Economic Analysis for the Proposed Revised Definition of “Waters of the United States”

U.S. Environmental Protection Agency

and

Department of the Army

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Table of Contents

List of Tables

List of Figures

Abbreviations

AFVO	Animal fats and vegetable oils
BAT	Best Available Technology Economically Achievable
BMP	Best management practice
BPJ	Best professional judgment
BPT	Best Practicable Control Technology Currently Available
CAFO	Concentrated animal feeding operation
CWA	Clean Water Act
EA	Economic analysis
EO	Executive Order
ESA	Endangered Species Act
FOSC	Federal on-site coordinator
FR	Federal Register
FRP	Facility Response Plan
HUC	Hydrologic unit code
ICR	Information Collection Request
JD	Jurisdictional determination
LEDPA	Least environmentally damaging practicable alternative
MS4	Municipal Separate Storm Sewer System
MSGP	Multi-sector general permit
NCP	National Contingency Plan
NHD	National Hydrography Dataset
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NPFC	National Pollution Funds Center
NRC	National Response Center
NWI	National Wetlands Inventory
OMB	Office of Management and Budget
OPA	Oil Pollution Act of 1990
OSLTF	Oil Spill Liability Trust Fund
OSRO	Oil spill removal organization
PHMSA	Pipeline and Hazardous Materials Safety Administration

PRA	Paperwork Reduction Act
Rapanos	Rapanos v. United States, 547 U.S. 715 (2006)
RFA	Regulatory Flexibility Act
RP	Responsible party
RPA	Resource and Programmatic Assessment
RPWWN	Wetlands adjacent to but not directly abutting relatively permanent waters
SAB	EPA's Science Advisory Board
SBA	Small Business Administration
SPCC	Spill Prevention, Control and Countermeasure
SWANCC	Solid Waste Agency of Northern Cook County v. U.S. Army Corps of Engineers, 531 U.S. 159 (2001)
SWAT	Soil and Water Assessment Tool
USACE	U.S. Army Corps of Engineers
U.S. EPA	U.S. Environmental Protection Agency
TAS	Treatment as State
TBEL	Technology-based effluent limit
TMDL	Total Maximum Daily Load
WLA	Wasteload allocation
WOTUS	Waters of the United States
WTP	Willingness to pay
WQBEL	Water quality-based effluent limit
WQS	Water quality standards

Executive Summary

The U.S. Environmental Protection Agency and Department of the Army ("the agencies") are proposing a rule to revise the definition of the term "waters of the United States." "Waters of the United States" is a foundational term establishing the jurisdictional scope of the Clean Water Act (CWA). The agencies are proposing to establish six categories of jurisdictional waters and would define eleven exclusions for features that would not be subject to CWA jurisdiction.

This Economic Analysis (EA) assesses the potential impacts of the proposed changes to the definition of "waters of the United States" based on the potential effects to CWA programs that rely on the definition of "waters of the United States." In this EA, the agencies describe how the proposed regulation compares to the baseline of the Clean Water Rule: Definition of "Waters of the United States" (hereinafter referred to as the 2015 Rule). 80 FR 37054 (June 29, 2015). The 2015 Rule is the current definition of "waters of the United States" in the Code of Federal Regulation. However, as discussed further in the preamble of this proposed rule, the 2015 Rule is enjoined in 28 states where the pre-2015 regulations are currently being implemented. Therefore, the agencies also describe how the proposed regulation compares to an alternate baseline of pre-2015 practice which represents the pre-2015 regulations as implemented consistent with Supreme Court decisions and informed by applicable guidance documents and longstanding agency practice. A separate Resource and Programmatic Assessment (available in Docket No. EPA-HQ-OW-2018-0149) outlines the agencies' assessment of the potential effects of the proposed definition on the regulation of aquatic resources across the country, as well as the potential effects on CWA programs and certain other programs under other federal statutes. The RPA also provides snapshots of the applicable regulatory and legal frameworks currently in place in states and some tribes to provide context for how aquatic resources are regulated. The two documents together present a comprehensive assessment of this proposed rule's potential impacts.

