OMB Control No. 1018-0093
Expires 08/31/2023

TAKE/IMPORT/EXPORT OF MARINE MAMMALS FOR PUBLIC DISPLAY, SCIENTIFIC RESEARCH, ENHANCEMENT, OR RESCUE/REHABILITATION/RELEASE ACTIVITIES OR RENEWAL/AMENDMENT OF EXISTING PERMIT (MMPA and/or ESA)

☐New ☐Reissue/Renew ■Amendment

Complete Sections **A or B**, and C, D, and E of this application. U.S. address may be required in Section C.**

A. Complete if applying as an individual

1.a. Last name	1.b. First name	1.c. Middle name or initial	1.d. Suffix

2 Date of birth (mm/dd/yyyy)	5.a. Telephone number	5.b. Alternate telephone number	6. E-mail address

B. Complete if applying on behalf of a business, corporation, public agency, Tribe, or institution

1.a. Name of business, agency, Tribe, or institution	1.b. Doing business as (dba)
U.S. Fish and Wildlife Service	Marine Mammals Management

2. Tax identification no.	3.a. Description of business, agency, Tribe, or institution	3.b. Website URL (if applicable)
	Regulatory Agency	

4.a. Principal officer (P.O.) last name	4.b. P.O. first name	4.c. P.O. middle initial	4.b. P.O. Title
Lemons	Patrick		Chief, Marine Mammals Management

5. Primary contact name	6. Primary e-mail address
Dave Gustine	david_gustine@fws.gov

7.a. Business telephone number	7.b. Alternate phone no.	8.a. Primary contact telephone no.
800-362-5148		907-786-3913

C. All applicants complete address information

1.a. Physical address (Street address; Apartment #, Suite #, or Room #; no P.O. Boxes)
1011 East Tudor Road, MS-341

1.b. City	1.c. State	1.d. Zip code/Postal code	1.e. County/Province	1.f. Country
Anchorage	AK	99503		U.S.A.

2.a. Mailing Address (include if different than physical address; include name of contact person if applicable)

2.b. City	2.c. State	2.d. Zip code/Postal code	2.e. County/Province	2.f. Country

D. All applicants MUST complete

1. Include a check or money order, payable to the U.S. FISH AND WILDLIFE SERVICE, **a nonrefundable processing fee** [50 CFR 13.11(d)(4)]. Federal, Tribal, State, and local government agencies, and those acting on behalf of such agencies, are exempt from the processing fee – ***attach documentation of fee exempt status as outlined in instructions.*** (50 CFR 13.11(d))

2. If you are requesting a reissue/renew/amendment, what is your permit/file number? MA82088B-1

3. Certification: I hereby certify that I have read and am familiar with the regulations contained in Title 50, Part 13 of the Code of Federal Regulations and the other applicable parts in subchapter B of Chapter I of Title 50, and I certify that the information submitted in this application for a permit is complete and accurate to the best of my knowledge and belief. I understand that any false statement herein may subject me to the criminal penalties of 18 U.S.C. 1001.

The individual/principal officer of the business must print and sign the application. (No photocopied or stamped signatures) Date (mm/dd/yyyy)

** Further instructions for the above application may be found on our ePermits website. See the last page for information on the Privacy Act, Paperwork Reduction Act, Estimated Burden, and Freedom of Information Act aspects of this application form.

Mail your application(s) to Division of Management Authority, Branch of Permits, MS:IA 5275 Leesburg Pike, Falls Church, VA 22041-3803.

OMB Control No. 1018-0093
Expires 08/31/2023

E. TAKE/IMPORT/EXPORT OF MARINE MAMMALS FOR PUBLIC DISPLAY, SCIENTIFIC RESEARCH, ENHANCEMENT, OR RESCUE/REHABILITATION/RELEASE ACTIVITIES OR RENEWAL/AMENDMENT OF EXISTING PERMIT (MMPA and/or ESA)

Allow at least 90 days for the application to be processed. Applications for marine mammal permits must be published in the Federal Register for a 30-day public comment period.

Use this application for the take[1], import, export, or re-export of marine mammal species (or their parts) under the jurisdiction of the U.S. Fish & Wildlife Service (sea otters, marine otter, polar bears, walrus, manatees, and dugong; see our marine mammal webpage) for purposes of public display of live animals, scientific research, or enhancement under the U.S. Marine Mammal Protection Act (MMPA) and/or U.S. Endangered Species Act (ESA). This application may also be used to apply for a letter of authorization (LOA) under MMPA Sections 109(h)/112(c) and/or an ESA permit for enhancement of propagation or survival of the species, which would provide authorization to work as a "cooperator" for the purpose(s) of **rescue, rehabilitation, and/or release of stranded marine mammals.** Finally, this application may be used for the **renewal and/or amendment** of an existing permit for these activities.

Note: Renewal and amendment requests require responses to all questions pertaining to your requested activity.

This form should NOT be used:

- For activities involving marine mammals under jurisdiction of the National Marine Fisheries Service (NMFS) (i.e., whales, dolphins, porpoises, seals, and sea lions); please contact NMFS.
- For activities involving photography in the wild for educational or commercial purposes; use Form 3-200-86.
- For transport/transfer of live captive-held animals within the United States; use Form 3-200-87.
- For transfer within the United States of dead marine mammal specimens for the purpose of public display or scientific research; use Form 3-200-87.

If you already have MMPA/ESA authorization and need a CITES permit:

- For CITES export/re-export of captive-held **LIVE** animals, use Form 3-200-53.
- For export, or re-export of parts or biological samples, use Form 3-200-29; for import of parts of Appendix-I animals, use Form 3-200-37; and for introduction from the sea, use Form 3-200-31.
- Provide a copy of your FWS or NOAA Fisheries permit or authorization with your CITES permit application.

All international shipment(s) must be through a designated port. A list of designated ports (where an inspector is posted) is available from the list of designated ports. If you wish to use a port not listed, please contact the Office of Law Enforcement for a Designated Port Exemption Permit (form 3-200-2).

[1] The term, "take," as defined by the MMPA means to harass, hunt, capture, or kill, or attempt to harass, hunt, capture, or kill any marine mammal. As defined by the ESA, "take" means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.

OMB Control No. 1018-0093
Expires 08/31/2023

Permit Types and Processing Fees

Please review the complete application carefully before beginning. Provide complete answers to all the questions in the sections relevant to the activity for which you are requesting authorization. If a question is not applicable, answer with "N/A." You will need to use additional sheets of paper. On all attachments or separate sheets you submit, indicate the application question number you are addressing. If you are applying for multiple species and/or activities, be sure to indicate which species/activity(ies) you are addressing in each response.

Electronic submission of inventories, photographs, and receipts/invoices: For hard copy submissions, if you wish to provide information electronically, please include a flash drive containing your information with your physical application.

PURPOSE for which you are applying (check below):

☐ PUBLIC DISPLAY of live animals: **Complete All of Part I and Part II**.

Note: A public display permit is not available for marine mammal species listed as depleted under the MMPA or listed under the ESA; a public display permit may be valid for the life of an animal and is not renewable; a public display permit may be available for a facility that would hold multiple animals of a particular species and would be renewable every 5 years.

☑ SCIENTIFIC RESEARCH: **Complete All of Part I and Part III**.

☐ RESCUE, REHABILITATION, and/or RELEASE of stranded marine mammals: **Complete questions 1-7 of Part I and Part IV**.

☐ MMPA ENHANCEMENT of survival or recovery of the species or stock: **Complete Part I and Part V**.

Request is for (check below):

☐ A NEW PERMIT

☐ A RENEWAL of Permit # _____ (Complete all questions for your requested activity, as described above).

☐ AN AMENDMENT of Permit # MA82088B-1.

If requesting renewal or amendment of your current permit, provide an update of any activity that has occurred under the permit since your last report.

OMB Control No. 1018-0093
Expires 08/31/2023

Part I.

1. Name and address where you wish the permit to be mailed, **if different from physical address**. If you would like expedited shipping, please enclose a self-addressed, pre-paid, computer-generated, courier service airway bill. If unspecified, all documents will be mailed via the U.S. Postal Service.

   Same as address listed above

2. Who should we contact if we have questions about the application (name, phone number, and e-mail)?

   Dave Gustine, 907-786-3913, david_gustine@fws.gov

3. Have you or any of the owners of the business (if applying as a business, corporation, or institution), been assessed a civil penalty or convicted of any criminal provision of any statute or regulation relating to the activity for which the application is filed; been convicted, or entered a plea of guilty or nolo contendere, for a felony violation of the Lacey Act, the Migratory Bird Treaty Act, or the Bald and Golden Eagle Protection Act; forfeited collateral; OR are currently under charges for any violation of the laws mentioned above?

   ☑ No ☐ Yes

   If you answered "Yes" to Question 3, provide: a) the individual's name; b) date of charge; c) charge(s); d) location of incident; e) court, and f) action taken for each violation. Please be aware that a "Yes" response does not automatically disqualify you from getting a permit.

4. List the scientific name (genus, species, and, if applicable, subspecies) and common name of each species for which you are applying.

   Ursus maritimus, polar bear

5. Provide a copy of any other applicable Federal, local, or state permissions (e.g., National Wildlife Refuge Special Use Permit, NOAA National Marine Sanctuary permit, etc.) required to conduct your proposed work, OR indicate whether you have applied for, secured, or will apply for such permissions (please provide contact information).

   NA

6. Is/are the species or population stock(s) for which you applying listed under the U.S. Endangered Species Act (ESA), a species proposed for listing, or a candidate species?

   ☐ **No** ☑ **Yes;** complete a-d, below.

a. Attach a justification for taking an ESA-listed species, and explain why your proposed activities are not appropriate for a similar non-ESA-listed species;

b. Describe both the short- and long-term anticipated effects of each of your activities alone or cumulatively on the behavior and physiology of the target animals and critical habitat or proposed critical habitat for the species.

See attached responses

c. Describe how the animals will react to your actions and the consequences of those reactions.

See attached responses

d. Identify how you would mitigate any potential negative effects.

See attached responses

7. Do you plan to conduct activities with **MARINE MAMMALS IN THEIR NATURAL ENVIRONMENT** (i.e., in the wild) where "non-target" marine mammal and ESA-listed species occur in the United States? ("Non-target" species are species that are not the subject of your activities.)

☐ **No** ☑ **Yes**; We will need to assess impacts to marine mammal and ESA-listed species that are not the subject of your activities; therefore, provide responses to a-c, below:

a. A list of all non-target marine mammals and ESA-listed species that might occur in your project area or might be affected by your activities;

See attached responses

b. The maximum number of animals of each non-target marine mammal and ESA-listed species (# per species) that might be harassed by your activities, the precautions that you will take to minimize the likelihood that harassment will occur, the actions that you will take should harassment occur; and

See attached responses

c. The maximum number of animals of each non-target marine mammal and ESA-listed species (# per species) that might be taken (e.g., killed, injured, feeding activities disrupted, etc.) by your activities, your precautions to minimize the likelihood that take will occur, and your actions should take occur.

See attached responses

(Note: The following link provides access to resources that might be useful for gathering the required information to answer this question, including links to FWS and NMFS offices responsible for managing marine mammals stocks, and Stock Assessment Reports, which provide population status information on marine mammal stocks.

8. Do you plan to conduct your public display, research, or MMPA enhancement activities with **MARINE MAMMALS that are CURRENTLY HELD IN A CAPTIVE ENVIRONMENT (including, but not limited to import into the U.S. of captive-held live animals/specimens)**

☑ **No** ☐ **Yes**;

If yes, specify the number of captive individuals for each species of interest: _____; and for each individual animal of each species of interest, respond to a-i, below.

Note: You may provide the information in tabular form, as in the example below:

a. Species	b. Sex	c. Birth date	d. Description (e.g., ID #, ISIS #, transponder #, tattoo #)	e. Country of origin	f. Source (i.e., wild, captive-born, or captive-bred)	g. Current location of animal
Example: *Enhydra lutris kenyoni*	Female	Approx. 04/09/2010	House # XXX123 Transponder # 45678	USA	Wild	ABC Aquarium, Anchorage Alaska

h. For **captive-born or captive-bred animal(s)**, provide a breeder's statement, ARKS/ZIMS specimen report, or other information that documents the animal was born in captivity, location of birth, and information on the source of the parental stock (e.g., captive-born, wild).

i. For **captive-held animal(s) already taken from the wild**, provide:

i. Information (e.g., ARKS/ZIMS specimen report(s)) on the source of the animal, including when the animal was removed from the wild, by whom, and the location.
ii. A copy of the MMPA permit or LOA under which the animal is currently being held in captivity or a copy of the MMPA permit or authorization for removal of the animal from the wild.
iii. Has the U.S Fish and Wildlife Service deemed the animal(s) non-releasable to the wild?

☐ **Yes**; provide a copy of the official letter confirming the animal's non-releasable status.

☐ **No**; if you are requesting to have the animal(s) deemed non-releasable at this time, provide an explanation of the following: a) why release of the animal to the wild will not likely be successful given its physical condition; b) why release of the animal to the wild will not likely be successful given its behavior, including adverse interactions with humans or marine mammals; or c) why release of the animal to the wild may jeopardize the wild population of the species.

9. For **animal(s) to be taken from the wild and brought into a captive environment for public display, research, or MMPA enhancement activities**, provide for each species:
   a. Information on the actual or proposed date(s) and location(s) of collection;
   b. The numbers of animals of each age class and sex to be taken from the wild (include a definition of each of these age classes by range of months and/or years).
   c. An estimate of the species' population stock in the wild; Note: stock assessment reports might assist you with this information and are available at the following FWS field offices, depending on the species involved:

Southern sea otter: Ventura Fish and Wildlife Office

Northern sea otter: Washington Fish and Wildlife Office

Northern sea otter, walrus, polar bear: Marine Mammals Management, AK

Manatee: North Florida Ecological Service Office

d. A description of the efforts made to acquire captive-held animals in lieu of taking animals from the wild.

Note: for holding and maintaining animals you must also provide the information requested in question 14.

10. Are you requesting to **CAPTURE LIVE** marine mammals in the wild? (i.e., for research, public display, or MMPA enhancement)

☑ **No** ☐ **Yes**

If yes, specify the number of individuals to be captured for each species of interest: _____ and provide responses to a – i, below:

a. A description of the manner in which the animal will be captured, type of gear used, and deployment method (e.g., from shore or boat approach and net deployment).
b. Methods of restraint and holding, including dimensions/type of holding container, if used;
c. The holding time required prior to transport or release of the animal;
d. Number and roles of personnel participating in the captures;
e. Duration of restraint/holding from capture to release; and
f. The number of non-target individual animals of the target species that will be incidentally harassed during capture activities, and precautions you will take to minimize incidental harassment of non-target animals;
g. If capturing females with calves/pups/cubs, describe:
    i. How calves/pup/cubs will be held;
    ii. Which procedures will be conducted on them;
    iii. The duration of time the pair will be separated; and
    iv. Procedures used to reunite the pair, and if they do not reunite, explain the disposition of the calf/pup/cub.
h. A description of the use of drugs during capture, including:
    i. Name of each drug/chemical used, its dosage rate (ml/kg), method of administration (IV, IM, SQ, topical and whether remotely-deployed IM), and purpose of the drug;
    ii. Duration of drug and required holding time;
    iii. The names of the personnel who would administer the drugs;
    iv. Provisions to minimize adverse reaction(s), including the use of appropriate drug reversals;
    v. Procedures to be used to minimize the chance that drugged animals will escape or enter the water prior to complete immobilization; and
    vi. Measures to be taken to ensure that the animal is fully recovered prior to release.
i. What emergency procedures would be employed (e.g., drugs, bagging, CPR, etc.) in the event that an animal's condition starts deteriorating during capture activities?

11. Are you requesting to **IMPORT LIVE** marine mammals?

☑ **No** ☐ **Yes**

If yes, specify the number of individuals to be imported for each species of interest: _____; and provide responses to a – m, below:

a. The proposed date of import;
b. The name and address of the foreign exporter, including the country of export;
c. For wild-sourced animal(s), a description of the manner in which it was taken from the wild and a copy of the foreign collecting/capture authorization(s);
d. The age (approximate or known) of the animal at the time of removal from wild or from its mother;
e. The age (approximate or known) of the animal at time of weaning; and

f. For females, respond to i & ii, below:
   i. At the time of removal from the wild, was the female pregnant? ☐ **No** ☐ **Yes**
   ii. At the time of the proposed import, will the female be pregnant? ☐ **No** ☐ **Yes**

g. A description of the means and duration of the transportation used to move and import the animals;
h. A description of the type, size, and construction of all shipping containers used to transport the animals;
i. A description of the arrangements for watering or otherwise caring for the animals during transport;
j. A description of the qualifications of each person accompanying the animal that demonstrates their ability to address the animal's needs during transport;
k. A copy of the transport plan;
l. Quarantine plans, including location and time-frame; and
m. Any additional documentation showing compliance with U.S. Department of Agriculture (USDA) regulations for transport and care of live marine mammals (7 U.S.C. 2131-2159; 9 CFR 3, Part E).

NOTE: A separate CITES permit will be required from our office prior to the import of live CITES Appendix I species.

12. Are you requesting to **IMPORT PARTS/SPECIMENS** of/from marine mammals?

☑ **No** ☐ **Yes**; provide a – m, below:

a. The proposed date of import;
b. The name and address of the foreign exporter, including the country of export;
c. The current location of the specimens;
d. The country of origin of the animals from which the specimens were/will be collected;
e. List the number of animals by species, age class/life stage, and sex from which parts/samples are sought. If you are requesting opportunistic sample import, you may request an unlimited number of samples from a specified number of animals, by taxa (e.g., unlimited samples from up to 100 polar bears annually).
f. The types of specimens to be imported (e.g., blood, skin biopsy, carcasses, etc.) and number of each type from each animal;
g. The source of the specimens to be imported (wild, captive-bred, or captive born);
h. Were the animals/will the animals be alive or dead at the time of sample collection?
   ☐ DEAD ☐ LIVE
i. Provide a detailed description of the source of the specimens to be imported and the manner in which the sample was/will be taken or collected. For example, this might include the following sources:
   i. Animals in captivity (samples taken during routine husbandry procedures or under separate authorization; distinguish between permanently captive in public display or research facility and temporarily captive in rehabilitation facility);
   ii. Animals in foreign countries stranded alive or dead or that died during rehabilitation;
   iii. Animals killed during legal subsistence harvests;
   iv. Animals killed incidental to legal commercial fishing operations;
   v. Samples from other authorized researchers or collections;
   vi. Soft or hard parts that are sloughed, excreted, or discharged naturally.
j. Provide a copy of the foreign collecting/capture authorization(s) (if not required, indicate "not required");
k. If importing samples from subsistence-hunted marine mammals in foreign countries, describe the subsistence method. Include documentation, if available, that verifies that the taking was/will be conducted in a humane manner (i.e., using the method that involves the least possible degree of pain and suffering);
l. If importing samples from live animals, describe how the samples were/will be collected, including animal handling and sample collection protocols. This should include a description of how the take was humane; and
m. Describe how the specimens will be preserved, shipped, and stored/curated.

NOTE: A separate CITES permit will be required from our office prior to the import of specimens of CITES Appendix I species.

OMB Control No. 1018-0093
Expires 08/31/2023

13. Are you requesting to **EXPORT or RE-EXPORT PARTS/SPECIMENS** of/from marine mammals?

☑ **No** ☐ **Yes**; provide a – e, below:

a. The types of specimens and quantity of each to be exported/re-exported;
b. The complete name and address of person/facility receiving the specimen(s);
c. A description of the origin of the specimens to be exported/re-exported;
d. The name(s) of the facility/institution that currently holds the specimens; and
e. Whether a portion of the specimen will need to be re-imported following export/re-export.

NOTE: A separate CITES permit will be required from our office prior to the export/re-export

14. Are you a facility requesting **MAINTENANCE of LIVE ANIMALS** (i.e., holding and caring for animals) for public display, research, or MMPA enhancement activities?

☑ **No** ☐ **Yes**

If yes, specify the number of individuals to be held for each species of interest: _____; provide responses to a – h, below:

a. A complete description, including photographs and/or diagrams (no blueprints), of the area and facilities where the animals will be held (including the dimensions of pools and haul-out areas);
b. The number of animals of the same species (include age and sex) presently maintained at the facilities and information indicating whether there is space for additional animals without exceeding USDA/Animal and Plant Health Inspection Service (APHIS) limits (i.e., provide the maximum # of animals of each species that could be held).
c. A list of all animal caretakers and a description of their specific duties/responsibilities;
d. A description of the animal caretakers' experience in the care, handling, and maintenance of the marine mammal species that is/are the subject of this application and copies of curriculum vitae (CVs) that demonstrate such experience for each caretaker;
e. A description of specific State requirements regarding who (e.g., attending veterinarians, vet technicians, researchers) may handle and administer certain drugs;
f. A list of all marine mammals under the jurisdiction of FWS maintained at the facility (specify whether they are held in the same exhibit/holding area as the target animals will be held and maintained);
g. A description of all deaths of FWS-jurisdiction marine mammal species at the facility within the past five years and the steps taken to prevent or decrease similar mortality;
h. A copy of the facility's USDA/APHIS, Animal Welfare Act (AWA) license and the most recent APHIS inspection report.

15. If you are a facility requesting maintenance of live animals for which the primary purpose is scientific research, or enhancement of survival or recovery of the species, are you seeking approval to publicly display the subject animals?

☑ **No** ☐ **Yes**; in a-c, below, provide information to show that:

a. The facility is open to the general public without limitations or restrictions (other than by the charging of an admission fee);

b. The facility offers a program for education or conservation purposes that is based on professionally recognized standards of the public display community; and

c. Such display will not interfere with attainment of the objectives of the permitted/authorized activity.

Part II.
For Public Display

OMB Control No. 1018-0093
Expires 08/31/2023

16. For U.S. facilities, provide information to show that the facility:
    a. Is open to the general public without limitations or restrictions (other than by the charging of an admission fee);
    b. Offers a program for education or conservation purposes that is based on professionally recognized standards of the public display community (include copies of outreach/educational materials and photos of signage); and
    c. Is registered or holds a license issued by the USDA Animal and Plant Health Inspection Service (APHIS) under the Animal Welfare Act (AWA).

Part III.
For Scientific Research

17. Explain how the proposed research meets the MMPA definition of "bona fide research," i.e., scientific research on marine mammals, the results of which: (A) are likely to be accepted for publication in a referenced scientific journal; (B) are likely to contribute to the basic knowledge of marine mammal biology or ecology; or (C) are likely to identify, evaluate, or resolve conservation problems.

    See attached responses

18. Provide a detailed description of the proposed project. You may attach a formal research proposal, provided it includes all the requested information, including: **See attached responses**

    a. Objectives and hypotheses and associated methodology;

    b. Background information discussing relevant published literature on the subject of your proposal, with citations;

    c. An explanation of how this study is different from, builds upon, or duplicates past research;

    d. An explanation of how you determined your sample size/take numbers (e.g., based on previous encounter rates or abundance estimates for the study area). If appropriate for your study, include a power analysis or other sample size estimation to show whether the sample size is sufficient to provide statistically significant or otherwise robust results appropriate for your study;

    e. If proposing novel procedures, include a discussion on results from pilot studies or studies on other species, if available; and

    f. Disposition of animals or remaining specimen material once your project is complete.

19. Provide the expected research schedule (clearly specify the proposed start date and end date of your research or field season(s) and overall duration of the project). Include the months of the year and frequency of fieldwork/sampling (e.g., number of times per year). If your research extends beyond five years, or is a continuation of previously authorized research, give information about when the research began and when you expect it to end. **See attached responses**

20. Indicate which research procedures/activities you will be conducting that will or might result in **TAKE or HARASSMENT of TARGET species**, and describe each activity in detail, including the information indicated in a-i, below. **See attached responses**

Level A harassment means any act of pursuit, torment, or annoyance, which has the potential to injure a marine mammal or marine mammal stock in the wild.

Level B harassment means any act of pursuit, torment, or annoyance, which has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering.

Take, as defined by the MMPA means to harass, hunt, capture, or kill, or attempt to harass, hunt, capture, or kill any marine mammal.

☐ a. Administration of drugs (including emergency drugs and prophylactic antibiotic use) or other substances (e.g., stable isotopes); include i-vii, below, in your activity description:

i. Name of each drug/chemical used, its dosage rate (ml/kg), method of administration (IV, IM, SQ, topical and whether remotely-deployed IM), and purpose of the drug;
ii. Duration of drug and required holding time;
iii. The names of the personnel who would administer the drugs;
iv. A description of specific State requirements regarding who (e.g., attending veterinarians, vet technicians, researchers) may handle and administer certain drugs;
v. Provisions to minimize adverse reaction(s), including the use of appropriate drug reversals;
vi. Procedures to be used to minimize the chance that drugged animals will escape prior to complete immobilization; and
vii. Measures to be taken to ensure that the animal is fully recovered prior to release.

☑ b. Aerial and vessel surveys (manned); include i-v, below, in your activity description:

i. Type of survey craft and vessel;
ii. Type of survey (e.g., line transect, photogrammetry);
iii. Number of surveys per year;
iv. Minimum and maximum altitude/approach distance; and
v. Duration spent with group or individual per day.

☐ c. Aerial surveys using unmanned aircraft systems (UAS); include i-xii, below, in your activity description:

i. Dimensions, mass, and battery life of UAS;
ii. Will the UAS ever be beyond the line of sight?
iii. Does the device have an auto-return feature should the device fail?
iv. Ground control station description (what it is, where it will be located, e.g., on shore or on vessel, number of stations, and how close the station will be to animals);
v. Spotter roles (e.g., one spotter monitoring the UAS, another for monitoring the ground control station);
vi. Do you have the appropriate FAA permits/authorizations (including pilot licenses)?
vii. Type of survey (e.g., line transect, photogrammetry);
viii. Number of surveys per year;
ix. Minimum and maximum altitude/approach distance;
x. Duration spent with group or individual per day;
xi. The names of the personnel who will pilot the aircraft, and
xii. Mitigation measures you will use to minimize disturbance including specific measures you will use to avoid separating female-calf/pup/cub pairs, and measures to ensure the UAS will not collide or crash into any of the animals.

☐ d. Capture and restraint; if you will be capturing animals, ensure that you have completed question 10, above.

☐ e. Instrumentation, Marking, and Tagging (MTI); include i-x, below, in your activity description:

i. The type of MTI (including dimensions and mass);

ii. The maximum number and total mass of MTIs to be attached to/implanted in an animal at a given time;
iii. The maximum dart penetration depth if MTI is attached via darts;
iv. Methods and location of attachment, including minimum approach distance for remote MTI attachment;
v. If surgeries for implantable tags are being conducted, specify who will be conducting them, where (in the field or in a facility), and if antibiotic prophylactics will be administered;
vi. The maximum number of times an animal would be fitted with MTIs in a given year;
vii. Will recapture be necessary (if so, how many times will animals be captured annually), would the instrument/tag have a release mechanism, or would the instrument/tag fall off?
viii. Have the proposed MTIs been used previously on this species?
ix. What are the potential adverse effects and the means of monitoring new MTIs for adverse effects?
x. What actions will be taken in the event that the MTI has a significant adverse impact on the animal(s), and what is the method of animal release from the MTI?

☐ f. Intrusive sampling (e.g., blood, blubber, muscle, skin); include i-xiii below, in your activity description:

i. Will sampling be remote or under restraint?
ii. Will local anesthetics be administered?
iii. Type of tissues sampled;
iv. Size or volume of sample (diameter and depth or total volume);
v. Target sampling location on body;
vi. Maximum number of samples per animal per day and per year;
vii. Sampling intervals (e.g., for serial blood or biopsy samples);
viii. Collection method and equipment/materials used (e.g., dart fired from rifle, dart depth, sterilization/disinfection);
ix. If remote, what is the minimum approach distance?
x. If restrained, describe treatment of site of sample collection (e.g., cleansing, wound left open or closed);
xi. Number of attempts per animal per day (include total number of attempts needed for all work if requesting multiple procedures (e.g., remote tagging and biopsy) on same animal on the same day);
xii. The names of the personnel who will conduct the sampling; and
xiii. Sample preservation and analysis.

☑ g. Non-intrusive sampling (e.g., behavioral observations via focal follows and ground surveys, scat collection, passive acoustic monitoring and recording, photo-ID, photogrammetry, remote video monitoring, underwater photography); include i-vi, below, in your activity description:

i. Approach, sampling methods, and platform type;
ii. Minimum and maximum approach distance (specify different distances for each deployment method);
iii. Are researchers within sight of animals or not (e.g., from a blind)?
iv. Frequency of observations/sampling;
v. Duration of observations/sampling per day; and
vi. If conducting underwater photography/videography, specify the method (e.g., snorkeling, underwater pole cam, or divers using typical gear or rebreathers) and number of people in the water at a given time, including the safety diver/snorkeler.

☐ h. Testing methodologies on captive-held animals; include i-iii, below, in your activity description:

i. A description of the methodologies and equipment to be used;
ii. Duration and times of testing and data analyses; and
iii. Methods used to decondition the animals that will be released to the wild after testing.

☐ i. Other procedures/activities; list each additional procedure/activity and provide a detailed description of each, including all appropriate mitigation measures (note, we might contact you with follow-up clarification of methodologies), novel procedures, and any procedures involving active acoustic or hearing studies).

OMB Control No. 1018-0093
Expires 08/31/2023

21. For each procedure/activity, provide the information in a-j, below, including the maximum number of animals of each species expected to be taken by the procedure annually, broken down by sex and age class; the number of takes per animal per year; and an estimate of the number of animals of the study species that might be incidentally harassed (i.e.,# of non-target animals of your study species that might be harassed by your activities). Also, include the time periods and specific locations of the takes. This information may be provided in table format such as: **See attached responses**

a. Species	b. Procedure/Activity	c. Level A or Level B Harassment*or other Take**	d. Age Class(see question 23, below)	e. Sex	f. Max. # Animals Per Year	g. Max. # Takes Per Animal,Per Year	h. Max. # non-target conspecifics incidentally harassed	i. Time-period	j. Location

*** Level A harassment** means any act of pursuit, torment, or annoyance which has the potential to injure a marine mammal or marine mammal stock in the wild. **Level B harassment** means any act of pursuit, torment, or annoyance which has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering.

****Take**, as defined by the MMPA means to harass, hunt, capture, or kill, or attempt to harass, hunt, capture, or kill any marine mammal.

22. Will any female-pup/calf/cub pairs be targeted for any of the proposed research activities? If so, describe how you would minimize impacts on pups/calves/cubs and associated females during each of those activities.

    See attached responses

23. Define each age class listed in your response to question 21(d), above, for each species (i.e., list the range of months or years (or mass for otters) constituting each age class); provide the minimum age (or mass) that animals will be targeted for take activities; and indicate whether females with calves/pups/cubs less than that minimum age will be targeted for take activities?

    See attached responses

24. Describe the precautions that will be taken to minimize the likelihood that harassment of non-target individuals of the study species will occur and the actions that will be taken should harassment occur.

