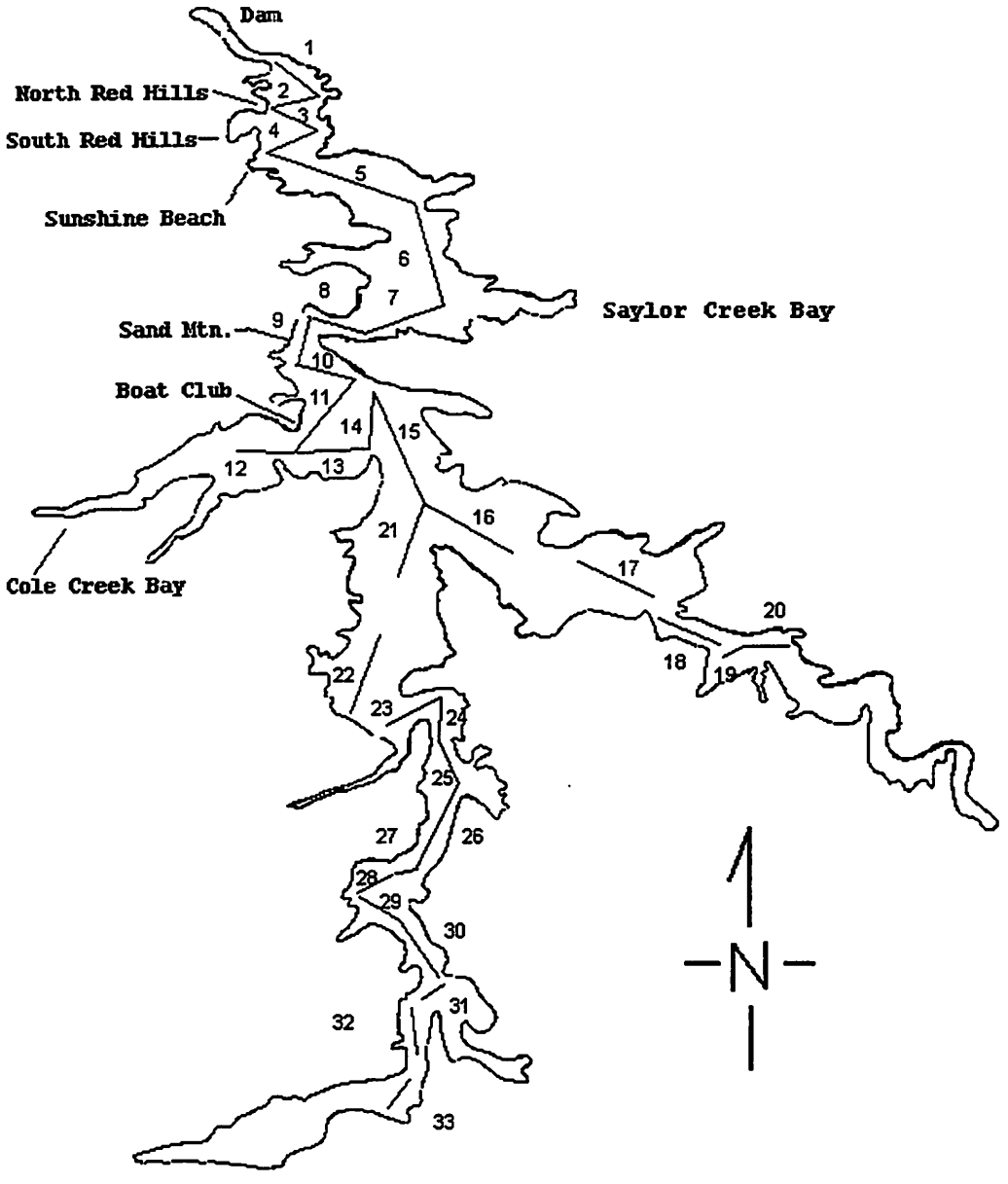


Figure 4. Map of Seminoe Reservoir showing the 33 sonar transects conducted in mid-September 1999. A total of 15 transects were run in the Main Body (1-15) and 18 in the River Arms (16-33).

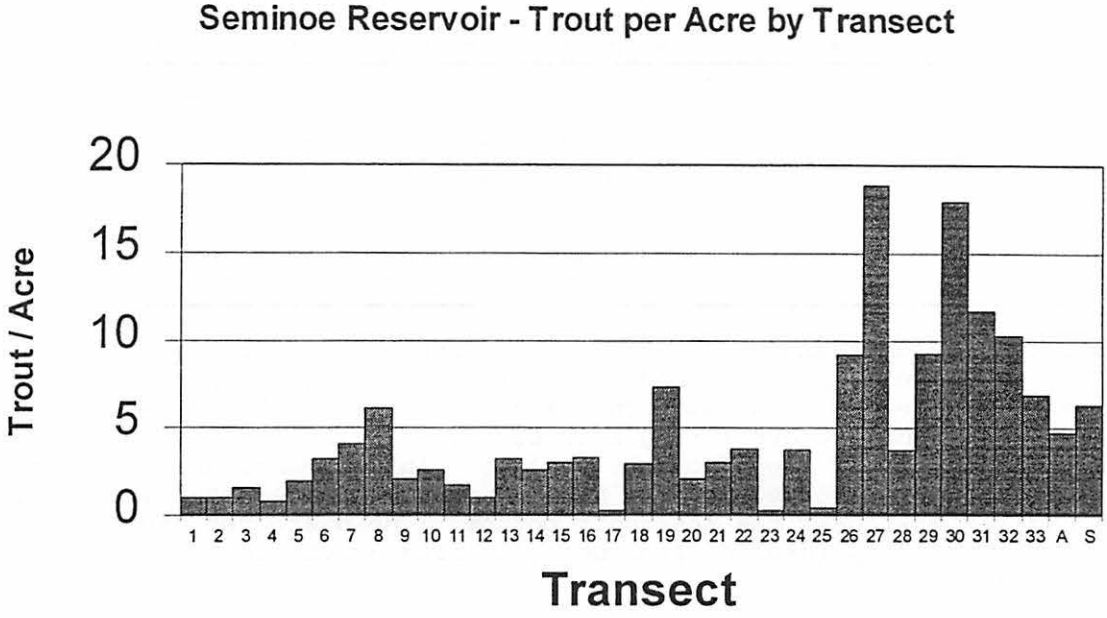


Figure 5. Trout density by transect during the daylight survey of Seminoe Reservoir, September 1999. Acoustic targets greater than 4 inches were classified as trout. The average (A) density across all transects and the average stocking (S) density is presented at the far right.

Sonar estimates of trout densities in the North Platte Arm were correlated with purse seine catches. Sonar estimates of large trout equaled 8.7 per acre, nearly identical to the 9.4 trout per acre captured by seine (Table 8).

Table 8. Number, number per haul, average length, average weight, and number per acre of fish captured in 30 foot deep purse seine, Seminoe Reservoir, September 29, 1999. (8 hauls).

Species	*Number*	*Number/Haul*	*Average L*	*Range*	*Number/Acre*
BNT	2	0.25	13.3	11.2-15.3	0.4
RBT	44	5.50	14.7	12.0-18.5	8.2
SRC	4	0.50	14.9	13.5-17.3	0.8
	50	6.25			9.4

Densities of trout measured by sonar averaged 2.4 fish per acre in the Main Body (Figure 5) and 5.9 per acre in the River Arms. The overall trout density was estimated at 4.7/acre. At a surface area of 18,884 acres, we estimate the trout population at 89,100 $\pm$ 31,100 (95% CI).

Productivity and supplemental information

Zooplankton abundance was high in May and June but then decreased rapidly in July (Table 9). Zooplankton samples in August were high but likely inaccurate because samples contained blue-green algae which may inflate volumetric zooplankton measurements if the algae is not completely dissolved.

Table 9. Seminoe zooplankton samples measured in milliliters from the 500 micron zooplankton nets and calculated zooplankton ratio (ZPR) for zooplankton captured in the 750 micron net compared to the 500 micron net.

	May	*June*	*July*	*Aug*	*Sep*	*Oct*
1992	34()	14()	15()	18()	3()	7()
1993	1(0.29)	25(0.44)	18(0.55)	-	6(0.59)	3(0.15)
1994	34(0.62)	21(0.76)	8(0.75)	10(0.42)	9(0.48)	5(0.35)
1995	-	12(0.83)	13(0.42)	19(0.63)	13(0.66)	3(0.12)
1997	-	-	-	-	-	1()
1998	20(0.50)	21(0.48)	25(0.42)	13(0.32)	13(0.46)	3(0.59)
1999	22(0.61)	30(0.40)	16(0.50)	44(0.70)	6(0.77)	4(0.60)

Water temperatures and dissolved oxygen measurements were similar to 1998 with peak temperatures reaching 74°F during the day. Temperature was higher near the dam than southern reservoir regions. Dissolved oxygen measurement remained above 6 mg/L in both river arms and at the dam in waters less than 40 feet from the surface. In September near the dam, dissolved oxygen dropped below 5 mg/L at depths greater than 40 feet and reached 1.2 mg/L near the reservoir bottom. The dissolved oxygen at these depths most likely resulted from decaying blue-green algae that had "settled" out.

During 1998 and 1999, game wardens recorded creel information when they contacted anglers (Table 10). In 1998, catch rate during June, August and September was 0.30 (n=15 interviews/200.5 hours). In 1999, catch rate was 0.30 (n=29 interviews/156 hours). Although this information suggest that catch rate in Seminoe Reservoir has not decreased much from changes to stocking, it should be viewed with caution because angler contacts in 1998 and 1999 represent few days from each month.

Table 10. Catch rate and (angling hours) for anglers contacted on Seminoe Reservoir by game wardens and the 1995-1996 programmed creel survey.

	June	*July*	*August*	*September*
1995-96	0.69	0.27	0.40	0.24
1998	0.26(22.5 hrs)	-	0.33(159 hrs)	0.10(19 hrs)
1999	-	0.30(156 hrs)	-	-

Summary

Unusual trout distributions were identified when the standardized GPS netting program was initiated in 1998. Gill netting data since 1994 also showed higher trout concentrations in shallow bays and the river arms. Prior to 1994, patterns for trout distribution were not apparent because sampling normally used EG, which were not effective for capturing large numbers of trout. Therefore it is possible that high trout densities in upper and shallow bay regions during the fall are normal.

Gillnetting abundance of RBT during fall 1999 was higher than in previous years and seemed to reflect changes in stocking density. Both sonar and purse seine data show that the open water of Seminoe Reservoir (where depths exceed 25 feet) supported few trout during September 1999. Because very few FG are set in upper regions of Seminoe Reservoir, RBT CPUE is much lower relative to Pathfinder or Alcova reservoirs.

Trout estimates may be conservative because trout abundance was highest in bays and river regions at this time of year few gill nets actually fished habitats that trout seemed to occupy. Sonar estimates did not assess trout densities in some of the shallow habitats and cannot assess trout densities near shore when gradual sloping shoreline is encountered.

The number of catchable sized trout stocked has decreased in Seminoe Reservoir since 1997. ELR and KRB were removed from the stocking program in 1999 (Table 11). In 1997 ELR and 1998 KRB were spring stocked. In 1997, 62,000 ELR fingerlings were also stocked in addition to the catchable trout listed in Table 11.

Table 11. Number of catchable (9-in) trout stocked in Seminoe Reservoir from 1997 through 1999.

	1997	*1998*	*1999*
ELR	27,495*	24,389	-
FRB	30,644	120,495	92,660
KRB	41,208	33,004*	-
SRC	21,405	-	19,350
Total	120,851	177,888	112,010

* - indicates spring stocked

RBT CPUE from 1995 through 1999 was strongly correlated (r^2=0.88) with stocking events for catchable trout from the previous year 1994 through 1998 (Figure 6). Fewer RBT were stocked in 1999, therefore netting abundance should be expected to decrease during the fall 2000. RBT CPUE in FG 1995-1999 was positively correlated with WAE CPUE in EG 1994-1998 (r^2=0.69) suggesting that WAE predation has greatly decreased with fall stocking.

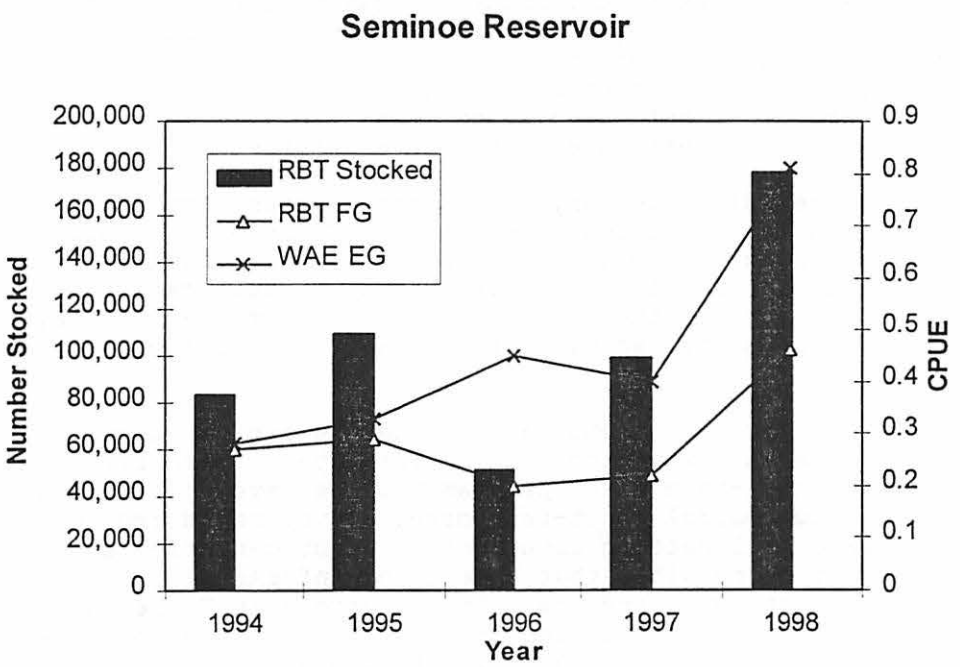


Figure 6. RBT catchable stocking amount versus WAE CPUE in EG nets and RBT CPUE in FG lagged one year. RBT CPUE was lagged one year because Age 1+ fish were dominant in FG catch and should reflect WAE predation from previous year (e.g., WAE CPUE measured just prior to stocking).

Management Recommendations

Assessment of trout numbers in September is difficult because densities are highly variable by region. Sonar should be used when trout are more evenly dispersed and easier to survey. We recommend assessment in late May or early June, because gill net sampling has shown that trout are more likely to utilize the Main Body. Angler catch rates from the 1995-1996 creel

survey show that FRB return more similar from bank and boat angler habitats in Seminoe and Alcova reservoirs in May (Table 12). June sampling of trout in Lake DeSmet has shown the stock to be distributed relatively homogenous across the lake surface.

Table 12. FRB catch rates to boat and bank anglers and ratio of bank:boat anglers in Seminoe and Alcova reservoirs.

		May	*June*	*July*	*Aug*	*Sep*	*Oct*
Seminoe	Bank	0.06	0.27	0.11	0.17	0.05	0.18
	Boat	0.07	0.09	0.03	0.02	0.04	0.02
	Bank:Boat	0.85	3.00	3.70	8.50	1.25	9.00
Alcova	Bank	0.49	0.31	0.32	0.32	0.18	0.63
	Boat	0.48	0.35	0.23	0.18	0.13	1.17
	Bank:Boat	1.02	0.88	1.39	1.78	1.38	0.53

Sampling in 2000 should include:

- Early summer sonar surveys, purse seine and gill net sampling
- Standardized fall gill netting with associated zooplankton sampling near net locations
- Monitoring of water temperature and dissolved oxygen during late summer
- Creel checks to measure the angler success from June to September

The proposed sampling will provide useful information to compare sonar during different seasons to determine if season affects the trout sampling effectiveness. Gill netting information during the spring and fall will be useful for determining relationships of gill netting to sonar at different seasons. Together, this information should strengthen our understanding of FRB, Seminoe RBT distribution, gill net/sonar relationship and give baseline sonar density estimates for future reference.

Water temperature, dissolved oxygen and zooplankton sampling has provided good information for historical comparison. Seminoe Reservoir is warmer than measured during the 1970s (BOR report). It is possible that warmer reservoir conditions result from weak thermal stratification from near full storage that has allowed the surface waters to warm. But it may also indicate an environmental warming trend that has occurred over the past 30 years.

Creel checks will provide trend data to measure angler success. A spot creel program over a few months will be initiated. With review of this information, a short-term creel program will be developed for future monitoring. A successful short-term creel survey could replace efforts trying to relate gill netting abundance or trout densities to angler success. It may be possible that some creel information be collected from game warden contacts with anglers. Creel surveys at Boysen Reservoir may provide a good model for designing creel surveys at Seminoe Reservoir. Gill netting efforts may be more useful toward determining WAE size structure.

Pathfinder Reservoir CR450435NA

AS - Aquatic Resource Survey

- Trend Gill Netting FX-CR-1UR-512

Water levels continued high in 1999, reaching capacity in June. This is the fourth consecutive year that Pathfinder either reached capacity or came very close.

Sampling in 1999 included spring (Table 13) and fall (Table 14) gill netting and spot creels. For trend data consistency, all gill net sites were placed with the aid of a GPS unit to make nets comparable from year to year and season to season. Three nets, spring nets 10-12, fished an extra 24 hours because high winds and waves prevented their removal. Data from these three nets, one EG and two FG, were excluded from the CPUE calculations but were used for overall average length and weight.

RBT CPUE (FG) increased to 0.70/hour in 1999 from 0.38/hour in 1998 in the spring sample (Table 13). Average size decreased from 16.0 inches in 1998 to 15.3 inches in 1999. SRC CPUE (FG) also increased from 0.33/hour in 1998 to 0.51/hour in 1999. Average size remained at 16.3 inches, same as in 1998. WAE CPUE (EG) decreased only slightly from 0.74/hour in 1998 to 0.70/hour in 1999. WAE average size in 1999 was 0.2 inches higher in 1999 (14.8 inches) than in 1998 (14.6 inches). Nongame CPUE remains the highest component of the overall catch. CPUE decreased from 4.47 WHS/hour in 1998 to 3.33 WHS/hour in 1999. LNS CPUE also decreased from 1.35/hour in 1998 to 0.66/hour in 1999.

RBT CPUE (FG) greatly increased from 0.39/hour in 1998 to 0.63/hour in 1999 fall sample (Table 14). Average size increased to 16.7 inches in fall 1999 from 16.2 inches in 1998. As in 1998, SRC catch was a fraction (12%) of the spring catch. WAE fall CPUE (EG) decreased to 0.57/hour from 0.81/hour in 1998. Average size is larger in 1999 (14.4 inches) than 1998 (13.7 inches) and mean C increased from 32.3 to 33.6. Like the spring, nongame fish CPUE has decreased from 4.35 WHS/hour and 1.20 LNS/hour in 1998 to 2.59 WHS/hour and 0.31 LNS/hour in 1999.

Total numbers, CPUE and length frequencies for RBT and WAE sampled in the spring were similar to fall levels (Table 15). The significant difference between netting seasons is SRC catch. SRC catch in the spring is much higher than the fall sample. Reasons for the near disappearance of SRC in the fall sample are unknown. Perhaps as water temperatures warm, SRC seek cooler water in the Miracle Mile. SRC may also occupy a habitat in the fall (e.g., deep water) that our nets are relatively ineffective in. The spring/fall gill netting information for Pathfinder and Alcova reservoirs will be compiled in an Administrative Report, now in draft form.

The benefits from the hypothesized "new reservoir effect" we saw the last few years appear to be diminishing. The percentage of RBT over 20 inches has declined (Figure 7). In addition, the nongame catch has decreased suggesting lower overall production in the reservoir.

The increase in RBT and SRC catch is likely the result of the stocking changes made as a result of the CWT study. All RBT and SRC are now stocked in the fall. The lower average size for trout could be a result of better survival of stocked trout.

In addition to the standard request of 120,000 9 inch trout, 135,500 small trout (extras) were stocked in July. These fish ranged from 80-145/lb (~3-5 inches) when stocked. By our fall sample in late September, these fish should have been 6-9 inches long. The smallest trout in the fall sample was 12.3 inches. Few of the extra small trout likely survived.

About 500 adult GZS were stocked to supplement forage following a declining WAE C in 1998. We did sample six YOY GZS (4-5 inches long) in the fall gill netting sample. With very high water levels, minnow seining was generally unsuccessful with only a few STS, JDT and FHM sampled. However, WAE C did increase in 1999 indicating forage levels are sufficient.

Table 13. Pathfinder gill net summary, June 1999.

Gear & Number	Spec. & Number	CPUE	Mean L (in.)	L Range (in.)	Mean Wt (lbs)	Wt Range (lbs)	Mean C
EG 5	BNT 13	0.13	16.0	6.5-21.8	1.93	0.16-3.65	40.4
EG 5	RBT 2	0.02	18.4	16.7-20.3	2.27	1.82-2.88	36.1
EG 5	SRC 16	0.16	16.0	13.0-20.5	1.77	0.93-3.32	41.3
EG 5	WAE 68	0.70	14.8	8.7-27.8	1.61	0.20-11.0	35.6
EG 5	CRP 7	0.07					
EG 5	LNS 64	0.66					
EG 5	WHS 323	3.33					
FG 10	BNT 6	0.03	17.2	15.2-21.1	1.82	1.34-3.30	35.0
FG 10	RBT 145	0.70	15.3	10.7-21.6	1.49	0.48-3.30	40.6
FG 10	SRC 106	0.51	16.3	13.2-20.7	1.76	0.86-3.02	40.1
FG 10	WAE 7	0.03	13.3	9.7-20.4	1.02	0.29-3.29	34.4
FG 10	LNS 1	0.00					
FG 10	WHS 41	0.20					

Table 14. Pathfinder gill net summary, September 1999.

Gear & Number	Spec. & Number	CPUE	Mean L (in.)	L Range (in.)	Mean Wt (lbs)	Wt Range (lbs)	Mean C
EG 6	BNT 14	0.12	16.4	11.5-22.7	1.82	0.92-4.49	41.3
EG 6	RBT 6	0.05	17.0	14.9-18.8	1.88	1.37-2.50	37.8
EG 6	WAE 67	0.57	14.4	8.5-25.0	1.35	0.19-6.24	33.6
EG 6	CRP 39	0.33					
EG 6	GZS 6	0.05					
EG 6	LNS 36	0.31					
EG 6	WHS 304	2.59					
FG 12	BNT 10	0.04	18.1	15.1-21.3	2.13	1.22-3.56	35.0
FG 12	RBT 152	0.63	16.7	12.3-21.8	1.86	0.60-2.98	39.7
FG 12	SRC 13	0.05	16.5	14.4-18.5	1.79	1.28-2.10	39.9
FG 12	WAE 25	0.10	16.0	10.3-28.5	2.05	0.34-10.0	34.8
FG 12	GZS 1	0.00					
FG 12	WHS 141	0.58					

Table 15. Comparison of spring (S) and fall (F) gill netting. Data for RBT and SRC are from FG while WAE are from EG, 1999.

	RBT S	RBT F	SRC S	SRC F	WAE S	WAE F
Number	145	152	106	13	68	67
CPUE	0.70	0.63	0.51	0.05	0.70	0.57
Mean L	15.3	16.7	16.3	16.5	14.8	14.4

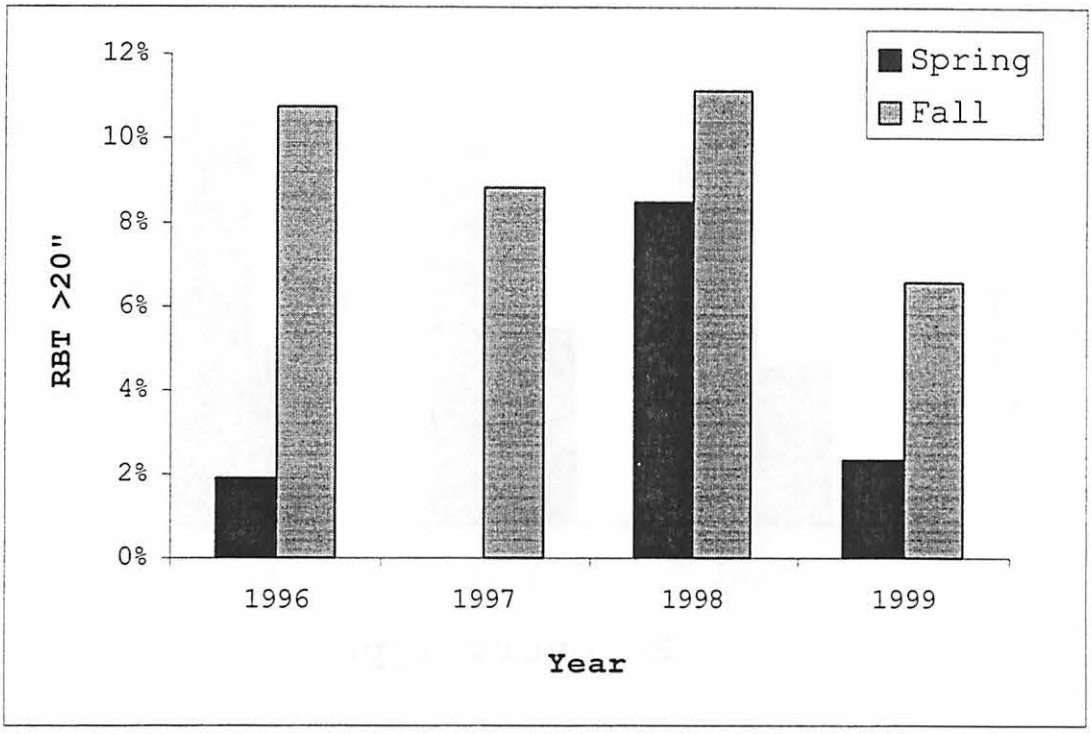


Figure 7. Percentage of RBT >20 inches in spring and fall FG.

7 inch versus 9 inch FRB study

This study was initiated in 1997 to evaluate returns of 7 inch FRB stocked in the fall. In 1997 and 1998, 30,000 7 inch FRB and 9 inch FRB were requested to be stocked in the fall. These fish were CWT and adipose clipped. In 1997, 28,500 7 inch FRB (7.2/lb) and 31,600 9 inch FRB (3.0/lb) were stocked.

Tags recovered in 1998 have been read. So far, 83 CWTs from this study fish have been returned through spot creels and biological sampling. From all tag returns, 9 inch fish made up about 70% of the sample with 7 inch accounting for 30% (Figure 8). The average size of fish returned through spot creels was 15 inches.

CWTs from the 1998 stock year will likely be collected through 2001. Results from this study will be available in 2001-2. If the trend of 70% 9 inch fish and 30% 7 inch fish continues, the decision on which size to stock will not be clear cut. A conservative estimate from hatchery personnel is they can raise 1½ 7 inch trout for each 9 inch trout. The current return of 70%/30% is close to a 2:1 ratio. We will likely discuss with the hatcheries the benefits of raising 120,000 9 inch or at least 240,000 7 inch FRB for stocking in the fall.

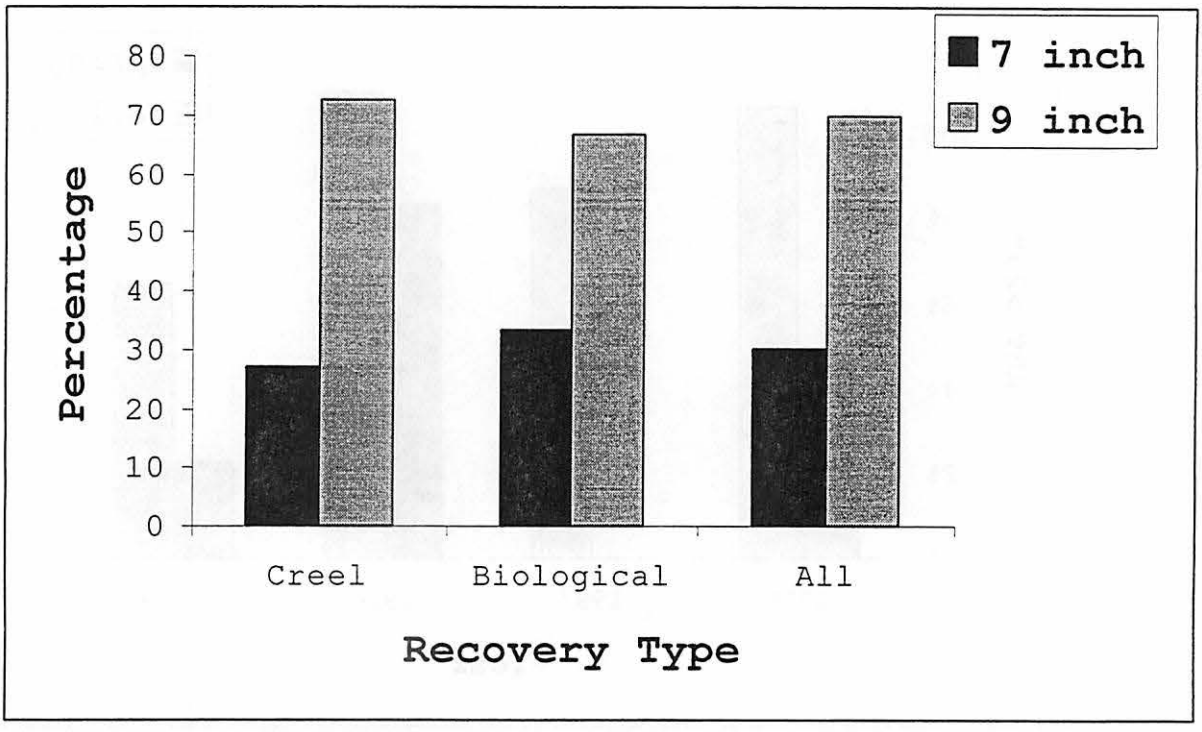


Figure 8. Return of CWT size at stocking study from 1998 recoveries.

- Zooplankton Collection FX-CR-1UR-512

Large zooplankton continues to dominate and the ZPR continues to be high (Table 16). There is no evidence that the zooplankton populations are being overgrazed in Pathfinder Reservoir.

Table 16. Zooplankton volumes (ml) in 500 and 750 micron nets and ZPR.

	MONTH					
500mc	5	6	7	8	9	10
1994	-	33	14	19	11	15
1995	27	46	17	16	-	-
1997	-	-	32	10	10	5
1998	-	-	49	14	23	-
1999	38	43	33	-	8	-

	MONTH					
750mc	5	6	7	8	9	10
1994	-	16	11	14	9	9
1995	18	26	12	12	12	-
1997	-	-	13	4	6	2
1998	-	-	19	9	16	-
1999	19	35	19	-	6	-

	MONTH					
750:500	5	6	7	8	9	10
1994	-	0.48	0.79	0.74	0.82	0.60
1995	0.67	0.57	0.71	0.75	-	-
1997	-	-	0.41	0.40	0.60	0.40
1998	-	-	0.39	0.64	0.70	-
1999	0.50	0.81	0.58	-	0.75	-

CS - Creel Surveys

- Spot Creel Survey FX-CR-1UR-520

A total of 440 anglers were contacted at Pathfinder Reservoir in 1999 (Table 17). Spot creels were intensified in 1999 to help evaluate the 7 inch versus 9 inch FRB study.

Catch rates were generally higher in 1999 than during the 1995-6 creel survey. The likely explanation for this increase is the implementation of the creel survey stocking recommendations.

The catch rate objective set following the 1995-6 creel survey is 0.4 stocked trout/hour. The overall average catch rate for the 8 months of spot creels was 0.42/hour.

Table 17. Spot creel results from 1999 at Pathfinder Reservoir. 1995-6 creel catch rates by month are an average over the survey period. Catch rates are for all species combined.

Month	*Number of* Anglers	*Total* Hours	*Total* Catch	*1999* Catch Rate	*1998* Catch Rate	*1995-6* Catch Rate
MAR	18	51	25	0.49	-	0.46
MAY	103	253	102	0.40	-	0.42
JUN	62	262	94	0.36	0.32	0.40
JUL	125	412	193	0.47	-	0.30
AUG	26	101	33	0.33	-	0.24
SEP	8	29	16	0.55	-	0.23
OCT	41	134	44	0.33	0.24	0.23
NOV	57	151	78	0.52	1.09	0.26

PF - Public Fishing Development

- Boat Ramp Development FX-CR-1UR-233

Sport fish restoration funds were used to construct a new boat ramp in the Bishop's Point area of Pathfinder Reservoir. The ramp was completed in fall 1999. This ramp will greatly improve boat access to the Sweetwater Arm of the reservoir.

Management Recommendations

Although the percentage of trout greater than 20 inches in the sample has declined, Pathfinder still provides the best opportunity in the Casper region to catch a stringer of large trout. With the catch rate criteria being met, stocking of 120,000 trout in the fall should continue. SRC are contributing to the spring fishery as well as the Miracle Mile. Stocking of a limited number (20,000) of SRC should continue since they are important to the spring fishery in Pathfinder and are popular year round in the Miracle Mile.

We will continue efforts to collect CWT from the 7 versus 9 inch study. Data from the tags already recovered will be analyzed when tags are decoded.

With WAE C at 33.6, above the 10 year mean C of 32.6, no forage supplementation in recommended. Although the WHS and LNS CPUE have declined in recent years, they still make up one of the largest components of the overall fishery. YOY suckers should provide adequate forage to the WAE population.

Gill netting in the spring and fall the last two years has not shown any large difference between the samples. The only significant difference was the abundance of SRC in the spring and the near disappearance of these fish in the fall. The standard trend sample should be moved to exclusively in the spring. This will allow for assessment of overwinter survival of the previous fall-stocked trout. It will also free up time in the fall we can use for other fieldwork.

Alcova Reservoir CR450390NA

AS - Aquatic Resource Survey

- Trend Gill Netting FX-CR-1UR-512

Alcova reservoir was sampled with gillnets in spring (Table 18) and fall (Table 19) 1999. Reservoir Research surveyed Alcova Reservoir with sonar, and large and small purse seines in July. See Reservoir Research section for sonar and purse seine results.

RBT CPUE in fall FG increased from 0.74 in 1998 to 1.27 in 1999 (Table 19). FG CPUE has increased yearly since 1996, when CPUE was 0.53. Average length decreased to 13.8 inches in 1999. Average length in 1997 and 1998 was 15.0 and 14.2 inches, respectively. Average condition for RBT was very good and similar to last year.

WAE CPUE in fall EG decreased to 0.16 in 1999, from 0.27 in 1998. Average length and condition of walleye increased in 1999. It is difficult to determine whether walleye densities have decreased because sample size was small. The largest walleye was 5.7 inches greater than last year, which likely led to increased average size for WAE.

BNT CPUE in fall FG increased slightly in 1999 to 0.20 (Table 19). Average length increased from 14.6 in 1998, to 15.8 in 1999. Increased CPUE and average size most likely resulted from recruitment and growth of BNT stocked in 1997.

WHS abundance decreased slightly in 1999. LNS abundance was much lower than WHS but was similar to LNS abundance in 1998. Spottail shiners, emerald shiners and Johnny darters were seined from shallow water.

Spring and fall netting allowed comparison of netting efficiency at different seasons. No fish were stocked between sampling time. Fall gill netting provided better RBT and BNT catch, but less WAE. This information suggests RBT and BNT in Alcova Reservoir were more vulnerable during fall to FG than spring in 1999.

Table 18. Alcova gill net summary, May 1999.

Gear & Number	*Spec. & Number*	CPUE	*Mean L (in.)*	*L Range (in.)*	*Mean Wt (lbs)*	*Wt Range (lbs)*	*Mean C*
FG 12	RBT 213	0.85	12.3	9.6-16.8	0.84	0.36-1.93	43.4
FG 12	BNT 2	0.01	14.3	13.3-15.2	1.02	0.80-1.24	34.7
FG 12	SRC 1	0.01	14.0	-	1.00	-	36.4
FG 12	WAE 6	0.02	14.7	11.1-19.3	1.20	0.45-2.48	34.4
FG 12	WHS 115	0.45					
FG 12	LNS 3	0.01					
FG 12	CRP 1	0.01					
EG 6	RBT 12	0.10	13.6	10.1-18.3	1.17	0.48-2.60	42.2
EG 6	BNT 20	0.17	15.1	12.5-19.0	1.38	0.79-2.74	38.0
EG 6	SRC 1	0.01	21.6	-	4.28	-	42.5
EG 6	WAE 29	0.24	15.2	10.5-25.8	1.51	0.31-6.45	35.6
EG 6	WHS 216	1.88					
EG 6	LNS 18	0.16					
EG 6	CRP 3	0.03					

Table 19. Alcova gill net summary, September 1999.

Gear & Number	*Spec. & Number*	CPUE	*Mean L (in.)*	*L Range (in.)*	*Mean Wt (lbs)*	*Wt Range (lbs)*	*Mean C*
FG 12	RBT 319	1.27	13.8	9.5-19.5	1.05	0.42-2.98	39.6
FG 12	BNT 49	0.20	15.8	13.0-21.0	1.69	0.87-3.93	41.8
FG 12	WAE 5	0.02	15.1	10.3-20.5	1.50	0.34-3.30	33.7
FG 12	WHS 1	0.01					
EG 6	RBT 24	0.20	14.7	12.4-18.2	1.28	0.82-2.90	39.6
EG 6	BNT 9	0.08	16.8	13.5-20.8	2.03	1.08-2.95	41.9
EG 6	WAE 19	0.16	16.9	9.0-30.8	2.55	0.23-11.8	36.5
EG 6	WHS 187	1.57					
EG 6	LNS 59	0.50					

Stocking in Alcova Reservoir changed to all fall stocked FRB in 1997 (Table 20). In 1999, stocking decreased to 90,983 just shy of the recommended 92,000.

Table 20. Number of catchable (9-in) trout stocked in Alcova Reservoir from 1996 through 1999.

	1996	*1997*	*1998*	*1999*
ELR	9,758[S]	-	-	-
FRB	50,525	105,377	112,070	90,983
KRB	24,139[S]	-	-	-
Total	84,422	105,377	112,070	90,983

[S] - indicates spring stocked

- Zooplankton Collection FX-CR-1UR-512

  Zooplankton abundance was high and dominated by larger zooplankton in the upper 60 feet of water (Table 21). This information suggests zooplankton are not overgrazed in the upper 60 ft of water.

Table 21. Zooplankton volumes (ml) in 500 and 750 micron nets and ZPR.

500mc	MONTH 5	6	7	8	9	10
1993	25	23	40	18	14	3
1994	38	36	18	15	11	8
1995	33	55	21	21	7	-
1997	-	-	27	9	10	6
1998	-	27	41	26	41	-
1999	21.1	32.3	37.8	-	20.8	-

750mc	MONTH 5	6	7	8	9	10
1993	23	15	20	17	10	1
1994	23	17	17	13	10	9
1995	24	40	16	14	4	-
1997	-	-	18	5	10	4
1998	-	20	19	18	36	-
1999	12	21	29	-	17	-

750:500	MONTH 5	6	7	8	9	10
1993	0.92	0.65	0.50	0.94	0.71	0.33
1994	0.61	0.47	0.94	0.87	0.91	1.13
1995	0.73	0.73	0.76	0.67	0.57	-
1997	-	-	0.67	0.56	1.00	0.67
1998	-	0.74	0.46	0.69	0.88	-
1999	0.59	0.64	0.77	-	0.84	-

Management Recommendations

Trout abundance in Alcova Reservoir appears to have increased following changes in 1997 to stocking all trout in the fall and only FRB strain. It is not likely that trout numbers have double as fall gillnetting data indicates. It is possible that netting effectiveness in the fall for FRB may be different than ELR and KRB, which were not found in fall FG in 1999. It is recommended that stocking be held constant until creel information is obtained and stocking recommendations from the 1998 Creel Report are evaluated.

Alcova Reservoir has been sampled in the spring and fall to determine if gill netting during the spring provides sound trend data. Shifting gill netting to the spring is desired to better utilize fieldwork time, and free up time during fall when other fieldwork could be accomplished.

Sampling in 2000 should include

- spring gill netting
- comparison of 20 ft to surface vs. 60 ft to surface zooplankton abundance to better sample water trout utilize

NPR - Pathfinder to Alcova Basin - 1PA

North Platte River CR851016NA

PF - Public Fishing Development

- Access to North Platte River FX-CR-1PA-260

The Fly Casters obtained the necessary $70,000 for the option agreement with the Cardwell Family and the easement deed was signed on 01/20/00. A draft management plan is being developed to submit to the Commission. Grants have been obtained by the Fly Casters totaling the target of $60,000 for habitat improvement. Access development costs are estimated near $70,000 if additional easements can be obtained from the Pathfinder Ranch. The property boundary survey has been completed and negotiations with Pathfinder Ranch can now continue.

NPR - Gray Reef Dam to Goose Egg Bridge - 1GG

North Platte River CR851014NA

AS - Aquatic Resource Survey

- Fish Population Survey FX-CR-1GG-512

One-pass electrofishing was conducted in October to monitor stocked RBT contribution to the population in the Bessemer reach. Stocked RBT comprised 33% of the RBT > 6.0 in in the catch (Table 22). This percentage of stocked RBT in the population is similar to the 40% obtained in the 1998 population estimate. We estimated 10% mortality on the distribution truck and assumed poor survival from the 1999 cohort of ELR due to pre-stocking stress. Our electrofishing indicated some survival from the cohort.

Table 22. Population statistics at Bessemer, October 1999.

Fish>6.0"	*Number*	*Avg. Length*	*Avg. C*
RBT Wild	179	13.1	40.7
ELR LPV (YOY)	56	6.9	41.7
ELR LPC (1+)	13	12.4	39.3
ELR LPV (2+)	18	15.2	37.5

Management Recommendations

Stocked trout continue to contribute to the population and are recruiting into larger size classes. Clipped ELR (LPC) will be stocked in 2000.

The Gray Reef and Bessemer stations will be electrofished in 2000 to obtain population estimates and evaluate possible regulation changes in 2002. These electrofishing stations will be used to monitor the percentage of stocked fish in the population. Spot creel information will be obtained in 2001 to evaluate our stocking program.

NPR - Goose Egg Bridge to Mills Bridge - 1GM

North Platte River CR851013NA

AS - Aquatic Resource Survey

- Fish Population Survey FX-CR-1GM-512

One-pass electrofishing effort was conducted in October to monitor stocked RBT contribution to the population in the Robertson Road reach. Stocked RBT comprised 32% of the RBT > 6.0" in the catch (Table 23), which was down from the 1995 estimate of 76%, stocked RBT in the population.

Habitat conditions have improved since 1995 with flushing and higher flow events. While a direct comparison of our one-pass estimate is not possible to the 1995 population estimate, the one-pass suggested the population has increased dramatically from the 1995 estimate of 184 trout per mile. Average size of RBT has increased 3.1 inches from 9.9 to 13.0 with increased average C from 36.2 to 41.3. We estimated 10% mortality on the distribution truck and assumed poor survival from the 1999 cohort of ELR due to stress pre-stocking. Our electrofishing indicated some survival from the cohort.

Table 23. Population statistics at Robertson Road, October 1999.

Fish>6.0"	*Number*	*Avg. Length*	*Avg. C*
RBT Wild	128	14.3	41.3
RBT LPV (YOY)	37	6.9	41.9
ELR LPC (1+)	4	13.0	39.9
ELR LPV (2+)	19	16.5	40.4

Management Recommendations

Stocked trout continue to contribute to the population and are recruiting into larger size classes. Clipped ELR (LPC) will be stocked in 2000. Spot creel information will be obtained in 2001 to evaluate our stocking program.

Glendo Reservoir Basin - 1GO

Glendo Reservoir CR450145PE

AS - Aquatic Resource Survey

- Trend Gill Netting FX-CR-1GO-512

This was a fabulous year for WAE fishing at Glendo Reservoir. Over the 4th of July weekend, game wardens estimated a harvest of 10,000 WAE. A programmed intensive creel survey is scheduled for April 1 through September 30, 2000. This creel will likely show us how good WAE fishing can be at Glendo.

Consistent with the last four years, spring and summer water storage was near capacity in 1999. Water levels again allowed a good spawn by conceivably all spring-spawning species. Water levels decreased in September to less than 20% (120,000 AF) of summer levels. Water levels did not decrease to minimum pool levels of 65,000 AF. The last time Glendo fell to 65,000 AF was in 1992, before the recent strong WAE year classes.

In August, random-configuration monofilament gill nets were set for two

hours each during daylight following a Latin Square design (Table 24). A total of 12 nets were set, each of the four sites were sampled three times.

CPUE for WAE continues to be high compared to historical levels (Table 25). WAE size structure is now very large; WAE greater than 15 inches made up 69% of the sample. Average length has increased from 15.0 inches in 1998 to 16.4 inches is 1999. Following two years of declining condition factors, average C has increased to near the 13 year mean of 34.3 (Figure 9). The population is dominated by WAE 14 to 18 inches (Figure 10). The 1998 year class appears weak compared to the previous four (Figure 11). The 1999 year class appeared strong in seining samples (Table 26) with average size of YOY WAE at 4.6 inches. The extent of cannibalism of this year class when water levels dropped will not be known until 2000.

YEP CPUE decreased from 17/hour in 1998 to 6.33 in 1999 (Table 24). This is still higher than the mean CPUE since 1987 of 5.18 YEP/hour. Average length fell from 6.7 inches in 1998 to 6.3 inches in 1999. There are still a surprising number of small (5-6 inch) YEP (Figure 12) given the large WAE population. It appears the YEP are in good shape with catchable-sized fish (>8 inches) in the population.

CCF CPUE (EG) increased for the third consecutive year from 0.28/hour in 1997, 0.50/hour in 1998 to 0.71/hour in 1999. Average size slightly increased from 15.0 inches in 1998 to 15.5 inches in 1999. This increase was expected since we did not stock CCF in 1999 following concerns of a stressed forage base.

To try to better sample CCF, we used overnight FG hoping the CCF were up in the water column feeding on GZS. Three FG captured 22 CCF compared to 17 CCF in 12 EG. In addition to CCF, the FG sampled a surprising number of WAE as well as two unexpected RBT (Table 24). The RBT probably drifted down from the North Platte River above Glendo.

Nongame catch remained consistent with previous years. Most all the nongame catch was large fish that are fairly invulnerable to predation. Even though GZS have not been stocked since 1997, we sampled 13 in FG and 5 in EG. The majority of the adult GZS were very large, reaching lengths near 20 inches.

Even in the face of a large WAE population, catch from 16 minnow seine hauls looked good compared to previous years (Table 26). Again this year, high spring water levels likely resulted in successful spring spawning. The GZS spawned twice in 1999. In the seine hauls, we captured GZS that were 4 inches and 1.5 inches. These two spawns should have provided good forage for the piscivores in Glendo.

A surprise this year is the appearance of a new predator, LMB. The origins of these fish are unknown. We received a few reports of LMB being caught in the spring. In the minnow seines, we captured four YOY LMB. Anglers reported catching 10-12 inch adults. There is no reason the LMB stock will not expand and become a sought after sportfish. Another surprise was a fairly large number of (83) of YOY BLC.

Table 24. Gill net summary data for Glendo Reservoir, August 1999.

Gear & Number	Spec. & Number	CPUE	Mean L (in.)	L Range (in.)	Mean Wt (lbs)	Wt Range (lbs)	Mean C
EG 12	BLC 3	0.13	9.7	8.1-12.3	0.59	0.36-1.04	58.8
EG 12	CCF 17	0.71	15.5	9.1-26.2	1.71	0.28-7.20	34.5
EG 12	WAE 166	6.92	16.4	9.5-22.5	1.59	0.29-4.24	34.0
EG 12	YEP 152	6.33	6.3	5.2-10.0	0.16	0.07-0.53	48.5
EG 12	CRP 42	1.75					
EG 12	QBK 24	1.00					
EG 12	SHR 14	0.58					
EG 12	GZS 5	0.21					
EG 12	WHS 10	0.42					
EG 12	LNS 1	0.04					
FG 3	BLC 1	0.03	9.0	9.0- 9.0	0.54	0.54-0.54	74.1
FG 3	CCF 22	0.56	13.3	9.5-17.3	0.83	0.30-1.85	33.0
FG 3	RBT 2	0.05	14.8	14.6-15.0	1.39	1.33-1.45	42.8
FG 3	WAE 39	0.99	16.0	9.8-20.4	1.50	0.31-3.11	34.1
FG 3	YEP 1	0.03	6.5	6.5- 6.5	0.13	0.13-0.13	47.3
FG 3	CRP 2	0.05					
FG 3	GZS 13	0.33					

Table 25. Experimental gill net CPUE for different size groups of WAE, 1993-1999.

Date	N	Size	Gill net CPUE	% of Captured Population
1999	166	All	6.92	100
	115	15-20	4.79	69
	3	21-24	0.13	2
	0	>24	0.00	0
1998	180	All	9.00	100
	87	15-20	4.35	48
	7	21-24	0.35	4
	1	>24	0.05	<1
1997	326	All	10.19	100
	151	15-20	4.72	46
	19	21-24	0.59	6
	1	>24	0.03	<1
1996	262	All	8.11	100
	88	15-20	2.72	33
	11	21-24	0.34	4
	1	>24	0.03	<1
1995	95	All	2.98	100
	26	15-20	0.82	27
	2	21-24	0.06	2
	3	>24	0.09	3
1994	41	All	1.28	100
	7	15-20	0.22	17
	2	21-24	0.06	5
	2	>24	0.06	5

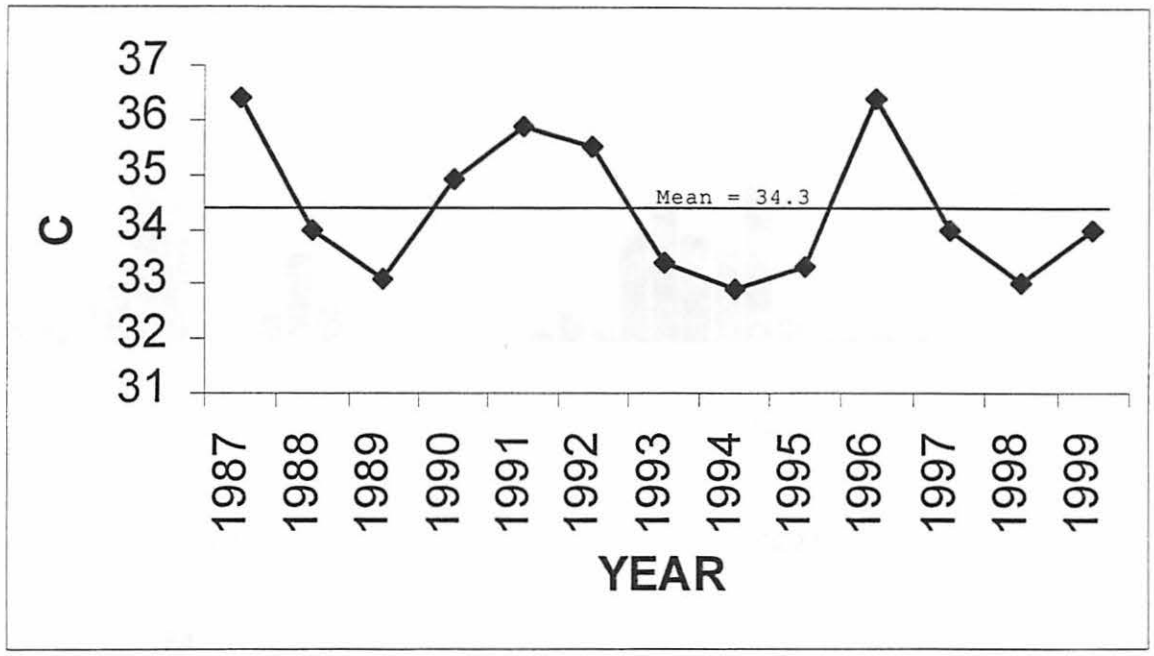


Figure 9. Mean C for WAE in Glendo Reservoir, 1987-1999.

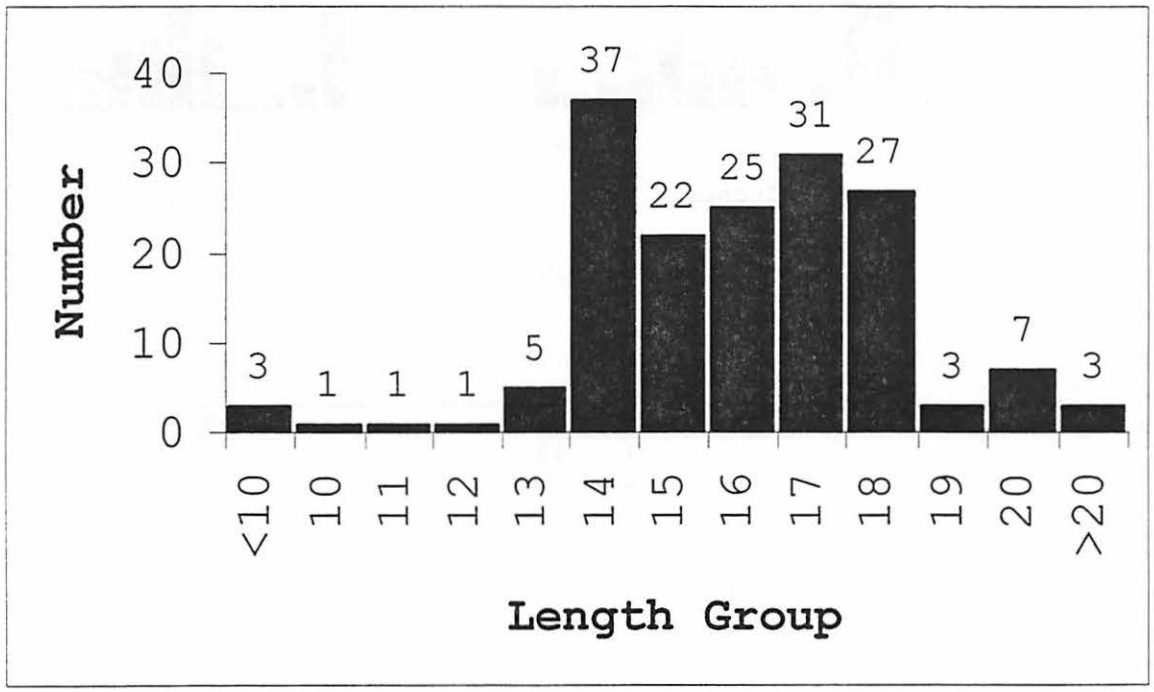


Figure 10. WAE size classes for 1999, Glendo Reservoir.

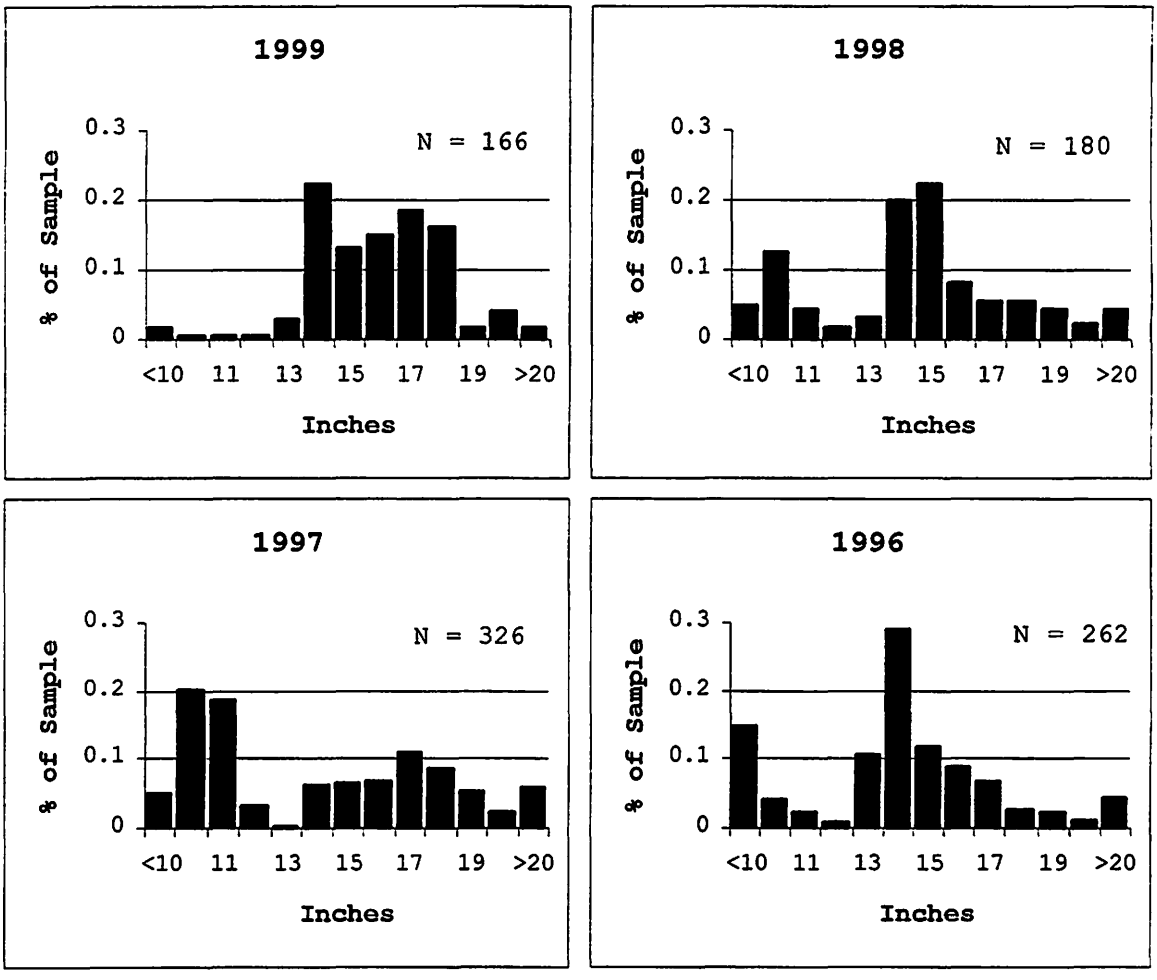


Figure 11. WAE length frequencies for 1996-1999 in EG.

Table 26. Total catch from 16 minnow seine hauls in 1996, 14 hauls in 1997, 9 hauls in 1998 and 16 hauls in 1999 from Glendo Reservoir.

	LMB	*CRP*	*FHM*	*WHS*	*GZS*	*YEP*	*STS*	*EMS*
1996	-	30	43	16	1353	156	1334	5868
1997	-	-	4	70	169	80	117	1390
1998	-	10	-	13	112	259	242	844
1999	4	68	-	85	622	279	789	6273
	WAE	*BLC*	*SDS*	*LNS*	*WHC*	*SHR*	*QBK*	*JDT*
1996	22	-	29	-	5	2	7	17
1997	2	-	6	-	-	-	1	13
1998	3	-	-	-	1	3	-	52
1999	74	83	-	2	-	40	51	20

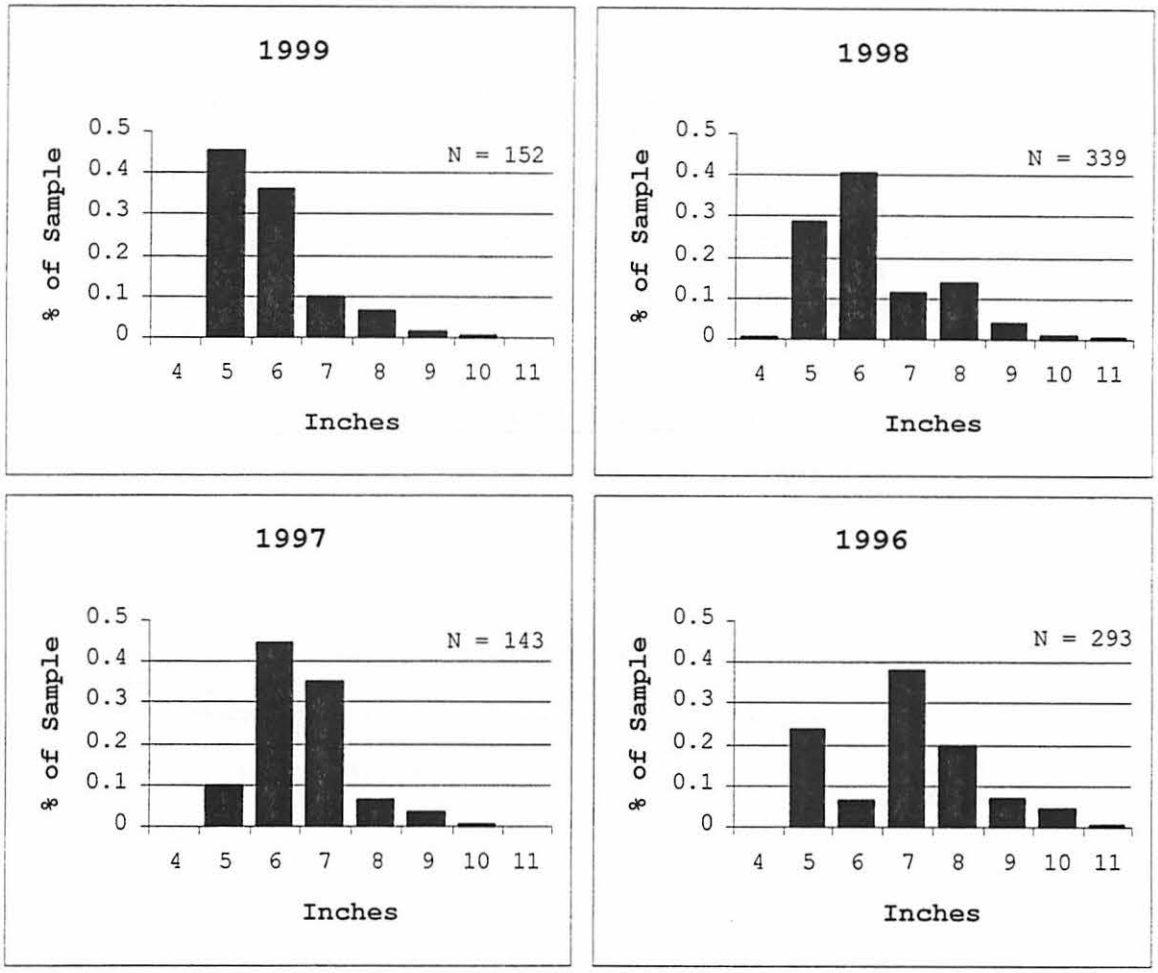


Figure 12. YEP length frequencies for 1996-1999 in EG.

Management Recommendations

Our hope last year was for anglers to harvest a good proportion of the WAE population to lessen the strain on the forage base. This appears to have taken place in 1999. CPUE in gill nets decreased and C and Wr increased. Wr went from 92.6 in 1997, 89.9 in 1998 to 90.3 in 1999.

We need to ascertain if the GZS overwintered in 1999-2000 as soon as possible. We will set some FG and pull seines in early April to determine if GZS survived the ice-covered period. If the GZS do not overwinter, we will stock 500-1,000 adults from NE in May.

Although the walleye population is as high as ever, large walleye have been absent from the August sample in recent years. When we are sampling for GZS in the spring, we will also try to find the large spawning fish by setting short duration EG in likely spawning areas at dawn and dusk.

Given the small additional effort required, FG should be incorporated into the standard sample. One overnight FG each sample day will be included in future samples to target CCF.

With the high numbers of predators in Glendo, the scheduled plant of 20,000 CCF will be cancelled. CCF stocking will continue in the river above Glendo Reservoir.

If LMB populations establish and become a sought after sportfish, we may have to add boat electrofishing to our standard sample. Boat electrofishing, preferably at night in the summer, is an effective way to sample adult LMB populations. The creel survey scheduled to begin in April 2000 will show how many anglers are currently fishing for LMB.

An intensive programmed creel survey will begin in April 2000 and run through September 2000. This creel survey will likely set the bar for how good walleye fishing can be at Glendo. Data will also be used in the Platte EIS process to demonstrate the angler use on this important fishery. Angler attitudes and our current management strategy will also be evaluated.

Pine Ridge to Sweetwater River - N. Bank Tribs. to NPR - 1PS

East Long Lake CR450114NA

AS - Aquatic Surveys

- Resource Reconnaissance FX-CR-1PS-530

East Long Lake is an abandoned gravel pit bordering the North Platte River in Casper. The company that owns the lake has expressed interest in giving the lake to the city, allowing public fishery development. The purpose of the sampling trip in 1999 was to ensure the lake was ready for trout and collect habitat data. Trout will not be stocked until it assured the lake will become public property.

Sampling in May 1999 included gill netting, zooplankton collection, temperature, DO and chemical data.

Unfortunately, gill nets found a substantial population of WHS (Table 27). The WHS ranged from 5-17 inches and at least three-year classes were present. In addition, GSF, CCF and CRP were also sampled. The origins of these fish are unknown. The lake could have been exposed to direct river flow in the past allowing fish entry. The CCF and GSF were likely a result of bucket biologists. Bryan Stock Trail Reservoir is separated from East Long Lake by a dike and it supports populations of CCF and GSF.

Table 27. Gill net catch from East Long Lake, May 1999.

Gear & Number		*Spec. & Number*		*CPUE*	*Length (in.)*	*Weight (lbs.)*
FG	3	GSF	1	0.01	5.5	
FG	3	CRP	1	0.01		
FG	3	WHS	40	0.60		
EG	3	CCF	1	0.02	23.6	7.63
EG	3	WHS	83	1.30		

Zooplankton populations were sampled using the standard 500 and 750 micron nets at three sites. Zooplankton volumes in the 500 and 750 micron nets averaged 7.9 and 2.9 mL, respectively. This yields a ZPR of 0.37. The abundant WHS populations are likely depressing but not severely limiting the zooplankton population since the WHS have grown to 17 inches.

Water chemistry found conditions would support trout. TDS (1,100), alkalinity (206), pH (8.0) and hardness (613) levels were at acceptable ranges for future trout.

Spring temperature, DO and water depth data were also favorable for trout. Temperatures ranged from 55°F on the surface to 50°F at 24 feet. DO ranged from 9.82 ppm near the surface to 8.98 ppm on the bottom. As a former gravel pit, the reservoir has an average depth of 25 feet with very little

littoral zone.

Management Recommendations

Eliminating the nongame fish is not practical. The lake directly borders the North Platte River and there is likely a high water exchange rate between the river and lake. This would make ensuring rotenone levels got hot enough for a complete kill and toxic water did not get into the North Platte nearly impossible.

Summer temperature and DO profiles are needed to ensure that trout could survive. The bordering Bryan Stock Trail Reservoir had reports of stressed trout swimming at the surface in 1999.

East Long Lake should be stocked as soon as it is guaranteed that the reservoir will become public property and conditions will support trout. The request for 2001 is 1,000 Size 4 RBT and 2,500 Size 3 RBT.

PF - Reservoir/Lake Habitat Development

- Habitat Development FX-CR-1PS-235

Efforts to transfer JTL's property to a public entity have been delayed with the purchase of JTL by Montana Dakota Utility. Transfer of the property was expected as early as 2000, however with the change in ownership the transfer schedule in unknown. The Platte River Parkway Trust will continue their efforts with the new company to facilitate the transfer and planned developments for the private shoreline on Bryan Stock Trail Reservoir and East Long Lake. Efforts to develop a fishery in East Long Lake will be held in abeyance pending a schedule for public ownership.

Bryan Stock Trail Reservoir CR450113NA

AS - Aquatic Surveys

- Resource Reconnaissance FX-CR-1PS-530

Bryan Stock Trail Reservoir was sampled in late May. Three two-hour gill nets, one FG and two EG, captured two CCF (16.6 inches, 1.75 lbs. and 9.0 inches), one CRP and six WHS. The reservoir is annually stocked with CCF and occasionally with extra trout. An overnight gill net survey in 1996 found WAE, CCF, WHS and CRP. Seining that same year found LMB, WHS, EMS, and GSF.

When we measure temperature and DO information at the bordering East Long Lake, this same information and depth should be collected at Bryan Stock Trail Reservoir for baseline data.

Goldeneye Reservoir CR350320NA

AS - Aquatic Resource Survey

- Trend Gill Netting FX-CR-1PS-512

Goldeneye Reservoir was surveyed in late April to determine stocked trout survival. We have concerns that poor water quality, specifically high turbidity, likely due to an abundant CRP population, has led to decreased trout survival and growth. Sampling consisted of overnight sets of 1 EG, 1 FG and 2 TN (Table 28).

Stocking since 1996 has consisted of approximately 20,000 SRC, 2,000 RBT, 40,000 BNT and 30,000 YSC. All fish were stocked at either size 3 or 4. High stocking numbers and low catch of BNT indicates they did not survive well. RBT are fairly large but the C factor was low (30.3). Cutthroats appear to perform best based on 1999 netting returns.

CRP catch has decreased over recent years. In FG, CRP CPUE was 1.51/hour in 1994, 13.5 in 1996 and 0.05 in 1999. Small sample size in 1999 may have contributed to this difference.

Table 28. Gill net summary data for Goldeneye Reservoir, 1999.

Gear & Number		Spec. & Number		CPUE	Mean L (in.)	L Range (in.)	Mean Wt (lbs)	Wt Range (lbs)	Mean C
EG	1	BNT	1	0.05	12.9	12.9 - 12.9	0.69	0.69 - 0.69	32.1
EG	1	SRC	8	0.42	14.6	12.9 - 19.7	1.18	0.88 - 2.49	36.8
EG	1	YSC	5	0.26	8.3	7.3 - 11.4	0.22	0.11 - 0.51	34.4
EG	1	CRP	1	0.05					
EG	1	WHS	19	1.00					
FG	1	BNT	1	0.05	11.6	11.6 - 11.6	0.59	0.59 - 0.59	37.8
FG	1	RBT	3	0.16	17.9	17.5 - 18.3	1.72	1.68 - 1.80	30.3
FG	1	SRC	6	0.32	14.2	13.6 - 14.5	1.04	0.98 - 1.09	36.6
FG	1	YSC	4	0.21	11.3	7.7 - 14.0	0.56	0.18 - 0.99	35.3
FG	1	CRP	1	0.05					
FG	1	WHS	19	1.00					

Gear & Number		Spec. & Number		Catch /Net	Mean L (in.)	L Range (in.)	Mean Wt (lbs)	Wt Range (lbs)	Mean C
TN	2	BNT	2	1.00	12.8	12.5 - 13.1	0.75	0.70 - 0.80	35.7
TN	2	SRC	6	3.00	15.1	14.0 - 15.7	1.19	0.90 - 1.30	34.6
TN	2	YSC	4	2.00	14.0	6.5 - 18.4	1.22	0.12 - 2.29	36.6
TN	2	CRP	12	6.00					
TN	2	WHS	11	5.50					

Management Recommendations

Until a rehabilitation plan is worked out (see next section), cutthroat trout stocking should continue to provide angling opportunity. It appears that both SRC and YSC survive well in Goldeneye.

HI - Habitat Improvement and Maintenance

- Aquatic Habitat Maintenance FX-CR-1PS-430

Discussions continued with Burlington Northern and Santa Fe Railroad (BNSFR) concerning the water rights for Goldeneye Reservoir. In December 1999, the BLM sent an agreement to BNSFR that allows the BLM to administer the water right. We are confident that this will be agreeable to all parties. We plan to shut off the inlet and let the water evaporate to levels it becomes toxic to fish, especially CRP. At that time, funds will be sought to install a drain to allow for quick draining of the reservoir since it appears CRP will always be able to get back in the reservoir.

N. Slope Laramie Range (Cottonwood to Garden Creek) Basin - 1LR

Curtis Gulch Creek CR852817AY

AS - Aquatic Resource Survey

- Electrofishing FX-CR-1LR-512

Curtis Gulch was sampled to obtain a population estimate and habitat data. The 300 foot station was located upstream from the 4 wheeler trailhead at 13T 448051 4695567. Habitat attributes are presented in Table 29.

A total of 82 BKT and 1 RBT were sampled in with a backpack electrofisher. A three pass removal generated an estimate of 1,527 BKT/mile and 18 RBT/mile. The BKT averaged 5.3 inches and 0.09 pounds. The single RBT was 5.9 inches and 0.09 pounds.

Table 29. Water characteristics of Laramie Range streams.

Stream	*TDS*	*pH*	*Hardness*	*Alkalinity*	*Velocity (ft/sec)*
Curtis Gulch Creek	30	7.5	62	131	0.05
S. Fork LaBonte Creek	52	8.0	188	105	0.12
Big Bear Creek	44	7.5	181	97	0.15

Management Recommendations

Curtis Gulch has limited fisheries value to anglers. The stream is small and very overgrown with vegetation making angling difficult. This stream likely serves as a nursery stream for LaBonte Creek.

South Fork LaBonte Creek CR852870AY

AS - Aquatic Resource Survey

- Electrofishing FX-CR-1LR-512

South Fork LaBonte Creek was sampled to obtain a population estimate and habitat data. The 200 foot station was located at 13T 447685 4694305. Habitat attributes are presented in Table 29.

A total of 81 BKT and 9 RBT were sampled in with a backpack electrofisher. A two pass removal generated an estimate of 2,164 BKT/mile and 238 RBT/mile. The BKT averaged 4.7 inches and 0.06 pounds. The RBT averaged 4.8 inches and 0.08 pounds.

The stream was extremely overgrown with willows. Near the headwaters were several old beaver complexes. Some of the ponds were very old while others were still functional although no current beaver signs were observed. The ponds did have fish, both BKT and RBT.

Management Recommendations

Other than LaBonte Creek, South Fork of LaBonte Creek has the most value to anglers in the area. Access to the fishable portions of the stream involves hiking a few miles. The old beaver ponds have good populations of both BKT and RBT reaching near 10 inches. Beaver activity should be encouraged in the future.

Big Bear Creek CR852971AY

AS - Aquatic Resource Survey

- Electrofishing FX-CR-1LR-512

  Big Bear Creek was sampled to obtain a population estimate and habitat data. The 300 foot station was located at 13T 448036 4694177. Habitat attributes are presented in Table 29.

  A total of 80 BKT and 5 RBT were sampled in with a backpack electrofisher. A two pass removal generated an estimate of 1,502 BKT/mile and 94 RBT/mile. The BKT averaged 4.2 inches and 0.04 pounds. The RBT averaged 4.4 inches and 0.03 pounds.

Management Recommendations

Like Curtis Gulch, Big Bear Creek has little value to anglers due to small size and difficult access to the water. Big Bear Creek likely serves as a nursery stream for LaBonte Creek.

North Horseshoe Creek CR8536020NA

AS - Aquatic Resource Survey

- Electrofishing FX-CR-1LR-512

  North Horseshoe Creek was electrofished in August below the confluence of Porcupine Creek. The RBT estimate was 915 per mile and BKT 1,201 per mile. Average length was 4.4 and 5.2 inches for RBT and BKT, respectively. No nongame fish were found.

  Habitat was diverse with woody debris, undercut banks, boulders and pools. The riparian zone was densely vegetated with grasses and willows. Stream banks were mostly stable, with some erosion.

Bates Hole Basin - 1BH

Bates Creek CR854145NA

AS - Aquatic Survey

- Electrofishing FX-CR-1BH-512

  Bates Creek was sampled in November to assess trout abundance downstream of the bridge crossing at Larry Lewis's ranch. Land containing approximately 1 mile of stream is for sale. The population estimate for RBT was 557 per mile. Only 1 BKT was sampled from the 370 ft section although many brook trout were observed downstream near apparent spawning redds. Average weight for RBT was 0.34 pounds while the BKT weighed 0.32 pounds. CKC were abundant near shore in grassy habitat (15 sampled). PMB summaries are presented in Table 4.

  Stream habitat, within the allotment for sale, appeared stable and provided many pools. Much of Bates Creek assessed contain cobble, gravel and sand substrate. Stream banks were densely vegetated.

South Fork Powder and Salt Creek Drainages - 1SS

Burlington Reservoir CR430490NA

AS - Aquatic Resource Surveys

- Trend Gill Netting FX-CR-1SS-512

Sampling in 1999 included three sampling trips using either gill nets or gill nets and trap nets. Following angler reports of no fish, the first sampling trip was in June to make sure the reservoir did not winterkill. We set two EG for one hour each and caught two large RBT.

The second sampling trip was the standard survey in late August (Table 30). One overnight EG and FG caught LMB, GSB and RBT. Compared to the 1998 sample, LMB average length has increased from 7.4 inches to 10.4 inches in EG. We sampled seven RBT that were 20 inches or more and weighed around 4-5 pounds. There were also several RBT less than 10 inches showing they survived predation by LMB.

Trap nets were also set during the second sampling trip. Due to scheduling conflicts, these were large mesh (1 inch) TN compared to small mesh (1/4 inch) TN last year. CPUE of GSB decreased from 71.25/net in 1998 to 6.75/net in 1999. This dramatic decrease was likely a result of large mesh size. These nets would not have captured any yearling GSB or YOY LMB.

In late October, we went back to Burlington to look for LMB reproduction. We have not stocked LMB since the initial plant of 1,500 in 1997. We used small mesh TN and were successful in capturing one YOY LMB.

Table 30. Netting results, August 1999.

Gear & Number	Species & Number	CPUE	Mean L (in.)	L Range (in.)	Mean Wt. (lbs.)	Wt. Range (lbs.)	Mean C
EG 1	GSB 2	0.10	6.3	4.7-7.8	0.31	0.12-0.50	-
EG 1	LMB 3	0.15	10.4	9.9-10.8	0.69	0.65-0.74	61.2
EG 1	RBT 26	1.30	12.8	8.0-22.3	1.39	0.20-5.45	41.0
EG 1	SAL 22	1.10					
FG 1	GSB 3	0.15	6.1	5.3-7.7	0.27	0.12-0.51	-
FG 1	LMB 1	0.05	10.1	10.1-10.1	0.62	0.62-0.62	60.2
FG 1	RBT 20	0.98	11.0	8.6-21.0	0.65	0.28-4.16	40.4
FG 1	SAL 45	2.20					
Gear & Number	**Species & Number**	**Catch /Net**	**Mean L (in.)**	**L Range (in.)**	**Mean Wt. (lbs.)**	**Wt. Range (lbs.)**	**Mean C**
TN 4	GSB 27	6.75	6.0	4.0-7.7	0.26	0.08-0.62	-
TN 4	LMB 1	0.25	10.0	10.0-10.0	0.65	0.65-0.65	65.0
TN 4	RBT 2	0.50	10.8	10.5-11.1	0.48	0.40-0.56	37.8
TN 4	SAL 15	3.75					

Management Recommendations

Water fell in 1999 to levels that the GSB plant was cancelled. If we have a hard winter, the likelihood of a winterkill is high. It will be a shame if a winterkill occurs since the warmwater fishery is reaching sizes likely acceptable to anglers. In addition, RBT have shown impressive growth and will be valuable to anglers when the reservoir opens to fishing in May.

In early spring, Burlington will be netted to see if a winterkill took place. We received several comments from anglers excited there was an area close to Casper they could catch a LMB and to a lesser extent GSB. A few anglers have reported catching LMB, although the fish are still too small

to take for a meal. If the reservoir does winterkill and water levels improve, we will restock the reservoir at 1997 levels (1,500 LMB @ 100/lb and 10,000 GSB @ 1,500/lb).

If the reservoir does not winterkill, standard sampling in late August will take place. Stocking will consist of 10,000 GSB (500/lb) and 1,000 RBT (35/lb).

Midwest Reservoir CR430075NA

AS - Aquatic Resource Surveys

- Fishery Investigation FX-CR-1SS-511

LMB (Florida strain) were stocked in late October 1998 to provide a fishery and thin a stunted GSF population. Five hundred LMB were stocked at 4-5 inches. At the time of stocking, there was a large population of stunted GSF and adult and juvenile aquarium goldfish. There was also a small population of CCF.

We sampled the reservoir at the end of July with daylight gill net sets and snorkeling. The daylight gill net caught only one 9 inch LMB. The water clarity likely made daylight nets ineffective. Three minnow traps were set overnight and caught two GSF. One was 4.2 inches and the other was 1.0 inch long.

Snorkeling was the best way to assess the LMB population. Absolute numbers of fish could not be quantified but the LMB survival was very high. A real surprise was a large number of YOY LMB. The YOY LMB were about 2-3 inches long. It is amazing that the LMB were able to reproduce so early given their young age.

Growth of the LMB was phenomenal. Warm water temperatures and available forage must have allowed the LMB to grow all year round. The 500 stocked LMB have nearly eliminated the stunted GSF population. The juvenile aquarium goldfish appear to have been eaten as well. We stocked 10,000 BLG (110/lb) in October to supplement LMB forage. By October, the large LMB appeared to have been at least 12 inches long and maybe as long as 15 inches.

Management Recommendations

This reservoir is definitely uncharted water for a Wyoming fishery. Growth of these LMB was expected to be good but nowhere near the observed growth. The biggest surprise was the YOY LMB. There were thousands of YOY LMB in the reservoir in late July. To ensure that the YOY were from the stocked LMB, we sent 4 YOY to the genetics lab in Oklahoma. The Florida strain LMB were obtained from Oklahoma and they can tell if a YOY is Florida strain. Results from the genetic testing showed the YOY were Florida strain.

In 2000, overnight gill nets should be tried to better sample the LMB. Snorkeling surveys are also useful to assess the relative population size and abundance of forage. LMB should cannibalize the YOY LMB as forage gets low. If forage is available and this growth continues, very large bass will be produced at this reservoir.

33 Mile Reservoirs

East Twin Reservoir CR430280NA

AS - Aquatic Resource Surveys

- Trend Gill Netting FX-CR-1SS-512

  In 1998, two short duration EG caught no trout. This had been a historically good producer but turbidity and TDS were very high in 1998. East Twin was gill netted in 1999 to determine survival of the 250 trout stocked in 1998. Two two-hour EG captured one RBT. The RBT was 13.1 inches and 1.02 pounds.

  The captured RBT showed fish could survive in East Twin Reservoir. This reservoir is close to the county road and should continue to be stocked with between 250 and 500 RBT annually.

Buffalo Bones Reservoir CR430431NA

AS - Aquatic Resource Surveys

- Trend Gill Netting FX-CR-1SS-512

  Anglers expressed concerns of small trout in late 1998 at Buffalo Bones Reservoir. In early 1998, Buffalo Bones was stocked for the first time with 1,500 RBT. In 1999, one half hour EG captured 12 RBT (CPUE = 24 RBT/hour). RBT ranged from 7.5 to 13.5 inches and 0.19 to 1.13 pounds. Of the 12 RBT, only one was over 8.7 inches. Average length in late June was 8.8 inches.

  RBT were not stocked in 1999. The initial stocking of 1,500 RBT was too many fish; it should have been closer to 500 RBT. A small number (~200) of trout should be stocked in 2000. This will be a very good reservoir and will gain in popularity as word spreads.

Salt Creek CR835910NA

AS - Aquatic Resource Surveys

- Seining ND-CR-1SS-512

  Salt Creek was sampled September 7 near Midwest, WY. Upstream of Midwest, but below Edgerton, WY, two fifty foot segments of Salt Creek were seined producing 14 FHC, 20 LND and 4 PMN. At the town of Midwest, two segments (40 and 50 ft) of Salt Creek were seined producing 14 FHC, 2 LND and 22 PMN. Approximately 6 miles downstream of Midwest, below the old power plant dam, one 50 ft segment of Salt Creek was seined. Below the dam 35 PKF, 2 FHC and 3 SDS were captured. Even though similar habitat was included within sampling sites on Salt Creek, abundance was different between locations. Electrofishing equipment did not effectively shock fish in Salt Creek because conductivity was high.

  Water in Salt Creek was very turbid. Habitat used by fish included scrap iron, overhanging vegetation and pool cover. Silt was very abundant and easily disturbed by seining.

South Fork Powder River CR836020NA

AS - Aquatic Resource Surveys

- Seining ND-CR-1SS-512

  The South Fork of the Powder River was sampled near confluence with Indian Creek. Two sites were sampled with seine. At site 1, downstream of Indian Creek, 2 LND, 63 FHC, 25 PMN and 12 PKF were captured. At site two, upstream of Indian Creek, 5 LND, 35 FHC, 4 PMN, and 16 PKF were captured. Many YOY were observed at both sites. Electrofishing did not effectively shock fish because conductivity was high.

  The South Fork of the Powder River was dominated by silt. Riparian vegetation was abundant but rarely provided overhanging cover because the main channel receded under normal flow conditions. According to the BLM, water flows are now permanent because oil exploration has produced water, which is discharged to the South Fork of the Powder River. Fish abundance was much higher than expected based on the homogenous habitat and silty conditions.

Lower Medicine Bow River Drainage - 5LM

Dome Rock Reservoir CR450386CN

AS - Aquatic Resource Survey

- Fish Population Survey FX-CR-EP1-510

  Dome Rock Reservoir, managed under the Trophy concept for SRC, was surveyed in late April. Eight one-hour experimental gill net sets caught a total of 40 trout (Table 31). The majority of the catch was SRC followed by RBT and one BNT. Other than 21 large RRB transplanted from McDonald Reservoir in 1998, no RBT have been stocked since 1992. No BNT have been stocked in Dome Rock.

  Even with no stocking, and likely no natural reproduction, catch rates for SRC and RBT increased from 1998 to 1999. SRC CPUE increased from 2.88 to 3.25 and RBT CPUE increased from 0.88 to 1.63 fish/hour. Like 1998, only one BNT was caught in 1999. Average size for all species increased (Figure 13).

Table 31. Gill net information for Dome Rock Reservoir, April 1999.

Gear & Number	*Species & Number*	CPUE	*Mean L (in.)*	*L Range (in.)*	*Mean Wt. (lbs.)*	*Wt. Range (lbs.)*	Mean C
EG 8	BNT 1	0.13	14.1	14.1-14.1	1.07	1.07-1.07	38.2
EG 8	SRC 26	3.25	15.3	13.9-17.2	1.39	1.06-2.26	38.1
EG 8	RBT 13	1.63	16.2	13.9-18.3	1.76	1.20-2.57	40.5

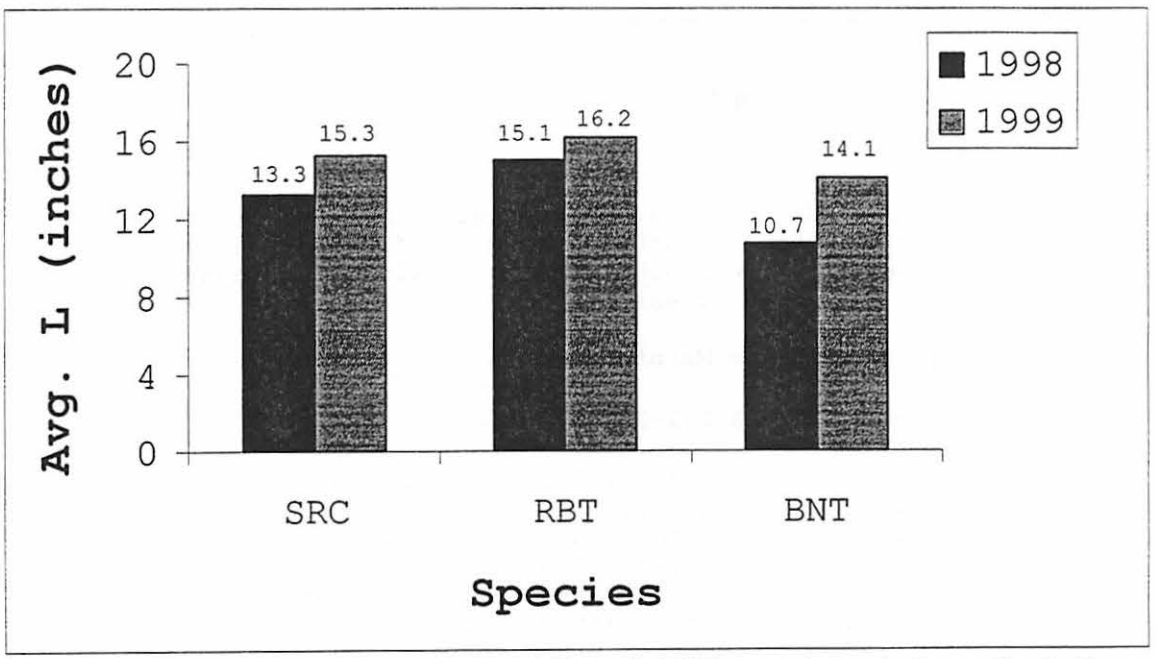


Figure 13. Average length from 1998 and 1999 netting at Dome Rock Reservoir.

Management Recommendations

With the trout population aging, stocking will start again. An add was placed for cutthroats for 2000.

Sage Creek CR856060CN

AS - Aquatic Resource Survey

- Fish Population Survey FX-CR-EP1-510

While not officially in the Casper Region, a population estimate was obtained on Sage Creek at the request of the landowner and to provide baseline information. Mr. Barry Strang, the new owner of the Wooden Rifle Ranch, has proposed new management plans for the ranch including enhancing the trout fishery in Sage Creek. The stream was degraded due to dewatering and grazing and no file data are available. Due to the habitat condition, no to an extremely limited fishery was assumed. The population estimate (Table 32) suggests marked improvement in habitat has already happened under new ownership.

Table 32. Sage Creek population estimate on 99/09/08, at elevation 6300.

Species	*Number*	*Ave L*	*Lbs/mile>6in*
BNT	12	8.9	89.1
RBT	3	5.3	6.7
SRC	3	3.6	
CKC	15	2.5	
LND	16	2.8	
WHS	29	4.9	

PF - Public Facility Development

- Fishing Easement FX-CR-EP1-233

  We have an annual agreement, we provide gates and Mr. Strang allows public access across portions of ranch to reach Pathfinder Reservoir. A nomination (Chapter 57) was submitted to obtain the necessary easements to complete a W/B motorboat access project.

HI - Habitat Improvement and Maintenance

- Habitat Improvement FX-CR-EP1-234

  Negotiations are ongoing with Mr. Strang, NRCS, FWS and the Department regarding restoration of aquatic and riparian habitat on Sage Creek. The stream corridor is managed under the NRCS Wetland Reserve Program. Current proposals include a "fish friendly" diversion structure and conversion of some existing irrigation water rights to an instream flow right. The instream flow issue may be the test case for the Board of Control to address various aspects of water right conversion.

Management Recommendations

Continue to pursue the necessary easements for a W/B project to access the east shore of Pathfinder Reservoir. Provide assistance as necessary to facilitate ongoing efforts for habitat improvement.

Work Not Associated With A Particular Basin

PA - Planning and Administration

- Cutthroat Management Plan FX-CY-NA8-121

Completed YSC cutthroat management plan. Coordinated with other regions that have vested interest in this plan. Plan addressed historic range, present range, and management recommendations for protection and enhancement of Yellowstone cutthroat. Work is in progress to download all pertinent fishery information into GIS. Efforts will be in concert with the US Forest Service. Special emphasis is on YSC.

PF - Public Fishing Development

- Walk-in Area Program FX-CY-PW4-065

Considerable time was allocated to assisting local wardens with signing WIA parcels under contract. Some 133 total hours (16 days) were spent signing the following parcels: Basin 2GR-Greybull River, three landowners, 5.5 miles of Greybull River; Basin 2LB-Lower Big Horn River, ten landowners, 8¼ miles of BHR and 2.25 miles of Nowood River; Basin 2PR-Paintrock Creek, three landowners, 1.25 miles of Paintrock Creek and one half mile of Medicine Lodge Creek; Basin 2LS-Lower Shoshone River, three landowners, 4 miles of Shoshone River and 1.25 miles of tributaries (Bitter and Alkali Creeks).

Additional time was allocated to meeting with wardens regarding perspective parcels, on-site consultation with landowners, review of land status and contracts and material logistics.

Big Horn Basin Lowland Waters - 2LW

Harrington Reservoir CY420715BN

AS - Aquatic Resource Surveys

- Harrington Reservoir Fisheries Survey FX-CY-2LW-512

May and July, 1999. Experimental gillnets and boat electrofishing (night) were used to monitor the fishery and determine success of the 1995 (35,040) and 1996 (12,650) LMB and 1997 (22,500) BLG plants.

Table 1. Harrington Reservoir netting results, May 1999.

Species and Number	CPUE	Mean Length Inches	Length Range Inches	Mean Weight Pounds	Length Frequency Distribution <4	5	6	7	8	9	>10
BLG 14	0.34	5.3	4.0- 6.1	0.15	3	9	2	0	0	0	0
YEP 223	5.64	9.6	3.5-12.5	0.34	6	1	2	31	45	21	117

Gillnet catch indicated a high density of adult YEP (7-12 inches), while adult BLG (> 5 inches) density was low (Table 1). Gillnets failed to capture any LMB, revealing poor recruitment of age-1 LMB. Recruitment may have been negatively impacted by YEP, either directly via predation or indirectly via competition for resources. The scarcity of FHM, which were once abundant, also indicates YEP have negatively affected the fishery.

Similar to gillnetting, boat electrofishing found YEP density had increased substantially (Figure 1). Although gillnets captured a greater percentage of adult YEP, boat electrofishing (July) found a greater percentage of age-0 YEP. The strong age-0 year class was responsible for the dramatic increase in CPUE.

LMB density declined substantially from 1997 to 1998, because of angler harvest. Warden creel checks (N=58) found that harvest rate was 100% (i.e., no release of bass). LMB density increased slightly from 1998 to 1999; however, the increase was due to the fingerling plant, before electrofishing. Similar to gillnet sampling, electrofishing found very few age-1 LMB. High harvest, combined with interspecific competition has negatively affected the LMB population.

BLG from the 1997 plant were captured for the first time in 1999. The number captured (65) and size (mean length=5.8) indicates reasonable plant success and good growth rates. BLG reached reproductive age in 1999, but age-0 BLG were too small to be sampled by electrofishing gear.

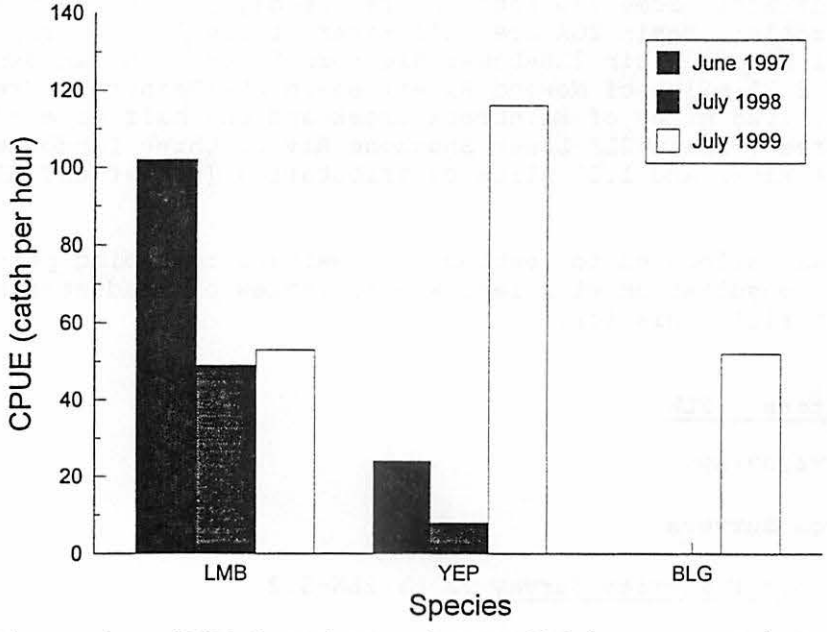


Figure 1. CPUE from boat electrofishing at Harrington Reservoir.

Management Recommendations

Continue annual monitoring. If BLG recruitment is low (i.e., weak age-1 year class), schedule stocking of BLG fingerlings. Continue removal of YEP during annual netting and electrofishing. Investigate potential benefits of a 15-inch minimum length limit and three fish limit for LMB prior to public regulation meetings in May 2001. A 15-inch minimum length limit may be most appropriate to improve size structure in a low-density, fast-growing population that has been over harvested (Willis and Neumann 1994).

South Worland Pond CY420581WE

AS - Aquatic Resource Surveys

South Worland Pond Fisheries Survey FX-CY-2LW-512

June 1999. Boat electrofishing was used to sample the fishery and determine success of GBH plants. The pond has been managed as a put and take trout fishery since 1969 (annual plant of 500 RBT). LMB were stocked in 1990 (6,356) and GBH in 1997 (2,250) and 1998 (3,500).

Table 2. Sampling results, South Worland Pond 1996 and 1999.

Date	Spp.	Gear Type	No.	CPUE	Mean Length	Length Range	Mean Weight	Weight Range
04/96	LMB	BF	24	48	10.5	7.2-17.3	0.72	0.16-3.62
	RBT	BF	11	22	8.9	5.9-10.5	0.24	0.08-0.34
	YEP	BF	247	988	5.7	3.7- 7.8	0.07	0.02-0.14
06/99	LMB	BF	6	12	9.6	7.9-14.2	0.48	0.22-1.36
	RBT	BF	5	10	9.3	8.1-10.8	0.24	0.18-0.36
	YEP	BF	52	104	4.6	3.5- 5.6	0.05	0.04-0.06

Sampling in 1999 found a general decline in sportfish abundance, compared to 1996 (Table 2). Other species sampled included CRP, EMS, and WHS. No GBH from the 1997 or 1998 plant were sampled, but they may have been too small to be captured by electrofishing gear.

Management Recommendations

Plant RBT in the spring and fall (250 each plant). Schedule stocking of 1,400 fingerling LMB (200/acre) and 3,500 GBH (500/acre).

Big Horn Basin Walleye Waters - 2WR

Deaver Reservoir CY420004PK

AS - Aquatic Resource Surveys

- Fish Population Sampling FX-CY-2WR-512

May 24, 1999. Night electrofished for one hour as part of annual assessment of the fishery (Table 3). Since first stocking WAE in 1993, average length has increased to 13.1 inches. However, few WAE over 15 inches were taken. No young WAE (<10 inches) were sampled suggesting poor survival of our stocked fingerlings. Predation has also kept the sucker population limited to larger fish. Fathead minnows and brook stickleback continue to provide the majority of the forage for this fishery.

Table 3. Deaver Reservoir sampling using boat electrofishing, May 1999.

Species	Number	CPUE	Average length	Range	Average Weight	Average Condition
RBT	3	3.00	10.4	8.8-12.5	0.49	40.5
WAE	56	56.00	13.1	10.4-18.4	0.88	36.8
WHS	26	26.00	15.0	12.7-17.7	1.68	49.5
YSC	1	1.00	12.8			
Totals	86	86.00				

November 22, 1999. Received case history report for WAE submitted to the Laramie Laboratory (10/30/98) that were suspected of having blackspot disease. The diagnosis was trematodiasis with the presumptive parasite thought to be *Apatemon gracilis pellucidus*. Fish are safe for human consumption but should be cooked properly.

CS - Creel Surveys

- Spot Creel Survey FX-CY-2WR-520

The local Game Warden contacted 83 anglers in 1999, who fished 155.7 hours to catch 21 RBT, 13 CUT, 18 WAE and released 15 fish for a catch rate of 0.43 fish/hour. The 1999 catch rate has rebounded to 1997 levels (CE=0.44) from a low in 1998 of 0.09 fish/hour.

April 7, 1999. Voluntary creel boxes were reinstalled at two locations around Deaver Reservoir. Forty-eight anglers recorded their catch and expressed their views on species preference; their satisfaction with this fishing experience and what factors influenced that satisfaction. Boxes were pulled on October 18, 1999. Results indicated most anglers were residents from Park County and used mostly bait in combination with lures to catch 98 WAE, while keeping 73. This is over twice the number kept compared to 1998. Anglers continue to prefer WAE. Angler satisfaction was much better than reported in 1998. Angler satisfaction was most influenced by "the number of fish caught".

Management Recommendations

1) Update 2WR BMP with results of 1999 sampling. 2) Reinstall voluntary creel boxes to obtain additional information. 3) Restructure questionnaire to determine angler attitudes toward special WAE regulations. 4) Sample in 2000 using night electrofishing to reduce mortality on game species. 5) Continue present stocking regime: 1,500 catchable RBT, 8,000 fingerling WAE and 500 catchable YSC. Stock GCP in 2000 for aquatic vegetation control.

Wardell Reservoir CY420710BN

AS - Aquatic Resource Surveys

- Wardell Reservoir Sampling FX-CY-2WR-512

May 1999. Experimental gillnets were used to monitor the fishery and evaluate 1997 (3,500) and 1998 (2,752) fingerling WAE plants and the 1997 WHC (5,458) plant (Table 4). Past sampling found poor WAE reproductive success, primarily due to low and or fluctuating water levels during spawning. Poor reproductive success in 1994 and 1995 led to a decline in WAE abundance by 1996. Annual stocking (2,675 fingerlings or 100,000 fry) was implemented in 1997 to guard against weak or missing year classes.

Table 4. Sampling results, Wardell Reservoir, 1994-1999.

Date	Spp.	Gear Type	No.	CPUE	Mean Length	Length Range	Mean Weight	Weight Range
8/94	WAE	EG	51	0.96	13.3	5.1-23.0	1.04	0.04-3.60
9/98			37	1.28	11.9	5.2-20.0	0.68	0.04-2.44
5/99			44	1.28	11.8	6.9-24.0	0.65	0.10-3.77
8/94	YEP	EG	29	0.55	5.6	3.6- 8.5	0.10	0.02-0.37
9/98			13	0.45	5.7	3.6- 9.8	0.12	0.02-0.44
5/99			7	0.20	4.5	4.0- 5.9	0.05	0.02-0.09
5/99	WHC	EG	15	0.61	7.6	6.3- 9.9	0.27	0.10-0.50

CPUE for WAE in 1998 and 1999 was 1.28, which is the highest gillnet catch rate since 1994. A strong year class in 1996, combined with stocking in 1997 and 1998, resulted in an increase in WAE abundance. Conversely, YEP abundance has remained low since 1994. Low YEP abundance is likely a result of several years of poor reproduction. WHC, planted in 1997, have now supplanted YEP as the most abundant panfish.

Management Recommendations

Continue annual plant of WAE and change WHC stocking to annual plant. Conduct spring and fall sampling in 2000 to evaluate success of WAE and WHC plants.

Big Horn Forest Mountain Lakes 2CP

Work Not Associated With A Particular Water

AS - Aquatic Resource Surveys

- Development of Stocking Guidelines for High-Elevation Lakes FX-CY-2CP-512

A proposal was submitted to the UW Cooperative Fish and Wildlife Research Unit to develop stocking guidelines for mountain lakes. The proposal was accepted and the study was initiated in 1999. The goal of the study is to provide defendable stocking guidelines for mountain lakes that maximize benefits to sport fisheries. The specific objectives are: 1) determine relationships between environmental factors (morphology, hydrology, and water chemistry) of mountain lakes and the success (survival and growth) of stocked trout; and 2) develop recommendations for stocking strategies for mountain lakes to assist fisheries managers in making stocking decisions. Fieldwork is set to begin in July 2000 and the study should be completed by June 2002.

Management Recommendations

Provide assistance to graduate student as needed. Schedule two weeks to assist with sampling.

Yellowtail Reservoir And Minor Tributaries 2BL

Yellowtail Reservoir CY823040BN

AS - Aquatic Resource Surveys

- Yellowtail Reservoir Fall Sampling FX-CY-2BL-512

September 12-14, 1999. Seven experimental gill nets were set from the Causeway (Hwy. 14A) downstream to Crooked Creek Bay (151.5 hours). The primary objectives were to locate tagged SAR (see Big Horn River Sauger Habitat Assessment) and collect data for monitoring.

SAR CPUE declined considerably from 1996 to 1998, but rebounded in 1999 (Fig. 2). SAR abundance fluctuates considerably between years; however, 1998 was the first year since impoundment that no SAR were collected during sampling. Similarly, CPUE for SAR in 1999 was also lower than previous years. The low number of SAR is cause for concern, but may be related more to movement patterns between the river and reservoir and less to declining abundance. SAR movement and migration patterns are not well understood; consequently, factors impacting SAR density in the reservoir, as well as the importance of the reservoir to the river SAR population remain unknown.

One objective of the SAR habitat study is to identify movement and migration patterns between the river and reservoir.

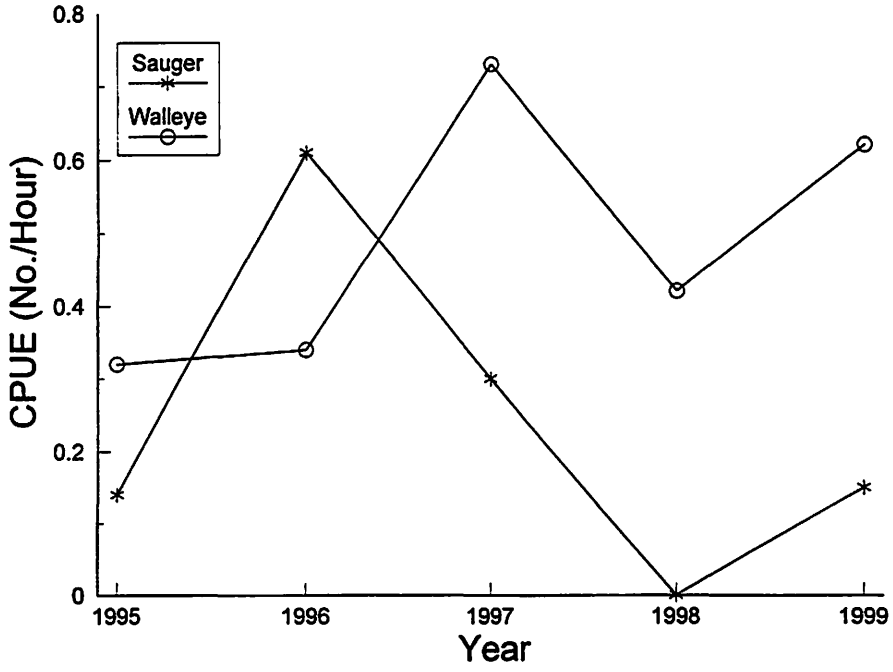


Figure 2. Fall gillnet CPUE at Yellowtail Reservoir, 1995-1999.

WAE CPUE increased from 1996 to 1997, declined in 1998, and then increased in 1999. The decline in relative abundance during 1998 was due to fewer age-0 WAE in 1998. Age-0 CPUE increased slightly in 1999 (CPUE=0.10), but the increase in all WAE CPUE was due to more age-2 and age-3 fish. In 1997, the population was dominated by age-0 and age-1 WAE. The age-0 year class was particularly strong, compared to 1996 and 1998. The strong age-0 and age-1 1997 cohorts led to an in increase in older WAE in 1998 and 1999; however, the two weak year classes in 1998 and 1999 will cause future declines in adult WAE abundance.

PM - Fish Population Management

- Fish Stocking FX-CY-2BL-716

In June 1999, 100,000 fingerling WAE from Garrison, North Dakota were stocked. In the past, WAE from Fort Peck Reservoir were a primary source for Yellowtail Reservoir stocking. However, concern about the purity of WAE from Fort Peck, which is known to have WAE-SAR hybrids, and how it may affect native SAR led to a cessation of stocking Fort Peck WAE.

Stocking Yellowtail Reservoir with Fort Peck WAE could introduce hybrids into Wyoming. Although hybridization in nature is rare (Nelson 1968; Billington et al. 1988), hybrids can easily be introduced via stocking if the brood stock is not screened for purity (Billington et al. 1997). Hybrids are fertile and readily reproduce with either of the parent species (Hearn 1986; Fiss et al. 1997).

Given the importance of native sauger, maintaining stock purity is vital. In April 1998, a letter stating WY concerns was sent from Mike Stone, WY Chief of Fisheries, to Larry Peterman, MT Fisheries Division Administrator. The response from Montana was that they would not initiate screening of their brood stock at this time. Consequently, we will not stock Ft. Peck

Reservoir Walleye in Yellowtail Reservoir. Only WAE from genetically pure stocks should be planted.

Management Recommendations

Continue annual sampling to monitor the fishery. Plant only genetically pure WAE, or WAE from brood sources that have minimal potential for hybridization (i.e., no SAR present with WAE brood stock).

Big Horn River, Lower and Tributaries 2LB

Big Horn River CY821001BN and CY821001WE

AS - Aquatic Resource Surveys

1) Big Horn River Seining Survey for Juvenile Fishes FX-CY-2LB-512

August 1999. Seining (50 foot bag seine; 12 sites) was used to sample the Big Horn River from Worland to Greybull. The primary purpose was to locate juvenile sauger and determine habitat preference; however, data were collected on all juvenile species. All seining was conducted in slow velocity side channels, or backwater areas. Results of the survey are included in Table 5.

Table 5. Summary of Big Horn River seining, 1999.

Species	No.	Mean Length	Length Range	Length Frequency 1	2	3	4	5
BLC	24	1.3	0.9-2.0	11	1	0	0	0
CCF	6	1.5	1.2-1.9	6	0	0	0	0
CRP	6	2.3	1.7-2.8	2	4	0	0	0
EMS	835	2.6	0.9-3.6	5	39	18	0	0
FHC	77	2.8	0.9-4.1	5	5	14	1	0
HYB*	98	1.5	0.9-2.2	19	4	0	0	0
LND	1	1.4	1.4-1.4	1	0	0	0	0
RCS	4	2.0	1.2-4.4	3	0	0	0	1
SAR	2	2.9	2.6-3.2	0	1	1	0	0
STC	1	1.3	1.3-1.3	1	0	0	0	0
WAE	1	4.9	4.9-4.9	0	0	0	1	0
WHC	1	1.6	1.6-1.6	1	0	0	0	0
WHS	34	1.6	1.5-1.8	4	0	0	0	0
YEP	10	2.1	1.8-2.5	1	9	0	0	0

*HYB=genus *Hybognathus*

The most abundant non-native species was EMS, followed by BLC, YEP, CRP, WAE, and WHC. The discovery of BLC, YEP, and WHC was interesting since there are few adults of this species present in the river and little if any suitable spawning habitat. Apparently, these young-of-year fish entered the river from an area pond. The most abundant native species were fish in the genus *Hybognathus*, followed by FHC, WHS, CCF, RCS, SAR, STC, and LND.

Only two SAR were captured, both in a side channel just above the Basin boat ramp. The side channel was not completely isolated from the main channel, but through-flow was low. The side channel averaged two feet deep with a maximum depth of four feet. The substrate was entirely silt and sand and there was very little woody debris present.

Management Recommendations

Use seining to locate juvenile sauger in backwater areas. At each sauger location collect habitat data on maximum depth, average depth, substrate type, substrate heterogeneity, water temperature, velocity, turbidity, dissolved oxygen, and available cover. Habitat collection should follow the methods from the SAR study plan (i.e., 11 transects spaced a distance of 2 X mean channel width apart; five upstream of the location, one at the location, and five downstream from the location). Concentrate sampling in the lower river section (Greybull to Yellowtail Res.), where most spawning is suspected.

AS - Aquatic Resource Surveys

Big Horn River Sauger Population Estimates FX-CY-2LB-512

September and October 1999. Mark-recapture was used to estimate SAR abundance at two sites on the Big Horn River (Worland and Basin). SAR abundance appears low throughout the drainage (mean of all estimates = 63/mile; Figure 3), but there are no prior Wyoming data for comparison. In Montana, mid-1970s population estimates yielded 2,024 SAR/mile in the Yellowstone River and 558/mile in the lower Tongue River. However, SAR abundance has since declined precipitously (McMahon 1999).

Mark-recapture found an average density of 96/mile, while multiple-pass found an average density of 42/mile. Recaptures of tagged SAR from the habitat assessment study also indicated a low population density (>12% recapture rate). The mark-recapture estimate differed appreciably from the multiple pass estimate at the Basin site, but the difference was more subtle at the Worland site (Figure 3). It appears that mark-recapture is a better estimator of population size; however, more mark-recapture estimates are needed for comparison. The difference probably lies in sampling more of the river, thereby including a better representation of available habitat.

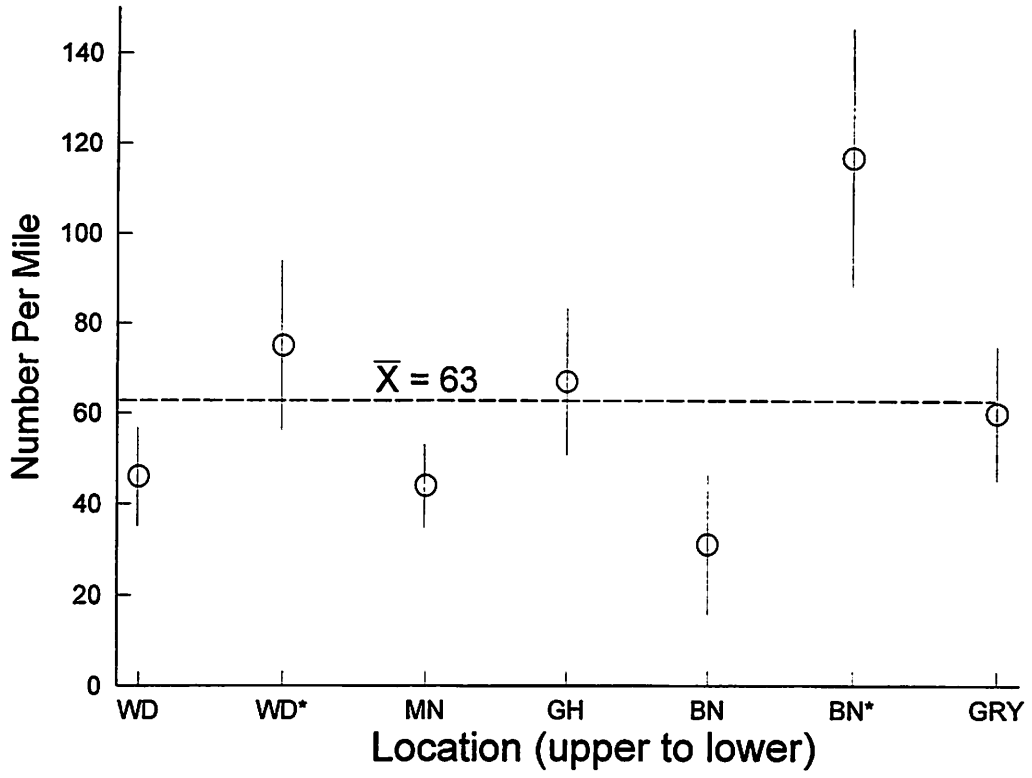


Figure 3. Big Horn R. SAR population estimates 1997-1999. Location codes are WD=Worland, MN=Manderson, GH=Glory Hole, BN=Basin, and GRY= Greybull. Asterisks indicate mark-recapture estimates. All others are multiple-pass. Error bars are 95% confidence intervals.

Management Recommendations

Use mark-recapture to estimate abundance in the lower study section (Eddy's to ML Ramp). Repeat stations every two years to monitor population status.

AS - Aquatic Resource Surveys

1) Big Horn River Sauger Habitat Assessment FX-CY-2LB-510

The Big Horn River SAR habitat study was approved as an Aquatic Habitat Trust Fund project for FY99 and FY00. The study was initiated in March 1999 with the following objectives: 1) Document preferred habitat during spring, summer, fall, and winter, 2) Identify spawning sites and describe physical spawning habitat requirements, 3) Determine movement and migration patterns between habitats, 4) Evaluate habitat potential above barriers in the Big Horn River and tributaries, and 5) Design habitat improvement projects.

March-December 1999. The river section from Lower Hanover Dam (above Worland) to ML Ramp (above Yellowtail Reservoir; Figure 4) was electrofished once each month to collect SAR for tagging and record recaptures. Each SAR was fitted with a Carlin dangler-type tag with a unique number. Locations of new and recaptured SAR were recorded using GPS. The objective of tagging was to determine movement and migration patterns between river sections and between the river and reservoir.

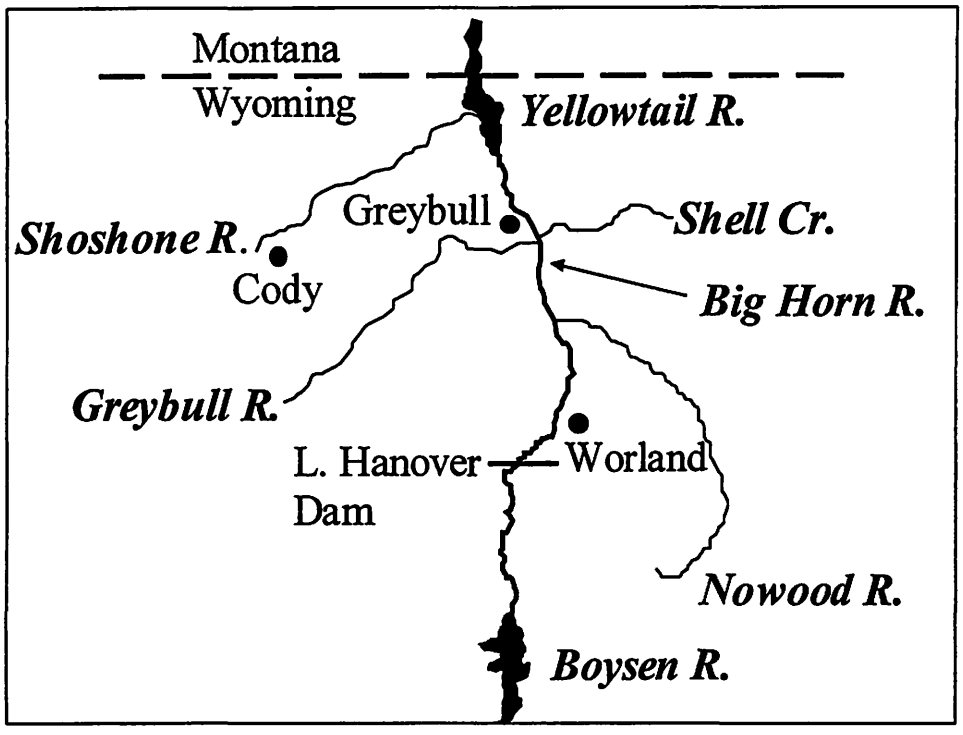


Figure 4. Map of Big Horn and Wind River Drainage, showing study area (Lower Hanover Dam to Yellowtail Reservoir).

By December, 2,192 SAR had been tagged with 267 recaptures (12.2%). Although anglers were encouraged to report tagged SAR, the majority of recaptures came from monthly electrofishing (73%). Assuming all angler returns represent harvested SAR, the return rate indicates very low exploitation (3%).

Movements between the river and reservoir were difficult to interpret, because of few recaptures. Eight SAR tagged in the river were later captured in the reservoir. All of these SAR were tagged at or near Stucco (north of Greybull) in the spring. Movements of these SAR suggest that SAR move out of the reservoir for spawning and return to the reservoir after spawning. Indeed, electrofishing during the spawning season found a concentration of both WAE and SAR near Stucco. Subsequent sampling found that both WAE and SAR had dispersed to other areas following spawning. No recaptures in the reservoir of SAR tagged farther up river suggests that reservoir to river movements are limited to the lower river.

Analysis of individually tagged SAR movements found that movement distance differed by season (ANOVA: $F=16.46$, $df=2,267$, $P=0.0000$); however, only spring movement was significantly different from other seasons ($P<0.05$; Tukey's Multiple Comparisons). Tagged SAR movements were split nearly equally between upstream and downstream directions during the spring period; however, mean upstream movement distance was nearly twice that of mean downstream movement distance (Table 6). During the summer, tagged sauger moved more upstream and, similar to spring movements, mean movement distance was greatest upstream. During the fall, movement direction and movement distance were similar.

Available information to date suggests that movement distance is greatest during the spring period and that SAR are moving in an upstream direction. During summer and fall, SAR appear more sedentary with less distance moved and no directional difference (i.e., up- or downstream). The spring movement may represent migration to and dispersal away from spawning sites to other river sections, where SAR spend the summer and fall months.

Following movements of tagged SAR after ice-out and through the spawning season should help to detect spawning movement patterns and also help to identify spawning sites.

Table 6. Number of seasonal movements and mean, minimum, and maximum distance moved for tagged Big Horn River SAR during spring (March-April), summer (May-August) and fall (September-December) 1999.

Movement	Spring Up-stream	Spring Down-stream	Summer Up-stream	Summer Down-Stream	Fall Up-stream	Fall Down-stream
N	36	33	60	35	54	47
Mean Distance (ft.)	2,762	1,460	1,260	410	731	741
Maximum Distance (ft.)	15,646	6,955	5,321	2,408	4,462	5,495
Minimum Distance (ft.)	17.4	11.5	2.6	6.9	2.6	20.0

May-December, 1999. Thirty-Five SAR were implanted with radio transmitters to follow movements and determine habitat use. Fifteen SAR were released in the upper study section (Worland), ten in the middle section (Basin), and ten at the lower section (ML Ramp). SAR were tracked weekly to record locations. At each SAR location, habitat use was recorded for the following variables: river width, depth, velocity, substrate type, substrate heterogeneity, bank height, and bank stability. To determine habitat availability, a random point away from the sauger location was selected to sample habitat variables. A site description was also recorded by habitat type (i.e., run, riffle, pool, structure, and backwater) and morphology (i.e., mid channel, lateral channel, outside bend, inside bend, and side channel).

The electivity index (D) of Jacobs (1974) was used to quantify habitat preferences (see Heggenes 1991). The index is calculated as:

$$D=(r-p)/(r+p-2rp)$$

Where r = the proportion of the resource used by sauger and p=the proportion of the resource available in the study reach. This formula yields a value between 1 and -1. A D value of 0 would indicate that the habitat was used in direct proportion to its availability, while positive values indicate selection for the habitat, and negative values indicate avoidance (Heggenes et al. 1991).

Because it is unlikely that fish respond independently to habitat variables, multivariate statistics were also used to assess habitat use and preference. A principle component analysis (PCA) was done separately on habitat availability data at each site. Components with eigenvalues > 1 were retained (Grossman and Freeman 1987).

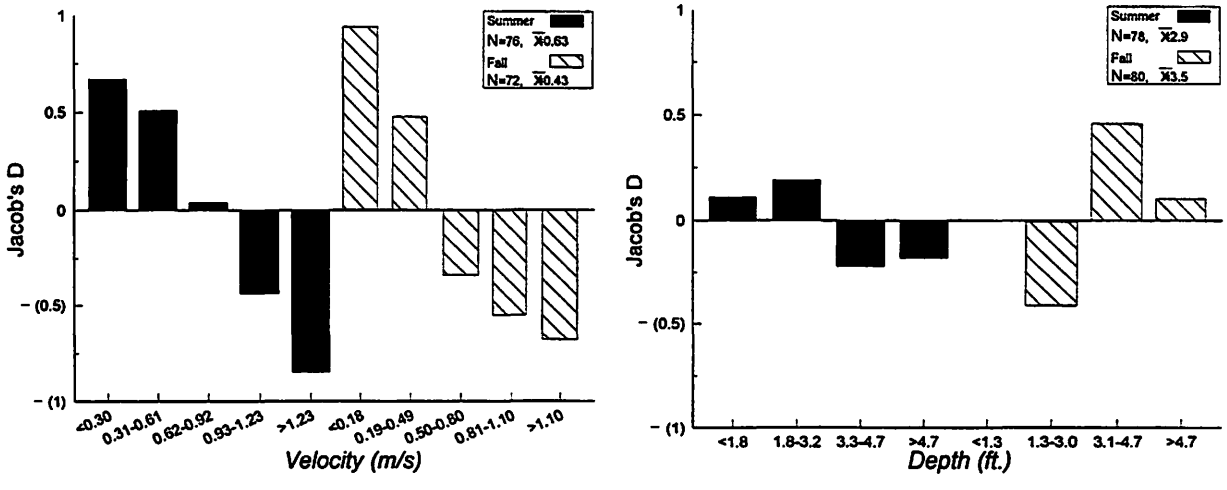
To test for non-random habitat use, the principle component scores at each site were applied to the fish location data in the following way. First, locations of fish in that particular microhabitat area were scored for each component by multiplying the vector of component score coefficients by the microhabitat use data for each location. Second, using the availability data as the expected data, a Kolmogorov-Smirnoff two-sample test was used to identify non-random habitat use. A significant difference ($P<0.05$) would indicate that habitat use by sauger was not random for that component.

Table 7. Number of seasonal movements and mean (movement/day), minimum, and maximum distance moved for radio-transmitter Big Horn River SAR, during spring (March-April), summer (May-August) and fall (September-December), 1999.

Movement	Spring Up-stream	Spring Down-stream	Summer Up-stream	Summer Down-Stream	Fall Up-stream	Fall Down-stream
N	20	62	71	51	37	42
Mean Distance (ft.)	377	1,489	1,463	1,437	262	1,726
Maximum Distance (ft.)	1,913	10,597	16,138	15,886	4,429	53,650
Minimum Distance (ft.)	11.2	9.8	2.6	2.9	3.0	0.7

Unlike tagged SAR, movement of radio-transmitter SAR did not differ by season. (ANOVA: F=1.56, df=2,267, P=0.7676). Radio-transmitter SAR showed an affinity for downstream movements during the spring period; however, during the summer movements were more upstream with similar means for both categories (Table 7). During fall, SAR movements were split fairly evenly between upstream and downstream, but mean movement distance was greater for downstream. Upon completion of the study, both radio-transmitter and tagged SAR movements will be closely examined to determine selection for river sections. If selection can be identified, then river sections can be compared to determine differences in habitat types and habitat availability.

During both the summer and fall periods, SAR selected low velocity sites (<0.61 ms^{-1}) and avoided areas with high velocities (>0.93 ms^{-1}; Figure 5). Selection for lower velocities was even greater in the fall, as SAR exhibited a strong selection for velocities <0.49 ms^{-1}. SAR also selected for areas with low substrate values (silt or silt/sand), while other substrate types were either used in proportion to availability or were avoided. Although the analysis did not show strong selection or avoidance for substrate heterogeneity classes, there was a clear trend for increased selection as substrate heterogeneity increased (i.e., more uniform habitat). For depth, SAR showed a somewhat positive selection for lower depths (<3.2 ft.) and a slight avoidance for greater depths (>3.3 ft.) during the summer. During fall selection appeared to be occurring for greater depth and avoidance for lower depth.



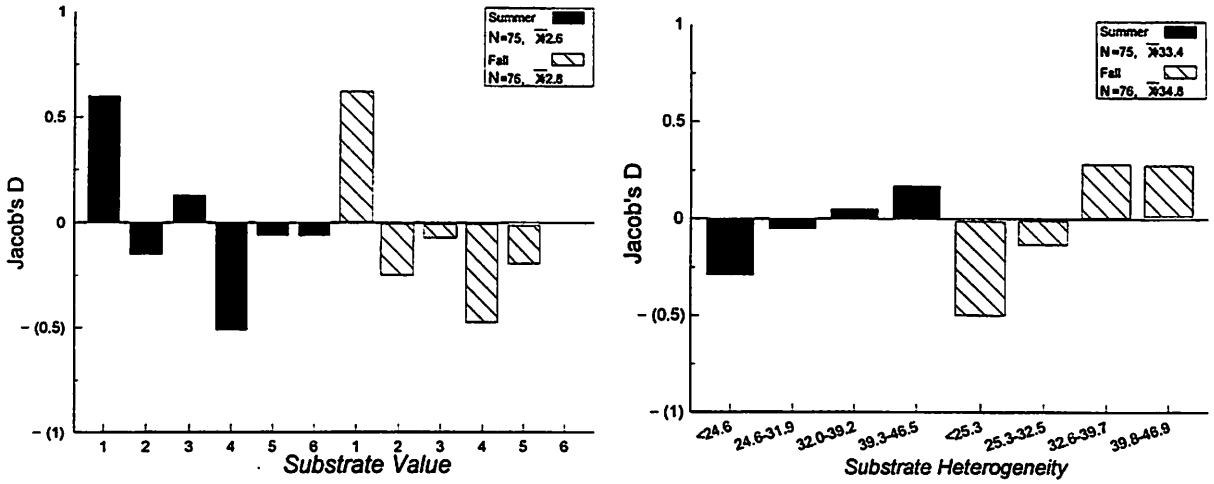


Figure 5. Big Horn River sauger habitat selection (Jacob's D) for velocity (m/s), depth (ft.), substrate value (modified Wentworth classification), and substrate heterogeneity (S.D. of substrate use categories). Sample size and use means are given within legends.

Principle component analysis found that velocity had the strongest influence on SAR habitat use during the summer (Figure 6). Width and substrate type also had a strong influence, while the influence of depth and substrate heterogeneity were minimal. Projections of habitat use and availability points for this principal component suggest a selection for areas with low velocity, low width, and smaller substrates, as indicated by the disproportional number of use points to availability points for the higher values. The analysis also suggests that areas with the opposite characteristics are avoided, as there are significantly more availability points in the lower values.

Some researchers have questioned the validity of using PCA in wildlife habitat studies, because it may produce invalid inferences (Rexstad et al. 1988). Therefore we looked at both univariate (Jacob's D) and multivariate (PCA) analyses to formulate conclusions. Both univariate and multivariate analyses show that velocity is the key variable affecting sauger habitat selection in the summer. Areas with velocities <0.61 ms^{-1} and silt substrates are clearly preferred. Areas with velocities >0.93 ms^{-1} and larger substrates are avoided. The other variables we included in our study appear to be used in proportion to their availability.

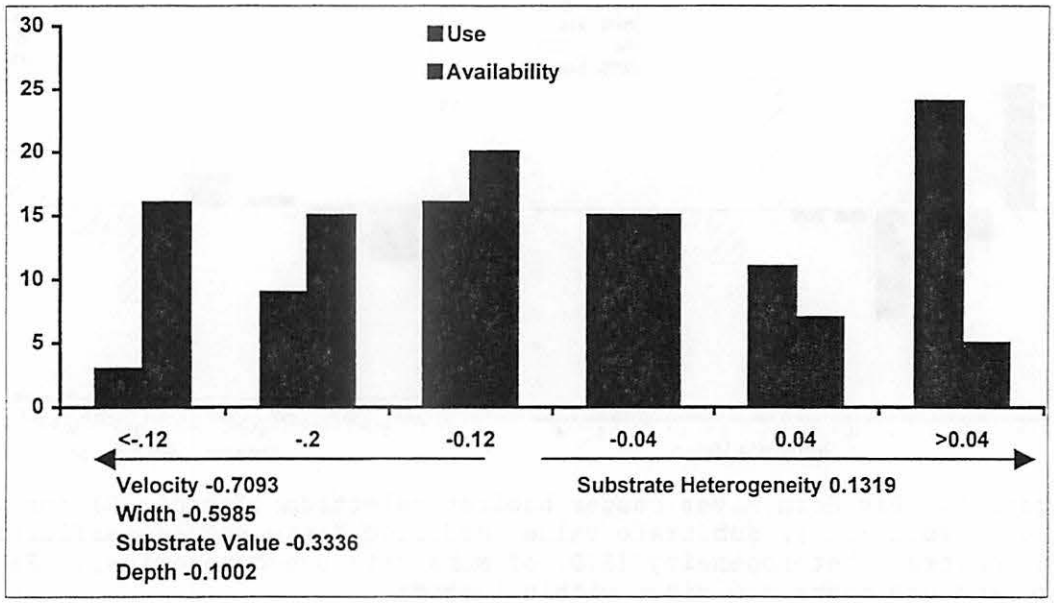


Figure 6. Principle Component Analysis of SAR habitat selection, Big Horn River, May-September, 1999.

Management Recommendations

Continue tracking and collection of movement, habitat use, and habitat availability data through June 2000.

Middle Big Horn River - 2MB

Enos Creek CY824360HS

AS - Aquatic Resource Surveys

- Fish Population Sampling FX-CY-2MB-512

July 21, 1999. Backpack electrofished 450 feet above Dipper (Z12, E668919, N4864715) to determine present status of fishery. No fish were seen or taken. We received a request from the BLM and Washakie Chapter of TU to investigate the fishery potential of this stream. This is historic YSC range and the landowner was interested in restoration efforts. The stream is recovering from years of grazing abuse and vegetation removal in the 60s. Habitat may be stabilizing and some undercut banks were evident. Overhead cover is still lacking but could be easily remedied by placement of nearby junipers for bush piles. Crew decided to stock 550 YSC at 2.5/pound as an experiment to reestablish a fishery. This will be the first of a three-year program with evaluation slated for 2002.

Management Recommendations

For two more years, stock YSC at density of 75 trout/AC through 13 miles of suitable habitat on this creek. Evaluate survival in 2002. Continue to work with landowner and suggest he limit fishing for short period until population becomes established.

Meadowlark Lake - 2ML

Meadowlark Lake CY220030BN

AS - Aquatic Resource Surveys

- Fish Stocking Evaluation FX-CY-2ML-512

June 1999. Overnight gillnet sets were used to evaluate annual fish plants and assess fishery status. The present stocking strategy, initiated in 1994, is 25,000 fingerling and 5,000 catchable RBT annually (165/acre). In 1996, a three year study was implemented to determine the following: 1) survival, growth rates, and carryover of annual plants, 2) approximate contribution of cutthroat, rainbow, and hybrids from reproduction in tributary streams, 3) contribution of catchable trout plant, and 4) total trout population (including wild BKT and BNT). All planted fish were fin clipped in 1996 (LPV) 1997 (AD), and 1998 (AD and RPV).

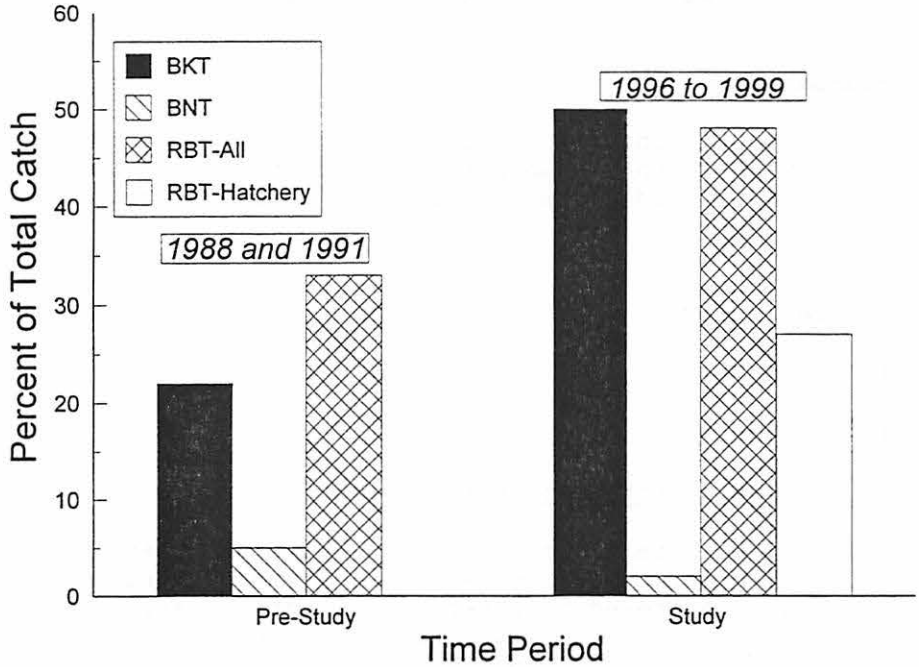


Figure 7. Percentages of the total catch for Meadowlark Lake wild and hatchery trout during pre-study (1988 and 1991) and study (1996-1999) years.

Assuming that CPUE is proportional to fish density, hatchery RBT comprised 27% of the trout population during the study (Figure 7). RBT abundance was lower during the pre-study years of 1988 and 1991. During these years only 5,000 catchable RBT were stocked annually. Beginning in 1995, the strategy switched to stocking 25,000 fingerlings in addition to the 5,000 catchables. The increase in RBT density is attributable to the increased stocking density. Likewise, the increase in BKT density can also be attributed to the new sampling strategy. In the pre-study years, 50,000 fingerling YSC and 5,000 catchable RBT were stocked each year. When the fingerling plant was changed to RBT and reduced to 25,000, BKT apparently filled the void. Interestingly, there was no substantial change in BNT abundance between pre-study and study years. Poor BNT response is likely due to low recruitment from Meadowlark tributaries, Lake Creek and East Ten Sleep Creek, which have mostly RBT and BKT populations.

Although an effort was made to distinguish between the catchable and fingerling RBT contributions, similar clips (all adipose in 1998) made analysis impossible. Therefore, the study looked only at contribution by hatchery plants. Sampling in 1997 found that only 28% of all RBT were marked; nearly all were from the 1997 plant. The lack of marked RBT from 1996 was probably due to a fish kill that occurred during the summer of 1996. In 1998, 83.9% of all RBT were marked, while 62.9% of all RBT were marked in 1999.

Available evidence suggests that the RBT plant could be reduced and BKT would fill the void. However, it appears that current stocking has achieved somewhat of a balance. The fishery is now comprised of nearly equal populations of RBT and BKT. Any reduction in the number of RBT stocked would likely lead to an increase in BKT density. Average size for both species is good (9-10 inches) and anglers are apparently satisfied with the fishery (i.e., few complaints from wardens, anglers, or the lodge). The best strategy is to manage the lake for both wild BKT and hatchery RBT.

Management Recommendations

Continue stocking 25,000 fingerling RBT and 5,000 catchable RBT annually (165/acre). Discontinue annual sampling and marking of hatchery trout. Monitor the fishery via Warden creel checks and comments from anglers and the lodge owner.

Nowood River and Tributaries - 2NR

Box Elder Creek CY420662BN

AS - Aquatic Resource Surveys

- Box Elder Habitat Improvement Project FX-CY-2NR-510

August 1999. Two sites were electrofished on Box Elder Creek to provide baseline information prior to a proposed habitat improvement project. Habitat data were also gathered to determine potential maximum biomass (Hubert et al. 1996). One station was chosen within the candidate improvement site and one outside the site (control). The candidate habitat improvement project includes fencing the riparian area to exclude livestock and placing rock riprap at unstable stream bank sites. Results of the sampling are illustrated in Table 8.

The fish community was dominated by native nongame species (i.e., suckers and dace). Total biomass of native suckers was 710 lbs./mile, compared to 86 lbs./mile for rainbow and brown trout. Conversely, outside the habitat improvement site non-native trout were dominant.

Results of the sampling indicate that the candidate habitat improvement could increase the trout population. However, this may come at the expense of native species, like MTS, LNS, and WHS. Habitat improvement projects have a proven record of improving water quality, leading to better conditions for non-native trout. As management begins to focus more on native species, improvement plans will need to consider effects on these "other fish."

Management Recommendations

If the habitat project proceeds, collect population information within the improvement area and at the control site. Monitor the effects of improvements on habitat and document effects on native and non-native species. Sampling should be conducted annually for three years after improvements are completed.

Table 8. Results of Box Elder Creek Sampling (control and improvement site).

Species	No.	Average Length	Length Range	Number/ Mile	Pounds/ Mile
		Control Site			
BNT	36	10.3	3.1-13.3	720	358.4
LND	1	3.2	3.2- 3.2	0	0.0
LNS	11	10.1	2.7-13.5	280	139.6
MTS	4	6.9	6.0- 7.8	0	0.0
RBT	5	9.3	6.0-11.4	80	9.6
WHS	9	12.2	3.0-15.4	200	170.4
TROUT				720	358.4
SUCKERS				560	319.6
		Improvement Site			
BNT	7	12.4	11.0-13.4	118	80.2
LND	16	3.2	2.5- 4.2	662	13.2
LNS	33	10.2	2.8-15.9	757	454.2
MTS	49	5.3	2.6- 7.6	915	73.2
RBT	2	9.6	8.0-11.1	16	5.1
WHS	19	9.3	2.3-16.1	294	182.3
TROUT				134	85.7
SUCKERS				1966	709.7

Nowood River CY823040BN

AS - Aquatic Resource Surveys

Nowood River Sauger Population Estimate FX-CY-2NR-512

July 1999. Mark-recapture boat electrofishing was used to estimate abundance of sport fish in the lower Nowood River. Four passes were made through a 4.56 miles section (Hwy. 31 Bridge to Manderson). The primary objective was to obtain baseline population information for native SAR.

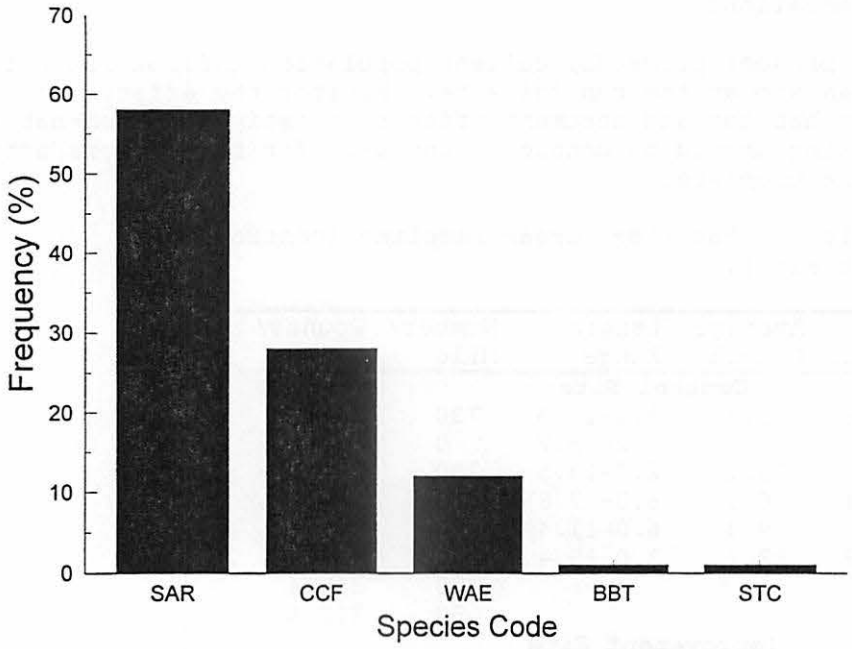


Figure 8. Frequency (percent) of sportfish collected during Nowood River electrofishing, 1999.

Although all sport fish were collected and marked, population estimates were possible only for SAR. Electrofishing captured 95 SAR, which averaged 16.4 inches (11.2-23.2). Total number of SAR per mile was 58±29 and total pounds per mile was 81±39. SAR were the dominant game fish, followed by CCF, WAE, BBT, and STC (Figure 8).

Management Recommendations

Electrofish above the first diversion (Hwy. 32 bridge) to determine SAR distribution.

Renner Reservoir - 2RR

Renner Reservoir CY420662BN

AS - Aquatic Resource Surveys

- Renner Reservoir Sampling FX-CY-2RR-512

June 1999. Annual spring electrofishing (night) gathered data for future management decisions. Abundance estimates for LMB ≥ 8 inches were generated using a formula developed by Edwards et al. (1997). The formula is Y=181.0X + 59.635, where Y=bass population density (number/ha) and x=electrofishing CPUE (number/minute).

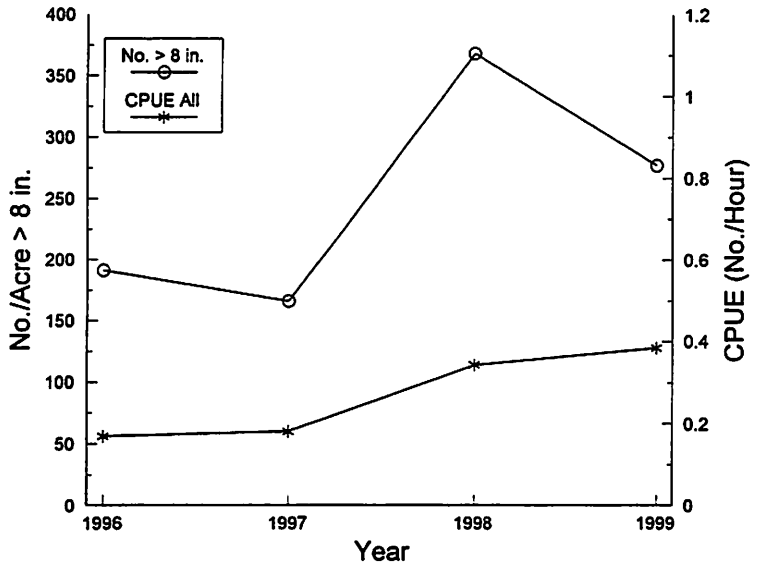


Figure 9. Renner Reservoir spring abundance estimates (1996-1999) for all LMB (CPUE) and adult LMB (No./Hectare > 8 inches).

Abundance of adult LMB (> 8 in.) increased sharply from 1997 to 1998, but declined slightly in 1999 (Figure 9). CPUE for all LMB has continued to increase since 1996, commensurate with strong year classes and good recruitment. Spring CPUE is a good indicator of the number of LMB available to anglers, since few age-0 and age-1 LMB are captured (i.e., selectivity of sampling gear). Conversely, fall electrofishing is a better indicator of the true LMB population. Fall sampling from 1996 through 1998 found strong year classes of age-0 LMB and good recruitment, which has led to the increased CPUE. Although adult abundance is below peak 1995 levels, maximum size in 1998 and 1999 (15.1 inches) was much greater than 1995 (10.5 inches). In addition, frequency of 12-15 inch LMB in 1998 and 1999 was much greater than previous years.

In 1998 the management strategy was changed to LMB and GBH. GBH replaced BNT, which were not planted in 1999. GBH were planted in 1997 (6,750) and 1998 (20,500). Abundance of GBH was low in 1998 (CPUE=12.0) and 1999 (CPUE=6.0), but growth was excellent (Avg. Length=4.2 inches; range=2.6-7.0 inches). CPUE should increase in 2000 as the 1999 plant reaches a size vulnerable to the sampling gear. Anglers reported catching GBH during 1999, but catch rates were low. In 1999 only 8,000 GBH were planted, because of poor availability from other states.

Management Recommendations

Continue spring and fall electrofishing to monitor LMB and GBH populations. Increase stocking of GBH to 36,000 (500/acre).

Buffalo Bill Reservoir - 2BB

Buffalo Bill Reservoir CY420152PK

PA - Planning and Administration

- Basin Management Plan FX-CY-2BB-121

  June 23, 1999. Updated Buffalo Bill Reservoir Basin Management Plan from one completed by Kent (1992). Document submitted to the Fisheries Management Coordinator for comment in late December 1999.

AS - Aquatic Resource Surveys

- Buffalo Bill Sampling FX-CY-2BB-512

Trap net and purse seine sampling to evaluate fish populations was completed in May 1999. In addition, purse seine and hydroacoustic surveys were completed in September 1999. The Reservoir Research Crew continues to assist with all data collection.

May 17-21, 1999. Set nine trap nets at standardized locations (Table 9). Concurrently, 30 purse seine hauls were taken during the week (Table 10).

Table 9. Number, number per net, average length, average weight, and average condition of fish captured in trap nets, Buffalo Bill Reservoir, May 17-21,1999. (34 overnight sets).

Species	Number	Number/net night	Average Length	Range	Average Weight	Average Condition
BNT	29	0.85	11.0	4.2-18.3	0.69	33.1
LAT	2	0.06	17.7	16.5-18.8	1.29	22.4
LKC	2	0.06	3.5	3.2-3.8	-	-
LND	20	0.59	3.0	2.0-4.9	-	-
LNS	19	0.56	7.5	4.1-11.5	0.17	34.0
MWF	1	0.03	13.5	-	0.95	38.6
RBT	101	2.97	10.5	2.7-18.6	0.70	34.8
WHS	268	7.88	10.3	1.7-18.6	0.99	37.8
YEP	37	1.09	4.8	2.5-8.1	0.05	38.4
YSC	37	1.09	13.1	4.4-17.0	0.99	35.2
Totals	516	15.18				

September 21-24, 1999. Took 28 purse seine hauls to determine species composition and density of fish (Table 11).

Comparing similar gear types from 1994 to 1999, the average trout catch rates continue to decline for purse seine samples while the catch of trout in trap nets was also low but similar to 1998 (Table 12). Sampling on the North Fork Shoshone River in 1999 indicated higher than normal numbers of adult fish. Large portions of these fish normally return to the reservoir post spawn and might explain lower fall 1999 reservoir counts.

The primary reason for trap netting in the spring is to monitor nongame populations. Since the modification of Buffalo Bill Reservoir, nongame numbers do not appear to be expanding.

Table 10. Number, number per haul, average length, average weight, and average condition of fish captured in the 30 foot deep purse seine, Buffalo Bill Reservoir, May 17-21,1999 (28 hauls).

Species	Number	Number/Haul	Average Length	Range	Average Weight	Average Condition
BNT	1	0.04	13.0	-	0.63	28.7
LAT	4	0.14	17.2	16.5-18.0	1.50	29.7
RBT	142	5.07	12.2	6.6-17.0	0.78	37.7
YSC	23	0.82	12.4	8.9-15.8	0.76	37.3
Totals	170	6.07				

Table 11. Number, number per haul, average length, average weight, and average condition of fish captured in 30 foot deep purse seine (28 hauls), Buffalo Bill Reservoir, September 21-24, 1999.

Species	Number	Number/Net	Average Length	Range	Average Weight	Average Condition
CRP	1	0.04	1.0	-	-	-
LAT	2	0.07	16.5	16.3-16.7	1.33	28.6
MWF	1	0.04	11.8	-	0.61	37.1
RBT	88	3.14	13.8	7.5-17.3	1.02	37.8
YSC	13	0.46	13.5	11.0-15.8	0.93	37.2
Totals	105	3.75				

Buffalo Bill Reservoir has experienced two extremely high water years (1996 and 1997) followed by a moderate water year in 1998. Inflows in 1999 were 25% higher than in 1998. See Figure 10, which illustrates inflow, and reservoir storage fluctuations that can have an impact on plankton production and trout growth.

Table 12. Netting Summary, Buffalo Bill Reservoir, 1994-99.

	1994	1995	1996	1997	1998	1999
SPRING						
ELEVATION	5352.30	5340.30	5345.70	5343.20	5372.30	5350.70
PS CPUE (trout)	9.12	9.70	15.40	12.10	8.20	6.07
TN CPUE (trout)	48.00	12.20	7.80	10.50	4.75	4.97
VG CPUE (trout)	-	-	0.78	-	-	-
TN CPUE (nongame)	72.69	32.19	18.90	33.94	7.64	9.15
FALL						
ELEVATION	5326.40	5378.70	5378.90	5386.10	5378.50	5378.50
PS CPUE (trout)	30.65	12.30	7.30	7.80	6.38	3.68
TN CPUE (trout)	35.11	3.20	4.80	-	-	-
TN CPUE (nongame)	24.30	22.06	15.30	-	-	-

A detailed analysis of fish condition is included in the Reservoir Research Crew section of this report. They concluded that size of rainbow caught in the fall has increased from an average of 12.4 inches to 13.8 inches. Length frequency analysis indicated that most trout in the sample fell into the 13-16 inch size range with few in the 5 to 9 inch range. This leads to speculation that recruitment to the Reservoir has declined. We feel, that in part, this is due to the series of high water inflows since 1995 within the North Fork Shoshone River drainage. Spring spawn RBT and YSC numbers suffer when runoff is high and of long duration.
Fish in the 17-20 inch size range continue to be in short supply in Buffalo Bill Reservoir.

Yellowstone cutthroat numbers from pelagic sampling were up from 1998 and accounted for 12.9% of the total trout catch in the purse seine.

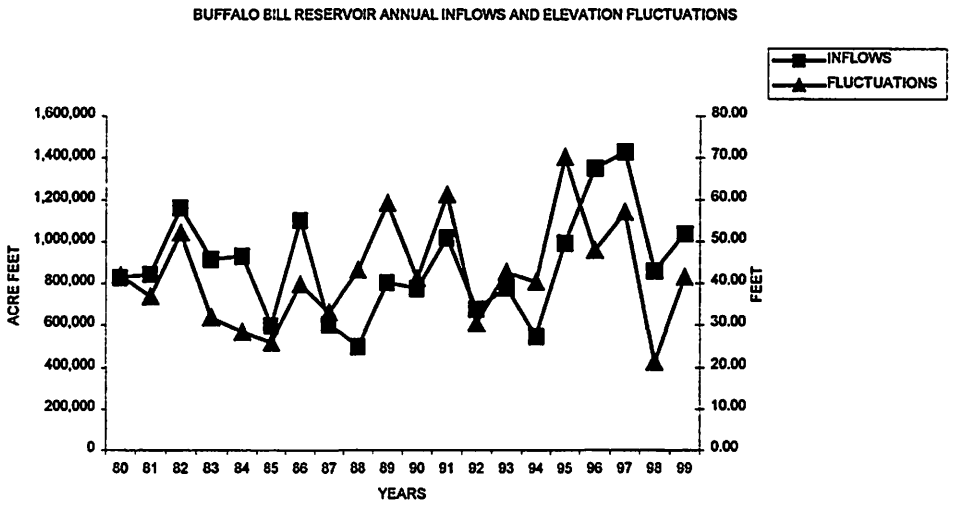


Figure 10. Average Inflow and Fluctuations, Buffalo Bill Reservoir, From 1980-1999.

Hydroacoustic surveys were again conducted in September 1999. Work was completed during daytime hours and, as in 1998, combined both side and down scan capabilities. Total fish numbers were estimated at 105,500 ± 33,300 (95% CI) and were only down nine percent from 1998 estimates of 116,500 ± 37,200 (95% CI). The 1998 and 1999 estimates were taken at an identical reservoir pool of 7,448 surface acres.

Vertical distribution of fish in 1999 appeared much different than in 1998. Results from 1998 gillnet surveys verified that fish found in deep water (100-140 feet) were mostly lake trout. Few fish were found in waters below 100 feet in 1999 surveys. These were partitioned by species based upon data gathered through 1998 gillnet sets. The accuracy of this may be in question and should be studied in 2000 using vertical gillnets to refine species composition figures for depths below 30 feet. Purse seine data defines the partition for depths above 30 feet. Sonar abundance estimates indicated a substantial drop in lake trout numbers and proportional increase in RBT and YSC numbers based upon shaky distribution data (i.e., 50% of sonar targets were below 30 feet and partitioned based upon 1998 data).

Physical/Chemical

The reservoir again spilled in 1999 and supplied the tailwater with fish (especially RBT) as indicated by sampling in October 1999. Water yield of 1,035,766 acre-feet was 20% above 1998 inflows (860,674 acre-feet). This is the third of four years where inflows were substantially above the long-term average for this drainage. The average annual inflow since 1980 was 887,548 acre-feet. The lake fluctuation was 41 feet. Naturally high inflows over numerous years will start to erode population dynamics by reducing recruitment. Growth will also decline as plankton levels are impacted by poor water quality and low water retention rates in the reservoir.

The Regional Fisheries Crew continues to cooperate with the United States Bureau of Reclamation (BR) to determine best water management practices. The Bureau is very cognizant of our desires to minimize reservoir fluctuations when possible while maximizing trout food production and trout survival. However, with high runoff years, their options are limited.

CA - Coordination and Assistance

- Bureau of Reclamation Entrainment Studies FX-CY-2BB-235

  September 12-18, 1999. The crew assisted BR install four strobe lights near Shoshone Conduit intake structure. A sieve net was operated during period to determine if lights would act as deterrent to entrainment. This was a preliminary investigation to test equipment and identify any necessary modifications to gear or methodologies. The lowest entrainment rates occurred when the lights were on. However, sample periods were short with no significant difference noted with lights on or off (Hiebert 1999)

CS - Creel Surveys

- Spot creel surveys FX-CY-2BB-520

  Spot creel checks by the regional fisheries management crew and local wardens indicated a decline in catch rates for 1999 (Table 13).

  Table 13. Buffalo Bill Reservoir (BBR) spot creel summary for data collected in 1999.

		Angler							Total	Fish	Catch
Water	SO	No.	Hours	RBT	CUT	YSC	BNT	LAT	Catch	Kept	/hour
BBR	FM	63	211.0	6	2	8	2	14	48	32	0.23
	WD	312	942.8	216	81	2	9	31	395	342	0.42

SO= Source of information; FM= Regional Fish Crew, WD= Warden

Catch rates during opening day events (July 1 and July 15) were down substantially in 1999 (CE=0.23) from 1998(CE=0.63). Here again high and murky water conditions played a role in angler success. Warden surveys conducted through out the year also showed a decline in angler success from 0.69 (1998) to 0.42 (1999). These catch rates are still above objective for this water; set at 0.35 fish per hour.

Management Recommendations

1) Continue to sample in May and September. 2) Assist RRC in September using hydroacoustics gear to develop reliable population estimates. 3) Immediately before or after September sampling, use gillnets (bottom sets and/or verticals) to augment species composition data gathered by purse seining for partitioning of acoustic targets. Work to standardize these netting locations. 4) Continue to gather spot creel information to determine angler success as time permits. 5) Formulate a standardized plankton sampling strategy to determine impacts that plankton fluctuations have on population numbers and fish growth 6) Continue to work with BR to formulate storage fluctuation level recommendations which will best benefit trout survival and production. 7) Contact Green River Region for information/techniques to reduce stress on trout brought to the surface from deep gill-net sets. 8) Assist BR (if requested) with Shoshone Conduit Entrainment Study

Beartooth Plateau - 2BP

Deep Lake CY180022PK

AS - Aquatic Resource Surveys

- Absaroka/Beartooth Lake Survey FX-CY-2BP-512

  August 17-20, 1999. Sampled lake using four-125 foot experimental gill net sets overnight for a total of 52.25 hours to determine present status of fishery (Table 14). Lake was also sounded for development of bathymetric information.

  Table 14. Gill Net Summary, Deep Lake, August 1999.

Species	Number	Number/Net Hour	Average Length	Range	Average Weight	Average Condition
BKT	137	2.62	9.2	4.7-12.4	0.28	34.5
YSC	13	0.25	10.9	7.5-14.5	0.47	31.8
Totals	150	2.87				

  Deep Lake was last sampled in 1972. Since then, BKT net catch rates have dramatically increased from 0.45 fish/hour to 2.62 fish/hour in 1999. YSC numbers have remained constant. This lake is extremely deep with a maximum of 505 feet noted through bathymetric surveys. Littoral feeding zones are extremely limited. Difficult access probably limits angler use.

Management Recommendations

Continue to manage lake as a wild fishery. Coordinate with engineering for development of bathymetric maps. Update 2BP Management Plan and stream lake inventory to reflect 1999 findings.

Heart Lake CY180432PK

AS - Aquatic Resource Surveys

- Absaroka/Beartooth Lake Survey FX-CY-2BP-512

  August 10, 1999. Sampled lake using one-125 foot experimental gill net set overnight for a total of 17.0 hours to determine present status of fishery. Lake was also sounded for development of bathymetric information. Took: 77 BKT (CE=4.53); mean length was 8.6 inches, with a range of 4.7 to 10.2 inches. Mean weight was 0.31 pound while mean condition was 50.3.

  This lake was last sampled in 1980 with a BKT catch rate of 0.45 fish/hour. Density of BKT in 1999 (CE=4.53) has increased substantially since 1980. Average length has also increased from 1980 (7.76 inches). Fishery appears to be healthy.

  Five transects were made across the lake to develop bathymetric information. Maximum depth was 117 feet. The littoral feeding zone was limited. Percent littoral zone will be included with detailed bathymetric mapping.

Management Recommendations

Continue to manage lake as a wild fishery. Coordinate with engineering for development of bathymetric maps. Update 2BP Management Plan and stream lake inventory to reflect 1999 findings.

Lower Sheepherder Lake CY180506PK

AS - Aquatic Resource Surveys

- Absaroka/Beartooth Lake Survey FX-CY-2BP-512

  August 9, 1999. Sampled lake using one-125 foot experimental gill net set overnight for a total of 17.4 hours to determine present status of fishery. Lake was also sounded for development of bathymetric information. Took: 60 BKT (CE=3.45); mean length was 7.8 inches, with a range of 4.3 to 10.8 inches. Mean weight was 0.18 pound while mean condition was 36.7.

  This lake was last sampled in 1980 with a BKT catch rate of 4.0 fish/hour. Density of BKT in 1999 has declined only slightly from 1980. Mean length noted in 1999 and 1980 have remained similar. Fishery has changed very little in the face of increased angler pressure.

  Five transects were made across the lake to develop bathymetric information. Maximum depth was 27 feet. The littoral feeding zone is quite extensive, especially at the south end of the lake. Detailed figures for total littoral zone (depth< 15 feet) will be developed from bathymetric mapping.

Management Recommendations

Continue to manage lake as a wild fishery. Coordinate with engineering for development of bathymetric maps. Update 2BP Management Plan and stream lake inventory to reflect 1999 findings.

Upper Sheepherder Lake CY180504PK

AS - Aquatic Resource Surveys

- Absaroka/Beartooth Lake Survey FX-CY-2BP-512

  August 9, 1999. Sampled lake using two-125 foot experimental gill net sets overnight for a total of 35.5 hours to determine present status of fishery. Lake was also sounded for development of bathymetric information (Table 15).

