



The Association of State Wetland Managers, Inc.

"Dedicated to the Protection and Restoration of the Nation's Wetlands"

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April 15, 2019

Andrew Wheeler
Administrator, U.S. Environmental Protection Agency
1200 Pennsylvania Ave, NW
Washington, DC 20460

R.D. Secretary James
Assistant Secretary, U.S. Army Corps of Engineers
441 G Street NW Washington, DC 20314

Re: Docket ID No. EPA-HQ-OW-2018-0149
Submitted to the docket on-line

Dear Mr. Wheeler and Mr. James:

The attached comments were prepared by the Association of State Wetland Managers (ASWM) in response to the February 14, 2019 *Federal Register* Notice: "Revised Definition of Waters of the United States." We view the proposed rule as being of paramount importance in maintaining the gains in water quality protection and management that have been achieved under the Clean Water Act during past decades, and are ready to continue to consult with the agencies to complete revision and implementation of the rule in a manner that will achieve this goal.

ASWM is a nonprofit professional organization that supports the use of sound science, law, and policy in development and implementation of state and tribal wetland programs. We are pleased to take this opportunity to convey our positions to the Environmental Protection Agency (EPA) and the Department of Army.

Our organization and our member states and tribes have long standing positive and effective working relationships with both agencies in the implementation of dredge and fill regulations to protect our nation's water resources, and trust that our additional comments will assist in moving forward to clarify the jurisdictional rule, and to increase regulatory stability as quickly as is possible. The important and unique role of states in the management of water resources is clearly recognized in the Clean Water Act (CWA). Therefore, any action taken by the federal government to either expand or contract the scope of federal protection *will* have direct and significant impacts on the states.

ASWM has previously submitted detailed comments on multiple related actions by the federal agencies (that is, EPA and the U.S. Army Corps of Engineers). We again request that our previous comments referenced in the attached document also be considered when making decisions on this rule.

ASWM appreciates the opportunity to review and comment on this Notice of the Proposed Rule. While these comments have been prepared with input from the ASWM Board of Directors, they do not necessarily represent the individual views of all states and tribes; we therefore encourage your full consideration of the comments of individual states and tribes and other state associations. Please do not hesitate to contact me should you wish to discuss these comments.

Sincerely,

A handwritten signature in black ink, appearing to read "Marla J. Stelk". The signature is fluid and cursive, with a long horizontal stroke at the end.

Marla J. Stelk
Executive Director

CC: ASWM Board of Directors
Michael McDavit, U.S. Environmental Protection Agency
Tammy Turley, U.S. Army Corps of Engineers

**COMMENTS OF THE ASSOCIATION OF STATE WETLAND MANAGERS
TO THE
U.S. ENVIRONMENTAL PROTECTION AGENCY AND THE U.S. ARMY CORPS
OF ENGINEERS IN RESPONSE TO THE FEBRUARY 14, 2019 *FEDERAL
REGISTER* NOTICE OF PROPOSED RULEMAKING REGARDING
A REVISED DEFINITION OF “WATERS OF THE UNITED STATES”**

The Association of State Wetland Managers (ASWM) is a nonprofit professional organization that supports integrated application of sound science, law, and policy in development and implementation of state and tribal wetland programs. ASWM has prepared these comments in response to a rule proposed by the U.S. Environmental Protection Agency (EPA) and the U.S. Army Corps of Engineers (Corps) to re-define the scope of waters regulated under the Clean Water Act (CWA). ASWM has previously provided detailed comments in response to multiple other federal notices related to development of the rule regarding definition of Waters of the U.S. (WOTUS), and request that these comments be re-considered as well.¹

ASWM cannot support the deregulation of a large component of wetlands that have been regulated under the CWA for decades, or the deregulation of ephemeral streams. These include the majority of adjacent wetlands that do not have a direct surface physical connection with other jurisdictional waters – i.e. are not “abutting” as defined in the rule; non-adjacent wetlands that currently may be regulated where they collectively have a significant nexus with navigable waters; and regional wetland types of national concern that are considered potentially jurisdictional by rule in the 2015 Rules, such as prairie potholes. Nor can we support the elimination of jurisdiction over all ephemeral streams regardless of importance in a given region.

¹ Please see:

ASWM [comments](#) to the agencies dated 6-16-17 in response to a federalism consultation on WOTUS.

ASWM [cover letter](#) and [comments](#) to the agencies dated 9-11-17 in response to a federal notice regarding recodification of the exiting rule

ASWM [cover letter](#) and [comments](#) to the agencies dated 11-28-17 in response to a federal notice regarding definition of WOTUS

ASMW [cover letter and comments](#) to the agencies dated 4-6-2018 in response to consultation with the states regarding the WOTUS definition

ASWM [comments](#) to the agencies dated 8-8-18 in response to a supplemental notice regarding recodification of the existing rule

Our comments address multiple areas of concern, including the impact of the proposed rule on the balance of state and federal authorities; the potential ecological impact of the proposed rule and the related impact on public health and well-being; the practicality of implementing the proposed rule at both the national level, and the state level in cooperation with federal agency programs, and the resulting impact on state agencies; and the legal and scientific justification for modification of the scope of the CWA as it has been administered since 1972. The range of our comments reflects the far-reaching nature of the proposed rule.

The agencies' stated intent is to modify the definition of Waters of the U.S. to conform with decisions of the U.S. Supreme Court in *Solid Waste Agency of Northern Cook County v. U.S. Army Corps of Engineers (SWANCC)*, and *Rapanos v. United States (Rapanos)*. Such was also their intent in development of the 2007 post-*Rapanos* guidance and the 2015 Waters of the U.S. rule. Our review therefore has also considered the justification offered for the agencies' altered interpretation of those decisions, and the consistency of the proposed rule with the comprehensive program to protect the nation's waters defined by the CWA.

ASWM supports clarity in definitions, jurisdiction, review standards, and procedures and recognizes the goal of federal agencies to achieve this clarity through the proposed rule. However, we believe that the proposed definitions do not accomplish this goal. The definitions alone in the proposed rule cannot determine jurisdiction. There will need to be accompanying regional field procedures to determine when the meanings of the definitions are met. In particular, we find that proposed criteria for adjacent wetlands, and the reliance on surface inundation from flooding during a "typical year" for jurisdiction, will require formal expertise and training in measuring physical characteristics of streams; application of engineering models; site-specific installation of measuring/monitoring equipment; plant and soil identification skills; or a combination of all approaches. We doubt that the stated level of clarity can be achieved on a national basis, as procedures to identify jurisdictional areas should address regional conditions.

We also encourage EPA and the Corps to be mindful of the need for training, guidance, and continued financial support to state programs to ensure a smooth transition as we implement any new definition of waters covered by the CWA.

COOPERATIVE FEDERALISM UNDER THE CWA: BALANCE OF FEDERAL AND STATE RESPONSIBILITIES

Throughout the *Federal Register* notice, the federal agencies emphasize the important balancing of federal and state roles in implementation of the CWA, citing CWA §101(b): "*the policy of Congress to recognize, preserve, and protect the primary responsibilities and rights*

of States to prevent, reduce, and eliminate pollution” and “to plan the development and use of land and water resources.” ASWM agrees that effective administration of the CWA requires the complex balancing of state and federal interests and responsibilities, and that a change in the definition of federal jurisdiction will alter this balance. However, we are also dedicated to achieving the stated objective of the Act – that being to *restore and maintain the chemical, physical, and biological integrity of the Nation’s waters*” as stated in CWA §101(a). We believe that the coordinated efforts of state and federal agencies can further that goal, but that any shift in state-federal responsibilities which undermines it is not acceptable.

Numerous states have demonstrated the ability to develop and to effectively administer regulations at the state level to implement many CWA programs in accordance with requirements established by the federal agencies, and with financial and technical support from the federal agencies. However, a number of states have chosen *not* to develop regulatory programs that parallel all CWA programs, and are unlikely to do so in the future. Therefore, it is necessary that the federal agencies consider the realistic impact of shifting authority to the states, and also the necessary role played by the federal agencies in ensuring that the level of protection established by the CWA is maintained under the proposed rule.

The state/tribal role in dredge and fill programs.

Through the 1977 amendments to the CWA, Congress more fully recognized and protected the rights and responsibilities of the states by ensuring a major role in the implementation of many CWA programs. In order to address dredge and fill activities, states have the option of assumption of the §404 dredge and fill permitting program, reliance on §401 water quality certification to incorporate state concerns, operation of independent state permitting programs, or a combination of the above. Other states operate only non-regulatory wetland programs. States have determined the appropriate balance of these choices for their respective states based in part on the scope of CWA jurisdiction. Significantly reducing the scope of jurisdiction, as proposed by the federal agencies, will require them to reassess their respective approaches. Where states elect not to address the regulatory gap caused by reduced federal jurisdiction, the goals of the CWA will not be met.

A significant reduction in federal jurisdiction over the nation’s waters will directly impact the ability of the states to meet the goals established under the CWA and state/tribal laws, while creating significant disparities among state permitting programs. These impacts include:

- **Reduction of state jurisdiction in those states where legislative mandates prohibit state regulatory actions that exceed the scope of federal protection.**

A number of states have enacted laws that prohibit state agencies from regulating waters not protected by federal law.² Thus, the proposed rule cannot rely on states to protect waters where federal jurisdiction is abandoned. Moreover, these states may be required to *reduce* the scope of existing state programs in response to deregulation under the CWA.

- **Reduced ability to rely on CWA §401.** Numerous states rely on §401 water quality certification either to coordinate permitting and enforcement of state regulatory programs with the federal agencies, or to allow for state input to federal decisions where state regulatory programs have not been established. Reduction in federal jurisdiction will either reduce federal assistance under §401 or leave previously covered waters unprotected. Even for states having established programs, enforcement meeting current CWA standards might not be possible without federal support.
- **Potentially reduced value of §404 assumption.** ASWM believes it is unlikely that the two states which have assumed §404 authority will choose to alter their state assumption programs³. However, assumption by additional states will depend upon the extent of jurisdiction conveyed to states by assumption, or in other words the extent to which state/federal duplication is reduced. In states where a significant portion of state waters are likely to be headwaters (especially ephemeral streams), isolated wetlands, and other “non-adjacent” wetlands under the proposed rule, assumption would have more limited value. The same may be true of states where a high percentage of waters are Rivers and Harbors Act §10 waters and thus regulated by the Corps and not assumable.

These decisions will need to be made on a state by state basis taking into account the extent of their water resources and the impact of the proposed regulatory change, cost of assumption, and benefits of assumption.

- **Loss of protection under NEPA and similar federal requirements.** The construction of airport, highway, and other federally supported infrastructure projects is currently controlled in part by review under NEPA; early review and consideration of alternatives that may avoid resource impacts is coordinated with the states. It is unclear to what extent headwaters and wetlands defined scientifically and/or by state programs would be protected under NEPA, but it must be assumed that such protection could be lost.

² Please see ACWA’s Memo on Waters of the State Stringency from March 13, 2018 to Mr. David Ross, U.S. Environmental Protection Agency; Mr. Ryan Fisher, U.S. Army Corps of Engineers here: <https://www.acwa-us.org/documents/acwa-memo-on-waters-of-the-state-stringency/>.

³ We do not believe that Michigan is likely to abandon §404 assumption, although we understand that the scope of jurisdiction in Michigan may be reduced to match federal jurisdiction, depending on actions taken under a legislative prohibition of regulation waters beyond the scope of the CWA without additional justification and approval by the state.

- **Increased cost to the states to replace federal protection with state level programs if desired.** Those states that chose to promulgate new regulations to fill new gaps in the federal program face, at a minimum, the cost of developing and enacting new legislation, public education, training of existing staff, and potentially hiring of additional staff. This process may also require significant time – likely a minimum of two years if legislative changes and appropriation of funds are required, during which time de-regulated resources would be left unprotected.
- **Potentially reduced federal funding for state monitoring, reporting, and program development.** Federal grants for non-regulatory activities such as biannual reporting rely heavily on attention to regulated federal waters. It is unclear to what extent federal funds would be available to support these programs in waters not defined as “waters of the U.S.” States receive and appreciate federal funding from a variety of CWA sources. Funds are used for implementation (CWA §106) and for program improvement (State Wetland Program Development Grants). We request that any change in federal jurisdiction does not result in a corresponding decrease in federal funds available to States and ask that the federal agencies increase, or at least maintain, the level of federal funding to States to implement sound water management programs, as intended by the CWA.
- **A public perception that non-federal waters have limited value.** Many citizens may view resources protected by federal law as “more important” than those protected only at the state or local level. This is reflected in legislative limits in a number of states prohibiting regulations that are broader in scope than the federal law.
- **Interstate disparity exacerbated by economic pressure and a “race to the bottom.”** The consistent application of water resource protection across the country is important in addressing development pressure; reducing CWA jurisdiction would create complex and contradictory programs among the states. Supporters of major economic development often suggest that they may prefer a state with less stringent environmental protections.

The CWA, in part through its coordination with states and tribes, has achieved major gains in the quality and protection of water resources for over 40 years, from which states have benefitted through cleaner water and its associated economic and environmental benefits. ASWM believes that the objectives of the CWA could not be fully realized in the absence of the current federal jurisdiction.

Essential federal roles in cooperative federalism.

ASWM agrees that the states and tribes play a critical role in implementation of the CWA, but strongly disagrees with the agencies’ characterization of what is required to maintain a balance between state and federal authorities. ASWM views cooperative federalism as integration of state and federal roles in protection of Waters of the U.S., with both state and

federal agencies playing an important part.⁴ Central to this position is the fact that upstream impacts must be regulated to prevent harm to the downstream states and waters. Moreover, “Scalia” defined waters cannot be protected by regulating *only* the Scalia waters, and the states have no means to mandate that upstream states protect critical tributaries and wetlands. In addition, the federal agencies often have a national perspective distinct from that of the individual states.

ASWM believes that the federal role in administration of the CWA is essential to the states in the following ways:

- To protect states and tribes from interstate impacts. Individual states cannot directly regulate actions in upstream states impacting waters flowing across their borders, or fully control pollution of large shared waters such as the Great Lakes. Pollution of interstate waters that are considered navigable may result from waters that would not be regulated under the proposed rule; in particular adjacent wetlands that would be removed from federal jurisdiction by the new rule, including wetlands in floodplains and river valleys that directly intercept sediments and other pollutants. Protection of headwater ephemeral streams that are key nursery areas for fish and other aquatic organisms would also be lost under the proposed rule. This rule would also eliminate the potential for case-by-case protection of “isolated” (unconnected) wetlands that not only retain sediment and flood waters, but that recharge groundwater and maintain baseflow while effectively removing pollutants.
- To ensure consideration of national level concerns. Hurricane protection, minimization of flooding, drought minimization prevention, control of toxic materials impacting public health, and numerous similar issues depend upon a national level perspective and regulation. Major impacts such as formation of a hypoxic zone in the Gulf of Mexico can result from the cumulative impacts in numerous states including regions geographically remote from the final impact.
- To avoid potential impacts on water use allocations by states. For example, fill of wetlands higher in the watershed or in the floodplain can result in less recharge, jeopardizing water allotments for downstream users.
- To provide protection of habitat. Numerous fish species, and in particular anadromous fish, depend on headwaters for spawning and other shallows fed by floodplain wetlands for their development, directly affecting fish populations in downstream states. Headwater areas are also essential for other organisms that rely the proximity of both land and water habitats, such as amphibians that may reproduce in areas adjacent to, but not “directly abutting” streams as defined in the

⁴ See in particular ASWM’s comments of November 28, 2017 in response to a *Federal Register* notice regarding the Schedule of Public Meetings.

proposed rule.

- To maintain a level economic playing field. States protective of natural resources can be put at an economic disadvantage given the costs associated with development and operation of permitting programs to fill federal gaps. States should not be penalizing for providing protection for not only their own but downstream waters.
- To more effectively address emerging pollutants as they are identified, and as novel pollution control mechanisms are developed. It is far more efficient for previously unidentified pollutants, and technical measures to control them, to be developed at the national level, rather than individually by all states and tribes.

THE LEGAL AND SCIENTIFIC BASIS FOR PROTECTION OF WATERS UNDER THE CLEAN WATER ACT

The Preamble to the proposed rule states that the “*proposed definition is also informed by the science,*” referring in particular to the *Connectivity Report*⁵ developed to support the 2015 Rule, among other sources. However, the preamble goes on to indicate that while the *Connectivity Report* is used to inform “*certain aspects*” of the proposed definition, that ***“science cannot be used to draw a line between Federal and State waters, as those are legal distinctions that have been established within the overall framework and construct of the CWA.”*** (page 4176 of preamble to the proposed rule)

This statement is incorrect for two primary reasons. First, there is no legal “line between state and federal waters”. Rather, both states and federal agencies have authority over a wide range of waters that overlap to a very great extent – in some instances almost completely - depending on the constitution of a given state. Within these overlapping areas of authority, the state and federal agencies may operate cooperative regulatory and non-regulatory programs or engage in totally different activities and decision-making based on the distinctions between state and federal law. It is true that states may choose to regulate some or all of the waters not covered by the CWA to meet their needs and goals, but that decision is not based on a line defined by the federal agencies. Even where a state decides to limit its regulation of waters to those defined under the CWA, this is a state legislative choice – not one dictated by the federal government. In other words, the federal agencies are, indeed “*impairing or in any manner affecting any right or jurisdiction of the states*” when they suggest that they have authority to make this distinction.

We agree that the CWA provides for a major role by the states in many water programs defined by the CWA. When, for example, a state that has assumed authority under §404 of

⁵ U.S. EPA. *Connectivity of Streams and Wetlands to Downstream Waters: A Review and Synthesis of the Scientific Evidence*. U.S. Environmental Protection Agency, September 2013.

the CWA issues a permit authorizing a dredge or fill project under the authority of §404, that permit applies to waters defined by the CWA. However, if that state issues a similar permit for non-CWA waters, it acts under state law only, and the CWA is irrelevant.

The federal agencies must recognize that they can draw a line only between “federal waters” and other waters that they chose not to protect under the CWA. This is an important distinction in that the agencies incorrectly imply repeatedly that the CWA somehow incorporates both federal and non-federal waters, with the latter being the obligation of the states. But where the CWA mandates state actions – such as development of water quality standards – those actions are assigned to the federal agencies for those states that choose not to undertake them. Likewise, where a state operating a federal program – such as §404 of the CWA – issues a permit for state regulated activities in non-federal waters, the provisions of §404 do not apply. In short CWA state and federal programs are, while closely coordinated, distinct.

Secondly, the federal agencies erred by constructing a verbal wall between law and science, and specifically between the CWA and science. There is perhaps no other federal law that relies more heavily on the foundations of science. The overall framework of the CWA as written by Congress references the need for a scientific approach throughout the stated goals of the Act, the mandates placed on the state and federal agencies to support and carry out scientific research, monitoring, and reporting, and the definition of a comprehensive set of water programs that reflect the findings of those scientific activities. The proposal of the federal agencies to significantly reduce protection of the nation’s waters based on the claim that the rule of law must trump science – as if these two perspectives were inconsistent - flies in the face of the language of the Act.

Our current scientific knowledge regarding the nation’s waters is, in fact, in large measure due to the CWA and its strong emphasis on scientific research, scientific monitoring, and the incorporation of scientific knowledge into a broad array of state/federal water programs, thus developing a “comprehensive program for water pollution control” as defined in §102-104.

“The Administrator shall, after careful investigation and in cooperation with other Federal agencies, State water pollution control agencies, interstate agencies, and the municipalities and industries involved, prepare or develop comprehensive programs for preventing, reducing, or eliminating the pollution of navigable waters and ground waters and improving the sanitary condition of surface and underground waters. In the development of such comprehensive programs due regard shall be given to the improvements which are necessary to conserve such waters for the protection and propagation of fish and aquatic life and wildlife, recreational purposes, and the withdrawal of such waters for public water supply, agricultural, industrial and other purposes.” -CWA §102(a)

The CWA mandates that the states – or in their absence the federal agencies – plan, research, monitor, and report. Research, monitoring, and reporting of state findings are all supported in the CWA by federal grants and requirements.

Congress acknowledged in the CWA the complexity and integrated nature of waters in addressing groundwater, watersheds, nonpoint source pollution, hydrologic cycles, and related considerations. While the agencies find it convenient to limit the scope of federal jurisdiction based on “bright lines” – especially in terms of wetland protection – this approach does not do justice to the scientific, comprehensive program envisioned by Congress.

Anticipated Impacts of the Proposed Rule on Protection of Waters under the CWA

Geographic extent of proposed reduction of protected waters

ASWM believes that an alarming percent of the nation’s waters would be deregulated under the proposed rule. While the federal agencies have stated that available sources of data are not robust enough to analyze the total impact, there are in fact reliable sources to provide a sound estimate of at least the minimum impacts on jurisdiction.

Documents from 2017 obtained by various organizations from the federal agencies⁶ which summarize the extent of various categories of waters based on the USGS National Hydrography Dataset (NHD), and on the National Wetland Inventory (NWI), present the following information:

- 18% of stream miles in the conterminous United States (that is, excluding Alaska) are ephemeral. However, in the arid and semi-arid west 39% of stream miles are ephemeral. This information notes that mapping of ephemeral streams has been less intense in eastern states, and for this reason the percent of ephemeral streams nationwide may be underestimated.
- Nationally, 52% of stream miles are intermittent (48% of stream miles in the arid and semi-arid west).
- Nationally, 50.9% of wetlands mapped by the National Wetland Inventory do not intersect a stream mapped on the NHD. An additional 0.5% intersect only ephemeral streams mapped on NHD (based on mapping of ephemeral streams being concentrated in the arid and semi-arid west). Therefore, given the requirement of a

⁶ Copy of memo from Stacey Jensen, Corps of Engineers, to EPA staff dated September 5, 2017

“continuous surface water connection”, approximately 51% of the NWI mapped wetland acreage in the U.S. would not be considered adjacent. Additional “isolated” wetlands that are currently regulated would also be deregulated under the proposed rule, but we have not found data available to estimate that additional loss.

Thus, although the NHD and NWI may be considered less than fully accurate given *gaps* in mapping, these national databases still indicate that ***at a minimum***, the proposed rule would exclude 51% of the wetlands and 18% of streams in the conterminous U.S. from CWA protection.

This estimate of the extent of ephemeral and intermittent streams is consistent with a detailed report prepared by the EPA in 2008⁷, which further documents that:

- Ephemeral and intermittent streams provide the same ecological and hydrological functions as perennial streams.
- While a higher percentage of intermittent and ephemeral streams appear in the arid and semi-arid southwest, they are also a significant portion of stream miles in other states (e.g. South Dakota, where 86% of streams are intermittent or ephemeral, and Kansas where 81% are intermittent or ephemeral).

Ephemeral streams also tend to be more common in glaciated watersheds found in the northern U.S.⁸

Trout Unlimited has developed on-line interactive maps showing estimates of mapped intermittent and ephemeral streams in various regions of the U.S., with data from the NHD. Their results are comparable to those cited above, but also provide a particularly graphic view allowing for comparison of headwater stream percentages in different geographic areas⁹. Individual maps for some states are also provided at the referenced web site.

ASWM recognizes that estimates from these sources include certain wetlands that were not protected under the 2015 rule unless covered by the provisions for wetland shown to have a significant nexus with downstream navigable waters. However, it is clear that the proposed rule excludes a large portion of wetlands nationally that have been protected in

⁷ Levick, L., J. Fonseca, D. Goodrich, M. Hernandez, D. Semmens, J. Stromberg, R. Leidy, M. Scianni, D. P. Guertin, M. Tluczek, and W. Kepner. 2008. The Ecological and Hydrological Significance of Ephemeral and Intermittent Streams in the Arid and Semi-arid American Southwest. U.S. Environmental Protection Agency and USDA/ARS Southwest Watershed Research Center, EPA/600/R-08/134, ARS/233046, 116 pp.

⁸ GeoSpatial Services, Saint Mary’s University, Winona Minnesota

⁹ See <http://standup.tu.org/stand-up-for-clean-water/>

the past, and in recent years at least potentially protected given appropriate findings of a significant nexus. The exclusion of ephemeral streams will have different impacts in different regions of the country but would at a minimum exclude a significant percentage of ecologically important streams in the arid and semi-arid west. We believe that the loss of protection of the nation's waters associated with this rule is excessive, is inconsistent with the stated goals of the CWA, and that it has not been justified by the federal agencies.

Additional tools to evaluate the impacts of differing regulatory scenarios have been developed by the GeoSpatial Services (GSS) program at Saint Mary's University of Minnesota¹⁰. With grant funding from the Hewlett Foundation, GSS created a geospatial model that predicts the spatial extent of federally protected wetlands and waterways. This model uses three different analysis scenarios – none of which rely on the currently proposed regulatory language, but which can inform decision making, with the “very restrictive” scenario being very similar to the proposed rule:

1. Most Restrictive Scenario - This scenario limits protection of wetlands to those directly adjacent to perennial (permanent) streams/rivers only.
2. Very Restrictive Scenario - This scenario limits protection of wetlands to those adjacent to protected perennial (permanent) and intermittent (seasonal) streams/rivers.
3. Less Restrictive Scenario - This is the least restrictive of the modeled scenarios and limits protection of wetlands to those adjacent to protected perennial, intermittent and ephemeral (temporary) streams, and ditched or channelized streams.