    See attached responses

25. Explain how you determined that your methods involve the least possible degree of pain and suffering and why there are no feasible alternative methods to obtain the desired data or results.

See attached responses

26. Provide: a) an estimate of the possible number of unintentional deaths or serious injuries that might result from your research activities; b) the number of unintentional and intentional (via euthanasia for humane purposes if an animal is seriously injured) deaths or serious injuries you seek approval for annually; c) the steps you will take to reduce the likelihood of deaths or injuries; and d) if euthanasia might occur, provide the method of euthanasia (e.g., gunshot, drug, etc.) and who would conduct the euthanasia procedure.

See attached responses

27. In the event of a death, will a necropsy be conducted on the animal?
☐ No ☑ Yes

28. If a female animal accompanied by calf/pup/cub(s) dies during research activities, specify the disposition of the associated calf/pup/cub(s).

See attached responses

29. If biological samples are to be collected or received domestically, provide responses to a through j, below, for each individual animal per species. This information, or part of the information, may be provided in table format such as the table below. (Note: if your **only** proposed activity is to transfer dead marine mammal specimens for purposes of public display or scientific research, complete application # 3-200-87).

a. Species	b. ID #	c. Sex	d. Source (Wild or Captive/ Live or Dead)	e. Birth Date or age class	f. Type of Samples (blood, tissue, DNA)	g. Number of animals sampled annually	h. Number of times each animal will be sampled annually	i. Packaging and Preservation of samples	j. Use/ Disposition of Samples

a. Provide a detailed description of the source of the specimens, including the circumstances under which the animals were/will be taken. For example, this might include the following sources:
   i. Animals stranded alive or dead;
   ii. Animals killed during legal subsistence harvests;
   iii. Animals killed incidental to legal commercial fishing operations;
   iv. Samples from other authorized researchers or collections;
   v. Soft or hard parts that are sloughed, excreted, or discharged naturally;
   vi. Samples that will be/were intrusively collected from captive-held animals;

vii. Samples that will /were collected from wild animals.

b. If collecting samples from live animals, describe how the samples were/will be collected, including animal handling and sample collection protocols.

c. For samples received domestically from U.S. permitted researchers, include the researcher's name, affiliation, and permit number under which samples will be/were collected.

(Note: if samples are to be imported, you must answer question 12, above).

30. Provide a list of all personnel that will be involved in the project, identifying each as either a principal investigator or co-investigator, their project duties/responsibilities, and a brief description or CV that demonstrates their experience and expertise to perform their designated duties, including knowledge of the marine mammal species that is/are the subject of this application. **See attached responses**

31. Describe how you will collaborate or coordinate with other researchers in your study area. Who are they? Explain how this will occur and how it will minimize negative impacts on the species. For example, will it involve sharing resources, samples or data; timing surveys to minimize disturbance, etc.? **See attached**

32. If you intend to conduct research on animals in a captive-holding facility such as a zoo or aquarium, provide documentation showing that the facility(ies) has authorized you to conduct your proposed activities.

33. Animal Welfare Act (AWA) Compliance (for research on live animals only): AWA requirements apply to all research facilities, which include institutions, organizations, or people that use or intend to use LIVE animals in research, tests, or experiments; AND, that receive funds under a grant, award, loan, or contract from a department, agency, or instrumentality of the U.S. for the purpose of carrying out research, tests, or experiments, or acquires or transports the animals in commerce. **Provide the following documentation:**

    a. Registration under the AWA as a research facility:
        i. Attach a copy of your APHIS certificate of registration as a research facility, or for Federal facilities, a letter from your Institutional Officer that you are compliant with applicable requirements for scientific research under the AWA; OR
        ii. If your facility does/will not conduct activities requiring registration under the AWA, attach a letter from APHIS confirming that registration is not required.

    b. Institutional Animal Care and Use Committee (IACUC) documentation: If your facility is registered as a research facility under the AWA or is a Federal research facility (see a.i), attach the applicable IACUC documentation from the list in i-iii, below. Please note that all activities that involve an invasive procedure, harm, or materially alter the behavior of an animal under study, even if the activities are carried out in the field, are subject to IACUC review and approval. See (AWA regulations and standards for definition/explanation of covered research activities.):
        i. Attach a copy of your final protocols with the IACUC signed approval; **OR**
        ii. Attach a copy of your proposed protocols to be reviewed by your IACUC along with an explanation as to how and when the protocols will be reviewed (Note: A copy of your final signed protocols and certification will be required prior to permit issuance.); **OR**
        iii. Attach the IACUC determination that your research activities are not subject to IACUC review and approval.

    c. If your facility is not registered as a research facility under the AWA, please provide an explanation of how your take activities are reviewed and monitored to assure that the proposed takes are humane (i.e., using the method that involves the least possible degree of pain and suffering).

Part IV.

OMB Control No. 1018-0093
Expires 08/31/2023

For Rescue, Rehabilitation, and/or release of stranded[2] Marine Mammals

Marine mammals may be captured from the wild by duly authorized U.S. Fish and Wildlife Service personnel or **authorized cooperators** for the protection or welfare of the marine mammal or for the protection of public health and welfare and held at cooperating authorized facilities. This section of the application is for those parties interested in applying for a letter of authorization (LOA) under MMPA Sections 109(h)/112(c). Parties interested in rescue, rehabilitation, and release activities involving ESA-listed marine mammals would also use this section of the application to apply for an accompanying ESA permit for enhancement of propagation or survival of the species OR to apply as a "sub-permittee" working under the authority of an ESA permit held by different organization or agency. Authorized "sub-permittees" would be responsible for coordinating their activities with the designated ESA permit-holder (i.e., "Permittee") and would be required to comply with the conditions of that permit. Each authorized party's MMPA LOA will document the ESA permit number associated with that LOA, whether the party is a sub-permittee or the Permittee on the ESA permit.

The MMPA LOA or, for ESA-listed species, the combined MMPA LOA and ESA permit would provide authorization for individuals or institutions to work as "cooperators" for the purpose(s) of rescue, rehabilitation, and/or release of stranded marine mammals. Marine mammal rescues are dangerous activities that require trained staff, specialized equipment, and clear communication among stranding partners. The U.S. Fish and Wildlife Service provides opportunities for different levels of involvement for approved cooperators: verifiers, rescuers, transporters, critical care facilities, and rehabilitation/holding facilities. These roles are defined in question 37, below.

34. Are you/your organization currently conducting research activities with marine mammals?

☐ **No** ☐ **Yes**

If yes, provide the permit number under which you are conducting research_____.

35. What type of authorization are you requesting (check all that apply)?

☐ LOA under MMPA Sections 109(h)/112(c)

☐ ESA permit for enhancement of propagation or survival of the species

☐ Sub-permittee under ESA permit #_____.

36. What type of stranding event are you requesting to respond as a cooperator for a U.S. Fish and Wildlife Service marine mammal rescue, rehabilitation, and release program?

☐ Oil spill events

☐ Other contaminant spill events; Specify types_____.

☐ Other stranding events

[2] The term, "stranding," as defined by the MMPA means an event in the wild in which: (A) a marine mammal is dead and is on a beach or shore of the United States or in the waters under the jurisdiction of the United States (including any navigable waters); OR (B) a marine mammal is alive and is on a beach or shore of the United States and unable to return to the water, on a beach or shore of the United States and, although able to return to the water, is in need of apparent medical attention, or in the waters under the jurisdiction of the United States (including any navigable waters), but is unable to return to its natural habitat under its own power or without assistance.

37. Indicate at which level(s) of responsibility the cooperator will participate (Check all that apply, and respond to the questions below).

☐ **VERIFIER:** The role of verifiers is limited to answering requests to provide physical verification of the condition of reported live, distressed animals and communicating the location and status of an animal to the appropriate person(s), including the rescue program coordinator and, if so directed, the nearest approved rescue facility. In most cases verifiers are required to stay with the animal until an approved rescue and transport team arrives. No physical interaction with animals are authorized under this designation. Verifiers may handle animals only under the guidance of an onsite designated rescue team(s).

a. Describe your organization's experience in verifying the condition of reported live, distressed or injured animals of each species requested (e.g., years of experience, number of responses, etc.).

b. Describe the qualifications of each of your staff who would be serving as a verifier in your organization that demonstrates their ability to verify the condition of reported, live, distressed animals of each species requested (including any work and/or volunteer experience that describes where, with what authorized organization, approximate number of hours, approximate number of verifications, and other relevant experience). Resumes, curriculum vitae (CV), and other supporting documents may be used to describe qualifications, including experience with the marine mammal species (or another similar marine mammal species) that is/are the subject of this application.

c. List and describe any specialized training that your staff have completed to perform this duty, including where and when the training occurred, which organization provided the training, types of training, and other relevant information.

d. Describe numbers and types of: a) vehicles (cars, trucks, boats, etc.) that will be used to travel to/from locations of reported, live, distressed animals; b) communications devices that will be used to communicate with rescue responders (phones, radios, etc.); and c) any other related equipment.

e. Provide a statement that you will be available to respond to reports of live, distressed animals of the subject species when needed.

☐ **RESCUER**: Rescuers respond to reports of injured and/or distressed animals and can initiate hands-on rescue and transport efforts as needed. This level of involvement requires substantial expertise and training in species-specific rescue techniques. Rescuers must meet U.S Department of Agriculture (USDA) standards for Humane Handling, Care, Treatment, and Transportation of Marine Mammals when rescuing live animals.

a. Describe your organization's experience in rescuing distressed or injured animals of each species requested (e.g., years of experience, number of rescues, etc.).

b. Describe the qualifications of each of your staff who would be serving as a rescuer in your organization that demonstrates their ability to rescue distressed animals of the subject species (including any work and/or volunteer experience that describes where, with what authorized organization, approximate number of hours, approximate number of rescues, and other relevant experience). Resumes, CVs, and other supporting documents may be used to describe qualifications, including experience with the marine mammal species (or another similar marine mammal species) that is/are the subject of this application.

c. List and describe any specialized training that your staff have completed to perform this duty, including where and when the training occurred, which organization provided the training, types of training, and other relevant information.

d. Describe how you meet or exceed USDA standards. Include a description of the number and types of:
a) vehicles (cars, trucks, boats, etc.) that will be used to support the rescue of distressed animals;
b) rescue equipment (nets, stretchers, etc.) that will be used for rescues;
c) communications devices that will be used during rescues (phones, radios, etc.); and
d) any other related equipment.

e. Describe your methods of capture of the species of interest, including:
   i. Methods of restraint and holding, including dimensions/type of holding container, if used;
   ii. Minimum number of personnel participating in captures at any given time;
   iii. Precautions you will take to avoid separating female-calf/pup/cub pairs, and protocol in the event they are separated, including disposition of the separated calf/pup/cub; and
   iv. Precautions you will take to minimize incidental harassment of non-target animals of the target species.

f. Provide a statement that you will be available to respond to reports of live, distressed animals when needed.

☐ **TRANSPORTER:** Transporters respond to reports of injured and/or distressed animals and initiate transport efforts as directed. This level of involvement requires substantial expertise and training in the species-specific transport methodology, as well as the necessary equipment and trained staff to accompany and move the animals to or between approved critical care and/or rehabilitation/holding facilities. Transporters must meet U.S Department of Agriculture (USDA) standards for Humane Handling, Care, Treatment, and Transportation of Marine Mammals when transporting live animals. Transports must also be consistent with Animal Welfare Act requirements for transportation and USFWS transport regulations.

a. Describe your organization's experience in transporting animals of each species requested (e.g., years of experience, number of transports, etc.).

b. Describe the qualifications of each of your staff in your organization who would be accompanying animals during transport, demonstrating their ability to transport, accompany, and support animals of the subject species (including any work and/or volunteer experience that describes where, with what authorized organization, approximate number of hours, approximate number of transports, and other relevant experience). Resumes, CVs, and other supporting documents may be used to describe qualifications, including experience with the marine mammal species (or another similar marine mammal species) that is/are the subject of this application.

c. List and describe any specialized training that your staff have completed to perform this duty, including where and when the training occurred, which organization provided the training, types of training, and other relevant information.

d. Describe how you meet or exceed USDA standards:

   i. Include a description of the number and types of: a) vehicles (trucks, boats, airplanes, etc.) that you will use to transport animals of the subject species; shipping containers that will be used to transport the animals (including type, construction, dimensions, and weight); other equipment that will be used in the transport of the animals (foam pads, water sprayers, stretchers, etc.); communications devices that will be used during transports (phones, radios, etc.); and any other related equipment.
   ii. Describe how the subject animals will be cared for during transport, including the number of attending staff and a description of the arrangements for watering or otherwise caring for the animals during transport.

e. Provide a statement that you will be available to transport animals of the requested species when needed.

☐ **CRITICAL CARE FACILITY**: These facilities hold and medically treat sick and/or injured animals whose lives would be jeopardized if care were not provided. These facilities have the species-specific equipment, experience, and credentials necessary to rescue, stabilize, rehabilitate and release animals. These facilities may also provide long-term care, as needed, for generally healthy animals awaiting release, or they may provide long-term care for those individuals designated as "non-releasable". Critical care facilities must meet or exceed USDA standards for Humane Handling, Care, Treatment, and Transportation of Marine Mammals when maintaining, treating, and holding live animals.

a. Describe your organization's experience in maintaining, holding, and caring for distressed or injured animals of each species requested (e.g., years of experience, number of animals held, etc.).

b. Describe the qualifications of each of the staff in your organization who would be caring for, handling, and maintaining animals of the subject species (including any work and/or volunteer experience that describes where, with what authorized organization, approximate number of hours, approximate number of animals, and other relevant experience). Resumes, CVs, and other supporting documents may be used to describe qualifications, including experience with the marine mammal species (or another similar marine mammal species) that is/are the subject of this application.

c. For authorization as a critical care facility, you must have a qualified, critical care veterinarian. Provide the name of the person assigned this role and describe his/her qualifications, including a CV or resume that demonstrates his/her ability to perform this role.

d. Describe how you meet or exceed USDA standards. Include a description of:
    i. critical care and holding areas, including descriptions of holding tanks and haul-out areas. The description should include photographs, drawings, and/or diagrams illustrating the area(s) and facility (or facilities) where animals of the subject species will be held. When describing holding tanks, include dimensions (tank length, width, depth, water volume); describe pumps and filtration systems in tanks (including type and capacity and other relevant information); describe lifting apparatus; describe water heaters (including degree to which tanks can be heated); describe water source and type (and ability to use freshwater, saltwater and/or both); and any other relevant features.
    ii. The maximum number of animals of the subject species that can be housed at your facility.
    iii. The current distribution and number of animals of the subject species by holding tank at your facility (include sex, age (if known), time in captivity, age/size class, calves/pups/cubs, etc.).
    iv. All deaths of the subject species at your facility within the past five years and the steps taken to prevent them.

e. Describe quarantine plans, including location and time-frame.

f. Provide a copy of i) your USDA Animal and Plant Health Inspection Service (APHIS) Animal Welfare Act (AWA) license; and ii) your most recent APHIS inspection report.

g. Provide a statement that you will be available to maintain, care for, and house animals of the subject species when needed, including round the clock veterinary care.

☐ **REHABILITATION/HOLDING FACILITY:** These facilities provide routine husbandry for generally healthy animals that require a minimum of specialized treatments. These facilities may provide long-term care, as needed, for generally healthy animals awaiting release, or they may provide long-term care for those individuals designated as non-releasable. Holding facilities must meet USDA standards for Humane Handling, Care, Treatment, and Transportation of Marine Mammals when holding live animals.

a. Describe your organization’s experience in maintaining and holding animals of each species requested (e.g., years of experience, number of animals held, etc.).

OMB Control No. 1018-0093
Expires 08/31/2023

b. Describe the qualifications of each of the staff in your organization who would be caring for, handling, and maintaining animals of the subject species (including any work and/or volunteer experience that describes where, with what authorized organization, approximate number of hours, approximate number of animals, and other relevant experience). Resumes, CVs, and other supporting documents may be used to describe qualifications, including experience with the marine mammal species (or another similar marine mammal species) that is/are the subject of this application.

c. For authorization as a holding facility, you must have a qualified veterinarian. Provide the name of the person assigned this role and describe his/her qualifications, including a CV or resume that demonstrates his/her ability to perform this role.

d. Describe how you meet or exceed USDA standards. Include a description of:
   i. holding areas, including descriptions of holding tanks and haul-out areas. The description should include photographs, drawings, and/or diagrams illustrating the area(s) and facility (or facilities) where animals of the subject species will be held. When describing holding tanks, include dimensions (tank length, width, depth, water volume); describe pumps and filtration systems in tanks (including type and capacity and other relevant information); describe lifting apparatus; describe water heaters (including degree to which tanks can be heated); describe water source and type (and ability to use freshwater, saltwater and/or both); and any other relevant features.
   ii. The maximum number of animals of the subject species that can be housed at your facility.
   iii. The current distribution and number of animals of the subject species by holding tank at your facility (include sex, age (if known), time in captivity, age/size class, calves/pups/cubs, etc.).
   iv. All deaths of the subject species at your facility within the past five years and the steps taken to prevent them.

e. Describe your facility's quarantine plans, including location and time-frame;

f. Provide a copy of i) your USDA Animal and Plant Health Inspection Service (APHIS) Animal Welfare Act (AWA) license; and ii) your most recent APHIS inspection report.

g. Provide a statement that you will be available to maintain and house animals of the subject species when needed.

h. Are you seeking approval to display the animals while holding and maintaining them for rehabilitation purposes?

☐ **No** ☐ **Yes**

If yes, in i-iii, below, provide information to show that:

i. The facility is open to the general public without limitations or restrictions (other than by the charging of an admission fee);
ii. The facility offers a program for education or conservation purposes that is based on professionally recognized standards of the public display community; and
iii. Such display will not interfere with attainment of the objectives of the permitted/authorized activity.

Part V.
For MMPA Enhancement of Survival or Recovery of a Species or Stock

Note: This section of the application should not be completed unless you are specifically requesting MMPA Enhancement activities (e.g., this section is not intended for those parties requesting to conduct rescue, rehabilitation, and release activities for marine mammals).

38. Provide information to show that your proposed activities are likely to contribute significantly to maintaining or increasing the distribution or population numbers necessary to ensure the survival or recovery of the species or stock in the wild.

39. Provide information to show that your proposed activities are consistent with any conservation or recovery plan for the species or stock, or, if no plans are available, that the activity is consistent with the actions required to enhance the survival or recovery of the species or stock and that would be addressed in a conservation or recovery plan. For activities that involve captive maintenance of live animals:

a. Provide an explanation on the benefit of removing animals from the wild into captivity; and
b. Include a description of plans in place for returning animals and any offspring to the wild.

(Note: You must also provide the information requested in question 14, above.)

OMB Control No. 1018-0093
Expires 08/31/2023

NOTICES

PRIVACY ACT STATEMENT

Authority: The information requested is authorized by the following: the Bald and Golden Eagle Protection Act (16 U.S.C. 668), 50 CFR 22; the Endangered Species Act (16 U.S.C. 1531-1544), 50 CFR 17; the Migratory Bird Treaty Act (16 U.S.C. 703-712), 50 CFR 21; the Marine Mammal Protection Act (16 U.S.C. 1361, et seq.), 50 CFR 18; the Wild Bird Conservation Act (16 U.S.C. 4901-4916), 50 CFR 15; the Lacey Act: Injurious Wildlife (18 U.S.C. 42), 50 CFR 16; Convention on International Trade in Endangered Species of Wild Fauna and Flora (TIAS 8249), 50 CFR 23; General Provisions, 50 CFR 10; General Permit Procedures, 50 CFR 13; and Wildlife Provisions (Import/export/transport), 50 CFR 14.

Purpose: The collection of contact information is to verify the individual has an eligible permit to conduct activities which affect protected species. This helps FWS monitor and report on protected species and assess the impact of permitted activities on the conservation and management of species and their habitats.

Routine Uses: The collected information may be used to verify an applicant's eligibility for a permit to conduct activities with protected wildlife; to provide the public and the permittees with permit related information; to monitor activities under a permit; to analyze data and produce reports to monitor the use of protected wildlife; to assess the impact of permitted activities on the conservation and management of protected species and their habitats; and to evaluate the effectiveness of the permit programs. More information about routine uses can be found in the System of Records Notice, Permits System, FWS-21.

Disclosure: The information requested in this form is voluntary. However, submission of requested information is required to process applications for permits authorized under the listed authorities. Failure to provide the requested information may be sufficient cause for the U.S. Fish & Wildlife Service to deny the request.

PAPERWORK REDUCTION ACT STATEMENT

We are collecting this information subject to the Paperwork Reduction Act (44 U.S.C. 3501) in order provide the U.S. Fish and Wildlife Service the information necessary, under the applicable laws governing the requested activity, for which a permit is requested. Information requested in this form is purely voluntary. However, submission of requested information is required in order to process applications for permits authorized under the applicable laws. Failure to provide all requested information may be sufficient cause for the U.S. Fish and Wildlife Service to deny the request. According to the Paperwork Reduction Act of 1995, an agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a currently valid OMB control number. OMB has approved this collection of information and assigned Control No. 1018-0093.

ESTIMATED BURDEN STATEMENT

We estimate public reporting for this collection of information to average 2 hours and 20 minutes, including time for reviewing instructions, gathering and maintaining data and completing and reviewing the form. Direct comments regarding the burden estimate or any other aspect of the form to the Service Information Clearance Officer, Fish and Wildlife Service,
U.S. Department of the Interior, 5275 Leesburg Pike, MS: BPHC, Falls Church, VA 22041-3803, or via email at Info_Coll@fws.gov.

Please do not send your completed form to this address.

6. Is/are the species or population stock(s) for which you applying listed under the U.S. Endangered Species Act (ESA), a species proposed for listing, or a candidate species?
    a. Attach a justification for taking an ESA-listed species, and explain why your proposed activities are not appropriate for a similar non-ESA-listed species.
        i. Consistent and large aggregations of polar bears have drawn thousands of visitors to Kaktovik, Alaska to view polar bears from boats. No research has been conducted to understand how this form of viewing may impact polar bears, and how much take (as defined under the MMPA) may occur. As discussed in the attached research proposal, this effort will allow us to better understand, and therefore minimize or mitigate, any potential disturbance (considered a form of take under the MMPA) to polar bears from human viewing activities. Also, as discussed in the research proposal, increased industry activity associated with Arctic development during the open water period is often conducted using boats. Our efforts will also help to inform management decisions on potential impacts of boat traffic by industry on polar bears.

            While grizzly bears (*Ursus arctos*), a non-ESA species of bear in Alaska, occur in and around Kaktovik, their behavior is significantly different from that of polar bears. For example, grizzly bears, on the Coastal Plain of Alaska due not aggregate in large numbers like polar bears, tend to be secretive, and are active mostly at night. They are also subject to hunting pressures that surpass that of polar bears making them often cryptic avoiding contact with humans. Because the nature of this research is to better understand, and therefore minimize, disturbance unique to polar bears from human activity, it would be inappropriate to use grizzly bears as a substitute species for this effort.
    b. Describe both the short-and long-term anticipated effects of each of your activities alone or cumulatively on the behavior and physiology of the target animals and critical habitat or proposed critical habitat for the species.
        i. We anticipate only short-term behavioral and physiological responses resulting from our proposed study. Our initial search for polar bears should result in no effects to bears given the distance (i.e., 1.6 km) we will be from shore. Any bears observed swimming will be avoided. All personnel on the boat will constantly scan the waters in front of the boat for potential bears. If a bear is observed, we will deviate from our current trajectory and attempt to stay at least 800 m from the bear if safe to do so. Only when we begin to approach bears, on barrier islands, mainland coast, or spits, with the boat do we anticipate effects to bears to manifest. Because our study only requires the first instance that a bear displays behavioral changes that indicate it has been disturbed (e.g., any disruption of behavioral patterns, including, but not limited to breathing, nursing, feeding, or sheltering), and we plan to immediately retreat once this occurs, we do not anticipate anything more than a short-term behavioral

and stress response. We do not anticipate any impacts to designated polar bear critical habitat from this research.

c. Describe how the animals will react to your actions and the consequences of those reactions.
    i. Based on an observational pilot study conducted in 2019 (based on viewing existing boat-based viewing activities from a distance), we expect bears to react to our approaching boat by exhibiting such behavioral patterns as increased alertness, pauses in feeding, or a short flee response. This is also consistent with our observations of bears responding to past aerial surveys in northern Alaska.
d. Identify how you would mitigate any potential negative effects.
    i. We do not anticipate any potential negative effects to the fitness of polar bears from this research. As stated above, our efforts are to better understand how bears may be responding to human approaches from boats, and at the first sign of a behavioral change our actions will cease. Specifically, at the first sign of a behavioral change we will immediately cease our progression towards the animal and begin to increase our distance from the focal animal. Further, any observed behavioral cue that has the potential to indicate a female may abandon her young, or if we observe a cub fleeing from their family group and there is a risk they may become separated from their mother, we will immediately cease operations and increase our distance from them.

7. Do you plan to conduct activities with MARINE MAMMALS IN THEIR NATURAL ENVIRONMENT (i.e., in the wild) where "non-target" marine mammal and ESA-listed species occur in the United States?
    a. A list of all non-target marine mammals and ESA-listed species that might occur in your project area or might be affected by your activities.
        i. Ringed seal (*Phoca hispida*)
        ii. Bearded seal (*Erignathus barbatus*)
        iii. Ribbon seal (*Histriophoca fasciata*)
        iv. Spotted seal (*Phoca largha*)
        v. Beluga whale (*Delphinapterus leucas*)
        vi. Steller's Eider (*Polysticta stelleri*)
        vii. Spectacled Eider (*Somateria fischeri*)
    b. The maximum number of animals of each non-target marine mammal and ESA-listed species (# per species) that might be harassed by your activities, the precautions that you will take to minimize the likelihood that harassment will occur, the actions that you will take should harassment occur.
        i. We anticipate a maximum 5 individuals of each species being disturbed by our activities. To minimize the likelihood of harassment, we will ensure we travel at a speed where the boat can quickly deviate its path or stop if a species of concern is detected. We will also ensure observers are constantly scanning for the presence of the above species and

communicating their locations to the boat operator so they can avoid them and given them as much space as safely possible.

c. The maximum number of animals of each non-target marine mammal and ESA-listed species (# per species) that might be taken (e.g., killed, injured, feeding activities disrupted, etc.) by your activities, your precautions to minimize the likelihood that take will occur, and your actions should take occur.
    i. We don't anticipate any animals to be killed or injured by our activities. We anticipate, at most, 1 individual from each species may have feeding patterns disrupted by our activities. To minimize the likelihood of harassment, we will ensure we travel at a speed where the boat can quickly deviate its path or stop if a species of concern is detected. We will also ensure observers are constantly scanning for the presence of the above species and communicating their locations to the boat operator so they can avoid them and given them as much space as safely possible.

8. Do you plan to conduct your public display, research, or MMPA enhancement activities with MARINE MAMMALS that are CURRENTLY HELD IN A CAPTIVE ENVIRONMENT (including, but not limited to import into the U.S. of captive-held live animals/specimens)?
    a. No
9. For animal(s) to be taken from the wild and brought into a captive environment for public display, research, or MMPA enhancement activities, provide for each species.
    a. NA
10. Are you requesting to CAPTURE LIVE marine mammals in the wild?
    a. No
11. Are you requesting to IMPORT LIVE marine mammals?
    a. No
12. Are you requesting to IMPORT PARTS/SPECIMENS of/from marine mammals?
    a. No
13. Are you requesting to EXPORT or RE-EXPORT PARTS/SPECIMENS of/from marine mammals?
    a. No
14. Are you a facility requesting MAINTENANCE of LIVE ANIMALS (i.e., holding and caring for animals) for public display, research, or MMPA enhancement activities?
    a. No
15. If you are a facility requesting maintenance of live animals for which the primary purpose is scientific research, or enhancement of survival or recovery of the species, are you seeking approval to publicly display the subject animals?
    a. No
16. For U.S. facilities, provide information to show that the facility:
    a. NA
17. Explain how the proposed research meets the MMPA definition of "bona fide research," i.e., scientific research on marine mammals, the results of which: (A) are likely to be accepted for publication in a referenced scientific journal; (B) are likely to contribute to

the basic knowledge of marine mammal biology or ecology; or (C) are likely to identify, evaluate, or resolve conservation problems.

- Boat-based polar bear viewing in Kaktovik, Alaska, has increased exponentially since approximately 2010. While boat operators follow guidelines set forth by the Arctic National Wildlife Refuge (Refuge) to minimize disturbance to polar bears, there has been no research to understand how polar bears respond to boat-based viewing or at what distances boats could cause harassment or take of polar bears. It has been assumed that if boat operators follow the guidelines set forth by the Refuge no take will occur. In 2019, however, we observed polar bears exhibiting a short-term behavioral response to the initial approach by a boat even though they were operating within the framework set by the Refuge. We therefore need to better understand how polar bears are responding to boat-based viewing and determine if there is a distance at which bears can be viewed by boats without being disturbed (i.e., harassed or taken). This study will employ a standard survey design and robust statistical methods for analyzing wildlife responses to sources of human disturbance. Thus, the research should be well-suited for acceptance in the peer-reviewed scientific literature, especially because it addresses an emerging issue in polar bear conservation. Additionally, polar bear researchers from other countries have also noted the need to better understand how boat-based viewing is affecting polar bears as these activities are increasing their jurisdictions as well. Lastly, under the MMPA, the Service must estimate potential impacts to polar bears from proposed industry activities, which include movement of people and property by boats. The results from this research will allow the Service to make better and more informed decisions as they may pertain to those regulatory actions.

18. Provide a detailed description of the proposed project. You may attach a formal research proposal, provided it includes all the requested information, including:
    i. Please see attached research proposal.
19. Provide the expected research schedule (clearly specify the proposed start date and end date of your research or field season(s) and overall duration of the project). Include the months of the year and frequency of fieldwork/sampling (e.g., number of times per year). If your research extends beyond five years, or is a continuation of previously authorized research, give information about when the research began and when you expect it to end.
    - The primary research period will occur in August and September, 2023, but there is a possibility that field work will need to be collected in the same months in 2024. This would occur if equipment (i.e., boats) were not available this fall, conflicts with personnel schedules given other field efforts, if we were unable to collect the desired number of samples, or if after a season of research we realize we need to accommodate interannual variability in bear responses. The most likely scenario, however, is a single field season this year.
20. Indicate which research procedures/activities you will be conducting that will or might result in TAKE or HARASSMENT of TARGET species, and describe each activity in detail, including the information indicated in a-i, below.

The research procedure/activity requested in this application includes approaching individual polar bears by boat. We will use a small boat (~6-passenger) to conduct our sampling efforts. We will search for bears at a ≥1.6 km from shore. After initial detection of a polar bear on shore, we will remain 1.6 km from the bear until the sampling session begins. If there is more than one bear at the location, we will randomly pick one bear for inclusion in sampling. Alternatively, if we need additional bears from a specific class (e.g., family group), we will preferentially choose a bear from the necessary class. If the bear exhibits an overt behavioral response to the boat prior to sampling, we will document the distance and location of the boat at the time of the response. We will focus on sampling bears on land that are not running when initially observed because of the difficulty in classifying a change in behavior while already running or swimming.