The agencies have applied a two-stage analysis for the economic analysis of this proposed rule to make the best use of limited local and national level water resources information available and to inform stakeholders and the public about the potential implications of these proposed actions. The agencies confronted several data limitations that would not allow for a single analysis of the proposed rule from the primary baseline directly to the proposed policy. Therefore, the agencies believe that the outputs of this two-stage analysis are the best way to illustrate the potential impact of the proposed rule against the baseline of the 2015 Rule being in effect nationwide (*i.e.*, the sum effect of both stages) and of the 2015 Rule not being in effect (*i.e.*, second stage only).

The first stage (hereinafter Stage 1) assesses the potential impacts of moving from the 2015 Rule to the pre-2015 baseline (*i.e.*, repealing the 2015 Rule and recodifying the prior regulations). For the Stage 1 analysis, the agencies used the original 2015 Rule economic analysis as a starting point, and thus pursued a quantitative assessment limited to Stage 1. However, several significant changes to the 2015 Rule analysis have been made in the Stage 1 analysis to account for the incorporation of existing state laws and programs that regulate water and potential state governance responses, as well as other analytic changes incorporating better information in assessing the potential benefits and costs of the Stage 1 effects.

The second stage (hereafter Stage 2) examines the potential impacts of moving to a new definition under the proposed rule from the pre-2015 baseline. Due to the analytic and data challenges discussed throughout, the agencies provide a series of qualitative analyses, three detailed case studies, and a national analysis of the avoided costs and forgone benefits of the proposed change on the CWA 404 program in the Stage 2 analysis. The agencies determined that a qualitative analysis and a series of case studies, where waters potentially could be assessed on a smaller scale in specific locations, was the best available alternative for applied empirical work estimating the potential benefits and costs of this proposed rule. Focusing on smaller geographic scales allows the analyses to focus on areas with better than average data availability, and when possible, to utilize additional location specific data sources. This economic analysis begins by systematically outlining the complexity and various layers of uncertainty regarding the potential implications of the proposed change in the CWA jurisdiction. The two main challenges faced by the economic analysis include determining the level of water resource regulation undertaken by individual states and tribes before and in response to the proposed change, and the difficulty in quantifying the amount, type, and location of water resources that change CWA jurisdictional status. Each major challenge and uncertainty and its implications for the costs and benefit of the proposed rule are discussed in detail in this economic analysis.

Environmental Federalism

The agencies carefully examined the potential responses of the states based on the economics literature on environmental federalism, the local provision of public goods, and federalism more broadly. The agencies assessed current state programs and the insight they provide regarding predicting future plans under the proposed CWA jurisdictional change. This revealed behavior, along with economic theory gleaned from the literature, suggests how state governments *could* respond to the proposed shift in the regulatory landscape. States have a continuum of responses to a change in CWA jurisdiction based on legal, economic, and other constraints. These responses may differ depending on the type of water resources, as well as across programs within a given state. The analysis considers CWA section 404 permitting and other surface water quality programs separately because a state's responses to a change in jurisdiction may differ between the two types of programs.

A state might choose to not regulate waters that now fall solely under its jurisdiction. In this case, the agencies would expect avoided costs and forgone benefits. At the other end of the continuum are states with regulations that are as broad or broader in scope than the CWA. In these states, the proposed change in jurisdictional scope would have no cost or benefit implications. Many, if not most, states likely fall in between these extremes. The federalism literature illustrates that states may actually be in a better position than the federal government to regulate local environmental public goods (*e.g.*, water quality). When given more flexibility over which waters to regulate, states may be able to direct resources toward their high priority waters and limit expenditures on their low priority waters, thereby maximizing the net benefits derived from their waters.