  This lake was last sampled in 1986 with a BKT catch rate of 1.29 fish/hour. Density of BKT in 1999 (CE=1.41) has increased only slightly from 1986. Mean length in 1999 (9.5 inches) declined slightly compared to 1986 (9.89 inches). This lake has a few very nice sized BKT considering the short growth season at this elevation (9,920 feet). Fishery has changed very little in the face of increased angler pressure.

  Table 15. Gill Net Summary, Upper Sheepherder Lake, August 1999.

Species	Number	Number/Net Hour	Average Length	Range	Average Weight	Average Condition
BKT	50	1.41	9.5	4.3-15.9	0.46	49.1
LKC	4	0.11	4.5	4.3- 4.6	0.06	69.2
Totals	54	1.51				

  Eight transects were made across this lake to develop bathymetric information. Maximum depth was 29 feet. The littoral feeding zone is considerable around the perimeter of this lake. Detailed figures for total littoral zone (depth< 15 feet) will be developed from bathymetric mapping.

Management Recommendations

Continue to manage lake as a wild fishery. Coordinate with engineering for construction of bathymetric maps. Update 2BP Management Plan and stream lake inventory to reflect 1999 findings.

Emerald Lake CY180426PK

AS - Aquatic Resource Surveys

- Absaroka/Beartooth Lake Survey FX-CY-2BP-512

August 05, 1999. Montana sampled lake using one-125 foot experimental gill net set during the day for a total of 4.5 hours to determine present status of fishery (Table 16).

Table 16. Gill net summary, Emerald Lake, August 1999.

Species	Number	Number/Net Hour	Average Length	Range	Average Weight	Average Condition
BKT	2	0.44	12.8	12.5-13.0	0.38	18.1
YSC	8	1.78	13.9	9.8-16.0	0.55	17.8
Totals	10	2.22				

This lake was last sampled by Montana in 1991. Net catch rates for YSC and BKT have changed very little in eight years. In 1991, CE for YSC was 2.0 with a BKT catch rate of 0.12 fish/hour. Mean length of YSC has increased from 9.7 inches in 1991 to 13.9 inches in 1999. Mean length of BKT also increased but only slightly (1991 BKT AL= 12.05 inches). Reports of poor condition fish in 1991 have not changed in 1999. Lake was last stocked in 1987 by Montana. Spawning potential is limited, but adequate to supply this fishery considering the limited growing season and food production. Lake should no longer be stocked.

Management Recommendations

Manage as wild fishery. Update 2BP Management Plan and stream lake inventory to reflect 1999 findings.

Little Glacier Lake CY180421PK

AS - Aquatic Resource Surveys

- Absaroka/Beartooth Lake Survey FX-CY-2BP-512

August 05, 1999. Montana sampled lake using one-125 foot experimental gill net set during the day for a total of 2.5 hours to determine present status of fishery. Net caught 15 BKT (CE=6.00); mean length was 8.0 inches and length range was 6.9 to 9.9 inches; mean weight was 0.08 pound. Condition factor was low at 15.0.

Last sampling on this lake was also completed by Montana in 1991. Catch contained 33 BKT with a mean length of 7.4 inches and range of 5.9 to 10.8 inches. Net also caught 17 CUT thought to come from Glacier Lake in high water conditions. Mean length of CUT was 13.1 with a range of 7.8 to 17.2 inches. Catch rates for this sampling were not available for comparison with work completed in 1999.

Condition factor suggested that productivity is low. Additional stocking should not be considered.

Management Recommendations

Continue to manage as wild fishery. Update 2BP Management Plan and stream lake inventory to reflect 1999 findings.

Glacier Lake CY180410PK

AS - Aquatic Resource Surveys

- Absaroka/Beartooth Lake Survey FX-CY-2BP-512

August 02, 1999. Montana sampled lake using one-125 foot experimental gill net set overnight for a total of 18.25 hours to determine present status of fishery (Table 17).

Table 17. Gill Net Summary, Glacier Lake, August 1999

Species	Number	Number/Net Hour	Average Length	Range	Average Weight	Average Condition
BKT	13	0.71	9.8	8.3-12.0	0.17	17.8
YSC	27	1.48	10.0	6.7-14.5	0.20	20.3
Totals	40	2.19				

Numbers of YSC captured increased since the last sampling in 1991. Catch rates were 0.58 fish/net hour in 1991 compared to a CE of 1.48 in 1999. Catch rates of BKT have changed little over the last 8 years.

This lake straddles the state line with the lower SW corner in Wyoming. Montana has been stocking YSC with the last plant in 1997 (125/SA).

Management Recommendations

Continue to cooperate with Montana for management of this lake with Montana taking the lead. Update 2BP Management Plan and stream lake inventory to reflect 1999 findings.

Lake Promise CY180428PK

AS - Aquatic Resource Surveys

- Absaroka/Beartooth Lake Survey FX-CY-2BP-512

August 10, 1999. Surveyed lake for fish populations and completed four transects for bathymetric information. Found no evidence of fish population based upon presence of large invertebrates indicative of fishless waters. Sampling in 1980 found similar results.

Maximum depth of lake was 32 feet. Littoral zone appears to be adequate to sustain a fishery.

Management Recommendations

Continue to manage lake as barren/virgin water. Coordinate with engineering for the completion of bathymetric maps. Update 2BP Management Plan and stream lake inventory to reflect 1999 findings.

Frozen Lake CY180507PK

AS - Aquatic Resource Surveys

- Absaroka/Beartooth Lake Survey FX-CY-2BP-512

  August 12, 1999. Sounded lake for bathymetric information. This is the second attempt to complete this work after tape malfunction on first. Maximum depth was 13 feet. Lake has abundant littoral zone, but with limited water depths winter conditions may be severe. This lake has small BKT population, last sampled in 1997.

Management Recommendations

Continue to manage lake as wild fishery. Coordinate with engineering for the completion of bathymetric maps. Update 2BP Management Plan and stream lake inventory to reflect 1999 findings.

Fort Lake CY180340PK

AS - Aquatic Resource Surveys

- Absaroka/Beartooth Lake Survey FX-CY-2BP-512

  August 12, 1999. Sounded lake for bathymetric information. Maximum depth was 18 feet, but majority of lake was less than 7 feet deep. Consequently, lake has abundant littoral zone. Fort Lake has small BKT population, last sampled in 1986. Most recruitment comes from outflow tributary streams of the Chain Lakes/Canyon Creek complex.

Management Recommendations

Continue to manage lake as wild fishery. Coordinate with engineering for the completion of bathymetric maps. Update 2BP Management Plan and stream lake inventory to reflect 1999 findings.

Overall Basin Management Recommendations

Select 5-10 waters to sample annually. Use Table 5 of 2BP Plan as priority list. Gather bathymetric and chemical information were needed.

Beck Lake Rec. Area - 2BR

Work Not Associated With A Particular Water

CS - Creel Surveys

- Spot Creel Surveys FX-CY-2BR-520

  Spot creel surveys in 1999 (Table 18) indicated catch rates have declined in Beck Lake and Markham Reservoir when compared to 1998 data, but increased for New Cody Reservoir.

  Table 18. Spot Creel Data Summary, Beck Lake Recreation Area, 1999.

Water	SO	Angler No.	Hours	RBT	CUT	YEP	Other Species	Total Catch	Fish Kept	Catch /hour
BECK LAKE	WD	73	111.9	1	11	18	15	76	45	0.68
MARKHAM RES.	WD	9	11.2	6				6	6	0.54
NEW CODY RES.	WD	98	159.6	86	8	5	3-BNT	188	102	1.18

SO= Source of information - FM= Regional Fish Crew, WD= Warden

Management Recommendations

Intensify spot creel surveys by management crew. Three year interval sampling will be conducted May 2000 to evaluate stock regime changes made in 1997. Continue to monitor new raw water system impacts to New Cody and Markham Reservoir.

Clark's Fork River Drainage - 2CF

Clarks Fork River, Lower CY882020PK

AS - Aquatic Resource Surveys

- Fish Population Sampling FX-CY-2CF-512

September 8, 1999. Sampled from Edelweiss to below the hatchery to determine status of trout populations. The effort was a one pass exploratory run designed primarily to assess grayling numbers (Table 19). We presently stock 5,000 GRL at 19.0/pound and only located about 3 per mile in sampling conducted upstream (rock project to the Beartooth Ranch) in 1998. We were unsuccessful in locating any GRL in 1999. The plant will be discontinued in 2000. Present plants are now being limited to RBT and YSC. Large numbers of MWF were also taken in this section. We will need to do a better job encouraging anglers to harvest this under utilized resource.

Table 19. Raft electrofishing summary, Lower Clarks Fork River, Edelweiss to below the Clarks Fork Hatchery, September 1999.

Species	Number	Average Length	Length Range	Average Weight	Weight Range	Average Condition
BNT	118	13.4	7.3-20.8	1.03	0.13-3.28	37.1
RBT	111	11.2	6.5-19.7	0.57	0.11-3.32	36.4
SRC	1	15.0		1.41		41.8
YSC	10	12.1	9.6-20.7	0.79	0.34-3.72	34.4
Total	240					

Management Recommendations

Discontinue 5,000 GRL planted annually at 19.0/pound because of poor return/survival. Continue all other present management strategies. In addition collaborate with the regional Information and Education Specialist to inform the public about MWF availability, highlighting the culinary assets of this under utilized resource. Update 2CF with 1999 data and recommendations.

Fubar Reservoir CY480054PK

AS - Aquatic Resource Surveys

- Fish Population Sampling FX-CY-2CF-512

June 28, 1999. Electrofished with Jon boat for one hour to determine present status of fishery (Table 20).

Table 20. Fubar Reservoir sampling summary for one hour of boat electrofishing, June 1999.

The population of LMB originated from transplants in 1992 and 1994. Numbers have declined since sampling in 1995 with the catch per hour of 34.0 compared to 9.0 in 1999. RBT are annually stocked at a density of 1,000 catchables (4.0/lb). Comparison from 1995 to 1999 for RBT are not possible as fish were not stocked prior to sampling in 1995, which was not the case in 1999. This reservoir continues to be plagued by poor water quality and reduced depths. Enhancement was scheduled for 1999, but project is on hold at this time.

Species	Number	CPUE	Average length	Range	Average Weight	Average Condition
BLC	5	5.00	4.1	2.1-6.4	0.15	58.6
FHM	2	2.00	2.6	2.5-2.6		
LMB	9	9.00	11.4	3.8-19.0	1.50	59.8
RBT	12	12.00	10.2	8.8-12.1	0.33	30.5
WHS	15	15.00	13.9	6.0-18.3	1.35	41.5
YEP	11	11.00	6.4	3.9-8.7	0.14	50.0
Total	54	54.00				

Management Recommendations

Continue present fishery management strategies. Once reservoir elevation has been raised, conditions should improve for this water. Monitor populations using electrofishing in 2002.

Ruff Reservoir CY480053PK

AS - Aquatic Resource Surveys

- Fish Population Sampling FX-CY-2CF-512

May 25, 1999. Electrofished with Jon boat for one hour to determine present status of fishery (Table 21).

Table 21. Ruff Reservoir sampling summary for one hour of boat electrofishing, May 1999.

Species	Number	CPUE	Average length	Range	Average Weight	Average Condition
LMB	71	71.00	5.8	2.4-11.5	0.13	51.2
RBT	22	22.00	11.5	10.5-14.2	0.66	42.9
Total	93	93.00				

This lake was last sampled in 1994. Catch of LMB was 20 fish/hour compared to a substantial increase noted for 1999 (CE=71.0 fish/hour). RBT numbers also increase slightly from 20 fish/hour in 1994 to 22 fish/hour. Stocking density for RBT has remained at 500 catchables annually throughout this time period. Of the four silt retention reservoirs in this complex, Ruff remains the most viable fishery. LMB populations appear to be in good shape with substantial evidence of natural reproduction occurring.

Management Recommendations

Continue present fishery management strategies. This reservoir would also be a good candidate for enlargement when monies become available. Monitor populations using electrofishing in 2002.

Barr's Creek CY883125PK

AS - Aquatic Resource Surveys

- Fish Population Sampling FX-CY-2CF-512

  August 24, 1999. Backpack electrofished 525 feet of stream to determine status of fishery at Morrison Trail Crossing (Z12, E625410, N4967636). Two-pass estimate was conducted. Took 59 BKT (601 fish/mile); average length was 5.8 inches and ranged from 2.8 to 9.0 inches; Average weight was 0.13 pound and ranged from 0.06 to 0.31 pound; average condition was 46. Total pounds/mile were 78.1 while pounds/acre were 161.2.

  Objectives were to determine if YSC were in the headwater reaches of this creek and assess fish population through a US Forest Service grazing allotment study site. No YSC were taken. BKT populations were good in this small high gradient stream.

Management Recommendations

Continue to manage as wild fishery. Update 2CF plan with findings from 1999 sampling. Check lower reaches when time permits to determine species composition and abundance.

Ghost Creek CY883675PK

AS - Aquatic Resource Surveys

- Fish Population Sampling FX-CY-2CF-512

  August 23, 1999. Backpack electrofished two stations to determine status of fishery. No fish were seen or taken in 450 feet at the upper station located down stream of the gravel pit within the US Forest Service study area (Z12, E607046, N4973885). Good BKT population was found near Lewis and Clark Trail on the lower end of the stream (Z12, E607455, N4970557). Took 53 BKT through one-pass of 300 feet. Average length was 4.6 inches and ranged from 1.6 to 8.3 inches; Average weight was 0.10 pound and ranged from 0.04 to 0.25 pound; average condition was 45. Total pounds/mile were 78.1 while pounds/acre were 161.2.

  Objectives were to determine if YSC were in this drainage and to assess fish population through a US Forest Service grazing allotment study site. No YSC were taken. BKT populations were good in the lower reach of the creek but none were found in the upper station that was extensively grazed. Habitat conditions on the lower station were good with few grazing impacts noted.

Management Recommendations

Continue to manage as wild fishery. Update 2CF plan with findings from 1999 sampling.

Squaw Creek CY883700PK

AS - Aquatic Resource Surveys

1) Fish Population Sampling FX-CY-2CF-512

   August 25, 1999. As part of an extensive survey of fish populations and habitat conditions, we backpack electrofished two stations on Squaw Creek and completed PMB analysis. The road adjacent to the creek was scheduled

for relocation to improve access, reduce damage to riparian areas and facilitate the removal of two culverts that have impeded fish movement. The structures have also down cut the stream channel. This area was also greatly damaged by the 1988 fires. Restoration was initiated by the US Forest Service with road relocation accomplished by Park County Road and Bridge in late fall 1999. Game and Fish voiced concerns during the planning process about habitat changes that might impact the fishery once the culverts were removed. This sampling effort was to provide baseline information prior to habitat manipulation.

A three-pass estimate was completed below the first culvert (Z12, E604358, N4971052) for 345 feet. A four-pass estimate was also conducted between the first and second culvert (Z12, E603639, N4971362) for 300 feet. Table 22 contains results of these efforts. A cursory check above the third culvert (which is slated to be removed and replaced with an open bottom structure) indicated only one RBT in about 300 feet. Abundant Northern spotted frogs were also found along the creek.

September 29, 1999. Habitat carrying capacity was determined at both sites using the PMB methodologies (Hubert 1996). Water levels had receded between the time that fish were sampled and PMB measurements were taken. The PMB estimate for below the culverts was 56.29 pounds/acre, while between the culverts was slightly higher at 59.03 pounds/acre. The standing crop estimate at each site was higher that the PMB estimate (Table 22). These estimators would have been more comparable if taken at similar times. However, this will still provide good baseline information for habitat comparisons should culvert removal change present conditions.

Table 22. Squaw Creek electrofishing results at two stations, August 1999.

Squaw Creek below 1st culvert, 08/25/99, Elevation 6780							
Species	SIZE	NO.	AVERAGE LENGTH	AVERAGE WEIGHT	NO/MILE	LBS/MILE	LBS/ACRE
BKT	1.4>	18	4.9	0.08	276	22.0	20.8
BKT	>6.0	4	9.0	0.20	62	12.4	11.7
RBT	3.4>	69	6.1	0.06	1057	63.4	59.9
RBT	>6.0	38	7.2	0.09	583	52.5	49.6
RXC	>6.0	1	7.5	0.08	15	1.2	1.2
Totals	ALL	88			1348	86.6	81.9

Squaw Creek between 1st and 2nd culvert, 08/25/99, Elevation 6880							
Species	Size	No.	Average Length	Average Weight	No/Mile	Lbs/Mile	Lbs/Acre
BKT	4.9>	6	6.0	0.10	115	10.6	9.6
BKT	>6.0	3	6.9	0.15	53	7.9	7.2
RBT	3.1>	38	6.1	0.12	687	68.7	62.2
RBT	>6.0	19	8.0	0.21	335	70.4	63.8
RXC	>6.0	1	8.9	0.33	18	5.8	5.3
Totals	ALL	45			820	85.1	77.1

Management Recommendations

Continue to manage as wild fishery. After culverts are removed, monitor for any changes that occur to habitat and fish populations once the stream stabilizes. Update 2CF plan with findings from 1999 sampling

Greybull River Drainage - 2GR

Meeteetse Creek CY822360PK

AS - Aquatic Resource Surveys

- Drainage Survey FX-CY-2GR-512

July 13, 1999. To determine management/reintroduction options, sampled creek using backpack electrofishing near Jack Horowitz property (upstream of Horse Creek-Z 12, E656492, N4898258). Table 23 indicates the catch of a one pass of 528 feet. This station was below a major water diversion that feeds Horse Creek Reservoir. Water is used for irrigation. Fish are lost to the canal, but probably take refuge in the reservoir. The creek channel was wide and shallow with fish habitat characterized as only fair.

SRC continue to persist in the drainage with the last stock coming in 1977. A local landowner that would not grant access thwarted attempts to sample headwater areas of the creek. The last sample near this site occurred in 1969. At that time SRC dominated trout numbers but were mostly from 1968 and 1969 stocking. Nongame species are the same. However, the number of LND has increased in proportion to MTS.

Table 23. Sampling Summary, Meeteetse Creek, July 1999.

Species	Number	Average Length	Length Range	Average Weight	Weight Range	Average Condition
LND	30	3.3	2.5-04.2	0.02	0.01-0.03	36.6
MTS	10	5.4	2.8-07.3	0.07	0.02-0.11	35.3
SRC	5	9.4	5.5-13.7	0.43	0.07-1.02	42.7
YSC	6	7.2	5.5-10.2	0.18	0.08-0.39	42.5
Totals	51					

Management Recommendations

Continue to manage as wild fishery. Considering dewatering and present habitat conditions, Meeteetse Creek would be low on the priority list for YSC restoration efforts. Sampling of the creek above all diversions should be completed (when access is possible) before a final decision is made regarding restoration. Update 2GR plan and stream lake inventory with findings from 1999 sampling.

Horse Creek CY822367PK

AS - Aquatic Resource Surveys

- Drainage Survey FX-CY-2GR-512

July 12, 1999. To determine management/reintroduction options, sampled creek using backpack electrofishing above road crossing (upstream of Horse Creek Reservoir; Z 12, E656642, N4899446). Table 24 shows the catch of a one pass run through about 300 feet. The creek channel was small and narrow. Some grazing impacts were noted. Fish habitat was characterized as fair.

Last sampling on this creek was in June 1977. No YSC were found at that time with SRC the dominant trout species. Nongame species then were LND and MTS. No MTS were taken in 1999. Creek would be low priority for YSC restoration.

Table 24. Sampling Summary, Horse Creek, July 1999.

Species	Number	Average Length	Length Range	Average Weight	Weight Range	Average Condition
LKC	12	4.0	1.4-5.2	0.03	0.02-0.06	41.2
LND	8	2.9	2.1-3.8			
SRC	1	8.9		0.22		31.2
YSC	6	8.1	5.6-11.4	0.23	0.07-0.48	36.1
Totals	27					

Management Recommendations

Continue to manage as a wild fishery. Update 2GR plan with results of 1999 sampling.

Lower Shoshone River Drainage - 2LS

Work Not Associated With A Particular Water

PF - Public Fishing Development

- Fishing Access Development FX-CY-2LS-061

Continued to work with federal, state, local agencies and private landowners to obtain additional and improved access for anglers and floaters at the following locations:
1) Gyp Plant Area—area development is pending until a Shoshone River agreement is signed with the BR.
2) Stock Property—City of Cody has completed most development on the Stock Property including bike/pedestrian trails and comfort station.
3) Corbett Dam (float access)—expansion of the PFA will be pursued when a downstream egress site is negotiated.
4) Darling PFA-no legal access available to this site. Future work will focus on access via George Property and canal crossing in conjunction with Hall Property.
5) Buck Creek Area—still pursuing an agreement with landowner for permission to use canal road as stipulation of the Canal Act.
6) BR gravel pit near West Park Hospital-area development of the gravel pit area will continue when BR agreement is signed.

Management Recommendations

Continue to pursue additional access as time permits.

Shoshone River, BB>Corbett CY821095PK

Aquatic Resource Surveys

- Fish Population Sampling FX-CY-2LS-512

As part of the instream flow evaluation study, spring and fall sampling of the Shoshone River tailwater was completed in 1999.

March 23, 1999. Attempted to conduct spring population estimates on the Shoshone River from the Gage to Belfry Bridge. However, as in 1996, hydrogen sulfide (H_2S) levels moved most fish to the lower end of the station. Results of exploratory sampling are shown in Table 25.

Table 25. Exploratory shocking summary, Shoshone River, Gage To Belfry Bridge, March 1999.

Species	Number	Average Length	Length Range	Average Weight	Weight Range	Average Condition
BNT	64	10.3	5.6-16.1	0.45	0.07-1.07	34.4
RBT	67	11.7	5.1-15.5	0.63	0.05-1.32	37.1
SRC	25	12.0	10.3-15.9	0.65	0.35-1.39	36.0
YSC	4	14.3	11.7-15.8	0.98	0.51-1.52	32.3
Totals	160					

Mean total discharge for the sampling day was 773 cfs and had been reduced from 1082 cfs on March 22, 1999 to accommodate sampling. The only water condition differences between 1996, 1998 and 1999, was that the BR began increasing discharges for flood control early in March 1996 and 1999. In contrast, 1998 population estimates were completed before substantial increases in flow occurred with no increased H_2S levels noted. Whether these increased spring discharges are impacting/increasing mineral spring activity is unknown, but appear suspect.

March 29, 1999. To pinpoint where the increased H_2S might be coming from, the University of Wyoming Coop Unit under the direction of Matt Dare sampled from the Dam to Belfry Bridge. No large amount of H_2S was noted. Matt theorized that this occurrence may have come from a belch of gas from springs near DeMaris, but this is speculation.

October 19-20, October 26-27, 1998. Conducted four pass raft electrofishing runs for population estimates through the standardized study station, Gage to Belfry Bridge, (Table 26). Good estimates were again obtained with coefficient of variation ranging from 11.72% for BNT to 9.34% for RBT.

Average discharge during fall 1999 sampling was 654 cfs and down from discharges in 1998 of 769 cfs.

Table 26. Shoshone River, Gage to Belfry Bridge, population estimates, October 1999.

Species	No.	Avg L (In)	No/ Mile	Lbs/ Acre	Lbs/ Mile	No> 6 In	No/Mile >6 In	Lbs/Ac >6 In	Lbs/ Mile >6 In
BNT	484	11.5	835	39.0	543.6	479	819	38.8	540.7
RBT	640	11.8	965	55.1	767.4	566	773	49.7	693.1
SRC *	440	12.3	699	37.8	526.3	439	699	37.8	526.3
SRC **	63	14.2	57	4.6	64.6	63	57	4.6	64.6
SRC ***	42	13.8	37	2.8	38.8	42	37	2.8	38.8
SRC +	9	14.9	6	0.5	7.6	9	6	0.5	7.6
SRC ++	25	14.7	25	2.2	31.1	25	25	2.2	31.1
SRC ALL	581	11.5	824	47.9	668.3	580	824	47.9	668.3
YSC	10	14.4				10			
ALL TROUT	1,715		2,625	142.0	1,979	1,635	2,415	136.5	1,902

*=Unmarked planted SRC, **=1995/97 AD marked SRC, ***=1997 ADR marked SRC, +=1996 ADL marked SRC, ++=1996 RPV marked SRC.

The following conclusions can be made from these estimates:

1) The total 1999 trout population (2,625 fish/mile) has stayed nearly identical to 1998 (2,649 fish/mile).
2) The BNT population (≥ 6.0 inches) increased for the second consecutive year from 658 fish/mile in 1998 to 819 fish/mile (24.5%) when comparing fall estimates. The strong year class noted in 1998 appears to be carrying the population with preponderance of 9 to 11 inch fish.
3) RBT numbers continue to be supplemented by reservoir spill (as noted by pale, washed out fish). Total population numbers were enhanced by small fish (some possible natural reproduction) to a level of 965 fish/mile compared to 835 in 1998. Numbers of RBT≥ 6 inches has changed little since 1998. However, the average size has increased from 11.8 to 12.9 for that category.
4) This is the second year since catchable SRC plants (6,000 over 15.1 miles) were canceled in 1998. Marked fish in the population from plants made from 1995 through 1997 accounted for only 15% of the total population estimate of SRC. The number of SRC (unmarked) from the 1998 estimate was 684 fish/mile. This number increased to 699 fish/mile in 1999, but now includes both 1998 and 1999 year classes. If you assume that the majority of fish under 13 inches are from the 1999 year class, length frequency data suggest that 40% or 280 fish/mile are from the 1998 year class. This would be an improvement from past year carry-over, but a decline for 1999 subcatchable survival. The increased number of larger SRC taken in 1999 was noticeable. The overall length of all SRC increased from 10.8 inches (1998) to 12.7 inches. Streamside vegetation, ideal cover and feeding sites for SRC continues to rebounded from poor condition caused by the high water releases of 1996 and 1997.
5) The total population of fish over six inches at 2,415 fish/mile continues to be excellent and provides great angler opportunities/diversity for this urban area.

CA - Coordination and Assistance

- Shoshone River Coop Studies FX-CY-2LS-551

The University of Wyoming Coop study of trout ecology under the direction of Matt Dare has completed its second winter of study. The Regional Fish Crew has been actively involved with the planning and development of this project. Equipment has been provided when necessary. Study results and conclusions are expected in 2000.

CS - Creel Surveys

- Spot Creel Survey FX-CY-2LS-520

The local Game Warden contacted 192 anglers in 1999, who fished 311.5 hours to catch 49 RBT, 22 BNT, 75 CUT, 18 SRC and 2 YSC, for an excellent catch rate of 1.51 fish/hour. This compares to 1.10 fish/hour taken in 1998.

April 7-8, 1999. Reinstalled voluntary creel boxes at three locations (Hayden Arch Bridge, Stock Property and Belfry Bridge). Recorded use by anglers was again highest at the Hayden Arch section within the Shoshone Canyon (71). Twenty-four anglers reported use for both the Belfry and Stock locations. The following information can be concluded:

One hundred and nineteen anglers fished 311.5 hours to catch 441 trout (CE=1.42) and kept 102 trout (CE=0.33). Rainbow represented 45% of the fish caught and released (C/R) and 39% of the fish kept while CUT represented 31% of the C/R and 51% of fish kept. Anglers from 17

different states used the river with 73.9% from Wyoming and the majority of those from Park County. Any trout was preferred by 87.6% of the responders. We asked anglers how satisfied they were with their fishing experience and found that 49% were very satisfied while 25% were somewhat satisfied. We also asked about the greatest influence on angler satisfaction rating. Data indicated the majority was fishing more for the pure enjoyment of scenery, weather, access and camaraderie than for number or size of fish caught.

Comparing 1998 results, we noted more anglers had used the volunteer boxes. Catch and harvest rates were down, while RBT replaced CUT as the species most caught and released. Anglers continue to harvest more CUT. Satisfaction and factors influencing the anglers experience have changed little.

Management Recommendations

1) Begin monitoring fish populations once every third year with next scheduled sampling in 2002. 2) Continue to pursue opportunities for improved angler access. 3) Assist Instream Flow Crew with final phases of their studies towards formulation of an instream flow recommendation to the Wyoming Water Development Commission. 5) Continue with voluntary creel survey program to monitor the heavy use sites downstream of Buffalo Bill Reservoir through the City of Cody. 6) Write administrative report summarizing results of population work since 1992. 7) Update 2LS management plan and river station databases with data from 1999. 8) Schedule population work for section of river from Corbett to Willwood in year 2000.

Shoshone River, Penrose to Big Horn Lake CY821090BN

AS - Aquatic Resource Surveys

- Fish Stock Evaluations FX-CY-2LS-510

October 5-6, 1999. Sampled below Penrose Dam to determine survival of SMB planted in 1996-98. Population estimates were not possible as fish capture was limited. Water conditions were murky. No SMB were found through two study reaches. See Table 27 for inventory results.

Table 27. Raft electrofishing results from the Lower Shoshone River, Penrose to below Williamson well site, Z12, E0696169, N4962048, (Station 1) and from Hooker Lane Bridge to near Cemetery Pond, Z12, E719841, N4972480, (Station 2), 1999.

Species	Number	Average Length	Length Range	Average Weight	Weight Range	Average Condition
Station 1						
BNT	17	11.4	8.4-17.5	0.77	0.22-2.49	41.1
BRC	1	18.6		2.5		38.9
RBT	1	11.7		0.64		40.0
Station 2						
BNT	2	12.3	12.2-12.3	0.65	0.65-0.65	35.4
Total	21					

Station 1 includes lands under WIA and has a limited potential as a good fishery due to dewatering, increased water temperatures and poor water quality especially during the irrigation season.

Management Recommendations

1) Discontinue stocking of SMB. 2) Remove angler access option from WIA agreement if it does not jeopardize the overall package. 3) Manage this stream reach as wild. 4) Update 2LS BMP to reflect 1999 findings and recommendations.

Luce and Hogan Reservoirs - 2LH

Luce Reservoir CY480180PK

CS - Creel Surveys

- Voluntary Creel Boxes and Spot Creel Surveys FX-CY-2CF-520

April 7, 1999. Reinstalled voluntary creel box at the Luce and Hogan parking area to assess angler success on Hogan and catch rates on Luce Reservoir. Use was very limited with only 22 anglers responding (only 7 from Hogan). On Luce Reservoir 15 anglers fished 53.7 hours to catch 68 trout for an excellent catch rate of 1.27 fish/hour. The majority of the anglers were from Park County, Wyoming. Lures were the preferred tackle with most fishing from shore. The satisfaction rating was mostly neutral or very satisfied. Fishing for the pure enjoyment of the outdoors and other consideration influenced the satisfaction rating the most.

Neither the crew nor local Game Warden conducted spot creel surveys on Luce Reservoir in 1999. This needs to be improved in the future.

Hogan Reservoir CY480176PK

CS - Creel Surveys

- Spot Creel Survey FX-CY-2LH-520

Only one angler was checked by the local Game Warden on Hogan Reservoir in 1999. Catch rate was one fish/hour. Voluntary creel information indicated that seven anglers fished 25.2 hours to catch and release nine SRC and three suckers and harvest five trout (C/E=0.56) (H/E=0.20). Angler satisfaction was on the low end of the scale, but most were there to enjoy the scenery rather then to be too concerned with fishing.

Management Recommendation

Continue to manage Luce Reservoir as trophy water. Discontinue collection of voluntary creel data in 2000, as response was too low. Increase crew spot creel checks in 2000. Work with local Game Warden to collect angler use data on both Luce and Hogan. Work with aquatic habitat biologist and landowner to submit water development grant proposal for head gate restructuring on Luce Reservoir in late 2000. Calculate MEI from average depth measurements from bathymetric data collected in 1998. Maintain current stocking regimes on Hogan Reservoir. Continue to work with those ranches that have storage rights in this reservoir to minimize draw down and over winter impacts to this fishery.

Newton Lakes - 2NL

Work Not Associated With a Particular Water

- Newton Lake Steering Committee FX-CY-2NL-140

  Committee did not meet in 1999, however numerous activities were completed by committee membership:

  1. Poor showing of Newton Lake Endowment Fund has prompted TU to discontinue placing funds in the account and seek legal advice as to options to withdrawal existing money from the fund. Money raised in 1999 was placed in a separate account until this issue is resolved.
  2. Park County assisted with the construction of an infiltration structure between the West and East Lake to protect against undesirable species introduction from the West Lake.
  3. Problems with the comfort station including vandalism, sanitation, tank pumping and general upkeep were remedied by TU when they agreed to temporarily fund a maintenance contract for this facility. A permanent solution to these issues is needed and will require a funding commitment by the WGFD, BR or special interest groups - at least until endowment funding is available.
  4. Three weeks of pumping from the West to the East Lake was conducted to reduce lake levels for scheduled rehabilitation and to reduce the possibility of flood. This effort required a sizeable commitment from both TU and the Absaroka Flycasters to man the pump.
  5. With voluntary help from Absaroka Flycasters 60.0 acre-feet of water was also pumped into the East Lake from the Heart Mountain Canal in 1999.

East Newton Lake CY320078PK

AS - Aquatic Resource Surveys

- Fish Population Sampling FX-CY-2NL-512

  March 30, 1999. Sampled fish population to determine growth of ELR and survival of BNT, BKT, and SPK plants. This was in conjunction with the annual egg collections. Took random sampling of many trap net sets (Table 28).

  Table 28. Netting Survey, East Newton Lake, March 1999.

Species	Number	Average Length	Length Range	Average Weight	Weight Range	Average Condition
BKT	10	17.3	15.6-18.6	2.26	1.82-2.58	43.8
BNT	29	20.7	19.0-23.1	3.35	2.48-4.34	38.6
ELR	145	19.6	11.6-25.8	3.05	1.81-6.19	40.0
SPK	92	20.1	17.0-23.0	2.91	1.82-3.89	35.0
Totals	276					

  The average size of ELR increased from 19.0 inches and 2.81 pounds in 1998 to 19.6 inches and 3.05 pounds in 1999. Over 41% of the fish sampled were 20 inches or over. The trophy regulation on this water allows the harvest of one fish over 20 inches. Now that more fish are available for harvest, angler satisfaction has been high. Figure 11 illustrates growth of ELR since 1992. Nice BNT and SPK are being caught and also are popular with anglers. Our BKT plants appear to have been only marginally successful but are providing some trophy quality fish. The size of stocked ELR was increased from 90.0/pound to 19.0/pound in 1999 to reduce predation from BNT and SPK with the main goal to maintain brood stock numbers.

- East Newton Lake Spawning Operation FX-CY-2NL-712

March 30, 1999. Assisted Spawning Crew take of 424,727 ELR eggs from 199 females using 152 males for a per female egg take of 2,134. The percent eye was 73%. Lengths and weights were also taken from green fish and used to assess annual growth trends.

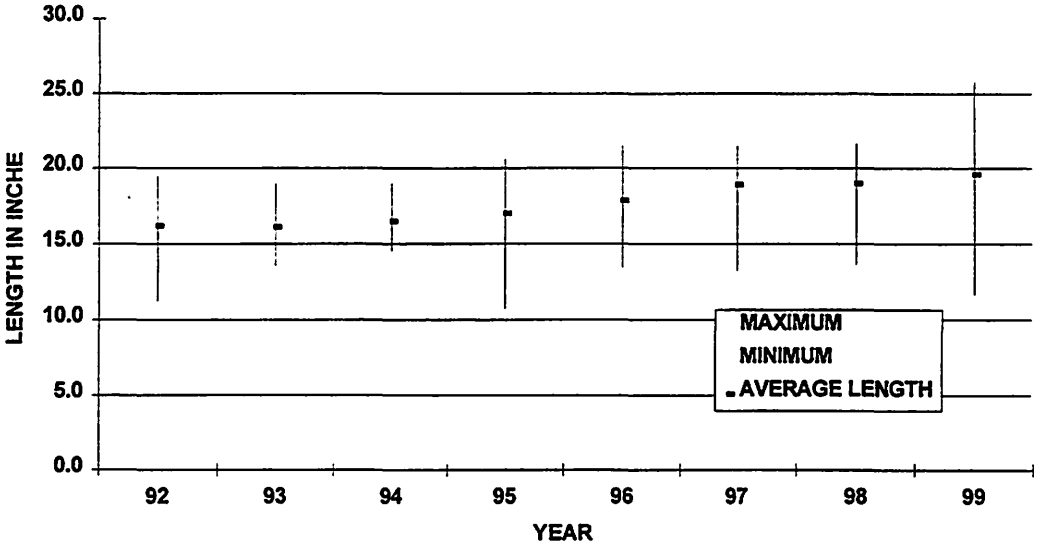


Figure 11. Growth Of ELR, East Newton Lake, 1992-1999.

- Spot Creel Surveys FX-CY-2NL-520

Very few fish were harvested from East Newton Lake in 1999 (CE=0.03) compared to 1998 (CE=0.49 fish/hour). However, catch rates were still similar to 1998 (0.41 vs. 0.49 fish/hour in 1998) (Table 29).

Table 29. Spot Creel Summary, Newton Lakes, 1999.

Water	So	Angler No.	Hours	RBT	CUT	BNT	YEP	Total Catch	Fish Kept	Catch /hour
E.Newton Lake	FM	8	14.7					22	0	1.50
	WD	215	456.3	13		1		189	15	0.41
W.Newton Lake	WD	29	61.9		28		91	221	119	3.57

SO= Source of Information: FM= Regional Fish Crew, WD= Warden.

April 7, 1999. Reinstalled a voluntary creel box at Newton Lakes Recreation Area to assess angler use. The following can be concluded:

Fifty-one anglers responded to the survey. Forty-one percent were boat versus bank anglers. Anglers from ten different states were represented with the majority from Park County, Wyoming. A total of 161.4 hours were expended to catch 88 RBT (3 kept) and 12 BNT (0 kept) and 3 unidentified trout (1 kept). A majority used flies as the tackle of choice. The satisfaction rating was 52%-very satisfied, followed by 22%-somewhat satisfied and very small portion was either neutral or somewhat dissatisfied. Size of catch had the greatest influence on satisfaction rating. This was not unexpected for this trophy water.

West Newton Lake CY320076PK

AS - Aquatic Resource Surveys

- Bathymetric Sampling FX-CY-2NL-510

  July Through November 1999. Lake's bathymetric characteristics were assessed due to higher than normal spring runoff inflows. An accurate calculation was necessary to determine chemical dosages for the scheduled rehabilitation of the lake. Worked with engineering to determine lake contained 759.3 acre-feet at elevation 5219.71 feet (40.2 SA). An area capacity table was established for the lake and lake elevation was monitored through out the summer and fall.

- Trapping and Transplanting FX-CY-2NL-730

  March 30-31, April 6, May 12-13, 1999. Set 6 trap nets each night to collect YEP and trout for transplant to area waters (Beck Lake, Wardell Reservoir and Diamond Creek Dike Pond). Collected a total of 6,452 YEP, 300 YSC and 1 BKT. This effort was aimed at reducing fish losses associated with the scheduled chemical rehabilitation of West Newton Lake and appease the public by enhancing the perch population in three desirable waters.

PM - Fish Population Management

- Chemical Control FX-CY-2NL-610

  April 1999. The crew continued to gather public input regarding the possible chemical treatment of this lake to eliminate an illegal plant of yellow perch. Public meeting was held with those in attendance in support of the plan to rehabilitate the lake. However, there were various opinions as to what species should be restocked. A small majority favored YSC and a green sunfish X blue gill hybrid as a pan fish.

  August 1999. Lake was deemed too high to rehab at this time and plans were made to reduce lake levels by pumping from the West to the East Lake. This effort was going to take considerable voluntary help from the TU and FFF sportsmen groups. The sell to these groups was difficult. We explained to them that pumping would accomplish three things:
  1) Reduce lake level for less expensive chemical treatment project.
  2) TDS levels in the West Lake were about 1,400 ppm and this water would enhance TDS levels in the East Lake that were about 426 ppm. This would improve the productivity of the East Lake.
  3) Reduce the potential for flooding, as West Lake was about 1 foot from overflowing into the East Lake. In addition, an overflow would have the potential to introduce YEP and suckers into the East Lake.

  After much consternation they agreed to assist with the project. But first an infiltration gallery was constructed in the channel between the West and East Lake to eliminate the possibility of undesirable fish introduction.

  Three weeks of pumping was concluded August 13, 1999 and was very labor intensive.

  November 15-17, 1999. With assistance from the Casper and Sheridan management crews along with volunteers, the chemical rehabilitation project was completed. Rotenone was applied at 1.5-ppm concentration and took about 2,348 pounds of powdered and about 30 gallons of liquid. Kill appeared to be 100%. Lake will be restocked with YSC in early spring 2000 after live car tests for residual rotenone is completed.

CS - Creel Surveys

- Spot Creel Surveys FX-CY-2NL-520

Yellow perch continue to dominate the spot creel catch at West Newton with catch rates extremely high (1.47 fish/hour)(Table 29).

April 7, 1999. Reinstalled a voluntary creel box at Newton Lakes Recreation Area to assess angler use. Only two anglers reported their fishing information on the card. These were bank anglers that fished for two hours to catch one perch and one sucker. They were of course somewhat dissatisfied. This typifies the angler attitude about the West Lake with the fishery limited to stunted YEP and trout in poor condition.

Management Recommendations

1) Continue to manage and stock East Newton Lake using present strategies.
2) Continue to gather financial support from community and interested parties for the Newton Lakes Endowment to cover maintenance costs.
3) Gather fishery growth information during the 2000 spawning operation and determine impacts on size structure of ELR from increasing the stock size in 1999.
4) Develop bathymetric data for East Newton Lake at full pool and adjust surface acre stocking densities if necessary.
5) Restock West Newton with YSC. Investigate other panfish species that will be more compatible with this water or nearby waters to provide for this type of public requested fishing opportunity.
6) Continue voluntary creel box for 2000. Restructure card to better distinguish the West from East Lake.

Swamp Lake - 2SL

Swamp Lake CY380520PK

PF - Public Fishing Development

- Fish Wyoming Project FX-CY-PD5-066

November 1999. US Forest Service resubmitted their application for Fish Wyoming Funding after the project was cancelled in early 1999 by inactivity on their part.
No other work was scheduled on this water in 1999.

Management Recommendations

We will schedule sampling on Swamp Lake in 2001. Contact local Game Warden and encourage him to increase spot creel checks to determine compliance with special regulation.

Sunshine Reservoirs - 2SR

Upper Sunshine Reservoir CY420055PK

CS - Creel Surveys

- Spot Creel Surveys FX-CY-2SR-520

  Spot creel surveys were completed by the local Game Warden in 1999 (Table 30). The catch rate for Upper Sunshine Reservoir continues to improve from 0.59 fish/hour in 1998 to 0.72 in 1999.

Management Recommendations

1) Sample Upper Sunshine Reservoir with RRC in Fall 2000. 2) Evaluate change in stock size of SRC from 40/pound to 19/pound instituted in 1999. 3) Update BMP with sampling data collected in 1999-2000. 4) Continue to encourage local warden to collect spot creel information on these waters to determine catch rates and angler satisfaction.

Table 30. Spot Creel Summaries, Sunshine Reservoirs, 1999.

Water	SO	Angler No.	Hours	CUT	YSC	BNT	Other Species	Total Catch	Fish Kept	Catch /hour
Upper Sunshine Res.	WD	236	709.0	248			96-SPK	509	347	0.72
Lower Sunshine Res.	WD	133	458.0	28		20	12-SPK	67	62	0.15

SO=Source of Information: FM= Fisheries Management Crew, WD= Warden.

Lower Sunshine Reservoir CY421028PK

CS - Creel Surveys

- Spot Creel Surveys FX-CY-2SR-520

  The catch rate from Game Warden spot creel checks on Lower Sunshine was 0.15 fish/hour and lower that the 0.35 fish/hour found in 1998 (Table 31). Reports in late 1999 suggest that BNT that were caught are in poor condition.

Management Recommendations

1) Sample Lower Sunshine Reservoir with RRC in Fall 2001 and place reservoir on an every other year sampling scheme to incorporate purse seining, trapnetting, and hydroacoustics. 2) Evaluate stocking recommendations made in 1999 that reduced BNT plant from 30,000 to 10,000 at 19.0/pound, while stock size of SRC was increased from 40/ pound to 19.0/pound to reduce predation on the SRC and force the BNT to utilize more non-game prey species. 3) Continue to coordinate with hatchery personnel for night stocking. 4) Update Basin Management Plan with 1999 sampling results and recommendations. 5) Continue to encourage local warden to collect spot creel information on these waters to determine catch rates and angler satisfaction.

Upper Shoshone-N. And S. Fk. Shoshone - 2US

North Fork Shoshone River CY821490PK

AS - Aquatic Resource Surveys

- Fish Population Sampling FX-CY-2US-512

  August 31, September 1 & 7, 1999. Raft electrofished for a three pass population estimate on the North Fork Shoshone River from Aspen Creek to above Elks Fork Creek (Table 31). Shocking efficiency was impacted by murky to muddy water conditions brought on by heavy thundershower activity.

  Overall Coefficient of Variance was 14.99% and higher than we like for good comparisons. This section was last sampled in 1995. Total numbers of fish have declined from 1,187 fish/mile to 797 fish/mile. However, numbers of fish ≥6 inches has actually increased from 479 fish/mile in 1995 to 716 fish/mile in 1999. If shocking efficiencies had been better our estimate of smaller fish might have been more comparable to 1995. Rainbow trout continue to dominate the population. The portion of YSC has increased from 3.2% of the total 1995 estimate to 20.7% in 1999. Condition of fish has also increased since 1995, while the number of fish ≥18 inches remains low.

  Table 31. Population estimates, Shoshone River, Aspen Creek to Elks Fork, August 1999.

Species	No.	Avg L (In)	No/ Mile	Lbs/ Acre	Lbs/ Mile	No> 6 In	No/Mile >6 In	Lbs/Ac >6 In	Lbs/ Mile >6 In
BKT	1	9.1				1			
BNT	11	13.6	11	1.1	11.0	11	11	1.1	11.0
RBT	405	10.7	601	35.4	343.6	386	546	33.7	327.0
YSC	130	12.2	186	15.3	148.2	125	172	14.7	142.3
ALL TROUT	547		797	51.8	502.7	523	716	43.7	423.6

CS - Creel Surveys

- Spot Creel Surveys FX-CY-2US-520

  July 1, July 15, 1999. Spot Creel surveys were conducted on opening day after spawning closure to determine catch, harvest and other trend information. The crew contacted 36 anglers that fished 91.2 hours to catch 41 fish (CE=0.45) and harvest 15 fish (CE=0.16). Water conditions were high and murky. Spot creel information gathered from the local Game Warden throughout 1999 showed a similar catch rate of 0.49 fish/hour and harvest rate of 0.12 fish/hour. This was based upon 256 anglers that fished 463.5 total hours. The catch was primarily RBT.

HP - Habitat Protection

- North Fork Highway Monitoring FX-CY-2US-540

  Considerable time was expended monitoring the Hanging Rock phase of the North Fork Highway project. This phase was completed in late 1999. The Palisade section is slated to begin in early 2000.

Management Recommendations

Continue to manage as a wild fishery. As part of rotational program, schedule sampling for this section again in 2002. Work with interested sportsmen groups to determine age structure of present population. Compare this information to that gathered by Kent 1984. If evidence shows reduced average age of mature fish, consider regulation change or length limit to protect older fish in the population. Determine public support for such a change for example from one over 20 inches to one over 18 or 17 inches.

South Fork Dike Pond CY420156PK

CS - Creel Surveys

- Voluntary Creel Boxes FX-CY-2US-520

  April 7, 1999. Reinstalled the voluntary creel box to assess angler success. Response continues to be very good with 50 anglers responding. Of those anglers, 98% fished from shore. Total catch was 61 trout (CE=0.44) with 33 of those trout (CE=0.24) kept. This is a decrease in both the catch (0.83) and harvest rates (0.40) seen in 1998. Anglers continue to report rainbow in the harvest (15%), but rainbow are not stocked in this water. These are most likely cutthroat trout that were incorrectly identified. Anglers from five different states utilized this water with the majority from Park County, Wyoming. In 1998 over 52% of anglers rated their fishing experience as very satisfying. However, in 1999 satisfaction ratings leaned toward the dissatisfied. Sampling in 2000 will determine if these complaints are valid. The largest influence on the anglers fishing experience continues to be for the pure enjoyment of the scenery.

  The local Game Warden also creel surveyed 65 anglers fishing 150.0 hours to catch 57 trout (CE=0.38) and harvested 49 (CE=0.32). Of harvested trout, 58% were CUT, followed by BNT (35%) and RBT (6%). Warden checks showed much better harvest rates than voluntary information.

Management Recommendations

Continue to monitor angler success through the use of a voluntary system. Schedule standardized netting for lake in July 2000. Verify if RBT are in this water. Update 2US BMP with results gathered in 1999.

Trout Creek CY821510PK

AS - Aquatic Resource Surveys

- Fish Stock Evaluation FX-CY-2US-512

  September 15, 1999. Backpack electrofished 340 feet of stream above forest boundary near Trout Creek Ranch (Robbie Keith) (Z12, E629061, N4931016). Conducted three pass for population estimates (Table 32). Evaluation was to determine survival of YSC stocked by helicopter in 1993, 1995 and 1999. Most YSC captured were from the 1999 helicopter plants. All fish appeared in excellent condition. To determine extent of movement of these fish, work will be scheduled farther up the drainage in 2000.

  Few larger fish were noted with most leaving this nursery stream by the time sampling took place.

  September 15, 1999. Conducted habitat measurement for PMB analysis. Results indicated that the habitat availability exceeds the present fish standing crop with PMB estimates of 53.29 pounds/acre compared to a standing crop of 43.0 pounds/acre.

Table 32. Backpack Electrofishing Results, Trout Creek, September 1999.

Species	No.	Avg L (In)	No/ Mile	Lbs/ Acre	Lbs/ Mile	No> 6 In	No/Mile >6 In	Lbs/Ac >6 In	Lbs/ Mile >6 In
RBT	21	6.1	388	31.2	77.8	13	217	21.8	54.5
YSC	37	3.9	730	11.8	29.5	3	47	4.6	11.5
ALL TROUT	58		1118	43.0	107.3	16	264	26.4	66.0

October 18, 1999. Toured four head gates on Trout Creek Ranch that cause fish loss. The local TU chapter is spearheading an effort to modify/rebuild these structures to allow for fish bypass. FMCY is very involved with this project and feels it is in important first step at protecting the spawning tributaries of the North Fork Shoshone River drainage. Money is available through the Fish and Wildlife Service and they are handling most design features. Work is slated to begin in 2000. This is just the first phase of an overall plan to improve the confluence area and first mile of stream to enhance this spawning tributary.

Management Recommendations

Conduct sampling at two upstream locations in 2000 to determine movement and survival of stocked YSC. Continue to work with interested parties on plans to modify head gate structures, reduce fish losses and enhance aquatic habitat.

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Regional Aquatic Wildlife Management Annual Progress Report

Green River Regional Fisheries Management Crew

Calendar Year 1999

Work Not Associated With A Particular Basin

PA - Planning and Administration

- CRC/BRC Management Plans FX-GR-NA8-121

  We continued coordination meetings with federal agencies (USFS/BLM) to go over format and review data from the preceding 5 year management plans (1993-1997) which include the CRC within the Westside Tributaries Enclave and BRC within the Bear River drainage. Ron also became part of Colorado River Cutthroat Trout Interagency Region-wide Conservation Steering Group formed by the Colorado River Fish and Wildlife Council. This group consists of federal and state agency representatives from Wyoming, Colorado, and Utah to prepare common definitions for species viability and genetic purity ratings to use in inter-regional and local Colorado River cutthroat trout conservation agreements and management plans.

  The region-wide Colorado River cutthroat trout conservation agreement and strategy was finalized and signed by the Wildlife Resource agencies of Colorado, Utah, and Wyoming as well as the Fish and Wildlife Service. After this agreement was signed our Steering Group met for our agreed to annual meetings to discuss the past year's work activities and next year's work. Representatives from the Forest Service and Bureau of Land Management were invited as well to discuss their future involvement in the agreement. Our Steering Group felt it would be beneficial if the federal agencies signed-off on the agreement if they (FS and BLM) committed to on-the-ground work as well as seek funds to implement necessary projects. Our group will work with representatives from the FS and BLM to work on modifying the existing strategies to include them in a responsible role. We will also be contacting the state agencies in Arizona and New Mexico as well as other federal agencies such as the National Park Service and Tribal Nations to see if they would like to be part of the agreement as each agency has the historic range of CRC within their area of responsibility.

TM - Tools and Methods

- ACCESS Database Conversion FX-GR-EB1-141

  Time was spent reviewing and commenting on efforts by Tom Varcalli; software developer contracted to convert the Fish Division's Riverstn, and Lakestn system to ACCESS. Riverstn is functional and Ron converted each management crew's data files to ACCESS then sent back out to each crew. Lakestn is still under development but it is anticipated crew data should be converted to ACCESS during the Spring, 2000.

  An ACCESS version of the Division's Fish Scheduling system was developed. This system was modified, especially the culture portion, with input from Al Gettings and Steve Sharon. Currently the system is functional and has been used by the crew's for the 2002 requests. Continued modifications will be necessary to fine-tune this system and the fish scheduling process.

Little Snake River - 3LS

No work scheduled.

North Fork Little Snake River Basin - 3NF

North Fork Little Snake River GR872840CN

PM - Fish Population Management

- CRC Genetic Analysis FX-GR-3NF-512

Colorado River cutthroat trout were sampled from North Fork of the Little Snake River drainage for genetic purity analysis. Greg Eaglin, North Zone Fisheries Biologist, Brush Creek District of the Medicine Bow National Forest received a $13,000 grant from the Inland Cutthroat Initiative, administered by USFS in Washington, D.C. to pay for the analysis. Mr. Eaglin contracted Dr. Robb Leary, Wild Trout and Genetics Lab at the University of Montana to analyze the samples. Table 1 summarizes the fish collections for genetic purity analysis in 1999 in the North Fork drainage. Where "Protein" is listed as the method, the whole fish was collected and sent to Dr. Leary. Where "DNA" is listed as the method, tissue samples (adipose and/or pectoral fins) were taken and sent to Dr. Leary. All CRC sampled for DNA analysis were released alive.

Table 1. Stream, elevation, collection date, sample size and method of genetic analysis of Colorado River cutthroat collected in the North Fork drainage in 1999.

STREAM	ELEVATION (ft)	DATE SAMPLED	SAMPLE SIZE	METHOD
North Fk Deadline Ck	8,160	09/15/99	25	DNA
South Fk Deadline Ck	8,280	09/15/99	25	DNA
Standard Creek	9,200	08/27/99	12	DNA
Rose Ck	7,880	08/02/99	25	Protein
Green Timber Ck	8,520	07/29/99	25	Protein
Deadman Ck	9,440	07/28/99	5	Protein
Third Ck	8,760	07/29/99	7	Protein
Third Ck	9,000	07/28/99	13	Protein
Dale Ck	9,000	09/13/99	3	DNA
Happy Ck	9,200	09/14/99	12	DNA
Rhodine Ck	9,200	09/14/99	25	DNA

Standard Creek is a tributary to the West Branch and contains a limited population of CRC. Horizontal starch gel electrophoresis was used to determine the genetic characteristics of 5 CRC sampled in 1997. Results determined the Standard Creek fish were pure. But Dr. Leary could not rule out hybridization with rainbow or Yellowstone cutthroat trout with the small number of fish used. The total sample size after the 12 tissue samples sent to Dr. Leary in 1999 would be 17 fish. Eight more fish from Standard Creek will be needed to attain the target sample size of 25 fish, which is necessary to have a 95% chance of detecting as little as a 1% rainbow trout or a 2% Yellowstone cutthroat genetic contribution to the population.

Deadman Creek was sampled in 1997 above the City of Cheyenne Stage II road, but below a series of very steep cascades, which was considered a natural fish barrier. A sample of 25 fish was sent to Dr. Leary. He stated the purity of the Deadman Creek population is uncertain. Fish in the 1997 sample possessed alleles (bGLUA) characteristic of both Colorado River cutthroat and Yellowstone cutthroat trout. Dr. Leary stated, "This could indicate a small amount of hybridization or it could be rare CRC genetic

variation that is electrophoretically indistinguishable from that characteristic of YSC." He suggested more CRC be collected to help distinguish between these possibilities and to manage the population as a pure CRC population. A survey of the headwaters of Deadman Creek, above the cascade area in an alpine meadow (elevation 9,440 ft.) found a small population of CRC. Only 5 CRC were removed from this population for protein analysis. The crew will take tissue samples from this population for DNA analysis in the future until 25 samples are obtained.

Deadline Creek was a part of the West Branch chemical treatment. However, BKT were not found in the headwaters of either the North or South Forks of the stream. CRC were present in both drainages above the treatment area and offspring are now recolonizing the lower portions of both the North and South Forks and in Deadline Creek between the confluences of the two forks downstream to the road-crossing going into the Mattern property.

More CRC tissue samples from Third, Dale and Happy Creeks will be collected to have a 95% chance of detecting RBT or YSC genetic materials in these CRC populations.

- BKT Removal FX-GR-3NF-610

The North Fork of the Little Snake River was electrofished the week of July 18, 1999 by Greg Eaglin's crew (Medicine Bow/Routt National Forest) to collect fish for necropsy by the Game and Fish Lab to determine the presence of bacterial or parasitic pathogens prior to salvaging fish and moving the salvaged fish to another drainage. A total of 19 CRC, 43 BKT and 60 MSC were sent to the Game and Fish Lab. No regionally important bacterial or parasitic pathogens were detected, clearing the way to transplant the salvaged fish in other drainages.

Fish were salvaged from the North Fork and West Branch during the week of August 2 in preparation for the North Fork chemical treatment. A total of 520 MSC, 118 BKT and 74 CRC were salvaged from the streams. All the MSC were transplanted to the previously rehabilitated portion of the West Branch and a tributary, Deadline Creek, on the Mattern property. The BKT and CRC were stocked in Little Savery Creek (Grizzly Unit).

Although a thorough pretreatment survey of the North Fork and West Branch was completed in 1998, more extensive pretreatment activities had to be completed prior to the first chemical treatment. All streams and tributaries to be treated were surveyed, dye times recalculated, flows taken and drip stations marked between August 5 and 13, 1999. Also potassium permanganate (detoxification agent) and drift nets were packed into the canyon below the waterfall. Drift nets were also packed into all the Antimycin drip stations and several beaver ponds were breached on the West Branch. Brook, rainbow and cutthroat trout were electrofished from the North Fork below the waterfall and placed in live cages 10 fish per cage) to serve as canaries during the chemical treatment.

The chemical treatment of the North Fork of the Little Snake River and its largest tributary, the West Branch took place on August 17, 1999. The treatment area included 1.4 miles of the North Fork from the fish barrier (elevation 7,400 ft.) to a natural waterfall (elevation 7,190 ft.) about 0.5 miles upstream of the Colorado - Wyoming Stateline and 0.2 miles of a small tributary stream, entering the North Fork at elevation 7,370 ft. The West Branch treatment began above the fish barrier (elevation 7,700 ft.) to the confluence of the West Branch with the North Fork (elevation 7,260 ft.). The West Branch treatment included 2.8 miles of the main West Branch and 1 mile of a small tributary stream entering the West Branch at elevation 7,620 ft. A total of 4.2 units of Antimycin were necessary for the treatment. The North Fork required 1.5 units and the West Branch 2.7

units of Antimycin. Approximately 2.5 gallons of emulsified rotenone was used to treat disconnected waters, mainly on the West Branch.

The primary potassium permanganate (detox) station was established in the canyon of the North Fork at elevations 7,190 ft. (just above the waterfall) and the backup station at elevation 7,130 ft. A concentration of 2 ppm of potassium permanganate for 10 hrs was used to detox the piscicides at the primary detox station. A concentration of 1-ppm potassium permanganate was to be used at the backup detox station. Live cars containing fish (canaries) were placed upstream of the backup detox station (elevation 7,130 ft.) and above the Wyoming - Colorado Stateline (elevation 7,070 ft.). The primary station was successful in oxidizing the piscicides and no fish were killed below the Wyoming - Colorado Stateline.

The North Fork portion of the treatment was accomplished using only one antimycin drip station. A total of 396 BKT, 135 CRC and 674 MSC were removed from the North Fork fish barrier downstream to the waterfall on August 18. However at least 17 live trout were seen in a 0.25-mile section of the North Fork above the confluence of the West Branch. The North Fork was treated at a conservative concentration of 8 ppb antimycin, taking into account the elevation drop and dye time to the confluence. To keep the concentration of Antimycin at lethal levels, the North Fork should be treated at a concentration of 10 ppb during the second chemical treatment.

The West Branch portion of the treatment was accomplished using four antimycin drip stations at a concentration of at least 8 to 10 ppb. A total 2,132 BKT, 46 CRC and 1,382 MSC were removed from the West Branch. These figures are conservative, because dead fish in the lower half of the West Branch above the confluence with the North Fork were not collected until August 23, because of a lack of man power and time to complete the collections on August 18. Undoubtedly by August 23 a considerable number of the smaller BKT and MSC had deteriorated or been removed by scavengers. No live fish were seen on August 23 in the West Branch.

All trout in the live cars at the Stateline (elevation 7,070 ft) and at the backup detox station (elevation 7,130 ft) were alive and well on August 18. The potassium permanganate caused considerable mortality of mountain whitefish (MWF) below the waterfall to the backup detox station. A total of 150 MWF, 32 BKT, 3 CRC, 2 SPD and 1 MTS were found in the drift net at the backup detox station and in the North Fork between the drift net and the waterfall. Some of the trout found below the waterfall were killed by the potassium permanganate above the waterfall. MSC were not affected by the treatment below the waterfall. No dead fish were found in the North Fork between the backup detox station and the Stateline drift net, although 49 MWF were found in the drift net above the Stateline.

Samples of mountain whitefish(39), rainbow trout(5) and hybrid cutthroat trout(1) collected below the waterfall were sent to the Fish pathologist at the Game and Fish Lab for disease testing. No serious bacterial or parasitic pathogens were detected in the fish.

The first chemical treatment of the lower West Branch and North Fork was a success, although not all targeted species (BKT and hybrid CRC) were removed from the lower reaches of the West Branch and North Fork. The concentrations of Antimycin used (8 ppb) were considered conservative, because of the steep stream gradients and flows encountered. A conservative approach to the first treatment was planned in order to contain the piscicides within the treatment area. Adjustments to the concentrations of Antimycin will be made during the second chemical treatment, at specific drip stations, to be more effective, but still contain the chemicals within the treatment area.

Mike Young (USFS) first discovered BKT above the barrier in 1995. Electrofishing efforts from 1995 through 1997 removed at least 88 BKT above the fish barrier including Solomon and Rose creeks. Although most of the BKT removed were adults (60%), juveniles, yearlings and YOYs were also found. No yearling or YOY BKT were sampled in 1998. Mike Young's yearly inventory produced only 1 adult BKT in 1998 and zero BKT in 1999. Another electrofishing survey will be made to identify the number and distribution of any remaining BKT prior to the final chemical treatment.

HI - Habitat Improvement and Maintenance

- Maintenance of habitat improvement structures FX-GR-3NF-430

The barrier on the North Fork Little Snake River was inspected August 3, 1999. The barrier was renovated in August 1997. The barrier appears to be working as designed and no structural damage was found.

Management Recommendations

Collect CRC from the North Fork drainage for protein or DNA genetic analysis to complete genetic survey of CRC in the drainage.

Electrofish the North Fork of the Little Snake River above the fish barrier to monitor the presence and distribution of remnant BKT. Complete second chemical treatment of the North Fork of the Little Snake River in mid to late August from the fish barrier downstream to the waterfall.

Annually inspect the fish barrier, remove debris and recommend beaver removal if necessary.

West Branch North Fork Little Snake River GR872860CN

PM - Fish Population Management

- BKT removal FX-GR-3NF-610

The chemical treatment of the West Branch, below the fish barrier (elevation 7,700 ft) was reported in the North Fork Little Snake River BKT removal portion of the report. However, while salvaging fish on the West Branch below the fish barrier on August 4, fish were seen surfacing in the fish barrier pool. Unfortunately these fish turned out to be BKT, which had circumvented the barrier during high spring flows in 1999. Seven BKT were electrofished in the first 100 feet of stream above the barrier. On August 10 approximately 1 mile of the West Branch was electrofished from the Stock Driveway Bridge (elevation 7,760 ft) to elevation 8,000 ft. Nineteen BKT were removed from the stream and 12 other BKT were seen, but not captured. Evidently a large number of BKT had migrated upstream and it was evident a considerable electrofishing effort would be necessary to remove them. Plans were made to chemically retreat the entire West Branch after the lower North Fork and West Branch treatment was completed.

A drip station was incorporated into the treatment of the lower West Branch at elevation 8,000 feet (Mattern property fence) in order to contain and remove BKT above the barrier. On August 18, 70 BKT were removed from the treated portion of the West Branch above the fish barrier.

On August 19 the West Branch was treated from the waterfall (elevation 8,600 ft) to Mattern residence. The lower portion of Rabbit Creek was also treated. This treatment removed at least 22 more BKT in the main West Branch, but fortunately no BKT were found in Rabbit Creek. In fact no BKT were collected from the main West Branch to the old road crossing above the

Mattern property (elevation 8,000 feet).

On August 25 the West Branch was again treated from the Mattern residence downstream to the fish barrier and Deadline Creek from the Mattern's road crossing to the West Branch. Only one BKT was found after the final treatment on the West Branch above the fish barrier. Eight BKT were also removed from a few small beaver ponds on Deadline Creek above the Mattern pasture fence. A total of 127 BKT were removed from the West Branch above the fish barrier, all of which moved around the West Branch fish barrier during spring runoff. Unfortunately, 19 CRC and all the newly transplanted MSC were removed from the West Branch and lower Deadline Creek.

On August 24 the USFS and WGFD crews electrofished upper Rabbit Creek and found only CRC from the fish transplanted in Rabbit Creek in 1998. On August 26, Deadline Creek was also electrofished from the road crossing upstream to the confluence of the South Fork of Deadline Creek. No BKT were found in this portion of the Deadline Creek. However approximately 45 CRC were sampled and MSC were numerous. Evidently remnant populations of CRC and MSC found in the untreated portions of both upper forks of the stream have been reproducing and repopulating the upper portion of the treated portion of Deadline Creek. Tissue samples from CRC found in both the North and South Forks of Deadline Creek were taken for genetic purity analysis and sent to Dr. Robb Leary at the University of Montana.

The crew now knows the reason why BKT were found yearly after careful treatment of the West Branch and tributary streams. A flaw in the design of the West Branch fish barrier was allowing BKT to circumvent the barrier during high spring flows. Fortunately, all reserve units of the invading BKT from the West Branch below the barrier have been silenced and the stream above the barrier to the waterfall is once again BKT free.

HI - Habitat Improvement and Maintenance

- Maintenance of habitat improvement structures FX-GR-3NF-430

The West Branch barrier was inspected on August 4, 1999. A relatively small amount of woody debris associated with beaver activity was found on the fish barrier. The debris was removed. Although the barrier appeared to be functioning as designed, BKT have been circumventing the barrier during high spring flows. The entire West Branch drainage above the fish barrier was carefully electrofished in August 1998. Only 3 BKT were found in the entire drainage. Careful examination of the barrier found spring flows were evidently high enough for BKT to swim around the ends of the barrier. The ends of the barrier are sloped upwards in a "U" shape. During spring runoff, water builds behind the main gabion structure and flows over the ends where there is less than a one-foot drop. In fact, it appears the water flowing over ends of the structure along the bank may form a continuous flow to the stream below. Future designs of gabion fish barriers should eliminate the "U" shape of the gabion structure on the downstream side. Barriers should be designed to allow the full volume of the high spring flows to flow through a designated spillway directly to the base of the downstream gabions and landing mats. There should be at least a 3-foot vertical drop on the downstream side of the barrier. Since most BKT have been removed from the West Branch below the barrier there will not be a need to renovate this barrier.

Management Recommendations

Electrofish the West Branch above the fish barrier and tributary streams to determine the effectiveness of the 1999 chemical treatment.

Complete the second chemical treatment of the West Branch in mid to late August from the fish barrier downstream to its confluence with the North Fork.

Transplant CRC from the West Branch above the City of Cheyenne Stage II water diversion structure or any other sources of pure CRC in the North Fork drainage to the West Branch above the fish barrier. MSC from the North Fork will also be transplanted to this portion of the West Branch after CRC are established.

Annually inspect the fish barrier, remove debris and recommend beaver removal if necessary.

Roaring Fork of the Little Snake River - 3RF

Roaring Fork of the Little Snake River GR872800CN

PM - Fish Population Management

- BKT removal FX-GR-3RF-610

Pretreatment work on the Roaring Fork began on September 1, 1999. The Roaring Fork was electrofished from the fish barrier upstream to elevation 9,400 feet. BKT were found in the Roaring Fork above the fish barrier and became more numerous at elevation 9,200 feet. YOY were found in a meadow area at elevation 8,900 feet and adults at elevation 9,000 feet. Flow measurements taken prior to the September 1998 treatment were not accurate and thus the concentration of Antimycin used was not lethal in the upper portion of the treatment area.

The second chemical treatment of the Roaring Fork occurred on September 8 and 9, 1999. The treatment area included 2 miles of the main Roaring Fork above the fish barrier and 0.2 miles of Sherard Creek, a small tributary of the Roaring Fork. The upper treatment station was located at elevation 9,440 feet, while the 1998 treatment began at elevation 9,630 feet. No BKT were found between these elevations after the 1998 treatment, only CRC. And BKT were never previously documented above elevation 6,440, thus excluding the need to retreat that portion of the stream.

The stream was treated at a concentration of 10 ppb Antimycin based upon flow measurements. A total of 1.7 units of Antimycin and 2 gallons of emulsified rotenone were used. Including the BKT removed by electrofishing, a total of 108 BKT were eliminated from the stream. Most of the BKT were found between elevations 8,930 and 9,050 feet. A total of 105 BKT were removed from a 0.25-mile area below the barrier by the potassium permanganate used to detoxify the piscicides, creating a buffer zone against the upstream movement of BKT during the fall of 1999.

The buffer zone below the barrier was necessary to keep BKT from invading the treated portion of the Roaring Fork above the barrier. The fish barrier on the Roaring Fork is suspect and may not provide protection from migrating BKT necessary to preserve the pure CRC population in the headwaters of the stream. Further electrofishing of the Roaring Fork above the fish barrier prior to the final chemical treatment will determine the barriers effectiveness. The crew will continue to appraise Mr. Jim Hill, Fletcher Peak Ranch, of the progress being made and future plans for a new

fish barrier downstream of his property, should the present barrier fail. Mr. Hill has been very cooperative and has indicated interest in allowing the WGFD to chemically treat the Roaring Fork and tributaries through his property, which would gain another 1 to 2 miles of CRC habitat.

HI - Habitat Improvement and Maintenance

- Maintenance of habitat improvement structures FX-GR-3RF-430

The Roaring Fork fish barrier was inspected on September 1, 1999. The barrier appears to be functioning as designed. Considering the problems encountered with the design of the West Branch barrier, the Roaring Fork barrier (similarily designed) may also not be an effective fish barrier.

Management Recommendations

The chemically treated portion of the Roaring Fork above the fish barrier will be electrofished to determine the effectiveness of the 1999 chemical treatment and the if the fish barrier is functioning properly.

Should the barrier not be effective, the cost of renovating the barrier to make it effective or building a new barrier downstream of the Fletcher Peak Ranch on USDA Forest Service lands should be evaluated. A decision on the fate of the present barrier may not possible after the 2000 sampling, because BKT populations in the stream below the barrier may not be dense enough to pressure individuals to circumvent the barrier and/or spring flows may not be high enough to actually test the barriers effectiveness. Do not initiate the third chemical treatment until the effectiveness of the fish barrier is determined.

Continue coordination of activities on the Roaring with Mr. Jim Hill, Fletcher Peak Ranch.

Annually inspect the fish barrier and remove debris as warranted.

Battle Creek Basin - 3BC

Battle Creek GR872620CN

AS - Aquatic Resource Surveys

- Habitat and Population Evaluations FX-GR-3BC-510

Due to time constraints and other work commitments this work was deferred until 2000.

Haggerty Creek GR872685CN

PM - Fish Population Management

- CRC Genetic Analysis FX-GR-3BC-512

Colorado River cutthroat trout were sampled from Haggerty Creek for genetic purity analysis. Greg Eaglin (Medicine Bow/Routt National Forest) utilizing a grant from the Inland Cutthroat Initiative, administered by USFS in Washington, D.C. paid for the analysis. The samples were again sent to Dr. Robb Leary (University of Montana) to analyze the samples. Table 2 summarizes the fish collections for genetic purity analysis in 1999 in Haggerty Creek.

Table 2. Elevation, collection date, sample size and method of genetic analysis of Colorado River cutthroat collected in Haggerty Creek in 1999.

STREAM	ELEVATION (ft)	DATE SAMPLED	SAMPLE SIZE	METHOD
Haggerty Ck	8,240	07/30/99	25	Protein

Colorado River cutthroat trout were sampled downstream of WY Highway 70 for genetic purity analysis. Fish became numerous just above the Stock Driveway bridge crossing. Copper pollution from the Ferrous-Haggerty Mine evidently dissipates in this area of the stream allowing CRC and other fish to exist from Haggerty Creek above the confluence with Lost Creek and then downstream in the West Fork of Battle Creek.

- Maintenance of habitat improvement structures FX-GR-3BC-430

The barrier was inspected in 1997 and was not functioning as designed. The cement barrier was built as part of the construction and paving of the Battle Creek Highway (WY Hwy 70). A design to renovate the barrier was approved by the Wyoming Highway Department in 1998. A U. S. Army Corps of Engineers 404 permit was issued in March 1999 to cover the barrier renovations. The Haggerty Creek Barrier Renovation Project was funded as a WGFD Trust Fund Project at a cost of $25,000. The project was bid and contracted to Weber Construction. Barrier renovations were completed by early September 1999, under the supervision of Ed Novotny (WGFD).

Inspection of the project after its completion found several problems. First, the new cement splash pad did not extend the full length of the old structure, which may cause erosion along the sides of the structure. Should erosion occur, the problem could be fixed by inserting gabions on both sides of the structure. Secondly, the channel below the splash pad was cleaned of all rock and bottom materials, consisting of only clay. This may cause erosion below the structure and turbidity downstream of the structure. The problem could be solved by artificially lowering the streambed and placement of rocks in the new stream channel to bring it up to grade with the existing channel below the structure. Thirdly, the stream channel below the structure was narrowed and did not allow enough width to handle high spring flows. This problem was partially solved by paying the contractor to come back to the site, excavate fill materials used to build the stream bank, so the artificial bank aligned with the natural stream bank downstream of the structure. Fourth, the site was scarred from the construction activities and the contractor did not properly re-landscape the area before leaving. The contractor also did not reseed the site, as specified in the contract. Should additional contract work be necessary to cure any of the problems, the area should be landscaped so it is aesthetically pleasing not only for the downstream landowner, but the general public stopping to view the structure. The crew, in cooperation with the Medicine Bow/Routt National Forest, hope someday to put informational display and turnout along this Scenic Byway (Highway 70) devoted to the management of the Colorado River cutthroat trout in the Medicine Bow National Forest.

Management Recommendations

Inspect the Haggerty Creek barrier during and after spring runoff to see if it is functioning properly. Document problems caused by the renovations and recommend renovations so the barrier functions optimally and is aesthetically correct.

Belvidere Ditch GR872260CN

PM - Fish Population Management

CRC life history investigations (spawning behavior) FX-GR-3BC-512

Studies concerning the spawning behavior of CRC in the Belvidere Ditch continued in 1999. The WGFD Spawning Crew, with help from Greg Eaglin (Medicine Bow National Forest), attempted to collect eggs from wild CRC in the Belvidere Ditch from June 23 until July 23, 1999. Approximately 200 adult CRC were captured by electrofishing in the Ditch and from those fish 130 were thought to be maturing adults. These fish were placed in an enclosed section of the Ditch near the Sandstone Work Center. Green females were sampled through July 7, but no ripe females were ever found. Ripe males were sampled routinely during this time period. By July 23 spent females were sampled in the Ditch and the work was terminated. No redds were found and no eggs were taken. Spawning probably occurred sometime during mid-July, but since the Belvidere Ditch stays mostly clear during the spring runoff and daily water temperatures fluctuate between 52 and 65 degrees F, annual spawning cycles may be difficult to ascertain.

Management Recommendations

Assist the Spawning Coordinator in efforts to define CRC spawning behavior in the Belvidere Ditch. Assist the Spawning Crew collect eggs from a minimum of 25 pairs CRC from the Belvidere Ditch.

Should efforts to obtain CRC eggs from the Belvidere ditch be unsuccessful, juvenile fish from the Belvidere Ditch will be collected with electrofishing gear in late September and either transferred to an Isolation (ISO) Unit at a WGFD hatchery or transplanted directly into Littlefield Creek.

Muddy Creek Basin - 3MC

Lake Draw Pond GR472420CN

AS - Aquatic Resource Surveys

- Habitat and population Survey FX-GR-3MC-512

A small stock pond (0.3 acres) on Lake Draw thought suitable for trout was stocked with 50 RBT in early August 1998 to see if trout could survive in the ponds throughout the year. An overnight experimental gill net set on June 9, 1999 did not recover any RBT and no fish were observed. The pond should be considered unsuitable for trout. The pond has a large population of axolotls (tiger salamander).

Management Recommendations

The pond is considered unsuitable for trout. No further stocking will be recommended.

Canary Grove Pond GR472410CN

AS - Aquatic Resource Surveys

- Habitat and population Survey FX-GR-3MC-512

  A stock pond on Canary Grove (2 acres) thought suitable for trout was stocked with 100 RBT in early August 1998 to see if trout could survive in the ponds throughout the year.

  An aquatic habitat survey of the pond on June 18, 1999 found the pond to have a maximum depth of 11.9 feet and an average depth of 7.0 feet. The pond had a pH of 8.4 and a conductivity of 350 micromhos/cm. The pond had a surface temperature of 63F at 10:40 am. The pond is built on Canary Grove, a small spring stream, with a flow of less than 0.5 cfs. The temperature of the water entering the pond was 54F.

  No gill nets were set in the pond. Hook and line sampling produced 8 RBT. The RBT averaged 13.2 inches in length and 1.12 lbs in weight.

Management Recommendations

Evaluate survival and growth of RBT plants in the Canary Grove Pond with rod and reel or gill nets. No further plants of RBT should be made in this pond until a hatchery source of CRC is available. Recommend vegetation and grazing improvements be made in the drainage above the reservoir to improve riparian vegetation and enhance spring flows.

West Canary Grove Pond GR472415CN

AS - Aquatic Resource Surveys

- Habitat and population Survey FX-GR-3MC-512

  A small (0.5 acres) stock pond on the West Branch of Canary Grove thought suitable for trout was stocked with 50 RBT in early August 1998. An overnight experimental gill net set on June 9, 1999 did not catch any RBT. One RBT was found dead in the rooted aquatic shoreline vegetation. The pond did not over winter fish and should not be considered suitable for trout. The pond has a large population of axolotls (tiger salamander).

Management Recommendations

The pond is considered unsuitable for trout. No further stocking will be recommended.

Pole Gulch Pond GR472419CN

AS - Aquatic Resource Surveys

- Habitat and population Survey FX-GR-3MC-512

  Pole Gulch has two main forks in it's upper drainage which come together at elevation 7,570 ft (R89W,T16N,S5), approximately 200 yards above a small stock pond. Although both forks contain many small spring seeps, which maintain a perennial flow, the North Fork has the largest flow (less than 0.2 cfs). Considerable beaver activity was noted throughout the upper drainage. The 1.0-acre pond was thought to be suitable for trout and 50 RBT were stocked on June 15, 1999.

  An aquatic habitat survey of the pond on June 16, 1999 found the pond to have a maximum depth of 9.6 feet and an average depth of 4.8 feet. The pond had a pH of 8.6 and a conductivity of 330 micromhos/cm. The pond had a surface temperature of 66F at 2:40 pm. The small stream supplying water to the pond had a flow less than 0.5 cfs. The temperature of the water

entering the pond was 64F.

A hook and line survey on October 28, found RBT had survived.

Management Recommendations

Evaluate survival and growth of RBT plants in the Pole Gulch Pond with rod and reel or gill nets. Should RBT survive in this pond, no further plants of RBT should be made until a hatchery source of CRC is available. Recommend vegetation and grazing improvements be made in the drainage above the reservoir to improve riparian vegetation and enhance spring flows.

Cabin Draw Pond GR472440CN

AS - Aquatic Resource Surveys

- Habitat and population Survey FX-GR-3MC-512

The 2.5-acre stock pond on Cabin Draw was stocked with 183 RBT in early August 1998. The pond was sampled with hook and line on October 22, 1998. Survival, growth and condition of stocked RBT were excellent at that time.

The pond was again sampled with hook and line on June 9, 1999. A total of 23 RBT were caught. The fish averaged 14.0 inches in length and 1.3 pounds in weight. At least 4 fish had spots of yellow fungus on their abdomens. Dave Money indicated this is most likely a fungal infection, Saprolegnia spp. The infection was grossly obvious and may have caused some mortality.

The pond was fished quite often during the summer and fall. RBT averaged 16 inches by late October and were in excellent condition.

An aquatic habitat survey of the pond on June 16, 1999 found the pond to have a maximum depth of 9.4 feet and an average depth of 6.6 feet. The pond had a pH of 8.4 and a conductivity of 525 micromhos/cm. The pond had a surface temperature of 66F at 12:00 noon. The small stream supplying water to the pond had a flow less than 0.5 cfs. The temperature of the water entering the pond was 59F.

Management Recommendations

Evaluate survival and growth of RBT plants in the Cabin Draw Pond with rod and reel or gill nets. No further plants of RBT should be made in this pond until a hatchery source of CRC is available. Recommend vegetation and grazing improvements be made in the drainage above the reservoir to improve riparian vegetation and enhance spring flows.

Upper Deep Gulch Pond GR422417CN

AS - Aquatic Resource Surveys

- Habitat and population Survey FX-GR-3MC-512

The Little Snake River Conservation District built the Upper Deep Gulch Pond in 1998. This small pond, built on the headwaters of Deep Gulch at an elevation of 7,630 feet, has a maximum depth of 10.9 feet and an average depth of 7.9 feet. Although the pond is less than 0.3 acres in size it is relatively deep and has a good spring water supply. An aquatic habitat survey of the pond on June 16, 1999 found the pond to have a pH of 7.6 and a conductivity of 329 micromhos/cm. The pond had a surface temperature of 64F at 2:00 pm.

A small number of RBT (31) were planted in the pond on June 15, 1999. A hook and line survey of the pond on October 28 found the fish had survived.

Management Recommendations

Evaluate survival and growth of RBT plants in the Upper Deep Gulch Pond with rod and reel or gill nets. Should fish survive in this pond, recommend additional stocking as needed. Recommend vegetation and grazing improvements be made in the drainage above the reservoir to improve riparian vegetation and enhance spring flows.

Middle Deep Gulch Pond GR470599CN

AS - Aquatic Resource Surveys

- Habitat and population Survey FX-GR-3MC-512

The Little Snake River Conservation District renovated the Middle Deep Gulch Pond found at elevation 7,350 feet in 1998. The earthen dike of the pond was heightened and extended. An aquatic survey of the 2.0-acre pond on June 16 found the pond to have a maximum depth of 8.6 feet and an average depth of 5.0 feet. The small stream, Deep Gulch, supplying water to the pond had a flow of less than 0.5 cfs. The pond had a pH of 8.0, a conductivity of 882 micromhos/cm and a surface temperature of 64F at 1:00 pm. Approximately 50% of the pond contained rooted aquatic vegetation.

A small number of RBT were planted in the pond on June 15, 1999. A hook and line survey of the pond on October 28 only produced 1 fish. Survival of the RBT planted in the pond to date was poor and survival through the winter is questionable.

Management Recommendations

Evaluate survival and growth of RBT plants in the Middle Deep Gulch Pond with rod and reel or gill nets. Should fish survive in this pond, recommend additional stocking as needed. Recommend vegetation and grazing improvements be made in the drainage above the reservoir to improve riparian vegetation and enhance spring flows.

Lower Deep Gulch Pond GR470600CN

AS - Aquatic Resource Surveys

- Habitat and population Survey FX-GR-3MC-512

The Little Snake River Conservation District built the Lower Deep Gulch Pond (elevation 7,130 feet) in 1998. The 3.0-acre pond is largest of the three ponds on Deep Gulch. The pond has a maximum depth of 20.0 feet and an average depth of 9.1 feet. The pond has a good water supply, as Deep Gulch has a perennial flow in this area. An aquatic habitat survey of the pond on June 16, 1999 found the pond to have a pH of 8.2 and a conductivity of 1,305 micromhos/cm. Since the pond is relatively new, rooted aquatic vegetation has not been established in the littoral areas.

A small number of RBT (151) were planted in the pond on June 15, 1999. The pond should be stocked with more RBT as littoral vegetation is established and the productivity of the pond increases.

Management Recommendations

Evaluate survival and growth of RBT plants in the Lower Deep Gulch Pond with rod and reel or gill nets. Should fish survive in this pond, recommend additional stocking as needed. Recommend vegetation and grazing improvements be made in the drainage above the reservoir to improve riparian vegetation and enhance spring flows.

Surprise Gulch Pond GR472423CN

AS - Aquatic Resource Surveys

- Habitat and population Survey FX-GR-3MC-512

The Surprise Gulch Pond (approximately 2.0-acres) is found on a small spring creek at elevation 7,440 feet. Surprise Gulch is a tributary to Deep Gulch. The pond is found at R89W,T16N,S18. The pond appeared suitable for trout and was stocked with 155 RBT on June 15, 1999.

An aquatic habitat survey of the pond on June 16 found the pond to have a maximum depth of 8.4 feet and an average depth of 5.0 feet. The pond had a pH of 7.3 and a conductivity of 1,029 micromhos/cm. A perennial spring supplies water to the pond. Flows in late October were less than 0.3 cfs.

Hook and line sampling on October 28 produced 12 RBT. The RBT averaged 12 to 13 inches in length and were in excellent condition.

Management Recommendations

Evaluate survival and growth of RBT plants in the Surprise Gulch Pond with rod and reel or gill nets. Should fish survive in this pond, recommend additional stocking as needed. Recommend vegetation and grazing improvements be made in the drainage above the reservoir to improve riparian vegetation and enhance spring flows.

Cow Creek Reservoir GR470593CN

AS - Aquatic Resource Surveys

- Habitat and population Survey FX-GR-3MC-512

Cow Creek Reservoir, one of the largest stock ponds (approximately 9 surface acres) in the Muddy Creek drainage, is found at R90W,T15N,S33. The Reservoir is located on Cow Creek at an elevation of 7,078 feet. The pond appeared suitable for trout and was stocked with 200 RBT on June 15, 1999 and 245 BKT, salvaged from Littlefield Creek on June 25, 1999.

An aquatic habitat survey of the pond on June 16, 1999 found the pond to have a maximum depth of 19.2 feet and an average depth of 10.6 feet. The pond had a pH of 8.6 and a conductivity of 1,830 micromhos/cm. A perennial flow in Cow Creek nearly subs out approximately 0.25 miles above the reservoir, leaving less than 0.1 cfs flowing into the pond. The reservoir, undoubtedly, has no inflow during the late summer and winter months. Rooted aquatic plants are found in the shallow littoral zone in the upper part of the reservoir and along the shorelines. A prolific phytoplankton bloom tinted the water brown on June 16.

Management Recommendations

Evaluate survival and growth of RBT plants in the Cow Creek Reservoir with rod and reel or gill nets. Should fish survive in this pond, recommend additional stocking as needed. Recommend vegetation and grazing improvements be made in the drainage above the reservoir to improve riparian vegetation and enhance spring flows.

Dry Cow Creek Reservoir GR470598CN

AS - Aquatic Resource Surveys

- Habitat and population Survey FX-GR-3MC-512

Dry Cow Creek Reservoir is found at R91W,T17N,S25. The Reservoir is located on Dry Cow Creek at an elevation of 6,770 feet. The pond appeared suitable for trout and was stocked with 110 RBT on May 27, 1998. The pond had been previously stocked with RBT in 1993, 1994 and 1996.

An aquatic habitat survey of the pond on June 17, 1999 found the pond to have a maximum depth of 15.1 feet and an average depth of 8.0 feet. The pond had a pH of 8.5 and a conductivity in excess of 2,000 micromhos/cm. There was no inflow to the reservoir on this date. Rooted aquatic plants are found in the shallow littoral zone in the upper part of the reservoir and along the shorelines.

One experimental gill net, set in the pond for two hours, caught no fish. No RBT were caught with rod and reel or seen rising in the pond. Either creek chubs or fathead minnows were observed around rocks near the dam. The pond was slightly turbid on the day it was sampled.

Management Recommendations

The pond is evidently not suitable as RBT habitat and no further stocking is recommended. Hopefully, we sampled the pond that was stocked.

Brazel Reservoir GR470596CN

AS - Aquatic Resource Surveys

- Habitat and population Survey FX-GR-3MC-512

Brazel Reservoir is located in the Dry Cow Creek drainage. The pond appeared suitable for trout and was stocked with 110 RBT on May 27, 1998. The pond had been stocked with RBT in 1993 and 1996.

One experimental gill net was set in the 1.0 acre pond for 3.5 hours, which caught no fish. No fish were seen rising in the pond. The pond has a large population of axolotls (tiger salamander). The pond is located on an intermittent draw, which was dry when the pond was sampled. The water in the pond was extremely turbid.

Management Recommendations

The pond is evidently not suitable as RBT habitat and no further stocking is recommended. Unless the pond surveyed was not the real Brazel Reservoir, which may have been the case. Another attempt should be made to locate and sample the reservoir.

Retention Reservoir GR470590CN

AS - Aquatic Resource Surveys

- Habitat and population Survey FX-GR-3MC-512

Retention Reservoir is found at R90W,T14N,S18. The Reservoir is located on an intermittent draw, which drains into Deep Creek at an elevation of 6,690 feet. The pond appeared suitable for trout and was stocked with 110 RBT on May 27, 1998. The pond was previously stocked with RBT in 1993 and 1996.

An aquatic habitat survey of the pond on June 17, 1999 found the pond to have a maximum depth of 15.9 feet and an average depth of 9.9 feet. The pond had a pH of 8.8 and a conductivity of 556 micromhos/cm. The surface water temperature of the pond at 4:15 pm was 65 F. There was no inflow to the reservoir on this date, but the pond water was clear. Rooted aquatic plants were found in the shallow littoral zone in the upper part of the reservoir and along the shorelines.

One experimental gill net, set for six hours, caught no fish. No RBT were caught with rod and reel or seen rising in the pond. No fish were sampled in the pond in 1996 either. Creek chubs were observed in a pool formed by the overflow from the pond in the draw below the pond.

Management Recommendations

The pond is evidently not suitable as RBT habitat and no further stocking is recommended.

Littlefield Creek GR871240CN

PM - Fish Population Management

- BKT Removal FX-GR-3MC-610

1999. In preparation for the Littlefield Creek chemical treatment, BKT were salvaged from the stream on June 25, 1999. Salvage efforts were limited to accessible portions of the stream where fish could be easily collected and carried to a stocking tank mounted in the bed of a ¾ ton truck. Most of the salvage work centered around the road crossing at Jim Chant's cow camp at elevation 7,840 feet. A total of 262 BKT (brook trout) were salvaged and planted in Cow Creek Reservoir, which is in the Muddy Creek drainage.

Final preparations and pretreatment activities in anticipation of Littlefield Creek chemical treatment were completed between June 29 and July 6, 1999. The treatment area included 11.3 miles of the main Littlefield Creek from the headwaters at elevation 7,915 feet (R89W,T17N,S25) downstream to the newly constructed fish barrier at elevation 7,240 feet (R89W,T17N,S8) and about 3 miles of small tributary streams (mostly spring seeps).

Pretreatment work included determining stream flows to calculate antimycin concentrations, marking the drip station sites, packing drift nets to the sites, collecting fish (canaries) to place in live cars below the fish barrier, establishing the detox sites, planning and coordination.

Littlefield Creek was divided into two separate sections for the treatment. The first section was treated on July 7 and included the area from the headwaters (elevation 7,915 feet) to a large beaver complex just downstream of the canyon (elevation 7,360 feet). On July 8 all fish euthanized were removed from the stream and driftnets retrieved. The fish were sorted by

species, counted and then buried in a hole dug by the fish barrier contractor. The beaver ponds acted a reservoir to hold and allow the antimycin to detoxify below lethal limits. However, some rotenone did flow through the beaver dam complex and had to be detoxified with potassium permanganate on the morning of July 8.

The second part of the chemical treatment was completed on July 13. The treatment area began at a pasture fence in the canyon (elevation 7,510 feet) and concluded at the fish barrier (elevation 7,240 feet). All beaver ponds were notched the day prior to the treatment in order to eliminate as much standing water as possible. The notching of the ponds allowed the piscicides to flow through the beaver pond complex quickly, be more effective and save on the amount of chemical used. The piscicides were oxidized with potassium permanganate below the fish barrier on public land. On July 14 all euthanized fish were collected from this portion of Littlefield Creek sorted, counted by species and buried. All chemical treatment gear was also removed from the stream.

Details of the 1999 treatment are as follows.

1. BLM completed construction of the fish barrier in mid-June.
2. A total of 262 BKT were salvaged from Littlefield Creek on June 25 and planted in Cow Creek Reservoir.
3. Pretreatment data and activities were completed between June 29 and July 6.
4. Potassium permanganate (detox) stations were selected below the fish barrier. Fish (canaries) were electrofished from the stream and placed in live cars, which were strategically placed throughout the detox area.
5. All cattle were removed from the treatment area prior to treatment on July 7. Thanks to Jim Chant for his cooperation and the BLM employees (especially Cheryl Newberry) for removing all livestock from the treatment area.
6. The chemical treatment was accomplished on July 7 and July 13. Antimycin A was applied at a concentration of 8 to 10 ppb for eight hours via 13 drip buckets on July 7 and 5 drip buckets on July 13. Liquid rotenone (Noxfish) was applied with hand applicators at a concentration of approximately 1 to 3 ppm in disconnected backwaters and spring seeps. A total of 4.1 units of Antimycin A and approximately 4 gallons of liquid rotenone (Noxfish) were used during the chemical treatment.
7. Potassium Permanganate was used at a concentration of 1 to 2 ppm to oxidize the piscicides below the fish barrier. Approximately 35 pounds of the chemical were used during the treatment to oxidize the piscicides.
8. Fish showing signs of the effects of the piscicides were observed two hours after the chemical treatment began. A total of 7,455 euthanized fish were collected from the stream and buried. The species and numbers of fish collected included 4,121 (BKT) brook trout (55.3%), 1,928 (SPD) speckled dace (25.9%), 679 (CKC) creek chubs (9.1%), 527 (MTS) mountain suckers (7.1%), 199 (WHS) white suckers or FLM X WHS hybrids (2.7%), 11 (FLM) flannelmouth suckers or FLM X WHS hybrids (less than 0.1%) and 1 (BHS) bluehead sucker (less than 0.1%).
9. A total of 31 worker days were necessary to complete the first portion of the treatment on July 7 and 8. An additional 21 worker days were needed to complete the second portion of the treatment. Crews from the WGFD, BLM, LSRCD and USFS helped to complete the treatment.

The Littlefield Creek chemical treatment appears to have been very successful, as no live adult fish were seen during the cleanup portion of the treatment. Dead young of the year (YOY) BKT were found during the cleanup portion of the treatment, indicating the eggs in the gravels may have hatched prior to the treatment. However, most of the non-game fish species had just finished spawning and it is not known if the YOY were out

of the gravels prior to the treatment. Although the target species was BKT, the crew hoped to eliminate all non-native species. If all BKT, CKC and WHS could be eliminated the native species populations could be reestablished without competition from the non-natives.

The crew hopes Littlefield Creek will become a brood source for pure CRC to be used, where genetically compatible, throughout the Little Snake River drainage.

Management Recommendations

Electrofish Littlefield Creek from the fish barrier upstream to its headwaters, including all tributary streams to determine the effectiveness of the 1999 chemical treatment in late June 2000. Reintroduction of the CRC will be dependent on, first, the effectiveness of the 1999 treatment and secondly, the availability of CRC from fish stocks in the Belvidere Ditch and Deep Creek. Should competing non-native fish species be found, chemically treat Littlefield Creek in mid-July from its headwaters to the fish barrier (elevation 7,240 ft.)and postpone transplanting CRC until 2001. The crew's intention is to stock or transplant CRC into the chemically rehabilitated portion of Littlefield Creek as soon as the stream is biologically fit to receive them and a source of CRC is available. All native non-game fish species will be reintroduced prior to the chemical treatment of the rest of the upper Muddy Creek drainage. Coordinate the treatment with the Rawlins BLM personnel.

Savery Creek Basin - 3SC

Savery Creek GR872280CN

PA -Planning and Administration

- High Savery Dam and Reservoir Fishery Management Plan FX-GR-VB1-121

The crew attended several meetings concerning the development of a fisheries management plan to present to the Wyoming Water Development Commission (WWDC) for the proposed High Savery Dam and Reservoir.

The WWDC provided funding for a contract employee to be hired by the WGFD to write a fishery management plan for the proposed reservoir. Curtis Gill was hired in November 1999 to formulate and write the plan under the supervision of the Green River Regional Fish Management Crew. Several days were spent surveying the Savery Creek drainage above the proposed dam site. A draft plan has been completed and forwarded to Administration for their review. Further work on the High Savery Dam and Reservoir Fishery Management Plan and implementation of that plan will not be initiated until the final U. S. Army Corps of Engineers 404 permit has been granted to the WWDC.

Management Recommendations

Complete the Fishery Management Plan and implement elements of the plan, if the final 404 permit is granted to the WWDC for construction of the High Savery Dam and Reservoir,

PM - Fish Population Management

- CRC Genetic Analysis FX-GR-3SC-512

Colorado River cutthroat trout were sampled from the Savery Creek drainage for genetic purity analysis. Greg Eaglin (Medicine Bow/Routt National Forest) utilizing a grant from the Inland Cutthroat Initiative,

administered by USFS in Washington, D.C. paid for the analysis. The samples were again sent to Dr. Robb Leary (University of Montana) to analyze the samples. Table 3 summarizes the fish collections for genetic purity analysis in 1999 in Savery Creek drainage.

Table 3. Stream, elevation, collection date, sample size and method of genetic analysis of Colorado River cutthroat collected in the Savery Creek drainage in 1999.

STREAM	ELEVATION (ft)	DATE SAMPLED	SAMPLE SIZE	METHOD
North Fk Deep Ck	8,680	07/27/99	25	Protein
Mill Ck	8,180	09/16/99	25	DNA
Mill Ck	8,600	09/17/99	25	DNA
South Fk Mill Ck	8,210	09/17/99	25	DNA
South Fk Mill Ck	8,230	09/17/99	6	DNA
Hell Canyon Ck	7,480	09/16/99	25	DNA
Dirtyman Ck	8,000	07/27/99	25	Protein

Colorado River cutthroat trout were collected from the North Fork of Deep Creek above USFS Road 830. The North Fork of Deep Creek above the USFS road was not treated during the Deep Creek treatment in 1993. Brook trout were only found below the culvert where the USFS road crosses the North Fork. The population is most likely contributing to the CRC population in the rehabilitated portion of Deep Creek, which was stocked with pure CRC from the Belvidere Ditch. No CRC were sampled in the South Fork of Deep Creek even though fish from the Belvidere ditch were stocked in the South Fork above the road culvert.

The CRC sampled in Mill Creek at the elevation 8,180 feet were all obtained below the USFS Road 822 culvert crossing. These fish were given a "B" purity rating by Behnke. However, CRC from the headwaters of Mill Creek (elevation 8,680 feet) at a marked, population sampling site may not have been analyzed for genetic purposes. A series of large beaver ponds on the McPherson property could impede the upstream movement of hybridized CRC. And fish in the headwaters of Mill Creek may still be pure.

The six CRC sampled at elevation 8,230 feet in the South fork of Mill Creek, were found just above the confluence of Elk Creek. These fish were sampled in hopes of finding pure CRC in the headwaters of the South Fork of Mill Creek, which had not been genetically tested to date.

Rendle Butte Reservoir GR472425CN

PM - Fish Population Management

- CRC Introduction to Brood Pond. FX-GR-3MC-715

Rod and reel sampling throughout the summer found both the FRB and CRC exhibiting excellent growth and condition. In fact by late October the FRB were averaging 16 inches and fish in the 18 inch size class were common. The pond is now becoming popular with local anglers and fish are being harvested from the pond. The crew has no immediate plans to use the pond as a CRC brood pond. However, until a CRC brood source is established the pond will be reserved to use as a CRC brood pond. No further RBT stocking will occur in the pond, until all the fish now residing in the pond are removed. Results of the current efforts to obtain a CRC brood stock from the Little Snake River drainage will determine the future use of this pond.

Management Recommendations

Continue hook and line sampling of the pond to determine survival, growth and condition of CRC and FRB.

Deep Creek GR872340CN

PM - Fish Population Management

- Restore CRC populations FX-GR-3SC-715

  Restoration efforts of CRC in Deep Creek were not monitored in 1999. However, a large CRC population was found in the North Fork while collecting CRC genetic samples. However, no CRC or any other fish were sampled in the South Fork above the culvert on USFS Road 830.

HI - Habitat Improvement and Maintenance

- Maintenance of habitat improvement structures FX-GR-3SC-430

  The Deep Creek fish barrier was inspected July 27, 1999. The barrier was found functioning as designed and no repairs or maintenance were needed.

Management Recommendations

Monitor the re-establishment of a viable population of CRC, in the chemically rehabilitated portions of Deep Creek, above the fish barrier (culvert barrier) where Deep Creek passes under Forest Service Road 401.

CRC from Deep Creek may be used as a source of eggs/fish to found a CRC brood stock for the Little Snake River drainage should genetic samples from CRC in Deep Creek reveal the fish to be genetically pure. Juvenile CRC from Deep Creek could also be transferred to Littlefield Creek should the population be found genetically pure.

Annually inspect the fish barrier, remove debris and recommend beaver removal as necessary.

Mill Creek GR872465CN

HI - Habitat Improvement and Maintenance

- Maintenance of habitat improvement structures FX-GR-3SC-430

  The recently renovated (September 1998) Mill Creek fish barrier was inspected on September 14, 1999 and found dysfunctional. Tom Annear, Instream Flow Supervisor, found BKT above the fish barrier while completing instream flow sampling. Inspection of the barrier found woody debris had collected on the north wing during high spring flows. Evidently the spillway was not large enough to handle spring runoff and water flowed around the side allowing BKT to circumvent the barrier. The downstream splash pad is built in a "U" configuration to conform to the stream channel and banks. When high flows exceed the capacity of the spillway, water flows over the gabion structures on the wings of the barrier. Water flowing over the wings has very little, if any, drop, because of the "U" shape design of the splash pad. This allows fish to basically swim around the sides of the barrier.

  A design to modify the existing Mill Creek barrier has been drafted. Modifications to the barrier will include an adjustment of the spillway to accommodate high spring flows of up to 50 cfs and increasing the height of the structure to accommodate a minimum of a 4 foot vertical drop from the spillway. Downstream gabion structures will also be modified to eliminate the "U" shape configuration. The project will be funded by an Aquatic Habitat Grant from the Wyoming Game and Fish Department. The cost of the modifications will be approximately $20,000. Sponsors of the Grant include

the Wyoming Game and Fish Department ($10,000), Medicine Bow National Forest ($5,000) and Platte Valley Trout Unlimited ($5,000). Mr. Ed Novotny, WGFD Habitat Biologist, will prepare the final design of the modifications to the barrier, prepare and complete bids, supervise and coordinate all construction activities with the contractor. Modifications to the Mill Creek barrier should be completed by September 1, 2000.

PM - Fish Population Management

- BKT removal FX-GR-3SC-610

After the failure of the Mill Creek barrier was discovered, the stream was electrofished to remove BKT, which had migrated above the barrier, and to define the extent of the movement. The stream was electrofished on September 15, 16, 21, 22 and 23, 1999. A total 156 BKT were removed from Mill Creek and it's largest tributary the South Fork of Mill Creek. Most of the fish were either juveniles or adults. No YOY BKT were found. The crew asked permission to sample and remove BKT from the portion of Mill Creek owned by Mr. and Mrs. John McPherson of Rawlins. Mr. McPherson turned down the request and asked for a meeting with the crew and Forest Service Fish Biologist to determine the need to enter his private land for the removal of BKT. Adult BKT were removed from a large beaver complex directly below the MacPherson property, elevation 8,240 feet. However, no BKT were sampled while collecting CRC genetic samples above the MacPherson property at elevation 8,600 feet.

The crew arranged a meeting with Mr. and Mrs. John MacPherson on December 15, 1999 at their law offices in Rawlins. All available reports were presented to the MacPherson's for their review and scope of the ongoing work explained to them. Mr. MacPherson phoned the crew in early February 2000 and agreed to access to Mill Creek for the purpose of removing BKT from the stream on their property.

Management Recommendations

Help Ed Novotny with the design and construction of renovations to the Mill Creek fish barrier. Inspect the renovated fish barrier to make sure it is functioning properly.

Electrofish the Mill Creek drainage above the fish barrier and remove BKT. Survey Mill Creek on the MacPherson property and determine upper limit of BKT infestation. Remove BKT from beaver ponds by mechanical means. Evaluate BKT removal in Mill Creek and determine if mechanical removal will be effective in protecting the "B" purity CRC population in the stream.

Coordination all work activities on the Mill Creek with the MacPherson's and keep them abreast of the progress made BKT removal.

Annually inspect the fish barrier and remove debris as warranted.

Dirtyman Creek GR872480CN

HI - Habitat Improvement and Maintenance

- Maintenance of habitat improvement structures FX-GR-3SC-430

The Dirtyman Creek fish barrier was inspected on July 27, 1999. The barrier was functioning as designed and no repairs or maintenance was needed.

Management Recommendations

Annually inspect the fish barrier, remove debris and recommend beaver removal as necessary.

Jim Bridger Pond Basin - 3JB

Jim Bridger Pond GR440410SR

PM - Fish Population Management

- Trap Netting to Remove Spawning WHS FX-GR-3JB-610

Following is a summary of efforts to remove spawning WHS from Jim Bridger Pond (JBP) during the week of May 16-20 1999. Rationale is presented in the 1997 Progress Report. Five trap nets were set in JBP for 4 nights during late May 1999. Volunteer labor was used to conduct the majority of the netting. Jim Bridger Plant personnel assisted with the disposal of the WHS. A total of 3,259 pounds of WHS were removed as a result of the 1999 efforts. Netting results are summarized in Table 4. Trapping was conducted while the WHS were staging to spawn; most of the eggs in the females caught were still green. The majority of the WHS were caught prior to spawning. This spawning period coincided with observations made in 1998 and 1997. A total of 9,539 pounds of WHS have been removed during spring netting in 1997, 1998 and 1999.

Table 4. Catch from trap netting conducted in Jim Bridger Pond during May 1999.

Date	*Gear and Number*	*Total Hours Fished*	*Species and Number*	*Mean Length Inches*	*Range Length Inches*	*Mean Weight Pounds*	*Mean Cond*
05/18/99	TN 5	480	WHS 3,430	12.1	4.9-18.0	.95	44.8
			RBT 75	10.4	7.0-14.7	0.36	29.5
			BNT 13	10.4	9.3-12.0	0.34	30.0
			SRC 20	14.0	12.5-17.5	0.88	30.7
			SPK 90	10.7	6.2-17.8	0.36	27.2
			WAE 12	7.3	6.5-8.2	0.11	26.6
			SMB 1	3.7	3.7-3.7	1.02	39.0
			CRP 4	10.9	5.0-15.0	1.05	45.5

Note: The number of WHS caught was estimated by dividing total pounds caught by the average weight of WHS measured.

Trout were also caught in the trap nets (Table 4). The majority of the trout were released unharmed. Good numbers of RBT, SRC, SPK and BNT survived over winter but were only in fair to good condition. The salmonid catch this year is the highest observed since trap netting started in 1997. The number of salmonids caught in 1997, 1998, and 1999 was 6, 82 and 198 respectively. The SPK continue to do well with some reaching lengths of 15 to 18 inches and condition factors of 38. Two-year classes of SPK now inhabit the reservoir, those stocked in 1997 and 1998. The BNT stocked in 1997 have done poorly. WAE continue to appear in the nets in low numbers. They entered the pond with the 1998 SMB plant. Four CRP were caught after their first appearance in 1997. No CRP were observed during 1998. The WAE and CRP are removed from the reservoir when caught.

AS - Aquatic Resource Surveys

- Fall Gill Netting FX-GR-3JB-512

Gill netting was conducted October 5 to evaluate trap netting and trout stocking (Table 5). Catch per unit effort for WHS decreased slightly from that observed during October 1997 (Table 5). As expected, a large group of juvenile WHS was recruited to be subadults (Table 6). These WHS were spawned in 1996 before trap netting. The juvenile portion of the WHS population has decreased due to reduced spawning and through predation by SPK and SMB. Trap netting has reduced the adult portion of the population. In the next couple years the CPUE for WHS, during October gill netting, should decrease sharply. The decrease will reflect poor recruitment and removal of the large pulse of young adult WHS as they attempt to spawn during the spring of 2000 and 2001.

Table 5. Catch from experimental gill netting conducted in Jim Bridger Pond during October 1999, 1998 and 1997.

Date	*Gear and #*	*Total Hours Fished*	*Species and Number*	*CPUE*	*Mean L (in)*	*Range L (in)*	*Mean Weight (lbs)*	*Mean C*
10/4/99	EG 3	55	WHS 207	3.78	10.2	7.7-14.2	0.41	36.5
			RBT 29	0.53	11.5	9.1-16.5	0.56	34.9
			BNT 2	0.04	11.7	11.2-12.2	0.51	30.5
			SRC 9	0.16	13.6	11.2-16.0	0.80	30.1
			SPK 1	0.02	12.5	12.5-12.5	0.59	30.0
			SMB 6	0.11	5.6	5.1-6.3	0.09	49.2
			WAE 4	0.07	9.6	9.2-10.4	0.24	25.5
10/1/98	EG 3	60	WHS 238	3.97	10.3	4.7-17.5	0.45	35.3
			RBT 12	0.20	9.8	7.3-11.3	0.32	33.4
			BNT 3	0.05	9.5	9.3-9.7	0.28	32.3
			SRC 5	0.08	13.8	13.1-15.0	0.87	32.6
			SPK 12	0.20	9.6	8.2-10.7	0.27	30.1
			SMB 35	0.58	3.7	3.4-4.1	0.03	50.5
			WAE 3	0.05	7.2	7.0-7.5	0.12	32.4
10/2/97	EG 3	48	WHS 272	5.67	9.7	6.2-17.3	0.45	37.2
			RBT 23	0.48	11.5	9.8-15.0	0.54	34.7
			BNT 4	0.08	6.4	5.0-7.0	0.11	38.6
			SPK 6	0.13	6.9	6.0-7.7	0.10	30.8
			CRP 3	0.06	6.4	4.1-10.5	0.27	60.0

Table 6. Percentage of total WHS catch categorized by size. Samples collected with gill.

Date	*Species*	*CPUE All fish*	*Juvenile (≤8 in.)*	*Sub adults (9-11 in.)*	*Adults (≥12 in.)*
10/4/99	WHS	3.78	15%	75%	10%
10/1/98	WHS	3.97	20%	50%	30%
10/2/97	WHS	5.67	43%	40%	17%
Pre- trap netting data					
5/28/97	WHS	3.76	37%	16%	47%

The performance of fish stocked in Jim Bridger Pond varied by species during 1999 (Table 5). The CPUE and condition factor for RBT is up from 1997 and 1998, suggesting reduced competition with WHS. At least two-year classes of RBT are represented in the catch, RBT stocked in 1998 and 1999. BNT continue to appear in very low numbers. The BNT caught grew approximately 2 inches since October 1998. SRC CPUE was up a little from 1998. Their condition is only fair though. The catch of SPK in the gill

nets was low, but this does not seem to reflect the SPK population in the reservoir. No CRP were observed in the gill nets. The CPUE for SMB is down from 1998, not unexpected (Table 5). The SMB grew two inches since October 1998. These fish, by October, were averaging 5.6 inches in length and looked great. All the SMB were caught in the gill net set off the dam. Four WAE were caught in the gill nets. They have grown just over 2 inches since October 1998. Since introduction in 1998 a total of 19 WAE have been removed from the reservoir.

- Fall Trap Netting FX-GR-3JB-512

Six trap nets were fished for one night following the October gill netting. The netting was conducted for two reasons: 1) opportunity to try new trap nets purchased by Jim Bridger Plant for sucker removal, 2) opportunity to remove more WHS and WAE. An additional 438 pounds of WHS were removed. Most came from one net in the East Bay. Most of the game fish demonstrated similar trends as seen from the gill netting data and therefore will not be discussed again (Table 7). The exception was the SPK. The majority of the 16 SPK caught came from two nets set in the large shallow bays of JBP. This trend is consistent with observations since SPK were stocked in 1997. This also explains why the gill net catches are typically low. No gill nets are fished in these bays. The SPK appear to have grown about an inch since the spring.

Table 7. Catch from trap netting conducted in Jim Bridger Pond.

Date	*Gear and Number*	*Total Hours Fished*	*Species and Number*		*Mean Length Inches*	*Range Length Inches*	*Mean Weight Pounds*	*Mean Cond*
10/05/99	TN 6	139.8	WHS	865	9.6	8.0-17.5	0.36	33.5
			RBT	20	10.9	8.7-11.8	0.47	35.7
			BNT	3	10.5	10.0-11.4	0.50	43.3
			SRC	9	13.6	11.1-15.0	0.80	30.3
			SPK	16	11.7	9.8-13.4	0.49	29.4
			WAE	1	9.8	9.8-9.8	0.28	29.0
			SMB	7	5.4	4.9-5.8	0.07	43.9

Note: The number of WHS caught was estimated by dividing total pounds caught by the average weight of WHS measured.

- ZPR- zooplankton sampling FX-GR-3JB-511

Zooplankton samples were collected during May, August and October to monitor food resources (Table 8). ZPR scores were calculated for 750:500 ratios. Filamentous algae clogged the 153 micron nets during all sample dates making the samples unusable.

The ZPR scores and total volume of zooplankton sampled during 1999 were generally poor. No May ZPR score could be calculated because there was only a trace of zooplankton in the 750 micron net. The ZPR scores for the August and October samples were good, but the total volume estimates were very low. This slight upward trend in ZPR is mirrored by the slight increase in condition factors of the RBT and WHS. Foraging by the large group of subadult WHS in the reservoir is likely still impacting the zooplankton community.

Table 8. Average volume of zooplankton collected with two vertical net tows in Jim Bridger Reservoir. NA equals not available.

	Mean Volume by Mesh Size			*ZPR ratio*	
Date	*153*	*500*	*750*	*750/153*	*750/500*
4-Oct-99	NA	1.75	0.75	NA	0.43
26-Aug-99	NA	4.50	1.65	NA	0.37
17-May-99	NA	0.15	trace	NA	Trace
1-Oct-98	4.5	1.3	0.4	0.07	0.25
19-Aug-98	NA	6.3	3.8	NA	0.63
16-Jul-98	3.4	1.6	0.4	0.10	0.22
28-May-98	8.5	4.0	0.9	0.10	0.21
3-Oct-97	20.5	NA	21.0	1.02	NA
14-Aug-97	10.3	NA	1.8	0.17	NA
30-May-97	8.5	NA	1.1	0.13	NA

Management Recommendations

Continue trap netting to reduce WHS stocks. Schedule trap netting to remove WHS spawners prior to the spawning peak for mid-May. Set 6 traps for 4 nights (one week) during May 2000. Repeat in May 2001. After 2001 consider 6 trap nets for one night annually to monitor the trout population and remove spawning WHS.

Evaluate performance of stocked trout with spring trap netting and fall gill netting. Evaluate spring trap netting with fall gill netting. Collect zooplankton samples in May, August and October; additional samples as time permits.

Switch RBT plants from subcatchable plant to catchable plant. Stock 4000 4/pound RBT after May 25th (~40 RBT/acre). Eliminate BNT plant. Continue with SPK and SRC plants. Continue with SMB plants until successful natural recruitment can be documented.

Remove all WAE caught during trap netting and gill netting. If there is successful WAE recruitment then chemically treat JBP. The proximity of JBP to other area waters including Flaming Gorge Reservoir would make illegal transplants easy.

Urban Ponds Basin - 3UP

Zehawi Pond GR540380SR

AS - Aquatic Resource Surveys

- Fish Population Monitoring FX-GR-3UP-512

This pond is part of a recreational complex developed by the town of Green River. We were approached to see if it might be feasible to stock trout to provide a recreational fishery in town. In July, when excess rainbow trout became available from the Boulder Rearing Station, approximately 250 RBT at 3.5 inches were stocked. On 9/2/99 a gill-net was set for about 1 hour and 2 rainbow were captured (average length was 5.5 inches). These fish survived through the hottest part of the summer season so it would appear at least an annual catchable plant could provide a new fishing opportunity for the local community.

Management Recommendations

Obtain catchable-size rainbow trout (when they become available) to provide an urban-type fishery. Incorporate this request into our annual stocking schedule.

East Side Flaming Gorge Tributaries - 3ES

Currant Creek GR841200SR

AS - Aquatic Resource Surveys

- Fish Population Monitoring FX-GR-3ES-512

Electrofishing stations were sampled from high on Currant Creek to near Flaming Gorge Reservoir during 1999. The upper five were monitored to evaluate species composition and the effect opening of Currant Creek to fishing in 1998 had on the trout population. The lower two new stations were sampled to determine species composition.

The population estimates in the upper 5 stations are higher than any previous estimates from 1987 on (Table 9). Clearly, the two years of light fishing pressure that has occurred since Currant Creek reopened to fishing in 1998 has had no impact on the trout populations. The CRC population is dominant in the upper canyon area as can be seen from the upper two stations. This area is characterized by medium to high gradient stretches dominated by riffle and fast run habitat. The BKT populations dominate in the meadow habitats (Upper and Lower Jane's Meadow, elevations 7030 and 6980, respectively). These areas are dominated by slow run and pool habitats. The Dry Hollow station (6700) is interesting, 1999 is the first time since the stations first sampling in 1992 that BKT have been present. The CRC and BKT population are nearly equal here. Dry Hollow is dominated by run habitat. This may explain why the BKT have not displaced the CRC.

Table 9. Fish population data collected at multiple stations on Currant Creek during 1999. The coefficient of variation (CV%) is presented in parenthesis.

Date/ Elev.	*Est.*	*Species/ Number*	*Avg Length (in)*	*Range Length (in)*	*Number/ mile (CV%)*	*> 6 inches #/mile CV%)*	*> 6 inches Lbs. Mile*	*> 6 inches Lbs. Acre*
6/27/99	2P	CRC 27	8.9	3.5-11.5	377 (2)	349 (1)	119	168
7640		BKT 9	7.7	5.3-10.0	126 (0)	98 (0)	28	40
6/27/99	2P	CRC 25	7.9	3.2-11.3	306 (18)	275 (17)	105	130
7490		BKT 22	6.9	2.1-11.0	169 (32)	84 (7)	27	33
6/28/99	2P	CRC 33	7.0	3.9-12.0	259 (7)	156 (3)	43	45
7030		BKT 59	5.6	2.1-9.4	452 (3)	200 (2)	38	40
6/28/99	2P	CRC 25	7.3	3.7-12.2	206 (12)	147 (39)	50	55
6980		BKT 31	6.4	2.0-12.0	229 (2)	147 (3)	28	31
6/28/99	2P	CRC 45	5.7	3.5-14.7	304 (2)	66 (0)	34	42
6700		BKT 35	4.2	2.1-12.3	278 (16)	93 (19)	20	24
8/24/99	2P	CRC? 3	11.4	7.3-14.1	80 (0)	80 (0)	24	30
6385		MTS 25	5.7	3.1-7.1	287 (1)	NA	NA	NA
8/24/99	2P	MTS 7	6.5	6.0-7.2	71 (0)	NA	NA	NA
6180								

The lowest two stations provided interesting insights. The station at elevation 6385 is a short distance below Currant Creek Ranch house. The station is deep within a fairly new cut. Even with the degraded habitat the MTS population is apparently strong. The trout collected at this

station appeared to be RBTxCRC hybrids that are thoroughly introgressant. Although these trout have orange slashes, they also have lots of fine spots and pink fins. The lowest station, which is near Flaming Gorge Reservoir, has only MTS. In addition to the MTS sampled, swarms of MTS fry were observed in several backwaters. Habitat data collected at all the stations is presented in Table 10.

Table 10. Habitat variables measured while surveying Currant Creek in 1999. NA indicates data not available.

							Substrate (%)		
Date	*Elev.*	*Station Length (ft)*	*Wetted Width (ft)*	*Mean Depth (ft)*	*Wetted W/D ratio*	*CFS*	*Silt/ Sand*	*Gravel*	*Cobble/ Boulder/ Bedrock*
6/27/99	7640	378	5.8	0.57	10.1	NA	13	82	5
6/27/99	7490	500	6.9	0.73	9.2	NA	16	78	5
6/28/99	7030	713	7.7	0.92	8.5	NA	20	80	0
6/28/99	6980	716	7.5	0.83	9.0	NA	13	78	9
6/28/99	6700	798	6.7	0.79	8.5	NA	36	64	0
8/24/99	6385	460	6.6	NA	NA	NA	NA	NA	NA
8/24/99	6180	520	6.6	0.64	10.2	NA	38	30	32

HI - Habitat Improvement and Maintenance

- Rock structure installation Currant Creek Ranch FX-GR-3ES-234

  This activity was not completed. Landowner changed his mind on completing this project.

Management Recommendations

Sample the upper 5 station again in 3-5 years.

Collect 30 trout for genetic analysis from Upper and Lower Jane's Meadow.

Camp Creek GR841973SR

AS - Aquatic Resource Surveys

- Fish population monitoring FX-GR-3ES-512

  The upper portion of Camp Creek was electrofished on July 20, 1999 to determine the status of any fish population present. A station was established at elevation 7650 (UTM =12Z N4555161, E648963).

  No fish were found in the section electrofished. There are two small reservoirs downstream a short distance which would block any movement of fish into the upper reaches of Camp Creek. Macroinvertebrates including caddis, mayflies, and stoneflies were observed but not counted. It appears that the minimum amount of habitat is present to support trout, although wintering pool habitat may be limiting. Habitat data collected is presented in Table 11.

Table 11. Habitat variables measured while surveying Camp Creek in 1999.

							Substrate (%)		
Date	*Elev.*	*Station Length (ft)*	*Wetted Width (ft)*	*Mean Depth (ft)*	*Wetted W/D ratio*	*CFS*	*Silt/ Sand*	*Gravel*	*Cobble/ Boulder/ Bedrock*
7/20/99	7650	360	3.2	0.3	13.3	0.9	20	60	20

With the reservoirs downstream this section of stream warrants further investigation as potential CRC brood pond or even a place to establish a bluehead sucker (BHS) conservation population. The landowner has been approached regarding both options and has agreed to talk about potential future plans.

Management Recommendations

Visit further with private landowner regarding access and use of the reservoirs on Camp Creek. Investigate the reservoirs and Camp Creek further to evaluate their potential to support fisheries.

Gooseberry Creek GR840976SR

AS - Aquatic Resource Surveys

- Fish population monitoring FX-GR-3ES-512

Surveys on Gooseberry Creek conducted in 1998 found the upper 1-1.5 miles barren of fish. Upon further investigation a 7-foot waterfall at elevation 7260 was found to be a barrier. Upstream of the waterfall spawning gravels were clean and abundant, although the creek is small and cold. Below the waterfall little spawning habitat is available, although summer and winter rearing habitat was plentiful. The surveys lead to an idea to develop a structure over the waterfall thereby providing fish passage and stabilizing the cut that formed the waterfall. With passage CRC could use upper Gooseberry for spawning and lower Gooseberry for rearing and wintering.

The first step in this project was to evaluate whether CRC could successfully spawn above the waterfall. On May 6 1999 41 adult CRC were collected from Trout Creek and moved to upper Gooseberry Creek (elevation 7600). This transplant was to test whether CRC could spawn in upper Gooseberry. A block net was placed at the downstream boundary of the study reach to encourage the adult CRC to remain and spawn.

The study reach was electrofished on October 11, 1999 to search for YOY CRC. Progeny from two redds were found in the experimental reach. One group of ten fry averaged 1.5 inches, the other group of twelve averaged 2.5 inches. Apparently given access, CRC can successfully spawn in the upper reaches of Gooseberry Creek.

- Genetic analysis FX-GR-3ES-512

Six cutthroat trout were collected from Gooseberry Creek, T105W, R14N, S16 & S21 during September 1998. There fish were submitted to Dr. Leary's lab at The University of Montana for electrophoretic analysis. An additional 15 fins were collected from Gooseberry Creek at similar locations during July and September and will be sent to Dr. Shiozawa's lab at Brigham Young University in March 2000.

Dr. Leary's lab found the allele frequencies to be dominated by CRC (0.875) with the remainder being YSC (0.125). This is curious because stocking records suggest only SRC were stocked between 1956 and 1976. There are no records of stocking YSC in the Trout Creek drainage. Most likely, the allele frequency of 0.125 designated as YSC is actually SRC.

HP - Habitat Protection

- Fish passage at Gooseberry Creek head-cut FX-GR-3ES-540

This activity has been postponed until a CRC brood is developed.

Management Recommendations

Table this project until such a time as money becomes available to design and build fish passage over the waterfall at elevation 7260. Additionally, and possibly more important, wait until a new CRC brood stock is developed from which either CRC fingerlings or fry (via a hatching box) can be stocked into upper Gooseberry Creek. These fish would be the basis for establishing a future-spawning run to upper Gooseberry Creek.

Sage Creek GR841970SR

AS - Aquatic Resource Surveys

- Fish Population Monitoring FX-GR-3ES-512

Two stations on Sage Creek were electrofished to determine species composition and abundance.

Mountain suckers dominated the station upstream of the confluence of Trout Creek, elevation 7010 (Table 1). One cutthroat trout, with predominantly CRC traits, was caught. Spotting patterns suggested possible hybridization with SRC. This stream has a good width to depth ratio (Table 12), but a predominantly silt/sand bottom. Additionally, the high levels of dissolved solids probably prohibit salmonid spawning: conductivity was 2300 µs/cm. The CRC caught most likely immigrated from Trout Creek. Mountain sucker spawning does not appear to be a problem judging from the hundreds of newly hatched MTS fry in the backwater habitats.

Table 12. Fish population data collected at multiple stations on Sage Creek during 1999. The coefficient of variation (CV%) is presented in parenthesis. NA equals not available.

Date/ Elev.	*Est.*	*Species & Number*	*Avg L (in)*	*Range Length (in)*	*#/mile (CV%)*	*> 6 inches #/mile >6 in.*	*Lbs. Mile*	*Lbs. Acre*
7/20/99	2P	CRC 1	11.6	11.6-11.6	9 (0)	9 (0)	5	21
7010		MTS 14	4.3	3.6-5.6	142 (12)	NA	NA	NA
8/23/99	3P	CRC 6	8.1	5.0-11.8	51 (0)	43 (0)	14	18
6760		MTS 40	4.4	2.6-6.9	417 (16)	NA	NA	NA

Several cutthroat trout, with predominantly CRC traits, were caught from the station just downstream of Trout Creek at elevation 6760 (Table 1). These fish looked similar to the CRC caught in Gooseberry Creek in 1998, likely of similar genetic composition (See Gooseberry Section). It is not clear where these trout are spawning. They may be spawning somewhere in either Gooseberry or Sage Creek or they might be drifting out of Trout Creek. The MTS population was strong at this station (Table 1). All year classes of MTS were observed. Habitat variables measured at both sites are presented in Table 13.

Table 13. Habitat variables measured while surveying Sage Creek in 1999. NA equals not available.

Date	Elev.	Station Length (ft)	Wetted Width (ft)	Mean Depth (ft)	Wetted W/D ratio	CFS	Substrate (%) Silt/ Sand	Gravel	Cobble/ Boulder/ Bedrock
7/20/99	7010	556	2	0.69	2.9	0.8	100	0	0
8/23/99	6760	620	6.3	0.78	8.1	NA	53	37	10

Management Recommendations

No further management action is recommended at this time.

Spring Creek GR841972SR

AS - Aquatic Resource Surveys

- Fish population monitoring FX-GR-3ES-512

The headwaters of Spring Creek were electrofished to determine species composition and abundance. Sampling was conducted at elevation 7400, just below a stock reservoir. Another site was sampled just above the stock reservoir. No fish were caught at either site. The livestock lessee stopped while we were sampling and informed us that Spring Creek above the stock reservoir goes dry some years. Spring Creek is nearly 8 miles long; presumably fish from Sage Creek use some portion of the lower reaches.

Management Recommendations

No further management action is recommended at this time.

Trout Creek GR841975SR

AS - Aquatic Resource Surveys

- Fish Population Monitoring FX-GR-3ES-512

Two stations were electrofished on Trout Creek to evaluate the status of CRC population. The station at elevation 7610 is a historical station. The station at elevation 7880 is a new station near the headwaters of Trout Creek.

Individuals of all year classes are represented in the CRC population at elevation 7880 (Table 14). The low population observed is a direct result of the limited habitat available in this medium to high gradient section of stream. The habitats available in the section sampled and surrounding reach are predominantly riffle and fast run with few pools interspersed. One pool outside the station of approximately 12-foot square supported at least 7 adult CRC (observed from bank). Any activity to encourage pool formation will increase the number of adult CRC supported in this stream reach.

Table 14. Fish population data collected at two stations on Trout Creek during 1999. The coefficient of variation (CV%) is presented in parenthesis. Pounds per acre and per mile are for fish >6 inches.

Date/ Elev.	Est.	Species & Number		Avg L (in.)	Range Length (in)	#/mile (CV%)		>6 inches #/mile >6 in.		Lbs. Mile	Lbs. Acre
7/21/99 7880	2P	CRC	8	5.7	2.7-8.8	101	(13)	51	(0)	13	25
7/22/99 7610	2P	CRC	26	6.3	2.6-13.3	356	(3)	164	(3)	65	67

The estimated number of CRC observed in Trout Creek at elevation 7610 is the highest observed during the 1970s through the 1990s (Table 1). This is undoubtedly due to the numerous good water years leading up to this population estimate. All year classes of CRC were observed in the station sampled. Habitat variables measured at both sites are presented in Table 15.

Table 15. Habitat variables measured while surveying Trout Creek in 1999. NA equals not available.

Date	Elev.	Station Length (ft)	Wetted Width (ft)	Mean Depth (ft)	Wetted W/D ratio	CFS	Substrate (%) Silt/ Sand	Gravel	Cobble/ Boulder/ Bedrock
7/21/99	7880	313	4.3	0.46	9.4	NA	NA	NA	NA
7/22/99	6760	386	7.9	NA	NA	NA	NA	NA	NA

Management Recommendations

Collect 30 CRC each, between 6-10 inches, from elevation 7880 and 7400 on Trout Creek during 2000. Have this samples analyzed to determine genetic purity (percent CRC) and genetic variability. SRC were stocked in lower Trout Creek from 1956 to 1976. CRC were stocked in Trout Creek from 1979 to 1996. Samples from the 6-10 inch portion of the population should help describe the genetic profile of the spawning population. The CRC at elevation 7880 are likely of Daniel domestic origin. The CRC at elevation 7300 are likely the most influenced by SRC stocking. Evaluating the genetic profile of this population will provide information upon which future management decisions can be made.

Bitter Creek Basin - 3BI

No work scheduled.

Flaming Gorge Reservoir Basin - 3FG

Flaming Gorge Reservoir GR440390SR

AS-Aquatic Resource Surveys

- Fish Population Trend Analysis FX-GR-3FG-512

Spring experimental trend netting began the week of May 10, 1999 with the UDWR Crew netting the Canyon area and the GR Crew netting the Open Hills sites. Water temperatures during the first week of netting ranged from 43F to 45F in the Canyon and Open Hills. The Inflow area was netted the week of May 17, 1999. Water temperatures during netting ranged from 47F to 54F.

Catches of white suckers (WHS) increased in the Inflow area to 28.8 fish per net (Table 16), while catches of Utah chubs (UTC) decreased slightly to 12.8 fish per net. Catches of both WHS and UTC remain low compared to catch rates for UTC prior to 1987. Periodic fluctuations of WHS and UTC populations can be expected, because of fluctuations in productivity of the reservoir, predation and competition between planktivorous fishes. Catches of lake trout (LAT) increased slightly for the third consecutive year to 5.4 fish per net. Only in 1984 were more LAT netted (6.1 per net). Catches during the last five years remain higher than during the years 1989 through 1993, indicating a trend of increased recruitment of smaller LAT. Survival of rainbow trout (RBT) stocked in 1998, as indicated by a catch of 0.8 RBT per net, appears to have been the best in many years. Catches of brown trout (BNT) increased three fold to 6.2 fish per net, nearly eclipsing the previous high of 6.3 fish per net caught in 1984. Considering the smaller numbers of BNT planted in the Inflow area since 1995 as compared to the numbers planted in the early 1980s, it appears survival of stocked BNT is quite high. Catches of kokanee (KOE) matched the previous high of 0.4 fish per net recorded in 1998. Other game fish caught in order of abundance in Inflow nets included flannelmouth suckers (FMS), smallmouth bass (SMB) and mountain whitefish (MWF).

Table 16. Spring gill net data (number of fish caught per net set - 4 hrs each) for the Inflow Area of Flaming Gorge Reservoir, 1983-1999.

	Year	WHS	UTC	RBT	BNT	LAT	KOE	SMB	CCF
	1983	48.8	53.1	0.2	0.8	2.5	0.1		0.1
	1984	55.2	53.3		6.3	6.1			
	1985	69.2	37.3	0.7	2.8	3.7		0.1	
	1986	42.7	34.4	0.3	2.8	3.3			0.1
	1987	52.3	30.3	1.4	2.0	2.0			0.3
Number	1988	21.1	40.0	0.5	1.0	4.3			
Caught	1989	33.1	22.6		0.3	2.7			
per	1990	21.4	14.3	0.6	0.3	1.5	0.1		0.1
Net	1991	24.3	43.4	0.3	0.1	1.0	0.3	0.1	0.2
	1992	30.5	22.2	0.3	0.3	1.8		0.7	
	1993	26.0	54.7	0.1	0.3	2.2		0.3	0.2
	1994	9.1	23.9		0.2	4.6	0.3	0.2	0.1
	1995	17.6	7.3	0.5	0.6	3.3	0.3	0.2	
	1996	29.6	14.7	0.1	0.4	3.3	0.3	0.7	
	1997	19.8	28.0	0.1	0.8	4.6	0.2	0.6	0.1
	1998	20.9	19.9	0.6	2.6	5.3	0.4	0.4	0.3
	1999	28.8	12.8	0.8	6.2	5.4	0.4	0.3	

In the Open Hills (Table 17) catches of WHS increased to 18.1 fish per net. Even though catches of WHS increased for the second consecutive year, catches remain much lower than most years prior to 1992.
No UTC were caught in the Open Hills in 1999. Catches of UTC have been inconsequential since 1985 and are not a significant component of the Open Hills fishery. Catches of LAT decreased slightly for the third consecutive year to 1.2 fish per net, indicating reduced numbers of small LAT in the Open Hills. RBT catches increased slightly again. RBT catches increased from a low of zero fish per net in 1996 to 1.4 fish per net in 1999, indicating increased survival of planted RBT since 1997. The catch of RBT exceeded all catch per unit of effort (CPUE) since 1987. Catches of kokanee decreased to 0.7 fish per net. BNT catches increased to 0.9 fish per net, which is the largest CPUE since 1985. BNT abundance in the Open Hills is dependent on the movement of BNT down reservoir from planting sites in the Inflow area. SMB and FMS were also caught in Open Hills nets.

Table 17. Spring gill net data (number of fish caught per net set - 4 hrs each) for the Open Hills Area of Flaming Gorge Reservoir, 1983-1999.

	Year	WHS	UTC	RBT	BNT	LAT	KOE	SMB	CCF
	1983	41.2	0.4	0.6	0.4	0.3			
	1984	44.2	13.3	0.6	1.5	0.8		0.3	
	1985	49.5	9.3	0.8	1.0	3.8			
	1986	34.8		1.0	0.6	4.0	0.1	0.3	
	1987	33.2	3.7	3.6	0.8	0.9	0.1	1.7	
Number	1988	23.1	0.1	0.8	0.5	0.8			
Caught	1989	13.2	0.5	1.3	0.2	2.3	0.1	0.3	
per	1990	11.8	0.2	0.3	0.1	0.9	0.5		
Net	1991	30.8	0.1	0.3		0.8		0.5	
	1992	20.5	0.6	0.3	0.1	1.2	0.2	0.8	
	1993	14.1	2.3	0.7	0.2	2.4		2.6	
	1994	11.8	1.4	0.1	0.1	1.3	0.1	0.3	
	1995	12.1	0.3	0.1		1.8		0.1	
	1996	19.8	0.4			0.8	0.6	1.2	
	1997	3.5	0.5	0.3	0.1	2.3	0.5	0.2	
	1998	10.6	0.4	1.0	0.4	1.9	2.4	1.1	
	1999	18.1		1.4	0.9	1.2	0.7	0.3	

In the Canyon Area (Table 18) WHS catches increased to 3.4 fish per net. As seen in other reservoir areas WHS abundance fluctuates, but the long-term trend has decreased. No UTC were caught in the Canyon, indicating their tenuous existence in this reservoir area. Catches of LAT decreased to 0.7 fish per net. Decreased catches of small LAT in both the Canyon and Open Hills may predict a decreasing trend in the abundance of small LAT in these reservoir areas. However, catches of small LAT in Inflow nets remains high. Catches of RBT increased to 2.8 fish per net, which is the best CPUE since 1989. CPUE for holdover RBT increased in all reservoir areas indicating good survival of the 1997 and 1998 planted RBT reservoir wide. KOE were caught in Canyon nets for the fourth consecutive year. No BNT have been captured in Canyon nets since 1994, but SMB and MWF were netted.

Table 18. Spring gill net data (number of fish caught per net) for the Canyon Area of Flaming Gorge Reservoir, 1983-1999.

	Year	WHS	UTC	RBT	BNT	LAT	KOE	SMB	CCF
	1983	25.8	0.2	2.6	0.1	0.7	0.1		
	1984	9.7	0.5	1.6	0.3	1.0			
	1985	21.3	2.0	3.3	0.3	1.2	0.5		
	1986	28.1	0.1	3.3	0.2	1.3	0.5	0.2	
	1987	9.3	0.1	2.9	0.6	1.0	0.1	0.3	
Number	1988	10.2		2.6	0.3	0.5			
Caught	1989	10.2		3.0	0.1	1.1	0.3		
per	1990	16.9	0.1	1.8		0.5	0.1	1.4	
Net	1991	12.8		0.8		0.2		0.6	
	1992	2.1	0.2	1.4		0.3		0.4	
	1993	2.2		0.6		1.3		1.0	
	1994	1.1		0.6	0.1	0.3	0.1	1.4	
	1995	2.4		0.1		1.0		0.3	
	1996	1.1		0.3		0.6	0.3	0.2	
	1997	5.6		0.7		1.0	0.3	1.8	
	1998	1.9	0.1	2.3		1.2	0.8	0.9	
	1999	3.4		2.8		0.7	0.4	0.3	

A total of 84 LAT were caught during the 1998 experimental netting (Table 19). The CPUE of LAT shows a decrease from 1997 and 1998 catches. Catches of LAT from 1997 through 1999 remain the highest since the period 1984 through 1986. The catch of LAT in experimental nets reflects trends in the

recruitment of catchable LAT to the fishery. As Table 9 indicates, this trend has been increasing steadily since lows in 1990, 1991 and 1992. Only in 1996 was the trend interrupted and was most likely an artifact of gill net sampling. The majority of LAT caught in experimental nets (92%) were less than 25 inches in length.

Table 19. Length-frequency (5 inch intervals) of LAT from all experimental gillnets nets from Flaming Gorge Reservoir from May 1983 through 1999.

Year	N	<15.0	15.0-19.9	20.0-24.9	25.0-29.9	30.0-34.9	>35.0
1983	42	0	27	9	2	4	0
1984	93	5	64	16	3	5	0
1985	103	6	60	26	7	3	1
1986	101	1	40	53	5	1	1
1987	47	0	24	15	5	1	2
1988	64	1	28	29	2	4	0
1989	79	0	29	36	9	3	2
1990	35	3	17	11	3	1	0
1991	23	0	7	16	0	0	0
1992	39	0	11	23	4	0	0
1993	70	0	19	29	12	9	1
1994	72	1	29	23	10	6	3
1995	72	0	16	36	10	6	4
1996	51	0	2	19	26	3	1
1997	95	4	28	56	2	4	1
1998	98	6	49	34	4	0	5
1999	84	2	32	43	5	1	1

- LAT Population Trend Analysis FX-GR-3FG-512

The tenth year of LAT trend netting was completed in 1999. Objectives were to follow changes in abundance, distribution, average length, average weight and average condition of LAT in Flaming Gorge. The UDWR Crew netted the Canyon, while FMGR netted the Open Hills and Inflow areas.

Netting for LAT began April 27, 1999 at the sites in the upper Inflow area. The balance of the netting at the Inflow sites, Open Hills and Canyon was completed in conjunction with the experimental netting program. Water temperatures ranged from 43F on May 11 in the Open Hills area to 47F on May 19 at the Big Bend sites in the Inflow area.

A total of 127 LAT were netted in 36, one-hour sets (Table 20). The total does not include 3 LAT lost from nets as they were pulled. The catch of LAT was 3.5 fish per net. Of the catch, 30% were caught in the Canyon, 29% in the Open Hills and 41% in the Inflow. LAT average length was largest in the Open Hills (31.6 inches) and smallest in the Inflow (25.2 inches).

Table 20. Summary of the catch of LAT by area of Flaming Gorge Reservoir caught during the LAT trend netting in April and May 1999.

Area of Reservoir	# of LAT Netted	% Netted	# of Nets	Catch /net
Inflow	52	41.0	12	4.3
Open Hills	37	29.1	12	3.1
Canyon	38	29.9	12	3.2
Total	127	100.0	36	3.5

The total catch of LAT increased from 89 fish in 1997 and 94 fish in 1998 to 127 fish in 1999. (Table 21). The population trend of lake trout (vulnerable to the exploratory nets) depicts an increase in the number of LAT in the reservoir during the last three years. Numbers of netted LAT in the 20.0 to 29.9 inch length classes account for most of the increase. Certainly the increased trend in recruitment diagnosed in the experimental netting (Table 4) can be identified in the catches of smaller LAT in the exploratory nets. Numbers of LAT 30.0 to 34.9 inches captured in the nets have fluctuated, but are certainly down from the numbers caught in 1990 and 1991. While the numbers of trophy LAT (35.0 inches and over) caught by the nets has fluctuated between 19 and 32 fish since 1990, the numbers of trophy LAT in the population appear fairly stable, averaging 23.4 fish per year. Should the number of large lake trout netted remain the same for the foreseeable future, further liberalization of the harvest of LAT less than 28 inches in length may not be necessary to keep the population in balance with available forage. Condition of the larger LAT and trends in KOE abundance will be keys to determining the number of large lake trout the forage base can support and the viability of the current LAT regulation.

Table 21. Length-frequency (5 inch intervals) of LAT from exploratory trend gill nets during May 1990 to 1999, Flaming Gorge Reservoir.

Year	N	<20.0	20.0-24.9	25.0-29.9	30.0-34.9	35.0-39.9	>40.0
1990	134	15	32	22	40	25	0
1991	139	6	28	40	41	21	3
1992	70	0	9	16	26	16	3
1993	89	3	18	19	30	16	3
1994	97	1	9	21	38	26	3
1995	86	5	14	13	35	18	1
1996	101	2	15	22	30	32	0
1997	89	8	20	15	25	21	0
1998	94	6	21	22	23	21	1
1999	127	16	26	34	28	22	1

No previously tagged LAT were recaptured in 1999. Only two fin clipped (adipose) LAT were netted. One of the fish was presumed stocked in June 1989 in the Inflow area (Buckboard). The plant of 15,120 LAT averaged 3.5 inches when stocked. The fish was netted north of Current Creek in the Inflow area. The LAT was 27.3 inches in length, weighing 5.5 pounds. The other adipose clipped LAT was caught at the Anvil Draw sites in the Open Hills. The fish was 38.0 inches in length and weighed 20.5 pounds. The fish was most likely planted in 1979 when 13,500 LAT were stocked in the Open Hills (Pipeline area) at an average length of 4.2 inches.

Condition of LAT is an indication of forage fish availability in Flaming Gorge. Table 22 compares the average Condition ("C") of all LAT netted between 1985 and 1998 to the average Condition of LAT caught in 1999 by length class. LAT Condition decreased in all length classes, except in the 24.0 to 27.9 inch size class between 1998 and 1999. And average Condition factors for LAT in all size classes were less than the average Condition of LAT calculated for the period 1985 through 1998. Condition of LAT may never approach the robust condition exhibited by fish in the 1980s and early 1990s, because the forage base changed from UTC to KOE.

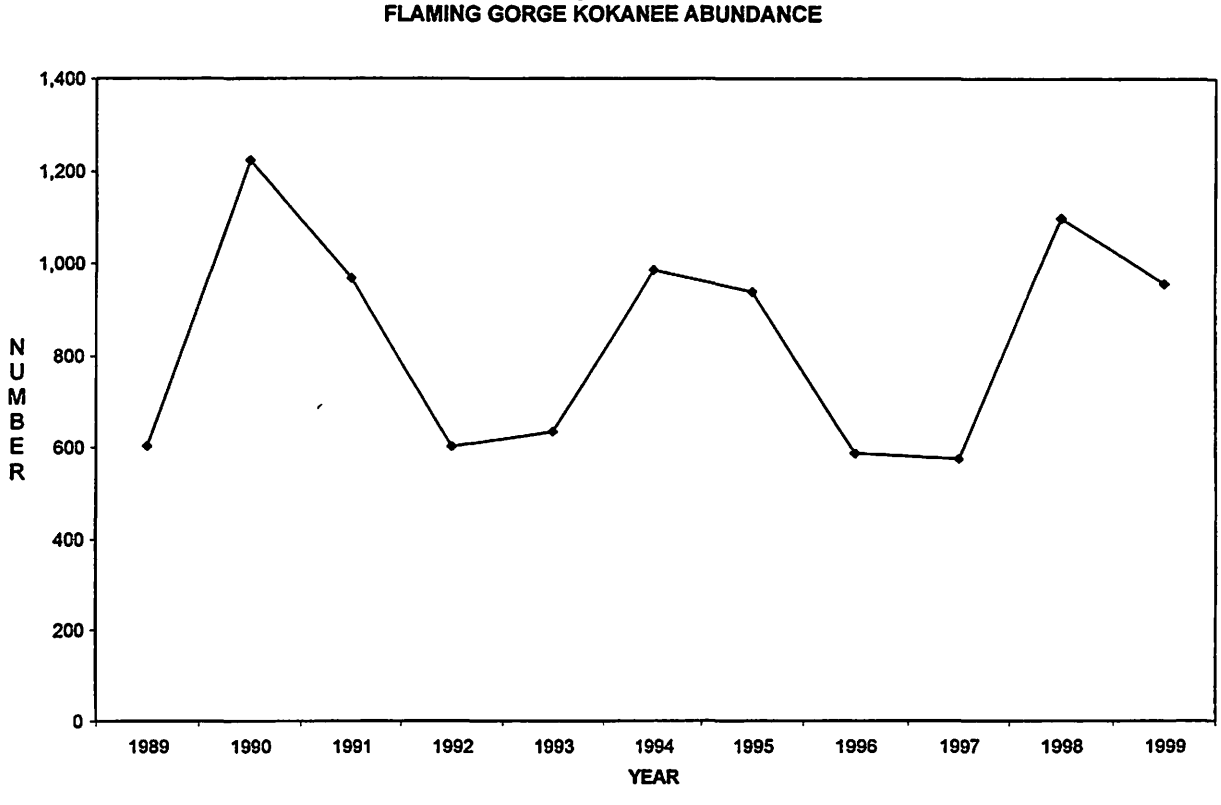
Additional exploratory netting was completed in order for Condition factors in each size group to be more representative of the population. An additional 62 LAT were netted and included in the condition factor data.

Table 22. Number of LAT and average condition of LAT by four inch size groups sampled in gill nets from Flaming Gorge Reservoir for the months of April and May, 1985 to 1998 as compared to the year 1999.

	1985 - 1998		*1999*	
Length Class (inches)	*Number*	*Average "C"*	*Number*	*Average "C"*
16.0 - 19.9	517	28.9	67	29.4
20.0 - 23.9	1084	30.6	80	29.4
24.0 - 27.9	920	35.9	35	35.0
28.0 - 31.9	770	40.4	45	38.0
32.0 - 35.9	605	42.1	21	37.3
>36	342	44.2	22	41.1

Annual hydroacoustic work was completed August 9 through 11, 1999. Beginning in 1997 UDWR personnel conducted the hydroacoustic survey without the assistance of Dr. Chris Luecke (Utah State University) who pioneered the hydroacoustic surveys on the reservoir. Results of the 1999 surveys are depicted in Figure 1. These results show the second most abundant year of the KOE cycle was higher than the last corresponding year (1995). A large cohort of Age 1+ KOE was found during the 1999 sampling which should translate into better KOE angling in 2002. Approximately 62% of the 958,000 KOE sampled were Age 1+. Although Age 0+ KOE are included in the estimate, the hydro-acoustics system may underestimate the numbers of Age 0+ KOE in the reservoir.

Figure 1. Abundance (thousands) of Flaming Gorge age 0+, 1+ and 2+ Kokanee (1.4 to 13.8 inches) from 1989 through 1999.



During the hydroacoustic and trawl sampling (by UDWR) all yearling KOE were collected then frozen to examine for OTC (oxytetracycline marks). OTC was fed to the KOE at the Auburn hatchery prior to stocking. A total of 78 KOE with an average length of 6.8 inches were examined. These fish were captured in the Inflow, Confluence, and Open Hills areas. Forty-four

percent of the examined KOE displayed the mark. And of these marked KOE; 76% were captured in the Inflow area, 12% in the Confluence area, and 12% in the Open Hills. These KOE would have originated from those stocked in 1998. In 1998, KOE were stocked at the Buckboard Marina as well as Flume Creek, all were fed OTC, so the examined fish could have moved from either area. The stocked KOE appear to be making a significant contribution to the population in the upper portion of the Reservoir. They may provide a source that will establish a self-sustaining population; something limited in this area.

CS - Creel Surveys

- Spot Creel Surveys FX-GR-3FG-520

No programmed creel surveys were scheduled for 1999. Instead, spot creel surveys were obtained by biologists and wardens to determine creel and catch rates. The third year of an angler log program was also completed. Angler logs were designed for the Flaming Gorge fishery and measuring boards built to entice anglers into the program. There were 15 anglers who kept logs of their 1999 angling experiences. Table 23 summarizes the Angler Logs and spot creel surveys data collected during the calendar year, 1999. Angler Log fishermen fished a total of 5,458.6 hours (844 trips), while anglers interviewed during spot creel checks fished 4,502.0 hours (1,110 trips).

Table 23. Summary of all fish kept, fish released and average catch rates (fish/ hour) by species by for anglers completing Angler Logs and spot creel surveys in 1999 for Flaming Gorge Reservoir.

SPECIES	*ANGLER LOG*			*SPOT CREELS*		
	FISH KEPT	*FISH RELEASED*	*CATCH/HOUR AVG*	*FISH KEPT*	*FISH RELEASED*	*CATCH/HOUR AVG*
Rainbow Trout	382	613	0.18	534	378	0.20
Kokanee	676	959	0.30	488	333	0.18
Lake Trout	232	796	0.19	126	162	0.07
Brown Trout	37	171	0.04	49	29	0.01
Smallmouth Bass	48	72	0.02	60	312	0.08
Channel Catfish	16	8	0.00	7	0	0.00
Others	0	3	0.00	0	2	0.00
TOTALS	1391	2622	0.73	1264	1216	0.54

Angler Log interview data summaries were completed for each person completing an Angler Log. The individual summary, along with the average catch data for all Angler Log fishermen were returned to the participants.

The first full commitment of the 5-inch RBT were planted in the reservoir during the spring of 1999. All RBT from WGFD hatcheries (206,970) were FRB, while 56% of the 505,059 RBT stocked from Jones Hole National Fish hatchery were FRB. All RBT planted in Flaming Gorge starting in 1999 were planned to be the FRB strain. Unfortunately, the WGFD could not supply Jones Hole with enough FRB eggs to fulfill their entire commitment for the reservoir. Returns of these RBT to fall and winter anglers (open water and ice fishermen) has been good. The RBT are averaging approximately 12 inches in length and are in superb condition. The quality of these fish (including the attribute of having all fins present and accounted for) is quite astonishing. Reservoir anglers are noting the difference in quality, as the crew has been asked several times where "wild" RBT are coming from.

Channel catfish (CCF) stocked from 1994 through 1998 were adipose clipped to differentiate them from wild CCF. None of the marked catfish were noted in the creel, although a few reports were received from catfish anglers who had caught catfish without adipose fins. A catfish angler who kept an

Angler Log during 1999 reported catching 17 CCF in two outings on the reservoir. Of the 17 CCF caught ten were adipose clipped. The catfish ranged in length from 16.0 to 19.25 inches. Based upon the information provided by this angler and incidental reports from other anglers, it appears CCF natural reproduction may not provide an adequate CCF fishery. A small number of CCF should be stocked yearly to enhance the fishery until future sampling indicates natural reproduction can sustain the fishery.

Only seven LAT tags were returned to the WGFD from anglers in 1999. One of the fish was tagged in 1988, while the other six fish were tagged in 1993. Data for these fish have been processed and are on file.

Management Recommendations

Continue the current management direction while evaluating the following:

- Continue on-going experimental trend netting in the Inflow and Open Hills areas to follow population trends.
- Concurrently with experimental netting, determine LAT population trends with the established exploratory trend-netting program in the Inflow and Open Hills areas.
- Utilizing gill nets, trap nets and set lines, sample the upper Blacks Fork Arm of the reservoir to determine ratios of marked to unmarked CCF.
- Examine kokanee captured during trawling, gill netting, and angler creels in those size groups potentially having OTC marks to determine if preliminary results confirm the contribution of stocked KOE.
- Continue to document LAT tag returns.
- Continue spot creel surveys and the Angler Log program to document angler success rates, species composition, and other biological data concerning the catch. The intensity of spot creel surveys will be increased as time permits to assess the performance of the 5 inch FRB plants in the reservoir.

Henry's Fork River Basin - 3HF

No work scheduled.

Blacks Fork River Basin - 3BF

Blacks Fork River GR841210UA

AS - Aquatic Resource Surveys

- Blacks Fork River Electrofishing FX-GR-3BF-510

This activity was not completed due to time constraints.

Management Recommendations

Reschedule for September 2000.

Beaverdam Hollow Creek GR841848UA

AS - Aquatic Resource Surveys

- Fish Population Monitoring FX-GR-3BF-512

Two stations were electrofished on Beaverdam Hollow Creek to determine the status of the CRC population. Beaverdam Hollow Creek is a tributary of East Fork Muddy Creek on the North Slope of the Uinta Mountains. This country was accessed using the Sheep Trail. Jeff Smith, local Department

warden, gained permission from the landowners for sampling stations on private land.

Individuals of all year classes were represented in the CRC population at elevation 9025 (Table 24). Twenty-eight CRC fry were caught during the two-pass estimate. The CRC are spawning successfully in this reach. These fish have strong CRC phenotypic characteristics. At least 3-year classes of MTS were observed, in addition to numerous MTS fry.

This stream emerges from the ground at elevation 9100 and goes under ground again at elevation 8940, approximately 0.75 to 1.0 miles of available habitat. Flows were estimated at approximately 0.25 CFS. Perennial flows were not reestablished until somewhere in section 17, R117W, T12N; approximately one mile down slope. Outflow from Vacher Reservoir is likely the source flow of Beaverdam Hollow Creek in this section. Section 17 was not investigated because the landowner would not grant permission. Willows and beaver ponds dominate the surveyed stream reach. The dominant substrate is silt/clay; even larger particles were covered by silt/clay (Table 25). Some silt covered spawning gravels are present. The dominant habitat in this reach is pool (90%); few riffles (10%) are present between the beaver dams.

Table 24. Fish population data collected at two stations on Beaverdam Hollow Creek during 1999. The coefficient of variation (CV%) is presented in parenthesis. NA equals not available.

Date/ Elev.	Est.	Species & Number	Avg L (in)	Range Length (in)	#/mile (CV%)	> 6 inches #/mile (CV%)	> 6 inches Lbs. Mile	> 6 inches Lbs. Acre
9/14/99	2P	CRC 37	4.1	3.1-7.6	544 (8)	41 (0)	4.5	10.9
9025		MTS 19	NA	3.0-3.0	272 (6)	NA	NA	NA
9/15/99	2P	CRC 9	5.0	3.7-7.0	135 (0)	30 (0)	3.3	4.5
8635		MSC 120	NA	NA	1935 (4)	NA	NA	NA
		MTS 45	NA	2.2-4.7	720 6)	NA	NA	NA

CRC numbers drop dramatically at the station on BLM land, elevation 8635 feet. No CRC fry were observed in the sample reach. These CRC show signs of hybridization with RBT. Outflow from Vacher Reservoir is likely the source flow of Beaverdam Hollow Creek in section 17, R117W, T12N. The Department authorized 1500 fingerling RBT to be stocked in Vacher Reservoir (R117W, T12N, S17) in 1990. MTS and MSC are abundant at this station. Beaverdam Hollow in this reach is wide and shallow with large diameter substrate material (Table 25). Riffle habitat is dominant in this reach (60%) with shallow pools (40%). No spawning gravel was observed. There is a large beaver complex below the study reach. The beaver dam complex is nearly continuous from the sample station to the confluence of Beaverdam Hollow and East Fork Muddy Creek. One six-inch CRC was caught from a four-hour gill net set in the largest pond.

Table 25 Habitat variables measured while surveying Beaverdam Hollow Creek in 1999. NA equals not available.

Date	Elev.	Station Length (ft)	Wetted Width (ft)	Mean Depth (ft)	Wetted W/D ratio	CFS	Substrate (%) Silt/ Sand	Substrate (%) Gravel	Substrate (%) Cobble/ Boulder/ Bedrock
9/14/99	9025	389	3.4	0.4	7.8	NA	85	0	15
9/15/99	8635	352	6.15	0.30	20.7	NA	7	0	93

- CRC Genetic Analysis FX-GR-3BF-512

  FMGR collected 18 whole trout and 2 sets of trout fins from elevation 9070 feet and 5 whole fish, 3 fins and 2 fry from elevation 9025 feet for genetic analysis. These samples represent the upper most reaches of Beaverdam Hollow. The samples were sent to Dr. Shiozawa's Lab at BYU on February 23, 2000.

  FMGR collected 30 whole trout from elevation 8636 feet for genetic analysis. These samples represent fish from the lower Beaverdam Hollow. The samples where not sent to a lab due to limited funds. The samples will be analyzed as soon as funds become available.

Management Recommendations

Future management activities are dependent on the results of the genetic analysis and coordination with private landowners in this area. Do not approve future private plants of RBT in Vacher Reservoir. RBT plants in this drainage are jeopardizing the resident CRC population.

East Fork Muddy Creek GR841840UA

AS - Aquatic Resource Surveys

- Fish Population Monitoring FX-GR-3BF-512

  One station was electrofished on East Fork Muddy Creek to determine the status of the CRC population on September 14, 1999. East Fork is a tributary of Muddy Creek on the North Slope of the Uinta Mountains. This country was accessed using the Sheep Trail. Jeff Smith, local warden, gained permission from the landowners for sampling stations on private land.

  Seven trout were caught with one pass through the sample station on East Fork Muddy Creek (Table 1). The trout caught ranged in length from 8 to 9.5 inches. All the trout were caught from one deep pool in the 432-foot long station. Some of the trout caught had strong RBT phenotypes; such as numerous fine spots (head to tail), pink fins and RBT coloration. MTS (n=127) and SPD (n=23) were numerous in the station, but only one MSC was caught.