Once a bear is chosen for sampling, we will begin approaching the bear at a "no wake" speed with minimal repositioning, consistent with how tour boats operate in Kaktovik. We will record the initial location of the boat with a global positioning system (GPS), the initial behavior of the bear, and use a compass to determine the direction to the focal bear. We will vary our approach angle between 45 – 90° to consider its impact on bear response rates. We will also record current environmental condition (e.g., sea state, visibility, cloud cover, wind) and demographic information such as the bear's age class (sub-adult, adult, unknown), sex, whether it's in a family group, and the number bears within close proximity (<100 m) to the focal bear. As our approach of the bear proceeds, two observers will conduct focal animal sampling (Altmann 1974) and record any behavioral changes (even if not considered take) along with the time of the observation (for later reconciliation with the GPS unit). The approach will continue until a behavioral change consistent with Level B take (i.e., disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering but which does not have the potential to injure) occurs or we come within 30 m of the bear (again consistent with current viewing regulations by the Refuge), whichever comes first. As soon as a behavioral change consistent with take is observed, we will cease moving towards the bear, obtain a way point from the GPS, take a bearing to the bear, as well as measure the distance between the boat and the bear with a range finder with accuracy of ± 1 meter. We will then depart the bear and move the boat to a position ≥1.6 km from the focal bear.

b. Aerial and vessel surveys (manned); include i-v, below, in your activity description:

i. Type of survey craft and vessel;
- We will conduct the research in a 20-28' rigid hulled boat equipped with an outboard motor of up to 300 horsepower which are similar to those used for tourism in Kaktovik.

ii. Type of survey (e.g., line transect, photogrammetry);
- The search phase of this project will entail a line transect survey 1.6 km from shore as we search for polar bears to include in our experimental study.

iii. Number of surveys per year;
- We define a "survey" for this project to include all of the sampling effort directed at polar bears during a given field season. Based on this

definition, we will only conduct surveys once per year, but it is likely that the survey would occur over a period of 2-3 weeks during Aug/Sep. We will aim to sample a minimum of 30 bears but if conditions are ideal, we will seek to sample a maximum of 50 bears within a given year. We anticipate detection and sampling of 10 polar bears per day when weather and sea conditions are suitable for boat operations and observability. Therefore, we anticipate 4 - 5 full days of boat sampling to obtain our desired sample size. Accounting for poor weather sea conditions, the full duration of the sample season could last up to 2 weeks.

iv. Minimum and maximum altitude/approach distance;

- Our research will attempt to understand at what distances polar bears exhibit a behavioral response to boats, so the minimum distance will vary between bears. But we will not approach bears any closer than 50 m in a boat if they have not already exhibited a behavioral response. The maximum distance we would begin our approach of a focal bear is 1 km.

v. Duration spent with group or individual per day.

- Given we do not know at which distances polar bears will respond to the boats, the time spent with a bear would be variable. But we do not anticipate interacting with a bear for more than 5 minutes, and our interaction would end as soon as we observed a behavioral response consistent with the animal showing signs of disturbance as discussed above.

g. Non-intrusive sampling (e.g., behavioral observations via focal follows and ground surveys, scat collection, passive acoustic monitoring and recording, photo-ID, photogrammetry, remote video monitoring, underwater photography); include i-vi, below, in your activity description:

i. Approach, sampling methods, and platform type;

a. We will conduct the research in a 20-28' rigid hulled boat equipped with an outboard motor of up to 300 horsepower which are similar to those used for tourism in Kaktovik. Once a bear is spotted and determined suitable for inclusion in our study, we will slowly approach the bear starting at distance of 1.6 km. The boat will approach the bear at a speed which does not produce wake (consistent with approach of tourist boats in Kaktovik). We will continue to approach the bear until it responds to the boat consistent with a behavioral response consistent with the animal showing signs of disturbance as discussed above, or once we reach 30 m from the bear, whichever comes first.

ii. Minimum and maximum approach distance (specify different distances for each deployment method);

- The maximum approach distance will be 1610 m, and the minimum will be 30 m. The minimum approach distance will be determined by the bear once it exhibits behavioral response consistent with the animal showing signs of disturbance as discussed above.

iii. Are researchers within sight of animals or not (e.g., from a blind)?

- Yes, researchers will be within sight of the bears being actively sampled.

iv. Frequency of observations/sampling;

v. Duration of observations/sampling per day;

- Each individual bear will be observed for < 10 minutes each day, whereas the full sampling effort (i.e., across all bears) is likely to be ~ 6 – 8 hours per day.

vi. If conducting underwater photography/videography, specify the method (e.g., snorkeling, underwater pole cam, or divers using typical gear or rebreathers) and number of people in the water at a given time, including the safety diver/snorkeler.

- NA

21. For each procedure/activity, provide the information in a-j, below, including the maximum number of animals of each species expected to be taken by the procedure annually, broken down by sex and age class; the number of takes per animal per year; and an estimate of the number of animals of the study species that might be incidentally harassed (i.e.,# of non-target animals of your study species that might be harassed by your activities). Also, include the time periods and specific locations of the takes.

a. Species	b. Procedure/Activity	c. Level A or Level B Harassment*or other Take**	d. Age Class(see question 23, below)	e. Sex	f. Max. #AnimalsPer Year	g. Max. # Takes Per Animal ,Per Year	h. Max. #non-target conspecifics incidentally harassed	i. Time-period	j. Location
Polar bear	Non-intrusive sampling	Level B	>2 years old	M/F	40	1	8	Aug-Sep	Beaufort Sea Coast, Alaska
Polar bear	Non-intrusive sampling	Level B	Adult-with cubs	F	10	1	2	Aug-Sep	Beaufort Sea Coast, Alaska
Polar bear	Non-intrusive sampling	Level B	Cubs (≤2 years old)	M/F	20	1	0	Aug-Sep	Beaufort Sea Coast, Alaska
Polar bear	Non-target bear incidental harassment	Level B	All	M/F	10	1	0	Aug-Sep	Beaufort Sea Coast, Alaska
Polar bear	vessel transiting	Level B	All	M/F	2	2	0	Aug-Sep	Beaufort Sea Coast, Alaska

22. Will any female-pup/calf/cub pairs be targeted for any of the proposed research activities? If so, describe how you would minimize impacts on pups/calves/cubs and associated females during each of those activities.
    - Females with cubs will be part of this proposed research effort, but not be the sole focus as the goal is to obtain an estimate of polar bear responses to boats that represents the population. For all polar bears we will immediately move away when a bear exhibits a behavioral response consistent with the animal showing signs of disturbance as discussed above. Special attention will be paid to family groups and if we observe any obvious signs that cubs might become separated from their mother, we will cease our approach and move to sample a different bear a minimum of 1 km away from the family group.
23. Define each age class listed in your response to question 21(d), above, for each species (i.e., list the range of months or years (or mass for otters) constituting each age class); provide the minimum age (or mass) that animals will be targeted for take activities; and indicate whether females with calves/pups/cubs less than that minimum age will be targeted for take activities?
    - We define adult polar bears as being >4 years old, which in this study will be determined subjectively based on the bear's relative size.
    - We define sub-adult polar bears as being ≥2 and <4 years old. Again, these will be determined subjectively based on the bear's relative size.
    - Cubs are defined as being between >0 and <2 years old and still with their mother.
    - We will target females with dependent cubs as they are commonly observed by tourists in Kaktovik and we want to ensure our recommendations consider behavioral differences between family groups and other polar bear classes.
    - We will not directly target cubs, but they will likely receive take if we target their mother. All cubs will be >8 months old at the time of our study.
24. Describe the precautions that will be taken to minimize the likelihood that harassment of non-target individuals of the study species will occur and the actions that will be taken should harassment occur.
    - When transiting to sampling areas we will constantly scan the water ahead of the boat for non-target bears, and deviate our route if animals are observed. We will also ensure that the boat is traveling at a slow-enough speed that we will be able to deviate our route in response to any animals observed and display signs of being harassed. We will also avoid sampling bears that are in large aggregations (>5 bears) to avoid disturbing non-target bears. However, because bears congregate in groups in Kaktovik, and this can affect their behavior, we won't be able to avoid sampling bears that are adjacent to other bears because it would bias our results and reduce their utility for application to Kaktovik.
25. Explain how you determined that your methods involve the least possible degree of pain and suffering and why there are no feasible alternative methods to obtain the desired data or results.

- By transiting 1.6 km from shore when search for bears, there will be no disturbance to bears. Because we are only interested in the first instance that a bear exhibits a behavioral change associated with the approaching boat (and then we'll depart), the duration of stress is very short. We could have continued to move towards the study bears to get more information on how they respond at increasingly close distances. However, this is outside of the needs of our study. So, immediately increasing our distance once a behavioral change is observed is the least possible amount of stress we can impose on the bears and still meet our study objectives.
- This study is intended to inform managers about the potential for harassment and take to occur to polar bears from boat-based activities, there is no other species or system that could be used as an alternative. We thoroughly reviewed the literature and found no information that met our information needs. While some studies have been conducted on grizzly bears they were in southeast Alaska and were responding to much larger vessels. Thus, it would not be a representative system. We also considered an observation-based study looking at bears responding to existing boat-based viewing in Kaktovik, but this has been deemed inadequate for two reasons. First, boat-based viewing is currently not occurring in Kaktovik, Alaska because of the pandemic and concerns from the community. There are therefor no boats operating currently. Secondly, an observational-based study in Kaktovik would make it impossible to estimate the distances at which polar bears respond to boats. This is because of the distance between the observer(s) and the boats and bears. We attempted to use range finders but they did not work in that study area.

26. Provide: a) an estimate of the possible number of unintentional deaths or serious injuries that might result from your research activities; b) the number of unintentional and intentional (via euthanasia for humane purposes if an animal is seriously injured) deaths or serious injuries you seek approval for annually; c) the steps you will take to reduce the likelihood of deaths or injuries; and d) if euthanasia might occur, provide the method of euthanasia(e.g., gunshot, drug, etc.) and who would conduct the euthanasia procedure.
    - a) We estimate that no animals will be killed or seriously injured from this research activity. The only risk of death or serious injury would be if we struck an animal in the water or permanently separated a sow from a cub. We estimate this as having an imperceptibly low probability of occurrence, so we state this to only be a single animal. Our boat speed and operation, as well as observation protocols, will further reduce the possibility of such an event to approaching zero. There has never been a report of tour boat striking a bear even though bears swim regularly in the lagoon where boats operate in Kaktovik. Similarly, we have never had a report of a cub being separated from its mother as a result of boat-based activity.
    - b) We estimate that no bears will be killed intentionally or unintentionally.
    - c) We will travel slowly in the boat to give observers ample time to spot a bear in the water and deviate the boat's course. We will avoid interacting with bears

along sections of coast where the topography could lead to a cub get separated from its mother and unable to easily reunite with it.

- d) We do not envision euthanasia being required, but if it were, it would be with a gun shot from a 12 gauge shotgun and would be administered by one of the team members listed on our DMA permit that works for the Service.

27. In the event of a death, will a necropsy be conducted on the animal?
    - Yes, if we are able to recover the carcass.
28. If a female animal accompanied by calf/pup/cub(s) dies during research activities, specify the disposition of the associated calf/pup/cub(s).
    - Every attempt would be made to capture the orphaned cub(s) if it was safe for project personnel and the animals to do so. We would then work the Alaska Zoo to find temporary housing for the cub(s) until placement in a permanent zoological facility.
29. If biological samples are to be collected or received domestically, provide responses to a through j, below, foreach individual animal per species.
    - NA
30. Provide a list of all personnel that will be involved in the project, identifying each as either a principal investigator or co-investigator, their project duties/responsibilities, and a brief description or CV that demonstrates their experience and expertise to perform their designated duties, including knowledge of the marine mammal species that is/are the subject of this application.
    - Principal investigators and co-investigators for this project are all already listed as personnel on our existing MMPA/ESA scientific research permit for polar bears (MA82088B-1) we are attaching their CVs to this application.
    - **Ryan Wilson**
        - **i.** Brief Outline of <u>Relevant</u> Experience and Qualifications: Four (4) years of experience capturing and handling polar bears in the Chukchi Sea and received ACETA certification in 2015. One season of experience capturing and sedating polar bears in culvert traps as part of management efforts by the Service to reduce conflict with the oil and gas industry in northern Alaska. Also completed Chemical Immobilization Course (by Safe Capture) in January 2016. Four (4) years of experience capturing, handling, and administering drugs to bobcats and coyotes. Experience deploying telemetry collars for carnivores and the study of large mammal and predator spatial ecology. First author publication on six peer-reviewed papers on the space use and resource selection patterns of polar bears in the Chukchi and Beaufort seas, as well as >25 co-authored papers on polar bear ecology. Serves as the co-chair of the Scientific Working Group of the U.S.-Russia Bilateral Agreement and is a member of the IUCN Polar Bear Specialists Group.
    - **Lindsey Mangipane**
        - i. Brief Outline of Relevant Experience and Qualifications: One season of experience capturing and sedating polar bears in culvert traps as part of

management efforts by the Service to reduce conflict with the oil and gas industry in northern Alaska. Immobilized >150 brown bears via aerial darting or jab stick; immobilized ~40 black bears in culvert traps; captured and relocated >100 pronghorn; captured, immobilized, and radiocollared cow elk; captured neonate elk using helicopter and ground methods; captured and immobilized mule deer to collect tonsil and rectal biopsies for Chronic Wasting Disease testing; captured turkey via drop net; captured, radiocollared, and translocated desert bighorn sheep; trapped and radiocollared Eastern and New England cottontails; captured and banded common loons.

- **Susannah Woodruff**
    i. Brief Outline of Relevant Experience and Qualifications: Extensive experience leading and co-leading capture, handling, radiocollaring, and sampling of multiple species, including: >80 wolves (helicopter and foothold trap), >50 mule deer (clover trap and ground dart), >50 Sonoran pronghorn (boma roundup), ~25 mountain goats (helicopter dart), ~10 black and grizzly bears (foot snare/culvert trap), mountain lion kittens (physical restraint), >25 coyotes (restrain or immobilize). Handled numerous other non-target species including foxes, raccoons, porcupines, and other species. One season of experience capturing and sedating polar bears in culvert traps as part of management efforts by the Service to reduce conflict with the oil and gas industry in northern Alaska. Completed capture and handling courses: USFWS/Montana Fish, Wildlife and Parks, Bear Capture and Handling 2022; National Park Service Wildlife Field Anesthesia Course, Fort Collins, CO, 2020; Wildlife Chemical Immobilization Training, Alaska Dept. of Fish and Game, Fairbanks, AK, 2019; Wildlife Capture and Handling Course, Terry Kreeger, Wyoming Game and Fish Department, Sybille, WY, 2007.; Wildlife Capture and Handling Course, Dr. Mark Atkinson, Montana Fish, Wildlife, and Parks. Bozeman, MT; 2006. Helicopter/Airplane/Aviation Safety (B3, A101, A100; 2006, 2009, 2011, 2020, 2022); Aviation Life Support (A-105; 2009, 2011), Crash Survival and Crash Survival for Alaska Employees (A113; 2009, 2011, 2020), Aviation Transportation of Hazardous Materials (A-110; 2021)
- **Dave Gustine**
    i. Brief Outline of Relevant Experience and Qualifications: Volunteered/worked as technician for Colorado Division of Wildlife at Foothills Wildlife Research Facility (1998−99); captured and processed 25 mule deer fawns from vehicle (2 seasons; 1998−99); aerially captured and processed 90 caribou neonates (3 seasons; 2002−2003; 2009); handled and processed 14 Stone's sheep captured via aerial net gunning (1 season; 2003); handled and processed 105 caribou cows captured by aerial net gunning (3 seasons; 2002−2003, 2015); dispatched 5 injured caribou cows

(gunshot; 2015); repeatedly handled and processed dozens of muskoxen, caribou, and reindeer at Large Animal Research Station in Fairbanks, Alaska as part of Ph.D. research (5 seasons; 2006−10); handled several porcupines as a volunteer in captive research project (1 season; 2008); aerial darted and processed ~250 adult caribou cows and bulls (Carfentanil citrate-xylazine; 7 seasons; 2009−15); aerial darted and processed 1 gray wolf (Telazol®; 2012); processed and handled 21 gray wolves (Telazol®; 5 seasons; 2015−19); aerial darted and processed ~100 adult male and female brown bears (Telazol®; 6 seasons; 2014−17, 2021−22); handled numerous little brown bats for relocation/removal from buildings or rabies testing (2015−20); captured and processed numerous grizzly and black bears by culvert trap (Telazol® and BAM; 6 seasons; 2015−20); captured and euthanized 6 black bears by culvert trap (Telazol®; gunshot, 2016−20); captured and processed 2 mule deer (BAM, ground darted; 2016); live-trapped and processed 30 red foxes (Telazol®; 5 seasons; 2016−20). Relevant training: Chemical Immobilization of Animals–Safe Capture International (2010); Advanced immobilization Field Techniques–Safe Capture International (2010); Introduction to Animal Care Issues–U.S. Fish and Wildlife Service (2015); National Park Service (NPS) Aerial Capture, Eradication, and Tagging of Animals (ACETA; 2015, 2018, 2019, 2020); NPS Darting qualifications (annually: 2015–20); Air Crew Member (B3, A100; 2008, 2014, 2017); Helicopter Crew Member (S-271; 2018); Aviation Transportation of Hazardous Materials (A-110; 2018, 2021).

- **Erik Andersen**
    i. Brief Outline of Relevant Experience and Qualifications: Twenty-two years of wildlife research experience, including leading or co-leading projects involving the capture, handling, and sampling of >1600 birds, >800 mammals, >200 reptiles, and >300 amphibians. One season of experience capturing and sedating polar bears in culvert traps as part of management efforts by the Service to reduce conflict with the oil and gas industry in northern Alaska. Trained in culvert trapping and ursid handling with the USGS Greater Yellowstone Ecosystem grizzly bear program in May–June 2022, including capture and handling of 3 grizzly bears and 2 black bears. Completed Safe Capture Chemical Immobilization Training in 2021.

31. Describe how you will collaborate or coordinate with other researchers in your study area. Who are they? Explain how this will occur and how it will minimize negative impacts on the species. For example, will it involve sharing resources, samples or data; timing surveys to minimize disturbance, etc.?
    - The only other researchers in the area are the U.S. Geological Survey Polar Bear program. We coordinate with them regularly on research projects so we are

aware of their plans. As of today, their work in the area only occurs in the spring and they have no intention of doing any boat-based surveys for polar bears.

32. If you intend to conduct research on animals in a captive-holding facility such as a zoo or aquarium, provide documentation showing that the facility(ies) has authorized you to conduct your proposed activities.
    - NA
33. Animal Welfare Act (AWA) Compliance (for research on live animals only): AWA requirements apply to all research facilities, which include institutions, organizations, or people that use or intend to use LIVE animals in research, tests, or experiments; AND, that receive funds under a grant, award, loan, or contract from a department, agency, or instrumentality of the U.S. for the purpose of carrying out research, tests, or experiments, or acquires or transports the animals in commerce.
    - Institutional Animal Care and Use Committee (IACUC) documentation: If your facility is registered as a research facility under the AWA or is a Federal research facility (see a.i), attach the applicable IACUC documentation from the list in i-iii, below. Please note that all activities that involve an invasive procedure, harm, or materially alter the behavior of an animal under study, even if the activities are carried out in the field, are subject to IACUC review and approval. See (AWA regulations and standards for definition/explanation of covered research activities.):
        ii. Attach a copy of your proposed protocols to be reviewed by your IACUC along with an explanation as to how and when the protocols will be reviewed (Note: A copy of your final signed protocols and certification will be required prior to permit issuance.);
            1. We have attached a copy of our approved IACUC document.

Behavioral Response of Polar Bear to Boat Activity

Ryan Wilson[1], Lindsey Magipane[1]

[1]USFWS

Purpose

Our project will assess polar bear (*Ursus maritimus*) response to boating activity on the north coast of Alaska. Our objectives are to: 1) estimate the distance that polar bears exhibit an initial overt response to an approaching boat, and 2) classify behavioral responses of polar bears to boat disturbance. Our findings will provide objective data to inform regulatory and management actions that would reduce the potential for disturbance and 'take' of polar bears from boat-based activities.

Introduction

Anthropogenic expansion into the Arctic has been steadily increasing over the last several decades, and the trajectory of industrial development in this region is forecasted to surge as Arctic sea ice continues to diminish (Van Hemert et al. 2015; Nevalainen et al. 2017; Owen et al. 2021). Species that rely on sea ice are having to adjust their life history strategies to accommodate unreliable sea ice conditions (Atwood et al. 2016a&b). For polar bears of the Southern Beaufort Sea subpopulation, this means that many bears are forced between choosing to spend more time on shore (Amstrup et al. 2006, Gautier et al. 2009, Smith and Stephenson 2013; Stephenson et al. 2013; Atwood et al. 2016b) or more time on sea ice over unproductive waters. While on shore, the increased availability of human-provisioned resources may concentrate bears near human settlements (Atwood et al. 2016a).

As a result of the increased number of bears coming on shore, boat-based tourism in the Southern Beaufort Sea has increased rapidly at sites where polar bears congregate on land (Hallo et al. 2019). Specifically, the community of Kaktovik, Alaska has had the greatest increase in boat-based polar bear viewing given the large number of polar bears in close proximity to the community and the ideal viewing conditions provided by the calm lagoon waters. The Arctic National Wildlife Refuge (Refuge) is the entity charged with managing the viewing program because it occurs on refuge waters. The Refuge has established best practice guidelines for boat-operators to minimize disturbance to bears as well as to ensure a safe viewing experience for visitors. These include a minimum of 30 m between bears and boats, no nosing boats onto shore, and ensuring no bears are disturbed while swimming in the lagoon. The polar bear viewing management system in Kaktovik currently operates under the assumption that bears are not disturbed during viewing, which is required for the viewing program to be compliant with the Marine Mammal Protection Act (MMPA). This assumption was based on anecdotal observations where bears did not exhibit behavioral responses indicating that they were disturbed by viewing activities. No formal study, however, has ever been conducted to assess the validity of this assumption or whether the current viewing setback distances are appropriate for eliminating the risk of disturbance to bears.

To help answer these questions, we initiated a study with a graduate student at the University of Alaska Fairbanks in 2019. During the pilot study, we observed clear examples of take occurring during boat-based polar bear viewing operations, even though the boat operators were compliant with Refuge guidelines. Take appeared to primarily occur when a bear was initially approached by a boat rather than while the bear was being viewed. Unfortunately, shortly after the pilot study was concluded, the Covid-19 pandemic caused polar bear viewing to cease in Kaktovik, and since then, community leadership has been reluctant to allow tourists to visit the community. Additionally, Secretarial Order 3392 from the Secretary of the Interior stated that the Service shall conduct studies to understand the impacts of boat-based polar bear tourism on polar bear behavior. We therefore require a better understanding of the level of take to polar bears associated with boat-based viewing and to identify under what conditions take can be reduced to negligible levels to allow for viewing to continue.

Study area

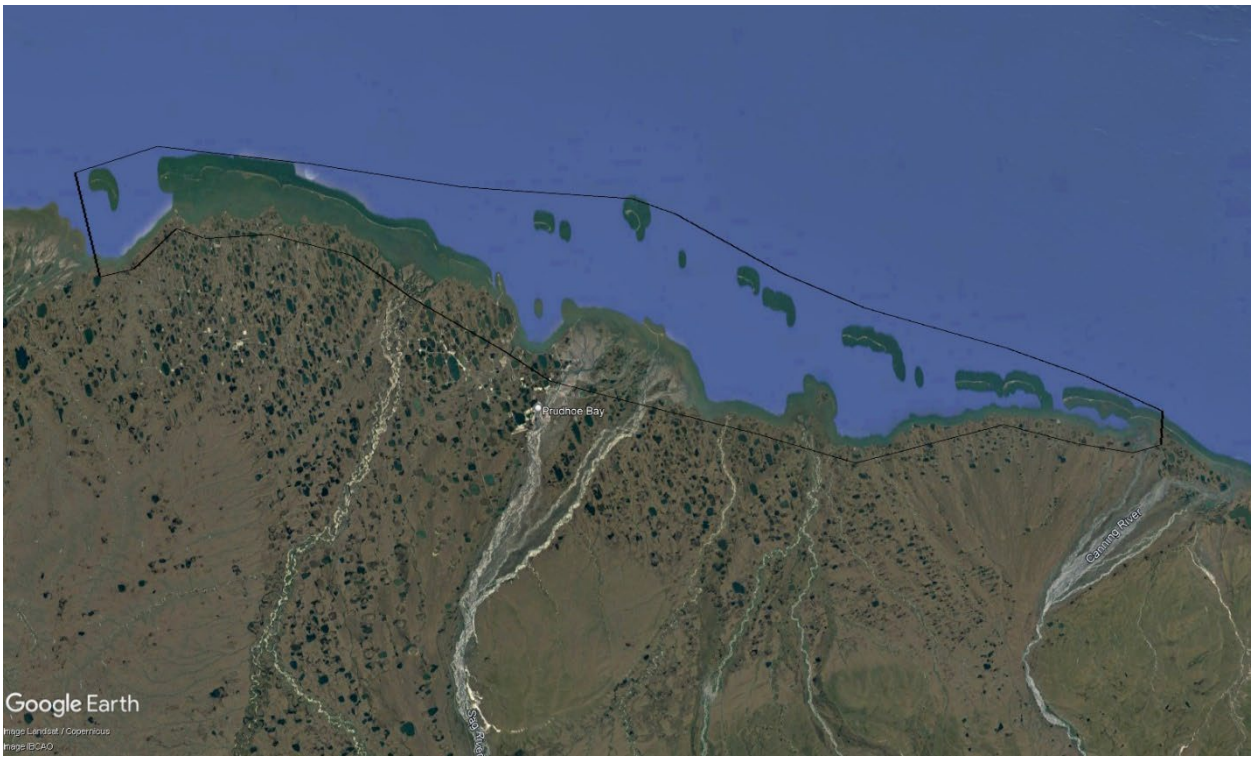

Figure 1. Map of project study area depicting the general area of coastline and barrier islands that will be available to be sampled.

Due to the current cessation of boat-based tourism near Kaktovik, we need to conduct this study in a different region that has a similarly high density of polar bears to sample that can be reached by boat. Deadhorse, Alaska provides a logisticallysuitable location to base operations, providing access to high numbers of bears as well as partners with existing equipment and boat captains. The extent of our study area will reach the Colville River Delta to the west and the Canning River Delta to the east. The study by Wilson et al. (2017) found that this region has some of the highest numbers of polar bears on shore in late summer/early autumn so it is an ideal location for this study. We will sample bears between ~15 – 30 Aug, 2023 on both the mainland coast and the barrier islands. We do not anticipate the timing of our study to conflict with bowhead whale (*Balaena mysticetus*) subsistence harvest activities. If whaling begins earlier than normal this year, however, we will limit our sampling to only bears reachable within protected lagoon waters where bowhead whales do not occur.

Methods

Sampling design

We will use a small boat (~6-passenger) to conduct our sampling efforts. We will search for bears at a ≥1.6 km from shore. After initial detection of a polar bear on shore, we will remain 1.6 km from the bear until the sampling session begins. If there is more than one bear at the location, we will randomly pick one bear for inclusion in sampling. Alternatively, if we need additional bears from a specific class (e.g., family group), we will preferentially choose a bear from the necessary class. If the bear exhibits an overt behavioral response to the boat prior to sampling, we will document the distance and location of the boat at the time of the response. We will focus on sampling bears on land that are not running when initially observed because of the difficulty in classifying a change in behavior while already running or swimming.

Once a bear is chosen for sampling, we will begin approaching the bear at a "no wake" speed with minimal repositioning, consistent with how tour boats operate in Kaktovik. We will record the initial location of the boat with a global positioning system (GPS), the initial behavior of the bear, and use a compass to determine the direction to the focal bear. We will vary our approach angle between 45 – 90° to consider its impact on bear response rates. We will also record current environmental condition (e.g., sea state, visibility, cloud cover, wind) and demographic information such as the bear's age class (sub-adult, adult, unknown), sex, whether it's in a family group, and the number bears within close proximity (<100 m) to the focal bear. As our approach of the bear proceeds, two observers will conduct focal animal sampling (Altmann 1974) and record any behavioral changes (even if not considered take) along with the time of the observation (for later reconciliation with the GPS unit). The approach will continue until a behavioral change consistent with Level B take (i.e., disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering but which does not have the potential to) occurs or we come within 30 m of the bear (again consistent with current viewing regulations by the Refuge), whichever comes first. As soon as a behavioral change consistent with take is observed, we will cease moving towards the bear, obtain a way point from the GPS, take a bearing to the bear, as well as measure the distance between the boat and the bear with a range finder with accuracy of NUMBER. We will then depart the bear and move the boat to a position ≥1.6 km from the focal bear.

We will then search for another bear to sample, but we will not sample bears within 1.6 km of the location of a bear that was sampled on the same day to avoid potentially affecting a bear prior to it being sampled. On consecutive days, we will not sample bears within 5 km: the estimated mean daily travel distances of land-based bears during the summer season (USGS unpublished data). This distance of separation will help us avoid resampling the same individual. Our distance and demographic information (sex, age, presence of young) will help us determine the likelihood that sampled individuals were unique.

To ensure that any behavioral responses are due to the approaching boat and not simply natural variation in polar bear behavior, we will conduct 5-minute-long focal animal sampling of bears not exposed to a boat, but on land in the same area at the same time of year. We will use a spotting scope or binoculars to continuously record behavior of bears location >1.6 km and <3.2 km from observers. We will attempt to collect a minimum of 20 sets of observations for control bears.

We will aim to sample a minimum of 30 bears but if conditions are ideal, we will seek to sample a maximum of 50 bears within a given year. This sample size has been documented to be sufficient for detecting behavioral responses of polar bears from aircraft overflights utilizing a similar sampling design (Quigley 2022). We will attempt to include a mix of demographic groups (e.g., males, females with and without cubs), but sample sizes may prevent predictive modeling of group effects. We anticipate detection and sampling of 10 polar bears per day when weather and sea conditions are suitable for boat operations and observability. Therefore, we anticipate 4 - 5 full days of boat sampling to obtain our desired sample size. Accounting for poor weather sea conditions, the full duration of the sample season could last up to 2 weeks.