Complicating the analysis are differences in state roles across CWA programs. While most states have been authorized to administer at least some, if not all, parts of the CWA section 402 National Pollutant Discharge Elimination System (NPDES) program, only two states have assumed administration of the section 404 dredged and fill material program, and therefore, some states may lack the capacity to administer the section 404 program or expand state dredged and fill permit programs that currently exist. The agencies emphasize, however, that if states do make regulatory changes to maintain the previous federal baseline level of CWA jurisdiction then the states will likely incur some transition costs in the short-run. The cost to states could be more or less than the cost to the federal government.

For state dredged and fill programs, state responses to the proposed change in CWA jurisdiction were grouped into four possible categories based on how the state's laws may limit in some manner their regulations of aquatic resources, how broadly they define their waters of the state, and whether they have a state-level dredged and fill program.

Table ES-1: Dredged/fill categorization criteria

Category	State regulatory indicators	Likely response
1	State has broad legal limitations on regulating aquatic resources	Likely to reduce regulatory practices
2	Does not have state-level dredged and fill program; does not define waters of the state more broadly than CWA; and does not have broad legal limitations on regulating aquatic resources.	State programs are likely to provide some regulatory coverage of waters that would no longer be "waters of the United States" and may reduce aquatic resource permitting practices
3	Has either a state-level dredged and fill program or defines waters of the state more broadly than CWA; and does not have broad legal limitations on regulating aquatic resources	State programs are likely to provide some regulatory coverage of waters that would no longer be "waters of the United States" and may continue baseline permitting practices
4	Has a state-level dredged and fill program and defines "waters of the state" more broadly than CWA	Likely to continue dredged/fill permitting practices in 2015 Rule

For state surface water programs, state responses to the proposed change in CWA jurisdiction were grouped into three possible categories based on the state's legal limitations on regulating aquatic resources, how broadly they define their waters of the state, and whether the state has NPDES authorization.

Table ES-2: Surface water discharge permitting categorization criteria

Category	State regulatory indicators	Likely response
1	State does not define waters of the state more broadly than CWA and has broad legal limitations on regulating aquatic resources; or state does not have NPDES authorization	Likely to reduce regulatory practices
2	NPDES-authorized state that either defines waters of the state more broadly than CWA or does not have broad legal limitations on regulating aquatic resources	State programs may provide partial regulatory or non-regulatory coverage of waters that would no longer be "waters of the United States" and may reduce surface water permitting practices
3	NPDES-authorized state that defines waters of the state more broadly than CWA and does not have broad legal limitations on regulating aquatic resources	State programs are likely to provide partial regulatory coverage of waters that would no longer be "waters of the United States" and may continue regulatory practices in 2015 Rule

The dredged and fill and other surface water state response categories were then used to create a number of possible state response scenarios for use in the Stage 1 and Stage 2 analysis. Scenario 0 is a lower bound in which no states are assumed to regulate the newly non-jurisdictional waters and Scenario 3 is an upper bound in which assumes the largest number of states would step in and regulate newly non-jurisdictional waters. Table ES-3 lays out what is included in each scenario.

Table ES-3: Treatment of the effect of state response on cost and benefits in the sensitivity analysis

	Sensitivity analysis			Appendix	
	Scenario 1	Scenario 2	Scenario 3	Scenario 0	Scenario 1a
Change in baseline dredged and fill practices					
1 - Likely reduce	Included	Included	Included	Included	Included
2 - May reduce	Included	Included	Excluded	Included	Included
3 - May continue	Included	Excluded	Excluded	Included	Excluded
4 - Likely continue	Excluded	Excluded	Excluded	Included	Excluded
Change in baseline surface water practices					
1 - Likely reduce	Included	Included	Included	Included	Included
2 - May continue	Included	Excluded	Excluded	Included	Included
3 - Likely continue	Excluded	Excluded	Excluded	Included	Excluded