  Flow through the station was very low. The majority of the flow came from Beaverdam Hollow. East Fork Muddy Creek was intermittent upstream of its confluence with Beaverdam Hollow. The substrate was 100 percent cobble. Riffle was the dominant habitat. The stream flowed through the cobble riffles, not over the cobble. The average wetted width was 5.4 feet but the active channel width was nearly twice the wetted width. The mean depth was 0.4 feet and the width/depth ratio equaled 14.

- CRC Genetic Analysis FX-GR-3BF-512

  FMGR collected 7 whole trout from elevation 8475 feet for genetic analysis. These samples where not sent to a lab due to limited funds. The samples will be analyzed as soon as funds become available.

Management Recommendations

Sample downstream to determine the distribution of the trout. Access may be a problem. Future management activities are dependent on the results of the genetic analysis and coordination with private landowners in this area.

West Fork Muddy Creek GR841855UA

AS - Aquatic Resource Surveys

- Fish Population Monitoring FX-GR-3BF-512

One station was electrofished on West Fork Muddy Creek to determine the status of the CRC population. West fork is a tributary of Muddy Creek on the North Slope of the Uinta Mountains. This country was accessed using the Sheep Trail. Jeff Smith, local warden, gained permission from the landowners for sampling stations on private land.

This location has been sampled in the past, but the station had to be moved upstream of the Sheep Trail due to beaver activity and willow density below the trail. CRC were abundant at this station and have phenotypic characteristics consistent with CRC (Table 26). No CRC fry were observed during sampling. These fish have strong CRC phenotypic characteristics. CRC sampled from West Fork in Utah are reported to be pure CRC according to the MtDNA analysis (Personal Communication, Paul Thompson, UDWR). MTS, MSC, and SPD were abundant in the reach sampled.

Table 26. Fish population data collected at one station on West Fork Muddy Creek. The coefficient of variation (CV%) is presented in parenthesis. NA equals not available.

Date/ Elev.	Est.	Species & Number	Avg Length (in)	Range Length (in)	#/mile (CV%)	>6 inches #/mile (CV%)	>6 inches Lbs. Mile	>6 inches Lbs. Acre
9/16/99	2P	CRC 31	6.9	4.3-12.8	286 (1)	157 (2)	33	30
8380		MSC 169	NA	NA	2552 (21)	NA	NA	NA
		MTS 33	NA	2.8-5.9	378 (19)	NA	NA	NA
		SPD 57	NA	2.7-4.5	663 (17)	NA	NA	NA

Reach sampled traversed a mix of recently breached beaver dams (60%) and functioning stream segments with stable banks (40%). This reach was typical of the area surveyed. Flow was visually estimated at 0.5 CFS. Habitat variables measured are presented in Table 27. Pools were the dominant habitat type available to the fish. The width/depth ratio is high because of breached beaver dams. Very little spawning gravel was observed in the reach sampled. Willows were dense on the valley bottom.

Table 27. Habitat variables measured while surveying West Fork Muddy Creek.

Date	Elev.	Station Length (ft)	Wetted Width (ft)	Mean Depth (ft)	Wetted W/D ratio	CFS	Substrate (%) Silt/ Sand	Substrate (%) Gravel	Substrate (%) Cobble/ Boulder/ Bedrock
9/16/99	8380	573	9.1	0.5	17.4	0.5	35	0	65

- CRC Genetic Analysis FX-GR-3BF-512

FMGR collected 26 whole trout from elevation 8380 feet for genetic analysis. The samples were sent to Dr. Leary's Lab at University of Montana on February 23, 2000.

Management Recommendations

Future management activities are dependent on the results of the genetic analysis and coordination with private landowners in this area.

Middle Fork Muddy Creek GR841860UA

AS - Aquatic Resource Surveys

- Fish Population Monitoring FX-GR-3BF-512

One station was electrofished on Middle Fork Muddy Creek to determine the status of the CRC population. Middle fork is a tributary of West Fork Muddy Creek on the North Slope of the Uinta Mountains. Middle Fork is not in the middle though, but on the west side of West Fork Muddy Creek. This country was accessed using the Sheep Trail. Jeff Smith, local warden, gained permission from the landowners for sampling stations on private land.

The segment sampled is 0.5 miles downstream of Middle Fork's origin. CRC were abundant at this station and have phenotypic characteristics consistent with pure CRC (Table 28). Thirty-one CRC fry were collected. CRC found in the beaver pond complexes downstream of the station range in length from 3.4 to 10.4 inches. Presumably, CRC inhabit all the beaver pond complexes to Middle Fork's confluence. MSC were abundant in the station. MTS were abundant below the station in the beaver pond complexes.

Table 28. Fish population data collected at one station on Middle Fork Muddy Creek. The coefficient of variation (CV%) is presented in parenthesis. NA equals not available.

Date/ Elev.	*Est.*	*Species & Number*	*Avg Length (in.)*	*Range Length (in)*	*Number/ mile (CV%)*	*> 6 inches #/mile (CV%)*	*Lbs. Mile*	*Lbs. Acre*
9/16/99	2P	CRC 24	5.1	3.4-9.2	530 (4)	127 (0)	19	32
8700		MSC 48	NA	NA	1357 (22)	NA	NA	NA

The station is near the top of the drainage in a moderate to high gradient section lined on both sides with mature conifers and aspen. There are few willows in the station, primarily due to the over story. The substrate is dominated by cobble and boulder, but gravel is present (Table 29). Stream habitat is composed of some pool habitat (20%) and extended riffle/cascade habitats intermixed with pocket pools (70%). Immediately below the station is a continuous series of beaver ponds, approximately 2 miles worth. The beaver complex is continuous from the station to the confluence with West Fork Muddy Creek. This segment is dense with willow.

Table 29. Habitat variables measured while surveying Middle Fork Muddy Creek.

							Substrate (%)	
Date	*Elev.*	*Station Length (ft)*	*Wetted Width (ft)*	*Mean Depth (ft)*	*Wetted W/D ratio*	*CFS*	*Silt/ Sand*	*Gravel*	*Cobble/ Boulder/ Bedrock*
9/16/99	8700	249	4.9	0.2	22.3	0.1	0	3	97

- CRC Genetic Analysis FX-GR-3BF-512

FMGR collected 26 trout fins and 3 trout fry from elevation 8700 feet for genetic analysis. The samples were sent to Dr. Shiozawa's Lab at BYU on February 23, 2000.

Management Recommendations

Future management activities are dependent on the results of the genetic analysis and coordination with private landowners in this area.

Van Tassel Creek GR841865UA

AS - Aquatic Resource Surveys

- Fish Population Monitoring FX-GR-3BF-512

Three stations were electrofished on Van Tassel Creek to determine the status of the CRC population. Van Tassel Creek is a tributary of West Fork Muddy Creek on the North Slope of the Uinta Mountains. This country was accessed using the Sheep Trail. Jeff Smith, local Department warden, gained permission from the landowners for sampling stations on private land.

The upper most station at elevation 8900 feet is 1.5 miles north of the Utah border. CRC were abundant at this station and have phenotypic characteristics consistent with pure CRC (Table 30). Thirty-five CRC fry were collected during sampling efforts. MSC were abundant in the station. Only one MTS was collected. Most of the station and surrounding stream is high gradient dominated by riffle/pocket pool habitats. There is some gravel present, but cobble and boulder are the dominant substrate (Table 2). The stream has a dense conifer canopy with rock/boulder banks, with very little riparian vegetation.

Table 30. Fish population data collected at three stations on Van Tassel Creek. The coefficient of variation (CV%) is presented in parenthesis. NA equals not available.

Date/ Elev.	*Est.*	*Species/ Number*	*Avg Length (in)*	*Range Length (in)*	*Number/ mile (CV%)*	*>6 inches #/mile (CV%)*	*>6 inches Lbs. Mile*	*>6 inches Lbs. Acre*
9/15/99	2P	CRC 40	6.0	3.5-9.6	503 (2)	246 (1)	37.0	30.2
8900		MSC 31	NA	NA	381 (0)	NA	7.6	6.2
		MTS 1	NA	NA	12 (0)	NA	0.5	0.4
9/22/99	2P	CRC 26	6.1	1.9-11.1	263 (0)	121 (0)	26.7	23.7
8430		MSC 73	NA	NA	779 (5)	NA	16.4	14.5
		MTS 5	NA	4.7-7.5	61 (13)	NA	5.1	4.5
9/22/99	2P	CRC 15	7.5	4.6-10.0	169 (0)	146 (0)	30.7	30.1
8140		MSC 64	NA	NA	910 (15)	NA	33.0	32.4
		MTS 2	NA	NA	22 (0)	NA	2.8	2.8
		SPD 2	NA	NA	22 (0)	NA	0.3	0.3

The CRC population at the middle station, elevation 8430 feet, is nearly half the density as observed at the upper station (Table 30). The reason for the decline is likely dewatering which this stream reach experiences during most of the summer. According to local landowners, there is an irrigation diversion somewhere below elevation 8900 feet. This diversion collects water from Van Tassel Creek and transports it to the Bear River drainage. The CRC caught displayed phenotypic characteristics typical of CRC, although spots were a little irregular and numerous toward the tail. Only one CRC fry was caught. This station is fairly high gradient with

lots of riffle/ cascade/ pocketwater habitats. The dominant substrate is cobble/boulder (Table 31). The few good pools in the station held the majority of the trout observed. The station traverses an area of high cut banks, 3-4 feet high. The cutting is attributed to grade adjustments after the loss of beaverdams in recent history. Below the station beaver pond complexes increase as the stream traverses a large willow covered valley bottom.

Table 31. Habitat variables measured while surveying Van Tassel Creek.

							Substrate (%)		
Date	*Elev.*	*Station Length (ft)*	*Wetted Width (ft)*	*Mean Depth (ft)*	*Wetted W/D ratio*	*CFS*	*Silt/ Sand*	*Gravel*	*Cobble/ Boulder/ Bedrock*
9/15/99	8900	430	10.1	0.44	22.7	3.1	0	3	97
9/22/99	8430	522	9.3	0.52	17.9	3.6	6	0	94
9/22/99	8140	470	8.4	0.59	14.2	2.6	10	0	90

The CRC population at the lowest station sampled was lower than that observed upstream. No CRC fry were observed. The appearance of the CRC in this reach was different than that observed upstream. Although there were no white fin tips, there may to be some RBT hybridization in the population. Oddly, some of the spots near the tail are doubled up, like cells in the process of division prior to separation. MSC were abundant in this reach. MTS and SPD were present in low numbers. This stream section is dewatered by an irrigation diversion somewhere below elevation 8900. According to local landowners, the irrigation diversion, during past summers, has dewatered Van Tassel Creek during much of the summer. Additionally, water upstream of this reach appears to go under ground, as seen in the reduced flow observed from elevation 8430 to elevation 8140 on the same day. The water table in this reach is likely not fully charged resulting in recruitment of stream water into the water table. The dewatering of this stream reach is the most likely reason for the reduced trout population observed.

This medium to low gradient stream section meanders through dense willow bottoms. The meandering pattern is accented by exposed gravel/cobble point bars and outside bends with 2-3 foot cut banks. Habitat characteristics measured during the survey are presented in Table 31. The substrate is dominated by cobble/boulder-sized material. Pools are the dominant habitat (80%) feature in the section.

According to local landowners, Joe Broadbent built an irrigation diversion on upper Van Tassel Creek, somewhere just below elevation 8900. The diversion was built around 1993. Water from this diversion is transported to the Bear River drainage via a trans-basin canal. The State Engineers Office was contacted and the trans-basin part of this diversion is legal. As I understand, from local landowners, the water goes to La Chapelle Creek, tributary to the Bear River Drainage. This diversion is threatening two native cutthroat trout populations. As discussed above the dewatering of Van Tassel Creek is impacting the CRC population downstream. According to the landowners, Broadbent can only legally divert excess water during spring runoff. He is not permitted do divert low flows during the summer. Additionally, CRC are likely being transported from the Colorado River Drainage into the Bear River Drainage leading to possible hybridization of CRC with BRC in La Chapelle Creek. No records could be found describing the BRC population in La Chapelle Creek. Surveys would have to be conducted to determine the status of BRC in La Chapelle Creek.

- CRC Genetic Analysis FX-GR-3BF-512

FMGR collected 32 whole trout from elevation 8900 for genetic analysis. The samples were sent to Dr. Leary's Lab at University of Montana on February 23, 2000.

FMGR collected 25 trout fins trout at elevation 8430 and 29 whole trout from elevation 8140 for genetic analysis. These samples where not sent to a lab due to limited funds. The samples will be analyzed as soon as funds become available.

Management Recommendations

Future management activities are dependent on the results of the genetic analysis and coordination with private landowners in this area. Further investigation is needed to determine the details behind the Broadbent Diversion.

Moslander Reservoir GR240310UA

AS - Aquatic Resource Surveys

- Gill Netting FX-GR-3BF-512

Moslander reservoir was sampled October 14, 1999 to determine the sucker species present in the reservoir. The reservoir owner informed the Fish Management crew (FMGR) that suckers first appeared in Moslander Reservoir a couple years after the Broadbent Ditch was completed. The Broadbent ditch transports water from Van Tassel Creek (Green River drainage) into La Chapelle Creek (Bear River drainage). The landowner speculated that Utah suckers (UTS) from the Bear River drainage were swimming through the irrigation system thereby gaining access to Moslander Reservoir. Moslander Reservoir receives its water from Van Tassel Creek. In order to determine the species and origin of the suckers in Moslander Reservoir FMGR gained permission from the landowner to set gill nets.

Three experimental gill nets were set for 1.5 to 2 hours. The resulting catch is presented in Table 32. Numerous suckers of all year classes were caught in the gill nets. Several suckers were kept and examined at the Game and Fish office. The suckers appeared to be white sucker (WHS) not UTS from the Bear River. A group of the suckers were sent to Dr. Frank Rahel at University of Wyoming. Dr. Rahel confirmed that the suckers were WHS. Although the exact origin of the WHS in Moslander cannot be determined, they definitely did not come from the Bear River. Utah Suckers are the only larger sucker indigenous to the Bear River drainage. Most likely someone using live bait introduced the WHS to Moslander Reservoir.

Table 32. Catch from experimental gill nets set in Moslander Reservoir during October 14, 1999.

Date	*Gear and #*	*Total Hours Fished*	*Species and Number*	*CPUE*	*Mean L (in.)*	*Range L (in.)*	*Mean W (Lbs)*	*Mean C*
10/14/99	EG 3	5.2	WHS 28	5.40	12.3	7.0-15.3	0.72	35
			BNT 6	1.20	16.1	11.5-22.9	2.04	39
			RBT 15	2.90	15.1	11.2-18.7	1.28	36
			SRC 3	1.20	17.2	16.2-18.5	1.59	31

There is no way to develop a cause and effect relationship from just the netting data to determine whether competition for food between the WHS and trout is impacting the trout population. There are some symptoms that suggest the WHS could be competing with the trout for food, especially

zooplankton. One is the poor average condition of the few SRC that were caught (Table 32). These fish did not look healthy. The condition of the rainbow trout is down a little from what would be expected of RBT without competition from WHS. The condition of the brown trout is still good, especially the larger individuals that are using the WHS as forage.

Management Recommendations

No further management action is recommended.

Horse Creek GR841965UA

AS - Aquatic Resource Surveys

- Fish Population Monitoring FX-GR-3BF-512

Three stations were electrofished on Horse Creek to determine the status of the CRC population. Horse Creek is a tributary of the Blacks Fork River on the North Slope of the Uinta Mountains. Permission was gained from the landowners for sampling stations on private land.

The stream at elevation 9280 feet was sampled October 13, 1999 to collect whole trout and trout fins for genetic analysis. No population estimate was attempted. The CRC in this area have phenotypic characteristics consistent with pure CRC. The upper stream reach starts as two tributaries in Utah and flows north into Wyoming. CRC were visually observed in the tributaries on the Utah side of the border. Once in Wyoming the tributaries merge and the stream flows north to elevation 9060 (~1.5 miles from border). Flow in this reach was estimated at 0.5 and 0.75 CFS. The stream goes under ground at elevation 9060 feet, although there is a definite channel. The dry section is ~0.5 miles long. At elevation 8960 feet the stream starts emerging as intermittent pools, flow becomes consistent below elevation 8860 feet.

The CRC population was low at elevation 8730 feet (Table 33). The trout caught had strong phenotypic characteristics. Twenty-one CRC fry were collected. MSC, MTS and SPD were abundant in the station. This station is in a large, low to medium gradient valley. Many parts of the stream are surrounded by willow. The trout habitat available is a mix of pool (50%) and riffle (50%) habitats. Complex pool habitat with structure was not abundant. Cobble and boulder sized material was the dominant substrate material in the station (Table 34). Flows through this reach were low. Water flowed predominately between cobble and boulder substrate, especially in the riffles. This stream in this section is very wide and open.

Table 33. Fish population data collected at three stations on Horse Creek. The coefficient of variation (CV%) is presented in parenthesis. Pounds per acre and per mile are for fish >6 inches. NA equals not available.

Date/ Elev.	Est.	Species & Number	Avg Length (in)	Range Length (in)	#/mile (CV%)	> 6 inches #/mile (CV%)	Lbs. Mile	Lbs. Acre
9/21/99	2P	CRC 7	5.5	4.2-7.2	73 (9)	21 (0)	2.3	2.3
8730		MSC 106	NA	NA	1202 (5)	NA	NA	NA
		MTS 111	NA	NA	1255 (5)	NA	NA	NA
		SPD 67	NA	NA	857 (13)	NA	NA	NA
9/23/99	2P	CRC 33	6.7	4.3-9.6	326 (3)	192 (3)	NA	NA
8620		RBT 1	7.2	7.2-7.2	10 (0)	10 (0)	NA	NA
		MSC 116	NA	NA	1958 (30)	NA	NA	NA
		MTS 39	NA	NA	547 (32)	NA	NA	NA
		SPD 14	NA	NA	307 (140)	NA	NA	NA
9/21/99	2P	CRC 3	7.7	6.0-9.5	26 (0)	26 (0)	6.7	5.8
8115		MSC 243	NA	NA	2922 (11)	NA	NA	NA
		MTS 125	NA	NA	1355 (10)	NA	NA	NA
		SPD 156	NA	NA	3168 (43)	NA	NA	NA
		BRS 61	NA	NA	546 (3)	NA	NA	NA

The CRC population at elevation 8620 is higher than observed upstream. Half of the trout caught came from one logjam pool in the station. Twelve CRC fry were caught during sampling. CRC in this reach appear to be hybridizing with RBT. One pure RBT was caught in the reach; in addition one CRCXRBT hybrid was caught. The hybrid had RBT spotting. The stream was low, flowing through exposed cobble and boulder. The valley in the vicinity of the sample station apparently was full of beaver activity once. The beaver are gone from this reach now and the dams likely breached some time ago. The stream at the study reach is fairly open with little cover. Shallow pools represented 45% of the study reach with riffle habitat encompassing another 45%. The lack of quality pool habitat is limiting the fish population in this reach.

Table 34. Habitat variables measured while surveying Horse Creek.

Date	Elev.	Station Length (ft)	Wetted Width (ft)	Mean Depth (ft)	Wetted W/D ratio	CFS	Substrate (%) Silt/ Sand	Gravel	Cobble/ Boulder/ Bedrock
9/15/99	8730	505	8.2	0.44	18.8	0.8	3	0	97
9/22/99	8620	550	9.1	0.44	20.6	1.0	9	20	72
9/22/99	8140	600	0.65	0.81	14.8	1.5	18	3	79

The lowest station sampled was at elevation 8115 feet. Few trout inhabited this reach. No trout fry were observed. The trout present resembled CRC; the spots were round, but a little too abundant toward the front half of the body. With the RBT caught upstream it is likely these CRC have some degree of hybridization with RBT. MSC, MTS, SPD and BRS are abundant in this section of Horse Creek. Three fish were caught that expressed intermediate characteristics between BRS and SPD. These where thought to be BRSxSPD hybrids. Many of the banks in this reach are eroding. The willows are abundant in some areas, less abundant in others. Willow and grasses colonized most of the point bars. A layer of silt covers most of the pool and run habitat. Silt is several inches deep in pools. The rocks in the riffles were covered with moss. Forty-six percent of the habitat in the study reach was pool with riffle and run habitat accounting for equal amounts of the remainder.

- CRC Genetic Analysis FX-GR-3BF-512

FMGR collected 10 whole trout and 23 trout fins from elevation 9280 for genetic analysis. The fins were sent to Dr Shiozawa's lab and the whole trout were sent to Dr. Leary's Lab at University of Montana on February 23, 2000.

FMGR collected 9 trout fins and 2 trout fry at elevation 8730 and 29 whole trout at elevation 8620 for genetic analysis. These samples were not sent to a lab due to limited funds. The samples will be analyzed as soon as funds become available.

Management Recommendations

Future management activities are dependent on the results of the genetic analysis and coordination with private landowners in this area.

Ringdahl Reservoir Basin - 3RR

Ringdahl Reservoir GR240310UA

AS - Aquatic Resource Surveys

- Gill Netting FX-GR-3RR-512

Ringdahl Reservoir was netted to collect trend data on the trout and bluehead sucker population. Two experimental gill nets were set for two hours each. Results of the netting are presented in Table 35.

The CPUE for BNT and BKT is similar to CPUEs observed previously. The present stocking strategy of 1,000 trout at 60 per pound with BNT and BKT on alternating years is working nicely. Anglers use Ringdahl Reservoir year round, yet few if any complaints are received.

The CPUE for BHS is over twice the highest CPUE observed during the 1990s. All but the smallest year classes were observed. The BHS are self-sustaining, even with predators such as BNT and BKT sharing the reservoir. Twenty-nine BHS were collected and provided to Dr. Shiozawa's Lab at BYU for genetic analysis. Dr. Shiozawa requested the fish; in exchange he will provide our crew a summary of his genetic analysis.

Table 35. Catch from experimental gill nets set in Ringdahl Reservoir.

Date	*Gear and #*	*Total Hours Fished*	*Species and Number*	*CPUE*	*Mean L (in.)*	*Range L (in.)*	*Mean W (Lbs)*	*Mean C*
7/2/99	EG 2	4.3	BNT 10	2.30	13.5	9.6-21.2	1.2	39.4
			BKT 7	1.60	13.6	12.7-14.8	1.0	39.4
			BHS 29	6.70	9.4	4.7-11.8	0.3	35.3

Management Recommendations

Continue with present stocking strategy for BNT and BKT. If the BHS are genetically pure, locate additional waters into which new populations could be established using the Ringdahl BHS.

Smiths Fork River - 3SF

Archie Creek GR841915UA

AS - Aquatic Resource Surveys

- Fish Population Monitoring FX-GR-3SF-512

  Until either 1997 or 1998 there was an old beaver dam that acted as a migration barrier keeping large numbers of RBT from immigrating into Archie Creek from the West Fork Smiths Fork. According to the local landowner the dam experienced a catastrophic breach. Now RBT have unhindered access to Archie Creek.

  Archie Creek was spot shocked from its confluence to a point several hundred yards upstream of the Forest Road 074 to determine the distribution of RBT and CRC. There appears to be a gradient from the confluence upstream with RBT most prevalent near the confluence and CRC more prevalent upstream. RBT phenotypes are most prevalent in Archie Creek just upstream from its confluence with West Fork Smiths Fork. RBT are evidently moving into lower Archie Creek from the West Fork Smiths Fork. Some of the trout sampled looked like pure RBT showing no CRC traits. Fish sampled above Forest Road 074 expressed predominantly CRC phenotypes, but some RBT characteristics were apparent.

  Non-game fish were abundant in the lower reaches of Archie Creek. The species sampled included MTS, MSC and SPD. RDS were present in low numbers. RDS are not native the Green River Drainage.

- CRC Genetic Analysis FX-GR-3SF-512

  Trout were sampled from a section of Archie Creek at elevation 8860 feet during 1998. The 34 trout collected were sent to Dr. Leary's lab at the University of Montana for genetic analysis. Alleles characteristic of CRC, SRC and RBT were detected at some of the diagnostic loci analyzed among fishes from Archie Creek. The influence of RBT and SRC appear to be slight, less than 10% combined. Further communication with Leary's lab will be necessary to determine the exact percentage of CRC in this population. With only slight hybridization the population of CRC in Archie Creek are an important conservation population.

PF - Public Fishing Development

- Fish migration barrier survey FX-GR-3SF-234

  Lower Archie Creek was surveyed for potential fish barrier locations. The most promising location for a barrier is where Forest Road 074 crosses Archie Creek. Archie Creek passes under the road through a culvert. If the road and culvert were elevated the culvert would act as barrier to upstream fish movement. The road and culvert are on private property.

Management Recommendations

Future management activities are dependent on coordination with the private landowner in this area.

Gilbert Creek GR841925UA and Little Gilbert Creek GR841930UA

AS - Aquatic Resource Surveys

- Distribution of BKT in beaver ponds FX-GR-3SF-512

  Nearly all the beaver ponds adjacent to Gilbert Creek were gill netted during 1999. Netting was conducted to document the distribution of BKT within the beaver pond complexes. Modified gill nets with a total length of 37 feet and mesh size from 0.75 to 1.25 were deployed overnight in each pond surveyed. A total of 69 BKT, 3 CRC and 7 MTS were caught in the 22

ponds netted. Three of the ponds were devoid of BKT. The BKT free ponds were perched above the flood plain of Gilbert Creek. Water filled the ponds from hillside springs.

Native fish were transplanted from main Gilbert Creek into the BKT free beaver ponds during 1999. The ponds are being evaluated as potential non-game fish refuge areas. If the ponds support the non-game fish year round they will be used to maintain populations of non-game fish during future chemical treatments. The non-game fish would be restored to the Gilbert Creek drainage from the refuge areas after the treatment is completed.

- Whirling disease sampling FX-GR-3SF-512

Thirty-seven BKT and 7 CRC were collected from Gilbert Creek in S18, R115W, T12N. The samples were submitted to the Wyoming Game & Fish Laboratory for whirling disease testing. All fish tested were negative for M. cerebralis spores.

- CRC Genetic Analysis FX-GR-3SF-512

Trout were sampled from a section of Little Gilbert Creek upstream of elevation 8900 (ATV Bridge). The 26 trout collected were sent to Dr. Leary's lab at the University of Montana for genetic analysis. Alleles characteristic of only CRC were detected at all the loci analyzed in the sample. With the sample size of 26, Leary's lab predicts a 95% chance of detecting as little as 1% RBT or 2% YSC genetic contribution to a population. The conclusion is that the Little Gilbert trout population is pure CRC.

Trout were sampled from a section of Gilbert Creek upstream of the West Side Tributary (elevation 8900 feet). The 27 trout collected were sent to Dr. Leary's lab at the University of Montana for genetic analysis. Alleles characteristic of CRC, SRC and RBT were detected at some of the diagnostic loci analyzed among fishes sampled. It is unclear which subspecies is dominant, but the RBT influence appears to be slight.

FMGR collected 28 trout fins from West Side tributary and 37 mottled sculpins from Gilbert Creek for genetic analysis. Dr. Shiozawa requested the MSC for ongoing work he is conducting at BYU. The MSC were picked up mid summer. The fins were sent to Dr Shiozawa's lab at BYU on February 23, 2000.

PM - Fish Population Management

- Brook trout removal FX-GR-3SF-610

Several days of intensive electrofishing were conducted to remove BKT from Gilbert Creek, Little Gilbert Creek and West Side tributary for two reasons. The first reason was to stop the upstream advance of BKT into Little Gilbert Creek. The trout in upper Little Gilbert Creek were found to be genetically pure CRC, a rare find on the Uinta Mountains in Wyoming. The second reason was to reduce the BKT population thereby increasing the opportunity for success when the chemical treatments are implemented. All the CRC caught were returned to the water unharmed. The number of CRC and BKT caught are summarized in Table 36.

Table 36. Results of one pass electrofishing efforts within the Gilbert Creek drainage. Numbers of fish caught were tallied by age group: Young Of Year <2 in., Juvenile 2-6 in., and adult >6 in.

	Colorado River Cutthroat				*Brook Trout*			
Stream	*YOY*	*Juv.*	*Adult*	*Total*	*YOY*	*Juv.*	*Adult*	*Total*
Gilbert	0	30	96	126	231	411	526	1168
Lt. Gilbert	124	385	149	658	149	145	56	350
West Side	0	60	31	91	2	64	55	121
Total	124	475	276	875	382	620	637	1639

No BKT existed above a point 0.46 miles upstream of the confluence of Little Gilbert Creek prior to 1996. In 1996 a natural fish movement barrier breached giving BKT access to upper Little Gilbert Creek. By 1998, BKT represented 49% of the trout from 0.46 miles (breached barrier) to 0.84 (ATV bridge). CRC were still dominant above the ATV Bridge (Figure 2).

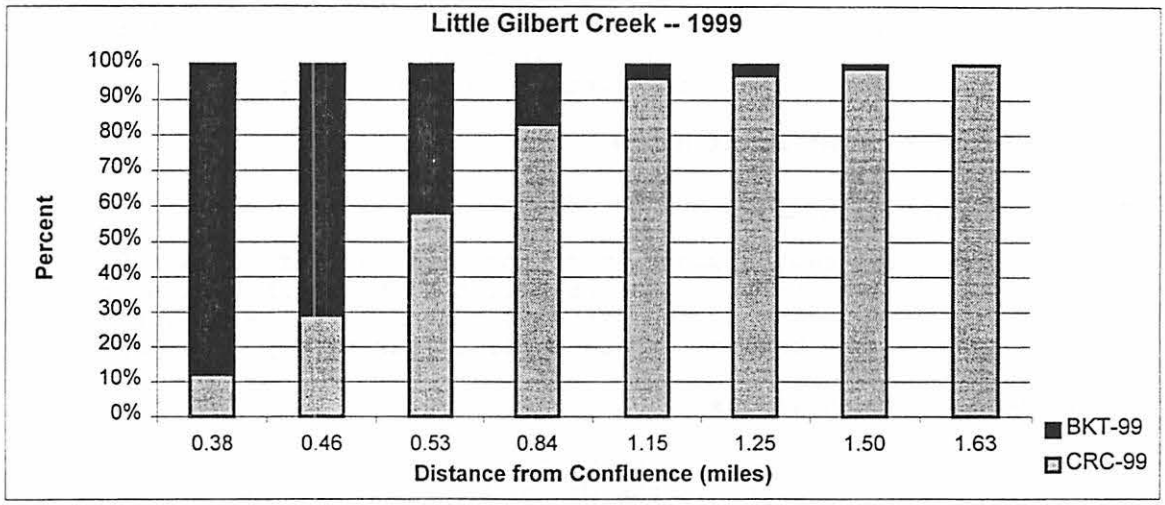


Figure 2. The percent of CRC and BKT sampled from discrete sections of Little Gilbert Creek. The end point of each section is the distance, in miles, from the confluence of Little Gilbert Creek.

BKT removal in 1998 reduced the number of BKT in Little Gilbert Creek, especially the juveniles and adults. The overall number of BKT removed in 1999 was 350, versus 643 in 1998. The advance of BKT upstream had been halted and CRC were still dominant upstream of the ATV Bridge. The percent of juvenile and adult BKT was reduced 13% from 1998 to 1999. The reduction in BKT is partially masked by the influx of BKT from Gilbert Creek. CRC inhabit an additional mile of habitat upstream of the end of BKT removal efforts (1.63 miles upstream of confluence).

One trout with pure RBT phenotypic characteristics was caught in Little Gilbert Creek 0.40 miles upstream of its confluence. Another RBT was caught from exactly the same location in 1998. Several RBTxCRC hybrids were caught in main Gilbert Creek above the fish barrier. All these fish were removed from the population.

- Chemical Treatments FX-GR-3SF-610

  Preparations for chemical treatments in the Gilbert Creek drainage proceeded during 1999. No treatments were implemented due to delays in installation of temporary fish barriers on the tributaries.

  Temporary barrier sites were located during the spring of 1999 on Little Gilbert Creek (R115W, T12N, S8, NW1/4), West Side tributary (R115W, T12N, S18, NE1/4) and main Gilbert Creek just north of the state line (R115W, T12N, S19). Permitting and clearance work will be conducted during January through May 2000. Construction is presently planned for July 2000.

  Open house meetings to discuss the chemical treatment of Gilbert Creek were held during the latter part of March 1999 in Evanston, Green River, Rock Springs, Lyman and Kemmerer. Press releases describing the chemical treatments and open house meetings were distributed to regional papers and radio stations during mid March. Meeting attendance was light. In addition, letters and copies of the press releases were sent to the landowners in the Gilbert Creek drainage. The letters informed the landowners of the project and invited them to participate in the open house meetings. Letters were followed up by phone calls.

HI - Aquatic Habitat Maintenance

- Repair of fish barrier FX-GR-3SF-430

  A few RBT were caught upstream of the fish barrier on main Gilbert Creek during 1998 and 1999. Close inspection of the fish barrier revealed areas that fish could pass during extremely high flows. Planning and design work has begun so the barrier can be modified during September of 2000.

Management Recommendations

The GC drainage is one of the best opportunities to restore and maintain CRC on the North Slope of the Uinta Mountains within Wyoming. The CRC in the headwaters of Little Gilbert Creek were found to be pure CRC. CRC within this system are presently jeopardized through competition with BKT and hybridization with RBT. BKT and RBT need to be removed from Gilbert Creek upstream of the fish barrier to encourage the expansion and conservation of native CRC.

Little Gilbert and West Side tributary will be treated with Antimycin A and rotenone during the later part of July 2000. The chemical treatment will follow installation of temporary fish barriers on these critical spawning tributaries. Prior to the chemical treatment trout will be salvaged from the tributaries. All trout below the ATV Bridge on Little Gilbert Creek with be collected and moved below the main fish barrier. The CRC will be released in Gilbert Creek below the barrier. The BKT will be moved into the East Fork Smiths Fork. All CRC collected from Little Gilbert upstream of the ATV bridge will be moved upstream above the treatment area. These fish represent the future of CRC in the Gilbert Creek drainage.

Treating main Gilbert Creek will proceed after the tributaries have been successfully treated, including Gilbert Creek in Utah.

Coordinate with private landowners within the Gilbert Creek drainage as this project is implemented during 2000 and in the future.

Sage Creek GR841880UA

AS - Aquatic Resource Surveys

- CRC Genetic Analysis FX-GR-3SF-512

  Trout were sampled from two sections of Sage Creek: upper Sage Creek at elevations 8900 feet and middle Sage Creek at elevation 8400 feet. The trout collected were sent to Dr. Leary's lab at the University of Montana for genetic analysis. Alleles characteristic of CRC and SRC were detected at all the loci analyzed in the sample from upper Sage Creek. According to Leary's lab the average allele frequency for CRC was 0.428 and SRC was 0.572. This is interesting considering the 9,900 CRC stocked from 1990 to 1996. There is no way to determine the influence stocking had on this population because there was no genetic analysis done on the original population. Alleles characteristic of CRC, SRC and RBT were detected at some of the diagnostic loci analyzed among fishes from middle Sage Creek. It is unclear which subspecies is dominant, but the RBT influence appears slight. Further communication with Leary's lab will be necessary to determine significance of the Sage Creek population.

Management Recommendations

Inspect fish barrier as time and schedules permit. No further management actions are recommended at this time.

West Fork Smiths Fork GR841910UA

AS - Aquatic Resource Surveys

- Fish Population Survey FX-GR-3SF-512

  Spot shocking was conducted on the West Fork Smiths Fork at the border of S3 & S10 R116W, T12N on July 27, 1999. The stream was sampled to determine species composition and relative abundance. Several small beaver complexes and channels connecting to beaver complexes were electrofished. MTS were numerous (adults in spawning colors) with some MSC and SPD found especially nearer the mainstream. No trout were found, not even in channels with some flow that were directly connected to the channel. The main channel, predominantly good pools, but also some runs and riffles was also electrofished. The trout observed ranged in length from 6-12 inches (n=7). They were predominantly RBT with CRC and potentially SRC traits. One trout had large spots similar to a CRC with white tipped fins and RBT colors. One trout appeared to be pure RBT. MTS, MSC and SPD were abundant. MWF were common.

PF - Public Fishing Development

- Fish migration barrier survey FX-GR-3SF-234

  West Fork Smiths Fork was walked from the Forest Boundary upstream to the confluence of Archie Creek to locate a potential fish barrier site. A barrier in this location would have protected the CRC populations in Archie Creek and in Utah from non-native salmonids lower in the drainage. No feasible barrier sites were located. The narrowest part of the West Fork Smiths Fork valley was located on the border of S3 and S10, R116W, T12N. The valley floor is approximately 600 feet across at this point.

Management Recommendations

No further management actions are recommended at this point.

Lower Ham's Fork River Basin - 3LH

Naughton Plant Pond GR441223LN

AS - Aquatic Resource Surveys

- Gill Netting FX-GR-3LH-512

Naughton Plant Pond was netted to evaluate the trout population. One experimental gill net was set for 2.8 hours. Results of the netting are presented in Table 37.

The CPUE in the gill net was good, especially for the short set. The BNT were the only portion of the fish population not represented. The growth and condition of fish in this reservoir has been very good. For example, the SRC, stocked at the same size and time as the SRC in Skull Point Reservoir are large and their average condition factor is much higher. The trout in Naughton Plant Pond have adequate forage.

Table 37. Catch from experimental gill nets set in Naughton Pond.

Date	Gear and #	Total Hours Fished	Species and Number		CPUE	Mean L (in.)	Range L (in.)	Mean W (Lbs)	Mean C
4/30/99	EG 1	2.8	RBT	5	1.79	11.9	10.7-12.8	0.77	44.2
			SRC	4	1.43	16.3	15.6-17.1	1.79	41.0
			BRC	2	0.71	10.9	10.7-11.0	0.55	42.5

Because of the higher than normal selenium levels found in the fish tissue of trout from this water, samples were again taken this year to monitor any changes. The fish were analyzed by a Utah State University toxicologist and paid for by PacifiCorp. The tissue samples came back with nearly twice the selenium levels from the 1997 samples. PacifiCorp expressed concern about this high level and closed the pond to fishing until it could be determined if these fish were safe to consume.

Department personnel, including Steve Wolff from our Environmental Office, PacifiCorp biologist and Plant Managers, and toxicologists from Utah State University and University of Wyoming met to discuss the situation. After considerable discussion and review of the existing data and EPA guidelines it was determined to re-open the pond to fishing in 2000 but PacifiCorp will request anglers harvest only two fish. A low consumption level will assure no negative consequences from selenium intake.

Management Recommendations

Continue with present stocking strategy. Set gill nets to monitor the trout population as time permits. Obtain fish samples in the Spring and Fall, 2000 for tissue analysis (paid for by PacifiCorp). Naughton Plant personnel have agreed to interview anglers throughout the fishing season to determine the extent of fishing pressure and harvest rates.

Skull Point Reservoir Basin - 3SP

Skull Point Reservoir GR440035LN

AS - Aquatic Resource Surveys

- Gill Netting FX-GR-3SP-512

Skull Point Reservoir was netted to evaluate the trout population. Two experimental gill nets were set twice for two hours per set. Results of the netting are presented in Table 38.

The CPUE for trout is 2-3 times what has been seen in recent years. The very high CPUE is the result of 10,914 SRC stocked at 214 per pound in November 1996. This plant was not expected to survive in such high numbers. The CPUE of SRC alone was 5.88. The CPUE for RBT was in line with historic levels. The result of this large number of trout in Skull Point Reservoir is a depression of average condition factors. The average condition factors for RBT in past years have ranged from 39 to 45. Trout scheduled for Skull Point Reservoir in 1999 were diverted due to the high CPUE and lower than normal condition.

The SPK netted were from 1,520 stocked in June of 1997 at 80 per pound. The number caught is low but the growth appears good. There was no sign of the BRC or BKT stocked in 1998. Given the size and date those fish were stocked they may not have been vulnerable to the gill nets.

Table 38. Catch from experimental gill nets set in Skull Point Reservoir.

Date	*Gear and #*	*Total Hours Fished*	*Species And Number*	*CPUE*	*Mean L (in.)*	*Range L (in.)*	*Mean W (Lbs)*	*Mean C*
04/30/99	EG 2	4.3	SRC 44	5.88	12.9	10.8-14.6	0.79	36
			RBT 7	1.00	13.4	12.3-16.3	0.92	37
			SPK 2	0.25	13.9	13.7-14.0	0.94	35
			BRS 10	1.25	4.3	4.1-4.4	0.04	47

Management Recommendations

Continue with present stocking strategy for RBT, SPK and BKT. Continue monitoring trout population with netting in April.

Viva Naughton Reservoir/Kemmerer City Reservoir Basin - 3VR

PA - Planning and Administration

- Boat Access Development FX-GR-3VR-121

A proposal was made to PacifiCorp by our agency to develop a boat ramp and dock, parking facility, and comfort station using Wallop-Breaux money. If we provided the money for this work we would only require that no user fees be charged for these facilities. PacifiCorp was receptive to this proposal but had to get concurrence from the existing marina lessee who currently has the ability to charge these user fees until 2004. He would only agree to changes if we, as a Department, would commit to stocking a specific species and number that he agreed to. We declined. When the current lessee's contract expires (2004), PacifiCorp would like to re-open negotiations with us.

Upper Ham's Fork River Basin - 3UH

Work Not Associated with a Particular Water

AS - Aquatic Resource Surveys

- Stocking Evaluations FX-GR-3UH-512

  This work was deferred until 2000 when Robb Keith can participate and become familiar with this area.

Basin Creek GR841640LN

AS - Aquatic Resource Surveys

- CRC Restoration Potential FX-GR-3UH-512

  This work was deferred until 2000 when Robb Keith can participate and become familiar with this area.

Elk Creek GR843205LN

PR - Public Relations

- Aquatic Education FX-GR-3UH-156

  The annual electrofishing and habitat surveys, as part of the USFS Demonstration Forest for the Kemmerer 6th grade students, was completed in September. This work includes classroom sessions explaining the work before sampling occurs, and data analysis following the sampling. During past sampling we observed CRC (one in 1996 and two in 1997) along with rainbow and brook trout. A 400 foot station was electrofished with 8 RBT, 6 BKT, and 1 CRC captured. The CRC was fin-clipped, 7.8 inches long, and it originated from the 1998 plant. In 1998 there were 56 CRC stocked at about 3.5 inches.

Management Recommendations

Continue this project and work with students to eliminate non-native trout and stock a small number of fin-clipped CRC into Elk Creek. Future sampling will evaluate the relative success of the CRC introductions.

Beaver Creek GR841520LN

PR - Public Relations

- Aquatic Education FX-GR-3UH-156

  The crew completed electrofishing, habitat surveys, and macroinvertebrate sampling with Kemmerer 5th grade students who recorded data and formulated conclusions on the fish population and habitat conditions at the stream site.

Management Recommendations

Continue annual two day Aquatic Ecology Workshop for the Kemmerer 5th Grade students.

Middle Green River Basin - 3GR

Green River GR841010SR and GR842010SR and GR841010LN

AS - Aquatic Resource Surveys

- Freezeout Island side-channel development FX-GR-3GR-234

  Evaluated the feasibility of reactivating a relic side channel on the east side of the Green River adjacent to Freezeout Island. The potential project was thought to be similar to the McCullen Bluff side channel reactivation project. Upon close inspection we found that the Badlands on the east side of the river drain into the abandoned side channel. The silt burden from the Badlands likely contributed to the river abandoning the channel. This idea has been dropped.

- Fish population monitoring FX-GR-3GR-512

  Beginning in 1994, trout stocking was reduced by nearly 70% from historical levels of 3,012/mile or 212 pounds/acre. These adjustments were guided by results of the 1991-1994 comprehensive study of the Green River and eight previous years of population studies. Accordingly, stocking requests are now about twice the (over-winter) carrying capacity of 15.7 pounds/mile for juvenile trout (mean estimated biomass, 1982-1992).

  Three modifications of the past stocking program were initiated in 1994. First, BNT stocking was eliminated in the upper 35 miles of the Fontenelle tailwaters, where natural recruitment is sufficient to drive a wild BNT fishery. In the lower 40 miles, BNT were stocked at a rate of 709/mile (47.3 Lbs/mi). Second, SRC stocking was eliminated from the lower 40 miles, and reduced from 1,140/mile to 283/mile (25/Lbs/mi) in the upper 35 miles. The lower half of the Green River is poorly suited for SRC. Third, the stocking rates for ELR were reduced by half, to 430/mile (15/Lbs/mi). The Town Section, where harvest has been high, receives 860 ELR/mi.

  The stocking changes initiated in 1994 were to be evaluated by three primary criteria. First, biomass of juvenile trout, measured in spring, should maintain a minimum of 15.7 pounds/mile (1995 Progress Report). This was especially important for the juvenile BNT population in the upper river that is supported exclusively by natural reproduction. Second, compare the number and biomass estimates for 1999 to similar estimates for 1992 to 1994. Third, compare the present catch rates to past catch rates to determine what, if any, effect the reduction in stocking has had on the catch rates. For this comparison 9 years of angler log data from one prominent angler will be used to evaluate catch rates from 1991 to 1999. This anglers fishing habits and proficiency have remained constant over the time period used. The angler fished between 39 and 63 days annually during the 1990s.

  To estimate trout abundance, trout were captured using two boom-shocking rafts in the 7-11 Section (Seedskadee) and Town Section during April 1999. The two rafts operated simultaneously in each section, each raft sampling one side of the river. Sections were sampled alternating nights for a total of three passes (nights) per section. The Capture program was used to estimate the number and biomass of trout within each section.

  Town Section:

  After five years of reduced stocking the 1999 estimated number and biomass of trout in the Town Section exceeds the totals for 1992-1994 (Table 39). Number and biomass of BNT dominate the Town Section, followed by RBT during 1999. The low number of SRC present represents drift from stocking 62 miles upstream. The trout ≥6 inches in the Town section are small with the average lengths ranging from 12.3 inches for RBT to 11.2 inches for SRC (Figure 3). Only a small portion of the trout population is greater than 15 inches long.

Table 39. Population and biomass estimates for trout ≥6 inches. Estimates are presented for the Town section during 1999 (Five years post- stocking reduction) and 1992, 1993 and 1994 (pre-stocking reduction). Coefficient of variation is presented in parenthesis.

Date	Species	No/mile	Lbs/mile	Lbs/Ac
Post Stocking Reduction				
4/99	BNT	414 (4%)	266 (6%)	10.0 (6%)
	RBT	124 (18%)	89 (16%)	3.2 (16%)
	SRC	22 (59%)	10 (49%)	0.4 (18%)
	Total	560	365	13.6
Pre-stocking Reduction				
4/94	BNT	303	228.7	10.0
	RBT	8	6.6	0.3
	SRC	46	25.0	1.1
	BRC	8	2.9	0.1
	Total	365	263.2	11.5
4/93	BNT	383	214.5	9.4
	RBT	28	18.9	0.8
	SRC	34	16.3	0.7
	BRC	3	5.7	0.3
	Total	448	255.4	11.2
4/92	BNT	143	124.5	5.4
	RBT	44	28.4	1.2
	SRC	10	3.1	0.1
	BRC	10	11.5	0.5
	Total	207	167.4	7.3

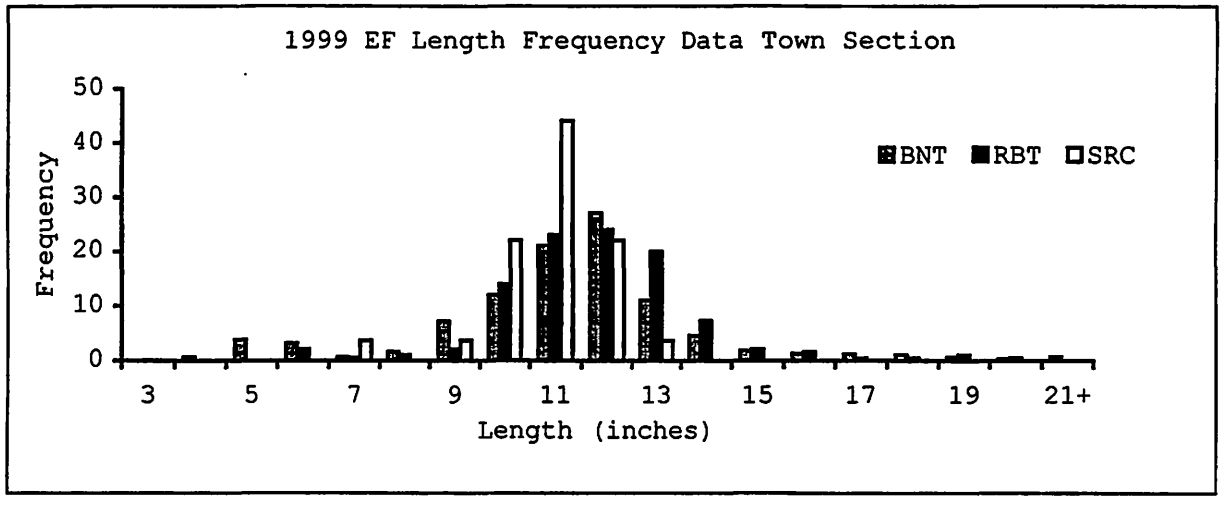


Figure 3. Length-frequency distribution of trout sampled from the Town Section of the Green River during the spring of 1999.

The 1999 biomass estimates for juvenile trout in the Town Section exceeded the average carrying capacity seen before 1993 (15.7 Lbs/mile mean estimated biomass 1982-1992) (Table 40). BNT account for the majority of the biomass sampled with an estimated 149 lbs/mile. The AD BNT stocked in spring 1998 represented approximately 20% of the total juvenile BNT with 27 lbs/mile. The other 80% was composed by BNT categorized as wild (28%) and hatchery (52%). The biomass estimate for RBT was 64 lbs/mile, over 4 times that observed prior to 1993. The biomass estimate for the AD ELR was 40 lbs/mile. The AD ELR were stocked in the Green River during May 1998.

Table 40. Population and biomass estimates for juvenile trout: RBT and SRC ≥6 - ≤15 in. and BNT ≥6 - ≤13 inches. The adipose clipped ELR (AD ELR) and BNT (AD BNT) were stocked in the spring of 1998. AD ELR and AD BNT are subsets of RBT and BNT.

			Population estimate for juvenile trout		
Section	*Date*	*Species*	*No./Mile*	*Lbs/mile*	*Lbs/ac.*
Town	4/99	BNT	318 (5%)	149 (6%)	5.6 (6%)
		RBT	108 (18%)	64 (15%)	2.4 (15%)
		SRC	22 (59%)	10 (49%)	0.4 (49%)
		Total	448	223	8.4
		AD BNT	83 (14%)	27 (14%)	1.0 (14%)
		AD ELR	79 (31%)	40 (24%)	1.5 (24%)

7-11 Section:

After five years of reduced stocking the estimated number and biomass of trout in the 7-11 sections exceeds the totals for 1992-1994 (Table 41). RBT were the most abundant trout in the 7-11 section during 1999. Estimated numbers of BNT and SRC are nearly equal during 1999, but the biomass of SRC exceeds that of BNT. The number and biomass of SRC increased over all previous estimates. This increase is primarily the result of a large group of SRC between 15 and 18 inches. The BNT population in the upper river is definitely self-sustaining. Of the BNT caught only 18% were thought to be of hatchery origin based on their fins. Of the 18% only 1.5% were fin clipped, definite hatchery origin. Trout ≥6 inches are large with the average lengths ranging from 15.5 inches for BNT to 16.8 inches for both RBT and SRC (Figure 4).

Table 41. Population and biomass estimates for trout ≥6 inches. Estimates are presented for the 7-11 section during 1999 (Five years post- stocking reduction) and 1992, 1993 and 1994 (pre-stocking reduction). Coefficient of variation is presented in parenthesis.

Date	Species	No/mile	Lbs/mile	Lbs/Ac
Post Stocking Reduction				
4/99	BNT	163 (11%)	253 (12%)	9.5 (12%)
	RBT	286 (10%)	562 (9%)	21.1 (9%)
	SRC	179 (23%)	326 (16%)	12.2 (16%)
	Total	628	1141	42.8
Pre-stocking Reduction				
4/94	BNT	163	196.5	7.4
	RBT	131	184.8	6.9
	SRC	37	61.3	2.3
	Total	331	442.6	16.6
4/93	BNT	68	125.3	4.7
	RBT	14	36.4	1.4
	SRC	12	28.9	1.1
	Total	96	190.5	7.1
4/92	BNT	88	114.0	4.3
	RBT	101	180.4	6.8
	SRC	28	39.9	1.5
	Total	217	334.7	12.6

SRC have been stocked in side channels since 1997. One third of the SRC are stocked in the Double Sill side channel and two thirds in the McCullen Bluff side channel. This strategy is intended to decrease predation and increase survival by stocking the small SRC (23/lb) into the protected habitats provided by these side channels. The 1998 year-class appears low, but this may be a function of the juvenile SRC still using the side channels. If these SRC had not recruited to the main channel by April they

would not be available to electrofishing efforts restricted to the main channel. The 1997 and part of the 1996 year classes were also stocked in side channels (1996 Progress Report). These fish would represent the large group of SRC in the 15 to 18 inch size group

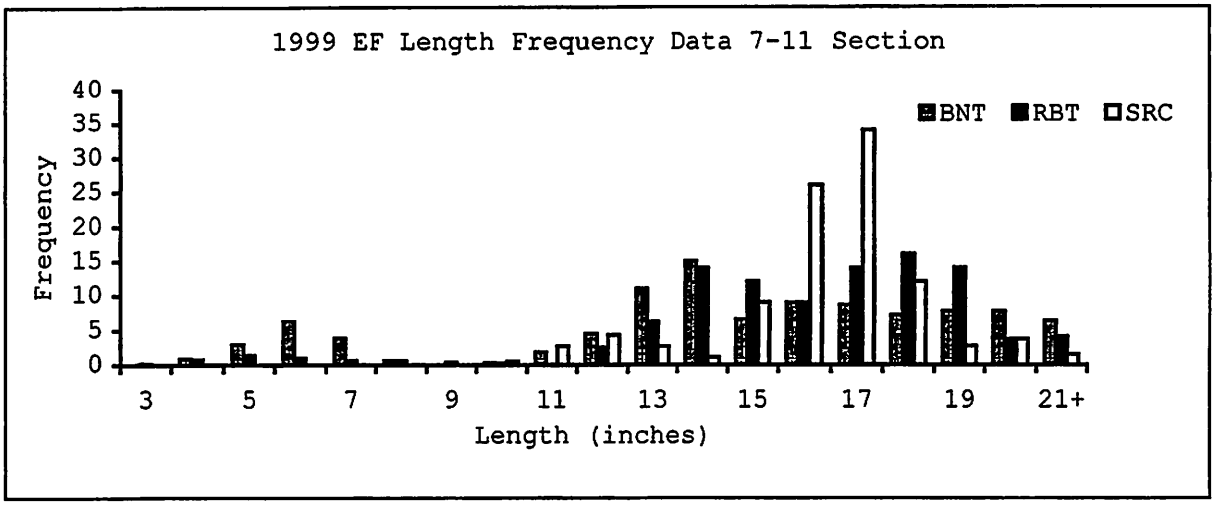


Figure 4. Length-frequency distribution for trout sampled from the 7-11 Section of Green River below Fontenelle Reservoir during the spring 1999.

Hatchery RBT dominate the RBT population in the upper river. All subcatchable RBT stocked between 1995 and 1998 were fin clipped. Fin clipped RBT represented 75 percent of the RBT caught. Seven percent of the remaining RBT were considered hatchery origin based on fin characteristics. These fish possibly drifted downstream from Fontenelle Reservoir. The remaining 18% represent fish from the following possible sources: 1) RBT fry releases from Flume Creek, 2) recruits from Big Sandy/Bone Draw hatching boxes, and/or 3) natural recruitment from RBT spawned in the river. The contribution by each of these sources is unknown.

The 1999 biomass estimates for all juvenile trout exceeded the average carrying capacity seen before 1993 (15.7 Lbs/mile mean estimated biomass 1982-1992) (Table 42). A 8-fold increase in biomass, above 15.7 Lbs/mile, was observed in the 7-11 section (Table 4). This number was similar to the 8.6 increase observed in 1997 and up from the 3.7 fold increase observed in the spring of 1996. RBT accounted for the majority of the increase. The adipose clipped ELR (AD ELR) exceed the target of 15.7 Lbs/mile in 7-11 section. These trout, stocked in 1998, represent a subset of the RBT. Natural reproduction is providing significant recruitment to maintain the BNT population in the 7-11 section. The SRC stocked during 1998 are also represented in the population estimate for the 7-11 section. Although 21 SRC between 6 and 15 inches were caught, no marked SRC in this size interval were recaptured. The capture program could not be used to calculate a population estimate. A quasi population estimate (calculations described as note attached to table) suggests that 14 lbs/mile of juvenile SRC exist through the 7-11 section.

Table 42. Population and biomass estimates for juvenile trout: RBT and SRC ≥6 - ≤15 inches and BNT ≥6 - ≤13 inches. Sampling was conducted in the 7-11 section during April 1999. The adipose clipped ELR (AD ELR) were stocked in the spring 1998.

			Population estimate for juvenile trout		
Section	*Date*	*Species*	*No./Mile*	*Lbs/mile*	*Lbs/ac.*
7-11	4/99	BNT	61 (43%)	19 (38%)	0.7 (38%)
		RBT	90 (20%)	87 (19%)	3.3 (19%)
		SRC	20* (na)	14* (na)	0.5* (na)
		Total	171	120	4.5
		AD ELR	63 (19%)	67 (19%)	2.5 (19%)

* Number per mile was calculated by multiplying the percent of SRC caught that were between 6 and 15 inches ({21/188}*100=11%) by the total SRC population estimate. Pounds per mile and acre were calculated by multiplying the percent of biomass for SRC between 6 and 15 inches ({14.6/349}*100=4.2%) by the total SRC pounds per mile and pounds per acre.

Several factors are likely contributing to the increased numbers of trout observed in the Town and 7-11 sections. These include good water years since 1996 and constant winter flows released from Fontenelle Dam before 1996. Increased, stable flows have inundated off channel habitats and increased the security cover for both juvenile and adult trout. Additionally, the reduced number of trout stocked are surviving and recruiting to the fishery in greater numbers than previous years. It appears the fewer fish are better able to utilize the available habitat without burdening the systems. The special regulations in the upper river are definitely increasing the survival and longevity of stocked trout. The regulation allows trout to be recycled through the fishery and anglers numerous times. Efforts by Seedskadee National Wildlife Refuge to install cattle access points has increased juvenile trout habitat. These cattle structures are composed of large quantities of big granite boulders. The structures protrude from the water surface during all but the highest flows thus providing velocity breaks and habitat for trout. The large interstitial spaces inherent to these structures provide security cover refuges, especially during winter months.

Based on one anglers experiences, it appears angling success has increased since the change to special regulations (two trout ≥ 18inches in 1990 and 1 trout ≥ 20 inches in 1994) and the reduction in stocking initiated in 1994 (Figure 5). The dip in trout per trip in 1996 is due in part to lung cancer surgery experienced by the angler that year.

Fish collected during sampling were set to the Fish Pathology Lab for Whirling Disease analysis. There were 102 MWF, 27 BNT, and 16 RBT submitted. All fish were negative for M.cerebralis spores.

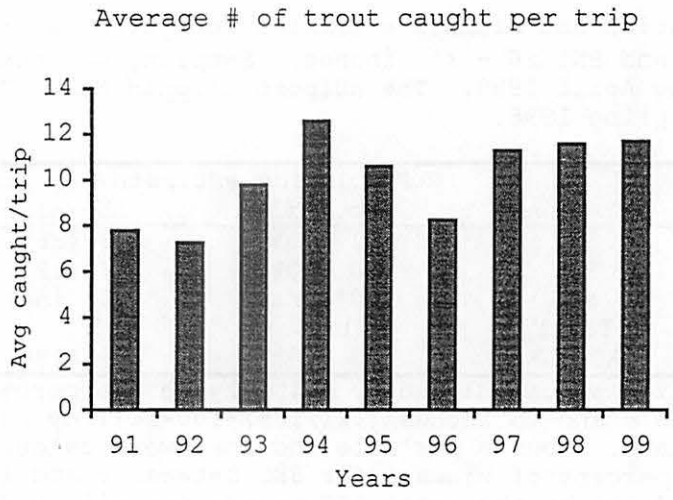


Figure 5. The average number of trout caught per trip (average trip is 4.5 hours) to the Seedskadee National Wildlife Refugee for one angler. The number of trips per year range from 39 to 63.

Management Recommendations

The present stocking strategies for RBT, BNT and SRC are working well. Continue stocking trout at current densities and sizes. Continue stocking SRC in side channels. Evaluate by following angler catch and with future electrofishing efforts. Scale back electrofishing efforts on the Green River to every 3-5 years. Next recommended effort is 2004 unless significant changes to flow patterns occur.

Lower Big Sandy River Basin - 3BS

Big Sandy River GR842340SR and GR842340SR and GR843340SR

AS - Aquatic Resource Surveys

- Fish population monitoring FX-GR-3GR-512

Five stations on the Big Sandy River were electrofished with raft-mounted gear during August and October 1999. A summary of the fish data collected is presented in Table 43. Sampling conducted in August was primarily to test the electrofishing gear. One pass data are not useful for calculating population estimates, but do describe the fish species composition and relative abundance in the reaches sampled. The October sampling was conducted to describe the species composition and abundance in the Big Sandy River below Gasson Bridge. These stations are located at proposed sill sites. Each station is approximately 1000 feet in length with equal reaches downstream and upstream of the proposed sill locations. Pre-sill fish data will be useful for comparing to fish data collected after the sills are constructed.

Low water temperatures and high total dissolved solids reduced the electrofishing efficiency. As a result the population estimates, especially for the non-game fish are conservative.

The fish community at all locations sampled was diverse; including game fish, native non-game fish, and fish not native to the Green River Drainage. Native non-game fish include FMS, MTS, SPD and MSC. Exotic non-game fish include BRS and UTC from the Bear River Drainage and LKC, FHM and

WHS from the Missouri River Drainage. All the fish sampled in the Big Sandy River were found to be closely associated with some form of cover. Cover in this part of the Big Sandy was limited. Observed cover took the form of irregular banks, small pockets of deeper water, beaver willow caches, outcroppings of bedrock/cobble substrate. Few other forms of cover were observed. The numbers of fish sampled at elevation 6323 feet is high due to one beaver willow cache. The one cache held nearly 70% of the fish sampled from that section. The cache was approximately 12 feet long, 6 feet wide, and 3 feet deep.

Table 43. Fish population data collected at five stations on Big Sandy River. NA indicates data not available.

Date/ Elev.	*Est.*	*Species & Number*		*Avg L (in)*	*Length Range (in)*	*Number/ Mile*	*Lbs. Mile*	*Lbs. Acre*
8/10/99	1P	RBT	2	10.6	9.8-11.5	NA	NA	NA
6407		BRC	3	9.8	9.2-10.3	NA	NA	NA
		FMS	5	NA	NA	NA	NA	NA
		MTS	5	NA	NA	NA	NA	NA
		SPD	11	NA	NA	NA	NA	NA
		MSC	8	NA	NA	NA	NA	NA
		BRS	13	NA	NA	NA	NA	NA
		LKC	14	NA	NA	NA	NA	NA
		UTC	1	NA	NA	NA	NA	NA
		WHS	40	NA	NA	NA	NA	NA
8/10/99	1P	BNT	1	8.4	8.4-8.4	NA	NA	NA
6337		FMS	1	4.9	4.9-4.9	NA	NA	NA
		MTS	3	3.3	3.1-3.6	NA	NA	NA
		SPD	4	3.0	2.6-3.4	NA	NA	NA
		MSC	7	4.3	3.6-4.8	NA	NA	NA
		BRS	1	3.5	3.5-3.5	NA	NA	NA
		WHS	25	5.6	2.9-9.0	NA	NA	NA
		FHM	4	2.3	2.2-2.4	NA	NA	NA
10/27/99	2P	BNT	2	5.6	4.7-6.5	17	1.4	0.2
6323		RBT	1	12.9	12.9-12.9	6	5.4	0.9
		SRC	1	17.1	17.1-17.1	6	13.7	2.3
		FMS	28	NA	2.4-6.2	162	1.6	0.3
		MTS	14	NA	1.5-5.1	81	0.8	0.1
		SPD	57	NA	1.4-4.6	329	3.3	0.5
		MSC	87	NA	2.5-4.5	503	5.0	0.8
		BRS	433	NA	1.2-4.1	2501	10.0	1.7
		FHM	19	NA	2.0-2.8	110	0.6	0.1
		LKC	25	NA	1.6-4.4	114	1.4	0.2
		UTC	2	NA	3.2-3.6	12	0.2	0.0
		WHS	118	NA	1.9-9.1	682	20.4	3.4
10/27/99	2P	BNT	5	5.3	4.5-5.8	23	1.4	0.2
6322		RBT	2	13.8	11.7-15.9	9	11.0	1.7
		FMS	15	NA	2.3-3.6	68	0.5	0.1
		MTS	28	NA	1.6-4.0	128	0.3	0.0
		SPD	58	NA	1.2-3.8	265	0.8	0.1
		MSC	70	NA	2.0-5.0	319	3.2	0.5
		BRS	19	NA	1.0-2.3	87	0.3	0.0
		FHM	2	NA	1.5-2.5	9	NA	NA
		LKC	1	NA	1.7-1.7	5	NA	NA
		WHS	55	NA	1.5-7.8	251	2.5	0.4
10/26/99	2P	BNT	5	6.2	4.3-12.2	23	4.0	0.6
6319		RBT	3	7.7	5.2-11.3	14	3.7	0.5
		FMS	14	NA	3.0-3.6	66	0.3	0.0
		MTS	7	NA	1.5-4.1	33	0.2	0.0
		SPD	10	NA	1.3-1.8	47	0.1	0.0
		MSC	79	NA	2.5-4.7	371	7.4	1.1
		BRS	1	NA	1.3-1.3	5	NA	NA

Date/ Elev.	Est.	Species & Number	Avg L (in)	Length Range (in)	Number/ Mile	Lbs. Mile	Lbs. Acre
		LKC 1	NA	4.0-4.0	5	0.1	0.0
		WHS 25	NA	1.8-13.0	117	0.5	0.1

Stream habitat data were collected at the electrofishing stations following the fish surveys. Most of the habitat data are summarized in Table 44. The Big Sandy in this reach is wide and shallow with a predominantly sandy bottom. The width to depth ratio is very high. Pool habitat represented between 18 and 28 percent of the habitat surveyed. Most of the pools surveyed were shallow. Run habitat dominated the reaches surveyed. Shallow riffle habitat was common. As with the fish data, the habitat survey will be repeated after the sills are constructed. The resulting data set should help document the influences of the sills on the river.

Table 44. Habitat variables measured while surveying Big Sandy River.

Date	Elev.	Station Length (ft)	Wetted Width (ft)	Mean Depth (ft)	Wetted W/D ratio	CFS	Substrate (%) Silt/ Sand	Gravel	Cobble/ Boulder/ Bedrock
7/30/99	6337	1093	59.4	1.0	58.8	100	NA	NA	NA
10/27/99	6323	914	49.5	0.9	56.1	61	92	8	0
10/28/99	6322	1157	54.4	0.8	67.9	61	85	14	2
10/28/99	6315	1125	56.4	0.8	70.3	61	90	7	3

Management Recommendations

Repeat the population surveys at the proposed sill sites during August 2000 time permitting. The resulting fish data will shed light on the fish community during the warm summer months. Repeat the population and habitat surveys one year after the 4 experimental sills below Gasson Bridge are constructed. Compare resulting data with pre-sill data.

Bone Draw GR842355SR

AS - Aquatic Resource Surveys

- Fish movement and dispersal FX-GR-3BS-553

Fish sampling was conducted in Bone Draw and Short Creek in March 1999, using a bag seine and backpack shocker. The goal of this project was to collect and fin clip trout. The right pelvic fins were clipped so these trout could be distinguished from other trout in the Big Sandy River and Green River. The hope is that some insights will be gained on the movement and distribution of trout dispersing from the Bone Draw area. The project was initiated because of the large number of easily caught trout that winter in Bone Draw. The results of the sampling efforts are summarized in Table 45.

Table 45. Fish data collected from Bone Draw and Short Creek.

Date/ Station	*Sampling Gear*	*Species/ Number*	*Average Length (in)*	*Length Range (in)*	*Average Weight (Lbs)*	*Avg. C*
03/13/99	Bag Seine	BNT 17	11.9	3.7-15.3	1.01	47
Bone Draw	&	RBT 314	10.9	4.3-17.7	0.72	44
	EF gear	BRC 55	8.0	4.4-14.3	0.40	48
		SRC 37	13.3	6.5-16.2	1.07	41
03/13/99	Bag Seine	BNT 33	6.0	3.4-11.5	0.12	48
Short Cr.	&	RBT 161	7.9	2.4-11.7	0.23	42
	EF gear	BRC 10	6.1	4.0-9.9	0.10	35
		SRC 7	6.5	3.6-12.0	0.16	36

One of the RBT clipped in Bone Draw during March 1999 was sampled in the Town Section of the Green River during the April sampling in 1999.

- Spawner and redd counts FX-GR-3BS-553

  This activity was not completed.

- Quantify trout recruitment FX-GR-3BS-512 and FX - GR 3BS 553

  This activity was rescheduled for October 2000.

Management Recommendations

Repeat March 2000, time permitting. Volunteer help will be sought to assist with sampling and fin clipping. A right pelvic clip will be used. The distribution and movement of the clipped fish will be monitored by angling and electrofishing. Tracking the fin clipped trout will be piggy-backed onto other projects.

Little Sandy River Basin - 3LT

No work scheduled.

Big Sandy Reservoir Basin - 3BR

Eden Reservoir GR8440340SR

AS - Aquatic Resource Surveys

- Electrofish withdraw canal from Eden Reservoir FX-GR-3BR-512

  This activity was not completed. No further action is recommended.

PM - Fish Population Management

- Fish Salvage FX-GR-3BR-730

  Green River fishery biologists and game wardens salvaged trout from an irrigation canal downstream of Eden Reservoir on October 12. The salvaged trout included 89 mature BNT and one SRC. All salvaged trout were immediately released in Eden Reservoir. The job required approximately 2 hours.

Upper Big Sandy River Basin - 3US

North Temple Creek GR842490SE

AS - Aquatic Resource Surveys

- Fish Population/Habitat Surveys FX-GR-3US-512 and FX-GR-3US-511

  North Temple Creek was initially visited on the recommendation of local Game Warden Duane Kerr. Duane identified this water as a potential for CRC introduction because he believed the stream to be barren of trout. North Temple Creek is a tributary to Big Sandy River 2.5 miles upstream from the Big Sandy Camp Ground.

  A temperature recorder was placed in North Temple Creek during August 1998. Upon retrieval in August 1999 the recorder was found to have malfunctioned and no data were collected.

  Several hundred yards of North Temple Creek was snorkeled during August 1999 to look for adult BKT spotted in August 1998 or potential recruitment. No fish were observed.

Management Recommendations

Place a temperature recorder in North Temple Creek starting in August 2000 for a year period. Postpone plans to transplant CRC from Irish Canyon until temperature profile can be reviewed.

Slate Creek Basin - 3SL

No Work Scheduled

Fontenelle Reservoir Basin - 3FR

Fontenelle Reservoir GR440005LN

AS - Aquatic Resource Surveys

- Gill Netting FX-GR-3FR-512

  Three sinking (EG) and three floating (FG) experimental gill nets were set in Fontenelle Reservoir during June 1999 to monitor the trout population.

  Four species of game and three exotic non-game fish were caught in the EG nets during June (Table 46). The BNT population is remaining consistent (Figure 6) even though stocking was eliminated after 1995. CPUE for BNT crept up a little from previous years. BNT sampled were in poor to fair condition. CPUE for RBT and SRC remains low. According to the EG netting, survival of the RBT and SRC plants over the last several years has been poor. The FG nets paint a different picture. CPUE for UTC, WHS, and MWF in the EG nets declined from 1998 (Figure 7). The CPUE for all these species returned to levels observed in 1994.

Table 46. Catch from gill nets set in Fontenelle Reservoir.

Date	Gear and #	Total Hours Fished	Species and Number		CPUE	Mean L (in.)	Range L (in.)	Mean W (Lbs)	Mean C
6/09/99	EG 3	109.2	BNT	83	0.76	15.9	7.7-26.4	1.48	31.1
			RBT	3	0.03	9.9	7.5-13.5	0.46	38.0
			SRC	1	0.01	13.8	13.8-13.8	0.95	36.0
			MWF	61	0.56	11.4	5.6-17.8	0.58	32.6
			UTC	281	2.57	8.1	4.0-13.3	0.38	49.8
			WHS	176	1.61	10.8	6.5-17.9	0.62	41.9
			BRS	19	0.17	4.1	3.9-4.2	0.03	43.0
6/09/99	FG 3	106.6	BNT	83	0.78	15.7	10.6-19.7	1.17	29.2
			RBT	118	1.11	14.3	8.7-19.9	1.11	37.1
			SRC	33	0.31	13.6	11.3-17.4	0.94	36.3
			KOE	10	0.09	16.0	9.0-18.2	1.82	40.4
			MWF	35	0.33	15.2	13.2-17.0	1.15	32.7
			UTC	262	2.46	9.0	3.8-15.9	0.50	57.2
			WHS	6	0.06	12.9	12.4-13.5	0.97	44.2

FG nets were fished to complement the data collected by the EG nets. The FG nets depicted a different picture of the trout population than the EG nets. The CPUE for BNT was good, similar to the CPUE for EG nets, but mainly from the middle 2/3 of the size distribution sampled by the EG nets. The CPUE for BNT, RBT and SRC was up from 1998 FG net data. The RBT and SRC were much higher than observed previously. The CPUE for KOE was similar to 1998. The SRC, stocked in September 1997, are from the last scheduled plant of SRC in Fontenelle Reservoir. This year class has done particularly well. SRC may need to be reconsidered. The RBT, SRC, and KOE were in good condition. The condition factor for the BNT was poor. The last release of 82,000 KOE from Boulder hatchery was in 1997. The last of these KOE will likely mature and leave the reservoir to spawn in 2000.

Fish collected during netting were sent to the Fish Pathology Lab for whirling disease analysis. There were 72 RBT, 86 BNT, 22 SRC and 10 KOE submitted. One RBT and 1 KOE came back positive.

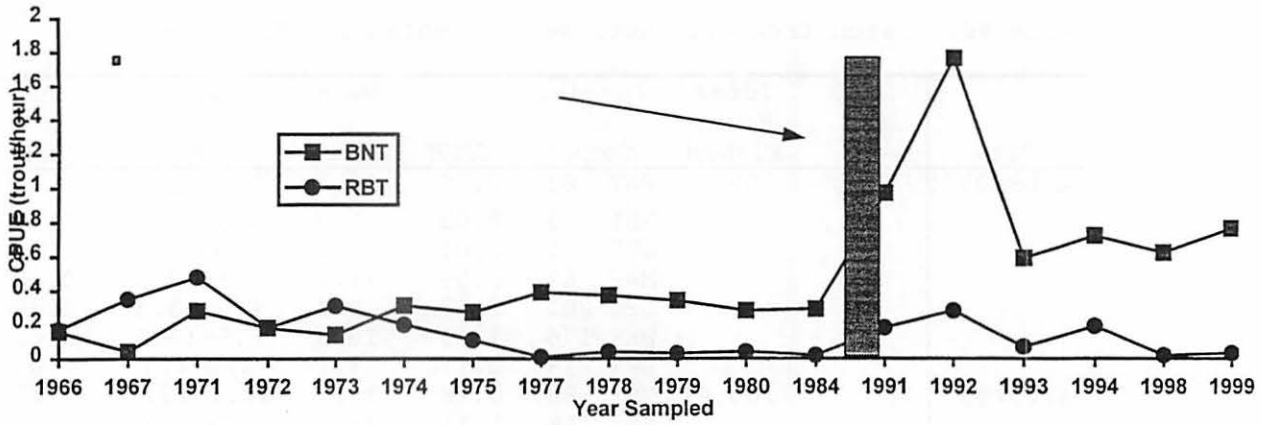


Figure 6. CPUE of fish captured in EG from Fontenelle Reservoir during early summer.

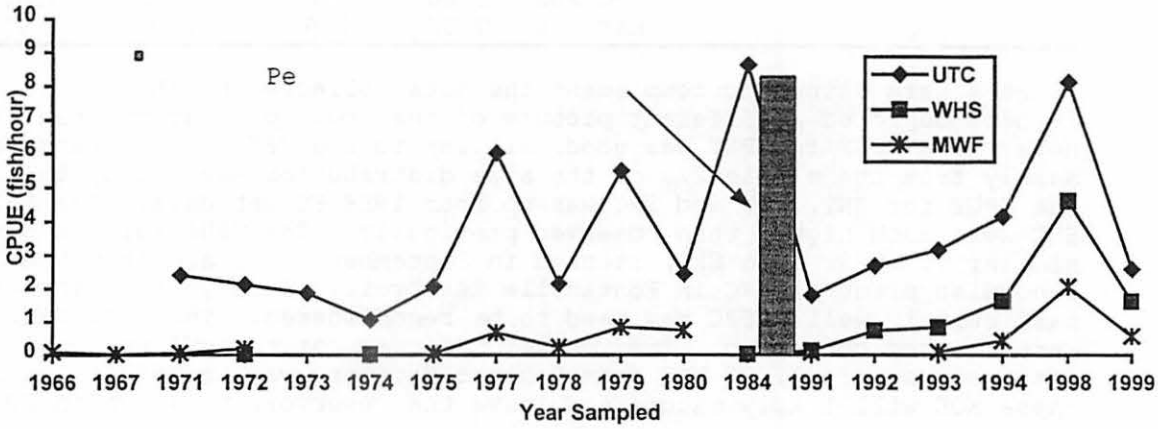


Figure 7. CPUE of fish captured in EG from Fontenelle Reservoir during early summer.

Management Recommendations

Move RBT plant to September. Continue evaluating the trout population in Fontenelle Reservoir with gill nets. If stocking RBT in the fall increases survival and angler success, consider trying the same strategy with SRC.

Continue stocking KOE when they become available. Resources permitting increase KOE plant to 150,000. The KOE fishery was increasing in popularity and use. Additionally, Fontenelle Reservoir produces KOE of above average size. Submit additional fish for WD sampling to determine any increase in incidence.

Sample zooplankton in mid August as schedules allow.

Fontenelle Creek - 3FC

No Work Scheduled.

Woodruff Reservoir Basin - 3WR

Woodruff Reservoir GR490600UA

AS - Aquatic Resource Surveys

- Gill Netting FX-GR-3WR-512

Woodruff Reservoir was netted to evaluate the trout population. Three experimental gill nets were set overnight. Results of the netting effort are presented in Table 47.

The CPUE for trout was extremely low compared to past netting efforts. Given the size of the trout caught they were probably stocked in 1997. No RBT or BRC from 1998 were caught. During 1998 approximately 20,000 RBT and 41,000 BRC fingerlings were stocked. These fish may be in the reservoir, just using a different part than was netted. RBT in other reservoirs are caught in greater numbers in floating gill nets from the pelagic zone. In 1997 and 1998 the gill net surveys indicated trout abundance in the reservoir was directly related to stocking; low stocking rates (reduced because of past poor storage levels) yielded few fish from the nets as well as angler creels. Recent good water years have allowed more consistent storage levels so more trout were stocked in 1998. Sinking and floating gill nets will be used in 2000 to get a better picture of the trout population.

Table 47. Catch from experimental gill nets set in Woodruff Reservoir.

Date	*Gear And #*	*Total Hours Fished*	*Species and Number*	*CPUE*	*Mean L (in)*	*Range L (in)*	*Mean W (Lbs)*	*Mean C*
6/11/99	EG 3	37	BNT 2	0.05	14.6	14.0-15.3	1.27	39.5
			BRC 3	0.08	16.9	15.3-19.3	1.79	36.0
			UTC 99	5.27	6.6	3.8-12.6	0.17	43.6
			UTS 44	1.95	8.8	3.8-13.4	0.34	43.1
			BRS 1	0.03	3.2	3.2- 3.2	0.34	61.0

UTC and UTS densities remain high. ZPR scores from past sampling predict adequate large bodied zooplankton to support more trout than are presently stocked despite the high non-game species densities. If storage levels remain stable higher numbers of trout will be stocked benefiting the anglers with better catch rates.

Management Recommendations

Continue monitoring fish population with gill netting efforts in June. Add three floating gill nets to the present effort. Make adjustments to stocking rates as future surveys provide more information concerning this fishery. Stocking levels should remain relatively high while reservoir storage levels remain stable.

Request extra trout, if compatible with the fishery, to enhance it.

Sulphur Creek Reservoir Basin - 3SR

Sulphur Creek Reservoir GR490325UA

AS - Aquatic Resource Surveys

- Gill Netting FX-GR-3SR-512

Sulphur Creek Reservoir was netted to evaluate the trout population. Three experimental and one floating gill net were set overnight. Results of the netting effort are presented in Table 48.

The CPUE of trout in the experimental gill nets were similar to past netting efforts. BRC densities have remained relatively low over the years. No change in 1999. The CPUE for RBT was much higher than BRC even though equal numbers were planted in 1998. Additionally, no RBT were stocked in 1997. The CPUE of BNT is consistent with past years. The CPUE of UTS was up from the past. The average condition factors for trout are similar to past years.

The CPUE by species in the floating gill net was opposite that observed in the sinking net. RBT had the highest CPUE. The sinking and floating nets target different habitats in the reservoir and the trout that use them. A combination of both floating and sinking nets provides a more complete picture of the trout population.

Table 48. Catch from experimental gill nets set in Woodruff Reservoir.

Date	*Gear and #*	*Total Hours Fished*	*Species and Number*		*CPUE*	*Mean L (in.)*	*Range L (in.)*	*Mean W (Lbs)*	*Mean C*
6/11/99	EG 3	54.5	BNT	20	0.37	14.9	9.4-20.3	1.4	36.3
			RBT	3	0.05	10.9	9.5-12.0	0.4	32.3
			BRC	7	0.13	13.6	9.7-16.2	1.0	36.6
			MWF	1	0.02	7.4	7.4-7.4	0.1	32.0
			UTS	55	1.74	11.7	6.3-18.6	0.7	38.8
			BRS	61	2.03	3.8	3.0-4.5	0.0	11.0
			MSC	1	0.02	3.3	3.3-3.3	NA	NA
6/11/99	FG 1	17.6	BNT	3	0.17	12.7	10.1-15.3	0.7	33.7
			RBT	43	2.44	12.6	11.3-19.6	0.8	39.5
			BRC	2	0.11	12.3	10.2-14.4	0.6	32.5
			UTS	1	0.80	15.4	12.4-17.5	1.5	39.4

Management Recommendations

Continue monitoring fish population with gill netting efforts in June, use three sinking nets and two floating nets. Continue moving towards BRC management if they can provide the catch rates and sizes that will satisfy anglers.

Upper Bear River Basin - 3BE

AS - Aquatic Resource Surveys

- Fish Population Monitoring FX-GR-3BE-512

Sulphur Creek, immediately below Sulphur Creek Reservoir, was sampled to collect whirling disease samples and sculpins for genetic analysis (S28, R119W, T14N). Two BNT and 13 BRC were collected from Sulphur Creek. The trout were submitted to the Wyoming Game & Fish Laboratory for whirling disease testing. All fish tested were negative for M. cerebralis spores. Dr. Shiozawa requested the MSC for ongoing work he is conducting at BYU. Dr. Shiozawa picked up the MSC mid summer.

The relative abundance of species present was recorded as the other work was completed. Thirteen small BRC were caught ranging in length from 2.3 to 7.5 inches. Six of the BRC were young of the year. Numerous non-game fish were observed. BRS and SPD were abundant. UTS, MTS, MSC, and LSC

Management Recommendations

Survey Sulphur Creek above the reservoir to document species composition including upstream distribution of BRC and quantify leatherside chub densities.

Lower Bear River Basin - 3LB

Work Not Associated with a Particular Water

AS - Aquatic Resource Surveys

- Fish Population Monitoring FX-GR-3LB-512

The Crew assisted Dr. Frank Rahel and University of Wyoming graduate students, Amy Schrank and Lainie Johnstone with the BRC movement studies. Electrofishing assistance occurred in May, July, August, September, and October on Coal, Thomas Fork, Salt, and Huff creeks. Preliminary work is confirming there are two BRC populations using the drainage, fluvial and residents. More detailed summaries can be found in quarterly reports prepared by Frank and his students.

Management Recommendations

Continue to assist the University with sampling, using crew gear, to capture BRC to insert radio tags (up to 60 in 2000) and follow movement of VI tagged fish. Some of this work will occur on the Thomas Fork in Idaho and will be coordinated with the local Idaho Fish and Game biologist.

Lake Alice GR190270LN

AS - Aquatic Resource Surveys

- Fish Population Survey FX-GR-3LB-512

This work was deferred until 2000.

Smiths Fork River GR891410LN

PM - Population Management

- Fish Salvage FX-GR-3LB-730

Concerned Cokeville anglers, local irrigation district personnel, and crew personnel met to discuss the potential loss of BRC in area irrigation canals. This was of particular importance to the Cokeville residents because of the pending petition to have these trout listed. We agreed to salvage fish from the canal system after the irrigation season concluded then determine if modifications to the system could be made to minimize future losses. During the salvage operations minimal losses were observed but additional sampling will occur in 2000 to see if this was an anomaly or an indication that this is not a significant problem.

Management Recommendations

Assist with a salvage operation in 2000, with assistance from local anglers and irrigators. Continue investigation in possible head-gate structures that could minimize fish loss to the canal system.

Regional Aquatic Wildlife Management Progress Report

Green River/Pinedale (Pinedale Regional Fisheries Management Crew)

Calendar Year 1999

Work Not Associated With A Particular Basin

AS - Aquatic Resource Surveys

- Colorado River Cutthroat Trout Genetic Analysis FX-PE-NA8-553

  Cutthroat trout were collected in 1999 for genetic analysis from Scab, Bare, Spring No. 2, Trail, South LaBarge, South Horse, South Fork Beaver, Rock and Lead creeks this year. Results from Leary have been received on Scab, Bare, Lead and Spring No. 2 creeks and indicate only Spring No. 2 has pure CRC. Trail, South LaBarge, South Horse, South Fork Beaver and Rock creeks results have not been received to date. Analyses for cutthroat trout collected during the 1998 field season (Camp, Dead Cow, South Fork of North Horse and Trudy creeks) were received this year from Shiozawa. The results indicate pure CRC for all these waters. Cutthroat trout collected from Trailridge and South Fork Beaver creeks (1998 field season) have not been analyzed by Shiozawa to date.

PA - Planning and Administration

- Basin Management Plans FX-PE-EB1-121

  North Piney, South Piney, Horse, LaBarge, Muddy, Dry Piney, Middle Piney, and Cottonwood creeks and East Fork River, New Fork Tributaries. Catch-Out Ponds, Meadow Lake, Soda Lake and Union Pass lakes Basin Management Plans were revised in 1999. Bridger Wilderness lakes BMP has not been finalized to date.

TM - Development of Tools and Methods

- Finger Lakes Sampling Techniques FX-PE-FL2-576

  Willow and Lower Green River lakes were each sampled on 4 nights in June/July to evaluate the impacts of meteorological and environmental variables on gill-net CPUE for LAT. These data were combined with data collected similarly on the Finger Lakes since 1993. With Green River and Finger Lakes Administrative reports taking precedence, an Administrative Report should be completed on netting data in FY2001.

Beaver Creek - 7BE

No work scheduled

Boulder Lake - BO

Boulder Lake PE240472SE

AS - Aquatic Resource Surveys

- Fish Population Survey FX-PE-7BO-512

  RBT collected by the spawning crew in trap nets were examined for contribution of stocked fin-clipped RBT. Previous fall operations to collect spawning KOE had yielded more RBT than other sampling methods, but 1999 was the first year these fish were enumerated. A total of 244 RBT were collected ranging from 7.0-22.6 in long. Fin clipped fish ranged from 7.0-14.8 in long. Of the total 233 fish 7.0-14.9 in long, about 56% were of hatchery origin.

- Life History Evaluation FX-PE-7BO-553

  The length of KOE captured in 1999 declined from 1998 reversing an increasing trend seen since 1995 (Table 1). A greater number of females and eggs were also taken in 1999, third greatest since spawning operations began. Good weather and a rebound in the KOE population are most likely responsible for the greater numbers. A concern over increased LAT predation led to an increase in the number of KOE stocked from 50,000 to 60,000 in 1997. The fish resulting from the first year of 60,000 KOE stocked comprised Age 2+ fish in the 1999 run. In general, the Boulder Lake mature KOE are Age 2+ - Age 3+ with Age 3+ comprising the greatest proportion of the run. The year 2000 will be the first to see the greatest impact of increased stocking numbers. Concern over the lack of KOE in 1998 resulted in a further increase in number stocked to 100,000 in 1999. These fish will enter the spawning population in 2001 with greatest contribution in 2002.

  Table 1. Mean length, number of females spawned and total eggs taken from the KOE spawning operation on Boulder Lake from 1993-1999.

	Mean L (in)		No female	Egg	Zooplankton vol (ml)		
Year	Male	Female	spawned	Total	153	500	750
1993	14.9	14.2	174	153,000	2.5	0.23	0.18
1994	17.4	15.9	510	611,000			
1995	14.8	13.9	782	641,000	7.6	0.30	0.10
1996	15.1	14.5	247	215,700			
1997	17.5	16.3	296	378,224			
1998	18.5	17.1	115	165,380	19.1	1.73	1.08
1999	16.7	16.1	434	441,178			

Management Recommendations

The concern over a decrease in spawning numbers led to the increase in the number of KOE stocked from 50,000 to 60,000 in 1997. This was increased to 100,000 in 1999. Crew will continue to fin-clip KOE until 2000 to evaluate OTC marking and determine the relative contribution of naturally reproduced fish. Fin clipped KOE should return as spawning adults in 2000. More management recommendations will be included in the Program Creel Administrative Report to be completed in FY00.

Burnt Lake - 7BU

Burnt Lake PE140497SE

AS - Aquatic Resource Surveys

- Fish population survey FX-PE-7BU-512

Surveys continue to evaluate trends in the naturally reproduced RBT given the popularity of fishing the spawning population at the outlet. Four RBT were captured compared to 14 in 1997 (Table 2). Gillnet samples have varied, which is not unusual, from 4-15 RBT/night from 1991-1997.

Table 2. Fish and population data collected with gill nets set in Burnt Lake in 1999.

Date	Species	No.	CPUE	Mean Length Inches	Range Length Inches	Mean Weight Pounds	Range Weight Pounds	Avg. C
09/28/99	LAT	13	0.32	18.1	12.6-41.0	1.20	0.64-1.92	28.1
	BKT	1	0.02	8.9		0.18		25.5
	RBT	4	0.10	12.9	7.3-16.6	0.94	0.18-1.52	39.0
	WHS	59	1.44	13.4	9.7-18.5	0.95	0.24-2.11	36.5
	FMS	6	0.15	10.6	6.9-14.6	0.57	0.10-1.20	34.7
	BRS	6	0.15					
	RTC	4	0.10					

CS - Creel Surveys

- Angler Spot Creel FX-PE-7BU-512

Concern has been expressed for the over-harvest of spawning RBT in Fall Creek, which contributes to the Burnt Lake fishery. Angler catch rates are one tool that has been used to monitor the wild RBT in Burnt Lake. Only 12 boat anglers were interviewed in 1999 for a total of 201 hours. Three anglers indicated they had fished for 60 hours each and caught only nine fish including one RBT for a catch rate of 0.006 RBT/hr. The other anglers fished for 21 hours and caught three RBT for a catch rate of 0.15 RBT/hr. RBT catch rates for boat anglers have ranged from 0.13 - 0.40 RBT/hr from 1993-1998. The small data set has been difficult to draw conclusions from.

Management Recommendations

Considering RBT are the target species for gillnets, floating gillnets will be used to sample the population. Installation of a volunteer creel box at the boat launch site may improve the opportunity to use creel information in the evaluation.

Bridger Wilderness Lakes - 7BW

Peak Lake PE140597SE

AS - Aquatic Resource Surveys

- Fish Population Monitoring FX-PE-7BW-512

Peak Lake is 31.9 acres and located in the Bridger Wilderness at 10,515 feet. This lake has been stocked with GDT from 1975-1993. The last survey was in 1993 and resulted in 6 GDT that were probably from the 1991 plant.

The lake was evaluated on August 22, 1999 to determine GDT status and stocking request. A Swedish gill net was set overnight (16 hours) and caught no fish. No fish were observed during the reconnaissance of the lake. Food is available, particularly caddis and mayflies. Spawning areas are available in the outlet stream.

Management Recommendations

This lake is considered to have a low to fair production potential with low to moderate angler pressure for an alpine lake. Recommend that Peak Lake be restocked with GDT when they become available.

- Stock every 2 years with 2,400 (75/acre), size 2 GDT.
- Monitor population every 5 years.

Stonehammer Lake PE140593SE

AS - Aquatic Resource Surveys

- Fish Population Monitoring FX-PE-7BW-512

Stonehammer Lake is 16.8 acres and located in the Bridger Wilderness at 10,259 feet. The lake is managed as a unique GDT fishery and was stocked with GDT from 1975 to 1993. The last survey was in 1993 and resulted in 12 GDT. Limited reproduction was evident in the lake during this survey.

On August 22, 1999 a Swedish gill net was set overnight (16 hours) and caught no fish. Food is available, particularly caddis and mayflies. Copepods are limited. Spawning area is available in the lower portion of the inlet stream.

Management Recommendations

This lake is considered to have a low to fair production potential with low to moderate angler pressure for an alpine lake. Recommend that Stonehammer Lake be restocked with GDT when they become available.

- Stock every 2 years with 1,300 (75/acre), size 2 GDT.
- Monitor population every 5 years.

Elbow Lake PE140681SE

AS - Aquatic Resource Surveys

- Fish Population Monitoring FX-PE-7BW-512

Elbow Lake is 80.4 acres and located at an elevation of 10,777 feet. This lake is managed as a unique GDT fishery. GDT were stocked in 1935 and 1939. It was determined at this time that stocking was not necessary to maintain the fishery. A gill net was last set at this lake in August 1973 and resulted in GDT averaging 12.8 inches; lengths range was 7.4-15.9 inches; weights ranged from 0.13-1.87 pounds.

On August 22, 1999 a Swedish gill net was set during the day for 2 hours and caught 2 GDT (CPUE=1.0); lengths were 13.4 and 17.8 inches; weights were 1.0 and 2.3 pounds. GDT in Elbow Lake are healthy and have an average condition factor of 40. The crew fished for 10 hours and caught 1.4 fish/hour with the average length and weight of 15.5 inches and 1.75 pounds.

This lake has a reputation of producing trophy size GDT and is one of the few excellent GDT lakes still present in the Bridger Wilderness. Even with the increase in fishing pressure at this lake, there is an excellent GDT fishery and the fish density appears in balance with available food. Mayflies, caddis, stoneflies, fairy shrimp and copepods are numerous.

Management Recommendations

- Continue managing Elbow Lake as a unique wild trout fishery.
- Monitor population every 10-15 years.

Mistake Lake PE140557SE

AS - Aquatic Resource Surveys

- Fish Population Monitoring FX-PE-7BW-512

Mistake Lake is 22.8 acres and located at an elevation of 10,781 feet. The lake is managed as a unique GDT fishery. The lake was initially stocked in 1966 and a survey in the 1973 determined that stocking was necessary to maintain this fishery. GDT stocking occurred until 1991. The lake was last surveyed in 1991 (1 GDT; 11.7 inches and 0.66 pounds). This fish was from the 1991 plant. This lake was considered one of the best GDT fisheries in the Titcomb Basin.

A Swedish gill net was not set at this lake due to limited time available. The shoreline was walked and no fish activity was observed. Angler contacts while at the lake indicated no catch. Caddis, mayflies and copepods are available as food.

Management Recommendations

This lake is considered to have a low to fair production potential with moderate angler pressure for an alpine lake. Recommend that Mistake Lake be restocked with GDT when they become available.

- Stock every 2 years with 1,700 (75/acre), size 2 GDT.
- Monitor population every 5 years.

Titcomb Lake No. 5 PE140556SE

AS - Aquatic Resource Surveys

- Fish Population Monitoring FX-PE-7BW-512

Titcomb Lake No. 5 is 106.6 acres and located at 10,598 feet. This lake is managed as a unique GDT fishery. GDT stocking began in 1966 and continued until 1983. This lake is popular with backpackers and climbers that frequent the Titcomb Basin. A Swedish gill net set in 1993 caught 1 GDT of 11.3 inches which was probably a fish that drifted downstream from Mistake Lake.

On August 25, 1999 a Swedish gill net was set overnight (16.25 hours) and caught no fish. Spawning areas are very limited. The food is abundant, particularly copepods and fairy shrimp.

Management Recommendations

This lake is considered to have a low to fair production potential with moderate angler pressure for an alpine lake. Recommend that Upper Titcomb Lake be restocked with GDT when they become available.

- Stock every 2 years with 10,600 (100/acre), size 2 GDT.
- Monitor population every 5 years.

Titcomb Lake No.4 PE140558SE

AS - Aquatic Resource Surveys

- Fish Population Monitoring FX-PE-7BW-512

Titcomb Lake No. 4 is 106.2 acres and located at 10,575 feet. This lake is managed as a unique GDT fishery. GDT were stocked from 1966-1983. This lake is popular with backpackers and climbers that frequent the Titcomb Basin. The last gill net survey was in 1985 and caught 9 GDT; lengths range was 6.1-18.6 inches; weights ranged from 0.8-2.5 pounds. The age of the fish ranged from 1-4 years.

On August 25, 1999 a Swedish gill net was set overnight (15 hours) and caught 1 GDT; length =14.3 inches; weight = 1.25 pounds. The GDT spent male was caught close to the shoreline and was released alive. Spawning areas are limited to the outlet. Food is available, particularly copepods and fairy shrimp.

Management Recommendations

This lake is considered to have a low to fair production potential with moderate angler pressure for an alpine lake. Recommend that Lower Titcomb Lake be restocked with GDT when they become available.

- Stock every 2 years with 10,600 (100/acre), size 2 GDT.
- Monitor population every 5 years.

Junction Lake PE140545SE

AS - Aquatic Resource Surveys

- Fish Population Monitoring FX-PE-7BW-512

Junction Lake, Pole Creek drainage, is 100 acres and located at 9,048 feet. According to the 1980 High Mountain Lake and Stream Survey of the Bridger Wilderness, this lake was managed as a wild brook, rainbow and cutthroat trout fishery, with BKT the primary species. There are no stocking records for this lake. The trout are probably from downstream drift.

On June 20, 1999 a 14 hour Swedish gill net set resulted in LAT, BNT, and RBT (Table 3). The maximum depth set was 9 feet. Weights were not measured for fish over 2 pounds and the average condition factor and weights for measured BNT and LAT was 33 and 28 C; 1.38 and 1.04 pounds.

The species composition has obviously changed since the 1972 survey. With the high flows from the inlet streams, it was considered that fall spawners (BKT) would be more favorable. BKT were not collected during this survey, yet other fall spawners, LAT and BNT were found. LAT and BNT have not previously been collected at this lake. The introduction of LAT must have occurred from downstream drift from Don and Peter lakes, which were stocked with LAT in 1962 to control BKT populations. If LAT reached Junction Lake by downstream drift, this means that probably 4 other lakes upstream of Junction Lake have changed species composition. No records of BNT stocking in this drainage can be found.

Table 3. Swedish gill net summary results for Junction Lake, Pole Creek drainage, June 20, 1999.

Species	No	CPUE	Mean Length Inches	Range Length Inches
BNT	3	0.21	19.2	16.0-23.0
LAT	5	0.35	19.7	13.0-28.0
RBT	1	0.07	17.8	17.8-17.8

Management Recommendations

- Recommend that Junction Lake be managed as a wild trout fishery.
- Monitor population every 10 - 15 years.

Surprise Lake PE140484SE

AS - Aquatic Resource Surveys

- Fish Population Monitoring FX-PE-7BW-512

Surprise Lake is 27.8 acres and located at 8,901 feet. This lake was surveyed regularly since 1956 and had been used as the GDT brood source until 1993. The last survey was during June and August 1995 and resulted in 16 GDT; length range was 6.0-11.3 inches. Natural reproduction has been occurring in the lake since the 1988 fire. This lake has not been used as a brood source since 1993 due to the assumed difficulty in trapping fish and the GDT lack of genetic variability.

A Swedish gill net was set at Surprise Lake to determine the status of GDT population and potential use as a brood water again. A 2 hour net set during the day on June 13, 1999 resulted in 1 adult GDT; 16.1 inches and 1.5 pounds. No fish were observed in the outlet or inlet. Spawning areas are available in the inlet.

On June 22, 1999 a 14.3 hour Swedish gill net set resulted in 12 GDT ranging in size from 6.2-7.6 inches. The CPUE was 0.84 fish/hour.

With the present GDT population and the lack of genetic variability within the Surprise Lake population it is recommended that this water no longer be considered as a brood lake.

Management Recommendations

- Continue to monitor the population every 10-15 years to determine if natural reproduction is able to support a wild GDT population.
- Recommend the lake not be used as potential GDT brood water if the Department is able to require pure GDT eggs from a source with high genetic variability.

- Recommend the possibility of using this lake as a brood water if the Department decides to use local egg source and the other recommended waters cannot be used.

Cottonwood Creek - 7CO

Sjhoberg Creek PE844110SE

AS - Aquatic Resource Surveys

- Fish Population Monitoring FX-PE-7CO-512

Population stations have been established at 3 sites on Sjhoberg Creek. However, these sites were not surveyed this year since approximately 3 miles were surveyed during spawning operation on July 22, 1999. A 1-pass electrofishing survey resulted in 2 mature females and 1 mature male. Juvenile fish were observed but in low density.

Livestock grazing is affecting the riparian habitat. A three unit deferred rotation grazing system has been proposed by the USFS for the North Cottonwood Cattle and Horse (C&H) allotment. However implementation will not begin until all range improvements are in place. At present year long grazing is allowed in this allotment. Once the allotment management plan is implemented, Sjhoberg Unit will be grazed from August 15 to October 5th with 1,457 head permitted.

Management Recommendations

- Continue monitoring the stream habitat and CRC population at the identified stations for the next 3 years during implementation of the C&H rotation.
- Address any identified habitat concerns so that the remnant CRC population is not extirpated.
- Recommend that Sjhoberg Creek no longer be used for CRC brood source development.

Camp Creek PE844142SE

AS - Aquatic Resource Surveys

- Habitat and Population Evaluation FX-PE-7CO-510

Camp Creek, tributary of Little Cottonwood, was surveyed on August 9, 1999 using a backpack electroshocker. A 2-pass removal survey of 190 feet resulted in no fish. The flow was minimal, however, good enough to support game and nongame fish species. Cows were all over in the riparian area and the channel was not in good condition. Nonriparian vegetation comprised 54% of the streambanks with 23% eroding banks. This drainage has high cattle use, road density and oil/gas developments.

Management Recommendations

This drainage historically supported CRC populations however has not been identified as a high priority CRC restoration area. Because of the minimal stream miles that can be connected, poor habitat condition, high road density and emphasis by BLM for high level livestock and oil/gas activities the potential for successfully reintroducing native fish is limited.

Little Cottonwood Creek PE844130SE

AS - Aquatic Resource Surveys

- Habitat and Population Evaluation FX-PE-7CO-510

  Little Cottonwood Creek was surveyed on August 9, 1999 using a backpack electroshocker. A 264 foot station was surveyed and resulted in 1 CRC and abundant MTS and SPD. The station was located in a heavy cattle use area and the stream had abundant algae growth. Nonriparian vegetation comprised 55% of the streambanks with 54% eroding banks. The stream has the capacity to support a game and nongame species populations, however the current conditions are not suitable. Cattle, roads and oil/gas development are common in this drainage.

Management Recommendations

This drainage historically supported CRC populations however has not been identified as a high priority CRC restoration area. Because of the minimal stream miles that can be connected, poor habitat condition, high road density and emphasis by BLM for high livestock and oil/gas activities the potential for successfully reintroducing native fish is limited.

Beecher Creek PE844140SE

AS - Aquatic Resource Surveys

- Fish Population Survey FX-PE-7CO-512

  Beecher Creek was surveyed on August 9, 1999 to determine presence and distribution of CRC. However, flows were intermittent and no fish were observed.

Management Recommendations

This drainage historically supported CRC populations however has not been identified as a high priority CRC restoration area. Because of the minimal stream miles that can be connected, poor habitat condition, high road density and emphasis by BLM for high level livestock and oil/gas activities the potential for successfully reintroducing native fish is limited.

Red Castle Creek PE844150SE

AS - Aquatic Resource Surveys

- Fish Population Survey FX-PE-7CO-512

  Work was not accomplished this year due to other work commitments

Soda Lake Cottonwood PE140955SE

AS - Aquatic Resource Surveys

- Fish Population Monitoring FX-PE-7CO-510

BKT stocking in Soda Lake Cottonwood was eliminated in 1997. The fish population has been monitored annually to determine BKT status and potential needs for restocking (Table 4). The high BKT mortality from the 1997 gill net set prompted the use of trap nets for population monitoring. A trap net was successful in monitoring BKT populations in 1998 but did not have adequate results in 1999. On August 24, 1999 the BKT status was monitored using a trap net and resulted in 912 MTS and 1 BKT. The BKT was 6.5 inches at 0.13 pounds.

Table 4. Soda Lake Cottonwood summary results from 1997 to 1999.

Gear/ Year	Species	No	CPUE	Mean Length Inches	Range Length Inches	Mean Weight Pounds	Range Weight Pounds	Mean C
EG/1997	SRC	1	0.02	8.8	8.8-8.8	0.25	0.25-0.25	36.7
EG/1997	BKT	63	1.64	8.6	4.9-14.6	0.31	0.05-1.39	43.4
TN/1998	BKT	5	0.24	9.6	6.2-16.0	0.51	0.1-1.8	36.9
TN/1999	BKT	1	0.04	6.5	6.5-6.5	0.13	0.13-0.13	47.0

A past management recommendation was to increase the creel information after BKT stocking was discontinued in 1997. A creel box was placed at the pond in 1998, but within weeks, was destroyed. No creel box was placed at this location during 1999 but creel data and angler contacts by the local game warden indicated BKT are still providing a fishery. Spot creel information and crew angling at the lake, indicate a BKT catch rate of approximately 0.62 fish/hour. This is based on 21 angler contacts.

Management Recommendations

- Continue trend net surveys to evaluate BKT status.
- Increase spot creels to evaluate anglers catch rates since the BKT plant was discontinued.

Catch-Out Ponds - 7CP

Little Soda Lake PE140853SE

AS - Aquatic Resource Surveys

- Fish Population Monitoring FX-PE-7CP-512

RBT catchables have been planted in Little Soda Lake since 1997. Fish are fin-clipped every other year to assist in stocking evaluation. A Swedish gill net was set on June 8, 1999 to evaluate catchable RBT overwinter survival. A 0.75 hour net set resulted in 3 RBT with a mean length and weight of 18.1 inches and 2.46 pounds. RBT were from the 1997 and 1998 plants. The CPUE was 4.0 fish/hour. Growth rates are excellent in this lake with an average condition factor of 40.

CS - Creel Surveys

- Stocked Fish Evaluation FX-PE-7CP-520

  Spot creel information was collected in 1999 with the majority of the information collected in the volunteer creel box. Based on 170 hours of fishing, the catch rate was 0.56 fish/hour with approximately 50% of the catch released.

Management Recommendations

This lake is providing an excellent RBT fishery. The lake has become a popular fishery for local and out-of-state residents and with this increase in use, conflicts between different interest groups have surfaced. Some publics have voiced their concerns that the increase in use is going to negatively affect the fisheries if the current regulations remain. Ideas that have been proposed by the public includes; use of artificial flies and lures only, no gas-powered motors, no trolling or gas-powered motors, walk-in access only, 3 fish creel limit, and no bait allowed except for children under 14 years. Population and creel information will be used to determine if any of the proposed fishing regulation changes are warranted.

- Stock 1,000 catchable RBT annually;
- Monitor RBT status;
- Increase spot creel data collection in order to assess catch rates, harvest rates and public use.

Dollar Lake PE140899SE

AS - Aquatic Resource Surveys

- Fish Population Monitoring FX-PE-7CP-512

  Dollar Lake is 27 acres with a maximum depth of 34 feet. The lake is primarily spring fed and is known to have partial winterkills. This water is managed as a basic yield fishery and is a popular family fishery. The lake has been surveyed annually with experimental gill nets. Since the high RBT numbers collected in 1998, a trap net was set overnight with hopes to eliminate the mortality. The trap net was not efficient in collecting RBT so a gill net was set for 3 hours, in order to decrease mortality yet collect overwinter survival data. An experimental gill net was set on June 4, 1999 and resulted in 2 RBT with mean length of 14.4 inches. MWF were also collected. Overwinter survival of stocked catchable RBT was evident (Table 5).

Table 5. Dollar Lake gillnet summary results from 1997 to 1998.

Year	Species	No.	CPUE	Mean Length Inches	Range Length Inches	Mean Weight Pounds	Range Weight Pounds	Mean C
1997	RBT	1	0.03	14.0	14.0-14.0	1.25	1.25-1.25	45.6
1997	GRL	3	0.08	12.3	10.5-15.5	0.75	0.05-1.25	35.6
1997	MWF	2	0.05	11.3	11.3-11.5	0.50	0.50-0.50	35.2
1998	RBT	30	1.54	13.1	8.8-14.9	0.95	0.3-1.5	40.5
1999	MWF	3	1.00	10.1	9.7-10.6	0.27	0.3-0.3	26.0
1999	RBT	2	0.67	14.4	13.3-15.4	1.04	0.9-1.2	35

Management Recommendations

- Continue annual trend net surveys to evaluate overwinter survival for public information.
- Continue to experiment with the use of trapnets as a monitoring tool for Dollar Lake.
- Stock 3,000 catchable RBT annually.

CCC Ponds PE440654SE

AS - Aquatic Resource Surveys

- Fish Population Monitoring FX-PE-7CP-512

Overwinter survival of the 1998 catchable and fingerling RBT plant was monitored in 1999. The lake was surveyed on May 17, 1999 using Swedish gill nets. Fish were observed rising within the vicinity of the net and since RBT had been stocked for 1999, the duration of the net set was minimal. No RBT were caught in the 1.52 hour net set. One BKT was caught which was 10.6 inches and 0.37 pounds. BKT have not been stocked since 1997 and this may indicate that some BKT natural reproduction is occurring or that fish are entering this lake through the inlet structure. The net sets were not adequate in evaluating fingerling or catchable RBT plants. Angling surveys during the winter, did result in both catchable and fingerling RBT. Growth rates for both plants appear minimal. This may be a reflection of the high stocking rates for a pond with low productivity.

Management Recommendations

- Continue annual trend net surveys to evaluate RBT status.
- Delete RBT fingerling plant.
- Monitor lake productivity to determine if stocking rates should decrease.
- Continue Aquatic Education Workshops for local school district.

Soda Lake Boulder PE340475SE

AS - Aquatic Resource Surveys

- Fish Population Monitoring FX-PE-7CP-512

Soda Lake Boulder is 261 acres and was first stocked in 1996. From 1997-1999 this lake was stocked with SRC subcatchables (Table 6).

Table 6. Soda Lake Boulder stocking data from 1996 to 1999.

Date	Species	Size	Number Planted
96/08/09	SRC	2	7,062
96/09/09	BKT	3	7,038
97/07/23	BKT	2	10,706
97/09/02	SRC	4	3,996
97/09/02	SRC	4	4,004
98/06/03	SRC	4	8,233
98/06/03	SRC	4	9,396
99/07/01	SRC	3	14,040

The lake has an excellent food base but the water chemistry may be less than conducive for fish survival. Water chemistry data results from July 1955 are as follows: TDS = 2,628 ppm, Calcium = 14.4 ppm, Magnesium = 231 ppm, pH = 8.8. The O_2 levels from March 1962 data ranged from 0 to 3 ppm. Water chemistry data will be collected in 2000.

The lake has been monitored since 1997 and some overwinter survival has been noted. On June 11, 1999, 2 experimental gill nets were set to monitor overwinter survival of SRC and BKT plants since 1996 (Table 7). SRC were the only species captured during 1999 net sets. The condition factor for the SRC averaged 38.0. The mean growth rate for 1 year was approximately 6 inches.

Table 7. Soda Lake Boulder gill net summary results from 1997-1999.

Year	Species	No.	CPUE	Mean Length Inches	Range Length Inches	Mean Weight Pounds	Range Weight Pounds	Mean C
1997	SRC	8	0.13	11.8	10.9-13.1	0.72	0.56-0.97	43.1
1998	BKT	3	0.07	9.1	6.6-10.5	0.38	0.12-0.52	45.1
1999	SRC	25	0.68	13.1	10.7-14.7	0.88	0.40-1.30	38.0

Management Recommendations

- Continue annual trend net surveys to evaluate overwinter survival.
- Collect water chemistry and zooplankton data to assist in the fisheries evaluation.
- Experiment with use of trap nets during monitoring to decrease mortality of stocked SRC.
- Annually stock 20,000 SRC at size 4.

Dry Piney Creek - 7DP

Pine Grove Creek PE843255SE

AS - Aquatic Resource Surveys

- Habitat and Population Evaluation FX-PE-7DP-510

The WGF, BLM and Mobile/Exxon Company discussed the possibility of upland and riparian habitat improvements and changes to grazing management in this watershed. Fish populations and habitat conditions were monitored in 1999.

Three stations on Pine Grove Creek were evaluated to determine CRC population and habitat conditions. Thermographs were placed at 2 stations to assess the thermal regime of this watershed and potential for CRC reintroduction.

Station 1, located in middle exclosure, was electrofished and resulted in no fish. Habitat conditions were assessed. The channel was narrow with no eroding banks. The stream channel comprised of 89% riparian vegetation and 11% nonriparian vegetation. The vegetation is providing good overhanging cover with many deep pools.

Station 2, located in canyon below 2nd road crossing, was surveyed and resulted in mountain suckers. No trout were captured. The stream channel habitat consisted of 70.8% riparian vegetation. Only 10.9% of the channel had eroding banks. Pools greater than 1 foot were common. The habitat was not as affected by grazing as those areas more accessible to cattle.

Station 3, below canyon at oil/gas pad, resulted in only mountain suckers. The channel is completely down cut with raw banks and no riparian vegetation. The substrate consisted of silt and clay. The channel is incised greater than 4.5 feet in some areas. Eroding banks consisted of 100% of the channel. This section of stream is not conducive to trout species at its present condition.

Management Recommendations

This drainage historically supported CRC populations however has not been identified as a high priority CRC restoration area. CRC were stocked in the 1970s but land management practices and drought years effected the survival of this population. The minimal stream miles that can be connected, poor habitat condition and continual BLM cattle and oil/gas management limit the potential for successfully reintroducing native fish. If CRC reintroduction does occur in this watershed it should focus on Pinegrove and possibly Black Canyon creeks.

Dry Piney Creek PE843240SE

AS - Aquatic Resource Surveys

- Habitat and Population Evaluation FX-PE-7DP-510

A 378 foot station on Dry Piney Creek, above Pine Grove confluence, was surveyed in August 1999 and 2 MTS were captured. The channel was wide and shallow. The streambanks are incised greater than 7 feet in some areas.

Management Recommendations

This drainage historically supported CRC populations however has not been identified as a high priority CRC restoration area. The minimal stream miles that can be connected, poor habitat condition and continual BLM cattle and oil/gas management limit the potential for successfully reintroducing native fish. CRC reintroduction should only occur in this drainage after years of habitat improvements and changes in land management practices.

Black Canyon Creek PE843260SE

AS - Aquatic Resource Surveys

- Habitat and Population Evaluation FX-PE-7DP-510

Work was not accomplished this year due to other work commitments.

East Fork Tributaries - 7EF

East Fork River PE843460SE

AS - Aquatic Resource Surveys

- Fish Population Monitoring FX-PE-7EF-512

  A station above the Boulder Rearing Station on the East Fork River, last surveyed in 1995, was surveyed. In 1995, 91 BNT/mile and 38 RBT/mile were estimated compared to 53 BNT/mile and 9 RBT/mile in 1999. In 1995, 67% of the RBT were believed to be of hatchery origin. Since that time, the number of RBT catchables stocked was decreased from 500 to 100. A sample of fish (2 RBT and 39 BNT) taken in 1999 was negative for WD.

Management Recommendations

In 1998, 400 RBT catchables were transferred from the East Fork River to the ponds at the Boulder Rearing Station for better use. The East Fork River is primarily a wild BNT fishery with low angler use. It is recommended that the 100 remaining catchable RBT stocked in the East Fork be moved to the rearing ponds where greater angler use will occur.

Fremont Lake - 7FR

Fremont Lake PE140654SE

CS - Creel Surveys

- Fishing Contests FX-PE-7FR-520

  Anglers were interviewed at the annual ice and open water fishing contests on Fremont Lake. At the ice fishing contest, 65 anglers interviewed fished for 220 hrs with a catch rate of 0.22 LAT/hr. During the summer fishing contest, 40 boat anglers interviewed fished for 263 hrs with a catch rate of 0.27 LAT/hr. The last year both ice and open water contests were surveyed was 1995 and catch rates of 0.13 and 0.09 LAT/hr were found, respectively.

Management Recommendations

Management recommendations will follow the 2001-2002 programmed creel survey.

Green River - 7GR

Green River (Above New Fork Confl) PE841040SE

AS - Aquatic Resource Survey

- Fish Population Monitoring FX-PE-7GR-512

  Fish samples were collected for WD testing near Swain's Bridge and 40-Rod Fishing access. Similar to 1997 sample, fish were found to be negative at the 40-Rod Fishing Access. A small sample of fish (4 RBT, 12 BNT, 3 RXC, and 11 MWF) from the Swain's Bridge area was also negative for WD.

- Angler Use FX-PE-7GR-520

  A camera to count float fishermen was placed at Nataros Bridge (Old-old Warren Bridge) located between Warren Bridge and 40-Rod Fishing Easement. This reach experiences the greatest float use on the Green River above Fontenelle Reservoir and has been an area of concern over excess use by guides. The camera worked consistently with a total count of 270 anglers, 147 fishing boats, and 78 non-fishing boats from July 15 - September 30.

Floating use began approximately 10-15 days before installation was completed and potentially 100-150 float days could have occurred. This is significantly less then the estimate of 1061 angler days in the 1997 programmed creel survey.

Management Recommendations

Use cameras whenever available to monitor angler use and purchase crew cameras if state-wide cameras are not regularly available. Recommendations are in the Green River Administrative report.

Green River (Warren Br-FS Boundary) PE841031SE

AS - Aquatic Resource Survey

- Fish Population Monitoring FX-PE-7GR-512

A station on the Green River was established in 1996 within the Warren Bridge Access area to evaluate the planned habitat improvement. The station, located in the area of greatest density of structures, was re-surveyed in 1999 prior to the beginning of construction. BNT were most numerous in 1996 and similar numbers were found in 1999 except for a lack of the larger fish (Table 8). The lack of larger fish is reflected in the biomass and mean length. RBT were found in greater numbers in 1999 compared to 1996 potentially reflecting a rebound in RBT populations from the high stream flows of 1996-1997. BKT numbers were similarly low in 1996 and 1999.

Table 8. Fish and population data collected by electrofishing the Green River near habitat improvement project in the Warren Bridge Access area in 1996 and 1999.

Year	Species	Number per mile (CV)	Pounds per acre	Mean length (in)
1996	BNT	175 (0.25)	7.8	10.9
1999		134 (0.24)	3.9	9.6
1996	RBT	41 (1.55)	0.4	8.3
1999		148 (1.10)	1.0	7.0
1996	BKT	13 (1.53)	0.2	8.8
1999		23 (0.57)	0.3	9.2

- Angler Use FX-PE-7GR-520

A camera was installed at Carney's Bridge between the Warren Bridge access area and USFS boundary to count float fishermen. This reach has been an area of concern over motorized use of the river. The camera worked sporadically and the data were unusable. The exact cause of the problems was not determined but included camera malfunctions, swallows setting the camera off, or improper electronic eye angle/clearance.

Management Recommendations

Set-up the river camera on Carney's when next available. A new location may be necessary since various placements at the Bridge did not yield consistent results. Re-survey habitat improvement station on the Warren Bridge Access area in 2002 or after habitat improvement work is completed.

Green River (FS - Wagon Cr.) PE841032SE

AS - Aquatic Resource Survey

- Fish Population Monitoring FX-PE-7GR-512

Within the Kendall Bridge station on the USFS lands a decline in the RBT population from the highs of 1993-1995 was found in 1997 (Table 9). In 1999, the RBT population increased from 668 fish/mile in 1997 to 985 fish/mile. The initial increase (1987-1995) in the RBT population was related to the completion of the habitat improvement project and the subsequent decline (1995-1997) related to record high stream flows. The improvement in the population to numbers greater than years prior to habitat improvement could be related to more favorable flows in 1998 and 1999. The BNT trout population has been relatively stable from 1995-1999. In 1999, however, a greater number of large BNT exhibiting spawning movements were sampled that significantly increased the biomass. The BKT population estimates indicate a steady decrease since the high of 436 fish/mile in 1995. As noted in the Administrative Report, sedimentation of some of the near-shore and interstitial space in the habitat structures was making them unavailable for fish. These spaces received the greatest use from BKT. Samples were collected (29 RBT, 7 BNT, and 16 BKT) for whirling disease analysis and fish were found negative.

Table 9. Fish and population data collected by electrofishing the Green River near Kendall Bridge in 1999 compared to previous years.

Year	Species	Number per mile (CV)	Pounds per acre	Mean length (in)
1987	BNT	14 (1.00)	2.2	14.8
1989		296 (1.02)	4.8	7.8
1993		99 (0.35)	3.0	9.7
1995		180 (0.27)	8.8	9.3
1997		128 (0.33)	5.9	9.6
1999		156 (0.41)	15.0	11.3
1987	RBT	630 (1.02)	15.9	8.9
1989		700 (1.01)	15.8	8.5
1993		1623 (0.15)	32.7	8.3
1995		1694 (0.15)	31.8	7.8
1997		668 (0.35)	11.5	7.9
1999		985 (0.18)	21.7	8.2
1987	BKT	49 (1.00)	1.8	10.0
1989		190 (1.01)	4.5	8.6
1993		264 (0.17)	7.0	9.5
1995		436 (0.25)	12.5	9.4
1997		274 (0.40)	10.6	10.0
1999		208 (0.26)	8.3	9.9

Management Recommendations

Management recommendations are given in the Green River Administrative Report.

Halfmoon - 7HA

No work scheduled.

Horse Creek - 7HO

Camp Creek PE844285SE

AS - Aquatic Resource Surveys

- Habitat and Population Evaluation FX-PE-7HO-510

  Population surveys and quantitative habitat measurements were not completed this year. Reconnaissance of the stream habitat condition occurred in September 1999. Cattle or the effect from grazing along the riparian area were not observed.

Management Recommendations

- Monitor habitat and fish populations during the first 3 years of C&H allotment implementation.

Dead Cow Creek PE844280SE

AS - Aquatic Resource Surveys

- Habitat and Population Evaluation FX-PE-7HO-510

  Population survey and quantitative habitat surveys were not completed. Reconnaissance of the stream did occur in September 1999. Cattle or the effects from grazing along the riparian areas were not observed. Stream channel appeared in similar condition as previous year based on visual observations.

Management Recommendations

- Monitor habitat and fish populations during the first 3 years of C&H allotment implementation.

LaBarge Creek Basin - 7LA

Work Associated with LaBarge Watershed

AS - Aquatic Resource Surveys

- Life History Investigation FX-PE-7LA-553

  Redd Surveys:

  Redd surveys and identification of spawning areas for Rock, Spring Creek No. 2 and Nameless creeks were accomplished this year. Critical spawning areas on Rock Creek have been identified and mapped on GIS. Spring No. 2 and Nameless creek redd surveys were not as successful in identifying those critical areas. However, it is evident that CRC spawn in the upper section of Nameless and Spring Creek No. 2 creeks since YOY were observed.

PM - Fish Population Management

- Chemical Treatment Preparations FX-PE-7LA-610

  Flows were calculated during summer 1999 to assist in chemical treatment and migration barrier preparations for this watershed. Flows on the

mainstem LaBarge Creek were calculated at population stations and also at the preferred barrier site. Information at the preferred barrier site will assist with barrier design (Table 18).

Table 18. Flows calculated for LaBarge Creek, 1999.

Location	Date	CFS
Above Sheep Creek Confluence	8/11/99	95.57
Above Coal Creek Confluence	5/5/99	147.10
Above Big Fall Creek Confluence	8/11/99	56.89
Preferred barrier site	7/8/99	195.43
Bald Hornet Structures	8/12/99	52.89
Above Nameless Confluence	8/12/99	31.10
Meadows	8/16/99	10.53

Flows on the tributaries were calculated during late summer. This information assisted the crew in determining what waters will need to be chemically treated, identifying those waters that electrofishing will be effective for nonnative removal, and identifying tributary waters that will need temporary barriers (Table 19).

Table 19. Flows calculated for LaBarge Creek tributaries, 1999.

Stream	Location	Date	CFS	Treatment	Barrier
Coyote Park	Confluence	10/4/99	0.40	Y	N
S. LaBarge	Confluence	10/4/99	8.11	Y	N
Spring Creek #2	Confluence	10/4/99	1.63	Y	Y
Witherspoon	Confluence	10/4/99	0.22	N	N
Little Clear Creek	Confluence	10/4/99	1.64	Y	Y
Clear Creek	Confluence	10/4/99	3.48	Y	N
Little Corral	Confluence	10/4/99	1.10	Y	Y
Crystal Creek	Confluence	10/4/99	0.91	Y	Y
Turkey	Confluence	10/4/99	0.26	Y	N
Shafer	Confluence	10/4/99	1.41	Y	Y
Indian	Confluence	10/4/99	0.83	Y	Y

Coyote Park, Spring Creek No. 2, Little Corral, Indian, Shafer, South Fork Indian, Turkey, Clear, Nameless, Cabin and Little Clear creeks were surveyed in 1999 to determine upper fish distribution and beaver pond location and densities. Each creek was walked from confluence to headwaters to collect UTM data at each beaver pond location and to visually determine upper fish distribution. These data will assist in determining the workload necessary for chemical treatment preparations. Beaver pond locations have been mapped with GIS for each tributary. This information will also provide baseline beaver habitat data for the LaBarge Watershed.

CA - Coordination and Administration

- LaBarge Watershed Cooperative Management FX-PE-7LA-140

WGFD, USFS and BLM met throughout the year and considerable time was spent discussing issues in the LaBarge Watershed. State and Federal agencies along with Trout Unlimited met on several occasions to discuss grazing issues, potential restoration projects and the LaBarge Watershed Cooperative Agreement.

The Agreement states that all agencies involved will assist in restoring and managing the LaBarge Creek watershed for native fauna and flora. The objectives focus on upland/riparian vegetative communities and native fish populations. The revised goal and objective statements were received January 1999 and are currently undergoing review.

Meetings with the USFS occurred in September and October 1999 to discuss the LaBarge Fisheries Management Plan. Opposition was evident with USFS personnel, particularly on the barrier location. USFS personnel blatantly stated that the WGFD does not have a good picture of the life history of CRC in the watershed and that a barrier located above Big Fall Creek was only creating a population reserve for CRC and ignoring the role key biological process play in population stability and resilience. It was also stated that we do not understand or address key life history requirements, biological processes and the habitat that support CRC. We felt all of this was stated in the draft LaBarge Fisheries Management Plan that was reviewed by the USFS. All of these issues were expanded in the final LaBarge Fisheries Management Plan.

LaBarge Creek PE843030LN

AS - Aquatic Resource Surveys

- Fish Population Monitoring FX-PE-7LA-512

The mainstem LaBarge Creek was surveyed at stations located from Sheep Creek to USFS Guard Station. Surveys on LaBarge Creek and its tributaries assisted in determining CRC distribution, evaluation of wild and hatchery CRC population, nonnative game species density and distribution and native nongame species density and distribution. All nonnative species were released into terrestrial habitat or collected for WD samples.

Comparisons between sampling years for LaBarge Creek and its tributaries can be found in the LaBarge Fisheries Management Plan.

Sheep Creek Station:

A 300 foot station on LaBarge Creek, located at Sheep Creek confluence, was surveyed using 2-pass removal to determine RBT population estimates and the presence of CRC in this lower portion of LaBarge Creek (Table 10). The stream was surveyed using an electrofishing cataraft. No CRC were observed and RBT population was 123/mile. MTS and MSC were abundant.

Table 10. Fish population survey results at Sheep Creek station, LaBarge Creek, August 11, 1999.

Elevation = 7450		Station Length = 300 feet				Est. Type 2P	
Species	No.	Mean Length inches	No/miles (≥3 in.)	CV%	Mean Weight pounds	Lbs/mile (≥3 in.)	Mean C
RBT	7	7.0	123	9	0.25	31.7	39
MSC	37	3.6			0.03		60
MTS	2	5.6			0.09		49

Big Fall Creek Station:

A 300 foot station on LaBarge Creek, Big Fall Creek confluence, was surveyed using 2-pass removal to determine RBT population and CRC presence.

The stream was surveyed using an electrofishing cataraft (Table 11). Only 1 CRC was captured which may indicate a low use during the summer months in this area. The CRC was from a 1997 plant. The RBT size ranged from 4.3 to 9.5 inches and estimated at 317 fish/mile.

Table 11. Fish population survey results at Big Fall Creek station, LaBarge Creek, August 11, 1999.

Elevation = 7640		Station Length = 300 feet				Est. Type 2P	
Species	No.	Mean Length inches	No/miles (≥3 in.)	CV%	Mean Weight pounds	Lbs/mile (≥3 in.)	Mean C
RBT	10	6.8	317	105	0.05	47.5	43
CRC	1	9.0	18	0	0.32	5.6	44
MTS	5	4.6			0.04		62
MSC	17	4.0			0.02		51

Bald Hornet Station:

A 440 foot station was surveyed on LaBarge Creek between structures 2 and 3. Instream structures were placed at this site in 1995 to increase pool habitat. Prior to construction of structures this section of stream was a shallow riffle and population surveys indicated no game fish present. On August 12, 1999 2-pass removal survey was conducted using an electrofishing cataraft. Fish population estimates were low except for MWF (Table 12).

Table 12. Fish population survey results at Bald Hornet Structures, LaBarge Creek, August 12, 1999.

Elevation = 7790		Station Length = 440 feet				Est. Type 2P	
Species	No.	Mean Length inches	No/mile (≥3 in.)	CV%	Mean Weight pounds	Lbs/mile (≥3 in.)	Mean C
BKT	1	8.7	12	0	0.27	3.2	41
BNT	1	10.3	12	0	0.46	5.5	42
CRC	1	11.1	12	0	0.50	6.0	37
MWF	11	5.8	192	65	0.52	101.5	39
MSC	77	4.4			0.05		50
MTS	15	5.7			0.08		43

Nameless Creek Station:

A 335 foot station was surveyed on LaBarge Creek, just upstream from Nameless Creek confluence. Due to beaver ponds, the historical station at this site could not be surveyed. Population estimates were determined using 2-pass removal, electrofishing cataraft (Table 13). No CRC were observed during the sampling. Population estimates for all game fish were low.

Table 13. Fish population survey results at Nameless Creek Station, LaBarge Creek, August 12, 1999.

Elevation = 8010		Station Length = 335 feet				Est. Type 2P	
Species	No.	Mean Length inches	No/mile (≥3 in.)	CV%	Mean Weight pounds	Lbs/mile (≥3 in.)	Mean C
BKT	2	8.1	32	0	0.24	3.8	41
BNT	1	7.2	16	0	0.17	2.7	46
RBT	1	10.9	16	0	0.50	7.9	39
MWF	1	5.7	16	0	0.05		27
MSC	72	5.0			0.06		45
MTS	5	4.0			0.02		26

Trail Creek Station:

A 360 foot station was surveyed on LaBarge Creek at Trail Creek confluence. A backpack electroshocker was used for the 2-pass removal (Table 14). BKT were abundant at this station. This may have been influenced by the high number of BKT present in Little Clear Creek just upstream of the station. CRC collected were wild fish.

Table 14. Fish population survey results at Trail Creek Station, LaBarge Creek, September 14, 1999.

Elevation = 8350		Station Length = 360 feet				Est. Type 2P	
Species	No.	Mean Length inches	No/mile (≥3 in.)	CV%	Mean Weight pounds	Lbs/mile (≥3 in.)	Mean C
BKT	53	6.4	924	13	0.19	175.0	46
CRC	3	8.5	59	87	0.35	20.5	47
RXC	1	8.0	15	0	0.27	4.0	53

LaBarge Meadow Station:

A 270 foot station was surveyed on LaBarge Creek at the meadow. Population estimates were determined using 2-pass removal, electrofishing cataraft (Table 15). No CRC were observed and as in the past the BKT population was high. CRC have not been observed in the Meadows during 1990s surveys even though stocking has occurred since 1993. The high BKT population probably displaces any stocked or wild CRC.

Table 15. Fish population survey results at LaBarge Meadow Station, LaBarge Creek, August 16 1999.

Elevation = 8480		Station Length = 270 feet				Est. Type 2P	
Species	No.	Mean Length inches	No/mile (≥3 in.)	CV%	Mean Weight pounds	Lbs/mile (≥3 in.)	Mean C
BKT	53	5.6	1,076	4	0.08	86.6	40
MSC	8	3.7			0.40		74

LaBarge Creek USFS Guard Station:

A 295 foot station on LaBarge Creek located below the USFS Guard Station culvert was surveyed on August 16, 1999. The purpose of this survey was to determine CRC presence. A 1-pass survey with the backpack electroshocker

resulted in abundant BKT and only 1 CRC. The CRC was 9.1 inches and from the 1997 plant.

Above Guard Station: Two stations above the guard station were surveyed on August 28, 1999 using backpack electroshocker. A 2-pass removal was used to determine population estimates. BKT populations were high and no nongame species were present (Table 16).

Table 16. Fish population survey results at stations located at Guard Station, LaBarge Creek, August 28, 1999.

Elevation = 8550		Station Length = 345 feet				Est. Type 2P	
Species	No.	Mean Length inches	No/mile (≥3 in.)	CV%	Mean Weight pounds	Lbs/mile (≥3 in.)	Mean C
BKT	25	5.2	383	4	0.09	35.0	50
Elevation = 8560		Station Length = 164 feet				Est. Type 2P	
BKT	21	5.3	740	8	0.07	52.2	41

- Movement/Migration FX-PE-7LA-553

Fish Weir:

An upstream and downstream migration weir was placed on LaBarge Creek to monitor migration of RBT and CRC during spawning season and late fall. The fish weir was planned for placement in LaBarge Creek, downstream of Turkey Creek confluence, for the months of May-October. However high water and lack of road access into LaBarge Creek inhibited the ability to begin monitoring upstream migration until July. On July 12, 1999 the upstream fish weir was placed in the channel to begin monitoring RBT and CRC migration. The upstream migration trap (elevation = 7,740) was in place from July 12-September 29, 1999. The downstream migration trap (elevation = 7,739) was in place from August 2-September 29, 1999. The weir was cleaned and checked for fish twice a day, seven days a week. The weir had to be removed on September 29 due to ice and debris build up that blew the weir out and left the upstream trap nonfunctional.

The information collected from the weir indicated minimal CRC movement during the summer or fall months (Table 17). However, these data did not provide the desired information since the trap could not be placed in the stream earlier in the year and had to be removed by late September. The CRC collected in the trap were either immature or spent adults. RBT movement was greater than CRC. However, the majority of upstream movement had likely already occurred for both species. The trap had to be removed just as it appeared that RBT downstream migration may have started. Both RBT and CRC may be moving downstream during late summer/early fall to find better overwintering pools. However, the trap had to be removed before this could be documented. CRC that were collected in the trap were removed and placed approximately 2 miles upstream at the Bald Hornet Structures. Nonnative fish collected were released into terrestrial habitat or collected for WD samples.

Table 17. Data summary for the upstream and downstream weir, LaBarge Creek, 1999.

Elevation	Data	BKT	BNT	CRC	MWF	RBT	RXC	Grand Total
7,739 ft.	Species No.			2	40	2		44
Downstream	Average Length			12.05	10.98	9.30		10.75
	Average Weight			0.59	0.51	0.39		0.50
7,740 ft.	Species No.	30	11	11	112	22	2	188
Upstream	Average Length	9.66	9.33	10.52	9.53	9.55	7.75	9.39
	Average Weight	0.35	0.21	0.45	0.34	0.37	0.17	0.32
Total No. Species		30	11	13	152	24	2	232
Total Average Length		9.66	9.33	10.75	9.91	9.53	7.75	9.49
Total Average Weight		0.35	0.21	0.47	0.38	0.37	0.17	0.33

CS - Creel Surveys

- Program Creel Survey FX-PE-7LA-520

The Pinedale and Green River crews designed the LaBarge Creek programmed creel survey. The creel survey started on July 11 and concluded October 31, 1999. LaBarge Creek was divided into 6 sections based on species composition and geographic changes in the drainage: Area 1 = Rock Creek to Big Fall; Area 2 = Big Fall to Bald Hornet; Area 3 = Bald Hornet to Cabin; Area 4 = Cabin to Meadow; Area 5 = Meadow to Culvert crossing; Area 6 = Culvert Crossing to headwaters. Counts were conducted 2 weekend days and 1 weekday per 2 weeks; 2 counts/day with 5 hours between counts. The purpose of this creel was to determine pressure, catch rates and to evaluate the current fishing regulations in this watershed.

The summary for LaBarge Creek, Rock Creek-Headwaters, was estimated at 2,193 total hours fished by 2,260 anglers. Estimated total species catch was 3,152 fish. A summary for waters between Big Fall Creek confluence and the headwaters was determined since this section has been targeted for CRC restoration. The pressure in this area was determined to be 42% of the total angler days/season for LaBarge Creek (Table 20). This area was estimated at 2,125 total catch by 959 total anglers.

Table 20. LaBarge Creek program creel summary results, July 1999 - October 1999.

	Rock Creek-Big Fall Creek (%CV)	Big Fall Creek to Headwaters (%CV)
Hours Fished	744 (29.4)	1,449 (27.1)
No. Anglers	1,927 (47.1)	959 (24.0)
Total Species Catch	1,385 (54.9)	2,125 (34.7)
No. Harvested	263 (49.8)	201 (44.4)
No. Released	1,122 (63.2)	1,923 (35.5)

Data were summarized by species and divided into 2 separate groups; Rock Creek-Big Fall Creek (high RBT density) and Area Big Fall Creek-Headwaters (CRC restoration target waters). Species most frequently caught by anglers in Area 1 were RBT and BKT with 81% of the fish released. The majority of fish harvested were BKT and RBT. From Big Fall-Headwaters, the majority of catch included BKT and CRC with 91% of the catch released. Only BKT and CRC were harvested in this area and CRC comprised 17% of the catch harvested (Table 21). An estimated total of 637 CRC were caught with 5% of them harvested.

Table 21. LaBarge Creek program creel species summary results, July 1999 - October 1999.

	Rock Creek-Big Fall Creek (%CV)	Big Fall Creek-Headwaters (%CV)
Brook Trout		
Total Catch	188 (36.73)	1,031 (42.42)
No. Harvested	0	167 (51.16)
Catch/Hour	0.25 (47.07)	0.71 (50.33)
Colorado River Cutthroat		
Total Catch	59 (82.82)	637 (47.36)
No. Harvested	0	35 (63.83)
Catch/Hour	0.08 (87.90)	0.44 (54.55)
Brown Trout		
Total Catch	17 (106.80)	17 (93.10)
No. Harvested	17 (106.80)	0
Catch/Hour	0.02 (110.78)	0.01 (96.95)
Rainbow Trout		
Total Catch	1,103 (63.90)	405 (52.88)
No. Harvested	229 (52.72)	0
Catch/Hour	1.48 (70.35)	0.28 (59.41)

To assist in fishing regulation evaluation, tackle used by anglers was noted. From Rock Creek to headwaters it was determined that 33% of the anglers used bait. When analyzing the data for areas that have the majority of CRC population, 28% of the anglers were using bait with the majority of the anglers using artificial flies and lures.

LaBarge Creek is the only watershed managed for CRC in the Pinedale Area that bait fishing and the take of 1 CRC is allowed. Concerns have been that the majority of anglers are using bait and having a negative impact on the reestablishing CRC population. Based on creel information it seems most anglers are not bait fishing and a small percentage of the population is harvested. The biggest concern for successfully reestablishing CRC in this drainage, based on population surveys and creel data, is the displacement of the stocked and wild CRC population by BKT and the potential for RBT hybridization.

Program Creel details will be summarized in an administrative report due in 2000.

Management Recommendations

- Remove nonnatives from 18 stream miles using chemical and electrofishing techniques. Treatments beginning in 2004
- Construct fish migration barrier on LaBarge Creek just below Turkey Creek confluence to protect the 18 stream miles from nonnatives. Construction planned for 2000.
- Continue to monitor CRC populations and identification of spawning areas on the mainstem LaBarge Creek.
- Assess overwintering pool habitat and beaver activity on the mainstem LaBarge Creek.
- See the "LaBarge Watershed Fisheries Management Plan for CRC" for a more detailed description of the restoration work planned for this watershed.

Rock Creek PE843065SE

AS - Aquatic Resource Surveys

- Fish Population Monitoring FX-PE-7LA-512

On October 18, 1999 Rock Creek was surveyed using backpack electroshocker. A population estimate was determined and CRC were collected for genetic analysis. A population survey estimated 273 CRC/mile (Table 22). Population has increased and has the highest no. fish/mile since 1983. This may be due to an improvement to habitat and good water years. Weights were not collected.

Table 22. Fish population survey results on Rock Creek, LaBarge drainage, October 18, 1999.

Species	Station Length Feet	Elevation	Est. Type	No.	Mean Length Inches	≥3/ Mile	CV %
CRC	465	7470	2P	19	6.1	273	28.9

Management Recommendations

- Monitor habitat and CRC population status every 3 years.
- Determine if this CRC population may potentially be used as a brood source again.

South LaBarge Creek PE843155LN

AS - Aquatic Resource Surveys

- Fish Population Monitoring FX-PE-7LA-512

Population estimates were determined for 2 stations on South LaBarge Creek on September 29, 1999. CRC and BKT were collected at both stations (Table 23). The CRC collected in the lower station was from a 1996 plant in the mainstem LaBarge Creek. This may indicate that the splash pad barrier is not preventing upstream migration during high flows. The CRC from the upper station were wild.

Table 23. Fish population survey results on South LaBarge Creek, LaBarge drainage, September 29, 1999.

Elevation = 8080		Station Length = 300 feet				Est. Type 2P	
Species	No.	Mean Length inches	No/mile (≥3 in.)	CV%	Mean Weight pounds	Lbs/mile (≥3 in.)	Mean C
CRC	1	10.7	18	0	0.56	9.9	46
BKT	4	5.2	88	20	0.09	8.4	42
Elevation = 8290		Station Length = 245 feet				Est. Type 2P	
CRC	3	6.6	65	0	0.27	17.5	47
BKT	17	6.9	453	24	0.20	88.6	45

On October 5, 1999 a 1-pass survey above Dock Creek resulted in 3 CRC. A 500 foot station, located approximately ¼ mile below Mack Creek confluence, resulted in 1 BKT and 31 CRC. Mean CRC size was 7.3 inches and ranged from 4.3 to 10.9 inches. CRC population became abundant approximately ½ mile below confluence of Mack Creek. The 1st BKT was collected about ¼ mile below Mack Creek. LPV fins from CRC were collected for genetic analysis.

PM - Fish Population Management

- **Chemical Treatment Preparations FX-PE-7LA-610**

South LaBarge Creek was surveyed to determine upper BKT distribution and chemical treatment stations. According to distribution surveys the upper chemical treatment station will be located approximately ¼ mile downstream of Mack Creek confluence. It was determined that approximately 6 stream miles will need chemical treatments. Five chemical stations have been identified and are located 2 hours apart based on dye flows and elevation drop. Each chemical treatment station has been flagged and mapped on GIS. The upper ½ mile has several beaver pond complexes that will need to be removed prior to treatment. No beaver ponds are located in the stream below the meadows, approximately 5 stream miles.

Management Recommendations

- Remove nonnatives using chemical and electrofishing techniques, beginning in 2000.
- Investigate the use of South LaBarge for CRC brood development, pending genetic analysis.
- Monitor nonnative removal progress and CRC status.

Indian Creek PE843125LN

AS - Aquatic Resource Surveys

- Fish Population Monitoring FX-PE-7LA-512

Indian Creek was last surveyed ½ mile above the confluence with LaBarge Creek on 8/7/58 and resulted in RBT, BKT and CUT. Population estimates were determined for Indian Creek on September 27, 1999. This station was located in the lower portion of the drainage. The CRC collected were from 1996, 1997 plants and 1 wild CRC (Table 24). MSC were abundant.

Table 24. Fish population survey results on Indian Creek, LaBarge drainage, September 27, 1999.

Elevation = 7780		Station Length = 165 feet				Est. Type 2P	
Species	No.	Mean Length inches	No/mile (≥3 in.)	CV%	Mean Weight pounds	Lbs/mile (≥3 in.)	Mean C
BKT	10	6.5	384	10	0.12	44.5	48
CRC	3	6.9	128	87	0.25	32.0	42
RBT	5	6.1	288	149	0.09	25.9	38
RXC	2	6.2	64	37	0.10	6.4	33

Management Recommendations

- Remove nonnatives using chemical and electrofishing techniques, beginning in 2000.
- Construct temporary fish migration barrier to prevent nonnatives from migrating from LaBarge Creek during the treatment stages. Construction beginning 2000.
- Monitor nonnative removal progress.
- Identify potential spawning habitat and man-induced habitat problem areas.

Shafer Creek PE843145LN

AS - Aquatic Resource Surveys

- Fish Population Monitoring FX-PE-7LA-512

Shafer Creek was last surveyed on 8/5/58 and resulted in RBT, BKT, CUT and RXC. Population estimates were determined for Shafer Creek on September 27, 1999 using multiple pass removal. This station was located on the lower portion of the drainage. BKT was the only species collected (Table 25). No nongame fish were collected.

Table 25. Fish population survey results on Shafer Creek, LaBarge drainage, September 27, 1999.

Elevation = 7810		Station Length = 170 feet				Est. Type 2P	
Species	No.	Mean Length inches	No/mile (≥3 in.)	CV%	Mean Weight pounds	Lbs/mile (≥3 in.)	Mean C
BKT	7	7.0	217	9	0.16	35.7	43

Management Recommendations

- Remove nonnatives using chemical and electrofishing techniques.
- Construct temporary fish migration barrier to prevent nonnatives from migrating upstream from LaBarge Creek during the treatment stage.
- Monitor nonnative removal progress.
- Identify potential spawning habitat and man-induced habitat problem areas.

Spring Creek No. 2 PE843200LN

AS - Aquatic Resource Surveys

- Fish Population Monitoring FX-PE-7LA-512

A population estimate was determined for the lower portion of Spring Creek No. 2 on August 17, 1999. BKT were the only species collected and YOY were abundant indicating good natural reproduction (Table 26). MSC were abundant.

A population estimate was determined for the headwaters of Spring Creek No. 2 on September 2, 1999. BKT and CRC were collected (Table 26). CRC YOY were collected at this station indicating spawning in this area. Twelve CRC were collected for genetic analysis and results by Leary indicated a pure population.

Table 26. Fish population survey results on Spring Creek No. 2 Creek, LaBarge drainage, August 17 and September 2, 1999.

Elevation = 8140		Station Length = 300 feet				Est. Type 2P	
Species	No.	Mean Length inches	No/mile (≥3 in.)	CV%	Mean Weight pounds	Lbs/mile (≥3 in.)	Mean C
BKT	30	4.9	581	7	0.06	34.7	40
Elevation = 8720			Station Length = 300 feet				
CRC	5	6.2	176	4			
BKT	10	5.6	123	18			

Management Recommendations

- Remove nonnatives using chemical and electrofishing techniques.
- Monitor nonnative removal progress and CRC status.
- Identify critical spawning habitat
- Identify man-induced habitat problem areas, particularly spring sources that need protection.
- Construct temporary migration barrier to prevent nonnatives from migrating from LaBarge Creek during treatment stages.

Trail Creek PE843210LN

AS - Aquatic Resource Surveys

- Fish Population Monitoring FX-PE-7LA-512

CRC were collected from Trail Creek on September 14, 1999. A 1-pass survey of 483 feet captured BKT, CRC, MTS and MSC. All BKT were removed. CRC were collected for genetic analysis (7 total) and ranged in size from 3.8 to 6.6 inches (Table 27). The flow was less than 0.5 cfs and fish were only collected in small isolated pockets of water less than 1 foot deep.

Table 27. Fish population survey results on Trail Creek, LaBarge Drainage, September 14, 1999.

Elevation = 8350		Station Length = 483 feet	Est. Type 1P
Species	No.	Mean Length Inches	Mean Weight Pounds
CRC	7	6.2	0.06
BKT	11	5.6	0.13
MSC	5	4.0	

The Trail Creek headwaters were surveyed on September 2, 1999 and resulted in mostly nongame species. One BKT was collected in an isolated pool. The stream was intermittent with abundant algae growth. Spring sources in the headwaters are not protected and therefore limiting flow potential in this drainage.

Management Recommendations

- Remove nonnatives using chemical and electrofishing techniques.
- Monitor nonnative removal progress and CRC status.
- Identify critical spawning habitat
- Identify man-induced habitat problem areas, particularly spring sources that may need protection.
- Construct temporary migration barrier to prevent nonnatives from migrating from LaBarge Creek during treatment stages.

Green River Lake - 7LG

Lower Green River Lake PE140813SE

AS - Aquatic Resource Survey

- Fish Population Monitoring FX-PE-7LG-512

The mean CPUE of 0.27 LAT/hr (Table 28) was less than the 0.37 found in 1995, but within the 0.21-0.53 LAT/hr range found from 1989-1995. LAT stocking was discontinued in 1993 with about 50% of the LAT 12-18 in long captured in 1995 of hatchery origin. The decrease in LAT CPUE may be related to the discontinuation of stocking. Similar to 1995, no RBT were sampled.

Table 28. Fish and population data collected with gill nets set in Lower Green River Lake in 1999.

Date	Species	No.	CPUE	Mean Length Inches	Range Length Inches	Mean Weight Pounds	Range Weight Pounds	Avg. C
06/09/99	LAT	14	0.24	16.6	10.1-37.0	2.58	0.34-22.0	33.8
	BKT	4	0.07	10.3	9.9-11.6	0.38	0.29-0.58	29.3
	MWF	14	0.24	13.3	9.6-17.4	0.86	0.31-1.83	34.0
	MTS	1	0.02	8.3		0.30		52.5
06/18/99	LAT	9	0.16	11.6	8.6-17.4	0.50	0.16-1.38	27.7
	BKT	2	0.04	8.8	8.5- 9.1	0.22	0.20-0.24	32.2
	MWF	14	0.25	14.1	10.1-17.6	0.96	0.33-1.98	31.6
	MTS	2	0.04	9.2	8.9- 9.4	0.27	0.23-0.30	35.1
06/30/99	LAT	26	0.46	15.7	7.7-33.9	1.67	0.17-15.5	30.5
	BKT	4	0.07	8.5	7.5-10.0	0.21	0.14-0.29	33.8
	MWF	24	0.42	12.7	9.4-16.5	0.70	0.24-1.44	32.2
07/08/99	LAT	12	0.21	15.6	6.9-34.0	2.50	0.12-18.0	32.6
	BKT	3	0.05	10.5	8.9-12.9	0.42	0.22-0.82	31.2
	MWF	13	0.23	13.6	8.1-17.1	0.98	0.16-1.65	34.8

An increase in the large zooplankton sampled in the 750 micron nets was found in 1999 (4.3 ml) compared to 1994 (2.5 ml) and 1995 (1.8 ml). The total volume of zooplankton, as indicated by the 153-micron nets, of 16.3 ml was intermediate to 1994 (27.5 ml) and 1995 (10.3 ml).

CS - Creel Survey

- Stocked fish evaluation FX-PE-7LG-520

As indicated in 1998 Progress Report, evaluation of the stocked catchables was de-emphasized considering the 2001-2002 programmed creel survey would be the final evaluation. A few anglers (10), however, were interviewed with two RBT about 18 in long released (0.14 fish/hr). Over-wintering of stocked catchables has been indicated since stocking began.

Management Recommendations

The stocking of LAT was discontinued in 1993 since the 1991-1992 programmed creel survey indicated little harvest occurred because the special regulation and natural reproduction could support the fishery. Net surveys indicate a potential decline in the population. The programmed creel in 2001-2002 will evaluate the LAT and RBT stocking policies.

Meadow Lake - 7ME

Meadow Lake PE140662SE

AS - Aquatic Resource Surveys

- Life History Evaluation FX-PE-7ME-553

During the 1999 spawning operation the average length of 30 mature male and female GRL was 13.8 and 13.6 inches. The size of mature GRL has been increasing since 1995 (Table 29). A management goal for the lake is to

maintain an average adult length of 13.5 inches.

Table 29. Mean length of mature GRL in Meadow Lake from 1992 to 1999.

Year	Sample Size	Mean Length Males	Mean Length Females
1992	35	13.9	13.2
1993	30	14.0	13.8
1994	30	14.2	13.8
1995	30	11.0	11.1
1996	30	11.2	11.0
1997	30	12.6	12.1
1998	30	13.3	12.9
1999	30	13.8	13.6

Gill nets were set in August to determine CPUE of juvenile GRL. Nets were set for approximately 1 hour to decrease mortality. A total of 94 fish were caught, 19 fish/hour. Juvenile fish (≤9 inches) comprised only 2 percent of the catch at a rate of 0.4 fish/hr. This is the lowest percentage of juveniles since 1994. Juvenile population needs to be monitored to assure that all age classes are present in this lake and determine if restocking will be necessary. At this time, natural reproduction appears to be occurring in the 300 foot inlet area below the spawning trap and a limited amount in the outlet area.

Management Recommendations

Natural reproduction is occurring, thus stocking has been discontinued. Since the population is not controlled with stocking, population monitoring of adults and juveniles is necessary to assist in determining if population management objective are being met.

- Continue net surveys to monitor mature and juvenile GRL population and assist in determining if restocking is necessary.
- Complete population surveys on even calendar years.
- Maintain Meadow Lake as Department's GRL brood.
- Maintain average mature GRL at 13.5 inches.
- Maintain mature GRL population at 6,000 to 8,000.
- Maintain angler catch rates of 1.0 GRL/hour.

Middle Piney Creek - 7MP

No work scheduled

Muddy Creek - 7MU

No work scheduled

New Fork Lake - 7NF

New Fork Lake (Upper) PE240894SE and New Fork Lake (Lower) PE240893SE

AS - Aquatic Resource Surveys

- Life History Evaluation FX-PE-7NF-553

A similar number of male KOE ran in 1999 compared to 1998 (Table 30). In 1999, however, a total of 711 females spawned yielded 373,000 eggs compared to 436 females yielding 195,000 eggs in 1998. High stream flows in 1998 caused problems in capturing and holding fish in the middle of the run

could have resulted in the reduction in female numbers. Regression models, hydroacoustic, and zooplankton samples in 1998 indicated that the 1999 run of KOE should have been smaller than 1998, but this was not the case.

Several regression models have been used to predict the return of both wild and stocked brood fish. In 1999, all hatchery fish returning to the stream were marked with finclips. It was anticipated that fine-tuning this model would be accomplished. Inconsistencies in the collection of data, however, prevented this fine-tuning. These inconsistencies included the failure to identify fin clips on all males captured and the lack of agreement on fin clip identification. Further regression analysis will be made in 2000.

Table 30. Characteristics of spawning KOE above New Fork Lake, including mean lengths and number of males captured, and relative densities of zooplankton.

	Mean length (in)		Number Of	Mean zooplankton vol (ml)		
Year	Males	Females	males	153	500	750
1992	9.8	9.5	8,275			
1993	9.5	9.3	4,980	2.95	0.09	<0.01
1994	11.1	10.8	6,676			
1995	11.7	11.0	1,595	9.64	2.71	0.44
1996	13.1	13.2	1,977	12.40	5.20	1.93
1997	11.2	11.2	3,496			
1998	11.6	12.2	2,426	15.04	9.91	8.34
1999	12.3	12.5	2,321			

TM - Development of Tools and Methods

- OTC study FX-PE-7NF-553

Oxytetracycline has been fed to fingerling KOE since 1997 with those possessing the mark providing Age 1+ and 2+ fish to the spawning populations in 1999. These fish were also fin clipped to determine OTC retention and identification. Fish were sampled from the spawning population in 1999 and from purse seines and gill nets in 1998. Inconsistencies, however, were found in identifying OTC-fed fish (Table 31). Fish with a left- or right-pelvic fin clip were fed OTC. A total of about 92% of these fish were correctly identified. Fish with an adipose or no fin clip were not fed OTC. About 62% of these fish were incorrectly identified with the OTC mark when there should have not been a mark. On the other hand, fin clips could have been incorrectly identified on these fish. This misidentification of OTC, however, was consistent between 1998 and 1999 samples.

Table 31. Number and percent of OTC marks identified on KOE collected from New Fork Lake in 1998 and 1999 that were both fed and not fed OTC.

	Fish fed OTC		Fish not fed OTC	
OTC mark present	No	Yes	No	Yes
1999	8	104	8	17
1998	1	7	12	16
Total	9	111	20	33
	(8%)	(92%)	(38%)	(62%)

- Creel surveys FX-PE-7NF-520

  A programmed creel survey was conducted until the end of the ice fishing season in 1999. The season ended when the County plowed the access road into the lake and blocked vehicle access. An administrative report will be prepared with these data in FY2000.

Management Recommendations

Inconsistencies in identification of marks hampered our abilities to evaluate wild and hatchery contribution to the fishery. Based on the suspect information collected in 1999, the wild population comprises a greater proportion of the spawning run than anticipated. In 2000, closer coordination with the spawning crew to jointly identify and agree on fin clipped fish and closer scrutiny of OTC identification will occur. Also trap nets will be set at different parts of the lake to determine if KOE, particularly hatchery adults, are spawning in other areas. Reservoir Research also plans to sample again in 2001. Further recommendations will be included in the Programmed Creel Survey Administrative Report.

North Piney Creek - 7NP

No work scheduled

New Fork River - 7NR

New Fork River (Pine Cr. to East Fork) PE843451SE

AS - Aquatic Resource Survey

- Fish Population Monitoring FX-PE-7NR-512

  The Airport Station on the New Fork River has consistently held about 700 trout/mile greater than 6 inches except for 1989 and 1994 (Table 32). In 1999, the trout population was estimated at almost 1000 trout/mi, the greatest density recorded. The exact cause of these population fluctuations is unknown, but stations on the Green River had relatively low populations 1996-1997. These lower populations on the Green River were possibly attributed to high stream flows, not as great a problem on the Upper New Fork River, which is regulated by dams. Low populations in 1989 and 1994 could be attributed to low flow years, but are separated by 1991 and 1992 with normal trout population densities. In 1994, the special regulation was changed from a 16-inch minimum length on BNT and catch-and-release on RBT to a two-fish limit requiring all fish 10-20 inches released.

  Considering the flow regime has been a random variable throughout the 20 years of sampling, two initial conclusions are possible. The regulation has had a positive impact on the population and whirling disease has not impacted the RBT population. Whirling disease samples were collected for analysis with both BNT (65 fish tested-1 positive) and RBT (7 fish tested-1 positive) found positive.

Table 32. Fish and population data collected by electrofishing the New Fork River near within the Pinedale Airport School section in 1999 compared to previous years.

Year	Species	Number per mile (CV)	Pounds per acre	Mean length (in)
1986	BNT	628 (0.21)	32.8	10.5
1989		394 (0.11)	33.2	11.1
1991		633 (0.09)	39.9	10.5
1992		623 (0.18)	61.2	10.3
1994		391 (0.12)	25.2	9.9
1999		853 (0.12)	48.5	9.9
1986	RBT	38 (1.03)	3.2	11.9
1989		44 (0.34)	5.1	12.6
1991		23 (0.14)	2.8	13.7
1992		60 (1.01)	6.8	13.2
1994		18 (0.99)	1.8	12.5
1999		118 (0.58)	9.5	10.9

Management Recommendations

Monitoring of the trout populations will continue to evaluate potential impacts of WD and affect of the habitat initiative. A programmed creel survey is planned for 2003.