The project included use of the comparative analysis to show the impact of regulatory changes for three geographically diverse case study watersheds using GIS and publicly available geographic digital data. The methods and communication of results were guided by a project advisory committee made up of science and legal professionals. While additional time is needed to apply this analysis across a broader landscape, the final project report¹¹ (Attachment A) regarding the analysis shows that narrowing the scope of federally protected waters would significantly reduce the number of streams, wetlands and wetland acreage protected by the Clean Water Act, leading to a potential loss of benefits provided by wetlands that would no longer be protected under the Act.

Most recently, this methodology was used to analyze the loss of federal protection of

¹⁰ <http://www.geospatialservices.org/news/2019/1/24/gss-partners-on-clean-water-rule-spatial-analysis>

¹¹ Meyer, R., and A. Robertson. 2019. Clean Water Rule spatial analysis: A GIS-based scenario model for comparative analysis of the potential spatial extent of jurisdictional and non-jurisdictional wetlands. Saint Mary's University of Minnesota, Winona, Minnesota.

wetlands that would result from the proposed rule in the Nanticoke River watershed located in Delaware and Maryland and flowing to the Chesapeake Bay¹². This analysis (Attachment B) demonstrated that the rule would result in deregulation of an estimated 20% of wetlands in the watershed, some 21,266 acres. Wetland functions associated with these wetlands include surface water detention (15,000 acres); wildlife habitat (16,000 acres); and nutrient transformation – protecting water quality (9,187 acres).

Loss of Federal Protection of Wetlands

Given the extent of change incorporated in the proposed rule, it is difficult to completely analyze the full impact on water resources within a 60-day comment period, but that potential impact is obviously sizeable. The proposed rule would significantly reduce protection of wetlands in two primary ways. First, the proposed rule shrinks the existing definition of “adjacent” to exclude the vast majority of adjacent wetlands that have been regulated since the 1977 amendments to the CWA. Secondly, the proposed rule deletes protection of wetlands defined by rule as having a significant nexus with traditional navigable waters as proposed by Justice Kennedy in the *Rapanos* case, and as implemented in the post *Rapanos* guidance and in the 2015 WOTUS rule. Either the 2015 rule or the 2016 post-*Rapanos* guidance are currently in effect in all 50 states.

The total adverse impact of the proposed rule on wetland resources compared to previous rules is difficult to quantify. Given the numerous well-documented benefits of wetland systems in the protection of downstream water quality, storage of precipitation and floodwaters, recharge of streams and groundwater during dry periods, provision of habitat and nursery areas for fish and numerous other organisms that depend upon the wetland component of aquatic systems, in addition to recreational and quality of life benefits, losses resulting from the proposed rule would extend well beyond even the significant reduction in acreage of protected waters alone. There is, however, no doubt that long-lasting adverse impacts would result. Pollution of traditional navigable waters can often, fortunately, be remediated over time by removal of the pollution source. By contrast, the loss of protection of wetlands too often leads to the draining and filling of wetland systems – that is, to the permanent loss of the resource itself.

We also note that the public frequently misunderstands the distinction between “regulation of (jurisdiction over)” wetlands, and “permissibility” of proposed actions. The CWA protects wetlands that provide important public services. Nonetheless, the vast

¹² Meyer, R., and A. Robertson. 2019. Clean Water Rule Spatial Modeling and Quantitative Analysis of Jurisdictional Wetlands in the Nanticoke Watershed, Maryland. Saint Mary’s University of Minnesota, Winona, Minnesota.

majority of permit applications submitted to the federal agencies (and to the states) are issued, albeit with conditions to help avoid and minimize impacts, and as needed with compensatory mitigation for losses. Many permit conditions actually benefit the landowner (e.g. correct sizing of equilization culverts to avoid flooding) while also protecting the resource. In other words, excessive deregulation of wetlands does relatively little to benefit many landowners, while generating adverse impacts to the public at large.

Discussion of proposed re-interpretation of “adjacent”

The CWA has protected wetlands adjacent to traditional navigable waters (TNW's) since 1977. The term “adjacent” has been defined since 1977 in Corps regulations as “bordering, neighboring, or contiguous.” The federal agencies proposed to redefine “adjacent” to mean only wetlands that “abut” or have a direct surface (not groundwater) hydrologic connection to waters of the United States, where “abut” is defined as meaning that a wetland physically touches the water in question.

The agencies assert that this new definition is consistent with the *Riverside Bayview* and *SWANCC* decisions, with the plurality (Scalia) decision in *Rapanos*, and with the opinion of Justice Kennedy in *Rapanos*. However, the *Riverside Bayview* decision essentially supported the regulation of adjacent wetlands, without discussing more remote wetlands. *SWANCC* discussed isolated waters – not adjacent wetlands. In the *Rapanos* decision, Justice Scalia argued for a limit on the extent of regulation of adjacent wetlands, but a majority did not agree with his decision. Justice Kennedy specifically disagreed with his decision.

ASWM is extremely concerned about the consequences of changing the definition of “adjacent wetlands” to eliminate a traceable groundwater connection, instead only recognizing continuous surface connections or flood inundation during a typical year of precipitation. Many wetlands are supported at least in part by groundwater, and in many wetlands, groundwater is the predominant source of supporting hydrology. These groundwater-supported wetlands are essential to other traditional surface waters by contributing base flow to maintain relatively permanent, perennially or seasonally flowing waters; storing floodwaters; and providing natural water quality and habitat benefits. We do not believe that it is possible to protect traditional navigable waters without regulating activities in wetlands hydrologically connected via groundwater to other surface waters. While some states will continue to regulate these wetlands, they remain concerned that their efforts to manage wetlands may be undermined when federal jurisdiction is lost for these wetlands, and upstream states do not have sufficient independent authority over waters and wetlands to fill regulatory gaps.

We also predict great difficulty in distinguishing between wetlands which would be considered “adjacent” under the new definition and those which lack the prescribed

surface connection during typical years. This would be difficult and time consuming for trained professionals, and even more so for the average landowner.

Loss of protection for riverine wetlands and other wetlands divided by natural or artificial dikes, berms, etc.

Of the many types of wetlands that would be left unprotected by the proposed rule, riverine wetlands are among the most common, and the most significant in their impact on traditional navigable waters. The proposed rule would eliminate federal jurisdiction over wetlands that are “*physically separated from jurisdictional waters by upland or by dikes, barriers, or similar structures and also lack a direct hydrologic surface connection to jurisdictional waters...*” (preamble to proposed rule page 4184). The preamble indicates that jurisdiction would be maintained if perennial or intermittent flow were established between the water and the wetland via features such as a culvert or tide gate, or by “overtopping” of the barrier. However, this approach is far more limiting than the traditional rule which simply provides that such barriers *do not* break the connection between wetlands and adjacent waters. As stated by Justice Scalia in the *Rapanos* decision, “*In many cases, moreover, filling in wetlands separated from another water by a berm can mean that flood water, impurities, or runoff that would have been stored or contained in the wetlands will instead flow out to major waterways.*” Wetlands that are physically separated by a surface connection still often have a traceable shallow ground water connection, demonstrated by properties of soils adjoining the stream channel.

This revision of the rule places a significant burden on the regulatory agencies to find and evaluate hydrologic connections with riverine floodplain wetlands, and to determine whether there is a hydrologic connection in a “typical” year (as defined in the proposed rule, over a rolling 30-year period). Given the extent of diking along major river systems such as the Ohio or the Mississippi and their tributaries, this would be a massive undertaking. Similar problems exist on a smaller scale for wetlands adjacent to all streams and their tributaries. Identification of culverts or similar feature along every perennial stream, including those heavily impacted by farm dikes, local roads, and so on, makes the approach difficult to implement with any accuracy and consistency in the timeframes allowed for dredge and fill permitting decisions. The result would likely be a considerable underassessment of such connections, with resulting errors in protection, and in general does not provide “bright line” clarity. This provision would also be expected to result in delays in review and increased uncertainty to applicants and landowners. It may take multiple trained personnel to make these determinations in the field that include hydrologic evaluations and wetland identifications.

Moreover, riverine wetlands typically have a *natural* hydrologic connection to rivers and streams through shallow subsurface waters, including filtration through berms.

Undisturbed rivers typically form natural berms as a result of sediment deposits associated with routine flooding. Patterns of flooding are unlikely to be sufficiently documented to readily define a “typical” year, but the hydrological connection is maintained regardless through groundwater flow. However, the federal agencies indicate in the preamble that groundwater connections will not be considered as “hydrologic connections.” We note that this position appears inconsistent with the language in the CWA that recognizes the importance of ground water (see CWA §102).

Flooding currently presents a growing threat in many areas of the nation, in some areas as a result of development and the past loss of wetland storage of runoff (as has been the case in Houston, TX), and also in response to more frequent severe storm events (as in the recent severe flooding of Midwest states in March 2019). Further loss of riverine wetlands by reregulation will exacerbate flooding. The flood impacts of major coastal storms, e.g. Hurricanes Katrina and Sandy, are multi-state. Limitation of damage by protection and restoration of coastal wetlands – which can extend miles inland beyond traditional navigable waters – is also connected to interstate actions. It is unlikely that extensive regional linear coastal wetlands will be protected by the term “abutting.”

Discussion of deregulation of “isolated” wetlands, and elimination of case-by-case jurisdictional determinations

The federal agencies propose eliminating regulation of “isolated” wetlands¹³ with this statement: *“The agencies propose to eliminate the case by case application of Justice Kennedy’s significant nexus test, proposing instead the establishment of clear categories of jurisdictional waters that adhere to the basic principles articulated in the Riverside Bayview, SWANCC, and Rapanos decisions while respecting the overall structure and function of the CWA.”* (preamble to proposed rule – pg. 4170). The agencies argue that the proposed regulation is “more specific”, thus eliminating the need for case by case analysis. They also argue that the proposed rule provides “better clarity for regulators and the regulated community” than the prior rule(s). While the proposed rule greatly simplifies the definition of federal jurisdiction, the proposed degree of simplification would sacrifice the protection of a large number of wetlands and other waters that benefit the public and were intended to be protected by the CWA. To the extent that the proposed rule deregulates waters that the public expects to be regulated, it does not provide clarity.

In the *Rapanos* case Justice Kennedy concurred with the plurality regarding the final judgement – that is, vacating the judgement of the Sixth Circuit, and a remand for further proceedings. He did not, however, concur with the Scalia opinion regarding the

¹³ By “isolated” we refer to wetlands located beyond the boundaries of adjacency to waters of the U.S. as defined in the existing rules

requirement that “adjacent” wetlands must possess a continuous surface water connection, nor Scalia’s opinion regarding the regulation of isolated waters. Concluding a discussion of the plurality decision and the basis for regulating a broader scope of wetlands and other waters of the U.S., Justice Kennedy summarized in part,

“Important public interests are served by the Clean Water Act in general and by wetlands in particular.” ... “The limits the plurality [Scalia opinion] would impose, moreover, give insufficient deference to Congress’ purposes in enactment the Clean Water act and to the authority of the Executive to implement that statutory mandate.”

It is significant that in his *Rapanos* opinion, Justice Kennedy also specifically describes the role in protection of water quality played by “isolated” wetlands, i.e. “...given the role wetlands play in pollutant filtering, flood control and runoff storage, it may well be the absence of hydrologic connection (in the sense of interchange of waters) that shows the wetlands’ significance for the aquatic system.”

The preamble to the proposed rule requests comments on Justice Kennedy’s opinion – additionally implying that the broad interpretation of the *Rapanos* decision by the agencies and the courts (making use of both the Scalia and Kennedy opinions) may be considered excessive compared to the agencies’ more narrow reading of the *SWANCC* decision (preamble to proposed rule – page 4167). The agencies then appear to dismiss Justice Kennedy’s opinion. ASWM supports both a narrow reading of *SWANCC* and a broad interpretation of *Rapanos*. This is easily understood given that *SWANCC* was a majority opinion with a clear final statement based upon the specific type of waters, and specifically on the use of the Migratory Bird Rule:

“We hold that 33 CFR §328.3(a)(3) (1999), as clarified and applied to petitioner’s balefill site pursuant to the “Migratory Bird Rule,” 51 Fed. Reg. 41217 (1986), exceeds the authority granted to respondents under §404(a) of the CWA. The judgment of the Court of Appeals for the Seventh Circuit is therefore Reversed.”

By contrast, the Supreme Court delivered a complex and fractured opinion in *Rapanos* with no majority. Moreover, no single opinion was as succinct as that in *SWANCC*. ASWM believes that to correctly implement the *Rapanos* decision, it has been necessary for the agencies and the courts to incorporate portions of more than one opinion in order to capture an interpretation consistent with the CWA and with prior rulings of the Supreme Court.

In addition, the preamble to the proposed rule indicates that the agencies are concerned that the usual broad reading of the significant nexus test relies too heavily on considerations outlined by Justice Kennedy (preamble – page 4196). Given that the Scalia opinion did not address the issue of a significant nexus, which was raised in the *SWANCC*

opinion, it is natural that Justice Kennedy's discussion is more frequently cited. The preamble further indicates that the agencies do not think that the opinion of a single justice in a complex case should be "the primary determinant of federal jurisdiction over potentially large swaths of aquatic resources..." ASWM notes that the 2015 rule did not rely only on the opinion of Justice Kennedy, but also the concerns expressed by Justice Scalia. Moreover, the opinion of "a single justice" (largely consistent with the opinion of three others) is not so distinct from the opinion of only four of the nine justices – that is, support for the Scalia opinion. Neither should alone determine the course of the agencies under the circumstances of this case.

Although the preamble presents discussion of the legal questions that may be raised regarding the regulation of isolated wetlands, it essentially eliminates these wetlands from the proposed new definition of waters of the U.S. without providing any sound reason for doing so. We are particularly concerned by the lack of any attempt to address the ecological values and associated economic benefits of these wetlands that were considered in development of the 2015 Rule.

Elimination of protection for special wetland types defined in 2015 Rule

The 2015 rule defines five special wetland types as potentially jurisdictional, thereby assuring federal protection. Prairie potholes, Carolina and Delmarva bays, pocosins, western vernal pools in California, and Texas coastal prairie wetlands are all considered similarly situated, and to have a significant nexus with other waters by rule. The proposed rule does not include these areas as "Waters of the U.S."

The preamble to the proposed rule offers no justification for the deregulation of these waters, other than the general discussion of eliminating case by case evaluations based on a significant nexus analysis. Because there is no justification for reversing the previous 2015 rule regarding these waters, ASWM objects to their exclusion from jurisdiction.

Loss of Federal Protection of Tributaries

The proposed rule to an extent simplifies the definition of streams as waters of the U.S. by including all tributaries regardless of size, provided that they contribute perennial or intermittent flow to navigable waters in a "typical year". Wetlands adjacent to jurisdictional tributaries – as defined using "abutting" – would also be jurisdictional. We agree that this approach would be useful in clarifying the extent of stream/tributary jurisdiction. In the field, however, this definition of a tributary would continue to be difficult to apply. Detailed flow information will not be available for many tributaries, and it may be difficult to determine flow patterns in a "typical" year, not to mention tracing that flow through various features from headwaters into the navigable waters. For this reason, at least some states found the 2015 Rule reliance on *physical indicators* of regular flow – i.e.

the presence of a bed and banks and an ordinary high water mark – useful in defining the regulated stream channel in the processing of a permit application. We also recognize that these features were not equally useful in all regions; our comments regarding regionalization of field methods are found below.

ASWM has major concerns regarding other aspects of the definition of tributaries, including the exclusion of ephemeral tributaries, and the impact of limiting “adjacent wetlands” to “abutting wetlands.” We also note the agencies’ request for comments regarding inclusion of intermittent tributaries, and therefore address that question in the following discussion.

ASWM accepts that there must be some limit to jurisdiction but believe that both ephemeral and intermittent streams are far too broad a category to be left unprotected in their entirety on a nationwide basis. We also understand the difficulty in readily identifying these water resources and their significance to navigable waters in the field by applying a simple definition on a nationwide basis. However, we feel that there are avenues that would clarify jurisdictional boundaries while providing for protection on a regional basis – e.g. in arid western states where some ephemeral streams have a large impact on the waters of a state or a group of states. This would require additional regionalization in the rule, which we also support as discussed below.

In discussing the agencies’ proposed approach to stream jurisdiction under the new rule, the Preamble rests heavily on a statement of the Science Advisory Board (SAB) to the effect that *“the literature review [the Connectivity Report] provides strong scientific support for the conclusion that ephemeral, intermittent, and perennial streams exert a strong influence on the character and functioning of downstream waters, and that tributary streams are connected to downstream waters”...* and to an additional SAB statement that *“the EPA should recognize that there is a gradient of connectivity”* and a recommendation that *“the interpretation of connectivity be revised to reflect a gradient approach that recognizes variation in the frequency, duration, magnitude, predictability, and consequences of physical, chemical, and biological connections.”* (page 82 of preamble).

While the preamble states that the agencies used the Connectivity Report to inform “certain aspects” of the proposed definition, they appear not to have applied the findings of the SAB regarding ephemeral streams – the SAB found that ephemeral tributaries exert a strong influence on downstream waters. While we agree that multiple factors including those listed in SAB’s statement (frequency, magnitude, etc.) might support the argument that ephemeral streams *may* have a lesser impact than perennial and intermittent streams on navigable waters, it does not mean that *no* ephemeral streams have a significant impact. Otherwise, they would not have been included in the SAB statement. Because the Connectivity Report did not define a precise line between significant or insignificant

ephemeral flow, the agencies chose to exclude this category of tributaries as a whole. We believe that it would be far more consistent with the CWA to make greater use of regional approaches and allow the identification of jurisdiction ephemeral streams based on the criteria listed above by the SAB.

Extent and importance of intermittent and ephemeral tributaries

A 2019 review paper published by the American Fisheries Society (AFS)¹⁴ reports that headwater streams (including intermittent and ephemeral reaches) comprise 79% of river length in the coterminous U.S. and directly drain just over 70% of land area. The AFS paper also cites numerous references that catalog the ecological services provided by intermittent and ephemeral streams, including provision of enhanced flood protection, flood mitigation, sustaining aquifers and – according to a 2009 report by the EPA – supplying clean water for more than a third of the U.S. population. The AFS paper reports that headwater streams combined provide an estimated \$15.7 trillion per year in ecosystem services to the coterminous U.S. Focusing on the role of intermittent ephemeral streams in support of fish habitat, the AFS paper documents numerous services including the following:

- Essential delivery of organic material to downstream reaches supporting fish and other aquatic life, and nutrient and carbon cycling. The AFS paper reports that ephemeral streams can support levels of aquatic invertebrate density and abundance – which support fish stocks - equal to or greater than estimated in perennial headwaters, while supporting unique species.
- Provision of a high percentage of flow to streams in arid regions. In some arid regions, up to 96% of streams contain little or no flow during much of the year, but are critical to the conveyance of runoff during the rainy season. During dry phases, ephemeral streams store organic matter, which is then cycled during the wet period.
- Provision of cool headwaters that provide both thermal refuge and spawning habitat for sensitive fish including trout and salmonids.
- Key support of both commercial and sport fishing and related ecosystems. One example documents that, “Nearly half of the population of Rainbow Trout ...in a Sierra Nevada mountain stream spawned in an intermittent tributary”. The report notes that among the most valuable commercial fisheries dependent on headwaters are the salmon fisheries of Alaska and the Pacific Northwest.

Consistency and legal concerns

¹⁴ Colvin, Susan A.R, et al. *Fisheries*. Vol. 44, Number 2, February 2019. Published by the American Fisheries Society.

- The proposed rule would allow intermittent flow to include melting of snowpack, but not precipitation (i.e. the same precipitation never contained in the form of snow). While we understand the difference in timing of the two contributions of precipitation, it seems inconsistent to limit the source of flow to snowmelt given changing climatic conditions that result in greater reliance on non-snow precipitation in increasingly arid regions. This distinction could result in the incongruous regulation of a tributary in some years but not others.
- We note that jurisdictional tributaries are not interrupted by flow through berms and similar artificial structures, but that adjacent wetlands would be interrupted by such structures, unless the flow is in a conduit. This appears to be inconsistent, since the hydrologic connection is similar.

Ditches and tributaries

ASWM supports the clear inclusion of certain ditches within the definition of “waters of the U.S.” as a step to clarification of these resources. However, we have identified the remaining concerns regarding the treatment of “ditches” in the proposed rule.

- We anticipate some confusion in determining whether an artificial ditch was historically created within a natural stream. This is particularly true where artificial channels were created long ago, and records of the original stream channel are scarce, even though some old channels can be identified with advanced techniques such as use of Lidar. For this reason, we are concerned that unless the original natural stream channels are identified, the default of the proposed rule is to consider such a ditch non-jurisdictional. We recommend additional field guidance to more accurately direct this decision, most likely based on regionally available information.
- We request an explanation of how exclusion of artificial drainage ditches (created in uplands) squares with the CWA §404(f)(1) exemption for maintenance, but not construction, of drainage ditches. Maintenance of drainage ditches created in upland and then flowing perennially may be of particular concern. The preamble indicates that such ditches would be excluded from regulation, yet the CWA exemptions indicate that maintenance would be regulated.
- We note that the proposed rule creates a new gap in regulation of ditches that would drain non-abutting wetlands, regardless of their role in water management, presence of endangered species, or similar issues. A return to the era of extensive wetland drainage is inappropriate under the CWA, and inconsistent with Congressional and legal history.

- We recommend the development of regionalized field guidance to clarify the regulatory status of “ditches” taking into account regional vernacular, land use history, and state/local resources available to identify upland ditch construction.

Federal jurisdiction over lakes and ponds

The proposed rule would add “certain” lakes and ponds to the list of waters of the U.S. as a separate category. ASWM strongly supports this approach, particularly given the closely integrated habitats provided by lakes and shoreline shallows and wetlands, and the integration of ponds and open water areas with many ecological types of wetlands.

However, we are concerned with the limits being placed on this category of waters that were not in place before, and in particular the exclusion of lakes that do not provide permanent or perennial flow (in a typical year) to downstream navigable waters, and that are not themselves considered (a)(1) waters. We do not find this limit to be consistent with the CWA for a number of reasons.

- Inland lakes have long been regulated as Waters of the U.S. without any limitation regarding their hydrologic connection to downstream waters. While the agencies indicate that lakes may, in themselves, be treated as navigable waters, the language of the exclusion implies that they may not be, given that only “certain” lakes are to be included in the definition. This approach in turn leads to questions regarding the nature of interstate and foreign commerce related to lakes. Does an undeveloped lake in a state or national forest in a closed basin contribute to interstate and foreign commerce? Does it do so if it can be navigated by canoe for recreational purposes? Must regulated lakes support a single cabin or campsite?
- Inland lakes have long been a significant component of the CWA through the §314 Clean Lakes Program, integrated reporting to the EPA, and monitoring through the §314 Program and more recently through the National Lakes Assessment. None of these programs exclude closed basin lakes and ponds.
- Lakes that are more isolated from larger tributary systems provide habitat that is important for certain species; for example, many ponds are critical habitat for amphibians that require protection from large fish populations, and/or upland breeding habitat. They can also serve as refugia from invasive species.

ASWM also notes that Justice Scalia also included “relatively permanent” lakes as one of the geographical features commonly understood to be “waters”. We find no justification for limiting the protection of lakes as is proposed in this rule.

We also have concerns regarding limitation of the term “ponds”. While less well defined, there being no distinction in federal law between lakes and ponds, many ponds are nonetheless relatively permanent waters that provide both economic and ecological value. Many types of ponds are considered to be exceptional resources in various regions, such as

those included in the 2015 rule as potentially jurisdictional based on the finding of a significant nexus, including prairie potholes, western vernal pools, and pocosins. We suggest that guidance regarding ponds be regionalized to account for such types that provide important public benefits on a regional basis together with appropriate protection.

Federal protection of impoundments

The federal agencies do not propose to make any changes to the impoundment category of “waters of the U.S.,” but they do question whether certain categories of impoundments should not be jurisdictional – citing, “*impoundments that release water downstream only very infrequently or impede flow downstream such that the flow is less than intermittent.*” [See page 4173 of Preamble.] Impoundments are created and managed for certain purposes, some of which require that releases be non-continuous as water is stored as much as possible. Uses may include drinking water supply and irrigation. These are critical uses, with direct economic impacts. Therefore, ASWM believes that the existing regulation regarding impoundments should be maintained, recognizing that impoundments may not follow a typical natural flow pattern, but that they directly impact both upstream and downstream flow, and impact commerce in their own right. We further believe that placing these structures in another category would only confuse definitions of natural patterns of flow in other waters with the managed flow of impoundments. In sum, we agree that there should be no change to this category.

Federal protection of interstate waters

The federal agencies are proposing to eliminate “interstate waters” as a separate jurisdictional category. Rather, such waters would only be jurisdictional if they were also defined as traditional navigable waters, or as part of another jurisdictional category. ASWM strongly objects to this proposed revision.