Data and Analytic Uncertainties

Limitations of the available data affected the agencies' ability to conduct national level analyses regarding the potential effect of the proposed rule and contributed to uncertainty in results. The agencies attempted to use the U.S. Geological Survey's National Hydrography Dataset (NHD) at high resolution and the U.S. Fish and Wildlife Service's (U.S. FWS) National Wetlands Inventory (NWI) to estimate the potential effect of the proposed rule on certain water types across the country. The datasets represent the best national datasets of the potential location and extent of streams, rivers, lakes, ponds, and wetlands of which the agencies are aware. However, because neither is a regulatory dataset, even where streams and wetlands are identified in the datasets the question of CWA jurisdiction under both baselines and the proposed rule often cannot be answered. For example, the proposed rule differentiates between intermittent and ephemeral flow for purposes of federal regulatory jurisdiction under the CWA, but the NHD generally does not differentiate between streams with intermittent or ephemeral flow in much of the country. Likewise, the NWI does not contain information that would allow the agencies to identify wetlands that meet or do not meet the baseline or proposed regulatory definitions of "adjacent wetlands," such as whether there is a berm between the wetland and the nearest river, and if so, what kind of surface hydrologic connections, if any, are present. Please refer to the RPA for a more in-depth discussion of these databases.

As a result, the agencies believe the best option for assessing the benefits and costs of the Proposed Rule are to use an updated version of the 2015 Rule analysis for the Stage 1 analysis of this rule, and to rely on qualitative discussions and three quantitative case studies, and a national analysis of the estimated avoided costs and forgone benefits of the proposed change to the CWA 404 program for the Stage 2 analysis of this rule.

Stage 1: CWA jurisdictional change from the 2015 Rule to the Pre-2015 Practice

The Stage 1 analysis builds upon the analysis done for the 2015 Rule and its proposed repeal but makes several significant changes and improvements. First among these improvements is consideration of potential state response to the proposed change in CWA jurisdiction previously discussed. Another improvement made in the Stage 1 analysis is an updated wetlands benefits analysis. Because the wetlands valuation analysis for the 2015 Rule did not follow a number of the best practices for benefit transfer, it was deemed too uncertain to be include in the 2017 proposed repeal of the 2015 Rule. The Stage 1 analysis improves upon the 2015 analysis by utilizing a meta-analysis of wetland valuation studies that combines and synthesizes the results from multiple valuations studies to estimate a new transfer function. Meta-analyses have the advantage of drawing information on willingness to pay (WTP) from a large number of disparate sources in order to control for a relatively large number of variables that influence WTP. Because meta-analyses can control for the confounding attributes of the underlying studies in a theoretically consistent way, it is sometimes possible to make use of a larger number of studies than would be considered for a unit or function transfer.

The Stage 1 benefit and cost estimates are presented for each state response scenario. Scenario 1, which is the most conservative federalism scenario in that it assumes the smallest number of states will take on the regulation of newly non-jurisdictional waters, finds the proposed rule produces annual avoided costs ranging between $98 and $164 million and forgone benefit ranging between $33 to $38 million.

Table ES-4: Estimates of avoided costs and forgone benefits of the potential CWA jurisdictional change from the 2015 Rule to the Pre-2015 Practice excluding the impact from states that are likely to continue the 2015 rule practices (Scenario 1)

	Annual Avoided Costs (2017$ millions)		Annual Forgone Benefits (2017$ millions)	
	Low	High	Low	High
CWA 402 CAFO Administration	$0.1	$0.1	$1.7	$3.0
CWA 402 CAFO Implementation	$2.8	$2.8		
CWA 402 Stormwater Administration	$0.1	$0.1	$14.2	$18.0
CWA 402 Stormwater Implementation	$14.3	$17.8		
CWA 404 Permit Application	$15.7	$39.5	$16.7	$16.7
CWA 404 Mitigation – Wetlands	$37.7	$57.6		
SUBTOTAL	$70.7	$117.8	$32.6	$37.7
CWA 311 Compliance	$7.3	$7.3	*not quantified*	*not quantified*
CWA 401 Administration	$0.4	$0.4	*not quantified*	*not quantified*
CWA 402 Pesticide General Permit Implementation	$1.8	$2.0	*not quantified*	*not quantified*
CWA 404 Mitigation – Streams[1]	$18.0	$36.6	*not quantified*	*not quantified*
TOTAL	$98.2	$164.2	$32.6	$37.7

These results exclude the costs and benefits for 404 permit applications and wetland mitigation for states classified as response category 4 for regulation of dredged or fill material, and they exclude the costs and benefits for all other categories for states classified as response category 3 for other surface water regulation.