New Fork River Tributaries - 7NT

Fall Creek PE843790SE

AS - Aquatic Resource Surveys

- Fish population survey FX-PE-7NT-512

A station was established in 1995 near the elk feed ground to monitor the wild RBT population in Fall Creek, which supplies recruitment to Burnt Lake. The RBT population estimate of 358 RBT/mi greater than 6 in was slightly less the 501 fish/mi found in 1995. The BKT estimate increased from 36 fish/mi greater than 6 in in 1995 to 68 fish/mi in 1999. Both species had a good distribution of younger age classes. Whirling disease sample (26 RBT and 13 BKT) was collected and fish were found negative.

In November, it was noted that the flow to Fall Creek was almost nonexistent. Investigation at the outlet of Burnt Lake found that two pieces of plywood had been placed in the channel. The lake level had decreased sufficiently that the boards acted as an effective dam. It is unknown who had placed the boards and when it occurred. The boards were removed and the incident was reported to the USFS. Fish losses occurred and the long-term impact on the fishery is unknown.

CS - Creel Surveys

- Spot creel surveys FX-PE-7NT-520

Only seven bank anglers who fished a total of 15 hr were surveyed. These anglers had a catch rate of 0.60 RBT/hr with 90% harvested. This is similar to the 0.36-0.67 fish/hr catch rate found in 1995-1997.

Management Recommendations

Electrofish the established station to determine impacts of dewatering. Increase monitoring of angler catch rate.

Pole Creek PE843770SE

AS - Aquatic Resource Surveys

- Fish population survey FX-PE-7NT-512

An 800-ft station was established on the Habitat Management Unit in 1984 and in 1995 and 1999. One of the objectives was to monitor any downstream movement of catchable RBT stocked in Little Halfmoon Lake. Fingerling stocking was discontinued in Little Halfmoon Lake in the early 1980's because these fish were moving out of the lake and into the stream. Total fish populations in this station were similarly small in 1995 and 1999. Eight BNT greater than 5 in were captured by two-pass electrofishing in 1999 compared to three in 1995. The BNT population has decreased from the 189 fish/mi found in 1984. Only one YOY BKT was captured in 1999 compared to three greater than 5 in 1995. In 1999, a single RBT, 6.0 in long, compared to one RBT, 5.1 in long, in 1995. No evidence of downstream movement of catchable RBT was found in 1999.

Management Recommendations

Continue to monitor possible downstream movement of catchable RBT.

Little Halfmoon Lake PE140661SE

AS - Aquatic Resource Surveys

- Stocked fish evaluation FX-PE-7NT-520

A total of 5 anglers (7 hours fished) were interviewed on Little Halfmoon Lake in 1999. RBT catch rate was 0.86 fish/hr with 50% harvested compared to 0.56 - 1.52 fish/hr with 26-56% harvested in 1997-1998. The stocking of catchables appears to have improved the fishery in Little Halfmoon Lake considering none was previously present and no evidence of fish drifting out the lake has been found.

Management Recommendations

Continue the stocking of 3,000 catchable RBT in Little Halfmoon Lake. Gillnet in 2000 using both standard nets and location and new floating gillnets.

Soda Lake- 7SO

Soda Lake PE340856SE

AS - Aquatic Resource Surveys

- Fish population survey FX-PE-7SO-512

Spring trap netting began in 1995 to assess the population on annual basis after winter and before the fishing season. In 1999, similar to 1996 and

1997, the lake did not become ice free with sufficient time to complete the operation. This operation will continue whenever possible, but after five years it is apparent that annual sampling will not be possible.

CS - Creel Surveys

- Creel surveys FX-PE-7SO-520

Though nobody was observed ice fishing on Opening Day, it would have been the most appropriate form of recreational activity. Soda Lake was about 90% ice covered on Opening Day with open water only around the edge. Some boaters tried to break up the ice by rocking the boats and bank anglers would come in behind them to fish. Open water actually began to refreeze by early afternoon. This was most likely the first time since the opening day was moved from May 1 to May 10 that this has occurred. Angling pressure and catch rates reflect these conditions (Table 33).

Table 33. Angling pressure and creel statistics for Soda Lake on May 10 from 1993 - 1999.

Opening day statistics	1993	1994	1995	1996	1997	1998	1999
Hours fished	1,740	3,589	2,933	3,088	3,246	1,869	694
Bank hours	771	1,281	987	1,339	1,551	963	458
Boat hours	877	2,115	1,763	1,349	1,459	775	169
Float tube hours	92	193	183	400	236	130	67
Total catch (fish)	832	2,344	1,712	1,732	1,321	1,921	159
BNT catch	559	1,375	1,424	1,560	989	1,184	94
Mean L(in)Harvested	18.5	16.7	16.9	16.2	17.1	16.8	18.4
BKT catch	273	969	290	171	333	737	65
Mean L(in)Harvested	14.9	14.1	14.2	13.9	14.4	14.7	14.2
Total harvest (fish)	705	1,383	972	1,009	718	870	156
Percent released	15.3	41.0	43.2	41.7	45.6	54.7	1.9
Catch rate (fish/hr)	0.48	0.65	0.58	0.56	0.41	1.03	0.23
Bank rate	0.49	0.41	0.21	0.43	0.25	1.11	0.28
Boat rate	0.48	0.76	0.81	0.60	0.61	0.95	0.08
Float rate	0.33	1.13	0.44	0.86	0.20	0.85	0.26

- Life History Investigations FX-PE-7SO-553

Mean lengths of BNT and BKT were collected from Soda Lake during the spawning operations. BNT averaged 16.8 in compared to 17.0 in 1998 and the 1984-1998 mean of 16.3 in. Fin clipped BNT had a mean length of 17.1 in (N=2, range 16.4-17.8 in). Fin clipped BNT (Age 3+) composed approximately 8% of the sample. Both fin clipped fish sampled were females.

BKT averaged 13.5 in compared to 12.7 in 1998 and the 1984-1998 mean of 13.1 in. Fin clipped BKT (Age 2+) had a mean length of 15.1 in (N=4, range 13.4 - 16.9). Fin clipped BKT composed approximately 13% of the sample. Though the sample size was small, fin clipped males (16.6 - 16.9 in) were larger than females (13.4-13.6 in).

Management Recommendations

Population estimate will be conducted during the fall spawning operation in 2000. Egg requests for BKT and BNT have decreased significantly over the years. As proposed before, sufficient egg production is available for a third broodstock in the lake should there be a need.

South Piney Creek - 7SP

South Piney Creek PE843272SE

AS - Aquatic Resource Surveys

- Fish Population Monitoring FX-PE-7SP-512

Two index stations on South Piney Creek were electrofished on August 30, 1999 to assess RBT populations since the change in management from basic yield to wild trout fishery in 1997 (Table 34).

Stations were sampled using 2-pass removal, electrofishing cataraft. The lower station RBT population has decreased since the 1996 population survey but had a slightly higher density than the 1992 survey. Populations appear to be fluctuating in this section however RBT are still the dominant species present. The upper station RBT population increased since the 1996 survey. BKT populations have also increased from 0 fish/mile in 1996 to 143 fish/mile in 1999. The RBT populations at both stations have fluctuated, but are still providing a wild trout fishery.

Table 34. Fish population survey results on South Piney Creek, August 30, 1999.

Elevation = 7880		Station Length = 465 feet				Est. Type 2P	
Species	No.	Mean Length inches	No/mile (≥3 in.)	CV%	Mean Weight pounds	Lbs/mile (≥3 in.)	Mean C
BNT	1	22.7	11	0	3.27	37.1	28
RBT	5	6.7	102	149	0.19	19.4	46
MWF	9	13.5	114	17	1.02	113.5	37
Elevation = 7960			Station Length = 847 feet				
BKT	20	7.4	143	13	0.19	27.6	45
RBT	14	7.9	94	13	0.26	24.5	48
MWF	18	11.3	112	0	0.62	69.6	38
MSC	22	4.4			0.08		96

Management Recommendations

- Continue to monitor population every 5 years.
- Manage South Piney Creek as a wild trout fishery, with RBT primary species.

Fish Creek PE843285SE

AS - Aquatic Resource Surveys

- Fish Population Monitoring FX-PE-7SP-512

Work was not accomplished this year due to other work commitments.

Spring Creek PE843280SE

AS - Aquatic Resource Surveys

- Fish Population Survey FX-PE-7SP-512

  Work was not accomplished this year due to other work commitments.

Middle Fork Beaver Creek PE843283SE

AS - Aquatic Resource Surveys

- Fish Population Survey FX-PE-7SP-512

  On September 30, 1999 Middle Fork Beaver Creek was surveyed to determine CRC status but resulted in no game species. The flow in this creek was minimal and algae growth abundant.

Management Recommendations

- Resurvey this creek in the next 2 years to determine if CRC population is still present.

Upper Green River Tributaries - 7UG

Ninth Parallel Res PE240760SE

FM - Fish Population Management

- Fish population management FX-PE-7UG-610

  As expected the chemical treatment of Ninth Parallel Reservoir reduced, but did not eliminate the BKT population. The fish population was surveyed in Spring Creek above 9th Parallel Reservoir with approximately 23 brook trout sampled in one pass of electrofishing in approximately a 500 ft section. All but three of these fish were yearlings indicating young-of-year fish were most successful in surviving the treatment.

  By year-end, the Schwabachers were still pursuing the proper permitting for the dam construction from the COE and EPA. The desire of the Schwabachers is to delay any discussion of the future use of this water until after the permitting process is complete.

Management Recommendations

Proceed with discussions with the Schwabachers after permitting is completed on the use of this water as a CRC broodstock and/or refugia.

Union Pass Alpine Lakes - 7UP

No work scheduled

Willow Lake- 7WI

AS - Aquatic Resource Surveys

- Fish Population Survey FX-PE-7WI-512

  Willow Lake had a mean LAT CPUE of 0.30 fish/hr (Table 35), which was

slightly less than the 0.49 and 0.39, found in 1996 and 1993, respectively. The LAT mean length of 15.0 in was comparable to 14.0-15.4 in found in 1993-1996, but less than the 18.5-19.3 in 1989-1991. No RBT were captured compared to 2 in 1996, but 4 KOE were captured in 1999 compared to none in 1996.

Table 35. Fish and population data collected with gill nets set in Willow Lake in 1999.

Date	Species	No.	CPUE	Mean Length Inches	Range Length Inches	Mean Weight Pounds	Range Weight Pounds	Avg. C
06/08/99	LAT	9	0.17	15.6	13.7-18.7	1.09	0.72-1.63	28.3
	KOE	1	0.02	8.0		0.15		29.3
	WHS	2	0.04	9.3	9.0- 9.5	0.26	0.25-0.27	32.9
	WXF	1	0.02	21.9		3.96		37.7
06/15/99	LAT	10	0.18	15.2	9.2-18.1	1.08	0.24-1.94	28.8
	FMS	1	0.02	9.5		0.25		29.2
	WHS	18	0.33	9.5	4.6-19.0	0.42	0.04-2.51	35.6
	MTS	1	0.02	6.6		0.13		45.2
	RTC	3	0.06	7.7	5.4-11.0	0.22	0.06-0.48	37.4
06/23/99	LAT	16	0.28	15.6	10.2-20.8	1.10	0.30-2.40	27.6
	KOE	3	0.05	10.6	7.4-13.7	0.51	0.13-0.99	35.0
	WHS	28	0.49	10.7	4.8-19.6	0.58	0.04-2.30	36.3
	RTC	19	0.33	6.5	4.6- 9.3	0.10	0.03-0.28	32.7
	BRS	8	0.14	4.0	3.2- 4.3	0.02	0.02-0.04	39.2
07/02/99	LAT	33	0.57	14.4	9.0-20.3	0.89	0.19-2.22	28.1
	RBT	1	0.02	11.1		0.56		40.9
	WHS	6	0.10	14.4	9.2-17.7	1.22	0.28-2.27	36.9
	FMS	1	0.02	12.8		0.67		31.9
	WXF	3	0.05	15.5	14.6-17.0	1.32	1.00-1.67	35.1
	MTS	1	0.02	4.5		0.04		43.9
	BRS	5	0.09	3.9	3.7- 4.2	0.02	0.02-0.03	40.5
	RTC	16	0.28	6.0	4.6- 8.9	0.08	0.03-0.25	31.6

Zooplankton sampling in August indicated an increase in 153-micron nets from 4.0-4.5 ml in 1993-1996 to 6.3 ml in 1999. Larger zooplankton, though still small in number, also increased from 0.003-0.04 ml in 500-micron nets to 0.11 ml in 1999. The elimination of RBT stocking and reduction of KOE may be responsible for these increases in zooplankton.

Management Recommendations

Final management recommendations will be included in the Programmed Creel Survey Administrative Report to be completed in FY00.

Regional Aquatic Wildlife Management Progress Report

Jackson Regional Fisheries Management Crew

Calendar Year 1999

Snake River Basin (Below Jackson Lake) - 4BJ

Work Not Associated With A Particular Water

AS - Aquatic Resource Surveys

- Summary of spawning assessment for spring creeks above Gros Ventre River FX-JN-4BJ-510

The past 10 years spawning has remained consistent with an average of 2,700 spawning fish in the eight spring creeks mapped above the confluence with the Gros Ventre River (Table 1). Anomalies occurred in 1991 with an unexplained strong run, and again in 1993, when estimates were made late in the season and redds were not easily identifiable. The estimated number of spawning fish has averaged more than 3,100 over the past four years. Each year since 1996 has shown an increase. This trend suggests a strengthening SRC population in the Snake River above the confluence of the Gros Ventre River.

Table 1. Summary of total estimated spawning above the Gros Ventre River confluence, 1990 through 1999.

Year	*Number of Redds Mapped*	*Est. Minimum No. of Pairs*	*Est. Maximum No. of Pairs*	*Est. Total No. of Trout*
1990	958	1195	1612	2817
1991	1030	1472	1963	3435
1992	718	983	1343	2326
1993	466	564	815	1369
1994	812	1098	1476	2574
1995	769	964	1242	2206
1996	896	1156	1643	2799
1997	870	1234	1693	2927
1998	1012	1386	1925	3309
1999	1294	1482	1888	3370
Average	883	1153	1560	2713

Management Recommendations

Continue to monitor spawning trends to assess population changes. Trend information for spring creeks above the Gros Ventre River confluence are used to assess the general stock levels of the Snake River fishery.

- YSC/SRC distribution FX-JN-4BJ-510

WGFD personnel assisted Forest Service personnel on the YSC/SRC distribution project on a limited number of occasions due to the Snake River creel survey schedule and general field obligations. The 1999 field activities were conducted in the Gros Ventre drainage rather than in the tributaries above Jackson Lake as originally proposed. A summary of field

activities will be submitted to Russ Pollard (Wildlife Law Enforcement Coordinator) by Mark Novak (Bridger-Teton Forest Fisheries Representative) to fulfill collection permit report obligations. Novak indicates his crew has inventoried approximately 65% of the Gros Ventre River drainage. A total of 97 miles of survey work was conducted by electrofishing and 40 miles by hook and line sampling. Data summaries include species sampled, distribution, habitat condition, management influence, and habitat improvement opportunity assessment. Data collection indicates SRC were present in 90% of streams surveyed. Apparent SRC x YSC hybrids were present in 8% of the streams, while only 2% were inhabited by YSC only.

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Management Recommendations

Crew members will maintain liaison with FS fisheries personnel during the progress of this project. The spot use of WGFD personnel with the FS crew was ineffective in 1999. In 2000, one temporary WGFD crewmember will assist with this project from July through September.

Blacktail Spring Creek JN815110TN

AS - Aquatic Resource Surveys

- Life history investigations FX-JN-4BJ-510

High water during June entered Blacktail Spring. The estimated run of 698 fish was well above the five-year average (523). The minimum and maximum estimated number of spawning pairs was 324 and 374, respectively.

Management Recommendations

Continue to monitor spawning trends to assess population changes. Trend information for Blacktail Spring Creek is combined with other spring creeks above the Gros Ventre River confluence to assess the general well being of the Snake River fishery.

Blue Crane Creek (Spring Creek Complex) JN814125TN and JN814120TN

AS - Aquatic Resource Surveys

- Life history investigations FX-JN-4BJ-510

The scheduled habitat rehabilitation work on this spring creek complex, with the exception of the fish ladder, was completed by mid-October. COE wetland limitations and the contractor's equipment dictated a broad change in the planned rehabilitation for this project. Of the 36 sites initially identified for rehabilitation, only about half were addressed. A total of 214 tons of commercially washed spawning gravels were placed at 14 riffles. Silt was removed from adjacent runs and pools to enhance movement of migrating cutthroat and provide resting areas. Dead and down trees were used to barricade several riffles from use by livestock and elk. New trees were used to replace aging overhead cover where needed. The repair of approximately 25 feet of the lower end of the fish ladder was completed in early December at a cost of nearly $20,000. New boards were placed in the lower steps that have been nearly inoperable the last several years. The total cost for the entire rehabilitation project was $30,274. Co-sponsors of the project were the landowner, Teton Conservation District, Jackson Hole One-fly, and the Wyoming Game and Fish Department.

The 1999 redd count data for Blue Crane Creek remains fairly constant in comparison to those of the last four years. The total estimate of spawners utilizing this tributary has not regained the levels attained in 1989 and 1990 (Table 2).

Table 2. Blue Crane Creek spawning activities, 1985 through 1999.

Year	Number of Redds Mapped	Est. Minimum No. Of Pairs	Est. Maximum No. Of Pairs	Est. Total No. Of Trout
1985	30	41	66	107
1986	34	57	98	155
1987	31	35	62	97
1988	18	35	61	96
1989	87	133	168	301
1990	91	130	172	302
1991	15	34	55	89
1992	60	106	130	236
1993	25	33	48	81
1994	12	14	23	37
1995	30	44	65	109
1996	31	45	72	117
1997	35	55	79	134
1998	27	47	75	122
1999	30	40	57	97

The loss is attributed to reduced spring creek spawning habit and changing Snake River habitat conditions below the Wilson Bridge. As noted, the total number of redds (30) remains considerably less than those prior to 1992. This reflects the enduring problem with Jackson Hole spring creeks and their inability for rejuvenation with Snake River flows due to the construction of the Snake River levee system. It also points out the loss of gravels and need for continued habitat rehabilitation in all spring creek systems. The sheer number of SRC spawners in 1989 and 1990 represent the very best of spawning conditions, and although we can't presume to maintain such levels for extended periods of time, it gives us a realistic goal to pursue.

A total of 591,164-eyed eggs were received from state (462,386) and federal (154,778) hatcheries in 1999. Of these eggs, 149,720 (56,942 state; 92,778 federal) were used in the Blue Crane Creek incubator. The hatching mortality for these eggs was 9.7% for the federal eggs and 0.9% for the state eggs. The federal eggs were held longer after eye-up than the state eggs, and premature hatching probably accounts for the difference. These egg stocks are utilized to revitalize decreased spawning runs.

The 1999 spawning data for lower Spring Creek exhibited a slight, but continued drop in total estimated spawning SRC (Table 3). Like Blue Crane Creek, gravels in this tributary need to be replaced or rejuvenated to maintain spawning opportunities and lessen the impacts of potential superimposition of redds.

Table 3. Lower Spring Creek (Porter/Oliver) spawning activities, 1990 through 1999.

Year	Number of Redds Mapped	Est. Minimum No. Of Pairs	Est. Maximum No. Of Pairs	Est. Total No. Of Trout
1990	148	289	493	782
1991	97	205	326	531
1992	128	237	357	594
1993	95	178	267	445
1994	57	50	69	119
1995	116	221	279	500
1996	97	161	255	416
1997	71	128	188	316
1998	77	113	178	291
1999	69	109	164	273

The upper Spring Creek segments within the Halpin/Poodle ranch properties also provide spawning for SRC stocks. As noted last year, this segment of Spring Creek is quite fragile due to compacted substrate and a resultant loss in spawning habitat. This is compounded by housing development and increased use of the resource. No habitat projects were addressed or proposed for this segment of the creek in 1999. Crew personnel contacted Mr. Cliff Hansen in regard to the removal of silt from an irrigation structure upstream of the potential habitat improvement area. Mr. Hansen expressed his approval contingent upon compliance with COE wetland regulations. Cheyenne COE personnel will visit the site this spring to determine silt removal/wetland criteria.

Adequate funding for silt removal, gravel rejuvenation, and cover still remain the key to the continued life of spring creek systems in general. Co-opting Department grants with special interest groups (TU, etc.) is a continuing problem with some landowners. Crew personnel will continue to work with all interests to address the needs of spring creeks and the native trout dependent upon them.

Management Recommendations

Continue collection of trend information relative to SRC stocks and habitat maintenance projects. Crew personnel will pursue a co-opted rehabilitation project on upper Spring Creek (Halpin/Poodle) with county and sportsmen groups in 2001.

Cowboy Cabin Creek JN815138TN

AS - Aquatic Resource Surveys

- Life history investigations FX-JN-4BJ-510

Cowboy Cabin Creek was inundated by cold spring flows from the Snake River that delayed the spawning run in 1999. The estimated number of spawners in the run was 155, compared to the five-year average of 134. The estimated number of pairs was between 66 and 89. New gravel exposed by the 1997 runoff was readily used for spawning by fish entering this stream from the Snake River.

Management Recommendations

Continue to monitor spawning trends to assess population changes. Trend information for Cowboy Cabin Creek is combined with other spring creeks above the Gros Ventre River confluence to assess the general stock levels of the Snake River fishery.

Fish Creek JN814200TN

AS - Aquatic Resource Surveys

- Life history investigations FX-JN-4BJ-510

Fish Creek redd count trend data have been compiled since 1985. A recorded decline in spawning activities in this spring creek system has been a concern since the sharp decline in 1994 spawning activities. The 1995, 1996, and 1997 redd counts were incomplete due to seasonally high water levels during June. Although counts were made in May, increased depth, velocities and turbidity made the June redd counts difficult and impractical. In 1999, a total of 90 redds and an estimated minimum total of 127 pairs spawning cutthroat trout were observed. The lack of continuous trend data from 1995 through 1977 renders definitive spawning data interpretation inadequate for this period of time. The construction of redds this year echo last year's spawning that occurred in areas not previously used. In some instances, spawning gravels continue being worked downstream into positions that will not be as readily available in the future. The shift of redd locations may be an indicator that gravels may become less accessible in select sites in the future.

Over 101,000-eyed eggs were stocked in two refrigerator incubators located on a reach of lower Fish Creek and one of its spring creek tributaries. Continuing habitat rehabilitation activities and landowner participation warrant the continuation of stocking activities as long as eggs are available.

Management Recommendations

Continue redd count monitoring. Continue the eyed-egg stocking program to compliment continued habitat enhancement projects in this system.

Flat Creek and Nowlin Creek JN814050TN and JN814090TN

AS - Aquatic Resource Surveys

- Life history investigations FX-JN-4BJ-510

The total number of Nowlin Creek spawners was estimated at 228 fish. In Flat Creek, the estimated number of spawners was 389. These estimates represent a greater than average number of spawning trout. Flat Creek typically has an estimated 20 fish more than Nowlin Creek, while this year the estimate was 161 greater. The combined estimated number of spawners for these two streams increased to 617, while the average number for the past four years is 565. Each of the past four years has shown an increase in estimated spawning activity. There was no diversion of water from the Gros Ventre River during these same years. The diversion structure was rebuilt, but natural discharge was a sufficient supply for the South Park irrigators needs this year.

- Population estimates FX-JN-4BJ-512

  Five established sample stations were electrofished on October 5 and 6 for population estimates. The estimate for the entire reach sampled, or refuge total, was 287 cutthroat trout per mile. Eighty-five per mile were greater than 15 inches. The 1994 estimates were 376 per mile, of which 65 were greater than 15 inches. The numbers per mile was down somewhat, but more large fish were present in the population. Productivity was estimated at 94.7 pounds per acre in 1999 in comparison to 78.7 in 1994.

Management Recommendations

Continue to monitor spawning trends to assess population changes. Continue monitoring drop structures. Resample to obtain population estimates in 2004.

Jenny Lake JN310421TN

PF - Public Fishing Development

- LAT broodstock FX-JN-4BJ-712

  Spawning crew personnel collected LAT eggs from 4 females, crossing them with twelve males. A total of 50 male LAT were captured. The average length for the males was 20.3 inches, with a range of 15 to 38 inches. The eggs will be used for brood-stock replacement.

Management Recommendations

Continue to assist the Culture Section in obtaining Jenny Lake LAT for brood stock replacement needs.

Lamb Spring JN813185TN

AS - Aquatic Resource Surveys

- Life history investigations FX-JN-4BJ-510

  Approximately 101,000-eyed SRC eggs were stocked in two refrigerator-incubators placed in the headwaters of this small spring creek in June. This was the seventh of the original eight-year program of stocking eyed eggs in Lamb Spring. The eggs were completely hatched by late July with an estimated hatching mortality of 4%, while fry were readily visible in August. A total of 12 redds were found this year with an estimated minimum of 13 pair of spawning cutthroat. All redds were laid down on artificially constructed riffles.

  As noted last year, the water of Martin Creek was turned back into its historic channel and once again adds secondary flow into Lamb Spring. The addition of new trace elements to these waters will require the eyed egg-stocking program to be extended for six more years to ensure the response of two generations of cutthroat to this system.

  Landowner and Forest Service personnel decided to replace the proposed culvert at the Martin Creek crossing with a bridge. The culvert placement was intended to facilitate fish movement near the Martin Creek/Lamb Springs confluence. The prefabricated bridge was constructed too late in the year for installation. Installation is now anticipated in 2000.

In addition, a wildlife friendly drift fence was also proposed for construction on Forest Service lands to protect the present riparian area and prevent the destruction of gravels by the movement of stock during the summer months. Landowner and Forest service personnel monitored livestock use in 1999 and found routine herding of livestock resulted in no abuse of the riparian zone. Grazing will be monitored once again in 2000 to determine the future need of fencing in this area.

Management Recommendations

Maintain close liaison with the property owner (Mr. Dick Edgecomb). Eyed egg stocking should be continued through the year 2005 for imprinting progeny with the mix of Lamb Spring and Martin Creek waters. Additional gravel work will also have to be considered during this period.

Little Bar BC Spring Creek JN814331TN

AS - Aquatic Resource Surveys

- Life history investigations FX-JN-4BJ-510

Spawning in Little Bar BC Spring has recovered to the approximate numbers noted in 1986 when the Gros Ventre levee breached and destroyed the lower reach of the creek. In 1999, an estimated 20 to 28 pairs (48 fish) spawned in the creek. The five-year average for this stream is 17 to 24 pairs or 41 fish. In addition to the increase in numbers of spawners, redds were also found farther upstream this year.

Management Recommendations

Continue to monitor spawning trends to assess population change.

Lower Bar BC Spring Creek JN814330TN

AS - Aquatic Resource Surveys

- Life history investigations FX-JN-4BJ-510

The fish trap was installed on May 24 and operated through July 16. A total of 599 mature SRC (294 male and 305 female) entered the trap. The average length for these fish was 15.7 inches. The females averaged 16.0 inches while the males averaged 15.3 inches.

Redds were mapped above and below the weir to estimate the total spawning run into this stream. Spawning pairs were estimated to be 267 to 343 (total of 610). The total estimate, from one-time redd mapping, is nearly equal to only the fish passing through the weir. Fifty-four redds mapped below the weir yielded an estimated 74 to 96 pair or 170 fish spawning in this reach. This estimate plus the number though the weir, places the total spawning run at 770 fish. This number is considerably higher than in previous years. The past five-year average estimate, including this year, is 435 fish in the spawning run.

Management Recommendations

Continue to monitor spawning trends to assess population change. Continue operating the trap to assess size and general condition of mature SRC for this reach of the river system.

Price Spring JN815010TN

AS - Aquatic Resource Surveys

- Life history investigations FX-JN-4BJ-510

Floodwaters from the Snake River inundated this spring creek below the reach monitored for spawning. An estimated 137 to 188 pairs (325 fish) spawned in 1999 compared to a five-year average of 93 to 124 pairs (217 fish).

About fifty thousand eyed eggs were placed in an incubator box on Don Lucas' property. Hatching survival was estimated at 81%. Over-loading the vibert boxes was the apparent reason for the lower hatching success.

Management Recommendations

Continue to monitor spawning trends to assess population changes. Trend information for Price Spring is combined with other spring creeks above the Gros Ventre River confluence to assess the condition of fish stocks in the Snake River. If eggs are available, continue with the eyed-egg plants. Habitat restoration maintenance is contemplated on the Chapman property, and an enhancement project has been submitted for the Wolfensohn property.

Snake River JN811001TN

AS - Aquatic Resource Surveys

- New Zealand mud snail monitoring FX-JN-4BJ-510

Crew personnel began the mud snail-monitoring project by meeting with fisheries field personnel from Yellowstone National Park. The field trip was held on the Snake River near the South Gate of Yellowstone National Park to assist and review protocol used in New Zealand mud snail (*Potamopyrgus antipodarum)* collection and identification. Park fish crew personnel then visited the Flagg Ranch bridge section and confirmed the identity of NZ mud snails at that location as noted by Jackson crew members last November.

Only one study site (Flagg Ranch bridge) was sampled in 1999, as access to additional collection sites above Jackson Lake was not easily reached. Three bottom samples were collected at this location in August, September, and October. Facilities for determining dry weights were not available and a numerical and volumetric method of analysis was used in these preliminary evaluations. In comparison to other invertebrates collected, mud snails comprised only a trace of the total samples taken in any given month.

Snail samples were shipped to Montana State University for further identification. Contact with researchers in Montana and New Zealand was made to assist in future project direction. Additional sample sites in the Snake River and possibly the upper reaches of Jackson Lake will be located in 2000.

- Snake River corridor FX-JN-4BJ-510

The Snake River corridor project was initiated to evaluate the effects of providing environmental restoration to riverine, wetland, and riparian habitat. The Feasibility Study Cost Sharing Agreement and Project Study Plan that was developed and formally signed in 1996 has been completed, and a final report is pending. The Walla-Walla COE unit held a public meeting in March (1999) to discuss the Feasibility Study EA. Crew comments were forwarded to Cheyenne and largely dealt with methods of gravel removal in select restoration sites. A finding of no significant impact was determined. Proposed Restoration Project construction is now tentatively scheduled for 2001 to 2002.

Four study sites were reviewed in 1998 and the impacts and benefits were discussed at that time. A site immediately upstream of the Wilson Highway Bridge was selected for demonstration project purposes. This project was initiated in late November of 1998 and entailed the use of fencing to protect and build islands, development of three summer holding areas (ponds), and for the construction of a spur dike. The regulatory branch of the COE and the Teton Road and Levee Department sponsored the construction of the spur dike. This structure was built at the cost of nearly $10,000, and was located below the island protection devices. Spring flows in 1999 served as a test for the island protection fencing. Although the expected entrapment of materials was realized, this action also reduced flow through the spur dike channel following spring runoff.

Water chemistry parameters for the fish ponds were monitored to determine the impact of winter conditions and the potential for fish loss if fish should become stranded. Little or no live flows fed these ponds until mid May. All three ponds maintained their respective winter levels with sub flows only. All ponds were sampled from mid December of 1998 through mid May of 1999. The dissolved oxygen and pH levels were determined at each of the three ponds (Table 4). The mid-sized pond reached dissolved oxygen levels in January and February (2 and 3 ppm) that were insufficient to support trout. This information supports the importance of developing gravel removal sites that allow an exchange of water (other than sub flow) during the winter.

Table 4. Water chemistry from three COE Demonstration Ponds at Site 9, winter, 1998-1999.

WATER	*DATE*	*AIR (°F)*	*WATER (°F)*	*DO (ppm)*	*pH*	*REMARKS*
POND #1	12/11/98	26	42	7	-	Ice free/clear water.
	01/12/99	35	40	10	8.2	Ice free/clear water.
	02/16/99	36	ICE	6	7.7	2" crud ice/clear water.
	03/17/99	55	ICE	7	7.5	Edge ice free/clear water.
	04/14/99	45	47	9	8.7	Ice free/clear water.
	05/14/99	50	46	7	8.7	Pond 1,2 share sub flow.
POND #2	12/11/98	26	ICE	8	7.7	2" ice/clear water.
	01/12/99	35	ICE	2	7.8	7" ice/clear water.
	02/16/99	36	ICE	3	8.7	7" ice/clear water.
	03/17/99	55	ICE	11	8.7	6" ice/clear water.
	04/14/99	45	52	8	8.3	Edge ice free/clear water.
	05/14/99	50	46	7	8.7	Water flow into pond.
POND #3	12/11/98	26	ICE	8	7.7	1.5" ice/cloudy water.
	01/12/99	35	ICE	9	8.5	Half ice free/clear water.
	02/16/99	36	ICE	9	8.0	4" crud ice/clear water.
	03/17/99	55	ICE	10	9.0	4" crud ice/clear water.
	04/14/99	45	50	9	8.0	Edge ice free/clear water.
	05/14/99	50	50	9	8.9	Ice free/clear water.

The close of the Feasibility Study now moves the COE and Teton County into the construction phase. Numerous meetings between these two agencies were held during 1999. Funding and work schedule needs were discussed before the project enters the next three phases (Phase I - Authorization, Phase II - Appropriations, and Phase III - Construction). The COE expects authorization and approval for funding in 2000 and 2001, with some form of construction beginning in 2001.

Grand Teton National Park and the Forest Service have implemented river management programs on their segments of the Snake River Corridor. The focus of both agencies has been on recreational activities and provides caps on the present level of use. The Bureau of Land Management will be holding public meetings in February of 2000 to discuss their proposed management plans for the Snake River.

- Population estimate FX-JN-4BJ-512

Special regulations have been in place between Jackson Lake Dam and Moose since 1973. In 1973, the creel limit on SRC was reduced to 2 fish. In 1986, an 11-15 inch slot limit was initiated along with a 4 fish possession limit. Terminal tackle was restricted to artificial flies and lures only. In 1990, the slot limit was expanded to protect SRC between 11 and 18 inches. The last change occurred in 1996 when the slot was modified to 12 to 18 inches.

Population estimates have been conducted for a five-mile reach of the Snake River between Deadman and the Bar BC Ranch in 1988, 1990, and 1999 (Table 5). Both number per mile and pounds per mile have steadily climbed since the 1988 estimate. It would appear that the change in population structure is a result of a combination of special regulations and good water years experienced in the 1990s.

Table 5. Number and pounds of SRC per mile for a 5-mile section of the Snake River between Deadman and the Bar BC Ranch, Section 2B, 1988-1999.

Size Group (Inches)	*Number per Mile*				*Pounds per Mile*			
	1988	1990	1999	Mean	1988	1990	1999	Mean
6.0-10.9	256	344	320	307	72	73	61	69
11.0-14.9	140	138	182	153	107	110	152	123
11.0-17.9	158	154	248	187	147	162	253	187
>15.0	28	42	73	48	40	70	104	71
Combined	424	523	575	507	219	253	317	263

- Snake River telemetry study FX-JN-4BJ-553

During September, 33 SRC with a minimum size of 14 inches were surgically implanted with radio transmitters. All fish were captured by hook and line between Moose and the Wilson Bridge. The United States Geological Survey Biological Resources Division will monitor fish movement by radio telemetry at least through April. The transmitters will still be functional next fall, and hopefully tracking will resume during the fall drawdown period.

To date, habitat data have been collected for 26 different fish. Fish were most often found in runs (56% of habitat measurements) and backwater pools (44%). Cover type most frequently used was shelf ice (27%). This was

followed by depth (26%), turbulence (26%), none (8%), large woody debris (7%), overhead vegetation (4%), and boulders (2%). Shelf ice was found only near slow moving or still water at the channel margin and in backwater pools, but appears to be selected during periods of extreme cold temperatures.

CS - Creel Surveys

- Programmed creel survey FX-JN-4BJ-520

A programmed creel survey was conducted on Sections 3 and 4 of the Snake River from July through October. A total of 544 anglers were interviewed in Section 3. The catch rate was 1.39 fish per hour, which exceeds the management objective of 1.0 fish per hour. Catch and release fishing is the prevailing practice with over 99% of the SRC being released. Anglers were satisfied with their experience with 99.7% of those that responded being either somewhat or very satisfied (Table 6). Scenery had the greatest influence on satisfaction levels (Table 7). The most common reason for indicating "other" was satisfaction with their guide. No tackle restriction violations were observed, however, 2 out of the 14 SRC harvested were within the slot limit.

Table 6. Number and percent of anglers responding to: "How satisfied were you with you're your angling experience today?"

	Section 3	*Section 4*
Very Satisfied	342 (90.0)	415 (83.0)
Somewhat Satisfied	37 (9.7)	66 (13.2)
Neutral	0 (0.0)	9 (1.8)
Somewhat Dissatisfied	1 (0.3)	10 (2.0)
Very Dissatisfied	0 (0.0)	0 (0.0)

Table 7. Angler response (number and percent) to: "Which of the following had the greatest influence on your satisfaction today?"

	Section 3	*Section 4*
Number of Fish Caught	92 (24.2)	122 (24.4)
Size of Fish Caught	39 (10.3)	30 (6.0)
Scenery	130 (34.2)	215 (43.0)
Being with Friends	32 (8.4)	54 (10.8)
Access	2 (0.5)	3 (0.6)
Weather	32 (8.4)	23 (4.6)
Other	53 (13.9)	53 (10.6)

A total of 698 anglers were interviewed in Section 4. Catch statistics were similar to Section 3 with a catch rate was 1.34 fish per hour. Creel clerks examined 53 SRC with an average length of 12.5 inches (range = 8.5 to 19.0 inches). Ninety-nine percent of the SRC were released. Anglers were satisfied with their experience with 96.2% of those that responded being either somewhat or very satisfied (Table 6). Scenery was the most common response (43.0%) for having the greatest influence on satisfaction (Table 7).

Management Recommendations

Continue to act as liaison with the Corps and County representatives, and provide these agencies with fishery information as requested. Crew personnel will also continue to attend all Steering Committee and Restoration Project Meetings.

Develop, expand, and refine sampling techniques in the Snake River below Yellowstone National Park. The collection of trend data pertaining to this exotic snail may lend itself to future university graduate studies. Dr. Billie Kerans indicates there have been few studies that correlate primary productivity and fishery needs. Continue collection of snail samples to develop long-term trend data with a minimum goal of ten years.

Fisheries personnel will continue to attend related meetings and provide input into the proposed construction phase as it is developed by the COE, Teton County, and any developing management plans proposed by other land managing agencies (Private, FS, NPS, or BLM).

Population estimates are one tool for determining a biological response to special regulations. Continue to monitor population trends in the Snake River through the use of electrofishing.

The Snake River creel survey administrative report will be completed in the spring 2000. The next creel survey is scheduled for 2004. Unless money is available to conduct flights, the creel will again focus on Sections 3 and 4. River use information obtained through such flights has been a highly sought after data source for the agencies developing the Snake River Management Plan.

Three Channel Spring Creek JN815001TN

AS - Aquatic Resource Surveys

- Life history investigations FX-JN-4BJ-510

Minimum and maximum spawning pairs were estimated as 153 and 208, respectively (361 fish) in 1999. The five-year average estimate is between 233 and 312 pairs (544 fish). The greatest estimated spawning run recorded was 979 cutthroat in 1991. The present spawning run has apparently been infused through imprinting fish by planting eyed eggs in this system. A saturation point could be reached in the near future, although additional spawning areas continue to be created by landowners.

Approximately 100,000-eyed eggs from the Jackson National Fish Hatchery brood were planted at two sites in this spring creek system. Two hatching boxes were located on Garrison's (Scott's) property. Each incubator received about 50,000 eggs. Hatching success was estimated as 84% in the East Fork, and 94% in the Main Fork. The maintenance of adequate flow through the incubator in the East Fork resulted in a lower hatch rate. Thurston's also continue to add spawning gravel to riffle sites on their property.

Management Recommendations

Continue to monitor spawning trends to assess population changes. Continue with egg planting to complement the proposed habitat maintenance project proposed on the Newton property.

Upper Bar BC Spring Creek and Snake River Side Channel JN815137TN

AS - Aquatic Resource Surveys

- Life history investigations FX-JN-4BJ-510

  Spawning within Upper Bar BC Spring was notably higher than the five-year average of 188 to 243 estimated pairs (431 fish). Spawning pairs were estimated as 248 to 298 pairs (546 fish) for 1999. This is the highest estimate on record. Minimal habitat improvement was allowed by Grand Teton National Park in 1997. The project was paid for with One-Fly funds. Some of the gradient control structures that were part of the old hatchery operation were removed. An estimated 11 to 12 pairs (23 fish), spawned in the old hatchery channel during 1999. Several redds were found upstream of the dam that was breached in 1997.

  Redd counts are made in a channel upstream of the confluence of Cottonwood Creek that is referred to as the Snake River Bottom. Spawning activity was essentially eliminated this year, due to channel changes upstream. Only an estimated 5 pairs (10 fish) spawned in this channel in 1999.

Management Recommendations

Continue to monitor spawning trends to assess population changes. Continue to assess the progress of channel development.

Snake River Basin (Above Jackson Lake Dam) - 4AJ

Jackson Lake JN410320TN

AS - Aquatic Resource Surveys

- Trend and trophy netting FX-JN-4AJ-510

  Trend netting (250 ft experimental gill net) was conducted between July 18 and July 22 at 11 locations. Sites were marked using GPS to aid in standardizing sampling locations. The mean length of each set was 13.18 hours. For all nets combined, a total of 106 LAT, 22 SRC, and 26 BNT were netted. The mean length of LAT was 16.3 inches (10.0 to 29.7 inches), while the mean weight was 1.34 pounds. SRC averaged 13.6 inches in length (7.4 to 18.6 inches), and 0.93 pounds in weight. The mean length of BNT was 12.9 inches (6.9 to 19.2 inches), and the mean weight was 0.83 pounds. The trout CPUE for all nets combined was 1.1

  Three LAT were tagged with $25 reward tags during July netting. Their mean length was 24.4 inches (20.4 to 29.7 inches), with a mean weight of 4.86 pounds (2.19 to 8.90 pounds). During October netting, 18 LAT were fitted with $25 reward tags. The mean length of tagged fish was 29.2 inches (21.3 to 39.0 inches). The mean weight of these LAT was 10.38 pounds (3.0 to 25.0 pounds).

  Seven reward tags were processed in 1999 from angler catches, while four additional tags were recovered through crew activities (Table 8). The mean yearly growth for these fish was 1.66 inches and 2.33 pounds.

Table 8. Summary of LAT tag returns in 1999 (*tagged LAT recaptured by crew personnel).

Tag Number	# of Years	Length (Inches) At Tagging	At Recap	Change	Change /Year	Weight (Pounds) At Tagging	At Recap	Change	Change/ Year
A1994	5.8	23.0	32.0	9.0	1.6	4.00	12.00	8.00	1.4
J106	1.5	24.0	28.0	4.0	2.6	3.75	5.50	1.75	1.1
J123*	1.0	27.5	28.2	0.7	0.7	6.50	7.42	0.92	0.9
J120	0.7	21.6	21.6	0.0	0.0	3.15	2.75	-0.40	-0.6
J119*	1.0	25.1	26.6	1.5	1.5	4.40	5.66	1.26	1.2
J124	1.0	23.9	24.0	0.1	0.1	3.95	5.50	1.55	1.6
J134	0.9	23.4	27.5	4.1	4.5	3.80	6.50	2.70	3.0
J126	0.6	25.9	27.0	1.1	1.7	5.82	7.50	1.68	2.6
J141*	1.0	31.8	37.0	5.2	5.2	11.30	21.00	9.70	9.7
J130	0.6	26.5	26.0	-0.5	-0.8	5.54	7.00	1.46	2.5
J154*	1.0	34.3	35.5	1.2	1.2	15.30	17.00	1.70	1.7

- Primary productivity study and hydroacoustic work FX-JN-4AJ-510

Two replicate zooplankton samples were taken with 153, 500, and 750 micron nets from five sites across the reservoir. Sites were located using GPS and sampled in August, September, and October. Mean volumes of zooplankton for the five sites were combined and are presented in Table 9. In general, zooplankton densities were greater near the dam in August and greater near the inlet in October. The volumetric ratio (750 micron:500 micron) ranged from 0.89 in August, to 0.57 in September. According to Reservoir Research crew member Dan Yule, ratios greater than 0.5 are indicative of a zooplankton community that is not being over utilized. Fish less than 20 inches that feed primarily on zooplankton should not be limited by zooplankton abundance.

Table 9. Mean volume of zooplankton (ml) sampled from five sites on Jackson Lake, 1997-1999. Zooplankton ratio (ZPR) is the volumetric ratio of zooplankton collected in 750 and 500 micron mesh.

Mesh	August			September			October		
(Microns)	1997	1998	1999	1997	1998	1999	1997	1998	1999
153	16.8	19.1	28.3	11.4	14.6	11.3	10.6	14.1	14.3
500	13.4	14.3	20.8	11.8	11.3	8.7	6.7	11.3	11.7
750		11.1	18.6		6.7	5.0		6.7	8.2
ZPR		0.77	0.89		0.59	0.57		0.59	0.70

The reservoir research crew conducted a hydroacoustic assessment of Jackson Lake the first week of August. Specific methodologies and results can be found in the reservoir research crew section. Results must be viewed only as trend data due to the numerous assumptions of hydroacoustic work. To illustrate, an estimate of 39,700 LAT is unquestionably low. During the three-month ice-fishing season of 1996, the estimate of LAT caught was 23,696 (59.7% of the hydroacoustic estimate), and the estimate of LAT harvested was 13,213 (33.3% of the hydroacoustic estimate). Also, 36,000 LAT are stocked annually and typically account for 15% of the harvest.

CS - Creel Surveys

- Spot creel survey FX-JN-4AJ-520

  A total of 250 interviews were conducted during creel checks on Jackson Lake during the ice-fishing season. The catch rate for LAT was 0.75 fish per hour, with SRC and BNT incidental to the creel. This is consistent with past catch rates and is above the management objective of 0.5 fish per hour. Forty-two percent of the catch was released. The mean length and weight of harvested LAT was consistent with past sampling efforts (mean length 17.4 inches, mean weight 1.55 pounds). Of the 481 LAT examined for clips, 16.6% were of hatchery origin.

  During the summer season, 59 anglers were interviewed. The catch rate for LAT was 0.50 while the catch rate for SRC was 0.07 fish per hour. Forty-seven percent of the LAT, and 53% of the SRC caught were reported as being released. The mean length-weight for LAT was 17.4 and 1.55 pounds respectively. Of the 59 LAT checked by creel clerks, 16.9% were fin clipped.

Management Recommendations

Continue to gill net standardized locations to assess changes in population structure. Continue to tag LAT greater than 20 inches with reward tags to determine growth of trophy sized fish and assess harvest rates. Of the 284 LAT tagged since 1987, recapture data are available for 80 fish (28%).

Continue to monitor zooplankton abundance and correlate these data with LAT condition factors. A hydroacoustic assessment is scheduled for 2004 to document trends in the fishery.

In addition to acquiring catch data, spot creel surveys are a great method for gaining a feel for public attitude and result in considerable positive public relations. Spot creel surveys should be conducted as time allows.

Snake River Basin (Wilderness Waters) - 4SW

No work scheduled.

Hoback River Basin - 4HR

Hoback River JN813330TN

AS - Aquatic Resource Surveys

- Fingerling stocking assessment FX-JN-4HR-510

  The population in the upper Hoback River, between Grizzly Creek and the South Fork, was sampled in October. This reach was not planted this year in order to assess natural recruitment. Assuming SRC less than 3 inches in length are young-of-the-year, no natural recruitment was found in the sample. Four fish in the sample were within the 3-inch length group. This suggests movement into this reach from last year's reproduction. The remainder of fish in the sample were greater than 6 inches.

The population estimate made for the reach near the confluence of Grizzly Creek yielded an estimate of 409 SRC per mile, with 331 greater than 6 inches. Based on this estimate, approximately 1,432 SRC occupy the 3.5-mile stretch of river between the South Fork and Grizzly Creek. The measured standing crop for this station was 20.7 pounds per acre. All trout in the sample were less than 12 inches. The estimate for 1998 for this same reach was approximately 4,000 SRC, with standing crop estimated as 32.9 pounds per acre. The stream was sampled a month earlier in 1998, and fish planting had occurred in July.

- Catchable stocking evaluation FX-JN-4HR-510

In the continuing evaluation of the catchable stocking program for the Hoback River, two 3-mile sections of the river were electrofished in August. The upper reach is located near the Kozy Campground, while the lower reach is located near the Hoback Campground. The upper reach was also sampled in April to determine the extent of hatchery fish being carried over in the system.

Fish stocked from the Jackson National Fish Hatchery (4,009) were adipose and left pelvic (ADL) clipped. These fish were stocked above the Kozy Campground. Fish from the Auburn hatchery (12,571) were adipose and right pelvic (ADR) clipped, and stocked below the Kozy Campground. Fish stocked in 1998 were pelvic clipped only. Fish were not clipped prior to 1998.

A total of 46 SRC were captured during sampling conducted in April (Table 10). While carryover of hatchery fish was documented, the growth rate was quite slow. Nine months post stocking, SRC from the Jackson National Fish hatchery are still less than 8 inches in total length.

Table 10. Summary of electrofishing catch data for the Hoback River, 1999.

Section	*Date*	*Clip*	*Number (%)*	*Mean Length (in)*	*Length Range (in)*
Upper	04/99	Wild	16 (35)	10.7	5.2-16.0
		RV	2 (4)	11.0	9.4-12.5
		LV	22 (48)	7.7	5.8-9.5
		Hatchery	6 (13)	13.3	8.4-20.1
	09/99	Wild	50 (43)	7.1	3.8-13.9
		ADR	33 (28)	10.5	6.2-11.7
		ADL	20 (17)	7.7	6.0-9.1
		RV	0 (0)	NA	NA
		LV	14 (12)	9.7	8.0-12.5
		Hatchery	0 (0)	NA	NA
Lower	09/99	Wild	78 (58)	9.0	4.1-17.7
		ADR	40 (30)	10.6	8.2-11.8
		ADL	3 (2)	7.4	7.1-7.8
		RV	4 (3)	11.5	9.1-13.1
		LV	2 (2)	9.8	9.7-9.8
		Hatchery	7 (5)	14.2	11.4-16.7

The proportion of wild fish in the upper section, during August sampling, was greater in 1999 (43%) than in 1998 (16%). In the lower reach, the proportion of wild fish increased from 43% in 1998 to 58% in 1999. This is believed to be the result of several back-to-back good water years that followed seven years of drought in the 1980s.

- Spot Creel FX-JN-4HR-520

  To assist in the evaluation of the catchable stocking program, the number of spot creel checks was intensified, and the stream was divided into 4 sampling stations (Area 1 = Hoback Junction to Stinking Spring, Area 2 = Stinking Springs to Hoback Campground, Area 3 = Hoback Campground to Granite Creek, and Area 4 = Granite Creek to the Elkhorn Store). A total of 150 anglers were interviewed between Hoback Junction and the Elkhorn Store. The mean catch rate for all areas combined was 2.43 SRC per hour. The range was 1.08 SRC per hour (Area 1) to 2.88 SRC per hour (Area 3). Of the 79 SRC analyzed for fin clips, 87.3% (69) were Auburn fish, 11.4% (9) were wild, and 1.3% (1) were carryover Jackson Hatchery fish. No Jackson Hatchery fish planted this year were observed in the creel.

Management Recommendations

The fingerling SRC plant will be deleted for a second year to assess natural recruitment.

Continue to monitor the summer fish population to determine seasonal proportionality of wild to stocked fish. In 2000, a population estimate will be obtained for the two study sites. Due to the poor return to the creel of fish stocked from the Jackson National Fish Hatchery, this plant will be dropped from the stocking schedule in 2000. The number of fish requested from the Auburn hatchery will remain at 12,500 and will be distributed from the Hoback Campground to the Elkhorn store.

Gros Ventre River Basin - 4GV

Lower Slide Lake JN310235TN

AS - Aquatic Resource Surveys

- Primary productivity study FX-JN-4GV-510

  In August, one 200 ft floating experimental gill net and two 250 ft sinking experimental gill nets were set overnight at standardized locations for approximately 10.5 hours. A total of six wild LAT were netted that had a mean length and weight of 16.0 inches and 1.55 pounds, respectively. Of the 15 SRC netted, 10 were of hatchery origin. The mean length of wild SRC was 10.1 inches (0.36 pounds), and the mean length of hatchery SRC was 8.5 inches (0.22 pounds).

  Zooplankton samples were collected in August, September, and October to determine food availability. Replicate samples were taken at two standardized sites with the 153 and 500-micron nets. Zooplankton abundance peaked in September with a volumetric reading of 4.4 ml for the 153 micron net and 1.2 ml for the 500 micron net. The estimated turnover rate was 7.6 days, meaning 7.6 days for full water exchange.

  The speculated correlation between turnover rate and zooplankton abundance appears correct. In 1998, the turnover rate was much longer (18.2 days) and the September samples were nearly double (7.8 ml for the 153 micron net and 2.4 ml for the 500 micron net). In years of high runoff, zooplankton densities may limit trout growth.

Management Recommendations

Continue to correlate zooplankton biomass with turnover time. Netting information should also be collected. Continue to evaluate the SRC plant that was initiated in 1999. All stocked SRC will be fin-clipped.

Fish Creek Basin - 4FC

Lake-of-the-Woods JN110305FT

AS - Aquatic Resource Surveys

- Fish population survey FX-JN-4FC-512

Low over-winter oxygen levels were documented in 1993 and 1994. GRL were first stocked in 1995 in hopes of better overwinter survival due to greater tolerance of low oxygen levels. At that time, 1,320 6 to 8 inch GRL were released. In 1996, an additional 5,000 6 to 8 inch GRL were stocked. Due to production problems, no GRL were available for stocking in 1997 or 1998. The stocking rate was reduced to 3000 LV clipped GRL in 1999 (2,717 actually stocked). In August, one 250 ft experimental gill net and one 200 ft floating experimental gill net were set overnight. For both nets combined, 131 GRL (85 LV clipped) and 5 SRC were captured. The mean length of unclipped GRL was 13.0 inches (9.1 to 14.2 inches), and the mean length of LV clipped GRL was 9.1 inches (7.6 to 11.7 inches). The mean length of SRC was 12.8 inches.

- Spot creel FX-JN-4FC-520

A spot creel was conducted over the July 4th weekend when angling pressure is typically greatest. Use was lighter than in the past due to reports of the road being closed due to snow and recent grizzly activity. Nineteen anglers were contacted over a 3-day period. Although GRL was the prominent species netted, SRC were most commonly seen in the creel. The catch rate for SRC was 0.30 fish per hour (0.28 kept and 0.02 released). The catch rate for GRL was 0.24 fish per hour (0.02 kept and 0.22 released).

Management Recommendations

Although a segment of anglers appreciate the opportunity to catch GRL, it appears that the primary users of the lake prefer to harvest SRC. Partial winterkills may continue, but at present SRC survival seems acceptable. Due to discontinuing stocking SRC in the Hoback River from the Jackson National Fish Hatchery, SRC are available in 2000 for Lake-of-the-Woods. SRC (1000) will be added to the stocking schedule. Continue to stock GRL as a unique species.

Spread Creek Basin - 4SC

No work scheduled.

Buffalo Fork Basin - 4BF

No work scheduled.

North Buffalo Fork Basin - 4NB

No work scheduled.

South Buffalo Fork Basin - 4SB

Golden Lake JN110083FT

AS - Aquatic Resource Surveys

- Golden Lake survey FX-JN-4SB-510

  A Swedish gillnet was fished overnight (20.5 hours) to sample the fishery. Twenty SRC were caught, of which 3 were released. The average length was 15.0 inches, while the average weight was 1.18 pounds.

Management Recommendations

No change in management is recommended. Continue to stock on alternate years.

Lake Creek JN815735FT

AS - Aquatic Resource Surveys

- Lake Creek survey FX-JN-4SB-510

  A station was electrofished to determine species composition and relative abundance. The conductivity was too low for electrofishing to capture fish. Fish were seen but could not be captured due to low conductivity (36 micromhos per centimeter). Lake Creek was flowing about 93 cfs when measured on August 31. Reasonable habitat exists for trout fisheries managed under the wild concept.

Management Recommendations

Sample fish population as time permits.

Mackinaw Lake JN110086FT

AS - Aquatic Resource Surveys

- Mackinaw Lake survey FX-JN-4SB-510

  A Swedish gillnet was fished overnight (19 hours) to sample the fishery. Seventeen SRC were caught. The average length was 13.7 inches, while the average weight was 0.87 pounds.

Management Recommendations

No change in management is recommended. Continue to stock on alternate years.

Rainbow Lake JN110077FT

AS - Aquatic Resource Surveys

- Rainbow Lake survey FX-JN-4SB-510

  A Swedish gillnet was fished overnight (22.75 hours) to sample the fishery. Sixteen RBT, 4 SRC, and 3 RXC were caught. The average length for RBT was 9.1 inches, while the average length for SRC and RXC were 11.6 and 15.6 inches, respectively. The average weight for fish greater than 7 inches was 0.53 pounds for RBT, 0.84 pounds for SRC, and 1.52 pounds for RXC. Natural reproduction is possible and represented in the population at Rainbow Lake.

  Johnson Creek flows through Rainbow Lake and has provided a source for RBT for many years. Rainbow trout were planted into the South Buffalo Fork as early as 1939. The latest recorded plant was into Bertha Lake, immediately upstream of Rainbow Lake, in 1964. Rainbow Lake was stocked regularly with RBT through 1957, at which time management was changed to cutthroat (black-spotted). Stocking SRC on a regular basis has been the management procedure for Rainbow Lake.

Management Recommendations

The prevalence of RBT in the population at Rainbow Lake suggests that natural reproduction is adequate to maintain a viable fishery. Stocking should be terminated with the provision that the practice will be reinstated if deemed necessary.

Cub Creek Basin - 4CC

No work scheduled.

Pacific Creek Basin - 4PC

Moss Lake JN110120TN

AS - Aquatic Resource Surveys

- Moss Lake Survey FX-JN-4PC-510

  Sampling with a Swedish gillnets showed good survival and exceptional growth of the SRC planted in August of 1998. Twenty fish were caught in 18 hours. These fish ranged from 11 to 14.4 inches and weighted between 0.25 and 1.4 pounds. The average length was 12.3 inches and average weight was 0.68 pounds. The planted fish averaged 5 inches and about 0.05 pounds. Productivity of this lake is moderate to high. No salamander populations were observed in 1999.

Management Recommendations

Continue coordination efforts with the U.S. Forest Service to reinstate the stocking program. Stocking was changed from BKT, which were stocked historically, to SRC, the indigenous species.

Point Lake JN010052TN

AS - Aquatic Resource Surveys

Point Lake survey FX-JN-4PC-510

A reconnaissance of Point Lake was conducted mid-summer. There was no indication of substantial angler use (paths in the grass) and no evidence of survival from past plants.

Management Recommendations

Delete from the stocking schedule.

Palisades Basin - 4PB

Work Not Associated With A Particular Water

AS - Aquatic Resource Surveys

- Palisades basin survey FX-JN-4PB-510

An administrative report of 1998 survey activities was prepared for this basin.

South Fork Indian Creek was dry for approximately one mile above its confluence with Indian Creek. The water number has been changed to indicate it is unsuitable for fish. However, topographical maps suggested a perennial stream farther upstream. The stream contains a good flow for about five miles from the confluence with Driveway Canyon to Lake Basin. The habitat generally looks good, but there is a general lack of suitable size gravel for adequate spawning. The water is very cold which tends to limit spawning success. Fry emergence would likely be delayed too late into the season for adequate survival.

North Fork Indian Creek did not produce trout in the number or size expected during 1998 survey activities. Sampling effort was reduced to angling in 1999, due to gear problems. A good flow is present in the North Fork for about one and a half miles above the confluence of Garden Canyon Creek. Streamflow was measured at approximately 30 cfs below the confluence of Garden Canyon Creek. No fish were captured or seen in this reach, but rainstorms hampered good observations. In general, the habitat looks good, but as in the South Fork, water temperatures are very cold. The temperature regime would probably have a negative affect on fry emergence as previously noted. There is about a mile of accumulated stream length that can be characterized as valley, while the remaining 4 miles is of high gradient.

Management Recommendations

A follow-up survey of the North Fork Indian Creek near Garden Canyon should be conducted.

Teton River Basin - 4TR

Work Not Associated With A Particular Water

AS - Aquatic Resource Surveys

- Teton River basin survey FX-JN-4TR-510

  An administrative report of 1998 and 1999 survey activities was prepared for this drainage.

  Sampling was completed upstream on South Bitch Creek in the Hidden Corral Basin and in Camp Lake. A canoe trip was made down a segment of the Falls River. The canoe capsized and no sampling was conducted due to equipment failure. No fish were observed in a walk up Winegar Creek, although old records indicate the presence of fish in this stream. Numerous trout were observed in Dog Creek near the state line upstream of the confluence with the Falls River.

Management Recommendations

Some lakes (i.e., Hidden Lake and Moose Lake) should be sampled again to assess relative abundance. Two Island and Sunset lakes in Alaska Basin have had fisheries in the past, but no data have been collected in this region since the early 1970s. Information for South Leigh Creek lakes is notably lacking. Two prominent lakes in the upper reaches of South Bitch Creek are not included in the present inventory. All of these lakes are at high elevations and should be left as virgin waters whether they support a fishery or not. Information for these waters will be documented when time permits. In addition, Conant Creek needs to be resampled due to past equipment failure. Stream sampling should be done on the Falls River, Winegar, and Dog creeks in Winegar Hole. Sampling should also include stations in Cascade Creek upstream of Tillery Lake, and South Boone Creek upstream of the Jedediah Smith Wilderness boundary. Continue collecting tissue samples for future cutthroat trout DNA analysis.

Lower Salt River Basin - 4LS

Anderson Spring JN811406LN

AS - Aquatic Resource Surveys

- Life history investigations FX-JN-4LS-510

  The number of BNT redds mapped on Anderson Spring is higher than in recent years and the number on Upper Anderson Spring down slightly. When combined, the total number is comparable to past surveys. This year, 52 redds were mapped on Anderson Spring. The minimum-maximum pairs were estimated to be 83 and 116, respectively. On Upper Anderson Spring, 19 redds were mapped with a minimum-maximum number of pairs estimated to be 29 and 38, respectively.

Management Recommendations

Continue to monitor spawning trends to assess population changes. Trend information for Anderson Spring Creek is combined with other spring creeks to assess trends for the Salt River fishery.

Big Spring JN811398LN

AS - Aquatic Resource Surveys

- Life history investigations FX-JN-4LS-510

  The number of SRC and BNT redds on Big Spring continues to be negligible. No SRC redds were observed, and in December, only 2 BNT redds were mapped (minimum-maximum pairs were 3 and 4, respectively).

Management Recommendations

Due to the relatively small number of fish spawning on the Orvis property where redd counts are conducted, redd counts will not be conducted on Big Spring in the future.

Christensen Spring JN811354LN

AS - Aquatic Resource Surveys

- Life history investigations FX-JN-4LS-510

  The number of SRC spawning in Christensen Spring has increased in comparison to previous years. The total number of estimated spawners between 1993 and 1998 has ranged between 18 and 183. This year, the estimated number of spawners was 155.

  The number of BNT redds observed in December was less than observed in 1998, but still remains strong. In 1998, 107 redds were mapped, while 89 redds were mapped in 1999. The estimated minimum and maximum pairs of spawners was 147 and 203, respectively.

  Results from the first field season of graduate student Mike Joyce show that clinical signs of whirling disease (black tail and skeletal deformities) were common among sentinel fish. However, Polymerase Chain Reaction (PCR) and histological analyses of the sentinel fish have not been completed. In wild fish, clinical signs of whirling disease (predominantly black tail) were seen in approximately 35% of both cutthroat trout and brown trout. Preliminary results of PCR analyses indicate that more than 60% of the age-0 cutthroat trout were carrying *Myxobolus cerebralis*.

Management Recommendations

Continue to monitor spawning trends to assess population changes and potential impacts of whirling disease. Continue to be involved in the University of Wyoming Research Project.

Cranney Creek JN811390LN

AS - Aquatic Resource Surveys

- Eyed-egg Stocking FX-JN-4LS-510

  This is the second year that eyed-eggs were stocked in Cranney Creek. The original upper valley stocking site was located on the Salt River immediately west of Afton. This site was changed due to inaccessibility and recent habitat improvements on Cranney Creek. In 1998, 33,156 eggs were available from state sources, and in 1999, 26,000 eggs were available from federal sources. The hatching mortality in 1999 was estimated to be 9%.

Management Recommendations

Continue to plant eyed eggs for a minimum of eight consecutive years (1998-2004).

Flat Creek JN811160LN

AS - Aquatic Resource Surveys

- Life history investigations FX-JN-4LS-510

During spring redd counts, 24 SRC redds were mapped on the Lainhart and Eliason properties near Thayne Lane. The minimum number of pairs was estimated at 27, and the maximum number of pairs was estimated at 32. Spring spawning continues to be minimal when compared to the number of BNT spawning in the same area.

This was the fifth year that approximately 50,000-eyed SRC eggs were stocked in Flat Creek using a Trout Unlimited refrigerator incubator. Eggs were taken from the Bar BC strain of SRC. The incubator is located on Sid Eliason's property. A hatching success of 90% was slightly lower than in past years. Increased mortality could be attributed to the additional handling of these eggs when they were transplanted from the Blue Crane Creek incubator to Flat Creek. Eggs were transplanted to meet the Star Valley commitment. Benefits from the eyed-egg stocking were not readily apparent from redd counts. A total of 20 redds were mapped which is consistent with past counts. Numerous riffles exist downstream of the area where redds counts are currently made, and returning SRC could be using them.

Management Recommendations

Continue to monitor spawning trends to assess population changes. Continue to plant eyed eggs for eight consecutive years (1995-2002). Contact landowners for permission to conduct redd counts on lower reaches of Flat Creek to assess overall benefits of the eyed-egg program.

Laker Spring JN811041LN

AS - Aquatic Resource Surveys

- Life history investigations FX-JN-4LS-510

In May, 52 redds were mapped on Laker Spring (minimum-maximum pairs of 64 to 80). Mike Joyce, University of Wyoming graduate student, observed no clinical signs of whirling disease during field activities. In addition, no clinical signs were observed in sentinel or wild fish. However, PCR and histological analyses of the sentinel fish have not been completed.

Management Recommendations

Continue to monitor spawning trends to assess population changes. Continue to provide guidance and assistance for the University of Wyoming Research Project.

Salt River JN811010LN

AS - Aquatic Resource Surveys

- Coop Unit whirling disease investigation FX-JN-4LS-512

  Mike Joyce began work on his master's research in March 1999. He will focus his research on Christensen, Laker, and Jess springs. The objectives of his research are; 1) estimate the spatial and temporal distribution of spawning SRC and their redds; 2) describe the spatial and temporal distribution of age-0 SRC from emergence to early fall; 3) describe the physical characteristics of habitat selected for spawning and as nursery habitat; 4) determine the temporal and spatial distribution patterns of triactinomyxons (TAMs) of *Myxobolus cerebralis;* 5) determine the temporal and spatial distribution of age-0 fish exhibiting clinical signs of whirling disease; 6) describe the spatial distribution of age-0 fish infected by *Myxobolus cerebralis* over the summer, and 7) evaluate the interactions of spawning and nursery habitat conditions, spatial and temporal distribution patterns of age-0 fish and TAMs, the spatial distribution of *Myxobolus cerebralis*, and clinical signs of whirling disease among age-0 fish. These data will complement data collected by WGFD as well as data collected by Dan Isaac. Dan is a University of Wyoming doctoral candidate whose studies focus primarily on mountain tributaries to the Salt River.

HI - Habitat Improvement and Maintenance

- Habitat Maintenance FX-JN-4LS-430

  The Salt River continues to need spot treatment at a variety of access locations. A permeable channel plug near the Clark's Barn access areas will have additional rip rap added in 2000 to prevent an additional channel change. A segment of the Orvis access that presented a potential cut-across in a bend way location, was repaired by Orvis. A section of the road into the Miller access is being worked on to prevent further loss during the coming spring runoff. Fence repair and bank protection was completed at the upper segment of Perkes access area in 1999.

Management Recommendations

This will be the last update on habitat maintenance segments of the work schedule as related to the Salt River. As suggested last year, this segment should be covered in the Aquatic Habitat Biologist's work schedule and report obligations. Fisheries personnel will continue to maintain liaison with the Regional Aquatic Habitat Biologist and the Pinedale Construction Supervisor in regard to areas that require specific need.

A comprehensive management plan will be devised when all aspects of the Salt River Study are complete. Game and Fish obligations will be reported in an administrative report scheduled for completion in June 2000. Dan Isaak is nearing completion of his doctoral dissertation addressing primarily mountain tributaries to the Salt River.

Swift Creek Reservoir JN410550LN

AS - Aquatic Resource Surveys

- Swift Creek Power hydro project FX-JN-4LS-510

  As noted in reports for the last two years, the FERC application is still being processed under the original Salt Lake City developer's name. Last year LVPL transferred all water rights and interests in the dam and penstocks to the Town of Afton. Dependent upon the outcome of litigation in regard to the present FERC application, LVPL has indicated they will assist the Town of Afton with their FERC permit and future power generation. Recent contact with city personnel indicates there is little new to report once again this year.

Management Recommendations

The lack of activity on this issue due to continued legal implications warrants dropping this segment from the Progress Report at this time. It is inevitable that crew personnel will be involved in any future fisheries concerns for this project and will amend the work schedule accordingly.

Upper Salt River Basin - 4US

No work scheduled.

Greys River Basin - 4GR

No work scheduled.

Little Greys River Basin - 4LG

No work scheduled.

Regional Aquatic Wildlife Management Progress Report

Lander Regional Fisheries Management Crew

Calendar Year 1999

Work Not Associated With a Particular Basin

HP - Habitat Protection

- Gold Dredging FX-LR-EP1-540

  Recreational gold mining activity continues to occur throughout the South Pass area. During 1999, several contacts were made with miners while conducting the Sweetwater Drainage survey. On lower Rock Creek an operation consisting of small, floating gas-powered dredges was observed. This activity was creating small holes or divots in the substrate within a short section of the creek. Impacts to fish habitat and channel stability were considered minor.

  A small group of miners/prospectors was encountered on lower Strawberry Creek, not far from the confluence with the Sweetwater River. These individuals were excavating material from the hillsides and carrying it to the stream for panning. No power equipment was involved and impacts to the creek were minimal.

  Two individuals with core drilling equipment were encountered in the upland areas of the Strawberry Creek drainage. They informed us that they had many claims throughout the area and were drilling test holes.

AS - Aquatic Resource Surveys

- Reconnaissance of South Pass waters for stocking FX-LR-LB3-530

  On July 7, 1999 many of the waters in the South Pass area that were scheduled for fish stocking were investigated to determine if water and habitat conditions warranted stocking.

  Pool Creek (LR854960FT), through visual examination, was found to have many BKT of several size classes. The 500 size 3 BKT scheduled for stocking were cancelled and will be removed from the fish stocking schedule in the future.

  The beaver ponds at Deep Gulch (LR854824FT) were in poor condition and only partially full. Scheduled stocking was reduced from 500 to 300 size 3 BKT. On September 20, 1999 the stream was revisited as part of the Sweetwater Drainage survey. Since the prior visit, beaver have established residence and the existing ponds were full, with new ponds created.

  Meadow Gulch #2(LR825357FT), which flows through Miner's Delight, has an active beaver population and four large ponds suitable for stocking. The full compliment of 500 size 3 BKT were distributed among the ponds on July 12, 1999.

All but one of the beaver ponds at Little Atlantic Gulch (LR854803FT) were determined to be unsuitable for stocking. This one pond is immediately adjacent to the road, is quite large and deep, and apparently contains a spring - as no channel flow enters the pond, but there is an outflow. No evidence of the 150 BKT stocked in the ponds in July 1998 was observed. It was decided that the 200 BKT that had been scheduled would be stocked, but that the ponds would be checked in 2000. If no evidence of survival is noted at that time, this water will not be stocked in the future.

Main Stem Wind River above Reservation Boundary - 6WU

Wind River - Dubois Area LR825010FT

PA - Planning and Administration

- Management Plan FX-LR-6WU-121

Wind River sampling and management recommendations will be reported in an administrative report that is currently in progress.

AS - Aquatic Resource Surveys

- Fish Population Sampling FX-LR-6UW-510

Spring electrofishing was done at 2 sites on the upper Wind River as part of the Wind River fishery evaluation. Single pass electrofishing was conducted on March 24 at the Warm Springs section above the town of Dubois (Table 1) and on March 25 at the Town section (Table 2). A single pass at the State Land section, as was done in 1997, was not conducted due to low water clarity.

Table 1. Summary of catch for the Warm Springs section, comparing fall, 1997 to spring 1999.

		Fall 1997		Spring 1999	
Species	Mark	Catch	(%)	Catch	(%)
BNT	Wild	587	(87)	357	(85)
RBT	Wild	38	(6)	39	(9)
KRB	**AD**	**13**	**(2)**	**4**	**(1)**
FRB	LPV	13	(2)	3	(<1)
RXC	Wild	0	(0)	1	(<1)
SRC	Wild	14	(2)	10	(2)
SRC	**AD**	**6**	**(1)**	**2**	**(<1)**
YSC	AD	0	(0)	2	(<1)

Table 2. Summary of catch for the Town Section, comparing fall 1997, fall 1998 (first pass for population estimate) and spring 1999.

		Fall 1997		Fall 1998		Spring 1999	
Species	Mark	Catch	(%)	Catch	(%)	Catch	(%)
BNT	Wild	617	(77)	388	(62)	405	(72)
RBT	Wild	69	(9)	21	(3)	85	(15)
KRB	**AD**	**43**	**(5)**	**14**	**(2)**	**18**	**(3)**
FRB	AD/RPV	10	(1)	0	(0)	7	(1)
FRB	LPV	43	(5)	55	(9)	23	(4)
FRB	RPV	2	(0)	0	(0)	0	(0)
RXC	Wild	1	(0)	0	(0)	2	(<1)
SRC	Wild	14	(2)	4	(<1)	5	(1)
SRC	**AD**	**2**	**(0)**	**3**	**(<1)**	**2**	**(<1)**
YSC	Wild	0	(0)	1	(<1)	2	(<1)
YSC	AD	0	(0)	138	(22)	13	(2)

Practically every species and strain of stocked fish decreased in relative abundance between fall 1998 and spring 1999. The relative catch for the Town section was fairly similar between 1997 and 1998 with the exception of the high proportion of subcatchable YSC in 1998. (These fish were not stocked in 1997) Spring, 1999 sampling showed that very few YSC survived the winter

A total of 160 trout and MWF were sent to the Wyoming Game and Fish Laboratory in Laramie for whirling disease analysis. The sample included 67 BNT, 68 MWF and 25 RBT. All samples tested negative for whirling disease spores.

Sampling for baseline population information was done in September at a site on the upper mainstem of the Wind River below the headwaters of Wind River Lake. Crewmembers electrofished 565 feet and captured 62 BKT, 2 to 9 inches TL and 3 RBT, 3 to 8 inches in length. A 2-pass, population estimate was calculated for the BKT captured (Table 3).

Table 3. Summary of BKT greater than 3 inches in the Wind River below Wind River Lake (elevation 8800) on September 16, 1999.

Species	No	Avg L (in.)	Avg Weight (lbs)	No/Mi (CV)	No/Ac	Lbs/Mi	Lbs/Ac
BKT	44	5.7	0.09	433 (3.4%)	256.8	39.0	23.1

A level 1 and 2 habitat evaluation was conducted at the same time population sampling was done. The population site was located on the National Forest in an area with relatively few habitat disturbances. It was noted that the substrate within the sample site was highly imbedded. Numerous slide areas of unstable, unconsolidated clays impact substrate through much of the area.

This area is a very good example of the natural, unstable nature of the substrate in the upper Wind River basin. This natural instability along with manmade habitat disturbances has been detrimental to the past and present Wind River fishery.

- Habitat Quality Index FX-LR-6WU-510

Habitat Quality Index (HQI) was performed at three sites on the lower Wind River under the direction of the Regional Aquatic Habitat Biologist. These sites bring the total HQI sites sampled to nine. The nine sites represent the six basic habitat types identified in the upper Wind River area.

For information on the results of this effort see Lander Regional Aquatic Habitat Management Crew report for details. Information about the results of the HQI sampling will be included in the administrative report about the Wind River fishery, which is currently in progress.

CS - Creel Surveys

- Spot Angler Checks FX-LR-6WU-520

Spot creel checks to obtain catch statistics were done by crewmembers on the mainstem of the Wind River mainly through July and August (Table 4).

Table 4. Spot creel statistics from checks on the upper Wind River, 1995, 1996, 1997 and 1999.

		Angler		Species----------				Total	Fish	Catch
Year	Source	No.	HOURS	RBT	BNT	SRC	CUT	Catch	Kept	/Hour
1995	FM	48	65.2	64	4	2	-	72	29	1.10
1996	FM	129	196.5	235	21	11	-	273	42	1.39
1997	FM	36	74.6	180	18	13	-	211	32	2.83
1999	FM	111	179.7	288	60	9	10	376	90	2.09

A total of 111 anglers were interviewed that fished a total of 180 hours. Anglers interviewed caught a total of 376 fish of which 90 were harvested and 286 were released. Anglers interviewed had an average catch rate of 2.1 fish per hour. This is comparable to the 2.4 fish per hour caught during the programmed creel of 1998.

A total of 66 RBT were harvested and 222 were caught and released. Of the 66 RBT harvested and examined by creel clerks, 30 (45%) were finclipped with a pelvic clip designating them as stocked catchables. Thirty-six fish or 55% had no fin clips and were assumed to be wild. No fish examined had adipose fin clips that would designate them as stocked fingerlings.

The anglers interviewed caught nineteen cutthroat trout. One cutthroat was identified as a YSC stocked in 1998. All other cutthroats were unmarked and considered wild.

Management Recommendations

Details of the 1999 sampling as well as additional Wind River sampling and management recommendations will be reported in an administrative report that is currently in progress.

North Tributaries of the Wind River above Dubois - 6WN

Rainbow Lake LR122501FT

PM - Population Management

- Fish and Wildlife Control FX-LR-6WN-610

  The decision was made to attempt to control the undesirable sucker population in Rainbow Lake by stocking SPK, a species known to be predacious under certain conditions. A request was made for 3,500 (100 per acre) fingerling SPK. The fish were added to the 1999 helicopter stocking schedule.

Management Recommendations

Additional stocking of 3,500 SPK should take place in 2001. Scheduled stocking should be followed by a netting evaluation sometime after 2001.

Horse Creek Drainage - 6HS

No work scheduled.

East Fork Drainage - 6EF

Work Not Associated with a Particular Water

PA - Planning and Administration

- Spence-Moriarity Technical Committee FX-LR-6EF-121

  All of the members of the Tech Committee were contacted to set a meeting date and determine issues for discussion. During these discussions it became apparent that there is a wide range of views as to the future direction of this group. Some feel that there are not enough issues to warrant a meeting while others feel a meeting is urgently needed to work on specific problems. The completion of the comprehensive management plan for the East Fork Area seems to be the main point of contention. A meeting has been set for January 5, 2000 to try to develop some direction for the group.

- Yellowstone cutthroat management study planning FX-LR-6EF-121

  Preliminary study of maps and historical records yielded several possible sites in the East Fork drainage for evaluation of native YSC distribution.

  Areas include the main East Fork of the Wind River and upper tributaries above the Forest boundary; Falls Creek, Needle Creek, Tee Pee Creek and Sheep Creek. Other areas in the Wiggins Fork and Bear Creek drainages will also be surveyed. Areas including Caldwell and Frontier Creeks in the upper Wiggins Fork and several areas above Bear Basin including Castle Rock Creek, Parallel Creek, and Bear Basin Creek will be sampled for the presence of native YSC.

AS - Aquatic Resource Surveys

- Monitor Stream Flows FX-LR-EP1-540

  Crewmembers assisted the Lander Regional Aquatic Habitat Biologist in monitoring the stream flow in Bear Creek through the irrigation season. The irrigation system is being rebuilt to improve water delivery for grass/hay crops.

Withdrawal Area of the Wind River Indian Reservation - 6WD

Cottonwood Drain LR825032FT

HI - Habitat Improvement and Maintenance

- Bank Stabilization Structures FX-LR-6WD-430

  The channel stabilization structures in Cottonwood Drain between Middle Depression Reservoir and Lake Cameahwait were inspected on May 26, 1999. No changes in the condition of the structures were noted, and no repair needs are anticipated at this time.

Middle Depression Reservoir LR420009FT

AS - Aquatic Resource Surveys

- Fish Population Sampling FX-LR-6WD-512

  Middle Depression Reservoir is a 126-acre impoundment operated by the Midvale Irrigation District as part of their irrigation project. The reservoir was prone to periodic winterkill until an aeration system was installed in 1982. In recent years the fishery has been managed with the stocking of 5,000 catchable ELR each year and 5,000 advanced-fingerling BNT every second year. In 1994 a special fishing regulation of three trout, only one over 15 inches, was implemented to manage for a trophy fishery. The fish populations of Middle Depression Reservoir were sampled with two experimental gill nets on April 13-14, 1999 (Table 5). The average length for RBT of 10.6 inches is the lowest calculated for the six sampling efforts since 1984. The maximum length, however, is the highest measured. The effect, if any, of the special regulation on the RBT population is unclear.

  Table 5. Summary of gill net catch from Middle Depression Reservoir, April 13-14, 1999.

Species	Number	CPUE	Average Length (inches)	Length Range (inches)	Average Weight (pounds)	Average Condition
RBT	37	1.14	10.6	6.8-20.9	0.63	38.7
BNT	7	0.22	12.1	7.8-16.0	0.90	39.7
WHS	125	2.96	-	-	-	-

  BNT have been stocked in the reservoir on a fairly regular basis since 1991. There is a good population of WHS in the reservoir, and trap netting conducted in 1997 indicated good numbers of FHM and LKC as well. Even with an apparent abundance of forage, BNT have not contributed a trophy aspect to the reservoir as originally hoped (Table 5). Limited creel checks and interactions with anglers have not indicated that the BNT are making a significant contribution to the catch.

HI - Habitat Improvement and Maintenance

- Aeration System FX-LR-6WD-430

  The aeration system was operated and maintained through the ice covered period of early 1999 and was again put into operation on October 25, 1999. No repair work was necessary and the system will continue to be monitored until ice-off.

Management Recommendations

BNT will be deleted from the fish stocking schedule for Middle Depression Reservoir. Beginning in 2002, the fish stocking request will be changed from 5,000 catchable ELR to 3,000 catchable and 16,000 advanced-fingerling ELR. These fish will be fin-clipped and evaluated to determine if the fishery can be acceptably maintained by stocking smaller RBT. Operation of the aeration system will continue as in the past.

Lake Cameahwait LR420013FT

AS - Aquatic Resource Surveys

- Zooplankton Sampling FX-LR-6WD-512

Plankton samples were collected from Lake Cameahwait on July 16 and August 4, 1999. Three hauls were taken with a 153-micron and three with a 500 micron net on each sample date near the center of the lake. As suspected, plankton densities are extremely low (Table 6). The majority of the zooplankton were identified as either small cladocerans (*Daphnia sp.*) or cyclopoid copepods. Secchi disk readings taken on the same dates ranged from 11.5 to 13 feet.

Table 6. Results of plankton sampling at Lake Cameahwait on July 16, 1999 and August 4, 1999.

Date	153 micron net (quantity in ml)			500 micron net (number of individuals)		
	Sample 1	Sample 2	Sample 3	Sample 1	Sample 2	Sample 3
07/16/99	6	7	12	12	23	25
08/04/99	1	0.7	0.9	6	18	12

The results of the zooplankton sampling indicate densities are virtually unchanged from those sampled by Dan Yule (Reservoir Research Crew) in 1994. Such extremely low plankton numbers explain why stocked RBT return was so poor during the 1998 evaluation of that program. Other planktivores in the lake include YEP and WHS. However, netting data conducted in 1998 do not indicate huge populations of these species that would explain the extremely low plankton numbers. High water clarity, as evidenced by the secchi disk readings, suggests that low algae densities are probably limiting zooplankton production. But, past water chemistry investigations do not point to primary productivity limitations.

Management Recommendations

Continue with the much-reduced (1,000) RBT stocking program as recommended in 1998.

Sampling in 1998 captured very few LMB in the smaller size classes. The LMB population will be sampled again in 2000 to determine if adequate recruitment is occurring under the present regulations and with the other fish assemblages in the lake.

Muddy Ridge Reservoir LR420020FT

AS - Aquatic Resource Surveys

- Fish Population Sampling FX-LR-6WD-512

Muddy Ridge Reservoir is a 15-acre impoundment located on Bureau of Reclamation withdrawal lands within the Muddy Creek drainage. Water is supplied via a lateral from the Wyoming Canal. Known stocking history consists of one plant of BKT in 1975 and one plant of LMB in 1978. Sampling with gill nets in 1976, 1979, and 1980 indicated that BKT did not survive past the first year following stocking and that LMB survival was poor. At that time, draw down of the water levels during the summer and failure to refill prior to winter was considered the most limiting feature of the fishery. Angler reports and visual observations during recent years confirmed that the LMB did indeed become established and were supporting at least a limited fishery. Furthermore, water levels in the reservoir have remained high and stable during recent years.

On June 6, 1999 the reservoir was sampled by electrofishing with a fixed-boom raft. Catch during 1.7 hours of electrofishing on time consisted of BLG, LMB, and WHS (Table 7). The origin of the BLG is unknown.

Table 7. Catch statistics for BLG, LMB, and WHS captured by electrofishing from Muddy Ridge Reservoir during 1999.

Species	Number	Average Length (inches)	Length Range (inches)	Average Weight (pounds)	Average Condition
BLG	22	4.9	3.4-5.8	0.10	75.8
LMB	14	8.7	2.5-12.5	0.41	45.1
WHS	5	17.0	4.7-20.2	2.64	48.0

Management Recommendations

Management as a wild fishery for LMB and BLG will continue. Contacts will be made with the Bureau of Reclamation and Midvale Irrigation District to determine what the present water management is and to attempt to insure that the reservoir continues to receive adequate water to maintain the present fishery.

Pilot Canal

PM - Fish Population Management

- Fish Salvage FX-LR-6WD-730

On October 20, two areas on the Pilot Canal were electrofished to salvage BBT following shutdown of flows in the canal. The outlet area immediately below Pilot Butte Reservoir yielded 260 BBT and the drop structure at Kinnear yielded 230. All 490 fish were transplanted into Ocean Lake. This same operation yielded 1,877 in 1998, 2,685 BBT in 1997, 732 BBT in 1996, and 445 BBT in 1995. It is still not known why young BBT become concentrated in these areas of Pilot Canal, or what influences the number of fish that accumulate in any given year.

Management Recommendations

Salvage should be scheduled annually, provided relatively high catches continue. Life history information of BBT within the Wind River Drainage should receive additional study if/when native species biologists are added to the Fish Division work force.

Pilot Butte Reservoir LR420032FT

AS - Aquatic Resource Surveys

- Fish Population Sampling FX-LR-6WD-512

Pilot Butte Reservoir is a storage reservoir for the Midvale and Riverton irrigation projects. One of the factors most limiting the fishery is the extreme annual fluctuation in water level that occurs during normal and low water years. Since 1985, management of the reservoir fishery has included the annual stocking of 2,000 catchable RBT. In 1999 an additional 2,000 catchable RBT were stocked in hopes of bolstering the fishery after several years of high, relatively stable water levels. The fish populations of Pilot Butte Reservoir were sampled with gill nets and shore seine on September 29-30, 1999. Two 150-foot experimental gill nets were allowed to fish overnight for a total of 40.1 net hours (Table 8). Three 200-foot shore seine hauls with a 30-foot seine yielded a total of only 11 CKC and 8 young-of-year WHS. The vast majority (90% or greater) of the shoreline consists of sand or fine gravels, with little habitat for forage fish.

Table 8. Summary of catch statistics for two gill nets set in Pilot Butte Reservoir from September 29-30, 1999.

Species	Number	CPUE	Average Length (inches)	Length Range (inches)	Average Weight (pounds)	Average Condition
WHS	70	1.75	13.2	6.7-17.1	0.98	38.9
YEP	68	1.70	7.6	5.2-9.3	0.27	56.0
LNS	5	0.12	11.8	9.7-12.6	0.71	41.8
BBT	3	0.07	24.6	20.5-31.8	4.74	23.1
BNT	1	0.02	14.1	-	0.96	34.2
RBT	1	0.02	15.4	-	1.46	40.0
MWF	1	0.02	7.9	-	0.17	34.5

The most recent previous sampling at the reservoir was September 28, 1994. As in 1999, two experimental gill nets were fished overnight (37.5 total net hours). The most noteworthy differences in the catch statistics for the two sampling occasions were concerning the catch of RBT and YEP. Compared to the one RBT caught this year, 46 (1.23/hour) were captured in 1994. The high RBT catch in 1994 was likely the result of an additional 16,000 (12/lb.) RBT stocked in 1993. YEP on the other hand, increased from a catch of 4 (0.11/hour) in 1994 to the 68 (1.7/hour) captured this year. The catch of YEP in 1994 was the first confirmed existence of this species in the reservoir. Gill net catch certainly indicates that the YEP population is increasing and may be competing with stocked RBT.

Management Recommendations

Zooplankton samples will be collected during July and August of 2000. If zooplankton numbers are limited, it may explain the severe decline in RBT gill net catch in the face of rising YEP numbers. If zooplankton numbers are sufficiently abundant, an increased RBT stocking rate may be warranted.

Ocean Lake - 60C

Ocean Lake LR420028FT

AS - Aquatic Resource Surveys

- Fish Population Sampling FX-LR-60C-512

Fish populations were sampled at the standard sites during the week of August 23-27, 1999. Sampling involved eight overnight experimental gill net sets, four nights of trap netting at each of nine sites, and ten 200-foot minnow seine hauls at established sites around the lake (Table 9).

Table 9. Catch summary for experimental gill nets (EG), 35-foot minnow seine (MS), and trap nets (TN) during standard sampling at Ocean Lake, August 23-27, 1999.

Gear	No.	Species	Number	CPUE	Mean Length	Length Range	Mean Weight	Mean C
EG	8	BLC	5	0.03	10.0	4.5-11.8	0.69	56.6
EG	8	CRP	50	0.33	21.1	4.5-24.7	4.64	48.3
EG	8	WAE	42	0.28	14.7	8.0-19.7	1.12	30.6
EG	8	WHC	2	0.01	7.8	6.7-8.8	0.26	51.3
EG	8	WHS	24	0.16	16.3	13.2-18.7	1.85	41.8
EG	8	YEP	14	0.09	9.2	5.4-12.0	0.50	53.9
MS	10	BLC[1]	354	35.40				
MS	10	CRP	61	6.10				
MS	10	EMS	8,239	823.90				
MS	10	FHM	74	7.40				
MS	10	JDT	8	0.80				
MS	10	STS	208	20.80				
MS	10	WAE	3	0.30	3.8	3.6-4.1		
MS	10	WHS[2]	5	0.50				
MS	10	YEP[2]	415	41.50				
TN	36	BBT	3	0.08	14.6	12.1-16.1	0.72	22.0
TN	36	BLC[3]	39	1.08	10.2	2.0-12.5	0.78	52.8
TN	36	BLG	1	0.03	8.4			
TN	36	CRP[4]	20	0.42				
TN	36	EMS	600	16.67				
TN	36	FHM	21	0.58				
TN	36	JDT	1	0.03				
TN	36	RCS	1	0.03				
TN	36	STS	4,560	126.70				
TN	36	WAE	26	0.72	14.3	4.1-21.8	1.18	30.1
TN	36	WHC[3]	13	0.36	5.1			
TN	36	WHS	173	4.81				
TN	36	YEP[2]	61	1.69				

[1] These were all yoy, and a mixture of BLC and WHC
[2] All yoy
[3] There were an additional 699 yoy crappie, either WHC or BLC
[4] Fifteen adults and 5 yoy

The sampling program for gill nets and trap nets has remained fairly constant since 1970. Catch per unit effort data for the 21 sampling occasions conducted since that time were compared. These data show some of the more gross trends that have occurred, such as the decline of the LMB and BLG fisheries during the early seventies. For other species the data seem to be more sporadic, with no conspicuous clear-cut trends. For both net types, CRP show a 50% or greater decline during the early and mid-1970s, followed by ups and downs in the catch over the next 20 years, with declining numbers since 1994. WAE numbers peaked around 1980 and catch has generally been increasing since 1994. While WAE catch has increased, condition has decreased over the past several years. A

similar decrease in condition was noted in the early 1980s when numbers of WAE were considered elevated after two years of stocking large numbers of fry.

Shore seine catch continues to show an increasing EMS population in the lake. Forage numbers seem to be strong, but the prevalence of turbid water conditions may be preventing WAE from capitalizing on the situation, thus their somewhat diminished condition. Capture of young-of-year crappie continues to increase. Catch has risen from one per net in 1994, to eleven in 1997, and 35 per net in 1999. As in 1997, the crappies were a mixture of BLC and WHC. Hopefully this trend of increasing catch in the shore seine will translate to more robust populations of adult crappie and increased angler catch in the future.

Of interest is the relative catchability of EMS and STS in trap nets and shore seines (Table 9). Evidently there are behavioral differences between these two species, which result in this dramatic disparity in their susceptibility to the different gear types.

With the help of the Regional Information and Education Specialist, interested members of the media and concerned public were invited to accompany the crew during sampling on August 25. Eight people were in attendance and watched and assisted with pulling of nets and processing fish samples. Ernie Over of the Riverton Ranger wrote a very good article with several photographs, which appeared on the front page of the paper the following day.

CS - Creel Surveys

- Spot Angler Checks FX-LR-60C-520

A total of 37 anglers were interviewed during 1999. They caught a total of 12 WAE, 7 YEP, and 1 BBT for a catch rate of 0.15 fish/hour. The catch rate for WAE was 0.08, which ranks among the highest in the past several years. Low angling pressure continues to make it difficult to obtain many angler interviews. Discussions with individuals who accompanied the crew during netting operations indicated that, in their opinion, WAE fishing was very acceptable during 1999.

PM - Fish Population Management

- Fish Stocking FX-LR-60C-716

During 1999 a total of 4.349 million WAE fry and 80,850 WAE fingerlings (1,470/lb.) were stocked into the lake. An additional 1 million WAE fry destined for Ocean Lake were temporarily lost in transit by Federal Express and perished.

CA - Coordination and Assistance

- Water Quality Improvements FX-LR-60C-511

Throughout the summer, assistance was provided to the Regional Aquatic Habitat Biologist for collection of water quality and flow data for drains entering Ocean Lake. Large quantities of silt-laden water continue to enter the lake (see Aquatic Habitat section). It appears that the amount of water passing through the lake has increased substantially during the past several years, with negative impacts to the water quality of the lake. Additional flow information will be collected during 2000, with plans to install a gage station on the outflow of Ocean Lake.

Additional data were collected for updating the bathometric map for the lake. The Regional Aquatic Habitat Biologist will be compiling and analyzing this information during the coming year.

Management Recommendations

Continue to stock WAE at a rate of 80,000 fingerling annually. If fingerling WAE are not available, request 6,000,000 fry. Sample the fishery with the established netting regime every two or three years. Conduct spot angler checks to aid in the evaluation of WAE stocking and the general state of the fishery. Continue to work with the Aquatic Habitat Biologist to gather water quality and flow data.

Boysen Reservoir - 6BO

Boysen Reservoir LR420114FT

AS - Aquatic Resource Surveys

- Fish Population Sampling FX-LR-6BO-512

Annual shore seining to sample young-of-the-year fish populations in Boysen was done on August 17 and 18, 1999. Standard shore seining stations established in 1968 were used and seining was done with a 1/8-inch mesh net, 35 feet long. Ten seine hauls produced a total catch of 282,975 fish or 28,297 fish per seine haul.

The 28,297 fish per seine haul was over seven times the previous record of 3,770 per haul in 1995. EMS composed most of the catch with 27,793 fish per haul. STS were the next most abundant species captured with 205 fish per haul. BLC at 102 per haul and SAR or WAE at 14 per haul were captured in greater abundance than previous sampling.

During mid-September FMLR assisted Reservoir Research in their annual reservoir sampling. WAE catch per unit effort in sinking gill nets decreased from 1.42 fish per hour in 1998 to 1.04 in 1999. A large year class of WAE 12 to 14 inches TL dominated the net catch. This year class, hatched in 1997, began to appear in the net catch in 1998. This class began to appear in the angler catch in 1999 and will likely result in an increase in the WAE catch during 2000.

The decrease in condition of smaller WAE is a concern to biologists. WAE in the net sampling had an approximate relative weight of 85 while relative weight in the angler catch averaged approximately 86. WAE relative weights have historically been low in Boysen but the trend of decreasing weights should be monitored. Anglers should be encouraged to harvest WAE in the 12 to 16 inch range.

Trout catch in the nets increased slightly in 1999. Average trout netted was 18.6 inches while the average trout in the angler creel was 16.9 inches. Results are premature, but no evidence was seen in the 1999 net sampling or creel surveys that fall stocking is having the desired effect of increasing trout survival.

For more information on the sampling, see the Reservoir Research Crew report.

Crewmembers assisted the Reservoir Research crew in a planned study of WAE movement in the Reservoir. It was determined that radio telemetry would be preferable to sonic tags in a body of water the size of Boysen. When tested under actual conditions in the reservoir, radio tags proved unusable due to an unknown interference.

At this time there are no plans to continue the WAE telemetry study in Boysen.

PR - Public Relations

- Fishing Tournaments FX-LR-6BO-160

One crewmember attended the Governor's Cup WAE Fishing Tournament held June 26 and 27. Crewmembers have attended in a public relations capacity since the first tournament in 1989 answering questions and discussing management concerns. Presence at the function allows contact with numerous individuals involved in the event and also allows the observation of tournament operations.

One crewmember attended the Fishing Has No Boundaries fishing tournament for the physically challenged on June 11, 12 and 13, 1999 and, as always, the fishing tournament was rewarding to all involved.

CS - Creel Surveys

- Spot creel interviews FX-LR-6BO-520

Spot creel interviews were conducted on Boysen Reservoir during ice-fishing season in January and February and ice-free fishing season May through October (Table 10). Spot creel checks act as not only a relative indicator of angler success and a method of evaluating size structure and condition of fish harvested but also as a public relations information tool for communication with the resource user.

Table 10. Boysen Reservoir spot creel summary for total number of fish caught and kept, 1995, 1996, 1997, 1998 and 1999.

Year	Angler No.	HOURS	YEP	WAE	RBT	BLC	BBT	SAR	Total Catch	Fish Kept	Catch /Hour
1995	485	2,520	586	360	204	34	16	16	1,250	816	0.50
1996	468	2,423	714	719	169	11	19	17	1,672	765	0.67
1997	544	3,302	657	644	62	25	35	24	1,473	957	0.45
1998	1106	4,086	717	902	83	151	16	47	1,976	1183	0.48
1999	645	2,967	162	1,382	87	122	56	106	1,946	971	0.66

Management crewmembers and reservoir wardens interviewed 645 anglers who fished a total of 2,967 hours and caught 1,946 fish for an overall catch rate of 0.66. The catch rate of 0.66 is up from 1997 and 1998.

The increased catch rate is partially due to the increased catch of WAE and SAR. An examination of 5-year trends show a stabilizing of the declining trout catch rate observed over the past 5 years. WAE in the creel are averaging 17 inches and 1.8 pounds. WAE size in the catch has changed little since 1998. Harvested SAR weighed an average 1.25 pounds and averaged 15.3 inches in length.

Management Recommendations

Continue annual RBT stocking of 30,000 FRB and 30,000 ELR. These fish should be stocked at 4/pound in the fall to help avoid predation by WAE. Continue monitoring the reservoir fishery in cooperation with the Reservoir Research crew. Conduct spot creel interviews during ice-fishing season and ice-free periods. Shore seine in mid-August. One crewmember should attend the Governor's Cup WAE Fishing Tournament weigh-in. One crewmember should attend the Fishing Has No Boundaries Tournament to assist in whatever way possible and as a show of Department support for the organization and event. The most recent, previous programmed creel was done in 1992-93. Review past and present creel procedures to begin planning for next programmed creel.

Wind River below Boysen Reservoir - 6WL

Wind River, Section 1 LR825005FT

AS - Aquatic Resource Surveys

- Fish Population Sampling FX-LR-6WL-512

Fish populations in the Wind River below Boysen Dam were sampled on February 17, 18, and 19. The sampling effort included personnel from the FMLR as well as Biologists from the Fish Population Crew and the Cody Region.

A 3-pass mark and recapture estimate was conducted on the 2-mile long section of river from Boysen Dam to the Wind River Indian Reservation boundary. Only RBT were captured in sufficient numbers for calculation of population estimates (Table 11). Program CAPTURE was used to analyze the sampling data.

Table 11. Summary statistics of fish captured during electrofishing in the Wind River below Boysen Dam February 17, 18, and 19, 1999.

Species	No	Avg L (in.)	Avg Weight (lbs)	No/Mi (CV)	No/Ac	Lbs/Mi	Lbs/Ac
RBT - Unmarked	86	19.91	3.68	55 7.4%	2.6	202.4	9.38
RBT - Catchables	144	13.09	0.95	140 12.1%	6.5	132.5	6.14
RBT - Broodculls	93	19.10	3.14	56 6.2%	2.6	174.3	8.08
MWF	62	16.10	1.83	-	-	-	-
WAE	46	19.40	3.23	-	-	-	-
BBT	19	10.40	0.36	-	-	-	-
BNT	10	19.30	2.88	-	-	-	-
SAR	1	14.80	1.02	-	-	-	-
YEP	1	5.20	0.06	-	-	-	-

A total of 462 fish were captured in the effort. RBT were the most abundant species with a total of 323 fish captured. One hundred forty-four of the 323 RBT captured, had adipose clips designating them as stocked catchables. Ninety-three RBT had the size and appearance of stocked brood culls and 86 RBT had no marks. Unmarked fish could be wild fish, fish stocked in previous years or fish stocked in Boysen Reservoir. A length frequency histogram of the captured RBT (Figure 1) shows stocking has produced a balanced size structure of RBT in the population. Unmarked RBT ranged from 9.8 inches TL and 0.39 pounds to 28.1 inches TL and 8.47 pounds. No evidence was found of small RBT from natural recruitment.

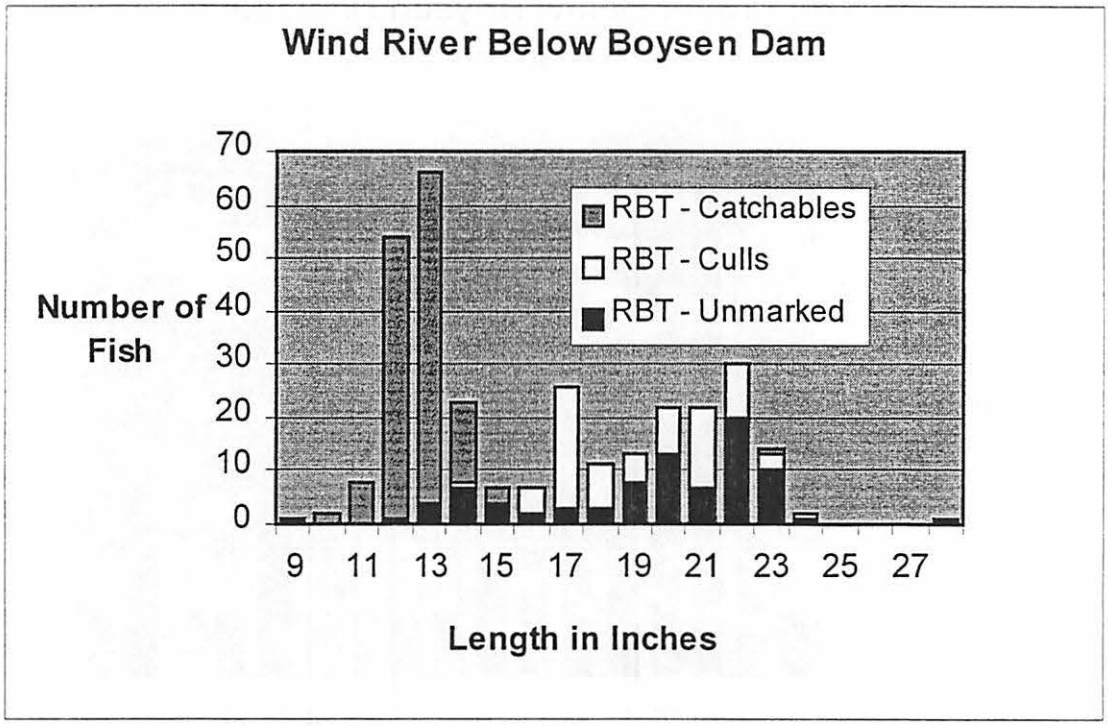

Figure 1. Length frequency histograms of RBT captured on the Wind River below Boysen Reservoir, 1999.

The second most abundant sportfish captured in the effort were 62 MWF followed by 46 WAE. Of the 46 WAE captured 15 exceeded 20 inches and 3 pounds and 4 of those exceeded 28 inches and 10 pounds (Figure 2). WAE relative weights averaged 92.3. WAE over 20 inches had relative weights averaging 105.1 while fish 20 inches or less had average relative weights of 87.7.

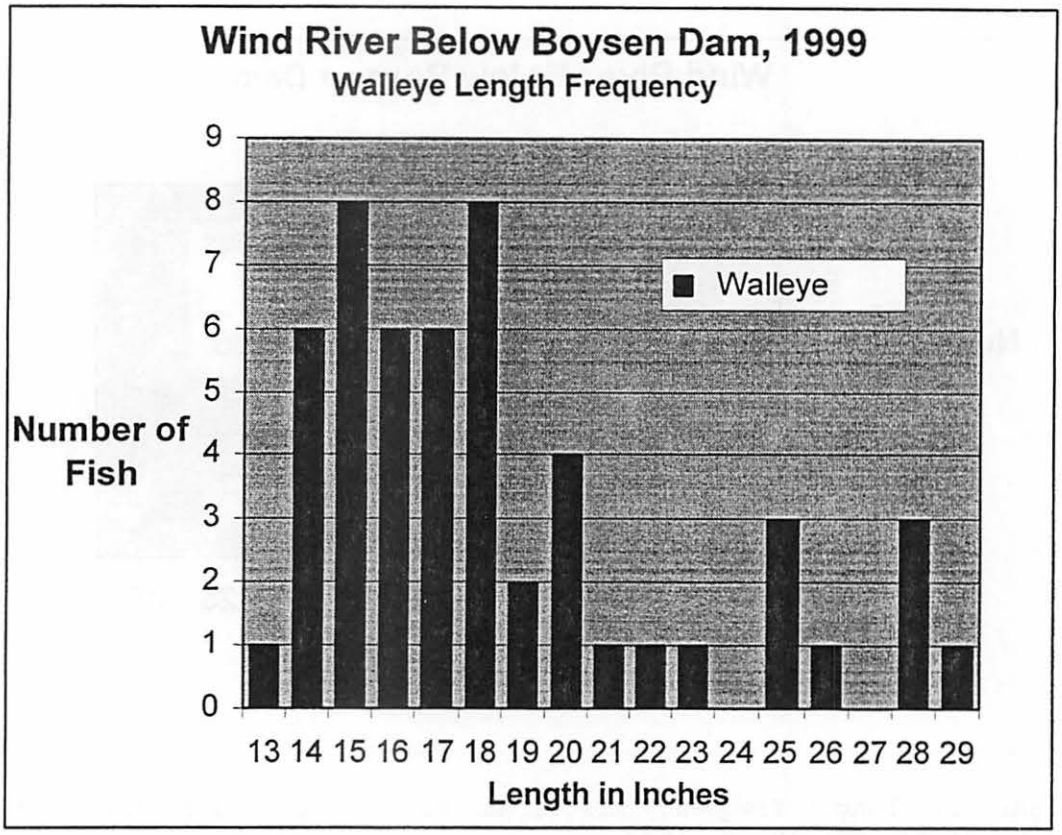

Figure 2. Length frequency histogram of WAE captured on the Wind River below Boysen Reservoir, 1999.

Other sportfish captured in the electrofishing effort included 19 BBT, 10 BNT, 1 SAR and 1 YEP.

Management Recommendations

Due to high angler use, the area should be stocked with 2,500 catchable RBT. The area is ice-free during most winter months when many waters throughout the state are ice-covered. This time period coincides with spawning time for several hatchery stocks. The popularity and high catch of culled brood fish combined with the central location make the area a good candidate to receive stocked brood culls from the hatcheries. Continue stocking excess brood culls in the area.

Badwater, Tough, and Birdseye Creek Drainages - 6BT

Burlington Reservoir LR020068FT

AS - Aquatic Resource Surveys

- Fish Population Sampling FX-LR-6BT-512

This 18-acre reservoir is located just north of the town of Lysite. It was originally built by the Burlington Northern Railroad but has since been turned over to the Town of Lysite and is used to irrigate lawns. Interested town citizens requested that we consider reestablishing a sport fishery in the reservoir. It did support populations of LMB and BKT at various times in the past (prior to 1979), but those fisheries succumbed to winterkill during periods of low reservoir levels. On October 7, 1999 a survey was conducted at the reservoir to determine the potential for a fishery. Two experimental gill nets caught four WHS from

8.2 to 17.9 inches in length. Two hauls with a 35-foot shore seine yielded FHM, WHS, PKF, and LKC. Soundings found a maximum depth of 16.3 feet, with over 50% of the reservoir area having a depth greater than 10 feet.

Management Recommendations

Experimental stocking of RBT is planned in 2000 when/if extra fish become available. We will continue to work with the townspeople to determine if the ditch supplying water to the reservoir can be upgraded and maintained to assure an adequate water supply.

Poison and Muskrat Creek Drainages - 6MP

No work scheduled.

South Tributaries of the Wind River above Dubois - 6WS

Fish Lake LR122341FT

CS - Creel Surveys

- Spot Angler Checks FX-LR-6WS-520

Fish Lake is currently one of the most popular fisheries in the upper Wind River basin. A special regulation was put into affect on the lake in 1996. The regulation restricted harvest of SRC from the lake to 3 fish per angler. The regulation was placed on the water in response to angler comments that excessive harvest caused a decrease of large fish.

A definite shift in size structure was noted in the sampling results from 1998 compared to previous years. It appears the regulation is having the desired affect. In light of the acceptable fish condition and high angler use, the stocking rate of 3,000 advanced fingerlings was increased to 3,500(125/acre)in 1998.

The lake is a popular destination for local and nonresident anglers. Access to the lake has previously been difficult but accessible by 4-wheel drive vehicles. The Forest Service has recently made improvements to the access road into the lake. Concerns have surfaced that easier access will lead to increased angler use.

Creel clerks interviewed 16 anglers in 1999. Anglers caught fish at a rate of 0.36 fish per hour, which is average for the past several years (Table 12). Creel clerks measured only 6 fish during 1999 checks and these fish varied widely in total length. One fish weighed and measured had a length of 22.1 inches and weighed 4.0 pounds with a condition factor of 37.6.

Table 12. Summary of spot creel statistics for Fish Lake, 1996, 1997, 1998 and 1999.

Year	Source	Angler No.	Hours	SRC	Total Catch	Fish Kept	Catch /Hour
1999	FM	16	41.5	15	15	5	0.36
1998	FM/WD	50	157.5	53	53	25	0.34
1997	FM	37	94.0	40	54	22	0.57
1996	FM	30	73.0	24	25	15	0.35

Management Recommendations

Spot creel checks will continue in 2000 and population sampling should be done in 2000 to assess response to the continued restrictive harvest regulation and increased stocking. The present stocking of 3,500 SRC should continue. Consideration should be given to a voluntary creel to obtain additional creel information.

Pelham Lake LR122477FT

AS - Aquatic Resource Surveys

Pelham Lake is a popular fishery in the upper Wind River Drainage. Since 1991, the lake has been managed as a trophy YSC fishery.

Until 1997, management consisted of yearly stocking of 2,000 sub-catchable YSC. In 1997 stocking was eliminated. In 1998 and 1999 stocking was reduced to 500 sub-catchable YSC. Stocking reductions were efforts to bring the population size down and still maintain year-classes. Other activities include population net sampling and spot creel checks to evaluate angler success.

The current regulation restricts harvest to two trout per day and all trout less than 14 inches must be released. Tackle is limited to the use of artificial flies and lures only.

Pelham Lake was sampled on July 9, 1999 using 2, 2-hour experimental gill net sets. Netting data suggests that even with a decrease in stocking over the last 2 years, the population remains large (Table 13). A slight shift in size toward larger fish is apparent, but this shift could be the result of normal sampling variability (Figure 3).

Table 13. Pelham Lake (LR122477FT), Fremont County.

Gear and Number	Species and Number	CPUE	Mean Length Inches	Length Range Inches	Mean Weight Pounds	Weight Range Pounds	Mean C	C Range
97/06/26								
EG 2	YSC 55	11.70	13.8	9.1-18.3	0.96	0.29-1.91	33.7	29.3-39.1
98/07/07								
EG 2	YSC 45	10.00	14.1	12.4-16.9	0.99	0.69-1.50	35.1	18.9-47.8
99/07/09								
EG 2	YSC 52	11.56	14.8	10.8-18.9	1.20	0.44-2.15	35.7	31.0-41.3

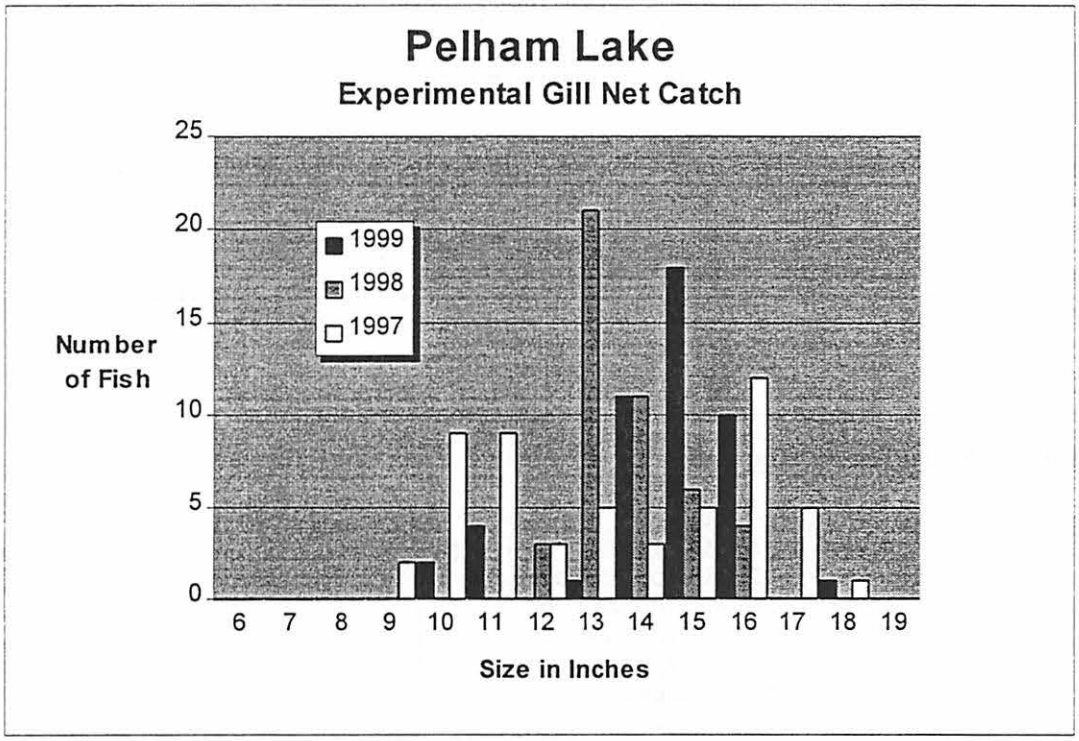

Figure 3. Length frequency histogram of YSC captured in gill nets at Pelham Lake in 1997, 1998 and 1999.

CS - Creel Surveys

- Spot Angler Checks FX-LR-6WS-520

Creel clerks conducted spot creel interviews of 37 anglers at Pelham Lake in 1999 to monitor size and number of fish in the harvest. Angler catch rate dropped from 1.08 fish/hour in 1997 to 0.67 in 1998 and then to 0.29 in 1999 (Table 14).

Table 14. Summary of spot creel checks for Pelham Lake for 1996, 1997, 1998 and 1999.

Year	Source	Angler No.	HOURS	YSC	Fish Released	Fish Kept	Catch /Hour
1999	FM	37	103.5	30	24	6	0.29
1998	FM/WD	98	176.0	101	74	27	0.67
1997	FM	30	98.0	129	106	23	1.08
1996	FM	86	241.1	194	167	27	1.31

The decline in angler catch is unexpected due to the continued high catch rate during net sampling. One explanation for the low angler catch rate could be the increased angling pressure from nonresident and tourist anglers (Table 15).

Table 15. Summary of license types for anglers interviewed at Pelham Lake for 1996, 1997, 1998 and 1999.

	License Summary			
Year	Resident	Nonresident	Tourist	Military/Pioneer
1999	40%	27%	32%	0
1998	82%	4%	10%	4%
1997	68%	18%	14%	0
1996	71%	1%	22%	6%

Management Recommendations

The current scheduled stocking of 2,000, sub-catchable, YSC should be temporarily reduced to 500 fish. The population should be re-sampled prior to stocking in 2000 for comparison to previous sampling. Spot creel checks to monitor size and number of fish in the harvest should continue with an emphasis of obtaining as many interviews as possible. Consideration should be given to a voluntary creel to obtain additional creel information. The management of the lake as a trophy fishery through the special regulations will continue. Monitoring of the fishery should continue to evaluate the special regulations. Adjustments to the stocking policy for the lake may be necessary in the future to maintain a quality trophy fishery.

Jakeys Fork Drainage - 6JY

Jakeys Fork Section 1 LR826740FT

AS - Aquatic Resource Surveys

- Fish Population Sampling FX-LR-6JY-512

The fish population in the Jakey's Fork River was sampled on April 8, 1999. Two sites were sampled by backpack electrofishing. A two-pass removal estimate was performed on a 360-foot section of stream directly below the Dubois Fish Hatchery outflow. A second site above the hatchery inlet was sampled to obtain fish for Whirling Disease examination. Only one run was made through this site and no population estimate was made.

A total of 261 BNT, 101 RBT and 8 MWF were captured. A length frequency histogram of all BNT and RBT captured shows the population is made up principally of small fish, reinforcing the importance of the stream as a spawning and nursery tributary (Figure 4). Population estimates were calculated at the lower site for all BNT over 4 inches and all RBT over 3.8 inches (Table 16). Others were considered juveniles, and were not included in the estimate.

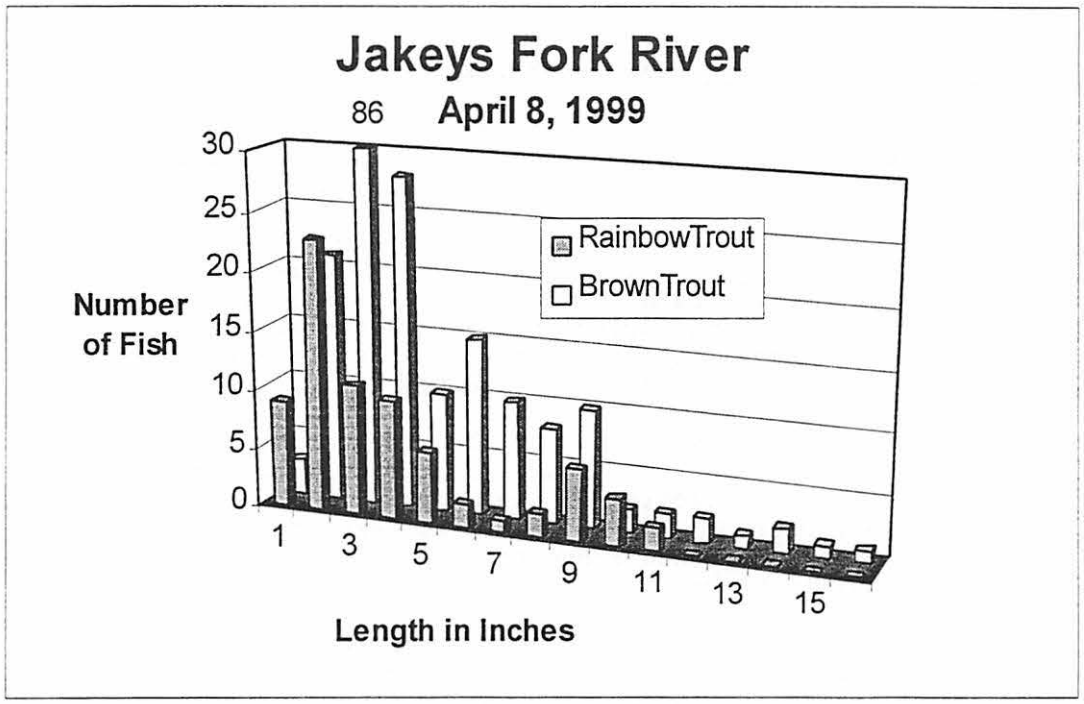

Figure 4. Length frequency histogram of brown trout and RBT captured in the Jakey's Fork River below the outflow of the Dubois Fish Hatchery, April 8, 1999.

Table 16. Summary of BNT greater than 4 inches and RBT greater than 3.8 inches in the Jakey's Fork River below The Dubois Fish Hatchery outlet, April 8, 1999.

Species	No	Avg L (in.)	Avg Weight (lbs)	No/Mi (CV)	No/Ac	Lbs/Mi	Lbs/Ac
BNT	87	5.2	0.10	1,840 (4.1%)	680.6	349.5	129.3
RBT	32	7.2	0.18	479 (3.2%)	177.2	86.2	31.9

Seventy-eight BNT, 35 RBT and 6 whitefish were collected from below the hatchery and 11 BNT and 24 RBT were obtained above the hatchery. These fish were submitted to the Wyoming Game and Fish Laboratory for Whirling Disease examination. All samples tested negative.

Management Recommendations

Continue to manage the Jakey's Fork as a wild fishery. Monitor physical conditions considering the importance as a spawning tributary to the Wind River. Collect fish from the stream near the Dubois fish hatchery for testing as per WG&F Fish Division, whirling disease policy.

Torrey Creek Drainage - 6TY

Torrey Creek LR826680FT

AS - Aquatic Resource Surveys

- Fish Population Sampling FX-LR-6TY-512

  The Torrey Creek area directly above and between Torrey, Ring and Trail Lakes lies within a heavily used recreational area. The creek is currently stocked with 1,000 catchable RBT annually.

  Over the past few years concern has been raised about excessive angler harvest of fish moving into Torrey Creek from Torrey and Trail Lakes. It has been observed that RBT move out of the lakes into sections of the creek for spawning. Some anglers have suggested that special regulations should be implemented on the stretch. A closure now exists on the creek at spring spawning time from April 1 to May 31.

  Until 1998, the fishery potential in the creek above Trail Lake was unknown. In September of that year a single pass electrofishing effort was made on a 517-foot section of the stream. A total of 77 BBT, 13 RBT and 2 BKT were captured. All BBT and trout except 2 RBT were young-of-the-year. Sampling evidence suggested the stream was nursery habitat for burbot and possibly trout

  Another area above the 1998 site was sampled to provide a more complete picture of the population. On October 8, 1999 a 400-foot section of stream above the Youth Conservation Camp was sampled using backpack electrofishing gear. Thirty-nine BBT, 16 BKT, 1 BNT and 1 RBT were captured in a one-pass electrofishing effort. All fish were considered juveniles with only 1 BBT greater than 6 inches.

  As with the lower sampling site, habitat parameters consisted of slow, flat water with undercut banks. It was apparent from the age distribution of the fish sampled and habitat that the area was principally nursery habitat.

Management Recommendations

Continue to stock catchable trout in the high use area around the Conservation Camp. Evidence suggests that Torrey Creek above Trail Lake is nursery habitat for burbot and some salmonids. The importance of this habitat to the overall fishery is not completely known. No future management changes should be considered without further study of this area.

Dinwoody, Blue Hole, and Red Creek Drainages - 6DW

No work scheduled.

Dry Creek Drainage - 6DR

No work scheduled.

Bull Lake Creek Drainage - 6BL

Work Not Associated with a Particular Water

AS - Aquatic Resource Surveys

- Drainage Surveys FX-LR-6BL-510

Three lakes were sampled in the upper Milky Creek Drainage in conjunction with the Fish Spawning Crew's attempt to locate a source of golden trout eggs. The Fish Spawning Crew sampled Lake No. 71, within the Wind River Indian Reservation. Sampling for 2 days with Swedish gill nets resulted in a catch of 2 GDT. No length-weight information is available for those fish. The inlet stream to this lake contains riffle areas that appear to be good spawning habitat. It is not known what is limiting the population.

Half'n Half Lake (LR121214FT) was sampled in a joint effort between the Fish Spawning Crew and FMLR. One Swedish gill net was set for two hours but no fish were caught thus overnight sets were made to attempt to locate fish. Two Swedish gill nets were set for a total of 36.25 hours resulting in a catch of one GDT. This fish measured 9.0 inches and weighed 0.27 pounds. Scuds and caddis larvae were numerous along the shoreline. Very little if any suitable spawning habitat was available at either the inlet or outlet of this lake. Half'n Half Lake was last stocked in 1983 by the U.S. Fish and Wildlife Service.

Shield Lake (LR121210FT) was sampled with one Swedish gill net for a total of 21.25 hours and no fish were captured. One fish was observed feeding near the outlet of the lake. This lake contains a good food supply with numerous scuds and caddis observed. Little or no spawning habitat is available at the inlet of this lake.

Lakes at the upper end of the Milky Creek Drainage contain very small populations of GDT.

Management Recommendations

The lakes under the jurisdiction of the Department should be stocked with GDT when these fish again become available. Half'n Half Lake should be stocked with 7,000 fingerling GDT and Shield Lake should be stocked with 4,700 fingerling GDT. Stocking of these lakes should be carried out on a four-year rotation.

South Fork of the Little Wind River Drainage - 6LW

No work scheduled.

North Fork and Main Stem Popo Agie River Drainages - 6PN

Shoshone Lake LR220584FT

AS - Aquatic Resource Surveys

- Fish Population Sampling FX-LR-6PN-512

Shoshone Lake is managed as a wild BKT fishery and has had a restrictive regulation, consisting of a two fish limit, in effect since 1996. Two 160-foot experimental gill nets were set on July 14, 1999 and pulled the following morning to monitor trends in population numbers and evaluate success of the special regulation. The catch of BKT was well above that for 1996, indicating a continued trend of increasing population size (Table 17). Mean length decreased by 0.1 inches and mean condition decreased from 44.4 to 40.6. Though this is the lowest condition calculated during the last four sampling efforts, it is still indicative of a healthy, well-fed BKT population.

Table 17. Summary of experimental gill net catch information from Shoshone Lake for the years 1994, 1995, 1996, and 1999.

Date	Species	Number Sampled	Catch per Gillnet Hour	Mean Length (inches)	Length Range (inches)	Mean Weight (pounds)	Mean Condition Factor
99/07/15	BKT	238	6.70	11.6	6.2-16.2	0.69	40.6
	LKC	3	0.08	6.3	5.9-6.9	0.11	43.2
96/07/20	BKT	111	3.96	11.7	6.0-17.1	0.77	44.4
	LKC	5	0.18	6.1	5.0- 6.5	0.11	48.9
95/07/25	BKT	124	2.81	11.0	6.3-16.1	0.64	42.8
	LKC	2	0.05	6.6	6.6- 6.6	0.13	45.2
94/09/07	BKT	6	0.67	9.5	8.2-11.6	0.40	43.3

On September 23, 1998 Shoshone Creek from Shoshone Lake to Johnson Meadow was walked, a distance of about 2.5 miles. An estimated 3,616 spawning size BKT were counted. This is the fifth year of conducting counts and numbers have increased with each count. In 1998 approximately 3,200 BKT were counted, in 1997 the count was 1,535, in 1996 there were 880, and in 1995 the count was 540 fish.

CS - Creel Surveys

- Spot Angler Checks FX-LR-6PN-520

Sixty-six anglers were interviewed during the June 1 through August 31 fishing season at Shoshone Lake. Catch rates are down from those estimated in 1997 and 1998, but still considered acceptable at 1.0 fish/hour. There remains overwhelming support of the special regulation from those anglers interviewed at the lake. They have noticed the same increase in catch rates that are reflected in our spot angler checks. There were inquiries this year regarding what our regulation plans might be if the BKT population has increased to "historic" high levels. During interviews, at least two separate anglers suggested that rather than remove the two fish limit, we should consider extending the limited fishing season into September. This may be considered as an option if a need for management changes become necessitated by a continued drop in average size and condition for the BKT (Table 17, Table 18). Regardless of possible changes in fishing season, a continuation of the closure on Shoshone Creek is needed to protect the spawning run in late September.

Table 18. Shoshone Lake spot creel summary, 1985-1999.

Year	Species	Angler Number	Hours	Total Catch	Catch/ Hour	Percent Released	Measured Fish	Mean Length
1999	BKT	66	187.8	187	1.00	65	26	13.8
1998	BKT	46	149.5	189	1.26	59	20	14.4
1997	BKT	4	22.9	36	1.57	83	2	14.4
1996	BKT	32	73.9	56	0.75	38	35	13.6
1995	BKT	20	90.0	79	0.89	65	14	11.5
1994	BKT	74	398.5	174	0.44	7	137	13.5
1993	BKT	28	64.0	45	0.70	40	27	14.4
1992	BKT	98	483.5	166	0.34	16	35	13.8
1991	BKT	31	108.5	80	0.34	0	69	13.6
1990	BKT	24	44.0	72	1.64	0	72	13.6
1989	BKT	57	247.0	325	1.32	17	24	11.9
1988	BKT	71	217.6	222	0.98	-	125	12.3
1987	BKT	22	204.0	107	0.52			
1986	BKT	45	263.5	235	0.89			
1985	BKT	9	26.0	35	1.35			

CA - Coordination and Assistance

- Habitat Evaluation FX-LR-6PN-540

Habitat conditions in Shoshone Creek, especially with regard to grazing impacts, were evaluated on September 23 while counting spawning BKT. Grazing pressure appeared to be moderate again this year. Generally, stubble height seemed adequate to function for erosion control and provide sufficient plant vigor. No areas of heavy cattle concentrations or trampling were noted near the stream. There was some minor bank sloughing and instability associated with livestock crossings, but these were not considered significant.

Management Recommendations

Angler checks will continue to provide catch rate information and fish size statistics. Coordination with the Forest Service will continue in an effort to monitor grazing management practices. Continue monitoring the BKT spawning run. This activity seems to provide fairly repeatable data for monitoring trends in the BKT population and can be done concurrently with an inspection of grazing impacts for the previous summer and early fall.
The BKT population will be sampled with gill nets every other year (next scheduled sampling will be 2001). A combination of angler checks, gill net samples, and spawning run monitoring will be used to determine the need for possible management changes in the future.

North Fork Popo Agie LR825620FT

AS - Aquatic Resource Surveys

- Fish Population Sampling FX-LR-6PN-512

The North Fork Popo Agie is managed as a wild fishery, and is dominated by BNT in the lower reaches. A fishing easement along approximately 1.5 miles of river just north of Lander was obtained in 1964. In 1980 the WGF construction crew installed 975 feet of rock riprap or tree/rock revetment through the public fishing easement. Much of the work was washed away during flooding in 1991 and was rebuilt in 1997.

The fishery of the North Fork Popo Agie River, PFA, was sampled October 11-13, 1999. Mark and recapture was used to make estimates of trout population numbers within a 1.3-mile section of river. One raft was used to make three sampling passes throughout the section on three consecutive days. As the North Fork Popo Agie River defines the boundary with the Wind River Indian Reservation, the sampling was done in cooperation with the U.S. Fish and Wildlife Service. Population numbers were estimated using Program CAPTURE (Table 19). The only other comparable population sampling for this site was conducted in August 1990. A comparison of the estimates for 1990 and 1999 reveal a considerable increase in BNT, while RBT have decreased markedly (Table 20). The increase in the BNT estimate may well be attributable to sampling in October rather than August. Spawning movement of fish into this stretch of the river from downstream areas may have resulted in increased population numbers, or movement of marked fish out of the section during sampling may have artificially created a high estimate.

Table 19. Summary of catch statistics and estimates of population size for BNT, RBT, and MWF from the North Fork Popo Agie River, October 11-13, 1999.

Species	Size Group	Number Collected	Average Length	Average Weight	Average Condition	Number /mile	Number /acre	(cv)
BNT	<6	187	4.25	0.03	39	1,398	264.5	36.1%
	6-9.9	573	7.95	0.19	36	1,589	300.7	12.4%
	10-13.9	281	11.40	0.55	36	548	103.6	13.9%
	≥14	88	15.80	1.47	36	130	24.6	20.3%
	All	1129	8.83	0.34	37	3,014	570.3	8.6%
RBT	All	31	12.30	0.82	38	55	10.3	38.2%
MWF	All	40	13.10	1.0	43	-	-	-

Table 20. Comparison of fish population estimates for the North Fork Popo Agie River, August 20-22, 1990 and October 11-13, 1999.

Species	Number/Mile		Pounds/Mile	
	1990	1999	1990	1999
BNT	993	3014	387	1025
RBT	324	55	92	45

The size structure of the BNT sampled in 1990 and 1999 was remarkably similar (Figure 5), even with the threefold change in estimated population size. An examination of the length-frequency histograms for RBT show an almost total absence of smaller fish in 1999 compared to 1990, when the catch was dominated by fish less than 9 inches in length (Figure 6). It appears that both the 1998 and 1999 year-classes for RBT were extremely unsuccessful. There are no indications or known changes that have occurred in the watershed or stream that would indicate that this is anything but normal variations in year-class strength related to natural environmental conditions.

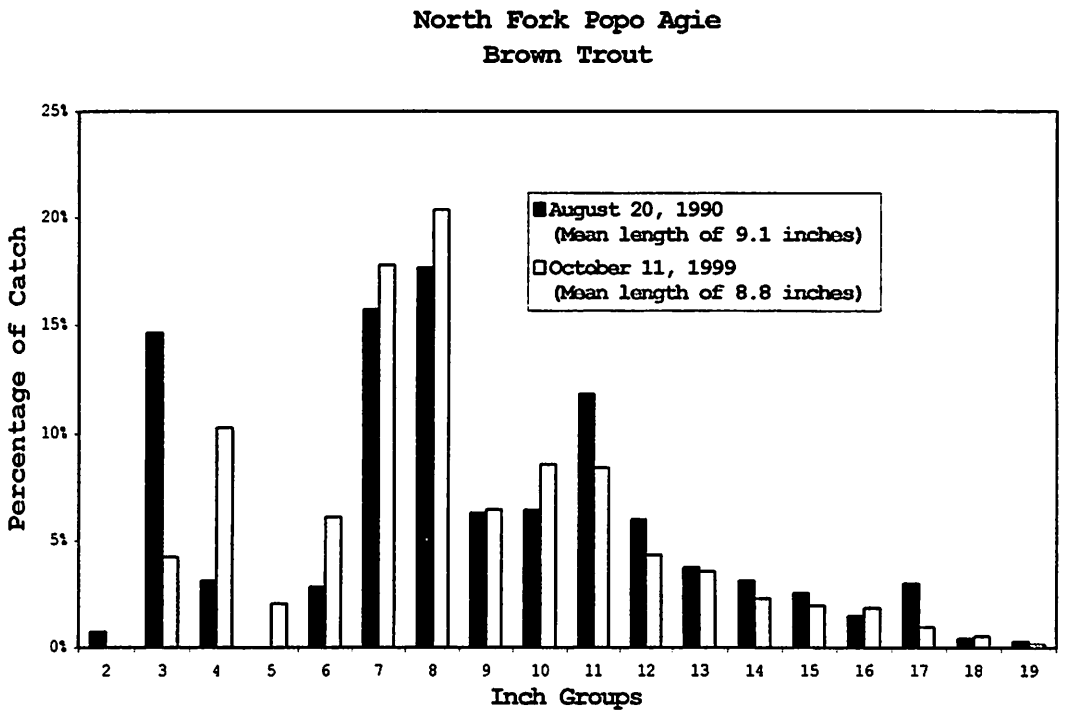

Figure 5. Length-frequency histogram for BNT captured from within the public fishing area on the North Fork Popo Agie River during August 20-22, 1990 and October 11-13, 1999.

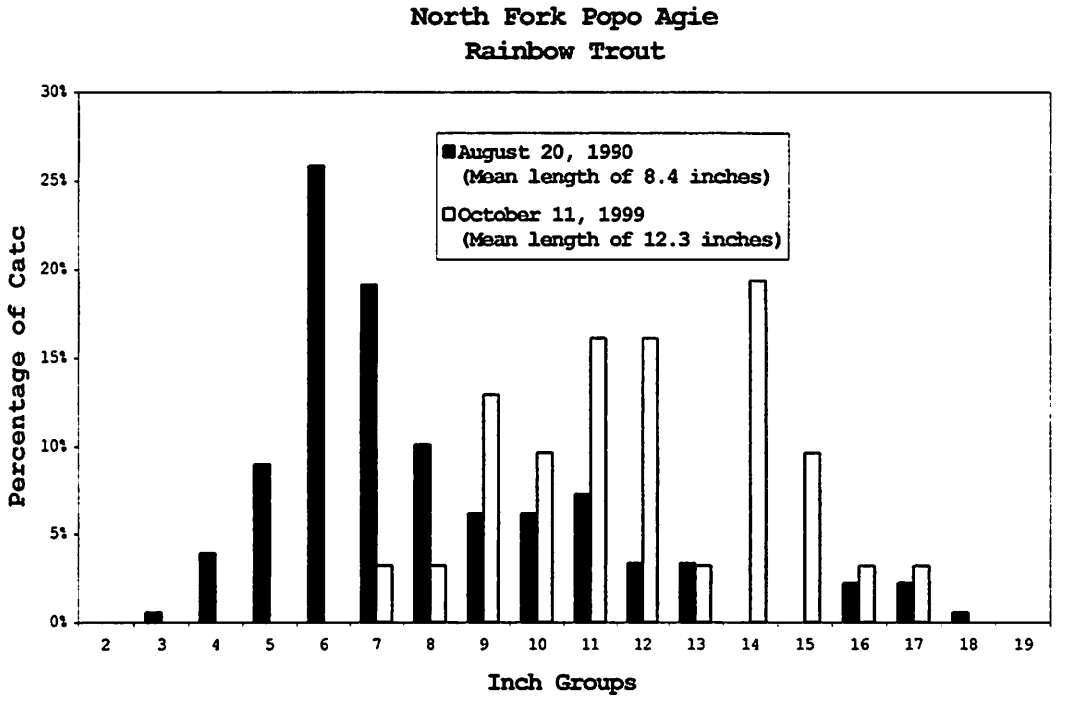

Figure 6. Length-frequency histogram for RBT captured from within the public fishing area on the North Fork Popo Agie River during August 20-22, 1990 and October 11-13, 1999.

Fish were taken for disease sampling and processed by a USFWS pathologist. Samples consisted of 60 BNT and 41 MWF. Both the BNT and

MWF tested positive for *Renibacterium salmoninarum* (bacterial kidney disease). Results of whirling disease testing have yet to be received.

PF - Public Fishing Development

- Fishing Easements FX-LR-6PN-460

The fishing easement on the North Fork Popo Agie was inspected in October in conjunction with fish population sampling. No problems with angler access or channel stability were noted. Some users have been parking outside the designated parking area, notably by the county road bridge, but it does not seem to constitute a problem at this time. Past habitat improvement/bank stabilization work is functioning well with no need for maintenance.

Management Recommendations

Continue to manage the North Fork Popo Agie River for a wild BNT and RBT fishery.

Middle Fork Popo Agie Drainage - 6PM

Middle Fork Popo Agie River LR825361FT

AS - Aquatic Resource Surveys

- Stocking Evaluation FX-LR-6PM-512

Due to much higher than normal water flows in the Middle Fork Popo Agie River during spring and early summer, evaluation of this stocking program was postponed until 2000.

Little Popo Agie Drainage - 6PL

Work Not Associated with a Particular Water

AS - Aquatic Resource Surveys

- Drainage Surveys FX-LR-6PL-510

Lakes within the Atlantic Creek Drainage were surveyed during August 16-21, 1999. Swedish gill nets, depth sounding, and angling were utilized to collect information on eight lakes within the drainage. No fish were captured in Upper Saddlebags, Lower Saddlebags, or Windy lakes, all of which were stocked with GDT in 1993. Gill netting yielded 11 SPK from Little Atlantic Lake, which was last stocked with SPK in 1959. The fish ranged in size from 9.7 to 14.5 inches and had highly variable phenotypes, with characteristics of both LAT and BKT expressed in individual fish. An Administrative Report detailing the results of the survey will be completed in early 2000.

- Fish Population Sampling FX-LR-6PL-512

In 1995 fish sampling stations were established on several streams within the Nature Conservancy's Red Canyon Ranch to provide baseline information for the monitoring of management and habitat changes associated with the ranch. Many of these sites were sampled again in 1999 (Table 21).

Table 21. Summary of fish population sampling information from four sites within the Red Canyon Ranch for 1995 and 1999.

Date	Species	Size Group	Number Collected	Average Length	Length Range	Average Weight	Number/ mile	(cv)
Red Canyon Creek, below Cherry Creek confluence (5560 ft.)								
8/22/95	BNT	All	9	8.4	5.8-10.9	0.26	278	20.4
		≥6	6	9.7	6.1-10.9	0.35	185	
	RBT	All	3	6.5	5.7-7.6	0.10	-	-
	LNS	All	8	5.8	3.0-14.2	0.22	-	-
	WHS	All	1	16.0	-	1.50	-	-
	LND	All	1	3.0	-	0.02	-	-
10/27/99	BNT	All	35	8.5	3.6-18.7	0.37	732	9.3
	BNT	≥6	24	10.5	6.2-18.7	0.52	501	9.1
	RBT	ALL	3	7.7	6.2-9.1	0.27	77	86.5
	LNS	ALL	7	12.8	9.3-16.3	1.04	135	9.0
Red Canyon Creek, below Deep Creek confluence (5900 ft.)								
8/21/95	BNT	All	10	10.4	7.8-16.7	0.50	295	0
10/21/99	BNT	All	230	4.6	2.8-15.2	0.07	4,221	4.0
	BNT	>6	31	9.9	7.1-15.2	0.42	513	1.4
Cherry Creek, 0.5 miles above Red Canyon Creek confluence								
8/22/95	BNT	All	45	8.3	5.0-14.5	0.20	1,513	4.0
10/14/99	BNT	All	43	8.0	3.3-13.6	0.27	759	4.4
	BNT	>6	32	9.4	6.3-13.6	0.35	557	3.3
Deep Creek, approximately 100 yds. above confluence with Red Canyon Cr.								
8/21/95	BNT	All	10	11.3	7.8-16.5	0.65	619	11.1
10/21/99	BNT	All	39	5.4	17.4	0.34	1,481	-
	BKT	All	1	8.6	-	0.24	38	-

BNT dominate the fisheries at all streams and sites sampled. Non-game fish were sampled only in the lower reaches of Red Canyon Creek for both the 1995 and 1999 efforts. LNS numbers were similar for both sampling events, but larger fish dominated the catch in 1999. WHS and LND were absent from the catch in 1999, but even in 1995 were only represented by one fish each. The predacious and territorial behavior of BNT is likely limiting the numbers and distribution of non-game, native fish.

Total (all size groups) BNT estimates for the two years are not strictly comparable because sampling occurred in August for 1995, and in October for 1999. Many young-of-year BNT were sampled during August 1999 (3,790/mile at the site on Red Canyon Creek below the Deep Creek confluence), whereas during August 1995 young-of-year were not represented in the catch. Some young-of-year BNT were observed during sampling in 1995, but they were too small for efficient collection. Therefore, when comparing estimated population numbers between the two years, the estimates for fish larger than 6 inches must be used. Such a comparison reveals that the estimated numbers of BNT increased at three of the four sites between 1995 and 1999 (Figure 7). Cherry Creek is the only site where estimates declined. This can be explained by the changes in habitat conditions noted for this site. In 1995, this section of stream was controlled by beaver activity. Habitat consisted of beaver ponds, woody debris, deep pools, undercut banks, and overhanging vegetation. When sampled in 1999, habitat conditions had changed considerably at the established site. Loss of beaver dams and ponds created a channel with little good cover for trout. Also, influences of

livestock grazing on streamside vegetation were considered more severe in 1999 than 1995. It is anticipated that as beaver re-colonize this portion of Cherry Creek, trout habitat will once again increase.

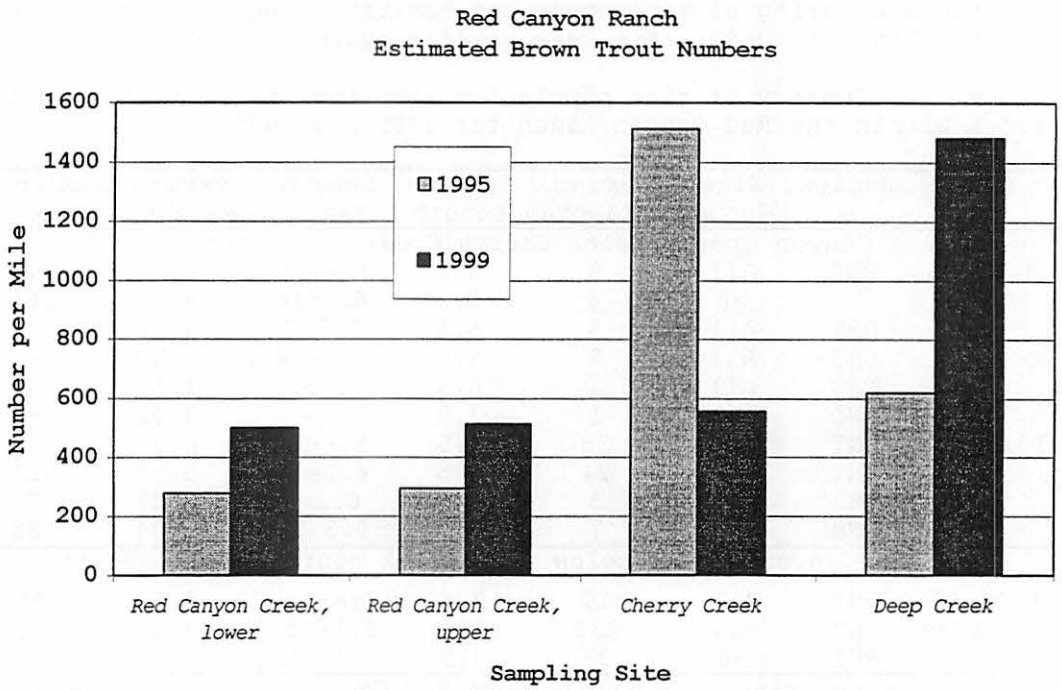

Figure 7. Comparison of estimated BNT numbers between 1995 and 1999 at four sites within the Red Canyon Ranch. Young-of-year fish have been excluded from the estimates.

Increases in estimated BNT numbers at the other three sites was accompanied by an observed increase in riparian and trout habitat conditions. Healthy willow communities, represented by many age/size classes, dominated the upper Red Canyon Creek and Deep Creek sites. Active beaver dam complexes at these areas further provides riparian and channel stability and habitat for BNT.

Management Recommendations

Repeat sampling at established stations in 2003. Work with Lander Valley High School and Red Canyon Ranch on habitat improvement project on Red Canyon Creek and with education projects/activities.

Little Louis Lake #67 LR120268FT

AS - Aquatic Resource Surveys

- Fish Population Sampling FX-LR-6PL-512

Little Louis Lake #67 was visually surveyed on July 6, 1999. The majority of the lake surface was covered with lily pads, with only a small area of open water near the center. BKT had been stocked in the lake in 1994 and 1997. No evidence of survival from these plants was observed. The amount of vegetation and observed shallow depths seem to indicate that survival of trout over the winter would be questionable. The scheduled stocking of BKT for 1999 was canceled.

Management Recommendations

This water will be removed from the stocking schedule.

Christina Lake LR220270FT

AS - Aquatic Resource Surveys

- Fish Population Sampling FX-LR-6PL-512

Christina Lake is a wild LAT and BKT fishery at the headwaters of the Little Popo Agie River. It is 340 acres in size and located at an elevation of 9942 feet. In 1992, a special fishing regulation was enacted which limits the take of LAT to two fish per day. Sampling was scheduled for 1999 to help evaluate the success of the regulation and to determine any trends or changes in the fish populations of the lake. Essentially, access to the lake is limited to ATV's, horses, or by foot. For this reason, a small raft is used to set gill nets. Unfortunately on August 11 and 12 when attempts were made to sample the lake, high winds and cold weather made for dangerous conditions on the lake. Only one net was set, and it had to be fished in a less than optimum manner because of the wind direction. After 16.5 hours, the net was pulled and contained only 3 LAT and 14 LNS. Though the mean length of 17.6 is the highest calculated for the past ten years, the small sample size makes conclusions meaningless.

CS - Creel Surveys

- Spot Angler Checks FX-LR-6PL-520

As in the past, obtaining angler interviews from this water proved difficult during 1999. Five anglers were contacted and they caught 8 LAT for a catch rate of 0.46 fish/hour. The mean length of the three fish examined was 17.7 inches. As with the gill net captured fish, this was the highest mean length calculated from angler catch in the past ten years. But again, the small sample size precludes drawing meaningful conclusions.

Management Recommendations

Sampling with gill nets will be scheduled for 2000 to gather data for monitoring trends and evaluating the special fishing regulation.

Snow Creek LR825442FT

CA - Coordination and Assistance

- Forest Service Enclosures FX-LR-6PL-430

The Red Canyon Ranch did some maintenance work on this fence during this past year but trespass livestock were observed within the enclosure on at least two occasions. The Forest Service has notified the Red Canyon Ranch about the problem.

Little Popo Agie River Section 1 LR825366FT

PF - Public Fishing Development

- Fishing Easements FX-LR-6Pl-460

  Crewmembers investigated complaints by the landowner of unlawful recreational activity on the Little Popo Agie public fishing area. Local young people had decided that less visible areas along the PFA were excellent sites for bonfires and alcohol consumption. Sheriff's Deputies confronted individuals involved on one occasion and informed them they were in violation of the law. The Sheriff's office and local game warden have agreed to step up surveillance of the area to prevent the activities. The Lander Construction Crew has cleaned up the litter and broken glass, and reclaimed the area to its original condition. No further problems have been reported.

Twin Creek LR825380FT

AS - Aquatic Resource Surveys

- Fish Population and Habitat Sampling FX-LR-6PL-510

  Sampling was planned for Twin Creek to establish baseline fish population and habitat information for the evaluation of vegetation manipulation work completed by BLM. Unfortunately, the high turbidity characteristic of the lower portion of this stream, prevented the work during 1999.

Management Recommendations

Attempts will be made to establish a sampling station on Twin Creek during spring, 2000.

Louis Lake LR120254FT

AS - Aquatic Resource Surveys

- Fish Population and Habitat Sampling FX-LR-6PL-510

  Louis Lake (120 acres) is a popular fishery along National Forest Highway 300(Loop Road). It is managed for SPK, LAT, RBT, and BKT. It is stocked annually with 5,000 catchable FRB and on alternate years with 24,000 advanced fingerling SPK. The RBT plant was evaluated with tag studies in 1976 and 1979. These studies determined that FRB returned 44% better than spring RBT and, depending on the year, between 43.6% and 51.2% of the stocked fish were harvested by anglers. Over 80% of the fish that returned were harvested during the first year after stocking. The SPK stocking program was evaluated in 1993. At that time SPK made up over 50% of the trout catch from gill nets and 40% of the angler harvest.

  On June 28, 1999 three experimental gill nets were set in the lake to sample the fish population and determine if management changes were warranted. Comparison of Table 22 with 1993, when it was last sampled with gill nets, reveals very little change in the fishery. The only major difference is a drop in catch-per-unit-effort for RBT from 0.25 fish/hour in 1993 to 0.02 fish/hour this year. In both instances the RBT had not yet been stocked for the year. Whether this represents a true change in the RBT population size (change in carryover of stocked fish) is difficult to surmise. Though there are no data to support it, fishing pressure may have increased since 1993 and resulted in higher harvest of the stocked RBT. The Louis Lake Lodge has reopened under new ownership since 1993 and the US Forest Service Campground has been improved. The construction of a new boat ramp in 1999 may cause even more increases in

angler use in the future.

Very limited natural reproduction by RBT and BKT was identified as a problem as early as 1954. Information since that time does nothing to change this early observation. BKT have always represented a small percentage of the catch, and since fingerling stocking of RBT ceased in 1967 very few RBT less than the catchable size that are stocked annually have been recorded from the catch of gillnets or by anglers.

Table 22. Summary of catch statistics from three experimental gill nets set in Louis Lake June 28, 1999.

Species	Number Sampled	Catch per Gillnet Hour	Mean Length (inches)	Length Range (inches)	Mean Weight (pounds)	Mean Condition Factor
BKT	1	0.02	7.4	-	0.16	39.5
LAT	3	0.05	27.3	17.5-33.9	7.43	29.7
RBT	1	0.02	10.7	-	0.40	32.7
SPK	11	0.20	11.6	8.0-14.5	0.45	26.7
LNS	10	0.18	9.1	8.2-9.9	0.26	34.6
WHS	20	0.37	10.5	8.6-15.2	0.44	35.2

With the help of the contract reservoir wardens, a total of 58 anglers (35 boat anglers, 21 bank anglers, 2 ice anglers) were interviewed at Louis Lake on 12 separate days from January 10 to August 27, 1999. Analysis of the data shows that RBT constitute 68% of the angler catch, with a catch rate of 0.76 fish/hour (Table 23). This compares to a catch rate of 0.31 fish/hour for RBT during the ice-free period of the 1993 programmed creel survey. SPK catch rates for 1993 and 1999 are nearly identical (0.30 vs. 0.29).

Table 23. Angler harvest and release rates for 58 anglers interviewed during 1999.

Species	Fish Kept		Fish Released		Total	
	Number	Average/hour	Number	Average/hour	Number	Average/hour
RBT	69	0.49	39	0.27	108	0.76
SPK	25	0.18	15	0.11	40	0.29
BKT	5	0.04	7	0.04	12	0.09
LAT	2	0.01	0	0	2	0.01
Total	101	0.71	61	0.43	162	1.14

Management Recommendations

The current stocking and management policies for this water will remain unchanged. Continued spot angler checks and periodic gill net sampling (every 3-6 years) will be used to monitor the fishery.

Beaver Creek Drainage - 6BV

Beaver Creek, Section 3 LR825320FT

CA - Coordination and Assistance

- Forest Service Enclosures FX-LR-6BV-430

Bids for a contract to rebuild the riparian enclosure on Beaver Creek was put out by the Forest Service this year but they weren't able to get anyone to bid on the contract. In order to utilize at least some of the money during the current fiscal year, the Forest Service purchased materials for the fence. Another contract will be put out for bid this coming spring to build the fence.

Sweetwater River Drainage - 6SW

Work Not Associated with a Particular Water

- Drainage Surveys FX-LR-6WS-510

  Work continued on the comprehensive Sweetwater Drainage survey during 1999. This survey is being conducted jointly with the Aquatic Habitat Biologist. The drainage has been divided into four sections or partitions. Work this year concentrated on the section of the drainage from Pine Creek downstream to Alkali Creek. Fish population and habitat information was gathered at 16 sites. Additionally, photographs and the Aquatic Habitat Section's "Level 1" habitat information were collected at sites that did not warrant fish sampling. The information will be contained in the final report for this project.

Management Recommendations

Survey work will continue in the lowest section of the drainage and portions of the main Sweetwater channel during 2000. The entire survey should be complete in 2001 or 2002.

Fish Creek LR854865FT and Pine Creek LR854850FT

HI - Habitat Improvement and Maintenance

- Bureau of Land Management Enclosures FX-LR-6SW-430

  A BLM maintenance crew repaired the Pine Creek Enclosure in 1999. According to John Henderson of the Rock Springs BLM Office, this maintenance crew is scheduled to inspect the enclosure fence on Fish Creek during the 2000 work season and make repairs if needed.

Diamond Springs Reservoir LR450133FT

HI - Habitat Improvement and Maintenance

- Reservoir Repair FX-LR-6SW-430

  Glenn Bobnick of Inberg-Miller Engineering developed a plan to line the bottom of Diamond Springs Reservoir with a clay layer. A source of clay was found on BLM land that was relatively close to the reservoir. At a meeting late in October, the Popo Agie Anglers decided the estimated cost of $45,000 was too much money to invest into this project. At this time there has been no further action. The fence around the reservoir is in poor condition. This fence needs to be either repaired or removed.

Bucklin Reservoirs 1 & 2 LR450571CN, LR450573CN

AS - Aquatic Resource Surveys

- Fish Population Sampling FX-LR-6SW-512

  A combination of short duration and overnight experimental gill net sets were used at Bucklin Reservoir #1 and Bucklin Reservoir #2 to assess the fishery and evaluate the stocking program (Table 24). These waters are fairly recent acquisitions from the Casper Region. The stocking schedule for 1999 called for 1,000 sub-catchable RBT for Bucklin Reservoir #1 (41 acres) and 500 sub-catchable RBT for Bucklin Reservoir #2 (66 acres). Stocking was last done in 1998, when 506 KRB (22/lb.) were put in each

reservoir. The RBT captured from Bucklin Reservoir #1 averaged 9.8 inches in length and are presumably all from the 1998 plant.

Table 24. Summary of catch information from experimental gill nets for Bucklin Reservoir #1 and Bucklin Reservoir #2, May 6-7, 1999.

Species	Number Sampled	Catch per Gillnet Hour	Mean Length (inches)	Length Range (inches)	Mean Weight (pounds)	Mean Condition Factor
			Bucklin Reservoir #1			
RBT	12	0.44	9.8	9.2-10.4	0.29	31.8
WHS	45	1.64	15.7	8.4-18.3	1.68	38.4
			Bucklin Reservoir #2			
YEP	8	1.31	8.2	6.1-11.4	0.26	40.5
WHS	56	9.03	16.0	12.6-18.8	-	-

No RBT were captured from Bucklin Reservoir #2. This reservoir is shallow with a maximum depth of 11 feet and much of its 35 acres filled with cattails. The scheduled RBT stocking for 1999 was cancelled for this water.

Management Recommendations

Eliminate trout stocking in Bucklin Reservoir #2 and continue to request 1,000 sub-catchable FRB annually for Bucklin Reservoir #1.

Great Divide Basin - 6GD

A & M Reservoir LR450028SR

HI - Habitat Improvement and Maintenance

- Water Supply FX-LR-6GD-430

A meeting was held on March 24, 1999 with BP Amoco and the BLM to work on sources of water for A & M reservoir. The BP Amoco people were new in the area and did not know the history of the project. Because of costs of pumping, they will not be able to provide surplus water for the reservoir. The BLM is committed to try to find a source of water for this project.

A project is being reviewed to place a solar pump in an old well that is about 1.5 miles from the reservoir. Water would be piped from the well to the reservoir to conserve as much as possible. There appears to be a good supply of water at the well but it is unknown if the solar pump can provide enough water to keep an adequate supply of water in the reservoir. A BLM Hydrologist is reviewing this situation.

Communications with the BLM at the end of the year reveal that other challenges have cropped up. The Bairoil Oil Field has been sold by BP Amoco to Merritt Oil Company, which means that new players will have to be brought on board. Also, cultural sites within the route of the proposed pipeline to A & M Reservoir may cause some problems for this project. The BLM is now considering a proposal to drill a new well near the reservoir.

Bairoil Kids Pond LR550042FT

AS - Aquatic Resource Surveys

- Fish Population Sampling FX-LR-6GD-512

  Bairoil Kids Pond is a small impoundment outside the town of Bairoil. The current stocking program is for 300 advanced-fingerling BKT annually. On May 20, 1999 one experimental gill net was set in the pond for 3 hours. A total of nine BKT were captured. The fish represented two size classes (1997 and 1998 stocked fish) and averaged 11.9 inches in length. The fish were in excellent shape with a mean condition of 44.4.

Management Recommendations

Continue the current stocking program of 300 advanced-fingerling BKT annually.