As discussed above (see roles of federal agencies), we view the protection of interstate waters – and thereby the protection of states from actions of upstream or neighboring states that harm downstream interstate waters – as one of the primary obligations of the federal agencies under the CWA. The federal agencies indicate that, “*interstate waters without any connection to traditional navigable waters would be more appropriately regulated by the states...*” (preamble to the proposed rule – page 4172). However, a state or tribe has no mechanism (short of a series of legal water wars fought in the Supreme Court) to compel an upstream state to control pollution of waters flowing downstream if not regulated by the CWA. Thus, the need for a federal authority and established regulation. Justice Scalia noted the importance of the federal agencies in regulating interstate waters in his *Rapanos* opinion: “...the Act protects downstream States from out-of-state pollution that they themselves cannot regulate.”

The federal agencies admit that the proposed modification would reduce the scope of jurisdictional waters due to proposed changes to the definition of “adjacent” and deregulation of ephemeral streams. As discussed previously, extensive areas of riverine and coastal wetlands (which extend inland beyond tidal wetlands) among other types, would be deregulated by the change in the definition of adjacent. These types of wetlands are also typically linear, impacting multiple states along a river system or coastline. Thus, the actions of one state could impact the extent of flooding, storm damage, etc. in adjacent states. Likewise, where ephemeral headwaters have a major impact on already limited water supplies in the arid west, deregulation could mean the disturbance of these portions of interstate systems – potentially reducing water supplies to downstream states – with no federal oversight.

Importantly, we draw attention to the preamble to the EPA-Corps of Engineers *Technical Support Document for the Clean Water Rule: Definition of Waters of the United States* (May 2015). We find the documentation supporting the 2015 Rule regarding Interstate Waters particularly thorough and compelling. Excerpts from the legislative history of the 1972 CWA quoted in the Technical Support Document (page 218) capture a clear image of legislative intent.

“...the control strategy of the Act extends to navigable waters. The definition of this term means the navigable waters of the United States, portions thereof, tributaries thereof, and includes the territorial seas and the Great Lakes. Through a narrow interpretation of the definition of interstate waters the implementation of the 1965 Act was severely limited. Water moves in hydrologic cycles and it is essential that discharge of pollutants be controlled at the source. Therefore, reference to the control requirements must be made the navigable waters, portions thereof, and their tributaries.”

The Technical Support Document provides a thorough evaluation of legal decisions and legislative history related to the regulation of interstate waters. ASWM finds nothing in the currently proposed rule and its preamble to negate the conclusions of the federal agencies in the 2015 Technical Support Document. Therefore, we ask the agencies to consider the discussion of Interstate Waters in the 2015 document to reflect the position of ASWM.

The Need for Regionalization:

Improving Clarity at the Field Level while Maintaining Scientific Integrity

The federal agencies state that, “Today’s proposed definition of ‘waters of the United States’ would establish bright line jurisdictional boundaries that are intended to be easily comprehensible and implementable by the regulated community...” While this is a worthy goal, decades of experience at both the state and federal level administering the CWA and researching water quality under the authority of the Act have documented the complex

nature of the nation's waters under the highly diverse landscapes, geography, climatic zones, land use patterns, and numerous other factors found across the nation. The proposed rule's attempt to achieve "bright line boundaries" does so by sacrificing types of waters that are less easily defined or mapped but which nonetheless may place a critical role in the integrity of the aquatic system as a whole. Some of the proposed new definitions are not in themselves easily understood.

ASWM concurs, however, with the goal of providing clarity and, where possible, greater simplicity in the regulatory process. We appreciate the recommendations in the preamble to support mapping efforts, which provide information based on regional conditions that is highly useful for both the regulatory agencies and landowners. However, we emphasize that while mapping is very useful for a number of programmatic purposes, remote sensing remains limited in its ability to define project level jurisdictional boundaries and cannot be used to substitute for field level jurisdictional determinations.

Even with costly human interpretation and field validation, the accuracy of resource maps is limited by multiple factors.

- Accuracy is dependent upon the timing of both field studies and collection of remote imagery (such as aerial or satellite photography). Data collected following a precipitation event may result in upland areas appearing to be wetlands. True wetland boundaries may be obscured by flooding. Field verification must be carried out during the growing season, which varies by ecoregion.
- In many situations, determining the precise wetland boundary and thus the extent of regulated wetlands requires site-specific information from on the ground surveys. While some waters lend themselves to remote identification of boundaries, it will be impossible to comprehensively determine jurisdictional boundaries using remote means.
- Many soil signatures associated with wetlands are not visible in remote imagery.
- The actual ink line shown on a map may in fact cover an area 50-80 feet in width, depending on scale, thus obscuring narrow bands of wetlands along streams, stream banks, and property boundaries.
- The transitional nature of wetlands means that boundaries often tend to shift over time, requiring frequent update of maps, or field verification of current boundaries.

For these reasons, any mapping dataset should include the caveat that maps are not definitive of actual conditions on any particular location.

Other regionalized field methods

In addition to mapping, we strongly suggest that the agencies look to their own past approach to CWA programs in:

- Regionalizing field methods for the identification of jurisdictional boundaries (through development of regional wetland delineation manuals to first identify wetlands, and then through the application of guidance to distinguish between jurisdictional wetlands and non-jurisdictional wetlands);
- The development of Corps of Engineers Regional General Permits that define and simplify regulation of activities that are found unlikely to result in unacceptable impacts on the nations waters in a given region, while maintaining protection of waters in other regions. For example, this could be a means of addressing ephemeral waters in regions where they are a significant aquatic resource;
- Identification of resources of special, national value but typically found in a given region. The wetlands protected by rule under the 2015 Rule – prairie potholes, Carolina and Delmarva bays, pocosins, western vernal pools, and Texas coastal prairie wetlands – are an excellent example of effective regionalization; and,
- General tailoring of coordination between state and federal agencies on a state by state basis, depending on the extent of and structure of regulations in a given state.

These field level approaches provide the necessary flexibility to mesh with local conditions and regulations and can be relatively readily developed through guidance documents. They are well proven and directly address the need to clarify the regulation of waters for the public, avoid state/federal duplication while fully protecting downstream states, and simplify regulations in a manner that can focus on both the resources that are under threat in a given region, and the activities of concern in a given region. Regional approaches also have the benefit of resulting in regional practices that are adapted to local conditions, and thus easier to implement for the regulatory community, and easier for the public to understand.

The Economic Analysis of the Proposed Rule

ASWM previously commented on the economic analysis prepared to support EPA's "Recodification of Existing Rules" in a letter dated September 22, 2017. Those comments objected to EPA's dismissal of the economic analysis for the 2015 rule as being outdated, and to the exclusion of ecological benefits as unquantifiable. We appreciate the attempt by the federal agencies to respond to these concerns in the current rulemaking by providing a partial quantification of wetland benefits associated with ecological services, although we have significant remaining concerns, as discussed below. We remain confused about the dismissal of the studies used in 2015 as being outdated, given that the time frame of studies cited in 2015 and in the current economic analysis (EA) overlap.

We also found the current EA exceptionally difficult to review and to compare with both the EA for the 2015 rule, and the EA for the proposed revocation of the 2015 Rule published in 2017. Multiple methods and scenarios used in the current EA resulted in numerous perplexing, and often inconsistent results. We do not believe that the presentation of information in the EA – including the overviews in the Preamble to the Rule and in the Executive Summary of the EA itself – will achieve the stated goal of “*informing stakeholders and the public about the potential implications of the proposed actions*” and doubt that most readers will understand the basis for the agencies’ conclusions. We suggest revision of the summary in the Preamble to clarify the overall economic impact of replacing the post-*Rapanos* guidance and the 2015 rule with the proposed version, taking into account the issues discussed below.

Comparison of “Stage 1” of the EA to the 2015 Rule EA

This portion of the EA is intended to evaluate the costs and benefits of returning to the post-*Rapanos* guidance (which remains in use in 28 states) from the 2015 rule (in use in 22 states). Thus, it is essentially a reversal of the 2015 EA where avoided costs to the regulated community and foregone benefits to the public documented in the two EA’s need to be compared.

The EA supporting the 2015 rule estimated the benefits provided by that rule – including the benefit of ecological services provided by protected wetlands – to be \$257-345 million. The federal agencies subsequently rejected the EA for the 2015 rule in 2017, when the agencies published a proposed recodification of the pre-existing rule. An article published in *Science*¹⁵ compared the 2015 and 2017 EA’s, noting “*The cost estimates remained unchanged, but the quantified benefits in 2017 decreased by almost 90%. The difference stems from a decision in the 2017 [EA] to exclude wetlands-related benefits...*”

The EA for the currently proposed rule does attempt a new estimate of (foregone) economic benefits associated with wetland services. However, we find the result unconvincing. The agencies rejected the 2015 analysis in part due to the age of supporting studies cited in 2015; we note that the age of studies used in 2015 and 2017 essentially overlap. More importantly, the new analysis estimates that the benefits that would be foregone under the currently proposed rule are still some 65-70% lower than the ecological benefits estimated by the 2015 analysis. Given that similar willingness-to-pay methods were used in both 2015 and 2018, and recognition of the importance of ecological services provided by wetlands – as listed by the agencies in the Stage 2 qualitative analysis - we have difficulty relying on the findings in Stage 1. This is not the result one would

¹⁵ Boyle, K.J. et al, *Deciphering dueling analysis of clean water regulations; Hundreds of millions of dollars in benefits were discarded*. *Science*, October 6, 2017.

anticipate from a minor “correction” of methods, and ASWM requests review of the economic analysis by an independent economic expert.

Basing the estimate of “foregone benefits” to the loss of mitigation for currently permittable losses of wetland that would be de-regulated under the proposed rule

The estimate of “foregone benefits” associated with the proposed rule is based on the acreage of mitigation required as conditions of past Army Corps of Engineers permits authorizing the loss of wetlands that would be deregulated under the proposed rule. However, following deregulation of a large percentage of the wetlands that are jurisdictional under the 2015 rule (and the post-*Rapanos* guidance), the agencies should anticipate *increased* loss of those types of wetlands - at least where no equivalent state programs are available to take their place. The public is loath to apply for permits where it is clear permits are unlikely to be approved; however, following deregulation of wetlands, it must be assumed that wetlands would be dredged and filled in a manner that would not currently be permittable. Thus, the foregone benefits should include not only lost mitigation for currently permittable losses, but losses that are not currently permittable. Yet even in scenarios in the EA that assume low or non-existent state regulation (i.e. scenario 0), the lost benefits are only considered equivalent to those provided by past mitigation.

Concerns regarding scenarios that involve differing levels of existing or potential state regulation

The EA provides a detailed evaluation of both avoided (permitting and mitigation) costs and foregone benefits (from mitigation for authorized activities) under a range of scenarios that reflect the extent to which states have existing, or may develop, permitting programs to fill the regulatory gap left by the new rule. Avoided costs are lower when states are estimated to more widely replace federal regulation, reflecting the assumption that applicants will still need to submit state permit applications and mitigate for impacts under state regulations.

The EA states that it employs a “simplifying assumption” that states with existing programs will have “the capacity and interest to regulate non-federal jurisdictional waters.” This assumption is based on the premise that states that have stronger regulatory programs will continue or strengthen their state controls is based on out of date assumptions. The analysis argues that decisions made in states in the early 2000s would be mirrored if the new Rule is adopted. However, current analysis of the political climate indicates that these same decisions would not be a given. The assumption of 29 states taking equal or greater control over permitting at the state level is flawed and overvalues states’ contributions to protecting resources.

Secondly, we note that while the agencies consider the continued cost to the permit applicant, they do not appear to account for the significant cost imposed on those state agencies that replace federal regulators. This may include the full cost of developing and promulgating new regulatory programs and implementing those permitting and enforcement programs, including the cost of hiring and training needed staff. This does little to inform state and local regulators of likely economic impacts of the proposed actions. However, deregulatory benefit cost analysis assumes that there is almost always a cost associated with taking over control of regulation from one entity to another; these costs should be incorporated into any analysis.

Thirdly, the EA argues that regulation may be more efficient in some states than regulation by the agencies. However, many states that rely solely on 401 Certification as their state regulatory tool, would have the largest stretch to develop capacity to take over control of state waters through a new state program. Many of these states also have the least resources, fewest regulatory staff to take on capacity building activities and the largest number of waters that would no longer be covered (e.g. arid western states having lost federal jurisdiction over their largely ephemeral wetlands and other waters).

We also note that foregone benefits are highest when state replacement for federal regulations is not anticipated, as in Scenario 0. This scenario most closely mirrors the EA that estimated the *increase* in ecological benefits provided by the 2015 rule, and for that reason, we recommend that only this scenario be used to compare with the 2015 rule. Our concern regarding the differing willingness-to-pay studies used in the 2015 and 2019 EA's remain.

Concerns regarding the Stage 2 evaluation

Stage 2 is described as an estimate of economic impacts of moving from the post-*Rapanos* guidance to the proposed new rule. This is the only portion of the EA that addresses the costs and benefits of the new rule itself. That is, while the economic impact of moving to the 2015 Rule from the post-*Rapanos* guidance has been evaluated before, and is reevaluated in the 2019 EA, only "Stage 2" of the current EA considers the economic impact of the shift from the 2015 rule to the 2019 proposed rule. The agencies find it impossible to create a full cost/benefit analysis of the 2019 proposed rule, reflecting their stated "inability" to estimate the geographic impact of that rule. However, they have prepared an estimate of impacts to the §404 program only, reportedly using the same methods as in Stage 1 (i.e. use of Corps records of permits issued, and foregone benefits based on a willingness to pay model). Again, scenarios reflecting anticipated state replacement of Corps programs are used, but state costs are not considered. Our other concerns regarding the Stage 1 assessment also apply here.

Stage 2 also includes a qualitative catalog of wetland ecological services which may be lost when wetlands are deregulated; we would find this information more useful to the public if literature values for the economic values of these services were included. For example, a team of scientists from the conservation, engineering, and insurance sectors report in 2016¹⁶ that coastal wetlands prevented \$625 million in property damage during Hurricane Sandy, and that these wetlands can reduce annual storm damage by 20%. Many other published studies have assigned economic figures to ecosystem services provided by wetlands. Finally, Stage 2 includes three detailed, quantitative case studies for specific watersheds, again focused on a comparison with past regulatory impacts only. Given that the extent of permit issuance and mitigation required in the three study watersheds was so limited that the lower estimates of “foregone benefits” are *zero*, we do not find these case studies useful in evaluating the impact of the proposed rule.

ASWM Conclusions and Recommendations

ASWM recognizes that the foundations of the CWA rest upon scientific principles, and we draw attention to the major role of science in advancing the protection of waters of the U.S. Monitoring and assessment of the extent and condition of the nation’s waters in turn support evaluation of the effectiveness of the Act’s various programs, and we therefore stress the importance of science in guiding the evolution of regulations within the legal framework of the Act. Awareness of current science is also essential in looking to emerging challenges, including climate change and the ongoing identification and analysis of previously unrecognized pollutants. Good government demands incorporation of new scientific information into both regulatory and non-regulatory programs as they are developed.

Based on our review of the proposed rule and supporting documents, and given the established role of the states as co-regulators within the framework of the CWA, ASWM makes the following recommendations to the federal agencies in regard to the proposed rule re-defining Waters of the U.S.

1. Revise the proposed rule to fully protect wetlands as envisioned under the CWA, and consistent with the full scope of the Supreme Court decision in *Rapanos*, by

¹⁶ Narayan, S., Beck, M.W., Wilson, P., Thomas, C., Guerrero, A., Shepard, C., Reguero, B.G., Franco, G., Ingram, C.J., Trespalacios, D. 2016. Coastal Wetlands and Flood Damage Reduction: Using Risk Industry-based Models to Assess Natural Defenses in the Northeastern USA. Lloyd’s Tercentenary Research Foundation, London.

accounting for both the Kennedy and the Scalia opinions.

- Revise the definition of “adjacent” to recognize the aquatic interconnection of wetlands with navigable waters and their tributaries. This includes wetlands connected to navigable waters through groundwater including flow from wetlands in close proximity to navigable waters or separated from such waters by natural or manmade berms, dikes, or roads, consistent with the Supreme Court decision in *Riverside Bayview*. Critical headwater wetlands which provide flow to a stream may also be connected to that stream by ephemeral stream headwaters.
 - Include within the definition of federally regulated waters those wetlands having a significant nexus with navigable waters as defined by Justice Kennedy in the *Rapanos* opinion and consistent with other Supreme Court opinions. In particular, include those ecological types of wetlands found in specific regions for which such a connection has been previously established (prairie potholes, Carolina and Delmarva bays, pocosins, western vernal pools, and Texas coastal prairie wetlands). While we recognize that a typical landowner cannot make a finding or a significant nexus, the same is true of components of the rule that require analysis of hydrologic conditions. We believe that the ecological importance of protecting waters of the U.S. outweighs adherence to simplified identification of the boundaries of those waters.
 - Provide a good estimate of the geographic extent of federal deregulation proposed in the rule. Current mapping and database sources provide sufficient sound data to provide estimates of the impact on wetlands, which will better inform final decisions regarding the proposed rule. Much of the current data regarding the extent of various wetland types and their connections to navigable waters was developed with federal funds specifically to inform management decisions; these sources should not be ignored.
 - Recognize that if federal rules remove CWA protection from a portion of the nation’s wetlands, then pollution, drainage, filling, placement of fill in floodplain wetlands, and other loss of deregulated wetland resources will increase significantly, and will include adverse impacts that are inconsistent with the 404(b)(1) guidelines (e.g. filling of wetlands and neighboring lakes and streams for residential, commercial or other uses where there are alternatives available, and placement of fill in floodplain wetlands). While some state programs may provide alternate protection, in many other states there is no protection equivalent to the CWA. Thus, the ecological and economic impact of deregulation goes well beyond the loss of mitigation for the loss of wetlands that is typically *permitted* under current regulations.
- 2. Revise the proposed rule to fully protect navigable waters and their tributaries as envisioned under the CWA. Maintain the basic definition of tributaries in the proposed rule protecting all perennial and intermittent streams. In addition, provide a reasonable level of protection of ephemeral waters that are important**

for protecting downstream traditional navigable waters.

- Recognize that ephemeral streams make up a significant portion of stream resources in some regions, particularly in the arid Southwest, and that removal of protection for these streams will lead to increase pollution of downstream waters, as well as loss of critical habitat.
- Consider providing for protection of ephemeral streams on a regional basis, with field evaluation of these features based on guidance developed cooperatively by federal agencies, states, and tribes based on the actual importance of these streams to regional aquatic systems.
- Provide protection for interstate ephemeral streams where the loss of protection would potentially impact the quality and quantity of waters reaching downstream states.
- Clarify the distinction between regulated and unregulated ditches. ASWM supports the inclusion of regulated ditches in the definition of “waters of the U.S.” as a good step in clarifying this issue. However, uncertainty remains where alteration of natural channels occurred so long ago that it is unclear whether the ditch was entirely manmade; therefore, the default to an unregulated condition is of concern. The current definition also creates uncertainty about the intersection of regulated tributaries and manmade ditches. It is likely that field level guidance will be needed to clarify these issues.

- 3. Revise the proposed rule to retain “interstate waters” as a category of jurisdictional waters.** We understand the logic of the proposal to regulate only interstate waters that otherwise meet the definition of “waters of the U.S.” However, the regulation of interstate waters reflects one of the primary roles of the federal agencies, i.e. to protect the waters of downstream states from the actions of upstream states, regardless of differences among states in the regulation of waters.

In particular, given that ephemeral streams make up a significant portion of aquatic systems in arid states – which are also among the most vulnerable to additional pollution or loss of water – interstate ephemeral streams should be included in the category of interstate waters, with the understanding that existing regulatory processes – such as Corps Regional General Permits – can be used to streamline permit programs as appropriate.

- 4. Retain the clear inclusion of certain lakes and ponds within the definition of waters of the U.S.** Clarification of the status of these waters is a positive step. However, we believe that field level guidance will be needed to support identification of lakes that – even if not connected to downstream waters – are considered to be traditionally navigable in their own right, recognizing recreational uses as supporting

interstate commerce.

5. Take full advantage of existing programs and regulatory processes developed under the CWA to increase clarity and efficiency at the field level. We recognize that making CWA jurisdictional decisions at a national level is difficult given the regional variation in water resources. This is one reason that routine regulatory decisions under multiple CWA programs are made largely at the field level in both federal and state agencies. This is essential to account both for national regulatory standards, and the actual conditions on the ground which vary regionally.

- Field level guidance developed cooperatively by multiple state and federal agencies can effectively account for regional differences among aquatic resources. For example, regional wetland delineation manuals have supported the identification of regional criteria that most accurately identify wetland boundaries.
- Field guidance can be used effectively to further clarify definitions used in the new rule. Examples include guidance in determination of a “typical year” or whatever timeframe is adopted in the final rule; the definition of “ditches”, both to cross walk definitions with regional and local vernacular, and to provide information on original “natural” drainage networks; and for “direct hydrologic connections” – particularly where local conditions – i.e. karst topography – can have a major impact on these definitions. Other terms would also benefit from regional guidance for both regulatory staff and the public.
- As an alternative to excessive deregulation of categories of waters that are more significant in some regions than others, but that collectively have national significance, greater use could be made of Corps Regional General Permits and State General Permits. Under such permits, appropriate regulatory review may be carried out where appropriate, while permitting can be streamlined in states where loss of these resources has limited impacts.

6. More accurately acknowledge the integration of state and federal roles and responsibilities in implementation of the CWA. While state, tribal, and federal water programs overlap and complement each other to a very great extent, they are not interchangeable. State regulation cannot be wholly substituted for CWA protection of those waters that Congress intended to be protected by CWA. Nor are agency roles binary – fully split between state programs and federal ones. Rather, most state programs rely on some aspects of federal ones, while still avoiding duplication to the extent possible. Therefore, we recommend the following.

- We appreciate acknowledgement in the preamble of the proposed rule of the CWA policy stated in CWA Section 101(b) - recognizing and preserving the rights and responsibilities of the states. However, consideration of state and federal cooperation must at least equally focus on the goal stated in CWA Section 101(a) - to restore and maintain the chemical, physical, and biological integrity of the nation’s

waters. These goals are complimentary, and removal of CWA protection of a portion of the nation's waters fails to fulfill either goal.

- Do not imply that state regulation can replace federal responsibilities under the CWA. Cooperative federalism under the CWA includes state implementation of numerous programs on the ground, reducing duplication of effort and providing effective and efficient service to the public. However, ASWM recognizes that state water programs complement, but do not replace, CWA authorities. Shifting responsibility from federal government to the states does not ensure that CWA goals will be met, especially for those states that have more limited regulatory programs or rely entirely on the federal law.
 - Recognize that federal responsibilities defined by the CWA – even when CWA programs are administered by the states – include setting minimum national standards and goals and enforcing those standards; providing enforcement assistance; funding of state monitoring, mapping, and other regulatory and non-regulatory programs; encouraging interstate consistency; and, protecting downstream states from actions of neighboring or upstream states that are beyond their control and that can diminish the quantity or quality of shared water resources.
 - Account for the fact that enforcement of CWA requirements is frequently coordinated among state and federal agencies, especially for complex concerns such as oil spills which may first impact headwaters before moving into traditional navigable waters. Such situations require coordination and cooperation – not a bifurcation of state and federal responsibilities.
 - Recognize the unintended consequences of deregulating some waters and wetlands that have been protected by the CWA. For example, obtaining permits under Section 10 of the Endangered Species Act as a private citizen is much more costly and time-consuming than coordinating this process under Section 7 of the ESA during issuance of CWA dredge and fill permits, as is routinely done. Deregulation of some waters can also have a ripple effect on non-regulatory programs such as non-point source management. Finally, mitigation banks developed to comply with CWA requirements may not be applicable to state-only permit programs or may not be used at all where there are more limited state regulations. Other examples can be readily identified.
7. **Correct the unsubstantiated assumption in the proposed rule and that many states will replace federal CWA protection of waters with state regulations.** While some states already support robust programs, others have more limited regulatory programs, or rely entirely on the federal law. Some state agencies are prohibited from exceeding the scope of federal regulation; thus, as federal protections are reduced, so are state protections in states with "no more stringent than" laws. Given that many of the states with more limited regulation are those that are most

impacted by the effects of cycles of drought and flooding, and that those states also have the largest percentage of non-abutting wetlands and ephemeral streams, we believe that the federal agencies are relying too heavily on transfer of authority over many waters to the states. We therefore recommend the following.

- Recheck information in the resource assessment to ensure that all state agencies with responsibilities for various CWA programs ties are identified in each state.
- Avoid federal deregulation of categories of waters that have great regional significance. Rely on regionalized approaches to maintain a level regulatory playing field.
- Recognize the significant time and financial resources needed for states to adjust their water programs in light of the final rule, and in particular to expand state jurisdiction for states that make this decision. The time to enact new legislation may extend to months and years, particularly for those states having part time legislatures.

8. Correct the economic analysis to more accurately account for costs and benefits as compared to current rules. The economic analysis is highly technical and complex. Nonetheless, our analysis indicates that it contains significant gaps, and it does not satisfy our concerns regarding differences between the current analysis and that for the 2015 rule.