Analysis

To determine the overall relationship between approach distance and the probability of displaying a behavioral change consistent with Level B take, we will analyze the data in a hierarchical Bayesian logistic regression model (Royle and Dorazio 2008). We will build a variety of candidate models which we will assess using model selection with the Watanabe–Akaike Information Criterion (WAIC). Each candidate model will include, at a minimum, the distance at which bears exhibited Level B take. We will also consider the influence of environmental conditions and demographics on the probability of exhibiting Level B take. We will choose the model(s) with the lowest WAIC score and will assess the predictive ability of the chosen model using posterior predictive checks (Hobbs and Hooten 2015). We will conduct all analyses in R (R Core Development Team 2022) and JAGS (Plummer 2003). Depending on the structure of the collected data, we may also consider analyzing the data in a time-to-even framework

using Cox Proportional Hazards models (Therneau 2013). Model selection would follow the same framework regardless of the final analytical methods used.

Lastly, we will compare the activity budgets of control and treatment bears during their periods of observation using contingency table analysis (Crawley 2007) to determine if treatment bear activity budgets differ significantly from control bears.

Anticipated Deliverables

Our research will be directly applicable to the management and regulation of boat-based viewing on the Refuge and help inform how to best structure their viewing program. The data and analysis will also provide important information to help estimate take associated with boat use by industry in northern Alaska and help set appropriate setback distances during autumn to avoid disturbing bears while transiting an area. We will publish the research in a peer-reviewed wildlife management or conservation journal and upload the collected data to the Service's Alaska regional data repository.

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U.S. Fish and Wildlife Service Alaska Region
Institutional Animal Care and Use Committee

All inventory, monitoring, and research projects involving warm-blooded vertebrates must be approved by the USFWS Alaska Region Institutional Animal Care and Use Committee (IACUC) *prior* to the commencement of the project. Principal Investigators (PI) are to submit the completed Assurance of Animal Care Form (Assurance) as an electronic file in Microsoft Word to the USFWS Alaska Region IACUC Coordinator, at fwsak_iacuc@fws.gov **at least 30 days prior to the IACUC meeting at which you would like it to be reviewed**. IACUC meetings are held on the second Tuesday of each month. A unique IACUC number will be assigned to the Assurance Form to identify and track the assurance throughout the IACUC process. The PI must complete and submit an annual review/renewal form summarizing the project's animal use for each year the project continues, up to three years. If the project goes beyond three years, a *de novo* review is required, through the completion of a new Assurance of Animal Care Form. Contact the IACUC coordinator immediately if major or minor changes to the protocol or methods are needed after approval.

ANIMAL USE ACTIVITIES MAY NOT BEGIN UNTIL THE ASSURANCE FORM HAS BEEN APPROVED

Contact the IACUC Coordinator at fwsak_iacuc@fws.gov with any questions.

Check List

Check this page before submitting your Assurance Form to fwsak_iacuc@fws.gov .

☒ Principal Investigators and field personnel should complete Training Module #1 and all other modules appropriate to proposed protocol procedures ***prior to*** completing the Assurance of Animal Care form. Contact IACUC coordinator if this cannot be accomplished prior to review.

☒ The Assurance of Animal Care form ***serves as a standalone document****. The IACUC will not review study plans or scientific proposals to answer questions left blank on the Assurance of Animal Care form. Supporting materials may be attached but they cannot substitute for material that must be answered on the Assurance Form.

☒ *DEA Registrants must attach a copy of their Drug Enforcement Agency Controlled Substances Registration Certificate

☒ Specific recommendations and guidelines (Guidelines of the American Society of Mammalogists, Guidelines to the Use of Wild Birds in Research, American Veterinary Medical Association Guidelines on Euthanasia) **must be reviewed and referenced** in the Assurance of Animal Care Form.

☒ Principal Investigators **must cite scientific literature** to verify the proposed methods are the most refined and best possible methods for the humane and ethical treatment of wildlife.

☒ All people using animals must be properly trained to use appropriate methods and have read and agree to comply with this protocol.

☒ Section **VII. DECLARATION, must be signed** by PI and appropriate supervisor prior to submission for review to the IACUC.

☒ Include corresponding IACUC # and brief title in Subject Line of all subsequent IACUC correspondence with the IACUC. Ex. IACUC 2021-0##: [Project Title/Description] at [Location]

☒ If there are still questions as to what is required to complete this form or the IACUC process, please contact the IACUC Coordinator at fwsak_iacuc@fws.gov .

IACUC Use Only

IACUC Number: 2023-005 **Date Received:** 3/8/2023

Initial Review Date: 4/11/2023 **IACUC Training Complete**: Yes ☒ No ☐

IACUC recommendations:

Approved: ☒ **Not Approved:** ☐ **Conditional-Request for more information** ☐

Date Revisions Received: Click or tap to enter a date. **Initial Approval Date:** 4/11/2023

Renewal Month: April

First Annual Renewal Date: Click or tap to enter a date.
Second Annual Renewal Date: Click or tap to enter a date.

Classification: Field Research

4/28/2023
X
IACUC Chair
Signed by: U.S. Fish and Wildlife Service

IACUC Chair Signature: _____ **Date:** **04-11-2023**

Project Title: Behavioral Response of Polar Bear to Boat Activity

Name(s) of Funding Source(s): U.S. Fish and Wildlife Service (USFWS)
Approximate Starting Date: mid-August to early September, 2023

Completion Date: 9/1/2024 **Ongoing:** ☐

The maximum interval between IACUC review and approval as 3 years, i.e., a complete de novo review is required at least every 3 years. During the de novo review, the IACUC is not permitted to rely on previously submitted information and must review the renewal application as a stand-alone protocol.

If this is a *de novo* Review include:

☐ **IACUC number** *[previously approved IACUC assurance #]***:** Click or tap here to enter text.

☐ **Highlighted text** indicating any changes from the previously approved protocol under the appropriate sections:

I. PERSONNEL

Principal Investigator: Ryan Wilson (USFWS)

Phone #: 907-786-3830 **E-mail:** ryan_r_wilson@fws.gov

Due to the remote location of many USFWS field stations and the fact the PI may not be on site during the entire project, please designate an alternate local responsible individual and provide the contact's name and phone number for use in case of emergency, after hours problems, or if the PI cannot be contacted for time-sensitive decisions or concerns regarding the project. This person should be able to assume responsibility for decisions or actions necessary to ensure health and welfare in the event of unanticipated problems. If the responsible individual cannot be contacted, the FWS Alaska Region IACUC will assume responsibility and take actions deemed necessary to ensure appropriate animal care.

Local (Field Station) Contacts:

Name: Susannah Woodruff	**Phone #:** 307-690-4928
Name: Dave Gustine	**Phone #:** 907-903-6396
Name: Lindsey Mangipane	**Phone #:** 907-205-9942

Personnel Qualifications:

List all personnel involved with the animal component of this project and their qualifications. ***Please list all personnel (biological technicians, graduate and undergraduate students, veterinarian and volunteers) involved with field work****. Include educational background and related qualifications (publications, field experience, training, collaborations, research grants, and professional experience) for each proposed procedure (e.g., capture, blood drawing, or euthanasia) that is proposed. Indicate the FWS Alaska Region IACUC training modules (or associated institution's training) completed by each. Add/Delete name blocks as needed.*

1. Name: Ryan Wilson (USFWS) Degree(s): B.S., M.S., Ph.D. (Wildlife Biology)

   Role(s) and Procedure Responsibilities: Co–Principal Investigator; field team leader and fieldwork co-coordinator. Participate in design of study and coordination with stakeholders to complete the project. Contribute to study plans, safety plans, and permitting requirements. Analyze and interpret data, assist with field reports, and publish results in peer-review journals.

   USFWS IACUC Training Module #(s): 1, 3

   Date(s) Completed: 12/1/2022

   Brief Outline of Relevant Experience and Qualifications: Four (4) years of experience capturing and handling polar bears in the Chukchi Sea and received ACETA certification in 2015. One season of experience capturing and sedating polar bears in culvert traps as part of management efforts by the Service to reduce conflict with the oil and gas industry in northern Alaska. Also completed Chemical Immobilization Course (by Safe Capture) in January 2016. Four (4) years of experience capturing, handling, and administering drugs to bobcats and coyotes. Experience deploying telemetry collars for carnivores and the study of large mammal and predator spatial ecology. First author publication on six peer-reviewed papers on the space use and resource selection patterns of polar bears in the Chukchi and Beaufort seas, as well as >25 co-authored papers on polar bear ecology. Serves as the co-chair of the Scientific Working Group of the U.S.-Russia Bilateral Agreement and is a member of the IUCN Polar Bear Specialists Group.

2. Name: Lindsey Mangipane (USFWS) Degree(s): B.S. (Fish and Wildlife Management) and M.S. (Wildlife, Fisheries, and Aquaculture)

   Role(s) and Procedure Responsibilities: Co–Principal Investigator; field team leader and fieldwork co-coordinator. Participate in design of study and coordination with stakeholders to

complete the project. Contribute to study plans, safety plans, and permitting requirements. Analyze and interpret data, assist with field reports, and publish results in peer-review journals.

USFWS IACUC Training Module #(s): 1, 3

Date(s) Completed: 1/4/2023

Brief Outline of Relevant Experience and Qualifications: One season of experience capturing and sedating polar bears in culvert traps as part of management efforts by the Service to reduce conflict with the oil and gas industry in northern Alaska. Immobilized >150 brown bears via aerial darting or jab stick; immobilized ~40 black bears in culvert traps; captured and relocated >100 pronghorn; captured, immobilized, and radiocollared cow elk; captured neonate elk using helicopter and ground methods; captured and immobilized mule deer to collect tonsil and rectal biopsies for Chronic Wasting Disease testing; captured turkey via drop net; captured, radiocollared, and translocated desert bighorn sheep; trapped and radiocollared Eastern and New England cottontails; captured and banded common loons.

3. Name: Susannah Woodruff (USFWS) Degree(s): B.S. (Environmental Science and Policy), M.S. (Wildlife Conservation), Ph.D. (Wildlife Sciences)

   Role(s) and Procedure Responsibilities: Project collaborator. Assist in data collection and field efforts.

   USFWS IACUC Training Module #(s): 1, 3

   Date(s) Completed: 12/5/2022

   Brief Outline of Relevant Experience and Qualifications: Extensive experience leading and co-leading capture, handling, radiocollaring, and sampling of multiple species, including: >80 wolves (helicopter and foothold trap), >50 mule deer (clover trap and ground dart), >50 Sonoran pronghorn (boma roundup), ~25 mountain goats (helicopter dart), ~10 black and grizzly bears (foot snare/culvert trap), mountain lion kittens (physical restraint), >25 coyotes (restrain or immobilize). Handled numerous other non-target species including foxes, raccoons, porcupines, and other species. One season of experience capturing and sedating polar bears in culvert traps as part of management efforts by the Service to reduce conflict with the oil and gas industry in northern Alaska. Completed capture and handling courses: USFWS/Montana Fish, Wildlife and Parks, Bear Capture and Handling 2022; National Park Service Wildlife Field Anesthesia Course, Fort Collins, CO, 2020; Wildlife Chemical Immobilization Training, Alaska Dept. of Fish and Game, Fairbanks, AK, 2019; Wildlife Capture and Handling Course, Terry Kreeger, Wyoming Game and Fish Department, Sybille, WY, 2007.; Wildlife Capture and Handling Course, Dr. Mark Atkinson, Montana Fish, Wildlife, and Parks. Bozeman, MT; 2006. Helicopter/Airplane/Aviation Safety (B3, A101, A100; 2006, 2009, 2011, 2020, 2022); Aviation Life Support (A-105; 2009, 2011), Crash Survival and Crash Survival for Alaska Employees (A113; 2009, 2011, 2020), Aviation Transportation of Hazardous Materials (A-110; 2021)Name:

4. Dave Gustine (USFWS) Degree(s): B.A. (Law Enforcement), B.S. (Wildlife Biology), M.S. (Natural Resource Management), Ph.D. (Wildlife Biology)

Role(s) and Procedure Responsibilities: Polar Bear Program Lead, field team co-leader, and fieldwork co-coordinator. Supervise study operations to ensure they are compliant with existing permits. Develop study plans and safety plans and permits. Assist in field work.

USFWS IACUC Training Module #(s): 1, 3, 4a

Date(s) Completed: 12/2/2022

Brief Outline of Relevant Experience and Qualifications: Volunteered/worked as technician for Colorado Division of Wildlife at Foothills Wildlife Research Facility (1998−99); captured and processed 25 mule deer fawns from vehicle (2 seasons; 1998−99); aerially captured and processed 90 caribou neonates (3 seasons; 2002−2003; 2009); handled and processed 14 Stone's sheep captured via aerial net gunning (1 season; 2003); handled and processed 105 caribou cows captured by aerial net gunning (3 seasons; 2002−2003, 2015); dispatched 5 injured caribou cows (gunshot; 2015); repeatedly handled and processed dozens of muskoxen, caribou, and reindeer at Large Animal Research Station in Fairbanks, Alaska as part of Ph.D. research (5 seasons; 2006−10); handled several porcupines as a volunteer in captive research project (1 season; 2008); aerial darted and processed ~250 adult caribou cows and bulls (Carfentanil citrate-xylazine; 7 seasons; 2009−15); aerial darted and processed 1 gray wolf (Telazol®; 2012); processed and handled 21 gray wolves (Telazol®; 5 seasons; 2015−19); aerial darted and processed ~100 adult male and female brown bears (Telazol®; 6 seasons; 2014−17, 2021−22); handled numerous little brown bats for relocation/removal from buildings or rabies testing (2015−20); captured and processed numerous grizzly and black bears by culvert trap (Telazol® and BAM; 6 seasons; 2015−20); captured and euthanized 6 black bears by culvert trap (Telazol®; gunshot, 2016−20); captured and processed 2 mule deer (BAM, ground darted; 2016); live-trapped and processed 30 red foxes (Telazol®; 5 seasons; 2016−20). Relevant training: Chemical Immobilization of Animals–Safe Capture International (2010); Advanced immobilization Field Techniques–Safe Capture International (2010); Introduction to Animal Care Issues–U.S. Fish and Wildlife Service (2015); National Park Service (NPS) Aerial Capture, Eradication, and Tagging of Animals (ACETA; 2015, 2018, 2019, 2020); NPS Darting qualifications (annually: 2015–20); Air Crew Member (B3, A100; 2008, 2014, 2017); Helicopter Crew Member (S-271; 2018); Aviation Transportation of Hazardous Materials (A-110; 2018, 2021)

5. Name: Erik Andersen (USFWS) Degree(s): B.S. (Biology), M.S. (Wildlife Biology), Ph.D. (Wildlife Conservation and Management)

   Role(s) and Procedure Responsibilities: Project collaborator. Assist in data collection and field efforts.

   USFWS IACUC Training Module #(s): 1, 3

   Date(s) Completed: 06/28/2022

   Brief Outline of Relevant Experience and Qualifications: Twenty-two years of wildlife research experience, including leading or co-leading projects involving the capture, handling, and sampling of >1600 birds, >800 mammals, >200 reptiles, and >300 amphibians. One season of experience capturing and sedating polar bears in culvert traps as part of management efforts by the Service to reduce conflict with the oil and gas industry in northern Alaska. Trained in culvert trapping and ursid handling with the USGS Greater Yellowstone Ecosystem grizzly bear

program in May–June 2022, including capture and handling of 3 grizzly bears and 2 black bears. Completed Safe Capture Chemical Immobilization Training in 2021.

II. USE OF VERTEBRATE ANIMALS AND PROJECT DETAILS

ANIMAL SPECIES (Scientific and Common Name)	**Age Class**	**Number Used** (Year 1)	**Number Used** (Year 2)	**Number Used** (Year 3)	**Treatment(s)** (Samples taken, transmitter attachment, monitoring, capture, banding, etc.)	**Location**
Ursus maritimus (polar bear)	All age classes	≤50	≤50	≤50	-Behavioral disturbance elicited by approaching bears with small watercraft	Mainland coastline and nearshore barrier islands between the Colville and Canning River deltas in northern Alaska; Aug-Sep
***OPPORTUNISTIC ANIMALS (Scientific and Common Name)**	**Age Class**	**Number Affected** (Year 1)	**Number Affected** (Year 2)	**Number Affected** (Year 3)	**Treatment(s)**	**Location**
*** NON-TARGET ANIMALS (Scientific and Common Name)**	**Age Class**	**Number Affected (Year 1)**	**Number Affected (Year 2)**	**Number Affected (Year 3)**	**Treatment(s)**	**Location**
Phoca hispida (ringed seal)	All age classes	5	5	5	Disturbance while transiting study area	Mainland coastline and nearshore barrier islands between the Colville and Canning River deltas in northern Alaska; Aug-Sep
Erignathus barbatus (bearded seal)	All age classes	5	5	5	Disturbance while transiting study area	Mainland coastline and nearshore barrier islands between the Colville and Canning River deltas in northern Alaska; Aug-Sep
Other marine mammals‡ *Histriophoca fasciata*, *Phoca largha, Delphinapterus leucas* (ribbon and spotted seals, beluga whales)	All age classes	5	5	5	Disturbance while transiting study area	Mainland coastline and nearshore barrier islands between the Colville and Canning River deltas in northern Alaska; Aug-Sep

Add/Delete name rows as needed.

***OPPORTUNISTIC ANIMALS** *[include any animal whose disturbance/capture is accidental or incidental, but can lead to valuable information. Examples include non-target species of birds whom if captured will be banded anyway and released, nests of non-target species that will be monitored anyway, etc.].*

*** NON-TARGET ANIMALS** *[include any animal directly or indirectly affected by the research. Examples include the potential to live-capture or kill non-target individuals (e.g., loss of offspring due to taking of one or both parents) or disturb/harass other species during the research activity (e.g., during a banding drive that employs aircraft and/or boats).]*

a. Please describe the duration and level of disturbance to opportunistic and non-target animals:

We do not anticipate any disturbance to non-target polar bears because the only time we have observed take occur during boat-based viewing of polar bears in Kaktovik, Alaska is when a boat is directly approaching a bear and not while it is being viewed. Disturbance to non-target animals will only occur to marine mammals that are in the water while we are operating the boat. Thus, the duration for any individual will be very short, likely < 1 minute as we transit through an area. Given the time of year we are proposing to conduct the research, there will be no sea ice, so we will not cause any basking seals to flush into the water. Any disturbance to non-target animals will only be short-term behavioral responses. Unless we are actively sampling an individual, we will stay ≥1.6 km from the shoreline, thus avoiding disturbing non-target polar bears.

b. **Study Areas:** *[Please describe the location of your study area with anticipated boundaries. Include a map depicting your specific study area, sites, and boundaries].*

Our study area spans from the Colville River delta in the west, to the Canning River delta in the east. The southern boundary of the study area will be the mainland coast of northern Alaska, and the northern boundary will be Cross Island (Fig. 1).

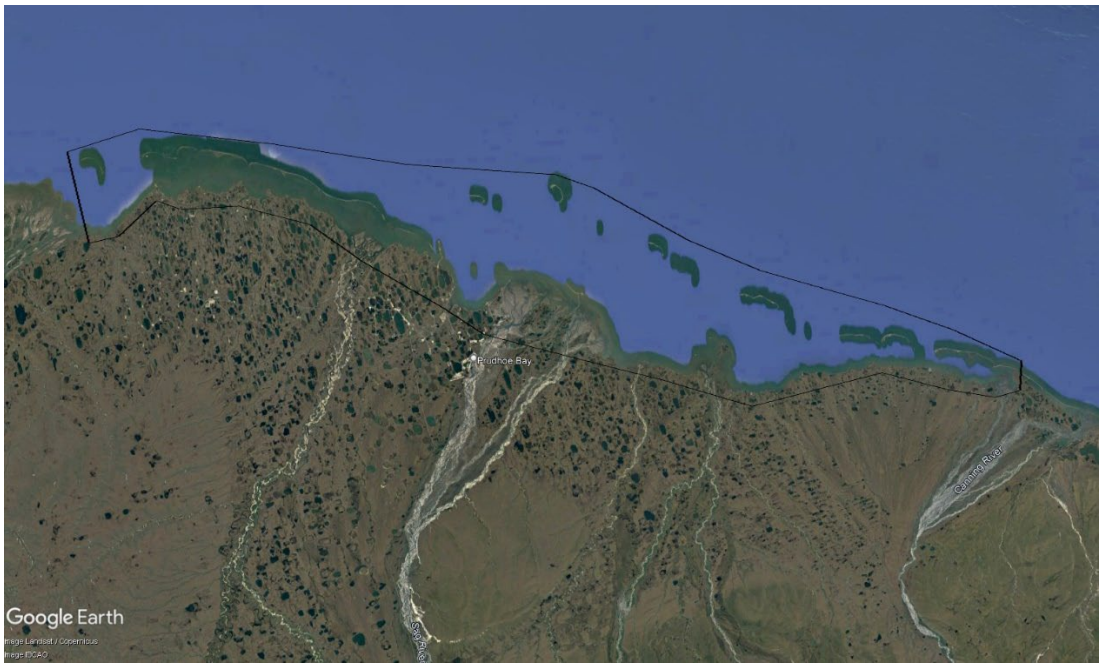

Figure 1. The region of northern Alaska where we will potentially operate during this project. The study area includes all of the mainland coast and nearshore barrier islands between the Colville and Canning river deltas.

c. **Animal Housing:** *[If animals are to be held captive for any period of time, you must describe the temporary holding facilities that you intend to use, the time the animals will spend there, and your animal care protocol. Describe the entire period of captivity, not just the period when the animals will be actively handled. A photograph, drawing, or illustration of the holding facility may help clarify your description.]*

No animals will be captured or handled as part of this research

d. **Permits: [***Identify all relevant permits/registrations (ADFG, USFWS, MMPA, CITES, USDA, DEA etc.) necessary to conduct this project. Provide type(s), name of individual(s) holding the permit/registration, number(s), and expiration date(s). Please indicate if a permit application is pending a decision.]*

Permit Type	Permit Holder(s)	Permit Number	Expiration Date
Federal Fish and Wildlife Permit; Marine Mammal Protection Act, Endangered Species Act	Patrick Lemons (Chief of MMM)	MA82088B-1*	07/20/2025

* We have submitted a modification request to include boat-based behavioral disturbance to our MMPA permit. Instead of adding additional take to our permit to account for this work, we are asking for some of our existing permitted take to be reallocated to this research effort.

e. **Purpose of Study**:

A) **How would you explain to a non-scientist, the specific objective(s) of your study?** *[In ~1,000 words or less, explain how this benefits human health, animal health, and/or how this project will provide a return of knowledge and understanding applicable to the species or biological process under study].*

As a result of the increased number of polar bears coming on shore in autumn, boat-based tourism has increased rapidly at sites where polar bears congregate on land. Specifically, the community of Kaktovik, Alaska has likely had the largest increase in boat-based polar bear viewing given the large number of polar bears in close proximity to the community (Wilson et al. 2017) and the ease to reach them in the calm lagoon waters. The Arctic National Wildlife Refuge (Refuge) is the entity charged with managing the viewing program because it occurs on refuge waters. The refuge has established best practice guidelines for boat-operators leading tourists to view bears to minimize disturbance to bears as well as to ensure a safe viewing experience for visitors. These include a minimum of 30 m between bears and boats, no nosing boats onto shore, and ensuring no bears are disturbed while swimming in the lagoon. The polar bear viewing management system in Kaktovik currently operates under the assumption that bears are not disturbed during viewing, which is required for the viewing program to be compliant with the Marine Mammal Protection Act (MMPA). This assumption was based on no clear anecdotal observations of bears being disturbed while viewing. No formal study, however, has ever been conducted to assess the validity of this assumption or whether the current viewing setback distances are appropriate for eliminating the risk of disturbance to bears.

To help answer these questions, we initiated a purely observational study with a graduate student at the University of Alaska Fairbanks in 2019. During the pilot study, we observed clear examples of take occurring during boat-based polar bear viewing operations, even though the boat operators were compliant with Refuge guidelines. Take appeared to primarily occur when a bear was initially approached by a boat rather than while the bear was being viewed. Unfortunately, shortly after the pilot study was concluded, the Covid-19 pandemic caused polar bear viewing to cease in Kaktovik, and since then, the community has been reluctant to allow tourists back into the community. Additionally, the Secretary of the Interior published an order (Secretarial Order 3392) that stated the Service shall conduct studies to understand the impacts of boat-based polar bear tourism on polar bear behavior. We therefore require a better understanding of the level of take to polar bears associated with boat-based viewing and to identify under what conditions take can be reduced to negligible levels to allow for viewing to continue.

Due to the current cessation of boat-based tourism near Kaktovik, we need to conduct this study in a different region that has a similarly high density of polar bears to sample that can be reached by boats. We, therefore, will base our operations out of the Deadhorse, Alaska area as that is where the boats are housed that will be used for the study.

B) **Explain why the study does not unnecessarily duplicate previous research**. *[If the study repeats previous research, please justify and explain why it is necessary to collect additional data, and how the additional data will help meet your project's objectives. (e.g., to determine potential shifts in migration, breeding distribution, body condition…due to changes in habitat, loss of riparian vegetation, sea level rise…).]*

a. We have conducted an extensive literature review and there are currently no studies that have documented behavioral responses of polar bears to boat-based viewing. There exist a couple of

studies looking at polar bear behavior in relation to large maritime ships (Smultea et al. 2016, Lomac-MacNair et al. 2019, 2021), these studies, however, are not appropriate for drawing inference to smaller boats that view polar bears on land. Additionally, those studies occurred in the open ocean when bears were on sea ice. Bears on shore are under different energetic constraints as the time of year when tourism operates in Kaktovik is when polar bears are largely fasting before the ice returns (Whiteman et al. 2015). Polar bears on shore near Kaktovik do have access to bowhead whale remains during a portion of their time onshore, but how much is available to them varies considerably within and between years. Additionally, these remains are likely insufficient to compensate for the longer duration bears are spending on shore in recent years (Rode et al. 2022) which could affect both how bears respond to boats. We therefore require a study design that more closely mimics how tourist boats are operating towards bears to help inform management of the viewing program, which in turn will lead to fewer disturbances to bears in the future.

C) Justify the following:

a. Rationale for the use of animals: *[Why must animals be used rather than computer models, habitat studies, etc.? If this is a field study, you may indicate that you are addressing specific biological questions on a species or population.]*

Prior to initiating this study proposal, we looked into the possibility of modeling the potential impacts of boat-based viewing on polar bears. Unfortunately, key parameters are required to inform this model that are not available from other species. Given the uniqueness of polar bears and the need for information specifically about how they respond to boats, it would not be possible to use a computer or habitat model to obtain this information.

b. Appropriateness of species to be used: *[Briefly describe the biological characteristics of the animal species selected that justifies its use in the proposed study. Cost should not be used as a justification, except as a means to choose among species that are equally well-suited for the proposed project. If this is a field study, please explain why this work will benefit the particular species or population under study or serve as a model for other species].* The study objectives are specific to polar bears. There are no other species appropriate to be used as an indicator of polar bear behavioral responses to boats. Polar bears are unique among ursids as they are the only bear species that is considered a marine mammal. Additionally, in the autumn polar bears are in a state of energy conservation due to their limited hunting opportunities, especially on shore. Whereas other species are hyperphagic during this period as they are preparing for hibernation (which polar bears do not do). Thus, their energetic constraints are likely different and would not be representative of polar bears during the same period.

c. Number of animals to be used: *[How did you determine the number of animals required? What is the estimated local population size from which the samples will be taken? When possible, include a statistical power justification of the group size(s) or a yield of tissue needed per animal. For complex studies, attaching a flow chart or*

table showing group sizes, time frame, study locations and other information may be helpful in understanding how the total number of animals was determined.]

We will aim to sample a minimum of 30 bears but if conditions are ideal, we seek to sample a maximum of 50 bears within a given year. This sample size has been documented to be sufficient for detecting behavioral responses of polar bears from aircraft overflights utilizing a similar sampling design (Quigley 2022). The polar bears in our study area are from the Southern Beaufort Sea subpopulation which has a current estimated size of ~900 animals (Bromaghin et al. 2021). During the period of our study, there are approximately 145 polar bears on the northern coast of Alaska during any given week (Wilson et al. 2017). It is estimated that ~30% of onshore bears in northern Alaska occur within our study area during any given week of autumn (Wilson et al. 2017).

f. Alternatives to Live Animal Use and Procedures that Cause Pain or Stress:

A) What alternatives to painful procedures were considered? And if available, why weren't they acceptable? *[The Animal Welfare Act and Public Health Service Policy requires the principal investigator consider alternatives to procedures that may cause more than momentary or slight pain or stress to the animal. You must provide a detailed narrative description of the methods used and sources consulted to determine that procedures are the most refined possible, and that alternative, less invasive procedures are not available or acceptable. This narrative description must provide details on the methods used and sources consulted to determine that alternative procedures are not available or acceptable. Examples of sources include a literature search, review of scientific journals, or discussions with colleagues.]*

No painful procedures will be applied to polar bears as part of this study. Only disturbance associated with an approaching boat will occur.

g. Literature Search

As a minimum, principal investigators are to: (i) use the National Conservation Training Center's (NCTC) Literature Search Service (https://inside.fws.gov/index.cfm/go/post/NCTC-FWS-LSS-Home?) or the Alaska Resources Library and information Services (ARLIS) http://www.arlis.org/, (ii) indicate the keywords used, and (iii) summarize or attach results. The NCTC Literature Search Service provides access to peer-reviewed literature in over 250 scientific and social science journals in electronic format. Through NCTC, FWS employees can access 360 Search, a tool that can search all available databases from one interface. Other databases available that are not included in 360 Search but can also be searched directly include Birds of North America Online, Searchable Ornithological Research Archive (SORA) and Wildlife and Ecology Studies Worldwide. Academic One File provides a comprehensive search of peer-reviewed, full text articles from leading journals (1980 to current). Principal investigators should indicate the databases searched or other sources consulted; the date of the search and the years covered by the search; and the key words and/or search strategy.

A) Check the sources of information or databases used to determine your responses to the above questions.