North Platte River Tributaries above the Sweetwater River - 6WP

Rim Lake LR450560CN

AS - Aquatic Resource Surveys

- Fish Population Sampling FX-LR-6WP-512

  This 25-acre landlocked lake is located south of Rawlins and was previously managed by the Laramie Region. A boat ramp, parking area, and picnic facilities have been built and maintained by the BLM. The current stocking policy is for 10,000 advanced-fingerling RBT annually. On April 21, 1999 two experimental gill nets were set and allowed to fish for about 3.5 hours each. A total of 136 RBT were captured (19.4/hour). The fish ranged in size from 9.9 to 16.7 inches and averaged 12.5 inches. Mean condition factor was 36.3.

Management Recommendations

Reduce the stocking rate to 6,000 advanced-fingerling RBT annually. Sample the fishery again in 2002.

Regional Aquatic Wildlife Management Progress Report

Laramie Regional Fisheries Management Crew

Calendar Year 1999

Work Not Associated with a Particular Basin

AS - Aquatic Resource Surveys

- Amphibians NE-LE-CAU-512

A contract biologist, Bethany Larson, was hired to search and record amphibian observations during the summer of 1999. Observations were entered into the crew's amphibian database. A report documenting her findings and recommendations was completed, printed and distributed as an Administrative Report.

Thirty-two localities were searched in the Snowy Range and Sierra Madres during 1999 where boreal toads, *Bufo boreas,* (BOT) had previously been documented. Only two live BOT were located during 1999. They were both observed at Rock Creek Park, located NW of Centennial, Wyoming. One dead "mummified" BOT was also found in the park and given to Dr. Beth Williams at the University of Wyoming (UW) for pathological examination. The autopsy was meaningless because of advanced decomposition.

Chytrid fungus was identified in BOT populations in Colorado during 1999. This fungus is believed to be one of the leading causes of the worldwide decline of amphibian populations. Chytrids are fungi that develop without hyphae and are found in aquatic habitats and moist soil, where they degrade cellulose, chitin, and keratin. Parasitic chytrids mainly infect plants, algae, and invertebrates; the amphibian pathogen is the only example of a chytrid parasitizing vertebrates.

Clinical signs of chytrid fungus infections (chytridiomycosis) in amphibians include abnormal posture, lethargy, loss of righting reflex and red patches resembling "red leg" on their hind legs. Lesions, which are usually not apparent, consist of abnormal epidermal sloughing and (more rarely) epidermal ulceration; hemorrhages in the skin, muscle, or eye. Diagnosis is by identification of characteristic intracellular flask-shaped sporangia and septate thalli within the epidermis. The chytrids found in wild amphibians belong to the genus *Batrachochytrium.*

Management Recommendations

Continue to work with and follow the BOT recovery group recommendations for data collection, surveys and disinfection of equipment.

Monitor Rock Creek and the South Fork of Bird Creek to determine BOT population status.

Stock captive raised tadpoles near Lake Owen and Lake Creek if they are available in 2000.

CA - Coordination and Assistance

- Medicine Bow Routt National Forest Plan FX-LE-EP1-140

During 1999, one organizational meeting was attended. Several newsletters were received with some tentative dates set that were later changed. Meanwhile, the State of Wyoming decided that it would provide assistance for rewriting the plan. The crew has not received any request for assistance with the plan after the state became involved.

Management Recommendations

Wood frogs (WDF) should be left as an indicator species of forest health for the Medicine Bow National Forest.

Salamanders should be considered as an indictor species of forest health for non-fish producing ponds along with amphibians.

PF - Public Fishing Development

- Walk-in Access (WIA) Program FX-LE-PW4-175

Two waters were signed up for walk-in-access in 1999. They were Three-mile Creek / Dry Creek area South of McFadden, Wyoming and Glomill Reservoir, aka Miller Lake located SW of Torrington, Wyoming. Both contracts qualified for the maximum lease of $1,200 per year as they included more than two miles of fishable streams and more than 200 acres of standing water.

Other WIA contacts were made with the following results:
Daily (Laramie River above Grayrocks) He only allows locals to fish.
Dody (Pierce Reservoir) He wanted more time to consider offer.
Major Kollin (East Allen Lake) He did not want to participate.
Etchepare (Horse Creek) He wanted to wait until 2000 to sign up.
Yost (Phillipi Reservoir) He did not want some individuals on his property.

Management Recommendation

Try to sign up four or more WIA waters in year 2000.

PR - Public Relations

- Wyoming Business Council TV Filming of Fishing

About three man days (July 19-21) were spent assisting Taft Love of the Wyoming Business Council, with arrangements to help VTI Sound Vision Studios Deerfield Beach, FL 33441, film and photograph some expert fly fishermen in the Snowy Range. This was part of a cooperative marketing agreement to advertise Wyoming. The USFS assisted with this production.

Management Recommendation

The WGFD Information and Education Division should coordinate any future out-of-state TV productions with assistance from the management crew.

North Platte River Basin - 5NP

North Platte River LE851024CN

AS - Aquatic Resource Surveys

- Trout samples (condition factors) from the Six Mile Gap area FX-LE-5NP-512

Outfitters reported trout at Six Mile Gap were in better condition during 1999 than in past years. No fish samples were obtained in 1999. Silt in several side channels of the river was observed during a visit to the area the fall of 1999.

CS - Creel Surveys

- Outfitter Reports FX-LE-5NP-520

Guide reports continue to be a valuable source of angler information. The data submitted from outfitters in 1999 were for 769 anglers who fished 4,468 hours (Table 1). Ninety-seven percent of all fish caught were released.

Table 1. 1999 Fishing outfitter reports for the North Platte River.

Outfitter	Fish Kept BNT	Fish Kept RBT	% Kept	Fish Released BNT	Fish Released RBT	Total Fish Caught	Total Anglers	Total Hours	Total Catch Hour
				Above Saratoga					
Patterson	6	4	1.2	620	239	869	122	880	0.99
Old Baldy	25	25	2.7	919	897	1866	351	1452	1.29
Great Rocky Mountain	13	8	1.2	1170	549	1740	218	1727	1.01
Totals above Saratoga	44	37	1.8	2709	1685	4475	691	4059	1.10
				Below Saratoga					
Patterson	38	20	27.0	113	44	215	73	378	0.57
Great Rocky Mountain	0	0	0.0	20	12	32	5	31	1.03
Totals below Saratoga	38	20	23.5	133	56	247	78	409	0.60

Of particular interest is that 96% of the BNT and RBT caught that were greater than 16 inches in length (legal keepers) in the special regulation area above Saratoga were released (Table 2).

Table 2. 1999 Fishing outfitter summary of fish caught and released ABOVE and BELOW Saratoga by size groups.

	Fish Kept						Fish Released					
	Rainbow			Brown			Rainbow			Brown		
Outfitter	<10	10-16	>16	<10	10-16	>16	<10	10-16	>16	<10	10-16	>16
					Above Saratoga							
Patterson	0	0	3	3	0	3	56	141	42	144	406	70
Old Baldy	24	0	1	24	0	1	488	351	58	517	365	37
Great Rocky	5	0	7	6	0	7	145	287	117	431	625	114
Total	29	0	7	33	0	11	689	779	217	1092	1396	221
					Below Saratoga							
Patterson	3	13	4	0	35	3	25	18	1	63	46	4
Great Rocky	0	0	0	0	0	0	4	5	3	7	10	3
Total	3	13	4	0	35	3	29	23	4	70	56	7

Outfitters expressed their concerns about conflicts and increase in use on the North Platte and Encampment River in the spring of 1999. More Colorado outfitters are reportedly coming to Wyoming because no fees or permits are needed to commercially outfit in Wyoming. The majority of outfitters in the Saratoga Valley wondered why the WGFD doesn't not impose a fee on commercial outfitters (resident and non-resident) using WGFD owned public fishing facilities up and down the North Platte River. The BLM and the USFS both require a fee that is based on a percentage of the fee the outfitters charge

their customers. The BLM and USFS are believed to take in over $10,000 annually. The outfitters concern was that the WGFD is short of funding, but yet they are not charging commercial outfitters a fee to use WGFD lands and easements. The chief of fisheries wrote a letter to the director's office and a response was received that this issue would be reviewed at the spring staff meeting.

PF - Public Fishing Development

- Negotiate public access to the old Pick Bridge PFA FX-LE-EC1-010

The director of the WGFD met with and then wrote a follow up letter on November 5, 1999 to Mr. Bert Johnson, Manager of the TA Ranch expressing the WGFD desire to lease or purchase a permanent easement to the TA Ranch property along the North Platte River to consist of a parking area and approximately two miles of bank fishing. The TA Ranch expressed an interest in leasing the WGFD Pennock Unit for livestock grazing. No agreement was realized in 1999.

Management Recommendations

Work with Colorado fisheries management personnel and USFS to determine if silt found in the North Platte River bed near Six Mile Gap is again coming down Camp Creek from the abandoned mine near Three-Way Colorado.

During year 2000, a fishermen creel survey from the Colorado State Line downstream to Interstate Highway 80 (I80) is recommended.

Fish population estimates are recommended at Treasure Island, Pick Bridge, Rochelle, Douglas Creek and the Dugway.

Collection and summarization of Fishing Outfitter data should be continued. Request printing of outfitter form booklets similar to the Habitat and Access Maintenance Branch Public Use booklets.

The management plan for the North Platte River above Seminoe should be reviewed and completely updated after the 2000 fieldwork is completed.

The local Regional Advisory Team (RAT) recommends that a fishing easement be purchased from the TA Ranch. The RAT also recommended that the Pennock Unit not be leased for grazing, in exchange for public fishing on the TA Ranch. The reason being that the Pennock Unit was purchased as critical winter range for wildlife.

Trout Run Cadwell Slough LE856335CN

AS - Aquatic Resource Surveys

- Electrofish Trout Run at Old Baldy Club FX-LE-5NP-512

A two-pass removal estimate, using shore-based equipment and wading with two anodes, was completed on September 27, 1999. The BNT fish per mile estimate was relatively large, compared to past estimates (Table 3). The average size and biomass of BNT ranked last out of the four data points. The fish per mile estimate for RBT was similar to the previous two estimates. As with BNT, the RBT biomass estimate (pounds per acre) was the lowest in the dataset.

Table 3. Brown and rainbow trout population statistics from Trout Run.

Date	Average Length	Average Weight	Number Collected	Fish/ Mile	Lbs/ Acre	Station Length & Width		Method *
Brown trout								
Mar.84	11.1	0.71	28	386	52.0	1,915	482	MR
Aug.84	11.1	0.71	73	375	50.6	43	40	MR
Aug.95	6.7	0.23	62	1,012	48.5	1,915	455	3-P
Sep.99	9.2	0.34	50	662	46.5	43	40	2-P
Rainbow trout								
Mar.84	15.8	1.43	80	356	85.7	1,915	482	MR
Aug.84	13.6	1.01	37	170	32.6	43	40	MR
Aug.95**	10.7	0.62	14	153	19.8	1,915	455	1-P**
Sep.99	9.3	0.44	14	167	15.2	43	40	2-P

*Method: (MR=multiple mark-recapture; 3-P=three pass removal; 2-P=two pass removal; 1-P=one pass removal).
**Aug. 1995 RBT numbers were not depleted during the three passes, so the data were treated as a single pass.

It appears that the "big fish" segment of the trout population has declined. For example, the length of the largest BNT collected over the four sample dates was 19.4 inches; 17.0 inches; 16.0 inches, and 15.9 inches, Mar '84, Aug '84, Aug '95, and Sep '99, respectively. Likewise for RBT, the length of the largest fish was 19.1 inches; 18.0 inches; 16.0 inches, and 15.5 inches. Annual outfitter reports have consistently shown very little harvest of fish throughout the upper North Platte River; therefore, harvest does not seem to be a likely explanation for the apparent decline of "big fish." The advent of *Myxobolus cerebralis* in 1988 in the river might be implicated, but trout population estimates at multiple locations before and after 1988 have not shown trout population declines attributable to this parasite.

The "fish manager" for Trout Run on the Old Baldy Club has received pressure from club members to stock trout. RBT and BNT stream fish populations throughout the Laramie Region are managed under the "Wild" fish management concept (no stocking), but for seven exceptions. Trout Run would not be stocked if it were a "public" water. The Old Baldy Club's "fish manager" says he does not support stocking trout in Trout Run, and he does not anticipate applying for a private fish-stocking permit.

Management Recommendations

Foster the good working relationship with the Old Baldy Club.

Continue trout population estimates in Trout Run, every four to five years as trend information.

Encourage Old Baldy Club members to continue managing Trout Run as a "Wild" fishery.

Horse, Bear, Cherry and Deer Creeks Basin - 5HC

No work scheduled during 1999.

Lower Laramie River Drainage Basin - 5LR

Laramie River LE851205AY

AS - Aquatic Resource Surveys

- Sample Fish Population upstream of Tunnel Road FX-LE-5LR-512

The Laramie River, just above the Tunnel Road, was sampled on October 7, 1999. Sampling was conducted to determine the response of the fish population to DEQ required water quality improvements in sediments released from the upstream diversion dam operated by Wheatland Irrigation District (WID). The outlet structure was re-engineered in late 1996 to avoid sediment release and the resulting downstream fish kills. The system was working in the fall of 1997 when clear water was flowing through the outlet structure. However, on October 7, 1999 the sediments were again flowing through the release gate.

WID was contacted and they corrected the problem promptly by removing all the riprap around the flow-through structure in the dam, sealing the hole under the gate and then again applying the riprap. Because the dam structure was not sealed, there was little upstream pool to settle out the sediments. A down-cutting stream had developed above the reservoir in the accumulated silt bed that increased the silt load moving through the dam.

While four BNT were collected on October 7, 1999, the majority of fishes were non-game (Table 4). This was a vast improvement from July 1996 when the same station yielded only 15 WHS and 7 LND.

Table 4. Electrofishing results from the Laramie River downstream of the tunnel diversion dam, October 7, 1999.

Species	Number	Average Length	Number /Mile	Pounds /Acre	Pounds /Mile	No >6in	No/Mile >6in	Pounds /Acre >6in	Pounds /Mile >6in
BNT	4	14.8	73	49.2	98.6	4	73	49.2	98.6
CKC	35	4.4	437	10.9	21.9				
CRP	11	3.2	200	3.0	6.0				
CSH	1		18						
FHM	1		18						
IDT	15		273						
LND	36	3.4	655	3.3	6.6				
LNS	90	7.2	1639	163.9	327.8	17	1266	151.9	303.8
WHS	354	11.1	6445	2320.3	4640.4	32	5729	2263.0	4525.9

Management Recommendations

Schedule a resource reconnaissance tour during late fall to determine if silt is again being swept downstream with water from the diversion dam.

Delete all trout stocking from the diversion dam downstream.

Chugwater and Wheatland Creeks Basin - 5CC

No action on any projects in 1999.

North Laramie River and Drainages Basin - 5NL

Toltec Reservoir LE450432AY

AS - Aquatic Resource Surveys

- Sample Fish Population FX-LE-5NL-512

  Two gill nets set overnight and pulled on May 17, 1999 captured 45 RBT averaging 11.3 inches, 2 SPK averaging 10.8 inches and 185 WHS averaging 11.1 inches.

  A roadblock creel survey on May 16th, in conjunction with Wheatland Reservoir #3, resulted in 18 Toltec anglers being checked. They had fished 84.5 hours and they had caught 57 RBT of which 10 were released. The trout averaged 13.0 inches in length.

  The WGFD laboratory in Laramie examined two 14 inch RBT, case #99-067, submitted on 07/14/99 from Toltec Res. Both fish were showing signs of a fungal infection on the operculum surface. The causative fungus, *Saprolegnia*, is an opportunistic ubiquitous organism that lives on dead or dying tissues, and is also a secondary invader that becomes parasitic, under favorable environmental conditions.

PM - Fish Population Management

- Salvage Fish in Outlet Ditch FX-LE-5NL-730

  The Medicine Bow Game Warden called in early July and indicated there may be game fish trapped in the irrigation outlet ditch below Toltec Reservoir. Toltec Irrigation District was contacted prior to the salvage and following the operation. On July 14, 1999 a backpack shocker and seine were used to capture fish and transport them back into the reservoir. There were 39 RBT averaging 10.4 inches and 24 SPK averaging 8.4 inches salvaged.

Management Recommendations

Continue the fish stocking recommendation of 20,000 subcatchable RBT. Also continue the stocking of 5,000 SPK to utilize the abundant WHS population.

A screening system may be needed on the outlet structure to prevent fish from becoming trapped below the dam, but may be impractical because it probably would become plugged with vegetation.

Sybille Creek and Drainages Basin - 5SY

No work scheduled in 1999.

Little Laramie River drainages Basin - 5LL

Little Laramie River LE851615AY

PF - Public Fishing Development

- Signing of State School Section FX-LE-5LL-260

  An existing parking area is present along Albany County Road 574 on school lands in R77W T16N S16 SE1/4 with a faded old style "Parking Lot Information" sign.

Management Recommendations

Submit a job request to have services division obtain permission to install a new standard 3x4 foot WGFD "Parking Lot Information" sign.

Albany South Twin Lake LE150723AY

HI - Habitat Improvement and Maintenance

- Inlet Stream Spawning Habitat Improvement FX-LE-5LL-234

The second phase of improving spawning habitat in the inlet and outlet streams of Albany South Twin Lake was completed in 1999. The gravel pile stored at the Big Brooklyn Lake parking lot (September 1998, see 1998 Progress Report) was transported over the snow on April 19, 1999 to Albany South Twin Lake using a large snow-cat and sled provided by the USFS. Mechanical problems with the snow-cat and sled necessitated completing the gravel hauling on May 14, 1999. The gravel was shoveled by hand onto the sled at the storage site, hauled about 1 mile to the lake and emptied again by shovel at the inlet stream storage site.

Crewmembers spent two days (August 4 and 6) removing large rock and preparing the inlet stream channel for gravel placement. Approximately 120 feet of stream was narrowed and deepened with hand tools in preparation for gravel placement. Gravel placement occurred August 9-10, 1999 with USFS, WGFD employees and volunteers from the Cathedral Home in Laramie. Gravel was placed to an average depth of 4-6 inches. Previously, gravel was not available in the stream bottom for trout spawning.

Management Recommendations

Monitor and evaluate the effectiveness of spawning gravels by visual inspection and backpack shocking.

Mark (clip) fish scheduled for stocking in 2000 and each stocking thereafter to evaluate contribution of naturally spawning fish to the population.

Sample (gill net and/or angling) the fish population every two years to determine the ratio of stocked (marked) to unmarked (naturally reproduced) trout.

Big Brooklyn Lake LE150775AY

AS - Aquatic Resource Surveys

- Splake evaluations FX-LE-5LL-512

Two-gill nets were set overnight and pulled on August 24th. The catch was 29 BKT averaging 8.9 inches in length and 0.27 pounds in weight, with an average condition factor of 37.7. Fifteen SPK were also caught that averaged 9.7 inches in length, 0.32 pounds in weight and with an average condition factor of 32.2. LNS were also present.

Stocking SPK began in 1985 on an annual basis to control overabundant BKT and provide larger fish. Mean length of SPK has increased from 8.8 inches (1987) to 9.4 inches (1992) to 9.7 inches (1999). SPK are providing larger fish for the angler. Catch per unit effort of BKT has decreased from 2.3 fish per net hour (1987) to 0.7 fish per hour (1999).

Management Recommendations

Continue stocking 3,000 SPK every other year.

Monitor population status with gill netting every 5 years.

Little Brooklyn Lake LE250779AY

AS - Aquatic Resource Surveys

- Splake evaluations FX-LE-5LL-512

One gill net was set overnight and pulled on August 24th. The catch was 11 BKT averaging 7.8 inches in length and 0.20 pounds in weight with an average condition factor of 38.4. Sixteen SPK were also caught that averaged 10.1 inches in length with an average weight of 0.36 pounds and an average condition factor of 32.1. LNS were also present.

Stocking SPK began in 1985 on an annual basis to control overabundant BKT and provide larger fish. Mean length of SPK has fluctuated from 9.1 inches (1987) to 8.0 inches (1992) to 10.1 inches (1999). SPK are providing larger fish for the anglers. Catch per unit effort of BKT has decreased from 0.8 fish per net hour (1987) to 0.5 fish per hour (1999).

Management Recommendations

Continue stocking 800 SPK every other year.

Monitor population status with gill netting every 5 years.

Lewis Lake LE150831AY

AS - Aquatic Resource Surveys

- Splake evaluations FX-LE-5LL-512

Two-gill nets were set overnight and pulled on August 24th. The catch was 35 SPK averaging 11.2 inches in length and 0.48 pounds in weight with an average condition factor of 32.1. LNS were also present.

Stocking SPK began in 1985 on an annual basis to control abundant LNS. Mean length of SPK has increased from 6.7 inches (1987) to 9.8 inches (1992) to 11.2 inches (1999). Catch per unit effort of LNS suckers has decreased from 3.3 fish per net hour (1987) to 0.7 fish per hour (1999).

Management Recommendations

Continue stocking 1,000 SPK every other year.

Monitor population status with gill netting every 5 years.

Upper Laramie River and Drainages Basin - 5UL

Laramie River LE851211AY (Pioneer Canal Diversion downstream through Laramie)

AS - Aquatic Resource Surveys

- Monolith Ranch PFA FX-LE-5UL-512

Electrofishing on July 22, 1999 and resulting trout population estimates found BNT at the highest level observed over the past 13 years (Figure 1). In 1987 bank stabilization, riparian fencing, and other habitat improvements, were initiated on the Monolith Ranch.

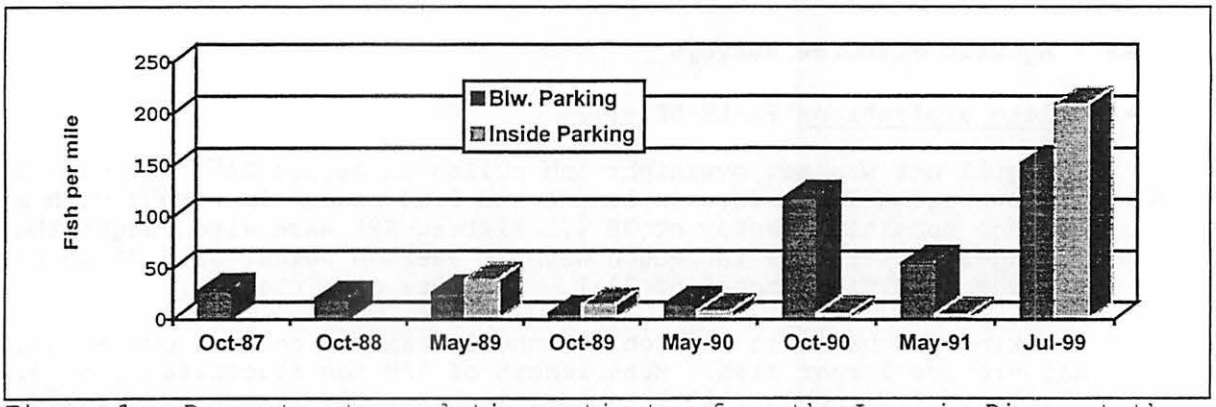

Figure 1. Brown trout population estimates from the Laramie River at the Monolith Ranch PFA.

The BNT are both "wild" and "stocked" trout, as 10,000 subcatchable BNT were stocked annually between 1989 and 1993 on the Monolith Ranch and through Laramie. No BNT have been stocked since 1993.

Catchable RBT are stocked each year (3,000 fish split between Monolith Ranch and within Laramie City limits). Stocked RBT survival on an annual basis may be negligible (this year's work was completed prior to stocking) (Figure 2).

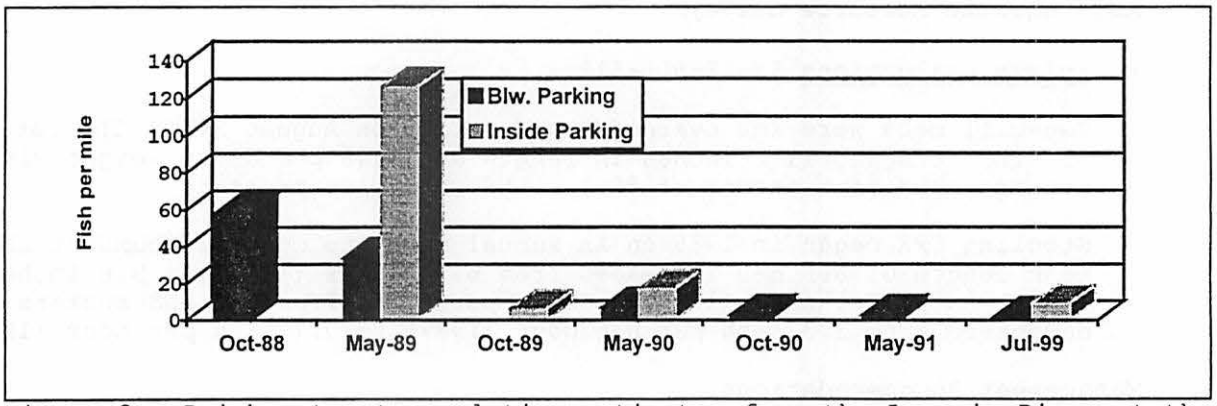

Figure 2. Rainbow trout population estimates from the Laramie River at the Monolith Ranch PFA.

- Laramie River within City of Laramie FX-LE-5UL-512

The Laramie River between Optimist Park and the Curtis Street Bridge was electrofished on July 12, 1999. A total of 1.4 river miles were sampled.

BNT (n=142) averaging 13.0 inches and 1.0 pound were taken. One BNT was 25.0 inches long and weighed 3.79 pounds. A majority of BNT (71%) were between 11 and 16 inches (Figure 3).

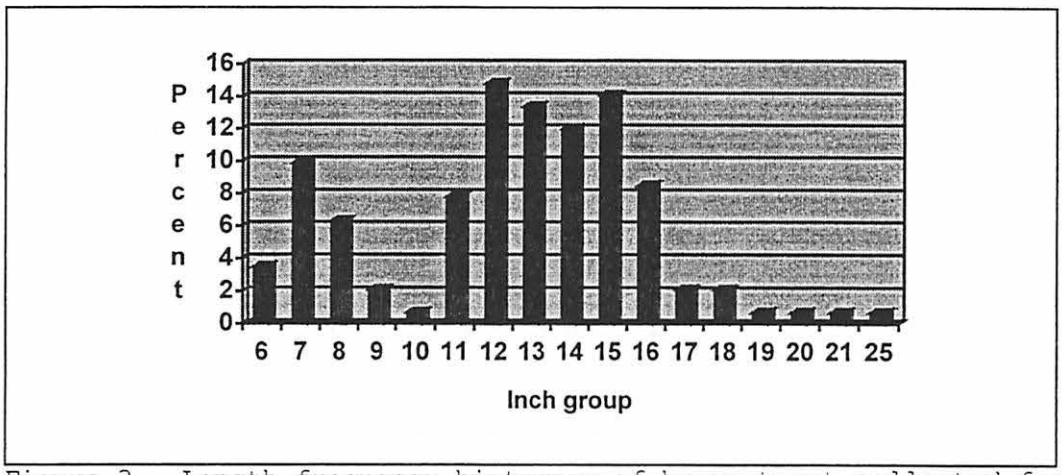

Figure 3. Length frequency histogram of brown trout collected from the Laramie River, Optimist Park to Curtis Street Bridge. N=142.

The two-pass estimate was 15.4 pounds per acre and 108 pounds per mile. BNT numbers were the highest (104/mile) compared to three previous years where estimates were conducted using similar equipment (raft with fixed electrodes). BNT estimates for the same area were 67/mile in 1988; 32/mile in 1990 and 33/mile in 1991. No RBT were collected. Other species collected include 5 CKC, 39 LNS and 47 WHS.

One dead BNT was submitted to the Lab for whirling disease analysis. It tested negative for *M. cerebralis* spores.

Management Recommendations

Evaluate return of the catchables stocked in the Laramie River through town and the Monolith Ranch using jaw tags and tag return boxes during 2001.

Have the Regional Aquatic Habitat Specialist write a habitat improvement plan for the river through the Laramie City limits, and implement the plan as a cooperative project among the WGFD, the City of Laramie, and others. Harry LaBonde, Laramie City Public Works Office, and expressed interest in such a plan and cooperating on such things as aquatic habitat grant applications.

Laramie River LE851215AY (Pioneer Canal Diversion upstream to Colorado)

AS - Aquatic Resource Surveys

- Hatchbox Operation and Evaluation FX-LE-5UL-576

No eggs were received during 1999 for the hatchbox.

- Electrofishing Population Estimates FX-LE-5LR-512

Electrofishing was completed on the Jelm to Danny Wright's station on August 18, 1999. Table 5 shows the BNT population was large and composed mostly of fish 5-6 inches and 8-12 inches (Figure 4). During the two days of electrofishing, only five RBT were collected. BNT population estimates have been relatively constant. The estimate in July 1988 was 1,713 trout/mile; July 1995 was 1,523 trout/mile; and August 1999 was 1,670 trout/mile.

Table 5. Two pass population statistics from the Laramie River at the Jelm to Danny Wright's Station, August 16 and 18, 1999.

Species	Number	Average Length	Number /Mile	Pounds /Acre	Pounds /Mile	No >6in	No /Mile >6in	Pounds /Acre >6in	Pounds /Mile >6in
BKT	1	7.5	1	0.0	0.2	1	1	0.0	0.2
BNT	1579	8.6	1670	55.1	501.0	1387	1467	53.2	484.1
LND	2	4.4	1						
LNS	17	10.8	12	0.9	8.6	16	11	0.9	7.9
RBT	6	6.2	4	0.0	0.4	4	2	0.0	0.3
WHS	15	15.5	10	1.9	16.9	15	10	1.9	16.9

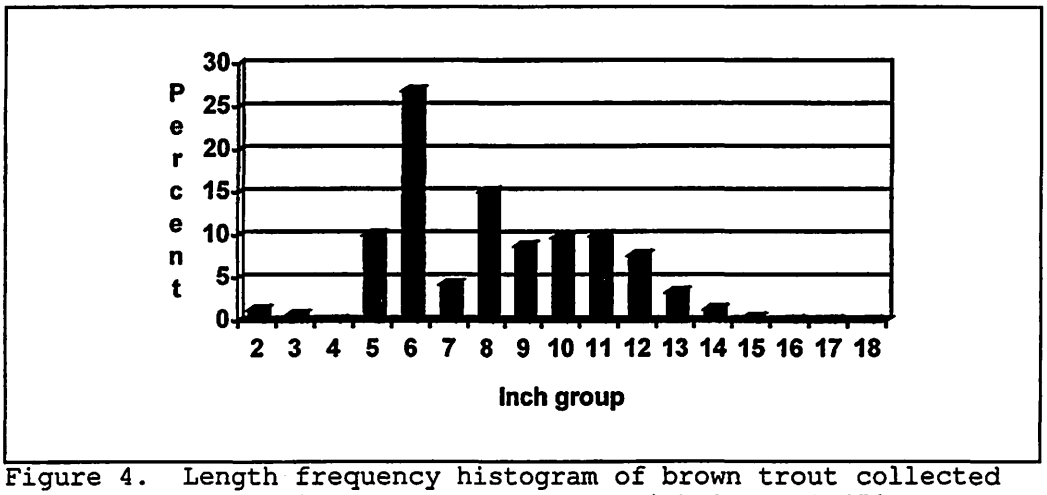

Figure 4. Length frequency histogram of brown trout collected from the Laramie River, Jelm to Danny Wright's. N=1,579.

Twenty-five BNT (seven fish 3-6 inches, and 18 fish ≥6 inches) were submitted to the WGFD Lab for whirling disease analysis. Fish in the 3-6 inch group were positive for *M. cerebralis* spores.

Management Recommendations

Discontinue use of the hatchbox as a means of stocking RBT; it has not established a "fishable" RBT population in the river.

In the fishing regulations, delete the prohibition on keeping RBT.

In 2005, evaluate the 10-16 inch slot limit on BNT by electrofishing the Jelm to Danny Wright's station and completing a programmed creel survey.

Lower Medicine Bow River Drainage Basin - 5LM

Difficulty Creek LE855440CN & Smith Creek LE855445CN

AS - Aquatic Resource Surveys

- Determine fishery status of farm ponds on old Williams Ranch FX-LE-5LM-512

The State Engineers office was contacted and they supplied a USGS map with the locations of impoundments. The stream and lake inventory database was updated with this information.

Little Medicine Bow River LE855460CN

AS - Aquatic Resource Surveys

- Ron Heward Ranch Walk-In-Fishing Access FX-LE-5LM-512

The Little Medicine Bow River was electrofished on the Heward Ranch on September 23, 1999. One hole, below a rock dam immediately below the ranch house, was sampled to test the electrofishing gear. Twenty-two BKT averaging 11.3 inches and two small RBT were collected as soon as the gear was turned on.

Another station was sampled immediately upstream of the above hole using the shore based unit. The VVP-15 failed a few minutes into the process. A backpack unit was used to obtain additional information in the remainder of the station. The water is deep and wide and the backpack unit was not adequate to sample all the fish present, therefore, only a one-pass estimate was completed. BKT and RBT were again collected in the station (Table 6). Of particular note is the collection of one STK.

Table 6. Electrofishing results from the Little Medicine Bow River on the Heward Ranch, September 23, 1999.

Species	Number	Average Length (inches)	Number >6 Inches
BKT	9	10.7	9
CKC	1	4.7	
LND	1	3.8	
RBT	13	8.0	13
STK	1	2.2	
WHS	1	7.3	

Management Recommendation

There are suitable numbers and sizes of game fish present to include this ranch in the WIA program.

Walker Jenkins Lake LE350054CN

PF - Public Fishing Development

- Negotiate public access to Walker Jenkins Lake FX-LE-EC1-010

A meeting was held with the WGFD lands branch, construction crew and Ron Heward in September. Mr. Heward indicated he was willing to lease a parking area on his land for fishermen to park near the Carbon County Road #2 bridge that crosses the Little Medicine Bow River. The Wyoming Game and Fish Commission approved the lease at their October commission meeting and Mr. Heward signed the ten-year lease for $1,200 on November 15, 1999.

A comatose trout, that appeared blind, was collected and sent to the WGFD laboratory for necropsy. There were no signs of lesions, gas bubble, parasites, trauma or cataracts. Since the fish was thin, with no food in the gut and no body fat, the laboratory concluded it was probably suffering from malnutrition.

Several 14-15 inch long RBT were caught by limited angling during the summer. During late December, a report was received of several ice fishermen also catching several small KOE (about eight inches long).

Several anglers were prosecuted for trespassing on private lands at the lake during 1999.

A fisheries management plan was written for the new Public Fishing Area (PFA). The goal of this PFA is to provide public access and a basic yield trout fishery for 1,000 annual fishermen days with a catch of 2.25 trout per fisherman day with an average size of nine inches (7-16 inch range).

Management Recommendations

Stock 10,000 fingerling trout annually (100 trout/acre).

Strive for a catch of 2.25 trout per fisherman day with an average size of nine inches (7-16 inch range).

Net the lake on a three-year cycle to determine species, size classes and condition factors. Adjust fish stocking recommendations to maintain an average condition factor of 36 (30-40 range).

Assist the construction crew with signing the parking area and boundaries of the state school lands, if necessary.

Troublesome Creek LE855420CN

AS - Aquatic Resource Surveys

- Provide assistance to BLM resource management plan FX-LE-EP1-512

Mike Bower, a temporary fisheries biologist employed by the Rawlins BLM Office, requested assistance with sampling Troublesome Creek on Shirley Mountain. Backpack electrofishing, water quality monitoring, and invertebrate sampling were completed on October 6, 1999. On one pass through 300 feet of stream, 155 BKT were collected, and they averaged 4.3 inches and 0.04 lbs. Twenty-four of the BKT submitted to the WGFD laboratory tested negative for *M. cerebralis*.

Upper Medicine Bow River Drainage Basin - 5UM

Work not Associated with a Particular Water, or Multiple Waters

HI - Habitat Improvement

- Carlson Creek Ditch Water Rights and Water for Diamond Lake FX-LE-5UM-511

The director of the WGFD wrote Wheatland Irrigation District (WID) a letter offering them all of the department's water rights to the Carlson Creek ditch. In return the WGFD wanted WID to fill Diamond Lake and keep it full in the future. WID refused the offer because the benefits to them were limited as their ditch is at capacity when the Carlson water rights are in priority.

A meeting was attended with the WID board of directors on September 14. The board expressed a possible interest in delivering water to the WGFD in calendar year 2000, after they first fill their reservoirs. The cost of the delivery would likely be between $10-30 per acre-foot of water.

Management Recommendation

Continue to work with the WID to facilitate water delivery to Diamond Lake.

Sand Lake LE250065CN

HI - Habitat Improvement

- Dam Repair FX-LE-5UM-511

  WID plans to rehabilitate the Sand Lake Dam, if they get the necessary clearances from the USFS.

Three-Mile Creek LE855790CN and Dry Creek LE855795CN

AS - Aquatic Resource Surveys

- Stream Survey FX-LE-5UM-512

  Three Mile Creek, located below McFadden, was enrolled in the WIA along with Dry Creek. Stream sampling was conducted to determine the presence or absence of game fish. Stream electrofishing conducted in August found no game fish present immediately downstream of the access road. Non-game fish included CKC, FHM, IDT, LND, and WHS.

  Dry Creek, located below McFadden and north of Three-Mile Creek, was also enrolled in the WIA. Electrofishing revealed a good population of BKT averaging 5.3 inches in length. Some BKT exceeded 11 inches. An estimated 783 BKT per mile were found that averaged 5.3 inches in length and 83.5 pounds per acre. Also netted were one CKC and nine LND.

  A nearby ditch (off Dry Creek) was sampled with electrofishing gear in a large hole at the road crossing. This ditch is also available to anglers as part of the WIA. This one hole produced 27 BKT ranging from 7.6-11.0 inches. One RBT (8.7 inches) was also collected.

Management Recommendation

Negotiate a lease for Three Mile Creek and Dry Creek again for WIA in year 2000, if possible.

Pass Creek Drainage Basin - 5PC

Turpin Creek Reservoir LE250261CN

AS - Aquatic Resource Surveys

- Splake evaluations FX-LE-5PC-512

  Two gill nets were set overnight and pulled on August 26th. The catch was 125 BKT averaging 7.7 inches in length and 0.22 pounds in weight with an average condition factor of 43.1. Also caught were 87 SPK that averaged 10.2 inches in length with an average weight of 0.46 pounds and an average condition factor of 38.3. One very impressive SPK was 22.2 inches long and weighed 4.64 pounds.

  Stocking SPK began in 1989 on an annual basis to control overabundant BKT and provide larger fish. Mean length of SPK has increased from 8.1 inches (1992) to 10.2 inches (1999). As indicated above, SPK are providing not only larger average fish but also trophy quality fishing opportunity. BKT continue to be abundant with no apparent effect on numbers from SPK. This may change in future years with the presence of larger SPK.

Management Recommendations

Continue with the SPK stocking, as their average size is now larger than BKT. Change stocking to alternate years at 5,000 fingerlings rather than the current 2,500/5,000 rotation on an annual basis. Over time SPK should aid in controlling the naturally reproducing small BKT in the reservoir.

Monitor population status with gill netting every 5 years. Consider shorter net sets to prevent net saturation and excessive mortality.

Sage Creek Basin - 5SC

Rawlins City Reservoir LE450537CN

PM - Fish Population Management

- Fish Stocking FX-LE-PE1-716

The Rawlins City Manager was contacted and permission was received to stock 3,500 ELR at 8.0 per pound in this 35-acre reservoir. The city does not want excessive use of this reservoir, as it is used for their backup domestic water supply.

Management Recommendation

Place Rawlins City Reservoir on an annual stocking schedule for 3,500 fingerling RBT.

Jack Creek and Spring Creek Basin - 5JC

No work scheduled in 1999.

Lake, Cedar and Elk Hollow Basin - 5LC

Saratoga Lake LE450401CN

AS - Aquatic Resource Surveys

- Gill and Trap Netting FX-LE-5LC-512

Trap and gill netting in May captured RBT and BNT that had been stocked between January and the capture dates (Table 7). STK have re-invaded the lake from the water supply ditch. These data serve primarily as an initial baseline to compare with future netting data.

Table 7. Saratoga Lake trap net and gill net catch statistics, May 18, 1999 (trap nets) and May 21, 1999 (gill nets).

Gear and Number		Species and Number		CPUE	Mean Lengt Inche	Min. Length Inches	Max. Length Inches	Mean Weight Pounds	Min. Weight Pounds	Max. Weight Pounds	Mean C	Min. C	Max. C
EG	3	BNT	5	0.24	8.1	7.5	9.0	0.22	0.15	0.32	39.0	35.6	43.9
EG	3	RBT	24	1.13	11.8	4.4	15.9	0.85	0.04	2.04	42.6	33.5	52.7
TN	7	BNT	1	0.14	7.6	7.6	7.6	0.16	0.16	0.16	36.4	36.4	36.4
TN	7	RBT	5	0.71	7.1	3.9	15.3	0.59	0.03	1.58	37.5	32.9	44.1
TN	7	STK	4	0.57									

Zooplankton tows on March 15, 1999 collected few critters (<0.5 ml per tow) in the 500µ-mesh, and none in the 750µ-mesh. Nearly all the zooplankton were copepods. The tows were taken in 11 feet of water near the dam. On May 21, 1999 tows were made in 11 feet of water in mid-lake, towards the northeast corner. The 500µ-mesh mean volume of zooplankton was 0.5 ml, and

the 750µ-mesh was 0.01 ml. In contrast to the March tows, nearly all the zooplankton were cladocerans.

Complaints from anglers about low catch rates continued from ice-out through June 1999.

Fish sampling was continued with gill nets and trap nets on August 30-31, 1999 (Table 8). The gill nets caught mostly RBT that were about 10 inches total length. The catch of LNS and WHS shows they were quick to re-invade the lake from the North Platte River, via the water supply ditch, following the October 1998 rotenone treatment. Trap nets caught RBT, WHS and STK. The numbers of STK indicates a veritable population explosion in the lake, from re-invasion from the North Platte River and reproduction in the lake. The gill net catch rate of RBT (2.48 fish/hr) compared favorably with the gill net catch rate of RBT following the treatment in May 1971. Gill netting in February 1972 caught 3.58 RBT/hr. Following the May 1971 treatment, 142,000 fingerling RBT were stocked. Our catch of suckers in August 1999 (0.24 fish/hr) was much lower than the sucker catch in February 1972 (2.84 fish/hr).

Table 8. Saratoga Lake trap/gill net catches, August 31, 1999.

Gear and Number		Species and Number		CPUE	Mean Length Inches	Min. Length Inches	Max. Length Inches	Mean Weight Pounds	Min. Weight Pounds	Max. Weight Pounds	Mean C	Min. C	Max. C
EG	2	BNT	5	0.12	12.2	11.5	13.1	0.86	0.74	1.04	47.5	41.8	52.5
EG	2	LNS	2	0.05	13.1	13.0	13.2	0.91	0.90	0.92	40.5	40.0	41.0
EG	2	RBT	102	2.48	9.7	7.0	18.5	0.46	0.14	2.98	45.5	33.5	46.3
EG	2	WHS	8	0.19	6.6	6.3	6.9	0.13	0.10	0.16	44.4	38.1	53.4
TN	7	LNS	2	0.29	8.7	4.8	12.5	0.38	0.06	0.70	45.0	35.8	54.3
TN	7	RBT	8	1.14	9.2	6.5	16.6	0.46	0.10	2.06	39.5	35.8	45.0
TN	7	STK	477	68.14									
TN	7	WHS	13	1.86	3.9	2.3	6.3	0.07	0.04	0.12	41.5	36.2	48.0

Table 9 shows that the RBT catch rate in gill nets on August 31, 1999 was surpassed only once since 1987. Sixty of the trout were examined for *Myxobolus cerebralis* spores and all were negative.

Table 9. Gill net catch per hour for rainbow trout from Saratoga Lake.

Date	May 87	May 90	May 91	May 92	May 93	Sep 93	Aug 94	May 95	May 96	May 98	May 99	Aug 99
Catch/hr	1.9	1.1	2.7	0.9	0.4	1.4	1.9	0.5	0.2	0.04	1.1	2.5

Zooplankton sampling was also continued on August 31, 1999. The anticipated "bloom" in the zooplankton population, following the rotenone treatment, has not been detected by our sampling. The volumes of zooplankton collected in the 500µ-mesh net and 750µ-mesh net were low (0.5ml), as in earlier samples this year. The same zooplankton sampling routine in August 1994 found 10ml of zooplankton in the 500µ-mesh net and 5ml in the 750µ-mesh net. We do not have a hypothesis for the depressed zooplankton population. Re-population by zooplankton following the rotenone treatment was expected to be relatively rapid.

Examination of stomach contents of RBT gill netted on August 31, 1999 found fish less than 10 inches in length were eating invertebrates. Stomachs from seven fish were examined: four of them contained primarily aquatic insect larvae (diptera), followed by cladoceran zooplankton, and corixid aquatic insects. Three stomachs were empty. Stomachs from three fish greater than 10 inches contained primarily STK, followed by snails and corixids.

Another round of zooplankton sampling was completed on September 13, 1999. Those results were much more promising in terms of the zooplankton food base of the lake. The mean volumes of zooplankton collected in the 500µ-mesh net and 750µ-mesh net were 6.8 ml and 1.4 ml, respectively (ZPR=0.20). Volumes collected seemed curiously variable, compared to past samples at this lake and sampling at other lakes. The zooplankton volumes in the 500µ-mesh net ranged from 1.0 ml to 18.0 ml and in the 750µ-mesh net from less than 1.0 ml to 3.0 ml. Additional tows were made with a 153µ-mesh net, and the zooplankton mean volume collected was 3.0 ml. Most of the zooplankton community was composed of larger animals, volumetrically. A cursory look at the samples from each of the three nets with a dissecting microscope revealed all the animals were cladocera.

Angler catch rates in September 1999 appeared much improved as angler interviews at the lake on September 13, 1999 and reports from the Saratoga Game Warden indicated people were catching and keeping limits of trout.

Dave Money, WGFD Fish Pathologist, examined sixty trout collected on August 31, 1999. He reported "the only noticeable trauma observed on these fish was the obvious presence of the larval trematode, *Apophallus imperator* (commonly called "black spot"). Internal examination further indicated that the fish were in very "good" condition as compared to other feral RBT. The fish were also negative for spores of *M. cerebralis*, the parasite that causes whirling disease.

Because of immigration of LNS, WHS and WAE, via the water supply ditch, a simple fish trap was installed in the ditch on November 3, 1999. The trap was basically a wire basket, smallest mesh size is ¼-inch hardware cloth, about 8x4x3 feet. Over the course of 20 days (November 3-23, 1999), the trap contained nine LNS, 13 BNT, 18 RBT, and one FHM. Length measurements (inches) of six of the LNS were 12.0, 12.8, 12.3, 12.7, 12.4 and 12.5. Forty-nine percent of the fish in the trap were dead. The sizes and fin conditions on many of the RBT in the trap indicated that people were likely catching fish from the plunge pool around the trap and throwing the fish into the trap. The trap was checked on December 13, 1999. Ice had weighed down a corner of the trap below water level, allowing fish to escape.

HP - Habitat Protection

- Flow Through Water Rights FX-LE-CAU 430

Steve Pechacek prepared and submitted a water right application to the State Engineer's Office to run water through Saratoga Lake on a year-around basis. The State Engineer wrote back and asked if the WGFD really wanted to do this, because the WGFD may be charged with depleting the flows in the North Platte River basin, and may be charged a large sum of money to pay for any depletion. The WGFD wrote back and said yes, we wanted to go ahead with the application to legalize the historic flow through.

Management Recommendations

Continue with stocking 100,000 fingerling RBT during early spring and 1,500 replacement RBT culls before the winter ice fishing derby.

Net the lake again in 2000. Future netting might be scheduled on even years only.

South Lake Creek LE856327CN

AS - Aquatic Resource Surveys

- Beaver Transplants and Brook Trout FL-LE-5LC-512

  Beaver have been re-established, by transplanting, in the South Lake Creek drainage on the Pennock WHMA. Evidence of active new beaver dams has been observed during the past two years.

  A channel change occurred during high water, below the abandoned ranch headquarters.

Management Recommendations

Request that the aquatic habitat biologist determine if the new channel formed during high water in 1999, should be blocked, and if the water should be diverted back into the old channel.

Monitor beaver activity and abundance in the drainage. Transplant more beaver if necessary.

Encampment River Basin - 5ER

Encampment River LE856620CN

PF - Public Fishing Development

- School Section Public Access FX-LE-5ER-012

  An existing parking area, provided by the lessee, is present adjacent to Carbon County Road 680 in the SE corner of the school lands in R83W T15N S16. This parking lot allows fishermen to park off of the county road, reducing a potential safety hazard of vehicles parked along the county road.

Management Recommendation

Submit a job request to have services division obtain permission to install a standard 3x4 foot WGFD "Parking Lot Information" sign.

South Fork Miner Creek LE856778CN

AS - Aquatic Resource Surveys

- Trout population estimates & cutthroat trout collection FX-LE-5ER-512

  A local angler indicated he was catching CRC from this stream. The stream was electrofished (Table 10) and specimens of CRC were preserved for future purity identification if necessary. Past CRC samples from this stream indicate the CRC are not pure (B or C grade). How they got into the stream is unknown.

Table 10. South Fork of Miner Creek trout population estimates (2 pass) from 385 feet of steam at an elevation of 7,445 feet on September 30, 1999.

Species	Number	Average Length	Average Weight	Average C	Number per Mile	Number per Mile>6"	Pounds per Mile	Pounds per Acre
BKT	178	5.2	0.07	40.6	2632	946	184.2	104.0
BNT	61	5.2	0.07	43.2	1225	261	110.3	62.3
CRC	7	7.3	0.14	33.2	99	85	13.9	7.8
RBT	11	4.4	0.04	41.4	158	29	6.3	3.6
Total number and pounds per mile of fish					4114	1311	314.7	177.7

Management Recommendation

Walk and fish the upstream area to determine distribution of CRC and other trout in the headwaters. A waterfall at elevation 7920 feet may be a barrier to upstream movement.

Soldier Creek LE856790CN

AS - Aquatic Resource Surveys

- Trout population estimates & cutthroat trout collection FX-LE-5ER-512

Soldier Creek was sampled just below the Wilderness boundary near the Walter Valley Ranch to check for CRC. No CRC were collected, but BKT, BNT and RBT were present (Table 11). Additional sampling may be done next year further up the drainage. Twenty RBT and 8 BKT samples were submitted to the Lab for whirling disease analysis. All samples were negative for *M. cerebralis*.

Table 11. Soldier Creek trout population estimates from 235 feet of stream sampled at an elevation of 7,520 feet on October 1, 1999.

Species	Number	Average Length	Average Weight	Average C	Number per Mile	Number per Mile>6"	Pounds per Mile	Pounds per Acre
BKT	36	4.6	0.05	46.1	1003	279	50.2	53.7
BNT	25	4.5	0.05	50.5	822	33	41.1	44.0
RBT	31	5.1	0.07	42.2	991	352	69.4	74.3
Total number and pounds per mile of fish					2816		160.7	

Management Recommendation

Walk and fish the upstream drainage to determine if CRC are present.

Beaver Creek and Big Creek Basin - 5BC

Cabin Reservoir LE550294CN

AS - Aquatic Resource Surveys

- Sucker investigations FX-LE-5ER-512

Ron Platt requested a gill net be set in his reservoir to determine the density of the sucker population. A gill net was set for approximately 3 hours on April 20, 1999 and it captured 16 trout and 14 suckers (Table 12). Ron Platt borrowed a trap-net to determine if he could successfully remove the non-game fish from the pond. The trap netting was not successful in removing many suckers.

Table 12. Results of a gill net set in Cabin Reservoir.

Gear and Number		Species and Number		CPUE	Mean Length Inches	Min. Length Inches	Max. Length Inches	Mean Weight Pounds	Min. Weight Pounds	Max. Weight Pounds	Mean C	Min. C	Max. C
EG	1	BNT	1	0.33	10.5	10.5	10.5	0.36	0.36	0.36	31.1	31.1	31.1
EG	1	RBT	15	5.00	10.7	9.5	15.0	0.46	0.34	1.27	36.1	28.5	43.2
EG	1	WHS	14	4.66	8.8	6.8	12.4	0.26	0.11	0.71	35.0	30.8	40.8

French, Brush, Cottonwood and Corral Creeks Basin - 5FC

Mirror Lake LE150839AY

AS - Aquatic Resource Surveys

- Splake evaluations FX-LE-5FC-512

Two gill nets were set overnight and pulled on August 25th. The catch was 34 SPK averaging 9.1 inches in length and 33 LNS averaging 10.0 inches in length. Of particular note is one splake was 20.6 inches and 3.65 pounds, truly an exceptional fish for this high altitude lake along a major highway.

Stocking SPK began in 1989 on an annual basis to control abundant LNS. Mean length of SPK increased from 6.6 inches (1992) to 9.1 inches (1999). Catch per unit effort of LNS has decreased from 3.8 fish per net hour (1987), 1.0 fish per net hour (1992 and 1999). SPK appear to have reduced the sucker population while providing the opportunity to catch a trophy fish.

Management Recommendations

Reduce SPK stocking from 1,500 annually to 1,000 every other year.

Continue stocking 1,000 catchable RBT trout annually to provide a fishery for this popular lake along scenic Highway 130.

Monitor population status with gill netting every five years.

Lake Marie LE150215CN

AS - Aquatic Resource Surveys

- Splake evaluations FX-LE-5FC-512

Two gill nets were set overnight and pulled on August 25th. The catch was one BKT averaging 7.3 inches in length; two RBT averaging 11.0 inches in length and five SPK averaging 8.6 inches in length. No non-game fish were present.

Stocking SPK began in 1989 on an annual basis to control abundant LNS. Mean length of SPK increased slightly from 8.2 inches (1992) to 8.6 inches (1999). Catch per unit effort of LNS has decreased from 1.8 fish per net hour (1987), 0.04 fish per net hour (1992) to 0 fish per hour (1999). LNS have disappeared from the lake fish population and no longer provide forage for splake.

Management Recommendations

Discontinue stocking SPK until LNS population becomes more abundant.

Continue stocking 1,000 catchable RBT annually to provide a fishery for this popular lake along scenic Highway 130.

Monitor population status with gill netting every five years.

Carbon South Twin Lake LE250207CN

AS - Aquatic Resource Surveys

- Splake evaluations FX-LE-5FC-512

Two gill nets were set overnight and pulled on August 26th. The catch was 89 SPK averaging 10.3 inches in length and 0.34 pounds in weight with an average condition factor of 29.5. LNS and WHS were also present.

Stocking SPK began in 1988 on an annual basis to control abundant LNS and WHS and to provide a game fishery where none had previously existed. Splake are abundant (CPUE of 2.2) and provide good fishing opportunity. Mean length of SPK has increased from 9.6 inches (1992) to 10.3 inches (1999). Catch per unit effort of LNS has decreased from 1.0 fish per net hour (1987) to 0.6 fish per hour (1999). Catch rates of WHS has increased slightly.

Management Recommendations

Continue stocking 1,000 SPK every other year.

Monitor population status with gill netting every five years.

Douglas, Mullen, Savage Run and Boat Creeks Basin - 5DC

No work scheduled.

South Platte River Basin - 5SP

South Plate River Basin

AS - Aquatic Resource Surveys

- Basin Management Plan Fish Survey FX-LE-5SP-512

The final Administrative Report on the South Platte River Drainages was submitted and the report was printed and distributed. All databases have been updated with the field information.

Granite Reservoir LE460560LE

CS - Creel Surveys

- Fishing Derby Creel Checks FX-LE-5SP-520

A total of 74 anglers fished for 201 hours during the Cosmopolitan Club Shotgun fishing derby held during February. They caught 25 KOE, 79 RBT and 14 YEP. They average catch rate was 0.59 fish per hour. The 34 RBT measured averaged 11.7 inches in length.

AS - Aquatic Resource Surveys

- Limnology Studies FX-LE-5SP-542

  The Cheyenne Board of Public Utilities and the USGS published a good paper bound book in 1999 entitled "Water Quality of Rob Roy Reservoir and Lake Owen, Albany County, and Granite Springs and Crystal Lake Reservoirs, Laramie County, Wyoming, 1997-98" by Kathy Muller Ogle, David A. Peterson, Bud Spillman, and Rosie Padilla (Water-Resources Investigations Report 99-4220) 50 pages plus appendix. The report summarizes water quality, plankton, and physical conditions of these four waters.

Pole Mountain Beaver Ponds Study

PM - Fish Population Management

- Beaver Pond Stocking FX-LE-5SP-716

  On June 19, 1999 approximately 70 volunteers assisted with stocking 18,000 BKT fingerlings in beaver ponds throughout the Pole Mountain area.

HI - Habitat Improvement and Maintenance

- Beaver Dam Restoration FX-LE-5SP-234

  Eleven abandoned beaver ponds were identified as potential candidates for dam rehabilitation in 1999. Rehabilitated dams and resulting ponds may be stocked with trout to provide additional fishing opportunity. Four dams were treated in 1999; one dam along Forest Service road 705, one along road 705H, and two along road 700G. Crew members filled sandbags at quarry sites on Pole Mountain and transported them to ponds. Initially, sandbags alone were used to plug holes in the dams. Later our habitat biologist suggested using large plastic sheeting prior to sandbag placement. This was done on subsequent dams. One dam (road 700G) repaired with sandbags in the fall of 1998 had evidence of active beaver activity and a pond has developed. Other dams have presented a challenge with hidden holes and water passages creating problems with sealing. It is possible that beaver may move into these areas completing the sealing process. Some dams have taken in excess of 100 sandbags with limited sealing success. Old ponds with breached dams present the biggest challenge due to sediment and vegetation filling the ponds and the numerous hidden passages for water within the structure of the dam.

Management Recommendations

Continue the fingerling-stocking program with the assistance of volunteers.

Continue monitoring the beaver dams repaired in 1999 to determine the effectiveness of rehabilitation efforts and if beaver move into the area and continue work on the dams.

During fish stocking activities identify those areas with breached dams suitable for rehabilitation and work those areas as time allows.

Crow Creek restoration on Warren Air Force Base

HI - Habitat Improvement

- Crow Creek Restoration FX-LE-5SP-515

No action was requested for management crew involvement during 1999 on clean up and habitat improvement on Crow Creek within Warren Air Force Base.

On April 5th, about 20 railroad cars of molasses derailed upstream of Warren Air Force Base. A very slight amount of molasses entered Crow Creek. No damage to aquatic animals was observed. Non-game fish were swimming in the discolored water with no ill effects noticed.

North Crow Reservoir LE460600LE

AS - Aquatic Resource Surveys

- Set nets to determine status of the fishery FX-LE-5SP-512

Four gill nets were set in North Crow Reservoir on August 8, 1999. The catch was dominated by LNS from four to ten inches in length (Table 13). The trout fishery is mostly composed of stocked RBT, SRC and SPK. The BKT are from natural reproduction.

Table 13. North Crow Reservoir netting catch statistics, August 8, 1999.

Gear and Number		Species and Number		CPUE	Mean Length Inches	Min. Length Inches	Max. Length Inches	Mean Weight Pounds	Min. Weight Pounds	Max. Weight Pounds	Mean C	Min. C	Max. C
EG	4	BKT	4	0.05	9.9	9.5	10.7	0.36	0.29	0.51	37.2	33.8	41.6
EG	4	CKC	30	0.36	4.2	3.9	4.6	0.03	0.02	0.04	39.8	27.0	50.6
EG	4	LNS	355	4.32	7.9	4.6	10.8	0.20	0.02	0.50	37.6	115.1	49.0
EG	4	RBT	34	0.41	10.3	6.6	18.2	0.43	0.11	2.58	34.3	27.6	42.8
EG	4	SPK	9	0.00	11.7	10.5	12.8	0.50	0.34	0.72	31.0	28.1	37.1
EG	4	SRC	3	0.04	14.6	12.3	15.9	1.11	0.52	1.57	33.3	27.9	39.1

Management Recommendations

Continue the present planting recommendations of 10,000 subcatchable RBT annually and 5,000 fingerling SPK every other year starting in 2002.

South Crow Reservoir LE560530LE

AS - Aquatic Resource Surveys

- Set nets to determine status of the fishery FX-LE-5SP-512

This small (5 acre) reservoir is surrounded by private land with no access and was not sampled in 1999.

Plains Lakes - 5PL

Work not Associated with a Particular Water, Or Multiple Waters

CS - Creel Surveys

- Plains Lakes Creel Survey FX-LE-5PL-520

An administrative report was finalized for the creel survey conducted during 1998 on Lake Hattie, Twin Buttes, Meeboer and Gelatt.

Mortenson Lake LE350473AY

AS - Aquatic Resource Surveys

- Use Mortenson Lake as a Brood Stock Lake FX-LE-5PL-718

The WGFD assistant chief of fisheries wrote Ralph Morgenwick, USFWS, Denver, CO 80255 to determine if the USFWS would allow limited public access to this fishery. No formal response was received, but indications from the wildlife refuge manager do not appear good for public access until the WYT population shows signs of recovery.

- Wyoming Toad (*Bufo baxteri*) NW-LE-PV1-512

Thirty-six individuals conducted a search for the Wyoming Toad (WYT) at Mortenson Lake on June 7, 1999. Art Anderson, a retired USFWS employee, organized the search that took about three hours. Three different search groups formed "skirmish lines" and walked designated shoreline areas. A total of 151 yearling toads were observed along with nine adults (five females and four males). One WYT was heard calling near the north shoreline. No egg masses were located by this date. The number of adult toads observed was down from twenty the previous year, but the number of yearling toads increased from 25 to 151.

The Saratoga National Fish Hatchery provided 24 mature WYT for release at Mortenson Lake along with about 630 tadpoles that were placed in the head-start tanks. Several other captive bred mature WYT from the Sybille Research Unit were put in breeding cages near the lake.

Twenty-four (24) adult WYT were released on 6-9-99 at Lake George on the Hutton Lake Wildlife Refuge, where captive-bred toads have been released in the past.

A calling WYT was heard in the NW corner of Garber Lake on June 14 and a pair of toads in amplexus was seen on the NW corner of Mortenson Lake. Thirteen yearling toads were also seen along the SE corner of Mortenson Lake on this date.

The fall WYT inventory was held on August 24, 1999 at Mortenson Lake. Twenty people were divided into three groups that searched Mortenson Lake. A total of 297 y-o-y toadlets, 148 yearling toads, and 27 adults were seen. Also counted were 324 chorus frogs (BCF).

A total of eight people searched Lake George and Rush Lake on August 24. They saw 118 BCF at Rush Lake and 24 BCF at Lake George. Three WYT were seen at Lake George.

Troy Gallion (phone 635-9931) said his son found two toads in the irrigation ditch located just SE of the toilet at Gelatt Lake. He indicated the toads were about 2½ inches in length. This would be the first observation of toads near Gelatt Lake for a number of years.

During the spring mosquito-spraying season, Harrison Talbott, chairman of the Big Laramie Mosquito Control District, was given a letter stating that the WGFD did not want any of their deeded lands at Meeboer and Gelatt Lakes spayed with malathion. Sharon Taylor, PHD graduate of UW, published a paper in the Journal of Wildlife Diseases during 1999 entitled "Effects of malathion on disease susceptibility in Woodhouse's toads." It concluded that a sublethal dose of malathion applied externally to toads might cause increased disease susceptibility when challenged with another stressor.

The new manager of the Mortenson Lake Wildlife Refuge is Greg Langer, P.O. Box 457, Walden Colorado. He intends to allow the private fishing lease to expire on the lake. WYT recovery efforts will have priority over a trout fishery or brood stock at Mortenson Lake, at least until toad recovery becomes evident.

An amphibian pathogen, histologically very similar to the chytrid fungus *Batrachochytrium,* was identified as *Basidiobolus ranarum* in wild WYT (*Bufo baxteri*) by Sharon Taylor, a PhD graduate of UW. Sharon Taylor and others published four articles in the Journal of Wildlife Diseases 95(1), pages 49-69, during 1999 documenting mortality causes of the WYT she examined.

Management Recommendations

Continue to assist with spring and fall WYT counts.

The ban on the use of malathion on WGFD deeded lands near Mortenson Lake (Meeboer and Gelatt Lakes) should be continued.

Alsop Lake LE350491AY

AS - Aquatic Resource Surveys

- Gill and Trap Netting FX-LE-5PL-512

Four trap nets were set overnight and pulled on April 4th. Only one CSH, one 24.3 inch long RBT, and 11 WHS averaging 11.5 inches in length were captured. The suckers had an average condition of 61.8.

Management Recommendations

Continue to keep the lake as full of water as practical by working with the water commissioner.

Continue stocking 5,000 RBT at 6/# in the lake to avoid predation and increase survival. If surplus catchable size RBT become available in the next calendar year, make arrangements to stock them in Alsop Lake.

Diamond Lake LE350007CN

AS - Aquatic Resource Surveys

- Gill and Trap Netting FX-LE-5PL-512

Eight trap nets were set overnight and pulled on April 2nd. The catch (Table 14) was entirely trout that averaged between eleven and sixteen inches in length. The mean condition factors of the trout were all good to excellent.

Table 14. Trap netting results from Diamond Lake.

Gear and Number		Species and Number		CPUE	Mean Length Inches	Min. Length Inches	Max. Length Inches	Mean Weight Pounds	Min. Weight Pounds	Max. Weight Pounds	Mean C	Min. C	Max. C
TN	8	BKT	1	0.13	11.4	11.4	11.4	0.64	0.64	0.64	43.2	43.2	43.2
TN	8	BRC	5	0.63	15.0	13.8	16.9	1.58	1.16	2.40	45.4	38.2	49.7
TN	8	RBT	83	10.38	14.7	8.9	20.7	1.40	0.48	2.90	42.3	29.6	68.1
TN	8	SPK	9	1.13	16.1	15.5	16.8	1.57	1.20	1.87	37.2	29.3	40.8
TN	8	SRC	16	2.00	16.6	14.4	20.5	1.88	1.32	3.12	40.7	31.1	55.7
TN	8	YSC	13	1.63	15.4	14.1	17.5	1.29	1.02	1.84	35.4	26.5	42.9

HI - Habitat Improvement

- Snow Fence FX-LE-5PL-430

Photographs were taken monthly during the winter of the snow accumulation behind the 2,000 foot long snow fence. Bob Jairell, of the Forest Research Lab in Laramie, measured the drift to estimate the water content. However, he retired before the estimates were finalized.

Two information signs were placed on the fence to explain its purpose. The sign had a background picture of the snowdrift accumulation during the winter of 1998-99, with informational wording.

A check for $500 was received in December 1999 from the Travelle Chapter of Izaak Walton League to help offset the cost of the snow fence.

During September of 1999, 4-D Fencing of Riverton agreed to build another 1,000 feet of snow fence between the two parking lots at the lake for $21,300, the same price per foot as the original fence. In December, the contractor agreed to build the remaining 180 feet of snow fence at Diamond Lake, between the parking lots (all three contracts would total 3,180 feet of fence at Diamond), and an additional 1,300 feet of snow fence, on a draw that drains into Diamond Lake, located on property owned by Brokaw's for $32,384. All of the snow fence located between the parking lots at Diamond Lake was completed before January 1, 2000. The contractor agreed to have the 1,300 feet of snow fence on Brokaw's finished by June 1, 2000. The total costs for the project and expected water yields were:

Diamond Lake,	3,180'	snow fence costing	$46,254	expected yield	80 AcFt/Yr
Brokaw's,	1,300'	snow fence costing	28,254	expected yield	34 AcFt/Yr
Totals	4,480		$74,508		114

A meeting with the WID board of directors was attended on September 14, 1999. The WGFD made an offer to purchase excess water from the district during 2000 for up to 2,000 acre-feet at $10.00 an acre-foot. The district has a large carry over of water from 1999 and conditions look good for excess water in the year 2000.

Management Recommendations

Continue the present stocking program of 10,000 fingerling BKT, 30,000 fingerling RBT and 30,000 fingerling BRC.

Monitor the snow build up behind the snow fence with monthly photos during the winter.

Clarify the 2002 fishing regulations that the limit is 2 trout greater than 16 inches in length; only one trout may exceed 20 inches in length. The intent is to manage Diamond Lake as a trophy lake.

Country Club Shop Pond LE550371AY

AS - Aquatic Resource Surveys

- Gill and Trap Netting FX-LE-5PL-512

A gill net was set for 3.2 hours on April 8th to assist the club with deciding if the lake had a non-game fish problem. The catch was 4 WHS averaging 8.0 inches in length and 0.23 pounds plus 2 YEP averaging 5.0 inches in length and 0.08 pounds.

Management Recommendations

It was recommended that the pond **not** be rotenoned to remove the suckers.

The club was also advised to stock about 1,000 RBT, about 10 inches in length, early in the spring and to fish the trout hard before fall.

East Allen Lake LE350053CN

CS - Creel Surveys

- Fishing Derby Creel Checks FX-LE-5PL-520

The Medicine Bow Lion's Club fishing derby was held on June 20th. There were 85 participants. Gross proceeds were $1,773.05 with a net of $1,051. The total value of prizes given out was reported as $3,298.92. Many prizes were donated. The Grand Prize was a rubber raft and 3 HP trolling motor provided by Carbon County Visitor Council. Second prize was $500 provided by the Lion's Club.

A total of 27 fishermen was checked that had fished a total of 432 hours. The results are summarized in Table 15. Excellent lake water levels during 1999 nearly inundated the entire boat ramp.

Table 15. Summary of results from fishing derby held on June 20, 1999.

SPP	Total Catch	Catch/ Hour	Fish Released	Measured Fish	Mean Length	Length Frequency Distribution In Inches 12	13	14	15	16	17	18	19	20
RBT	477	1.10	388	71	14.8	1	12	33	12	10	2	1		
CUT	93	0.22	80	13	16.2	1	1	1	1	1	6	2		
BNT*				1	16.6					1				
CUT*				24	17.8			1	1	4	9	5	2	2
RBT*				119	16.0	3	1	19	34	29	22	10	1	
	570	1.32	468											

*Data from Derby Sponsor's report.

Management Recommendations

Continue the "spot" creel surveys during the derby, if manpower is available.

Trap net and or gill net the lake every other year.

Gelatt Lake LE350479AY

AS - Aquatic Resource Surveys

- Gill and Trap Netting FX-LE-5PL-512

Four overnight trap nets were pulled from Gelatt Lake on March 25, 1999, and all the nets were empty. The lack of any trap-net catches did not indicate a loss of fish to winter kill, but was most likely an indication of the low density of trout. Anglers were observed catching RBT throughout the winter, and an angler caught a RBT while we were pulling the nets.

HI - Habitat Improvement and Maintenance

- Oxygen Injection System FX-LE-5PL-235

The oxygen injection system was installed October 26, 1998 and removed March 25, 1999. The system utilizes two ceramic diffuser stones connected with oxygen hose in a Y configuration. One size K oxygen bottle is used at 50 psi and between 0.025-0.25 liters per minute. One bottle lasts 2-3 weeks. The system was monitored weekly and the bottle changed as required.

The dissolved oxygen level was monitored using the titration method on January 22, 1999 and was 10.8 ppm off the shoreline near the oxygen tank. Small portions of the lake remained ice-free for most of the remaining winter and no further oxygen readings were taken. There was no evidence of

winterkill conditions throughout the winter period. Anglers were catching RBT on February 4, 1999 indicating over-winter survival.

The oxygen system was reinstalled on October 14, 1999 for the 1999/2000 winter season. The system was not turned on until mid December due to mild fall weather. The system is run up to 0.25 liters per minute depending on snow and ice cover to provide more open water and potential for oxygen exchange.

Management Recommendations

Continue stocking 7,500 RBT at 4/# annually.

Use the oxygen system in winter to reduce the risk of winterkill. Run the oxygen system up to 0.25 liters per minute to provide an increased area of open water and oxygen exchange.

Continue spring netting to evaluate over-winter survival.

Lake Hattie LE450451AY

AS - Aquatic Resource Surveys

- Fish Management Evaluation FX-LE-EP1-512

The results of ten trap and four gill nets set on October 12, 1999 and pulled on October 13, 1999 are given in Table 16. Two of the gill nets were typical shoreline, shallow (<20 feet deep) sets and two were deep-water sets (>30 feet). KOE outnumbered all other game fish in the nets. Figures 5 and 6 show that in the latter half of this decade, gill net catches of RBT appeared to have increased, then fallen, and trap net catches of RBT were relatively constant, then fell. Gill net catches of BNT were variable; whereas trap net catches increased sharply, then fell. KOE gill net catches appeared to steadily increase, and trap nets catches increased through 1997, then declined in 1999. YEP net catches were variable, and no YEP were caught in trap nets until 1999. Condition factors of all species were near or slightly above average.

Table 16. Lake Hattie netting results, October 13, 1999.

Gear and Number		Species and Number		CPUE	Mean Length Inches	Min. Length Inches	Max. Length Inches	Mean Weight Pounds	Min. Weight Pounds	Max. Weight Pounds	Mean C	Min. C	Max. C
EG	4	BNT	12	0.14	12.9	8.7	24.5	1.23	0.26	6.70	38.2	31.6	49.2
EG	4	KOE	46	0.54	14.0	10.9	15.6	0.94	0.46	1.24	34.3	27.7	40.8
EG	4	LNS	3	0.04	8.3	7.0	10.7	0.23	0.07	0.45	34.2	20.4	45.5
EG	4	WHS	9	0.11	15.0	11.0	21.9	1.35	0.50	3.72	35.5	32.6	40.8
EG	4	WHS	105	1.23	13.6	6.4	16.4	1.13	0.12	1.93	43.1	29.8	56.5
EG	4	YEP	60	0.70	7.4	3.5	11.6	0.23	0.02	0.80	46.9	16.2	58.7
TN	10	BNT	9	0.90	13.9	9.0	17.8	1.14	0.26	2.22	36.3	31.0	40.7
TN	10	KOE	17	1.70	14.1	13.2	15.6	0.86	0.58	1.06	30.6	20.5	37.0
TN	10	RBT	4	0.40	13.7	12.8	16.0	0.87	0.68	1.38	33.1	31.9	34.3
TN	10	WHS	4	0.40	13.8	12.9*	14.7	1.01	0.81	1.17	38.6	36.8	41.7
TN	10	YEP	2	0.20	8.3	8.0	8.5	0.29	0.24	0.33	50.3	46.9	53.7

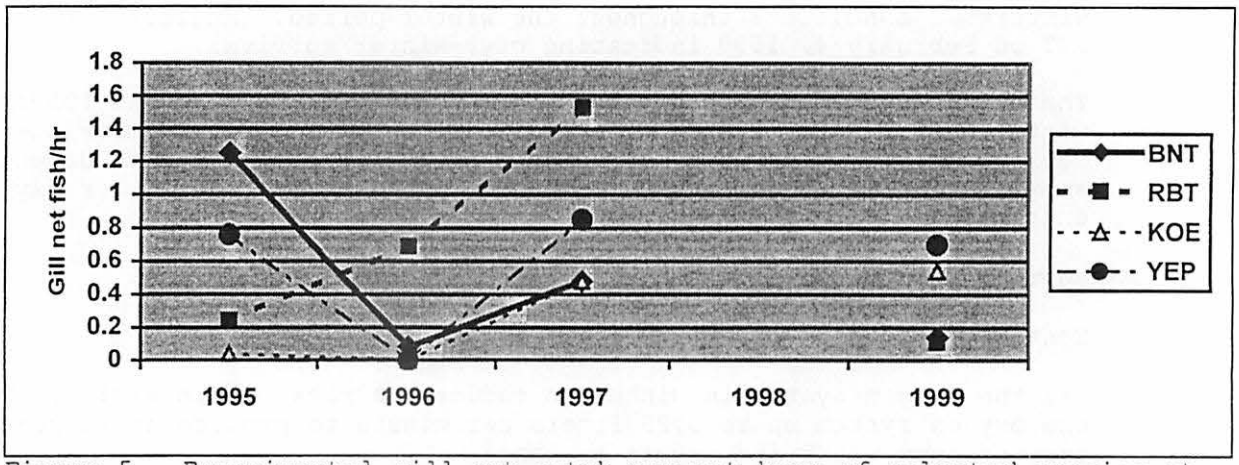

Figure 5. Experimental gill net catch per net-hour of selected species at Lake Hattie. Netting occurred in October of each year, except 1998.

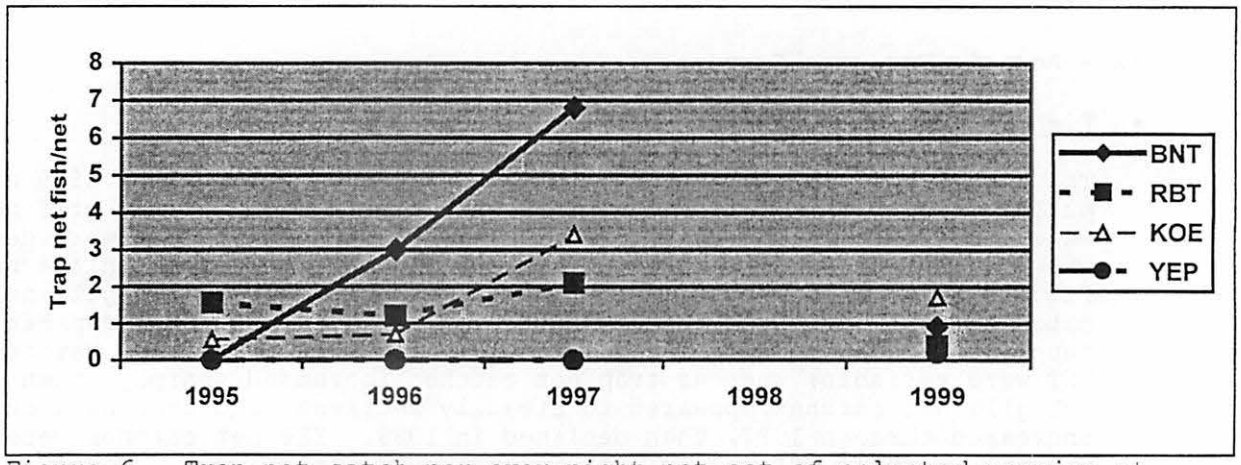

Figure 6. Trap net catch per over-night net-set of selected species at Lake Hattie. Netting occurred in October of each year, except 1998.

It's possible that KOE survival and growth has been so good in the 1990s that RBT have suffered. Figure 7 shows that the mean Wr of RBT in yearly sampling during the 1990s was at it's lowest in 1998.

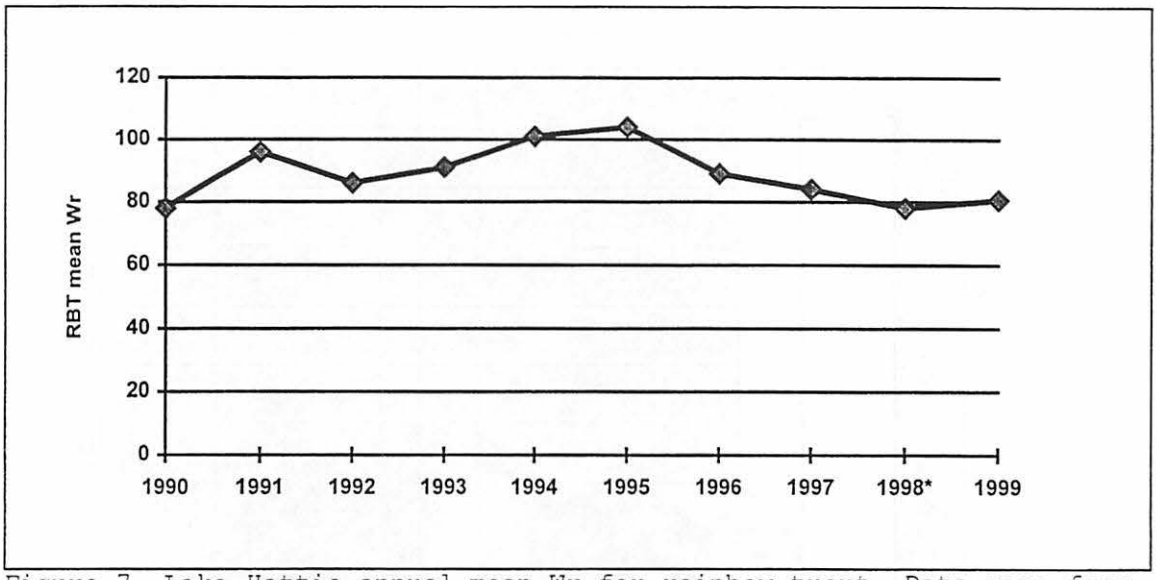

Figure 7. Lake Hattie annual mean Wr for rainbow trout. Data were from netting in October of each year, except 1998 was in August.

Figure 8 shows the history of zooplankton volumes collected from Lake Hattie. The inaugural sampling in 1993 produced the greatest volumes (ml) of zooplankton and the largest ZPR. Volumes of zooplankton collected in 1999 were greater than in the previous two years, but ZPR was unchanged (Figure 9). Between the two sample dates in July 1999, zooplankton volume declined in both the 500µ and 750µ tows. The ZPR increased by 0.1 between those two samples. The volume of zooplankton in the 500µ-mesh tows was greatest in the August 13 samples, but the volume in the 750µ-mesh tows remained low. Throughout the four sampling occasions in 1999, the ZPR was low, indicating relatively poor foraging conditions for sight-feeders, such as RBT.

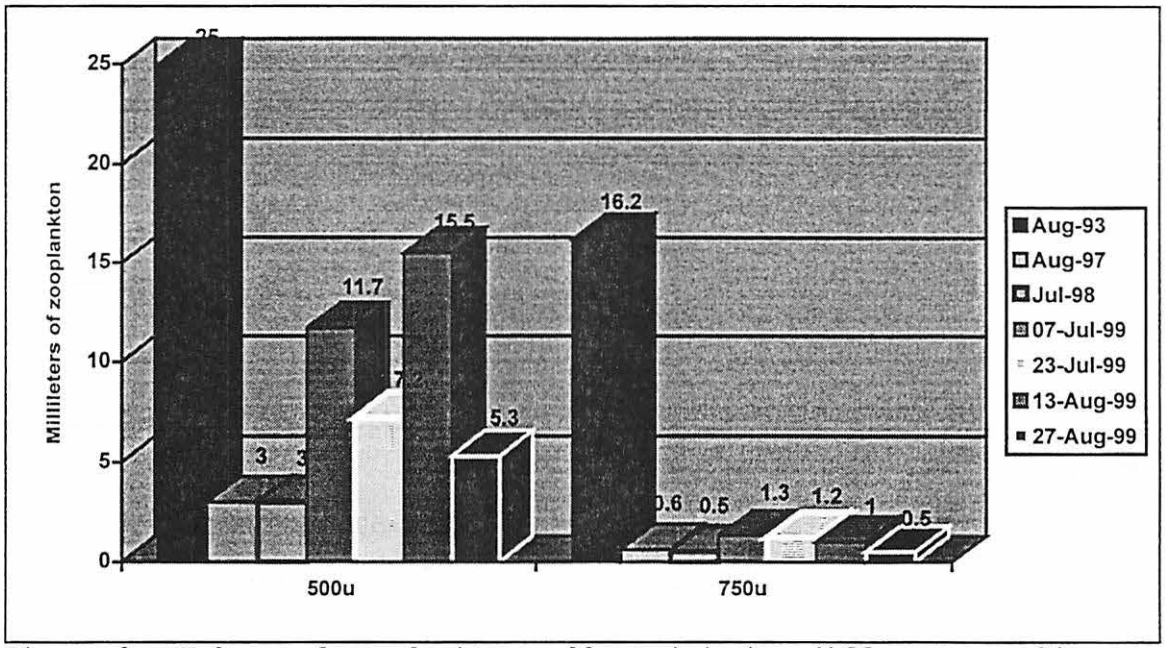

Figure 8. Volume of zooplankton collected during different sampling dates. The collection site was near the dam; all tows were vertical; the 1993 tows were 20 feet, and the 1997, 1998 and 1999 tows were 30 feet.

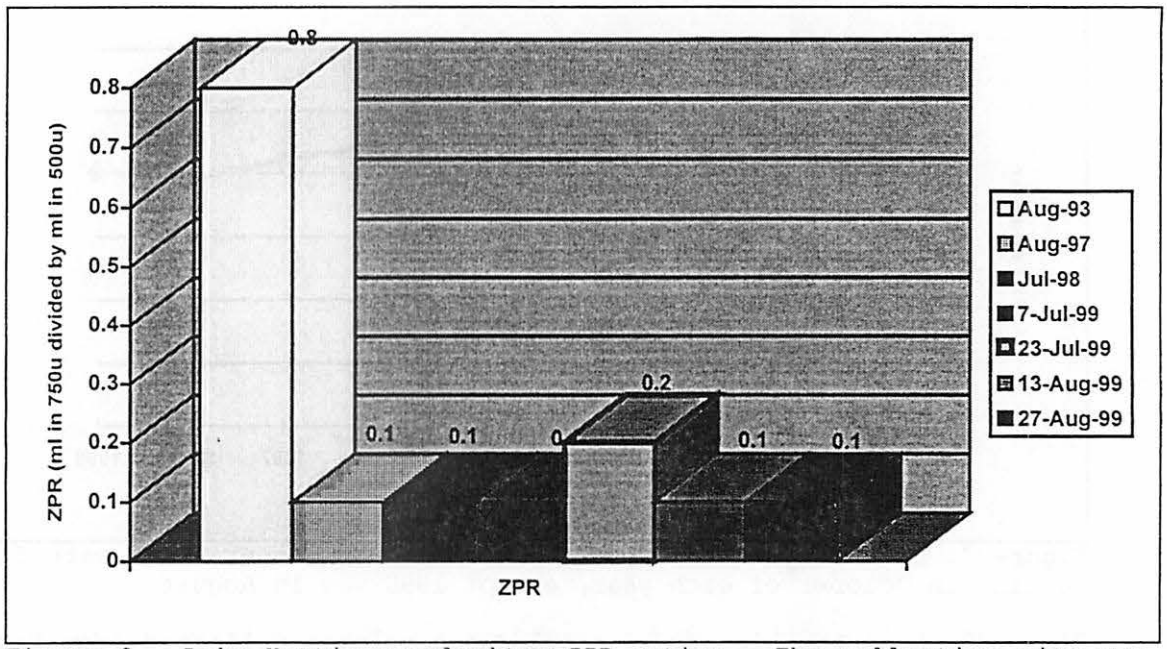

Figure 9. Lake Hattie zooplankton ZPR ratios. The collection site was near the dam; all tows were vertical; the 1993 tows were 20 feet, and the 1997, 1998 and 1999 tows were 30 feet.

Plankton blooms may occur as a reservoir is filling with water and nutrients are leached from the soil or brought in with inflowing water. The ZPR does not take into account the total volume of plankton, only the ratio of large plankton to small.

CS - Creel Surveys

- Fishing Derby Creel Checks FX-LE-5PL-520

The Chamber of Commerce Ice Fishing Derby was held on January 3. A total of 133 fishermen were surveyed that had fished a total of 555 hours. The catch is summarized in Table 17.

Table 17. Results of creel surveys conducted during Lake Hattie Ice Fishing Derby on January 3, 1999.

SPP	Total Catch	Catch/ Hour	Fish Release	Measure Fish	Mean Length	<11	11	12	13	14	15	16	17	18	19	20	>21
BNT	16	0.03	3	13	17.9			2		1	2	1	1		1	2	3
KOE	182	0.33	49	129	15.2		1	6	30	19	21	40	11		1		
LAT	62	0.11	3	29	28.2												63
RBT	104	0.19	40	55	15.8	2	3	4	6	5	5	11	6	6	5	1	1
SRC	1	0.00	0	1	16.2							1					
YEP	15	0.03	7														
	380	0.68	102														

Management Recommendations

The KOE plants were reduced from 150,000 to 50,000 fingerling and LAT brood culls were reduced from 750 to 250, to try to increase ZPR ratios and theoretically RBT condition factors. This is the first use of ZPR in the Laramie Region, instead of condition factors, to adjust stocking recommendations.

BNT plants were eliminated because return to the creel in the 1998 programmed creel survey did not justify annual stocking. Spot plants of BNT may be made in the future to diversify fishing opportunity and provide some trophy fish.

Submit a job request to improve fishermen access to the NE corner of the lake. The existing two-track road below the dam to this area becomes impassible when the reservoir water level is near full because of seepage from the dam.

Meeboer Lake LE350471AY

AS - Aquatic Resource Surveys

- Gill and Trap Netting FX-LE-5PL-512

Three overnight trap nets caught five RBT, seven WHS, and FHM and IDT on March 25, 1999. The netting confirmed the over-winter survival of trout that had been observed via spot creel checks of ice fishermen catching RBT throughout the 1998-1999 winter. The RBT averaged 17.0 inches and 2.30 pounds.

HI - Habitat Improvement and Maintenance

- Oxygen injection system FX-LE-5PL-235

The two oxygen injection systems, were installed October 26, 1998, and removed March 25, 1999. The systems utilized two ceramic diffuser stones connected with oxygen hose in a Y configuration. One size K oxygen bottle was used for each system at 50 psi and between 0.025-0.25 liters per minute. Each bottle lasted 2-3 weeks. The systems were monitored weekly and bottles changed as required.

The dissolved oxygen level was monitored using the titration method on January 22, 1999 and was 5.0 ppm off the boat ramp. Small portions of the lake remained ice-free for most of the remaining winter and no further oxygen readings were taken. There was no evidence of winterkill conditions throughout the winter period. Anglers were catching RBT on February 4, 1999 indicating over-winter survival.

The oxygen systems were reinstalled on October 14, 1999 for the 1999-2000-winter season. The two systems are run up to 0.25 liters per minute depending on snow and ice cover to provide more open water and increased potential for oxygen exchange.

Management Recommendations

Continue stocking 25,000 RBT (5 fish/pound)annually.

Use the winter oxygen injection system to reduce the risk of winterkill. Run the oxygen systems up to 0.25 liters per minute to provide an increased area of open water and oxygen exchange. Continue spring netting to evaluate over winter survival.

Twin Buttes Reservoir LE350545AY

AS - Aquatic Resource Surveys

- Gill and Trap Netting FX-LE-5PL-512

Seven trap nets and two gill nets were set overnight and pulled on October 12th, 1999. The catch was composed mostly of BNT (Table 18). Condition factors were good for all species.

Table 18. Twin Buttes Reservoir netting data, October 12, 1999.

Gear and Number		Species and Number		CPUE	Mean Length Inches	Min. Length Inches	Max. Length Inches	Mean Weight Pounds	Min. Weight Pounds	Max. Weight Pounds	Mean C	Min. C	Max. C
EG	2	BNT	126	2.76	14.1	6.5	21.3	1.23	0.18	3.54	41.8	32.2	87.4
EG	2	CUT	9	0.20	14.5	13.9	15.4	1.10	0.92	1.38	35.7	33.5	39.8
EG	2	RBT	26	0.57	14.8	11.4	16.2	1.19	0.72	1.64	36.4	30.7	55.3
EG	2	WHS	1	0.02	10.6	10.6	10.6	0.50	0.50	0.50	42.0	42.0	42.0
TN	7	BNT	45	6.43	15.0	6.5	19.8	1.40	0.20	3.09	40.9	35.9	72.8
TN	7	RBT	8	1.14	15.6	13.5	18.9	1.32	0.93	2.06	34.4	30.2	40.3

- Water Level Maintenance FX-LE-CAU-430

Riprap placement was completed October 22, 1999. About 150 acre-feet of water was delivered during the summer. An additional 450 acre-feet of water was delivered from Lake Hattie between October 24 and November 2, 1999 after the riprap was placed. Gil Engen, ditch rider, recommended a permanent staff gauge be installed at the inlet structure in order to determine water levels more accurately. Dave Lewis, WGFD construction supervisor, measured this year's water level at the concrete boat ramp.

Management Recommendations

A request was been made to Steve Pechacek, WGFD survey supervisor, to determine the feasibility of installing a permanent staff gauge and to expand the capacity chart for Twin Buttes Reservoir.

Wheatland Reservoir #3 LE450411AY

AS - Aquatic Resource Surveys

- Gill and Trap Netting FX-LE-5PL-512

Annual fall netting was conducted on September 22, 1999. RBT numbers were down from 1998, however, large RBT are still present (Table 19). BNT numbers were greater in 1999 and their average size from gill nets was larger (15.3 inches compared to 10.2 inches in 1998). WAE in a variety of sizes were present, indicating natural reproduction is occurring. CRP numbers continue to increase with lots of small CRP present in trap nets.

Table 19. Wheatland Reservoir #3 netting results, September 22, 1999.

Gear and Number		Species and Number		CPUE	Mean Length Inches	Min. Length Inches	Max. Length Inches	Mean Weight Pounds	Min. Weight Pounds	Max. Weight Pounds	Mean C	Min. C	Max. C
EG	2	BNT	30	0.63	15.3	13.2	17.2	1.58	1.10	2.12	43.4	36.1	47.9
EG	2	CRP	12	0.25	7.6	2.8	16.1	0.71	0.01	2.24	66.2	33.6	80.0
EG	2	LNS	1	0.02	10.7	10.7	10.7	0.48	0.48	0.48	39.2	39.2	39.2
EG	2	RBT	3	0.06	18.0	16.3	19.7	2.99	1.98	4.38	49.0	43.8	57.3
EG	2	STS	1	0.02	4.2	4.2	4.2	0.04	0.04	0.04	54.0	54.0	54.0
EG	2	WAE	11	0.23	11.7	4.2	16.2	0.74	0.02	1.92	37.2	27.0	45.2
EG	2	WHS	65	1.35	13.0	5.6	20.1	1.16	0.04	4.34	42.0	4.0	53.4
TN	6	BNT	1	0.17	15.3	15.3	15.3	1.58	1.58	1.58	44.1	44.1	44.1
TN	6	CRP	1072	178.67	2.4	2.0	3.7	0.02	0.01	0.04			
TN	6	FHM	1	0.17	2.1			0.01					
TN	6	IDT	20	3.33	2.1			0.01					
TN	6	WAE	3	0.50	7.6	5.0	12.6	0.25	0.04	0.68	31.0	26.9	34.0
TN	6	WHS	108	18.00	7.2	2.0	16.1	0.53	0.01	1.80			

- Road Block Creel Survey FX-LE-PPL-512

A road block creel survey was run on May 16. The 93 fishermen checked had fished 719 hours and had caught a total of 135 game fish for a catch rate of 0.19 fish per hour (Table 20). Anglers made nice catches of large RBT and BNT.

Table 20. Game fish caught from Wheatland Reservoir #3, May 16, 1999.

SPP	Total Catch	Catch/ Hour	Fish Release	Measure Fish	Mean Length	11	12	13	14	15	16	17	18	19	20	>21
BNT	10	0.01	2	8	18.5		2	1	1	2	1	1	1	2	2	1
RBT	114	0.16	60	54	19.3	1	1	4	2			1	5	12	12	16
SRC	4	0.01		4	15.8					3	1					
CUT	5	0.01		5	19.7					1						
WAE	2	0.00		2	15.0					2						
	135	0.19	62													

Frontier Refinery of Cheyenne held a fishing tournament on April 10, 1999. Sixteen participants caught nine trout that weighed a total of 37.4 pounds while fishing for a total of 96 hours.

PM - Fish Population Management

- Trout Salvage FX-LE-5PL-730

The local Game Warden checked the canal several times this year, noting only some suckers present. Therefore, no salvage operation was conducted.

Management Recommendations

Continue with the present stocking program of 350,000 RBT at a size of 40/# as long as the water level remains nearly full. If the water level declines, the numbers should be adjusted.

Future netting should be scheduled for odd years only because of manpower limitations during the fall.

Warm Water Fisheries - 5WW

Work not Associated with a Particular Water, Or Multiple Waters

PM - Fish Population Management

- Gizzard shad transplants from Nebraska FX-LE-5WW-716

Rock Lake, Wheatland Reservoir #1, Hawk Springs Reservoir, Springer Reservoir, and Packers Lake received 460 gravid GZS collected by electrofishing from two lakes south of North Platte, Nebraska. Three WGFD biologists spent two days, May 11-12, 1999, in the field with Nebraska biologists and their electrofishing boat to collect the numbers of shad requested by three WGFD Regions. The gravid GZS are stocked to produce offspring that are utilized as forage by the piscivorous fish in the lakes. As in past years, the cooperation and hospitality of the NGFP fisheries personnel in the North Platte Office was exemplary.

Management Recommendation

No adult GZS transplants are recommended in 2000 so that over-winter GZS survival may be evaluated in 2000. GZS transplants may resume in 2001.

Festo Lake LE350231PE

AS - Aquatic Resource Surveys

- Gill and Trap Netting FX-LE-5WW-512

Two experimental gill nets and two trap nets were set overnight and pulled on June 21-22, 1999. The fish population appeared to be dominated by small BLC, BLG, and PMK (Table 21).

Table 21. Festo Lake netting data, July 22, 1999.

Gear and Number		Species and Number		CPUE	Mean Length Inches	Min. Length Inches	Max. Length Inches	Mean Weight Pounds	Min. Weight Pounds	Max. Weight Pounds	Mean C	Min. C	Max. C
EG	2	BLC	6	0.14	5.9	5.7	6.1	0.09	0.08	0.09	41.4	37.0	43.8
EG	2	BLG	1	0.02	4.4			0.05			58.7		
EG	2	CCF	12	0.29	11.7	9.0	15.9	0.51	0.51	1.38	29.3	24.5	34.3
EG	2	CRP	13	0.31	16.4	7.4	22.6	2.28	0.24	3.93	49.9	34.0	78.9
EG	2	GOS	8	0.19	5.4	3.5	7.1	0.10	0.08	0.13	34.7		
EG	2	PMK	2	0.05	4.4	3.8	4.9	0.06	0.04	0.07	66.2	59.5	72.9
EG	2	TIM	1	0.02	11.9			0.29			17.2		
EG	2	YEP	3	0.07	4.4	3.6	5.7	0.07	0.07	0.07	37.8	37.8	37.8
TN	2	BLC	7	3.50	5.7	5.2	6.0	0.09	0.07	0.10	47.8	39.0	64.0
TN	2	BLC	7	3.50	5.7	5.2	6.0	0.09	0.07	0.10	47.8	39.0	64.0
TN	2	BLG	44	22.00	4.6	3.5	6.4						
TN	2	PMK	9	4.50	3.3	2.7	4.0						
TN	2	STS	18	9.00	3.7	3.0	4.7	0.03	0.02	0.04	42.5	31.3	61.0
TN	2	YEP	1	0.50	3.2								

PM - Fish Population Management

- Fish Stocking FX-LE-5WW-716

Stocking in 1999 consisted of 220 TIM and 2,500 CCF.

Management Recommendation

Annual stocking of 2,500 fingerling CCF and every other year stocking of 500 subcatchable TIM muskie should be continued to establish a "balance" between panfish and game fish.

Grayrocks Reservoir LE450005PE

AS - Aquatic Resource Surveys

- Fish Management Evaluation FX-LE-5WW-512

Assistance was provided to the statewide reservoir crew netting the lake. Netting results are summarized under the statewide reservoir crew results.

PM - Fish Population Management

- Fish Stocking FX-LE-5WW-716

A total of 3,500,000 WAE fry were stocked by boat on April 12, 1999. An additional 230,055 fingerling WAE were stocked by boat on June 29, 1999.

CS - Creel Surveys

- June Programmed Creel Survey FX-LE-5WW-520

A contract biologist was hired in Wheatland to do creel survey work on Grayrocks Reservoir during the month of June. The survey went well and many fishermen checks were made.

An estimated 4,487 anglers spent 21,067 hours fishing Grayrocks Reservoir, and boat anglers exerted 94% of the fishing pressure. Fishing pressure was estimated as 5.9 hr/acre (se=1.26), or 1.3 angler-days/acre (se=0.39). WAE

averaged 15.2 inches and 1.26 pounds, and of the 633 WAE measured by creel clerks, 48% were equal to, or greater than, 15 inches. The estimated WAE harvest was 9,673 fish (se=1,974), or 2.7 fish/acre (se=0.56). Anglers caught WAE at the rate of 0.72 fish/hr (se=0.09) and creeled them at a rate of 0.46 fish/hr (se=0.01).

The June 1999 angler estimate (4,487 anglers, s.e. 1,368) was 26% greater than in June 1994 (3,570 anglers, s.e. 1,108) (Meyer 1995). Because anglers' average trip length was shorter in 1999 than in 1994, the angling pressure (hr) during June 1999 was nearly identical to the pressure in June 1994. Anglers enjoyed a WAE catch rate in June 1999 that was 44% greater than in June 1994, yet was well below the outstanding catch rate in 1989 (Table 22). In 1999 anglers were more inclined to keep WAE rather than release them, relative to 1994 (Table 22). Anglers in June 1999 caught more WAE (15,185 fish), and creeled more (9,673 fish) than they caught (10,444 fish) or creeled (3,962 fish) in June 1994 (Meyer 1995).

Table 22. Walleye catch, harvest, creel and release rates (se) for Grayrocks Reservoir, June 1999, June 1994 (Meyer 1995), and June 1989 (Snigg 1990).

Variable	June 1999	June 1994	June 1989
Number caught/hr	0.72 (0.09)	0.50 (0.59)	1.95 (2.29)
Number kept/hr	0.46 (0.01)	0.19 (0.02)	1.28 (1.51)
Number released/hr	0.26 (0.07)	0.31 (0.06)	0.67 (0.78)
Number WAE kept	9,673(1,974)	3,962 (541)	32,385 (8,802)
Pounds/acre WAE kept	3.4	1.3	16.0

The 16.0 pounds per acre harvested(kept)in June 1989 represented about 50% of the 32.2 pounds per acre of WAE per acre harvested during the creel survey period of May 3rd through September 16th, 1989. Therefore, the 3.4 pounds per acre harvested in June 1999 may be expanded to about 6.8 pounds per acre for the same time period as May 3rd through September 16th 1989. The present WAE harvest from Grayrocks Reservoir continues to be much higher than other WAE waters reported in the region and perhaps the nation where 3.0 pounds per acre or more is rare and 1.0 pound per acre or less is normal.

The WAE creeled in June 1999 were smaller than in June 1994, on average (15.2 inches, 1.26 pounds and 15.5 inches, 1.47 pounds, 1999 and 1994 respective means). The histogram of WAE lengths in 1999 had a peak at 14 inches with a small tail extending out to 36 inches (Figure 10). The 1994 histogram had a sharper peak at 14 inches, a secondary peak around 20 inches, and greater frequencies of small fish (<12 inches) than the 1999 histogram (Figure 10). Between June and late August, or early September, when annual gill netting occurs, WAE probably grow at least two inches. Figure 10 shows that anglers' harvest fell heavily on the WAE size classes (13-15 inches) that were subsequently abundant in gill nets (15-17 inches) in 1999 (Figure 11). On the extremes of the length frequency distributions in 1999, anglers generally did not harvest WAE less than 12 inches, which were well represented in gill nets as 14-inch fish, and anglers were able to catch a few larger WAE than the gill nets. The large cohort of 14-16 inch WAE sampled in gill nets in the fall of 1999 may provide fishing in 2000 for 16-18 inch fish. The gill net catch of WAE <12 inches also indicated the WAE population will be able to sustain the expected continued focus of angler harvest in 2000 on 13-15.9 inch WAE. Heavy exploitation may explain the relatively limited number of larger WAE in Grayrocks Reservoir.

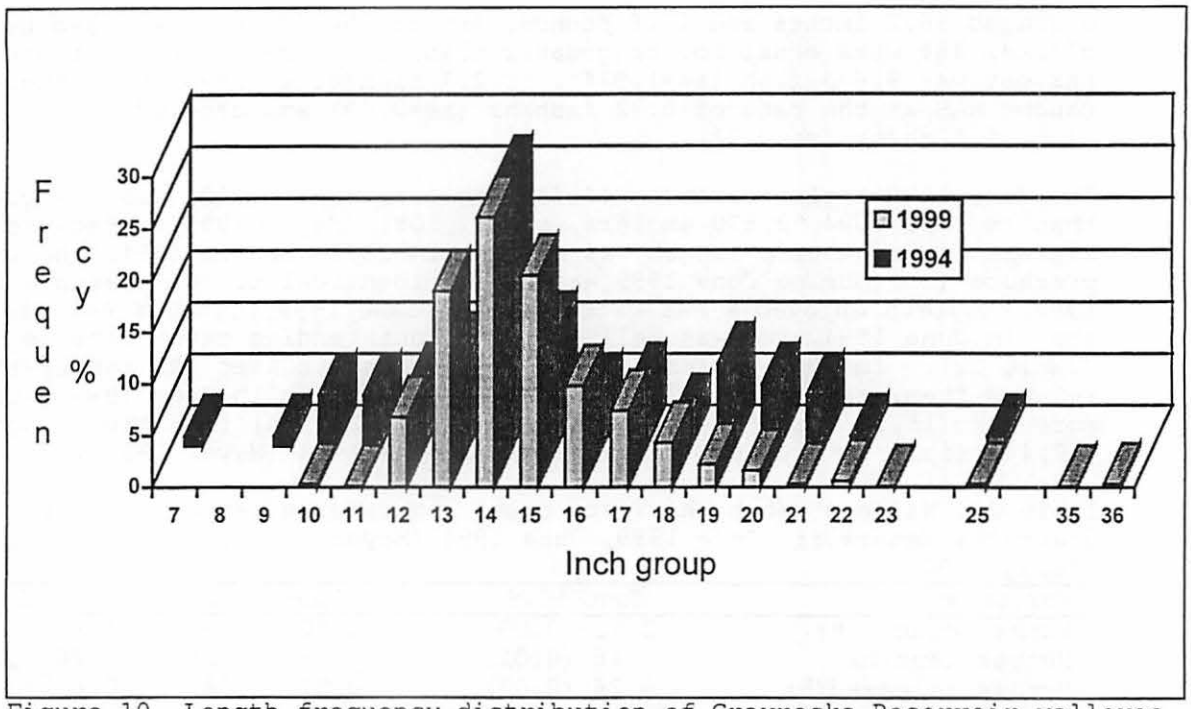

Figure 10. Length frequency distribution of Grayrocks Reservoir walleyes measured from anglers' creels, June 1999 (N=633), and June 1994 (N=128).

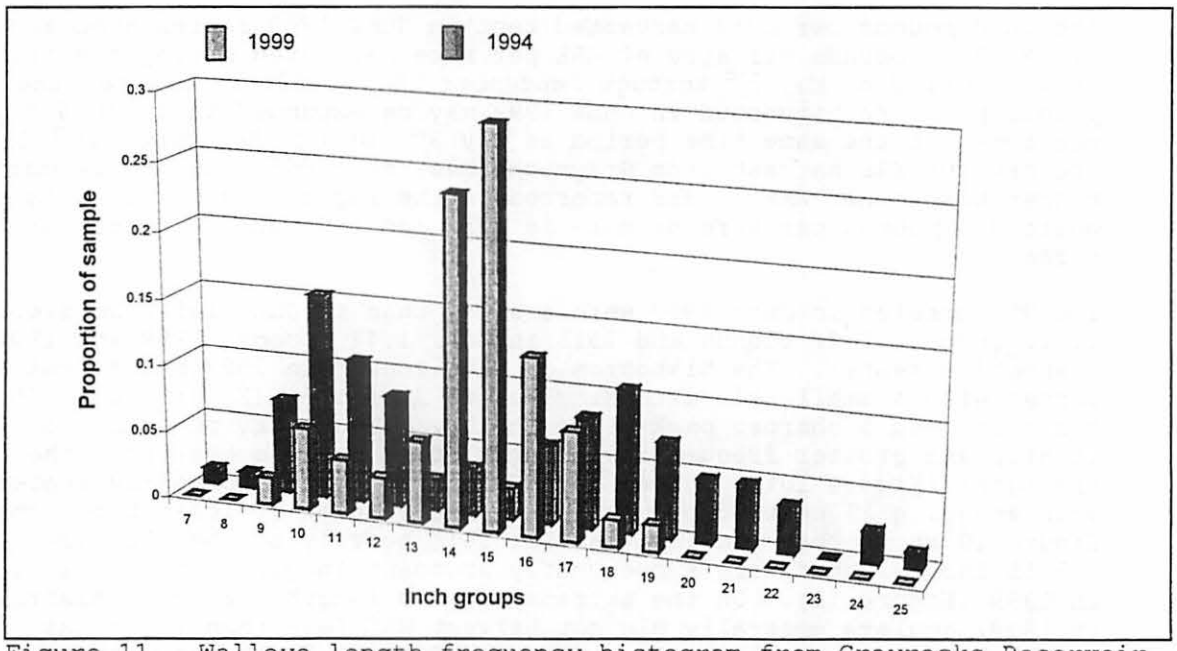

Figure 11. Walleye length frequency histogram from Grayrocks Reservoir experimental gill netting, August 30-September 1, 1999 (N=99) and September 6-8, 1994 (N-85).

Most anglers (54.5%) in June 1999 were very satisfied with their fishing experience at Grayrocks Reservoir, and many were somewhat satisfied (24%). Only 7.5% expressed dissatisfaction with fishing. Angler satisfaction was largely based on the perception of not being crowded by others (few other people) (Table 23). Less than 20% of anglers attributed any parameter of the fish population (e.g., size or number of fish) as having influenced their satisfaction. Factors presented to anglers for consideration were: size of fish caught; numbers of fish; few people; too many people; just

being outdoors; surrounding scenery; being with family & friends; weather (good/bad), and fishing regulations.

Table 23. Frequency that anglers (N=429) attributed several factors with influencing their level of satisfaction with their fishing experience at Grayrocks Reservoir, June 1999.

Factors	Frequency
Few people	317
Few people; Just being outdoors	41
Few people; Being with family & friends	16
Few people; Surrounding scenery	8
Various combinations of factors	33
Not asked/no response*	14

*This question was neglected by the creel clerk in several instances and several anglers chose not to answer.

One aspect of the Grayrocks Reservoir fishery not addressed by the management objectives is CCF angling. Evaluation of CCF stocking will require measurement of the return of stocked catfish to anglers in months other than June. Consideration needs to be given to whether stocking a species that represents 2% of the catch and 3% of the harvest is justified.

A draft report is being reviewed for printing as an administrative report.

- June Road-block Creel Survey FX-LE-5WW-520

The annual angler road-block creel survey was held on June 13. A total of 249 anglers was checked that had fished a total of 1757 hours. Information is summarized in Table 24.

Table 24. Results of the 1999 Grayrocks Reservoir roadblock, 6/13/99.

	Total	Catch/	Fish	Measure	Mean	Length frequency distribution in inches										
SPP	Catch	Hour	Release	Fish	Length	<10	11	12	13	14	15	16	17	18	19	20	>21
BLC	3	0.00	0	1	10.3	1											
CCF	33	0.002	16	10	19.5					1			1	2	1	3	2
CRP	10	0.01	10														
FWD	8	0.00	2	4	13.8				3	1							
LMB	4	0.00	4														
RBT	10	0.01	8	1	15.1						1						
SMB	115	0.07	111	2	12.5			2									
WAE	758	0.43	372	170	15.6			6	26	51	34	18	14	9	1	3	8
YEP	21	0.01	8	13	14.1	1			4	4	3	1					
	962	0.55	531														

A comparison of WAE data collected from Grayrocks road-block surveys between 1987 and 1999 is shown in Table 25. The mean length of WAE harvested has declined over the years, but showed improvement in 1999.

Table 25. Comparison of the number of anglers checked at the Grayrocks Reservoir road block surveys from 1987 through 1999 and the number of walleyes reported caught / released and their average size.

Year	Angler	Total WAE Catch	Catch per Hour	WAE Released	WAE Measured	WAE Mean Length
1987	264	322	0.17	131	191	17.2
1988	236	578	0.47	54	466	15.6
1989	2615	3384	0.66	2745	639	16.2
1990	454	1714	0.44	822	325	16.1
1991	451	645	0.15	143	182	16.0
1992	458	619	0.14	279	174	16.3
1993	405	395	0.12	140	39	16.0
1994	323	817	0.53	473	128	15.5
1995	298	1176	0.49	718	234	14.2
1996	221	613	0.27	201	149	14.4
1997	207	543	0.33	390	58	14.9
1998	155	663	0.52	428	55	14.6
1999	249	758	0.43	372	170	15.6

The one-day road-block data may be less reliable than the annual netting data because variables such as weather may influence anglers' success in a single day of fishing. For angler catch rates in 1999, the one-day road-block data differed from the month-long survey data and data from two other Sundays in June 1999 (Table 26). In contrast to catch rates, the mean lengths of harvested WAE were similar among the 1999 data sets (Table 26). The value of the one-day road-blocks is the opportunity for information exchange between anglers, biologists and enforcement personnel.

Table 26. Angler catch rates for walleye and mean length of creeled fish from the June 1999 programmed survey, the two programmed Sundays (June 6 and 20) and the Sunday, June 13, on which the road block was conducted.

Source	catch/hr	mean length (in)
Programmed June (month-long, 1999)	0.72	15.2
Programmed Sundays (June 6 and 20, 199)	0.62	15.3
Road-block (June 13, 1999)	0.43	15.6

A total of 130 anglers entered the IBEW612 Fishing Derby at Grayrocks Reservoir during June 19, 1999. There were 117 adults that paid $10 each and 13 youths paid $5 each. All fees collected were paid back as prizes. The 130 anglers fished a total of 730 hours. All WAE less than 15 inches in length had to be released. They did not record released fish. The catch was 1 BLC ten inches long, 123 WAE averaging 17.1 inches in length, and 3 YEP averaging 8.6 inches in length.

Management Recommendations

Continue the fall netting, if personnel and time are available.

Continue annual WAE fingerling stocking with OTC-marked fish, and utilize that marking to investigate fingerling contribution to the fishery. Continue WAE fry stocking until the fingerling evaluation is completed.

Continue with the annual one-day road-block survey during June.

Schedule another programmed creel survey in June 2004.

Management objectives for the CCF segment of the fishery need to be developed and evaluated. Stocking request for CCF was reduced from 7,500 to 6,500 size 4 CCF annually since 1999 because netting data indicate an abundance of this species, but harvest data show only limited use of this resource.

Hawk Springs Reservoir LE450230GN

AS - Aquatic Resource Surveys

- Gill and Trap Netting FX-LE-5WW-512

  See Statewide Reservoir Crew report for this water.

- Habitat Improvement FX-LE-5WW-235

  Fishing around the structures, placed in September 1997, caught no fish, and none were seen on a fish finder. Fishing through the ice is planned to further evaluate the worth of the structures as fish habitat.

Bump Sullivan Reservoir LE4505750GN

HI - Habitat Improvement and Maintenance

- Habitat Improvement FX-LE-5WW-235

  A Habitat Trust Fund grant was awarded to install "Berkeley" structures to create additional fish habitat. Such a project was completed at Hawk Springs Reservoir in 1997. Eighteen structures were placed in Bump Sullivan Reservoir on September 2, 1999. Seventeen structures were grouped together in the north basin of the reservoir (Easting 556931; Northing 5634842). Due to a fast approaching thunderstorm, the final (eighteenth) structure was put in the north basin, off the south end of the dam. Because of the shallowness of the reservoir, and the height of the structures, monitoring of possible ice damage will be done during winter and after ice-out.

Scott Pond LE550209PE

PM - Fish Population Management

- Largemouth bass stocking FX-LE-5WW-716

  David Kaughman, LaGrange, Wyoming, asked the Laramie Crew for assistance in salvaging LMB from one of his ponds. A contractor removing silt, broke the outlet valve, and Kaughman feared the low water level of the pond might result in a fish kill. On June 24, 1999, three personnel seined the Kaughman pond and transferred 190 LMB (36.7 pounds; 5.18 fish/pound) to Roy Hitt's pond (aka Scott Pond). One hundred fifty-eight LMB (36.28 pounds) were also transferred to another of Kaughman's ponds.

Packers Lake LE450020GN

PF - Public Fishing Development

The access road to Packers Lake is owned by a School District. They do not want to enter into an agreement directly with the WGFD, but would give the property to Nebraska Game/Fish and Parks (NGFP). However, NGFP says they cannot receive a gift without going through their legislature for approval. NGFP does not want title to the road.

The School District may not want to continue to hold the title because of potential liability.

Lynda Cook, GF attorney, advises that WGFD should not hold title in another state as it may negate sovereign immunity. Since WGFD cannot hold title in another state some kind of agreement is needed with the School District or NGFP. NGFP said they would contact the School District and find out more about the situation.

Management Recommendations

Determine if the road to the lake could be accepted by Scottsbluff County in Nebraska as a county road, if some party (Wyoming sportsmen organization) would pay to have it upgraded to county specifications.

Regional Aquatic Wildlife Management Progress Report

Sheridan Regional Fisheries Management Crew

Calendar Year 1999

Work Not Associated With A Particular Basin

Little Bighorn River Basin - 8LH

Crater Lake SN130604SN

AS - Aquatic Resource Surveys

- Lake Location and Existence FX-SN-8LH-530

  The Sheridan Fish Management Crew did not schedule time in the Mann Creek drainage because Neil Stichert was sampling it in conjunction with his MS project. Because the Sheridan Fish Management Crew had no other trips scheduled into this area, the search for the lake was not done.

Dinwiddie Lake SN330598SN

AS - Aquatic Resource Surveys

- Lake Location and Existence FX-SN-8LH-530

  Time constraints while conducting YSC surveys did not allow this project to be pursued.

Gold Creek SN834177SN

AS - Aquatic Resource Surveys

- Fish Population Inventory FX-SN-8LH-512

  On September 2, 1999 a two pass population estimate was at the Old Cabin Station (Elev.= 8,820) established in 1998 to determine if YSC stocked in this reach on September 3, 1998(~400 unmarked YSC @ 67/lb, 3.4 in) were able to compete with the BKT and establish in the stream. Fish collection data are summarized in Tables 1 and 2 below.

  Table 1. Date, species, length, weight and condition of fish collected in Gold Creek on September 2, 1999.

Species	Number Collected	Average L. (Range)	Average W. (Range)	Average C.
BKT	244*	4.8 (1.8-9.0)	0.09 (.01-.30)	41.0
YSC	19	5.2 (4.3-6.0)	0.05 (.02-.09)	35.0

*Numerous YOY were observed but not collected

  Table 2. Date, species, population estimates and biomass estimates for Gold Creek on September 2, 1999.

Species	Est. No./mile	Est. No./ mile >3"	Est. Total Lbs./acre	Est. Lbs./ Acre>3 in	Est. Lbs./mile
BKT	2,775	2,538	236.9	216.9	249.8
YSC	214	214	10.2	10.2	10.7

Average growth of the stocked YSC was 1.8 in or only 0.15 in/month. With the low number of YSC sampled and the slow growth it appears there is low chance of establishing YSC in this stream reach. However, if YSC planted in this stream spend some time here and then move downstream into the upper Little Bighorn River and establish themselves, continued stocking would be beneficial.

Management Recommendations

1) Stock some (400-500) of the YSC scheduled for the Little Bighorn drainage above Dayton Gulch Creek in 2000 and 2001 into Gold Creek. A distinctive mark for these fish would help determine if YSC planted in Gold Creek do move downstream into the upper Little Bighorn River.

2) Sample in conjunction with the sampling scheduled for the stations on the upper Little Bighorn River to determine movement patterns.

Lick Creek SN834100SN

AS - Aquatic Resource Surveys

- Yellowstone cutthroat stocking evaluation FX-SN-8LH-512

This project continued evaluation of post 1996 YSC stocking to establish natural reproduction. The first YSC stocked in 1996 were unmarked, but all others have been fin clipped (1997=AD, 1998=RPV, 1999=LPV).

On July 14, 1999, a two-pass population estimate was made inside the upper exclosure on the upper reaches of Lick Creek that contains habitat improvement structures. A backpack shocker was used to sample an established monitoring station, 528 feet long and averages 11.0 feet wide. There were 30 YSC captured ranging from 8.5-10.0 inches. This resulted in a population estimate of 300/mile.

The smallest YSC captured in 1999 was 8.5 inches long, which indicates no recruitment through this stream reach. This is consistent with sampling in 1997 and 1998 when the smallest YSC captured was 5.5 inches long. SRC were also stocked in the past, and the smallest captured from 1994-1998 was 5.4 inches long. Past sampling also showed RBT were unable to propagate successfully.

With virtually no recruitment, stocking is required to maintain a fish population in this stream reach.

Management Recommendations

1) Discontinue monitoring.

2) Continue stocking catchable-size YSC to maintain a fish population capable of supporting some harvest. The Little Bighorn River basin is part of the historical range of YSC, and Lick Creek is within this basin. Although it is unknown, and probably unlikely, that YSC ever inhabited the upper reaches of Lick Creek, emigration of stocked fish to lower parts of the drainage could affect future management options. Until YSC and habitat inventories are complete, only genetically pure YSC will be stocked in upper Lick Creek.

Lake Creek SN834110SN

AS - Aquatic Resource Surveys

- Fish Population Inventory FX-SN-8LH-512

  On July 14 about 375 ft of this stream was electrofished (single pass) just below and above the Burgess Road to determine fish presence in the vicinity of the road. Catchable RBT were last stocked in July 1995. Twenty-four RBT averaging 11.3 in with a range of 9.3-13.1 in were sampled. The fish appeared to be in good condition. The stream appears to be doing well in the absence of fish stocking.

Management Recommendations

Manage Lake Creek as a wild fishery.

Little Bighorn River SN834015SN

AS - Aquatic Resource Surveys

- Yellowstone Cutthroat Evaluation in Dayton Meadows FX-SN-8LH-512

  Population estimates were done at two established stations, one within and one above Dayton Meadows, to follow trends in trout densities and biomass following several changes in management and habitat improvements. RBT catchables were last stocked in 1994 (2,127 ELR from 6/30-8/8/94). YSC have been stocked since 1990 and are recognizable by their year-specific marks (Table 3). YSC stocked on September 3, 1998 (7,370 @ 67/lb) were not marked because they were "extra" fish and there was not sufficient time to mark them. These "extra" fingerling YSC were scattered in the upper portions of the watershed including Half Ounce Creek, Gold Creek, the mainstem Little Bighorn River and unnamed tributaries in an effort to establish them.

  Table 3. Stocking record for YSC in the Little Bighorn River.

Date:	1990	1991	1992	1993	1995	1997	1998	1999
Number:	4,050	4,002	2,880	4,250	3,850	960	7,370	2,198
No/Lb:	54	107	14.4	5.6	7.0	9.1	67	7.0
Mark:	None	AD	RPV	LPV	AD	RPV	None	LPV
Brood:*	PR	MB	MB	MB	LH	LH	LH	LH

* PR=Paintrock, MB=McBride, LH=LaHardy

  Starting in 1994, angling regulations required the release of all cutthroat trout in the Little Bighorn River from the mouth of Dayton Gulch Creek upstream. In 1996, this regulation was extended to the Little Bighorn and all tributaries from the mouth of Dayton Gulch Creek upstream. In 1998, the regulation was extended to require the release of all trout except BKT and angling was restricted to the use of artificial flies and lures only.

  An extensive habitat improvement project was started in the fall of 1995 and completed in 1996, with the installation of tie and rock plunges, tree revetments, rock and tree chutes and rock vortex weirs. The project area encompassed all 3 of the established fish population monitoring stations in the meadow. Prior to the latest improvements, station 8275 (below) and station 8340 (above) were outside the older (USFS) improvements, as monitored by station 8300. In addition to the electrofishing stations in the meadow, 2 additional stations were established upstream (8830 and 8790), above and below USFS Road 15, respectively.

Results of the 1999 sampling are summarized in the following tables. Comparisons with previous sampling at these stations are included.

1) Station 8300 - Habitat improvement station. This station measured 440 feet long with an average width of 13.5 feet. A two pass estimate was obtained with the bank positioned equipment, VVP15 and two cathodes. Fish collected and measured are summarized in Table 4. Population estimates are summarized and compared with sampling done since 1989 in Table 5.

Table 4. Length, weight and condition of fish collected in the Little Bighorn River, station 8300, 1989 through 1999.

Date	Species	Number Collected	Average L. (Range)	Average W. (Range)	Average C.
9/1/99	BKT	558	5.1 (1.9-10.0)	0.07 (.01-.44)	41.0
	YSC	116	5.2 (5.2-10.0)	0.15 (.05-.35)	33.0
8/11/98	BKT	398	5.0 (1.8-10.6)	0.09 (.01-.52)	42.3
	YSC	3	7.5 (5.0-12.1)	0.28 (.05-.75)	38.6
9/11/97	BKT	328	5.2 (1.9-10.7)	0.10 (.01-.58)	40.5
	RBT	1	11.9 (0.0-11.9)	0.66 (.00-.66)	39.2
	YSC	26	7.8 (6.2-11.5)	0.19 (.08-.64)	37.5
7/22/97	BKT	201	5.5 (1.3- 9.7)	0.09 (.01-.37)	39.2
	RBT	1	11.9 (0.0-11.9)	0.65 (.00-.65)	38.6
	YSC	1	10.8 (0.0-10.8)	0.47 (.00-.47)	37.3
7/12/94	BKT	238	5.7 (1.4- 9.7)	0.09 (.01-.33)	40.6
	RBT	63	9.2 (2.4-11.2)	0.30 (.05-.52)	35.8
	YSC	46	8.2 (6.5-10.9)	0.21 (.08-.46)	36.4
8/13/92	BKT	165	4.7 (1.4- 8.9)	0.08 (.01-.32)	47.7
	RBT	65	8.9 (6.5-10.8)	0.30 (.11-.60)	41.2
	YSC	60	6.8 (3.2- 8.6)	0.13 (.02-.26)	38.4
7/18/89	BKT	121	5.7 (1.3- 9.2)	0.09 (.01-.34)	37.7
	RBT	71	9.8 (7.2-11.2)	0.37 (.10-.52)	39.0

Table 5. Population estimates for the Little Bighorn River at station 8300, 1989 through 1999.

Date	Species	Est. No. /mile	Est. No./ mile>6 in	Est. Total Lbs./acre	Est. Lbs./ Acre >6"	Est. Lbs. /mile
9/1/99	BKT	6,912	1,956	295.5	168.9	483.5
	YSC	1,404	1,224	128.5	119.2	210.2
8/11/98	BKT	4,890	1,677	273.9	174.2	448.2
	YSC	48	16	8.2	7.3	13.4
9/11/97	BKT	3,911	1,411	230.5	141.3	391.1
	RBT	0	0	0	0	0
	YSC	304	304	34.1	34.1	57.8
7/22/97	BKT	2,513	1,025	133.3	108.7	226.2
	RBT	12	12	4.5	4.5	7.8
	YSC	12	12	3.2	3.2	5.6
7/12/94	BKT	2,896	1,192	154.7	106.2	260.6
	RBT	761	737	135.5	135.6	228.3
	YSC	558	558	69.6	69.6	117.2
8/13/92	BKT	1,997	641	94.8	57.1	159.8
	RBT	784	784	139.5	139.5	235.2
	YSC	725	568	56.0	54.0	94.3
7/18/89	BKT	2,158	1,277	151.2	129.2	194.2
	RBT	1,157	1,157	346.3	346.3	428.1

Average size of BKT stayed relatively constant, but this varies by how many YOY are collected during sampling. Numerous YOY BKT were seen in shallow areas but not collected. The BKT population has increased steadily since 1992. RBT have disappeared since stocking ended in 1994. Although more YSC were sampled this year than in any year in the past, 68% of the YSC sampled had been stocked on July 13, 1999, presumably directly within this station. These YSC had an average growth rate of 0.75 in or about 0.5 in/month since being planted. The remaining 32% of the YSC sampled were most likely from the September 3, 1998 plant (unmarked YSC @ 67/lb, 3.4 in) that were scattered throughout the upper watershed of the Little Bighorn River. These fish had an average growth rate of 2.9 in or 0.24 in/month since being planted. None of marked YSC planted in 1997 or before were sampled.

After the 1997 sampling it was speculated the decrease in YSC numbers and biomass observed was possibly due to movement out of the area from high water conditions (1997 flood in Dayton Meadows) and/or angler harvest. The 1998 sampling, done after a "normal" water year, indicated YSC were apparently disappearing for reasons other than high water. Sampling done this year confirms that competition with ever increasing BKT within the habitat improvements is a more likely explanation of YSC disappearance.

2) Station 8790 - Below USFS Road 15. This station measured 360 feet, had an average width of 8.0 feet. A two-pass estimate was obtained with the Coffelt backpack unit. Fish collected and measured are summarized in Table 7. Population estimates are summarized and compared with sampling done since 1994 in Table 6.

Table 6. Date, species, number, length, weight and condition of fish collected in the Little Bighorn River, station 8790, since 1994.

Date	Species	Number Collected	Average L. (Range)	Average W. (Range)	Average C.
9/2/99	BKT	12	6.1 (2.5-10.0)	0.15 (.02-.04)	51.0
	YSC	29	5.9 (5.1-7.0)	0.08 (.05-.20)	42.0
8/19/98	BKT	1	3.9 (3.9-3.9)	0.02 (.02-.02)	33.7
7/23/97	BKT	2	8.5 (7.7-9.3)	0.26 (.20-.31)	41.2
7/21/94	BKT	4	6.0 (5.3-6.9)	0.10 (.06-.14)	43.6

Table 7. Date, species, population estimates and biomass for the Little Bighorn River at station 8790, since 1994.

Date	Species	Est. No./mile	Est. No./ mile >6"	Est. Total Lbs./acre	Est. Lbs./ Acre>6 in	Est. Lbs./mile
9/2/99	BKT	176	88	27.5	22.7	26.7
	YSC	469	191	39.0	20.3	37.8
8/19/98	BKT	15	0	0.3	0	0.3
7/23/97	BKT	29	29	7.9	7.9	7.5
7/21/94	BKT	59	29	8.8	5.3	5.9

This is the first year since this station was established in 1994 that YSC have been sampled. No fin clips were noted on the fish collection data sheets, indicating the YSC were from the 1998 plant (unmarked YSC @ 67/lb, 3.4 in) of "extra" fish that were scattered throughout the upper Little Bighorn River watershed. These YSC had an average growth rate of 2.5 in or 0.21 in/month since being planted. Although the growth rate is rather slow, it is promising to see some carryover of stocked YSC at this station. The key to establishing YSC in the upper Little Bighorn River may be planting small fish in the very upper portions of the watershed where competition with BKT is nonexistent.

- Drainage survey of Little Bighorn river and tributaries FX-SN-8LH-512

Surveys were begun in 1999 to assess YSC distribution, genetic status, and habitat throughout their historic range in the Northern Bighorn Mountains. Initial efforts focused on tributaries to the Little Bighorn in Montana (Basin code=SN405) with twenty-four stations on 10 streams sampled (Table 8). Elevations ranged between 4,720 and 6,030 ft and streams were generally small (average width = 7.6 ft). Upper trout distribution bounds were identified for all streams. Lower bounds were defined for all but East Pass Creek, Red Gulch Creek, and West Pass Creek below the confluence of the North and South Forks. YSC were present at 8 of the sites supporting trout representing slightly more than half the fish-bearing stations. YSC presence was documented from Elkhorn Creek and the North Fork of West Pass Creek before this survey but populations in Red Gulch Creek and the South Fork of West Pass Creek were previously unknown. YSC density is roughly inversely related to density of other trout species, with greatest YSC densities occurring in the absence of other species (Table 9).

Table 8. Stream name and station number, elevation, average width, and species present for station sampled in the Little Bighorn River drainage during 1999.

Stream and Station	Elev.	Width	Species Present
Elkhorn Creek 1	4430	6.6	BKT
Elkhorn Creek 2	4720	6.9	BKT BNT
Elkhorn Creek 3	5000	6.6	BKT YSC
Elkhorn Creek 4	5360	9.8	YSC
Elkhorn Creek 5	5830	8.5	BARREN
Elkhorn Creek 6	6030	5.6	BARREN
East Pass Creek 1	4910	10.8	BKT BNT RBT
East Pass Creek 2	5070	9.5	BKT BNT RBT
East Pass Creek 3	5270	9.2	BKT BNT RBT
East Fork East Pass Creek 1	5880	5.2	BARREN
Middle Fork East Pass Creek 1	5800	6.6	BARREN
West Fork East Pass Creek 1	5270	10.5	BARREN
North Fork West Pass Creek 1	5060	6.6	BKT BNT YSC
North Fork West Pass Creek 2	5600	14.4	YSC
North Fork West Pass Creek 3	6400	8.9	BARREN
South Fork West Pass Creek 1	4990	6.9	BKT BNT YSC
South Fork West Pass Creek 2	5310	7.2	BKT YSC
South Fork West Pass Creek 3	5745	5.2	BKT YSC
Gay Creek 1	4915	5.9	BARREN
Red Gulch Creek 1	4740	6.2	BKT YSC
Red Gulch Creek 2	5080	7.9	YSC
Red Gulch Creek 3	5320	7.2	BARREN
West Fork Tafner Creek 1	5380	4.3	BKT
West Fork Tafner Creek 2	5720	4.9	BARREN

Table 9. Population estimates expressed as number/km for all trout (> 1 in) sampled during the Little Bighorn River drainage survey conducted in 1999. Barren Streams and sites excluded.

Stream and Station	Elev.	BKT	BNT	RBT	YSC
Elkhorn Creek 1	4430	450	9		
Elkhorn Creek 2	4720	347	10		
Elkhorn Creek 3	5000	641			8
Elkhorn Creek 4	5360				213
East Pass Creek 1	4910	20	490	20	
East Pass Creek 2	5070	231	230	110	
East Pass Creek 3	5270	124	60	210	
North Fork West Pass Creek 1	5060	1505	10		10
North Fork West Pass Creek 2	5600				450
South Fork West Pass Creek 1	4990	276	245		112
South Fork West Pass Creek 2	5310	1137			21
South Fork West Pass Creek 3	5745	27			109
Red Gulch Creek 1	4740	1739			22
Red Gulch Creek 2	5080				257
West Fork Tafner Creek 1	5380	271			

Tissue samples were collected from 20 individual YSC from 4 sites for MtDNA analyses to determine genetic status. Unfortunately, these samples were lost at the processing laboratory in Provo, Utah. Replacement samples will be collected in 2000. In addition to obtaining population estimates and DNA tissue samples, the FPC is analyzing fifty-three habitat variables for correlation with trout distribution and density. Results of these analyses will be used to refine surveys planned for major tributaries to the Tongue River in 2000 that will further define and describe YSC distributions and potential habitats.

- Whirling disease monitoring FX-SN-8LH-551

  Samples collected on September 1, 1999 (95 BKT) in conjunction with population monitoring were analyzed by the WGFD Fish Health Section for the presence of whirling disease. All fish were negative for *Myxobolis cerebralis* spores.

Management Recommendations

1) Continue surveys of tributaries to the Tongue River previously identified as high priority. These include the Smith, Columbus, and Amsden Creek drainages. Collect replacement samples for tissues sample needed to describe genetic characteristics of YSC populations sampled in 1999.

2) Begin GIS mapping of past, current, and potential YSC distributions in the Bighorn Mountains.

Tongue River Basin - 8TR

Bull Creek SN833240SN

CS - Creel Surveys

- 1999 Programmed Creel Survey FX-SN-8TR-520

  A programmed creel survey was conducted on Bull Creek from mid-May through mid-October, 1999. Results show an estimated 144 anglers fished 362 hours to catch 530 fish, all of which were released. The catch/hr was 1.46. SRC

were caught most frequently, followed by BKT. Anglers from four Wyoming counties and 2 states were interviewed during the creel survey. An Administrative Report detailing creel survey results is in progress, to be completed by April 15, 2000.

Fool Creek SN833060SN

AS - Aquatic Resource Surveys

- Yellowstone cutthroat stocking evaluation FX-SN-8TR-512

YSC were introduced to Fool Creek in 1990 to establish a self-sustaining population. Evaluation of this introduction began in 1992 and was continued in 1999 by sampling an established electrofishing station in July. The station, which is inside a livestock exclosure containing fish habitat improvement structures, has been sampled repeatedly in past years with backpack electroshockers. Similar methods and equipment were used in 1999.

This year 265 YSC were sampled, considerably more than in past years. However, all were AD marked, indicating they were from the September 9, 1998 plant of 4,200 @ 56/lb, 3.5 in (Table 10). This was an "add on" plant of YSC that were requested after it was learned the 1998 RPV marked YSC were planted about 1-2 miles downstream. The YSC averaged 4.7 in (Table 11), representing an average growth rate of 1.2 in in 10 months or 0.12 in/month.

Table 10. Number of marked and unmarked YSC and FRB stocked in Fool Creek since 1992.

Year	# YSC	#/Lb	Mark	# FRB	#/Lb	Mark
1992	1,013	13.5	LPV	1,017	12.4	None
1993	1,154	5.6	None	1,012	22.0	None
1994	970	9.6	LPV	900	15.0	None
1995	1,001	11.1	None	902	22.0	None
1996	902	5.1	None	0	--	--
1997	638	11.7	AD	0	--	--
1998	900	8.0	RPV	0	--	--
1998	4,200	56.0	AD	0	--	--
1999	595	7.0	LPV	0	--	--

Table 11. Number, length, weight and condition of YSC collected from Fool Creek on July 13, 1998.

Number Collected	Average L. (Range)	Average W. (Range)	Average C.
265	4.7(3.9-5.8)	0.04(0.02-0.08)	33.0

Population and biomass estimates appear in Table 12. This information, combined with the drainage survey (see below), suggests that most YSC either move downstream into the North Tongue River or do not survive after stocking into Fool Creek. It appears the goal of establishing a self-sustaining population of YSC in Fool Creek cannot be met. Larger fish will have to be stocked annually to provide angling opportunity.

Table 12. Population and biomass estimates for YSC collected from Fool Creek on July 7, 1999.

Est. No./mile	Est. Total Lbs./acre	Est. Lbs./mile
2,769	97.3	110.8

- Drainage survey FX-SN-8TR-512

On July 7, 8 & 9, 1999 six reaches of Fool Creek from very near the mouth to the headwaters were sampled with the backpack shocker to determine relative abundance of species present and movements of planted YSC. Habitat conditions and spawning habitat potential were visually assessed. Sampling results are detailed below.

Station 7190. 300 ft reach near the confluence with North Tongue River. Fish sampled: 23 RBT avg L = 7.9 in, range = 3.8-10.7 in; 1 RXC hybrid 9.5 in; 1 BNT 6.1 in. The lower part of the sampled reach has a conifer dominated riparian area, deeper pools and generally better habitat than the upper part of sampled reach.

Station 7360. 750 ft reach just below the Hay Creek Road (FS Road 167) crossing. Fish sampled: 10 RBT avg L = 9.6, range = 6.1 - 12.1; 1 BNT 8.9 in; 1 SRC 9.2 in (no marks); 2 RPV marked YSC avg L = 9.5, range = 8.8 - 10.1. The sampled reach had limited habitat; most of the reach is wide and shallow.

Station 7690. 330 ft reach sampled at the downstream end of Fool Creek basin. Fish sampled: 2 RPV marked YSC avg L = 9.8 in, range = 9.8 - 9.8 in. Very poor habitat in the sampled reach. Stream is dominated by high gradient shallow, swift riffle stretches with scattered plunges and shallow pools. Residual pool depth is low. Winter habitat conditions must be harsh.

Station 7850. 200 ft reach through Forest Service habitat structures just below Burgess Road (FS Road 15). Fish sampled: 6 RPV marked YSC avg L = 8.7 in, range = 7.5 - 9.9 in, 1 AD marked YSC 4.9 in. Lower habitat structure is approaching barrier status. Considerable silt has accumulated above and below each structure.

Station 8220. 200+ ft reach on south edge of Schuler Park above the stream forks and cow camp. Fish sampled: 2 AD marked YSC avg L = 4.6 in, range = 4.3 - 4.9 in. Stream is narrow, shallow and gradient is fairly high. Stabile, sedge lined banks.

Station 8420. 200 ft reach about 1.2 miles above Station 8220 (just past cattle guard in meadow). Fish sampled: None. Stream is narrow, shallow and gradient is moderate to high. Conspicuous lack of pools.

No absolute barriers were observed, however the lower fish habitat structure installed by the Forest Service below the Burgess Road might be preventing some fish passage. The geology of the Fool Creek basin is very similar to that of the North Tongue basin so there is little spawning habitat. Habitat is generally poor to very poor throughout the upper 90% of the stream course. In this area the only fish sampled were those planted only one year ago. No second or third year carryover of planted YSC was observed. While some downstream drift of YSC is occurring, it seems the majority of the planted YSC are disappearing from the stream.

Management Recommendations

1) Cease stocking fingerling YSC in Fool Creek.

2) To provide angling opportunity, stock catchable-size YSC within the habitat structures.

Kleenburn Pond 1 SN730336SN and Kleenburn Pond 2 SN730334SN

AS - Aquatic Resource Surveys

- Fish population survey FX-SN-8TR-512

Kleenburn Pond 1 is one of the few publicly accessible waters in Sheridan County supporting cool and warmwater species. Prior to 1998, the most recent data were from 1987, and sampling was conducted in 1998 and 1999 to update information from this pond.

This is a very steep sided, abandoned coalmine pit that is difficult to sample effectively. Sampling in 1998 showed that trap netting and electrofishing were mostly ineffective methods, and that gill nets were the best sampling option. Consequently, two sinking experimental gill nets were set overnight on from June 10-11, 1999, and these data are summarized in Table 13 with 1998 data.

Table 13. Species, number, CPUE, length, weight and condition of fish caught in two small mesh trap nets set for 37 hours and one experimental gill net set for 19 hours in Kleenburn Pond 1, 1998.

Species	N	CPUE	Average Length	Length Range	Average Condition
		1998 Experimental Gill Net (1)			
WHC	1	0.1	13.0	N/A	56
WHS	26	1.4	12.6	9.2-14.5	46
		1999 Experimental Gill Nets (2)			
BLC	29	0.9	7.9	6.0-11.2	43
WHS	25	0.8	12.9	11.6-13.8	44
BLB	6	0.2	6.5	5.5-7.7	48
GSF	2	0.1	3.3	2.8-3.8	50

BLC are the most abundant (desirable) game fish and monitoring efforts will continue after FHM are introduced. Though a few BLB and GSF were captured in 1999, these low numbers don't reflect their general high abundance. Continued monitoring will indicate increasing or stabile populations.

In January 1999, approximately 30 Christmas trees were sunk in the west end of the pond to create structure for BLC and WHC.

This pond (and its neighbor) is in an area popular with dirt bike and 4-wheeler riders. Years of this activity have resulted in trails at the waters edge in places and complete removal of vegetation. While probably not impacting the fishery, it does create some aesthetic conflict between anglers and ATV riders. Discussions with the Sheridan County Commission were begun in December, 1999 seeking solutions to this user-group conflict.

Management Recommendations

1) Continue exploring options to improve area compatibility with ATV riders and anglers.

2) Manage this pond primarily for BLC, and secondarily for SMB and CCF. To this end, FHM should be stocked to improve the forage base for BLC. Though prey in the preferred size range is undoubtedly present at times (after GSF, BLB, and WHS spawn), constant availability of prey less than 2.5 inches could improve growth rate and condition. Stock 200 CCF when available.

3) Begin monitoring annually in the spring of 1999 with experimental gill nets to obtain baseline data and to evaluate the impact of FHM introduction on BLC growth and quality.

4) Continue exploring opportunities for improving physical habitat for BLC.

Kleenburn Pond 2 SN730334SN

AS - Aquatic Resource Surveys

- Fish population survey FX-SN-8TR-512

Like Kleenburn Pond 1, this is one of only a few publicly accessible waters in Sheridan County supporting coolwater game fish. To update information from this pond, small mesh trap nets and one sinking experimental gill net were set overnight in this small pond on May 21 and 22. These data, and similarly collected data from 1998, are summarized in Table 14.

Table 14. Species, number, CPUE, length, weight of fish caught in two small mesh trap nets set for 40 hours, one experimental gill net set for 19 hours, and electrofishing for one hour in Kleenburn Pond #2, 1998. CPUE is catch per hour for gillnets and electrofishing, and catch per night for trap nets.

Species	N	CPUE	Average Length	Length Range
		1998 Trap Nets		
LMB	2	1.0	9.3	2.9-15.6
SMB	1	0.5	8.2	N/A
BLB	12	12.0	7.3	6.3-8.4
GSF	32	16.0	3.3	2.5-5.0
	1998 Experimental Gill Net			
LMB	3	0.2	5.3	4.0-6.3
CCF	3	0.2	15.2	11.3-21.3
BLB	68	3.6	7.3	6.5-7.9
WHS	2	0.1	15.2	14.9-15.4
LMB	26	26.0	6.2	3.0-16.2
		1999 Trap Nets		
LMB	1	0.5	13.5	N/A
BLB	5	2.5	7.9	7.3-8.4
GSF	19	9.5	4.3	3.1-5.7
	1999 Experimental Gill Net			
CCF	1	0.2	17.6	N/A
BLB	29	1.9	7.9	7.3-8.6
WHS	4	0.3	11.5	9.2-13.0

HI - Habitat Improvement and Maintenance

- Habitat Enhancement FX-SN-8TR-515

A meeting was held with two County Commissioners on January 24, 2000 to discuss options for fish habitat work with a field trip planned for this spring to develop more specific proposals.

Management Recommendations

1) Explore options to improve compatibility with ATV riders and anglers.

2) Manage this pond primarily for LMB, and secondarily for CCF. Assuming BLB and GSF are not optimal prey for LMB, FHM should be stocked to improve the forage base for LMB. Begin monitoring by boat electrofishing to obtain additional baseline data and to evaluate the impact of FHM introduction on LMB growth and quality.

3) Stock marked (adipose clip) CCF to increase abundance. Begin monitoring with gill nets and setlines to obtain additional baseline data and evaluate the contribution of stocked fish.

4) Explore opportunities for improving physical habitat for LMB including the possibility of felling select cottonwood trees into the lake from the shoreline. Work with Sheridan County Commissioners (landowner) for permission to alter or improve habitat.

North Tongue River SN833030SN

CS - Creel Surveys

- Creel Survey FX-SN-8TR-520

A programmed creel survey was conducted on the North Tongue from mid-May through mid-October, 1999. Results show an estimated 17,359 anglers fished 30,029 hours to catch 54,484 fish, of which 93% were released. The catch/hr was 1.81. SRC were caught most frequently, followed by RBT and BKT. Anglers from 12 Wyoming counties, 38 states and two foreign countries (Canada and Scotland) were interviewed during the creel survey. An Administrative Report detailing creel survey results is in progress, and will be completed by April 15, 2000.

Prairie Dog Creek SN831035SN

AS - Aquatic Resource Surveys

- Pre-channel change fish population evaluation FX-SN-8TR-512

On March 18 two-pass removal estimates were made using the Coffelt backpack shocker to establish baseline data for a NRCS project. The project will create a channel block to divert the stream back into it's original channel and reclaim several ox bows. This station was 452 ft long and 17.1 ft wide. No amphibians were observed. Other data collected: Conductivity = 980 micromhos, TDS = 440 ppm, pH = 7.6, Discharge = 21.7 cfs, water temperature 38F at 1130 hrs.

Fish collection and population data are summarized in Tables 15 and 16 below.

Table 15. Length, weight, and condition of fish species collected at station 3925 (Baccari) on Prairie Dog Creek, 1999.

Species	Number Collected	Average L. (Range)	Average W. (Range)	Average C.
		Station 3925 - Baccari Sta.		
BNT	16	7.2 (3.8-14.8)	0.26 (.02-1.00)	36
LNS	37	11.1 (6.5-16.0)	0.57 (.11-1.52)	37
MTS	14	6.0 (3.9-7.8)	0.10 (.02-.19)	41
WHS	17	9.1 (1.7-15.2)	0.42 (.03-1.46)	39

Table 16. Fish population and biomass estimates at station 3925 (Baccari) on Prairie Dog Creek, 1999.

Species	Est. Total No./mile	Est. No./ mile> 6 in	Est. Total Lbs./acre	Est. Lbs./ Acre> 6 in	Est. Total Lbs./mile
		Station 3925 - Baccari Sta.			
BNT	210	70	26.4	22.0	54.7
LNS	607	607	168.1	168.1	348.3
MTS	164	70	8.1	4.6	16.8
WHS	222	199	44.5	43.8	92.2

Dirt work for the channel block was completed in 1999 and the stream was restored to its original channel. Some fencing (to exclude livestock) and reseeding is scheduled for the spring of 2000 to complete this project.

Management Recommendations

1) Sample the station in 2002 to determine what effects restoring the stream to its original has had on the fish populations within the project site.

Sibley Lake SN230580SN

CS - Creel Surveys

- Creel Survey FX-SN-8TR-520

Sibley Lake was excluded from the programmed creel survey on the North and South Tongue Rivers and Bull Creek due to contract employee time constraints.

South Tongue River SN832600SN

AS - Aquatic Resource Surveys

- Fish Population Estimates - Habitat Improvement Sites, South Tongue River FX-SN-8TR-512

Electrofishing at South Tongue River Habitat Improvement stations. Four established stations on the South Tongue River were electrofished to monitor the response of fish populations to improvements. These stations were: 7650 at Pine Island, 7670 at Prune Creek, 7740 at Schutts Flat and 7790 at Schutts Flat. The electrofishing raft with 4 hand-held positive electrodes and trailing negatives was used for all stations. Upper and lower ends of each station were blocked with nets to minimize fish movements. Estimates at each station, compared to previous estimates, are presented below. Data comparisons are for "wild" trout only. Catchable RBT were planted in the South Tongue through the Pine Island and Prune Creek stations through 1989. Management was changed to wild trout and all stocking ceased in 1990.

1) South Tongue River station 7650 at Pine Island:

A 3-pass estimate was made at this station on September 22, 1999. Previous estimates were made at this station on September 7, 1989, August 18, 1992 and September 3, 1997. Fish habitat improvement structures were completed on about 970 feet of stream in September 1986. In 1999 this station measured 900 feet long, averaged 43.4 feet wide and had a flow of 27.3 cfs. Species collected and measured in sampling since 1989 are summarized in Table 17 and population estimates for those sampling periods are summarized and compared in Table 18.

Table 17. Length, weight, and condition of fish species collected at station 7650 (Pine Island) on the South Tongue River 1989 through 1999.

Species	Year	Number Collected	Average L. (Range)	Average W. (Range)	Average C.
BKT	1999	54	5.0 (2.4 -8.3)	0.07 (.01-.02)	43.0
	1997	43	5.8 (2.6 -8.6)	0.09 (.01-.22)	42.6
	1992	26	6.0 (1.9 -8.1)	0.11 (.02-.20)	42.7
	1989	90	5.0 (1.6 -8.5)	0.06 (.01-.22)	35.0
BNT	1999	321	6.8 (2.2-13.0)	0.15 (.01-.90)	38.0
	1997	251	6.9 (1.6-13.6)	0.18 (.01-.95)	45.2
	1992	100	8.1 (4.0-12.7)	0.21 (.05-.71)	39.1
	1989	219	5.6 (2.1-13.6)	0.10 (.01-1.0)	36.7
RBT	1999	329	7.0 (1.7-10.7)	0.15 (.01-.04)	37.0
	1997	444	6.7 (1.2-10.1)	0.13 (.01-.90)	38.1
	1992	168	7.0 (1.4-10.2)	0.15 (.01-.30)	41.3
	1989	449	6.0 (1.8-10.2)	0.09 (.01-.35)	34.2
MTS	1999	39	7.9 (3.8-10.6)	0.48 (.02-.47)	44.0
	1997	66	8.1 (4.7-10.8)	0.26 (.05-.72)	46.8
	1992	38	7.4 (5.5-10.2)	0.19 (.07-.41)	45.0
	1989	89	6.8 (2.4-11.0)	0.21 (.01-.53)	44.0

Table 18. Fish population estimates for the South Tongue River at station 7650 (Pine Island), 1989 through 1999.

Species	Year	Est. Total No./mile	Est. No./ mile>6 in	Est. Total Lbs./acre	Est. Lbs./ Acre>6 in	Est. Total Lbs./mile
BKT	1999	329	117	4.4	3.1	23.2
	1997	328	191	5.6	4.4	29.5
	1992	285	198	5.1	4.2	31.4
	1989	966	172	12.9	5.4	58.0
BNT	1999	1,918	980	54.8	42.9	288.1
	1997	1,511	975	51.9	48.4	272.0
	1992	684	636	23.5	22.9	143.6
	1989	1,341	435	29.9	23.3	143.1
RBT	1999	1,948	1,308	55.6	47.3	292.4
	1997	2,597	1,965	64.5	60.0	337.6
	1992	1,421	1,108	34.8	32.6	213.2
	1989	2,752	1,465	55.2	45.7	247.7
MTS	1999	264	**	24.2	**	127.4
	1997	478	427	23.7	22.8	124.3
	1992	250	211	7.8	7.2	47.5
	1989	560	327	26.2	24.0	117.6

** Not calculated in 1999

The average size of each species has fluctuated slightly over the last 10 years. In most years when higher numbers of a species are collected the average size tends to be lower, suggesting this fluctuation can be attributed to natural variation.

BKT densities and biomass estimates have changed little since 1992. Total BNT densities increased slightly from 1997 to 1999 but, densities of BNT over 6.0 in remained unchanged. The total BNT biomass estimate decreased slightly while the estimated biomass of BNT >6 in decreased slightly. RBT estimated densities and biomass showed slight to moderate decreases across the size groups. The trout population density of 4,195 trout/mile this year is similar to 1997 (4,436 trout/mile), but higher than in 1992 (2,390 trout/mile), yet lower than 1989 5,059 trout/mile). The total estimated trout biomass found this year (114.8 lb/acre) is similar to that found in 1997 (122 lbs./acre) and 1989 (98 lbs./acre) but, greater than the 1992 estimate of 63.4 lbs./acre. With the similar densities and biomass estimates experienced during the last two sampling efforts it appears the fish populations within the sample station area have stabilized since the

habitat structures were installed.

Based on the best data documenting pre-habitat improvements (see 1986 estimates below), trout densities and biomass have increased substantially since habitat improvement. Total trout estimates for 1999 are 4,195/mile compared to 1,787/mile in 1986, an increase of 135%. Biomass estimates for all trout increased from 38.5 pounds per acre in 1986 to 114.8 lbs./acre in 1999, an increase of 198%. Note that the 1986 estimates were collected slightly upstream from the upper end of the Pine Island habitat improvements in an area of old USFS improvements (stream bank rock work, primarily), so are not a direct comparison of the pre and post Pine Island improvement area.

2) South Tongue River station 7670 at Prune Creek:

A 3-pass estimate was made at this station on September 28, 1999. In 1999 this station measured 750 feet long and averaged 41.2 ft wide. No discharge measurements were taken. A pre-improvement population estimate was made at this station on August 30, 1994. Fish habitat improvement structures were completed here in September 1995. A population estimate was obtained within this same area (approximately between the two stations - but closer to the bottom of the Prune Creek station) on 390 feet of stream in 1986. These 1986 data were considered the baseline population data for the Pine Island station, and an additional pre-habitat estimate for the Prune Creek station. Species collected and measured in 1997 and 1999 are compared to data collected in 1986 and 1994 in Table 19. Fish population estimates for those sampling periods are summarized and compared in Table 20.

Table 19. Length, weight, and condition of fish species collected at station 7670 (Prune Creek) on the South Tongue River 1994, 1997 and 1999. Fish collected in 1986 at a station near the lower end of station 7670 are included for comparison.

Species	Year	Number Collected	Average L. (Range)	Average W. (Range)	Average C.
BKT	1999	28	5.6 (1.9- 8.4)	0.08 (.01-.20)	52.0
	1997	42	5.0 (2.3- 7.7)	0.06 (.01-.22)	37.8
	1994	28	6.2 (4.4- 8.4)	0.09 (.04-.20)	36.0
	1986	8	5.0 (2.4- 7.7)	0.06 (.01-.16)	N/A
BNT	1999	415	7.2 (2.0- 2.5)	0.17 (.01-.70)	39.0
	1997	289	7.4 (1.9-11.8)	0.19 (.01-.80)	36.8
	1994	215	7.4 (2.4-12.5)	0.18 (.01-.50)	39.1
	1986	23	7.2 (2.3-10.0)	0.15 (.01-.34)	N/A
RBT	1999	265	7.6 (3.5-10.2)	0.18 (.01-.40)	37.0
	1997	281	7.1 (1.7-10.0)	0.14 (.01-.30)	34.8
	1994	329	6.4 (1.5-10.5)	0.13 (.01-.35)	37.9
	1986	70	6.7 (3.4-11.2)	0.13 (.01-.56)	N/A
MTS	1999	8	**	**	**
	1997	38	8.0 (4.2-10.3)	0.22 (.03-.47)	40.6
	1994	10	7.7 (7.0- 9.4)	0.24 (.16-.37)	48.6
	1986	Noted as common - but not counted			

** Not analyzed in 1999

Table 20. Fish population estimates at station 7670 (Prune Creek) on the South Tongue River 1994, 1997 and 1999. Population estimates obtained in 1986 at a station near the lower end of station 7670 are included for comparison.

Species	Year	Est. Total No./mile	Est. No./ mile>6 in	Est. Total Lbs./acre	Est. Lbs./ Acre> 6 in	Est. Total Lbs./mile
BKT	1999	253	127	4.2	2.8	21.0
	1997	298	121	3.5	2.6	17.9
	1994	439	251	8.1	6.2	39.5
	1986*		See total trout estimate			
BNT	1999	3,062	1,922	104.2	88.4	520.4
	1997	2,028	1,515	76.0	65.8	385.3
	1994	1,569	1,196	57.7	56.2	282.4
	1986*		See total trout estimate			
RBT	1999	1,908	1,598	68.7	63.9	343.3
	1997	2,015	1,685	55.7	53.2	282.1
	1994	2,915	1,745	77.4	64.2	379.0
	1986*		See total trout estimate			

* 1986 estimate: 1,787/mile, 1,173/mile >6", 38.5 lbs./acre, 34.6 lbs./acre >6", 234.1 lbs./mile.

Average lengths of RBT, BNT and BKT have not changed significantly at this station since habitat improvement. Density estimates of BKT and RBT have decreased from 1997 and 1994, but BNT numbers have increased. Biomass estimates show similar trends. It appears the habitat improvements completed within the station have favored BNT. Compared to 1986 estimates obtained in the lower portion of this station (most of the reach in a flat run), total trout density estimates obtained in 1999 are 193% higher and biomass estimates are 362% higher.

3) South Tongue River station 7740 at Schutts Flat (Lower Station):

A 3-pass estimate was made at this, the Schutts Flat Lower Station, on September 21, 1999. The habitat improvements in this area were completed in September 1998 and the sampling done in 1999 was the first post-habitat improvement evaluation. This station was 717 ft long, 62.5 ft wide and had a measured flow of 25.2 cfs. A pre-improvement population estimate was made on September 6, 1996. Species collected and measured in 1999 are compared to data collected in 1996 in Table 21. Fish population estimates for those sampling periods are summarized and compared in Table 22.

Table 21. Length, weight, and condition of fish species collected at station 7740 (Schutts Flat-Lower) on the South Tongue River 1996 and 1999.

Species	Year	Number Collected	Average L. (Range)	Average W. (Range)	Average C.
BKT	1999	182	5.3 (1.3-10.8)	0.08 (0.01-0.40)	40.0
	1996	135	5.8 (2.5- 8.5)	0.08 (0.10-0.25)	37.0
BNT	1999	207	7.6 (2.1-18.3)	0.22 (0.01-2.40)	38.0
	1996	133	8.4 (2.0-15.3)	0.25 (0.01-1.18)	37.0
RBT	1999	601	6.2 (1.4-10.8)	0.12 (0.01-0.40)	40.0
	1996	477	6.5 (2.4-15.5)	0.13 (0.01-1.28)	41.0

Table 22. Fish population estimates at station 7740 (Schutts Flat-Lower) on the South Tongue River 1996 and 1999.