- Although some attempt was made to identify the ecological service of wetlands in a qualitative way, this does not appear to have significantly influenced the conclusions of the analysis. The failure of the analysis to account of the great economic value of these benefits remains.
- The analysis defines negative economic benefits primarily in terms of mitigation that would not be required for the kinds of permits that are typically authorized under the existing rule. It ignores that fact that the proposed rule would almost certainly result in increased loss of wetlands that are no longer regulated in states which do not have programs equivalent to the CWA. That is, in many situations where wetland permits would currently be denied (or where private owners may not even apply for a permit) wetlands will no longer be regulated and will therefore be subject to pollution or outright destruction by drainage and filling, with full loss of ecological services.
- The economic analysis does not account for increased costs to the states when it assumes that states will take over protection of deregulated wetlands. By reducing the scope of jurisdiction, the federal agencies reduce *their* permitting cost, but fail to recognize that shift of cost to some states and/or the further loss of ecological services to the citizens of states that cannot assume this greater burden. The

economic burden on states will be great in both instances.

- We request a review of the economic analysis by an independent economic expert.

9. Lay the groundwork for post-rule implementation now. Regardless of decisions made in issuance of a final rule re-defining “waters of the U.S.” that rule will require some degree of implementation guidance and/or training. We see it as important that the final rule and supporting documentation lay out the framework for implementation, including how states will be involved. Specifically:

- Development of field procedures and guidance needed to implement the new rule should be developed to the greatest extent possible concurrently with revision and release of the final rule, and in cooperation with co-regulators. Note that the lack of guidance will encourage multiple and likely diverse interpretations of the new rule by both regulatory staff and private consultants. The end result of this scenario will include both delays and legal costs for all stakeholders.
- Financial support from the federal agencies will be needed to support states to ensure a smooth transition. In addition, regional field manuals and training for state co-regulators are essential. States receive and appreciate federal funding from a variety of Clean Water Act sources. Funds are used for implementation (Section 106) and for program improvement (State Wetland Program Development Grants). We request that a change in federal jurisdiction not result in a corresponding decrease in federal funds available to States and request that the federal agencies increase, or at least maintain, the level of federal funding to States to implement sound water management programs, as intended by the Clean Water Act.
- We request that the federal agencies coordinate with the states and tribes throughout the development of national and regional guidance and field procedures.

Attachment A

Saint Mary's University of Minnesota Final Report

Clean Water Rule Spatial Analysis

*A GIS-based scenario model for comparative analysis of
the potential spatial extent of jurisdictional and non-
jurisdictional wetlands*



ON THE COVER

Photo of wetland restoration site in Bowler, WI.

Clean Water Rule Spatial Analysis

A GIS-based scenario model for comparative analysis of the potential spatial extent of jurisdictional and non-jurisdictional wetlands

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Contents

	Page
Contents	i
Figures.....	iii
Tables.....	v
Acronyms and Abbreviations	vi
Acknowledgements.....	viii
Executive Summary	ix
Introduction.....	1
Background.....	2
Rapanos Supreme Court Decision	3
Scalia Plurality Opinion	3
Kennedy Concurring Opinion.....	3
2015 Clean Water Rule.....	3
Categorically Jurisdictional Waters	4
Significant Nexus Waters	4
Categorically Excluded Waters.....	5
Modeling Jurisdictional Determination Review	5
Methods.....	6
Overview.....	6
Model Development and Interface	7
Model Input	11
NHD Hydrography Data	11
SSURGO Data for Floodplain Mapping.....	12
NWI and NWI-Plus Data	12

Model Function and Scenario Criteria.....	12
Very Restrictive and Most Restrictive Model Criteria	13
Less Restrictive Model Criteria	14
Model Output.....	14
Wetland Functional Assessment.....	17
Case Study Watersheds.....	18
Cottonwood River Watershed, MN	18
South Platte Headwaters Watershed, CO.....	19
Cimarron River Watershed, NM.....	19
Results.....	23
Overview.....	23
Watershed Summaries	23
Potential Wetland Function Impacts.....	27
Communication of Results	31
Story Map.....	31
Operations Dashboard.....	32
Custom Web GIS Application	32
Model Limitations	33
Observations	34
Bibliography	35

Figures

	Page
Figure 1. Critical events timeline: Evolution of "Waters of the United States". Congressional Research Service ⁶	2
Figure 2. CWA Jurisdictional Modeling toolbox containing the jurisdictional scenario models..	8
Figure 3. View of the main CWA Jurisdictional Scenario Model in the ArcGIS ModelBuilder graphical interface, showing how the model is composed of multiple submodels linked together in a geoprocessing workflow.	10
Figure 4. Tool user interface for the <i>CWA Jurisdictional Scenario Model</i>	11
Figure 5. SSURGO query for extracting riparian areas.	12
Figure 6. (A) Undissolved NWI palustrine polygons, (B) dissolved NWI palustrine polygons.	13
Figure 7. Example of model output in ArcMap, if running the model from the ArcGIS ModelBuilder interface.	16
Figure 8. Location of Cottonwood River Watershed in Minnesota.	20
Figure 9. Location of the South Platte Headwaters Watershed in Colorado.	21
Figure 10. Location of Cimarron River Watershed in New Mexico.	22
Figure 11. Cottonwood River watershed, potentially protected and non-protected wetland acres by modeling scenario.	24
Figure 12. South Platte Headwaters watershed, potentially jurisdictional and non-jurisdictional wetland acres by modeling scenario.	25
Figure 13. Cimarron River watershed, potentially jurisdictional and non-jurisdictional wetland acres by modeling scenario.	27
Figure 14. Percent non-jurisdictional wetland acres by jurisdictional scenario for NWI wetlands receiving a high or moderate functional rating from the wetland functional assessments in the Cottonwood River watershed.....	28
Figure 15. Percent non-jurisdictional wetland acres by jurisdictional scenario for NWI wetlands receiving a high or moderate functional rating from the wetland functional assessments in the South Platte Headwaters watershed.	29
Figure 16. Percent non-jurisdictional wetland acres by jurisdictional scenario for NWI wetlands receiving a high or moderate functional rating from the wetland functional assessments in the Cimarron River watershed.	30

Figures (continued)

	Page
Figure 17. Cover page for the Modeling Federally Protected Wetlands story map.....	31
Figure 18. Graphic showing the Operations Dashboard for the Cimarron River Watershed.	32
Figure 19. Graphic showing the opacity slider custom web application.	33

Tables

	Page
Table 1. Descriptions of the three jurisdictional scenarios utilized in the GIS model.	7
Table 2. Description of ArcGIS ModelBuilder models in the CWA Jurisdictional Modeling toolbox. TNW = traditionally navigable water, RPW = relatively permanent waters.	9
Table 3. Description of model output layers.	15
Table 4. Jurisdictional scenario summary statistics for the Cottonwood River watershed in MN.	23
Table 5. Jurisdictional scenario summary statistics for the South Platte Headwaters watershed in CO.	25
Table 6. Jurisdictional scenario summary statistics for the Cimarron River watershed in NM.	26

Acronyms and Abbreviations

AGOL – ArcGIS online

API – Application Programming Interface

ASWM – Association of State Wetland Managers

CFR – Code of Federal Regulations

CWA – Clean Water Act

CWR – Clean Water Rule

DEM – Digital Elevation Model

DNR – Department of Natural Resources

DRG – Digital Raster Graphic

EPA – United States Environmental Protection Agency

ESRI – Environmental Systems Research Institute

FEMA – Federal Emergency Management Agency

FP – Flood Protection Wetland Function

FSH – Fish Habitat Wetland Function

GIS – Geographic Information Systems

GSS – GeoSpatial Services

HUC – Hydrologic Unit Code

LLWW – Landscape Position, Landform, Water Flow Path, Waterbody Type

LR – Lotic River

LS – Lotic Stream

MPCA – Minnesota Pollution Control Agency

NHD – National Hydrography Dataset

NHDPlus – National Hydrography Dataset Plus

NRCS – Natural Resources Conservation Service

Acronyms and Abbreviations (continued)

NWI – National Wetland Inventory

OHWM – Ordinary High Water Mark

PLLC – Professional Limited Liability Company

WH – Wildlife Habitat Wetland Function

RPW – Relatively Permanent Water

SMUMN – Saint Mary’s University of Minnesota

SQL – Structured Query Language

SSURGO – Soil Survey Geographic Database

TMDL – Total Maximum Daily Load

TNW – Traditionally Navigable Water

USDA – United States Department of Agriculture

USACE – United States Army Corps of Engineers

USFS - United States Forest Service

USFWS – United States Fish and Wildlife Service

USGS – United States Geological Survey

WH – Wildlife Habitat Wetland Function

WQ – Water Quality Wetland Function

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Executive Summary

In February 2017, the U.S. President issued an executive order directing the Environmental Protection Agency (EPA) and the U.S. Army Corps of Engineers (USACE) to undertake a proposed rulemaking for notice and comment to rescind or revise the joint 2015 Clean Water Rule, also known as the Waters of the United States or “WOTUS” rule. The rule was originally intended to clarify the jurisdictional scope of the Clean Water Act. Per comments by the President and other members of the Executive Office, the intent of this Order potentially signals a move to substantially narrow the jurisdictional scope of the Clean Water Act. If this is the case, the new rule may remove protection from a range of ephemeral and intermittent flowing waters (streams and rivers) and the wetlands that abut or are hydrologically connected to those waters and provide such functions as streamflow maintenance, water quality management and floodwater storage.

The Clean Water Act of 1972 (CWA) is the primary piece of federal legislation regulating discharge of pollutants to navigable waters or “waters of the United States”. This term has been contentious since the Act was written over 40 years ago and the latest attempt at clarification was the 2015 Clean Water Rule (CWR), developed by the EPA under the Obama Administration. The intent of this Rule was to ensure that CWA programs were more precisely defined and to save time and avoid costs and confusion in future implementations of the Act. The rule intended to make it easier to predict what action(s) would be taken by the EPA and what processes companies and other stakeholders would have to undergo for projects and permitting. Unfortunately, shortly after the rule was announced, numerous legal challenges were filed and implementation of the rule was halted in several states, pending resolution of these issues.

Challenges to the 2015 CWR were not the first litigation actions involving implementation of the Clean Water Act. Originally, the USACE applied the law narrowly, but this view was found to be unlawful by a federal court. Subsequently, the law was applied very broadly, until what has become known as the 2001 SWANCC litigation (Solid Waste Agency of Northern Cook County v. U.S. Army Corps of Engineers). This litigation established that the jurisdictional coverage of the CWA did not extend to isolated waters that were not directly adjacent or connected to navigable waters where CWA jurisdiction is based solely on the Migratory Bird Rule. The SWANCC decision did allow for CWA jurisdiction over such isolated waters based on other rationales, such as flood storage or pollution filtration that demonstrate physical, chemical, or biological connectivity to navigable waters. Then, in 2006, the Supreme Court was asked again to take up the scope of the CWA in what has become known as the Rapanos Decision. This litigation resulted in a split decision of the Supreme Court justices, which included opinions by two of the Justices (Scalia and Kennedy) adopting different interpretations of the Act’s jurisdictional limitations.

With the decision of the current administration to initiate a new rulemaking aimed at shrinking the jurisdictional scope of the CWA and with the availability of new wetland spatial data sets and collateral data layers, this project was initiated to spatially document the extent of protection for wetlands and waters of the U.S. under three different jurisdictional scenarios. The scenarios draw distinctions using geographic concepts deemed relevant in Justice Scalia’s plurality opinion and Justice Kennedy’s concurring opinion, and from the 2015 CWR. However, the scenarios do not depict the precise limits imposed by any specific legal framework or opinion. Each of these scenarios are modelled spatially using commonly available geodatabases, current wetland mapping and Geographic Information Systems (GIS) technology. The parameters used to define jurisdictional extent are drawn directly from the legal guidance of each scenario. The completed models are fully

documented and stored in ESRI's (Environmental Systems Research Institute) ArcGIS ModelBuilder environment and are available for users to run and adapt for their own assessments.

Results from this project are presented using three digital communication tools: an ESRI Story Map based on ArcGIS Online; a dashboard summary of project outputs hosted using ESRI Operations Dashboard on the Saint Mary's University of Minnesota GeoSpatial Services (SMUMN GSS) portal; and an interactive spatial Web Map hosted by SMUMN GSS. The jurisdictional scenario models for each of three case study watersheds were summarized for comparative analysis of the spatial extent of jurisdictional wetlands that would be regulated and protected by the federal government using the criteria, as well as non-jurisdictional wetlands. Total jurisdictional and non-jurisdictional wetland acres, percent of total jurisdictional and non-jurisdictional wetland acres, number of jurisdictional and non-jurisdictional wetland polygons, and percent jurisdictional and non-jurisdictional polygons were compiled and summarized for each scenario in the case study watersheds. Potential impacts on the FP, WH, FSH, and WQ wetland functions were assessed by compiling total wetland acres that were identified as potentially jurisdictional and non-jurisdictional for those National Wetland Inventory (NWI) polygons that were rated as having a high or moderate functional rating by the functional assessment models.

Summarization of jurisdictional scenario modeling results for all sample watersheds is presented in the form of change from the Less Restrictive Scenario. The Most Restrictive Scenario produced the highest number of potentially non-jurisdictional wetland acres with comparative totals ranging from 125% to 1,774% increase in non-jurisdictional wetland acres when compared to the Less Restrictive Scenario. The Very Restrictive Scenario increased non-jurisdictional acres from between 37% to 426% when compared to the Less Restrictive Scenario. In the Cottonwood River Watershed of southern Minnesota, the Most Restrictive Scenario removed more than 50% of the wetland acres with high or moderate water quality function from protection. In the South Platte Headwaters watershed of Colorado, 40 to 45% of the wetland acres were removed from protection for each of the wetland functions. Impacts on wetland function for the Cimarron River watershed in New Mexico were more significant, with greater than 50% of wetland acres for each evaluated wetland function removed from protection.

Results from this project support the conclusion that a narrower definition of jurisdictional waters, as proposed by the current administration, will have a significant impact on the protection of wetlands and waters nationwide. In addition, the risk is more pronounced for ephemeral and isolated wetlands such as those found in semi-arid environments and the glaciated prairie pothole region of the U.S. Many ephemeral and intermittently flowing streams and rivers, and wetlands adjacent to these streams and rivers could be potentially removed from federal protection. Future work could include: further refinement of the spatial models to include additional variables which help adjust and refine each modelling scenario; modelling of the proposed rulemaking as additional details become available from the EPA and USACE; further automation of modelling scenarios to increase accessibility for concerned practitioners; and incorporation of down-scaled climate predictive model outputs to simulate potential changes in precipitation for modelled watersheds.

Introduction

Discharge of pollutants into waters of the U.S., including dredged and fill material, is regulated by the Clean Water Act (CWA) of 1972. Over the last 40 years, the regulatory scope of waters protected under the CWA has been subject to numerous legal challenges and judicial review, including multiple litigation actions in the Supreme Court. The basis for these legal challenges is the premise that the administering agencies of the CWA, the EPA and the USACE, have expanded the jurisdictional scope of federally protected waters and wetlands beyond original Congressional intent.

The 2015 Clean Water Rule (CWR) was published jointly by the EPA and the USACE to address confusion that has persisted around the scope of jurisdictional waters protected under the CWA. The Rule was challenged immediately and the U.S. Court of Appeals for the Sixth Circuit issued a nationwide stay on implementation of the Rule about six weeks after it became effective. On 28 February 2017, the Trump Administration issued an executive order directing the EPA and the USACE to issue a proposed rulemaking for notice and comment to rescind or revise their joint 2015 CWR. The Supreme Court ruled that the Sixth Circuit lacked authority to hear the case, effectively lifting the nationwide stay on the rule in January of 2018. The Trump Administration responded by suspending the rule until February 6, 2020, ostensibly in order to provide more time to develop replacement regulations. That suspension was invalidated, which had the effect of making the rule effective in any state where it was not on hold due to other litigation. Following the suspension, the Administration has also proposed to repeal the CWR and, more recently, replace it with a completely new scheme.

These actions by the Trump Administration signal a move toward a substantially narrower jurisdictional scope for waters protected by the CWA. This move could have major implications for protection of waters and wetlands nationwide, especially for ephemeral and isolated wetlands such as those found in semi-arid environments and the glaciated prairie pothole region of the U.S. The new rule may remove protection from a range of ephemeral and intermittent flowing waters (streams and rivers) and the wetlands that abut or are hydrologically connected to those waters. Removal of these wetlands from federal protection could have detrimental effects on important ecological functions such as streamflow maintenance, water quality management, floodwater storage, and habitat provision.

Given the questions that exist around the jurisdictional extent of the CWA, it is important for public agencies, private corporations and other stakeholders to have an understanding of the waters at stake under different approaches, such as those envisioned by the CWR and a narrower scope of jurisdictional waters advocated by the current Administration. SMUMN GSS, working in collaboration with project sponsors and partners, developed a GIS-based model to compare and contrast the potential spatial extent of regulatory protection for U.S. waters. The model presents two jurisdictional scenarios that draw on distinctions using geographic concepts deemed to be relevant based on opinions from the 2006 Rapanos Supreme Court decision (Scalia and Kennedy) and a third scenario based on concepts embodied in the 2015 CWR. Three geographically and hydrologically diverse case study watersheds were selected for comparative analysis of the spatial extent of potentially jurisdictional and non-jurisdictional wetlands using these three modeling scenarios.

It is envisioned that the data resulting from this analysis will be used as the basis for commentary on proposed changes to the CWR under the new executive order. It is also anticipated that the research and data created through this project will: enhance public education about the CWA (including regional stakeholders, property owners, businesses and others); provide a foundation from which

others can continue to investigate the jurisdictional scope of the CWA and the CWR; and extend scientific understanding of the ecological functions and societal services associated with wetlands and other surface waters.

Background

The CWA of 1972¹ established the legal basis for regulating the discharge of pollutants into “navigable waters” of the U.S., defined in the Act as “the waters of the United States, including the territorial seas.” The EPA and USACE have interpreted jurisdictional waters broadly to include navigable waters and their tributaries, including wetlands adjacent to these waters.² This language in the CWA, along with the claim that the administering agencies have expanded the scope of jurisdictional waters beyond original Congressional intent, has resulted in intense debate, litigation, and judicial review over the last 40 years (Figure 1). Legal challenges to the EPA’s and USACE’s interpretation of jurisdictional waters reached the Supreme Court in 1985, 2001 and again in 2006, and have redefined the scope of federally protected waters.³⁻⁵

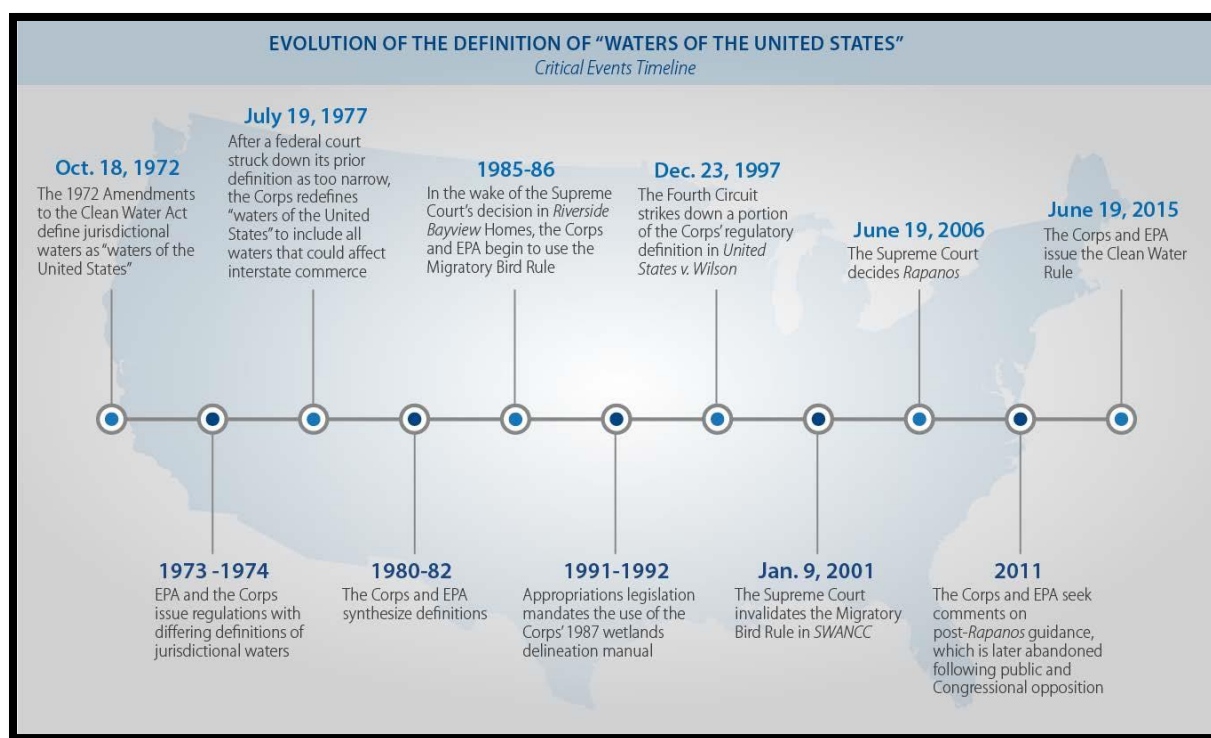


Figure 1. Critical events timeline: Evolution of "Waters of the United States". Congressional Research Service⁶

The Clean Water Rule⁷ was published in 2015 by the EPA and USACE with the intent of replacing the EPA-USACE guidance issued in 2008 following the *Rapanos* decision and to further clarify the scope of waters protected under the CWA. Opponents of the rule claimed that the administering agencies were exceeding their authority in defining the scope of jurisdictional waters and immediately challenged the rule in several courts, where litigation remains ongoing. President Trump signed an executive order in February of 2017 calling on the EPA and USACE to rescind and revise the CWR to incorporate a narrower scope of jurisdictional waters as opined by Justice Scalia in the 2006 *Rapanos* Supreme Court ruling.⁸

Rapanos Supreme Court Decision

The 2006 Supreme Court case, *Rapanos et al. v. United States*, did not clarify disputes over jurisdictional waters but instead added to the confusion.^{9,10} In the Rapanos case, the justices split 4-1-4 and ruled against the government, sending the case back to the lower courts for further analysis. However, the Supreme Court did not agree on a standard for jurisdictional determination, resulting in a plurality opinion written by Justice Scalia for four of the justices and a concurring opinion written by Justice Kennedy on behalf of himself. These two opinions offered different criteria for defining the scope of jurisdictional waters and created uncertainty regarding which criteria to apply. The EPA and USACE issued a joint memorandum in 2008 to provide guidance for implementing the Rapanos decision, to determine federal jurisdiction of waters protected under the CWA.¹¹ Despite the EPA-USACE guidance, confusion persisted, especially regarding the degree to which isolated wetlands and small streams are jurisdictional.¹²

Scalia Plurality Opinion

Justice Scalia's plurality opinion in the Rapanos decision was the narrowest approach in the case to defining federal jurisdictional waters protected under the CWA. He defined waters of the United States to mean only "relatively permanent, standing or flowing bodies of water" found in streams, lakes and rivers, and excludes "ordinarily dry channels through which water occasionally or intermittently flows." Wetlands must have a "continuous surface connection" to bodies that are "waters of the United States" to be considered jurisdictional waters. Isolated wetlands, even those that have an intermittent hydrological connection, are not considered to be jurisdictional waters using Scalia's definition.

Kennedy Concurring Opinion

Justice Kennedy's concurring opinion in the Rapanos decision provided alternative criteria for identifying jurisdictional waters. Kennedy's criteria included adjacent, non-contiguous wetlands without a continuous surface connection if they demonstrated a "significant nexus" with traditional navigable waters. Significant nexus was determined if a wetland "alone or in combination with similarly situated lands in the region, significantly affect the chemical, physical, and biological integrity of other covered waters understood as navigable in the traditional sense." Thus, isolated wetlands or wetlands adjacent to intermittent and ephemeral streams could be included as jurisdictional, provided they demonstrated a significant nexus. Major criticism of Kennedy's significant nexus test focused on the lack of guidance in how to implement the test and the administrative burden placed on the EPA and USACE to determine significant nexus, when doing so on a case by case basis.¹³

2015 Clean Water Rule

In 2015, the EPA and USACE jointly published the CWR in an attempt to clarify the confusion that persisted following the Rapanos decision. The Rule centered on the concept of significant nexus and the concurring opinion written by Justice Kennedy in the Rapanos decision. The intent of the 2015 CWR was to ensure that jurisdictional waters covered by the CWA programs were more precisely defined in order to save time and money during the permitting process. Numerous legal challenges were filed after the announcement of the Rule; due to this litigation, implementation has been halted in 28 states, pending resolution of these issues.

The 2015 CWR, while still less inclusive than the 1980s regulations, offers very specific criteria for identifying jurisdictional waters and wetlands. Tributaries are defined in the Rule as features having a defined bed, bank and ordinary high water mark (OHWM). Specific distance criteria are provided for identifying jurisdictional wetlands adjacent to these tributaries. The following sections detailing the

criteria for jurisdictional determination under the 2015 CWR were adapted from Copeland's Congressional Research Report.¹²

Categorically Jurisdictional Waters

The following categories of waters are jurisdictional by rule without significant nexus case analysis:

- Traditional navigable waters supporting interstate commerce.
- All interstate waters, including wetlands.
- The territorial seas.
- Tributaries of above waters; these waters must have a bed, bank and OHWM.
- Impoundments of above waters or a tributary.
- All waters, including wetlands, ponds, lakes, oxbows, and similar waters, that are adjacent to a water identified in the above categories.