☐ 360 Search ☐ Academic One File ☒ Other Web of Science

Date(s) of Search: 15 Feb 2023 Years Covered: 1987–2023

Key Words: ("polar bear") AND ("boat" OR "vessel" OR "ship")

Search Results: 14, 0 of which were relevant

Summary of Results characterizing any new literature's relevancy (or not) to the project:

Of the 14 studies that were found using the above keywords, only three related specifically to polar bears and boats. Those studies, however, were all behavioral observations of polar bears to large ships (e.g., ice breakers). They occurred in the open ocean when sea ice was present and not in the nearshore ecosystem in autumn or with small boats similar in size to those used for tourist operations.

h. **Animal Use Procedures:** *Please check Yes or No and add the needed information below the appropriate section. Expected information is explained in italics. Some protocols may require information not specifically listed here. Please ensure that all information needed to evaluate your protocol is provided. If an IACUC-approved Standard Operating Procedure(s) exists for the planned study, list the Standard Operating Procedure Protocol number, title, and review date. If you are planning activities not listed below, please describe all procedures under the section entitled "OTHER."*

- ☐YES ☒ NO **WILDLIFE CAPTURE (LIVE CAPTURE OR KILL TRAPPING)**
  [Describe equipment used, duration of trapping/restraint, monitoring protocol/schedule for traps, potential for trapping non-target species, disposition of trapped animals. ***If anesthesia or immobilization is planned please refer to those sections of this form.]***

- ☐YES ☒ NO **ANIMAL TRANSPORTATION** *[Describe how animals are transported from a capture location to a field camp or processing site or facility and returned. If an animal (live or dead) is to be transported from the field, please describe measures taken to avoid potential disease transmission.]*

- ☐YES ☒ NO **PHYSICAL RESTRAINT** *[Describe method, duration, equipment used, dimensions of equipment if applicable, and observation schedule during confinement. Provide detailed justification and protocol if animals are to be physically restrained for longer than 1 hour at a time. Explain method(s) to record the time required to complete specific tasks and procedures (e.g., banding, measure and record tarsus and culmen lengths and measure body mass, draw blood…) as well as the end effect on animals in order to better understand the impact and identify possible areas for improvement/refinement.]*

- ☐YES ☒ NO **CLEANING/DISINFECTION PROCEDURES** *[Please describe the cleaning, disinfection, products used, concentration and use procedures and .frequency of cleaning of any equipment or PPE that will be used to capture, transport, contain, etc. animals]*

- ☐YES ☒ NO **PERSONAL PROTECTIVE EQUIPMENT (PPE)** *[Please describe any and all PPE that will be used by personnel including, gloves, respirators, goggles or face shields, etc.]*
  Click or tap here to enter text.

- ☐YES ☒ NO **MONITORING OF PHYSIOLOGICAL VITAL SIGNS** *[Describe physiological parameters (e.g., temperature, pulse rate, respiration rate, capillary refill time) to be recorded, frequency of measurements, and expected normal ranges for all physiological parameter monitored. Provide protocol for addressing physiological parameters outside of normal ranges (e.g., how do you plan to treat hypothermia?]*

- ☐YES ☒ NO **MARKING OR TAGGING** *[Describe leg band type (e.g., USGS, colored, alphanumeric code), neck collar, transmitter (e.g., VHF, satellite, GPS), passive integrated transponder (PIT) tags, or other devices or methods (e.g., dying feathers or fur) to be used. Document why the device or method is not expected to interfere with the behavior, health, or social status of an individual. Provide the mass of attachment device, range of body mass of the study species, device mass as a proportion of body mass, and the recommended device mass as a percent of body mass.]*

- ☐YES ☒ NO **BLOOD SAMPLING** *[Describe needle gauge and length, collection site preparation, location of collection sites, sample volumes, frequency of sampling(s), total samples per animal, and how long an animal is retained for sampling; indicate the percent blood loss per sample based on the animal's body mass and, describe how animal(s) will be monitored for anemia.]*
  Click or tap here to enter text.

- ☐YES ☒ NO **URINE/FECES SAMPLING** *[For all methods indicate the length of time the animal is maintained for sampling(s).]* Click or tap here to enter text.

- ☐YES ☒ NO **OTHER BODY FLUIDS AND TISSUE SAMPLING** *[Indicate the type of substance, e.g., muscle tissue, abdominal fluid, microbial swabs, bone marrow; method of collection; volumes per sample; frequency of sampling(s); length of time animal is maintained for sampling; total samples per animal.]*
- ☒YES ☐ NO **BEHAVIORAL OR OBSERVATIONAL STUDY**

  ☒YES ☐ NO We propose to observe polar bear responses to slow approaches by small to medium-sized boats to better understand how boat-based viewing affects them. We will use a small boat (i.e., ~ 6 passengers) to conduct our sampling efforts. We will search for bears at a ≥1.6 km from shore to ensure we are

not disturbing bears prior to initiating our treatment. After initial detection of a polar bear on shore, we will remain 1.6 km from the bear until the sampling session begins. If there is more than one bear at the location, we will pick one bear for inclusion in sampling either randomly or non-randomly if we need additional observations for a given class of bears (e.g., sub-adults). If the bear exhibits an overt behavioral response to the boat prior to sampling, we will document the distance and location of the boat at the time of the response. We will focus on sampling bears on land that are not running when initially observed because of the difficulty in classifying a change in behavior while already running or swimming.

Once a bear is chosen for sampling, we will begin approaching the bear slow enough to avoid making a wake, which is consistent with how tour boats operate in Kaktovik. We will record the initial location of the boat with a global positioning system (GPS), the initial behavior of the bear, and use a compass to determine the direction to the focal bear. We will vary our approach angle between 45–90° to consider its impact on bear response rates. We will also record current environmental condition (e.g., sea state, visibility, cloud cover, wind) and demographic information such as the bear's age class (sub-adult, adult, unknown), sex, whether it's in a family group, and the number bears within close proximity (<100 m) to the focal bear. As our approach of the bear proceeds, two observers will conduct focal animal sampling (Altmann 1974) and record any behavioral changes (even if not considered take) along with the time of the observation (for later reconciliation with the GPS unit). The approach will continue until a behavioral change consistent with Level B take (i.e., disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering but which does not have the potential to injure a marine mammal or marine mammal stock in the wild) occurs or we come within 30 m of the bear (again consistent with current viewing regulations by the Refuge), whichever comes first. As soon as a behavioral change consistent with take is observed, we will cease moving towards the bear, obtain a way point from the GPS, take a bearing to the bear, as well as measure the distance between the boat and the bear with a range finder. We will then depart the bear and move the boat to a position ≥1.6 km from the focal bear.

We will then search for another bear to sample, but we will not sample bears within 1.6 km of the location of a bear that was sampled on the same day to avoid potentially affecting a bear prior to it being sampled. On consecutive days, we will not sample bears within 5 km; the estimated mean daily travel distances of land-based bears during the summer season (USGS unpublished data). This distance of separation will help us avoid resampling the same individual. Our distance and demographic information (sex, age, presence of young) will help us determine the likelihood that sampled individuals were unique.

To ensure that any behavioral responses are due to the approaching boat and not simply natural variation in polar bear behavior, we will conduct 5-minute long focal animal

sampling of bears not exposed to a boat, but on land in the same area at the same time of year. We will use a spotting scope or binoculars to continuously record behavior of bears location >1.6 km and <3.2 km from observers. We will attempt to collect a minimum of 20 sets of observations for control bears. We will aim to sample 30 bears but if conditions were ideal, we would seek to sample a maximum of 50 bears within a given year. This sample size has been documented to be sufficient for detecting behavioral responses of polar bears from aircraft overflights utilizing a similar sampling design (Quigley 2022). We will attempt to include a mix of demographic groups (e.g., males, females with and without cubs), but sample sizes may prevent predictive modeling of group effects. We anticipate detection and sampling of 10 polar bears per day when weather and sea conditions are suitable for boat operations and observability. Therefore, we anticipate 4–5 full days of boat sampling to obtain our desired sample size. Accounting for poor weather sea conditions, the full duration of the sample season could last up to 2 weeks.

i. ☒YES ☐ NO *Provide scientific justification for the degree of restraint and/or noxious stimuli.]* Given that the primary objective of this study is to determine how polar bears respond to a close approach by a smaller-sized boat, it is imperative that this stimulus be employed. As discussed in the section immediately above, our experimental design is closely tied to how boat-based viewing operates in Kaktovik, so that the results can be directly applied to answering the management question.

- ☐YES ☒ NO **SPECIAL DIETS** *[Will food items other than routine husbandry diets be used? If yes, describe diet, duration of use, anticipated nutritional deficit/adverse effect, weight monitoring of animal(s), amount of weight loss that will be allowed, monitoring protocol/schedule for effects.]* Click or tap here to enter text.
- ☐YES ☒ NO **FOOD AND/OR WATER DEPRIVATION** *[Describe duration, frequency of deprivation, reason(s) for deprivation, monitoring protocol of animal(s), amount of weight loss that will be allowed, anticipated deficit/adverse effect, monitoring protocol/schedule for effects.]*
  Click or tap here to enter text.
- ☐YES ☒ NO **INDWELLING CATHETERS OR IMPLANTS** *[Describe type, size, duration of use, maintenance and monitoring protocol/schedule. If implantation requires a surgical protocol please complete the section on Animal Surgery Information.]* Click or tap here to enter text.
- ☐YES ☒ NO **ADMINISTRATION OF DRUGS, TOXINS, REAGENTS, CELLS, ETC.**

☐YES ☒ NO **USE OF CONTROLLED AND/OR PRESCRIPTION SUBSTANCES** *[What source(s) will be used to obtain the substances? **A completed Drug Enforcement Agency Controlled Substance Registration Certificate must be attached**. Include DEA info in Permit section above. Irrespective of source, describe arrangements for use and transport between storage and field, ordering, record keeping, storage & disposal, and precautions taken to avoid unauthorized access.]*

i. ☐YES ☒ NO **ADMINISTRATION OF PARALYTICS** *[Describe agent, dose (mg/kg), route of administration, frequency of administration, duration of paralysis. If used in conjunction with a procedure(s) involving potential pain, how will the presence of pain, depth of anesthesia, degree of analgesia be assessed? If associated with a surgical procedure, please indicate and refer to the Animal Surgery Information section.]* Click or tap here to enter text.

i. ☐YES ☒ NO **ADMINISTRATION OF ANESTHETICS** *[If associated with a surgical procedure please indicate and refer to the Animal Surgery Information section. Describe agent, dose (mg/kg), route of administration, duration of anesthesia, method of monitoring anesthesia; maintenance/monitoring procedures to ensure normal body temperature is maintained in the animal, procedures employed in case of anesthetic emergency over-dose, monitoring protocol to ensure animal's complete recovery from anesthesia; if by inhalation describe the equipment used and state the method of scavenging waste anesthetic gas/fumes; if injectable agent(s) are not commercially prepared and sterility guaranteed please describe method used to assure the agent's sterility when injected.]* Click or tap here to enter text.

ii. ☐YES ☒ NO **ADMINISTRATION OF ANALGESICS** *[Describe agent, dose (in mg/kg), route of administration, frequency, duration of use. If associated with a surgical procedure please indicate and refer to the Animal Surgery Information section.]*

☐YES ☒ NO **USE OF CONTROLLED AND/OR PRESCRIPTION SUBSTANCES** *[What source(s) will be used to obtain the substances? **A completed Drug Enforcement Agency Prescription/Controlled Drug Form must be attached**. Irrespective of source, describe arrangements for use and transport between storage and field, ordering, record keeping, storage & disposal, and precautions taken to avoid unauthorized access.]*

iii. ☐YES ☒ NO **ADMINISTRATION OF DRUGS, TOXINS, REAGENTS, CELLS, ETC. (OTHER THAN ANESTHETICS, PARALYTICS, OR ANALGESICS)** *[Describe agent, dose (mg/kg), diluent, route of administration, list equipment used for administration (e.g. gavage needle, stomach tube, cerebral cannula, venipuncture, etc.), frequency of administration, length of time animal maintained, anticipated deficit/adverse effects, and monitoring protocol/schedule for effects. State if no adverse effects are anticipated. Describe monitoring procedures to ensure cell lines have been screened for rodent pathogens. If injectable agent(s) or silastic implant(s) are not commercially prepared and sterility guaranteed please describe method used to assure the agent's sterility when injected.]* Click or tap here to enter text.

- ☐YES ☒ NO **SURGERY**
  - i. ☐YES ☒ NO **SURVIVAL SURGERY (MINOR)** *[If YES, complete Animal Surgery Information. A minor operative procedure example is implanting a subcutaneous transmitter or passive integrated transponder (PIT) tag.]* Click or tap here to enter text.
  - ii. ☐YES ☒ NO **SINGLE MAJOR SURGERY INVOLVING AN INDIVIDUAL ANIMAL** *[If YES, complete Animal Surgery Information. A major operative procedure is one that enters a body*

cavity for example, implanting a telemetry device into the body cavity).] Click or tap here to enter text.

iii. ☐YES ☒ NO **MULTIPLE MAJOR SURVIVAL SURGERIES INVOLVING AN INDIVIDUAL ANIMAL** *[A major operative procedure is one that enters a body cavity. You must provide additional justification to perform multiple major operative procedures on one animal. Removal of telemetry devices is an acceptable reason. If YES, complete Animal Surgery Information.]* Click or tap here to enter text.

iv. ☐YES ☒ NO **NON-SURVIVAL SURGERY** *[If YES, complete Animal Surgery Information]* Click or tap here to enter text.

- ☐YES ☒ NO **DEATH AS AN ENDPOINT** *[If the protocol involves observing or studying the animal until death occurs or collecting the animal by shooting, lethal trapping or other means, you must provide scientific justification as to why an earlier endpoint is not acceptable.]*

Click or tap here to enter text.

- ☐YES ☒ NO **OTHER** *[Describe any other procedure to be administered not previously addressed.]* Click or tap here to enter text.

- ☒YES ☐ NO **WILL ANY PROCEDURES CAUSE PAIN OR STRESS?** ***[If yes**, complete the following table and describe measures taken to alleviate adverse effects. What methods are used to estimate presence or degree of pain or stress? If no measures are taken to alleviate adverse effects, you must provide scientific justification. **Refer to Attachment A for category descriptions**]*

	NO	NIL	LOW	MODERATE	HIGH
PAIN IS EXPECTED PRIOR TO PROCEDURE	☒	☐	☐	☐	☐
STRESS IS EXPECTED PRIOR TO PROCEDURE	☒	☐	☐	☐	☐
PAIN IS EXPECTED DURING PROCEDURE	☒	☐	☐	☐	☐
STRESS IS EXPECTED DURING PROCEDURE	☐	☐	☒	☐	☐
PAIN IS EXPECTED POST PROCEDURE	☒	☐	☐	☐	☐
STRESS IS EXPECTED POST PROCEDURE	☐	☒	☐	☐	☐

A) METHODS USED IN THE FIELD TO ESTIMATE PAIN/STRESS OF THE ANIMAL: Because we won't be physically handling any bears, the only method we can rely on to estimate the stress of the animal will be behavioral cues. Specifically, we will monitor bears for signs of stress, which includes yawning, and jaw "popping". We will be especially cognizant of family group stress behavior, specifically if a female begins to "round-up" her cubs in a protective-type behavior

B) MEASURES TO ALLEVIATE ADVERSE EFFECTS OF PAIN AND STRESS TO THE ANIMAL:

1. Given that our research goals are to attempt to elicit a behavioral response consistent with Level B Take under the MMPA, we won't be able to alleviate stress to the animal. At the first sign of a Level B take, we will immediately cease our progression towards the animal and begin to increase our distance from the focal animal. Additionally, we do not want to elicit take that is greater than that categorized as Level B (i.e., Level A or Lethal). Thus, any behavioral cue that has the potential to indicate a female may abandon her young, or if we observe a cub fleeing from their family group and there is a risk they may become separated from their mother, we will immediately cease operations and increase our distance from them.

III. TYPE, FREQUENCY, AND TREATMENT OF INJURIES

A) Describe the most likely forms of injuries to research animals, how frequent an injury(ies) are expected to occur, and planned procedures to treat injuries. **Even if you do not intend or expect to injure an animal, you must describe potential injuries and expected methods of treatment(s).**

The only form of injury that our research could cause to bears would be hitting a bear while swimming in the water. Over nearly a decade of boat-based viewing in Kaktovik, where there are the highest densities of polar bears on shore in Alaska, this has never been documented to occur. To prevent this, we will ensure that boat operators and observers will be on constant look-out for bears in the water when transiting between sites. In the event of a boat strike, we most likely would be unable to treat the animal for its injuries as there would be no safe way to transport the bear to shore. If the bear lost consciousness, we could use a noose pole to keep its head above water as we attempted to bring it to shore. We would then call our veterinarians to see what their recommendations would be based on the visible injuries. In either scenario, if it was determined that the bear needed treatment, we could potentially attempt to capture it in a culvert trap (if road access is available) given that a separate capture-based study by the Service will be conducted at the same time and in the same general area (IACUC 2023-001).

IV. EUTHANASIA AND DISPOSITION

All methods of euthanasia must follow the American Veterinary Medical Association Panel on Euthanasia Guidelines on Euthanasia (January 2020, 121pp) or in accordance with professional taxon-specific guidelines. Any deviations must be scientifically justified. ***Even if you do not intend to euthanize animals at the completion of your project, a method of euthanasia must be listed in cases of emergency.***

A) Describe the method of euthanasia planned. If by chemical agent you must identify the compound and specify the dose (mg/kg) and route of administration. Physical methods (cervical dislocation, decapitation) may be used only after other methods have been excluded and when scientifically justified. See part B
B) Describe the method used to ensure the animal will not revive and method of disposal of remains. If you plan to donate remains to a university, museum, or other research/educational institution, please verify that the institution has agreed to accept the remains.

The only scenario we can conceive of that could lead to the need for euthanizing a polar bear as part of this study would be if we struck one in open water with the boat. However, this is highly unlikely to occur given the small chances of directly crossing paths with a bear in the water, having observers miss seeing the bear, and also the relatively low speed we will travel in the boat. In the unlikely event euthanasia is necessary, we would administer a single shot from a shotgun (with slugs), or high-powered rifle placed in a location that will be lethal (i.e., lungs, heart, back of head) by a person certified under the USFWS Bear Safety Firearms Training (at least one qualified person is present during capture) and with experience using firearms in a lethal capacity. We would be unable to safely capture and transport an injured bear back to shore for treatment for euthanasia as it would be too hazardous for the boat crew. This follows the American Veterinary Medical Association guidelines on euthanasia (AVMA 2020) in that it causes an immediate loss of consciousness. We will collect the meat, hide, skull, and samples of liver, kidney, and fat as feasible under field conditions. The hide and skull would be retained by the USFWS and used for educational purposes. We would use collected samples for analyses that complement ongoing research.

V. ANIMAL SURGERY INFORMATION

☒ Check here if no surgery is planned. *[If no surgery is planned, skip to section VI.]*

ANIMAL SPECIES (Scientific and Common Name)	Number Used	S = Survival N = Non-survival	Surgery Description & Location

VI. LITERATURE CITED

PLEASE PROVIDE COMPLETE CITATIONS (AUTHOR, DATE, PUBLICATION TITLE, PUBLISHER) OF ALL LITERATURE CITED TO SUPPORT THE ASSURANCE FORM.

Altmann, J. 1974. Observational study of behavior: sampling methods. Behavior 49:227-267.

American Veterinary Medical Association [AVMA]. 2020. AVMA Guidelines for the Euthanasia of Animals: 2020 edition.https://www.avma.org/sites/default/files/2020-02/Guidelines-on-Euthanasia-2020.pdf.

Bromaghin, J.F., D.C. Douglas, G.M. Durner, K.S. Simac, and T.C. Atwood. 2021. Survival and abundance of polar bears in Alaska's Beaufort Sea, 2001-2016. Ecology and Evolution 11:14250-14267.

Lomac-MacNair, K., J.P. Andrade, and E. Esteves. 2019. Seal and polar bear behavioral response to an icebreaker vessel in noprthwest Greenland. Human-Wildlife Interactions 13:13.

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VII. DECLARATION:

THE INFORMATION ON THIS ASSURANCE OF ANIMAL CARE FORM IS AN ACCURATE DESCRIPTION OF MY ANIMAL CARE AND USE PROTOCOL(S). ALL PEOPLE USING ANIMALS HAVE BEEN PROPERLY TRAINED TO USE APPROPRIATE METHODS AND HAVE READ AND AGREE TO COMPLY WITH THIS PROTOCOL. ALL INDIVIDUALS WORKING UNDER THIS ASSURANCE WILL COMPLY WITH THE PROCEDURES AND METHODS OUTLINED IN THE NATIONAL INSTITUTE OF HEALTH GUIDE FOR THE CARE AND USE OF LABORATORY ANIMALS, AS WELL AS PUBLIC HEALTH SERVICE POLICY, THE ANIMAL WELFARE ACT, AND APPLICABLE U.S. FISH AND WILDLIFE SERVICE POLICIES. ALL FIELD RESEARCH WILL BE CARRIED OUT IN ACCORDANCE WITH THE PRINCIPLES OUTLINED IN ACCEPTABLE FIELD METHODS OF MAMMALOGY, GUIDELINES FOR THE USE OF WILD BIRDS IN RESEARCH, OR OTHER TAXON SPECIFIC GUIDELINES. ALL WORK PROPOSED HEREIN IS DESIGNED IN THE ATTEMPT TO AVOID DISCOMFORT, STRESS, AND PAIN TO THE ANIMALS; DOES NOT UNNECESSARILY DUPLICATE PREVIOUS EXPERIMENT; AND NON-ANIMAL ALTERNATIVES HAVE BEEN CONSIDERED.

X _____

Ryan Wilson

DATE: _____

X _____

Dave Gustine

DATE: _____

☐ MIGRATORY BIRD MANAGEMENT BRANCH CHIEF
☒ FISHERIES-ECOLOGICAL SERVICES SUPERVISOR
☐ REFUGE MANAGER

Attachment A: Categories of Invasiveness in Animal Experiments

Please assist the USFWS Alaska Region IACUC in this determination by assigning the animal procedures in your project to one of the categories below. The *U.S. Government Principles Regarding the Care and Use of Animals* state, "Unless the contrary is established, investigators should consider that procedures that cause pain or distress in human beings may cause pain or distress in other animals."

1. Experiments which cause little or no discomfort or stress.** **(Nil)**
Examples: individual or small numbers of animals being confined and maintained in natural habitat that affords an appropriate quantity and quality of food, cover, and water; injection of materials in amounts that will not cause adverse reactions by the following routes: intravenous, subcutaneous, intramuscular, intraperitoneal, or oral, but not intrathoracic or intracardiac (Category 2); acute non-survival studies in which the animals are completely anesthetized and do not regain consciousness; approved methods of euthanasia following rapid unconsciousness such as anesthetic overdose or decapitation; short periods of food and/or water-deprivation equivalent to periods of abstinence in nature.

2. Experiments which cause minor stress or pain of short duration**. (Low)**
Examples: cannulation or catheterization of blood vessels or body cavities under anesthesia; minor surgical procedures under anesthesia, such as biopsies or laparoscopy; short periods of restraint beyond that required for simple observation or examination, but consistent with minimal stress; short periods of food and/or water deprivation which exceed period of abstinence in nature; behavioral experiments on conscious animals that involve short-term, stressful restrain; short term exposure to noxious but non-lethal levels of drugs or chemicals. Such procedures should not cause significant changes in the animal's appearance, in physiological parameters such as respiratory or cardiac rate, or fecal or urinary output, or in social responses.

3. Experiments which cause moderate to severe stress or discomfort. **(Moderate)**

Examples: major surgical procedures conducted under general anesthesia, with subsequent recovery; prolonged (several hours or more) periods of physical restraint; induction of behavioral stresses such as maternal deprivation, aggression, predator-prey interactions; procedures which cause severe, persistent or irreversible disruption of sensorimotor organization; the use of adjuvants which cause clinically evident swelling or abscesses. Other examples include induction of anatomical and physiological abnormalities that will result in pain or distress; the exposure of an animal to noxious stimuli from which escape is impossible; exposure to drugs or chemicals at levels that impair physiological systems. Note: procedures used in Category 3 studies should not cause prolonged or severe clinical distress as may be exhibited by a wide range of clinical signs, such as marked abnormalities in behavioral patterns or attitudes, the absence of grooming, dehydration, abnormal vocalization, prolonged anorexia, circulatory collapse, extreme lethargy or disinclination to move, and clinical signs of severe or advanced local or systemic infection, etc.

** The text of these categories has been freely adapted from a document originally published by the Canadian Council on Animal Care (CCAC).

4 Procedures which cause severe pain near, at, or above the pain tolerance threshold of un-anaesthetized conscious animals. **(High)**
Examples: exposure to noxious stimuli or agents whose effects are unknown; exposure to drugs or chemicals at levels that (may) markedly impair physiological systems and which cause death, severe pain, or extreme distress: completely new biomedical experiments which have a high degree of invasiveness; behavioral studies about which the effects of the degree of distress are not known; use of muscle relaxants or paralytic drugs without anesthetics; burn or trauma infliction on unanesthetized animals, a euthanasia method not approved by the American Veterinary Medical Association; any procedures (e.g. the injection of noxious agents or the induction of severe stress or shock) that will result in pain which approaches the pain tolerance threshold and cannot be relieved by analgesia (e.g. when toxicity testing and experimentally-induced infectious disease studies have death as the endpoint).

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EDUCATION

Ph.D. (Biological Sciences–Wildlife Biology) *2010*
University of Alaska Fairbanks, Fairbanks, AK

M.S. (Natural Resource and Environmental Science–Biology) *2005*
University of Northern British Columbia, Prince George, BC

B.S., *cum laude* (Wildlife Biology) *2000*
Colorado State University, Fort Collins, CO

B.A. (Political Science) *1994*
University of Oklahoma, Norman, OK

EXPERTISE

- Nutritional, spatial, and habitat ecology of large mammals
- Human-wildlife conflict management

RELEVANT WORK HISTORY

Supervisory Biologist *2020−Current*
U.S. Fish and Wildlife Service – Polar Bear Program
Anchorage, AK

Supervisory Wildlife Biologist *2015−2020*
National Park Service (NPS) – Grand Teton National Park
Moose, WY

Research Wildlife Biologist *2010−2015*
U.S. Geological Survey – Alaska Science Center
Anchorage, AK

Contract Biologist *2004−2005*
British Columbia Ministry of Environment
Fort St. John, BC

Range Management Specialist *2001*
Bureau of Land Management
Twin Falls, ID

Research Technician I–III *1998−2000*
Colorado Division of Wildlife
Fort Collins, CO

PROFESSIONAL SERVICE, MEMBERSHIP, AND HONORS/AWARDS

Reviewer

- Polar Biology *2017−current*
- Environmental Reviews *2017−current*
- Ecosphere *2017−current*
- Ursus *2016−current*
- Population Ecology *2015−current*
- Global Change Biology *2014−current*
- PLOS One *2013−current*

- Wildlife Society Bulletin *2012−current*
- Canadian Field-Naturalist *2012−current*
- International Journal of Zoology *2010−current*
- Journal of Wildlife Management *2010−current*
- Canadian Journal of Zoology *2009−current*
- Journal of Mammalogy *2009−current*
- Mammal Review *2009−current*
- Biological Conservation *2008−current*
- Behavioral Ecology *2007−current*
- Ecography *2007−current*

Associate editor

- Journal of Wildlife Management *2019−2021*

Membership in professional societies

- The Ecological Society of America *2007−2012*
- The Wildlife Society *2003−current*
- International Association for Bear and Research Management *2013−current*

Prominent teams/committees

- Sage Grouse Technical Team, State of Wyoming *2019−2020*
- State of Wyoming, Chronic Wasting Disease Working Group *2019−2020*
- Greater Yellowstone Ecosystem Elk Migration Working Group (*Co-Lead*) *2017−2020*
- Department of Interior Aerial Capture, Eradications, and Tagging of Animals Unit *2017−2020*
- NPS Aerial Capture, Eradications, and Tagging of Animals Operations Policy team *2016−2017*
- Interagency Grizzly Bear Study Team *2015−2020*
- Jackson Hole Cooperative Elk Studies Group *2015−2020*

Academic service

- Graduate committee member for one M.S. student at University of Wyoming (E. Burkholder; *Ecology of Montane Red Fox*) *2020−2023*
- Graduate co-advisor for one M.S. student at University of California Berkeley (M. Templin; *Spatial Ecology of Wolves in the Southern Greater Yellowstone Ecosystem*) *2018−2021*
- Graduate committee member for one Ph.D. candidate at University of Alaska Anchorage (M. Rogers; *Feeding Ecology of Brown Bears in Alaska*) *2012−2020*
- Affiliate Faculty Member, Department of Biology and Wildlife, University of Alaska Fairbanks, Fairbanks (UAF) *2010−2020*
- Affiliate Faculty Member, Department of Biology and Wildlife, Texas A&M University *2015−2017*
- Graduate committee member for one M.S. student at Texas A&M University (K. Oster; *A Spatial and Phenological Perspective of Forage Minerals for Arctic Caribou*) *2013−2017*
- Graduate committee member for one M.S. student at Mississippi State University (L. Stutzman; *Effects of Dietary Plasticity and Landscape Heterogeneity on Brown Bears*) *2014−2017*
- Graduate committee member for one M.S. student at UAF (L. Van Someren; *Monitoring Energy and Nitrogen Availability for Arctic* *2011−2015*

Caribou)

Honors/awards

- Wildlife Conservation Award (Alaska Chapter of The Wildlife Society) *2018*
- U.S. Department of Interior Unit Award for Excellence Service *2022*

PUBLICATIONS

Burkholder, E., J. Stephenson, S. Hegg, D. Gustine, T. Robinson, and J. Holbrook. Anthropogenic food in a national park: How does it influence the trophic ecology of Rocky Mountain red fox? Journal of Mammalogy: In Review.

Van Hemert, C., L. Ballweber, D. Sinnett, T. Atwood, T. Fischbach, **D. Gustine**, and K. Pabilonia. Giardia and Cryptosporidium in resident wildlife species in Arctic Alaska. Parasites and Vectors: In Review.

Fuchs, B. K., Joly, G. V. Hilderbrand, A. L. Evans1, I. Rodushkin, L. S. Mangipane, B. A. Mangipane, **D. D. Gustine**, A. Zedrosser, L. Brown, and J. M. Arnemo. Heavy metals in arctic and sub-arctic brown bears: Blood concentrations of As, Cd, Hg and Pb in relation to diet, age and the human footprint. Environmental Research: In Review.

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Wilson, R. R., **D. D. Gustine**, and K. Joly. 2014. Evaluating potential effects of an industrial road on winter habitat of caribou in north-central Alaska. Arctic 67: 472-482.

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Gustine, D. D., T. Brinkman, M. Lindgren, J. I. Schmidt, T. S. Rupp, and L. G. Adams. 2014. Climate-driven effects of fire on winter habitat for migratory tundra caribou in the Alaskan-

Yukon Arctic. PLOS One 9(7): e100588.

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Gustine, D. D., P. S. Barboza, L. G. Adams, J. P. Lawler, S. Arthur, K. L. Parker, and B. Shults. 2012. Diversity of nitrogen isotopes and correlates of protein status in caribou: implications for monitoring northern ungulates. Journal of Mammalogy 93:778-790.

Milakovic, B., K. L. Parker, **D. D. Gustine**, R. J. Lay, A. B. D. Walker, and M. P. Gillingham. 2012. Seasonal habitat use and selection by grizzly bears in northern British Columbia. Journal of Wildlife Management 76:170-180.