[1]Stream mitigation benefits are not quantified in this Economic Analyses due to a lack of available studies estimating the value of mitigation.

Scenario 2 assumes a larger number of states will take actions to regulate newly non-jurisdictional waters. Avoided annual costs range from $55 to $100 million and annual forgone benefits are estimated to be roughly $16 to $17 million.

Table ES-5: Estimates of avoided costs and forgone benefits of the potential CWA jurisdictional change from the 2015 Rule to the Pre-2015 Practice excluding the impact from states that are likely to continue the 2015 rule practices (Scenario 2)

	Annual Avoided Costs (2017$ millions)			Annual Forgone Benefits (2017$ millions)	
	Low	**High**		**Low**	**High**
CWA 402 CAFO Administration	$0.0	$0.0		$0.3	$0.6
CWA 402 CAFO Implementation	$0.5	$0.5			
CWA 402 Stormwater Administration	$0.0	$0.0		$1.5	$1.9
CWA 402 Stormwater Implementation	$1.5	$1.9			
CWA 404 Permit Application	$10.2	$25.5		$14.3	$14.3
CWA 404 Mitigation – Wetlands	$26.7	$42.1			
SUBTOTAL	$38.9	$70.1		$16.1	$16.8
CWA 311 Compliance	$1.1	$1.1		*not quantified*	*not quantified*
CWA 401 Administration	$0.1	$0.1		*not quantified*	*not quantified*
CWA 402 Pesticide General Permit Implementation	$0.4	$0.5		*not quantified*	*not quantified*
CWA 404 Mitigation – Streams	$14.0	$27.8		*not quantified*	*not quantified*
TOTAL	$54.6	$99.6		$16.1	$16.8

These results exclude the costs and benefits for 404 permit applications and wetland mitigation for states classified as response category 3 and 4 for regulation of dredged or fill material, and they exclude the costs and benefits for all other categories for states classified as response category 2 and 3 for other surface water regulation.

Scenario 3 assumes the largest number of states will take actions to regulate newly non-jurisdictional waters. Avoided annual costs range from $9 to $15 million and annual forgone benefits are estimated to be roughly $3 million. The change in cost and benefit estimates between Scenarios 1, 2, and 3 shows the importance of accounting for state response to the proposed change in CWA jurisdiction.

Table ES-6: Estimates of avoided costs and forgone benefits of the potential CWA jurisdictional change from the 2015 Rule to the Pre-2015 Practice excluding the impact from states that are likely to continue the 2015 rule practices (Scenario 3)

	Annual Avoided Costs (2017$ millions)			Annual Forgone Benefits (2017$ millions)	
	Low	**High**		**Low**	**High**
CWA 402 CAFO Administration	$0.0	$0.0		$0.3	$0.6
CWA 402 CAFO Implementation	$0.5	$0.5			
CWA 402 Stormwater Administration	$0.0	$0.0		$1.5	$1.9
CWA 402 Stormwater Implementation	$1.5	$1.9			
CWA 404 Permit Application	$1.5	$3.8		$1.2	$1.2
CWA 404 Mitigation – Wetlands	$2.3	$2.9			
SUBTOTAL	$5.9	$9.2		$3.1	$3.7

Table ES-6: Estimates of avoided costs and forgone benefits of the potential CWA jurisdictional change from the 2015 Rule to the Pre-2015 Practice excluding the impact from states that are likely to continue the 2015 rule practices (Scenario 3)