Specific distance limits are set in the Rule to define adjacent waters:

- Waters in whole or in part within 100 feet of the OHWM of a jurisdictional water.
- All waters located in whole or in part within the 100-year floodplain that are not more than 1,500 feet from the OHWM of a jurisdictional water.
- All waters located in whole or in part within 1,500 feet of the high tide line of a traditional navigable water, the territorial seas, or an interstate water, or within 1,500 feet of the OHWM of the Great Lakes.

Significant Nexus Waters

Subcategories of wetlands are jurisdictional if they are found to have significant nexus to downstream jurisdictional waters: prairie potholes, Carolina bays and Delmarva bays, pocosins, western vernal pools, and Texas coastal prairie wetlands. Additional waters requiring significant nexus analysis are waters located in the 100-year floodplain of a traditional navigable water, interstate water, or the territorial seas, and those waters within 4,000 feet of the OHWM or high tide line of a jurisdictional water. Specific ecological functions demonstrating significant nexus to downstream jurisdictional waters include:

- Sediment trapping,
- Nutrient recycling,
- Pollutant trapping, transformation, filtering, and transport,
- Retention and attenuation of flood waters,
- Runoff storage,
- Contribution of flow,
- Export of organic matter,
- Export of food resources, and
- Provision of life cycle-dependent aquatic habitat (such as foraging, feeding, nesting, breeding, spawning, or use as a nursery area) for species located in a jurisdictional water.

Categorically Excluded Waters

The following waters are categorically excluded from protection in the CWR:

- Prior converted cropland.
- Waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of the CWA.
- The following ditches:
 - Ditches with ephemeral flow that are not a relocated tributary or excavated in a tributary.
 - Ditches with intermittent flow that are not a relocated tributary, excavated in a tributary, or drain wetlands.
 - Ditches that do not flow, either directly or through another water, into a traditional navigable water, interstate water, or territorial sea.
- Artificially irrigated areas that would revert to dry land should application of water to that area cease.
- Artificial, constructed lakes and ponds created in dry land such as farm and stock watering ponds, irrigation ponds, settling basins, fields flooded for rice growing, log cleaning ponds, or cooling ponds.
- Artificial reflecting pools or swimming pools created in dry land.
- Small ornamental waters created in dry land.
- Water-filled depressions created in dry land incidental to mining or construction activity, including pits excavated for obtaining fill, sand, or gravel that fill with water.
- Erosional features, including gullies, rills, and other ephemeral features that do not meet the definition of tributary, non-wetland swales, and lawfully constructed grassed waterways and puddles.
- Groundwater, including groundwater drained through subsurface drainage systems.
- Stormwater control features constructed to convey, treat, or store stormwater that are created in dry land.

Modeling Jurisdictional Determination Review

Supreme Court decisions and administering agency guidance has had a direct impact on federal jurisdiction of waters protected by the CWA. The status of protections for a high percentage of intermittent and ephemeral waters and geographically isolated wetlands, particularly in the semi-arid western U.S., under the CWA has been uncertain as a result of implementation of this guidance.¹⁴⁻¹⁶ Development of tools and resource inventories are needed to assist in determining characteristics and mapping of jurisdictional and non-jurisdictional waters.^{15,17} Successful implementation of a GIS-based model for analysis of jurisdictional scenarios that draws distinctions using geographic concepts from the Rapanos decision and the 2015 CWR requires modeling of several essential environmental processes: hydrologic connectivity to traditional navigable waters; hydrologic permanence using stream classification; and some form of proximity analysis to determine adjacency and possibly significant nexus.

Determination of jurisdiction is most often done on a case-by-case basis using field surveys, but a few studies have investigated the possibility of using nationally-available datasets and tools to aid in determining jurisdictional waters at the watershed or regional scales. Caruso and Haynes¹⁴ utilized NHDPlus data to develop stream classes based on hydrological permanence and stream order to aid in regional planning and analysis of jurisdictional waters. Vance¹⁶ used buffer proximity to medium and high-resolution National Hydrography Dataset (NHD) hydrography data to categorize streams and identify wetlands that were geographically isolated. In a separate study, Caruso¹⁸ used a GIS-based analysis of stream characteristics in a mountain watershed to produce a three-level hierarchical classification scheme to aid in determining jurisdictional status of waters at a watershed scale. Caruso's methods used nationally-available NHD and U.S. Geological Survey (USGS) StreamStats data along with field observations to classify streams using flow duration, stream order, and other biophysical metrics to aid in determining jurisdictional status.

Methods

Overview

The first step in implementation of this project was to assemble a project advisory committee to provide guidance for model implementation, assessment, and validation of the analysis techniques and results. Members of this committee were drawn from nationwide wetlands and natural resource experts who have a working understanding of the CWA and the CWR, wetland functional assessment, and spatial analysis techniques. Members of the advisory team included:

Kevin Stark - Project Manager, SMUMN GSS
Roger Meyer - GIS Analyst, SMUMN GSS
Andy Robertson - Director, SMUMN GSS
Nick Miller - Senior Wetland Scientist, The Nature Conservancy
Jeanne Christie - Executive Director, Association of State Wetland Managers (ASWM)
Joanna Lemly - Wetland Ecologist, Colorado Natural Heritage Program
Sarah Marshall - Wetland Hydrologist, Colorado Natural Heritage Program
Steve Kloiber - Wetlands Program Manager, MN Department of Natural Resources
Mark Ryan - Principal Lawyer, Ryan & Kuehler PLLC
Jon Devine – Director, Federal Water Policy, Natural Resources Defense Council
Jan Goldman-Carter - Counsel, National Wildlife Federation

Different approaches to modeling were first explored at SMUMN GSS and presented to the advisory group for feedback. Feedback from the group resulted in the following objectives and requirements for development of the GIS model:

- The model should allow users to compare potential jurisdiction of wetlands for three scenarios: a Most Restrictive Scenario and a Very Restrictive Scenario that draw distinctions using geographic concepts deemed relevant in Justice Scalia's plurality opinion and Justice Kennedy's concurring opinion; and, a Less Restrictive Scenario that incorporates some of the guidance from the 2015 Clean Water Rule (Table 1).
- Model input parameters should be user interactive and modifiable for exploratory analysis.
- The model should be simple, transparent, and easy to explain to a general audience.

- The model should use nationally-available GIS datasets.
- The model should be transferable and utilize a process that can be reproduced for other watersheds.

Table 1. Descriptions of the three jurisdictional scenarios utilized in the GIS model.

Scenario Name	Description
<i>Most Restrictive</i>	This scenario limits protection of wetlands to those directly adjacent to perennial (permanent) streams/rivers only.
<i>Very Restrictive</i>	This scenario limits protection of wetlands to those adjacent to protected perennial (permanent) and intermittent (seasonal) streams/rivers.
<i>Less Restrictive</i>	This is the least restrictive of the modeled scenarios and limits protection of wetlands to those adjacent to protected perennial, intermittent and ephemeral (temporary) streams, and ditched or channelized streams.

With technical guidance provided by the advisory group, SMUMN GSS developed the jurisdictional scenario models using ESRI's ArcGIS ModelBuilder. The goal was to produce a flexible, interactive and transferable modeling tool that allowed users to view potentially jurisdictional and non-jurisdictional wetlands within a watershed using model criteria developed for the jurisdictional scenarios. Three case study watersheds were chosen by the group for comparative analysis of the scenarios. As part of this analysis, wetland functional assessments were performed to determine potential jurisdictional impacts on broad wetland functions within the case study watersheds.

Model Development and Interface

ArcGIS ModelBuilder was chosen for development of the GIS model for the project. ModelBuilder is a visual programming interface that can be used for building geoprocessing workflows or models. These geoprocessing models automate and document the spatial analysis process, providing a transparent and effective way to document and distribute processing methods. Within ModelBuilder, the user can link multiple tools and submodels together into a single geoprocessing workflow, which can then be packaged and distributed to other users as a toolbox (Figure 2). A user with ModelBuilder experience can step through the model, observe intermediate output to better understand how the model is working, and easily make modifications to the model if desired.

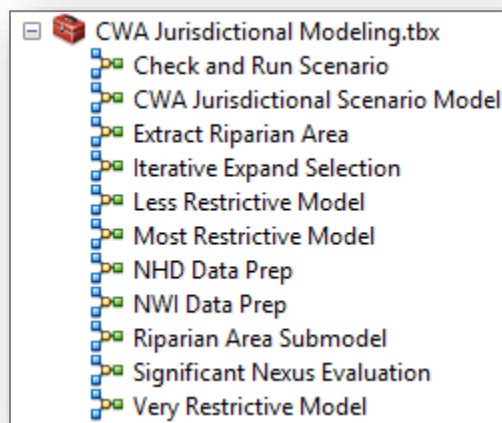


Figure 2. CWA Jurisdictional Modeling toolbox containing the jurisdictional scenario models.

Table 2 provides a general description of the models stored in the CWA Jurisdictional Modeling toolbox in ArcGIS. The tools are documented with help metadata to assist users with the input data requirements and determining the model parameters that are needed to run the model. The *CWA Jurisdictional Scenario Model* as seen in the toolbox is the main model that the user interacts with to run the jurisdictional scenarios. The other models contained in the toolbox are submodels linked together in the main model that perform specific functions in the scenario modeling workflow (Figure 3). The *CWA Jurisdictional Scenario Model* identifies potential jurisdictional and non-jurisdictional wetlands in a watershed using three different modeling scenarios. The *Very Restrictive* scenario assumes the jurisdictional scope of wetlands protected under the CWA is limited to wetlands that are adjacent to jurisdictional perennial and intermittent streams and rivers. The *Most Restrictive* scenario is the least protective and assumes the jurisdictional scope of wetlands protected under the CWA is limited to wetlands that are adjacent to perennial streams and rivers only. The *Less Restrictive* scenario assumes the jurisdictional scope of wetlands protected under the CWA includes wetlands adjacent to jurisdictional perennial, intermittent, and ephemeral streams, and tributary ditches. None of these scenarios is directly reflective of a specific legal opinion, as nationwide spatial datasets that replicate the criteria of each decision are not available.

The *CWA Jurisdictional Scenario Model* can run directly from the graphical ESRI ModelBuilder interface as seen in Figure 3 or from the tool user interface as seen in Figure 4. The user is required to designate an output geodatabase workspace, select a modeling scenario, input the NHD and NWI datasets, and a feature class representing the nearest downstream, jurisdictional traditionally navigable water (TNW). If running the *Less Restrictive* scenario, the user needs to also select a riparian area model and the input data for creating the riparian area model.

Model parameters provide the option to model wetland-to-wetland connectivity in the modeling scenarios using a user-specified distance, or to add a buffer restriction distance also using a user-specified distance. The wetland-to-wetland connectivity option will do a series of iterative adjacent-to-adjacent selection queries on the initial jurisdictional wetland selection set to add additional wetlands to the jurisdictional selection set that are connected within the user-specified distance. The buffer restriction option will do a final select-by-location query on the jurisdictional selection set that will remove any wetlands that are beyond the user-specified buffer distance from the NHD and NWI lake jurisdictional waters. Finally, the user has the option for the *Less Restrictive* scenario to enter a

SQL expression to extract any pre-determined categorical significant nexus wetlands from the input NWI dataset.

Table 2. Description of ArcGIS ModelBuilder models in the CWA Jurisdictional Modeling toolbox. TNW = traditionally navigable water, RPW = relatively permanent waters.

Model Name	Model Description
Check and Run Scenario	This is a utility model that checks to see what scenario model has been selected by the user (i.e., <i>Most, Very, Less Restrictive</i>). Output true/false Boolean variables determine which branch of the model will run based on the user selection.
CWA Jurisdictional Scenario Model	This is the main model which runs the jurisdictional scenario models. All the other models in the toolbox are linked together in this model in a single geoprocessing workflow.
Extract Riparian Area	This is a submodel called by the CWA Jurisdictional Scenario Model which extracts the riparian areas used for the less restrictive scenario model and significant nexus evaluation. The model requires a minimum input of SSURGO, LLWW with LR and LS attributes, or FEMA flood zone data. The user has the option to combine and dissolve this data together into a single riparian area mask by selecting the desired riparian area model (options are FEMA, SSURGO, LLWW, FEMA_SSURGO_LLWW, FEMA_SSURGO, FEMA_LLWW, or SSURGO_LLWW).
Iterative Expand Selection	This is a utility model which does an iterative selection of all adjacent polygons within a user-specified distance. The model requires an initial selection set of polygons as input.
NHD Data Prep	This model extracts NHD flowlines that are flow-connected to the input downstream TNW feature. These flowlines represent RPWs which are used in proximity analysis to determine potential wetland jurisdiction. The NHD FCode is used to extract NHD perennial, intermittent, ephemeral or ditches connected to the TNW. Isolated flowlines are removed. The extracted flowlines include NHD connectors and artificial paths.
NWI Data Prep	Submodel that extracts and dissolves bordering palustrine NWI polygons that will be used for the jurisdictional evaluation. NWI lacustrine polygons without the K water regime are also extracted from the NWI dataset for use as RPWs in the jurisdictional evaluation of the dissolved palustrine wetlands.
Riparian Area Submodel	Submodel called by the Riparian Area Model which uses select by attribute queries to extract the initial riparian area from the FEMA, LLWW or SSURGO input data. SSURGO query: muname LIKE 'Water%' OR geomdesc LIKE '%flood%' OR taxsuborder LIKE '%Fluv%' OR flodfreqdcd IN ('Rare', 'Frequent', 'Occasional', 'Very frequent'); LLWW lotic query: LLWW LIKE 'LR%' OR LLWW LIKE 'LS%'; FEMA query: FLD_ZONE IN ('A', 'AE', 'AH', 'AO').
Very Restrictive Model	Submodel called by the main model that models a very restrictive scenario. NHD perennial and intermittent streams are used in the selection criteria.
Most Restrictive Model	Submodel called by the main model that models the most restrictive scenario. Only NHD perennial streams are used in the selection criteria.
Significant Nexus Evaluation	Submodel that identifies and flags significant nexus wetlands for the Less Restrictive jurisdictional model.
Less Restrictive Model	Submodel called by the main model that models the most protective scenario. NHD perennial, intermittent, ephemeral streams, and ditches are used in the selection criteria.

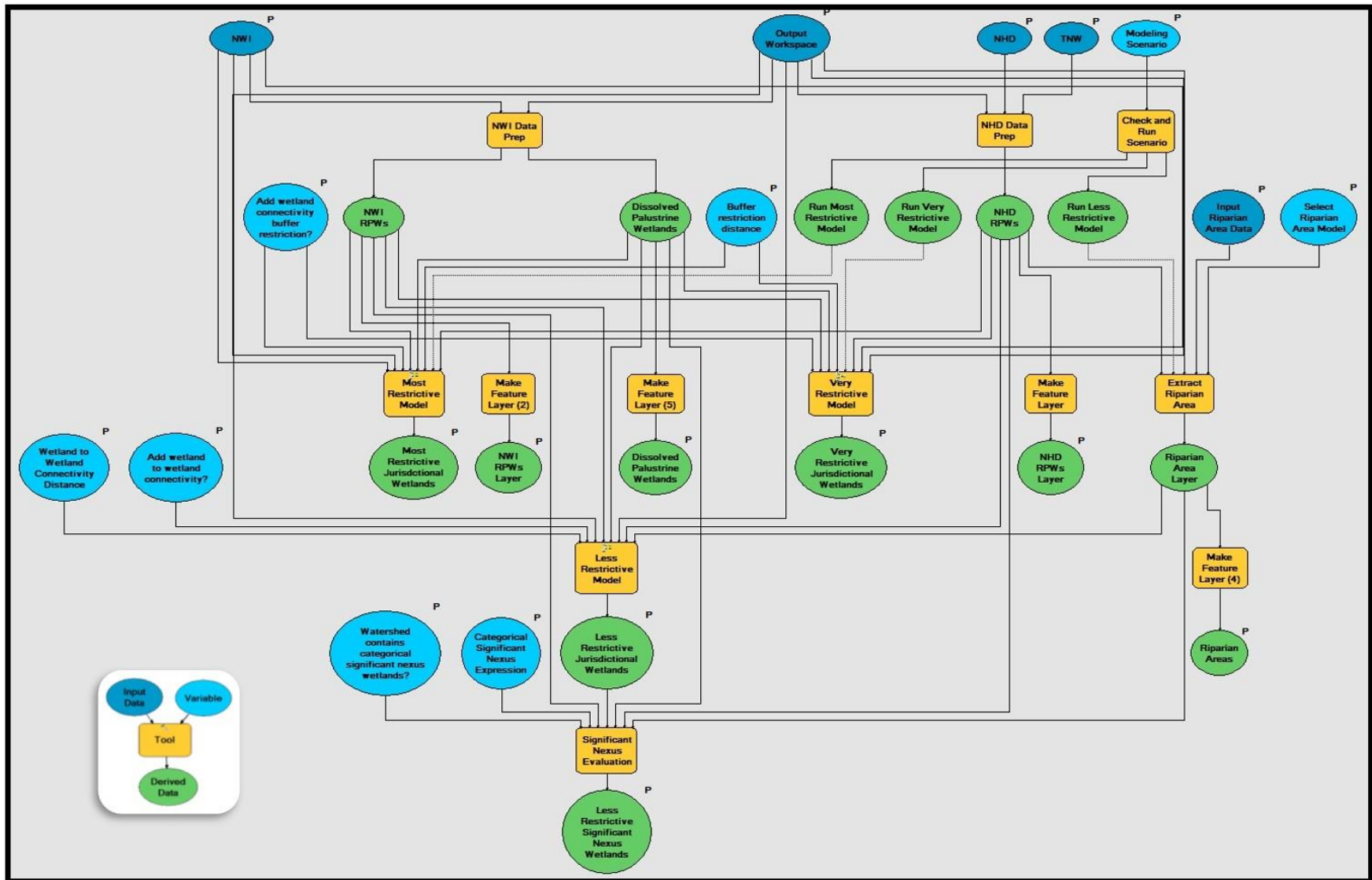


Figure 3. View of the main CWA Jurisdictional Scenario Model in the ArcGIS ModelBuilder graphical interface, showing how the model is composed of multiple submodels linked together in a geoprocessing workflow.

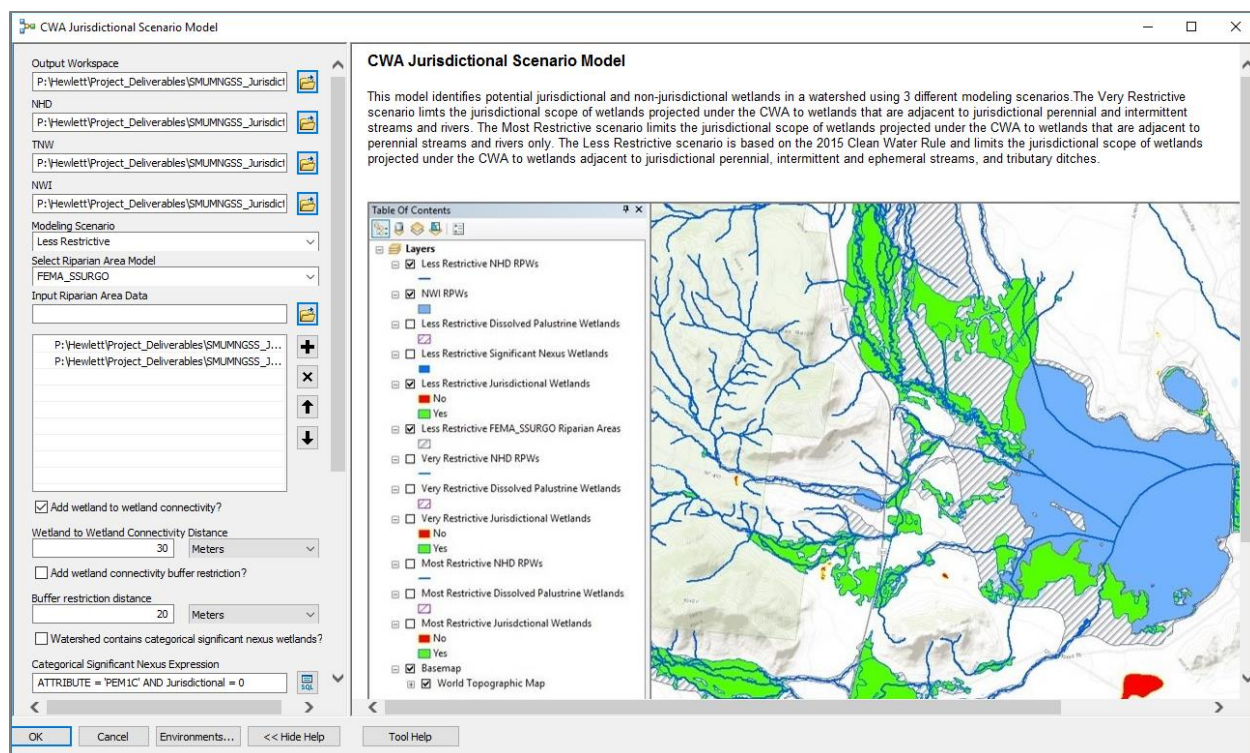


Figure 4. Tool user interface for the *CWA Jurisdictional Scenario Model*.

Model Input

One of the model requirements was to leverage nationally-available GIS datasets for model input data. Use of nationally-available datasets allows the model to be easily transferable to other geographic areas and watersheds. The *CWA Jurisdictional Scenario Model* requires three primary input datasets: the NHD, Soil Survey Geographic Database (SSURGO) soils data, and NWI wetland data.

NHD Hydrography Data

The [NHD](#) dataset is produced by the USGS and provides digital vector GIS data representing surface water features and the water drainage network of the United States. NHD is available at medium resolution (1:100,000 scale) or high resolution (1:24,000 scale). NHD data can be downloaded using the [National Map Download](#) viewer by state or Hydrologic Unit Code (HUC) subbasin.

It was determined from meetings with the advisory group that successful modeling of the jurisdictional scenarios would be highly dependent on the accurate classification of hydrography (i.e., identifying streams as perennial, intermittent, ephemeral, and ditches) within a watershed. Accurate classification of streams in a watershed would normally require intensive field work, which was beyond the scope and budget of this project. Other approaches to capture additional ephemeral and intermittent headwater streams that are not typically mapped or detected in NHD, such as deriving synthetic streams from a digital elevation model (DEM), were explored, but the issues of accurate classification of the resulting synthetic streams still remained an issue. Ultimately, it was concluded that despite the variability and accuracy of classification of NHD streams in some geographic areas, high resolution NHD was the best nationally-available hydrography dataset for model input. Proximity analysis of wetlands to NHD streams/rivers types is one of the major modeling components in determining jurisdictional status of wetlands for the three modeling scenarios.

SSURGO Data for Floodplain Mapping

The [SSURGO](#) is a digital soils database produced by the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS). The SSURGO database contains soil map units linked to a relational database, which can be used to derive the proportionate extent of the component soils and their properties. ESRI provides a [SSURGO Downloader](#) application that can be used to download soils data by HUC8. Soil map units have been pre-compiled with ready-to-use attributes eliminating the pre-processing steps previously required to work with the soils data.

Model criteria for the *Less Restrictive* jurisdictional scenario requires a representation of the floodplain for determining categorically jurisdictional wetlands and for identifying significant nexus wetlands. There are many GIS techniques for modeling floodplains, ranging from basic topographic analysis of DEMs to highly complex 2D/3D hydraulic models. Most of these techniques rely on informed user input of modeling parameters. SSURGO data offers a convenient method to model flood inundation with nationally-available data, and has been found to be as effective as methods using DEMs.¹⁹ An attribute query of SSURGO data is used to extract a model of riparian areas (Figure 5). These extracted SSURGO floodplain/riparian areas can be combined in the model with FEMA and LLWW lotic features if they are available for the watershed to generate a more comprehensive model of flooded riparian areas.

```
muname LIKE 'Water%' OR geomdesc LIKE '%flood%' OR  
taxsuborder LIKE '%Fluv%' OR flodfreqdcd IN ('Rare',  
'Frequent', 'Occasional', 'Very frequent')
```

Figure 5. SSURGO query for extracting riparian areas.

NWI and NWI-Plus Data

[NWI](#) data, managed by the U.S. Fish and Wildlife Service (USFWS), is a public, nationally-available dataset that provides detailed GIS vector data of nationwide wetlands and deepwater habitats. Wetland data is mapped and classified using a wetland classification system developed by the NWI program.²⁰ NWI data can be downloaded using the [NWI Wetlands Mapper](#) application.