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Research interests

My research focuses on understanding how environmental change and anthropogenic actions affect wildlife demography and population dynamics and using this information to inform conservation actions

Education

2019 Ph.D. Wildlife Conservation and Management, University of Arizona
Minor: Ecology and Evolutionary Biology

2003 M.S. Wildlife Biology, Sul Ross State University

2000 B.S. Biology, Lees-McRae College

Research experience

2021-present Wildlife Biologist, USFWS, Polar bear program, Anchorage, AK
Lead and assist research and management efforts focused on the conservation of polar bears in the Beaufort and Chukchi Seas. Focal areas include demographic modeling, harvest management, polar bear capture and handling, and human-bear conflict

2020-2021 Polar Bear Ecologist, Lindahl Reed, Inc., Anchorage, AK
Supported the USFWS Marine Mammals Management polar bear program with a research focus on the effects of industrial activity and harvest on polar bear demography

2018-2019 Postdoctoral Research Associate, University of Arizona, Tucson, AZ
Designed and executed a research project to determine presence of Mexican gray wolves on Holloman Air Force Base and develop a habitat-suitability model for south-central NM

2017-2018 Senior Research Specialist, University of Arizona, Tucson, AZ
Designed and executed a research project investigating habitat requirements and effects of disturbance on endangered southwestern willow flycatchers and other riparian birds. Collaborated with federal, state and non-profit entities; supervised technicians

2013-2016 Graduate Research Assistant, University of Arizona, Tucson, AZ
Designed and implemented research on the effects of shrub encroachment and nonnative grasses on birds, arthropods, and vegetation in arid grasslands

2012, 2009 Biological Science Technician, USFWS, Alaska Maritime NWR, AK

Crew leader, Chowiet Island (Gulf of Alaska) seabird project. Monitored abundance, survival, diet, breeding productivity, and phenology of 12 seabird species

2010-2012 Avian Biologist, Hawks Aloft, Inc., Albuquerque, NM
Biologist and GIS specialist for a non-profit conservation organization. Principal Investigator on 12 ecological research projects for federal (BLM, USFS, USACE), tribal, and private sector entities. Responsible for project design and administration, managing technicians and volunteers, analysis, and reporting. Participated in outreach, education, and mitigation focused on avian conservation

2008 Biological Science Technician, USFWS, Arctic NWR, AK
Crew leader. Inventory, survival, and nest success of Smith's longspurs in the Brooks Range, AK. Abundance and survival monitoring and disease and contaminants sampling in post-breeding shorebirds on the Arctic Coastal Plain, AK

2007, 2005 Biological Science Technician, USFWS, Alaska Maritime NWR, AK
Crew leader, Buldir Island (western Aleutian Islands) seabird project. Monitored abundance, survival, diet, breeding productivity, and phenology of 16 seabird species

2006 Biological Science Technician, USFWS, Tetlin NWR, AK
Inventory and monitoring of waterfowl, raptor, and passerine populations; post-breeding landbird demography study in boreal forest of eastern AK

2004 Biological Science Technician, USFWS, Alaska Peninsula / Becharof NWR, AK
Inventory, monitoring, and habitat studies of shorebirds, landbirds, seabirds, mammals

2004 Bird Banding Technician, USGS, Hawaii Volcanoes National Park, HI
Demography and disease of Hawaiian birds, plant phenology in native forests

2003 Environmental Consultant, SWCA Environmental Consultants, Flagstaff, AZ
Occurrence and nest success of endangered southwestern willow flycatcher

2002-2003 Graduate Research Assistant, Sul Ross State University, Alpine, TX
Inventory and monitoring of biological resources at oases in Guadalupe Mountains NP

Publications

Andersen, E.M., R.R. Wilson, K.D. Rode, G.M. Durner, T.C. Atwood, and D.D. Gustine. *In review*. The post-emergence period for denning polar bears: phenology and influence on cub survival.

Andersen, E.M. and R.J. Steidl. 2023. Woody plant encroachment reduces density of most grassland specialists in a desert grassland but has limited influence on nest survival. *Ornithological Applications.* 125:1-14. DOI: 10.1093/ornithapp/duac049

Woodruff, S.P., E.M. Andersen, R.R. Wilson, L.S. Mangipane, S.B. Miller, K.J. Klein, and P.R. Lemons. 2022. Classifying the effects of human disturbance on denning polar bears. *Endangered Species Research* 49:43-56. DOI: 10.3354/esr01203

Andersen, E.M. and S.F Freeman. 2022. Use of thermal data loggers to evaluate nest survival in a grassland songbird. *Wilson Journal of Ornithology* 134:390-397. DOI: 10.1676/21-00005

Andersen, E.M. and R.J. Steidl. 2020. Plant invasions alter settlement patterns of breeding grassland birds. *Ecosphere* 11:e03012. DOI: 10.1002/ecs2.3012

Andersen, E.M. and R.J. Steidl. 2019. Power to detect trends in abundance within distance sampling frameworks. *Journal of Applied Ecology* 57:344-353. DOI: 10.1111/1365-2664.13529

Andersen, E.M. and R.J. Steidl. 2019. Woody plant encroachment restructures bird communities in semiarid grasslands. *Biological Conservation* 240:108276. DOI: 10.1016/j.biocon.2019.108276

Andersen, E.M., M.N. Cambrelin, and R.J. Steidl. 2019. Responses of grassland arthropods to an invasion by nonnative grasses. *Biological Invasions* 21:405-416. OI: 10.1007/s10530-018-1831-z

Arnold, A.E., E.M. Andersen, M.J. Taylor, and R.J. Steidl. 2017. Using cytochrome b to identify nests and museum specimens of cryptic songbirds. *Conservation Genetics Resources* 9:451-458. DOI: 10.1007/s12686-016-0680-2

Archer, S.R., E.M. Andersen, K.I. Predick, S. Schwinning, R.J. Steidl, and S.R. Woods. 2017. Woody plant encroachment: causes and consequences *in* Rangeland systems: processes, management, and challenges, D.D. Briske, editor. Springer, New York, NY

Andersen, E.M., C. Schlawe, and S. Lorenz. 2008. First record of the lanceolated warbler breeding in North America. *Western Birds* 39:2-7

Andersen, E.M. 2004. Intraspecific predation among northwestern crows. *Wilson Bulletin* 116:180-181. DOI: 10.1676/03-113

Research grants

2018 Surveys and habitat suitability for Mexican gray wolves on Holloman Air Force Base, USACE, [redacted], *co-investigator with R. J. Steidl and D. Christianson, University of Arizona*

2014 Monitoring populations of breeding grassland birds, Arizona Game and Fish Department, [redacted], *co-investigator with R. J. Steidl, University of Arizona*

2011 Inventory and monitoring of riparian birds on Pueblo de Cochiti, US Army Corps of Engineers, [redacted], *co-investigator, Hawks Aloft, Inc.*

2011 Mexican spotted owl surveys on Santa Fe National Forest, New Mexico Gas [redacted], *co-investigator, Hawks Aloft, Inc.*

2011 Inventory and monitoring of mountain plovers, burrowing owls, and Gunnison's prairie dogs on the North Unit, BLM, [redacted], *co-investigator, Hawks Aloft, Inc.*

2010 Willow flycatcher monitoring on the Albuquerque unit, BLM, [redacted], *co-investigator, Hawks Aloft, Inc.*

2010 Mexican Spotted Owl Inventory, Alamosa and Jarita Mesa Allotments, Carson National Forest, USFS, [redacted], *co-investigator, Hawks Aloft, Inc.*

Travel grants

2017, 2019	American Ornithological Society, two national meetings
2017-2019	Graduate and Professional Student Council, University of Arizona, three grants
2017	The Wildlife Society, national meeting
2017	Arizona Field Ornithologists, state meeting

Teaching experience

2016	Teaching Assistant, Population Ecology, University of Arizona
2015	Teaching Assistant, Ecological Surveys and Sampling, University of Arizona
2003-2004	Teaching Assistant, General Zoology, Sul Ross State University

Selected presentations

2019 American Ornithological Society, national meeting, Anchorage, AK
Shrub encroachment alters distributions and demography of breeding birds in semiarid grasslands

2019 Research Insights in Semiarid Ecosystems symposium, Invited speaker, Tucson, AZ
Shrub encroachment restructures avian communities in semiarid grasslands

2018 University of Arizona William G. McGinnies Lecture, Invited speaker, Tucson, AZ
Effects of plant invasions on birds breeding in desert grasslands

2018 Arizona Birds Conservation Initiative annual meeting, Invited speaker. Phoenix, AZ
Breeding birds in Arizona grasslands: Conservation threats from plant invasions

2017 The Wildlife Society, national meeting, Albuquerque, NM
Nonnative grasses decouple density and nest success in grassland birds

2017 American Ornithological Society, national meeting, Lansing, MI
Nonnative grasses decouple habitat selection from fitness in arid grassland birds

2017 Science on the Sonoita Plain, Elgin, AZ
Shrub encroachment alters demography and species richness of grassland birds

2017 Arizona Field Ornithologists, annual meeting, Cottonwood, AZ
Woody plant encroachment in Arizona grasslands: impacts on breeding birds and opportunities for restoration

2017 The Wildlife Society, AZ/NM Chapters joint annual meeting, Farmington, NM
Nonnative grasses decouple density and nest success in grassland birds

2017 University of Arizona EarthWeek 2017, Invited plenary speaker, Tucson, AZ

Plant invasions affect density and reproductive success of birds in arid grasslands.

Selected awards

2022	Unit Award for Excellence of Service, US Fish and Wildlife Service
2020	STAR Award, US Fish and Wildlife Service and Lindahl Reed, Inc.
2019	Outstanding Dissertation, School of Natural Resources and the Environment, University of Arizona
2018	William G. McGinnies Graduate Scholarship in Arid Lands Studies, University of Arizona
2017	Best Student Paper Award, AZ Chapter of The Wildlife Society, Annual Meeting
2017	Clifford W. Carstens, Jr. Memorial Scholarship
2016-2017	Pistor-Stanley Scholarship, University of Arizona
2015-2016	Martha Grinder Memorial Scholarship, University of Arizona
2013	Audubon Graduate Apacheria Fellowship

Professional service

Member	American Association for the Advancement of Science, Ecological Society of America, The Wildlife Society, American Ornithological Society
Reviewer	Ornithological Applications, Global Change Biology, Journal of Wildlife Management, Landscape Ecology, Global Ecology and Biogeography, Biological Invasions, Wilson Journal of Ornithology, Biological Conservation, Frontiers in Conservation Science, Florida Field Naturalist
2017-2018	Judge, University of Arizona Student Showcase (research division)
2016-2018	Judge, Travel grants, UA Graduate and Professional Student Council
2013-2018	Las Cienegas NCA Biological Planning Partnership

References

Dave Gustine, Supervisory Biologist, Marine Mammals Management, US Fish and Wildlife Service, (907) 786-3621, david_gustine@fws.gov

Robert J. Steidl, Professor, School of Natural Resources and the Environment, University of Arizona, (520) 626-3164, steidl@email.arizona.edu

A. Elizabeth Arnold, Professor, Department of Ecology and Evolutionary Biology, University of Arizona, (520) 344-2327, arnold@ag.arizona.edu

Lindsey Stutzman Mangipane

EDUCATION

2017 **M.S. in Wildlife, Fisheries, and Aquaculture**
Mississippi State University
Thesis title: Effects of dietary plasticity and landscape heterogeneity on brown bears

2011 **B.S. in Fish and Wildlife Management**
Montana State University

EMPLOYMENT HISTORY

Wildlife Biologist, Polar Bears (GS-0486-12/2)
U.S. Fish and Wildlife Service
1011 E. Tudor Road, Anchorage, AK 99507
August 2019–present (40 hours/week, [redacted]0/year)
Supervisor: Dave Gustine, 907-786-3913, david_gustine@fws.gov

- Worked as the lead human-polar bear conflict biologist for the USFWS Polar Bear Program
- Worked closely with community leadership, regional government, nongovernmental organizations (NGO), and Industry partners to respond to, monitor, and mitigate human-polar bear conflicts in Alaska
- Built capacity for the program by collaborating with NGO partners to fund additional human-bear conflict work in communities
- Worked with the Arctic National Wildlife Refuge to manage polar bear viewing in the community of Kaktovik
- Worked collaboratively to develop a set of data-based polar bear safety messages for universal use across the circumpolar Arctic
- Maintained the Polar Bear Human Information Management System (PBHIMS) to track human-polar bear interactions across the Arctic
- Worked with zoos to validate noninvasive tools for evaluating ursid body mass
- Managed multiple cooperative agreements with domestic and international partners
- Actively participated in international meetings on behalf of the United States
- Holds the position of co-chair of the Polar Bear Range States Communications Working Group (2019- present)
- Participated in multiple Range States working groups including: the Human-Polar Bear Conflict Working Group, Climate Change Communications Working Group, Circumpolar Action Plan Implementation Team, Harvest Management Working Group, and assisted the U.S. Head of Delegation (HoD) in all relevant leadership meetings.
- Lead multiple projects for the Range States Human-Polar Bear Conflict Working Group

- Maintained 40-hour HAZWOPER certification for oil spill response
- Provided consultation to USFWS regulatory program and field offices to inform regulatory and ESA documents
- Assisted with the development of the Polar Bear SSA
- Assisted National Park Service staff with aerial brown bear captures
- Contributed as an author on multiple chapters of the book "Brown Bears in Alaska's National Parks: Research, Ecology, and Conservation" (in prep) and contributed as the lead author on the chapter titled "Human-bear interactions in Alaska's National Parks".
- Developed opportunities for student involvement in the polar bear program
- Maintained DEA license and drug inventory
- Contributed to peer reviewed manuscripts evaluating various topics related to polar bear management

Regional Wildlife Biologist
New Mexico Department of Game and Fish
118 Guthrie Lane, Taos, NM 87571
July 2018- July 2019 (40 hours/ week, [redacted]/year)
Supervisor: James Pitman 505-476-8039, james.pitman@state.nm.us

- Managed wildlife populations in the Northeastern quarter of New Mexico
- Conducted aerial distance sampling surveys via helicopter for deer
- Conducted aerial composition surveys via helicopter for elk
- Conducted aerial distance sampling surveys via fixed-wing aircraft for pronghorn
- Conducted radio-telemetry flights for deer, elk, and mountain lions
- Captured and relocated over 100 pronghorn to augment populations in Mexico
- Captured and radio collared elk via corral traps
- Captured neonate elk using helicopter and ground methods
- Captured deer to collect tonsil and rectal biopsies for CWD testing
- Captured turkey via drop net to augment populations in Southern New Mexico
- Captured, radio collared, and translocated desert bighorn sheep to augment populations in Southern New Mexico
- Conducted ground surveys for Rocky Mountain bighorn sheep
- Conducted night surveys for black footed ferrets
- Conducted mast surveys to evaluate black bear food availability
- Collected CWD samples from hunter harvested elk
- Managed survey data for future analyses
- Identified knowledge gaps and crafted proposals for future research projects including a camera based occupancy study to evaluate pacific marten distribution
- Managed habitat incentive programs for deer, elk, and pronghorn
- Worked closely with landowners to issue private lands elk, deer, and pronghorn licenses
- Responded to inquiries from the public regarding complex regulations, private lands license authorizations, and general wildlife related inquiries
- Participated in working groups such as the Upper Rio Grande Wildlife Connectivity working group

- Managed collar frequency database for the Gila elk project which had roughly 500 transmitters on the air at any one time
- Worked effectively with state species biologists, New Mexico State University students and staff, and federal biologists
- Presented pertinent information about changes in regulations and the status of wildlife populations at landowner meetings

Research Associate
Mississippi State University
General Delivery, Port Alsworth, AK 99653
May 2017–November 2017 (40 hours/week, $16,500/year)
Supervisor: Jerry Belant (315)470-4826, jbelant@esf.edu

- Designed, developed and implemented research and monitoring activities for brown bear populations in Gates of the Arctic National Park and Preserve and Lake Clark National Park and Preserve, Alaska
- Planned and implemented biological field studies while operating from remote field camps
- Participated as a team leader on projects dealing with complex and controversial wildlife conservation issues.
- Helicopter darted, collected biological samples and physiological data, and radio collared brown bears
- Conducted radio-telemetry flights for brown bears via fixed-winged aircraft and helicopter
- Use statistical software to develop models, test hypotheses, and analyze data using GIS, Program R, and maximum entropy modeling
- Synthesized wildlife research findings to be incorporated into recommendations for practical management
- Wrote and submitted peer-reviewed manuscripts for scientific journals
- Reviewed and edited peer reviewed manuscripts
- Formulated recommendations to avoid and minimize detrimental impacts of development on brown bears
- Prepared responses to requests for information from the public as a representative of Mississippi State University and The National Park Service
- Conducted aerial Dall's sheep distance sampling and minimum count surveys
- Conducted aerial coastal brown bear population surveys
- Assisted with vegetation transects (identified various plants to the species level, collected point intercept vegetation data, collected soil profile data, took soil depth measurements, took nested quadrat frequency data, took tree cores to evaluate forest age structure, measured tree height and DBH, assessed for tree pathogens, conducted seeding counts, measured canopy cover, took standardized digital photos of vegetation plots for long term monitoring)

Graduate Research Assistant
Mississippi State University
75 B. S. Hood Rd, Mississippi State, MS 39762

Jan 2015– May 2017 (40 hours/week, [redacted]/year)
Supervisor: Jerry Belant 662-325-2996, j.belant@msstate.edu

- Coordinated and conducted research evaluating brown bear diet and home-range selection in Lake Clark National Park and Preserve, Alaska
- Planned and implemented field studies in remote field settings
- Worked well with others in stressful situations such as aerial animal capture
- Helicopter darted, collected biological samples and physiological data, and radio collared brown bears
- Collaborated with various federal agencies and contractors
- Conducted aerial brown bear population trend and composition surveys
- Conducted aerial Dall's sheep distance sampling and minimum count surveys
- Conducted radio-telemetry caribou census flights
- Identified plants, conducted vegetation transects, and cored trees
- Collected Sockeye Salmon otoliths for long term population age-structure study
- Monitored, researched and identified results to address management issues
- Conducted statistical analyses in program R
- Used geographic information systems (GIS) for data management and analysis.
- Prepared peer-reviewed manuscripts for scientific journals
- Recommend mitigation strategies to prevent or lessen the impact of human development on brown bear populations.
- Presented scientific findings to other science professionals at technical meetings
- Attended and presented research results at Lake Clark Subsistence Resource Commission (SRC) meetings
- Attended and presented research results at Lake Clark commercial operators annual meeting
- Participated as a team member on projects dealing with complex and controversial issues.
- Developed and maintained positive working relationships with personnel and interested members of the public.

Grizzly Bear Conflict Management Technician
Montana Fish, Wildlife, and Parks
490 N Meridian Rd, Kalispell, MT 59901
May 2011–Oct 2011 (40 hours/week, [redacted]0/ year)
May 2012– Oct 2012 (40 hours/week, [redacted] year)
May 2013– Oct 2013 (40 hours/week, [redacted]/ year)
May 2014– Nov 2014 (40 hours/week, [redacted]/ year)
Supervisor: Tim Manley (406)890-5604, tmanley803@gmail.com

- Identified and resolved grizzly and black bear-human conflicts
- Trapped and handled over 90 grizzly bears
- Worked with supervisor, FWS recovery coordinator, Forest Supervisors to coordinate grizzly bear relocations
- Used remote cameras to monitor trap sites
- Conducted telemetry for radio-collared bears from the ground and air
- Independently conducted augmentation trapping to move grizzly bears from the Northern Continental Divide Ecosystem (NCDE) to the Cabinet Mountains

- Assisted in long-term grizzly bear population trend study
- Trained and supervised volunteers and interns
- Safely handled 12 gauge shotgun
- Identified plant species important for bears
- Assisted in bear handling training for Glacier National Park personnel
- Assisted in bear spray training for Forest Service personnel
- Worked with landowners to mitigate and prevent grizzly bear conflicts, and responded to conflict calls during all hours of the day/night
- Represented Fish, Wildlife, and Parks at conferences and meetings with outside entities to present, explain, and support the organization's policies, positions, and recommendations with respect to wildlife management.
- Developed and maintained positive working relationships with personnel and interested members of the public.
- Organized bear educational outreach events, or "bear fairs"
- Prepared comprehensive reports and presentations
- Presented scientific findings to other science professionals at technical meetings (The Montana Chapter of The Wildlife Society).
- Produced scientific posters for presentation at technical meetings (Human-bear conflicts workshop).
- Worked well in stressful situations such as trapping bears in populated areas
- Prepare responses to requests from the public, federal and state agencies, industry, conservation organizations, and other interested organizations.

New England Cottontail Technician
Commonwealth of Massachusetts
Camp Edwards Military Training Installation, Connery Ave, Buzzards Bay, MA 02542
Dec 2013– Mar 2014 (37 hours/week, [redacted])
Supervisor: Stephanie Paventy; 508-808-3100, stefanie.m.paventy.nfg@mail.mil

- Trapped and radio collared Eastern and New England Cottontails
- Took body measurements and tissue samples from cottontails
- Conducted pellet surveys to estimate cottontail density
- Drove military grade humvee through hazardous winter conditions
- Entered New England Cottontail data into database
- Conducted night time and day time telemetry of rabbits

Work Exchange Program
Alaska Department of Fish and Game
Aug 2013 (24 hours, volunteer)
Supervisor: Jessy Coltrane; 406-407-3800, jessycoltrane206@gmail.com

- Assisted on wildlife conflict calls with Anchorage area biologist
- Assisted in radio–collaring a black bear for urban black bear project
- Reciprocated work exchange by hosting ADF&G biologist in Montana to assist with grizzly bear conflict work

Kalispell Check Station Technician
Montana Fish, Wildlife, and Parks

490 N Meridian Rd, Kalispell, MT 59901
Oct 2012– Nov 2012 (20 hours/ week, [redacted])
Supervisor: John Vore; 406-751-4584, jvore@mt.gov

- Communicated effectively with hunters to collect harvest data and hunting information
- Collected teeth from elk, deer, bears, and wolves for aging

Nongame Technician
Montana Fish, Wildlife, and Parks
490 N Meridian Rd, Kalispell, MT 59901
Apr 2012 (40 hours/week, [redacted])
Supervisor: Chris Hammond; 406-751-4582; chammond@mt.gov

- Conducted surveys for short-eared owls and common loons
- Delineated important loon nesting areas
- Maintained loon banding and nesting database
- Assisted in aerial elk surveys

Educator
Alter Enterprise
1121 E Broadway St #173, Missoula, MT 59802
Nov 2011 (40 hours, [redacted])
Supervisor: Ryan Alter: (406)550-0292, ryan@alterenterprise.com

- Created and presented interactive bear education course to four elementary school classes via virtual web conference

Research Assistant
Montana State University
Culbertson Hall, 100, Bozeman, MT 59717
Feb 2010– Apr 2010 (10 hours/week, [redacted])
Jan 2011– May 2011 (10 hours/week, [redacted])
Supervisor: Bob Garrott; 406-994-2270, rgarrott@montana.edu

- Conducted in depth literature searches for historic mountain goat and bighorn sheep locations
- Mapped seasonal animal locations through the use of ArcGIS

Teaching Assistant: "Introduction to Fish and Wildlife"
Montana State University
Culbertson Hall, 100, Bozeman, MT 59717
Sep 2010– Dec 2010 (10 hours/week, [redacted])
Supervisor: Tom Mcmahon; tmcmahon@montana.edu

- Assisted professor in daily classroom lectures, graded papers, and maintained class performance database

Big Timber Check Station Technician
Montana Fish, Wildlife, and Parks
1420 East Sixth Avenue, Helena, MT 59620

Oct 2009– Nov 2009 (20 hours/week, [redacted])
Oct 2010 (20 hours/week)
Supervisor: Justin Paugh;406-932-5012, JPaugh@mt.gov

- Communicated with hunters about their harvest
- Aged elk, deer, pronghorn, bighorn sheep, and mountain goats via tooth or horn
- Collected biological data on harvested animals

Nongame Intern
Montana Fish, Wildlife, and Parks
490 N Meridian Rd, Kalispell, MT 59901
May 2010– Aug 2010 (40 hours/week, [redacted])
Supervisor: Chris Hammond; 406-751-4582; chammond@mt.gov

- Trapped small mammals for Wildlife Management Area inventories
- Conducted field surveys for avian species (colonial water birds and common loons)
- Participated in loon banding
- Taught new interns banding protocol and techniques
- Conducted raptor surveys
- Designed and field-tested a novel track plate for detection of northern bog lemmings
- Conducted amphibian and reptile surveys
- Participated in extended backcountry trips to survey for alpine species of concern including pika, Clark's Nutcracker, and marmots
- Conducted harlequin duck surveys
- Deployed acoustic recorders for bat surveys
- Handled injured raptors and owls for transport to the rehabilitation center
- Prepared professional reports of small mammal trapping results

Giraffe Photoidentification Research
Montana State University
Culbertson Hall, 100, Bozeman, MT 59717
Jan 2010– Apr 2010 (5 hours/week, volunteer)
Supervisor: Bob Garrott; 406-994-2270, rgarrott@montana.edu

- Created photographic database of giraffe based on unique spot patterns
- Identified 65 unique giraffe

Chronic Wasting Disease Technician
Montana Fish, Wildlife, and Parks
1400 South 19th, Bozeman, MT 59718
Oct 2008– Dec 2008 (20 hours/week, [redacted])
Oct 2009– Dec 2009 (20 hours/week, [redacted])
Supervisor: Neil Anderson; 406-994-6358, NAnderson@mt.gov

- Collected tooth, brain, and retro gland samples from hunter harvested deer and elk to test for chronic wasting disease and brucellosis
- Aged elk and deer based on relative tooth wear
- Maintained organized records of sampled animals

Bear/Loon Intern
Montana Fish, Wildlife, and Parks
490 N Meridian Rd, Kalispell, MT 59901
May 2008– Aug 2008 (40 hours/week, [redacted])
Supervisor: Tim Manley (406)890-5604, tmanley803@gmail.com

- Conducted daily monitoring of eleven pairs of nesting loons
- Informed the public about loon ecology and sensitive nesting conditions
- Guided loon education field trips
- Presented information on loon ecology at homeowners association meetings
- Created a lake specific management plan for loons
- Operated motor boat with minimal supervision
- Conducted loon banding via canoe and motor boat
- Took blood and feather samples, banded, and measured adult and juvenile loons
- Completed annual loon reports
- Attended Common Loon Working Group meetings to revise management plan
- Assisted with the trapping and collaring of multiple grizzly and black bears
- Involved with aversive conditioning of black and grizzly bears
- Set up bear hair snare sites and collected hair for DNA studies
- Provided information at educational events
- Radio tracked bears from the ground and from the air via fixed wing aircraft
- Recommend mitigation strategies to prevent or lessen the impact of human development on nesting common loons.

Volunteer
Montana Fish, Wildlife, and Parks
1400 South 19th, Bozeman, MT 59718
Jan 2008– Feb 2009 (5–20 hours/week, volunteer)

- Aided in testing elk gut piles left by hunters for Brucellosis
- Interacted with hunters in Gardner and the Madison Valley to obtain harvest data
- Assisted in mountain goat transplant
- Assisted in evaluation of Ruffed Grouse habitat
- Helped place orphaned black bear cub in artificial den with remote cameras

PUBLICATIONS

Wilder, J.M., L.S. Mangipane, T. Atwood, A. Kochnev, T. Smith, and D. Vongraven. In Review. Efficacy of Bear Spray as a Deterrent against Polar Bears.

Woodruff, S.P., E.M. Andersen, R.R. Wilson, L.S. Mangipane, S.B. Miller, K.J. Klein, and P.R. Lemons. In review. Evaluating the effects of human disturbance on denning polar bears.

Trujillo, S.M., E.A. McKenney, G.V. Hilderbrand, L.S. Mangipane, M.C. Rogers, K. Joly, D.D. Gustine, J.A. Erlenbach, B.A. Mangipane, D.J.R. Lafferty. In Review. Correlating gut microbial membership to brown bear health metrics.

Trujillo, S.M., E.A. McKenney, G.V. Hilderbrand, L.S. Mangipane, M.C. Rogers, K. Joly, D.D. Gustine, J.A. Erlenbach, B.A. Mangipane, D.J.R. Lafferty. In Review.

Intrinsic and extrinsic factors' influence on brown bear *(Ursus arctos)* gut microbiomes.
Cameron, M., G. Hilderbrand, K. Joly, J. Schmidt, D. Gustine, L. Mangipane, B. Mangipane, and M. Sorum. 2021. Body size plasticity in North American black and brown bears. Ecosphere: e03235.
Mangipane, L. S., D. J. R. Lafferty, K. Joly, M. S. Sorum, M. D. Cameron, J. L. Belant, G. V. Hilderbrand, and D. D. Gustine. 2020. Dietary plasticity and the importance of salmon to brown bear body size and condition in a low arctic ecosystem. Polar Biology: https://doi.org/10.1007/s00300-020-02690-7.
Hilderbrand, G., D. Gustine, K. Joly, B. Mangipane, W. Leacock, M. Cameron, M. Sorum, L. Mangipane, and J. Erlenbach. 2019. The influence of maternal body size, condition, and age on recruitment of four Alaska brown bear populations. Ursus 29:111–118.
Mangipane, L. S., J. Belant, B. Mangipane, D. Gustine, and G. Hilderbrand. 2018. Sex-specific variation in denning by brown bears. Mammalian Biology 93:38–44.
Hilderbrand, G. V., D. D. Gustine, B. A. Mangipane, K. Joly, W. Leacock, L. S. Mangipane, J. A. Erlenbach, M. S. Sorum, M. D. Cameron, J. L. Belant, and T. Cambier. 2018. Body size and lean mass of brown bears across and within four diverse ecosystems. Journal of Zoology 305:53-62. doi:10.1111/jzo.12536
Hilderbrand, G. V., D. D. Gustine, B. A. Mangipane, K. Joly, W. Leacock, L. S. Mangipane, J. A. Erlenbach, M. S. Sorum, M. D. Cameron, J. L. Belant, and T. Cambier. 2018. Plasticity in physiological condition of female brown bears across diverse ecosystems. Polar Biology. doi:10.1007/s00300-017-2238-5
Mangipane, L., J. Belant, D. Lafferty, D. Gustine, T. Hiller, M. Colvin, B. Mangipane, and G. Hilderbrand. 2018. Dietary plasticity in a nutrient-rich system does not influence brown bear (*Ursus arctos*) body condition or denning. Polar Biology 41:763-772
Mangipane, L., J. Belant, T. Hiller, M. Colvin, D. Gustine, B. Mangipane, and G. Hilderbrand. 2017. Influences of landscape heterogeneity on home-range sizes of brown bears. Mammalian Biology 88: 1–7.
Stutzman, L. and E. Flesch. 2010. Evaluating the dynamics of Thornicroft's giraffe through photographic database construction. Giraffa 4:15–19.