Species	Year	Est. Total No./mile	Est. No./ mile> 6 in	Est. Total Lbs./acre	Est. Lbs./ Acre> 6 in	Est. Total Lbs./mile
BKT	1999	1,384	655	14.6	10.4	111.0
	1996	1,019	476	10.7	8.1	81.5
BNT	1999	2,121	1,060	45.0	40.6	340.7
	1996	1,082	927	35.6	35.4	270.5
RBT	1999	4,492	2,349	71.2	58.9	539.0
	1996	3,917	2,431	67.0	54.4	413.3

The average length of each species decreased slightly from 1996 to 1999, probably natural variation. Average weights either remained unchanged (BKT) or showed the same trend as average lengths, a slight decrease (BNT and RBT). Total estimated densities increased moderately for BKT and RBT, but more than doubled for BNT. Biomass estimates had a slight (RBT) to moderate (BNT and BKT) increase. The total estimated trout density increased 33% from 1996 (6,018 trout/mile) to 1999 (7,997 trout/mile), while the total estimated biomass increased 15% from 113.3 lb/acre in 1996 to 130.8 lb/acre in 1999. With the large density of trout within the station prior to the installation of habitat structures, large increases in trout density and biomass, as has been experienced at other habitat improvement projects, may not materialize here. It was hoped the habitat improvement would result in increasing the proportion of larger trout in the population. This is not yet apparent, but periodic monitoring should continue.

4) South Tongue River station 7790 at Schutts Flat (Upper Station):

A 3-pass estimate was made on September 20, 1999. The habitat improvements in this area were completed in September 1998 and the sampling done in 1999 was the first post-habitat improvement evaluation completed. This station was 471 ft long, 56.3 ft wide and had a measured flow of 25.2 cfs. Only 471 ft of the original 697 ft station was sampled in 1999 because during block net set up the lower end was mistakenly set at a 250 ft transect marker rather than the bottom end. A pre-improvement population estimate was made at this station on September 4, 1996. Species collected and measured in 1999 are compared to data collected in 1996 in Table 23. Fish population estimates for those sampling periods are summarized and compared in Table 24.

Table 23. Length, weight, and condition of fish species collected at station 7790 (Schutts Flat-Upper) on the South Tongue River 1996 and 1999.

Species	Year	Number Collected	Average L. (Range)	Average W. (Range)	Average C.
BKT	1999	131	5.4 (1.8- 9.3)	0.08 (.01-.30)	38.0
	1996	99	6.0 (2.2- 8.6)	0.09 (.01-.24)	37.0
BNT	1999	163	7.4 (2.1-14.8)	0.21 (.01-1.2)	38.0
	1996	127	9.0 (2.5-13.2)	0.28 (.01-.70)	35.0
RBT	1999	194	6.5 (1.5-10.4)	0.14 (.01-.40)	40.0
	1996	247	7.0 (3.4-11.0)	0.15 (.01-.55)	37.0
SRC	1999	2	9.5 (9.2- 9.8)	0.25 (.20-.30)	29.0
	1996	**			

** No SRC collected in 1996

Table 24. Fish population estimates at station 7790 (Schutts Flat-Upper) on the South Tongue River 1996 and 1999.

Species	Year	Est. Total No./mile	Est. No./ mile>6 in	Est. Total Lbs./acre	Est. Lbs./ Acre> 6 in	Est. Total Lbs./mile
BKT	1999	1,536	695	18.0	14.3	122.8
	1996	954	492	12.8	9.6	85.9
BNT	1999	1,872	1,132	57.7	51.6	393.7
	1996	1,136	1,064	47.5	47.7	318.1
RBT	1999	2,298	1,356	47.1	41.6	321.4
	1996	2,102	1,574	47.1	42.4	315.3
SRC	1999	22	22	0.1	0.1	0.6
	1996	**				

** No SRC were collected in 1996

The average length of each species decreased slightly from 1996 to 1999 but, is likely natural variation. Average weights showed the same trend as average lengths, slight decreases in all species. Total estimated densities increased moderately for BNT and BKT, but only slightly for RBT. Biomass estimates remained unchanged for RBT, but increased moderately for BNT and BKT. The total estimated trout density increased 37% from 1996 (4,192 trout/mile) to 1999 (5,728 trout/mile), while the total estimated biomass increased 14% from 107.4 lb/acre in 1996 to 122.9 lb/acre in 1999. With the large density of trout the before habitat work, large increases in trout density and biomass, as has been experienced at other habitat improvement projects, may not materialize here.

CS - Creel Surveys

- Creel Survey FX-SN-8TR-520

A programmed creel survey was conducted on the South Tongue from mid-May through mid-October, 1999. Results showed an estimated 1,589 anglers fished 3,283 hours to catch 6,792 fish, of which 70% were released. The catch/hr was 2.07. RBT were caught most frequently, followed by BKT and BNT. Anglers from seven Wyoming counties and 19 states were interviewed during the creel survey. An Administrative Report detailing creel survey results is in progress and will be completed by April 15, 2000.

HI - Habitat Improvement and Maintenance

- Shutts Flat Habitat Improvement Project FX-SN-8TR-234

The Shutts Flat habitat project area was toured in August and livestock presence was reported to Bighorn Forest. Subsequent correspondence resulted regarding use of this area for livestock relative to our verbal agreement for non-use during habitat and riparian restoration. The District Ranger indicated this issue would be addressed in the upcoming AMP revision. The ranger further indicated they had approved up to a 4 day, 300 cow use of the area in early September to move livestock off the mountain. During electrofishing surveys on September 20 incidental impacts of the livestock use were noted. The District Ranger suggested if further concerns existed he would agree to review the area in 2000 with the WGFD, grazing permittee and USFS.

Management Recommendations

1) Electrofish the two habitat improvement monitoring stations at Schutts Flat in 2001 and 2003 to continue monitoring changes in trout density and biomass following habitat work.

2) Fish populations seemed to have stabilized within the Pine Island and Prune Creek habitat improvement stations so continued monitoring of fish population changes related to habitat work is unnecessary. Population trend monitoring at 10 year intervals starting in 2001 is appropriate.

3) Analyze creel survey data and submit Administrative Report by April 15, 2000.

4) Update the Tongue River Basin plan in 2000 utilizing the fish population and creel survey data.

5) Continue annual monitoring and photography of Shutts Flat improvement area. Coordinate with Aquatic Habitat Biologist in 2000 to measure cross-sectional transects. Continue to work with Bighorn NF during AMP revision to incorporate aquatic habitat, channel integrity, and public fishery concerns into planning.

Tongue River SN831102SN

AS - Aquatic Resource Surveys

- Whirling disease monitoring FX-SN-8TR-551

  Samples collected on August 31, 1999 (66 BNT, 71 RBT, and 30 MWF) were analyzed for whirling disease by the WGFD Fish Health Section. All fish were negative for *Myxobolis cerebralis* spores.

PF - Public Fishing Development

- Bighorn Coal Mine Pond Development FX-SN-8TR-064

  No meetings with Bighorn Coal Company could be arranged this year, due primarily to changes in personnel and management at the mine. Phone calls indicated the mine was still interested in coordinating on this reclamation and discussion of potential future public access. A meeting is scheduled for mid-February 2000 to resume discussions.

Goose Creek Basin - 8GC

Big Goose Creek SN831150SN

AS - Aquatic Resource Surveys

- Whirling disease monitoring FX-SN-8GC-551

  Samples collected on July 21, 1999 (25 BNT and 5 RBT) were analyzed for whirling disease by the WGFD Fish Health Section. All fish were negative for *Myxobolis cerebralis* spores.

Twin Lakes Reservoirs SN230510SN and SN230508SN

HP - Habitat Protection

- Sheridan area water project FX-SN-8GC-540

  We were notified July 12, 1999 that Twin Lakes Reservoir was full and spilling at 3,400 AF with a maximum depth of 70 feet. The City of Sheridan, Joint Powers Board planned to dedicate the project in August and wanted an update on projected fish stocking (scheduled for 2000). Photos were taken during a visual inspection of the reservoir on August 5.

Although fisheries personnel made no creel checks, some angler reports indicated catches of some wild trout during this first year of filling.

Management Recommendations

1) Begin annual stocking of advanced fingerling SRC (12,450) starting in 2000 (rate of 150 per full SA [83 SA]). Continue to monitor water levels and minimum pool (44 SA).

2) Set gillnets to evaluate fishery and first year stocking in July 2001.

Lake DeSmet Basin - 8DS

Lake DeSmet SN430227JN

AS - Aquatic Resource Surveys

- Fish population surveys FX-SN-8DS-512

A variety of nets were used primarily to monitor ELR and YSC size structure, condition, and relative abundance. Past experience has shown that spring netting (see 1998 Progress Report) is more effective for sampling ELR than fall sampling, and efforts were concentrated early in the field season for this reason. Four experimental gill nets were set during the day on May 20 and three were set overnight on May 20-21. Also on May 20-21, single panel, 2 ¼-inch mesh, gill nets (2) and 1/4-inch mesh trap nets, were set overnight. Results are summarized in Table 25.

Table 25. Species, number, catch/effort, length, weight and condition data from Lake DeSmet netting during May 1999.

Species	N	CPUE	Mean Length (in)	Length Range (in)	Mean Weight (lbs)	Weight Range (lbs)	Mean C Factor
Experimental gill nets - short duration day sets, May 20							
ELR	16	1.52	15.1	9.0-16.5	1.3	0.3-1.6	35
YSC	1	0.10	16.1	N/A	1.4	N/A	33
WHS	1	0.10	17.8	N/A	2.3	N/A	40
Experimental gill nets - overnight sets, May 21-21							
ELR	43	0.72	14.0	5.0-18.5	1.1	0.1-2.25	35
YSC	12	0.20	10.7	7.2-15.2	0.5	0.2-1.1	33
BNT	3	0.05	20.7	18.3-22.6	4.1	2.49-5.2	44
WAE	2	0.02	17.1	17.0-17.2	**	**	**
YEP	6	0.10	6.7	5.8-7.7	**	**	**
WHS	50	0.84	13.4	6.9-17.4	**	**	**
RKB	6	0.10	6.3	5.5-7.6	**	**	**
CRP	2	0.03	18.6	9.4-27.8	**	**	**
100 ft, two 1/4-inch mesh gill nets - overnight sets, May 20-21							
CRP	2	2.50	24.2	25.8-25.8	**	**	**
WHS	6	0.13	**	**	**	**	**
¼ -inch mesh trap nets - overnight sets, May 20-21							
ELR	101	33.7	9.7	3.6-18.3	1.3	0.1-1.8	38
YSC	56	18.7	6.7	4.0-17.1	0.2	0.1-2.0	40
WHS	24	8.0	**	**	**	**	**
RKB	2	0.67	5.4	5.0-5.7	**	**	**

** Data unavailable.

The combination of gill and trap nets provided a large and adequate sample of ELR (N=160) and YSC (N=69) but typically, other game species (BNT, YEP, WAE) were caught in very low numbers. Lengths of ELR ranged from 3.6-18.5 in and averaged 9.7 in. The average is biased downwards by many small

recently stocked fish in the sample. Excluding them (> 10.0 in) results in an average of 15.5 in, which is similar to previous years. The average length of ELR (> 10.0 in) from 1998 spring samples was slightly larger at 16.0 in, but the difference between the two years was not significant (T-test, P=0.06). Aside from the small fish caught in 1999, the overall length distributions of ELR over the last two years have been similar, and consistently lacking large trout (Figure 1).

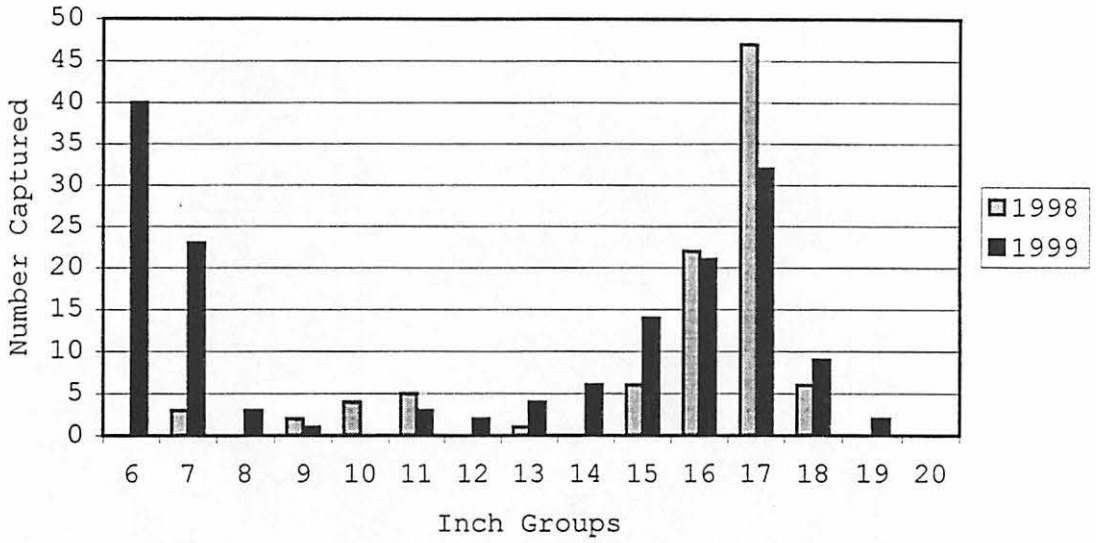

Figure 1. Number of ELR/inch group from spring samples collected in 1998 and 1999.

Brown trout are typically caught in very low numbers and 1999 was no exception. Catch rate (CPUE = 0.05) for three BNT caught in experimental gill nets was near the low end for all species (Table 23).

YSC were introduced in 1996 and their appearance in nets was low through 1998 (N = 4). By comparison, netting in 1999 was much more successful, with much higher numbers caught in most gear types (Table 23). The higher catch in 1999 was dominated by recently stocked YSC (Figure 2), with relatively few larger, older fish derived from plants made in 1996-1998 (unmarked, AD, and RPV, respectively). The smaller fish, caught almost exclusively by trap net, averaged 6.5 in. Average lengths of other YSC of known age captured in 1999 were 13.7, 14.3, and 10.6 in, for unmarked, AD, and RPV-marked fish.

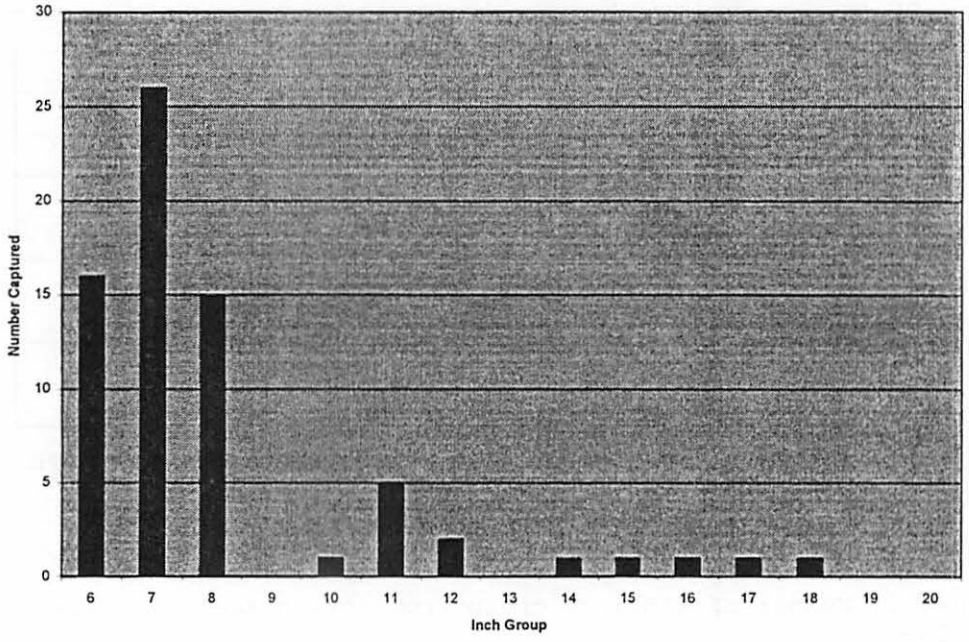

Figure 2. Number of YSC/inch group from spring samples collected in 1999.

The numbers and average length of YEP sampled with nets have varied considerably over the last five years. In 1995, 1996, 1997, and 1998 there were 122, 57, 5, and 39 YEP captured respectively, while this year 6 were sampled. Average lengths over the past four years have been 3.9, 4.4, 6.9, and 4.8 in. respectively. In 1999 the average length was 6.7 in. Cause for the variation in YEP numbers sampled from 1995-1998 is unknown, but sampling over the years has clearly demonstrated the change from a once perch-rich lake, to the present perch-depauperate condition.

Since 1997, fin-clipped groups of ELR and YSC have been released to evaluate spring vs. fall stocking and growth, respectively, and information about these groups is summarized in Table 26.

Table 26. Species, stocking season, number, and size of marked ELR and YSC planted in Lake DeSmet since 1997.

Species	Mark	Planting Time	# Planted	#/Pound
		1996		
YSC	None	Spring, Fall	26,202	1.8, 15
		1997		
ELR	AD	Spring	62,363	6.0-8.1
ELR	None	Fall	1,694	2.8
ELR	None	Fall	17,180	190
ELR	RPV	Fall	17,640	3.5
ELR	LPV	Fall	27,455	17
YSC	AD	Spring	22,348	18.5
		1998		
*ELR	AD/RPV	Spring	75,000	20
*ELR	AD/LPV	Fall	25,000	20
*ELR	DPV	Fall	25,000	4
YSC	RPV	Spring	25,000	25
		1999		
ELR	None	Spring	105,285	9.8-19
ELR	None	Spring	8,200	10
ELR	None	Summer	75,108	569
ELR	DPV	Fall	11,628	153
ELR	None	Fall	22,464	27
ELR	None	Fall	7,526	14.2
YSC	LPV	Spring	12,635	13.3

* 25% of these groups were clipped.

Data from marked trout have been collected from several sources, but the largest has been the yearlong creel survey conducted in 1998. Annual netting has also produced some information (Table 27). In 2000, more data will be collected from spring netting and from an index creel survey scheduled for the summer. Data will be analyzed in detail once most marked fish have cycled through Lake DeSmet.

Table 27. Marked ELR and YSC recoveries from Lake DeSmet since 1997.

Source	Mark		ELR		YSC
Creel Survey	AD		372		16
Creel Survey	Unmarked				15
Gill Nets	AD		42		4
Gill Nets	Unmarked				15
Trap Nets	AD		6		
Trap Nets	Unmarked				73
	Total		420	Total	123
Creel Survey	AD/LPV		4		
		Total	4		
Creel Survey	AD/RPV		11		
Gill Nets	AD/RPV		4		
		Total	15		
Creel Survey	LPV		8		
Gill Nets	LPV		2		2
Trap Nets	LPV		2		55
		Total	12	Total	57
Creel Survey	RPV		106		
Gill Nets	RPV		5		9
Trap Nets	RPV		1		
		Total	112	Total	9

A secondary purpose of spring gill netting was to monitor for increases in WAE abundance and to expand the number of sites sampled for spawning walleye. Because an adequate sample of trout was collected with experimental gill nets, only 2 ¼ or 3-inch mesh gill nets (100 feet long) were used for additional WAE sampling, which effectively excluded ELR and YSC from capture.

Initial sampling with three overnight gill net sets occurred on May 26-27, and about two weeks after ELR had been stocked. Gut-content inspection revealed WAE and BNT predation on recently stocked trout. Encouraged by results of this effort and suspecting that predation on trout was more than coincidence, two additional nets were set on June 1-2. As additional verification that WAE and BNT were congregating to feed on little trout, five more gill nets were set four days after stocking YSC on September 30. While some large WHS, a handful of ELR and YSC, and a few CRP and RKB were captured during these efforts, only data for WAE and large BNT are reported. Results are summarized in Table 28.

Table 28. Number, catch/effort, length, weight and condition data for WAE and BNT captured by gill net at Lake DeSmet in May, June, and October, 1999.

Species	N	CPUE	Mean Length (in)	Length Range (in)	Mean Weight (lbs)	Weight Range (lbs)	Mean C Factor
Large mesh gill nets - overnight sets, May 26-27							
WAE	8	0.15	20.1	16.5-29.8	4.0	1.8-12.8	41
BNT	2	0.04	27.3	21.3-33.3	**	**	**
Large mesh gill nets - overnight sets, June 1-2							
WAE	1	0.04	20.1	N/A	3.28	N/A	40
BNT	1	0.04	25.7	N/A	7.6	N/A	45
Large mesh gill nets - overnight sets, October 4-5							
WAE	23	0.28	20.5	17.6-26.7	4.04	2.5-8.9	45
BNT	9	0.11	21.5	17.1-29.7	4.5	1.7-10.8	40

** Data unavailable.

Though WAE CPUE values ranging from 0.04-0.28 are relatively low (e.g., Keyhole Reservoir = 3.0), the total catch in 1999 (32) was 4 times the number caught since their first appearance in 1991. Because WAE were probably concentrated to feed on stocked trout, the catch rates are unrealistic as an indicator of overall abundance. Several year classes are evident from the size distribution of WAE sampled since 1991 (Figure 3), and it seems apparent that recruitment is occurring at some unknown level. Spawning areas remain unidentified.

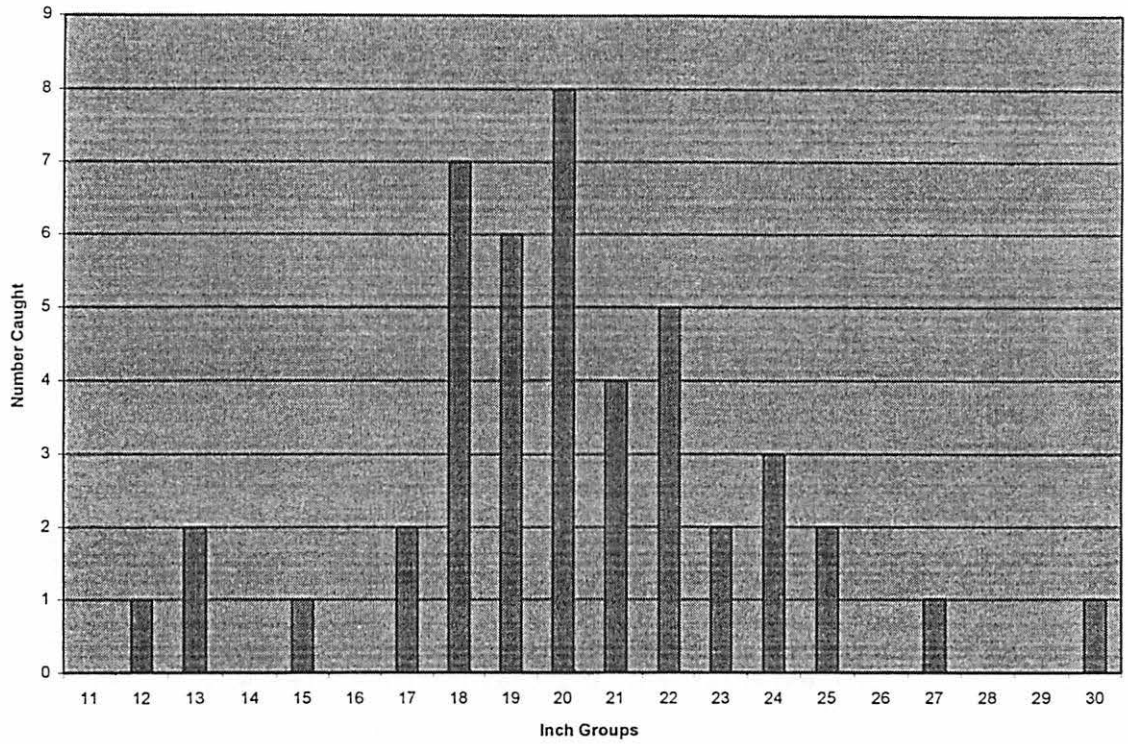

Figure 3. Number of WAE/inch group from Lake DeSmet from 1991-1999.

In contrast to 1998, when one BLC was captured, none were sampled in 1999. Since 1993, only three have been captured from the nearly 126,000 that were stocked between 1993-1996. It appears that efforts to establish BLC have failed. Several habitat components associated with BLC survival are apparently lacking and may have accounted for their failure. Lack of vegetation, cold temperatures, and lack of forage as BLC switch from plankton and insects to piscivory may all be factors.

The Reservoir Research Crew sampled Lake DeSmet in June with hydroacoustic equipment and assistance was provided. Results of sampling are reported under the Reservoir Research Crew section in this document.

Beach seining was conducted at 4 locations on August 27, 1999, to monitor introduced EMS population levels. Two of the locations were also sampled in 1995 (Table 29). The average number of adult EMS/seine haul in 1998 was 150, and the average number of YOY EMS/seine haul was 8,325. EMS density in 1999 was nearly 56 times greater than in 1995, for YOY, and nearly 5 times greater for adults. A banner year for EMS production was evident. No adult WHS were captured either year and YOY density was also much greater in 1998. Density of YOY WHS was 100% greater in 1998, with an average of 150/seine haul.

Table 29. Species and number of fish caught at Lake DeSmet by beach seine on August 27, 1999 (N=4) and September 13, 1995 (N=3). Blanks indicate species not captured at that location.

	Number of Adults:YOY				
Location 1999	EMS	WHS	YEP	GSF	RKB
Shell Creek Bay	0:300				
East Big Bay	0:1,000	0:100			
South Boat Dock Bay	400:2,000				
North Boat Dock Bay	200:30,000	0:500	0:20	0:1	20:30
Location 1995					
W. End, South Dam	0:34	0:27			
South Boat Dock Bay	120:100	0:177			
North Boat Dock Bay	3:35	0:3			

Interest in YEP reproduction was one of the primary reasons for shore seining and results were similar from past efforts. Shore seining did not yield significant numbers of YOY YEP in 1999, and the approximately 70,000 YOY YEP stocked in June 1999, were not evident.

It is clear from sporadic seining since their introduction in 1984, that EMS have become established, and that catch varies widely, which may or may not reflect year class strengths. It is also well documented that piscivory by ELR is minimal, and EMS are not an important forage species. However, this may change if the WAE population increases.

PM - Fish Population Management

- Fish salvage FX-SN-8DS-730

  Water was not added to Lake DeSmet through Leiter Ditch in 1999, no calls were received from the Board of Control, and no fish salvage efforts were necessary.

CS - Creel Surveys

- Creel survey for calendar year 1998 FX-SN-8DS-520

  The creel survey was completed as scheduled and an Administrative Report detailing results will be completed by March 15, 2000. Preliminary empirical results for interview, catch, and harvest are summarized in Tables 30 and 31.

Table 30. Number of interviews, total hours fished, and trip length for ice, shore and boat anglers at Lake DeSmet during the 1998 creel survey.

	Interviews	Hours Fished	Hours/Trip
Complete trip ice anglers	408	1,475	3.6
Incomplete trip ice anglers	12	40	3.3
Total for all ice anglers	420	1,514	3.6
Complete trip bank anglers	411	1,157	2.8
Incomplete trip bank anglers	97	168	1.7
Total for all bank anglers	508	1,325	2.6
Complete trip boat anglers	584	2,620	4.5
Incomplete trip boat anglers	10	51	5.1
Total for all boat anglers	594	2,671	4.5
Complete trip all anglers	1,403	5,252	3.7
Incomplete trip all anglers	119	259	2.2
Total for all anglers	1,522	5,510	3.6

Table 31. Summary of empirical catch and harvest data obtained from anglers interviewed at Lake DeSmet during the 1999 creel survey.

	Fish Caught			Fish Released			Fish Kept		
Species	N	Avg/ Trip	Avg/ Hour	N	Avg/ Trip	Avg/ Hour	N	Avg/ Trip	Avg/ Hour
Ice Fishing Period									
ELR	643	1.53	0.42	173	0.41	0.11	470	1.12	0.31
YSC	20	0.05	0.02	12	0.03	0.01	8	0.02	0.01
BNT	4	0.01	0.00	1	0.00	0.00	3	0.01	0.00
Totals	667	1.59	0.44	186	0.44	0.12	482	1.15	0.34
Ice Free Period									
ELR	2,033	1.84	0.51	1,104	1.00	0.28	929	0.84	0.23
YSC	29	0.03	0.01	7	0.01	0.00	22	0.02	0.01
BNT	13	0.02	0.00	6	0.01	0.00	7	0.01	0.00
Totals	2,075	1.89	0.52	1,117	1.02	0.28	958	0.87	0.24

Preliminary survey estimates from 1998 are compared to estimates from the most recent survey conducted in 1991 (Table 32). The number of anglers, hours fished, and RBT catch and harvest were all lower in 1998, while BNT catch was slightly higher, and both catch and release rates were nearly identical both years.

Table 32. Preliminary estimates of catch and harvest data obtained from creel surveys conducted at Lake DeSmet in 1991 and 1999.

	1991 Totals	1998 Totals
Anglers	43,389	28,864
Hours	166,297	103,746
BNT Catch	215	331
RBT Catch	89,381	57,489
RBT Harvest	55,765	23,933
RBT Released	33,616	33,556
RBT Catch/Hour	0.54	0.52

PF - Public Fishing Development

- Access negotiations and development at Monument FX-SN-8DS-064

  Monument site access development was completed under contract with a final inspection on September 23, 1999. An agreement for cooperative maintenance (restroom facilities, road and parking lot grading, annual removal and installation of boat dock) was completed and signed with Johnson County Commissioners in January 2000. Various news releases were made throughout the construction period and upon completion to notify the public about the access area.

PA - Planning and Administration

- Basin Plan update FX-SN-8DS-120

  Basin Plan update is progressing with an anticipated completion date of March 30, 2000.

Management recommendations

1) Intensify spring netting efforts to increase the sample size of marked ELR and YSC available for analyses of spring vs. fall stocking.

2) Discontinue YEP stocking until contribution of fish planted in 1999 is realized.

3) Sample before and after stocking to further refine the pattern of WAE and BNT predation on ELR and YSC.

4) Employ radio telemetry to identify WAE spawning areas, explore the use of predictive models to help assess potential WAE population impacts, and evaluate options for affecting population growth.

5) Initiate index creel survey as scheduled in 2000 to monitor fishing use and harvest.

6) Install car counter on Monument Access road to monitor use of this recently renovated access site.

Clear Creek Basin - 8CC

Clear Creek SN834250SN

AS - Aquatic Resource Surveys

- Whirling disease monitoring FX-SN-8CC-551

  Samples collected on August 17, 1999 (71 BNT and 41 RBT) were analyzed for whirling disease by the WGFD Fish Health Section. All fish were negative for *Myxobolis cerebralis* spores.

- Channel Catfish Sampling FX-SN-8CW-512

  On September 15 and 16 Clear Creek below Kendrick Dam was sampled with gill nets, hoop nets and a beach seine, and on the Rocking Horse Ranch hoop nets and raft electrofishing were used to obtain CCF for DNA analyses. Ten CCF were captured at these two sites and samples (fin clips) taken. These ten samples combined with nine samples from the Powder River (obtained from anglers) and one from Crazy Woman Creek (see below) were sufficient to meet the goal of 20 samples needed from an relatively unstocked CCF population. Fish species captured during this effort are detailed in Table 33.

Table 33. Species, number sampled, length and weight of fish species collected on Clear Creek, 1999.

Species	Number Sampled	Average L. (Range)	Average W. (Range)
CCF	10	19.2 (11.6-27.9)	3.3 (0.38-<10.0)*
SAR	10	16.4 (14.0-20.9)	1.35 (0.8-2.79)
SMB	12	3.8 (1.8-11.3)	**
GDE	35	11.8 (10.7-13.7)	0.49 (0.32-0.71)
NRH	3	10.5 (8.4-12.1)	**
WHS	5	9.3 (6.5-11.2)	**
RKB	9	5.3 (4.2-7.4)	**
FHC	2	2.8 (2.3-3.3)	**
CRP	4	11.5 (6.5-24.5)	**
RCS	5	7.8 (6.3-9.7)	**
YEP	1	6.3	**

* the largest CCF "bottomed out" the 10 lb scale, the average weight is based on that CCF weighing 12.0 lb.
** weights were not recorded for these species

One snapping turtle that weighed 9.07 lb was captured in a hoop net on the Rocking Horse Ranch.

Management recommendations

1) Continue coordination with NRCS to devise a bypass channel around Kendrick irrigation diversion to allow fish access to Clear Creek above the diversion.

2) Initiate icthyofaunal community (especially CCF and SAR) monitoring program in conjunction with irrigation diversion bypass project.

Healy Reservoir SN431134JN.

AS - Aquatic Resource Surveys

- Fish population survey FX-SN-8CC-512

Healy Reservoir was netted On June 14-15 and October 4-5, 1999, to evaluate effectiveness of current trophy trout regulations and performance of three types of trout (SRC, ELR, FRB) stocked in the reservoir. A combination of experimental gill nets, large mesh (2 in) sinking gill nets, floating experimental gill nets, and 1/4 in mesh trap nets were used in a combination of day and overnight sets to sample trout. Data from spring and fall are summarized in Table 34 and Table 35, respectively.

Table 34. Species, number caught, catch/effort, length, weight and condition data from nets set at Healy Reservoir on June 14-15, 1999.

Species	N	CPUE	Mean Length	Length Range	Mean Weight	Weight Range	Mean C
June 14 Experimental Gill Net Day Sets							
BNT	1	0.12	22.0	22.0-22.0	5.2	5.2-5.2	49
RBT	10	1.22	14.0	7.2-17.0	1.1	0.3-1.6	39
SRC	3	0.37	10.9	7.5-17.5	0.8	0.1-2.1	37
WHS	91	11.1	13.0	8.3-18.0	---	-------	--
June 14 Floating Experimental Gill Net Day Set							
SRC	1	0.25	12.9	12.9-12.9	0.8	0.8-0.8	38
June 14 Sinking Gill Net (100 ft, 2 in mesh) Day Set							
WHS	2	0.67	19.0	18.8-19.1	---	-------	--
June 14-15 Floating Experimental Gill Net							
RBT	24	1.16	13.5	7.9-16.3	1.0	0.1-1.6	36
SRC	1	0.05	12.1	7.9-16.3	1.0	0.1-1.6	36
WHS	1	0.05	14.2	14.2-14.2	---	-------	--
June 14-15 Sinking Gill Net (100 ft, 2 in mesh)							
RBT	4	0.20	12.4	9.3-15.5	0.8	0.3-1.3	37
WHS	1	0.05	18.7	18.7-18.7	2.9	2.9-2.9	44
June 14-15 Trap Nets							
RBT	1	0.33	5.4	5.4-5.4	---	-------	--
WHS	192	64.0	----	---------	---	-------	--
STC	1	0.33	9.6	9.6-9.6	---	-------	---

Table 35. Species, number caught, catch/effort, length, weight and condition data from nets set overnight at Healy Reservoir on October 4-5. 1999.

Species	N	CPUE	Mean Length	Length Range	Mean Weight	Weight Range	Mean C
October 4-5 Sinking Experimental Gill Nets							
RBT	94	1.44	13.1	9.3-21.0	0.9	0.3-3.3	36
SRC	11	0.17	12.7	9.2-17.7	0.9	0.3-2.0	37
BNT	1	0.02	10.8	10.8-10.8	0.5	0.5-0.5	41
YEP	1	0.02	10.8	10.8-10.8	0.7	0.7-0.7	54
WHS	220	3.37	12.5	6.3-17.0	---	-------	--
October 4-5 Trap Nets							
RBT	15	5.00	15.0	11.1-19.2	1.2	0.5-2.3	34
SRC	3	1.00	16.0	14.3-17.2	1.4	1.0-1.7	34
WHS	207	69.0	----	--------	---	-------	--

A single trout over 20 in was caught in 1999 but no large BNT were captured. This contrasts to 1998 when 4 large BNT were captured, but no RBT over 20 in. The grand average length for RBT was 12.7 in and 12.8 in for SRC. Too few BNT were captured (N=2) to calculate a meaningful average length.

Various marked fish, stocked in 1997, 1998, and 1999 (Table 36) have been recovered in 1998 and 1999, and these are tabulated in Table 37.

Table 36. Year stocked, strain, mark, number stocked, average length (inches) when stocked, and number stocked per acre (250 acres), for Healy Reservoir in 1997 and 1998.

Year	Strain	Mark	Number Stocked	Average Length	Number Per Acre
1997	ELR	AD	15,012	6.3	60
1997	FRB	DPV	5,000	4.5	20
1997	SRC	AD	5,130	4.4	21
	Totals		25,142	---	101
1998	ELR	RPV	10,017	6.2	40
1998	FRB	AD-RPV	3,192	4.3	13
1998	SRC	RPV	5,518	4.6	22
Totals			18,727	---	75
1999	ELR	LPV	5,805	6.3	23
1999	FRB	AD-LPV	4,320	7.3	17
1999	FRB	---	1,656	7.3	7
1999	SRC	LPV	3,090	4.6	12
Totals			14,871	---	59

Table 37. Number and size of marked trout sampled at Healy Reservoir in 1998 and 1999, and their average increase in size since being stocked (inches).

Strain	Year Stocked	Mark	Number Recovered	Average Stocking Length	Average Recovery Length	Average Increase
			Fish Recovered in 1998			
ELR	1997	AD	161	6.3	13.3	7.0
SRC	1997	AD	30	4.4	13.0	8.6
FRB	1997	DPV	13	4.5	13.0	8.5
ELR	1998	RPV	48	6.2	9.5	3.3
SRC	1998	RPV	4	4.6	7.8	3.2
FRB	1998	AD-RPV	1	4.3	11.2	6.9
			Fish Recovered in 1999			
ELR	1997	AD	55	6.3	15.3	9.0
SRC	1997	AD	6	4.4	17.0	12.6
ELR	1998	RPV	17	6.2	14.3	8.1
SRC	1998	RPV	2	4.6	12.5	7.9
FRB	1998	AD-RPV	2	4.3	13.3	9.0
ELR	1999	LPV	25	6.3	10.9	4.6
FRB	1999	AD-LPV	35	7.3	10.9	3.6
SRC	1999	LPV	9	4.6	9.7	5.1

CS - Creel Surveys

- Creel survey for calendar year 1998 FX-SN-8CC-520

  A draft administrative report was completed in April 1999 and submitted for review and printing.

PF - Public Fishing Development

- Access development FX-SN-8CC-065

  Long-term access negotiations continued during 1999 without resolution. The present draft of the access lease agreement is still in the hands of Lake DeSmet Energy Company. No access area development or improvement has been initiated pending final agreement on this lease, other than regulation signing and periodic litter removal.

Management Recommendations

1) Continue sampling in early to mid-June and October to evaluate RBT and SRC stocking, effects of the trophy regulation instituted in 1998, and the relative abundance of WHS in 1999 and 2000.

2) Analyze strain evaluation data and population size structure data and include in an Administrative Report scheduled for completion in 2001.

3) Contact Healy Reservoir owners and urge finalizing the agreement or making substantive changes in the negotiations. Access development funding was not encumbered due to delays in this agreement, so if a finalized agreement is reached, we will need to renew our request for funding through the Commission.

4) Healy Reservoir is tentatively planned for chemical rehabilitation in September 2001. However, we will delay any plans for rehabilitation of the fishery pending completing a satisfactory long-term access agreement.

Piney Creek, North SN834420SN and South SN834485JN

AS - Aquatic Resource Surveys

- Whirling disease monitoring FX-SN-8CC-551

  Samples collected from South Piney Creek above Story Hatchery (38 BNT, 49 RBT, 25 BKT), and from Spring Creek below the hatchery (49 BNT, 10 RBT) were analyzed by the WGFD Fish Health Section for the presence of whirling disease. All fish were negative for *Myxobolis cerebralis* spores.

Tie Hack Reservoir SN430300JN

AS - Aquatic Resource Surveys

- Fish Population Sampling FX-SN-8CC-512

  On July 7-8, 1999 two trap nets, one floating and three sinking experimental gill nets were set over night to determine composition and relative abundance of fish populations one year after initial stocking. Fish collection data are summarized in Table 38. For comparison Table 39 contains fish sampling information from 1998. The 1998 sampling was done prior to scheduled fish stocking in this new reservoir (Table 40).

Table 38. Species, year, catch/effort, length, weight, and condition of fish species collected at Tie Hack Reservoir, 1999.

Species	N	CPUE*	Average L. (Range)	Average W. (Range)	Avg. C.
Gill nets - short duration sets 6/7/99					
BKT	2	0.26	9.1 (8.8-9.4)	0.26 (.23-.28)	33.7
BNT	8	1.04	11.7 (9.9-14.0)	0.57 (.36-.90)	34.5
RBT	3	0.39	7.5 (6.0-10.2)	0.16 (.08-.31)	34.1
YSC	24	3.12	9.7 (8.9-10.4)	0.28 (.23-.34)	31.1
Gill nets - overnight sets 6/7-8/99					
BKT	3	0.05	8.9 (7.9-10.3)	0.25 (.16-.34)	34.2
BNT	10	0.16	11.5 (8.8-22.5)	0.83 (.24-4.56)	37.4
RBT	29	0.48	8.1 (6.1-11.6)	0.22 (.09-.46)	37.0
YSC	34	0.56	9.9 (8.9-11.2)	0.31 (.24-.43)	32.2
Trap nets set overnight 6/7-8/99					
RBT	3	1.5	10.7 (9.2-12.5)	0.40 (.29-.57)	31.9

*CPUE=net hours for gill nets and net nights for trap nets

Table 39. Species, year, catch/effort, length, weight, and condition of fish species collected at Tie Hack Reservoir, 1998.

Species	N	CPUE	Average L. (Range)	Average W. (Range)	Avg. C.
BKT	1	0.02	9.1 (9.1-9.1)	0.30(.30-.30)	39.8
BNT	13	0.28	11.0 (8.2-20.8)	0.73 (.24-4.4)	40.3
RBT	8	0.17	9.7 (8.5-11.6)	0.36 (.24-.66)	37.9
YSC	95	1.47	7.5 (5.6-9.5)	0.14 (.06-.52)	32.4

Table 40. Number, size and mark of fish stocked at Tie Hack Reservoir, 1998 and 1999.

Species	Number	#/Lb	Mark
1998			
YSC	5,069	10.9	None
FRB	6,803	3.0-3.4	AD
1999			
YSC	5,500	7.2	AD
FRB	4,904	2.5-3.4	RPV
GDT	454	7.0	None
RRB	85	0.3	None

This year six AD marked FRB were sampled that averaged 10.6 in. These fish had grown an average of 1.4 in the 11 months since being stocked for an average growth rate of 0.13 in/month. Five RPV marked FRB had been stocked just 10 days earlier on May 27. Fifty-eight YSC sampled averaged 9.8 in representing an average growth rate of 3.6 in or 0.3 in/month.

Although net catch CPUE's are different between years, much of the difference can be attributed to the amount and timing of fish stocking done between the sampling efforts.

This new reservoir is very popular among anglers, so continued monitoring and refinement of stocking rates will be necessary to provide quality angling opportunities in the future.

Management Recommendations

1) Stock 5,400 (4.0/lb) marked FRB in 2000 (LPV) and 2001 (DPV). After 2001 stock 5,400 FRB (4.0/lb) annually. This is a rate of 86 per surface acre.

2) Stock 6,000 (20/lb) marked YSC in 2000 (RPV) and 2001 (LPV). After 2001 stock 6,000 YSC (20/lb) annually. This is a rate of 95 per surface acre (total of 181/SA rainbow + cutthroat).

3) Monitor the fish population in 2000 to refine monitoring program and fish stocking.

4) Conduct programmed creel survey in 2000 (May through September) to determine fishing pressure, angler preferences and catch and harvest rates.

Crazy Woman Creek Basin - 8CW

Crazy Woman Creek SN835020JN

AS - Aquatic Resource Surveys

- Channel Catfish Sampling FX-SN-8CW-512

On August 17 and 18 a reach of Crazy Woman Creek just downstream of Interstate 90 was sampled with electrofishing equipment, a beach seine and hoop nets to capture channel catfish for DNA analyses. One YOY CCF (1.2 in) and one adult CCF (18.4 in and 2.54 lb) were sampled. Fin clips were taken from the adult CCF for DNA analyses. Table 41 details the fish species captured during this effort.

Table 41. Species, number sampled, length, weight, and condition of fish species collected at Crazy Woman Creek, 1999.

Species	Number Sampled	Average L. (Range)	Average W. (Range)	Avg. C.
CCF	2	9.8 (1.2-18.4)	1.27 (0.0-2.54)	49
CRP	2	14.7 (12.9-16.5)	1.45 (1.0-1.89)	44
FHC	9	5.1 (3.3-6.2)	0.04 (.01-.07)	29
GDE	3	12.7 (11.5-13.4)	0.41 (.37-.45)	22
NRH	6	9.6 (3.8-12.8)	0.33 (.03-.69)	38
RCS	1	9.2	0.36	46
STC	18	6.2 (3.2-7.2)	0.07 (.01-.10)	32
WHS	1	9.6	0.34	38

To date no DNA results have been received.

Muddy Guard Reservoir No. 1 SN431193JN

AS - Aquatic Resource Surveys

- Fish Population Check and Stocking/Regulation Evaluation FX-SN-8CW-512

Muddy Guard Reservoir 1 was surveyed on June 16 and October 7 to assess fish populations relative to recent stocking history and regulations. Two sinking experimental gill nets, one single panel (100 ft, 225 in mesh) sinking gill net, and two 1/4 in mesh trap nets were set overnight at identical locations during spring and fall sampling. Sample locations were

similar to those used in 1997 and 1998. Capture data are summarized below in Table 42.

Table 42. Species, number caught, catch/effort, length, weight and condition data from nets set at Muddy Guard Reservoir 1, June 17 and October 10, 1998.

Species	N	CPUE	Mean Length	Length Range	Mean Weight	Range	Mean C
Spring Experimental Gill Nets							
BNT	24	0.56	13.8	10.8-20.0	0.9	0.4-2.9	33
RBT	21	0.49	14.1	11.4-17.0	0.9	0.5-1.3	32
SPK	7	0.16	10.3	4.7-14.4	0.6	0.1-1.0	41
WHS	101	2.38	14.2	11.1-17.4	1.4	0.9-2.1	42
Spring Trap Nets							
BNT	1	0.50	16.5	N/A	1.3	N/A	29
SPK	20	10.0	3.8	3.0-4.74	0.0	0.0-0.1	64
WHS	2	1.0	9.7	6.3-13.1	0.5	0.1-0.9	43
Spring Sinking Gill Net (100', 2.25" mesh)							
BNT	5	0.25	13.1	11.6-15.4	0.7	0.5-1.1	32
RBT	2	0.10	14.3	13.0-15.5	1.0	0.8-1.2	34
WHS	5	0.25	18.1	17.6-18.7	2.8	2.6-3.0	46
Fall Experimental Gill Nets							
BNT	51	1.27	13.7	10.3-18.7	1.0	0.4-2.7	38
RBT	16	0.40	14.3	12.7-16.2	1.0	0.6-1.6	34
SPK	2	0.05	14.0	14.0-14.0	0.8	0.8-0.9	30
WHS	64	1.59	14.9	9.9-19.4	1.1	0.4-2.9	40
LNS	1	0.02	7.1	N/A	0.2	N/A	42
Fall Trap Nets							
BNT	9	3.00	15.3	11.6-18.9	1.4	0.7-2.3	38
RBT	17	5.67	14.8	13.0-16.6	1.0	0.7-1.3	30
WHS	53	17.7	15.2	10.4-17.1	---	---	---
Fall Sinking Gill Net (100 ft, 2.25 in mesh)							
BNT	7	0.36	16.3	13.5-17.8	1.8	1.0-2.3	32
RBT	1	0.05	15.1	N/A	1.1	N/A	N/A
WHS	32	1.66	16.3	14.1-18.0	1.9	1.5-2.4	45

SPK were captured in typically low numbers except during spring when 20 were caught in trap nets. These fish ranged from 3-5 in and were all marked with RPV fin clips. As recommended in the 1998 Progress Report, this is the last group of SPK scheduled unless performance improves over past plants.

Muddy Guard 1 is managed as a trophy water but produced no trophy size (>20 in) RBT and only one trophy size BNT in 1999. This is consistent with catch of trophy fish from past years shown in Figures 4 and 5, where maximum fish size reflects the 4 BNT > 20 in, and the single RBT > 20 in, 8, caught since 1986.

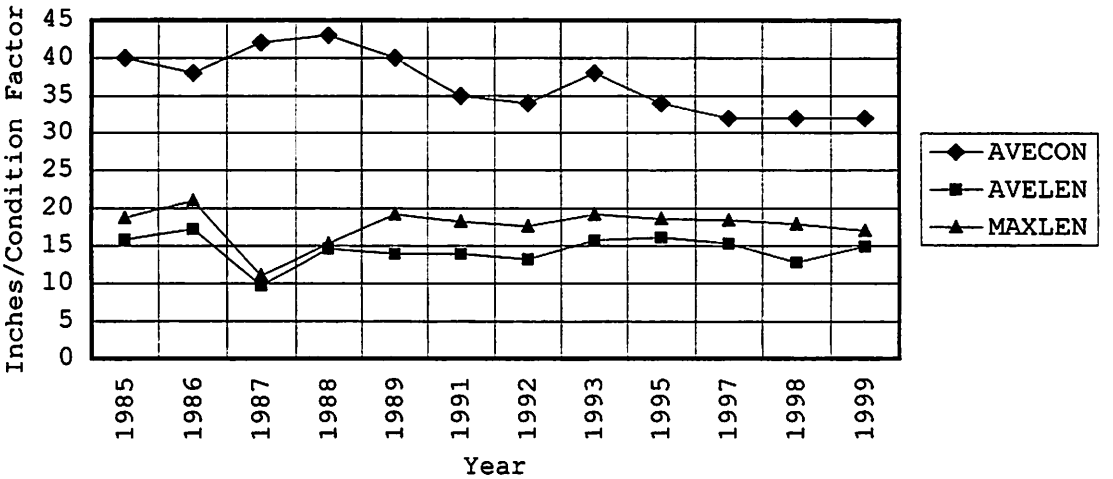

Figure 4. Average condition factor, average length, and maximum length of RBT sampled from Muddy Guard Reservoir #1 from 1985-1999. Data were combined from all sampling gears, and from spring and fall samples in 1998 and 1999. Sample sizes were greater than 15 all years except 1986 and 1988 (N=6).

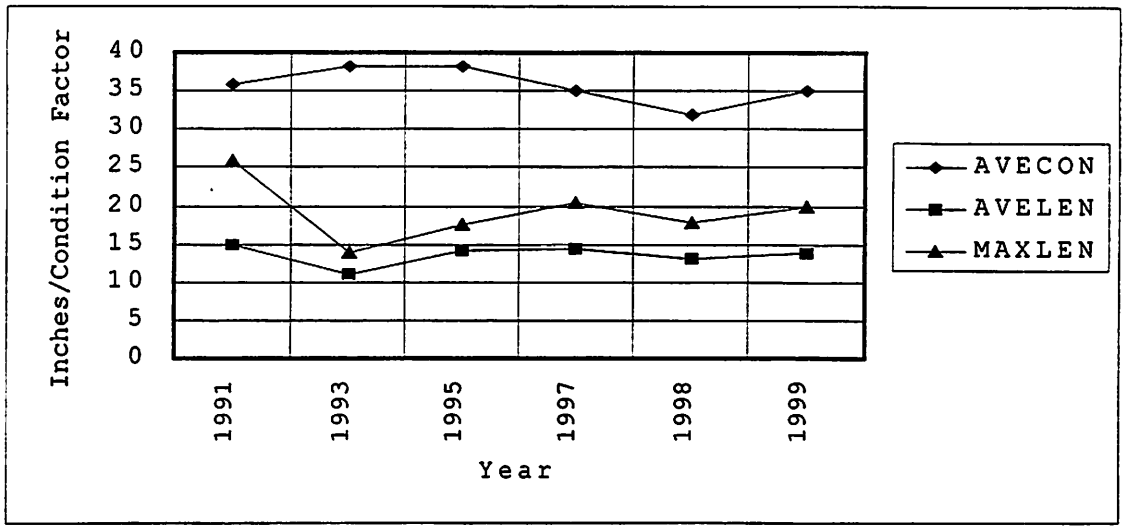

Figure 5. Average condition factor, average length, and maximum length of BNT sampled from Muddy Guard Reservoir #1 from 1991-1999. Data were combined from all sampling gears, and from spring and fall samples in 1998 and 1999. Sample sizes were greater than 15 all years except 1991 and 1995 (N=10).

Condition of RBT and BNT trout in the spring of 1998 was poor and the decline in condition was especially evident for BNT, which showed a statistically significant decline from the fall of 1997 (1998 Progress Report). Average condition of RBT and BNT had improved significantly by the fall of 1998, relative to the spring. Compared to the fall of 1997, average RBT condition was slightly and significantly better than in the fall of 1998, but BNT condition in the fall of 1998 remained significantly lower than in the fall of 1997. Low water conditions and high water temperatures were considered a possible cause of the low condition factors, and two temperature recorders were installed in August 1998 to monitor temperatures through August 1999.

While the trends between spring and fall condition factors for RBT are masked in Figures 4 and 5 because seasonal samples were combined, the reduction for BNT in 1998 appears, as does an apparent decline for RBT since about 1988. The years with highest average RBT condition coincide with samples dominated by small, recently stocked fish, and are inflated accordingly. However, since about 1989, average RBT size has fluctuated only slightly around 15 in, while average condition has steadily and fairly consistently declined from 40 to about 30. Figure 5 is not standardized for gear, sample season, or size class, but interestingly, the apparent decline roughly corresponds to BNT introduction in 1990.

Between 1990, when restrictive harvest regulations were imposed, to 1996, stocking rates averaged around 110/acre (Figure 6). Harvest at Muddy Guard #1 is nominal, angling pressure is low, and post-release mortality is assumed negligible. For these reasons, concern over stockpiling fish and impacting growth, has led to a gradual lowering of stocking rates.

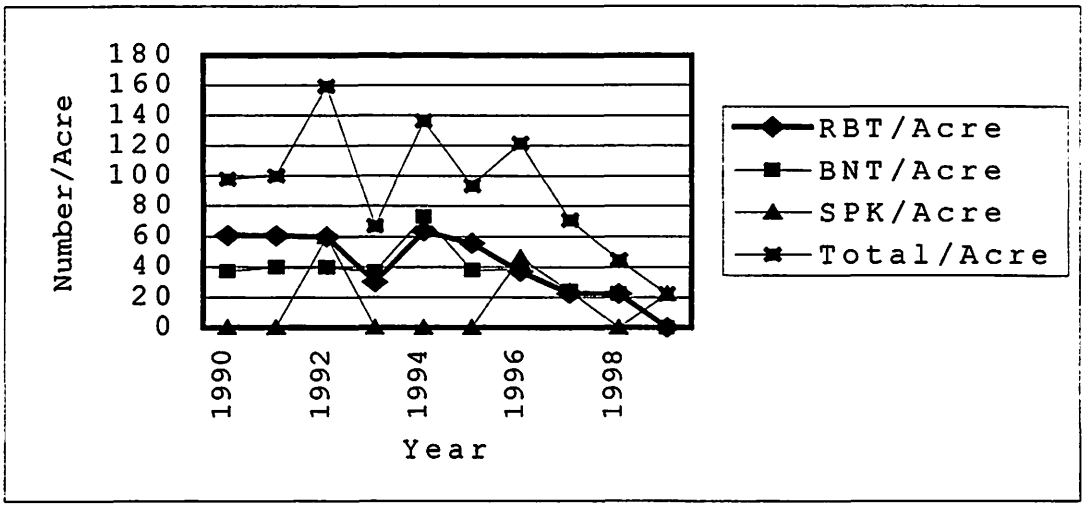

Figure 6. RBT, BNT, and SPK stocking rates at Muddy Guard Reservoir #1 since 1990 when BNT were introduced and current special regulations were established. Values are based on a full pool of 27 surface acres.

Stocking rates have ranged from 20-160/acre with the largest fluctuations associated with SPK stocking. SPK have been stocked at densities equivalent to RBT and BNT but never sampled in proportion to these two species and harvest is considered low. Because of their apparently low survival and generally poor condition, 1999 is the last year they are scheduled for stocking.

BNT exhibited the lowest catch rate of any species during a 1993 creel survey (0.07), and none were harvested. It is clear they contribute very little to the fishery, but their stocking rates have paralleled those for RBT. Though BNT stocking now occurs on a semi-annual basis, and RBT numbers are generally lower than during the early to mid 1990s, further BNT reductions or elimination could accelerate production of trophy trout, which is the management goal for Muddy Guard #1.

Further monitoring is required to determine if changes in stocking strategy will result in production of more trophy trout (> 20 in).

Management Recommendations

1) Continue monitoring at Muddy Guard 1 with annual sampling in early to mid-June and October, to help refine stocking densities of RBT and assess population structure for this trophy water.

2) Eliminate BNT stocking and continue planting RBT at the rate of 22/acre (600 fish per year).

Muddy Guard Reservoir No. 2 SN430193JN

AS - Aquatic Resource Surveys

- Fish Population Check and Stocking/Regulation Evaluation FX-SN-8CW-512

Scheduling conflicts and access difficulties caused by severe reservoir drawdown precluded sampling in 1998. Annual drawdowns make fall access problematic, but water levels are typically high in the spring, which would be a more reasonable time to sample this reservoir.

Management Recommendations

1) Continue monitoring at Muddy Guard 2 with occasional spring sampling to monitor changes in the RBT:BNT ratio relative to changes in stocking rates, and to help refine stocking densities of RBT, BNT, and SPK for this basic yield water.

Middle Fork Powder River Basin - 8MP

Bear Trap Creek SN836550JN

AS - Aquatic Resource Surveys

- Fish population survey FX-SN-8MP-512

On October 20, 1999 two stations on Bear Trap Creek were sampled with the Coffelt backpack electrofishing unit. Station 7720 is through the habitat improvements and encompasses most of the original station at this site. The control station 7520 sampled this year was upstream of the original control station. A recent snow and time constraints prevented us from sampling the original control station. Table 43 contains the fish collection data while Table 44 details the population and biomass estimates.

Table 43. Length, weight, and condition of fish species collected at station 7720 (Habitat Improvement) on Bear Trap Creek, 1999.

Species	Number Collected	Average L. (Range)	Average W. (Range)	Average C.
BKT	18	5.5 (2.0-9.8)	0.11 (.01-.32)	43.0
RBT	43	5.7 (3.3-9.3)	0.09 (.02-.32)	40.0

Table 44. Fish population and biomass estimates at station 7720 (Habitat Improvement) on Bear Trap Creek, 1999.

Species	Est. Total No./mile	Est. No./ mile>6 in	Est. Total Lbs./acre	Est. Lbs./ Acre> 6 in	Est. Total Lbs./mile
BKT	289	152	36.9	32.6	31.3
RBT	654	243	69.4	51.6	43.8

Only two of 43 RBT sampled at this station appeared to be hatchery fish. Their lengths, 8.8 and 9.3 suggest they were part of the July 2, 1999 plant of FRB (96 @ 3.2/lb, 9.2 in). Continued stocking of 200 catchable FRB per year is not necessary due to a good population of wild fish in this small stream. Two nonresident hunters that were fishing the stream were interviewed at this station during the sampling trip. They indicated they had caught several fish and were pleased with their fishing experience on Bear Trap Creek.

Management Recommendations

1) Discontinue stocking catchable RBT in Bear Trap Creek.

2) Make on site visits to this area at least every other year to check the instream habitat structures for any maintenance needs.

Middle Fork Powder River SN836485JN

AS - Aquatic Resource Surveys

- Whirling disease monitoring FX-SN-8LH-551

  On July 29, 1999 31 RBT and 44 BNT were collected from the lower Middle Fork Powder River and analyzed for the presence of *Myxobolis cerebralis* spores. Results from all fish were negative.

- Administrative Report on Fish Population FX-SN-8MP-512

  An Administrative Report was planned to synthesize and summarize fish population data collected since special regulations were instituted in 1990. However review of an Administrative Report completed in 1993 showed that regulations had little effect on fish population structure because of low exploitation rates. Additional review of data collected since 1994 also indicated that little change in fish population structure has occurred since 1990. Because it is unlikely that detailed analyses of additional data will reveal anything not already unknown, this project should be deleted so resources can be directed to higher priority projects.

North Fork Powder River - Headwaters SN836420JN

AS - Aquatic Resource Surveys

To evaluate wild and stocked trout populations, two established electrofishing stations were sampled on September 29, 1999. A two-pass estimate was developed for the lower station (elevation=8,800) which is inside a FS exclosure, and a three-pass estimate was developed at an established station outside the exclosure (elevation = 8,868). The most recent estimates are from 1989, and they are summarized and compared to 1999 data in Tables 45 and 46.

Table 45. Population and biomass estimates for trout collected from two stations sampled in the upper North Fork Powder River, August 10, 1989 and September 29, 1999.

Station	Species/Size	N		Est. N/Mile		Est. Lbs/Acre	
		1989	1999	1989	1999	1989	1999
Exclosure	BNT > 1"	196	117	3,641	2,147	171	193
Exclosure	RBT > 1"	28	2	503	35	88	13
Totals		224	119	4,144	2,182	259	206
Control	BNT > 1"	105	86	1,570	1,273	63	128
Control	RBT > 1"	24	4	349	58	76	12
Control	BKT > 1"	0	6	0	87	0	5
Totals		129	96	1,919	1,418	139	145
Exclosure	BNT > 6"	26	32	483	563	92	120
Exclosure	RBT > 6"	18	2	323	35	77	13
Totals		44	32	806	598	169	133
Control	BNT > 6"	10	25	149	376	24	85
Control	RBT > 6"	11	4	160	58	69	12
Control	BKT > 6"	0	1	0	N/A	0	N/A
Totals		21	30	309	434	93	97

Table 46. Average Length and condition of all trout (> 1 in) collected from two stations the upper North Fork Powder River, August 10, 1989 and September 29, 1999.

Station	Species	N		Average Length (range)		Average C	
		1989	1999	1989	1999	1989	1999
Exclosure	BNT	196	86	4.5 (1.7-2.8)	5.3 (1.7-11.7)	33	42
Exclosure	RBT	28	4	8.7 (5.7-12.5)	3.6 (2.0-6.2)	35	45
Exclosure	BKT	0	6	N/A	7.8 (6.1-9.7)	N/A	40
Control	BNT	105	86	4.3 (2.9-10.6)	5.3 (1.7-11.7)	36	42
Control	RBT	24	4	7.6 (3.3-12.2)	7.9 (6.1-9.7)	40	40
Control	BKT	0	6	N/A	3.6 (2.0-6.2)	N/A	45

Though total biomass (Lbs/acre) estimates were similar between years at both stations, relative biomass of individual species changed between years (Table 42). BNT increases across years, stations, and size classes corresponded to decreases in RBT biomass. Biomass dependence on and size and density offers a reasonable explanation for the apparent changes.

Density of BNT (N/Mile > 1 in) was lower in 1999, but average size was about an inch greater, while the density of BNT > 6 in increased at both stations in 1999. Both trends contributed to an overall increase in BNT biomass between 1989 and 1999 at both stations. Density of RBT was consistently lower at both stations both years but size between stations differed. RBT were substantially smaller on average within the exclosure, while the very few caught from the control station were about the same length as measured in 1989. Again, the combination of density and size resulted in reduced biomass.

Catchable RBT trout (N=550) were stocked on July 30, presumably throughout both sample stations, but were not evident when data were collected on September 29. Conceivably they were stocked elsewhere, though traditionally this would not be the case, or they were depleted rapidly through mortality or emigration. Regardless though, the lack of catchable RBT, which were present in greater numbers in 1989, is one of the more

obvious differences in RBT population characteristics between the two years. Few small, wild RBT were captured in 1999, and there is no indication that past stocking has resulted in establishment of a significant wild population. Brown trout have remained the dominant species.

The biomass (85-120 lbs/acre), density (376-563/mile), and maximum size (11.7 in) of wild BNT (> 6 in) at both stations, indicate a wild trout population capable of supporting angling in this small, headwater stream.

Management Recommendations

Discontinue stocking catchable RBT and re-sample site in three years to monitor population trends, including BKT that have become established since 1989. Reassess stream capacity to support angling after several years without infusions of stocked trout.

Powder River Basin - 8PR

Powder River SN834200JN

AS - Aquatic Resource Surveys

- Shovelnose Sturgeon and CCF Sampling FX-SN-8CW-512

No sampling for either shovelnose sturgeon or channel catfish was done this year to determine upstream migration patterns.

Little Powder River Basin - 8LP

Dry Fork Mine Pond SN430280CL

PF - Public Fishing Development

- Mine pond development FX-SN-8LP-236

By the end of 1998 reservoir construction was nearly complete however, early in 1999 Wyoming Dept. of Environmental Quality (DEQ) discovered the construction had not been done as permitted. Coincident to this discovery, the mine engineer in charge of the project terminated employment with Dry Fork Coal Company.

DEQ informed Dry Fork Coal Company they would have to complete the entire permit process again in order for a reservoir to be built. Although Dry Fork Mine was not contacted directly in 1999, DEQ employees indicate Dry Fork is committed to building a reservoir. The new reservoir may however, be only 50%-60% as large as the previously permitted reservoir.

Management Recommendations

Establish contacts with Dry Fork Mine personnel to provide input on reservoir construction, habitat placement and public access. Especially important is the pursuit of legal public access.

Little Missouri River Basin - 8LM

Work not associated with a particular water

AS - Aquatic Resource Surveys

- Resource reconnaissance of drainage FX-SN-8LM-530

  A brief reconnaissance of the upper portion or the Little Missouri drainage and Oshoto Reservoir was done in late November, 1999 in conjunction with a tour of Fish Walk-In areas. No water chemistry data were collected at this time and discussions with the warden indicated future access to Oshoto Reservoir might be negotiated.

  Management recommendations

  Conduct additional reconnaissance of the drainage and remote possibility of CBM development in 2000 in preparation for designing a future drainage survey. Limited sampling may be conducted to determine best sites for survey.

Belle Fourche River Basin - 8BF

Arrowhead Reservoir SN460220CK

AS - Aquatic Resource Surveys

- Fish population monitoring FX-SN-8BF-512

  Arrowhead Reservoir sampling was not completed because rain prevented access initially and then scheduling to accomplish the sampling goal could not be done. This has been rescheduled for spring of 2000.

Cook Lake SN460209CK

AS - Aquatic Resource Surveys

- Fish population survey FX-SN-8BF-512

  On July 19-20, 1999 three trap nets and two sinking experimental gill nets were set over night to assess effects GSF and BBH are having on the fishery, overall condition of the fishery and annual stocking of advanced fingerling SRC, subcatchable BNT, and catchable RBT. Fish collection data are summarized in Table 47. Fish stocking in Cook Lake is summarized in Table 48.

  Other information collected: pH = 8.2, TDS = 190 ppm, Conductivity = 410 u/cm, Average depth = 12 ft. MET = 15.8.

Table 47. Species, catch/effort, length, weight, and condition of fish species collected at Cook Lake, 1999.

Species	N	CPUE*	Average L. (Range)	Average W. (Range)	Avg. C.
Gill nets - overnight sets 6/19-20/99					
RBT	36	1.03	9.4 (6.5-21.5)	0.35 (.10-3.2)	36.0
SRC	15	0.43	8.5 (6.5-10.0)	0.20 (.09-.30)	31.9
BNT	2	0.06	8.9 (7.8-9.9)	0.23 (.16-.30)	32.3
WHS	74	2.11	12.9 (9.1-15.0)	0.83 (.29-1.32)	36.9
BBH	49	1.4	7.0 (5.0-8.5)	0.21 (.07-.38)	59.0
GSF	47	1.34	4.2 (3.8-4.9)	0.05 (.04-.08)	70.1
Trap nets set overnight 6/19-20/99					
RBT	1	0.5	9.8 (9.8-9.8)	0.33 (.33-.33)	35.1
SRC	1	0.5	6.2 (6.2-6.2)	0.07 (.07-.07)	29.4
BNT	1	0.5	10.8 (10.8-10.8)	0.45 (.45-.45)	35.7
WHS	5	2.5	**	**	**
BBH	356	178	**	**	**
GSF	1,999	999.5	**	**	**

* CPUE = net hours for gill nets and net nights for trap nets
** these species just enumerated, no L, W or C data available

Table 48. Number, size and mark of fish stocked at Cook Lake, 1998 and 1999.

Species	Number	#/Lb	Mark
1998			
FRB	6,326	3.8-2.8	None
BNT	1,000	10.7	None
SRC	2,250	30.0	None
1999			
FRB	8,880	3.8-3.5	None
FRB	608	19.0	None
BNT	900	9.0	None
SRC	2,150	17.2	None
SRC	56	0.35	AD
RRB	85	0.3	None

Net catches of trout seem low for the number that had been planted in 1998 and in 1999 previous to the sampling effort. Less than one percent of BNT, SRC and FRB that were stocked the last two years were sampled. The high numbers of BBH and GSF sampled in the nets is discouraging. Apparently competition between trout and these undesirable species is reducing trout numbers to undesirable levels. Overall the fishery of Cook Lake is in poor shape and actions necessary to remedy the situation are needed.

With the current turbidity of Cook Lake, most likely from the BBH population now occupying the lake, it is difficult to determine if the grass carp or the turbidity have influenced the reduction in vegetation at this lake. If grass carp are to be stocked to control the vegetation after the lake is chemically renovated, then a research project should be designed to determine if, in fact, they are effective in controlling undesirable waterweeds.

No amphibians were observed while sampling this lake.

Management Recommendations

Make plans to chemically remove the fish population of Cook Lake with rotenone. Coordination with the Black Hills National Forest should start immediately so chemical application can be done before 2004.

Panther Pond SN660235CL

AS - Aquatic Resource Surveys

- Fish population monitoring FX-SN-8BF-512

On May 26-27, 1999 two sinking experimental gill nets were set for short periods of time and three trap nets were set over night to assess the overall condition of the fishery and annual stocking of catchable RBT. Fish collection data are summarized in Table 49. Fish stocking in Panther Pond is summarized in Table 50. FRB are stocked by the WGFD, CCF and LMB are stocked by the Town of Wright.

Table 49. Species, catch/unit of effort, length, weight, and condition of fish species collected at Panther Pond, 1999.

Species	N	CPUE*	Average L. (Range)	Average W. (Range)	Avg. C.
Gill nets - short duration sets 5/26/99					
RBT	9	2.9	11.7 (8.7-17.8)	0.86 (.27-2.56)	42.7
Trap nets set overnight 5/26-27/99					
RBT	1	0.33	11.5 (11.5-11.5)	0.52 (.52-.52)	34.2
BLB	1	0.33	12.2 (12.2-12.2)	1.08 (1.08-1.08)	59.5
GSF	100	33.3	4.1 (3.0-5.0)	0.06 (.02-.10)	75.0
WHS	2	0.67	13.1 (11.1-15.0)	1.02 (.60-1.44)	43.3

* CPUE = net hours for gill nets and net nights for trap nets

Table 50. Number, size and mark of fish stocked at Panther Pond, 1998 and 1999.

Species	Number	#/Lb	Mark
1998			
FRB	1,123	4.0-2.8	None
1999			
FRB	949	4.0-2.2	None
CCF	150	Unknown	None
LMB	175	Unknown	None

The RBT caught in the short duration gill net sets indicated there was good survival of planted catchable RBT and three of the nine RBT sampled in gill nets were carryovers from 1998 or 1997 stocking. To minimize mortality and depletion of stocked RBT no gill nets were set overnight. The low numbers of BBH and WHS sampled is encouraging, but the rather high number of GSF and total lack of LMB is discouraging.

Management Recommendations

1) Stock 1,000 catchable RBT per year in 4 different plants, 3 prior to June 15 and one after September 15.

2) Set nets to monitor fishery in 3-5 years. Keep in contact with City of Wright personnel to obtain information regarding angler catch rates and opinions.

3) Consider night electrofishing to monitor LMB populations.

Sand Creek SN862485CK

AS - Aquatic Resource Surveys

- Whirling disease monitoring FX-SN-8BF-551

  On October 13, 1999 69 BNT were collected in conjunction with population monitoring for analyses by the WGFD Fish Health Section for the presence of whirling disease. All fish were negative for *Myxobolis cerebralis* spores.

- Fish Population Survey FX-SN-8BF-512

  Population estimates to monitor the condition of the fishery and survival of the 1997 plant (September 15 - 820 AD marked SRC at 9.0/lb; 6.6 in, stocked above diversion dam) of SRC were conducted or attempted at four established stations on Sand Creek. Sampling results, by station, are listed below.

  1) Ranch A Station (3780) - Sand Creek

  A 3-pass estimate was made at this 266 ft long, 21.5 ft wide station on October 11. Tables 51 and 52 summarize the electrofishing results at the Ranch A station for 1999 and for comparison, the previous two sampling efforts (1995 and 1993).

  Table 51. Date, species, number, length, weight and condition of fish collected at the Ranch A station, Sand Creek.

Date	Species	Number Collected	Average L. (Range)	Average W. (Range)	Average C.
1999	BNT	504	6.2 (3.2-13.5)	0.13 (.01-.95)	40
	RBT	10	8.8 (3.3-11.3)	0.33 (.02-.63)	39
1995	BNT	171	6.8 (3.8-13.0)	0.16 (.01-.72)	37
	RBT	6	10.3 (8.0-12.9)	0.47 (.20-.88)	40
	SRC	1	16.0 (16.0-16.0)	1.42 (1.42-1.42)	35
1993	BNT	197	7.5 (3.4-19.2)	0.21 (.02-2.87)	40
	RBT	38	8.7 (4.8-12.7)	0.29 (.04-.82)	39
	SRC	3	7.2 (6.4-7.8)	0.13 (0.09-0.16)	33

  Table 52. Date, species, population and biomass estimates of fish collected at the Ranch A station, Sand Creek.

Date	Species	Est. No./mile	Est. No./ mile>6 in	Est. Total Lbs./acre	Est. Lbs./ Acre> 6 in	Est. Lbs./mile
1999	BNT	10,481	5,121	522.6	431.7	1,361.9
	RBT	198	159	25.4	24.9	66.3
1995	BNT	3,153	1,623	221.4	192.3	504.5
	RBT	110	110	22.6	22.6	51.7
	SRC	18	18	11.4	11.4	25.6
1993	BNT	3,342	2,460	312.9	285.2	701.8
	RBT	633	533	81.8	78.4	183.6
	SRC	50	50	2.9	2.9	6.5

  The average size of the BNT decreased from 7.5 in in 1993 to 6.8 in in 1997 to 6.2 in in 1999. If all the YOY BNT observed this year would have been dipped the average size for BNT would have been even lower than recorded. The estimated density of BNT in this station has increased dramatically from the previous two sampling efforts. The estimated 10,481 BNT in 1999 is 232% higher than the estimated density in 1995. Apparently the large

spring flood of 1995 has produced favorable spawning conditions and BNT have responded.

2) Hospital Gulch Station (3760) - Sand Creek

A 3-pass estimate was made at this 413 ft long, 21.3 ft wide station on October 12. Tables 53 and 54 summarize the electrofishing results at the Hospital Gulch station for 1999 and for comparison, the previous two sampling efforts (1997 and 1995).

Table 53. Date, species, number, length, weight and condition of fish collected at the Hospital Gulch station, Sand Creek.

Date	Species	Number Collected	Average L. (Range)	Average W. (Range)	Average C.
1999	BNT	600	6.6 (3.1-17.8)	0.17 (.01-2.74)	40.0
	RBT	16	11.4 (4.5-13.5)	13.5 (.04-.90)	38.0
	SRC	1	10.8	0.52	41.0
	LNS	46	15.6 (10.0-18.8)	1.6 (.3-2.82)	40.0
1997	BNT	440	6.2 (3.2-23.8)	0.15(0.01-5.51)	35.9
	RBT	15	6.1 (3.9-13.5)	0.13(0.02-1.00)	36.9
	SRC	4	9.2 (4.7-11.4)	0.30(0.04-0.43)	33.1
	LNS	14	13.2 (4.2-18.8)	1.20(0.03-2.25)	35.9
1995	BNT	354	6.4 (3.1-22.5)	0.15(0.01-5.14)	39.6
	RBT	8	9.6 (4.4-12.4)	0.38(0.03-0.67)	35.9
	SRC	1	11.8	0.54	32.9
	LNS	23	14.3 (2.5-18.0)	1.28(0.01-2.08)	38.9

Table 54. Date, species, population and biomass estimates of fish collected at the Hospital Gulch station, Sand Creek.

Date	Species	Est. No./mile	Est. No./ mile>6 in	Est. Total Lbs./acre	Est. Lbs./ Acre>6 in	Est. Lbs./mile
1999	BNT	7,862	4,308	518.3	451.3	1,335.7
	RBT	205	192	49.4	49.0	127.3
	SRC	13	13	5.0	5.0	6.6
	LNS	588	588	366.5	366.5	944.5
1997	BNT	10,003	3,774	625.2	518.9	1,245.4
	RBT	208	83	11.2	8.6	26.8
	SRC	55	42	6.9	6.6	16.5
	LNS	**	**	**	**	**
1995	BNT	5,709	2,613	324.1	286.7	856.4
	RBT	166	146	23.9	23.7	63.1
	SRC	20	20	4.2	4.2	10.8
	LNS	470	429	227.6	227.3	601.6

** Estimates could not be calculated for these species due to poor capture efficiency. In some cases more fish were captured during subsequent passes than during previous passes.

The BNT average size has remained virtually unchanged from 1995 through 1999. The BNT estimated density this year was 21% lower than 1997 but, 38% higher than 1995. These fluctuations in BNT density can be attributed mostly to natural variation in year-class strength and somewhat to capture efficiency during sampling efforts.

The low numbers of RBT and SRC sampled at this station over the last few years indicates the competition with BNT is great enough to preclude any substantial population increase.

3) State Land Station (3630) - Sand Creek

A 3-pass estimate was planned for this station, however two things prevented this. One, the narrow, steep sided middle section of the station has deepened making wading impossible. The steep sides and depth make electrofishing quite dangerous. And, two, at the end of the first removal "run" it was discovered a live car holding the majority of the collected fish had overturned and the fish had escaped. Therefore attempts to obtain a population estimate were abandoned. Fish remaining in another live car were sacrificed for *Myoxobolis cerebralis* sampling.

4) Reinecke Station (3530) - Sand Creek

A 2-pass estimate was made at this 280 ft long, 21.2 ft wide station on August 24. Sampling was done in August at the Reinecke Station to accommodate Dr. Mark Barnes from the Dept. of Natural Resources, Chinese Cultural University, Taipei, Taiwan, R.O.C. Professor Barnes has contracted by the Nature Conservancy to do research on longnose sucker populations in the Black Hills region of South Dakota and Wyoming.

Tables 55 and 56 summarize the electrofishing results at the Reinecke station for 1999 and for comparison, the previous two sampling efforts (1995 and 1993).

Table 55. Date, species, number, length, weight and condition of fish collected at the Reinecke station, Sand Creek.

Date	Species	Number Collected	Average L. (Range)	Average W. (Range)	Average C.
1999	BNT	235	6.0 (2.7-16.4)	0.15 (.01-1.67)	43
	LNS	10	11.2 (3.8-17.3)	0.81 (.02-1.66)	34
	WHS	3	4.9 (3.6-6.7)	0.06 (.02-.12)	39
1995	BNT	137	7.7 (3.5-14.2)	0.20 (.02-1.04)	37
	SRC	8.4	8.4	0.21	35
	LNS	26	7.6 (1.8-13.5)	0.37 (.02-.75)	32
	WHS	17	7.3 (2.2-11.8)	0.30 (.01-.64)	38
1993	BNT	274	5.4 (2.8-12.9)	0.13 (.01-.79)	36
	LNS	29	6.7 (3.5-14.6)	0.46 (.02-1.03)	31
	WHS	37	4.2 (1.2-9.0)	0.13 (.01-.30)	33

Table 56. Date, species, population and biomass estimates of fish collected at the Reinecke station, Sand Creek.

Date	Species	Est. No./mile	Est. No./ mile>6 in	Est. Total Lbs./acre	Est. Lbs./ Acre> 6 in	Est. Lbs./mile
1999	BNT	4,997	2,131	291.4	240.2	748.8
	LNS	339	**	107.0	**	274.9
	WHS	57	**	1.3	**	3.4
1995	BNT	2,741	2,241	213.3	200.6	548.2
	SRC	**	**	**	**	**
	LNS	563	325	81.0	59.4	208.3
	WHS	326	192	38.1	32.8	97.8
1993	BNT	6,013	1,690	294.5	152.8	781.7
	LNS	575	198	99.6	59.0	264.5
	WHS	734	119	36.0	10.3	95.4

** Estimates could not be calculated for these species or this size due to poor capture efficiency. In most cases more fish were captured during subsequent passes than during previous passes.

As is probably the case in many naturally reproducing BNT populations, the average size of the BNT at this station is inversely correlated with the density estimate. Of the three sampling efforts reported, the smallest

average size of 5.4 in was found in 1993 when the largest density estimate was recorded. Conversely, in 1995 when the density estimate was the lowest of the three years, the largest BNT average size, 7.4 in, was found. This year the density estimate and average size of BNT fell between the extremes found in 1993 and 1995.

Only one SRC was sampled this year, a 10.8 in fish sampled during the third pass at the Hospital Gulch station. No mark information was recorded so it is unknown if this fish is from the 1997 plant that were placed above the diversion dam.

The information from the electrofishing stations mentioned above indicates Sand Creek continues to support a very high population of small BNT. Standing crops are much higher than normally found on Wyoming streams supported by natural reproduction.

Management Recommendations

1) Sample the Sawtooth Bridge station (3930) in the fall of 2000 or 2001 to determine if any of the 1997 plant of SRC (820 AD marked @ 9.0/lb; 6.6 in) stocked above diversion dam survived.

2) Sample all stations in 2004 to monitor fish populations and the overall condition of the fishery.

Spottedtail Pond SN560010CK

AS - Aquatic Resource Surveys

- Fish population survey FX-SN-8BF-512

On August 24, 1999 two experimental gill nets were set for one hour to assess the condition of fishery and annual stocking of catchable RBT and semi-annual stocking of advanced fingerling BKT. This pond is so small that 150 ft gill nets reached from shore to shore and so shallow the 6 ft deep nets sampled the entire depth. In the two hours the nets were set 11 BKT and 7 RBT were sampled. The BKT averaged 5.9 in (4.3-8.3) and 0.09 lb (0.02-0.25) and had a mean condition of 35.3. The RBT averaged 9.9 in (9.3-10.3) and 0.31 lb (0.22-0.38) and had a mean condition of 32.1. A dip net was used to sample FSD and even though they were numerous, only four could be captured. The FSD averaged 2.4 in (2.2-2.9). Other information collected: Secchi dish depth = 6.0 ft; TDS = 1400 ppm; Maximum depth = 6.5 ft; water temperature @ 1700 = 72F. MEI = 467.

It appears the current stocking regimen is providing angling opportunity, however it is doubtful many anglers make the effort to access this small, out of the way water.

Management Recommendations

Stock 250 catchable RBT per year and 400 BKT in odd numbered years.

Keyhole Reservoir Basin - 8KH

Keyhole Reservoir SN460371CK

AS - Aquatic Resource Surveys

- Fish population monitoring FX-SN-8KH-512

The reservoir water level on April 1, 1999 was 4098.04 feet above MSL, a gain of 0.43 feet from October 1, 1998. At elevation 4098.04 the

reservoir has 8,990 surface acres and 182,160 acre-feet, which is 94.0% of capacity. The highest water level recorded in 1999 was on June 14 at elevation 4099.04. From April 1, 1999 to October 1, 1999 the reservoir lost only 0.84 feet to elevation 4097.20. At this elevation, the reservoir has 8,709 surface acres and 174,727 acre-feet (90.2% of capacity). With the increased water levels the last seven years very little or no progress has been made on negotiations for a minimum pool because there has been adequate water for recreation so interest in the issue has decreased for the time being.

The electrofishing and short duration gill net sampling was not completed as planned in 1999. Other work schedule items took precedent during the short window of opportunity when this sampling has to be done.

On June 21-23 four overnight gill nets, six small mesh trap nets and 12 purse seine hauls were used to monitor the CRP and game fish populations. Complete results and additional discussion of this sampling are in the Reservoir Research section of this progress report.

On August 19 and 20, 20 seine hauls with a 50 foot (1/8 in mesh) straight seine were taken on different types of habitat common to Keyhole Reservoir to monitor YOY game and forage fish abundance. Seine haul sites included sandy beach areas (two), gravel bars (four) and mud flats (14). Due to the high water levels the flooded terrestrial vegetation made seining some of the mud flat areas difficult. Thirteen species of fish were collected with STS and GZS most abundant. Trend information on fall seining for the last 10 years is summarized in Table 57.

Table 57. Species captured and shore seining CPUE for 1989-1999, Keyhole Reservoir. CPUE is average number of fish per seine haul.

YEAR	1999	1998	1997	1996	1995	1994	1993	1992	1991	1990	1989
WAE	**	0.04	**	0.3	0.5	0.3	2.2	0.2	1.6	0.8	0.2
NOP	0.05	0.16	0.17	0.45	0.06	0.1	0.3	0.05	**	**	**
SMB	1.0	2.6	8.9	0.9	0.1	0.4	0.25	1.25	3.75	3.1	2.65
YEP	6.4	13.04	26.6	42.0	0.7	2.8	3.9	1.9	1.4	9.4	2.0
Crappie	19.1	28.36	73.9	454.4	82.1	69.0	104.6	0.9	48.3	17.2	9.5
GZS	19.25	6.0	1.5	24.7	29.1	8.8	63.8	110.4	56.4	4.8	71.2
STS	22.5	28.8	30.5	34.7	51.5	16.2	17.0	18.0	63.2	87.2	89.8
EMS	10.2	12.48	6.3	8.6	5.4	5.8	0.6	0.4	1.2	<0.1	**
FWD	0.45	0.04	3.7	1.8	1.7	1.9	**	0.3	8.2	0.3	0.9
CRP	3.85	1.64	8.9	3.4	2.7	1.7	8.4	0.6	13.2	2.2	4.8
GSF	3.25	2.08	2.7	1.4	**	1.6	**	**	**	**	**
RCS	0.1	0.04	1.7	0.1	0.2	**	0.2	0.3	1.6	5.8	11.2
RDS	**	**	**	**	**	0.4	**	0.6	<0.1	0.1	0.4
Hybog.	0.9	0.2	1.5	0.6	0.1	0.2	5.7	9.1	1.2	0.3	0.2
CCF	**	0.08	**	**	**	**	**	**	**	**	<0.1
FHM	**	**	**	**	**	**	**	0.1	**	**	**
BLB	**	**	2.3	**	**	**	**	**	**	**	**
LNS	**	**	0.95	**	**	**	**	**	**	**	**
SDS	**	**	**	**	**	**	**	**	**	**	0.6
LMB	0.3	0.04	**	**	**	**	**	**	**	**	**

** Species not sampled that year

The WAE CPUE found the last two years is low compared to the previous nine years. However, shoreline seining at Keyhole must not be a reliable predictor of WAE year class strength because several large WAE year classes have recruited to the fishery from years when the August shoreline seining showed low CPUE of YOY WAE. The same can be applied to crappie. This year the shoreline seining CPUE for crappie was lower than seven of the past eight years, however during the June sampling,

unprecedented numbers of crappie were sampled with the 30 ft purse seine. Most of the crappie sampled in the purse seine were YOY and yearling white crappie. The purse seine, sampling the pelagic areas of Keyhole, is a better predictor of white crappie year class strength than shoreline seining.

This year three size classes of YOY GZS were observed (<1.5 in, 2.6 in and 4.3 in), which is similar to past observations when adult GZS are stocked in the spring. Ten YOY LMB were captured, apparently progeny from the LMB stocked on October 2, 1997 (46,000, 100/lb). The EMS CPUE of 10.2 is a close second to the 12.48 observed in 1998 which was a 10 year high CPUE for that species. The CRP CPUE increased to 3.85 in 1999, up from 1.64 in 1998, but lower than the 8.9 found in 1997.

PM - Fish Population Management

- Fish stocking and transplanting FX-SN-8KH-716

On May 13, 880 adult GZS from North Platte, NE were released into Keyhole to supply forage for predators. On May 28, 175,000 NOP fingerlings (1,050/lb) obtained from the Garrison National Fish Hatchery (GNFH) (through a trade with North Dakota) were stocked. On June 17 and 28 a total of 164,934 WAE fingerlings (89,964 @ 88.2/lb from Wisconsin and 74,970 @ 51/lb from GNFH) were stocked by boat into Keyhole. On July 1, 103,455 LMB fingerlings (1045/lb) from Valley City National Fish Hatchery in Valley City, ND were released in the reservoir.

PA - Planning and Administration

- Basin Plan update FX-SN-8KH-120

The Basin Plan update will be completed in February 2000.

Management Recommendations

1) Annually stock at least 20 WAE fingerlings per surface acre and 20 NOP fingerlings per surface acre. The surface area of Keyhole on October 1 of the year prior to the scheduled stocking is the acreage used to calculate the total number of WAE and NOP to be stocked. If possible stock the fingerlings at two different times during the year to avoid unfavorable environmental conditions.

2) Transplant (from Nebraska) and stock about 800-1000 adult GZS each year.

3) In 2000 and 2001 stock 10 LMB fingerlings per surface acre. Discontinue stocking in 2002 and determine survival and extent of natural reproduction.

4) Continue to monitor YOY game fish and forage fish by seining in mid-August with 20 or more seine hauls proportionate to habitat type.

5) In odd numbered years monitor the sport fish and nongame fish populations, especially carp, by setting trap, gill nets and purse seining.

Cheyenne River Basin - 8CR

East Iron Creek Reservoir SN460245WN

AS - Aquatic Resource Surveys

- Fish Population Check and Stocking Evaluation FX-SN-8CR-512

  East Iron Creek Reservoir sampling was not completed because rain prevented access initially and then scheduling to accomplish the sampling goal could not be done.

PM - Fish Population Management

- Stock LMB FX-SN-PE1-716

  On July 1, 8,360 LMB @ 1,045/lb from the Valley City National Fish Hatchery in Valley City, ND were stocked into the reservoir. On October 20, 5,031 BLG @ 117/lb from a state fish hatchery in OK were released into the reservoir. SRC were observed feeding on the BLG just after they were stocked.

LAK Reservoir SN460007WN

AS - Aquatic Resource Surveys

- Fish population survey FX-SN-8CR-512

  LAK Reservoir was sampled with trap nets and gill nets as part of the ongoing evaluation of tiger muskie and walleye introductions. Data are not analyzed yet, but the presence of all previously captured species was re-affirmed. As in past years, a virtual smorgasbord of species were sampled at LAK, including RBT, BNT, LMB, SMB, TIM, WAE, WHS, BLB, and, GSF.

  Population monitoring data were collected on June 3 and 4, and again on August 25 and 26. Sampling was standardized with three gill nets and 7 trap nets set overnight. Catch, catch per effort, and average length, weight, and condition are summarized in Table 58 for 1995-1999. Gear types and seasons are combined for each year (purse seining data is included under 1996), but catch/effort is tallied separately for trap and gill nets (seasons are combined).

Table 58. Total catch, average length, average weight, average condition factor, and CPUE, of fish from LAK Reservoir from 1995-1999.

Year	BNT	RBT	SRC	TIM	WAE	GSF	LMB	SMB	WHS	GOS
					Number Caught					
1995	31	28	1	0	3	1034	4	98	199	2
1996	92	81	2	16	0	182	1	33	175	12
1997	44	27	2	3	4	2551	18	106	220	5
1998	15	21	0	4	13	1695	8	162	214	3
1999	17	28	0	16	10	840	6	89	54	0
					Average Length					
1995	11.9	10.4	7.2	N/A	21.1	5.0	5.0	4.9	15.7	6.9
1996	11.3	10.4	15.0	14.0	N/A	5.2	15.0	7.7	15.0	6.6
1997	12.4	10.3	11.4	27.5	7.9	4.1	10.3	5.4	16.4	7.2
1998	12.7	10.6	N/A	27.1	9.3	4.8	7.2	6.7	16.6	7.5
1999	13.8	9.1	N/A	12.1	15.0	4.5	8.5	7.6	17.4	N/A
					Average Weight					
1995	0.3	0.6	0.1	N/A	3.3	0.2	0.1	0.3	1.4	0.1
1996	0.5	0.4	1.0	0.6	N/A	0.2	2.4	0.6	1.4	0.1
1997	0.7	0.4	0.5	5.8	0.3	0.1	0.4	0.4	2.2	0.2
1998	0.8	0.5	N/A	5.3	0.4	0.1	0.2	0.2	2.1	0.2
1999	1.1	0.3	N/A	0.5	1.6	0.02	0.4	0.3	1.7	N/A
					Average Condition Factor					
1995	36	34	30	N/A	35	67	44	44	32	43
1996	34	32	30	17	N/A	73	60	46	43	43
1997	35	34	33	26	31	71	55	50	42	39
1998	35	39	N/A	25	32	65	57	56	38	43
1999	37	37	N/A	20	35	68	51	49	34	N/A
					Trap Net CPUE					
1995	0	0.86	0.05	N/A	0	98.71	0.14	4.48	3.57	4.33
1996	0	0.61	0	0.25	N/A	48.00	0	0.75	2.57	0.43
1997	0	0.14	0.07	0	0.15	62.79	0.36	3.29	6.36	0.36
1998	0	0.14	N/A	0	0.27	54.93	0.50	4.31	6.66	0
1999	0	0.29	N/A	2.0	0	115.0	0.72	8.43	4.42	0
					Gill Net CPUE					
1995	0.43	0.25	0	0	0.08	1.30	0.03	0.19	3.01	0
1996	0.65	0.11	0.02	0.06	0	0.18	0.01	0.07	0.65	0
1997	0.07	0.33	0	0.02	0	1.30	0.02	0.09	1.11	0
1998	0.12	0.12	N/A	0.06	0.07	0.30	0.03	0.50	0.50	0.07
1999	0.54	0.83	N/A	0.05	0.30	1.20	0.02	0.94	0.76	0

Though catch and CPUE have varied widely for BNT and RBT, their length and weight remained nearly constant through 1998. In 1999, BNT length and weight increased while RBT length and weight were the lowest since 1995. Catch and CPUE for SRC were low through 1997, and fell to zero in 1998 and 1999. SRC have not been stocked since 1995 and it's probable they have cycled out of the reservoir.

This is the fourth year TIM have been captured since their introduction in 1995, and the highest catch (16) of 1996 was matched in 1999. The lack of fin clips prior to 1998 indicated all fish were from the 1995 cohort, but the size of fish captured in 1999 showed at least some were from the 1998

plant. Catch of these sedentary ambush predators with passive sampling gears has been typically low.

Fingerling WAE stocked in 1996 and 1997 were first sampled in 1997, and were captured in relatively greater numbers in 1998 and 1999. Though total catch has been low, it appears from length data that at least two year classes are present, and average length and weight have steadily increased.

Sampling has never produced many LMB and 1999 was no exception. Adults are rarely sampled and this is probably related to capture vulnerability more than relative abundance. Trap nets are providing a reasonably good sample of small SMB, with gill nets providing some information about larger fish. Samples in 1997 were dominated by 3-5 in fish in trap nets and this strong year class may be evident from the relatively larger average size in 1999.

Total catch of WHS was similar through 1998, but fell to the lowest number in 1999. This appears to stem from a reduction in CPUE from gill nets rather than trap nets.

Unfortunately, the fish population continues to be numerically dominated by GSF, which is the primary target species for introduced piscivores. Total catch has declined steadily since 1997, but it is unclear if this represents a real reduction in GSF population.

PM - Fish Population Management

- Stock WAE and TIM fingerlings FX-SN-PE1-716

WAE and TIM were stocked as scheduled (Table 59). Approximately 10,000 WAE fingerlings (893/lb.) were stocked on June 17, and about 800 TIM were stocked on April 22. These were the first TIM stocked in the spring, and were captured during spring netting. None of the marked TIM have ever been captured, and before 1999, only the 1995 cohort had been sampled since their introduction. Most of the TIM in 1999 were small fish planted in April 1999. TIM stocked from 1995-1998 were pellet-fed and all were stocked in the fall. In 1999 minnow-fed TIM were stocked in the spring, and following this change, relatively high numbers of TIM were captured. It is assumed the 1996-1998 cohorts survived poorly and stocking minnow-fed TIM in the spring offers the possibility of improved survival.

Table 59. Year, number stocked, size at stocking for TIM and WAE at LAK Reservoir since 1995.

Date Stocked	Number	Size (#/Lb)
Tiger Muskie		
9/19/95	748	9
10/14/96	749	17
10/8/97	800	31
10/28/98	1,018	11
4/22/99	800	10
Walleye		
7/11/96	8,400	309
7/1/97	11,000	762
6/4/98	10,000	893
6/17/99	9,078	1,020

Management Recommendations

1) Continue spring and fall sampling through 2000 to complete data collection for evaluating changes in LAK's fish population structure after introducing TIM and WAE.

2) In conjunction with regularly scheduled sampling, electrofish in the spring of 2000 to more effectively sample LMB and TIM.

3) Continue to stock RBT, BNT, TIM and WAE as scheduled.

4) Detail results and analysis of post-introduction (TIM, WAE) sampling in an Administrative Report and provide management guidelines based on available data. Report will be completed by spring of 2001 (FY2001).

Blackhills Power and Light Reservoir SN460177WN

PF - Public Fishing Development

- Fish Wyoming Facility Development FX-SN-8CR-260

  This Fish Wyoming project was completed and correspondence from Fiscal Section indicated a warrant for payment was issued.

Turner Creek Reservoir SN460210WN

PF - Public Fishing Development

- Fish Wyoming Facility Development FX-SN-8CR-260

  The Douglas Ranger District reported that a restroom, parking area, handicapped fishing pier, and graveling of the road has been completed. Fiscal Division reported that payment has been made, thus closing this project.

Niobrara River Basin - 8NR

Work not associated with a particular water

PA - Planning and Administration

- Transfer Management of Drainage to Casper Crew FX-SN-8NR-100

  Files and records for the Niobrara drainage were transferred to the Casper Crew in early February 2000. Water numbers and basin codes will not be changed until all Access databases are operational on all the crews - anticipated before June 2000.

Statewide Aquatic Wildlife Management Progress Report

Fish Population Crew

Calendar Year 1999

Work Not Associated With A Particular Basin

PM - Fish Population Management

- Development of Firehole River Rainbow Trout Broodstock FX-HM-PM3-512

  Two trips were made in 1999 to the Firehole River in Yellowstone National Park to collect RBT for development of a new brood source. Past collections are detailed in the FPU chapter of the 1998 progress report.

  On May 20, 1999, the Jackson Regional Fish Management crew conducted raft electrofishing on an approximately 2.5 mile reach between Nez Perce Creek and the Cascades of the Firehole. This site is downstream of the sections of river electrofished in 1997 and 1998 and was chosen because of grizzly bear activity in upstream reaches. One hundred RBT were collected for brood recruitment.

  The FPU conducted additional electrofishing on October 12-13, 1999. On October 12, the 3.7 mi reach from the Biscuit Basin parking area to the Fairy Falls parking area was electrofished. Additional time allowed us to continue from Fairy Falls to Midway Geyser Basin (1.5 mi); however, most of this reach was not electrofished due to angler activity. Total shocking time was 7,118 seconds, water temperatures were 55°F (Biscuit Basin, 9:30 am) and 62°F (Fairy Falls, 2:30 pm) and conductivity was 255 µmhos/cm at Biscuit Basin. On October 13, we electrofished the 5.7 mi reach from Midway Geyser Basin to the highway turn-out below Nez Perce Creek. Total shocking time was 10,043 seconds; water temperatures were 57°F (Midway, 9:25 am), 68°F (primitive bike trail bridge, 2:00 pm) and 64°F (take out 1.0 mi below Nez Perce Creek, 4:00 pm).

  Species composition was 67% BNT and 33% RBT at the upper site and 28% BNT and 72% RBT at the lower site. Brown trout ranged from 4.1-16.5 in and 0.01-1.64 lb. Rainbow trout ranged from 3.0-15.0 in and 0.01-1.11 lb. Only 14% of the RBT and BNT were larger than 12.0 in. Thirty RBT and 30 BNT were sacrificed for disease testing. Rainbow trout larger than 9 in were targeted for brood stock recruitment. However, five trout in the 8-9 in length range were also collected (Figure 2). A total of 199 RBT were collected. These trout were transported to the Red Buttes Laboratory until purged of New Zealand mud snails and were then transferred to an earthen pond at the Wyoming Game and Fish Department's Ten Sleep Fish Hatchery. Fall collections are planned to continue in 2000 and 2001.

  Sampling data are summarized in Table 1 and length frequencies of the 1998 and 1999 catch are in Figures 1-4. Relative weights were calculated based on equations for lotic BNT and RBT found in Anderson and Neumann (1996). Relative weights reported in the 1998 progress report were re-calculated based on these equations. Relative weights were only calculated for trout within the size range for which the equation is applicable; BNT greater than 5.5 in (140 mm) and RBT greater than 4.7 in (120 mm).

Comparisons of length frequencies and relative weights between years are confounded because 1998 electrofishing was conducted in spring and 1999 electrofishing was conducted in fall. One would expect trout to have higher relative weights in the fall than in spring, because trout sampled in fall have built up fat reserves during the summer months, whereas trout sampled in spring have depleted these reserves over the winter. This appears to have been the case with trout sampled from the Firehole River. Relative weights were generally higher in fall of 1999 than in spring of 1998. Future collections will be made in the fall, probably through 2002. A more precise comparison of relative weights and length frequencies will be possible following fall 2000 sampling.

Table 1. Summary information for all trout collected from the Firehole River in Yellowstone National Park on May 18-19, 1998 and October 12-13, 1999.

			Upper Section		
Year	Species	Number	Avg. L (mm/in)	Avg. W (g/lbs)	W_r
1998	BNT Released	269	273/10.8	236/0.52	91.0
1998	RBT Released	13	198/7.8	124/0.27	80.5
1998	RBT Sacrificed	60	271/10.7	198/0.44	88.4
1998	RBT Kept	134	283/11.2	238/0.53	86.3
1998	All RBT	207	274/10.8	219/0.48	86.8
1999	BNT Released	180	247/9.7	175/0.39	86.4
1999	RBT Released	50	138/5.4	33/0.07	96.8
1999	RBT Kept	37	293/11.5	240/0.53	86.5
1999	All RBT	87	204/8.0	121/0.27	91.4
			Lower Section		
Year	Species	Number	Avg. L (mm)	Avg. W (g)	W_r
1998	BNT Released	87	275/10.8	223/0.49	92.6
1998	RBT Released	3	97/3.8		
1998	RBT Kept	174	272/10.7	205/0.45	87.6
1998	All RBT	177	269/10.6	205/0.45	87.6
1999	BNT Released	114	227/8.9	141/0.31	94.2
1999	BNT Sacrificed	30			
1999	RBT Released	72	163/6.4	52/0.11	99.9
1999	RBT Sacrificed	30			
1999	RBT Kept	162	265/10.5	181/0.40	87.4
1999	All RBT	234	234/9.2	141/0.31	90.9

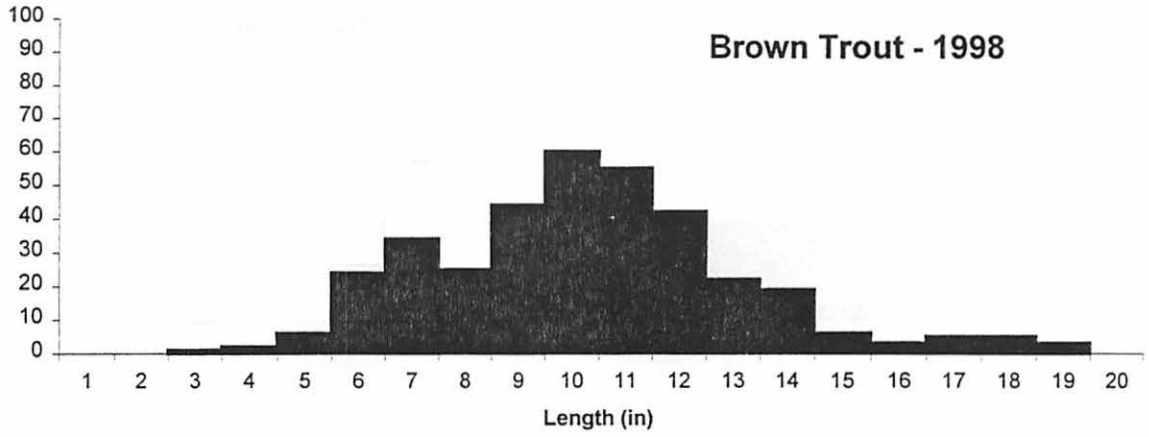

Figure 1. Length frequency of BNT electrofished on the Firehole River, May 1998.

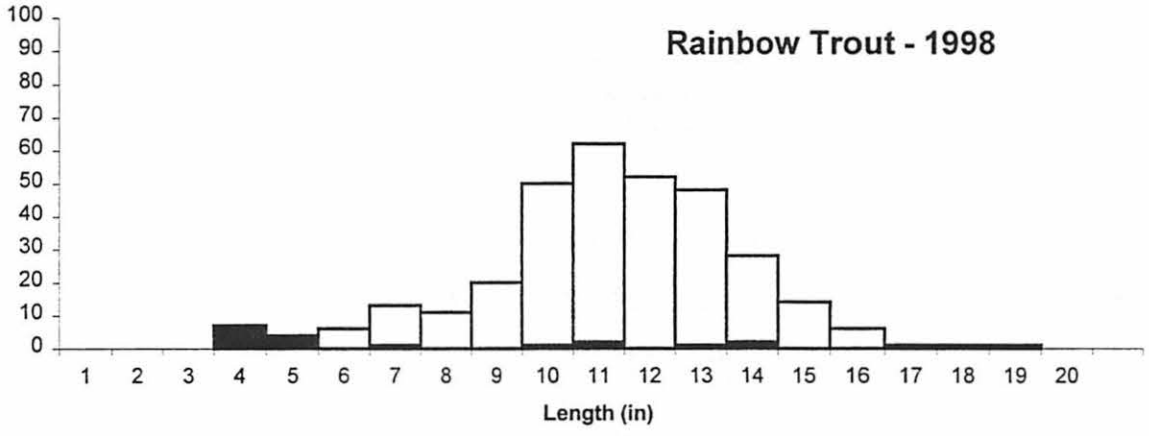

Figure 2. Length frequency of RBT electrofished on the Firehole River, May 1998. Black bars indicate trout released and stacked white bars indicate trout removed for brood recruitment.

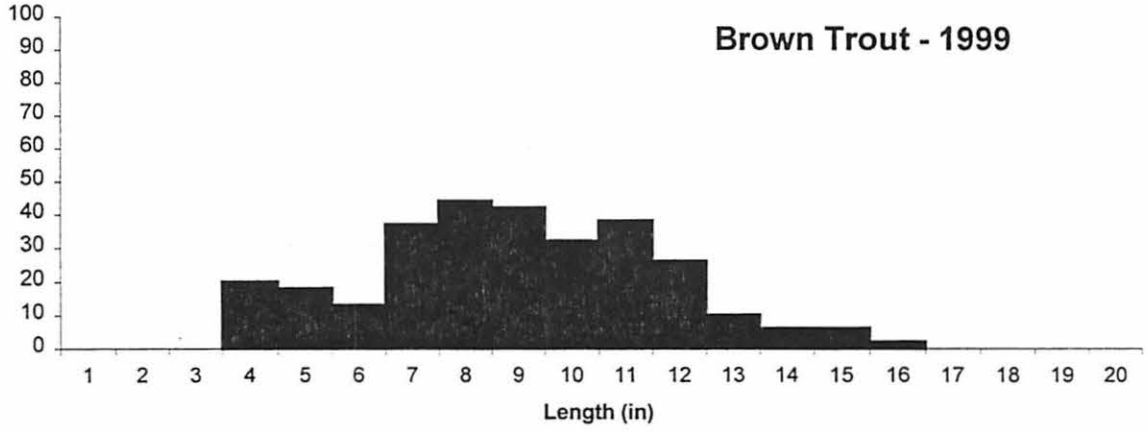

Figure 3. Length frequency of BNT electrofished on the Firehole River, October 1999.

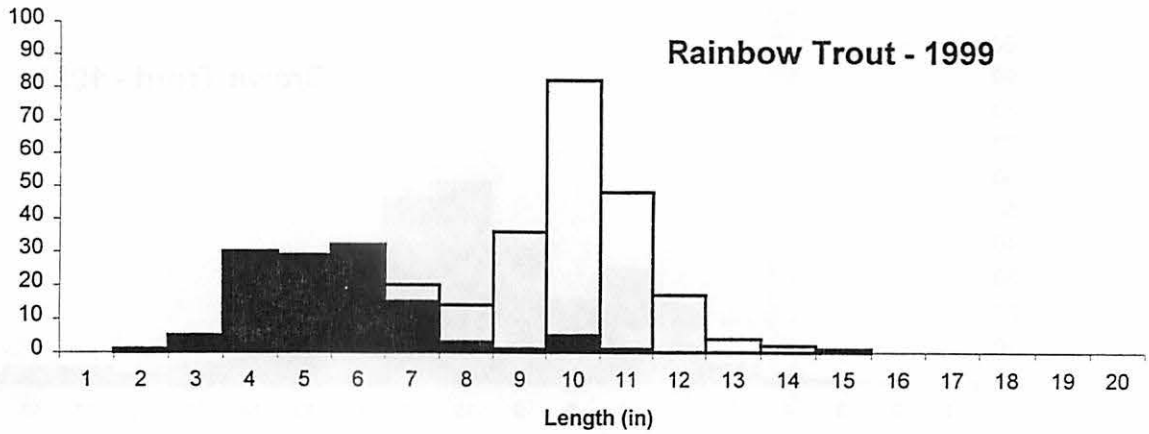

Figure 4. Length frequency of RBT electrofished on the Firehole River, October 1999. Black bars indicate trout released and stacked white bars indicate trout removed for brood recruitment.

Literature Cited

Anderson, R. O. and R. M. Neumann. 1996. Length, weight and associated structural indices *in* B. R. Murphy and D. W. Willis, editors. Fisheries Techniques, second edition. American Fisheries Society, Bethesda, Maryland.

TM - Development of Tools and Methods

- Update of Fish Division Databases FX-SW-EP1-512

  The Fish Population Unit (FPU) hired 7-month contract employee Jason Burckhardt to update the FPU's records in the riverdat.mdb Access database. A list was prepared of all population estimates that the FPU has conducted since the inception of the crew in 1977. Jason then searched the Fish Division Enable riverstn.dbf database to determine which records had been previously entered. He began with 1999 data and, working backwards, began entering all population estimates into riverdat.mdb that had not been entered in the Enable database. The 1991-2000 records were entered by March 2000. This included nearly all fish population estimates conducted after 1992. All estimates, including estimates of individual groups of marked fish and/or size groups of fish were being entered. Associated data from Enable fishlw.dbf files (species, mark, length, weight, capture history) was also being converted to Access. Jason will continue entering estimates and converting Enable fishlw.dbf records to Access riverdat.mdb until all FPU records have been entered. As he works back to the pre-computer era, if fish length weight data were never entered on computer, it will not be entered into the Access database. All FPU population estimates from the late 1977 to 2000 will be entered in riverdat.mdb by the end of June 2000.

- Visible Implant Tagging FX-SW-EP1-576

  No progress on report preparation. Rescheduled for spring 2001. Final results will be presented in a manuscript and or management brief and submitted to the North American Journal of Fisheries Management.

North Platte River - Glendo Reservoir - 1GO

North Platte River; Glendo Reservoir CR450145PE

CS - Creel Surveys

- 2000 Creel Survey FX-CR-1GO-520

  Designed a standardized creel survey for Glendo Reservoir to run from April 1 through September 30, 2000. Aerial counts will be conducted on 4 week days and 4 weekend days per month, 3 times per day. Results will be analyzed in October and provided to the Casper management crew by the end of that month.

Lower Big Horn and Tributaries - 2LB

Big Horn River; Lower Hanover Dam to Big Horn Lake CY821001BN and CY821001WE

AS - Aquatic Resource Surveys

- Big Horn River Sauger Investigations FX-CY-2LB-512

  Assisted with sauger population estimates on the Bighorn River at study sites near Basin and Worland. FPU involvement in this project has been limited to this assistance with fieldwork. See Cody management crew section of this report for details.

Lower Shoshone River Drainage - 2LS

Shoshone River, Penrose to Big Horn Lake CY821090BN

AS - Aquatic Resource Surveys

- Sauger Sampling FX-CY-2LS-512

  FPU did not assist. See Cody management crew section of this report for details.

Shoshone River; Buffalo Bill to Corbett - CY821095PK

AS - Aquatic Resource Surveys

- Population Estimate; Buffalo Bill to Corbett Section FX-CY-2LS-512

  Two electrofishing rafts were used in late October 1999 to conduct four pass capture-recapture population estimates on the Shoshone River between the gaging station and Belfry Bridge. FPU assisted with the first two electrofishing passes. The Cody Fish Management Crew calculated population estimates. See the Cody Fisheries Regional Management Crew chapter of this report for details.

Nowood River and Tributaries - 2NR

Nowood River CY823040BN

AS - Aquatic Resource Surveys

- Sauger Sampling FX-CY-2NR-512

  FPU did not assist. See Cody management crew section of this report for details.

Snake River Basin (Below Jackson Lake) - 4BJ

Snake River JN811001TN

CS - Creel Surveys

- 1999 Creel Surveys FX-JN-4BJ-520

  Programmed creel surveys were conducted on two sections of the Snake River from mid-July through October 1999; sections 3 (Moose-Wilson) and 4 (Wilson-South Park).

  The schedule design was based largely on the results of the 1990 and 1994 Snake River creel surveys. Based on these results, there was no reason to stratify between weekends and weekdays. Approximately 75% of all boat anglers fished on weekdays and 25% fished on weekends; equal to the number of weekday vs. weekend days available each month.

  The fishing day was defined as 9:00 a.m. to 8:00 p.m. during past creel surveys. The 1999 creel survey was designed specifically to estimate only the number of boat anglers; although bank anglers were counted and interviewed, bank angler estimates were not calculated. The average boat trip length has been about five hours during past surveys and the minimum trip has been about three hours. No anglers were interviewed before 11:45 a.m. during past surveys. Approximately 10% of all boat anglers interviewed during past surveys were interviewed prior to 2:00 p.m. The remaining 90% were interviewed between 2:00 p.m. and 7:45 p.m. This information suggested that 11:00 a.m. was a reasonable time to begin counting boats as they pulled out at the bottom of each survey section.

  The creel survey schedule was created by randomly selecting 22 count days per month. The first count day of the survey was randomly assigned to section 3 or 4 and all remaining count days were systematically assigned to a section by alternating between sections. The final schedule included 11 count days per section on which complete counts would be made at the bottom of each section from 2:00 p.m. to 8:00 p.m. Two of the 11 days were randomly selected to include an 11:00 a.m. to 2:00 p.m. count each month.

  Creel clerks spent the entire count day at the downstream end of each section and counted and interviewed all boat anglers as they came off the water. All bank anglers that were encountered were also interviewed. A total of 522 boat anglers and 37 bank anglers were interviewed in section 3 and 614 boat anglers and 67 bank anglers were interviewed in section 4.

Estimates of all boat anglers, numbers of non-fishing boats, numbers of private non-fishing boats, and numbers of commercial non-fishing boats were estimated. The 1-Fly Tournament was treated as a distinct stratum. Interview summaries were prepared for private boat anglers, commercial boat anglers, and bank anglers in each section. An interview summary of 1-Fly tournament anglers was prepared for section 4. Results were submitted to the Jackson management crew in January 2000. The Jackson management crew will present the final survey results in an administrative report.

Lower Salt River Basin - 4LS

Salt River downstream of Afton JN811010LN

AS - Aquatic Resource Surveys

- Trout Population Estimates FX-JN-4LS-512

  Final population estimates for the Salt River project were conducted in 1998 (see Annual Fisheries Progress Report on the 1998 Work Schedule). Results of 1995 and 1996 estimates can be found in the Annual Progress Reports for the respective years. The population estimate section of the final report is in progress. The first section of the final report will include a summary of historical population estimates since 1971. The introduction reviews all previous population data. Population estimates have been recalculated from 1988 through 1994, and reliability of all historical estimates has been assessed. The next section will evaluate population estimates conducted in 1995, 1996 and 1998 at four sites. All population estimates have been assessed in terms of reliability and comparability and population estimates have been recalculated where appropriate. The third section of the report compares population estimates with first pass catch to determine the applicability of single pass electrofishing data collected from 1995 through 1997. Preliminary analyses indicate a strong relationship between single pass catch and population estimates (r^2=0.84, P<0.0001). Therefore, the final section of the report will use single pass electrofishing data to define trout species relative abundance throughout the mainstem river. Final recommendations will appear in the Salt River Study Administrative Report.

- Relative Abundance of Mountain Whitefish and Non-game Fish FX-JN-4LS-512

  Mountain Whitefish

  Mountain whitefish relative abundance sampling was conducted on 12 quarter-mile reaches on the Salt River in 1997 and 1998. Results of this sampling are included in the 1997 and 1998 Progress Reports. The mountain whitefish chapter of the Salt River Study Administrative Report will summarize historical information on MWF in the Salt River drainage and will analyze information collected in 1997 and 1998. This information will be used as a baseline to monitor relative abundance of MWF in conjunction with routine trout population monitoring.

  Nongame fish presence/absence sampling

  Nongame species were captured and identified in conjunction with Salt River Project electrofishing in 1997 and 1998. Presence/absence information from these two years is summarized in the respective progress reports. The nongame fish chapter of the Salt River Study Administrative Report will summarize all information on nongame fish. Species presence and absence will also be related to habitat survey results.

- Salt River Habitat Evaluation FX-JN-4LS-510

A habitat survey was originally planned for the 56 miles of the Salt River between Afton and Palisades Reservoir, Wyoming to describe current habitat conditions. The Oregon Aquatic Inventory Project stream habitat survey method was used (Moore et al. 1998). Due to the time involved in conducting the survey, we decided to limit the survey to the four 6 mi study sections of the Salt River. The Hwy 238 and Etna Lane Study sections were surveyed in 1998. The Auburn-Grover Lane and Thayne Lane study sections were surveyed in 1999. The 1998-99 surveys will be used to:

a) assess changes in habitat since 1970
b) provide an accurate baseline description of existing habitat between Afton and Alpine for making future comparisons
c) evaluate potential relationships between habitat and trout populations
d) evaluate potential relationships between habitat and the relative levels of whirling disease (WD) infectivity in trout collected from different habitats
e) prioritize areas for habitat improvement efforts.

In 1998 and 1999, two 2-person crews worked simultaneously in different sections of the river. The FPU conducted a survey of the 5.75 mi Thayne Lane study section; Thayne Lane to Freedom Lane. The Jackson Regional Fish Management crew surveyed the 6 mi AG Lane study section; Auburn Grover Lane to a point 6.0 miles downstream. The surveys were conducted over a period of about 2 weeks in early-mid September on 6-7 days between September 22 and October 7 at a rate of about 0.6 miles per day.

A few modifications were made to the survey methodology to adapt it to the conditions in the Salt River and to allow habitat data to be easily related to other data (trout population, WD, etc.) collected throughout the course of the Salt River study. The modifications are described in the FPU section of the Progress Report on the 1998 work schedule.

The AG Lane and Thayne Lane study sections contained 27 and 24 survey reaches, respectively. A total of 660 habitat units were described in the 5.75-mile Thayne Lane study section and 287 habitat units were described in the 6.0-mile AG Lane study section. The habitat in the Salt River is much more complex in the high gradient reaches than in the lower gradient reaches (Figure 5 and Table 2).

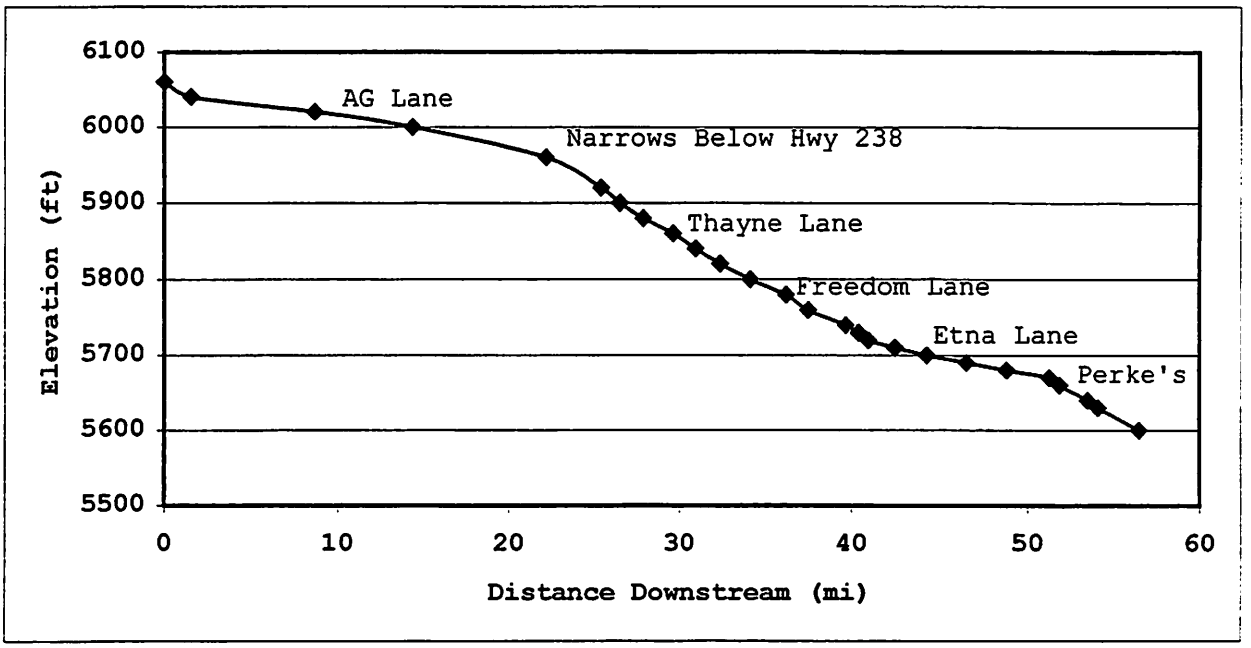

Figure 5. Profile of the Salt River between Afton and Palisades Reservoir. Study site locations are indicated.

Data entry is finished for 3 of the 4 sections and habitat has been summarized for these sections. AG Lane data have not yet been entered to the database. Population estimates on the Salt River were strongly correlated with single pass electrofishing catch (see Trout Populations Estimates section above). Standardized stopping locations were used throughout the Salt River project. The locations were 0.25 mi apart. During the habitat surveys, a new survey reach was started at each of these locations. This will enable us to compare species composition and abundance of trout to habitat attributes within 48 different 0.25-mile reaches of main channel habitat. Logistic regression will be used to describe relationships between habitat variables and total trout abundance, abundance of individual species, and levels of WD infectivity. When habitat is surveyed in the remaining 15-20 miles of the Salt River, only the most significant habitat variables should be measured.

Table 2. Average slope and number of habitat units per reach in each of the four Salt River project study sections.

Study Section	*Average % Slope*	*Average # Habitat Units/Reach (Range)*
AG Lane - Hwy 238	0.08	10.1 (1-27)
Hwy 238 - Thayne Lane	0.25	14.7 (2-34)
Thayne -Freedom	0.23	28.7 (5-97)
Etna Lane - Perkes	0.10	5.5 (1-20)

Trout population estimates in 3 of the 4 primary study sections are listed with a few habitat attributes in Table 3. As expected, the channel is wider, deeper and less complex in the low gradient reach (Etna Lane). Spawning habitat (riffle) is much more abundant in the higher gradient reaches and the riparian zone is in better condition; more shrub cover and canopy closure.

Table 3. Brown trout and Snake River cutthroat trout population estimates (inflated to include trout in secondary channel habitats) and various habitat attributes in 3 study sections of the Salt River between Afton and Palisades Reservoir.

Attribute	*Hwy 238-Thayne*	*Thayne-Freedom*	*Etna-Perkes*
# BNT/mile	1,939	2,010	261
# SRC/mile	820	799	582
lb/acre BNT	52.3	43.5	5.7
lb/acre SRC	22.6	15.3	9.9
% of total Area/L in Primary Channel	71/54	59/41	84/72
L Secondary Channel (ft)	27,520	45,649	12,421
Avg Width (ft)	43	33	74
Avg Depth (ft)	2.9	2.6	4.1
Channel Widths/Pool	3.7	2.3	6.9
Residual Pool Depth (ft)	2.8	2.8	4.3
Hab. Units/328 ft	1.9	2.8	1.1
# Hab. Units in Section	352	660	143
# Pools in Reach	152	301	58
# Beaver Dam Pools	12	3	0
Total Area Riffle (Acres)	13.61	10.87	4.14
% Riffle	19.7	15.1	4.8
% Glide	6.8	10.4	33.8
% Pool	34.6	35.8	20.4
% Undercut Bank	8	13	3
% Shrub Cover in Riparian	20	32	8
% Canopy Closure in Riparian	33	19	5

Trout densities in the primary channel appear to be related to the amount of secondary channel habitat, number of habitat units in the reach, number of pools, amount of beaver activity, amount of riffle habitat, amount of undercut bank, shrub cover and canopy closure in the riparian zone. Trout densities appear to be inversely related to the percent of the total area that is in the primary channel, average wetted width, average depth, pool frequency (the number of channel widths per pool), residual pool depth, and the amount of glide habitat.

These attributes will be examined much more closely in the logistic regression analyses in the final report.

Stream Categorization

Habitat survey results should be considered when estimating trout populations in the Salt River. Significant amounts of habitat are found outside of the channel that was electrofished, primarily in the higher gradient reaches. Between Thayne Lane and Freedom Lane, only 59% of the habitat is in the channel that was electrofished. Therefore, population estimates per mile are actually estimates of the trout population within the largest single channel, per mile of braided stream. As such, estimates of numbers of biomass per unit stream length are certainly biased low. Wetted widths of the primary channel were used to calculate estimates of numbers and biomass per acre so these estimates are relatively unbiased.

If population estimates are based only on the channel actually electrofished, 3-year average trout populations in the four reaches were: 333 lbs/mile (AG Lane), 659 lbs/mile (Hwy 238), 537 lbs/mile (Thayne Lane) and 205 lbs/mile (Etna Lane). This would result in a red ribbon categorization for the two high gradient reaches and yellow ribbon classification for the two low gradient reaches.

If we assume that the biomass of trout in secondary channel habitats is equal to the biomass in the primary channel, the proportion of the habitat that was not electrofished (secondary channels) can be used to adjust the estimates. For instance, we calculated a population estimate of 537 lbs/mile in the Thayne Lane section based on electrofishing only 41% of the total length of channels in the section. Assuming equal populations in primary and secondary channels, this estimate would be adjusted to 1,309 lbs/mile. Etna Lane and Hwy 238 estimates would be adjusted from 205 to 285 lbs/mile and 659 to 1,221 lbs/mile, respectively. The adjustment cannot be calculated for the AG Lane section until the habitat data have been summarized. The adjusted estimates support blue ribbon category for the Salt River between Hwy 238 and Freedom Lane (possibly extending as far as Etna Lane) and yellow ribbon category above and below this section.

Literature Cited

Moore, K., K. Jones and J. Dambacher. 1998. Methods for Stream Habitat Surveys, Aquatic Inventory Project. Oregon Department of Fish and Wildlife, Natural Production Program, Corvallis, OR 97330.

- Salt River Whirling Disease Investigations FX-JN-4LS-551

Salt River Whirling Disease Presentation

A presentation was prepared for the 6th Annual Whirling Disease Symposium in Coeur d'Alene, Idaho on February 3-5, 2000. The title of the talk was "Effects of *Myxobolus cerebralis* on salmonids in the mainstem Salt River, Wyoming" and was co-authored by Kevin Gelwicks, Dave Zafft and Rob Gipson. This talk summarized information on the parasite and trout populations to determine potential whirling disease impacts on mainstem trout populations. A 1,000 word extended abstract was submitted for inclusion in the symposium proceedings. An unabridged version of this abstract follows.

Introduction

The Salt River is the downstream most tributary to the Snake River in Wyoming. Nine major mountain tributaries flow into the Salt River and there are numerous low-gradient streams that arise from springs in the valley floor. The valley is heavily irrigated and most of the mountain tributaries are seasonally dewatered below the national forest boundary. The mainstem of the Salt River is also completely dewatered during irrigation season near Fairview, Wyoming. The river reappears via irrigation return flow approximately 4 mi downstream near Afton, Wyoming and flows 48 mi to Palisades Reservoir. Salmonid populations in this portion of the Salt River are primarily composed of Snake River cutthroat trout *Oncorhynchus clarki sp.* (SRC), brown trout *Salmo trutta* (BNT) and mountain whitefish *Prosopium williamsoni* (MWF). Limited populations of rainbow trout *Oncorhynchus mykiss* (RBT) and brook trout *Salvelinus fontinalis* also occur in the mainstem river. In November and December the upper 19 mi of river are closed to fishing to protect spawning BNT. In addition, a 7 mi stretch of river is managed under a special slot length limit regulation with tackle restricted to artificial flies and lures only. The remainder of the river is managed under general statewide fishing

regulations. Approximately 10,000 catchable-size SRC are stocked annually in the mainstem Salt River.

In 1995, Wyoming Game and Fish Department personnel began a 4-yr project (1995-1998) on the mainstem of the Salt River between Afton and Palisades Reservoir. The project was conducted to describe the populations of SRC and BNT, evaluate the success of stocking catchable SRC, determine trout movement patterns, describe the relative growth of stocked and wild SRC and assess habitat conditions along the river. Coincident with the first year of the study (1995), *Myxobolus cerebralis* (Mc) was detected in a Salt River RBT. This led to more intensive Mc sampling in 1996. Results from 1996 samples detected Mc in adult RBT, SRC, rainbow/cutthroat hybrid (RXC) and juvenile MWF from the Salt River mainstem (Money and Wanner 1997). In addition, trout were sampled in 1997 from all major tributaries and tested for the presence of Mc (Isaak and Hubert, 1998). These samples confirmed the presence of Mc in adult trout from two mountain tributaries and four spring streams in the Salt River drainage. Further investigation is underway to determine the impacts of Mc on SRC and BNT in spring streams tributary to the Salt River (Hubert et al. 2000).

In 1997, 349 adult trout and whitefish were sacrificed for age and growth and electrofishing injury analyses and Mc testing. This paper will present the results of this Mc testing and will examine trout population trends in the mainstem Salt River through 1998 to determine if population level declines attributable to whirling disease can be detected.

Methods

Between July 15, 1997 and November 6, 1997 adult salmonids were collected from the mainstem river between Afton and Palisades Reservoir. Each fish was tested individually with the pepsin-trypsin digest method. Fish considered suspect for Mc with pepsin-trypsin digest were tested with histological sectioning to confirm the presence of Mc. An early version of the MacConnell-Baldwin scale was used to rate the severity of infection on a scale of zero to four (Kiryu et al. 1988). Percentages of fish testing positive for each species and grade were then compared.

Trout population estimates were conducted on four 3-mi reaches of the Salt River in July and/or August 1995, 1996 and 1998. From upstream to downstream, these sites were Auburn-Grover Lane, Highway 238, Thayne Lane and Etna Lane. Population estimates (1971-1998) of BNT and SRC were examined from all four sites to determine population level declines in trout greater than 6 in. Because wild and stocked SRC could not be differentiated in pre-1995 data, SRC estimates are presented as both wild and stocked SRC. Estimates of wild 6-10.9 in BNT and SRC from 1995, 1996 and 1998 were also evaluated to reflect population fluctuations in age 1 and 2 trout.

Results

Rainbow trout showed the highest prevalence (percent positive) of Mc infection, followed by RXC, SRC and BNT (Table 4). No MWF in this sample tested positive for Mc. RBT had the highest incidence of all grades of infection. Grade four infections were only found in RBT and RXC, whereas grade three infections were present in RBT, RXC and BNT. Interestingly, RXC were intermediate between RBT and SRC in terms of percent positive. Compared to RXC, SRC had higher incidence of grade one infections but lower incidence of grade 2-4 infections. Positive trout and whitefish were collected throughout the mainstem river from Afton to Palisades Reservoir.

Table 4. Results of histological testing of five species of salmonids from the mainstem Salt River, 1997. Results are expressed as number testing positive (#+) and percentage testing positive (%+) for each infection grade.

Species	Number Tested	All Grades		*Infection Grade*							
				1		2		3		4	
		#+	(%)	#+	(%+)	#+	(%+)	#+	(%+)	#+	(%+)
RBT	58	27	(47)	9	(15)	8	(14)	5	(9)	5	(9)
RXC	86	21	(24)	5	(6)	7	(8)	6	(7)	3	(3)
SRC	72	7	(10)	6	(8)	1	(1)	0	(0)	0	(0)
BNT	76	8	(11)	5	(7)	2	(3)	1	(1)	0	(0)
MWF	57	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)

Although there is considerable fluctuation from year to year, estimates of BNT >6 in generally increased at all four sites through 1998 (Table 5). At all sites except Thayne Lane, the 1996 BNT estimate was the highest on record (at Thayne Lane, the 1998 BNT estimate was highest). At the Highway 238 and Thayne Lane sites, estimates of SRC (wild and stocked combined) >6 in also showed a general increase through 1998, with high estimates in 1996. At both sites, 1998 estimates were greater than or equal to pre-1995 estimates.

At the lower gradient sites (Auburn-Grover Lane and Etna Lane) SRC populations tend to be decreasing. At the Auburn-Grover Lane site, 1996 and 1998 estimates of SRC >6 in were lower than the three previous estimates, but were slightly higher than the 1988 estimate. At the Etna Lane site, the 1998 estimate of SRC >6 in was considerably lower than 1995 and 1996 estimates, however, it was consistent with the 1971 estimate at that site.

Estimates of 6-10.9 in wild BNT in 1995, 1996 and 1998 showed patterns similar to estimates of wild BNT >6 in (Table 5). All sites displayed a general increase in wild BNT numbers with highs in 1996 at all sites but Thayne Lane, where the 1998 estimate was highest. At Highway 238 and Thayne Lane, wild SRC (6-10.9 in) estimates displayed similar trends. However, at Auburn-Grover Lane and Etna Lane, estimates of 152-279 mm wild SRC showed decreases in trout numbers from 1995 through 1998. At Auburn-Grover Lane, wild SRC (6-10.9 in) displayed a 50% decline from 1995 to 1996 (174 to 87 trout per mile, respectively) and remained at the same level in 1998 (57 trout per km). At Etna Lane, wild SRC (6-10.9 in) showed a 40% decline from 1995 to 1996 (508 to 305 trout per mile, respectively) and continued this decline to 357 trout per mile in 1998.

Table 5. Population estimates (trout >6 in) from four sites on the mainstem Salt River, 1971-1998.

Year	Study Site and Species							
	Auburn-Grover Lane		Highway 238		Thayne Lane		Etna Lane	
	BNT	SRC	BNT	SRC	BNT	SRC	BNT	SRC
Trout per Mile (>6 in)								
1971							190	405
1978					541	412		
1979					596	477		
1981					942	662		
1988	116	173			173	387		
1989			741	163				
1993	264	335						
1994	408	107	586	254				
1995	432	419	483	303	544	193	71	784
1996	743	190	1646	960	902	464	275	395
1998	552	236	1043	563	1043	398	218	357
Trout per Mile (6-10.9 in)								
1995	359	174	381	196	390	111	60	508
1996	596	87	1281	523	683	339	210	305
1998	479	92	874	279	856	258	173	194

Discussion

Based on 1997 adult trout samples, RBT had the highest infection rates of all species tested. The higher infection rate is evident in both the percentage testing positive for Mc and in the histological grading of cartilage damage. Percent positive and histological grading indicate that infection rates in BNT are similar to those in SRC and both species display much lower infection rates than RBT. The observed variation in infectivity across species may be confounded by the fact that all fish tested were age 1 or older. All MWF, SRC and BNT were age 2 or older. Therefore, these results do not take into account young of year fish that may have been killed by the disease, but rather only reflect infectivity levels in survivors (Baldwin et al. 1998). However, the relative infectivity levels we observed across species are consistent with sentinel fish studies carried out by other investigators (e.g. Thompson et al. 1998). No MWF were positive for Mc in 1997. In 1996, 65% of the 1-3 in MWF tested were positive (Money and Wanner, 1997). This difference is likely due to size differences of MWF tested; in 1997, all MWF tested were larger than 10 in.

Population data indicate that Salt River BNT numbers are stable or increasing. Numbers of wild SRC at the middle two sampling sites (Highway 238 and Thayne Lane) have also remained stable. Estimates of SRC at the upper and lower sites (Auburn-Grover Lane and Etna Lane) decreased from 1995 through 1998. Wild SRC estimates prior to 1995 are limited. Therefore, these declines could either indicate the beginning of a trend or natural population fluctuation. However, these findings are interesting given the distinct differences in habitat conditions between the four sites. Habitat data indicate that the Auburn-Grover Lane and Etna Lane reaches have lower gradient than the middle two reaches. Such conditions seem more suitable for *Tubifex tubifex*, thus there may be greater potential for whirling disease to manifest itself in these reaches.

Preliminary results of a study on spring creeks in the Salt River drainage show evidence of whirling disease having adverse impacts on age-0 trout in one of two creeks studied (Hubert et al. 2000). This leads us to believe that whirling disease may be affecting recruitment at isolated sites within the drainage. Additional information is needed to determine where these sites exist and how they may affect mainstem trout populations.

References

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Future Plans

Further whirling disease investigations are warranted in the Salt River drainage given the observed short term declines in SRC populations at the Auburn-Grover Lane and Etna Lane study sites and the documentation of disease impacts on age-0 trout in Christensen Creek. In 2000, the FPU will sample approximately 40 sites in the mainstem river with potential spawning and nursery habitat for young-of-year SRC and MWF. Sampling locations will be chosen based on existing habitat inventory data collected in 1998 and 1999. In sites where age-0 salmonids are found, a sample of up to 25 fish will be sacrificed and tested for the presence of *Myxobolus cerebralis*. The FPU and University of Wyoming have submitted two proposals to the Whirling Disease Initiative (of the National Partnership on the Management of Wild and Native Cold Water Fisheries) to extend young of the year sampling to approximately 100 additional sites in Salt River tributaries. If the proposals are funded, the occurrence of the parasite in all age-0 salmonids that were sacrificed will be determined by PCR and histological analysis. Results will describe the distribution of age-0 SRC and MWF throughout the drainage and will relate prevalence and intensity of *Myxobolus cerebralis* infection in age-0 salmonids to physical habitat features.

If the proposal is not funded, mainstem age-0 SRC and MWF samples will be catalogued until funding becomes available for laboratory analysis. The FPU will describe the distribution of salmonid fry in mainstem habitats and will describe relationships between the occurrence of salmonid fry, clinical signs of whirling disease and habitat features in the mainstem river.

CS - Creel Surveys

- Salt River Creel Survey and Stocking Evaluation FX-JN-4LS-520

Programmed creel surveys were conducted on two sections of the Salt River from mid-May through October 1998. See the FPU section of the Progress on the 1998 Work Schedule for information regarding the creel survey designs. Results were analyzed in May and June 1999 and estimates were calculated for boat and bank anglers in the upper and lower creel survey sections. We began work on the creel survey chapter of the Salt River project completion report in July 1999.

A problem was detected during the report preparation. A total of 98 boat anglers were counted via remote video cameras in the lower river section in July 1998. The resulting estimate of angler hours for the month of July was 0. The problem was that if boat anglers were counted via video camera on a given day, but no anglers were interviewed, trip length was estimated as 0 hrs and the resulting estimate of total hours became 0 for that day.

This problem has most likely affected few, if any, past surveys because it was detected in the census portion of program Wyocreel. Few complete census creels have been conducted in the past.

The problem was corrected so that the Wyocreel analyses program would use the season average trip length in pressure calculations. The estimates that were calculated in May and June 1999 are certainly biased low and must be recalculated. The figures and tables that were prepared using the erroneous estimates will have to be recreated. The analyses will be redone in March 2000 and the results will be related to two past creel surveys and reported as a chapter of the Salt River project completion report by mid-May 2000 (Dave Zafft). The report will include estimates of the return to the catch of stocked, catchable Snake River cutthroat trout. Recommendations regarding stocking and fishing regulations will be included.

TM - Development of Tools and Methods

- Salt River Age and Growth Investigations FX-LE-4LS-553

In conjunction with the Salt River project, 352 trout and MWF were sacrificed for electrofishing injury analysis, *Myxobolus cerebralis* testing and age and growth analyses. Scales and otoliths were collected from each trout or MWF for aging and back-calculation of growth rates. In 1998, Kevin Gelwicks and a contract biologist technician aged all otoliths and the same technician aged all scales. In 1999, a contract biologist technician aged all otoliths and two technicians aged all scales. Three independent investigators have now aged all scales and otoliths. The age and growth information will be presented by the Jackson regional fish management crew in the age and growth chapter of the Salt River Study final report. Comparisons will be made between the two different methods (scales vs. otoliths) to determine relative accuracy and precision. Preliminary aging results suggest that for fish 3 years and older, scale analysis results in a younger age determination than otoliths. This trend could have profound impacts on back-calculated growth rates. If data permits,

visible implant tag recaptures will be used to calculate "real" growth rates to validate (or invalidate) growth rates from scales and otoliths. If age and growth data are valid from scales and/or otoliths, this information will be used to evaluate the effects of exposure to electrofishing injury and severity of injuries on growth rates. We will also attempt to determine whether or not growth rates are influenced by *Myxobolus cerebralis* infection.

- Salt River Electrofishing Injury Investigations FX-JN-4LS-576

In 1997, 352 Salt River trout and MWF were sacrificed for electrofishing injury analysis, age and growth determination and whirling disease testing. Electrofishing gear consisted of inflatable rafts equipped with 5000-Watt generators and Coffelt VVP-15s. Anodes consisted of two 6-dropper, boom-mounted Wisconsin arrays and cathodes consisted of ten 4-ft long, 5/8-in diameter lengths of stainless steel cable. Electrofishing settings were constant across all sampling occasions (250 V, 5-7 Amps, 40 pulses per second, 20% pulse width). Fish were x-rayed and autopsied in 1998 to evaluate spinal injury and internal hemorrhage damage induced by electrofishing. In 1999, FPU contract biologist technicians evaluated x-rays and autopsy slides to rate electrofishing injuries. Stacy Johnson evaluated both the x-rays and autopsy slides, Brian Hutton evaluated x-rays, and Mike Ogden evaluated autopsy slides. Kevin Gelwicks also evaluated internal hemorrhage as trout were being processed in 1998. Therefore, two investigators have evaluated spinal damage and three investigators have evaluated internal hemorrhage damage. Electrofishing injury rating criteria are summarized in Tables 6 and 7. For further details on collection and processing procedures, see the 1998 progress report.

Table 6. Spinal damage rating procedure for x-rays.

Record the position of every affected vertebra, counting the first separate vertebra behind the head as number 1. Rate the worst damage to the spine as follows;	
0	No spinal damage apparent
1	Compression (distortion) of vertebrae only
2	Misalignment of vertebrae, including compression
3	Fracture of one or more vertebrae or complete separation of two or more vertebrae

Table 7. Internal hemorrhage rating procedure for autopsies.

Rate the injury from the actual specimen; then photograph the worst side of the fish with the fillet inside up. Rate the worst hemorrhage in the muscle mass as follows;	
0	No hemorrhage apparent
1	Mild hemorrhage; one or more wounds in the muscle, separate from the spine
2	Moderate hemorrhage; one or more small ($\leq$ width of two vertebrae) wounds on the spine
3	Severe hemorrhage; one or more large (> width of two vertebrae) wounds on the spine

Previous investigations have shown that the size of a fish is related to severity of electrofishing injury (i.e., larger fish are more prone to electrofishing injury). Sizes of sacrificed BNT, SRC and MWF were comparable. BNT ranged from 10.3-18.3 in (mean=14.9 in), SRC ranged from 9.9-17.0 in (mean=13.3 in) and MWF ranged from 10.5-16.1 in (mean=13.6 in). All RBT and RXC that were captured in 1997 were sacrificed so that they

could not hybridize with native SRC. Therefore, a greater number of small RBT and RXC were sacrificed and evaluated for injury. RBT ranged from 4.3-19.9 in (mean=9.7 in) and RXC ranged from 4.5-20.6 in (mean=9.0 in). Due to the smaller size of RBT and RXC that were evaluated, one would expect fewer electrofishing injuries.

The results of electrofishing injury evaluations that have been conducted thus far are presented in Tables 8 through 12. These results are preliminary and will be used to guide final injury evaluations. To determine final injury ratings, Kevin Gelwicks and Dave Zafft will re-evaluate all fish and concur on a rating for each fish based on all available information.

Results of preliminary spinal damage evaluations by species are shown in Table 8. Trout that were not electrofished did not exhibit spinal damage, with the exception of one injury in a BNT noted by Investigator B. Of the trout that were electrofished, SRC had the highest injury rate, with 22-25% exhibiting grade 1-2 spinal damage. BNT showed the second highest injury rate, with 16-18% exhibiting grade 1-2 spinal damage. The MWF injury rate was much lower, with 4-11% exhibiting injuries. However, MWF was the only species to exhibit a grade 3 spinal injury. RBT and RXC showed virtually no spinal damage. When BNT and SRC are combined, spinal damage was evident in approximately 20 percent of the sample (16% grade 1, 4% grade 2). If all trout (excluding MWF) are combined, spinal damage was evident in approximately nine percent of the sample (8% grade 1, 1% grade 2). The decrease in injury prevalence in all trout is most likely due to the smaller RBT and RXC included in the sample.

Table 8. Results of x-ray analysis showing percentage of trout and MWF with spinal damage. Results are expressed as the percentage of fish in each class showing signs of grade 0-3 spinal damage. A and B signify two independent investigators.

			Spinal Damage Severity Rating (%)							
			0		1		2		3	
Species	*Electrofished*	*N*	A	B	A	B	A	B	A	B
BNT	No	21	100	95	0	5	0	0	0	0
BNT	Yes	56	84	82	14	14	2	4	0	0
SRC	No	22	100	100	0	0	0	0	0	0
SRC	Yes	51	78	75	20	16	2	10	0	0
RBT	Yes	56	96	100	4	0	0	0	0	0
RXC	Yes	83	100	100	0	0	0	0	0	0
MWF	Yes	51	89	96	7	0	2	4	2	0
BNT & SRC	Yes	107	81	79	17	15	2	6	0	0
All Trout	Yes	246	91	91	8	7	1	2	0	0

Preliminary BNT and SRC spinal injury results were also evaluated based on the minimum number of times a trout was electrofished (Table 9). Trout that were electrofished once were collected during single pass electrofishing in areas that had not been sampled previously. Trout that were electrofished 2-4 times were collected from throughout the drainage, and the number of times electrofished was based on visible implant tagging information. The number of times electrofished should be considered a minimum because it does not take into account trout that may have been exposed to electrofishing gear and not captured and tagged on previous sampling occasions.

Spinal damage was virtually non-existent in BNT and SRC that were not electrofished or electrofished on one occasion. Absence of electrofishing injury in trout electrofished once may be partially related to smaller sample sizes. Spinal damage for trout electrofished twice was

approximately 20% and spinal damage for trout electrofished three times rose to approximately 34%. There were only five trout in the sample that were electrofished four times. Of these five trout, only one injury was noted, a grade 2 injury in a SRC. These results indicate that the likelihood of a trout being injured increases with repeated exposures to electroshock.

Table 9. Results of x-ray analysis showing percentage of BNT and SRC that were electrofished from 0 to 4 times with spinal damage. Results are expressed as the percentage of fish in each class showing signs of grade 0-3 spinal damage. A and B signify two independent investigators.

			Spinal Damage Severity Rating (%)							
			0		1		2		3	
Species	*Electrofished*	*N*	A	B	A	B	A	B	A	B
BNT	0	21	100	95	0	5	0	0	0	0
BNT	1	13	100	100	0	0	0	0	0	0
BNT	2	20	90	75	5	20	5	5	0	0
BNT	3	20	65	75	35	20	0	5	0	0
BNT	4	3	100	100	0	0	0	0	0	0
SRC	0	22	100	100	0	0	0	0	0	0
SRC	1	12	100	100	0	0	0	0	0	0
SRC	2	20	80	75	15	15	5	10	0	0
SRC	3	18	61	61	39	22	0	17	0	0
SRC	4	1	100	0	0	100	0	0	0	0
BNT & SRC	0	43	100	98	0	2	0	0	0	0
BNT & SRC	1	25	100	100	0	0	0	0	0	0
BNT & SRC	2	40	85	75	10	18	5	8	0	0
BNT & SRC	3	38	63	68	37	21	0	11	0	0
BNT & SRC	4	4	100	75	0	25	0	0	0	0

Investigators also rated internal hemorrhages in the musculature of trout. Investigator A rated internal hemorrhages as the trout were being processed in the laboratory. Investigators B and C rated internal hemorrhages from 35 mm slides of the fish's musculature. After initial laboratory evaluation of internal hemorrhages by Investigator A, it became evident that some hemorrhages may have been due to freezing and not electrofishing. We attempted to describe the rate and severity of freeze-induced by sacrificing an additional 50 RBT from the WGFD Como Bluffs Fish Hatchery. Twenty-five of these trout were autopsied immediately after being overdosed with MS-222. The other twenty-five trout were immediately frozen and were thawed and autopsied approximately two months later. Results of this comparison showed that hairline hemorrhages extending from the spine into the surrounding musculature were due to freezing. Because these hemorrhages originate from the spine, they were usually classified as grade 2 injuries. Investigators B and C were shown 35 mm slides of these types of hemorrhages and attempted to separate hemorrhages in Salt River fish into two categories; those caused by electrofishing, and those caused by freezing. The inclusion of freeze-induced hemorrhages by Investigator A is evident in the high prevalence of grade 2 hemorrhages, even in trout that were collected on hook and line (Table 10). Further interpretation of investigator A's results is difficult given this discrepancy.

Table 10. Results of Investigator A autopsy analyses showing percentage of trout and MWF with internal hemorrhages. Results are expressed as the percentage of fish in each class showing signs of grade 0-3 internal hemorrhage damage. Class 2 ratings include injuries due to electrofishing and freezing.

Species	*Electrofished*	*N*	*Internal Hemorrhage Severity Rating (%)* 0	1	2	3
BNT	No	21	24	0	76	0
BNT	Yes	56	9	4	80	7
SRC	No	22	41	5	55	0
SRC	Yes	51	31	10	49	10
RBT	Yes	58	64	14	12	10
RXC	Yes	86	76	12	10	2
MWF	Yes	57	40	18	30	12
BNT & SRC	Yes	107	20	7	65	8
All Trout	Yes	251	49	10	34	7

Because Investigators B and C evaluated both electrofishing and freeze-induced hemorrhages, further interpretation is possible. Overall, investigator C noted more hemorrhages than investigator B (Tables 11 and 12). Based on hemorrhages that were not attributed to freezing, 0-14% of the BNT and 14-18% of the SRC that were collected on hook and line showed evidence of grade 1 hemorrhages. Among BNT and SRC that were electrofished, between 9% and 33% had electrofishing induced internal hemorrhages ranging from grade 1 through grade 3. Incidence of electrofishing-induced internal hemorrhages was generally higher in BNT than in SRC.

Table 11. Results investigator B autopsy analysis showing percentage of trout and MWF with internal hemorrhages. Results are expressed as the percentage of fish in each class showing signs of grade 0-3 internal hemorrhage damage. F indicates injuries attributed to freezing, S indicates all other injuries.

Species	*Electrofished*	*N*	*Internal Hemorrhage Severity Rating (%)* 0		1		2		3	
			S	F	S	F	S	F	S	F
BNT	No	21	100	52	0	0	0	48	0	0
BNT	Yes	56	91	18	4	2	4	80	2	0
SRC	No	22	86	59	14	5	0	36	0	0
SRC	Yes	51	90	61	4	4	0	35	6	0
RBT	Yes	53	87	81	2	0	4	19	8	0
RXC	Yes	82	91	88	6	0	2	12	0	0
MWF	Yes	57	77	72	9	4	7	25	7	0
BNT & SRC	Yes	107	91	38	4	3	2	59	4	0
All Trout	Yes	242	90	64	4	1	2	34	3	0

Table 12. Results of investigator C autopsy analysis showing percentage of trout and MWF with internal hemorrhages. Results are expressed as the percentage of fish in each class showing signs of grade 0-3 internal hemorrhage damage. S indicates injuries attributed to electrofishing, F indicates injuries attributed to freezing.

			Internal Hemorrhage Severity Rating (%)							
			0		1		2		3	
Species	*Electrofished*	*N*	S	F	S	F	S	F	S	F
BNT	No	21	86	33	14	0	0	67	0	0
BNT	Yes	55	65	18	20	0	11	80	4	2
SRC	No	22	82	55	18	0	0	45	0	0
SRC	Yes	51	69	53	14	2	6	45	12	0
RBT	Yes	53	74	75	4	0	15	25	8	0
RXC	Yes	84	86	82	11	0	4	18	0	0
MWF	Yes	56	43	57	38	0	7	43	13	0
BNT & SRC	Yes	106	67	35	17	1	8	63	8	1
All Trout	Yes	243	75	60	12	0	8	39	5	0

The information presented here is preliminary. Further evaluation of electrofishing injury data will be possible after final electrofishing injury evaluations are complete. Differences in electrofishing injury rates and severity will be evaluated based on species and on the minimum number of times fish were exposed to electrofishing gear. Additional comparisons will be made based on the size of fish. Four size classes will be used in size comparisons; 4-8 in, 8-12 in, 12-16 in and >16 in. If age and growth information from scales and/or otoliths is deemed reliable, growth data will be used to evaluate the effects of electrofishing injury on growth rates. Growth rates of trout captured on hook and line will be compared to those captured with electrofishing gear.

Final results of the Salt River electrofishing injury investigations will be presented in administrative reports and/or professional manuscripts. Results will also be presented at professional meetings.

North Platte River Basin - 5NP

North Platte River LE851024CN

AS - Aquatic Resource Surveys

- North Platte River Triactinomyxon Investigations FX-LE-5NP-551

Triactinomyxon Sampling

The objective of this project was to determine the potential of *Myxobolus cerebralis* triactinomyxon (TAM) sampling as a tool for monitoring the whirling disease pathogen in Wyoming. This initial effort involved monthly water filtrations to refine the sampling technique and to begin characterizing seasonal patterns of TAM abundance in the upper North Platte River drainage.

TAM abundances and associated sentinel fish infectivity levels appear to be seasonally and spatially variable within drainages. To account for seasonal variation, sampling was conducted monthly from July through December at both Treasure Island and Six-mile Gap. To partially account for spatial variation, one to two additional sites were sampled each month. It would have been necessary to sample numerous sites over a short time period to fully account for spatial variation.

Sampling protocols were developed by Barry Nehring, CDOW. Samples were collected by filtering 500 gal of river water through a 20-micron mesh screen. Water temperature, date, time, volume of water filtered and a detailed description of each study site were recorded on each sampling occasion. In the laboratory, the filtrate was sub-sampled, stained, placed on a gridded petri dish, covered with a cover slip and examined under a 40X dissecting microscope. An additional sample was preserved in 95% ETOH for PCR analysis.

Once samples were collected, they were placed on ice and returned to the office for microscopy. In July and August, twenty sub-samples from each sample were examined under the microscope. No TAMs were identified from any of the sub-samples. Due to the lack of TAMs and the time required for microscopy, analyses were not conducted on Treasure Island and Six-mile Gap samples in September and October. We assumed if TAMs were present in high densities in these samples, they would be detected with PCR analyses. Five sub-samples were examined from the Boswell Creek sample in September and the Middle Fork Big Creek sample in October. No TAMs were identified from either of these samples. In November and December, five sub-samples were examined from each of the four samples collected each month. In November, a TAM was identified from the fifth sub-sample of the Encampment River sample. Therefore, 20 sub-samples were examined and a total of two TAMs were found. This equals a density estimate of 0.09 TAMs/L or 0.34 TAMs/gal. This is the only sample in which TAMs were found. However, if TAMs had been present at this low density they may not have been identified. PCR analysis has been conducted on all samples collected through October and all samples were negative for Mc. Samples from November and December have been submitted to the WGFD Laboratory and PCR results are pending.

Temperature Monitoring

There is a general consensus among researchers that production of TAMs by Tubifex worms is highly correlated with water temperature. Nehring (1999) collected almost 1,000 TAM samples from 39 sites in 15 streams over a five-year period. He found that TAM production generally begins as spring water temperatures reach 50°F and can continue for six months or more. In the laboratory, El-Matbouli et al. (1998) quantified TAM production at water temperatures of 41, 50, 59, 68, 77 and 86°F. They found that the optimal temperature for *T. tubifex* to release TAMs was 59°F and TAM production ceased at water temperatures of 68°F or above. They did not find a corresponding lower bound. *T. tubifex* released TAMs at water temperatures as low as 41°F. These laboratory and field results appear to concur with sentinel fish exposure studies. Vincent (1999) found that peak intensity of infection occurred between 54-55°F in sentinel fish exposed to Mc positive waters. He noted a decline in infection rates as temperature decreased, with infection intensity at 39°F near zero. Results of sentinel fish exposures in Idaho (Burton et al. 2000) generally concurred with Vincent's findings. Sentinel fish exposed in the South Fork of the Boise River showed reduced infections when water temperatures were below 48°F. However, they also noted natural infections at water temperatures as low as 36.7°F. Therefore, it appears that TAM production is virtually non-existent at water temperatures in excess of 68°F and optimum at water temperatures between 50 and 59°F. At lower temperatures, TAM production still occurs, but decreases with decreasing temperature.

In anticipation of whirling disease investigations on the upper North Platte River, ten recording thermometers were installed throughout the drainage. These data should be valuable in predicting when optimal TAM production could occur at various locations in the drainage. Thermometers were placed in the mainstem river at the Rochelle Easement, Pick Bridge,

Treasure Island and Prospect. Six thermometers were placed in east and west side tributaries, near their confluence with the North Platte River. East side tributaries included Cedar Creek, French Creek and Douglas Creek. West side tributaries included Spring Creek, the Encampment River and Big Creek. Each thermometer recorded water temperatures from May 1, 1998 through June 16, 1999. The Spring Creek unit was not recovered.

All locations exhibited a great deal of fluctuation in daily mean water temperature in May and June, followed by a sharp increase in temperature in late June or Early July. If TAM production is optimum at 50-59°F, it seems logical that if water temperatures remain in this range for a longer period of time, more TAMs can be produced. For instance, in the Encampment River, water temperatures fluctuated between 39 and 50°F in May and June, and sharply increased to the 64°F peak in July (Figure 6). However, in the North Platte River at Prospect, water temperatures fluctuated between 50 and 59°F in May and June before increasing to the 68°F peak in July (Figure 7). Therefore, there was a full two-month period of optimum temperatures at Prospect, but only about two weeks of optimum temperatures in the Encampment River. Vincent (1999) noted that peak infections could also occur as water temperatures decline through the optimum temperature range in fall. Temperature data indicate that fall temperatures generally drop rapidly, resulting in a short infectivity window over an approximately two-week period in late September and Early October at most locations.

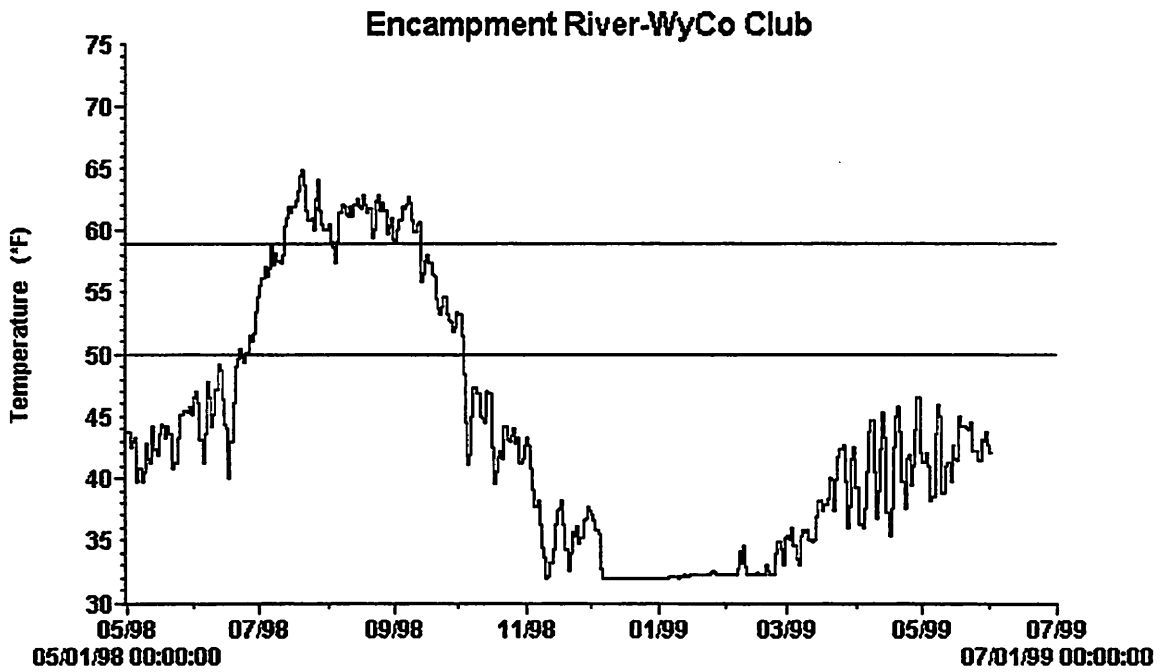

Figure 6. Mean daily water temperatures (°F) of the Encampment River at the WYCO Club. Horizontal lines indicate theoretical bounds of optimum TAM production.