[NWI-Plus](#) attributes, also referred to as LLWW, are hydrogeomorphic descriptive attributes that describe wetland landscape position, waterbody, landform, and waterflow path. These attributes are added to NWI by skilled interpreters using digital raster graphics (DRGs), hydrographic data such as NHD, and aerial imagery. The combination of these attributes with standard NWI attributes are used to facilitate the prediction of wetland function. These attributes are not included with downloaded NWI data and are not needed to run the modeling scenarios. However, for this project the NWI-Plus attributes are used as an option for generating the riparian area floodplain for the *Less Restrictive* scenario model and also for determining potential jurisdictional impacts on wetland function within a watershed. NWI-Plus data for the Cottonwood River and Cimarron River watersheds was developed by GSS SMUMN. NWI-Plus data for the South Platte Headwaters watershed was developed by the Colorado Natural Heritage Program.²¹

Model Function and Scenario Criteria

All of the modelled scenarios in this project are translated into criteria that can be processed and modeled in a GIS. In general, this process uses a series of select-by-attributes and select-by-location spatial queries to identify jurisdictional and non-jurisdictional wetlands for each scenario. The basic model function is to first use the translated scenario criteria to extract NHD relatively permanent

waters (RPWs) that are flow-connected to the nearest downstream jurisdictional TNW. For example, for the *Most Restrictive* scenario, only perennials that are connected to the downstream TNW would be extracted as NHD RPWs. RPW lakes that are not artificially flooded are also extracted from the NWI data. Next, palustrine wetlands are extracted from the NWI data and all bordering polygons are dissolved. A single wetland complex can be composed of multiple NWI polygons that contain different descriptive attributes (

Figure 6). The dissolved palustrine polygons are used in the proximity analysis to determine whether the polygon can be considered jurisdictional based on scenario distance criteria from the NHD and NWI Lake RPWs. Wetlands are flagged in the attribute table with a value of 0 if they are non-jurisdictional and a value of 1 if they are jurisdictional. The jurisdictional determination for a dissolved palustrine polygon is then transferred to all NWI polygons contained within the dissolved polygon.

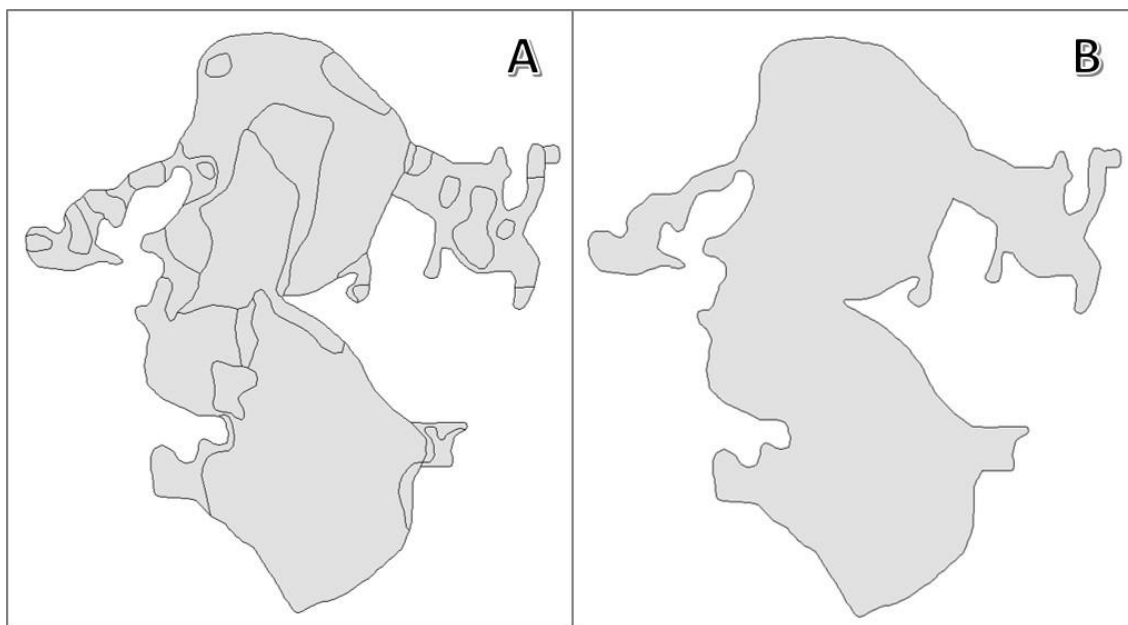


Figure 6. (A) Undissolved NWI palustrine polygons, (B) dissolved NWI palustrine polygons.

Very Restrictive and Most Restrictive Model Criteria

For the scenarios guided by the 2006 Rapanos decision, less (*Most Restrictive*) and more (*Very Restrictive*) protective scenarios are modeled. The *Most Restrictive* scenario provides less federal protection for wetlands by limiting the classes of NHD streams that are considered jurisdictional. For example, wetland jurisdiction for the *Most Restrictive* scenario is based on proximity to NHD RPW perennial streams only, whereas the *Very Restrictive* scenario is based on proximity to NHD RPW perennial and intermittent streams. The specific model criteria used by these scenarios is as follows:

- Wetlands intersecting with a “continuous surface connection” to the nearest TNW and RPWs are adjacent and jurisdictional.
- NWI lacustrine polygons (ATTRIBUTE LIKE ‘L’) that are not artificially flooded are jurisdictional RPWs.

- Stream and river jurisdictional RPWs are NHD perennials for the *Most Restrictive* scenario, and perennial and intermittent streams and rivers for the *Very Restrictive* scenario that are connected by flow to the nearest downstream TNW.
- Wetlands intersecting RPW lakes and RPW streams/rivers are jurisdictional.
- NWI palustrine wetlands with the K water regime, or the d (drained), x (excavated) or f (farmed) modifiers are excluded from the jurisdictional selection.

Less Restrictive Model Criteria

For the *Less Restrictive* scenario based on aspects of the 2015 CWR, proximity of wetlands is evaluated using NHD RPW perennial, intermittent and ephemeral streams, and ditches. The specific model criteria used by the *Less Restrictive* scenario are as follows:

- Adjacency is defined by specific distance criteria given in the 2015 CWR.
- NWI lacustrine polygons (ATTRIBUTE LIKE 'L') that are not artificially flooded are jurisdictional RPWs.
- Stream and river jurisdictional RPWs are NHD perennial, intermittent, ephemeral and ditches connected by flow to the nearest downstream TNW.
- Wetlands intersecting within 100 ft of RPW lakes and RPW streams/rivers are jurisdictional by rule.
- Wetlands intersecting the floodplain and within 1,500 ft of a RPW are jurisdictional by rule.
- By default, wetland-to-wetland connectivity is modeled for this scenario (i.e., all adjacent-to-adjacent of the initial jurisdictional selection set within the user-specified distance are added to the final jurisdictional selection set).
- NWI palustrine wetlands with the K water regime or f modifier are excluded from the jurisdictional selection.
- Significant nexus wetlands are flagged if a categorical SQL query is input or if the wetland intersects the riparian area floodplain, and is greater than 1,500 ft but less than 4,000 ft from an NWI or NHD RPW.

Model Output

If running the *CWA Jurisdictional Scenario Model* from the ModelBuilder interface, the model spatial output layers will be added directly to an open ArcMap document using predefined layer symbology (Figure 7). Table 3 contains descriptions of the spatial layers output by the scenario models. The output layer names will vary depending on the scenario that is modeled. Spatial output layers are prefixed with the scenario name (i.e., *Less Restrictive*, *Very Restrictive*, *Most Restrictive*).

Table 3. Description of model output layers.

Output Layer Name	Layer Description
"Scenario Name" Jurisdictional Wetlands	Layer containing NWI wetland polygons that have been identified as jurisdictional (value of 1) and non-jurisdictional (value of 0)
"Scenario Name" Dissolved Palustrine Wetlands	Dissolved palustrine polygons that were used for proximity analysis
"Scenario Name" NHD RPWs	The extracted scenario NHD RPWs
Less Restrictive "Riparian Area Model" Riparian Areas	The riparian area floodplain that was used by the <i>Less Restrictive</i> modeling scenario; layer name will vary depending on riparian area model selected by the user
NWI RPWs	Extracted Lacustrine NWI RPWs
Less Restrictive Significant Nexus Wetlands	NWI wetland polygons flagged as potentially significant nexus wetlands when running the <i>Less Restrictive</i> model scenario

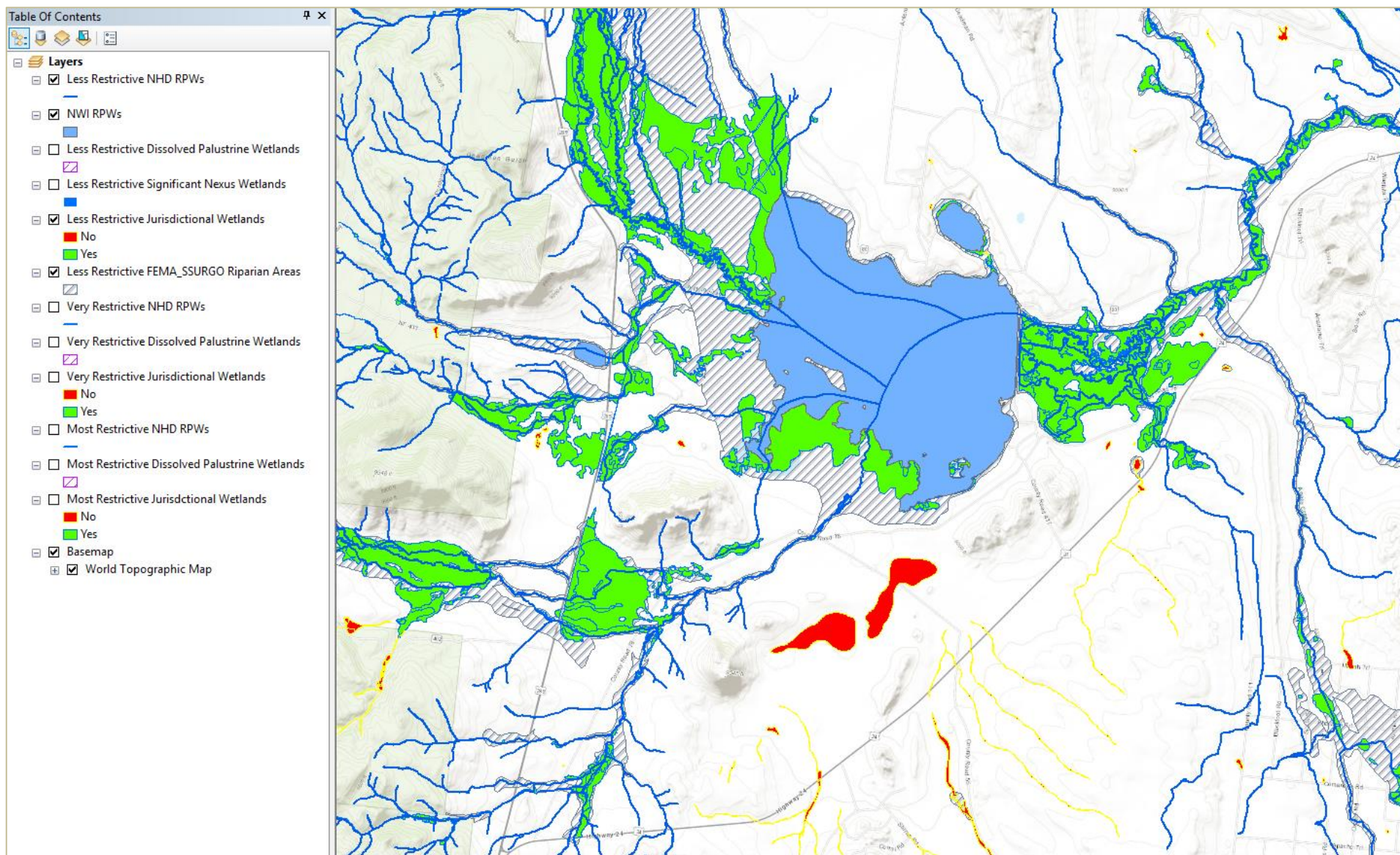


Figure 7. Example of model output in ArcMap, if running the model from the ArcGIS ModelBuilder interface.

Wetland Functional Assessment

Advancements in wetland mapping over the past decade have focused on extending traditional inventories to include additional abiotic metrics that further describe wetland resources. These hydrogeomorphic metrics, such as landscape position, hydrologic connectivity, landform and water body type, can contribute to an understanding of the ecological functions provided by particular wetland types. Using a best professional judgement and field reconnaissance process, wetland scientists have developed correlation tables that link existing wetland classification metrics (biotic and abiotic) to the predicted performance of various ecological functions. These functional assessments can then be used to provide an indication of ecological gain or loss across a project study area when wetlands are added (restoration, enhancement) or removed (dredge, drain, or fill) from jurisdictional protection.

Wetlands play an important role in the ecological balance of natural landscapes. In the past, wetlands were drained and filled without much consideration of their value. It is now commonly understood that wetlands provide essential physical, chemical, and biological processes that help maintain the integrity of the surrounding environment. These functions are recognized as particularly crucial in semi-arid regions such as New Mexico, where only a small percentage of the land area is occupied by wetlands.

Wetlands are called the “kidneys of the landscape”²² due to their function as headwater and downstream receivers of water and waste from both natural and human sources. They stabilize water supply, lessening the extreme effects of flood, drought, and fire. Wetlands are critical to the food chain and biodiversity, with a significant percentage of terrestrial animals using wetlands for a portion of their life cycle. On a global scale, wetlands contribute to the stability of worldwide levels of available nitrogen, atmospheric sulfur, carbon dioxide and methane.²¹ Wetlands are important sinks for carbon and increase landscape resilience and adaptation to climate change. Finally, functioning wetlands directly provide services to humans in the form of food, air and water quality, flood attenuation, energy resources (peat), recreation, and aesthetic values.

Wetlands perform a number of ecological functions that help improve and maintain environmental quality. When natural wetlands are degraded or filled, some wetland functions may still occur through human intervention or technology. Healthy natural wetland systems provide functions most effectively in terms of cost and performance. Four wetland functions were examined to determine potential jurisdictional scenario impacts on wetland function within the case study watersheds of this project.

Fish Habitat (FSH) – Wetlands performing the FSH function provide an environment for various portions of the aquatic life cycle. The FSH function provides an indication of the capacity to support an abundance of native fish species for functions other than spawning (e.g., cover/refugia, foraging, and connectivity). Organisms essential to fish survival depend on wetlands to survive. Wetlands provide spawning and nursery areas, and wetland vegetation provides cover for small and young fish avoiding predators. Shade provided by wetland trees or shrubs also helps maintain cooler water temperatures for cold water species.

Water Quality (WQ) – Wetlands can break down nutrients from natural sources, fertilizers, or other pollutants in a process known as nutrient transformation, thereby providing treatment of pollutants in storm water runoff. Nutrient transformation refers to the natural chemical processes that remove or recycle compounds in the environment. In the case of many wetlands, nitrates and phosphorous from agricultural runoff are the primary nutrients of concern. The WQ function provides a measurement of

the effectiveness of a wetland and wetland vegetation in chemical absorption, conversion and retention of these organic compounds. Wetlands are perhaps the most effective component of the landscape in removing nitrate from surface water particles, acting as a sink for excess nitrogen. In terms of phosphorus retention, sediment dynamics and local geology are the determining factors in whether a wetland is a source, sink, or convertor of phosphorus over long periods of time (>1 growing season). Nutrients are prevented from moving further through the watershed either through storage or by wetland vegetation using the nutrients for their own life cycle.

Wetlands also improve water quality by physically trapping particles in a process referred to as sediment retention. In addition to nutrient transformation, the WQ function provides a measurement of a wetland's effectiveness in filtering and intercepting suspended inorganic particles. In contrast to nutrient transformation, which involves chemical processes, sediment retention is a physical process where the suspended particles are filtered by the soil and plant roots. This removal of suspended particles helps to improve water clarity and helps maintain cooler temperatures on cold water streams. Generally, wetlands perform the WQ function if they are vegetated with herbaceous plants and are flooded seasonally, semi-permanently, permanently, or intermittently.

Flood Protection (FP) - Wetlands capture and store surface water from precipitation or spring snow melt. The FP function provides a measurement of the effectiveness of a wetland to store or slow the flow of surface water. Water is then slowly released through surface or underground hydrologic networks. In general, depression wetlands that capture and store precipitation or runoff are performing the FP function. This important function also provides groundwater recharge points found in wetlands near stream or river floodplains or in lake basins, fringe areas, or islands. From the human perspective, this process equates to lower, shorter-duration, and less-frequent peak flood levels downstream.

Wildlife Habitat (WH) - A number of bird species rely on wetlands and associated habitats for survival. The WH function provides an indication of the capacity to support an abundance and diversity of feeding and nesting water birds. Wetlands performing this function provide semiaquatic or riparian habitats for many species of waterfowl, water birds or shorebirds. Depending on the species, critical water bird habitat is typically associated with open water in lakes, or forested ponds or streams.

Case Study Watersheds

For comparative analysis of the jurisdictional scenarios, three geographically-diverse case study watersheds were selected: the Cottonwood River Watershed in Minnesota, the South Platte Headwaters Watershed in Colorado, and the Cimarron River Watershed in New Mexico. Selection of case study watersheds was limited by the availability of NWI wetlands data containing the NWI-Plus attributes.

Cottonwood River Watershed, MN

The Cottonwood River Watershed (USGS HUC 07020008) encompasses approximately 1,284 square miles and is located in southern MN (Figure 8). The Cottonwood River flows into the Minnesota River which is a TNW, regulated under the CWA. According to the Minnesota Pollution Control Agency (MPCA)²³, the Cottonwood River watershed is mostly agricultural with 88% of the land in cultivation. The remaining land consists of 6% grassland, 1% wetlands or water, and only about 3% forested land. The climate within the Cottonwood River Watershed is continental, with cold dry winters and warm wet summers, and annual precipitation ranging from 26 to 29 inches. NHD streams

and rivers in the watershed are mostly classified as perennial or intermittent (65% intermittent, 21% perennial, and 7% ditches).

South Platte Headwaters Watershed, CO

The South Platte Headwaters Watershed (USGS HUC 10190001) encompasses approximately 1,604 square miles and contains the headwaters of the South Platte River, a designated TNW protected under the CWA (Figure 9). The watershed is characterized by an intermontane valley surrounded by steep, high mountains. Majority land use in the watershed is composed of 51% rangeland/grassland and 40% forest. The climate is continental, semi-arid and heavily influenced by the local mountainous terrain. Droughts are frequent, with precipitation falling in the valleys in spring and late summer as brief, intense rain events and in the mountains as snowfall during the winter months. Annual precipitation ranges from 30 to 40 inches in the surrounding higher elevation alpine forests to 11 inches in the semiarid intermontane valley at lower elevations. Surges in water flow in the South Platte River occur during the spring snowmelt. NHD streams and rivers are mostly classified as intermittent, ephemeral, and perennial (46% intermittent, 11% perennial, 33% ephemeral, 2% pipeline, and 5% ditches).

Cimarron River Watershed, NM

The Cimarron River Watershed (USGS HUC 11080002) is located in northeastern NM and drains approximately 1,049 square miles (Figure 10). The watershed is part of the Canadian River Basin that eventually drains to the Mississippi River. The Canadian River is the nearest downstream TNW connected to the Cimarron River. Most of the land in the watershed is privately owned and undeveloped. According to the New Mexico Environment Department's Surface Water Quality Bureau²⁴, land use in the watershed is composed of 51% forest, 31% grassland, 16% shrubland, 2% agricultural, and <1% urban. The arid to semiarid climate is characterized by wide variations in annual precipitation totals. Annual precipitation ranges from 30 inches in the higher elevation alpine forests in the west to 15 inches in the semiarid grasslands at lower elevations in the east. Flow of surface water is highly influenced by snowmelt in the higher elevations and by brief but intense rainfall events that typically occur during the summer months. NHD streams and rivers are mostly classified as intermittent (73% intermittent, 16% perennial, 4% ephemeral, and 5% ditches).

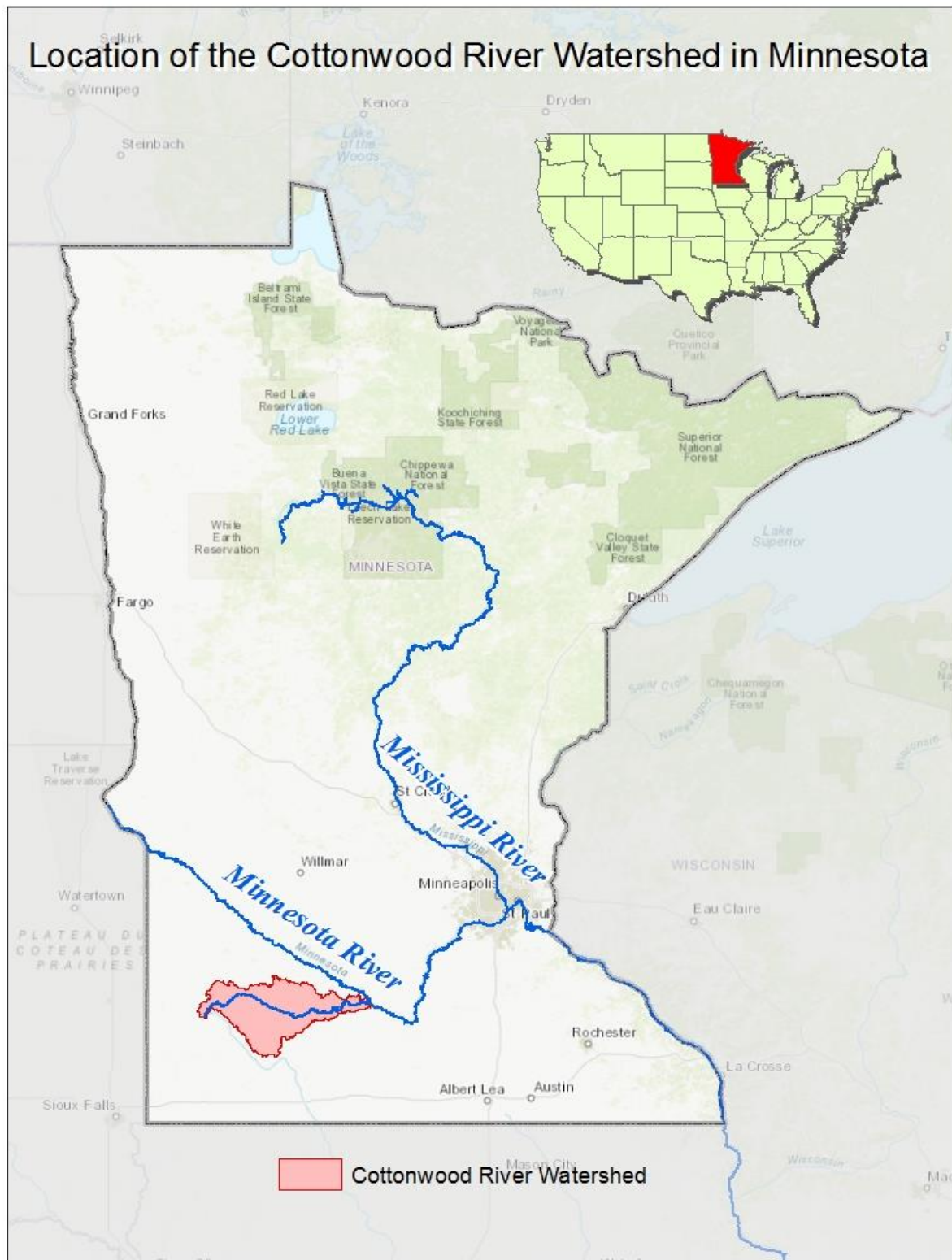


Figure 8. Location of Cottonwood River Watershed in Minnesota.



Figure 9. Location of the South Platte Headwaters Watershed in Colorado.

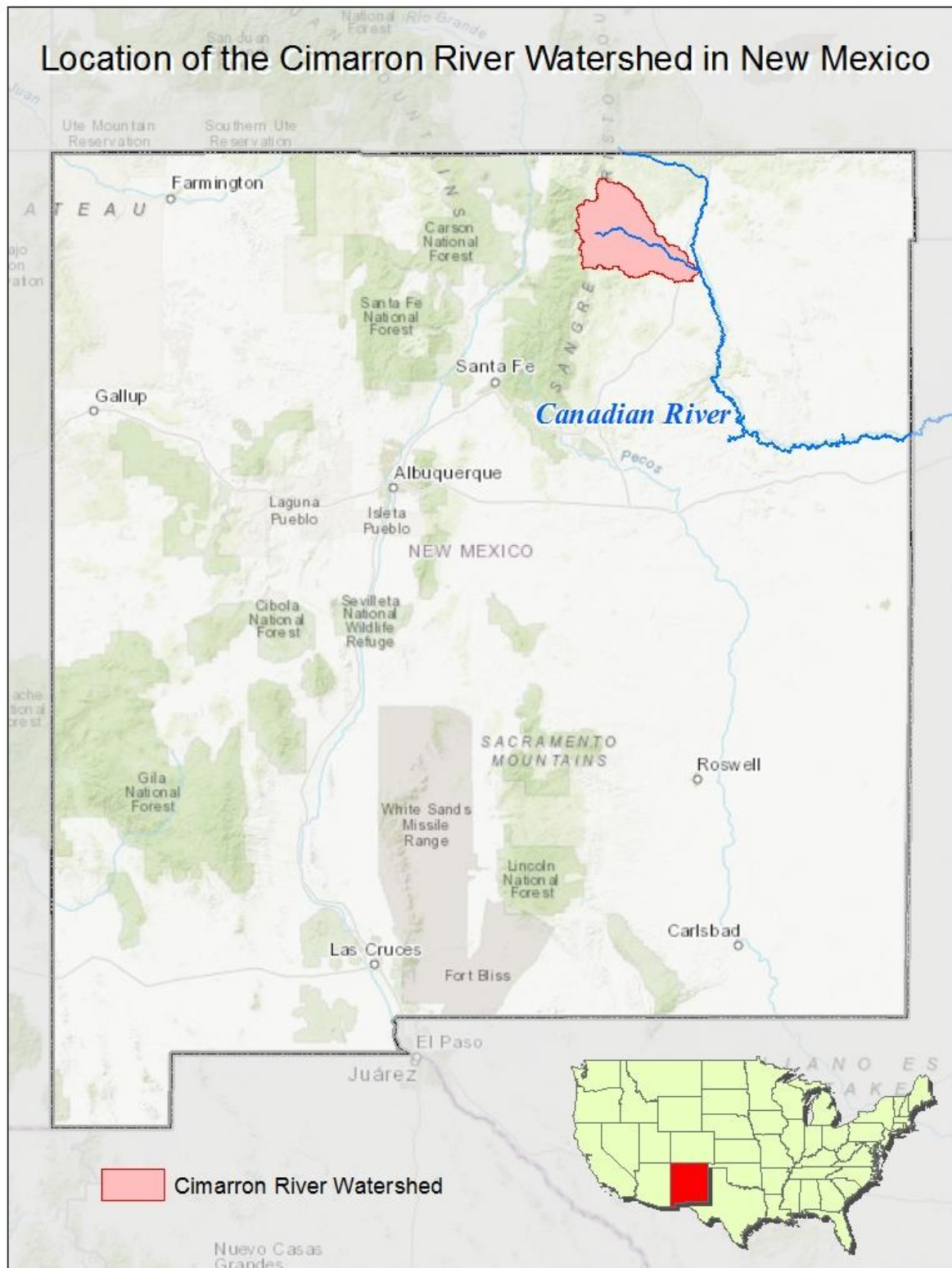


Figure 10. Location of Cimarron River Watershed in New Mexico.