RELEVANT EXPERIENCE AND TRAINING

2021	**40-Hour HAZWOPER**	Anchorage, AK
2021–2015	**Aviation Transportation of Hazardous Materials**	Anchorage, AK
2019–2021	**USFWS Shotgun certification**	Anchorage, AK
2020	**FWS Safety Awareness in Bear Country**	Anchorage, AK
2020–2015	**Aviation Mishap Review (A-200)**	Anchorage, AK
2014–2020	**Basic Aviation Safety**	Anchorage, AK
2020	**Grant Solutions Project Officer Training**	Anchorage, AK
2018	**NMDG&F Chemical Immobilization course**	Santa Fe, NM
2015–2017	**National Park Service Shotgun qualification**	Port Alsworth, AK
2016	**First Aid and CPR**	Port Alsworth, AK
2015	**National Park Service UTV training**	Port Alsworth, AK

2015	**General Aviation Awareness Security Training**	Port Alsworth, AK
2015	**Motorboat Operator Certification Course**	Port Alsworth, AK
2015	**Operational Leadership**	Port Alsworth, AK
2011–2014	**Montana FWP Shotgun qualification**	Kalispell, MT
2010–2012	**Bear Handling Clinic**	Kalispell, MT
2011	**Wildlife Chemical Immobilization Workshop**	Helena, MT
2010	**Diversity Monitoring Training**	Helena, MT

PROFESSIONAL ORGANIZATIONS

International Association for Bear Research and Management (IBA)
2015–present

IBA Bear Managers Committee
2021–present

The Wildlife Society New Mexico Chapter
2018–2019

The Wildlife Society Montana Chapter
2008–2016

The Wildlife Society Student Chapters

Bozeman, MT	2010	President
	2009	Vice-President
	2008	Member
Fort Collins, CO	2007	Member

PRESENTATIONS

2021 **International Association for Bear Research and Management**
"Efficacy of Bear Spray as a Deterrent against Polar Bears"

2020 **The Explorers Club**
Presented information on polar bear biology and management to over 2600 attendees as part of a panel discussion on the world's bear species

2020 **Polar Bear Range States Meeting of the Parties, Svalbard, Norway**
"Efficacy of Bear Spray as a Deterrent against Polar Bears"

2020 **FWS Youth Fish and Wildlife Club**
"Polar bear biology"

2017 **Lake Clark Commercial Use Authorization annual meeting**
"Brown Bear Resource Use in Lake Clark National Park and Preserve"

2017 **Video: Lake Clark's inland brown bears**
https://www.nps.gov/lacl/learn/nature/ursus-arctos.htm

2016 **Lake Clark National Park and Preserve Subsistence Resource Commission**
"Brown Bear Resource Selection in Lake Clark National Park and Preserve"

2016 **International Association for Bear Research and Management**
"Influence of Dietary Meat Intake on Body Condition and Denning of Brown Bears"

2016 **Montana Chapter of the Wildlife Society**
"Influence of Dietary Meat Intake on Body Condition and Denning Attributes of Brown Bears"

2014 **Human-bear Conflicts Workshop**
Poster: "Mitigating impacts of trains on grizzly bears in North-West Montana"

2013 **Montana "Becoming an Outdoors Woman" Workshop**
"Grizzly Bear Ecology and Management in North West Montana"

2013 **Montana Chapter of the Wildlife Society**
"20 Years of Grizzly Bear Conflict Management in North West Montana"

2012 **Grizzly bear handling workshop**
"The importance of teaching wildlife handling skills to the next generation of professionals"

GRANTS

2018 **Physiological response of brown bears to increasing visitation on the Lake Clark coast**
National Park Service Alaska Regional Block Funding
[redacted] to be used in FY 2020-2022

RELEVENT COURSEWORK

Wildlife Biology:
Mammalogy: 3 semester hours (Montana State University)
- Studied mammal identification, taxonomy, and ecology

Wildlife Management Techniques: 3 semester hours (Montana State University)
- Studied and practiced techniques for wildlife research and management such as wildlife capture, radio tracking, and data analysis

General Ecology: 3 semester hours (Montana State University)
- Studied ecological principals related to wildlife populations

Behavioral and Evolutionary Ecology: 3 semester hours (Montana State University)

- Studied behavioral ecology topics related to wildlife populations such as optimal foraging and population dynamics.

Ornithology: 3 semester hours (Montana State University)
- Studied bird identification, taxonomy, and ecology

Introduction to Fish and Wildlife: 1 semester hour (Montana State University)
- Introductory course exposing students to various career options in wildlife and fisheries.

Wildlife Internship: 10 semester hours (Montana State University)
- Credit for wildlife internships with outside entities

Undergraduate Research: 3 semester hours (Montana State University)
- Giraffe photo identification research

Fish and Wildlife Topics: 2 semester hours (Montana State University)
- Senior capstone wildlife course

Yellowstone: A Scientific Lab: 4 semester hours (Montana State University)
- Studied topics related to wildlife, plants, and geology in Yellowstone National Park.

Introduction to Geographic Information Systems: 4 semester hours (Flathead Valley Community College transferred to Montana State University)
- Introduction to using ArcGIS

Advanced GIS: 3 semester hours (Mississippi State University)
- Advanced techniques for using ArcGIS for data analysis

Ecological Theory and Applications (Special Topics in Wildlife, Fisheries, and Aquaculture): 3 semester hours (Mississippi State University)
- Studied ecological theory with a lab practical to apply theories to real datasets using statistical software (i.e. Program R)

Applications of GIS in Wildlife: 3 semester hours (Mississippi State University)
- Studied GIS techniques used for the analysis of wildlife data

Carnivore Ecology: 3 semester hours (Mississippi State University)
- Studied ecological theories in relation to carnivores

Zoology:

Animal Physiology: 3 semester hours (Montana State University)
- Studied physiological processed that occur in animals

Freshwater Ecology: 3 semester hours (Montana State University)
- Studies ecological processed in relation to aquatic plants and animals

Aquatic Field Ecology: 2 semester hours (Montana State University)
- Field course covering aquatic invertebrate identification, aquatic vegetation identification, and fisheries techniques

Comparative Vertebrate Anatomy: 4 semester hours (Montana State University)
- Studied anatomy (bones, muscles, organs) of various vertebrates as well as evolutionary origins of anatomical features

General Genetics: 3 semester hours (Montana State University)
- Studied genetics of plants and animals

Evolution: 3 semester hours (Montana State University)
- Studied evolutionary processes

Biogeography: 3 semester hours (Mississippi State University)
- Studied the global distribution of plants and animals

Plant Sciences:
Wildlife Habitat and Conservation: 3 semester hours (Flathead Valley Community College transferred to Montana State University)
- Studied various plants important for wildlife species and how to conserve habitats

Attributes of Living Systems: 4 semester hours (Colorado State University transferred to Montana State University)
- Studied basic biology of plant systems

Organismal Biology: 4 semester hours (Montana State University)
- Studied cellular makeup of plants and animals

Identification of seed plants: 3 semester hours (Flathead Valley Community College transferred to Montana State University)
- Studied field identification of seed plants

Soil Resources: 3 credit hours (Montana State University)
- Studied soil properties in relation to plant communities

Landscape Ecology: 3 semester hours (Mississippi State University)
- Studied plant ecology at the landscape level

REFERENCES

Tim Manley
Montana Department of Fish, Wildlife, and Parks (retired)
Grizzly Bear Management Specialist
(406)890-5604
tmanley803@gmail.com

Dave Gustine
U.S. Fish and Wildlife Service
Polar Bear Program Lead
907-786-3913
david_gustine@fws.gov

Grant Hilderbrand
National Park Service, Alaska Region
Natural Resource Team Lead
907-240-8355
grant_hilderbrand@nps.gov

Curriculum Vitae
Ryan Radford Wilson
Certified Wildlife Biologist

Present Address:
Marine Mammals Management
U.S. Fish and Wildlife Service
1011 E. Tudor Rd., MS341
Anchorage, AK 99503
907-786-3830
ryan_r_wilson@fws.gov

Education:

UTAH STATE UNIVERSITY 2010
- Ph.D. Wildlife Biology Advisor: John A. Shivik
- Dissertation Title: Identifying and understanding the spatial distribution of bobcat and coyote behavior

UNIVERSITY OF ARIZONA 2006
- M.S. Wildlife Ecology Advisor: Paul R. Krausman
- Thesis Title: Recovery efforts for and behavior of Sonoran Pronghorn

UNIVERSITY OF ALASKA FAIRBANKS 2003
- B.S. Wildlife Biology
- B.S. Statistics
- Minor in Math
- Cum laude

SIERRA HIGH SCHOOL, Tollhouse, CA 1999
- Valedictorian

Professional Work Experience:
Biologist GS-401-13, U.S. Fish and Wildlife Service, Anchorage, AK 99503
Supervisor: Dave Gustine, 907-786-
March 2020 – Present:

Wildlife Biologist GS-486-12, U.S. Fish and Wildlife Service, Anchorage, AK 99503
Supervisor: James Wilder, 907-786-3913
January 2013 – March 2020: I work as a polar bear biologist assisting with all aspects of the Chukchi Sea polar bear capture program. My research focuses on the analysis of polar bear space use, resource selection, and movement patterns to better understand the potential effects of sea ice loss on the populations. I also work to better understand how human activities might influence polar bear ecology and space use patterns, such as in relation to potential offshore oil spills, future oil and gas development, or subsistence whale harvests. To accomplish these analyses, I use state-space and hierarchical Bayesian models. I also collaborate with colleagues both in the U.S. Fish and Wildlife Service, as well as other agencies (e.g., U.S. Geological Survey, North Slope Borough) on various other polar bear research projects, particularly when

there is a need for more robust analytical needs. As part of this position, I serve as a co-chair of the Science and Monitoring Working Group of Polar Bear Recovery Team and the U.S. co-chair of the Scientific Working Group of the U.S.-Russia Bilateral Agreement for the joint management of polar bears in the Chukchi Sea.

Wildlife Ecologist, The Wilderness Society, Anchorage, AK 99501
Supervisor: Wendy Loya, 907-272-9453 x 105
July 2010 – January 2013: I served as the lead researcher on a project to determine the cumulative effects of climate change and oil and gas development on caribou herds in northern Alaska. The project was a collaboration between multiple non-profit organizations, county, state, and federal government agencies. I worked with all of the organizations to coordinate research efforts, obtain data sets, and ensure that current research is done to support long-term project goals. This work entailed creating present-day resource selection functions and estimating migratory pathways to assess the future impacts of climate change and oil and gas development. I also worked with university and federal researchers to determine the potential for winter icing events to negatively impact Alaskan ungulate population by detecting icing events with remote sensed data.

Instructor, Linn-Benton Community College, Albany, OR 97321
Supervisor: Steve Skarda, 541-917-4654
March 2010 – June 2010: I taught a general biology class for non-majors which included a lab section.

Graduate Research Assistant, Utah State University, Department of Wildland Resources, Logan, UT 84322.
Advisor: John A. Shivik, 435-760-0245
July 2006 – June 2010: I worked on the spatial ecology of bobcats and coyotes in south Texas on the Welder Wildlife Foundation Refuge. I determined the spatial distribution of behaviors and factors that explaining their distribution. I set traps, captured, sedated, and handled animals on my own or with the assistance of a technician. I used both radio telemetry and fine-scale movement data from GPS collars to answer these questions. I also developed a new method to analyze the spatial structure of animal space use patterns obtained from traditional telemetry studies. My work required frequent use and extensive knowledge of programs R and ArcGIS for data manipulation and analysis. I was responsible for the hiring and supervision of 6 technicians over a 2 years period. I worked closely with each technician to train them in proper animal capture and handling methods, radio telemetry, and the underlying ecological and management rational for the research. I also collaborated with other graduate students and faculty members to conduct research outside of my dissertation.

Graduate Research Assistant, University of Arizona, School of Natural Resources, Tucson, AZ 85721.
Advisor: Paul R. Krausman, 406-243-6011
August 2004 – June 2006: I worked with the endangered Sonoran pronghorn to determine seasonal, and diurnal activity budgets. I also documented recovery efforts that have so far been initiated. The research occurred on Cabeza Prieta National Wildlife Refuge, in Ajo, Arizona. I

worked independently on my own research, but also assisted individuals from the Arizona Game and Fish Department and the wildlife refuge when requested.

Research Assistant, University of Alaska Fairbanks, Institute of Arctic Biology, P.O. Box 757000, Fairbanks, AK 99775.
Supervisor: Brian M. Barnes, 907-474-7649
November 2000- December 2003: I researched the mechanisms responsible for the seasonal change in supercooling ability of arctic ground squirrels. I was responsible for assisting with plasma collection, experimental design, data collection, and analysis.

Publications:

Andersen, E.M., **R.R. Wilson**, K.D. Rode, T.C. Atwood, and G.M. Durner. In prep. The post emergence period for denning polar bears: phenology and influence on cub survival. Journal of Mammalogy.

Quigley, G., T. Brinkman, and **R.R. Wilson**. In review. Behavioral response of polar bears to aircraft activity on the northern coast of Alaska. Biological Conservation.

Quigley, G., T.J. Brinkman, **R.R. Wilson**, and S. Miller. In review. Outcomes of human-polar bear interactions in Kaktovik, Alaska. Polar Biology.

Rode, K.D., D.C. Douglas, T.C. Atwood, G.M. Durner, **R.R. Wilson**, and A.M. Pagano. 2022. Observed forecasted changes in land use by polar bears in the Beaufort and Chukchi Seas, 1985-2040. Global Ecology and Conservation 40:e02319.

Hamilton, C.D., et al. 2022. Arctic marine mammal hotspots across the circumpolar Arctic. Diversity and Distributions 28:2729-2753.

Hostetter, N.J., E.V. Regehr, **R.R. Wilson**, J.A. Royle, and S.J. Converse. 2022. Modeling spatiotemporal abundance and movement dynamics using an integrated spatial capture-recapture movement model. Ecology 103:e3772.

Woodruff, S.P., E.M. Andersen, **R.R. Wilson**, L.S. Mangipane, S.B. Miller, K.J. Klein, and P.R. Lemons. 2022. Classifying the effects of human disturbance on denning polar bears. Endangered Species Update 49:43-56.

Woodruff, S.P., J.J. Blank, S.S. Wisdom, **R.R. Wilson**, G.M. Durner, T.C. Atwood, C.J. Perham, and C.H.M. Pohl. 2022. Evaluating the efficacy of aerial infrared sensors to detect artificial polar bear dens. Wildlife Society Bulletin 46:e1324.

Wilson, R.R., M. St. Martin, E.V. Regehr, and K.D. Rode. 2022. Intrapopulation differences in polar bear movement and step selection patterns. Movement Ecology 10:25.

Regehr, E.V., M.C. Runge, A. Von Duyke, **R.R. Wilson**, K.D. Rode, L. Polasek, N. Hostetter, and S.J. Converse. 2021. Demographic risk assessment for harvested species threatened by climate change. Ecological Applications 31:e02461.

Wilson, R.R., M. St. Martin, and W.S. Beatty. 2021. A hierarchical distance sampling model to estimate spatially-explicit sea otter density. Ecosphere 12:e03666.

Rode, K.D., E.V. Regehr, J.F. Bromaghin, **R.R. Wilson**, M. St. Martin, J.A. Crawford, and L.T. Quakenbush. 2021. Seal body condition and atmospheric circulation patterns influence polar bear body condition, recruitment, and feeding ecology in the Chukchi Sea. Global Change Biology 27:2684-2701.

Conn, P.B., V.I. Chernook, E.E. Moreland, I.S. Trukhanova, E.V. Regehr, A.N. Vasiliev, **R.R. Wilson**, S.E. Belikov, and P.L. Boveng. 2021. Aerial survey estimates of polar bears

and their tracks in the Chukchi Sea. PLoS One 16:e0251130.
Beatty, W.S., M. St. Martin, and **R.R. Wilson**. 2021. Evaluating the current condition of a threatened marine mammal population: estimating northern sea otter (*Enhydra lutris kenyoni*) abundance with hierarchical distance sampling models. Marine Mammal Science 37:1245-1260.
Rode, K.D., T.C. Atwood, G.W. Thiemann, M. St. Martin, **R.R. Wilson**, G.M. Durner, E.V. Regehr, S.L. Talbot, G.K. Sage, A.M. Pagano, and K. Simac. 2020. Identifying reliable indicators of fitness in polar bears. PLoS One 15:e0237444.
Fulllman, T., **R.R. Wilson**, K. Joly, D. Gustine, P. Leonard, and W. Loya. 2021. Mapping potential effects of proposed roads on migratory connectivity for a highly mobile herbivore using circuit theory. Ecological Applications 31:e2207.
Wilson, R.R., and G.M. Durner. 2020. Erratum. Journal of Wildlife Management 84:1022-1024.
Wilson, R.R., and G.M. Durner. 2020. Seismic survey design and impacts to maternal polar bear dens. Journal of Wildlife Management 84:201-212
Scharf, H.R., M.B. Hooten, **R.R. Wilson**, G.M. Durner, and T.C. Atwood. 2019. Accounting for phenology in the analysis of animal movement. Biometrics 75:810-820.
Regehr, E.V., N.J. Hostetter, **R.R. Wilson**, K.D. Rode, M. St. Martin, A. Von Duyke, G. Pendleton, and S.J. Converse. 2018. Estimating vital rates and regional abundance for polar bears (*Ursus maritimus*) in the Chukchi Sea using an integrated population model. Scientific Reports 8:16780.
Wilson, R.R., C. Perham, D. French-McCay, and R. Balouskus. 2018. Potential impacts of offshore oil spills on polar bears in the Chukchi Sea. Environmental Pollution 235:652-659.
Rode, K.D., J. Olson, D. Eggett, D.C. Douglas, G. Durner, T.C. Atwood, E.V. Regehr, **R.R. Wilson**, T. Smith, and M. St. Martin. 2018. Effects of polar bear denning phenology on cub survival in a changing climate. Journal of Mammalogy 99:16-26.
French-McCay, D., R. Balouskus, J. Ducharme, M. Schroeder Gearon, Y. Kim, S. Zamorski, Z. Li, J. Rowe, C. Perham, and **R. Wilson**. 2017. Potential exposures of wildlife to oil from hypothetical discharges in the Chukchi and Beaufort Seas. Proceedings of the 40th AMOP Technical Seminary on Environmental Contamination and Response. Environment Canada, Ottawa, Canada.
Rode, K.D., **R.R. Wilson**, D.C. Douglas, V. Muhlenbruch, T.C. Atwood, E.V. Regehr, E. Richardson, N. Pilfold, A. Derocher, G. Durner, I. Stirling, S. Amstrup, M. St. Martin, A. Pagano, E. Peacock, and K. Simac. 2018. Spring fasting behavior among polar bears provides and index of ecosystem productivity. Global Change Biology 24:410-423.
Wilson, R.R., E.V. Regehr, M. St. Martin, T.C. Atwood, L. Peacock, S. Miller, and G. Divoky. 2017. Onshore ecology of polar bears in relation to sea-ice loss with implications for the management of conflict with humans. Biological Conservation 214:288-294.
Regehr, E.V., **R.R. Wilson**, K.D. Rode, M.C. Runge, and H. Stern. 2017. Harvesting wildlife under climate change: an improved modeling and management framework for polar bears. Journal of Applied Ecology 54:1534-1543.
Durner, G.M., D.C. Douglas, S.E. Albeke, J.P. Whiteman, S.C. Amstrup, E. Richardson, **R.R. Wilson**, M. Ben-David. 2017. Increased Arctic sea ice drift alters polar bear movements and energetics. Global Change Biology 23:3460-3473.
Ware, J.V., K.D. Rode, J.F. Bromaghin, D. Douglas, **R.R. Wilson**, E.V. Regehr, S.C. Amstrup, G. Durner, A. Pagano, J. Olson, C.T. Robinson, and H.T. Jansen. 2017.

Summer activity of polar bears in response to habitat degradation in the Chukchi and Beaufort Seas. Oecologia 184:87-99.

Olson, J.W., K.D. Rode, D. Eggett, T.S. Smith, **R.R. Wilson**, G. Durner, A. Fischbach, T. Atwood, and D.C. Douglas. 2017. Identifying maternal denning of polar bears using temperature: denning substrate in relation to sea ice in the southern Beaufort Sea. Marine Ecology Progress Series 564:211-224.

Wilson, R.R., E.V. Regehr, K.D. Rode, and M. St. Martin. 2016. Invariant polar bear habitat selection during a period of sea ice loss. Proceedings of the Royal Society B 283:20160380.

Atwood, T.C., E.M. Peacock, M.A. McKinney, K. Lillie, **R.R. Wilson**, D. Douglas, and S. Miller, and P. Terletzky. 2016. Rapid environmental change drives increased land use by an Arctic marine predator. PLoS One 11:e0155932.

Wilson, R.R., L.S. Parrett, K. Joly, and J.R. Dau. 2016. Effects of an industrial road as a semi-permeable barrier on movements of individual caribou during autumn migration. Biological Conservation 195:2-8.

Atwood, T.C., E.M. Peacock, M.A. McKinney, K. Lillie, **R.R. Wilson**, and S. Miller. 2015. Demographic composition and behavior of polar bears summering on shore in Alaska. U.S. Geological Survey Administrative Report, Anchorage, Alaska.

Rode, K.D., **R.R. Wilson**, M. St. Martin, E.V. Regehr, D. Douglas, and J. Olson. 2015. Environmental factors affected increased land use by Chukchi Sea polar bears. PLoS One 10:e0142213.

Miller, S., J. Wilder, and **R.R. Wilson**. 2015. Polar bear-grizzly bear interactions during the autumn open water period in Alaska. Journal of Mammalogy 96:1317-1325.

Regehr, E.V., **R.R. Wilson**, K.D. Rode, and M.C. Runge. 2015. Resilience and risk: a demographic model to inform conservation planning for polar bears. U.S. Geological Survey Open-File Report 2015-1029. U.S. Geological Survey, Reston, Virginia.

Wilson, R.R., J.S. Horne, K.D. Rode, E.V. Regehr, and G.M. Durner. 2014. Identifying polar bear resource selection patterns to inform conservation planning in a dynamic and changing Arctic. Ecosphere 5:136.

Wilson, R.R., D.D. Gustine, and K. Joly. 2014. Evaluating potential effects of an industrial road on winter habitat of caribou in north-central Alaska. Arctic 67:472-482.

Leppi, J.C., D.J. Rinella, **R.R. Wilson**, and W.M. Loya. 2014. Linking climate change projections for an Alaskan watershed to future coho salmon production. Global Change Biology 20:1808-1820.

Wilson, R.R., J.R. Liebezeit, and W.M. Loya. 2013. Applying Monte Carlo development models to account for uncertainty in oil and gas development impacts to wildlife. Conservation Letters 6:350-358.

Gilbert-Norton, L., **R.R. Wilson**, and J.A. Shivik. 2013. The effect of social hierarchy on captive coyote (*Canis latrans*) foraging behavior. Ethology 119:335-343.

Wilson R.R., A. Bartsch, K. Joly, J.H. Reynolds, A. Orlando, and W.M. Loya. 2013. Frequency, timing, and extent of winter icing events in Alaska with a prospectus for future monitoring efforts. Polar Biology 36:419-426.

Wilson, R.R., L. Gilbert-Norton, and E.M. Gese. 2012. Beyond use and availability: behavior-explicit resource selection. Wildlife Biology 18:424-430.

Wilson, R.R., A.K. Prichard, L.S. Parrett, B.T. Person, G.M. Carroll, M.A. Smith, C.L. Rea,

and D.A. Yokel. 2012. Summer resource selection patterns for the Teshekpuk Caribou Herd in northern Alaska. PLoS One 7:e48697.

Shivik, J.A., **R.R. Wilson**, and L. Gilbert-Norton. 2011. Will an artificial scent boundary prevent coyote intrusion? Wildlife Society Bulletin 35:494-497.

Wilson, R.R. and J.A. Shivik. 2011. Does conspecific interference or resource limitation regulate coyote territory size? Canadian Journal of Zoology 89:960-967.

Wilson, R.R., J.K. Young, and J.A. Shivik. 2011. Coyote capture vulnerability relative to territory boundaries. Journal of Wildlife Management 75:721-725.

Wilson, R.R., T.L. Blankenship, M.B. Hooten, and J.A. Shivik. 2010. Prey-mediated avoidance of an intraguild predator by its intraguild prey. Oecologia 164:921-929.

*†Gilbert-Norton, L., **R.R. Wilson**, J.R. Stevens, and K.H. Beard. 2010. Corridors increase movement: a meta-analytical review. Conservation Biology 24:660-668.

Wilson, R.R., M.B. Hooten, B.N. Strobel, and J.A. Shivik. 2010. Accounting for individuals, uncertainty, and multi-scale clustering in core area estimation. Journal of Wildlife Management 74:1343-1352.

Wilson, R.R., P.R. Krausman, and J.R. Morgart. 2010. Efficacy of forage enhancement plots as a management tool for Sonoran pronghorn recovery. Journal of Wildlife Management 74:236-239.

Wilson, R.R., P.R. Krausman, and J.R. Morgart. 2010. Recovery efforts for the Sonoran pronghorn in the United States. Pages 283-292 *in* W. Halvorson, C. Schwalbe, and C. van Riper III, editors. Southwestern desert resources. University of Arizona Press, Tucson, USA.

Wilson, R.R., P.R. Krausman, and J.R. Morgart. 2009. Behavior and activity of Sonoran pronghorn. Southwestern Naturalist 54:45-54.

Wilson, R.R., B.D. Jansen, and P.R. Krausman. 2008. Planning and assessment of activity budget studies employing instantaneous sampling. Ethology 114:999-1005.

Wilson, R.R., P.R. Krausman, and J.R. Morgart. 2008. Behavior and timing of life-history events in a semi-captive population of the Sonoran pronghorn (*Antilocapra americana sonoriensis*). Southwestern Naturalist 53:389-393.

Wilson, R.R., and P.R. Krausman. 2008. Possibility of heat-related mortality in desert ungulates. Journal of the Arizona-Nevada Academy of Science 40:12-15.

Cain, J.W., III, B.D. Jansen, **R.R. Wilson**, and P.R. Krausman. 2008. Potential thermoregulatory advantages of shade use by desert bighorn sheep. Journal of Arid Environments 72:1518-1525.

Krausman, P.R., L.K. Harris, **R.R. Wilson**, J.W. Cain, III, and K.K.G. Koenen. 2007. Bombing and Sonoran pronghorn: a clear and present danger? Journal of Wildlife Management 71:2820-2823.

Wilson, R.R., P.R. Krausman, and J.R. Morgart. 2006. Recovery efforts for Sonoran pronghorn in the United States. Pages 68-78 *in* J.W. Cain, III, and P.R. Krausman, editors. Managing wildlife in the southwest: new challenges for the 21st century. Southwest Section of the Wildlife Society, Tucson, Arizona. USA.

**2011 Outstanding Paper in Landscape Ecology Award* from US-International Association for Landscape Ecology
†Included in the virtual issue *International Year of Biodiversity: Connectivity and Corridors* in *Conservation Biology* as 1 of 10 articles making an important contribution to the study of corridors and connectivity

Presentations:

Wilson, R.R., and G.M. Durner. 2020. Seismic survey design and effects on maternal polar bear

dens. The Wildlife Society Annual Conference.

Wilson, R.R., M. St. Martin, and K.D. Rode. 2019. An Unsung Risk to Arctic Marine Mammal Populations: Population Monitoring Research Threatened By Climate Change. The Wildlife Society Annual Conference, Reno, NV.

Wilson, R.R., C. Perham, D.P. French-McCay, and R. Balouskus. 2018. Potential impacts of offshore oil spills on polar bears in the Chukchi Sea. Alaska Chapter of the Wildlife Society, Anchorage, AK.

Wilson, R.R., C. Perham, D.P. French-McCay, and R. Balouskus. 2018. Potential impacts of offshore oil spills on polar bears in the Chukchi Sea. Alaska Marine Science Symposium, Anchorage, AK.

Wilson, R. R., E. V. Regehr, K. D. Rode, and M. St. Martin. 2016. Invariant polar bear habitat selection during a period of sea ice loss. International Bear Association, Anchorage, AK.

Rode, K. D., R. R. Wilson, M. St. Martin, E. V. Regehr, D. Douglas, and J. Olson. 2015. The effect of changing sea ice conditions on land use patterns of Chukchi Sea polar bears. Alaska Marine Science Symposium, Anchorage, AK.

Wilson, R. R., A. Bartsch, K. Joly, J. H. Reynolds, A. Orlando, and W. Loya. 2012. Frequency, timing, and extent of winter icing events in Alaska with a prospectus for future monitoring efforts. Alaska Chapter of The Wildlife Society Annual Meeting, Anchorage, AK.

Wilson, R. R., A. Bartsch, K. Joly, J. H. Reynolds, A. Orlando, and W. Loya. 2011. Timing and extent of icing events in southwest Alaska during winters 2001-2008 derived from remote sensing data. Western Arctic Caribou Herd Working Group Annual Meeting, Anchorage, AK.

Wilson, R. R., A. K. Prichard, L. S. Parrett, B. T. Person, G. M. Carroll, M. A. Smith, C. L. Rea, and D. A. Yokel. 2011. Seasonal resource selection by the Teshekpuk Lake Herd. Western Arctic Caribou Herd Working Group Annual Meeting, Anchorage, AK.

Wilson, R. R., M. A. Smith, N. Walker, E. Whitten, L. Chartier, and W. Loya. 2011. Cumulative impacts of development on Teshekpuk Caribou Herd calving habitat. The Wildlife Society Annual Conference, Kona, HI.

Wilson, R. R., A. Bartsch, K. Joly, J. H. Reynolds, A. Orlando, and W. Loya. 2011. Timing and extent of icing events in southwest Alaska during winters 2001-2008 derived from remote sensing data. Southwest Alaska Science Symposium, Anchorage, AK.

Wilson, R. R., A. K. Prichard, L. S. Parrett, B. T. Person, G. M. Carroll, M. A. Smith, C. L. Rea, and D. A. Yokel. 2011. Seasonal resource selection by the Teshekpuk Lake Herd. Arctic Ungulate Conference, Yellowknife, NWT.

Wilson, R. R., T. L. Blankenship, M. B. Hooten, and J. A. Shivk. 2010. Prey-mediated avoidance of an intraguild predatoy by its intraguild prey. American Society of Mammalogists Meeting, Laramie, WY.

Wilson, R. R., M. B. Hooten, B. N. Strobel, and J. A. Shivik. 2009. Accounting for individuals, uncertainty, and multi-scale clustering in core area characterization. Ecology Society of America Meeting, Albuquerque, New Mexico.

Wilson, R. R., M. B. Hooten, B. N. Strobel, and J. A. Shivik. 2009. Accounting for individuals, uncertainty, and multi-scale clustering in core area characterization. US-IALE, Snowbird, Utah.

Wilson, R. R., P. R. Krausman, and J. R. Morgart. 2006. Activity Budgets of Sonoran pronghorn. Biennial Pronghorn Workshop, Idaho Falls, Idaho

Wilson, R. R., P. R. Krausman, and J. R. Morgart. 2006. Recovery efforts for Sonoran pronghorn in the United States. Conference on Research and Resource Management in the Southwestern Deserts, Tucson, Arizona

Wilson, R. R., P. R. Krausman, and J. R. Morgart. 2006. Activity budgets of Sonoran pronghorn in a semi-captive enclosure. Arizona, New Mexico Chapters of the Wildlife Society, Annual Meeting, Flagstaff, Arizona

Wilson, R. R., P. R. Krausman, and J. R. Morgart. 2005. Recovery efforts for Sonoran pronghorn in the United States. Southwest Section of the Wildlife Society Meeting, Alpine, Texas

Wilson, R. R., and B. M. Barnes. 2004. Seasonal changes in supercooling points of blood plasma from the arctic ground squirrel (*Spermophilus parryii*). Experimental Biology Meeting, Washington, D.C.