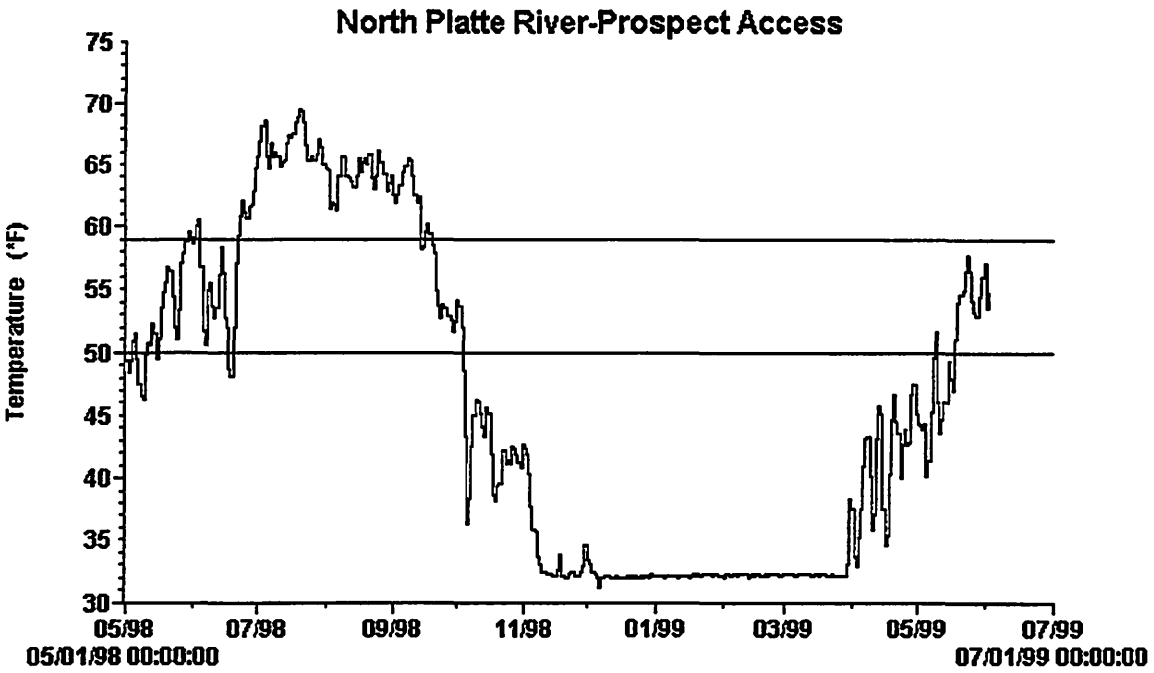

Figure 7. Mean daily water temperatures (°F) of the North Platte River at the Prospect Access. Horizontal lines indicate theoretical bounds of optimum TAM production.

The number of days at each site that mean daily water temperatures were between 50-59°F and exceeded 68°F is summarized in Table 13. Based on the entire year of data (5/1/98-4/30/99), Cedar Creek had the most days in the temperature range of optimum TAM production and Treasure Island had the fewest days. Although French Creek had much cooler temperatures overall, it had an exceptionally high number of days in the optimum temperature range. None of the tributary sites ever exceeded 68°F, the temperature at which TAM production is thought to cease. Mean daily water temperatures exceeded 68°F at all four sites on the mainstem river. Theoretically, TAM production could occur year-round in tributaries, but would not occur in the mainstem at certain times of year when temperatures exceed 68°F.

Table 13. Number of days that mean daily water temperatures fell within the 50-59°F range of optimum TAM production and exceeded the 68°F point of no TAM production. The time period from 5/1/98-4/30/99 represents an entire year of data, whereas 5/15/98-7/31/98 represents the estimated period of fry emergence.

Location	*Number of Days in Temperature Range*			
	5/1/98-4/30/99		5/15/98-7/31/98	
	50-59°F	>68°F	50-59°F	>68°F
NPR @ Rochelle	62	24	34	14
NPR @ Pick Bridge	50	7	33	7
NPR @ Treasure Island	37	3	22	3
NPR @ Prospect	52	7	29	7
Cedar Creek	95	0	43	0
French Creek	85	0	31	0
Douglas Creek	46	0	16	0
Encampment River	40	0	18	0
Big Creek	49	0	29	0

TAM sampling for this project did not begin until July, so if TAM production was occurring, spring peaks in TAM production may have occurred prior to sampling. Water temperatures were recorded as TAM sampling was conducted. These temperatures are summarized in Tables 14 and 15. Some of the samples were taken from waters in the 50-59°F temperature range, but no TAMs were found in these samples. The water temperature was actually 40°F on the only occasion when TAMs were found (Encampment River, 11/1/99).

Table 14. Water temperatures recorded during TAM sampling at Treasure Island and Six-mile Gap stations.

	Treasure Island		*Six-mile Gap*	
Date	Temperature (°F)	Time	Temperature (°F)	Time
7/1/99	55	12:00	64	14:30
8/3/99	64	12:10	67	14:00
8/30/99	59	13:00	59	11:20
10/1/99	44	13:35	44	12:00
11/1/99	40	14:45	35	9:30
12/6/99	32	13:30	32	9:40

Table 15. Water temperatures recorded during TAM sampling at various stations in the North Platte River Drainage. The Boswell Creek station is in the Laramie River Drainage.

Date	*Location*	*Temperature (°F)*	*Time*
7/1/99	North Platte River @ Rochelle	55	10:00
8/3/99	Cedar Creek @ Old Baldy Club	56	10:25
8/30/99	Boswell Creek @ NFS Campground	51	9:15
10/1/99	Middle Fork Big Creek	37	10:30
11/1/99	Irrigation Canal @ Encampment River State School Section	45	13:00
11/1/99	Encampment River @ State School Section	40	13:00
12/6/99	Encampment River @ State School Section	32	11:50
12/6/99	Spring Creek @ Highway 130	32	15:10

One of the most important considerations when evaluating potential disease impacts on trout is whether the "window of infectivity" occurs as trout emerge from redds. Trout are known to be most susceptible to whirling disease in the first 2-3 wks of life. RBT spawning information is limited for the upper North Platte River drainage. McDowell (1983) reported that RBT spawn as early as late April in the lower reaches (Pick Bridge) and as late as June 19 in the upstream reaches (Six-mile and Walbright Creeks). If emergence occurs approximately 30 days post-spawn (given a mean water temperature of 50°F, Carlander 1969) this would mean that trout should be emerging as early as late May in lower reaches and as late as late July in upstream reaches. The number of days at each site within this emergence period (5/15/98-7/31/98) when temperatures fell between 50 and 59°F and exceeded 68°F is summarized in Table 13. Cedar Creek had the most days between 50 and 59°F and no days when temperatures exceeded 70°F during the estimated emergence period. Therefore, it appears that it would be a higher risk site if TAMs were being produced. On the other hand, Douglas Creek had only 16 days in the optimum temperature range during the emergence period, so one would expect a lower risk of fry being infected. These risk assessments are purely speculative and detailed information on timing and location of trout spawning and emergence and TAM production is necessary before such speculation can be substantiated.

Recommendations

TAM sampling has proven to be a useful tool for determining the spatial and temporal patterns in infectivity in Colorado waters. The favorable results in Colorado are most likely due to exceptionally high TAM densities. The technique has not been as successful in other states. For instance, Utah biologists invested considerable time in developing the technique, but were unable to isolate a single TAM from waters in the state. They have tried a number of different techniques to improve recovery rates, but to no avail. These investigators believe that TAMs are actually pushed through the mesh by the force of water pressure, and the TAMs that remain in the sample are only from the last few gallons of water filtered. Their laboratory tests indicated that only about one percent of the TAMs in a sample are recovered. Therefore, Utah has abandoned any future plans for TAM sampling (Eric Wagner, UDWR, personal communication). Other investigations in Montana indicate that this TAM sampling protocol is inaccurate and imprecise for filtering and estimating densities of TAMs (Barrows et al. 2000). Therefore, it appears that TAM sampling may not be the best means for tracking Mc in Wyoming, especially when infections are light, as they appear to be in the upper North Platte River. A better technique for determining spatial and temporal patterns of infectivity would be sentinel fish exposures at multiple sites over time, as Burton et al. (2000) have done in Idaho.

Thus far, population level impacts attributable to whirling disease have not been detected in the Treasure Island area. However, this does not mean that the parasite is not affecting recruitment in other areas of the drainage. To understand the impacts of whirling disease on wild trout recruitment, information is needed on the location of trout spawning and timing of emergence and the timing and location of *Myxobolus cerebralis* infectivity. The best way to determine temporal and spatial patterns of infectivity would be with sentinel fish exposures at multiple sites throughout the drainage. Rainbow trout fry could be exposed for 10-d periods each month for a calendar year. After 10 days, trout would be moved to a lab and reared for an additional 80 days to allow the disease to develop in cartilage. Trout would be sacrificed and analyzed with PCR and histology to define infection rates. This type of study would determine "hot spots" of infectivity throughout the drainage across time. The next step would be to determine how these infectivity "hot spots" are affecting trout recruitment. More detailed information would be necessary to determine where trout are spawning and when fry are emerging. Once this information is gathered, one can begin to understand how isolated infectivity "hot spots" may be affecting trout populations throughout the drainage.

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CS - Creel Surveys

- 2000 Creel Survey; North Platte River Near Saratoga FX-LE-5NP-520

Began planning for a May 15 to September 30, 2000 creel survey on the North Platte River between the Routt access area and I-80. Two creel clerks and 10 video cameras will be used to survey the 104-mile section of river. Each clerk will be responsible for conducting interviews at three of the six sections (Table 16).

Table 16. River sections where each creel clerk is responsible for interviewing anglers.

Clerk #1			*Clerk #2*		
1	Routt to Pickaroon	18 mi	4	Saratoga to Pick Bridge	11 mi
2	Pickaroon to Treasure Is.	29 mi	5	Pick Bridge to Frazier	5 mi
3	Treasure Is. to Saratoga	12 mi	6	Frazier to I-80	29 mi

The areas were chosen so that results would be comparable with past creel surveys and so that fishing regulations could be evaluated. Sections 1, 2, and 3 have an artificial flies and lures only restriction, a limit of six trout per day, 10-16 in trout must be released and only one trout over 16 in can be creeled. Section 5 also has an artificial flies and lures only restriction and a limit of six trout per day, 10-20 in trout must be released and only one trout over 20 in can be creeled. Sections 4 and 6 have a statewide regulation of six trout per day and only one trout over 20 in can be creeled.

The survey will concentrate on boat anglers. Bank anglers will be interviewed, but the survey will not be designed to estimate numbers of bank anglers. Ten cameras will be operated within the six sections to census all recreational and fishing boats. Cameras will be maintained by the Laramie regional fish biologists. The creel clerks will conduct interviews throughout the survey period. Numbers of anglers per boat will be estimated from the interviews. An interview schedule will be developed in spring 2000.

Warm Water Fisheries - 5WW

Grayrocks Reservoir LE450005PE

CS - Creel Surveys

- 2000 Creel Survey FX-LE-5WW-520

  Analyzed the results of a June 1 to June 30, 1999 creel survey on Grayrocks Reservoir. Anglers were counted 3 times per day on 4 weekdays and 4 weekend days. See the Laramie management crew's section of this report for details. The management crew will present the final results in an administrative report.

Wind River below Boysen Reservoir - 6WL

Wind River below Boysen Reservoir, LR825010FT

AS - Aquatic Resource Surveys

- Population estimate below Boysen Reservoir FX-LR-6WL-512

  The FPU biologist technician traveled to the Wind River below Boysen Dam with the FPU electrofishing boat to assist in population estimate sampling on February 17, 18 and 19, 1999. See the Lander Regional Fisheries Management Crew chapter of this report for details.

Wind River Above Reservation Boundary - 6WU

Wind River - Dubois Area - LR825010FT

AS - Aquatic Resource Surveys

- Single Pass Electrofishing FX-LR-6WU-512

  Kevin Gelwicks and a contract biologist technician assisted with single pass electrofishing on two reaches of the Wind River near Dubois on March 24 and 25. Data was summarized by Kevin Gelwicks and was sent to the Lander Regional Fisheries Management Crew. See the Lander Regional Fisheries Management Crew chapter of this report for details.

CS - Creel Surveys

- Upper Wind River Creel Survey FX-LR-6WU-520

  See the FPU section of the Progress on the 1998 Work Schedule for information regarding the creel survey design. Results of the April 15 to October 31, 1998 creel survey were sent to the Lander management crew in April 1999. The results suffered from a lack of interview data and heavy reliance on creel card return information. The ability to accurately estimate the relative returns of stocked and wild trout to anglers is closely related to the quality of the fin-clip data collected by the creel clerk. Unfortunately, the clerk checked only 61 fish during the entire creel period in both the upper and lower valley creel surveys combined. All fish were checked between mid-April and August, none were apparently checked between August 7 and the end of October. This problem was exacerbated by the fact that catchable trout were not stocked until July 27 and August 11; although anglers were probably catching catchables, very few of these fish could possibly have been checked.

  Due to the paucity of non-card interview data, the relative contributions of different groups of stocked fish to the angler catch could not be accurately estimated. However, the combination of electrofishing and creel

data is probably sufficient to address most of the original objectives of the stocking evaluation. The objectives were:

1) To estimate the % contribution of stocked fingerling trout to the total population of trout ≥ 6 inches in five sections of the mainstem Wind River.
2) To estimate the % contribution of stocked fingerling trout to the total trout catch by anglers in 2 sections of the Wind River.
3) To utilize the proposed criteria to determine fingerling stocking success in each of the 5 study sections.
4) To utilize the results to modify the catchable and fingerling stocking programs so that the return to anglers is maximized.

The following criteria will be used to evaluate fingerling stocking:

"Stocked fingerling trout must constitute at least 25% of the electrofishing catch of all trout ≥ 6.0 inches OR stocked fingerlings must constitute at least 25% of all trout caught by anglers."

In 1998, cutthroat were stocked at an unusually large size. YSC were stocked as subcatchables instead of advanced fingerlings. These fish were AD clipped and easily recognized due to their size and relatively poor condition (poor condition factor and eroded fins). We assumed that anglers were able to identify the subcatchable YSC and used all interview data (including card returns) to generate separate estimates for this mark group.

All other estimates of marked groups of stocked trout were based on the small number of fish that were physically checked by the creel clerk. These must be considered minimum estimates. Returns of catchable (LPV) and advanced fingerling (AD) RBT and cutthroat could not be estimated accurately. Many of the RBT listed as unmarked could actually have been stocked catchables, but it is highly unlikely that many of these fish were stocked as advanced fingerlings.

Fishing pressure was relatively low in both the upper and lower river creel survey sections. In the upper river, an estimated 1,092 anglers fished a total of 2,183 hours between April 15 and October 31. Pressure was slightly higher in the lower river where an estimated 1,513 anglers fished a total of 3,578 hours during the same period. Approximately 50% of the pressure occurred in August in both sections.

Anglers fishing both sections of the river enjoyed relatively high success rates. The average catch rates were about 2.25 fish/hr in both sections. Electrofishing data suggest that RBT dominate the trout population in the upper river. Not surprisingly, RBT dominated the angler catch as well. Anglers in the upper river caught an estimated 2,354 RBT and 605 BNT. Rainbow and brown trout catch rates were 1.1/hr and 0.3/hr, respectively.

Brown trout were much more abundant in the lower creel survey section. When all study sections were averaged, BNT and RBT comprised nearly equal proportions of the trout population in the lower river; 35-40% each. However, anglers caught many more RBT than BNT. Anglers caught an estimated 5,413 RBT (1.5/hr) and 1,105 BNT (0.3/hr).

FPU Comments Regarding the Stocking Evaluation

Subcatchable YSC (stocked in 1998 only) Subcatchable (AD clipped) YSC accounted for roughly 10% of the angler catch in both creel survey sections. Anglers caught an estimated 0.22 AD YSC/hr in the lower river and 0.29/hr in the upper river. Due to their small size and poor condition, the fish were not likely sought by most anglers. Some anglers went so far as to complain about the number and appearance of these fish.

Subcatchable YSC did not meet the 25% angler catch criteria in either section. Subcatchable YSC did not meet the 25% population criteria in any section except the Town section during the first summer after stocking and disappeared over winter. Total catch rates would have been nearly 2 fish/hr in both creel survey sections even if these fish had not been stocked.

- ✓ Recommendation; eliminate stocking of subcatchable YSC.

Advanced fingerling SRC Cutthroat other than AD YSC did not contribute significantly to the trout populations or angler catches in either of the survey sections. All cutthroat other than AD YSC (advanced fingerling + wild - AD YSC) constituted less than 5% of the trout population in all study sections. Advanced fingerling and wild cutthroat combined accounted for only 5% of the angler catch in the lower river and 16% in the upper river. Very few survived beyond the first winter after stocking.

- ✓ Advanced fingerling cutthroat did not meet either 25% minimum return criteria. Eliminate stocking of advanced fingerling SRC.

Advanced fingerling RBT (AD marked) Trout stocked as advanced fingerlings must survive at least a year in the river to reach a size that can contribute to the fishery. Most do not. There was no evidence of overwinter survival of AD RBT in the upper river and only 2-3% of the trout in the lower river were carry-over AD RBT.

Rainbow trout (all wild and stocked combined) comprise roughly 36% (range 21-66%) of the total population of trout larger than 6 inches in the lower river. Rainbow trout (all wild and stocked combined) comprised about 69% of the angler catch in the lower river. Therefore, 69% of the trout that anglers caught were RBT even though only 36% of the population in the lower river was RBT. If advanced fingerling RBT contribute similarly (1.9 times their relative abundance in the population), only 4-6% of the angler catch in the lower river is likely to have been advanced fingerling RBT.

- ✓ Advanced fingerling RBT did not meet either 25% criteria in the upper river. They fell far short of the 25% population criteria in the lower river and it is highly unlikely that 2-3% of the population could have contributed 25% of the catch. Eliminate stocking of advanced fingerling rainbow trout.

Catchable RBT Electrofishing surveys suggest that catchable RBT dominate the trout populations in all of the study sections in the upper river except the Warm Springs section (87% wild BNT). The 1998 trout population in the Parker section was approximately 65% RBT and most of these (66%) were catchable RBT. Similarly, the population in the Town section was about 22% RBT and nearly 75% of the RBT were stocked catchables. Catchables were not stocked in the State Land section.

Anglers in the upper river caught an estimated 2,354 unmarked RBT and 5,413 were caught in the lower river. The estimated total catch of catchable (LPV) RBT was only 200 in the upper river and 232 in the lower. The relative proportions of catchable and wild RBT in the populations suggest that the contribution of catchable RBT to anglers was drastically underestimated due to the small number of fish checked by the creel clerk and the fact that most fish were checked before the catchables were even stocked.

- ✓ The 1998 creel survey results cannot be used to evaluate the success of the catchable RBT stocking program.

- ✓ Population data suggest that catchable RBT are an important component of the fishery. Continue stocking 4,500 RBT (or cutthroat) catchables in the Wind River each year. Consider not stocking any catchables in the State Land or Warm Springs sections of the river.

- ✓ Continue annual marking of all catchables to facilitate future evaluations. The 25% stocking evaluation criteria was not intended for evaluation of the catchable RBT plant. When the catchable plant is eventually evaluated, the statewide criteria requiring a return of 50% of the stocked fish should be used.

The above comments represent the FPU's interpretation of the creel survey results. Our suggestions and recommendations were submitted to the regional crew in April 1999. The Lander regional management crew will present the creel survey results and make the final management recommendations in an administrative report.

Green River - 7GR

Green River above Fontenelle Reservoir, PE41020SE

AS - Aquatic Resource Surveys

- Population estimate at 5-Mile Bridge FX-PE-7GR-512

  Spring population estimates on the Green River at 5-mile bridge were cancelled due to unfavorable electrofishing conditions. Green River and Pinedale personnel attempted a single electrofishing pass, but the effort was abandoned due to poor water clarity.

Green River below Fontenelle Reservoir, GR841010SR

AS - Aquatic Resource Surveys

- Population estimates at 7-11 and Town FX-GR-7GR-512

  The FPU assisted the Green River crew with spring population estimates at the 7-11 and Town sites on the Green River. Electrofishing was conducted on the nights of April 7, 9 and 11 at the Town Site and April 8, 10 and 12 at the 7-11 Site. One electrofishing raft was supplied and the FPU technician assisted on all nights except April 10. Kevin Gelwicks assisted on the night of April 7. The Green River crew calculated all population estimates and additional details can be found in the Green River Regional Fisheries Management Crew chapter of this report.

Clear Creek Basin - 8CC

Healy Reservoir SN431134JN

CS - Creel Surveys

- Creel Surveys; Healy Reservoir FX-SN-8CC-520

  The 1999 and 2000 creel surveys were cancelled.

Crazy Woman Creek Basin - 8CW

Muddy Guard Reservoir No. 1 SN431193JN

CS - Creel Surveys

- 2000 Creel Survey FX-SN-8CW-520

  The two 2 week standardized creel surveys (June and July 2000) were cancelled.

Muddy Guard Reservoir No. 2 SN430193JN

CS - Creel Surveys

- 2000 Creel Survey FX-SN-8CW-520

  The two 2 week standardized creel surveys (June and July 2000) were cancelled.

Little Bighorn River Basin - 8LH

Little Bighorn River SN834015SN

AS - Aquatic Resource Surveys

- Drainage Survey of Little Bighorn River and Tributaries FX-SN-8LH-512

  In 1999, the FPU and Sheridan management crew initiated a survey to assess the Yellowstone cutthroat distribution, genetic status, and habitat condition throughout their historic range in the Northern Bighorn Mountains.

  Initial efforts were concentrated on streams at the northernmost portion of the Bighorn Mountains in Wyoming. The first surveys were conducted as planned, by beginning at or near the USFS boundary and selecting a 328 ft (100 m) reach of stream. Block nets were installed at both ends of the reach and a 3-pass removal population estimate was conducted to estimate populations of all species present. Fin-clips were taken from 20 YSC per drainage and preserved in ethanol for genetic analysis. A basin-wide habitat inventory technique was used to survey the habitat within the 328 ft reach (Moore et al 1998). A crew of four to five people conducted all fieldwork.

  If fish were found, the crew moved upstream 0.93 mi (1,500 m) and established a second 328 ft station and population and habitat surveys were conducted. The original plan was to describe the range of YSC within each drainage by continuing to move upstream in 1,500 m increments until two consecutive sections were surveyed without finding YSC. This approach was used on Elkhorn Creek, but it was soon obvious that it was not efficient or effective.

  An initial site on Elkhorn Creek was selected about 0.55 miles from the confluence with the Bighorn River. The habitat was surveyed and BKT were found during the population estimate. We moved upstream 0.94 mi and established a second site. Surveys were repeated and BKT and BNT were found. We considered moving to another drainage because no YSC had been found in two consecutive stations, but decided to move upstream to an area accessible by road about 1.96 stream miles upstream from the second station. We established a third site at this location (3.5 miles above the confluence with the Bighorn River) and found YSC above a potential barrier with no other species present.

  Another relatively accessible location was chosen about 1.14 miles above this point. The stream between the two sections was walked and potential

barriers to the upstream movement of fish were identified and photographed. Visual observation was found to be an effective means of identifying the distribution of fish in the stream. The upper distribution of YSC in Elkhorn Creek was visually identified approximately 0.75 miles above the next site downstream. The fourth site surveyed was indeed fishless. We described the distribution of YSC in the drainage to within 0.94 mi of the actual distribution by visually surveying additional stream reaches and adding two more 328 ft study sections in the drainage.

Subsequent streams were sampled using this approach. A site was selected to survey in the lower end of the drainage, at an elevation of 4430 to 5880 feet. If the site was fishless, we visually surveyed other accessible areas in the drainage until we became convinced that the stream or stream section was indeed fishless. If trout were found, 328 ft survey sites were used to describe populations and habitat.

A total of 24 328 ft sites were sampled on 10 streams in 1999 (Table 17). East Fork Taffner and Stockade Creeks were found to be too small and fishless; no population or habitat surveys were conducted on these two creeks. The total number of 328 ft survey sites ranged from six sites on Elkhorn Creek to one site each on East, Middle and West Forks of East Pass Creek, and Gay Creek. The four to five person crew averaged 2.5 sites per stream and about 1.5 to two sites per day.

Table 17. Total stream miles investigated, number of 328 ft study sites surveyed for habitat and fish population estimates, and slope at upstream end of reach investigated.

Creek Name	*Miles Investigated*	*Number of 328 ft Study Sites*	*% Slope at Upstream End of Reach Investigated*
Elkhorn	5.03	6	8.6
Red Gulch	3.12	3	10.8
Gay	4.13	1	8.2
Stockade	0	0	---[a]
North Fork West Pass	4.35	3	9.2
South Fork West Pass	3.23	3	13.2
West Fork East Pass	0.28	1	6.6
Middle Fork East Pass	1.33	1	9.3
East Fork East Pass	1.08	1	11.8
East Pass	4.21	3	---[b]
West Fork Taffner	2.97	2	9.3
East Fork Taffner	0	0	---[a]
Totals/Avg Slope	29.73	24	9.7%

[a] Creek was too small to be sampled, obviously fishless.
[b] Highest points investigated are in upper forks of drainage reported in table.

YSC were found at two of six sites on Elkhorn Creek, two of three sites on Red Gulch, three of three sites on South Fork West Pass Creek and two of three sites on North Fork West Pass Creek. YSC populations ranged from <1 per 328 ft of stream to 45 per 328 ft (averaged 11.8 per 328 ft). 33% of stream distance investigated (9.75 mi) in 1999 had YSC present with other trout species and 6% (1.77 mi) had only YSC present (Table 18).

Trout were found at 15 of 24 sites; nine sites were fishless. Populations were composed of various combinations of BKT, BNT, RBT, and YSC. No other fish species were found. Barriers were found that isolated YSC from other trout in 4,400 ft of Elkhorn Creek and 1,600 ft of Red Gulch. A potential barrier was also found in North Fork West Pass Creek that may isolate YSC from other trout in 3,350 ft of stream. RBT were never found in streams inhabited by YSC.

Habitat survey data were entered into a computer database and summary reports were prepared for each stream. 43 habitat attributes and two trout population attributes (population of BKT, population of RBT and BNT) were calculated for each study site to relate to the presence or absence of YSC. Binary logistic regression is being used to determine which of these attributes (or combination of attributes) best predicts the presence or absence of YSC. A graduate student in the University of Wyoming statistics department is conducting these analyses. The results will be used to eliminate some of the habitat attributes from the basinwide survey, thereby reducing the time required to complete habitat surveys.

Table 18. Stream distances occupied by Yellowstone cutthroat trout in streams surveyed in 1999. Minimum Stream Miles = minimum distance occupied by YSC. Stream Length with no BKT = stream distance occupied by YSC in absence of BKT (this is usually due to fish passage barriers at the downstream end of a section occupied by only YSC). Potential Additional Stream Miles = stream mileage downstream of lowest site surveyed in drainages that contained YSC.

Creek Name	*Minimum Stream Miles*	*Stream Length with no BKT (ft)*	*Potential Additional Stream Miles*
Elkhorn	2.85	4,400	0
Red Gulch	1.10	1,600	3
North Fork West Pass	2.55	3,350	Unknown[a]
South Fork West Pass	3.25	0	Unknown[a]
Total	9.75	9,350	

[a] Unknown distance down West Pass Creek and Pass Creek drainage. Pass Creek drainage extends into the state of Montana.

Most of the streams surveyed in 1999 were high gradient. Slope played an important role in determining the upstream limit of trout distribution in each stream. Only one site with a slope > 7% contained YSC. YSC were never found at sites with slopes > 9.4%. Only two of nine sites with slopes > 7% (8.3% and 9.4%) contained any species of trout. The slope at the uppermost point in each stream we investigated was estimated from USGS quadrangle maps. The average maximum slope investigated during the survey was 9.7% (Table 17). Based on the fact that YSC were never found at slopes > 9.4% in 1999 and the average maximum slope that was investigated (9.7%), we determined that it is unlikely that YSC will be found at slopes > 10%. In 2000, we plan to survey approximately 30 additional stream miles where gradients are less than 10%.

Approximately 20 "high priority" streams remain to be surveyed; maximum of 72 miles of stream (Table 19). These streams will be surveyed in 2000 and 2001.

Table 19. Remaining high priority streams to be surveyed in 2000 and 2001.

Stream Name	*Tributary to*	*Maximum Miles to Survey*
Little Bighorn River Drainage		
Little Bighorn	Bighorn River, MT	13.61
Dry Fork Little Bighorn	Little Bighorn River	6.19
Bear Trap Creek	Dry Fork Little Bighorn River	1.72
West Pass Creek	Pass Creek	2.22
Twin Creek	Pass Creek, MT	10.52
Dayton Gulch Creek	Little Bighorn River	1.36
Kettle Gulch	Little Bighorn River	2.47
Half Ounce Creek	Little Bighorn River	0.83
Taylor Creek	Little Bighorn River	0.00
Wagon Box Creek	Little Bighorn River	3.67
Duncum Creek	Wagon Box Creek	2.61
Burnt Mountain Creek	Duncum Creek	2.20
Cub Creek	Pumpkin Creek	1.53
Tongue River Drainage		
Columbus Creek	Tongue River	2.88
Smith Creek	Tongue River	1.11
Amsden Creek	Tongue River	4.99
Sheep Creek	Tongue River	0.00
Horse Creek	Sheep Creek	0.00
Big Goose Creek	Tongue River	1.59
Little Goose Creek	Big Goose Creek	12.34
MAXIMUM High Priority Stream Miles Remaining to Survey=		71.84

The sampling priority of streams was determined quite subjectively. "High priority" streams were within the historical range of YSC. This list is based on historical accounts as well as local knowledge of particular streams.

See the Sheridan fish management section of this report for additional details.

Literature Cited

Moore, K., K. Jones and J. Dambacher. 1998. Methods for Stream Habitat Surveys, Aquatic Inventory Project. Oregon Department of Fish and Wildlife, Natural Production Program, Corvallis, OR 97330.

Tongue River Basin - 8TR

Bull Creek SN833240SN

CS - Creel Surveys

- 1999 Creel Survey FX-SN-8TR-520

A programmed creel survey was conducted from mid-May to mid-October on a 1.1-mile section of Bull Creek in conjunction with the creel survey on the North Tongue River. The creel survey was scheduled for 3 counts per day on 4 weekdays and 4 weekend days per month, but the number of actual survey days varied, as did the proportion of weekday and weekend days surveyed. The North Tongue River was usually surveyed on the same days. Creel survey cards were used to gather information necessary to convert incompleted trip interviews to completed trip interviews. Creel survey results and an interview summary were submitted to the Sheridan management crew in January 2000. The crew will present the results in an administrative report. A summary of the results of the 3 surveys is presented in Table 20.

North Tongue River SN833030SN

CS - Creel Surveys

- 1999 Creel Survey FX-SN-8TR-520

  A programmed creel survey was conducted from mid-May to mid-October on a 14.0-mile section of the North Tongue River in conjunction with the creel survey on Bull Creek. The creel survey was scheduled for 3 counts per day on 4 weekdays and 4 weekend days per month, but the number of actual survey days varied, as did the proportion of weekday and weekend days surveyed. Bull Creek was usually surveyed on the same days. Creel survey cards were used to gather information necessary to convert incompleted trip interviews to completed trip interviews. Interview data were not sufficient to calculate creel estimates for area 4 alone (1.5 miles), but estimates were calculated for area 1 (5.2 miles), area 2 (3.0 miles) and area 3 (4.3 miles) and all areas combined. Interview summaries were also prepared for each area.

  Results were submitted to the Sheridan management crew in January 2000. The Sheridan management crew later revised the length of the survey section from 11.2 to 14.0 miles. The creel survey estimates will be recalculated for areas 1 and 4 and all areas combined to correct for the revised section length and re-submitted to the management crew. The crew will present the results in an administrative report. A summary of the results of the 3 surveys is presented in Table 20. The North Tongue data have been adjusted for the corrected stream length.

Sibley Lake SN230580SN

CS - Creel Surveys

- 1999 Creel Survey FX-SN-8TR-520

  The May to September 1999 creel survey was cancelled.

South Tongue River SN832600SN

CS - Creel Surveys

- 1999 Creel Survey FX-SN-8TR-520

  A programmed creel survey was conducted from mid-May to mid-October on a 1.2-mile section of the South Tongue River. The creel survey was scheduled for 3 counts per day on 4 weekdays and 4 weekend days per month. Surveys on the North Tongue and Bull Creek were conducted on different days. The number of actual survey days varied from 7 to 8 days per month, as did the proportion of weekday and weekend days surveyed. The 1.2-mile stream reach was broken into four study areas. Creel survey cards were used to gather information necessary to convert incompleted trip interviews to completed trip interviews. Interview data were not sufficient to calculate creel estimates for all areas individually. Estimates were calculated for area 1 only and all 4 areas combined. Interview summaries were also prepared for each area. Results were submitted to the Sheridan management crew in January 2000. The crew will present the results in an administrative report. A summary of the results of the 3 surveys is presented in Table 20.

Table 20. Creel summary statistics for the North Tongue and South Tongue Rivers and Bull Creek; mid-May to mid-October 1999.

Summary Statistics	*North Tongue River Area*				*South Tongue River Area*		*Bull Cr.*
	All Areas	1 Only	2 Only	3 Only	All Areas	1 Only	
Catch Rate (trout/hr)	2.2	1.4	2.6	2.0	2.1	0.8	1.5
Hours/mile	1,210	924	2,921	635	909	188	302
Anglers/mile	428	440	954	212	440	107	120
% Comp. of Catch							
SRC	89	51	95	92	<1	0	99
RBT	6	32	3	4	52	43	0
BKT	5	17	2	5	29	14	1
BNT	<1	<1	<1	0	18	43	0
Other	0	0	0	0	<1	0	0
% of Catch Released							
All Trout	95	59	>99	99	70	13	100
BKT	70	30	>99	91	74	0	100
Non BKT	96	65	>99	99	68	16	100
Avg Trip Length (hrs)	3.1	2.2	3.3	3.2	2.1	1.6	2.3
Total # Interviews	509	107	315	85	169	8	20
% Comp. of Tackle							
Flies	84	55	93	91	59	50	65
Lures	8	10	7	7	23	50	35
Bait	8	36	0	2	17	0	0

Seminoe, Kortes, Pathfinder, Alcova and Gray Reef Basin - 1UR

Alcova Reservoir CR450390NA

AS - Aquatic Resource Survey

- Fisheries Survey FX-CR-1UR-512

GFRR and FMCR sampled Alcova Reservoir with purse seine and sonar August 16-19. Ten seine hauls with the 60 foot seine have been conducted annually since 1987 at standardized sites. The inaugural sonar survey of 1998 showed that the majority of trout were surface oriented (top 25 feet), so the decision was made to compare trout catch in the 30 foot versus 60 foot deep seines during 1999 and 2000. Because the small seine can be retrieved faster than the large seine more sites can be sampled per day. Both sonar and seining show that RBT densities have increased over 1998 levels. The catch of RBT per seine haul was the highest recorded during the 1990's. The RBT population appears to have increased following the change to fall stocking.

1999 Sonar Surveys

A total of 19 standardized sonar transects were conducted (Figure 1). The highest fish densities (50-70 per acre) were tracked along transects 5 through 8 (Figure 2). Densities were generally lower across transects 12 through 18 (5-30 per acre), and high again in Freemont Canyon (transect 19). Mean fish densities were generally greater in the upper 25 feet of the water column (22.9/acre) than below 25 feet (6/acre). At a surface area of 2,436 acres we estimate pelagic fish numbers at 72,300 +/- 26,300 (95% CI). Using the proportion of RBT captured in the 60 foot deep purse seine (0.875) we estimate RBT numbers at 63,300.

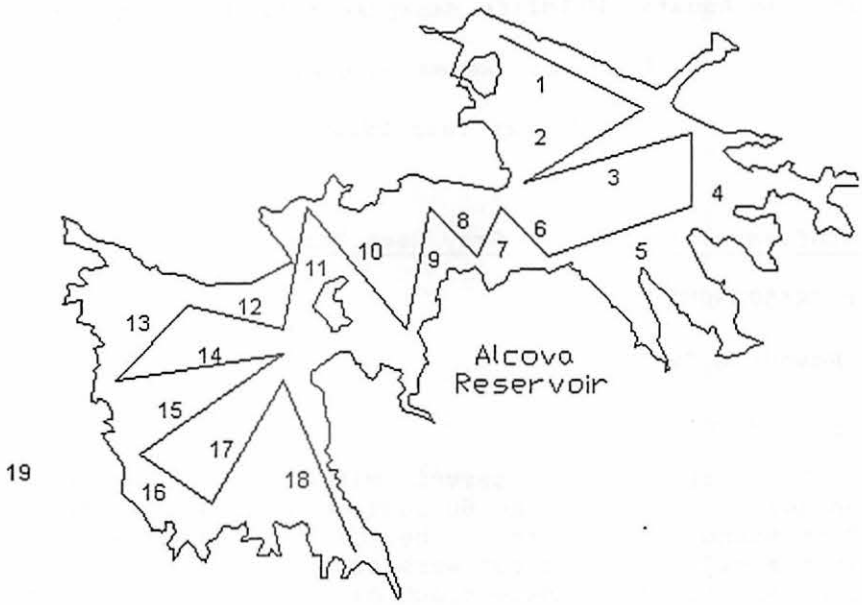


Figure 1. Map of Alcova Reservoir showing location of sonar transects.

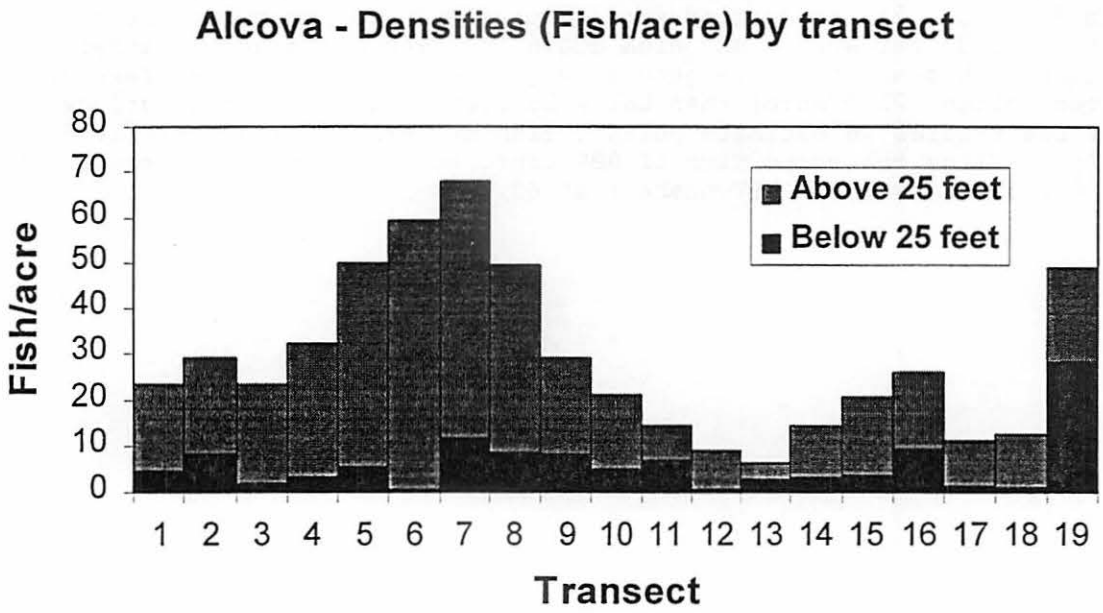


Figure 2. Fish distribution patterns in Alcova Reservoir, August 1999.

During 1998 a mistake was made in the calculation of pelagic fish numbers when fish below 25 feet were included in the total estimate twice. The 1998 estimate was recalculated at 35,300 +/- 11,500, of which we estimate 25,300 were RBT. The mean density of fish tracked by sonar in 1999 (28.9/acre) was significantly greater ($P < 0.001$) than the density tracked

during 1998 (14.6/acre). This comparison demonstrates that RBT numbers increased from 1998 (25,300) to 1999 (63,300).

1999 Purse Seine Surveys

Ten hauls with the 60 foot seine and 20 hauls with the 30 foot seine were conducted (8 sites were sampled with both seines). An average of 25.2 RBT +/- 13.6 (95% CI) were caught per haul in the 60 foot seine (Table 1). RBT accounted for 87.5% of the catch. An average of 11.2 RBT +/- 4.2 (95% CI) were caught per haul in the 30 foot seine (Table 2). RBT accounted for 80.6% of the catch.

Table 1. Number, number per haul, average length, average weight, and average condition of fish captured in 60 foot deep purse seine, Alcova Reservoir, August 16-17, 1999 (10 hauls).

Species	*Number*	*Number/ Haul*	*Average Length*	*Range*	*Average Weight*	*Average Condition*
BNT	2	0.20	14.2	14.0-14.4		
CRP	5	0.50	24.4	23.4-25.3		
WAE	1	0.10	21.5			
RBT	252	25.20	13.4	9.9-18.0	0.93	38.6
WHS	28	2.80	14.6	11.1-17.0		
TOTAL	288	28.80				

Table 2. Number, number per haul, average length, average weight, and average condition of fish captured in 30 foot deep purse seine, Alcova Reservoir, August 18-19, 1999 (20 hauls).

Species	*Number*	*Number/ Haul*	*Average Length*	*Range*	*Average Weight*	*Average Condition*
LNS	1	0.05	13.8			
RBT	224	11.20	13.6	11.8-17.2	0.98	38.4
WHS	53	2.65	14.4	10.7-16.9		
TOTAL	278	13.90				

To compare catches in the two seines the sample data were first standardized to a per acre basis (the 60 foot seine encircles 1.1 acres and the 30 foot seine 0.67 acres). The mean catch of RBT per acre in the 60 foot net (mean = 23.5, N = 10) did not vary significantly (P = 0.27) from the catch of RBT in the 30 foot seine (mean 17.0, N = 20). When data are compared across the eight sites surveyed by both seines, the means (LP = 21.4, SP = 18.4) did not vary significantly (P = 0.71).

Comparison to Historical Seine Data

The 1999 catch of 25.2 RBT per haul in the 60 foot seine represents a record catch for the decade of the 1990's (Figure 3) and the single highest total since late July 1987 when 27.9 RBT were caught per haul (Figure 3). The mean catches in 1987 and 1995 were significantly greater ($P < 0.05$) than the mean catches during both 1989 (6.1/haul) and 1992 (6.3/haul). All other pairwise comparisons did not vary significantly.

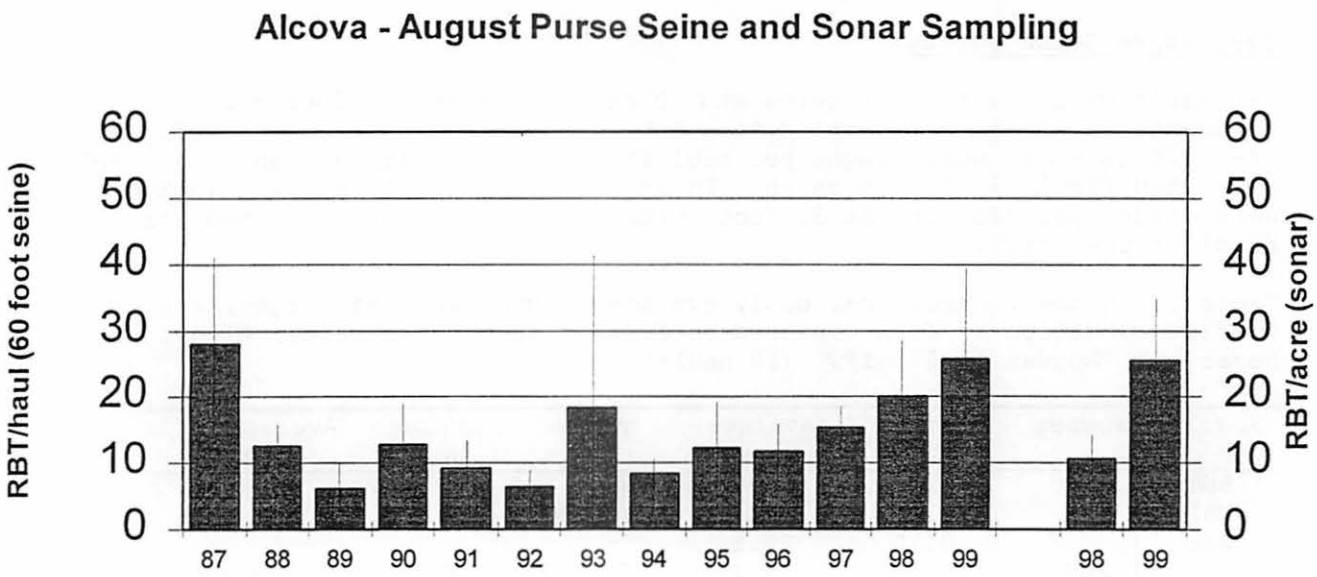


Figure 3. Average RBT catch per haul and sonar estimates, Alcova Reservoir, August 1999.

Management Recommendations

Annual purse seining indicates that RBT densities have increased since 1992. Possible reasons for this increase include 1) a change to fall stocking, 2) a perceived decline in WAE densities, or 3) a change in management at Speas Rearing Station. We offer no changes to the present stocking program.

The Alcova purse seine effort represents the longest contiguous standardized data set on a Wyoming reservoir. As the average catch has increased in recent years so have the 95% confidence intervals. In 1999 the average catch of RBT and 95% CI in the 60 foot seine equaled 25.8 +/- 13.6 compared to the 11.3 +/- 4.2 in the 30 foot seine. More hauls will improve the precision of the mean estimate of RBT per haul but the decision to relinquish 13 years of standardized sampling must be well thought out.

Seminoe Reservoir CR450405CN

AS - Aquatic Resource Survey

- Fisheries Survey FX-CR-1UR-512

GFRR worked with FMCR personnel to sample Seminoe Reservoir in September using sonar and the purse seine. The summary report was co-authored by the crews and, to avoid redundancy, appears only in the FMCR annual report.

Buffalo Bill Reservoir - 2BB

Buffalo Bill Reservoir CY420152PK

AS - Aquatic Resource Survey

- Fisheries Survey FX-CY-2BB-512

We sampled Buffalo Bill Reservoir twice in 1999, May 17-21 using the 30 foot purse seine and trap nets and September 20-23 with the small purse seine and hydroacoustics. September sonar surveys have been conducted annually since 1996. We modified our purse seining sampling design slightly beginning in 1998 so that, weather permitting, we now take a total of 28 hauls covering more of the reservoir to better interpret sonar findings.

May Netting

Rainbow trout dominated the spring trout catch in both traps and the purse seine. RBT always dominate the purse seine catch but not always the trap nets (Figure 4). We noted a decline in the catch of YSC nearshore (trap nets) and a considerable difference in RBT and YSC size structures compared to 1998. In 1998 trap nets we found 68% of RBT and 94% of YSC were yearling fish (<8 inches). This spring small RBT made up only 44% of the catch and cutthroats comprised less than 20%.

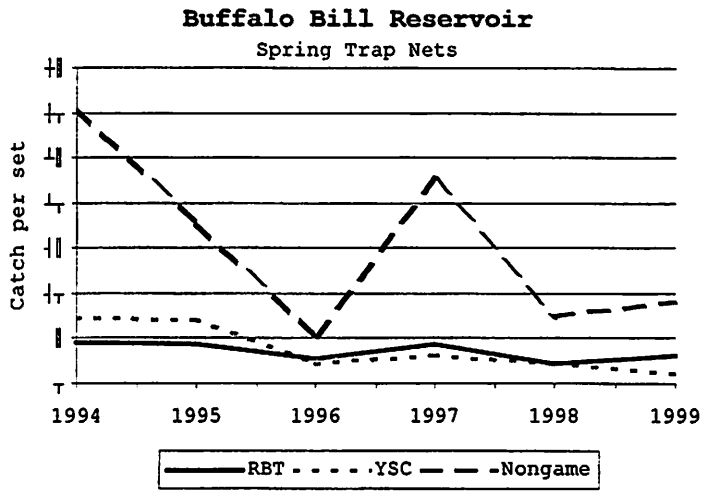


Figure 4. Spring trap net catch, 1994-1999, Buffalo Bill Reservoir.

Last year we predicted that improved trout body condition going into winter 1998/99 would result in an increased spring purse seine catch of trout greater than 15 inches. That prediction was not realized. Even though the proportion of trout that was over 15 inches in September 1998 was quite high (43%), the percentage of the trout exceeding 15 inches in May 1999 remained the same as in May 1998 at 20%.

FMCY worried that the 1995 reservoir enlargement might result in expansion of nongame fish populations, primarily suckers. Trap netting is included in our standardized spring sampling program primarily to address that concern. FMCY noted in last year's annual report that water storage, which was the highest noted since 1995, rather than a real decrease in fish number, might have been responsible for a lower than average nongame fish catch in traps in May 1998 by virtue of spreading the fish out within the reservoir. The average reservoir surface elevation during our May 1999 netting was 5,351, 22 vertical feet lower than May 1998 and only six feet higher than the average from 1994-1997 when trap net catch of nongame fish averaged nearly 40 fish per set. This year we netted only 9.1 nongame fish per set, barely higher than the 7.6 caught in traps last May. Sucker populations do not appear to be increasing in Buffalo Bill.

September Netting

Fall purse seining again confirmed that open water sonar targets are trout. In 28 hauls we only caught two nongame fish, a 12 inch long mountain whitefish and a one inch long carp. Eighty-seven percent of the trout netted were rainbow trout. Cutthroat trout maintained a viable proportion at 13% (Figure 5).

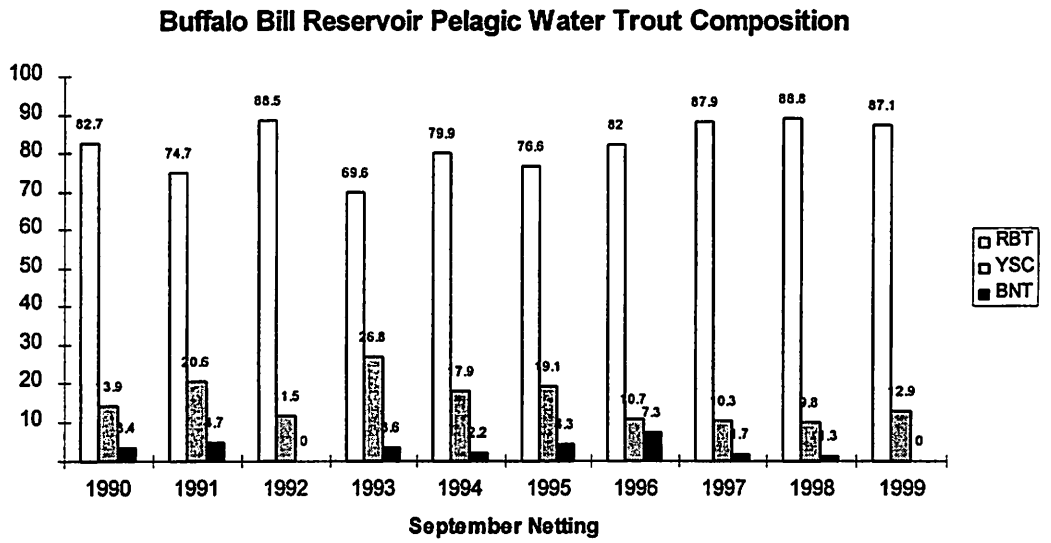


Figure 5. Trout species composition in pelagic water, September 1990-1999, Buffalo Bill Reservoir.

The average length of RBT increased over one inch from last fall to 13.5 inches. Nearly 50% exceeded 15 inches. Relative weight increased a full 10 points to 92 over the same time period. In spite of those improvements in size and condition, however, trout seem unable to grow beyond 18 inches in Buffalo Bill. Only one of over 400 trout we netted all year exceeded that barrier.

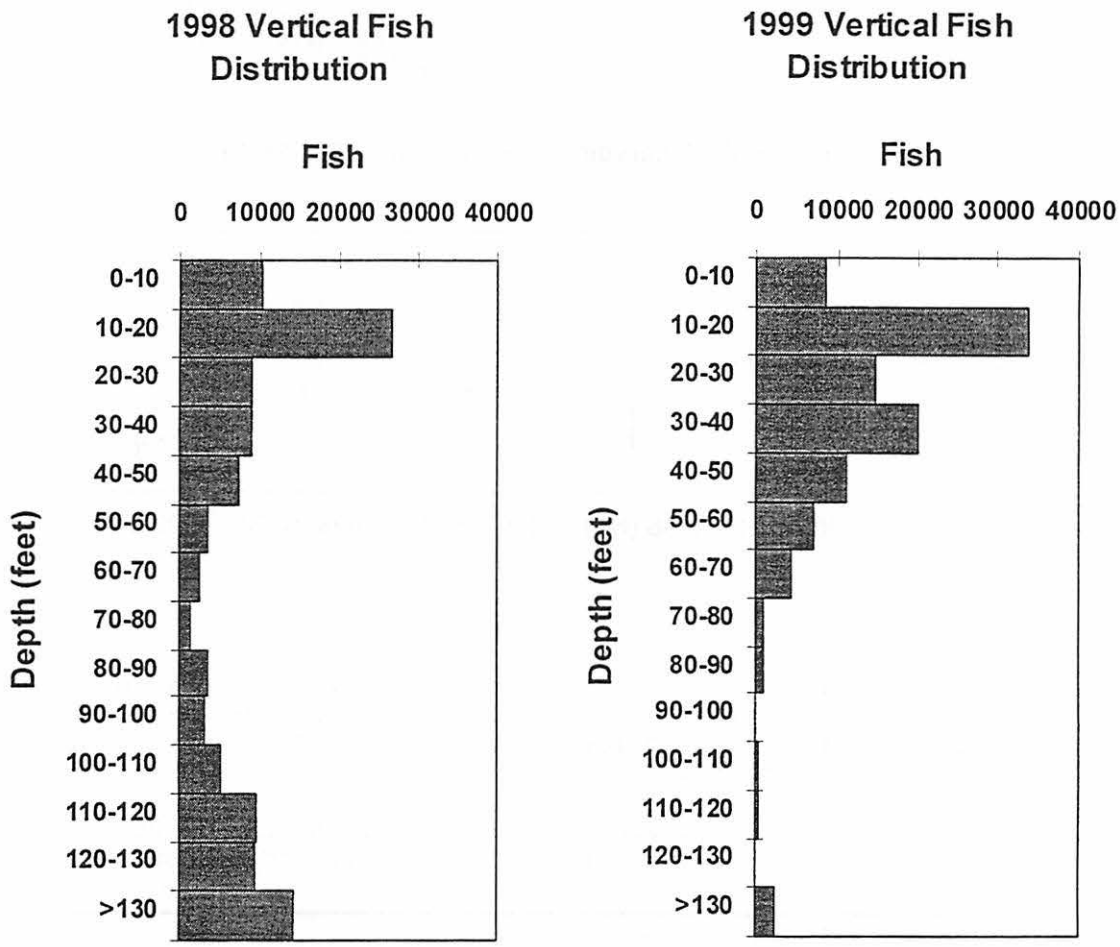
September 1999 Sonar and Purse Seine Surveys

We stratified the reservoir into three regions (North Fork Arm, Confluence, and South Fork Arm) and conducted seven sonar transects and seven seine hauls per region. Sonar sampling was conducted using two transducers. A horizontally-aimed transducer was used to estimate fish numbers from the surface to a depth of 25 feet (side-looking) and a vertically-aimed transducer was used to enumerate fish below 25 feet (down-looking). Side-looking surveys of 1996 and 1997 were conducted using a threshold allowing detection of targets greater than -45 decibels (roughly 12 inches). We now know that a threshold of -55 decibels is needed to detect smaller targets (roughly >6 inches). This preferred thresh hold was used during the 1998 and 1999 surveys. We use sonar transects and purse seine hauls as samples in statistical tests.

Using sonar, we estimated the mean fish density of Buffalo Bill reservoir to be 14.2/acre. With a surface area of 7,448 acres, we estimate pelagic fish numbers at 105,500 +/- 33,300 (95% CI). This estimate is down slightly from the total estimate of 116,500 +/- 37,200 for 1998.

Previous netting surveys of Buffalo Bill Reservoir during September have shown that RBT and YSC have an affinity for surface waters (0-25 feet), while LAT and suckers (WHS/LNS) tend to occupy greater depths. During 1998

we tracked a large number of targets below 100 feet (Figure 6A) with a resulting population estimate of 26,100 LAT. During September 1999, these



deep-water targets were strangely absent (Figure 6B), while greater numbers

Figure 6. Vertical distribution of fish in Buffalo Bill Reservoir during A) September 1998, and B) September 1999.

of fish were tracked in the open water between 20 and 70 feet of depth.

We used the catch of fish in the 30 foot deep purse seine to partition sonar targets to species above 100 feet. The results of bottom-set gill netting during 1998 (67% LAT and 33% sucker, N=12) were used to partition targets below 100 feet. We estimate the RBT population at 85,300, the YSC population at 12,600, and the LAT population at 4,400 (Table 3). Estimates of RBT and YSC increased slightly over 1998 levels, while LAT numbers declined markedly.

Purse seine sampling suggests that trout numbers have declined from 1995 to the present (Figure 7). ANOVA showed that the mean number of trout (RBT, YSC, and BNT pooled) captured per haul during 1999 (3.6/haul) was significantly less ($P<0.001$) than the mean number seined during 1995 (12.0/haul). Examination of length-frequency distributions from 1995 through 1999 (Figure 8) suggest that the decline in purse seine catch probably coincides with declining recruitment. During 1995 a strong year-class of trout measuring 7- to 9-inches appeared in our sampling. That cohort has been dominant since, measuring 13- to 14-inches during 1997 and 15 to 16-inches during 1999. Subsequent year-classes have been comparatively small, thus the stock has declined.

While recent purse seine sampling indicates a decline in overall trout densities, sonar sampling suggests no significant changes (P=0.57) in mean densities of large trout (> -45 dB or roughly 12 inches) since 1996 (Figure 9). We conclude that as overall densities have declined, densities of large trout have remained stable since 1996.

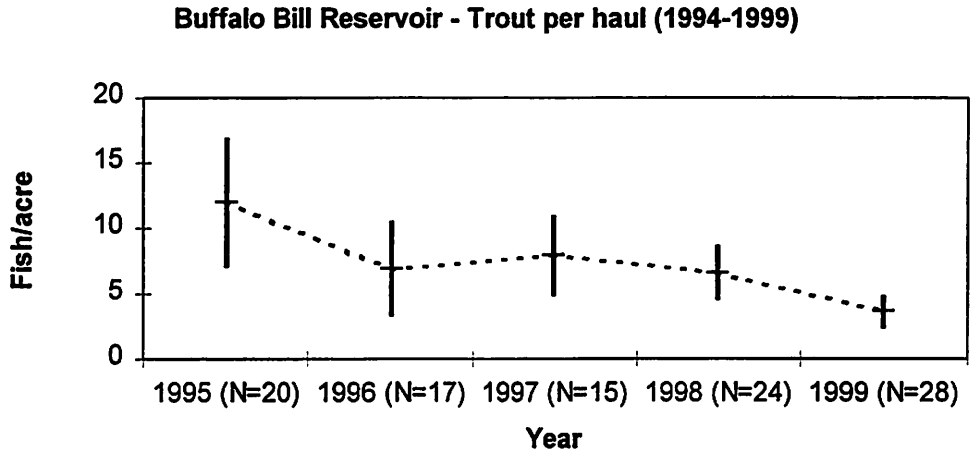


Figure 7. Number of trout captured per 30 foot deep seine haul from Buffalo Bill Reservoir during September 1995, 1996, 1997, 1998, and 1999. Error bars equal 95% confidence intervals. The catch of RBT, YSC, and BNT were pooled for this analysis

Table 3. Abundance estimates of RBT, YSC, and LAT in Buffalo Bill Reservoir estimated by sonar, September 1999 and September 1998.

Depth stratum (feet)	RBT	YSC	LAT
0-30	47,700	7,000	1,000
30-100	37,600	5,600	900
>100			2,500
1999 totals	85,300	12,600	4,400
1998 totals	69,000	7,700	26,100

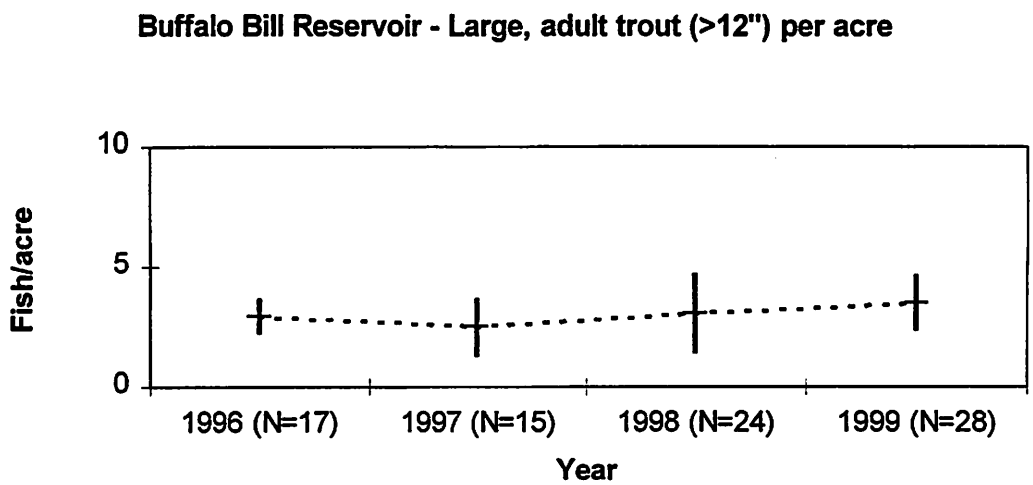


Figure 9. Sonar estimates of fish targets greater than -45 dB (roughly 12 inches) sampled by side-looking sonar from 1996 through 1999. Error bars represent 95% confidence intervals.

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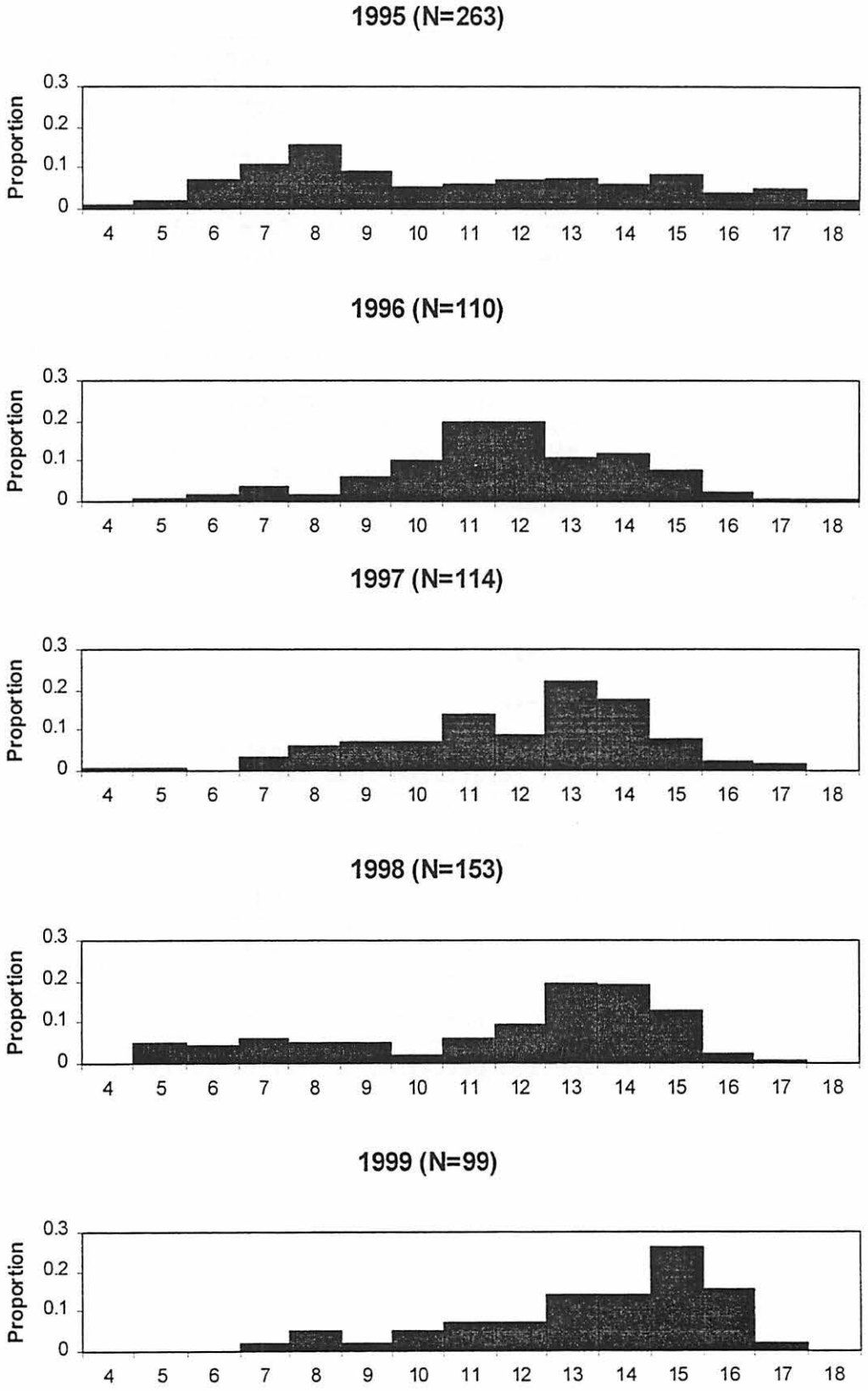


Management Recommendations

Seining suggests that trout numbers have declined since 1995, an occurrence we attribute to low recruitment. Sonar indicates that numbers of large trout have remained relatively stable since 1996. Because some portion of trout now measuring 15-16 inches will be harvested and the year-class of trout now measuring 8 to 10 inches does not appear to be particularly large, we predict that overall trout densities will continue to decline during 2000.

The decline in hypolimnetic fish targets from 1998 to 1999 is very curious. We have assumed that lake trout are suspended off the reservoir bottom owing to low dissolved oxygen levels and so can be detected by sonar. Unfortunately, this assumption has never been validated. It is conceivable that dissolved oxygen conditions allowed greater numbers of lake trout to occupy depths within three feet of the bottom (where fish can't be detected with sonar) during 1999 compared to 1998. It is also conceivable that lake trout were higher in the water column during 1999 compared to 1998, which might explain the increase in densities in the 20 to 70 foot depth stratum. To adequately assess species composition in depths not sampled by purse seine we must increase netting effort. Suspended gill net and bottom-set gill net effort should be increased during September 2000.

Jackson Lake - 4AJ

Jackson Lake JN410320TN

AS - Aquatic Resource Surveys

- Fisheries Survey FX-JN-4AJ-512

GFRR and FMJN sampled Jackson Lake with sonar the first week of August 1999. Jackson Lake was stratified into two zones: 1) offshore waters exceeding 125 feet in depth, and 2) near shore waters less than 125 feet (Figure 10). Six transects were conducted offshore and 19 near shore. Seven of the near shore transects were parallel to shore in depths not exceeding 50 feet, and 12 were further offshore in depths ranging from 50 to 125 feet. The sonar survey was conducted at night because the predominant forage fish (UTC) show a propensity to school during daylight hours (refer to 1998 GFRR Report on Lake Viva Naughton). Details of sonar data collection and analysis techniques are described in Yule (1997). The catch of fish in overnight floating, bottom set, and suspended gill nets set at 10-, 20-, 30-, 40-, 60-feet was used to interpret sonar data. The objectives of this research were: 1) gather baseline data on horizontal and vertical fish distribution patterns, and 2) quantify forage fish biomass. We discuss the collection of data necessary to model annual lake trout food demand.

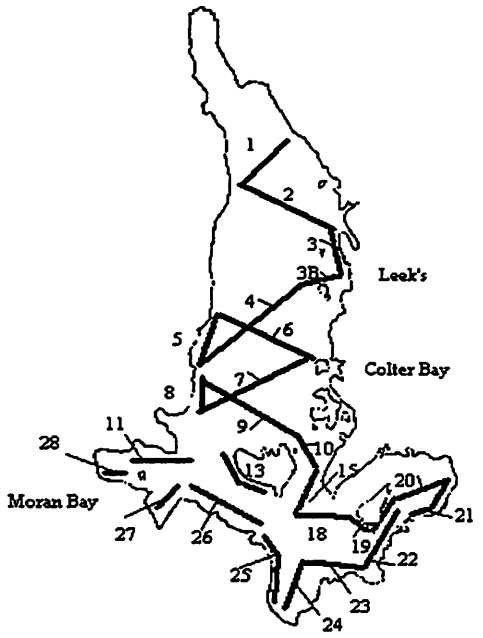


Figure 10. Map of Jackson Lake showing location of sonar transects. Jackson Lake was stratified into two zones (offshore and near shore). Offshore transects equal 4, 6, 7, 9, 11, and 22. Along near shore transects 3, 5, 8, 13, 19, 21, 25, and 28 we sampled by aiming the side-looking transducer towards shore, traveling parallel to shore (150- to 300-feet from the water line).

Sonar Survey Results

The highest fish densities (Figure 11) were tracked along transect 20 (near the Dam), transect 13 (Elk Island) and transect 25 (Spalding Bay). We anticipated that higher fish densities would be tracked in near shore waters, but this assumption was not substantiated. The mean fish density near shore (10 fish/acre, N = 19) did not vary significantly (P=0.55) from the mean density offshore (8.4 fish/acre, N = 6). No region of Jackson Lake had notably high fish densities. The overall fish density was estimated at 10.5 per acre. With a surface area of 25,430 acres (elevation 6,768 feet), we estimate total pelagic fish numbers at 266,700 +/- 96,000 (95% CI).

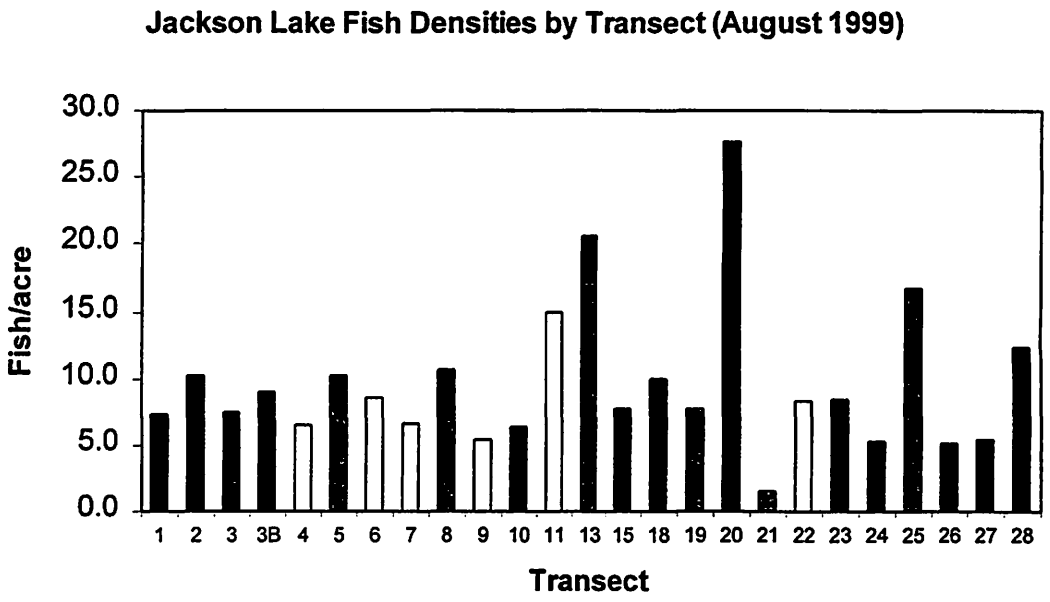


Figure 11. Fish densities tracked in Jackson Lake along sonar transects during August 1999. White bars represent offshore transects (depths greater than 125 feet), gray bars represent transects conducted parallel to shore in depths less than 50 feet, and black bars are transects conducted in depths ranging from 50 to 125 feet.

Most ensonified fish were found occupying depths from 39 feet to the surface (Figure 12). Fish numbers declined between 39 feet and 59 feet, but increased again slightly at depths below 66 feet. The tendency for pelagic fish to occupy surface waters has been demonstrated in other Wyoming reservoirs (Yule, *In Review*).

A total of 341 individuals and six species were captured in gill nets. UTC dominated the catch (70%), followed by UTS (9%), BNT (6%), SRC (5%), MWF (5%), and LAT (5%). We calculated the average capture depth of each species assuming fish were captured in the middle of the net. For example, a BNT caught in a suspended gill net (6 feet deep) set at 20 feet was assigned a capture depth of 23 feet.

UTC dominated the catch in floating gill nets and had an average capture depth of 4.3 feet (Table 4). BNT, SRC, and UTS were also surface oriented with mean capture depths of 8.7 feet, 9.8 feet, and 9.5 feet, respectively. The mean capture depth of MWF was 40.2 feet, while the mean depth of netted LAT was 80.8 feet. The mean capture depths of both MWF and LAT were significantly different from the other species netted, indicating these species, for the most part, occupy unique depth stratum. There was a great deal of overlap in the vertical distribution of BNT, SRC, UTC, and UTS, and because of this overlap, we don't feel the netting effort was sufficient to warrant partitioning near-surface sonar targets to species. Assuming all fish below 20 m were lake trout we estimate their numbers at 39,700. This estimate should be viewed as conservative because of the inability of sonar to detect fish within 3 feet of the bottom.

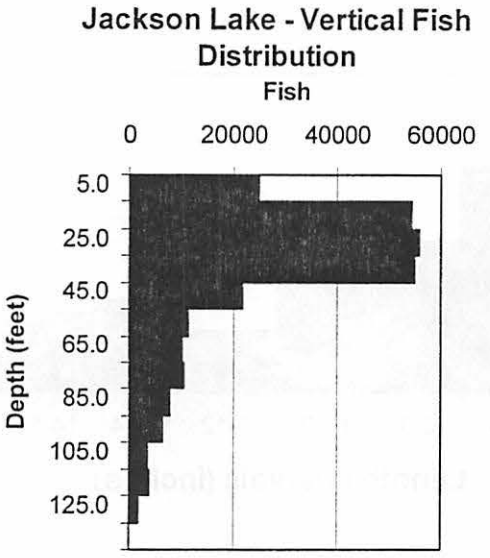


Figure 12. Vertical distribution of fish sampled by sonar in Jackson Lake during August 1999. Most fish were tracked from the surface to a depth of 39 feet.

Table 4. Average depth of capture, N, and results of Bonferroni comparison of means test to determine which means varied significantly at an alpha level of 0.05. Means not denoted by a common letter varied significantly at an alpha level of 0.05.

Species	*Average depth of capture Feet*	*N*	*Means which did not vary significantly (alpha = 0.05) denoted by common letter*
BNT	8.7 +/- 9.6	19	Z Y
LAT	80.8 +/- 20.8	17	
MWF	40.2 +/- 23.4	17	
SRC	9.8 +/- 9.9	18	Z y
UTC	4.3 +/- 1.6	239	Z
UTS	9.5 +/- 9.8	31	Y

Analysis of sonar targets showed that fish less than 10 inches were predominant (Figure 13). The length distribution of sonar targets was bimodal with peaks at 2-6 and 12-16 inches. We used sonar length frequency data to partition the total abundance estimate to size-classes and then used a length-weight regression equation for Utah chub to calculate size-specific biomass estimates (Figure 14). This analysis showed that biomass estimates of fish between 10 and 16 inches (25.8 metric tons) exceeded biomass estimates of fish less than 10 inches (7.8 metric tons). This finding is somewhat unusual because in most Wyoming reservoirs, biomass estimates of small fish (< 10 inches) will typically exceed biomass estimates of large fish. It is important to note that UTC, UTS, and MWF are atypical forage species because of their long life expectancy and the large size attained by adults.

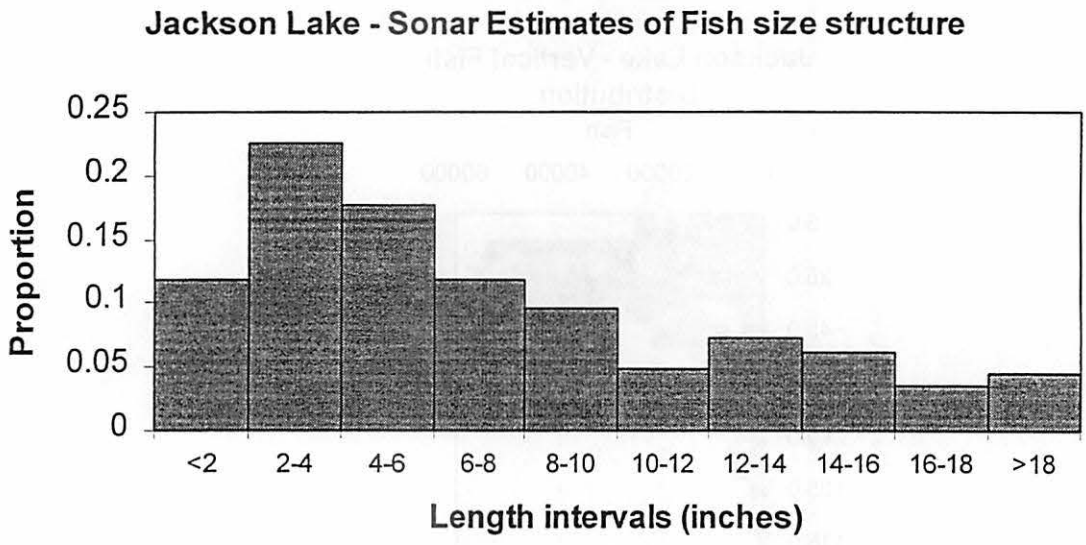


Figure 13. Length-frequency distribution of Jackson Lake sonar targets. Individual target strength measurements were measured in decibels by sonar and later converted to inches using an equation developed by Love (1971).

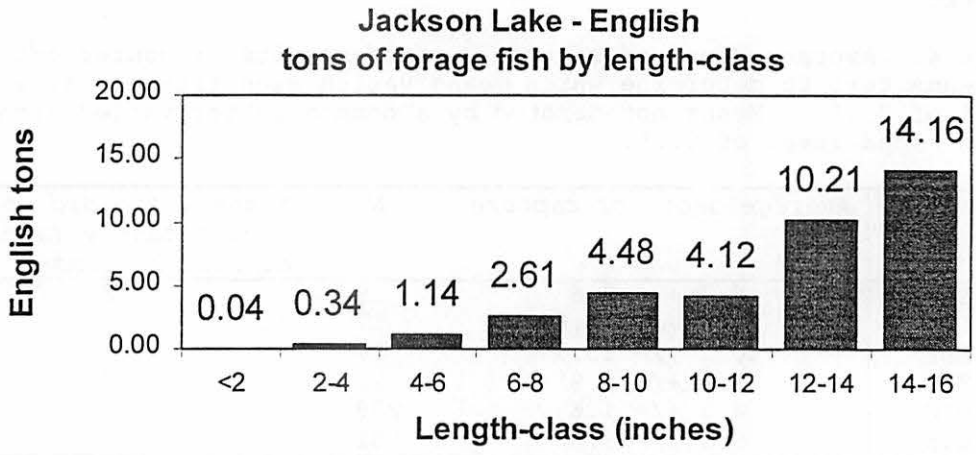


Figure 14. Fish biomass estimates by length class in Jackson Lake. Although fish less than 10 inches are predominant there is actually a greater biomass of fish greater than 10 inches.

Limitations of Sonar and Discussion

Sonar estimates of forage fish should be viewed as conservative for a number of reasons. First, sampling is limited to depths greater than 20 feet, thus littoral zones are not sampled. Littoral areas can hold high densities of UTC, especially juvenile fish. Second, fish in depths from 6 feet to the surface are difficult to sample. This could potentially be a severe limitation for sampling UTC in Jackson Lake because netting data show these fish were utilizing surface waters. When calculating fish abundance estimates we assume that densities from 6 to 25 feet where we can effectively sample with sonar), reflect densities from 6 feet to the surface. This assumption should be tested using gill nets if future sonar surveys are undertaken at Jackson Lake. Finally, fish densities within 6 feet of the bottom can also be underestimated. This depth stratum is important habitat to LAT and our estimate of 39,700 LAT should be viewed as

conservative. Given that LAT are limnetic predators and are not likely to spend much time in warm littoral zones, we believe our sonar estimates of forage fish probably approximate numbers available to lake trout during summer.

Sonar results indicate that relatively few fish occupy offshore waters of Jackson Lake. This finding is consistent with recent zooplankton collection of Jackson Lake revealing high ZPR scores, suggesting the average Daphnia is quite large. The large size attained by adult UTC (15 inches) would also suggest that fish densities are low and that food is not limiting limnetic fishes.

Horse, Bear, Cherry and Deer Creeks - 5HC

Hawk Springs Reservoir LE450230GN

AS - Aquatic Resource Surveys

- Fisheries Survey FX-LE-5HC-512

We sampled Hawk Springs Reservoir August 23-25, 1999 using floating and sinking experimental gill nets and trap nets (Tables 5-7). Our primary interests were walleye, catfish, and forage fish.

Walleye comprised 55% of all fish and 73% of all game fish caught in gill nets. Average length of walleye was unchanged from last year but size structure did change. The very evident 1996 cohort dominated the walleye catch, making up more than half of the walleye taken (Figure 15). This year class ranged in length from 13-17 inches. No cohort has been so dominant in the past several years but smaller walleye also found their way into our nets, with fish less than 13 inches comprising 10% of the gill net catch. Five young of the year were captured in trap nets. Because three year old fish made up such a disproportionate percentage of our catch, memorable sized walleye (>20") were less evident than in previous years, making up only 10% of our catch. Still, fish up to 8 pounds should be of interest to anglers seeking large fish.

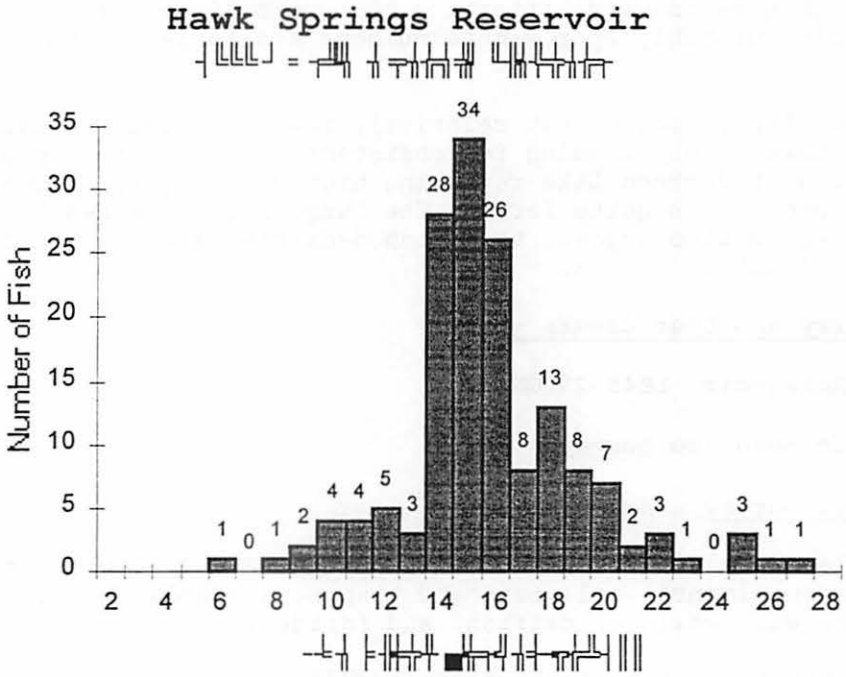


Figure 15. Length frequency histogram of walleye captured in gill nets, Hawk Springs Reservoir, August 1999.

The condition of walleye remains high, with an average condition factor of 35. The few walleye which contained food items were feeding on small perch, bass, and shad.

We caught half as many catfish this year as last. Four exceeded five pounds but 2/3 were less than 15 inches so the future of catfish appears secure. Nevertheless, last year's suggestion that we attempt to increase the size of catfish stocked remains relevant. The Grayrocks catfish fishery did not take off until fish greater than eight inches were introduced.

It was encouraging to see so many harvestable-sized crappie, averaging 10 inches and weighing up to 1.2 pounds. Our netting efforts are generally ineffective at capturing mature largemouth bass, so what little we learned of bass was garnered from anglers, who find bass seasonally along the dam and among submerged tree trunks.

Small mesh trap nets were effective in catching small forage fish species. Yellow perch and black crappie appeared to be the most abundant forage fish. As in past years, young largemouth bass were sufficiently numerous to provide considerable forage for piscivores. Spottail shiners were rare in our traps, whereas in past years they have been abundant. We did not minnow seine this year, so perhaps we just did not target them with the gear at hand. We did catch a few young gizzard shad in traps and in walleye guts, enough to suggest that shad did reproduce successfully this spring. We gill netted five adult shad.

Nongame fish species continue to be a rarity in our nets. We caught only 42 adult carp and five adult white suckers. Both species were equally rare as a percentage of our young of the year fish catch, probably falling victim to the numerous predators throughout the summer months.

We found little of concern in Hawk Springs. Walleye numbers are high, as is average walleye condition. Although one cohort appears to dominate the fishery, small walleye continue to enter the fishery and large walleye are available to anglers. Our netting did not provide enough evidence to suggest a fifth consecutive strong walleye year class but time will tell.

Other species are doing well: black crappie numbers seem to be increasing, largemouth bass reproduced well enough to provide forage, yellow perch produced many young, and catfish provide large fish for anglers. Nongame fish are insufficient in number to compete with preferred species.

Management Recommendations

- Continue current walleye stocking policy, with special effort in obtaining both fry and fingerlings stocked more than one time into the reservoir each spring.
- Continue efforts to obtain the largest available catfish for stocking.
- Continue annual sampling program.

Table 5. Number, number per hour, average length, average weight, and average condition of fish captured in floating experimental gill nets, Hawk Springs Reservoir, August 23-25, 1999. (2 nets, 24.5 hours).

Species	*Number*	*Number/ Hour*	*Average Length*	*Range*	*Average Weight*	*Average Condition*
BLC	6	0.24	9.0	8.3 - 9.5	0.41	56.1
CCF	7	0.29	13.7	9.2 - 28.5	1.56	30.2
CRP	3	0.12	17.0	16.8 - 17.2	2.23	45.3
GZS	14	0.57	8.7	4.7 - 17.0	1.90	48.6
LMB	15	0.61	5.4	5.2 - 6.0		
WAE	85	3.47	15.9	8.5 - 22.9	1.49	34.4
TOTAL	130	5.30				

Table 6. Number, number per hour, average length, average weight, and average condition of fish captured in sinking experimental gill nets, Hawk Springs Reservoir, August 23-25, 1999. (3 nets, 39.0 hours).

Species	*Number*	*Number/ Hour*	*Average Length*	*Range*	*Average Weight*	*Average Condition*
BLC	7	0.18	9.9	8.6-12.0	0.63	57.9
CCF	4	0.10	23.6	14.2-29.1	5.24	33.8
CRP	39	1.00	15.1	3.9-21.5	1.97	44.8
GZS	4	0.10	7.9	4.9-16.9	2.28	47.2
LMB	12	0.31	5.3	5.1-5.7		
WAE	70	1.79	16.7	6.5-27.4	1.93	34.8
WHS	11	0.28	13.2	6.9-15.4	1.04	39.9
YEP	6	0.15	11.1	10.1-12.0	0.72	52.5
TOTAL	153	3.91				

Table 7. Number, number per net, average length, average weight, and average condition of fish captured in trap nets, Hawk Springs Reservoir, August 23-25,1999 (8 overnight sets).

Species	*Number*	*Number/ Net*	*Average Length*	*Range*	*Average Weight*	*Average Condition*
BLC	520	74.32	8.4	6.3-9.2	0.37	62.7
BLG	18	2.25	5.3	4.6-6.1	0.13	84.4
CCF	28	3.50				
CRP	38	4.75				
GZS	16	2.00				
LMB	185	23.13	5.0	4.3-5.6		
STS	15	1.88				
WAE	9	1.13	7.5	3.9-18.2	0.78	32.8
WHS	8	1.00	12.8	5.1-17.1	1.43	36.1
YEP	406	50.75				
TOTAL	1243	155.38				

Warm Water Lakes Fisheries - 5WW

Grayrocks Reservoir LE450005PE

AS - Aquatic Resource Surveys

- Fisheries Survey FX-LE-5WW-512

Winter 1998/1999 walleye regulation change discussions heightened interest in information gathered from Grayrocks Reservoir during the week of September 30. Our 1998 summary suggested that, from a biological perspective, the walleye population was in excellent shape. Preferred sized walleye comprised one quarter of the population, mature fish exhibited good body condition, and sufficient yearling and two year old walleye survived the 1998 fishing season to sustain strong cohorts of quality sized fish in the fall. The past few years' data supported key arguments used to rebut the angler suggestion that more restrictive harvest regulations would benefit the walleye fishery.

The standard sampling design of floating and sinking experimental gill nets, small mesh traps, and a minnow seine caught fewer walleye than in 1997 and 1998 (Tables 8-10). In fact, catch more closely resembled 1995 and 1996, years prior to the production of several consecutive large cohorts which resulted in the stockpiling of so many small fish and prompted so many vociferous angler complaints. This fall's gill net catch dropped to 0.78 walleye per net hour, down from 1.3 last year and 1.9 in 1997. Average length increased from 13.8 in both 1997 and 1998 to 15.4 this fall. Only 10% of the walleye we captured in gill nets were yearling fish compared to over 20% in each of the previous two years. Nearly 60% of all walleye gill netted were the size anglers prefer to catch, greater than 15 inches in length (Figure 16). The "average" walleye was in good shape with a condition factor of 33.5.

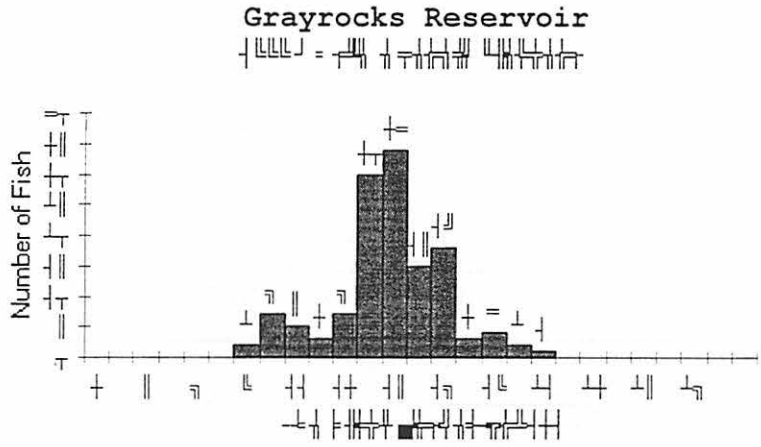


Figure 16. Length frequency histogram of walleye captured in gill nets, Grayrocks Reservoir, September 1999.

These findings suggest that the proportion of small fish has declined significantly this year and anglers will be able to catch larger walleye next year. Three consecutive years of strong walleye cohorts were unprecedented in Wyoming but were also documented in Glendo and Boysen Reservoirs. Although we have not determined the reason for successive strong year classes, we assume environmental conditions were the most likely cause. We suggested during our review of data last year that once more typical cohort production cycles return, angler complaints would diminish. Next fishing season will provide a test of that position.

Catfish again comprised a substantial portion of our catch; 38% of all game fish gill netted. As in past years, floating gill nets were the most efficient gear at sampling catfish. More were caught as we moved our nets toward the inflow region of the reservoir. Average length has increased nearly one inch during each of the past three years to a current 16.2 inches and average weight now is 1.6 pounds. An impressive 35% of catfish exceeded 2 pounds but equally important, 44% weighed less than one pound, giving us confidence that the current stocking strategy continues to produce results and that the future is bright for catfish in Grayrocks.

Windy conditions hampered minnow seine efforts but small mesh traps provided some evidence that forage fish production was on par with previous years. We did entrap quite a few spottail shiners, more than in recent past years. Evidence of relatively good gizzard shad reproduction was provided by traps, the minnow seine, and walleye gut contents. Yellow perch also reproduced successfully, although adult fish were rarely taken.

Freshwater drum are in Grayrocks to stay. We collected 20 drum, the most ever, ranging is length from 4 to 18 inches.

Quillback continue to comprise the largest percentage of nongame fish species but they seem to have no discernable impact on the sport fishery. Carp and sucker numbers remain relatively low.

Management Recommendations

- The walleye fishery remains strong with a population more balanced than in recent years. Maintain present stocking and regulation policy.

- Walleye fingerlings introduced from North Dakota in spring 1999 were OTC marked. Yearling walleye should be collected in 2000 and analyzed for OTC marks to evaluate fingerling plant success.

- Catfish are abundant and exhibit good size structure. Catfish appear to be an underutilized resource. Promotion of the Grayrocks catfish fishery via media releases should increase the catfish harvest.

Table 8. Number, number per hour, average length, average weight, and average condition of fish captured in floating experimental gill nets, Grayrocks Reservoir, August 30-September 2, 1999. (3 nets, 38.5 hours).

Species	*Number*	*Number/ Hour*	*Average Length*	*Range*	*Average Weight*	*Average Condition*
CCF	45	1.17	15.6	10.8-23.1	1.33	30.6
GZS	1	0.03	13.4	13.4-13.4	0.94	39.1
RBT	1	0.03	16.9	16.9-16.9	2.20	45.6
WAE	30	0.78	16.2	10.8-22.5	1.56	35.1
TOTAL	77	2.01				

Table 9. Number, number per hour, average length, average weight, and average condition of fish captured in sinking experimental gill nets, Grayrocks Reservoir, August 30-September 2, 1999. (9 nets, 131.0 hours).

Species	*Number*	*Number/ Hour*	*Average Length*	*Range*	*Average Weight*	*Average Condition*
BLC	4	0.03	9.4	5.9-11.9	0.67	67.6
CCF	78	0.60	16.5	8.7-26.8	1.77	30.4
CRP	35	0.27				
FWD	15	0.11	13.2	7.4-18.0	1.11	43.0
NRH	46	0.35				
RBT	1	0.01	12.0	12.0-12.0	0.68	39.4
QBK	211	1.61				
SMB	44	0.34	10.5	7.0-13.8	0.66	55.4
WAE	102	0.78	15.1	9.3-21.8	1.23	33.4
WHS	14	0.11	12.7	12.7-12.7	0.76	37.1
YEP	18	0.14	7.6	5.4-8.9	0.21	43.7
TOTAL	568	4.34				

Table 10. Number, number per net, average length, average weight, and average condition of fish captured in trap nets, Grayrocks Reservoir, August 30-September 2, 1999. (18 overnight sets).

Species	*Number*	*Number/ Net*	*Average Length*	*Range*	*Average Weight*	*Average Condition*
BLC	36	2.0	4.0	2.4-8.7		
BLG	1	0.1				
CCF	1	0.1				
CRP	11	0.6				
FWD	5	0.3				
GSF	2	0.1				
GZS	46	2.6				
NRH	12	0.7				
PMK	2	0.1				
QBK	6	0.3				
SMB	161	8.9	4.1	2.1-10.3		
STS	441	24.5	2.6	1.8-3.5		
WAE	3	0.2	4.1	2.7-6.3		
WHS	9	0.5				
YEP	150	8.3	3.2	2.4-5.7		
TOTAL	886	49.2				

Boysen Bill Reservoir - 6BO

Boysen Reservoir LR420114FT

AS - Aquatic Resource Survey

- Fisheries Survey FX-LR-6BO-512

GFRR and Lander Regional fisheries biologists sampled Boysen during mid-September. Standardized annual sampling of Boysen began in 1988. A total of six sinking gill nets are set to follow population trends of WAE, SAR, and YEP. Floating gill nets are also set annually at six standardized sites to track trends in RBT numbers. Daytime sonar surveys offer additional information on WAE and RBT numbers in pelagic waters. Fish are collected by suspended gill nets (10, 20, 30, 40 and 60 ft depths) to aid interpretation of sonar data. Lander biologists interview anglers at the reservoir from 2 to 4 days per month during the ice-free period. We believe that data collection efforts at Boysen are outstanding and that this program should serve as a model for other large reservoirs in Wyoming.

Netting data and sonar suggest the WAE population remains high. WAE have become increasingly important to anglers since the early 1990's. As WAE numbers have increased, RBT numbers have declined. The body condition of WAE has also declined in recent years. We recommend that FM-Lander continue to encourage anglers to harvest WAE. Fall stocking of trout began in 1998 in an effort to increase survival. To date the RBT fishery has not improved. We recommend two additional years of fall stocking (1999 and 2000) before making any changes to the rainbow program. The catch of SAR in experimental gill nets (0.79/hr) is the highest on record since 1988. The 1998 cohorts of WAE and SAR that recruited to our nets during 1999 at I+ (9- to 11-inches) both appear weak.

Trends in sportfish

Walleye

Walleye catch per unit effort in sinking gill nets decreased to 1.04 fish per hour in 1999 (Table 11), down from 1.42 during 1998 (Figure 17). Individuals measuring 14 to 18 inches dominated the WAE population during 1997 (Figure 18A). In 1998 a huge year class (hatched during 1997) appeared in the gill net catch. This year class now measures 12 to 14 inches and continues to be numerically dominant. The year class hatched during 1998 does not appear noteworthy.

Analysis of length frequency suggests that WAE growth rates may be slowing. The 1998 length frequency data show modes at 10 and 14 inches, while the modes during 1999 were measured at 9 and 13 inches.

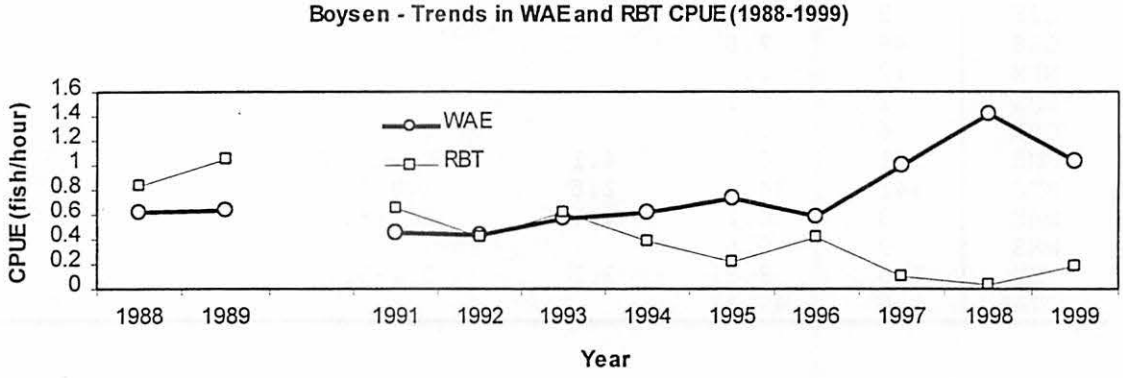
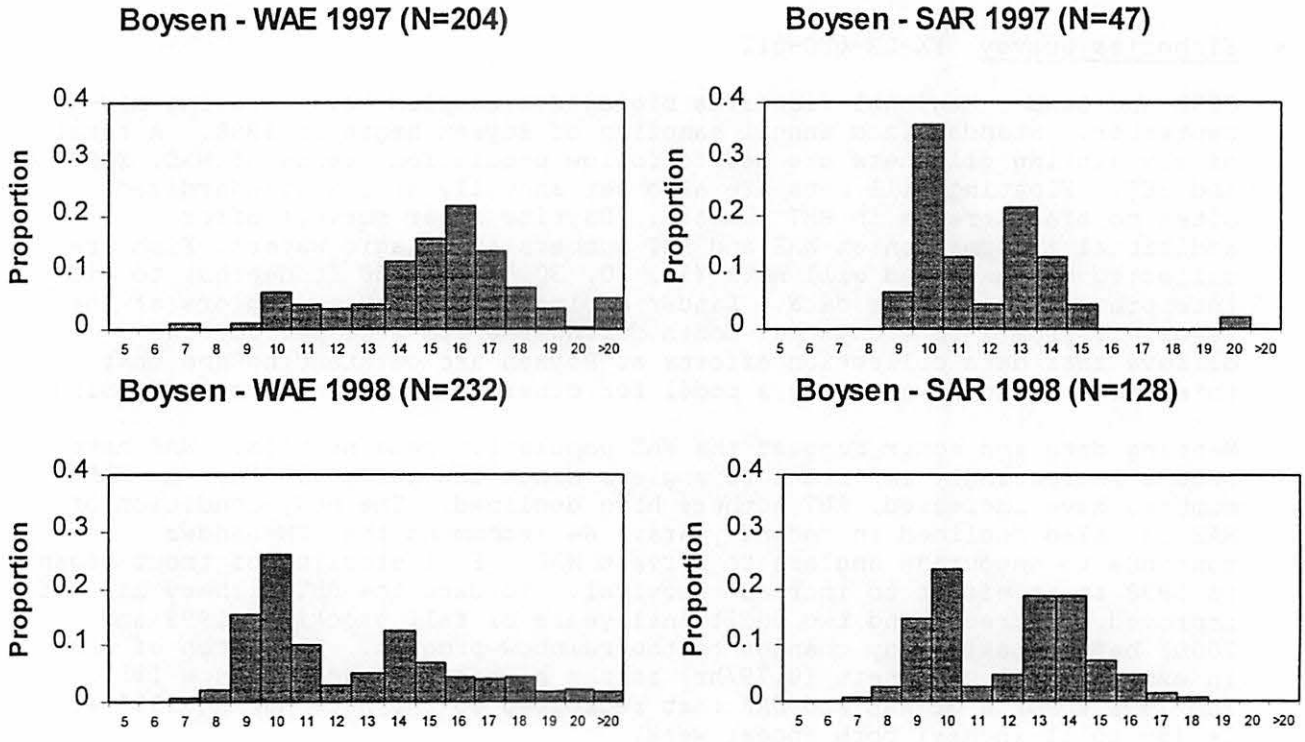


Figure 17. Trends in WAE and RBT catch per unit effort (CPUE) since 1988, Boysen Reservoir. Walleye catch rates are for sinking gill nets, while RBT catch data is for floating gill nets.



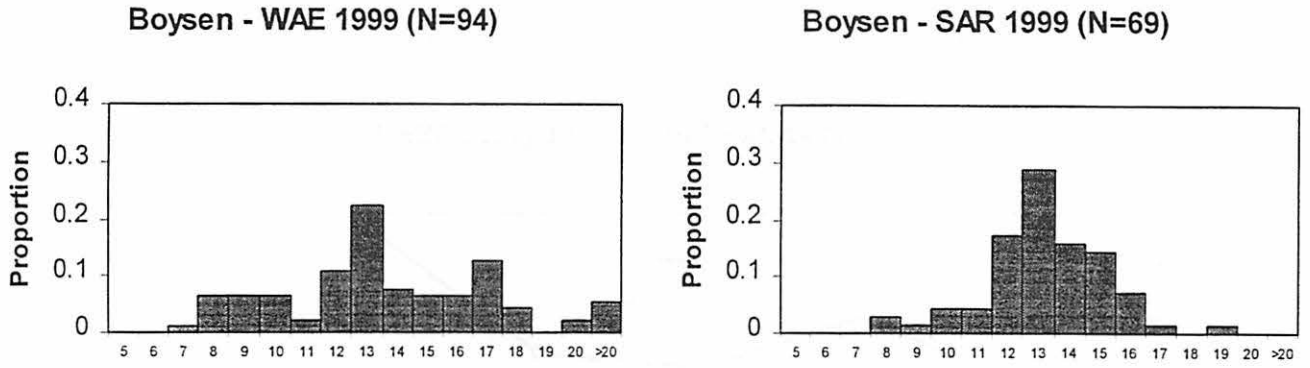


Figure 18. Length-frequency of WAE and SAR (1997-1999), Boysen Reservoir.

We examined trends in WAE body condition by plotting average relative weight scores of 10-15 and 15-20 inch WAE since 1988 (Figure 19). Relative weights of WAE continue to decline, averaging 84.4 for 10- to 15-inch WAE and 85 for 15- to 20-inch WAE. We must encourage Boysen anglers to harvest WAE to prevent the stock from stunting.

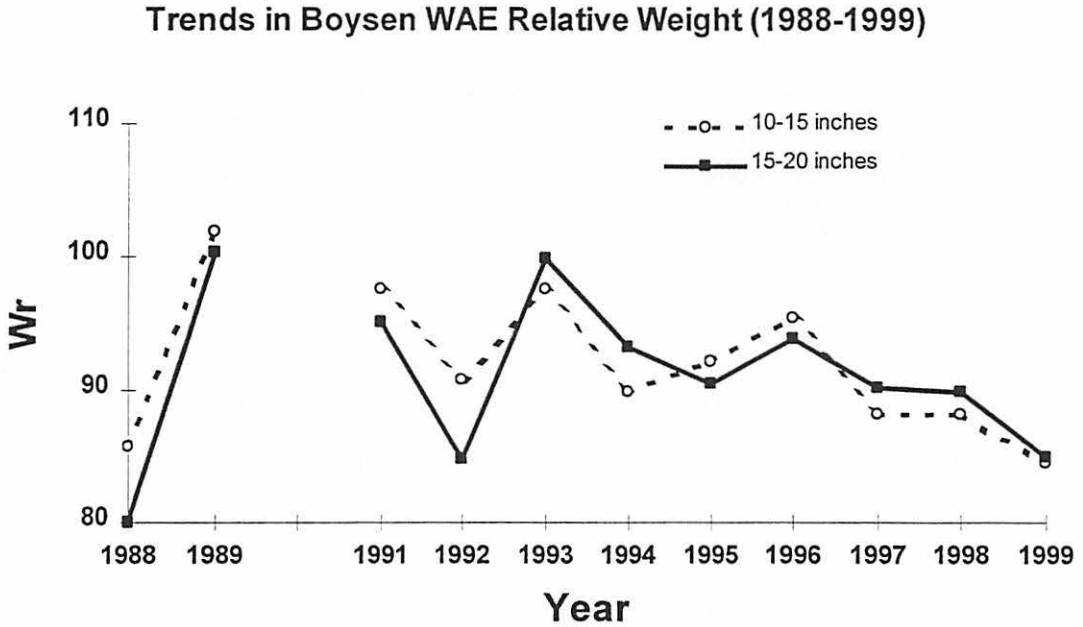


Figure 19. Trends in 10-15 inch and 15-20 inch WAE relative weights in Boysen Reservoir since 1988.

Rainbow Trout

The catch of RBT in floating gill nets generally declined during the 1990's but increased slightly during 1999 (Figure 20). The average netted RBT remains large (18.6 inches, Table 12), indicating limited success of recent stocking events.

Since 1995 FMLR has conducted spot creel work at Boysen. Over this interval angler catch of RBT has generally decreased, while WAE catch has increased (Figure 20). These patterns are identical to recent gill net findings. Because RBT were in decline the decision was made to initiate fall stocking, a strategy first adopted in 1998. Over the next two years

spot creel checks and floating gill net CPUE can be used to evaluate the success of this management change. Cooperatively with Fish Division administration, FMLR should develop guidelines during winter 1999/2000 by which the success of the stocked trout program is measured.

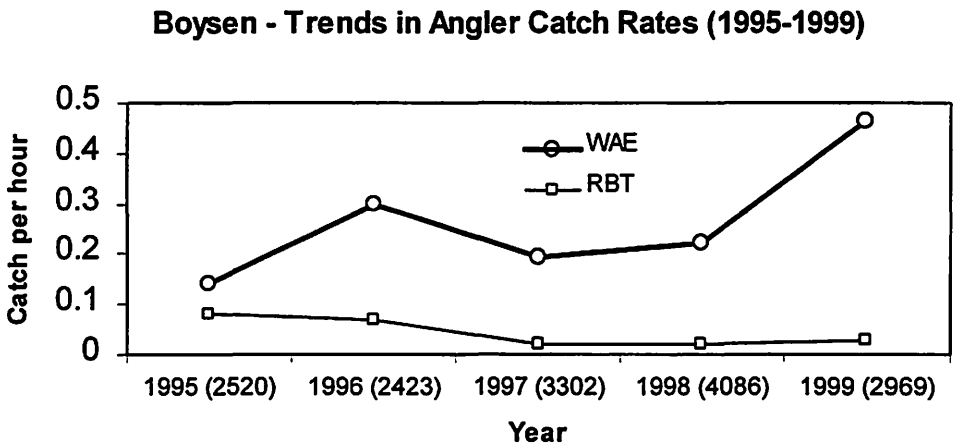


Figure 20. Angler catches of WAE and RBT from Boysen Reservoir(1995-1999).

Sauger

Sauger catch rates, which had been remarkably stable during the decade of the 1990's, increased to a record high during 1999 (Figure 21). The stock is presently dominated by 12- to 16-inch fish (Figure 22), hatched during 1996 and 1997. The 1998 cohort appears comparatively weak. SAR catch in experimental gill nets (0.79/hr) is similar to WAE (1.04/hr), yet during 1999 angler catch rates of WAE (0.47/hour) exceed SAR (0.04/hour) by nearly 12 times.

Yellow Perch

Catch rate of YEP in experimental gill nets was 0.73 per hour (Figure 21). Over the last several years we've attempted to predict angler catch of YEP based upon gill net CPUE. During 1995 we netted large numbers of 7 and 8 inch WAE and the 1996 YEP catch rate by anglers was the highest on record since 1995 (0.29/hour). Because high numbers of 5 and 6 inch YEP were netted during 1998 we expected angler catch during 1999 to also be high. This prediction was not substantiated (angler catch during 1999 was only 0.05/hour). The YEP population is again dominated by 7 and 8 inch fish so we predict good YEP fishing in 2000.

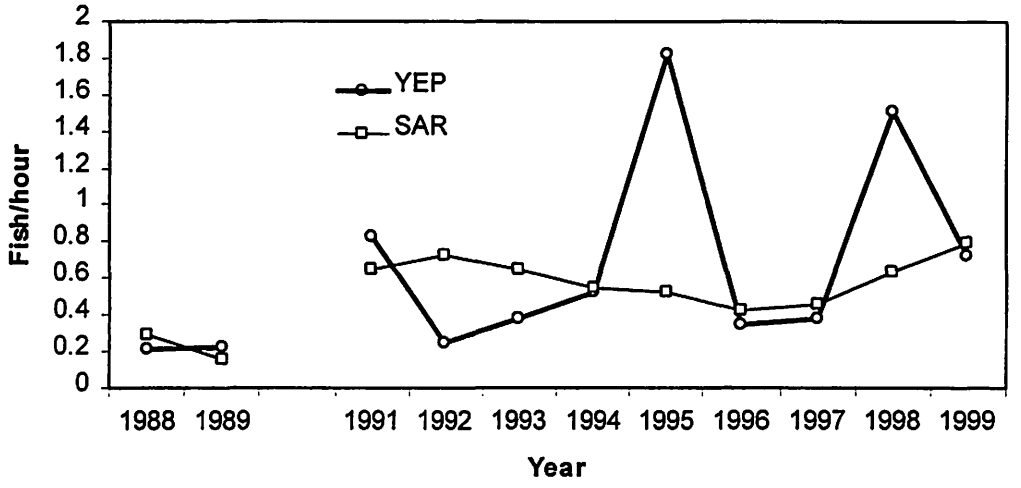


Figure 21. Trends in SAR and YEP catch rates in sinking gill nets since 1988, Boysen Reservoir.

Sonar survey

We had ideal weather conditions for the sonar survey with glass-like water. We estimate the numbers of large fish (> 7 inches) at 5.7/acre and with a surface area of 17,414 acres we estimate pelagic fish numbers at 99,700 +/- 35,500 (95% CI). We partitioned this estimate to species based on the catch of fish in floating and suspended gill nets. We estimate numbers of pelagic WAE at 84,700 and numbers of pelagic RBT at 3,500 (Table 13). These estimates are similar to estimates reported during 1997. We intend to repeat the sonar survey of Boysen Reservoir in 2001 to help determine if the RBT stock increased following the change to fall stocking.

Management Recommendations

- Continue to request RBT for fall stocking. Criteria to determine the success of fall stocking should be developed during winter 2000.
- We recommend news releases to encourage walleye harvest in Boysen.
- We are concerned about a decline in WAE body condition and growth. Data from recent creel checks should be examined to determine if liberalized WAE bag limits could increase harvest and thereby avert potential stunting of the walleye population.

Table 11. Number, number per hour, average length, average weight, and average condition of fish captured in experimental gill nets, Boysen Reservoir, September 7-10, 1999. (6 nets, 89.5 hours).

Species	*Number*	*Number/ Hour*	*Average Length*	*Range*	*Average Weight*	*Average ondition*
BLC	2	0.02	7.6	6.0-9.2	0.29	47.3
CCF	4	0.04	13.0	12.0-13.5	0.75	34.3
CRP	46	0.51	25.8			
RBT	11	0.12	17.4	15.3-21.4	2.21	40.4
SAR	71	0.79	13.7	8.6-19.2	0.74	27.5
WAE	93	1.04	14.2	7.6-28.1	1.06	30.2
YEP	65	0.73	6.8	5.2-9.5	0.17	47.3
TOTAL	292	3.25				

Table 12. Number, number per hour, average length, average weight, and average condition of fish captured in floating experimental gill nets, Boysen Reservoir, September 7-10, 1999. (6 nets, 83.0 hours).

Species	*Number*	*Number/ Hour*	*Average Length*	*Range*	*Average Weight*	*Average Condition*
RBT	15	0.18	18.6	14.6-20.8	2.48	37.6
SAR	1	0.01	19.5	-	2.28	30.7
WAE	38	0.46	14.2	8.4-20.0	1.04	32.3
TOTAL	54	0.65				

Table 13. Acoustics estimates of WAE, RBT in Boysen reservoir, September 1999 and September 1997

Depth Strata	*Species*	*Prop. Netted*	*Density (fish/ac ft)*	*Water volume (ac ft)*	*Abundance*
0-25'	RBT	0.09[1]	0.1183	330,000	3,500
0-25'	WAE	0.88[1]	0.1183	330,000	34,400
Depth Strata	*Species*	*Prop. Netted*	*Density (fish/ac)*	*Acres*	*Abundance*
>25'	WAE	0.83[2]	5.9	10,258	50,300

Species	*1999 Estimates*	*1997 Estimates*
RBT	3,500	7,700
WAE	84,700	66,800

[1] floating gill net, and 10 and 20 ft suspended nets pooled (N=177 fish).
[2] 30', 40 and 60 ft suspended nets pooled (N=192 fish).
[3] area of reservoir 25 feet below pool.

Keyhole Reservoir - 8KH

Keyhole Reservoir SN460371CK

AS - Aquatic Resource Surveys

- Fisheries Survey FX-SN-8KH-512

We repeated the alternate year sampling program on Keyhole Reservoir the week of June 21 using the 30 foot deep purse seine and trap nets. We also assisted FMSN set and retrieve four overnight sinking experimental gill nets to assess sportfish numbers. We were particularly interested in the

response of the sportfish populations to the precipitous decline in carp numbers first documented in 1993.

Carp continue to yield relatively few of their number to our sampling efforts (Figure 22). Whereas, during their glory years carp catch exceeded 200 fish per purse seine haul, this year we averaged only 14. If small mesh traps are any gauge, carp recruitment remains low enough to keep numbers suppressed. We caught only 19 small carp in 12 overnight trap sets.

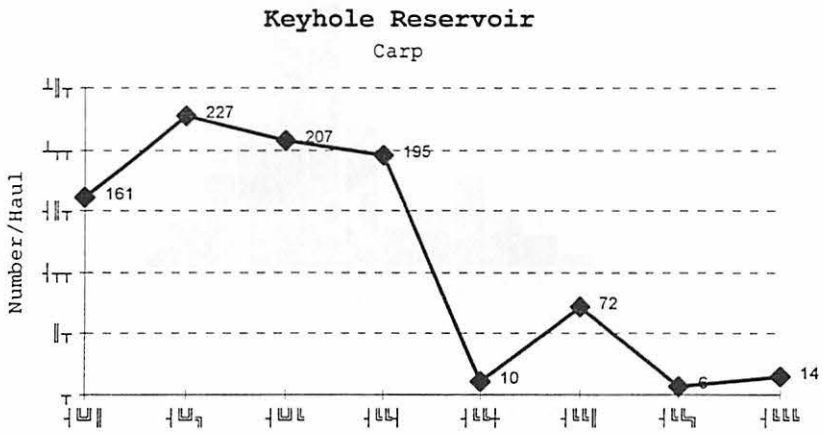


Figure 22. Carp purse seine catch per haul, Keyhole Reservoir, June 1999.

The walleye population has responded in impressive fashion to the decrease in carp density. Gill net CPUE for walleye has risen each year since 1993 from 0.3 walleye per net hour to 3 per net hour this June (Figure 23). This year's catch rate is three times the 1999 gill net catch rates in Grayrocks, Hawk Springs, and Boysen Reservoirs, three of Wyoming's premiere walleye fisheries. Average walleye body condition in Keyhole has improved with population density (Figure 23).

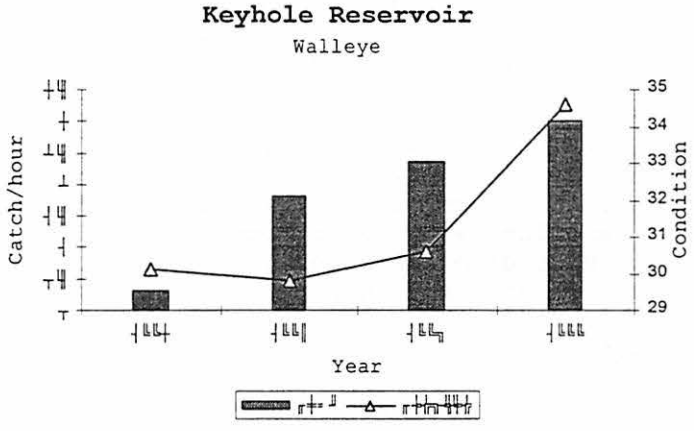


Figure 23. Walleye gill net catch per hour and average condition, Keyhole Reservoir, June 1993-1999.

Factors responsible for such a favorable response include the additive combination of several possibilities. First, reservoir water level has remained unusually high for several consecutive years. Second, diminished carp densities permit more favorable conditions for walleye recruitment and growth. Third, in 1995 a change in walleye stocking policy from fry to fingerlings was initiated. Our 1997 sampling showed a walleye population

dominated by small fish, a result of two consecutive strong year classes. Those same cohorts are represented this year as larger fish, 13-17 inches in length (Figure 24).

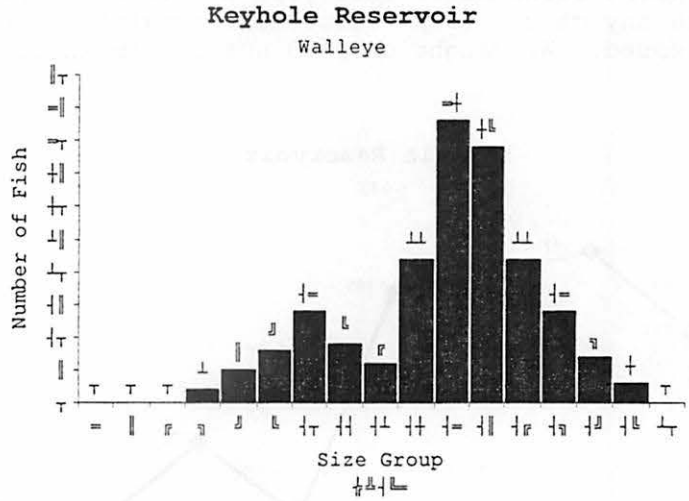


Figure 24. Length frequency histogram of WAE, Keyhole Reservoir, June 1999.

The environmental factors responsible for positive walleye growth and survival may be equally important to the success of forage fish species. The past several years have yielded high numbers of prey species to FMSN's standard August minnow seine sampling and to our June trap nets. The proliferation of forage fish is undoubtedly the key to the increase in walleye body condition since 1995.

The unprecedented large purse seine hauls of small crappie, predominately young of the year and yearling white crappie, were an unexpected bonus to our usual harvest of carp, with the occasional small walleye, gizzard shad, spottail shiner, and crappie. We surrounded three schools of crappie totaling over 1500 fish. We caught crappie in all but one of the 10 hauls we took. Adult white crappie also made a strong appearance in traps. They averaged eight inches in length but over 1/3 exceeded 10 inches.

The other two species of note were northern pike and freshwater drum. We gill netted nine pike, the largest 35.5 inches and 12.7 pounds. The catch of pike in only four gill nets is likely as much affected by where we set the nets and weather conditions as by the true density of the population. With such limited sampling we'll defer comments on the pike population to FMSN. We did catch more drum than ever before. There seems little doubt that drum have secured residency in Keyhole.

Management Recommendations

- The walleye population is the strongest we have seen since this crew began netting Keyhole Reservoir. The combination of high water level, strong forage base, low carp population, and stocking fingerlings has greatly benefited the fishery. About the only factor which we can directly and immediately influence is the size at which walleye are stocked. In addition to continued fingerling stocking, it would be wise to attempt, whenever possible, to stock fingerling walleye more than once each spring to increase the odds of liberating fish during favorable environmental conditions.

- Crappie were netted in unprecedented numbers. Those factors identified as beneficial to walleye apparently were equally good for crappie. We should pay special attention to crappie numbers in future sampling to evaluate the long term survival of this year's very strong hatch of white crappie.

- The 1997 programmed creel survey report will summarize angling success for walleye year classes established 1993-1995. Those cohorts are mostly now gone from the fishery and the present walleye fishery has improved so much over the past several years that we suggest great caution in the application of 1997 catch, harvest, and pressure data to today's fishery.

- Alternate year sampling has been adequate to follow sport fish, forage fish, and nongame fish populations in Keyhole and should be continued.

Lake DeSmet - 8DS

Lake DeSmet SN430227JN

AS - Aquatic Resource Survey

- Fisheries Survey FX-SN-8DS-512

GFRR and FMSN sampled Lake DeSmet with sonar and purse seining June 23-25, 1999. A total of 15 sonar transects and 21 hauls with the 30-foot deep seine were conducted. This survey has been undertaken annually since 1997 with the objective to monitor RBT numbers (ELR strain) in the open water. We used one-way ANOVA to test for significant changes in RBT densities over time. Confidence intervals were calculated using techniques described by Brown and Austen (1996). Relative weights of RBT were calculated using an equation developed by Simpkins and Hubert (1998). Survey results indicate no significant changes in fish numbers since 1997.

Purse seine catch (1999, 1998, and 1997)

An average of 2.86 RBT (4.2/acre) and 0.33 CRP were caught per haul during June 1999 (Table 14). Purse seine catches of RBT have declined annually since 1997 (Table 15), however these differences are not statistically significant ($F=1.93$, $df=2$, $P=0.15$).

Table 14. Number, number per haul, average length, length range, and average weight of fish captured in 30 foot deep purse seine, Lake DeSmet, June 23-25, 1999 (21 hauls).

Species	*umber*	*Number/ Haul*	*Average Length*	*Range*	*Average Weight*
CRP	7	0.33	25.1	24.1-26.7	5.62
RBT	60	2.86	14.1	8.2-17.9	0.97
TOTAL	67	3.19			

Table 15. Year, number of hauls (N), RBT per haul, 95% confidence intervals (95% CI), proportion RBT of the total catch, average length, and average relative weight (Wr) of RBT captured in the 30 foot deep purse seine, Lake DeSmet, June 1997, 1998, and 1999.

Month Year	*N*	*RBT/Haul*	*95% CI*	*RBT %*	*Average Length +/- 95% CI*	*Average Wr +/- 95% CI*
June 1997	19	5.79	3.6	0.99	13.3 +/- 0.5	85 +/- 2
June 1998	21	3.76	1.3	1.00	14.7 +/- 0.3	79 +/- 2
June 1999	21	2.86	1.3	0.90	14.1 +/- 0.5	79 +/- 2

The average RBT seined during both 1998 and 1999 was slightly larger than the average RBT seined in 1997 (Table 15). It should be noted that some newly stocked trout (9-12 inches) were represented in the catch during 1997 but not during 1998 and 1999. The scarcity of trout less than 9 inches in the open water is consistent with many other Wyoming reservoirs (Yule, *In review*).
The decline in relative weight (Wr) from 85 (1997) to 79 (1998 and 1999) is not biologically significant because RBT Wr is negatively correlated with length ($r = -0.35$, $P < 0.01$) in Lake DeSmet.

Sonar survey

The sonar survey was completed under ideal conditions with low wind using techniques described by Yule (1998). Using sonar, we estimate fish densities in the top 25 feet of the water column (sidelooking) at 4.2 per acre and below 25 feet (downlooking) at 7.3 fish per acre (Table 16). At a surface area of 3,291 acres we estimate that 37,600 +/- 9,000 fish (95% CI) were utilizing offshore waters during June 1999.

Table 16. Estimates of offshore fish from 0 to 25 feet (sidelooking) and below 25 feet (downlooking) in Lake DeSmet during June 1999.

Depth	*Fish Density (number/acre) +/- 95% CI*	*Fish +/- 95% CI*
0-25 feet	4.2 +/- 3.5	13,700 +/- 2,200
> 25 feet	7.3 +/- 2.1	23,900 +/- 6,800
Totals	11.5 +/- 5.6	37,600 +/- 9,000

Like seining results, sidelooking sonar suggests that densities in the top 25 feet of the water column have declined from 1997 levels. A Bonferroni test showed that 1997 densities (7.2/acre) were greater than 1998 (3.2/acre) but not 1999 (4.2/acre, $P < 0.05$). We attribute this decline to a paucity of newly stocked trout in the open water during 1998 and 1999 compared to 1997.

As densities between 0 and 25 feet have declined, densities below 25 feet have increased slightly (Table 17). Examination of sonar targets showed three size modes at 15, 9, and 4 inches, with the 15-inch group predominant (roughly 40% of the targets). It may be impossible to ground truth small fish targets (4 inches) at depth in Lake DeSmet because densities are too low. Small targets in both Boysen and Seminoe reservoirs have been identified as shiners and juvenile walleye.

Differences in overall fish densities between 1997, 1998, and 1999 are not significant ($F = 1.85$, $df = 2$, $P = 0.18$), meaning offshore fish numbers have not varied over this interval.

Table 17. Sonar estimates of fish abundance in the open water of lake DeSmet, 1997-1999.

Month Year	*N*	*Fish (0-25 feet) +/- 95% CI*	*Fish (>25 feet) +/- 95% CI*	*Trout (assuming RBT % from seine)*	*CV*
June 1997	15	23,600 +/- 11,700	20,000 +/- 5,200	43,200 +/- 16,900	57
June 1998	15	10,400 +/- 2,000	21,300 +/- 5,500	31,700 +/- 7,500	31
June 1999	14	13,700 +/- 2,200	23,900 +/- 6,800	33,800 +/- 9,000	31

Management Recommendations

Sidelooking sonar and purse seine catches both indicate fish densities in the top 25 feet (predominantly RBT) have declined from 1997 levels. We attribute this decline to the near absence of newly stocked trout in the open water during 1998 and 1999 compared to 1997. It is curious that as densities in surface have declined, densities below 25 feet have risen slightly. We recommend repeating the same survey in June 2000, but adding daytime suspended gill nets to verify species composition at depth. This additional netting is important given the increase in walleye catch in gill nets by FMSN. GFRR has netted walleye offshore at depths of 25 to 35 feet in Boysen Reservoir. Therefore, it is important to examine species composition at depth to help interpret sonar data. Because seining and sonar show no change in overall fish numbers, no management changes are recommended at this time.

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Regional Aquatic Habitat Management Annual Report

Assistant Aquatic Habitat Manager

Calendar Year 1999

State-wide Work

- Fish Habitat Project Compendium FX-SW-EJ1-234

  Completed final revision of the compendium of fish habitat improvement projects done in Wyoming by the Wyoming Game and Fish Department. This report was published in April, 1999. Presented slide talks on long-term effects of stream improvement structures in Wyoming at the Great Plains Fishery Workers meeting at Casper in February and at the Colo/Wyo AFS meeting at Cheyenne in March.

- Aquatic Habitat Evaluation Methods AW-SW-EJ1-510

  Met with regional aquatic habitat biologists (RAHABs) to further develop a standardized method for evaluating aquatic habitat. Further refinement of the Wyoming Habitat Assessment method (WHAM) continued in 1999 at an April meeting of all RAHABs and at the June RAHAB workshop, which was held in the Lander Region.

- Aquatic Habitat Extension AW-SW-EB1-155

  Presented a "hands-on, in the creek" review of fish and riparian habitat features at the Nature Conservatory's Red Canyon Ranch for five sections of sixth graders from Lander's West School.

Casper/Sheridan Region

NPR - Pathfinder to Alcova - 1PA

North Platte River - CR851016NA

- Cardwell Easement Habitat Improvement Project FX-CR-1PA-234

  Assisted Casper Regional Aquatic Habitat Biologist and FMCR with planning for the proposed stream habitat improvement project at the Cardwell Easement in the Pathfinder Reservoir tailwater. Two visits were made with the Casper RAHAB to evaluate fish habitat potential and locate possible structure types and sites. Planning will continue in 2000.

Cody Region

Green River Region

Lander Region

East Fork Drainage - 6EF

Bear Creek LR826500FT

- Bear Creek FX-LE-6EF-234

  With Bob Yates, regional terrestrial habitat biologist, and Dave Guthridge, regional construction crew, assisted a group of scouts with an Eagle Scout shelterbelt tree-planting project at the lower Bear Creek Campground.

Pinedale Region

Green River - 7GR

Green River (Above New Fork Confl) PE841030SE

- Forty Rod Flat Public Fishing Areas - Habitat Maintenance FX-PE-7GR-234

  Inspected the completed repair job on the rock sills.

- Warren Bridge Habitat Improvement Project FX-PE-7GR-234

  Continued planning for the project, including an onsite evaluation of proposed rock sources during May. In October, WGF construction and fishery personnel, as well as BLM and private contractor personnel, constructed five tree jam structures and one rock barb at the Warren Bridge Public Fishing Area. These "fish houses" at sites 5-9 will furnish shelter for trout through a section of the PFA previously lacking woody debris and deep-water cover. This project is a cooperative fish habitat improvement venture between Wyoming Game and Fish Department, BLM, and the Central Utah Project.

- Upper Green River Habitat Improvement Project FX-PE-7GR-234

  With statewide construction personnel, inspected tree jams for flood damage and maintenance needs. Broken or degraded cables were found at about 250 sites. The construction crew later spent two man-days to redrill, glue, and recable at 35 sites. More maintenance is needed to prevent wholesale loss of trees from the structures. A letter will be written to USFS in 2000 about this problem.

- Huston Property Habitat Improvement Project FX-PE-7GR-234

  With the Pinedale Regional Aquatic Habitat Biologist, visited the Green River at the proposed easement purchase to assess a potential river oxbow cut-off and discuss possible corrective measures to preserve river flow through the easement and boatramp site.

New Fork River Basin - 7NR

New Fork River PE843451

- New Fork River Corridor Habitat Improvement Project FX-PE-7NR-234

  With the Pinedale Regional Aquatic Habitat Biologist, visited potential habitat improvement work at several sites on the New Fork River. With Randall Montgomery, from the "One Fly Club", toured a potential sill site on Rod Rozzier's place. Also evaluated sill sites on the airport section and revetments on Rossiter's place.

Lower Bear River - 7LB

Salt Creek GR891160LN

- Salt Creek Habitat Improvement project FX-PE-7LB-234

  Inspected habitat improvement structures on forest to assess structure performance and condition.

Laramie Region

Sheridan Region

Little Bighorn River Basin - 8LH

Little Bighorn River SN834015SN

- Little Big Horn River Habitat Improvement (Dayton Meadows) FX-SN-8LH-234

  With Fowden, McDowell, and Cundy, inspected the entire project to determine maintenance needs. Several problems were identified, including a tree structure that had washed out of position to block the channel. Also discussed USFS comments about the project made to Cundy and McDowell during an earlier tour.

Tongue River Basin - 8TR

South Tongue River SN832600SN

- South Tongue River Shutts Flat Habitat Improvement Project FX-SN-8TR-234

  Walked out the entire project and inspected all structures for performance. Obtained photos to document changes.

Regional Aquatic Habitat Management Progress Report

Casper / Sheridan Regional Aquatic Habitat Biologist

Calendar Year 1999

Casper Region

Region-Wide Work

- Casper Regional Team Coordination and Assistance AW-CR-EB1-121

  The Casper regional advisory team met in January to review and rank three habitat grant proposals and one trust fund proposal. Two of the grantees ultimately withdrew their proposals because agreements could not be reached, and the trust fund proposal, which proposed cost sharing with the Wyoming Fly Casters to secure an access easement to the Cardwell property, was ultimately rejected at the Cheyenne Staff level.

- Coordination with Land Management Agencies AW-CR-EB1-140

  Assisted a BLM focus group exercise to identify how they could improve their process management and customer service.

- Casper Regional Public Contacts AW-CR-EB1-160

  At the request of regional personnel, assistance was provided to judge the student presentations at the Wyoming Envirothon, and operate the firing range during the Expo, the Department's information booth at the Central Wyoming Fair, and the Esterbrook and 33-Mile Road game check stations. Cundy also gave a presentation to a University of Wyoming Natural Resources Seminar class on "How Can We Integrate Species Management with Ecosystem Management -- Species-Proponent and Ecosystem-Proponent Approaches toward Habitat Management", and met with Cooperative Fish and Wildlife Research Unit personnel to provide input on a graduate project to develop habitat assessment techniques for warm water (prairie) streams.

- Habitat Display AW-CR-EB1-165

  The budget was closed out on the 1998 Worth-The-Watching trust fund project to develop a regional habitat information and education display. Rather than contracting additional photo enlargements, the Casper Regional Advisory Team purchased a combination reflective and transparency scanner, and a high quality color laser printer, which can prepare additional display information and various other uses as well. The regional habitat display was used at the Hunting and Fishing Heritage Exposition in September.

- Wildlife Environmental Reviews AW-CR-EP1-540

  Commented on BLM grazing lease/permit renewals, as well as on the planned structure and function of the proposed interagency vegetation manipulation committee.

Bates Hole Basin - 1BH

Basin-Wide Work

- Eagle Ridge Ranch Extension and BLM Coordination AW-CR-1BH-175

  In January, met with Mr. Stacey Scott of the Eagle Ridge Ranch, Mr. Pete Scott of the Two-Bar Ranch, and BLM personnel to review resource concerns, identify alternatives to improve livestock grazing management practices, and investigate potential habitat restoration projects in the watersheds draining Coal Mountain and the southwest side of Casper Mountain. A rotational series of prescribed burn projects is being considered to restore age-class diversity and improve hydrologic function within juniper encroached meadow, mountain shrub, and big sagebrush steppe vegetation types in the Gothberg Draw, Little Red, Coal, and Cottonwood creek drainages, as well as riparian rehabilitation work on Little Red Creek. These projects will be planned and implemented over time as the grazing management regime allows.

  A management plan for the Eagle Ridge Ranch allotment will be drafted by Mr. Stacy Scott, then revised and finalized by BLM. Goals are to rotate livestock through the allotment while spending no more that 2 weeks in any one pasture. Numerous fencing and water developments are being considered to achieve these goals.

- Garrett Ranch Extension and BLM Coordination AW-CR-1BH-175

  Met several times with the Garrett Ranch to discuss how to enhance livestock grazing management, while bringing rangeland and riparian conditions into compliance with BLM standards for rangeland health. Topics included logistics and feasibility of several water developments, a cross fence to segregate Sand Draw from Mud Springs, and a riparian pasture fence to segregate Lawn Creek for special management. The ranch agreed to retain the existing upper electric fence to further rest the Lawn Creek prescribed burns, segregate the upper Lawn Creek pasture into two pastures, and segregate the perennial segments of Lawn Creek into a smaller pasture to be funded and constructed by BLM in 2000. They will remove the lower electric fence, reconstructing it as a division fence segregating the Sand Draw pasture into two separate pastures, thus facilitating a reduced duration spring or fall rotation through all the smaller pastures. These actions should allow several habitat restoration projects to proceed, including grade control projects on Lawn Creek, and prescribed burns in the Lone Tree Creek breaks and the Sand Draw drainage. Together, these livestock rotation and habitat restoration projects should meet BLM standards for rangeland health, at least on the east side of the allotment.

  Future projects include segregating the Mud Springs pasture, which receives summer use by cattle on an annual basis, segregating the Bolton and Stinking Creek pasture, finding alternative water sources where possible, and rehabilitating Bolton Creek. BLM will pursue a water pipeline project in the Sand Draw area over the next 2 years. Completing these projects would shorten grazing durations further, allow for more season of use flexibility, and passively improve riparian habitats.

- Two Bar Ranch Extension and BLM Coordination AW-CR-1BH-175

  In June, met with Two Bar Ranch and BLM personnel to review adjustments in the annual operations of the Upper Bates Creek and Bates Hole grazing allotments. An update was provided on the status of beaver translocation efforts to Little Red Creek and potential opportunities for cost-share on grade control (riparian rehabilitation) projects. Our long-standing concerns regarding the affect of high intensity livestock grazing in

riparian habitat types was discussed at length. The ranch remains convinced their high-intensity, short-duration grazing regime adequately conserves the wetland soils and stream banks of the riparian wet meadow and stream habitat types, and improves hydrologic function. Their main premise is to avoid any set annual rotation pattern and apply the highest intensity of use possible in the shortest time possible. Cundy's observations do not support their belief that high intensity grazing is improving hydrologic function of upland and riparian types. Intense physical impact appears to be degrading hydrologic function, particularly within the riparian and wetland ecotypes. Cundy favors once-annual, moderate-intensity, short-duration regimes that avoid July to mid September seasons of use.

Mr. Pete Scott proposed that we follow-up an earlier proposal to fence and develop off-site water sources at two reservoirs in the upper Bates Creek drainage. Project goal is to passively restore riparian and wetland habitats on portions of upper Bates Creek. Mr. Scott was willing to accept NRCS technical assistance in designing the project, provided no federal dollars are involved in completing the project.

- Hedges Ranch Extension and BLM Coordination AW-CR-1BH-175

  Met with Mr. Tony Hedges in March to discuss problems with beaver activity on Elk and Stinking creeks, explain the benefits derived from grade and water table enhancing activities of beaver, and explain the WGF Habitat Grant Program. Offered to help Mr. Hedges develop a grant proposal, but despite several follow-up calls, there was no further progress.

Bates Creek CR854150NA

- Habitat Quality Index FX-CR-1BH-511

  Plans to collect baseline aquatic insect samples at the upper HQI sample reach during August were postponed because Allen Binns could not assist.

- Wet Meadow Restoration AW-CR-1BH-240

  In August, inspected two spring-fed reservoirs proposed for rehabilitation by Mr. Pete Scott. Project goal is to develop off-site livestock watering facilities using water from the reservoirs and, at the same time, passively restore nearby riparian and wetland habitats. The shallow, diked wetlands and wet meadows would be fenced to exclude cattle, thus passively restoring wet meadow spring complexes that drain into the reservoirs. One reservoir is on deeded land while the other is on public land. There is also potential to develop two spring-fed reservoirs on deeded lands in the upper Bates Creek watershed.

Little Red Creek CR854175NA

- Beaver Transplants AW-CR-1BH-240

  Mr. Mark McKinstry (University of Wyoming Cooperative Fish and Wildlife Research Unit) released 15 beaver in the drainage between May and September 1998. Results of this beaver transplant were reported in the Wyoming Cooperative Fish and Wildlife Research Unit 1999 annual report.

  The drainage was visited several times to monitor beaver activities and maintain a photographic record. No additional activity was noticed in the dam pond complex discovered in July 1998. But two large beaver ponds and many smaller ponds were located immediately above the fence segregating the Government pasture from the Little Red Creek pasture.

- Riparian Rehabilitation AW-CR-1BH-240

  During 1998, Boy Scout Troop 167 placed 20 small woody debris structures in Little Red Creek to provide subtle grade control and increase roughness at the interface between channel and floodplain. By 1999, these structures had elevated the riparian water table and helped trap additional sediment. Such sediment deposition should provide pioneer sites for riparian plants, thus stabilizing the floodplain and enhancing its buffering capability.

  In early spring, about 200 streambank willow sprigs were planted throughout the project reach. In June, suspended panel segments were completed across stream channel crossings at the Little Red Creek study exclosure.

  In October, a head cut on Little Red Creek was stabilized using a rock grade control structure built with 18 cuyd of rock, which was waste from a nearby gas pipeline.

  Re-reading riparian greenline and cross-section transects within the improvement reach was deferred until spring 2000. An additional greenline transect was not established on lower Little Red Creek due to lack of suitable sites.

Coal Creek CR954176NA

- Coal Mountain Prescribed Burns AA-CR-1BH-454

  Contributing partners to this project include: WGF, Bureau of Land Management, Nature Conservancy, Mule Deer Foundation, National Fish and Wildlife Foundation, and Eagle Ridge Ranch. These proposed burns include ephemeral segments of both Gothberg Draw (north face) and Coal Creek (south face) drainages. Goals are: 1) restore community habitat diversity by creating a variety of successional seres, 2) improve hydrologic function within Ponderosa pine, mixed mountain shrub, and mountain big sagebrush steppe vegetation types, 3) promote nutrient cycling and woody plant regeneration, 4) entice mule deer and antelope herbivory away from crucial winter ranges during spring and fall, 5) entice livestock herbivory away from riparian vegetation, and 6) reduce volatile fuel loads along the Casper Mountain urban interface.

  Mr. Orrin Connell of Firetrax Inc., the contractor conducting the private lands (Nature Conservancy conservation easement) segment of the proposed burn project, will provide insurance to cover the suppression costs should the burn escape. This insurance satisfied the Eagle Ridge Ranch.

  Our efforts to hit the spring burn window were not successful in 1999. Met with Mr. Stacey Scott during April to discuss options to carry-over cost-share funding and implement the first stage of the proposed Coal Mountain prescribed burns during spring 2000. WGF will provide support for the public lands segment of the project. A Services Division project request was submitted asking for additional help from regional construction personnel for the project.

  The potential for a second stage burn on Coal Mountain was investigated during the summer.

Lone Tree Creek CR854163NA

- Lone Tree Creek Breaks Prescribed Burn AA-CR-1BH-454

  During fall 1999, an environmental assessment was completed for a prescribed burn of old mountain mahogany in the Lone Tree Creek watershed. BLM will fund the project, and WGF will provide in-kind services during the

burn and monitor post-burn vegetation responses. The burn is scheduled for spring 2000, and if available, will utilize a helitorch. All monitoring will be done post-burn when burned and unburned sites can be identified, which was not possible pre-burn. A Services Division project request was submitted asking for help from Casper regional construction personnel during the burn.

Stinking Creek CR854160NA

- Lawn Creek Prescribed Burns AA-CR-1BH-454

  During 1998, about 900 acres were burned within a 2,800-acre area, giving about a 1:2 burned to unburned landscape mosaic in the upper Lawn Creek Drainage. The goals were: 1) rejuvenate true mountain mahogany and antelope bitterbrush, revert dense and decadent big sagebrush steppe communities to early successional seres and restore habitat diversity, 2) accelerate nutrient cycling, spring "green-up" (phenology) and fall re-growth, and 3) enhance ground coverage, water infiltration, soil moisture recharge, and moisture availability. Expected benefits include reduced sedimentation into Lawn and Stinking creeks, increased water flows in several springs contributing to Lawn Creek, increased transitional use by migratory pronghorn and mule deer, which means reduced duration of use on winter ranges, reduced livestock use of mixed maple, aspen, and riparian communities, and improved juvenile recruitment of resident mule deer and antelope.

  In 1999, post-burn plant composition was sampled in the spring and fall burn segments. Fire-induced mortality of true mountain mahogany was 1-5% in the spring burn and about 5-30% in the fall burn. These data are filed at the Casper regional office.

  Burning a north aspect site with mixed aspen and maple during fall 1999 was the final stage of this project. To facilitate stand regeneration by reducing livestock herbivory, a Services Division project request was submitted asking for labor and equipment support from regional construction personnel to erect an electric fence exclosure during spring 2000.

- Lawn Creek Riparian Floodplain Restoration AW-CR-1BH-240

  Met with Garrett Ranch Corporation, Casper regional construction, and BLM personnel in January to review the proposed floodplain restoration project. Everyone agreed to proceed with the project in 1999. In 2000, BLM will complete a riparian pasture fence to segregate the perennial flowing segments of Lawn Creek for special management.

  Sheet piling grade control structures will be placed across the incised channel and floodplain at strategic locations on Lawn Creek to stabilize down cutting and bank sloughing, aggrade the channel, rebuild banks, perpetuate riparian plant communities, and restore riparian water storage capacity.

  Submitted a Services Division project request for personnel and equipment from regional and statewide construction to build the first stage of the project during summer 1999. Drafted project designs and maps, secured an individual 404 permit for BLM, and completed an Environmental Assessment. The Bureau of Reclamation granted WGF a special use permit to obtain rock from their overburden pile near Pathfinder Bridge. Laser Construction of Glenrock, Wyoming was contracted to repair the access roads and haul the rock needed for the overflow aprons above and below the sheet piling structures. Materials International of Atlanta, Georgia delivered vinyl sheet piling materials in late June.

Unfortunately, construction personnel were unable to assist, so plans were developed to combine the first and second stages of the project, which will reduce the mobilization costs, and a follow-up project request was submitted for construction assistance during 2000. The necessary paperwork was also compiled to amend the 404 permit and gain archeological clearance for the larger area.

To gain experience working with these materials, Cundy assisted Lander and Laramie region personnel with installation of sheet piling grade control structures at Separation Creek. He learned that a vibratory hammer will be essential to build sheet-piling structures at Lawn Creek.

Bolton Creek CR854280NA

- Beaver Activity Evaluations AW-CR-1BH-240

Mr. Pete Garrett reported the beaver colony near the old Fetterman Homestead had finally been removed. A tour through the colony found high flows had washed out most dams and they were no longer being maintained, thus supporting Mr. Garrett's report. Considerable new bank erosion was evident. In past dry years, these beaver dam ponds, and associated water storage in stream banks, appeared to be the only reason water flowed in this stream reach past September. Consequently, this stream reach will likely be dry during late summer, except during cloudbursts.

NPR - Pathfinder to Alcova Basin - 1PA

North Platte River CR851016NA

- Cardwell Easement Stream Enhancement FX-CR-1PA-234

In January, toured the proposed Cardwell fishing access easement with FMCR, Wyoming Fly Casters, NRCS, and USFWS personnel. Potential grant funding sources to secure the easement and augment habitat features were discussed. Funds to enhancement aquatic habitat on the easement were later secured from the NRCS Wetland Reserve, USFWS Partners for Wildlife, and WGF Fish Wyoming program. In October, designed and mapped an instream improvement project on the easement, and helped Wyoming Fly Casters Club locate and mark the approximate northern easement boundary.

NPR - Gray Reef Dam to Goose Egg Bridge - 1GG

North Platte River CR851014NA

- Richner Property Streambank Stabilization FX-CR-1GG-234

Submitted a FY2001 wildlife trust fund project proposal to stabilize eroding banks and increase channel roughness on Ed Richner's property above the Lusby Public Fishing Area. Also submitted a Services Division form requesting help from regional construction personnel in case adequate funding is not secured to contract the project.

NPR - Mills Bridge to Glendo Reservoir - 1MG

North Platte River CR851012NA

- Amoco Reuse Committee Extension AW-CR-1MG-175

Provided technical advice about wetland development or enhancement at the old refinery property to the Amoco property reuse committee.

N. Slope Laramie Range (Cottonwood to Garden Creek) Basin - 1LR

Basin-Wide Work

- Inventory (WHAM Level 1 and 2), Coordination, Contacts AW-CR-1LR-511

  In August, with wildlife division personnel toured the Boxelder and upper Deer Creek drainages to assess potential for habitat restoration projects on the Grant properties.

  In November, assisted Keith Schoup with several Habitat Extension Service contacts and initial habitat evaluations in the Laramie Mountain Range. Contacted Mr. Ricky Grant and Mr. And Mrs. Ben Middleton regarding access to and evaluation of the properties they either control or oversee. Initiated additional evaluations on the Duncan property within the Hunton Creek watershed.

Curtis Gulch Creek CR852817AY
South Fork LaBonte Creek CR852870AY
Big Bear Creek CR852971AY

- Potential Maximum Biomass (PMB) Sampling FX-CR-1LR-511

  Completed PMB evaluations and assisted FMCR with population samples at selected stream reaches. Results are reported in the FMCR 1999 annual progress report.

South Fork Powder and Salt Creek Drainages - 1SS

3-T Reservoir CR730039NA

- 3-T Reservoir Watershed Rehabilitation AW-CR-1SS-236

  A $25,000 WGF trust fund habitat project and a $30,000 BLM challenge cost-share proposal to rehabilitate the 3-T Reservoir watershed were approved during 1998. But a $25,000 North American Wetlands Conservation Act small grant proposal and a $20,000 EPA challenge cost-share proposal were rejected. Hence, BLM added funds from their range betterment account to make-up enough of the shortfall so five of the six proposed reservoirs could be built. A grant agreement between BLM and WGF was completed for the WGF cost-share contribution.

  During spring, toured the proposed reservoir sites with BLM personnel to finalize construction standards. Subsequently, 5 retention wetlands comprising 14.8 surface acres were constructed upstream of the existing 3-T Reservoir to reduce flood peaks, channel degradation, and sedimentation of 3-T Reservoir. The wetlands will improve habitat quality for waterfowl, shorebirds, fisheries, and riparian/wetland dependent wildlife, provide additional water sources for terrestrial wildlife, and extend livestock distributions, thus reducing grazing management constraints.

  Evaluated the feasibility of dredging 3-T Reservoir to restore the sport fishery potential. Operating a floating dredge appears highly questionable due to fine sediments and water recycling requirements. Other options include draining and dredging 3-T Reservoir with tracked equipment, or stocking one or more of the newly constructed reservoirs to replace angler opportunities lost at 3-T Reservoir. In which case, only the spillway at 3-T Reservoir would be repaired.

Region-Wide Work

- Sheridan Regional Team Coordination and Assistance AW-SN-EB1-121

  The Sheridan regional advisory team met in January to review and rank six habitat grant proposals and four trust fund proposals. Assistance was requested to help administer the on-going rehabilitation of reservoir complexes on the Bud Love WHMA.

Belle Fourche River Basin - 8BF

Crow Creek SN962450CK

- Tribe Extension AW-SN-8BF-240

  In July, with Mr. Steve Tribe, toured two reservoir rehabilitation projects done in past years on Crow Creek. These projects were cooperatively funded through the USFWS Partners for Wildlife Program. We also looked at four other existing reservoirs that Mr. Tribe would like to repair, two of which support fisheries. Each reservoir has some erosion on the dike or spillway. In August, information from Mr. Mark Hogan (USFWS) was relayed to Mr. Tribe regarding options to rehabilitate the eroding dikes and spillways. He said he would get cost estimates; then visit each site with Mr. Hogan.

Sand Creek SN861485CK

- Population Survey Assistance FX-SN-8BF-512

  Assisted FMSN personnel with electro-fishing at the Ranch A and country club stations.

- Sand Creek Public Fishing Area Management AW-SN-8BF-451/452

  In May, two 8′ X 8′ wire panel exclosure cages were constructed next to the cages built in 1998. Follow-up photos were taken to monitor the affect short-duration grazing on grasses, shrubs, and streambank stability. The grazing lessee again used the area for about three weeks immediately prior to and through Memorial Day. In July, post-grazing photos were taken to monitor herbivory of shrubs.

- Ranch A Public Fishing Access Management AW-SN-8BF-451

  Despite chemical treatments in 1998, Canada thistle grew abundantly on the floodplain terraces of Sand Creek at Ranch A and generated numerous phone calls during June. In July, a spraying contractor was hired to spray thistle on the property. All spraying was completed the last week of July. In October, examination showed the Canada thistle stands were top-killed and did not disperse seed. Since the treated colonies will continue to regenerate from colonial root systems, responsibility for managing this situation was transferred to the State Land Board by the Cheyenne staff.

Little Bighorn River Basin - 8LH

Basin-Wide Work

- Little Bighorn Basin Survey FX-SN-8LH-511

  In September, Cundy accompanied FMSN during some of their Little Bighorn drainage surveys. They are using the Oregon Stream survey technique, which does not determine the proportion of trout cover in a reach. Nonetheless, if habitat attributes were recorded differently, potential maximum biomass could be calculated from the basin surveys and Cundy would not have to redo PMB measurements on these streams.

Little Bighorn River SN834015SN

- Dayton Meadows Instream Enhancement FX-SN-8LH-430

  The Dayton Meadows instream improvement project was inspected in August with FMSN, Sheridan Region Construction, and Bighorn National Forest personnel to discuss follow-up restoration within the improvement reach. Erosion continues around the riprap placed at the old road crossing, but this erosion, and at the meander below the crossing, can be stabilized when USFS upgrades the road next year. Additional cost-share dollars may be sought by USFS to obtain large rock for the meander and crossing restoration work.

  An upstream meander also appears to be at risk of being cut-off. During high flows, several instream cover trees broke loose, moved downstream, and are now deflecting flows into the bank to widen the channel. The USFS hydrologist suggested readjusting and securing these bundles as upstream vanes to reduce erosive forces directed at the bank. He also questioned the suitability of using plunge structures to help narrow the stream channel. He prefers rock vortex weirs to restore overhanging bank habitat for trout while also providing a plunge pool. Concurrently, he questioned the height and close spacing between many of the plunge structures. Many of the log plunges are being undermined and may need to be replaced or removed in the future. Other concerns were expressed regarding the visibility of many of the sand bags used to seal the plunge structures.

  Residual pool depths were measured for all plunge structures at Dayton Meadows during September. Concurrently, recording thermometers were placed in the Little Bighorn River above the Forest Road 15 Bridge and at Dayton Meadows to gain over-winter temperature data.

  Also toured the improvement reach with FMSN and Aquatic Habitat section personnel to discuss needed repairs and options for follow-up restoration work. The general consensus of the group was that we should not tear-out and replace existing structures with another variation, which from past experience, will also likely be subject to undesirable changes during high flows.

  A draft condition assessment for the Dayton Meadows Habitat Improvement project was summarized and distributed for internal review. It will be reformatted to the compendium format prior to being distributed to USFS personnel. A Services Division project request, which outlines needed maintenance activities, was submitted for assistance from SN regional construction personnel during 2000.

Lick Creek SN834100SN

- BHNF Instream Enhancement - Lick Creek FX-SN-8LH-430

  Two recording thermometers were placed in Lick Creek to gain over-winter temperature data. One was placed above Forest Road 15 and the other in the upper exclosure at the improvement reach.

Middle Fork Powder River Basin - 8MP

Pine Creek SN936710NA

- Pine Creek Prescribed Burns AW-SN-8MP-454

  Assisted BLM personnel in completing the final year of animal use monitoring at the Pine Creek prescribed burns. BLM Casper Field office personnel have the data for analyses. Their goal is to assess burn influence on big game and livestock use, and evaluate the effectiveness of using prescribed burns to entice cattle use away from riparian habitats on Pine and Grieve creeks, and Clapp and Elk springs. A BLM cooperative education student began summarizing the results.

  Greenline transects on Pine Creek were re-read to assess changes in riparian community composition following the implementation of a reduced duration late spring or early fall grazing regime. Rest from livestock grazing occurred during the 1996 and 1997 growing season. After rest from livestock use, desirable bank-building, mesic vegetation (mainly sedges and rushes) in the riparian community doubled at the lower transect, and increased 34% at the upper transect (Table 1).

  Table 1. Trends in mesic herbaceous vegetation along riparian greenline transects at Pine Creek.

	Mesic plants (%)		
Transect	June 1996	June 1997	June 1999
Lower (PC1)	41.9	84.0	80.4
Upper (PC2)	60.9	81.3	67.5

  During the rest period, desirable mesic vegetation increased in the riparian community by 4.5% at the lower transect and 151% at the upper transect (Table 2). Although changes at the lower transect appear insignificant, a desirable shift in community composition did occur. Sedges, which are more desirable that rushes in terms of root mass, organic matter development, stability, water-retention, and bank building capability, increased 60% (28.4% to 45.4%) while rushes declined 80% (19.9% to 4.0%). At the upper transect, sedges increased about 336% (4.5% to 19.6%) while rushes increased 21% (3.3% to 4.0%).

  Table 2. Trends in mesic herbaceous vegetation along riparian cross-section transects at Pine Creek.

	Mesic plants (%)		
Transect	June 1996	June 1997	June 1999
Lower (PC1)	48.3	50.5	32.2
Upper (PC2)	7.8	19.6	13.0

  Once livestock grazing resumed in 1997 (8/25 - 10/6/97, 664 AUMs) and 1998 (8/10 - 10/1/98, 680 AUMs), the initial gains have waned and trends appear to be downward. In both years, livestock stocking rates exceeded the 600

AUM limit outlined in the interim CRM grazing plan. Mesic vegetation along the greenline declined by 4% at the lower transect and 17% at the upper transect (Table 1). Similarly, mesic vegetation declined 36% at the lower cross-section transect and 34% at the upper transect (Table 2.). Loss or reversion of sedges to rushes across riparian cross-sections accounts for most of the downward change in the riparian community composition. Sedges declined 58% at the lower transect (45.4% to 19.0%) and 56% at the upper transect (19.6% to 8.7%). Meanwhile, rushes increased 230% (4.0% to 13.2%) at the lower transect and 7.5% at the upper transect (4.0% to 4.3%).

Buffalo Creek SN836730NA

- Buffalo Creek CRM AW-SN-8MP-175

  No Buffalo Creek Ranch CRM meetings were held during 1999. However, a noxious weed CRM committee was formed for a portion of the southern Bighorn Mountain area, including the Buffalo Creek Ranch. WGF Casper Region opted not to participate in this new CRM because of questionable benefits and a desire that all weed management be handled under the existing CRM. To increase the possibility for success, weed management must be addressed concurrently with grazing and haying management on an individual ranch basis

  During the year, BLM did no upland monitoring to determine if the grazing management regime outlined in the current CRM plan will be adequate to meet standards for long-term rangeland health. Concurrently, the Murphy Slope allotment continues to be operated outside the CRM under a season-long grazing management regime. Likewise, BLM has not fenced small areas of riparian habitat in the Murphy Slope allotment or developed adjacent off-site water. Furthermore, other proposed restoration projects remain on the shelf because the grazing lessee believes such work is of limited benefit to his operation if he must concurrently adjust his grazing management.

  The two-wire electric fence (Gap Electric Fence Riparian Grant), which was designed to facilitate reduced duration grazing management, prolong the benefits of the Pine Creek prescribed burns, and help restore riparian vegetation types along Pine and Grieves creeks, and Clapp and Elk springs, was again not used for its intended purpose during the year.

Bear Trap Creek SN836550JN

- Bear Trap Creek Instream Structures FX-SN-8MP-430

  An attempt was made to assess old instream habitat structures while FMSN personnel were completing their population surveys. Scheduling conflicts prevented this from being completed. An attempt was then made to locate the improvement reach but it was not found.

Tongue River Basin - 8TR

South Tongue River SN832600SN

- Population Survey Assistance FX-SN-8TR-512

  Assisted FMSN with fish population samples from the improvement reaches at Shutts Flat and Pine Island.

- Shutts Flat Instream Enhancement FX-SN-WT1-234

  The instream improvements at Shutts Flat were inspected during August. Livestock grazing has depleted portions of the reseeded areas.