Results

Overview

Results of the jurisdictional scenario models for each case study watershed were summarized for comparative analysis of the spatial extent of jurisdictional and non-jurisdictional wetlands. Total jurisdictional and non-jurisdictional wetland acres, percent of total jurisdictional and non-jurisdictional wetland acres, number of jurisdictional and non-jurisdictional wetland polygons, and percent jurisdictional and non-jurisdictional polygons were compiled and summarized for each scenario in the case study watersheds. Potential impacts on wetland function were assessed by compiling total wetland acres that were identified as potentially jurisdictional and non-jurisdictional for those NWI polygons that were rated as having a high or moderate functional rating by the functional assessment models. Functional impacts were compared for each scenario in the case study watersheds by examining percent jurisdictional and non-jurisdictional wetland acres for NWI polygons having a high or moderate functional rating for the FP, WH, FSH, and WQ functions. Modeling results were converted to web compatible format for visual comparison and communication of the spatial modeling results using GIS web applications. When reviewing and using the jurisdictional scenario modeling results, one should take into consideration the model limitations and recommendations for appropriate uses for the model and results (see **Model Limitations**).

Watershed Summaries

Summarization of jurisdictional scenario modeling results for the Cottonwood River watershed indicate that the *Most Restrictive* scenario produced the highest number of potentially non-jurisdictional wetland acres (Table 4, Figure 11). The *Most Restrictive* scenario increased the total amount of non-jurisdictional wetland acres in the Cottonwood River watershed to 20,666 acres, representing a 125% increase in non-jurisdictional wetland acres when compared to the *Less Restrictive* scenario (9,166 acres) and a 64% increase when compared to the *Very Restrictive* scenario (12,567 acres). Differences between the *Very Restrictive* and *Less Restrictive* scenario were less pronounced. Compared to the *Less Restrictive* scenario, the *Very Restrictive* scenario increased total non-jurisdictional wetland acres from 9,166 to 12,567, representing a 37% increase in non-jurisdictional wetland acres.

Table 4. Jurisdictional scenario summary statistics for the Cottonwood River watershed in MN.

Summary parameter	Jurisdictional determination	No. of polygons	% of total polygons	Area (acres)	% of total wetland acres
Watershed					
Watershed Area	--	--	--	840,784	--
All Wetlands	--	12,461	--	57,371	--
Non jurisdictional	Most	8,216	65.9	20,666	36.0
Non jurisdictional	Very	6,024	45.3	12,567	21.9
Non jurisdictional	Less	4592	36.9	9,166	16.0
Jurisdictional	Most	4,245	34.1	36,705	64.0
Jurisdictional	Very	6,437	51.7	44,803	78.1
Jurisdictional	Less	7,869	63.1	48,205	84.0
Significant nexus	Less	7	--	78.2	--

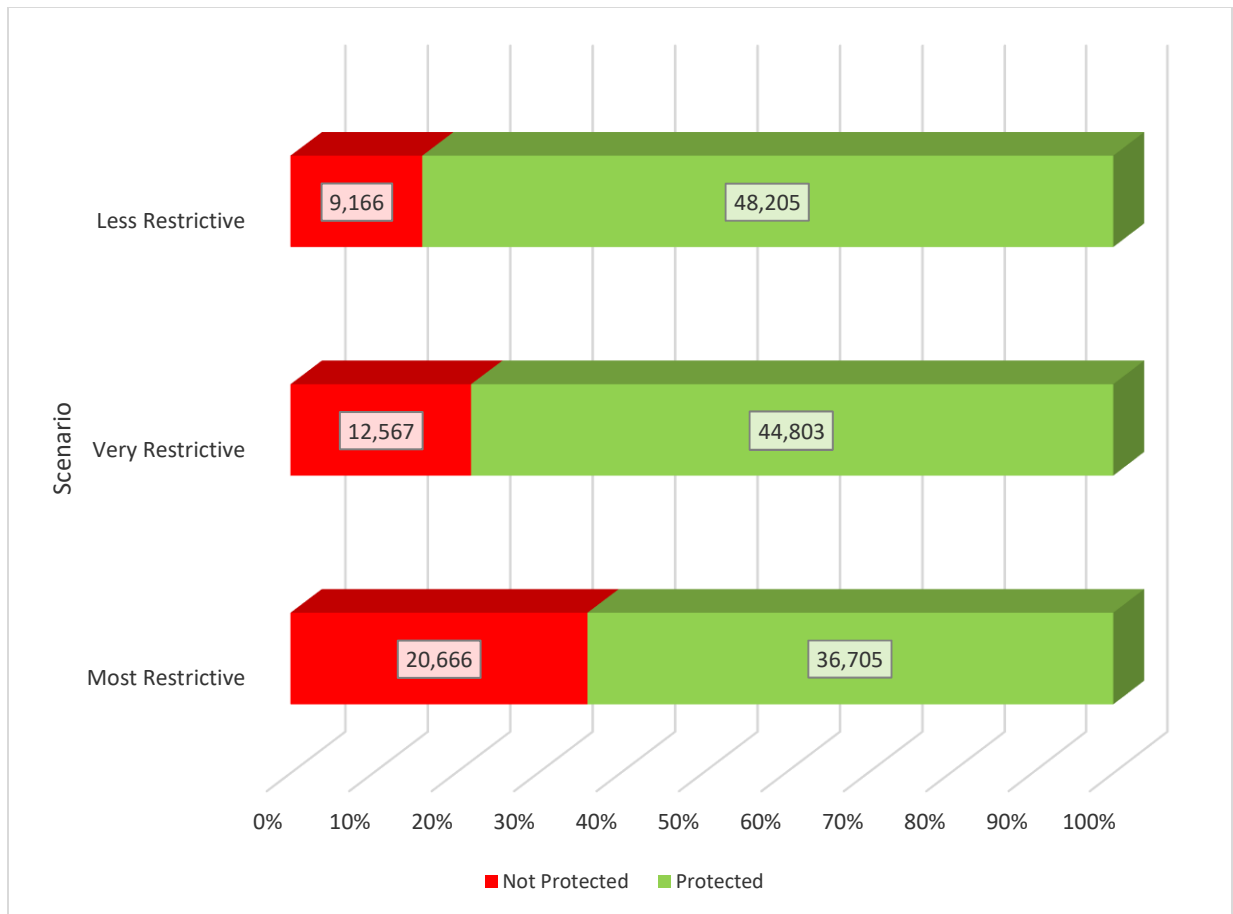


Figure 11. Cottonwood River watershed, potentially protected and non-protected wetland acres by modeling scenario.

Summarization of jurisdictional scenario modeling results for the South Platte Headwaters watershed indicate that the *Most Restrictive* scenario also produced the highest number of potentially non-jurisdictional wetland acres (Table 5, Figure 12). The *Most Restrictive* scenario increased the total amount of non-jurisdictional wetlands in the South Platte Headwaters watershed to 36,836 acres, representing a 1,774% increase in non-jurisdictional wetland acres when compared to the *Less Restrictive* scenario (1,966 acres) and a 256% increase when compared to the *Very Restrictive* scenario (10,344 acres). Differences between the *Very Restrictive* and *Less Restrictive* scenario were found to be more significant in the South Platte Headwaters watershed than in our other case study watersheds. Compared to the *Less Restrictive* scenario, the *Very Restrictive* scenario increased total non-jurisdictional wetland acres from 1,966 to 10,344, representing a 426% increase in non-jurisdictional wetland acres.

Table 5. Jurisdictional scenario summary statistics for the South Platte Headwaters watershed in CO.

Summary parameter	Jurisdictional determination	No. of polygons	% of total polygons	Area (acres)	% of total wetland acres
Watershed					
Watershed Area	--	--	--	1,026,696	--
All Wetlands	--	22,294	--	67,597	--
Non jurisdictional	Most	15,892	71.3	36,836	54.5
Non jurisdictional	Very	4445	19.9	10344	15.3
Non jurisdictional	Less	1692	7.6	1966	2.9
Jurisdictional	Most	6,402	28.7	30,761	45.5
Jurisdictional	Very	17849	80.1	57252	84.7
Jurisdictional	Less	20,602	92.4	65631	97.1
Significant nexus	Less	22	--	68.6	--

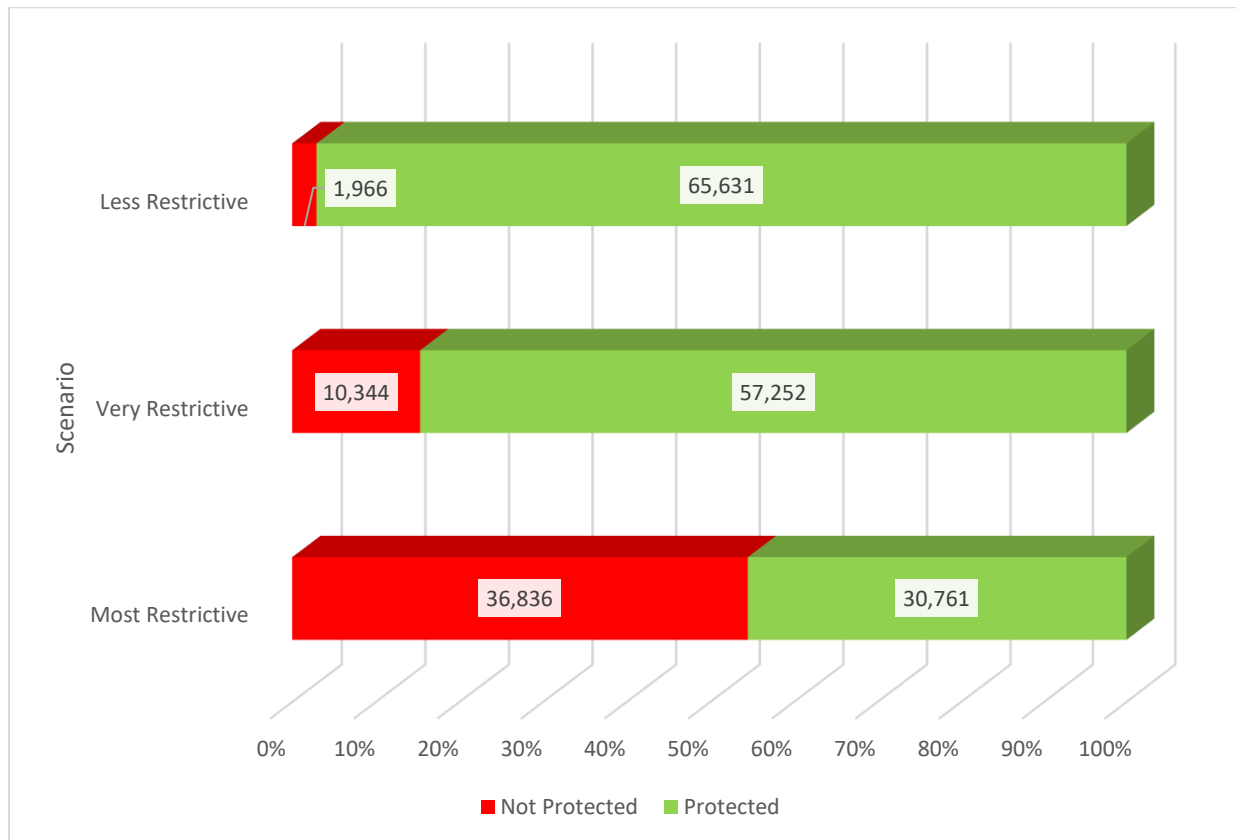


Figure 12. South Platte Headwaters watershed, potentially jurisdictional and non-jurisdictional wetland acres by modeling scenario.

As with the Cottonwood River and South Platte Headwaters watershed, summarization of the jurisdictional scenario modeling results for the Cimarron River watershed indicate that the *Most Restrictive* scenario produced the highest number of non-jurisdictional wetland acres (Table 6, Figure 13). The *Most Restrictive* scenario increased the total amount of non-jurisdictional wetlands in the Cimarron River watershed to 14,069 acres, representing a 502% increase in non-jurisdictional wetland acres when compared to the *Less Restrictive* scenario (2,336 acres) and a 288% increase when compared to the *Very Restrictive* scenario (3,626 acres). Compared to the *Less Restrictive* scenario, the *Very Restrictive* scenario increased total non-jurisdictional wetland acres from 2,336 to 3,626, representing a 55% increase in non-jurisdictional wetland acres.

Table 6. Jurisdictional scenario summary statistics for the Cimarron River watershed in NM.

Summary parameter	Jurisdictional determination	No. of polygons	% of total polygons	Area (acres)	% of total wetland acres
Watershed					
Watershed Area	--	--	--	840,784	--
All Wetlands	--	5,278	--	20,445	--
Non jurisdictional	Most	4,949	93.8	14,069	68.8
Non jurisdictional	Very	2,557	48.4	3,626	17.7
Non jurisdictional	Less	1,862	35.3	2,336	11.4
Jurisdictional	Most	329	6.2	6,376	31.2
Jurisdictional	Very	2,721	51.6	16,820	82.3
Jurisdictional	Less	3,416	64.7	18,109	88.6
Significant nexus	Less	14	--	26.2	--

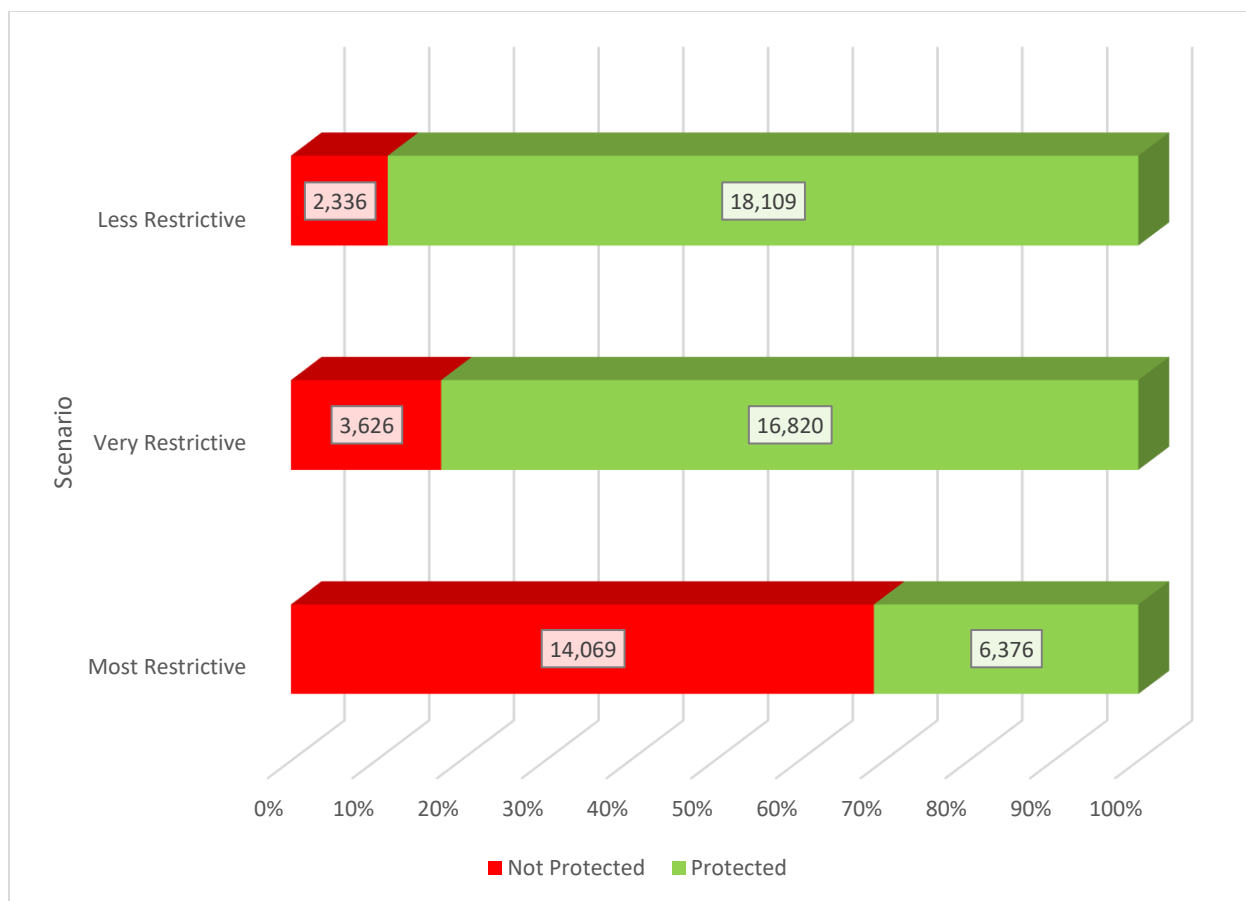


Figure 13. Cimarron River watershed, potentially jurisdictional and non-jurisdictional wetland acres by modeling scenario.

Potential Wetland Function Impacts

Wetland functional assessments conducted for the case study watersheds identified wetland polygons that had a high or moderate functional rating for the FP, WH, FSH and WQ functions. Potential impact of the jurisdictional scenarios on wetland functions was evaluated by summing the total wetland acres for NWI polygons that received a high or moderate functional rating for a particular function and determining the percentage of that acreage that was determined to be jurisdictional and non-jurisdictional by each jurisdictional scenario model. As shown in Figure 14, Figure 15, and Figure 16 the model results indicate that the *Most Restrictive* scenario could potentially remove more wetland function acres from protection for all of the evaluated functions in the case study watersheds. The *Most Restrictive* scenario in the Cottonwood River Watershed removed more than 50% of the wetland acres from protection for the water quality function. In the South Platte Headwaters watershed, 40-45% of the wetland acres were removed from protection for all of the wetland functions. Impacts on wetland function for the Cimarron River watershed were more significant, with greater than 50% of wetland acres removed from protection for all of the evaluated wetland functions.

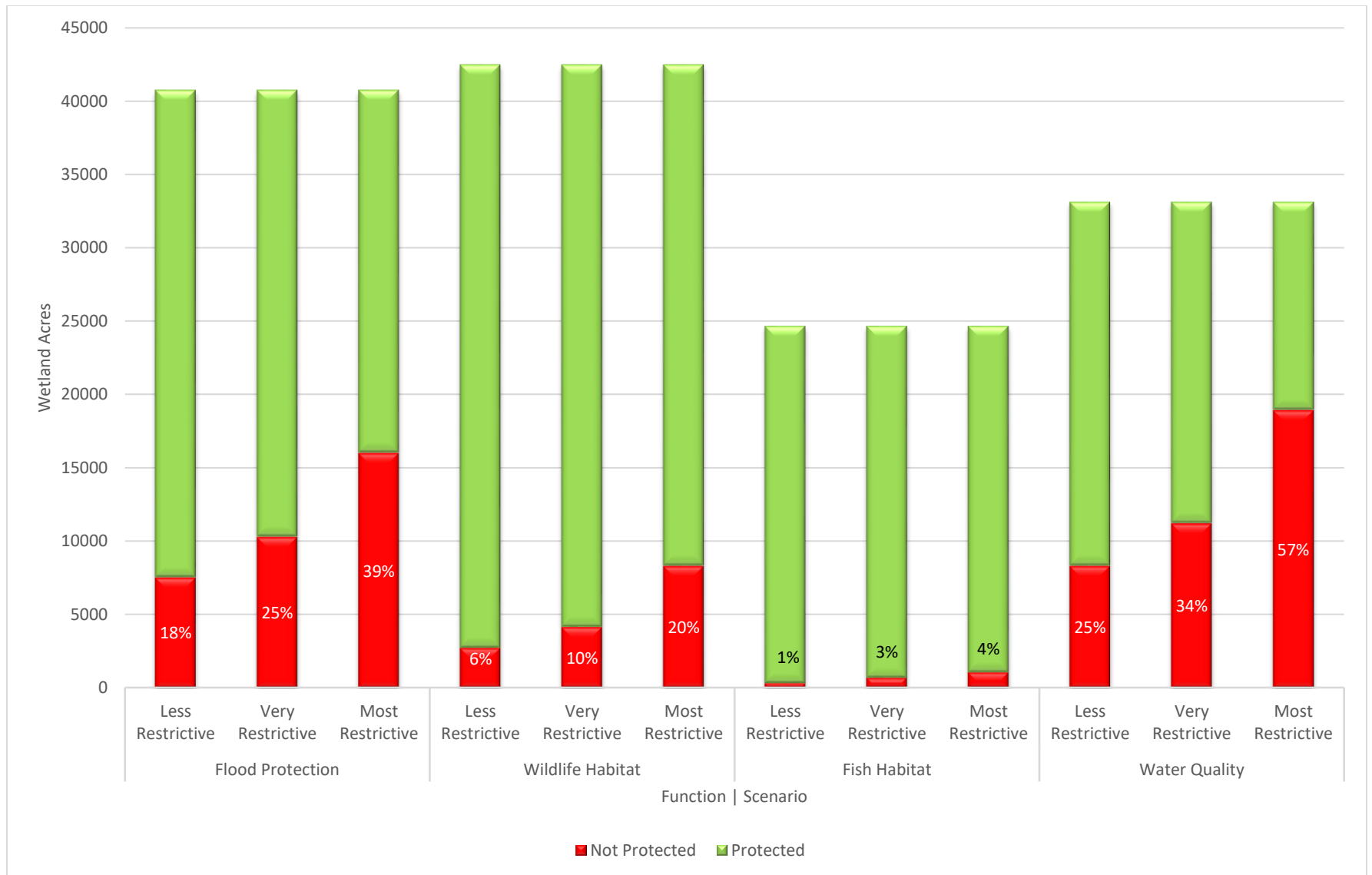


Figure 14. Percent non-jurisdictional wetland acres by jurisdictional scenario for NWI wetlands receiving a high or moderate functional rating from the wetland functional assessments in the Cottonwood River watershed.