Wilson, R. R., and B. M. Barnes. 2003. Seasonal changes in supercooling point of blood plasma from hibernating arctic ground squirrels (*Spermophilus parryii*). American Society of Mammalogists Meeting, Lubbock, Texas

Invited Presentations:

2020: Seismic survey design and effects on maternal polar bear dens, The Wildlife Society Annual Conference.

2017: Polar bear telemetry activities in the Chukchi Sea. Alaska Ocean Observing System hosted Animal Telemetry Workshop, Anchorage, AK

2013: Accounting for uncertainty in oil and gas development impacts to wildlife. Panel discussion: "A vision for stewardship in the Arctic: integrating the twin goals of enhancing ecological resilience and human well-being." Marine Science Symposium, Anchorage, AK.

2010: Beyond the boundary: inferring process from patter in animal space use studies. Lincoln University

2009: International Association for Landscape Ecology Workshop: Bayesian Methods for Landscape Ecologists

Research Grants:

2014 Training in Bayesian Modeling for Practicing Ecologists, travel award ([redacted])

2012 Using existing Inventory and Monitoring data to evaluate development scenarios within Parklands: a case study on the Western Arctic caribou herd and a transportation right of way through Gates of the Arctic. From: USGS, Co-principal investigator ([redacted])

2011 Timing and extent of winter snow thaw/refreeze events in Alaska 2001-2008. From: Western Alaska Landscape Conservation Cooperative. Principal Investigator ([redacted])

2008 Does predator avoidance determine bobcat core areas? From: American Society of Mammalogists. Principal Investigator ([redacted])

2006 Welder Wildlife Foundation Ph.D. Fellowship. From: Welder Wildlife Foundation. ([redacted]).

2005 Behavior and recovery of Sonoran pronghorn. From: National Fish and Wildlife Foundation. Principal Investigator ([redacted])

2005 Activity budgets of Sonoran pronghorn in the United States. From: T&E Inc. Co-principal investigator ([redacted]).

2002 Seasonal changes in the supercooling ability of the arctic ground squirrel. From:

University of Alaska Fairbanks, Undergraduate Research Grant. Co-principal investigator ([redacted]).

Awards and Scholarships:

- **U.S. Fish and Wildlife Director's Unit Award**, 2022
- **Data Champion Award**, U.S. Fish and Wildlife Service, 2021
- **Star Award**, U.S. Fish and Wildlife Service, 2003, 2017, 2018, 2019, 2020, 2021
- **Regional Director's Excellence Award**, U.S. Fish and Wildlife Service, Region 7, 2019
- **Certified Wildlife Biologist**, The Wildlife Society, 2013
- **Outstanding Paper in Landscape Ecology Award**, US-International Association for Landscape Ecology, 2011
- **Student Travel Award, American Society of Mammalogists**, 2010
- **E. C. Pielou Student Award, ESA Statistical Ecology Section**, 2009
- **Welder Wildlife Foundation Fellowship** 2006-2010.
- **Best Student Presentation Award**, Arizona/New Mexico Chapters of the Wildlife Society, Annual Meeting, 2006.
- **Certified Associate Wildlife Biologist**, The Wildlife Society, 2004.
- **Outstanding Wildlife Biology Student**, University of Alaska Fairbanks, 2004.
- **Rex Thomas Memorial Award**, University of Alaska Fairbanks, 2003.
- **Chancellor's Scholarship**, University of Alaska Fairbanks, 1999.
- **Usibelli Memorial Scholarship**, University of Alaska Fairbanks, 2000 and 2001.
- **Jessie O'Bryan McIntosh Scholarship**, University of Alaska Fairbanks, 2001.
- **Ford Motor Company/Golden Key International Honour Society Undergraduate Scholarship**, 2001.
- **Seymour Memorial Scholarship**, California Scholarship Foundation, 1999.

Workshops Attended:

2019 Bayesian Model Selection, Anchorage, Alaska
2016 Safe Capture, Fairbanks, Alaska
2014 Training in Bayesian Modeling for Practicing Ecologists, Fort Collins, Colorado
2010 Science Communication Workshop, Whistler, British Columbia
2010 Modeling Patterns and Dynamics of Species Occurrence, USGS Webinar
2009 Bayesian Methods for Landscape Ecology, Snowbird, Utah
2009 Adaptive Management of Natural Resources, USGS Webinar
2006 Home Range and Animal Movements Workshop, Pocatello, Idaho

Professional Meetings Attended:

2021 International Bear Association, Kalispel, Montana
2019 Wildlife Society Conference, Reno, Nevada
2018 Alaska Chapter of the Wildlife Society, Anchorage, Alaska
2017 Alaska Marine Science Symposium, Anchorage, Alaska
2016 International Bear Association Conference, Anchorage, Alaska
2016 Alaska Marine Science Symposium, Anchorage, Alaska
2015 Alaska Marine Science Symposium, Anchorage, Alaska
2012 Alaska Chapter of the Wildlife Society, Anchorage, Alaska
2011 Wildlife Society Conference, Kona, Hawaii

2011 Southwest Alaska Science Symposium, Anchorage, Alaska.
2011 Arctic Ungulate Conference, Yellowknife, Northwest Territories
2010 American Society of Mammalogists, Laramie, Wyoming
2009 Ecology Society of America, Albuquerque, New Mexico
2009 U.S. International Association for Landscape Ecology, Snowbird, Utah
2006 Biennial Pronghorn Workshop, Idaho Falls, Idaho
2006 Conference on Research and Resource Management in the Southwestern Deserts, Tucson Arizona
2006 Arizona, New Mexico Chapters of the Wildlife Society, Annual Meeting, Flagstaff, Arizona
2005 Southwest Section of the Wildlife Society Meeting, Alpine, Texas
2005 Annual Meeting of the Arizona and New Mexico Chapter of the Wildlife Society, Gallop, New Mexico
2004 Sonoran Pronghorn Workshop, Tucson, Arizona
2004 Experimental Biology Meeting, Washington, D.C.
2003 American Society of Mammalogists Meeting, Lubbock, Texas.
2001 Wildlife Society Conference, Reno, Nevada.

Professional Service:

- Served as Subject Matter Expert on Interagency Grizzly Bear Study Team Greater Yellowstone grizzly bear demographic workshop, November 2022
- IUCN Polar Bear Specialist Group member (2021 – present)
- Co-chair of the Scientific Working Group of the United States-Russian Polar Bear Bilateral Commission (2018 – present)
- Polar Bear Recovery Team member (2013 – 2016)
- Member of the United States-Russian Polar Bear Bilateral Commission Scientific Working Group (2014 – 2018)
- Member of the *Species and Habitat Work Group* for the Arctic Landscape Conservation Cooperative through the U.S. Fish and Wildlife Service (2011 – 2012).
- Conference session moderator at *International Bear Association Conference (2021)*
- Peer-reviewer for *Endangered Species Research*, *Scientific Reports*, *Methods in Ecology and Evolution, Frontiers Ecology and Evolution*, *Movement Ecology*, *Environmental Science and Technology*, *Marine Mammal Science*, *Arctic*, *Ecosphere, Conservation Physiology , Biological Conservation, Wildlife Society Bulletin*, *Global Change Biology*, *Ecological Applications*, *Ecological Monographs, Ecography*, *Behavioral Ecology*, *Oikos, Journal of Wildlife Management, Journal of Fish and Wildlife Management, Southwestern Naturalist, European Journal of Wildlife Research, Prairie Naturalist, Managing Wildlife in the Southwest, Rangifer*
- Technical Reviewer for *Wildlife Monographs*

Other Skills and Qualifications:

Extensive knowledge of R, Bayesian statistics, ArcGIS, Microsoft Word, Excel and Power Point, Certified Wilderness First Responder, USFWS Bear Safety Training, ACETA-certified, Underwater egress trained, Alaska Driver's License, ability to drive manual transmission vehicles, strong swimmer, avid backpacker and hiker, and experience with firearms.

Membership in Professional Organizations:

The Wildlife Society 2001-present

Susannah P. Woodruff, Ph.D.

EDUCATION

Ph.D. • Wildlife Sciences • University of Idaho, December 2015
Dissertation title: *Developing and evaluating genetic monitoring tools for Sonoran pronghorn* (Antilocapra americana sonoriensis)

Master's Degree • Wildlife Biology • Prescott College, 2006.
Thesis title: *Characteristics of wolf and cougar kill sites in the southern Yellowstone ecosystem*

Bachelor's Degree • Environmental Science and Policy: Applied Ecology and Field Methods • University of Southern Maine, 1999 *Cum Laude*

PROFESSIONAL AND UNIVERSITY EXPERIENCE

US FISH AND WILDLIFE SERVICE, Anchorage, AK • Wildlife Biologist, Marine Mammals Management • September 2019–current

- Develop, facilitate, and conduct strategic and collaborative national/international/co-management activities to facilitate the long-term persistence of polar bears, their habitats, their prey, and the indigenous cultural connections to polar bears
- Co-principal investigator Chukchi Sea polar bear research and monitoring
- Conduct research on multiple aspects of polar bear ecology including detection and disturbance of polar bear dens, potential impacts to polar bears from vessel traffic and fuel spills
- Capture and chemically immobilize and mark (e.g., radio collar) polar bears for research and management
- Develop and implement genetic monitoring plan for polar bears in Alaska
- Member of US-Russia Polar Bear Commission Scientific Working Group
- Participate in multi-disciplinary collaboration to improve harvest monitoring and reporting in the Southern Beaufort Sea
- Support staff for technical advisor to Polar Bear Technical Committee (Canada)
- Lead author of polar bear Species Status Assessment (2022) to inform regulatory decision making
- Secure external funding for US-Russia collaborative research in Chukchi Sea
- Collaborate with agency and industry personnel on polar bear research and monitoring

ALASKA FISH AND GAME DEPARTMENT, Douglas, AK • Wildlife Biologist IV, Region 1 Wildlife Research Coordinator • April 2017–September 2019

- Responsible for oversight and supervision of the wildlife research program in Region 1 (southeast Alaska) including brown and black bear, moose, mountain goat, wolf, Sitka black-tailed deer and a variety of furbearers
- Lead principal investigator (PI) and co-PI designing and co-designing large-scale research projects throughout southeast Alaska
- Captured and chemically immobilized, radio-collared (VHF, GPS and Satellite), and collected biological samples of wolves, mountain goats, and brown bears

- Conducted fieldwork in remote, difficult to access areas often with access only by helicopter, float plane, or boat
- Developed and maintained scientific basis for regional wildlife research program, including determining project priorities and spending priorities
- Oversaw annual budgetary cycle for research staff and Federal Aid cycle for research staff including annual work plans, in-season amendments, and annual reports
- Authored/co-authored agency reports and manuscripts for peer-reviewed journals
- Presented results of research studies to regulatory bodies, including state Fish and Game Advisory Committees, the Alaska Board of Game, federal Regional Advisory Committees, and Federal Subsistence Board
- Participated in the Alaska Board of Game regulatory process for Regional board meetings
- Coordinated inter-regional and inter-agency research projects
- Represented Fish and Game Region I research program in communication with stakeholders (e.g., federal agencies, Native communities, hunters/trappers, subsistence users) regarding research and management issues
- Provided interviews for written, visual, and audio media outlets
- Supervised 4 research biologists, a biometrician, a GIS analyst, and several technicians

IDAHO FISH AND GAME DEPARTMENT, Lewiston, ID • Postdoctoral Researcher/ Contract Research Biologist • June 2016–March 2017
Project goal: Answer management-relevant research questions based on cause-specific mortality data of elk; inform covariate selection for the analysis of environmental factors related to elk survival.

- Performed literature review summarizing cause-specific mortality studies on elk and other ungulates
- Assimilated and standardized information on cause-specific elk mortality
- Created database on capture, necropsy, and location from GPS collars of ~3,000 elk
- Analyze location data in ArcGIS from elk GPS and satellite collars
- Develop list of potential research questions that can answered from this data and write proposal describing the proposed analyses
- Perform cause-specific mortality analysis using cumulative incidence functions
- Prepare manuscript for publication in peer-reviewed journal

UNIVERSITY OF IDAHO, Moscow, ID • Graduate Research Assistant • June 2012–December 2015

- Designed and implemented non-invasive genetic sampling capture-recapture monitoring programs for Sonoran pronghorn and coyotes
- Performed capture-recapture quantitative analysis to estimate abundance and other population demographics
- Performed analysis of genetic diversity and population substructure and parentage analysis of Sonoran pronghorn
- Developed recommendations for wildlife managers based on the results of statistical analysis
- Collaborated with Department of Defense, US Fish and Wildlife Service, and Arizona Game and Fish Department personnel to live capture and radio-collar >50 Sonoran pronghorn
- Published 6 manuscripts related to dissertation work

CONSERVATION RESEARCH CENTER, Jackson, WY • Research Biologist and Crew Leader • November 2010–May 2011

- Lead member of mule deer ecology study including study design, project implementation, fieldwork, data analysis, manuscript preparation, and project management
- Goals of research included delineation of short-distance migration corridors, improved understanding of mule deer responses to roadways and human development; and development of spatially-explicit winter habitat-use models
- Member of regional interagency working group established to determine management strategies to mitigate deer-human roadway conflicts
- Designed and implemented a capture and collar plan using clover traps and ground darting to capture chemically immobilize, radio-collar, and collect samples of >50 mule deer
- Supervised and managed a team of 7 people
- Responsible for ordering and properly storing, deploying, tracking, and recording capture/immobilization drugs
- Participated in project design and edited papers for publication
- Monitored radio-collared mule deer with radio-telemetry and conducted necropsies on mule deer mortalities
- Designed and implemented method of collection of snow measurements and behavior
- Performed literature reviews and spatial analyses (ArcGIS) and wrote extensive reports
- Created and managed databases and gave professional presentations
- Collaborated with agency staff, volunteers and other project partners

U.S. FISH AND WILDLIFE SERVICE, Jackson, WY • Biological Science Technician and Volunteer • January 2004–February 2011

- Conducted all management aspects related to federal, state, and regional issues for federally listed gray wolves
- Aerial captured (helicopter), leg-hold trapped, and chemically immobilized, radio-collared (VHF, GPS and Satellite), and collected biological samples of 75+ wolves; this also included handling of non-target trapped species, such as grizzly and black bears, bobcats, coyotes, foxes, deer, antelope, and a variety of other small mammals
- Located wolves via ground and aerial telemetry and tracked on foot, skis/snowshoes, ATV, snowmobile, horses, and other forms of transportation in remote, difficult to access areas
- Monitored wolf population size, trend, and distribution
- Documented potential breeding packs/pairs of wolves to determine reproductive status and recruitment
- Coordinated wolf monitoring with Wind River Reservation (Arapaho and Shoshone tribes)
- Developed and taught wolf trapping and handling/immobilization education training classes for wildlife managers and wardens of the Shoshone and Arapaho Fish and Game Department
- Conducted field work in high-density grizzly bear country
- Supervised field crew of 3–5 people in all activities (e.g., trapping, data collection)
- Designed and implemented large-scale applied and field-based research projects for direct application to management activities including:
    - Performed qualitative and quantitative analysis on the behavioral response of elk to the presence of wolves
    - Resource selection analyses using ArcGIS for wolves and cougars in the study area

    - Implemented methodology using ArcGIS data analysis and mapping to predict potential sites to locate, document, and track uncollared wolf packs
    - Investigated >300 carcasses from potential wolf kills for multi-year predation/prey selection study which included:
        - Age estimation of prey (approximated by tooth wear)
        - Written reconstruction of chase/pursuit of prey by predator
        - Skinning of carcass to determine time and cause of death including predator responsible (if applicable) by investigating trauma, hemorrhaging, bite marks, livor mortis (pooling of blood)
- Participated in project design, drafting of study plans, data analysis, and the preparation of technical reports, annual reports and peer-reviewed manuscripts for publication
- Compiled data and generated maps (ArcGIS), including home range, wolf movement, and dispersal maps, for both intra and inter-agency distribution, use by federal agencies for USFWS wolf delisting rule, conservation organizations, in presentations, published in peer-reviewed journals, and media publications
- Created and maintained U.S. Fish and Wildlife Service 3-state (Idaho, Montana, and Wyoming) wolf databases (capture, depredation, and mortality)
- Worked with USDA APHIS Wildlife Services and private landowners to investigate problem wolves and livestock depredations
- Relocated and/or euthanized problem or injured wolves
- Worked on a sensitive, high profile, confidential, project which included educating and interacting with the public on this highly controversial issue
- Ensured compliance with the Endangered Species Act
- Represented USFWS at statewide public comment meetings
- Prepared briefing documents and provided expert knowledge and recommendations for USFWS lawyers in preparation for Federal Register notices pertaining to wolf delisting and subsequent litigation
- Assisted Wyoming Game and Fish Department (state agency) personnel in the development of post-delisting hunting quotas
- Supervised field crew of 3–5 people in all activities (e.g., trapping, data collection)
- Frequently used snowmobiles, 4-wheel drive trucks, 4-wheel ATV's, and trailers

TETON COUGAR PROJECT, Kelly, WY • Wildlife biologist • June 2004-December 2006
Salary:~[redacted]/year
Hours per week: 50–60

- Assisted in live capturing, processing/handling, biological sample collection, and radio-collaring cougars
- Located cougars via ground and aerial telemetry and track on foot, ATV, ski, snowshoes, and snowmobile
- Monitored demographic rates of cougars in and around Grand Teton National Park, WY
- Collected, analyzed and presented data on cougar behavior and ecology including prey selection, dispersal and reproduction
- Investigated carcasses and collected data from potential cougar kills including GPS location, age estimation and conjecture of time and cause of death
- Frequently used snowmobiles, 4-wheel drive trucks and 4-wheel ATV's

NEZ PERCE TRIBE GRAY WOLF RECOVERY PROJECT, McCall, ID • Assistant field biologist • June 2003–August 2003
Salary: [redacted]
Hours per week: 50–60

- Assisted in capturing, processing/handling, and radio-collaring wolves
- Located, via ground and aerial telemetry, potential breeding packs/pairs of wolves to determine reproductive status
- Documented locations of wolf den sites and obtain accurate counts of wolf pups at den sites
- Frequently used 4-wheel drive trucks and 4-wheel ATV's

PRESCOTT COLLEGE, Prescott, AZ • Master's student • January 2003–December 2006

- Conducted research on delineation of habitat characteristics at wolf and cougar kill sites
- Compared and contrasted characteristics between wolf and cougar kill sites and winter versus spring kill site characteristics
- Evaluated use and availability of wolf kills vs random locations with Resource Selection Function analysis

NATIONAL OUTDOOR LEADERSHIP SCHOOL (NOLS), Lander, WY • Instructor • June 2001–December 2003

- Led students on extended (25+ days) self-sufficient backcountry trips
- Taught non-technical and technical outdoor skills pertaining to course type as well as Wilderness First Aid curriculum
- Role modeled and coached students on leadership skills and behavior
- Designed, implemented, and supervised a progression of skills development for students

RED TOP MEADOWS TREATMENT CENTER, Wilson, WY • Assistant teacher and curriculum development • November 1999- September 2001

- Taught science, history, American government, Eastern philosophy, math and English to youth-at-risk and learning disabled boys ages 12-18
- Developed curriculum and created lesson plans for all subjects
- Led students on backcountry backpacking trips and teach wilderness skills

ADDITIONAL TRAINING AND INFORMATION

- Manuscript reviewer for *Journal of Wildlife Management*, *Ecology and Evolution*, *Wildlife Society Bulletin*, *African Zoology, Biological Conservation, Wildlife Research, Ecosphere, European Journal of Wildlife Research*, *Journal of Fish and Wildlife Management, Wildlife Monographs*
- Firearms and Bear Deterrents Training and Qualification, May 2021 and April 2022
- Bear Handling Workshop, Interagency Grizzly Bear Study Team, April 4–5, 2022
- Alaska Native Relations Training, 13-class series, 2021
- Oiled Sea Otter Rehabilitation 2-day Training, International Wildlife Research, March 2021
- Bear Safety Training, US Fish and Wildlife Service, Anchorage, AK, June 2020
- Wildlife Field Anesthesia, National Park Service, Fort Collins, CO, January 25–29, 2020
- Southeast Representative/Executive Board Member, The Wildlife Society, Alaska Chapter 2018–2020.

- Basic Firearms Safety, AK Fish and Game, Juneau, AK. March 2019.
- Wildlife Chemical Immobilization Training, Alaska Dept. of Fish and Game, Fairbanks, AK. Jan 22–25, 2019.
- Integrated Population Modeling. Alaska Dept. of Fish and Game, Douglas, AK. Jan 28–29, 2019.
- Spatial Capture-Recapture and Bayesian Inference: A 5-day Workshop. A. Royle and A. Fuller, Juneau, AK. August 2018.
- Animal Movement and Spatial Modeling Workshop. The Wildlife Society, Alaska Chapter, Anchorage, AK. March 2018.
- Wildlife and Sport Fish Restoration Program USFWS Project Leaders Course, USFWS, Juneau, AK. January 2018.
- Academy for Supervisors, State of Alaska, Juneau, AK. November 2017.
- ATV Operation and Safety Training Refresher Course. Action Polaris, Jackson, WY. May 2009.
- Wildlife Capture and Handling Course. 2007. Terry Kreeger, Wyoming Game and Fish Department, Sybille, WY. May 2007.
- Wildlife Capture and Handling Course. 2006. Dr. Mark Atkinson, Montana Fish, Wildlife, and Parks. Bozeman, MT. May 2006.
- Home Range and Animal Movements: A Workshop. Idaho State University, Pocatello, ID. May 2006.
- OAS Federal Aviation Safety Training. B3 Combination Helicopter/Airplane Safety certified. Jackson, WY. January 2006. Certification is current.
- Snowmobile Repair and Handling Workshop. Bridger-Teton National Forest, Jackson, WY. November 2006.
- Bear Safety Training. Craighead Beringia South/Teton Cougar Project. Kelly, WY. May 2004.
- Wilderness First Responder and CPR - Certification - 1996-2009, 2022
- Avalanche Safety Training Course. National Outdoor Leadership School (NOLS). 4-day course. January 2002.
- NOLS student courses:
    - Wind River Mountain Instructor Course - 34 day course - August 2000.
    - Outdoor Educator, Alaska - 24-day course for educators - August 1999.
    - Semester in Patagonia, Chile - 75-day mountaineering & leadership course - Fall 1994.
    - Sea Kayaking, Baja, CA - 21-day leadership course - January 1993.
- NTL Institute for Applied Behavioral Science Group Process Consultation Workshop Intensive training in group dynamics and diagnostic and intervention skills - 7 days - May 1999
- Member *The Wildlife Society* (2011-present) and AK TWS Chapter (2017–present)
- Member *Society for Conservation Biology* (2013-present)

PUBLICATIONS

Woodruff, S.P., E. M. Andersen, R.R. Wilson, L.M. Mangipane, S.B. Miller, K.J. Klein, and P.R. Lemons. 2022. Classifying the effects of human disturbance on denning polar bears. Endangered Species Research 49: 43–56.

Woodruff, S.P., J.J. Blank, S.S. Wisdom, R.R. Wilson, G.M. Durner, T.C. Atwood, C.J. Perham, and C.H. Pohl. 2022. Evaluating the efficacy of aerial infrared surveys to detect artificial polar bear dens. Wildlife Society Bulletin 46:e1324.

Woodruff, S.P., D.A. Eacker, and L.P. Waits. 2021. Estimating coyote densities with local, discrete Bayesian capture-recapture models. Journal of Wildlife Management 85:73–86.

Woodruff, S.P., C. Hamilton, S. Miller, M. St. Martin, J. Wilder, and R.R. Wilson. 2020. Polar Bear Annual Summary Report of Activities, 2019. US Fish and Wildlife Service, Anchorage, AK.

Woodruff, S.P. and M.D. Jimenez. 2019. Winter predation patterns of wolves in northwestern Wyoming. Journal of Wildlife Management 83:1352–1367.

Woodruff, S.P., M.D., Jimenez, and T.R. Johnson. 2018. Characteristics of winter wolf kill sites in the southern Yellowstone ecosystem in the presence of elk feedgrounds. Journal of Fish and Wildlife Management 9:155–167.

Woodruff, S.P., P.M. Lukacs, and L.P. Waits. 2018. Comparing performance of multiple non-invasive genetic capture–recapture methods for abundance estimation: a case study with the Sonoran pronghorn *Antilocapra americana sonoriensis*. Oryx 54:412–420.

Woodruff, S.P., P.M. Lukacs, D. Christianson, and L.P. Waits. 2016. Estimating Sonoran pronghorn abundance and survival with fecal DNA and capture-recapture methods. Conservation Biology 30:1102–1111.

Woodruff, S.P., T.R. Johnson, and L.P. Waits. 2016. Examining the use of faecal pellet morphometry to differentiate age classes in Sonoran pronghorn. Wildlife Biology 22:217–227.

Horne, J.S., J.J. Hervert, **S.P. Woodruff**, and L.S. Mills. 2016. Evaluating the benefit of captive breeding and reintroductions to endangered Sonoran pronghorn. Biological Conservation. doi:10.1016/j.biocon.2016.02.005

Woodruff, S.P. 2015. Developing and evaluating genetic monitoring tools for Sonoran pronghorn (*Antilocapra americana sonoriensis*). PhD Dissertation, University of Idaho, Moscow, Idaho.

Woodruff, S.P., T.R. Johnson, and L.P. Waits. 2015. Evaluating the interaction of faecal pellet deposition rates and DNA degradation rates to optimize sampling design for DNA-based mark-recapture analysis of Sonoran pronghorn. Molecular Ecology Resources 15:843:854.

Woodruff, S.P., J.R. Adams, T.R. Johnson, and L.P. Waits. 2014. Rapid species identification of Sonoran pronghorn from fecal pellet DNA**.** Wildlife Society Bulletin 38: 842-848.

Jimenez, M.D., E.E. Bangs**,** D K. Boyd, D.W. Smith, S.A. Becker, D.E. Ausband, **S.P. Woodruff**, E.H. Bradley, J. Holyan, and K. Laudon. 2017. Wolf dispersal in the Rocky Mountains, Western United States: 1993–2008. Journal of Wildlife Management 81:581–592.

Jimenez, M.D., V.J. Asher, C. Bergman, E.E. Bangs, and **S.P. Woodruff**. 2009. Gray Wolves, *Canis lupus*, killed by cougars, *Puma concolor,* and a grizzly bear, *Ursus arctos,* in Montana, Alberta, and Wyoming. Canadian Field-Naturalist 122:76-78.

Jimenez, M.D., D.W. Smith, **S.P. Woodruff**, D.R. Stahler, E. Albers, and R.F. Krischke. Wyoming Wolf Recovery Annual Report 2005–2010. *In* Rocky Mountain Wolf Recovery 2008 Interagency Annual Report. C.A. Sime and E.E. Bangs, eds. USFWS, Ecological Services, Helena, MT

Jimenez, M.D., **S.P. Woodruff**, S. Dewey, and S. Cain. Monitoring wolf distribution and annual predation patterns of wolves near Jackson, WY. 2005–2007 Progress Report. US Fish and Wildlife Service Jackson, WY.

Jimenez, M.D**., S.P. Woodruff**, S. Cain, and S. Dewey. Wolf-elk interactions on winter range and state-managed feed grounds in Wyoming. 2005–2007 Progress Report. US Fish and Wildlife Service Jackson, WY.

Woodruff, S.P. 2006. Characteristics of wolf and cougar kill sites in the southern Yellowstone ecosystem. Master's Thesis, Prescott College, Prescott, Arizona.

SELECTED PRESENTATIONS

- *Evaluating the effects of human disturbance on denning polar bears*. 2021. Polar Bear Universe, virtual conference hosted by Russian Federation.
- *Polar Bear Research and Management*, Natural Resources Class. University of Colorado, Boulder, CO.
- *Winter predation patterns of wolves and wolf-elk interactions on state-managed winter feedgrounds and traditional winter range in western Wyoming*, International Wolf Symposium. 2018. Minneapolis, MN.
- *Monitoring Sonoran Pronghorn using Noninvasive Genetic Sampling*, 22nd Annual Wildlife Society Conference, 2015. Winnipeg, MB. ***2nd place Best Student Presentation.***
- *Monitoring Species of Concern on Military Lands using Noninvasive Genetic Sampling*, North American Wildlife and Natural Resources Conference. 2015. Omaha, NE.
- *Predator Management*, Wildlife Management Class, University of Idaho, Moscow, ID.
- *Population Abundance Estimation*, Wildlife Ecology II, University of Idaho, Moscow, ID.
- *Abundance estimation: From wolves to pronghorn*, Wildlife Ecology II, University of Idaho, Moscow, ID.
- *Monitoring species of concern using noninvasive genetic sampling and capture-recapture*. Department of Defense SEDRP and ESTCP Joint annual Fall In-Progress Review. 2014 and 2015. Arlington, VA.
- *Simultaneous demographic monitoring of predator and prey population sizes using fecal DNA sampling.* 2014. North American Congress for Conservation Biology, Missoula, MT.
- *Preliminary results of non-invasive genetic sampling for mark-recapture studies of endangered Sonoran pronghorn and coyotes with Sonoran pronghorn range*. 2014. Collaborator meeting, Cabeza Prieta National Wildlife Refuge, Ajo, AZ.
- *Preliminary results of non-invasive genetic sampling for mark-recapture studies of endangered Sonoran pronghorn.* 2014. Idaho Chapter of the Wildlife Society, Annual Meeting, Boise, ID.
- *Wolf reintroduction, management, and ecology in Wyoming*. 2011. Undergraduate students in wildlife biology from Arizona, Conservation Research Center, Jackson, WY.
- *A Day in the Life of a Wolf Biologist.* 2010. Young Women in Science, Teton Science Schools, Kelly, WY.
- *Wolf reintroduction, management, and ecology in Wyoming*. 2008, 2009, 2010. Instructors of the National Outdoor Leadership School (NOLS), Lander, WY.
- *Wolf trapping and handling training*. 2010. Wildlife managers of the Shoshone and Arapaho Fish and Game Department, Ethete, WY.
- *Wolf reintroduction and wolf ecology in the Northern Rockies*. 2008. 3rd and 4th grade students, Paso Robles, CA.
- *Characteristics of wolf and cougar kill sites in the southern Yellowstone ecosystem*. 2006. Interagency Collaborative Research Meeting--USFWS, GTNP, Wyoming Game and Fish Department, Bridger Teton National Forest.
- *Characteristics of wolf and cougar kill sites in the southern Yellowstone ecosystem*. 2006. Prospective graduate students, Prescott College.