	Annual Avoided Costs (2017$ millions)			Annual Forgone Benefits (2017$ millions)	
	Low	High		Low	High
CWA 311 Compliance	$1.1	$1.1		*not quantified*	*not quantified*
CWA 401 Administration	$0.1	$0.1		*not quantified*	*not quantified*
CWA 402 Pesticide General Permit Implementation	$0.4	$0.5		*not quantified*	*not quantified*
CWA 404 Mitigation – Streams	$1.7	$3.8		*not quantified*	*not quantified*
TOTAL	$9.1	$14.6		$3.1	$3.7

These results exclude the costs and benefits for 404 permit applications and wetland mitigation for states classified as response category 2, 3, or 4 for regulation of dredged or fill material, and they exclude the costs and benefits for all other categories for states classified as response category 2 or 3 for other surface water regulation.

Stage 2 Analysis: CWA Jurisdictional Change from Pre-2015 Practice to the Proposed Rule

The Stage 2 economic analysis consists of a series of qualitative analyses and three detailed case studies. The purpose of the qualitative analysis is to provide the best national assessment of the likely effects of this proposal without providing quantitative assessment. As stated, the agencies currently lack the data sets to quantitatively assess the likely effects of this portion of the provisions. The qualitative analysis is intended to provide information on the likely direction of the effects based on the best professional judgments of the agencies. In addition, the agencies conducted three case studies in three major watersheds to provide in-depth information on the likely quantitative assessment of the effects. The case studies have considered likely ecological effects, and their accompanying economic effects. The case studies highlight the complexity of the potential decision matrices and the depth of data and modeling requirements, requiring more sophisticated analytic framework than the framework used in the 2015 analysis. The case studies conclude that the effects of provisions going beyond the pre-2015 baseline are modest regardless of the level of state engagement in water resource protection as modeled in Scenarios 1 through 3. The anticipated cost savings range from $7 to $22 million, and the estimated foregone benefits less than $1 to $3 million. The results of the case studies demonstrate that only the avoided costs and forgone benefits of the CWA 404 program can be estimated reliably nationwide with the available data. Using the same methodologies employed in the case studies, the national annual avoided costs of the CWA 404 program are estimated to range from $28 to $266 million over Scenarios 1 through 3. National annual forgone benefits from the CWA 404 program are estimated to range from $7 to $47 million over Scenarios 1 through 3.

Stage 2 Qualitative Analyses

The first component of the Stage 2 analysis relies on a series of qualitative analyses of the major CWA programs affected by a change in the definition of "waters of the United States." The CWA programs, including the section 303(c) water quality standards program, the section 311 oil spill prevention program, the section 401 water quality certification program, the section 402 National Pollutant Discharge Elimination System (NPDES) permit program, and the section 404 permit program for the discharge of dredged or fill material, rely on the definition of "waters of the United States" for program implementation. A revised definition of "waters of the United States" may affect these CWA programs as implemented at the state level. Potential effects vary from state to state based on a state's ability and authority under their own state law to regulate or address through non-regulatory programs their aquatic resources. Please refer to the RPA for a more detailed description of these and other programs potentially affected by this proposed rule.

<u>Section 402</u>

Facilities that currently have a NPDES permit under CWA section 402 or an authorized state program can be assumed to either discharge to a "water of the United States" or to waters designated to be "waters of the state" by the authorized state in which they are located. The proposed regulation could result in a jurisdictional change to a discharger's receiving water or downstream water, and thus may result in a potential change to the discharger's permit. This is more likely the case if the state does not currently consider these immediate receiving waters to be "waters of the state" and/or if they do not extend this status to these waters in response to a change in the definition of "waters of the United States." Facilities that consider their receiving water's status to have potentially changed can opt to: continue with their existing permit (*status quo*); formally request a permit modification; or formally request to have their permit terminated.