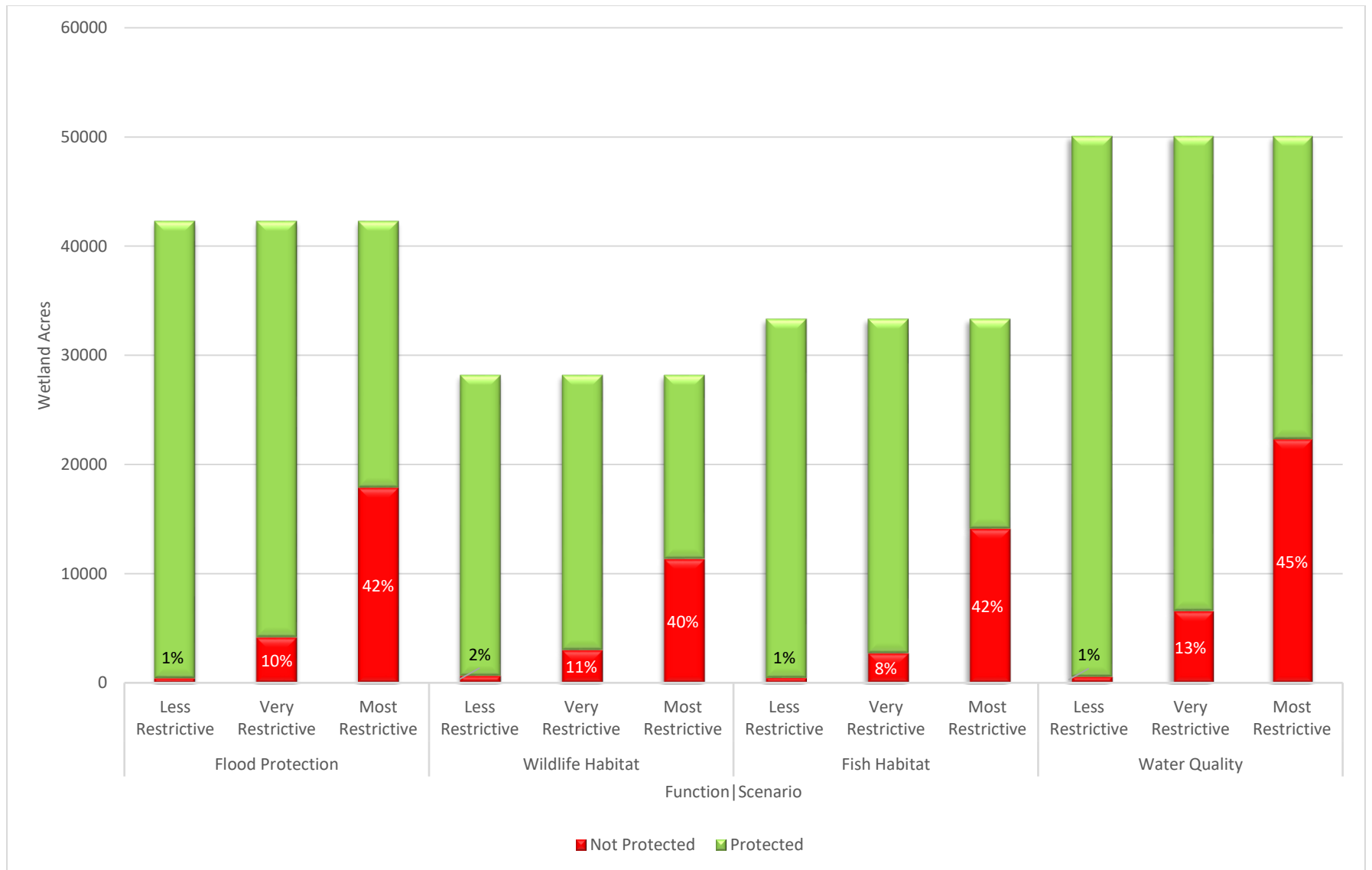


Figure 15. Percent non-jurisdictional wetland acres by jurisdictional scenario for NWI wetlands receiving a high or moderate functional rating from the wetland functional assessments in the South Platte Headwaters watershed.

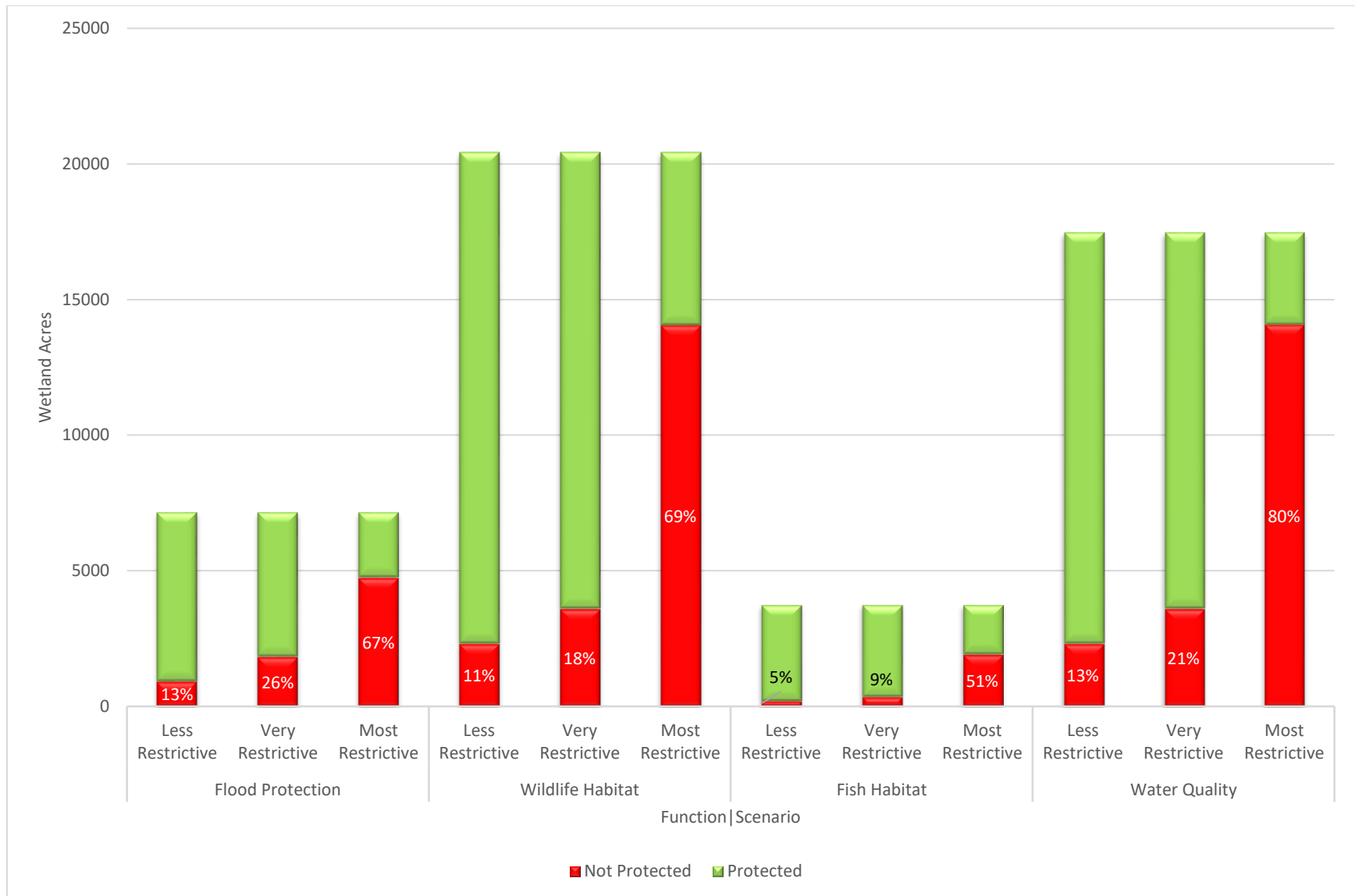


Figure 16. Percent non-jurisdictional wetland acres by jurisdictional scenario for NWI wetlands receiving a high or moderate functional rating from the wetland functional assessments in the Cimarron River watershed.

Communication of Results

Several different tools were explored to find effective ways to communicate modeling results to a diverse target audience. Spatial output layers for the scenario modeling results were converted to web GIS format and uploaded to ArcGIS Online (AGOL). ESRI GIS web applications such as Story Maps and Operations Dashboards were then developed for communicating the modeling results. A custom web application using the ESRI ArcGIS JavaScript API was also developed for visually comparing the scenario results. These applications allow spatial output from the model to be easily shared over the web without the need for specialized GIS software or expertise.

Story Map

The ESRI Story Maps are web application templates that allow maps, narrative text, multi-media and images to be combined to tell a story. The ESRI Cascade story map template was used to develop a story map for the project, entitled *Modeling Federally Protected Waters and Wetlands* (Figure 17). The story map provides an overview of the jurisdictional modeling project.



Figure 17. Cover page for the Modeling Federally Protected Wetlands story map.

Link: [Story Map - Modeling Federally Protected Wetlands](https://smumn.maps.arcgis.com/apps/Cascade/index.html?appid=f3de6b30c0454c15ac9d3d881f18ae33)

(<https://smumn.maps.arcgis.com/apps/Cascade/index.html?appid=f3de6b30c0454c15ac9d3d881f18ae33>)

Operations Dashboard

Operations Dashboard is an ESRI web application developed for monitoring events or activities using geographic data. The Dashboard application allows important quantitative metrics of spatial data to be highlighted and viewed using a series of visual graphics such as gauges, charts, lists, indicators and maps. An Operations Dashboard was created for the Cottonwood and Cimarron case study watersheds to evaluate the potential for using the application to highlight the quantitative results for each jurisdictional scenario model (Figure 18).

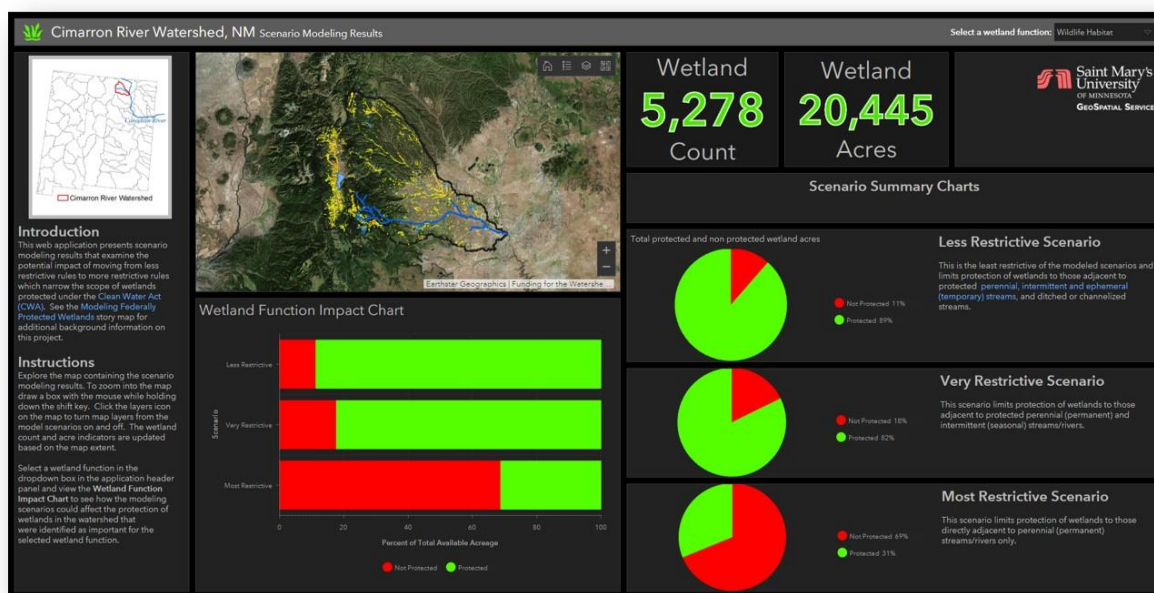


Figure 18. Graphic showing the Operations Dashboard for the Cimarron River Watershed.

Link: [Operations Dashboard - Cottonwood River watershed jurisdictional scenario results](https://smumn.maps.arcgis.com/apps/opstdashboard/index.html#/4d6b3c3fd1d34c7fb656afc6f9871293)
(<https://smumn.maps.arcgis.com/apps/opstdashboard/index.html#/4d6b3c3fd1d34c7fb656afc6f9871293>)

Link: [Operations Dashboard – South Platte Headwaters watershed jurisdictional scenario results](https://smumn.maps.arcgis.com/apps/opstdashboard/index.html#/dda84dfafb554b7abca39d8cecaff9a8)
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Link: [Operations Dashboard - Cimarron River watershed jurisdictional scenario results](https://smumn.maps.arcgis.com/apps/opstdashboard/index.html#/cd7b28a7a4764217a369acbdba4413c8)
(<https://smumn.maps.arcgis.com/apps/opstdashboard/index.html#/cd7b28a7a4764217a369acbdba4413c8>)

Custom Web GIS Application

A custom web application was developed using the ArcGIS JavaScript API. This custom web application provides an opacity slider tool, which can be used to visually compare the scenario results (Figure 19). The user can use the slider to vary the opacity of the scenario results in order to observe how the spatial extent of jurisdictional and non-jurisdictional wetlands changes as you progress from the *Most Restrictive*, *Very Restrictive*, and *Less Restrictive* jurisdictional scenarios.

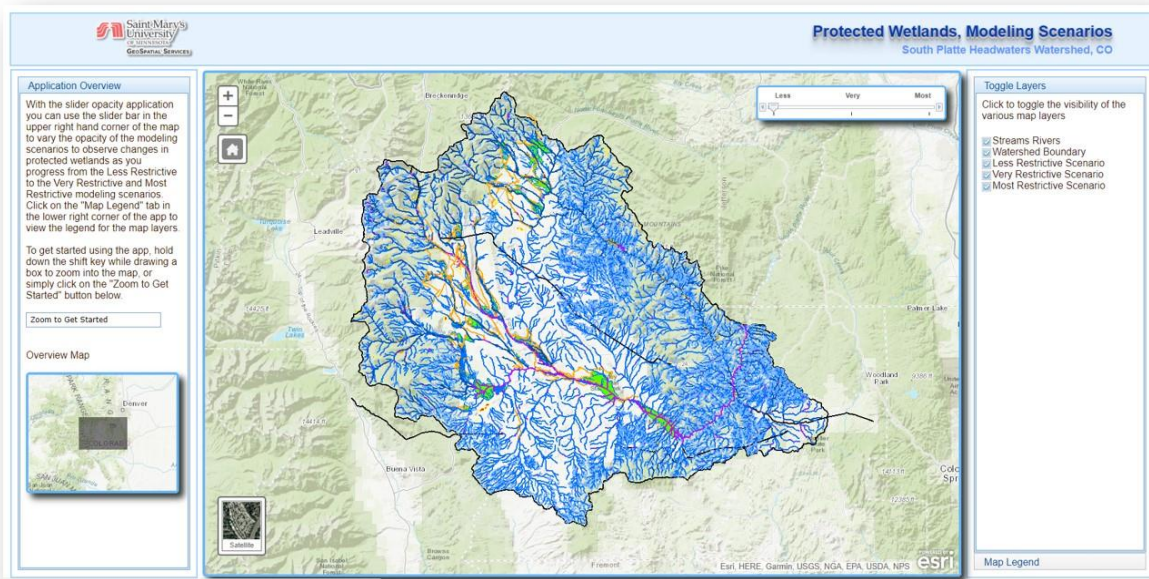


Figure 19. Graphic showing the opacity slider custom web application.

Link: [Custom web application - Cottonwood River watershed jurisdictional scenario results](https://gsswolf.smumn.edu/CottonwoodJurisdictionalScenarioSlider/)
(<https://gsswolf.smumn.edu/CottonwoodJurisdictionalScenarioSlider/>)

Link: [Custom web application - Cimarron River watershed jurisdictional scenario results](https://gsswolf.smumn.edu/CimarronJurisdictionalScenarioSlider/)
(<https://gsswolf.smumn.edu/CimarronJurisdictionalScenarioSlider/>)

Link: [Custom web application – South Platte watershed jurisdictional scenario results](https://gsswolf.smumn.edu/SouthPlatteJurisdictionalScenarioSlider/)
(<https://gsswolf.smumn.edu/SouthPlatteJurisdictionalScenarioSlider/>)

Model Limitations

When using the *CWA Jurisdictional Scenario Model* and applying the results, one should be aware of the limitations of the model. This model provides a conceptual framework for evaluating and visualizing potential jurisdictional determinations using generalized criteria for the possible jurisdictional scenarios. Consequently, results of the model are only approximations of the spatial extent of potential jurisdictional and non-jurisdictional wetlands. Accuracy of the model is also limited by the accuracy of the input data used for modeling. The GIS data used as input for the model have their own inherent limitations due to spatial and attribute inaccuracies. For example, the model is highly dependent on the classification of NHD streams and rivers, which could have errors in classification that would affect model results. Thus, the results of this model are not intended to serve as the primary tool for regulatory or jurisdictional decision-making. Regulatory applications should involve rigorous field verification before any decisions or conclusions are made. Specifically, the data set was created for broad-scale evaluation and research applications at the county and regional level. Some general examples of appropriate and inappropriate uses would include:

Appropriate Uses

- Regional and county planning
- Large area resource management planning
- Educational purposes for students and citizens
- Broad-scale evaluation of environmental impact

Inappropriate Uses

- Determining the location of jurisdictional wetlands
- Establishing definite jurisdiction or non-jurisdiction of a wetland without consideration of the limitations of the model

Observations

The purpose of this project was to model and examine the potential jurisdictional impacts on wetlands that may occur if there is a transition to rules that significantly narrow the regulatory scope of federally protected waters. This was accomplished by developing a GIS-based spatial model for comparing the extent of protected wetlands in three geographically diverse case study watersheds using three different jurisdictional scenarios. The knowledge gained through completion of the project provides the basis for the following observations:

1. Results from this project support the conclusion that a narrower definition of jurisdictional waters proposed by the current administration will have a significant impact on the protection of wetlands and waters nationwide.
2. Risk is more pronounced for ephemeral and isolated wetlands such as those found in semi-arid environments and the glaciated prairie pothole region of the U.S. Many ephemeral and intermittently flowing streams and rivers, and wetlands adjacent to these streams and rivers could be potentially removed from federal protection.
3. Model results can be improved through further refinement of model input data, primarily classification of watershed hydrography, and by the addition of variables which help adjust and refine each modelling scenario.
4. More accurate modelling of the final proposed rulemaking can be achieved as additional details become available from the EPA and USACE.
5. The modeling tool can be made more accessible to concerned practitioners with limited knowledge of GIS through further automation of the tool and modeling scenarios.

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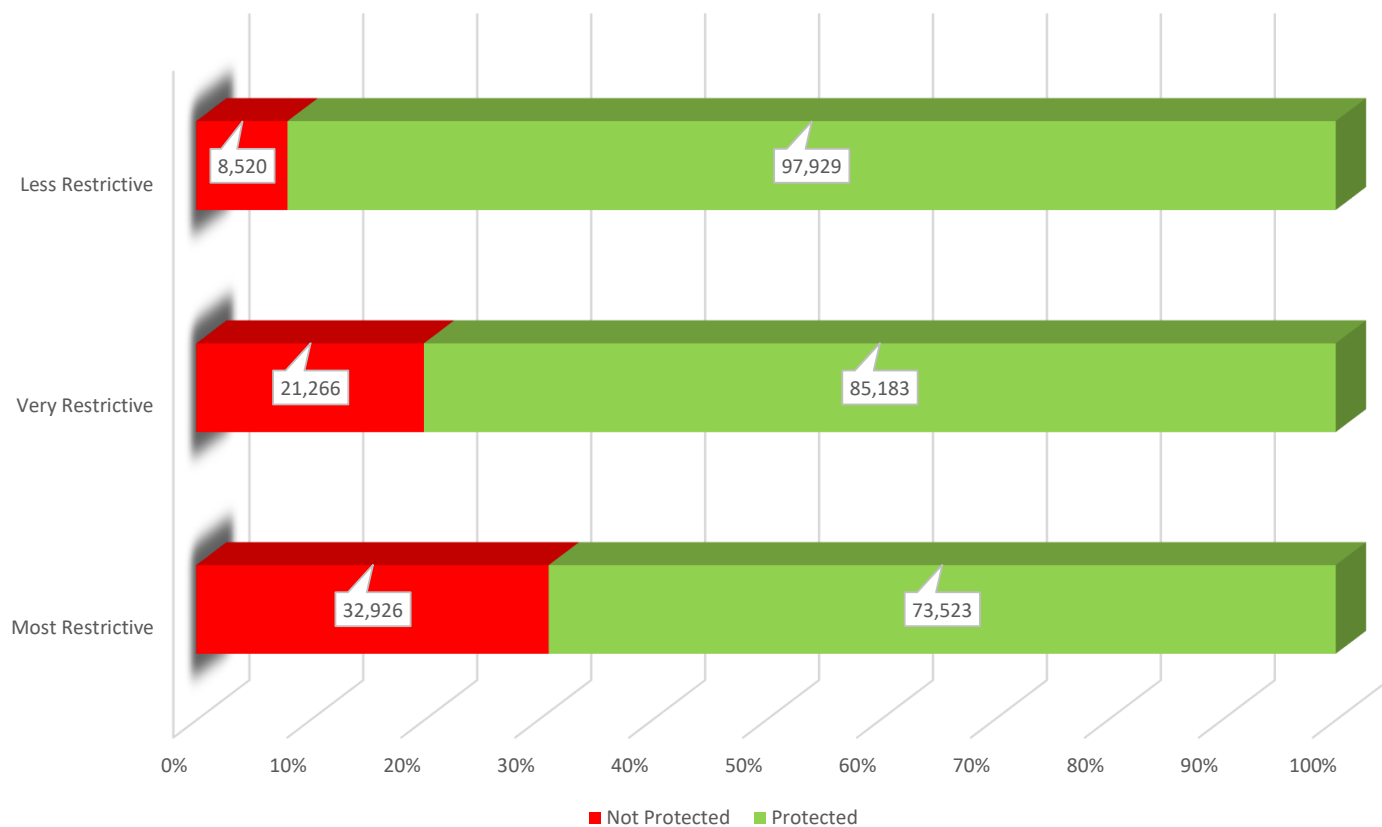
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Attachment B

Saint Mary's University of Minnesota Nanticoke Watershed Results

Potential Protected and Not Protected Wetland Acres by Modeling Scenario for the Nanticoke Watershed

(Excluding estuarine, marine, and SQRTV water regimes)



Nanticoke Summary Table

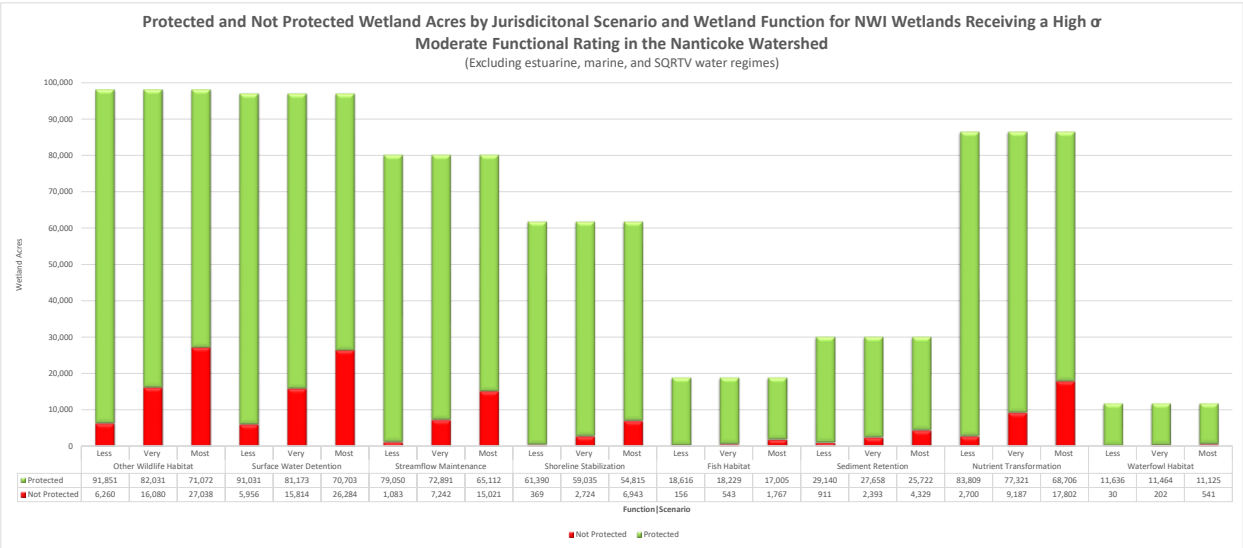
Summary parameter	Jurisdictional scenario	No. of polygons	% of total polygons	Acres	% of total wetland acres
Watershed	--	--	--	529,402	--
All Wetlands	--	16,669	--	106,449	--
Not Protected	Most	8,760	52.6	32,926	30.9
Not Protected	Very	6,768	40.6	21,266	20.0
Not Protected	Less	3,490	20.9	8,520	8.0
Protected	Most	7,909	47.4	73,523	69.1
Protected	Very	9,901	59.4	85,183	80.0
Protected	Less	13,179	79.1	97,929	92.0
Significant nexus	Less	33	0.2	131	0.1

Wetland Acres

Scenario	Not Protected	Protected
Most Restrictive	32,926	73,523
Very Restrictive	21,266	85,183
Less Restrictive	8,520	97,929

Number of Polygons

Scenario	Not Protected	Protected
Most Restrictive	8,760	7,909
Very Restrictive	6,768	9,901
Less Restrictive	3,490	13,179



Function	Scenario	Not Protected	Protected
Other Wildlife	Less	6,260	91,851
	Very	16,080	82,031
	Most	27,038	71,072
Surface Water	Less	5,956	91,031
	Very	15,814	81,173
	Most	26,284	70,703
Streamflow M	Less	1,083	79,050
	Very	7,242	72,891
	Most	15,021	65,112
Shoreline Stal	Less	369	61,390
	Very	2,724	59,035
	Most	6,943	54,815
Fish Habitat	Less	156	18,616
	Very	543	18,229
	Most	1,767	17,005
Sediment Ret	Less	911	29,140
	Very	2,393	27,658
	Most	4,329	25,722
Nutrient Trans	Less	2,700	83,809
	Very	9,187	77,321
	Most	17,802	68,706
Waterfowl Hal	Less	30	11,636
	Very	202	11,464
	Most	541	11,125

STATE NAMI (All)			
Sum of ACRE Column Labels			
Row Labels	0	1	Grand Total
Less Restr.	6259.69	91850.7	98110.4
Most Restr.	27038.2	71072.2	98110.4
Very Restr.	16079.7	82030.7	98110.4
Grand Total	49377.6	244954	294331