Regional Aquatic Habitat Management Progress Report

Cody Regional Aquatic Habitat Biologist

Calendar Year 1999

Region-Wide Work

- Cutthroat Management Plans AW-SW-NA8-121

  For the YSC Management Plan, Internet files and ArcView GIS were used to make maps showing Cody regional boundaries, watershed boundaries, streams, and stream order. Additional GIS data, based on the WGF stream/lake database, was downloaded into two Cody computers for use in the YSC plan. MIS personnel provided the additional software needed to properly download the data.

- Regional Team Coordination and Assistance AW-CY-EB1-121

  Attended regional team meetings and helped develop, review, and rank trust fund proposals and grant applications prior to submission to Cheyenne staff. Project submission was coordinated with the Cody regional terrestrial habitat biologist and information and education specialist. Commented on Rocky Mountain Elk Foundation proposals. These consisted primarily of proposed habitat burns, but some would affect YSC streams.

  Developed a two-hour power point training session for Cody personnel.

  Investigated a bald eagle death at Buffalo Bill Reservoir and reported it to the regional Wildlife Supervisor.

  Helped the grizzly bear team tag and measure a grizzly bear.

- Coordination with Land Management Agencies AW-CY-EB1-140

  Participated in a interagency meeting with BLM and USFS. Discussed existing projects and future priorities for the aquatic habitat biologist.

  Attendance was not possible at the Worland interagency meeting, but FMCY presented my habitat information there. Follow up telephone calls were made to BLM to answer questions and discuss the potential for cooperation on the existing sauger project, which was discussed in more detail during a meeting in February.

  Met with Wyoming State Parks and Historic Sites concerning status and potential management of the Bear Tooth Ranch. Fishery and aquatic habitat recommendations were developed and included in the regional recommendations submitted to Cheyenne.

- Intermountain West Joint Venture Committee AW-SW-EB1-121

  Attended the statewide meeting at Casper where each agency gave updates on various projects.

- Computer User Group and Computer Network Maintenance AW-CY-EB1-141

  Served on the Fish Division computer committee, where the grant-tracking database was reviewed and modified to meet division standards.

  Assisted DA&I with connecting upgraded server hardware and converting to the new T1 communication system.

- Geographic Information System & Geographic Positioning System AW-CY-EB1-141

  Continued working with USFS to obtain their GIS data, but software incompatibility continues to cause problems.

  Obtained BLM digital orthophoto quadrangles covering part of the Cody region.

  Accurate maps were provided to regional personnel, including the Cody game warden for use in a court case, and the information and education specialist to guide volunteers to the Spence Cave so they could install a gate to protect bats. A rock drill was loaned to construction personnel to help install the gate in the cave.

  Considerable time and effort was spent to get ArcView GIS software working properly after the installation of Office 2000. A new version of ArcView is being purchased. Pathfinder GPS software was upgraded to Pathfinder Office, which also took time and effort since the company sent a disk with the wrong installation codes.

  Assisted FMCY with GPS equipment and software being used to map lakes and determine volumes for rotenone calculations.

- Park County Fair AW-CY-EB1-160

  Assisted with setting up and operating the WGF booth at the Park County Fair. Distributed a wide variety of materials and answered questions. Selected enlarged habitat photos for the photo display board, which concentrated on habitat values and improvements.

- Cody Office Habitat Display Board AW-CY-EB1-160

  Helped keep the display board updated with photographs, newspaper clippings, and habitat grant information.

- Habitat Extension and Trust Fund Proposals AW-CY-WD4-175, AW-CY-TF1-175

  Provided information concerning the WGF habitat grant program to several public groups and individuals. Assisted Cody regional personnel with their applications and coordinated computer file access rights with MIS so grant application forms could be accessed and applications submitted for regional review. All grants were reviewed, discussed, and prioritized with the regional team. Grants were forwarded to Cheyenne for further review and approval.

  Discussed habitat improvement practices and potential funding opportunities with 12 landowners or land managers in 1999. Assistance included discussions of wildlife needs, providing literature on specific topics, making on-site evaluations and recommendations, and development of project proposals for Department and other outside funding. Provided information about WGF grants and procedures to the Cody information and education specialist for inclusion into news releases and radio talk shows. Assisted landowners as a member of the Wapiti Ridge and Big Horn River Coordinated Resource Management teams, as a member of the new Kirby Creek Watershed

Management Group, and as part of local working groups for the USDA Farm Bill Program.

Bighorn Basin Lowland Waters - 2LW

Basin-Wide Work

- Knopp Reservoir Water Development Habitat Grant AW-CY-2LW-175

  In 1999, Mr. Knopp's project was submitted, initiated, and nearly completed. The NRCS provided additional Wetland Reserve funding, as well as engineers to survey the project. A small reservoir for fish was built, along with two silt detention ponds, which were located upstream from the reservoir. In spring 2000, the area will be fenced, trees and shrubs planted, and disturbed areas reseeded. Although the project is small, it is important to Powell and Cody anglers and hunters because he allows fishing in his ponds, as well as hunting on about 150 acres of uplands, free of charge.

- Schaeren Pond Habitat Extension AW-CY-2LW-175

  Discussed pond development in their subdivision with Mr. and Mrs. Schaeren, including depth requirements for fish, ratios of open water and emergent vegetation, bottom roughness, and adding man-made habitat structures prior to filling.

Horseshoe Reservoir CY520757BN

- Horseshoe Reservoir Rehabilitation FX-54-2LW-235

  This cooperative project between WGF (trust fund) and BR was designed to replace the leaking dam, replace the non-functional water level control structure, and install a new inlet that would prevent reinvasion by carp and suckers. The old dam did not meet State Dam Safety Act specifications. A rock infiltration gallery lined with fabric in the new inlet will prevent passage of carp and suckers into the rejuvenated reservoir from the irrigation canal supplying water to the pond.

  In 1999, problems with water rights, an archaeological survey, NEPA documentation, and applicable permits were resolved. After engineering designs were developed by a consultant and reviewed by both agencies, the project was contracted, and the entire dike and outlet structure were replaced. The inlet will be installed after the spring thaw in 2000. In an effort to identify a geotextile fabric that would screen out fish eggs and fry while still allowing enough water flow and not be plagued by silt blockage, Stahl reviewed literature and discussed the problem with manufacturers, Wyoming DOT, and others. Potential fabrics were identified, but the search for something better continues.

  After project bids were higher than expected, an additional $32,000 was sought and received from BR.

  With the Cody information and education specialist, wrote news releases to inform the public about the project, encourage anglers to keep fish from the reservoir prior to the dam breach, and inform the public about road detours and project progression.

  A Cody Boy Scout earned his Eagle Scout badge by organizing his troop and constructing forty fish habitat structures, which consisting of five tires apiece, for placement in the reservoir prior to refilling. The structures will be connected into chains as underwater reefs. WGF provided the hardware, while the scouts collected the tires and provided labor. A Lovell

Boy Scout is also earning his Eagle Scout badge by making additional structures that also be will be placed in the reservoir. In addition, a trailer load of unsold Christmas trees donated by Allen and Sheila Hasvold were picked up and delivered to the reservoir. Volunteers will assemble the trees into fish habitat structures when the tire structures are placed. A 404 permit was obtained for this activity.

Harrington Reservoir CY420715BN

- Harrington Reservoir Artificial Fish Habitat Development AW-CY-2LW-235

As part of an Eagle Scout project, Boy Scouts constructed 25 pyramid shaped fish habitat structures, each consisting of nine tires. WGF provided hardware, while the scouts gathered the tires and provided all the labor.

As part of a second Eagle Scout project, Boy Scouts designed and constructed a wooden-pole framework that straddles two canoes and supports a tire structure during delivery to the appropriate part of the reservoir. The scouts delivered and sank the structures at designated locations. A 404 permit was obtained for this work.

Ray Hageman, a WGF videographer, filmed the placement activity and produced a three-minute television spot to demonstrate the worthwhile efforts of the scouting program throughout the state and the need for habitat assistance.

Big Horn River, Lower and Tributaries - 2LB

Big Horn River CY821001BN and CY821001WE

- Big Horn River Sauger Habitat Inventory FX-CY-2LB-510

This project is a cooperative investigation between WGF and BLM. FMCY has the lead role, with assistance from Stahl and the BLM fish biologist. Study results are also detailed in the FMCY progress report.

In spring 1999, project plans, objectives, and techniques were developed, and two project biologists were hired. Equipment was obtained, including 35 radio transmitter tags bought with $3,000 provided by Worland BLM.

Some 2,192 sauger were electro-shocked and tagged between March 11 and November 17, 1999. Recaptures by electro-shocking, or by anglers, totaled 267 sauger, which is a 12.2% recapture rate. Fish traveled both upstream and downstream, with some individuals traveling from Greybull to Devil's Canyon in the Big Horn Reservoir.

During the tagging process, an attempt was made to find concentrations of fish indicating spawning sites. Although walleye spawning sites were located, no sauger spawning sites were definitely identified. Some gravid females were in proximity of the walleye spawning sites, but the number of sauger did not indicate major sauger spawning activity. While no spawning site could definitively be identified, Montana researchers found that sauger can spawn in a 1-2 day period when conditions are right, so this year's sauger spawning activities could possibly have been missed or they may have not spawned at all. Sauger are noted for sensitivity to spawning conditions, meaning sudden changes in temperature or flows may have affected spawning in 1999. Several fish were still full of eggs long after the expected spawning period and some even appeared to be reabsorbing the eggs. The search for spawning sites will continue in 2000 with emphasis in the Stucco area, just north of Greybull, which had higher concentrations of fish than did other river reaches.

Thirty-five sauger were implanted with radio transmitters between May 3 and May 5, 1999. Tracking of these fish continued through December 14, 1999 when ice conditions prevented boat access to the river. Saugers with transmitters were located 284 times. Some fish were located numerous times and others located only once or not at all. Anglers returned no transmitters and no non-functional transmitters were picked up during shocking operations. There may be a resident population in the river that moves downstream to spawn in the spring and then disperses back upstream for the remainder of the year. Also, adult fish may reside in Big Horn Reservoir until spawning time when they move upstream into the river. Some of the "river residents" moved little except during the spring spawning season.

Habitat data collected in 1999 included water velocity, water depth, bottom substrate, river width, habitat type, stream morphology, and bank stability. Two systems of sampling were utilized, stream cross section transects and random points established in conjunction with data taken whenever radio tagged fish were located. Multi-variate and uni-variate statistical analysis was used to evaluate the data. Velocity appears to be the main factor determining where sauger are found. Velocities less than 0.61 ms are preferred during summer and fall, with even slower velocities preferred in late fall. Sandy or silty substrates are apparently preferred, although this may be due to the slower velocities where we found the fish. Depths less than 3.3 feet were favored until late fall and winter when the fish were moving to deeper pools.

Population samples indicate between 42 and 96 sauger per mile on the Big Horn and Nowood rivers. With no historic population data available for the river, this may or may not be a normal population level.

Twelve sites were seined during a juvenile fish survey, but only two young sauger were located, both of which were in a side channel just above the Basin boat ramp. This side channel was nearly isolated from the main channel, mean depth was 2 ft, maximum depth was 4 ft, and substrate was sand and silt. Several other species of fish were found during the sampling (see FMCY progress report for details).

Coordinated with the Cody information and education specialist to produce news releases and interviewed with a Billing's Gazette reporter, which resulted in an informative article. Signs asking for information from anglers catching tagged fish or fish implanted with radio transmitters were placed at access points and popular "hot spots" on the river. Signs along the river frequently disappeared and had to be replaced. Tag return information received from anglers was entered with the mark-recapture data for analysis.

New landowners at the mouth of Nowater Creek contacted concerning placement of a sign were later enrolled in the PLPW program.

- Bighorn River Coordinated Resource Management Team AW-CY-2LB-175

Participated in the steering committee and technical review team. Periodically provided updates concerning the sauger project, as well as location, development, and known management of several reservoirs to be included in their inventory system. Funding was obtained from DEQ for stream monitoring. Discussed sampling techniques with the team, but did not help with the sampling due to other obligations. Commented on a CRM sponsored video being produced by Grunko Films on various habitat management activities.

Big Horn River, Upper and Tributaries - 2UB

Kirby Creek CY9246680HS and CY824740HS

- Kirby Creek Watershed Management Group AW-CY-2UB-175

  Attended organizational meetings and offered assistance as a committee member. The core group is made up of landowners living along the Kirby Creek drainage who are interested in improvement possibilities. Various agencies are also a part of this group. The WGF wildlife biologist, NRCS district conservationist, and a local conservation consultant recorded an aerial view of the drainage accompanied by narrated concerns. The tape was reviewed and discussed with the group. A first step will be to inventory the stream and its associated habitats. An inventory and problem identification proposal will be submitted to the EPA for funding.

Nowood River and Tributaries - 2NR

Box Elder Creek CY823820WE

- Box Elder Creek Habitat Improvement Project AW-CY-2NR-510

  A proposed habitat improvement project would fence the riparian area to exclude sheep and stabilize several banks with rock riprap and tree revetments. Although portions of the treatment site had healthy stands of willow along the banks, other areas were heavily grazed and characterized by tall, steep, eroded banks having little vegetative cover. At the upstream station, the stream was deeper, narrower, clearer, and had a dense willow and herbaceous riparian zone. Water quality, stream width, and the number of deep pools had been negatively affected at the lower site. One stream oxbow cut through in the spring of 1999 and other oxbows are also in danger.

  To obtain baseline habitat data from the creek prior to implementation of a habitat improvement grant, Stahl assisted the terrestrial habitat biologist and FMCY with collection of fish and habitat samples. Two stream reaches were sampled, one at the lower end of the proposed improvement site and one upstream from the improvement site. The lower site is within the area to be fenced, but is below the main disturbance area and has an extensive willow dominated riparian zone and mostly stable banks. These sites were selected because they were similar in appearance and provided a good comparison of fish numbers and habitat availability above and below the heavily disturbed area. Little, if any, fish habitat is available within the heavy disturbance area. Fish species were identified, the fish population was estimated, and PMB data were collected (Table 1).

  PMB for trout was slightly higher in the stable section below the disturbance but these results are somewhat deceptive. Major disturbances can have a significant impact on measured biomass and cannot be realistically accounted for in the PMB model. Although the total estimate is slightly higher, the type and quality of habitat is different between sites. The upstream site has larger and deeper pools whereas the downstream area has many small pockets of cover. When water is clear and no longer provides adequate visual protection, some of these pockets may not be cover. At the upstream station, 14% of the bottom substrate had materials >3 inches in diameter, while the downstream site had only 2%. Sand/silt substrate increased from 45% upstream to 52% downstream of the disturbed area, a distance of about 1.5 miles.

Table 1. Box Elder Creek PMB and fish population estimates, August 10, 1999.

Reach location	Elevation (ft)	Gradient (%)	Cover (%)	Late summer width (ft)	PMB estimate (lbs/acre)	Electrofishing estimate (lbs/acre)	PMB / population difference (lbs/acre)
Undisturbed area	5040	0.8	24	10.8	45	19	26
Proposed treatment area	5000	1.5	20	13.2	52	5	47

Native nongame species (suckers and dace) heavily dominated the proposed treatment site, while the upstream, less undisturbed area was dominated by rainbow and brown trout.

These data indicate the proposed habitat improvement can be expected to assist bank revegetation, help stabilize banks and meanders, improve water quality, and narrow and deepen the stream, thus providing better habitat for trout. Some modifications were suggested for the Box Elder Creek Riparian Project Proposal, and were included in the final draft, which was then approved by the regional team for submission to Cheyenne for trust fund dollars.

Paintrock Creek Drainage - 2PR

Medicine Lodge Creek CY823130BN

- WGFD/Wyoming State Park and Historic Sites Agreement AW-36-2PR-140

  Commented on agreement renewal and deeding the campground and historic site portion of the WHMA to State Parks and Historic Sites. Aquatic comments primarily centered around stream bank management, riparian management, vegetation management, erosion control, permitting practices, and limiting further development due to the potential for habitat degradation and overuse of the fishery.

Clark's Fork River Drainage - 2CF

Clark's Fork River CY882020PK

- Lower Clark's Fork Stream Habitat Improvement Project FX-CY-LC6-234

  Cable and cable clamps for use in maintaining the in-stream structures were purchased, which completes the budgets for both the random tree placement and boulder structure maintenance projects. Individual sites were monitored for maintenance needs and very little change could be found in any of the structures.

- Clark's Fork Grazing Allotment AW-CY-2CF-540

  Commented on the new allotment plan and discussed it with BLM. They agreed to delay fall grazing by a month and added several bits of critical information to the document that had accidentally been left out. The rancher has asked for a different grazing system. Suggestions and comments were provided to BLM for discussion with the rancher prior to reworking the EA.

Squaw Creek CY883700PK

- Squaw Creek Riparian Grant AW-CY-2CF-234

  This cooperative project neared completion in 1999. Primary sponsors were the Park County Road and Bridge Department and the USFS, but DEQ, the Fish and Wildlife Foundation, and WGF provided additional funding. Much of the earth moving work was done by the Park County Road and Bridge Department.

  A portion of the Squaw Creek Road was located within the riparian zone and contained three culverts too small to handle high flows, thus making the area prone to annual spring washouts, as well as causing considerable aggradation upstream and scouring downstream. These culverts also prevented adequate fish passage. A large arch culvert was installed at the up-stream site and the two other culverts, along with the section of road, were removed from the riparian zone. A new road was constructed on the adjacent hillside and the old roadbed was removed and reseeded. Some additional reseeding is planned for spring 2000 and the local TU chapter will plant willow shoots in the riparian area.

  Collected PMB measurements at two fish population data stations. Both fishery and habitat data will be used to determine effects of culvert and road removal. A laser level was used to take additional elevation measurements along the thalweg of the creek above and below each culvert to be modified or removed. These measurements will evaluate any change in stream gradient following culvert removal.

  Predicted potential biomass was lower than the electrofishing estimate (Table 2). Much of this difference may be due to collection of PMB estimates a month later than the fishery estimates, when water flow, depth, and stream width were markedly lower. During the PMB sampling, fish were also noticeably absent from sites that held fish during the population sampling. The only fish still remaining during PMB sampling were located in the few remaining deep pools. If fish and PMB data will determine management of the fisheries, both samples need to be taken at the same time. Also, sampling dates need to be selected to meet specific objectives or specific seasons.

Table 2. Squaw Creek PMB (September 29, 1999) and population estimates (August 25, 1999).

Reach location	Elevation (ft)	Gradient (%)	Cover (%)	Late summer width (ft)	PMB estimate (lbs/acre)	Electrofishing estimate (lbs/acre)	PMB / population difference (lbs/acre)
Between culverts	6880	3.1	6.8	9.1	59	77	-18
Lower station	6780	2.7	7.0	8.7	56	82	-26

Sand Coulee Reservoir CY080028PK
Fubar Reservoir CY480054PK
Ruff Reservoir CY480053PK

- Sand Coulee Riparian Habitat Grant FX-CY-2CF-235

  Several fiscal problems within BLM caused delays. Also, estimated construction cost was much higher than initial figures. But some work was done in 1999 when Sand Coulee Silt Detention Pond was repaired and a new overflow structure was installed. This work will protect Fubar Reservoir and the Clarks Fork River from a silt flow if the detention pond failed. Rock riprap was also hauled and placed on the reservoir's dike.

  Further work will deepen the reservoir 5 ft by extending its outlet vertically. The new outlet on the detention pond was installed poorly and will require repair using BLM maintenance funds. Unfortunately, Ruff Reservoir will probably not be improved as originally planned. High cost estimates and problems within BLM require that this project be delayed. Consequently, WGF funding for this portion of the original agreement was rescinded and placed back into the trust fund account for use on other projects.

Sunlight Creek CY882500PK

- Sunlight Creek Bank Stabilization FX-28-2CF-234

  Tree and rock bank revetments installed in 1997 continued to function properly, but the revetment near the cabins was extended upstream slightly in 1999. Six trees and rock riprap were placed on the downstream side of a narrow stream meander where the creek was cutting into the bank. Cody and Sheridan construction personnel did this work, including 404 permitting. Monitoring will continue.

Greybull River Drainage - 2GR

Basin-Wide Work

- Greybull River Easements AW-CY-2GR-201

  The Nature Conservancy requested input concerning possible easement purchase opportunities for fish and riparian habitat at Greybull River, Wood River, Timber Creek, Franc's Fork, and Jack Creek. The conservancy had recently acquired some easements for upland species near Meeteetse and felt that some of the newer landowners would be receptive to additional riparian and aquatic easements. Stahl suggested proper riparian management, irrigation turnouts, and improving YSC trout habitat.

Luce and Hogan Reservoirs - 2LH

Luce and Hogan Reservoirs CY480180PK, CY480176PK

- Luce and Hogan Reservoirs FX-CY-2CF-235

  Goal of this proposed fish habitat project is to allow increased depth for more winter fish habitat. Met with Steve Pechacek concerning initial survey information to identify costs of improving the dikes, replacing water outlets, and riprap. Later, the WGF survey crew obtained the needed measurements. Final calculations and water rights clarification are still needed.

Lower Shoshone River Drainage - 2LS

White Drain CY821138BH

- White Drain Riparian Habitat Grant AW-CY-2LS-234

  This project was a cooperative project between Mr. and Mrs. White, Mr. Burchall Hopkins, NRCS, and the USDA Wetland Reserve Program. WGF contributed funding through a riparian habitat grant. After the pond dike, water control structures, and irrigation diversion structure were completed, the pond was filled with irrigation return flows that had passed through a grass bio-filter that trapped much silt. Trees and shrubs were planted and waterfowl nests were erected. The lower end of the drain was cleaned and the mouth was reshaped where it entered the Shoshone River. Further assistance will be provided to develop spawning habitat in the lower drain.

Newton Lakes - 2NL

East Newton Lake CY320078PK

- East Newton Lake Environmental Protection FX-CY-2NL-540

  Helped design and locate an infiltration gallery to prevent perch and suckers, or their eggs, from moving into East Newton Lake when West Newton Lake overflows. Although this is a rare event, overflow appeared possible in 1999 due to high water conditions. The rock dam structure placed in the connecting waterway has a geotextile fabric and gravel face. A location was identified to allow filtration without backing water above an elevation designated by BR. Water above this elevation could cause bank instability in a nearby irrigation canal.

West Newton Lake CY320076PK

- West Newton Lake Rehabilitation FX-CY-2NL-430

  Fishery rehabilitation was scheduled for West Newton Lake in 1999, but high water levels in the lake would have required too much rotenone. To reduce the amount of chemical required for the rehabilitation project, FMCY pumped water from the west lake to the east lake. The water was passed through an infiltration gallery to prevent passage of undesirable fish or eggs. This process should have also modified water chemistry in the second lake, making it more productive.

  Instructed FMCY in use of GIS and laser level equipment for mapping lake volume, which was needed to calculate the proper amount of rotenone for rehabilitation of the lake. Some coordination of GPS and GIS files was also undertaken with WGF engineers during this process.

  Instructed FMCY in operation and maintenance of the system used to pump excess water from West to East Newton Lakes. A local TU member volunteered the tractor and the pump was a WGF power-take-off pump. Assisted during the rotenone project, clean up, and removal of the drip system.

Upper Shoshone - N. and S. Fork Shoshone - 2US

Basin-Wide Work

- Wapiti Ridge Coordinated Resource Management Team AW-CY-2US-175

  Continued as a member of the steering committee and the funding technical review team. The CRM continues to be active and is progressing forward with a variety of projects. Volunteers continued to monitor elk numbers and locations in conjunction with WGF aerial surveys. Rangeland was monitored utilizing photo points and production and utilization cages. Montana State University collected data concerning rangeland production, utilization, elk numbers, elk and cattle competition, heavy use areas, and ranch management issues.

  Assisted with a CRM open house/ice-cream social attended by about 150 people. A slide show explained what the CRM was and what it was doing. Local ranchers answered questions about their ranches and provided hunter access permission slips.

  For another CRM project, a WGF range pitter was repaired and provided to the TE Ranch where 20-30 acres were pitted to demonstrate how pitting can improve water infiltration, vegetative establishment, vegetative vigor, species diversity, and reduce erosion.

  The CRM and local groups also undertook several other projects. The local TU Chapter worked seven days fencing a spring and about a quarter mile of a small, unnamed tributary to the South Fork of the Shoshone River. Some willows were also planted and fenced. Photographic monitoring of willow use, riparian condition, and water quality was initiated. Sagebrush and limber pine areas were burned for rangeland improvement, and an electrified fence surrounding a small aspen exclosure was maintained. A coordinator was hired to assist the CRM with project proposals and oversight.

Newton Creek CY821690PK

- Newton Creek Bridge Riparian Habitat Grant AW-CY-2US-236

  A cooperative effort continued toward replacing a culvert with a full span bridge rather than replacing it with a larger culvert that would reduce but not solve the problem. Several delays have occurred due to priorities, funding, and organizational problems within USFS, but the bridge is scheduled for installation in April 2000. Scoping, decision statements, NEPA, permitting requirements, engineering, and contract development have been completed. The project will remove a creek restriction, improve stream dynamics, bedload movement, and fish passage. Conifers in the surrounding campgrounds will be thinned in May 2000 to help re-establish a grass/shrub community by allowing more sunlight to reach the ground. In turn, the increased vegetation will stabilize soil and reduce erosion of creek banks. TU volunteers also plan to sprig willow shoots in the area.

  Due to paperwork problems with this project, a standard grant agreement was developed to meet the needs of both USFS and WGF. Development of this agreement, coordinated by Karen Wilson, will reduce time and paperwork requirements for future cooperative projects. This was a progressive step by both agencies.

- Newton Creek Habitat Assessment AW-CY-2US-510

  As part Of the Level 1 basin habitat survey, reviewed the basin management plan. Took photos at the mouth, above and below the replacement culvert, and at several locations higher in the drainage. Walked the stream to get a feel for general system dynamics and conditions affecting fish spawning. Several natural fish barriers were discovered. Fish may be able to pass over the first barrier at high water, but probably cannot get past the second barrier, which has a nine-foot drop. Only young of the year trout were observed during this visual survey and no fish were seen above the first barrier. Moving upstream, the drainage classification changes several times until it becomes a tight canyon with an "A" stream channel. Banks are high, steep rock walls, and the shallow, smooth creek bottom is bedrock. Fish habitat there is non-existent. Instream barriers in the canyon prevented passage to the upper drainage; access to the headwaters is overland only. Without inspection, fish habitat condition above the canyon remains unknown. Further inventory and measurements will be scheduled for 2001, especially in the lower section where trout currently spawn.

Trout Creek CY821510PK

- Trout Creek Inventory AW-CY-2US-510

  With FMCY, collected PMB and fish population data on Shoshone National Forest land immediately above the Trout Creek Ranch (Table 3). The Trout Creek ranch manager was present during some of the inventory to provide his insight on the drainage. Calculated potential for this stream is not much higher than what was documented to be present. This conclusion agreed with visual observations made by fisheries and habitat personnel. Instream habitat is small pocket pools with a few larger and deeper lateral scour pools. By September, habitat for adult fish is much reduced by lower flows, and by winter, very little habitat is present. The stream is, however, an important spawning tributary for adult fish migrating from the North Fork of the Shoshone River and Buffalo Bill Reservoir. Although the drainage also has rainbow trout and is not free from hybridization, the stream is managed primarily as a YSC spawning tributary and is currently being stocked by helicopter with pure YSC YOY.

Table 3. Trout Creek PMB and Population Estimates, September 15, 1999.

Reach location	Elevation (ft)	Gradient (%)	Cover (%)	Late summer width (ft)	PMB estimate (lbs/acre)	Electrofishing estimate (lbs/acre)	PMB / population difference (lbs/acre)
Trout Creek USFS property	5920	2.8	4.8	21	53	43	10

- Trout Creek Irrigation Diversions FX-CY-2US-236

  Four irrigation diversions located on the Trout Creek Ranch serve the ranch, other farmers, and the Wyoming State Parks and Historic Sites land north of Buffalo Bill Reservoir. These structures pass many fish from the creek to irrigated meadows. Screens placed over the headgates prevent some fish loss, but young trout can still pass through the openings. The screens easily clog with debris or moss and are often removed by other water users. To obtain water at some headgate locations, water users must modify the stream channel annually, which sometimes causes bank damage. Met on-site with the landowner, various irrigation interests, TU, USFWS, NRCS, and FMCY to discuss potential improvements. Also met with USFWS personnel from Montana and Colorado to obtain input based on their work with bull trout. Various headgate improvements designed to prevent fish loss were discussed along with in-stream structures designed to help bank stabilization and water flow to headgates. Initial plans were made to repair the stream damage and replace headgates with turbulent fountains in 2000. Funding will be sought from various organizations with the USFWS Private Lands Program and TU being the primary funding contacts. USFWS engineers will survey the stream reach containing the headgates and produce initial stream improvement designs.

Whit Creek CY821530PK

- Whit Creek Dam Structure AW-CY-2US-540

  A concerned citizen reported a potentially illegal structure developed by a private landowner on Whit Creek. Fish passage was the main concern. Discussions with the FMCY and Cody warden indicate that the structure may not be new and may not be a fisheries concern. Time restraints prohibited an on site review.

Regional Aquatic Habitat Management Progress Report

Green River Regional Aquatic Habitat Biologist

Calendar Year 1999

Region-Wide Work

- Habitat Extension - Trust Fund Grant Program AW-GR-TF1-175

  The Green River Region Team met in January 2000 to review and prioritize regional trust fund proposals for riparian, water development, and industrial water categories. Reviewed three grant projects and seven internal project proposals. With some modification, all proposals were recommended for funding approval and forwarded to Cheyenne.

  The Little Mountain Project Biologist developed a database to track details of regional trust fund grant projects; this database has been adopted for statewide use.

- Habitat Displays at Public Meetings AW-GR-EJ1-160

  The project biologist gave a presentation on the Little Mountain Watershed Restoration Project to a large group of fisheries, wildlife, zoology, and agriculture graduate students and faculty at the University of Wyoming in February. A habitat display depicting watershed restoration work was exhibited at the Rock Springs and Green River open house meetings dealing with big game seasons.

- Aquatic Habitat Workshop AW-GR-EJ1-180

  Participated in the aquatic habitat section workshop held at Lander in June.

- Coordination with Land Management Agencies AW-GR-EJ1-140

  Annual coordination meetings were held with Rock Springs BLM and Ashley National Forest personnel during January. Discussed a variety of topics including habitat management issues.

  Met with Rock Springs BLM personnel to discuss proposed grazing management plans for the Currant Creek Watershed and Sugarloaf Allotment. New permittees wanted to graze cattle in 1999 at upper Currant Creek, which is where watershed restoration has been done. Since all riparian areas on Currant Creek and the Sugarloaf Allotment failed BLM riparian habitat standards and guideline evaluations in 1998, WGF personnel expressed concern about how grazing could adversely effect CRC habitat in Currant Creek and the need to maintain the integrity of watershed restoration efforts.

  Met with Ashley Forest, BR, and BLM personnel to discuss and plan installation of a proposed TU gradient control/fish barrier structure near the confluence of Currant Creek and Flaming Gorge Reservoir. Discussions also included riparian exclosure fencing on USFS and BLM lands on lower Currant Creek.

Lower Big Sandy River Basin 3BS

Big Sandy River GR842340SR, GR842340SR, GR843340SR

- Riparian Green-Line Surveys FX-GR-SW1-511_

  Green-line transects were established on the Big Sandy River in 1993 to monitor response of riparian vegetation to water tables elevated by rock sills constructed by TU. These transects were scheduled to be read during 1999, but unusually high summer flows flooded the green-line sites and prevented transect measurement.

- Population Surveys on the Big Sandy River FX-GR-3BS-511_

  Scheduled fish population surveys on the lower Big Sandy River were not completed due to high flows during summer.

- Big Sandy CRM AW-GR-SW1-175

  Attended several Big Sandy Working Group meetings during 1999. To improve riparian habitat conditions along the Big Sandy River, several fencing and upland water developments have been proposed; however, consensus has not yet been reached on a specific comprehensive grazing management plan. More recently, the group has been developing a plan to monitor riparian vegetation within the river corridor. This plan will evaluate progress towards meeting improvement goals and objectives, and is expected to be incorporated into the comprehensive grazing management plan.

  Measured willow height, browsing frequency, and current annual growth at two locations on the Big Sandy River below Gasson Bridge. This information will help establish long term monitoring for the willow community and also provide the working group with baseline data so riparian vegetation recovery objectives can be established.

- TU Rock Sill Project FX-GR-3BS-175

  Advised the local TU chapter about riparian habitat benefits that can be expected if additional rock sills are installed on BR land on the lower Big Sandy River. This information was used in an environmental assessment for a proposal to build more rock sills downstream from existing sills.

Eastside Flaming Gorge Tributaries Basin 3ES

Basin-Wide Work

- Aspen Regeneration Monitoring AW-GR-3ES-511

  A concern of the Little Mountain Watershed Enhancement Project is ungulate browsing of young aspen to the extent that they do not grow into mature trees. To monitor this problem, several sites were measured in early fall to determine the quality of aspen regeneration and wildlife utilization.

  Aspen regeneration was measured at five prescribed burns within the Little Mountain watershed project in 1999. Average aspen sapling height was 5.1 ft; frequency of browsed stems was 30%. Since 1995, aspen regeneration height, browse frequency, and stem densities have been measured at the Harris Spring treatment site, which serves as a representative site to evaluate aspen response to prescribed fire treatment (Table 1). Aspen stem

density was not monitored after 1998 because all sites exceeded the minimum 6 ft height needed for successful aspen stand replacement.

Table 1. Trends in aspen regeneration response at the Harris Spring site.

Years after treatment	Stems/Acre		Average height (ft)		Stems browsed (%)	
	Within cage	Outside cage	Within cage	Outside cage	Within cage	Outside cage
1995	124,000	104,000	1.78	1.04	1	35
1996	48,000	31,000	2.96	2.38	16	70
1997	30,000	30,000	3.94	2.84	51	75
1998	15,000	13,000	5.06	3.50	64	70
1999	NA	NA	5.64	4.41	0	32

- Project Funding FX-GR-3ES-135

FY00 funding from the habitat trust fund was approved for the project biologist position. Also funded were salaries for Habitat and Access Maintenance Crew work on grade control structures at the Currant Creek Ranch. Funding was solicited and approved by BLM and the National Mule Deer Foundation for a prescribed burn in the Upper Sage Creek Watershed during spring 2000. A status and evaluation report on the beaver habitat maintenance and transplant project was written at the request of the USFWS-Partners for Wildlife Program. This status report was submitted, but status of the funding proposal remained unknown despite several attempts to contact the USFWS representative.

Red Creek GR845860SR

- Prescribed Burns AW-GR-3ES-454

During spring 1999, BLM fire crews did a prescribed burn on 700 acres of sagebrush-grassland and scattered juniper in the Red Creek Watershed between Hazel Creek, June Creek, and Little Red Creek. An additional 1,800 acres of similar vegetation was burned during September at Ely Creek in the Red Creek Watershed. These burn treatments are expected to diversify wildlife habitat and enhance vegetative ground cover to improve watershed function.

Currant Creek GR841200SR

- Beaver Transplant Evaluation and Habitat Maintenance AW-GR-3ES-511,440,730

Beaver transplanted to upper Currant Creek Ranch in late summer 1998, and supplemented with fresh cut aspen trees at the release site, built dams and over-wintered at this location. During spring 1999, high stream flows and sediment deposition breeched most of the dams. Subsequently, a pair of beaver moved 3-4 miles downstream to create problems by damming culverts near the ranch buildings. These beaver were then live-trapped and relocated to middle Trout Creek. During September, a single beaver was live-trapped from an irrigation diversion structure on the Currant Creek Ranch and transplanted to Little Red Creek.

- Currant Creek Grade Control Structures FX-GR-3ES-440

  In April, developed a proposal to construct two instream rock sills on the Currant Creek Ranch to control gradient and slow upstream progression of head-cuts so riparian habitat can be maintained. Met with a representative of Rock Springs Grazing Association (RSGA) to discuss the proposal and the Little Mountain Watershed Enhancement Project in general. He said that USFS and BR had already approached him with a comprehensive instream structure plan that included significant federal cost share opportunities. In August, RSGA rejected the WGF project proposal in favor of the larger federal project, which was not implemented during 1999.

  Large angular rock was added to a grade control structure at the confluence of Dry Hollow and Currant Creek for increased stability and improved function. This structure is slowing the upstream migration of an active head-cut, thus preserving trout habitat upstream from the headcut.

  Provided technical advice to USFS and TU for a combination grade control/fish barrier structure that was constructed by BR in October 1999 on lower Currant Creek. Located near the high water line of Flaming Gorge Reservoir, the structure should provide a more consistent base level for the stream than the fluctuating reservoir. BLM and USFS erected a riparian corridor fence to exclude livestock so riparian habitat can recover on 2-3 miles of Currant Creek upstream from Flaming Gorge Reservoir.

- Woody Riparian Vegetation Exclosures FX-GR-3ES-440,401,511

  Panel exclosures were erected around relic willow stands in headwaters of West Fork Currant Creek. Preservation of these willow stands will maintain a seed source to aid seedling establishment in downstream areas currently lacking woody riparian vegetation.

- Grazing Management AW-GR-3ES-140,160

  Commented on the transfer of the livestock-grazing permit for the BLM Sugarloaf Grazing Allotment, which includes most of the Currant Creek drainage. Toured the area with the new grazing permittee and BLM personnel to review completed work and future goals of the Little Mountain Watershed Enhancement Project.

  During October, measured annual willow heights and frequency of browsing at permanent transects inside and outside a 3-acre livestock exclosure at upper Jane's Meadow.

- Habitat Quality Index and Green Line Monitoring AW-GR-3ES-511

  HQI trends were monitored at five stations on Currant Creek. These sites included: (1) Between East Fork and Dipping Springs (T14N., R106W, S1, SW ¼), (2) Below Dipping Springs (T14N, R106W, S25, SW ¼), (3) Dry Hollow (T14N, R106W, S14, SW ¼), (4) Upper Jane's Meadow (T14N, R106W, S11, SE ¼), and (5) Lower Jane's Meadow (T14N, R106W, S11, SE ¼). Average stream channel width and depth increased at all stations sampled between 1996 and 1999, while average channel width:depth ratios decreased at all five stations sampled in 1999. These improvements in the stream channel may be attributed to better watershed conditions caused by the cumulative effects of prescribed burn treatments and more precipitation in recent years. These factors have improved upland watershed vegetation and function, thus

resulting in a higher base flow in Currant Creek and better stream channel condition.

Three riparian green line transects were measured for baseline data on Currant Creek in 1999 at sites 1 and 2 (see above), as well as at lower Currant Creek (T15N, R107W, S30, SE ¼)(Tables 2,3, and 4). These sites were selected to monitor trends in riparian vegetation recovery in both the upper and lower portions of the drainage.

Table 2. Green line vegetative species composition in 1999 at lower Currant Creek (T14N, R107W, S30, SE ¼).

Community type	Cross section composition (%)	Green line composition (%)	Ecological rating	Stability Class	Stability Index
Upland grass	4.1	3	Early	3	0.09
Sedge	7.5	22	Late	9	1.98
Rush	21	20	Late	9	1.8
Forbs	57.5	41	Early	3	1.23
Dry shrubs	3.4	0	-	-	-
Wet shrubs	1.5	0	-	-	-
Bare ground	5.5	11	Early	1	0.11
Woody debris	0	3	Late	4	0.12

Table 3. Green line vegetative species composition in 1999 at middle Currant Creek (Below Dipping Springs, T14N, R106W, S25, SW1/4).

Community type	Cross section composition (%)	Green line composition (%)	Ecological rating	Stability Class	Stability Index
Upland grass	74.5	56	Early	3	1.68
Sedge	1.8	12	Late	9	1.08
Rush	0.0	7	Late	9	0.63
Riparian grass (Hairgrass)	2.7	1	Early	3	0.03
Forbs	9.5	5	Early	3	0.15
Dry shrubs	7.7	0	-	-	-
Bare ground	3.2	7	Early	1	0.07
Woody debris	0.5	12	Late	4	0.48

Table 4. Green line vegetative species composition in 1999 at upper Currant Creek (Between East Fork & Dipping Springs, T14N, R106W, S1, NW1/4).

Community type	Cross section composition (%)	Green line composition (%)	Ecological rating	Stability Class	Stability Index
Upland grass	64.1	52.8	Early	3	1.58
Sedge	0.6	6.4	Late	9	0.58
Rush	0.0	7.8	Late	9	0.70
Riparian grass (Hairgrass)	0.0	4.9	Early	3	0.15
Forbs	2.8	18.3	Early	3	0.55
Dry shrubs	19.4	2.2	Early	4	0.09
Wet shrubs	6.3	0.3	Early	7	0.02
Rock	6.9	0.6	Early	1	0.01
Bare ground	0.0	6.1	Late	10	0.61

Trout Creek GR841975SR

- Beaver Transplant Evaluation and Habitat Maintenance AW-GR-3ES-511,440,730

A large-scale landslide added much sediment to Trout Creek during May 1999. Consequently, ponds filled with sediment and the dams breeched at a beaver colony located below the Narrows of Trout Creek. Fluvial deposition also filled a three-pond complex further downstream that had been created in fall 1998 by transplanted beaver. This bedload event forced both resident and transplanted beaver to abandon their pond complexes. During September 1999, the University of Wyoming Cooperative Research Unit released 11 more beaver at the original transplant site in an effort to reestablish the colony. These beaver were fitted with radio collar telemetry before being released, and the researchers conducted an aerial flight in November to relocate each beaver. Of eleven beaver released in 1999, seven had survived. Three had moved from Trout Creek to the West Fork Currant Creek and were refurbishing old dam complexes there. Another pair was constructing dams in the headwaters of Trout Creek, while the remaining pair of beaver had moved downstream into Sage Creek.

Sage Creek GR841970SR

- Sage Creek Watershed WHAM Survey AW-GR-3ES-511

Conducted a level I WHAM baseline stream reach inventory for the upper Sage Creek watershed, including tributaries of Trout Creek, Gooseberry Creek, and Camp Creek. Collected WHAM level II HQI and green line data from two stations on upper Sage Creek, and one station each on upper Trout and Camp creeks. FMGR surveyed fish populations at the same sites and dates. Upland WHAM measurements are planned for the upper Sage Creek watershed in late spring 2000.

Gooseberry Creek GR841977SR

- Post-Burn Mountain Shrub Transects AW-GR-3ES-511_

  Mixed mountain shrub stands in the Gooseberry Creek drainage were treated with a prescribed fire mosaic in spring 1996. Goal of the treatment was to enhance wildlife habitat and upland watershed function by diversifying vegetative species and age classes while improving overall plant community vigor and health. Permanent belt transects were read in 1995 (pre-treatment), 1996 (post treatment), and again in 1999 (4 years post burn) to evaluate burn effectiveness and the response of shrubs to prescribed fire. In 1999, recruitment of seedling and mature mountain shrub plants into the community increased over 1996 levels, indicating an improving trend in age class composition.

Little Red Creek GR045080SR

- Beaver Transplant Evaluation and Habitat Maintenance AW-GR-3ES-511,440,730

  In 1998, a colony of beaver became established in lower Little Red Creek as a result of recent transplants made at Red Creek. During 1999, this colony of beaver constructed additional dams that survived high spring flows. These ponds have elevated the water table and enhanced nearby willow growth.

- Willow Density and Height Class Monitoring AW-GR-3ES-511

  During August, measured baseline willow density and height class at three transects on Little Red Creek to monitor trends in riparian habitat.

- Gully Plug Structures AW-GR-3ES-440

  Cut and placed several juniper trees in three ephemeral tributaries of Little Red Creek to serve as sediment catchments. By trapping sediment, this woody debris will help vegetative recovery, stabilization of gullies, and reduce silt loads entering Little Red Creek.

Muddy Creek Drainage Basin 3MC

Basin-Wide Work

- Grizzly WHMA/Red Rim WHMA/Muddy Creek CRM AW-39-UM1-452,175,530

  Area Improvement Project Agreement activities scheduled and completed by the Grizzly/Red Rim grazing lessee included: repaired windmill six and the roof of the open face shed on the Red Rim WHMA. At the Grizzly WHMA, repaired the livestock shipping scales at headquarters and two upland water developments in Deep Gulch and Cabin Draw. He also purchased and delivered 30 cuyd of angular rock for construction of instream habitat improvement structures at upper Littlefield Creek.

  In 1999, Rawlins BLM personnel completed a standards and guidelines evaluation report for the livestock grazing allotment on the Grizzly WHMA. This evaluation indicated great satisfaction with the riparian habitat response resulting from grazing management strategies implemented during the past seven years. As a result, BLM proposed increasing authorized grazing use levels by 200 cattle per year to establish the true multiple use livestock carrying capacity of the Grizzly WHMA and provide a

stewardship incentive reward to the grazing permittee. Although general riparian habitat condition has improved, site-specific aquatic habitat and riparian management objectives have not been met, and WGF representatives did not agree that grazing use should be increased while still attempting to achieve habitat objectives. BLM then abandoned the idea of increasing grazing as originally proposed. However, in 1999, BLM allowed the permittee to run 200 additional yearling cattle on the Grizzly WHMA by reducing season of use and not exceeding total available AUMs.

Spence participated in two separate meetings and a field tour for the Muddy Creek CRM in 1999. Discussions centered on CRC restoration work at Littlefield Creek and range improvements associated with grazing management in the upper Muddy Creek Watershed. During October, toured the Grizzly WHMA with the lessee, LSRCD coordinator, and BLM to examine grazing management on the Shipping, Wild Cow, Deep Gulch, and lower Littlefield riparian pastures, which were at acceptable levels. Livestock deferment again in 1999 continued to promote desirable riparian vegetation responses in both the upper and lower Muddy Creek riparian pastures; however, a less than desirable vegetative response to grazing use was observed in both the upper Littlefield Creek and Dennison Pastures.

Rawlins BLM personnel completed prescribed burns within sagebrush-grassland communities in the upper Littlefield Creek and Shipping Pastures at the Grizzly WHMA. BLM efforts achieved a desirable 30-40% mosaic of blacked areas, which is expected to enhance wildlife habitat and watershed function. BLM prescribed burns conducted during September on adjacent grazing allotments appeared very large and lacked desirable mosaics for wildlife. Spence feels these large burns may have undesirable cumulative effects on wildlife habitat in the South Rawlins Area.

- Stream Temperature Monitoring FX-GR-3MC-511

  Measured summer and winter stream temperatures at four stations on upper Muddy Creek upstream of the fish barrier and two stations on Littlefield Creek. These data will help identify intervals and durations when stream temperatures become stressful or limiting for trout and will be collected annually to determine trends.

Muddy Creek GR871040CN

- Willow Community Monitoring AW-39-3MC-511

  During October, read willow height class/browse use transects and photo points inside and outside the exclosure at the confluence of Lake Draw and Muddy Creek. Each belt transect is permanently marked by steel fence posts on each end, is 12 ft by 185 ft, and is 12 ft from water's edge on the west streambank. Average willow height inside the exclosure was 1.34 ft in 1999, compared to 0.79 ft in 1998. Average willow height outside the exclosure in 1999 was 0.94 ft. Frequency of willow browsing was 14% inside the exclosure and 45% outside. This annual monitoring will help evaluate trends in willow community re-establishment and browsing effects so grazing management strategies can be developed to address riparian habitat objectives for the Grizzly WHMA.

- HQI Surveys FX-39-3MC-511

HQI surveys were completed for both Muddy Creek stations during September. Stream habitat objectives in the Red Rim/Grizzly HMP call for the stream channel to become 40-50% narrower, and 30-40% deeper, by 2000. By 1999, the channel at the lower station had narrowed 35%, and deepened 40%, compared to 1991 (Table 5). Streambanks rated at 85% eroded in 1991 had decreased to 0% by 1999.

Table 5. HQI parameters measured at the lower Muddy Creek Station (T17N, R89W, S32)

Stream habitat components	1991	1993	1995	1997	1999	Percent change
Average stream width (ft)	7.1	5.5	6.5	5.8	4.6	-35
Average stream depth (ft)	0.6	0.6	0.7	0.7	0.8	+40
Steam discharge (CFS)	1.7	1.8	1.9	2.5	2.8	
Cover (%)	10	30	30	30	17	+7
Eroded bank (%)	85	65	17	5	0	-100
HQI Score	3.7			17.1	7.7	+108
Habitat Unit	9.2			22.0	13.1	+42

At the upper station, the stream channel narrowed 31%, and deepened by 70%, since 1991 (Table 6). Streambanks rated at 20% eroded in 1991 had decreased to 0% by 1999.

Table 6. HQI parameters measured at the upper Muddy Creek Station (T16N, R89W, S3).

Stream habitat components	1991	1993	1995	1997	1999	Percent change
Average stream width (ft)	3.4	2.9	3.1	2.5	2.3	-32
Average stream depth (ft)	0.3	0.4	0.4	0.4	0.5	+67
Steam flow (CFS)	0.6	0.8	0.4	0.8	0.9	
Cover (%)	12	20	30	30	10	-2
Eroded banks (%)	20	20	10	16	0	-100
HQI Score	5.4			6.1	2.2	-59
Habitat Unit	10.8			12.0	7.8	-28

Littlefield Creek GR871240CN

- HQI Surveys FX-39-3MC-511

HQI surveys were completed for both Littlefield Creek stations during September. Stream habitat objectives in the Red Rim/Grizzly HMP call for the stream channel to be 40-50% narrower, and 30-40% deeper, by 2000. In 1999, the stream channel at the upper station was 14% narrower and 40% deeper than in 1991 (Table 7). Streambanks rated at 30% eroded in 1991 had decreased to 0% by 1999.

In 1999, the stream channel at the lower station was 13% narrower, and 55% deeper, than in 1991 (Figure 8). Streambanks rated at 10% eroded in 1991 had decreased to 3% by 1999.

Table 7. HQI parameters measured at the upper Littlefield Creek station (T17N, R89W, S13).

Stream habitat components	1991	1993	1995	1997	1999	Percent change
Average stream width (ft)	5.4	4.1	4.8	4.9	4.7	-13
Average stream depth (ft)	0.4	0.5	0.5	0.5	0.6	+50
Steam flow (CFS)	0.5	1.1	1.0	1.0	2.1	
Cover (%)	30	30	30	36	14	-16
Eroded banks (%)	30	10	5	5	0	-100
HQI Score	5.1			6.5	5.7	+12
Habitat Unit	10.6			12	11.1	+5

Table 8. HQI parameters measured at the lower Littlefield Creek station (T17N, R89W, S8).

Stream habitat components	1991	1993	1995	1997	1999	Percent change
Average stream width (ft)	5.9	5.0	4.8	5.2	5.1	-14
Average stream depth (ft)	0.4	0.7	0.7	0.4	0.6	+50
Steam flows (CFS)	0.9	1.4	1.4	1.4	2.2	
Cover (%)	13	15	15	11	11	-15
Eroded banks (%)	10	20	38	5	3	-70
HQI Score	2.9			5.7	4.2	+45
Habitat Unit	8.5			11	9.7	+14

- Willow Monitoring AW-GR-3MC-511

  To monitor willow height class/browse use, a 3 ft x 100 ft belt transect was established in 1998 on lower Littlefield Creek at the fish population survey station (T17N, R89W, S8, SE1/4, SE1/4). Frequency of willow browsing was 2% in late May 1999, which was attributed to winter/spring wildlife use. On October 13, 1999, willows had been browsed 86%, which was attributed to cattle grazing during summer 1999. Average willow stem height in 1999 was 1.14 ft.

- Riparian Green Line Survey FX-39-UM1-511

  During September, two permanent transects were established near the headwaters of Littlefield Creek to monitor riparian green line vegetation. One transect was located inside the headwaters spring exclosure (Table 9), while the other was just downstream, and outside, the exclosure (Table 10). These data will help establish riparian habitat restoration objectives and also guide livestock grazing management strategies for the

upper Littlefield Pasture.

Table 9. Green line vegetative composition in 1999 inside the exclosure at upper Littlefield Creek (T17N, R89W, S25, NW1/4).

Community type	Cross section composition (%)	Green line composition (%)	Ecological rating	Stability Class	Stability Index
Nebraska sedge	25	46	Late	9	4.14
Spike rush	-	2	Early	5	0.10
Brook grass	2	18	Early	3	0.54
Redtop, bent	-	5	Early	3	0.15
Mesic forb	2	26	Early	5	1.30
Dandelion/Yarrow	11	0.5	Early	3	0.02
Bare ground	3	0.5	Early	0	0
Poa	48	2	Early	3	0.06
Juba	5	-	-	-	-
Eleocharis	4	-	-	-	-

Table 10. Green line vegetative composition in 1999 outside the exclosure at upper Littlefield Creek (T17N, R89W, S25, NW1/4).

Community type	Cross section composition (%)	Green line composition (%)	Ecological rating	Stability Class	Stability Index
Nebraska sedge	24	10	Late	9	0.90
Spike rush	-	1	Early	5	0.05
Brook grass	12	64	Early	3	1.92
Redtop bent	11	9	Early	3	0.27
Baltic rush	-	2	Late	9	0.18
Upland forb (Yarrow)	-	3	Early	3	0.09
Bare ground	24	11	Early	0	0
Poa	5	-	-	-	-
Mesic forb	12	-	-	-	-
Eleocharis	12	-	-	-	-

- Chemical Treatment of Littlefield Creek FX-39-3MC-610

During early July, assisted FMGR with chemical treatment of Littlefield Creek to remove brook trout. See FMGR progress report for details.

- Upper Littlefield Riparian Pasture Fence AW-39-3MC-290

  A FY00 habitat trust fund grant was approved to erect a 4.2 mile fence at the upper Littlefield riparian pasture on the Grizzly WHMA. After the regional construction supervisor prepared bid specifications, a contract was awarded in the late fall of 1999 and fence construction is scheduled for May 2000.

- Woody Riparian Vegetation Plantings AW-39-3MC-440

  During May, assisted Rawlins BLM and Little Snake River Conservation District personnel with planting about 200 water birch and honeysuckle seedlings in upper Littlefield Creek canyon. About 1,000 Booth's and Geyer willow cuttings were also planted between the canyon and the headwater springs. Initial response of the plantings appeared promising by fall.

Little Muddy Creek GR871235CN

- HQI Surveys FX-39-3MC-511

  HQI surveys were completed at the Little Muddy Creek station during September. Stream habitat objectives in the Red Rim/Grizzly HMP call for the stream channel to be 40%-50% narrower, and 30%-40% deeper, by 2000. In 1999, the stream channel was 9% wider, and 2% deeper, than in 1991. Eroded streambanks decreased from 10% in 1991 to 1% in 1999. Habitat Units were less in 1999 than in 1991.

  Table 11. HQI parameters measured at the Little Muddy Creek station (T17N, R88W, S6).

Stream habitat components	1991	1993	1995	1997	1999	Percent change
Average stream width (ft)	3.3	3.2	3.9	3.0	3.6	+9
Average stream depth (ft)	0.5	0.5	0.6	0.4	0.5	+2
Steam flow (CFS)	0.17	0.49	0.73	0.29	0.79	
Cover (%)	24	55	60	37	23	-1
Eroded banks (%)	10	0	5	45	1	-9
HQI Score	10.4			8.6	8.6	-17
Habitat Unit	15.6			14.0	13.9	-11

North Fork Little Snake River Basin 3NF

Roaring Fork North Fork Little Snake River GR872800CN

- Brook Trout Removal FX-GR-3NF-610

  During early September, assisted FMGR with chemical treatment of Roaring Fork North Fork Little Snake River to remove brook trout. See FMGR progress report for details.

Middle Green River Basin 3GR

Lower Green River - Lower section GR841010SR

- Freezeout Island Side Channel Development FX-GR-3GR-511

  Evaluated the feasibility of reactivating an east bank channel near Freezeout Island. The potential project would have been similar to the McCullen Bluff side channel reactivation project. However, silt from the uplands on the east side of the river drains into the side channel and likely caused the river to abandon the channel initially. Reactivation of the channel would transport sediment directly into the Green River, so the proposal was terminated.

Savery Creek 3SC

Little Savery Creek GR872390CN

- Temporary Electric fence AW-39-3MC-450

  WGF workers erected about 2 miles of temporary electric fence in the Shipping Pasture on the Grizzly WHMA during August. This fence deferred livestock grazing on pasture segments treated with prescribed fire during fall 1998.

- Post Burn Mountain Shrub Community Monitoring AW-39-3SC-511

  A transect established in 1998 on east Shipping Pasture at the Grizzly WHMA prior to a prescribed burn was re-read to evaluate initial posttreatment response of the mountain shrub community. The majority of shrubs sampled, with the exception of a few seedlings, were young re-sprouts stimulated by the burn. All shrub species present prior to the fire treatment reestablished after the burn, except big sagebrush.

Regional Aquatic Habitat Management Progress Report

Pinedale / Jackson Regional Aquatic Biologist

Calendar Year 1999

Region-Wide Work

- Habitat Assessment and Basin Inventories AW-SW-EB1-511

  No Level 1 and 2 habitat assessments and inventories were completed for Basin Management Plans. Participated in several meetings and numerous discussions regarding development of the Wyoming Habitat Assessment Method (WHAM). Work associated with level 1 and 2 assessments is coded to specific basins.

- NRCS Technical Coordinating Committee AW-PE-EB1-175

  Discussed the CREP program with other Habitat Biologists and Habitat Extension Biologists. Commented on the access requirement attached to the CREP program. Met with State NRCS personnel and the Sublette County Conservation District to discuss the CREP Program.

- WGFD Cooperative Riparian Improvement Grant Projects AW-SW-TF1-175

  Participated in the Jackson/Pinedale Region Team review, and ranking of three Upland Grant proposals, five Riparian Grant proposals (which are part of the New Fork Corridor Block Grant), and two Terrestrial Habitat Trust Fund proposals. The Team recommended all or partial funding for these proposals.

- Native trout management plans AW-SW-NA8-511

  Reviewed annual BRC projects with BLM and USFS relative to future plans.

- Bridger-Teton Forest Planning AW-GR-EB1-160

  Met with Kemmerer Ranger District personnel to gain understanding of their scheme to merge four existing "Area Analysis Plans" into a "Landscape Scale Assessment", which is essentially a "Kemmerer Ranger District Management Plan". That information was summarized and forwarded to WGF personnel. Collected regional WGF input and passed it on to USFS.

- Standardized Comments for Grazing Management in Riparian Areas AW-GR-EB1-160

  Standardized comments for grazing management in riparian areas were drafted and forwarded to Habitat Protection. A section on resting vegetation treatments was added.

  Prioritized and reviewed Pinedale BLM grazing allotments with FMJN and FMPE, then sent the information to Habitat Protection.

Snake River Basin (Below Jackson Lake) - 4BJ

Basin-Wide Work

- Spring Fed Spawning Habitat FX-JN-4BJ-234

  Met with FMJN to evaluate the potential for cleaning out an existing sediment catchment on Spring Creek. This project will require wetland clearance from COE. Also, discussed the status of the proposed spawning gravel enhancement projects and the Snake River Bridge float access.

Lower Salt River Basin - 4LS

Basin-Wide Work

- Habitat Maintenance and Improvement AW-JN-4LS-175

  Discussed the status of WHIP and EQIP funding with the NRCS District Conservationist. Few landowners have signed up for EQIP funded animal waste management projects in the Salt River Priority Area because of their fear of "strings" attached to this Government program. The availability of any WHIP funding sounds very unlikely for the upcoming federal fiscal year.

Cottonwood Creek Drainage - 7CO

Dead Cow Creek PE844280SE
Nylander Creek PE844080SE
Ole Creek PE844090SE
Sjhoberg Creek PE844110SE
South Horse Creek PE844250SE

North and South Cottonwood Allotments - Big Piney Ranger District

Requested clarification on the status of these allotments from USFS. Following an appeal by the permittees of the original USFS decision to reduce the stocking rate by about 30%, USFS decided to monitor South Cottonwood for another three years using "Permittee Monitoring" protocols, after which a decision could be made based on the data collected. According to USFS Range Specialist, the operating plan for North Cottonwood can't be successfully implemented until an interior fence (directly affecting deferment of Sjhoberg Creek), and several allotment boundary fences are constructed and/or rebuilt. USFS does not plan to implement a formal Grazing Capacity Study until these projects are done. No specific time frame was projected for implementation.

During fall, 1999, evaluated grazing use on portions of Sjhoberg, Dead Cow, and South Horse Creeks relative to CRC concerns. Cattle heavily used Sjhoberg Creek and the headwaters of Dead Cow Creek. South Horse Creek is part of a currently unallocated sheep allotment, so it should not receive any livestock use, but light cattle use was wide spread throughout the upper portions of the drainage. An end-of-season assessment of the most accessible portions of Halverson, Ole, and Nylander creeks revealed widespread moderate to heavy grazing.

Reviewed and commented on a scoping statement for USFS Wyoming Range domestic sheep allotments. The proposal could affect CRC and SRC, as well as numerous big game species, primarily Big Horn sheep. Later toured portions of this allotment complex and noted heavy grazing use in all areas visited.

Dry Piney Creek Watershed - 7DP

Black Canyon Creek PE843260SE
Dry Piney Creek PE843240SE
Hogarty Creek PE843245SE
Pine Grove Creek PE843255SE
Sawmill Creek PE843250SE

- Coordination and Assistance FX-PE-7SP-140, 175

  With proper grazing management, vegetation treatments, and possibly some instream enhancement, up to 15 miles of CRC habitat could be interconnected in the Dry Piney Watershed. Such a project would require a close working relationship with BLM range and wildlife personnel, as well with Exxon/Mobile Corporation.

  Provided input for the first draft of the North LaBarge AMP. Preliminary discussions with Mobil indicated they are very receptive to working cooperatively with WGF and BLM to improve habitat conditions in this watershed and may not lease the grazing on their "Stacey Place" during the 2000 growing season. However, formal commitments are premature due to the pending Exxon/Mobil merger.

  Reviewed and discussed the draft Piney Front Habitat Proposal with Bridger-Teton Forest personnel and FMPE. This proposal is focused on elk winter range enhancement projects within a three mile radius of feedgrounds. Some of the proposed treatments could potentially be incorporated into plans to enhance watersheds in the North LaBarge Allotment (Dry Piney Watershed projects).

  After an Exxon representative was unable to attend a planned meeting to discuss fence specification adjustments on the Exxon Pond exclosure fence, sites where adjustments should be made were marked and later explained in a follow-up conversation. Exxon plans to complete these modifications in summer 2000.

  Conducted a walk through assessment and flow measurement on Pine Groove Creek with FMPE. A baseline greenline transect was established outside the lower exclosure.

South Piney Creek - 7SP

North Fork Beaver Creek PE843283SE
Middle Fork Beaver Creek PE843283SE
South Fork Beaver Creek PE843284SE
South Piney Creek PE843272SE
Trail Ridge Creek PE843281SE

- Coordination and Assistance FX-PE-7SP-140, 175

  All work conducted in these basins was associated with coordination with BLM on the North LaBarge Allotment. Refer to Dry Piney Watershed.

Green River - 7GR

Green River (Above New Fork Confl) PE841030SE

- Huston Access Project - FX-PE-7GR-175

  Preliminary meetings and phone conversations with Mr. Huston and two downstream irrigators indicated all are willing to cooperatively address the potential channel change. Following a site visit with the Aquatic Habitat Supervisor, a draft plan and diagram was prepared for the proposed channel stabilization, which was included in the Acquisition Summary Report for the proposed easement. Plans for access development and the channel stabilization were discussed with the irrigators, who expressed concern about potential vandalism of the headgate near the proposed parking lot. Proper locks and fencing should prevent any vandalism.

  With COE personnel, evaluated the stream stabilization project. They requested measured estimates of fill volume be included in the 404 permit application. ISF personnel assisted with measurements to develop these estimates.

  Visited the site with the BLM Recreation Planner to discuss right-of-way needs to properly develop the site. Also discussed the draft access development plan. Took specific measurements and provided same to BLM for the ROW application. BLM conducted an archeological survey of the area to be developed. Coordinated with BLM, irrigators, and permittees to alleviate concerns about retaining the Ada ditch for livestock watering on the adjacent BLM allotment. Fence design and crossing maintenance was discussed with Pinedale Region Construction Branch personnel.

  The Sublette County Planning and Zoning Board approved a Variance Request by Mr. Huston allowing him to sell the 30-acre parcel and retain his home on the remaining 10-acre parcel. This variance was approved by the Sublette County Commission granted on March 16, 1999.

  Summarized essential facts about the proposed easement acquisition in a status report for staff to use at the Commission meeting in Buffalo, which Roadifer attended.

- Forty Rod Flat PFA - FX-PE-7GR-234

  Maintenance work was completed on the stabilization sills at the 40-Rod access area. Several large boulders were added to the west channel sill and several small boulders were removed from the other two sills. Boulders previously hauled in for a proposed sill near the boat ramp were moved out of the channel.

Green River (Above Warren Br) PE841031SE

- Warren Bridge PFA Project - FX-PE-7GR-234

  An extension was granted for the funding agreement. Both BLM and Central Utah Project (CUP) moneys are available for this project. Wrote an EA and Decision Notice, which was signed by BLM on April 4, 1999.

  A potential back-up rock source was discussed with BLM. Made an on-site visit to the primary and the back-up rock sources with Ed Novotny, construction personnel, and BLM. Enough rock is available at the primary site to complete the project, but the back-up source has marginal value because of difficult access.

  Five logjam structures and a rock barb were built between October 4th and 11th. Availability of funding to pay overtime for construction personnel increased the project efficiency by significantly reducing mobilization time.

LaBarge Creek Basin - 7LA

LaBarge Creek PE843030LN

- CRC Restoration FX-PE-7LA-140

  A draft work plan and a revised Cooperative Management Agreement for the LaBarge CRC Watershed Restoration Project were reviewed with FMPE. These documents clearly spell out WGF management direction for the LaBarge Creek Watershed and initiated several meetings and discussions with USFS and FMPE personnel. However, full support and cooperation from USFS is crucial to the success of this watershed restoration effort.

  In 2000, a very focused meeting will be needed with USFS administrators about the LaBarge Creek fish migration barrier, the Nameless Creek exclosure, and future direction of the LaBarge Creek Watershed Project to move these projects forward.

  With USFS, reviewed and discussed the annual operating plan for the LaBarge Creek Allotment, livestock concentrations, trampling of the riparian zone near the Bald Hornet fish habitat structures and wetland project, and the need for a long term management plan.

  Evaluated late season livestock use on LaBarge Creek and several tributaries. Utilization appeared well dispersed, but not evenly distributed. Most areas had moderate to heavy use, while a few areas had lightly to moderately use.

  With FMPE and Ed Novotny, evaluated high flow conditions and three potential barrier sites on LaBarge Creek.

  Measured depth, dissolved oxygen, pond size, and other attributes at a pond on lower LaBarge Creek. A potential CRC refuge pond, it will need to be deepened to ensure over winter survival of fish. Formerly owned by Cliff Long, this property was sold to Bill Busbice in October. In a brief telephone conversation with him, he expressed interest in pursuing the

proposed plans to deepen the pond and make it available as a temporary CRC refuge to assist with CRC restoration in the LaBarge Creek drainage.

Nameless Creek PE843180SE

Assisted USFS with maintenance work on the Nameless Creek exclosure. However, this exclosure needs complete reconstruction. A proposal seeking CUP funds to reconstruct the exclosure was submitted, but not funded. The reason cited by the CUP committee was that the project "appears to address problems related to land and livestock grazing management that must ultimately be resolved by USFS".

Rock Creek PE843200LN

With FMPE, evaluated lower Rock Creek and measured flows.

Reviewed and discussed the draft annual operating plan for the "Upper North LaBarge Individual Allotment" with BLM and FMPE. Also provided written questions and comments to BLM. Established greenline transects inside and outside the lower exclosure to provide baseline information.

Lower Bear River (Section 1) - 3LB

Bear River GR891020LNLN

Basin-Wide Work

- Coordination and Assistance FX-PE-7SP-140, 175

Attended several Lincoln County-Salt River EQIP/WHIP Local Work Group meetings to discuss, review ranking criteria, and rank projects and. Future EQIP/WHIP funding available to the Lower Bear River appears very limited at this time. Provided comments to the District Conservationist.

Participated in the Green River Region Team review, discussion, and ranking of seven WGF Trust Fund Proposals, two Riparian Grant Proposals, and one Industrial Water Development Grant. All Trust Fund and Industrial Water Development projects were recommended for funding. Only one riparian project was funded; the other should have been submitted as a water development project and was recommended for funding with regional team conditions added.

The trust fund proposal for an additional year of funding for the Project Biologist position was ranked second by the Green River Regional Team. Specific projects in this funding proposal were discussed extensively with WGF, TU, and BLM personnel. BLM indicated that many of the projects outlined in the proposal could eventually be accomplished.

Other coordination efforts with BLM and other WGF personnel included: 1) review the 2000 Smiths Fork Interim Allotment Management Plan, 2) participation in an early season CRM tour on the Smiths Fork Allotment and several CRM Technical Review team meetings to discuss various projects, objectives, and

management recommendations, 3) reviewed the BLM 1979 Thomas Fork HMP, the 1982 Raymond Mountain ACEC Management Plan, the 1987 and 2000 Rock Creek Allotment Management Plans, and past recommendations for the Sawmill Creek Allotment.

At the end of the grazing season, surveyed allotments to document grazing effects on habitat and reported survey results to BLM.

Assisted BLM with stubble height measurements at lower Bear River drainage allotments to determine utilization. BLM techniques and the specific location on the streambank where data was collected were questioned and discussed at length with BLM personnel. A resolution to these concerns is not expected until there is a change of BLM personnel.

Assisted terrestrial habitat biologists in collecting data on mahogany browse transects, which were established to measure long-term utilization by elk and mule deer over wintering in watersheds of concern to BRC.

- Smiths Fork Allotment - AW-GR-3LB-511

  Assisted BLM with re-reading greenlines at four locations on the Smiths Fork Allotment: Coal Creek, First Creek, and two sites on Little Muddy Creek. Although BLM did not provide a summary of these data, the trend is expected to be static because no significant livestock management changes have been made since the baseline data were collected in 1996. BLM claims a slight upward trend on Little Muddy Creek, which may be possible, because this area only received spring use for the last two seasons.

  To protect springs and existing small stands of willows, small exclosures were constructed using wire panels and steel fence posts. They were built throughout the watershed along streams affected by livestock grazing. While many older exclosures were in good condition in 1999, some will need maintenance in 2000. Maintaining these structures is important as they help sustain spring flows and may contain the only available seed source to re-establish willows in many of these drainages.

- BRC Habitat - AW-GR-3LB-511

  As time allowed, assisted University of Wyoming graduate students Amy Shrank and Lanie Johnstone with electrofishing and habitat surveys for two BRC research projects.

  Locations vital to over winter survival of BRC were sought throughout the lower Bear River watershed. In October, several temperature recorders were placed in Little Muddy, Coal, and Huff creeks to monitor winter conditions. In December, recorders were placed in Howland and Sawmill creeks. To determine specific locations of concern and possible projects to improve over winter habitat for BRC, these data will be combined with temperatures collected by UW graduate students and BLM. These data will also document current water temperatures under degraded riparian conditions and serve as a baseline for comparison with future temperatures after watershed scale projects have been implemented.

Coal Creek GR891320LN

- Watershed Management Plan AW-GR-3LB-140

  At the time the new Project Biologist was introduced to BLM, both the trust fund proposal "Project Implementation - Lower Bear River Watershed Habitat Project" and the "Coal Creek Watershed Project Proposal" were presented. Although somewhat receptive to developing a watershed management plan in Coal Creek, they suggested that watershed scale projects need CRM approval. After further discussions BLM agreed to review any project proposals presented to them.

  Numerous specific projects were identified and outlined in both documents for the Coal Creek watershed (Little Muddy, Stoner, East Fork Coal, and Upper Coal creeks), as well as throughout the Lower Bear River Watershed.

- Grazing Management AW-GR-3LB-511

  Evaluated effects of 1999 livestock grazing on upper Coal Creek. Frequency of browsed willow plants exceeded 75%. Utilization inside the Coal Creek exclosure was also unacceptably high.

  BLM reported stubble height was still within the 5-inch criteria defined by the CRM, but Roadifer disagreed with BLM techniques and the specific location on the streambank where plants were measured.

Huff Creek GR891280LN

- Grazing Management AW-GR-3LB-511

  Several times during 1999, evaluated how intense sheep and cattle grazing is affecting the re-establishment of willow communities on Huff Creek. Frequency of browsed willow plants has consistently approached 100% on upper Huff Creek for all years evaluated. Livestock use within the exclosures has been high except for 1999 when the exclosures were rebuilt. Although stubble heights were within the 5-inch criteria, as defined by the CRM, Roadifer questioned measuring techniques and locations.

  With a WGF Riparian Grant providing part of the cost share, the livestock grazing exclosures on Huff Creek were reconstructed in 1999. As a result, 1-¼ miles of the riparian corridor should be protected for about 5 years.

Little Muddy Creek GR891300LN

- Watershed Management AW-GR-3LB-140

  To reroute cattle around springs and trails on West Trail Creek, tributary to Little Muddy Creek, trees were used as barriers. These natural fences were partially successful until breached by cattle or human interference. West Trail Creek currently has the only known, reproducing population of BRC in

the Little Muddy watershed. Stronger fencing has been proposed for construction in summer 2000.

Raymond Creek PE891080LN

- Watershed Management AW-GR-3LB-140

  Cooperative development of a plan for livestock grazing and vegetation management in the Raymond Canyon watershed to allow recovery and enhancement of degraded riparian, aspen, and mountain shrub communities remains the highest priority activity for this watershed. Prescribed burn locations were discussed at length, delineated, and agreed upon with the BLM biologist. Habitat quality and cattle use and distribution in the watershed were documented and photographed during regular reconnaissance surveys

  Written and verbal comments were presented to BLM, the CRM Steering Committee, and the Technical Review Team regarding delays and their reluctance to construct the Raymond Watershed fence. Also discussed at these meetings was a proposal by the permittee to re-route the fence farther down the slope and numerous other issues.

  BLM and permittees elected to hire a rider to prevent cattle from drifting into the canyon. And as occurred in the three previous years, this herding effort was fairly successful until late in the grazing season when the little remaining forage became dry and less palatable, which forced the livestock to disperse, out of control. The herder camped at the confluence of the two primary forks of Raymond Creek for most of the summer. Although grazing by his horses was justifiably blamed for much vegetation degradation there, heavy cattle use also contributed. Cattle use was moderate to light throughout the remainder of the watershed.

- Raymond Creek Fence and Head Cut AW-GR-3LB-234

  The TU Raymond Creek Erosion Control project successfully reduced down cutting in the system, helped slow the headcut, and reduced erosion problems. WYDOT reported a substantial reduction in the amount of sediment transported downstream to the highway after construction of these structures. This anecdotal evidence, along with visual assessment and photo documentation, indicate instream sediment loading has been reduced by these structures. Vegetation is also beginning to re-establish along key points throughout the affected area. Limited maintenance was performed on these structures in 1999, but continued maintenance will be needed. However, protection from trampling by livestock will be critical to the future stability of these structures.

  Where beaver are attempting to re-colonize the drainage, aspen trees were cut and placed by the dams to encourage their persistence, minimize beaver effects on riparian vegetation, and add large woody debris to the area with the best BRC winter habitat.

  Constructed three water bars in the old canyon road at lower Raymond Creek to decrease sediment input and water

temperatures. This work also improved the condition and quality of the trail. Prior to construction, water ran down the old roadway, becoming warmer and picking up debris before it joined Raymond Creek. Volunteer local sportsmen built the water bars.

Gully plugs made from trees placed instream in a X-fashion were added to Cougar Hollow to trap sediment and prevent further down cutting, thus increasing watershed stability.

Smiths Fork River GR891410LN

Howland Creek GR891600LN
Sawmill Creek GR891616LN

- Sawmill Creek Allotment AW-GR-3SF-234

  Investigated a concern that BRC are being funneled into an irrigation ditch with water diverted from lower Howland Creek. An engineer familiar with fish screen design will be consulted to determine if a screen is necessary. However, if water diversions are slowly reduced over three days at the end of the irrigation season, only a simple dam may need to be constructed. Further information is being collected to complete this analysis.

  Negotiated with USFS about ways to decrease sediment input into Howland Creek from their land and from the forest access road that crosses state, BLM, and USFS managed lands. Discussion focused on installation of cross drains, graveling road surfaces, rerouting the existing road, stream revetments, and watershed scale issues and projects. Identified potential funding sources and problems.

  USFS has identified upland habitat treatments in the upper Sawmill and Howland Creek watershed as part of the Tunp Ridge Vegetation Treatment Analysis. A finding of No Significant Impact was determined from the EA, and a decision was issued in June 1997 to implement the habitat treatments. Upland treatments could be implemented as soon as fall 2000. Extensively negotiated with BLM and a permittee to develop a concurrent project proposal for a 1,400-acre prescribed burn on BLM land in the Sawmill Allotment. Implementation of this project is expected in fall 2000.

  At the request of the Sawmill Allotment permittee, the project biologist conducted a grazing evaluation. Riparian areas are improving, but a second grazing cycle negatively affected willows and sedges. Potential solutions and alternatives were discussed with the permittee, but no definite plans were made. Future discussions will focus on altering the management plan to eliminate second grazing while increasing time spent in each pasture. The allotment and management plan will be evaluated at the end of each grazing season and management options will be discussed with the permittee.

  A sagebrush and mountain shrub burn proposed on state land in this allotment was temporarily delayed to accommodate the Tunp Ridge/Sawmill Allotment burn noted above. Once all proposed burns have been implemented and rested, forage production and availability will be increased significantly, thus enhancing

management flexibility, which, in turn, will increase the recovery rate in riparian areas critical to BRC.

New Fork River Basin - 7NR

New Fork River PE843451SE

- New Fork River Corridor AW-PE-7NR-175

  Met with a landowner and NRCS, Sublette County, and BLM representatives to discuss opportunities to digitize old aerial photos. A GIS demonstration illustrated the value of this information once digitization is completed, but getting to that endpoint would require much time and advanced GIS training.

  Participated in a riparian workshop and corridor tour. The WGF stream/riparian demonstration trailer was very helpful and entertaining for the public. Future progress will hinge on individual landowner motivation and desire to implement sound management practices and projects. Providing additional and appropriate educational opportunities like this workshop should also be beneficial.

  A Riparian Habitat block grant was prepared and submitted to the Sublette County Conservation District and Sublette County Local Work Group so landowners can cost share with WHIP projects. The projects listed below will be pursued and monitored as long as both internal and external financial support remains strong:

- Cooperative Habitat Extension Projects FX-PE-7NR-175

  Rossetter Riparian Grant Project: (Tom Rossetter) Based on a visit after the cattle were removed, implementation of a spring-use-only grazing management plan appeared highly successful.

  Wild Horse Ranch Riparian Grant Project: (Mike Looney) Helped the landowner finalize paperwork for this project. The fence to protect the site will be constructed before the property is grazed in 2000.

  Feather Down Wetland and Fish Habitat Projects: (Ross Hocker) Implementation of this wetland project has been temporarily delayed until irregular property boundaries can be accurately surveyed. Preliminary surveys indicate this wetland project should be successful. Cooperation with this landowner is expected to lead to riparian and instream enhancement projects. Potential opportunities include enhancement of the Eklund Ditch overflow, which is an important secondary channel in the proposed Airport Project, and improved grazing management on BLM property adjacent to the Eklund easement. A letter of support was written and sent to COE for instream projects he has proposed along this secondary channel on his property.

  New Riparian Grant Projects

  Swift Streambank Project: (Phelps Swift) About 400 ft of streambank will be stabilized using willow and rock revetments, plus revegetation with willow and cottonwood plantings behind the revetment. Fencing will protect the plantings.

Implementation is currently scheduled prior to high water in spring 2000.

Brower Larson Group Project (Brower Portion): (Kathy Brower) About 90 ft of streambank will be stabilized using willow and rock revetments, plus revegetation with willow whip and clump plantings behind the revetment. An additional 140 ft of stream bank will be stabilized using willow clump and whip plantings alone. Fencing will be constructed 35 ft back from the streambank to protect the entire 230 ft, plus an additional 60 ft wide mouth of a spring fed slough. Implementation is currently scheduled prior to high water in spring 2000.

Brower Larson Group Project (Larson Portion): (Bubba Larson) A downstream continuation of the Brower project detailed above, the Larson portion involves about 80 ft of streambank stabilization using willow and rock revetments with revegetation by willow whip and clump plantings behind the revetment. An additional 200 ft of stream bank will be stabilized using willow clump and whip plantings. Fencing will be constructed 35 ft back from the streambank to protect the entire 280 ft. Implementation is currently scheduled prior to high water in spring 2000.

Feltner Sanchez Group Project (Feltner Portion): (Wayne and Gina Feltner) About 220 ft of streambank will be stabilized using conifer tree revetments with willow whip and cottonwood pole plantings behind the revetment. Implementation is currently scheduled prior to ice-up in fall 2000.

"Feltner Sanchez Group Project (Sanchez Portion)": (Fred and Rose Sanchez) An upstream continuation of the Feltner project detailed above involving about 390 ft of streambank. Implementation is currently scheduled prior to ice-up in fall 2000.

Potential Future Projects Evaluated

Jerry Kirk Projects: With the Habitat Extension Biologist, the Terrestrial Habitat Biologist, and the NRCS, evaluated potential instream and wetland projects, as well as opportunities to monitor browse on Jerry Kirk's property. A riparian grazing management plan needs to be developed on this property.

Harkness Project: (Tom Harkness) After on-site visits with COE and NRCS, this project reached an impasse over the need to leave a 25' buffer of un-mowed grass along the unstable, upstream riverbank. Properly implemented, this project would have helped prevent a meander cut-off while offering some protection to the home site.

Hagenstein/Maytag/Mocroft Cooperative Project : With the Aquatic Habitat Biologist Supervisor and a local sportsman familiar with the river, evaluated a potential opportunity to provide a long term solution by dividing flows above the Hagenstein Ranch headquarters. A proposed rock sill located upstream on the Maytag property would enhance the fisheries and elevate the water table, while reducing flood flows near the Rozier house. This project would be fairly costly and require rock delivery over frozen soils.

Later at the downstream Mocroft Ranch, the lessee voiced concerns regarding floater access, fences, and fence repair, which issues will delay progress on this opportunity. These problems have been caused by a combination of disrespectful floaters, unsafe fence designs, and have been ongoing for years. Greater cooperation between floaters and landowners, plus proper fence designs at stream crossings, should at least partially resolve the issues. Potential need for enforcement of trespass laws was briefly discussed with the Regional Wildlife Supervisor and FMPE. Current plans are to work cooperatively with several key landowners and floaters to develop improved fence crossings at critical locations as an initial attempt to alleviate the situation.

Mocroft Ranch Projects: (Sylvia and Roberto Sandoval) Evaluated potential willow monitoring sites on the Mocroft Ranch. Opportunities to implement habitat projects on the Mocroft Ranch are "on hold", partly due to concerns about floater access and fences.

- Airport Section Habitat Improvement Project FX-PE-7NR-234

With the Aquatic Habitat Biologist Supervisor, evaluated potential enhancement projects on the Airport Section, including opportunities to enhance base flows into a secondary channel through the Eklund Ditch. Examined two potential rock sill locations and possible revetment of the first high bluff upstream from the lower boundary of the state section. If implemented, these projects would enhance instream fish habitat, elevate water tables to benefit riparian vegetation, and reduce sediment contributions from the bluff. Costs would be fairly high and implementation would be challenging because rocks would need to be delivered when soils are frozen solid. Drafted a diagram for the proposed enhancement projects on the lower Airport Section.

A project proposal for potential cost share funding of enhancement projects on the Airport Section was presented to the "One Fly Foundation" and they approved a $45,000 grant. However, several follow up discussions with FMPE and "One-Fly Foundation" representatives generated unanswered questions regarding time frames for project implementation, as well as project design and structure locations.

Evaluated riparian conditions from browse use during winter 1998-1999. On a paced line through a representative willow community, 50 of 50 willows surveyed had been browsed. Three exclosures to monitor willow and cottonwood browsing were installed in the fall of 1999, but domestic livestock did not graze this section during fall and winter 1999-2000.

Assisted the InStream Flow section by collecting several flow measurements at the Airport Section relative to a filing for instream flow.

Regional Aquatic Habitat Management Progress Report

Lander \ Laramie Regional Aquatic Habitat Biologist

Calendar Year 1999

Region-Wide Work

- Army Corp Nationwide General 404 Permit (GP82-02) FXSWEJ1165

  Revised diagrams and figures for timber plunges, tree and rock revetments, and rock sills. Provided updated diagrams to COE to be included in Nationwide Permit. Diagrams used in previous permits were copies of copies and they also needed to reflect changes in techniques. Unfortunately, COE used only paper copies even though electronic copies were made available.

- Computer Hardware and Programs FXLREJ1141

  Set up the new scanner, removed plotter and disconnected digitizer due to lack of use. Evaluated various software packages for watershed modeling; this software would be very useful once there more GIS systems are set up. Continued learning the Watershed Modeling Software (WMS) through its tutorial.

- Aquatic Habitat Tour and Training Week FXSWEJ1180

  Attended the Aquatic Habitat Workshop in Lander Region. Sponsored by the Lander\Laramie Region Aquatic Habitat Biologist.

- Watershed Modeling Software (WMS) Training FX-SW-EJ1-180

  Attended a very useful WMS training course at Salt Lake City sponsored by BYU. Oberlie had worked with WMS for two years to learn enough to take advantage of this intense two day course. Learned that escape key means stop, the one key means yes, and the software was designed for watersheds <10 sqmi. This software will work on larger watersheds, but calculations would take hours to do.

Laramie Region

Beaver Creek and Big Creek Basin - 5BC

Big Creek LE857430CN

- Big Creek FXLE5BC175

  Met with landowner Ron Platts about possible habitat improvement ideas for an eroding bank. Wetlands, which were created by rehabilitating an old gravel pit, forced Big Creek into a bank on one side of the narrow valley and caused erosion. Information was sent to Mr. Platts and there was no further contact.

Met with Inter-Flue consultants about their habitat improvement plans for Big Creek on A-Bar-A Ranch land. They wanted a letter of support before they provided a plan to speed up the COE 404 permit process. After some delay, a plan was provided and letter of support was sent.

Little Laramie River drainages Basin - 5LL

Albany South Twin Lake LE150723AY

- Inlet Stream Spawning Habitat Improvement FX-LE-5LL-234

  Assisted FMLR with excavation and design of a spawning gravel project at the inlet to Albany South Twin Lake. Evaluated gravel that was placed in the outlet stream in 1997. A couple of areas appeared to have been used for spawning. The gravels are still being actively moved, cleaned, and sorted by the current. See FMLR Progress Report for details.

Lower Medicine Bow River Drainage - 5LM

Medicine Bow River LE855380CN

- Medicine Bow River (Town of Elk Mountain) FXLE5LM234

  The Town of Elk Mountain obtained a permit for a rock barb bank stabilization project to replace a proposed WGF Riparian Grant project that was inundated by a huge bedload event in the Medicine Bow River.

Sage Creek Drainage - 5SC

Basin-Wide Work

- Sage Creek Drainage FXLE5SC175

  Saratoga-Encampment-Rawlins (SER) Conservation District received a 319 EPA grant to improve the Sage Creek Watershed. The goal of this project is to improve water quality in the North Platte River by reducing sediment entering from Sage Creek. Assisted in further developing the Project Implementation Plan (PIP) and participated in an oversight meeting.

Sybille Creek and Drainages - 5SY

North Sybille Creek LE851515AY

- North Sybille Creek FXLE5SY540

  Provided WYDOT with additional information on stream improvement techniques.

South Platte River Basin - 5SP

Basin-Wide Work

Pole Mountain Beaver Ponds Study

- Beaver Pond Repair FXLE5SP234

  Assisted Mike Snigg with repair efforts on three beaver dams in various stages of disrepair. Two of the three dams were still holding water in November 1999 and beavers had moved into one of the ponds. The third dam would only hold water until it found the next rotted log then would drain away. For best results, dams should be repaired shortly after the breach has occurred. Repairing one large breach worked better than doing many small separate ones.

Lander Region

Beaver Creek Drainage - 6BV

Beaver Creek, Section 3 LR825320FT

- Beaver Creek FXLR6BV175

  A Ranch Management consultant (Tony Malmberg) contacted WGF to provide information on the fisheries potential of Beaver Creek. This information was to be used by an interested party to evaluate buying a ranch along Beaver Creek.

Boysen Reservoir - 6BO

Boysen Reservoir LR420114FT

- Boysen Reservoir FXLR6BO510

  Assisted with recovery and deployment of the temperature data loggers in Boysen Reservoir. The temperature loggers were switched on in May 1999 and new cables and chains were installed in November 1998. But the cable and chain holding the temperature loggers broke during the summer 1999, causing the loss of two Ryan temperature loggers and two Onset temperature loggers.

East Fork Drainage - 6EF

Basin-Wide Work

Bear Creek LR826500FT

- Bear Creek FXLE6EF511

  Assisted the Instream Flow Crew (ISFC) by monitoring flows in Bear Creek

and irrigation practices on the Spence\Moriarity WHMA. Irrigation from Bear Creek was stopped approximately one week before the flow reached 20 cfs as per recommendations from ISFC. The ISFC and the Construction Crew had installed a permanent stage recorder in 1998, but the inflow pipe filled with silt and sand in spring 1999. After the stage recorder became totally inoperatable by July 1999, it was removed. However, the horizontal staff gage worked as designed and three different flows were measured in 1999 to continue calibration of the staff gage flow curve. Inspected the Bear Creek Stream Improvement Project for maintenance needs.

Great Divide Basin 6GD

Separation Creek LR857940CN

- Separation Creek AW-LR-939-430

  Installed two PVC sheet piling grade control structures on Separation Creek. A third structure was started, but due to a hard substrate, it was only partially driven into the ground. Three rock grade controls were also completed in conjunction with the three PVC grade controls. Plans were made to resume this project in mid-September 2000, and to obtain a vibrator-pounding tool for the backhoe so driving the panels will be easier.

Ocean Lake - 6OC

Ocean Lake LR420028FT

- Ocean Lake FXLREJ4511

  Sampled water flow and quality in Drains 4,6 and 7, and sent the water samples to Wyoming Department of Agriculture Lab for analysis. Water flowing into Ocean Lake was cleaner than before the project. Outflow recorders downloaded from the BR website showed the Ocean Lake outflow in the 1950s averaged 26 cfs, but in the 1980s, the outflow was 50-70 cfs. For the eutrophication study, calculations had assumed a 26 cfs outflow. Contact was made with BR to monitor the outflow of Ocean Lake starting in 2000.

  To monitor how Ocean Lake is filling in with sediment and organic material, Oberlie used GPS and depths to locate areas missed by previous transects. These data gaps were filled in so a bathometric map can be completed using ARCVIEW and Watershed Modeling Software software.

Little Popo Agie Drainage - 6PL

Cherry Creek LR825435FT
Red Creek LR825435FT
Little Popo Agie River LR825365FT

- Red Canyon Ranch (TNC) FXLR6PL175

At the request of the Popo Agie Angler Club, toured Red Canyon during winter and spring to seek possible hatchery box locations, but after much looking and discussion, Oberlie was unable to locate a good site because there isn't a good off-channel spring to use as a water source.

- Little Popo Agie Watershed FXLR6PL175

  The Popo Agie Conservation District's EQUIP project for the Little Popo Agie Watershed received approval from the USDA. Assisted them in reviewing the priorities set in 1998.

Middle Fork Popo Agie Drainage - 6PM

Middle Fork Popo Agie LR825506FT

- Middle Fork Popo Agie (Popo Agie Conservation District) FXLR6PM511

  Attended two meetings of the Water Quality Team and two meetings of the Popo Agie Watershed steering group. However, this group later reorganized after the coordinator was fired.

Sweetwater River Drainage - 6SW

Habitat Sampling AW-LR-6SW-510

As part of a multi-year survey, FMLR and Oberlie completed fisheries and habitat sampling on streams flowing into the Middle Section of the Sweetwater River. Using stream order and stream gradient changes as guides, the river was broken into four sections. The Upper Section is the headwater streams and the main Sweetwater River down to the confluence with Pine Creek. The Middle Section is the streams flowing into the Sweetwater River from the confluence with Pine Creek downstream to include the Alkali Creek watershed. The Lower Section is the streams flowing into Sweetwater from Alkali Creek downstream to Pathfinder Reservoir. The fourth section is the main stem of the Sweetwater River from its confluence with Pine Creek downstream to Pathfinder Reservoir. Surveys in 1999 were completed at intervals from July to early October.

In 1999, Wyoming Habitat Assessment Method (WHAM) Level 1 and fish population surveys were completed at representative reaches of streams flowing into the Middle Section of the Sweetwater. WHAM Level 2 riparian assessments were completed where riparian systems appeared to be deteriorated. WHAM Level 2 upland assessments were completed in representative upland areas of each stream sampled. Ryan and Onset temperature loggers were installed in mid-June and recovered in October from Rock Creek, Willow Creek # 3, Strawberry Creek and Chimney Creek. Water samples were collected at the above sites and analysis for alkalinity, nitrate + nitrite as N, Sulfate, and Ortho Phosphorus. Macro-invertebrate samples collected at the above sites were sent to the National Aquatic Monitoring Center at Utah State University for analysis. WHAM Level 1 assessments were also completed on streams where fish population sampling was impractical or on intermittent/ephemeral streams.

All site locations and boundaries were measured using a Tremble Geo-Explorer and locations corrected to the Casper BLM Base station.

A- Drive-by Surveys.

The following streams were surveyed by drive-by surveys to see if there were fisheries potential:

Fog Gulch (No water number) - No flow or channel was found on September 8, 1999.

Pine Creek LR854850FT - Lower Pine Creek had no flow, but was puddled in the deeper pools on July 28, 1999. There are irrigation diversions upstream of the site surveyed.

Dead Ox Creek LR854855FT - This creek was dry on July 28, 1999.

Dickie Springs Creek LR954849FT - This creek had no flow on September 8, 1999.

Oregon Slough Creek LR854846FT - This creek had flow on September 8, 1999 from Oregon Spring downstream to Sweetwater River. Due to private lands, no further survey was done.

Oregon Gulch Creek LR954848FT - This creek had no flow on September 8, 1999

Meadow Creek LR954847FT - This creek had no flow on September 8, 1999

Long Gulch LR954790FT - This creek had no flow or channel on September 8, 1999. A report that there might be spring spawning activity in Long Gulch was not documented.

Buffalo Creek LR954656FT - This creek had no flow on September 23, 1999.

Barras Spring (No Water Number) - This creek had flow on September 22, 1999, but no fish were seen so the stream was not sampled for fish.

Warm Springs Creek LR854693FT - This creek was flowing for a short distance downstream from the Warm Springs spring and the creek was backed up into one big pool west of Bison Basin Road. No fish were seen and the creek was not sampled.

Alkali Creek, West LR954720FT - This creek had no flow on September 19, 1999. Water was pooled up in only the deepest pools near culverts.

East Alkali LR954717FT - This creek had no flow on July 22, 1999 or September 19, 1999.

Sulpher Creek LR854721FT - No flow on July 22, 1999.

South Fork, Sulpher Creek. LR954724FT - No flow on July 22, 1999

Sulpher Creek, North Fork LR854722FT - No flow on July 22, 1999, but water was puddled in some pools.

Sulpher Creek, Middle Fork LR854723FT - No flow on July 22, 1999.

P.B. Spring LR954725FT - No flow in channel; water was pooled at spring, which had been dugout by ranch hands. Brook trout from Willow Creek had been moved to spring pool.

B- Tributaries on the North Side of the Sweetwater River.

The following streams on the north side of the Sweetwater River were evaluated with WHAM Level 1:

Slaughter House Gulch LR854845FT - The lower section features a decadent willow/aspen riparian zone with numerous old relic beaver dams, but without any stream flow. Two beaver dams had ponds without any outflow; no fish were found during this survey. Riparian zone is in poor condition due to high intensity grazing.

Willow Creek #3 LR854820FT - Three WHAM Level 1 assessments were completed on Willow Creek #3; East Willow Creek, Upper Willow Creek #3 (South Pass City) and Lower Willow Creek #3 (near Sweetwater River). These sections represent very different reaches. East Willow Creek is a beaver dam dominated stream with a willow and aspen riparian zone grazed with both cows and domestic sheep. Its uplands have sagebrush/grassland with conifers. Upper Willow Creek #3 next to South Pass City has been extensively dredged for gold. The willow dominated riparian zone is narrow for this size of stream. Beaver are trying to establish dams, but due to small sized dam building material and a channelized stream, dams are temporary. All pool bottoms are coated with very fine sediment. Mountain white fish characterize the fisheries in this section. Lower Willow Creek has a willow dominated riparian zone. Many beaver dams have been built using willows, but due to numerous dams, the dam complex is stable despite the dams being made with willows. Stream gradient is low with a sand and silt stream substrate that does not appear to have been dredged.

Willow Creek, West LR854830FT - A cobble/gravel stream with steady flow and a stable brook trout fishery. Its riparian area is dominated by conifers and willows with sagebrush and grasslands in the uplands. Some stream sections have been channelized by gold mining and others by the road crossing. Downstream from Highway 28, West Willow Creek is dominated by beaver dams.

Hermit Creek, Little LR854828FT - A sand/silt stream with a willow riparian zone. Inactive beaver dams dominate this stream, which is periodically stocked with trout. The riparian area is heavily grazed because the stream is one of the few sources of water in this area. Re-growth of aspens as beaver dam building material is limited.

Hermit Creek LR854826FT - A sand/silt stream with a riparian zone featuring old willow and aspen. Regrowth of willows and aspens is very limited due to high intensity grazing. Conifers have begun to encroach into the riparian zone. There are a few old decadent beaver dams. Uplands are sagebrush and grassland with conifer stands.

Deep Gulch LR854824FT - A steep gradient stream with an aspen/willow riparian zone. There are numerous old large inactive beaver dams in the lower two-thirds of Deep Gulch. Heavily grazed uplands have sagebrush with old stands of aspens. New aspens and willows survive among the old downfallen aspens, but those areas not protected are grazed and conifers were encroaching into the old aspen stands. A limited fisheries in the

upper third of Deep Gulch is supported by stocking trout in the few active beaver dams, which are in danger due to a limited food supply and few dam building materials for beavers.

Rock Creek Sec 2 LR854796FT - A boulder/cobble mountain stream with a moderate gradient, which is controlled by large boulders. A willow riparian zone has an over-story of conifers; grazing pressure is low.

Slate Creek LR854810FT - A rubble/cobble stream controlled by boulders and rubble in steep gradient sections, while low gradient sand/silt sections are controlled by beaver dams. Active beaver dams are in good shape and have adequate dam building and food supplies. Riparian vegetation alternates between willow/sedges near beaver dams and conifer/willow where gradient is steeper. The riparian zone is in excellent condition being little affected by grazing.

Little Beaver Creek LR854805FT - Beaver dams dominated this stream, but there is limited large dam building material. The aspen/willow riparian zone is in fair condition, but there is no seedling growth and conifers are beginning to encroach into the aspen stands. This creek is being adversely affected by grazing. Conditions improve downstream towards Atlantic City.

Atlantic Gulch, Big LR854802FT - Stream was dredged for gold in the 1930s and has some of the tallest dredge piles seen in the Sweetwater area. Large, stair stepped beaver dams dominate the stream with ponds extending from one dam to the next. Some beaver dams are starting to deteriorate due to inactivity, while others are being filled with sediment. Grazing intensity is high. A riparian zone of aspen, conifers and willows is in fair condition, but conifers appear to be encroaching into the old aspen stands.

Atlantic Gulch, Little LR854803FT - The stream had no flow when visited. A couple of beaver dams had small puddles of water behind them. A willow/aspen riparian zone was in good condition, but there were no young willows.

Smith Gulch Creek LR854800FT - The stream is flow limited and the flow was subsurface when visited. Despite high grazing intensity, the willow/sedge riparian zone was in good condition. In the headwater area with its aspen/ willow riparian zone, some beaver ponds have been stocked with trout.

Rock Creek, Sec 1 LR854795FT - Rock Creek was dredged for gold in the 1930s. Two sites were established, one within the dredged section and another below it. In the dredged section, stream substrate was rubble/cobble with a willow riparian zone starting to redevelop inside the dredged channel. The riparian area is in poor condition due to the dredging and moderate grazing. A commercial gold exploration is active in this section. Downstream from the dredged area is a low gradient gravel/sand stream with a willow dominated riparian zone, which is in poor condition due to heavy grazing. Pools are filling with sediment from bank erosion and past gold dredging. In protected areas, willows flourish and beaver dams dominate. Recreational gold dredging is active in this lower section.

Deep Creek LR854771FT - A sand/gravel stream with boulder grade controls in the lowest section. The willow/sedge riparian zone is in poor

condition due to high intensity grazing. Active down cutting in the channel is causing the water table to drop. Brook trout move upstream to these head cuts.

Strawberry Creek LR854770FT - Strawberry Creek was broken into three sections. WHAM Level 1 was done on the upper and lower sections, but not in the middle section due to private land.

The upper section is a low gradient gravel/sand stream, which may become flow limited during dry years, but inflow from springs occurs throughout the section. The willow/sedge riparian zone is in fair condition due to moderate grazing intensity. Uplands are sagebrush/grassland grazed at moderate intensity. Beaver dams had been breached by high flows in early summer, but beavers resumed dam building during the summer. Their food supply is adequate, but the supply of dam building material is questionable. A wide riparian zone is narrowed down by geological formations, which leads to the middle section.

A steep gradient canyon stream controlled by large boulders and local geology is in the lower section. Its willow and grass riparian area becomes dominated by a cottonwood over-story low in the drainage. Although the area is grazed at high intensity, it is in good condition mainly because the stream is controlled by boulders rather then riparian vegetation. Most of the pools are filled with sediment caused by grazing, mining, and present-day gold exploration in the upper watershed.

Chimney Creek LR854755FT - Creek substrate is cobble to sand with a moderate gradient uncontrolled by beaver dams. Moderate grazing intensity has left its grass and willow riparian area in fair condition. No beaver dams were found; food supply is inadequate and dam building material is questionable. Uplands are sagebrush and grassland along the Pony Express and Oregon Trails; grazing intensity is moderate. Soil loss was apparent in the uplands from wind erosion and use of the trail.

Silver Creek LR854740FT - A sand/silt stream, the lower section of Silver Creek is down cut by irrigation activities and is in poor shape. Stream flow may be limiting. No beaver dams are present; dam building and food supplies are inadequate. Since the water table is dropping due to down cutting by the stream, the riparian zone (upland grasses/thistle) is in poor condition. Grazing intensity is low in both riparian and upland areas. Uplands are sagebrush and grassland. This area is protected by the The Nature Conservancy.

C- Tributaries on the South Side of the Sweetwater River.

The following streams on the south side of the Sweetwater River were evaluated with WHAM Level 1:

Harris Slough LR854785FT - A down cut cobble/sand stream with a sedge/grass riparian zone in poor condition. Few pools are present and the best pool is at the road-crossing culvert. There is no evidence of past or current beaver activity. Grazing intensity is moderate in the sagebrush and grassland uplands.

Granite Creek LR954780FT - This creek had no flow on September 23, 1999, but had puddles near springs. Granite rock outcrops control the stream.

High intensity grazing has left both upland and riparian grasses and sedges in poor condition. The riparian areas are covered by hummocks.

Mormon Creek LR854765FT - A narrow, deep cobble/gravel stream with a sedge/grass riparian zone in fair condition. Grazing intensity is high, but not as high as Granite Creek to the west. No beaver activity because food and dam building supplies are inadequate. Uplands are sagebrush and grassland grazed at low to moderate intensity. BKT from young of the year up to 10 inches occur in the stream.

Willow Creek #2 LR854760FT - A sand/gravel stream that is down cutting and starting to dry out the grassy riparian zone, which is heavily grazed and in poor condition. Two beaver dams that have been built, using willows from an old cutoff oxbow and an adjoining spring area, may help heal the riparian area. However, food for beaver and dam building materials are limited. One of the few streams surveyed in 1999 having bank erosion >25%. Sagebrush and grassland uplands are being grazed at moderate intensity.

Spring Creek LR854750FT - A cobble/sand stream of moderate gradient that is located inside the Sweetwater Canyon riparian fence. Two relic beaver dams are present, but the food supply for beaver and dam building materials are questionable. A very narrow riparian zone of willows/aspens is in excellent condition, but conifers are encroaching into the aspens. Uplands are sagebrush and grassland grazed at moderate intensity.

Alkali Creek LR854715FT - A sand/silt stream with large deep pools spaced about every 200 to 500 feet; only a narrow stream flows between pools. Only the lower 7 miles, or so, had water flow on September 14, 1999. Water flowed from private lands (R96W, T28N, S12) downstream to the Sweetwater River. Mostly populated by non-game fish, but some BNT are present.

A narrow sagebrush/grass riparian zone has upland vegetation right next to the stream in places. Grazing intensity is low to moderate and the riparian zone is in fair to poor condition depending upon location. Private and some state land riparian areas are in fair condition, with BLM lands often in poor condition. Uplands are sagebrush and grassland having few water sources and low intensity grazing.

Basin-Wide Work

- Drainage Surveys FX-LR-6WS-510

  Digital elevation models (DEMs) were downloaded from the USGS website for the entire Sweetwater watershed, which contains about 2340 sqmi. This task took over two weeks, but was accomplished with the assistance of FMLR contract biologists. The model using the 1-100,000 scale (quad maps) did not represent the upper Sweetwater watershed correctly, as it had the upper Sweetwater watershed, from Gold Creek upstream, flowing into the Big Sandy. So, DEMs at the 1-24,000 scale (topographic map) were added together to model the upper Sweetwater watershed upstream from Alkali Creek (Figures 1 and 2). This effort took about one month due to some maps having erroneous elevations or faulty data that did not allow maps to be joined. A model was then created to summarize physical characteristics of the upper Sweetwater Watershed. Upstream from Alkali Creek the drainage contains about 850 sqmi. The middle section, surveyed summer 1999, represents about 617 square miles with 291 squares miles in

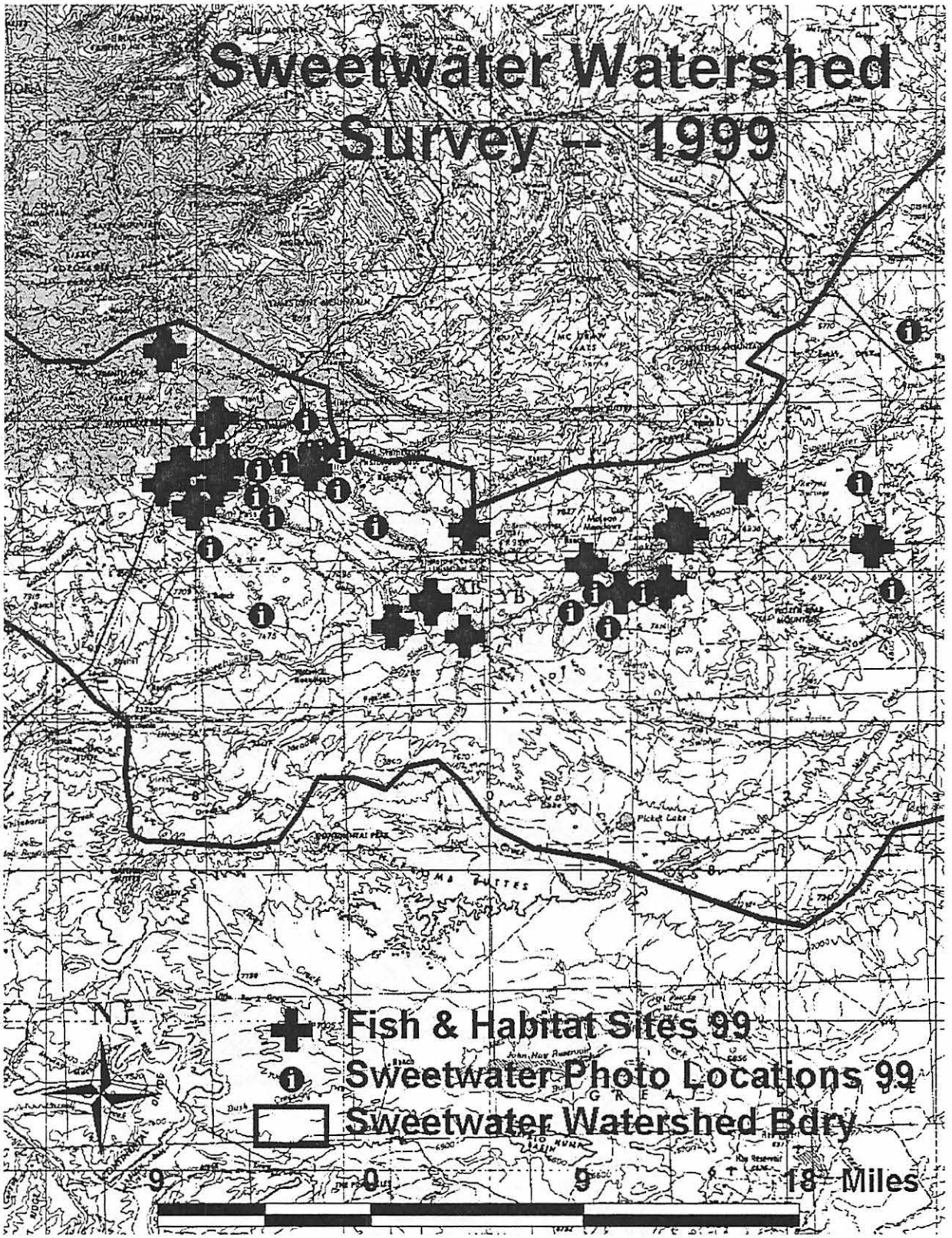


Figure 1. Fisheries and Habitat Survey Sites in the middle Sweetwater watershed, with photo locations plotted by ArcView, Photo Database, GeoExplorer and Pathfinder Software.

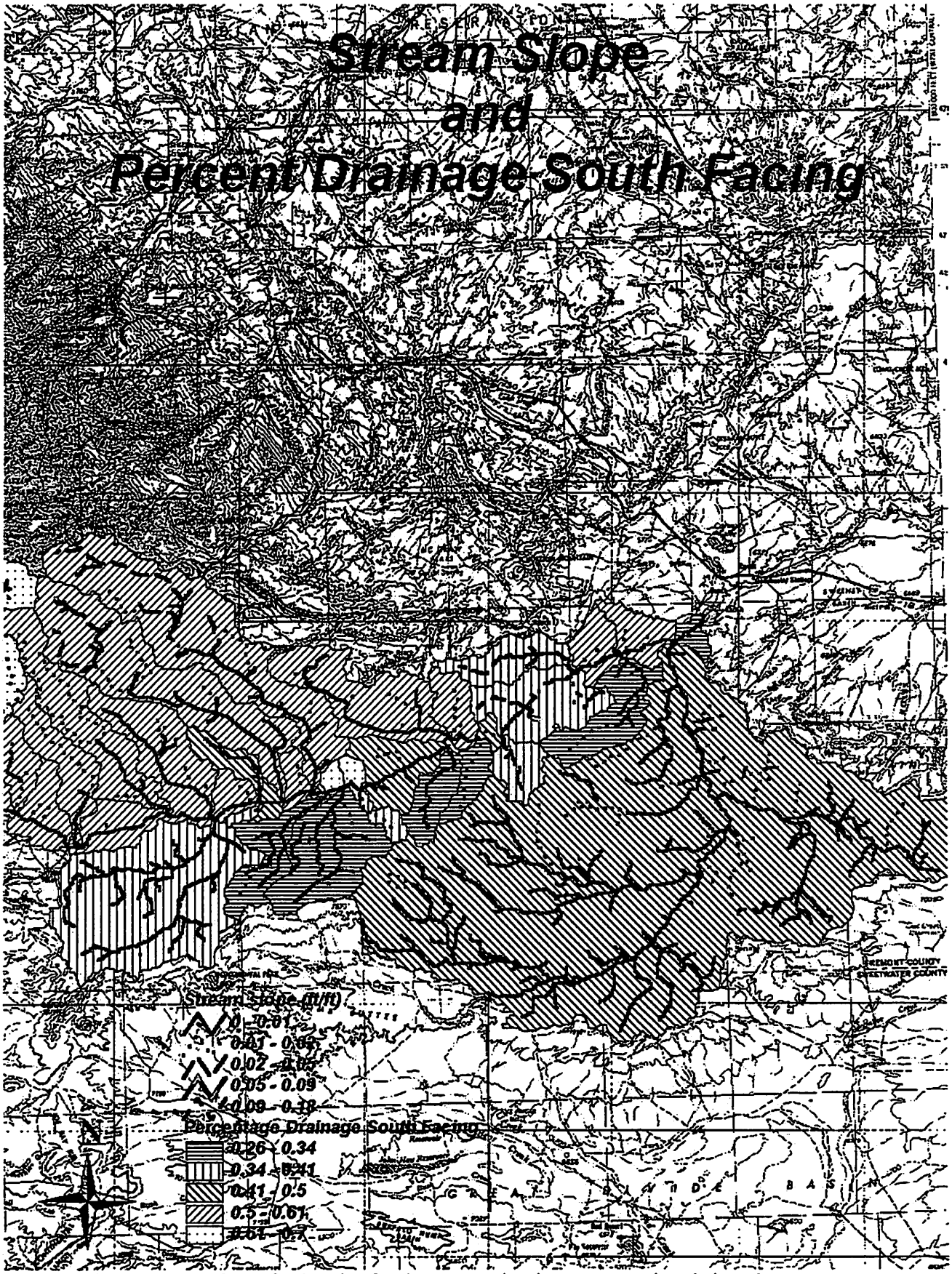


Figure 2. An example of physical characteristics summarized in the Sweetwater Watershed by WMS and ArcView programs.

the Alkali Creek watershed,. Only three sites were sampled on Alkali Creek, which may seem too few until one considers that only the lower 7-8 miles flow perennially. Moreover, that area is <9% of the total Alkali Creek watershed, so three sites adequately represent the fisheries.

All sample site locations were recorded with the Tremble GPS, downloaded, data corrected, and imported into ArcView. Location of all photos was inputted into a photo database, which was then hot linked to the ArcView Project, thus allowing the pictures to be viewed by highlighting locations on a map.

- Green Mountain Road Rehabilitation and Erosion Control FXLREJ1234

  Toured the Green Mountain Road rehab and erosion control project with BLM. There are many possibilities to improve the fisheries once the Handcart Ranch decides if they will start a CRM group.

Sweetwater River LR854400FT

- Sweetwater River (Riparian Fence) FXLR6SW234

  The Sweetwater Canyon Riparian fence was completed. Photo monitoring sites were established for comparison in the future.

East Sage Hen Creek LR8544622NA

- East Sage Hen Creek FXLR6SW512

  Split Rock CRM has proposed high intensity/low duration grazing for the Black Jack Allotment. For pre-project monitoring, WGF completed Level 1 WHAM, HQI, and Level 2 upland and riparian assessments at three sites. Final analysis awaits the return of macroinvertebrate samples being processed by the National Aquatic Monitoring Center at Utah State University. Photo points were established in conjunction with the CRM consultants, BLM, and WGF. WGF will be responsible for the photo point at the confluence of East Sage Hen and Middle Sage Hen creeks.

Little Hermit Creek LR854828FT

- Little Hermit Creek FXLR6SW234

  Repaired three beaver dams using combination sandbags and black plastic and about eight man-days of labor. These repairs raised pond elevation an average of 0.9 feet. These beaver dam are an important local fisheries for South Pass and Atlantic City. Repairing the dams and raising the pond level should extend the dam life until beavers move back. Adequate food and dam building materials are available.

Torrey Creek Drainage - 6TY

Torrey Creek LR826680FT

- Fish Population / Habitat Survey FX-LR-6TY-511

After considerable searching, a second HQI and fish population sample site was established on Torrey Creek because the 1998 site may not be representative of upper Torrey Creek. Finding a reach suitable for electrofishing was made difficult by multiple channels; this task took a day. A site upstream from the 1998 site was electrofished with one-pass (see FMLR progress report for results). This stream is nutrient limited, with very limited habitat for larger fish. As at the lower sampling site, the fish age distribution and habitat parameters suggest the upper site is principally nursery habitat.

Wind River above Reservation Boundary - 6WU

Wind River LR825006FT
Wind River LR825010FT

- Wind River above Reservation Boundary FXLR6WU511

Oberlie provided Don Aycock with ideas to improve the fisheries at his 2000 feet of frontage on the Wind River just west of Dubois. However, he only owns one side of the river, which limits his options. Gave him detailed information on hatching boxes for Yellowstone cutthroat, as he has some springs and an ideal location. Had no further contact.

Met with Town of Dubois and the Dubois Interpretative Trail Association personnel to discuss a potential fisheries improvement and walk-path project along the Wind River at City Park. Provided general concepts for fisheries improvement and await a plan from the NRCS engineers. Unfortunately, Dubois City Park borders a long riffle; two large pools are at each end, but these are on private land. Explained the importance of riffles, and why the whole river can't be one big pool, to the landowner.

Measured HQI and PMB on the upper Wind River at Stampert's Public Fishing Area, the State Land Section, and Dubois City Park. HQI evaluations are on hold pending completion of macroinvertebrate analysis by the National Aquatic Monitoring Center at Utah State University. Took digital photos of all sample sites and linked them to ArcView. Some old photos of the Wind River will be digitized and linked to ArcView for comparisons with the 1999 photos.

From the USGS website, downloaded Digital Elevation Models (DEMs) and digital orthoquads for the upper Wind River. Collecting the needed files took 10 days. Calculated watershed attributes after DEM information was imported into watershed modeling software. This task was done twice, once with the 1-100,000 scale (quad map) and then again at the 1-24,000 (topo map) scale. Due to elevation differences within the upper Wind River, the software was able to model the watershed and stream locations well at either scale. Using the topo scale DEMs, the software was able to find more gradient breaks within the streams, which was not the case in other watersheds evaluated in 1999. Calculations at the quad map scale took two days and a week at the topo map scale. But these calculations only need to be done once for a given watershed or drainage.

Digital orthoquads will be used to measure the extent of different habitat conditions and will be very useful to measure how much of the river has been channelized or developed.

Work Not Associated With a Particular Basin

- Monitor Flows in Instream Flow Segments FX-SW-EP1-511

A total of 194 discharge measurements from 38 streams were recorded in 1999. Twenty-five of the 38 streams had flow measurements on 4 or more different dates. Most of these measurements were direct measures of instantaneous discharge. Additional flow estimates were derived from rating curves at gage sites established by the instream flow crew. Gages were installed at 14 sites on 13 streams in 1999. Including 1998 activities, a total of 31 gages have been installed. Of these, twenty-seven were active through 1999 (Table 1).

Table 1. Stream gages active through 1999.

Stream	Water Number	Region	Date Established	# 1999 Flow Records
Jack Creek	CY822790PK	CY	05/12/1998	2
Pickett Creek #1	CY822740PK	CY	06/22/1999	5
Pickett Creek #2	CY822740PK	CY	06/17/1999	8
North Fork Pickett Creek	CY822750PK	CY	06/17/1999	10
Tensleep Creek	CY823370WE	CY	05/14/1999	8
Currant Creek*	GR841200SR	GR	05/05/1998	8
Sage Creek	GR841880UA	GR	06/15/1999	1
Gilbert Creek	GR841925UA	GR	06/15/1999	1
Little Gilbert Creek	GR841930UA	GR	06/15/1999	1
Trout Creek	GF841975SR	GR	05/05/1998	6
Red Creek	GR845860SR	GR	05/05/1998	6
Big Sandstone Creek	GR872330CN	GR	07/01/1998	6
Deep Creek	GR872340CN	GR	07/01/1998	6
Mill Creek	GR872350CN	GR	07/14/1999	7
Douglas Creek	GR872360CN	GR	07/09/1998	5
North Fork Big Sandstone	GR872366CN	GR	07/09/1998	5
Dirtyman Creek	GR872480CN	GR	07/01/1998	5
Roaring Fk. Little Snake	GR872800CN	GR	06/30/1998	5
Packstring Creek	GR891200LN	GR	05/27/1999	9
Huff Creek	GR891280LN	GR	05/25/1999	12
Coal Creek	GR891320LN	GR	05/26/1999	7
Wagonhound Creek	LE855920CN	LE	06/05/1998	11
Bear Creek	LR826500FT	LR	05/07/1998	3
LaBarge Creek	PE843025SE	PE	08/11/1999	1
Fish Creek	PE843285SE	PE	07/29/1998	1
North Cottonwood Creek	PE844020SE	PE	07/29/1998	1
Middle Fork Powder River	SN836490JN	SN	05/26/1998	5

* A continuous flow record exists for June 15 to October 12, 1999.

Most gages consist of a staff gage mounted on a board. The board is attached to a fencepost, which is pounded into the stream channel. During site visits water level (stage) on the gage is recorded along with discharge. The relationship between stage and discharge is plotted so that subsequent stage readings can be converted to discharge. The elevation of the gage is periodically checked with a level to ensure that the gage has not shifted. Some gages are designed to be

more permanent and consist of a staff gage mounted horizontally on a board suspended over the stream. A weight attached to a chain is suspended from the board and dropped to the water's surface; a permanent pin on the chain is aligned with the staff gage to read stage. These "cantilevered" staff gages were installed on Wagonhound Creek, Middle Fork Powder River, LaBarge Creek, and Tensleep Creek in 1999. A cantilevered gage installed in 1998 on Francs Fork Creek was removed in 1999 because the channel shifted away from the gage location. Another cantilevered gage remains on Bear Creek on the Spence Moriarity WHMA.

A continuous flow recorder was established on Currant Creek and results are presented below under the heading "East Side Flaming Gorge Tributaries". A second Sutron gage was to be installed in Big Sandstone Creek, but it was found to be defective (factory problem). A replacement was obtained but not in time to place the recorder in the stream in 1999.

The USGS was contacted to estimate the cost of establishing a gaging station on Thomas Fork, at the site of a previous USGS gage station. Under a 50:50 cost share, installation would require approximately $6,234 from the WGFD. Annual maintenance and data collection costs to the WGFD would be $4,300. The product would be a continuous flow record for April 1 through October 31 published in the USGS annual flow data report. Due to the significant costs, an agreement with USGS will not be pursued immediately. Other options being considered include finding other partners to cost share or having the instream flow crew establish and maintain a continuous recording gage station similar to the one on Currant Creek.

A significant amount of effort was devoted to developing an ACCESS database for efficient storing and reporting of flow and gage records. This database was used to develop flow reports that were sent in early January to the Board of Control members representing each of the four water districts. Another effort under the flow-monitoring program included consulting with USGS technical experts in Cheyenne, Sutron technical experts, and members of the State Engineers Office to ensure that data were collected in an appropriate manner.

Present plans are to continue gathering data on Big Sandstone Creek and Currant Creek and streams in the immediate vicinity of each to establish a relationship between flow at the gage and flow at remote stream segments. Data will be collected on other proposed instream flow segments until enough data have been collected in all seasons that establish the availability of the recommended flow in each season or reveal an indication that the recommended flow needs to be adjusted.

In the two years of monitoring, gage reading assistance has been received from the Wigwam rearing station, Sheridan fishery management, Aquatic Habitat Biologists in Lander and Pinedale, and University of Wyoming student researchers. This assistance is much appreciated and hopefully can continue until the instream flow water rights are adjudicated.

- Colorado River Endangered Fishes Recovery Program AW-SW-CE2-140

Biology committee meetings in Colorado were attended in August, November, February, March, and April. The annual researchers meeting in January was attended in Moab, Utah and a short presentation given on Wyoming's non-native fish control efforts and perspective. Dey was chosen to chair the biology committee effective November 2000.

- Public Presentations AW-SW-EP1-160

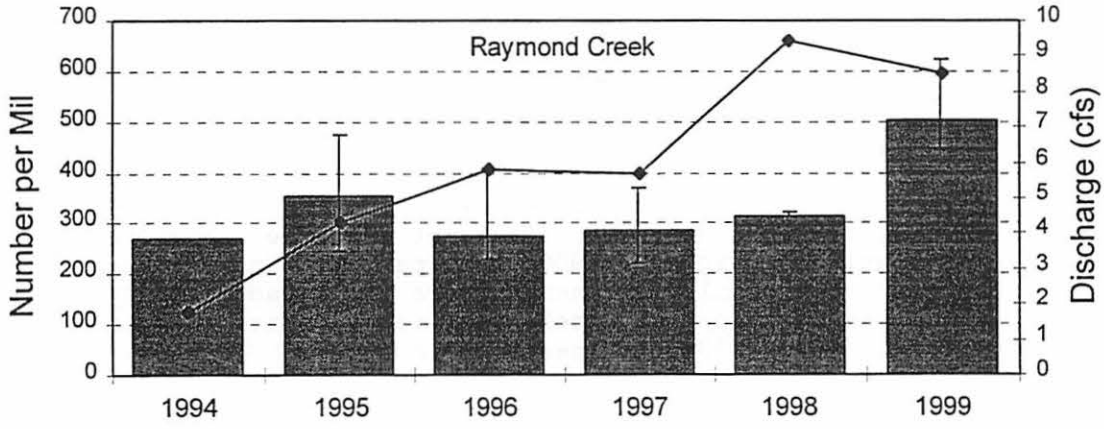
  Wrote a paper summarizing the results of research done by the department and directed at the University of Wyoming Co-op Unit on the behavioral and physiological response of trout in tailwaters to winter habitat conditions. The paper was presented at the International Union of Geodesy and Geophysics conference in Birmingham, England in July. All travel expenses were paid by the International Union of Hydraulic Scientists courtesy of a grant from the Canadian government.

- Update Five Year Plan AW-SW-EP1-122

  Regional fishery management crews and fish staff were surveyed for input in January 2000. The first draft of the document will be completed in June 2000. Direction will be provided based on an exploratory trip by Dey to tributaries of the Greybull River in August 2000. Following that effort, the report will be modified again in August 2000 and presented to selected individuals and groups outside the department (State Engineer's Office, Board of Control, Trout Unlimited, Wyoming Wildlife Federation, Flycasters, Powder River Basin Resource Council) for input and minor modifications. The document will be finalized by November 2000. Instream flow filings for calendar year 2000 have already been targeted and were based on the guidance provided by the preceding five-year plan.

- Instream Flow/Fish Population Monitoring FX-SW-EP1-511

  Population estimates were conducted during August and September for four to six consecutive years on headwater cutthroat trout streams to document natural levels of population fluctuation (Figures 1-2, Table 2). All streams were sampled in August or September. For Bonneville cutthroat trout, Raymond Creek was sampled at the trailhead/BLM boundary, Porcupine Creek approximately 500 yards upstream from its confluence with Smiths Fork River, and Coal Creek near the upper end of the cattle exclosure. For Colorado River cutthroat trout, Mill Creek was sampled approximately 500 yards downstream from the Forest Road 871 culvert crossing and Dirtyman Creek was sampled approximately 100 yards upstream from the barrier.



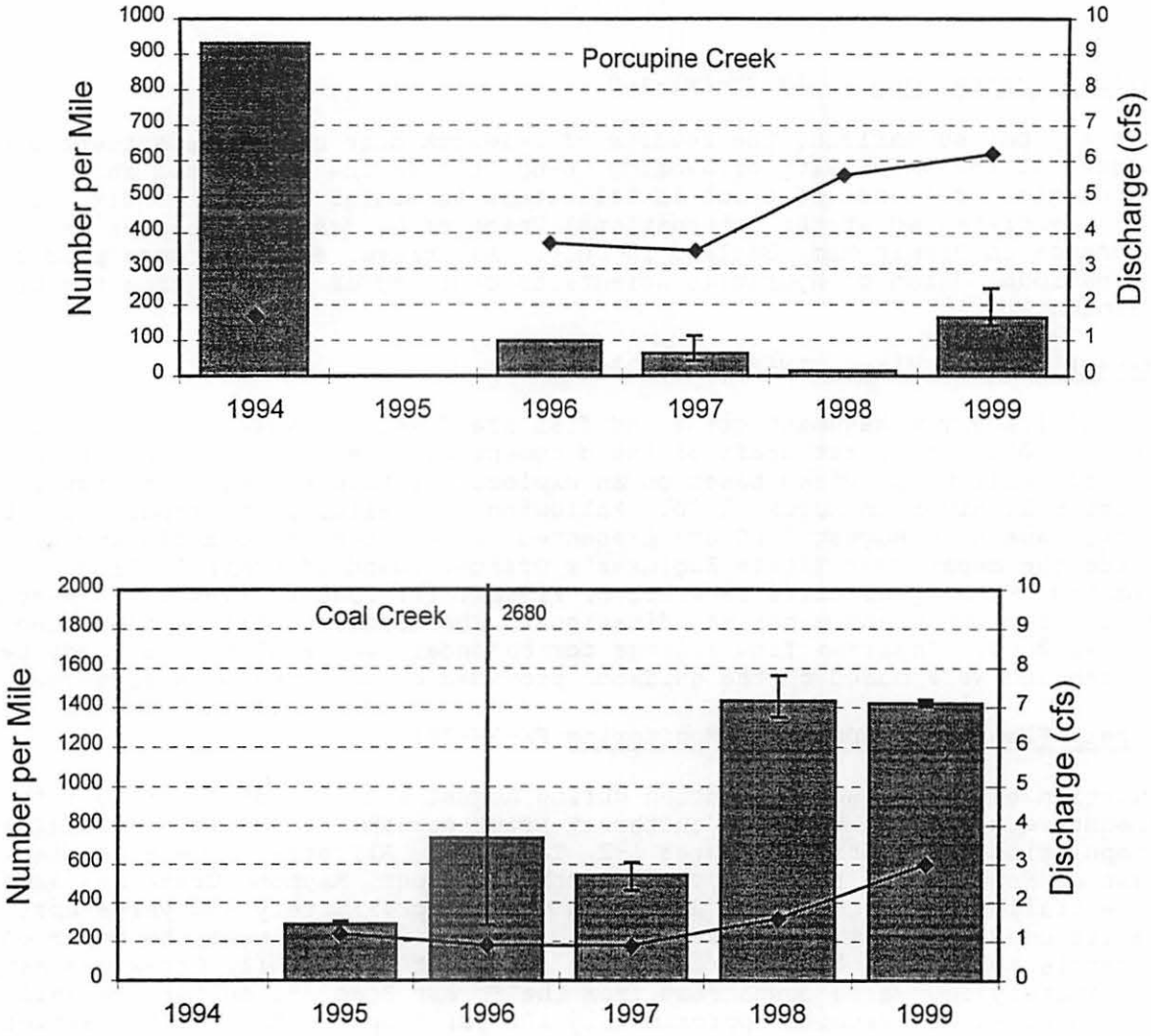


Figure 1. Bonneville cutthroat trout numbers in three streams (1994-1999). Discharge was measured concurrent with population sampling.

The pattern of variation in number per mile over the sample period differed among the three streams sampled for Bonneville cutthroat trout (Figure 1, Table 2). Of the three streams examined, Raymond Creek exhibited the most stable numbers (CV=26%) but still ranged from 272 to 495 trout per mile. Numbers in Porcupine Creek ranged dramatically with over 900 trout per mile in 1994 dropping to less than 100 trout per mile until 1999 when numbers increased slightly. Likewise, annual variation was high in Coal Creek with over 1400 trout per mile in 1998 and 1999 compared to a low of 290 trout per mile in 1995.

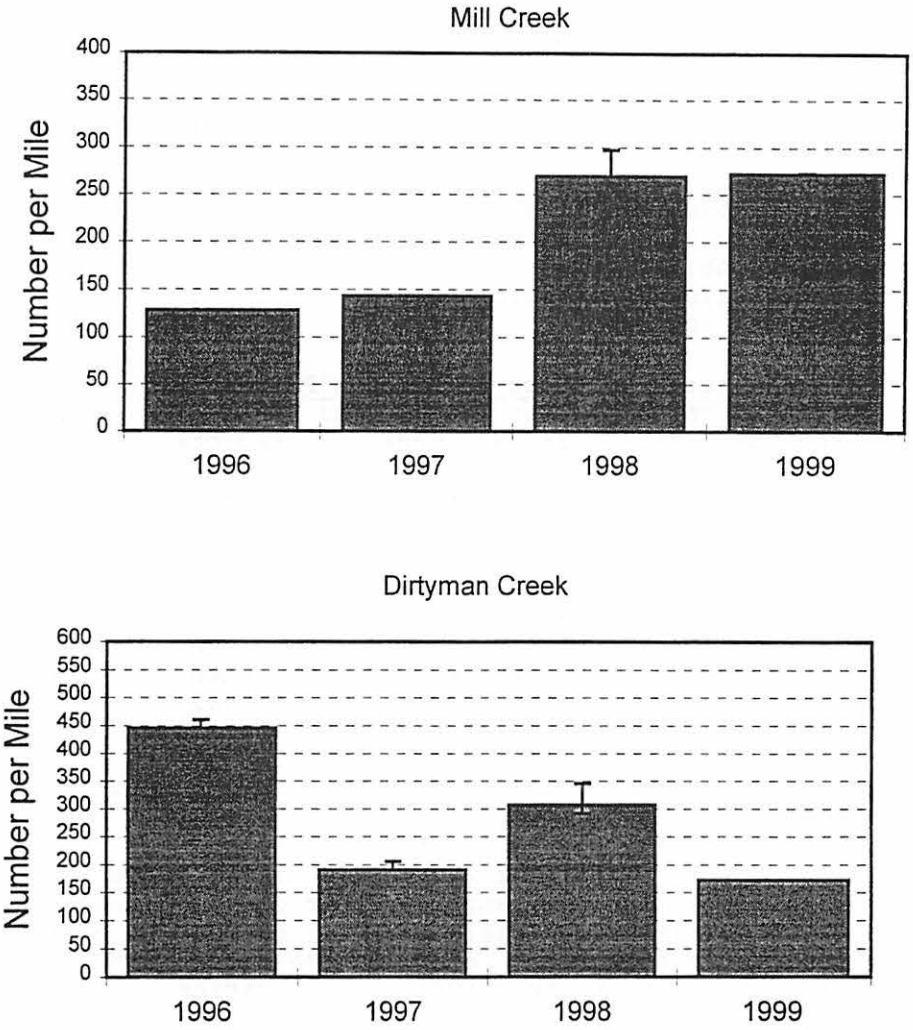


Figure 2. Colorado River cutthroat trout numbers in two streams, 1996-1999.

Abundance estimates in two Colorado River cutthroat trout streams likewise reflect inter annual variations within and among streams (Figure 2, Table 2). In 1996 and 1997, Mill Creek had relatively low trout densities but densities were substantially higher in 1998 and 1999. Dirtyman Creek trout densities ranged between 172 trout per mile in 1999 and 445 trout per mile in 1996. In contrast to Mill Creek, density was relatively high in 1996 and low in 1999. The drop in numbers may be a reflection of the loss of beaver ponds immediately upstream from the site in 1996. Most of the trout in this segment are YOY that likely originate from spawning activity upstream (very little suitable spawning habitat or adult habitat) below the beaver ponds. Thus, the loss of the beaver ponds may have resulted in the decline in densities in the study site.

Table 2. Cutthroat trout population density and standing stock statistics over a 4 to 6 year period.

	Density (number per mile)			*Biomass (lbs/acre)*		
Stream	**Mean (n)**	**CV**	**Range**	**Mean (n)**	**CV**	**Range**
Raymond	332 (6)	26%	272-495	25.1 (6)	40%	14.3-38.6
Porcupine	242 (5)	161%	0-931	17.2 (5)	117%	0-48.0
Coal	883 (5)	59%	290-1434	81.9 (5)	49%	35.1-127.5
Mill	203 (4)	38%	128-272	26.7 (4)	11%	23.9-30.4
Dirtyman	278 (4)	45%	172-445	16.1 (3)	70%	9.3-29.0

The documented variation in populations of cutthroat trout in small Wyoming streams has implications regarding the interpretation of instream flow water right recommendations. The instream flow law (W.S.41-3-1001) directs WGFD to identify flow levels necessary to maintain or improve existing fisheries. There is a temptation by some to interpret the term "existing fishery" as a static density or standing stock of fish. The fishery literature and Wyoming data, including the above, document naturally fluctuating trout populations in mountainous regions. Sometimes these fluctuations can be tied to variation in environmental conditions. In other cases, fluctuations occur despite seemingly stable habitat conditions. Instream flow water right recommendations should strive to provide conditions that allow natural (existing) fluctuation patterns in density and standing stock.

Comparison of measured standing stock to HQI and PMB estimates

The population data set collected for the various streams provides an opportunity to evaluate HQI and PMB models. The HQI model II predicts standing stock from measurements of nine habitat attributes. The HQI model-predicted standing stocks differed widely from measured values (Table 3). Porcupine and Dirtyman Creeks had predicted standing stock that fell within the range of measured values. The HQI model substantially over-predicted Raymond Creek standing stock and it under-predicted standing stock for Coal and Mill Creeks. Differences between measured and HQI-predicted standing stock are expected under the notion that, because it is based on measurements of relatively stable habitat features, the HQI should reflect long-term population status while spot measurements are subject to the vagaries of defining a population that varies considerably in time and space. However, the series of four to six population estimates collected on each stream should provide a fair estimate of long-term population status. These results reinforce the need for caution in using the HQI as an index of trout biomass.

The PMB model (Hubert and Marwitz, 1996) predicts maximum potential biomass from elevation, gradient, cover, and stream width. Predicted biomass under this model was close to or within the measured range for four of the five streams (though it was close to the average measured biomass for only one stream - Mill Creek). For Raymond Creek, predicted biomass was higher than measured. The unique characteristics of Raymond Creek (relatively low elevation and high gradient) likely account for the model's imprecision. The PMB model suggests that several of the streams and especially Porcupine Creek are well below potential. For Porcupine Creek this result seems realistic as population surveys have consistently failed to reveal the numbers and size of trout this stream appears capable of carrying. The population has not yet recovered from a crash following the 1994 population estimate (Figure 1).

Table 3. Comparison of average measured standing stock to that estimated from the HQI and PMB models.

Stream	Average Biomass (Lbs/acre)	HQI (year) (Lbs/acre)	Predicted (Lbs/acre)	PMB (Lbs/acre)
Raymond	25 (14-39)	130 (1994)	54	111
Porcupine	17 (0-48)	42 (1994)	47	100
Coal	82 (35-127)	6.8 (1995)	39	88
Mill	27 (24-30)	0.6 (1994)	32	74
Dirtyman	16 (9-29)	28.2 (1994)	30	72

- Instream Flow Council FX-SW-EP1-122

  Annear attended the annual Excom meeting in Boise May 1 to 2. He also participated in meetings of the two committees that are developing national standards for instream flow methods and policies. One meeting was held in Boise, ID from May 3 to 5 and the other was held in Phoenix from November 7 to 9. Considerable time was spent coordinating with members to pursue matters such as acquiring the journal Rivers, resolving instream flow training opportunities and other organizational issues.

- Hunting and Fishing Heritage Exposition FX-SW-EP1- 160

  The crew set up the instream flow poster at the Hunting and Fishing Heritage Exposition in Casper from September 9-12. Over the course of the three-day event, several hundred instream flow brochures and note pads were distributed and many good contacts were established.

- Third International Symposium on Ecohydraulics AW-SW-EP1-180

  Paul Dey attended this conference in Salt Lake City that provided valuable information and contacts regarding application of engineering and modeling approaches toward instream flow evaluation. A short workshop on two-dimensional modeling was attended to learn more about this approach and how it might be applied in Wyoming waters.

Mills Bridge to Glendo Reservoir - 1MG

North Platte River - CR851010CE and CR851012CE

- Instream Flow Studies FX-CR-1MG-511

  Floated much of the North Platte River between Dave Johnson Power Plant near Glenrock and Glendo Reservoir with Casper Regional fish management crew in April to visually assess habitat characteristics of the river and identify potential future sampling sites. Hoop nets and trot lines were set in various locations and presentations for two consecutive weeks in June at two different sections of the river to evaluate the effectiveness of capture techniques for channel catfish. Details of sampling are presented in the Progress Report for the Casper Region Fish Management Section. Hoop nets were generally more effective than trot lines in upstream sections of the river. Trot lines were effective when placed in flooded bottom lands.

Lower Bighorn River and Tributaries - 2LB

Big Horn River CY821001BN

- Shovelnose Sturgeon Reintroduction FX-CY-2LB-511

  No sturgeon were stocked in 1999 due to the discovery of an apparent iridovirus in the federal hatchery system and the total shutdown of pallid and shovelnose sturgeon propagation and distribution. Subsequent study by the Fish and Wildlife Service failed to detect the virus in the wild or outside the Yankton Hatchery where it was first observed. No significant negative effects were documented to infected fish. Official word on future opportunities for stocking sturgeon has not yet been issued at this writing (March 2000).

The Bighorn River sauger special project biologist captured two sturgeon greater than 24 inches in the Bighorn River downstream from Worland. Because of the large size and apparently rapid growth of these two fish, it is likely they were from among the lot of 371, 8-10 inch fish stocked in July of 1996. Regardless, this growth rate exceeds any observed by other studies in either culture or wild settings and suggests stocked fish are finding a vacant niche in the river that offers excellent habitat.

Lower Shoshone River - 2LS

Shoshone River CY821095PK

- Shoshone River Habitat Evaluation FX-CY-2LS-511

Coordinated with the Bureau of Reclamation to have flows of 250 cfs, 450 cfs and 650 cfs released incrementally over a four-day period between November 12 and 16. Set up two study sites on the Stock easement after coordinating with UW grad student Matt Dare to identify appropriate locations to model habitat dynamics. Four transects were established during low flow conditions at one site. Two other partial transects were established on a gravel bar at the mouth of Sulphur Creek. A full set of hydraulic data were collected at low flow and all surveying was also completed. Hydraulic data and water surface elevations were collected at the middle flow. Only water surface elevations were collected at high flow. Data entry and analysis will be completed in March and April 2000. Public input will be received to determine winter bank and boat angling flow preferences. This information will supplement habitat modeling data. Final recommendations will be developed before December 31, 2000

Greybull River Basin - 2GR

Timber Creek CY822720PK
Francs Fork CY822732PK
Jack Creek CY822790PK

Instream flow studies were conducted in 1998 on these Yellowstone cutthroat trout streams. Data analysis and report writing is planned for FY 2000 with instream flow water right applications to be filed in FY2001.

- Yellowstone Cutthroat Trout Instream Flow Studies - FX-CY-2GR-512

Pickett Creek
Two representative study sites were established to collect data for modeling flow-habitat relationships below and above the North Fork Pickett Creek confluence. Data were collected at four flow levels at the upper site and three flow levels at the lower site to calibrate HQI, Habitat Retention, and PHABSIM models. A population estimate was conducted at the upper site on September 16, 1999. Data analysis, reporting and water right applications will be completed in FY 2001.

North Fork Pickett Creek
A representative study site near the mouth was established to collect data for modeling flow-habitat relationships with the HQI, Habitat Retention, and PHABSIM models. Data were collected at four flow levels. In addition, a population estimate was conducted on September 15, 1999. Data analysis, reporting and water right applications will be completed in FY 2001.

Lower Big Sandy River Drainage - 3BS

Big Sandy River GR842340SR

Stream flows in the Big Sandy were atypically high through the period when HQI data needed to be collected (August). After consultation with the Green River crew, this effort was delayed until the summer of 2000.

- Long Term Monitoring - AW-SW-3BS-512

Other commitments precluded any opportunity to sample Rock Creek in FY2000.

East Side Flaming Gorge Tributaries - 3ES

Currant Creek GR841200SR

- Central Utah Project - Flow Monitoring FX-GR-SM4-511

A Central Utah Project (CUP) grant of $5,100 was received to purchase equipment for monitoring streamflows on Currant Creek and Big Sandstone Creek. The streamflow data collected is intended to help in adjudicating instream flow water rights on these streams as well as nearby streams. Purchased equipment included two Sutron Model 8400 data loggers, two pressure transducers for sensing changes in water level, and miscellaneous accessory equipment. Equipment was not received in time to establish a station on Big Sandstone Creek in 1999; instead, monitoring will begin in 2000 as soon as the stream is accessible.

A Sutron 8400 data logger was established at a Currant Creek station near Dry Hollow on July 17, 1999. The data logger recorded stage readings via a pressure transducer at 15-minute intervals until October 13. An F-1 chart recorder was run concurrently at the same station from June 15 until October 12, 1999. The chart recorder was used to ensure data collection while using the unfamiliar Sutron equipment and to cross validate the Sutron data. Stage and discharge measurements were collected on the dates listed in Table 4 and used to develop regression equations for converting recorded stage readings to flow estimates.

Table 4. Discharge and stage readings for Currant Creek at Dry Hollow.

Date	Q	Staff
06/15/1999	18	1.28
07/01/1999	11	1.04
07/02/1999	12	1.06
07/26/1999	6.6	0.92
08/19/1999	5.8	0.87
09/20/1999	4.1	0.80
09/21/1999	4.4	0.81
10/12/1999	3.7	0.77

The hydrograph developed is relatively flat, with little seasonal change over the period measured (figure 3). A few spates increased the discharge but flow quickly stabilized and continued a gradual decline toward base flow.

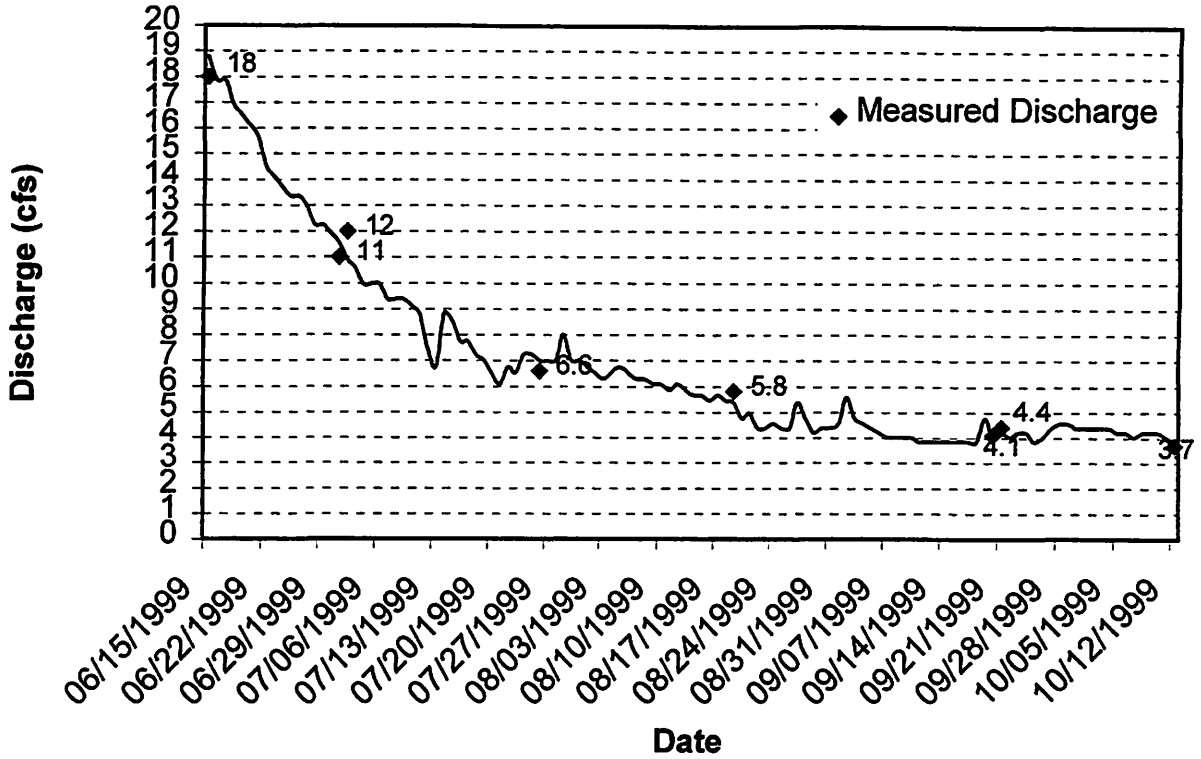


Figure 3. Seasonal hydrograph for Currant Creek at Dry Hollow, 1999.

Relatively stable flows and the channel characteristics at the monitoring station combined to produce little change in stage over the period when both stage-recording devices were operating (Figure 4). Small changes in stage were associated with sizable flow changes. For instance, average stage on 7/29 (spate) was 0.96 feet and decreased to 0.92 on 7/30. The corresponding flows were 8 and 7 cfs, respectively. Thus, a stage change of only 0.04 feet reflected a flow change of 1.0 cfs.

Notable differences occurred between the stage recordings. Several stage variations were recorded on the chart recorder but not on the Sutron. Or, the stages changes recorded by the Sutron were lower in magnitude. For example, average stage as recorded on chart paper increased 0.05 feet on 8/27; but it only increased 0.01 feet according to the Sutron. It is possible that Sutron parameters and features can be adjusted to increase sensitivity, if that indeed is a problem. Further data comparison and consultation with Sutron technical experts will be done before resuming data collection in spring 2000. The chart recorder data is depicted in the hydrograph above in Figure 3 and will serve as the default flow data for 1999 adjudication purposes.

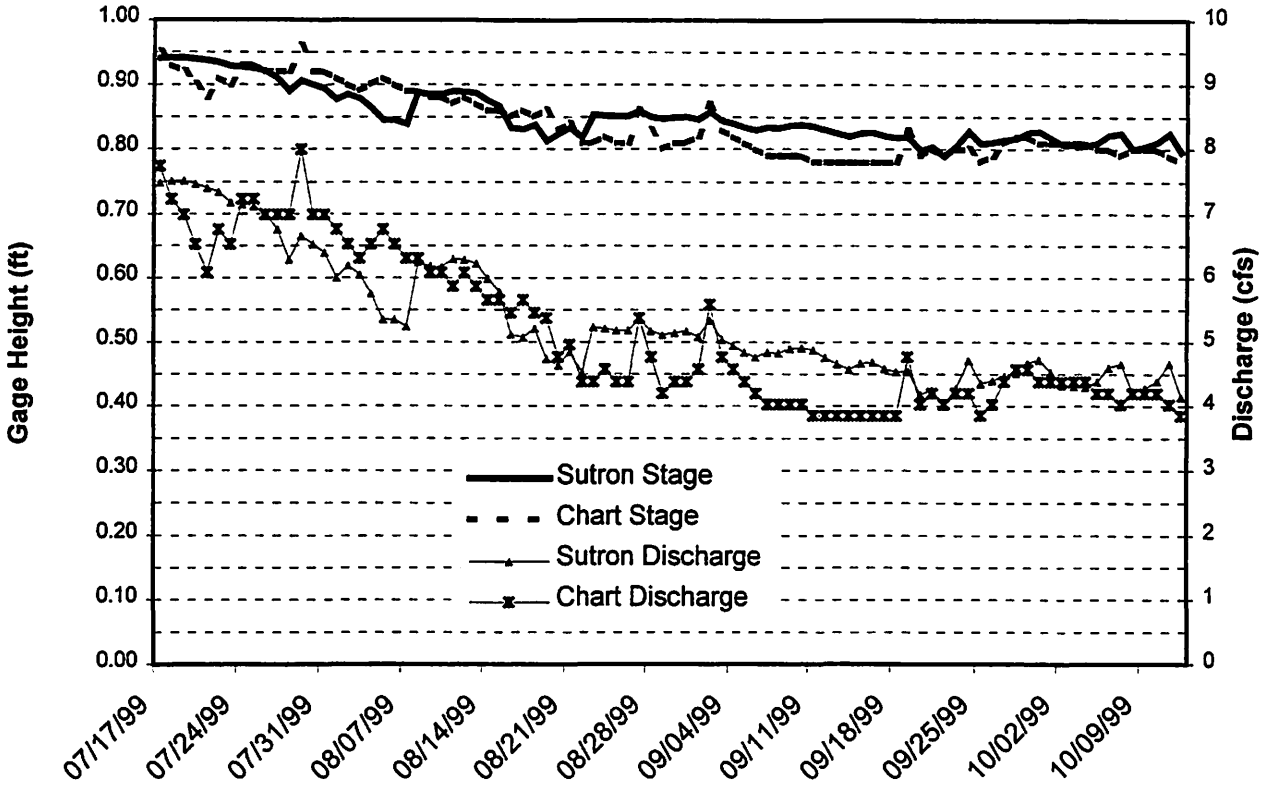


Figure 4. Currant Creek stage and calculated average daily flow recorded with a chart recorder and a Sutron data logger for the period July 17 to October 12, 1999.

In calendar year 2000, flow monitoring will continue on Currant Creek. To increase precision, an artificial flume should be created or installed to create greater stage changes. This could involve confining the channel for a short distance, perhaps 8 feet, between plank walls. Or, a pre-manufactured flume could be installed. These solutions would work well for post-peak runoff monitoring. Unstable substrate would preclude successful implementation for capturing the runoff hydrograph, however. If documenting runoff is determined to be important, then the best course is to continue establishing stations where the channel is relatively stable and confined and accept lower precision during baseflow periods.

Lower Bear River Basin - 7LB

Thomas Fork PE891060LN

- Bonneville Cutthroat Trout Research FX-GR-EP1-511

Assistance was provided to UW researchers during three field trips. In May and June we used electrofishing, weirs, dip nets, and angling to help capture BRC for radio transmitter and VI tagging. During August we spent a week doing extensive electrofishing in an effort to recapture VI-tagged fish and implant additional VI tags. Preliminary results have been provided in quarterly reports from Frank Rahel, University of Wyoming.

Clear Creek SN834266JN

- Clear Creek Instream Flow and Fish Population Monitoring FX-SN-8CC-511

Annual trout population monitoring has been conducted at two sites on Clear Creek since 1994 (Tables 5 and 6). The "Tie Hack" site is within 1/4 mile downstream of the Tie Hack Dam while the "Power Plant" site is a short distance upstream from the city of Buffalo, Wyoming. The dam was closed in October 1997. Data collected in 1998 and 1999 reflect post-dam conditions for trout while October 1997 data, collected before closure of the dam, reflects possible effects of construction activities. Additional population estimates will be conducted in 2000 and 2001 to complete project monitoring activities as agreed by WGFD and the City of Buffalo. Since trout in small mountain streams like Clear Creek typically complete their life cycles over a period of 3 to 5 years, it is important to monitor effects for all year classes for a similar period. Also, the results reported here must be interpreted as preliminary until all years of post-dam monitoring data are collected.

Adult trout, those greater than or equal to 6 inches in length, have maintained relatively stable levels of standing stock (figure 5). Abundance estimates for all sizes and species also show little apparent evidence of population declines (Tables 5 and 6). More comprehensive and detailed statistical analyses will be performed when monitoring is complete or if data collected in 2000 suggest population changes might have occurred.

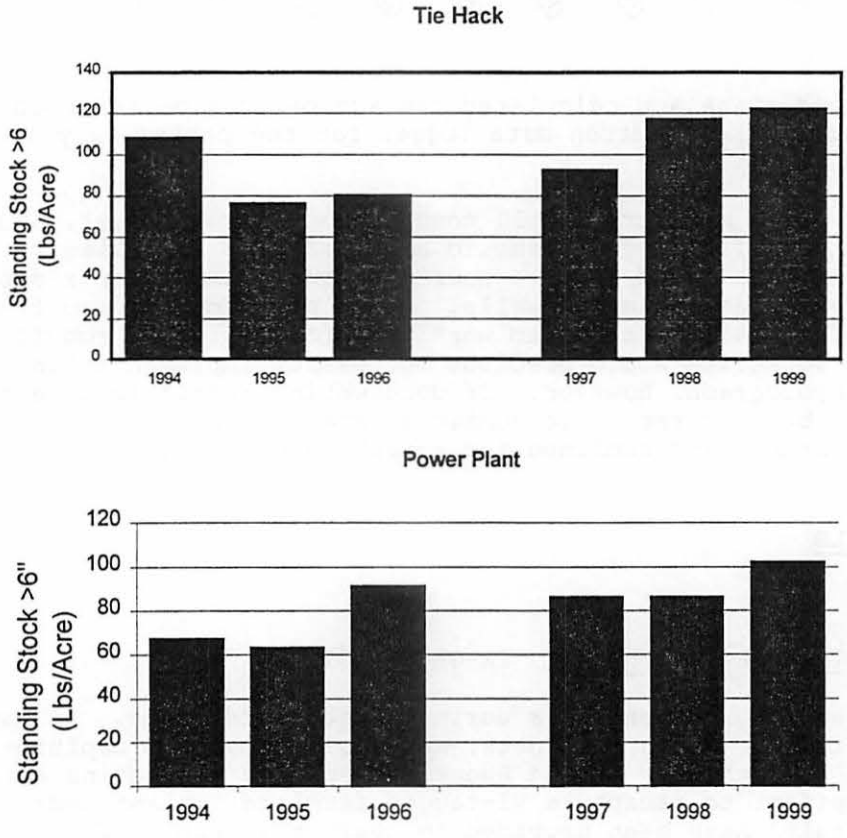


Figure 5. Standing stock (lbs/acre) of rainbow and brown trout (combined) greater than or equal to 6 inches at two sites on Clear Creek.

At the Tie Hack site, rainbow trout numbers appear relatively stable between 1998 and 1999 (Table 5). Brown trout numbers may have decreased slightly in 1999 over the previous two years but dam effects cannot be evaluated until monitoring is complete. A notable 20.5 inch-long, 4.5 lb brown trout was captured in 1999 at the Tie Hack site. This was the largest trout observed since monitoring began.

At the Power Plant site, the rainbow trout population appears robust (Table 6). Large numbers of juvenile fish indicate that reproduction has been successful and populations are being maintained. Likewise, the brown trout population is relatively stable.

Table 5. Rainbow and brown trout population characteristics at the Tie Hack study site downstream from Tie Hack Dam.

Year	Flow (cfs)	Total Capt.	Ave. Ln.	Number per Mile (95% CI)	Lbs per Acre	N >6 in	No per Mile >6 in (95% CI)	Lbs per Acre > 6 in
Tie Hack				**Rainbow Trout**				
1999		63	6.7	1055 (1024-1110)	65.1	37	604 (601-619)	58.3
1998		62	7.0	1058 (1007-1142)	82.5	44	748 (715-815)	76.8
1997	20	38	6.7	740 (650-830)	36.5	28	495 (455-590)	33.6
1996	18	54	6.7	955 (893-1023)	47.1	36	723 (682-808)	41.6
1995	23	65	6.1	1190 (1055-1364)	48.9	33	571 (536-645)	39.8
1994	13	75	6.2	1380 (1218-1575)	62.3	46	778 (747-840)	54.3
				Brown Trout				
1999		21	8.7	360 (341-411)	67.9	16	269 (260-303)	62.3
1998		28	7.8	495 (455-583)	52.9	19	304 (292-342)	45.0
1997	20	28	8.9	586 (487-682)	57.8	26	467 (422-571)	58.1
1996	18	25	8.1	479 (406-552)	43.2	21	371 (341-453)	38.1
1995	23	30	7.6	515 (487-584)	38.0	25	424 (406-472)	36.5
1994	13	32	8.2	605 (519-763)	52.2	32	605 (520-766)	53.8

Table 6. Rainbow and brown trout population characteristics at the Power Plant site downstream from Tie Hack Dam and upstream from Buffalo, Wyoming.

Year	Flow (cfs)	Total Capt.	Ave. Ln.	Number per Mile (95% CI)	Lbs per Acre	N >6 in	No per Mile >6 in (95% CI)	Lbs per Acre > 6 in
Power Plant				**Rainbow Trout**				
1999	45	213	5.6	3689 (3628-3767)	94.8	91	1595 (1550-1669)	85.0
1998	44	47	7.6	1157 (801-1747)	73.2	33	684 (562-907)	56.4
1997	60	56	7.2	1641 (1431-1857)	76.7	37	719 (579-994)	68.6
1996	36	91	7.0	3543 (3185-3901)	156	64	1252 (1090-1486)	68.8
1995	54	92	6.8	1681 (1596-1749)	64.7	59	1065 (1005-1169)	55.6
1994	20	193	5.7	3512 (3427-3597)	67.6	76	1354 (1294-1453)	56.5
				Brown Trout				
1999	45	25	7.1	451 (426-514)	19.0	21	385 (358-455)	18.5
1998	44	9	10.2	154 (153-165)	29.7	7	119 (119-124)	29.6
1997	60	5	9.1	237 (85-1730)	17.7	4	156 (68-957)	17.2
1996	36	15	7.7	262 (262-290)	22.3	9	161 (153-198)	22.2
1995	54	8	8.4	136 (136-136)	9.0	8	136 (136-136)	7.1
1994	20	15	7.8	257 (257-274)	10.6	12	206 (204-217)	10.2