<u>Section 311</u>

Section 311 of the CWA, Oil Spill Prevention, Preparedness, Reporting and Response, includes two main components that address the risk and harm from oil spills: (1) spill prevention and preparedness, as contained in the EPA's Spill Prevention, Control, and Countermeasure (SPCC) and Facility Response Plan (FRP) regulations for non-transportation related facilities and in United States Coast Guard (USCG) and Department of Transportation (DOT) regulations for transportation-related facilities, and (2) spill notification and response, as described under the National Contingency Plan. The agencies estimate that approximately 540,000 facilities are currently subject to SPCC requirements. This estimate is based on the number of establishments in each industry sector and oil storage capacities. The estimate does not explicitly account for the location of the facilities and reasonable potential for a discharge to a "water of the United States;" it is therefore not possible to assess the degree to which a change in the scope of jurisdictional waters will affect the number of regulated facilities. In determining the reasonable expectation of a discharge, facility owners consider solely the geographical and locational aspects of the facility.

In addition, the EPA requires a subset of SPCC facilities that could, because of their location, reasonably be expected to cause substantial harm to the environment by discharging oil into or on the navigable waters or adjoining shorelines to prepare and submit an FRP to the EPA Regional Administrator for the state or tribe where the facility is located. Changes in CWA jurisdiction that would exempt a facility from SPCC because the facility no longer has a reasonable potential of a discharge to a "water of the United States" as described in 40 CFR 112.1(b) similarly would exempt the facility from FRP requirements.

The agencies expect no change to compliance costs or spill risk for facilities required to comply with equivalent state regulations or that elect to voluntarily implement SPCC measures. At the other end of the spectrum are facilities located in states and Indian lands without spill prevention requirements and that do not voluntarily follow industry standards. The compliance cost savings and spill risk are potentially larger for these facilities. The agencies anticipate that most facilities potentially affected by the proposed rule may fall between these two extremes. For example, facilities may choose to implement *some* spill prevention measures that are considered good engineering practices for their industry, such as secondary containment, overfill prevention, practices to ensure the safe transfer of oil to bulk storage containers, visual inspections of bulk storage containers, etc., even if they are not subject to 40 CFR part 112.

<u>Section 404</u>

The proposed rule could affect requirements to obtain 404 permits for certain activities in waters whose jurisdictional status would change, and for permittees to mitigate unavoidable impacts from those activities, where applicable. Absent any state, tribal, or local programs regulating these waters under their own dredged/fill programs, developers and other project proponents affecting these non-jurisdictional waters may not take the same steps to avoid impacts to wetlands and other aquatic resources, as compared to activities requiring a 404 permit in the baseline, nor would they need to demonstrate that they have minimized potential impacts to the maximum extent practicable. Further, the amount of mitigation required to offset impacts of activities would decrease due to the proposed rule, in the absence of any similar state, tribal, or local requirements.

<u>Section 303</u>

The potential effect of the definitional change on the number of waterbodies added to the impaired waters list (and subsequent total maximum daily load (TMDL) development) is uncertain. Absent the application of the CWA to newly non-jurisdictional waters, states and tribes can still choose to impose similar state law requirements on these waters irrespective of federal mandates. The development and revision of statewide water quality standards is typically an ongoing process independent from changes to the definition of "waters of the United States," although some states have developed standards for certain categories of water (*e.g.*, ephemeral features) that would be non-jurisdictional under the proposed rule. The agencies thus do not project additional costs relating to development or revision of water quality standards as a consequence of this proposed rule.

Changes in CWA jurisdiction could also lead to requests for changes in TMDL waste load allocations (WLAs) for point sources and load allocations (LAs) for nonpoint sources and its margin of safety. TMDL allocation revisions could shift additional pollutant reduction responsibility to those sources discharging to jurisdictional waters downstream. Given that there are currently more than 73,000 completed TMDLs nationwide, requests to revise even a small percentage of them would require significant resources to complete (U.S. EPA and U.S. Department of the Army, 2018).

<u>Section 401</u>

Under the proposed rule, the number of CWA section 404 permits would be expected to decrease since wetlands that no longer meet the proposed definition of adjacent wetlands and ephemeral features would be categorically excluded from the definition of "waters of the United States," and certain ditches, certain interstate waters, and certain lakes and ponds would not be jurisdictional. Some of these features are regulated categorically or based upon a case-specific significant nexus analysis under the pre-2015 practice, and substantially more of these features are regulated under the 2015 Rule. A reduction in 404 permits could result in costs savings to states and authorized tribes by reducing the number of 401 reviews and required staff time. However, a reduction in the scope of CWA jurisdiction could affect a state or tribe's ability to regulate wetlands that no longer meet the proposed definition of adjacent wetlands, ephemeral features, and certain other waters via section 401 authority.

The vast majority of states have been authorized to administer section 402 of the CWA. States that have not been authorized for the section 402 program and tribes authorized to administer section 401 would continue to have the opportunity to complete section 401 certification on EPA-issued 402 permits. If there are fewer EPA-issued 402 permits, then there would be a reduction in the number of 401 reviews and associated staff time. As with 404 permits, a reduction in the scope of CWA jurisdiction could affect a state or tribe's ability to regulate wetlands that no longer meet the proposed definition of adjacent wetlands, ephemeral features, and certain other waters via section 401 authority.

Stage 2 Case Study Analyses

To support benefit-cost analyses of the proposed rule, the agencies relied on three case studies for the second component of the Stage 2 economic analysis. The case studies enable the agencies to focus on key geographical areas to explore factors that determine potential proposed rule impacts in greater detail than would be possible in a national analysis given the large size and limitations of critical datasets. The agencies initially selected three geographic regions. Within these regions, the agencies then identified a total of six watersheds intersecting 10 states to explore potential changes and resulting forgone benefits and avoided costs. The major factors in selecting specific case study locations included: complete NHD data coverage, availability of other data (*e.g.*, studies needed for monetizing forgone benefits), and projected state responses to a change in CWA jurisdiction. The case study locations analyzed include the Ohio River Basin, the Lower Missouri River Basin, and the Rio Grande River Basin.

The case studies illustrate the potential impacts of the proposed rule on major program areas – notably on the number of facilities subject to CWA section 311 oil spill prevention and preparedness regulations, section 402 permits, and section 404 permits requiring mitigation – and on the resulting environmental effects and impacts on regulated entities. For each case study, the agencies first identified the facilities and activities covered under each of the three CWA programs under baseline conditions. The identified facilities and activities were then assessed to determine whether they would be affected by the changes to regulatory requirements under the proposed rule. The high-resolution NHD and NWI data have significant gaps and limitations that impede the agencies' ability to categorically identify waters that will change jurisdictional status under the proposed rule in a large fraction of the United States. Therefore, where the available data were sufficiently detailed, the agencies identified affected facilities and activities using data from the relevant program database(s) that describe the flow regime of the affected resources. These data most often reflect site-specific assessments that supported the issuance of the permit.

The agencies then evaluated the impacts of these proposed changes on compliance costs, stream flows, water quality, drinking water treatment, endangered and threatened species habitats, and other ecosystem services. The agencies quantified and monetized the impacts where possible given the available data and methods. In general, annual avoided costs exceed annualized forgone benefits, but limitations of the data curtailed the agencies' ability to quantify or monetize some of the environmental effects and forgone benefits of the proposed rule.

Under state response Scenario 1, annual avoided costs ranged from almost $0 to over $16 million, while annual forgone benefits ranged from almost $0 to slightly over $2 million.

Table ES-7: Scenario 1 — Estimates of avoided costs and forgone benefits of the potential CWA jurisdictional change from the Pre-2015 Practice to the Proposed Rule excluding the impact from states that are likely to continue the 2015 rule practices (Scenario 1)

	Annual Avoided Costs (2017$ millions)			Annual Forgone Benefits (2017$ millions)	
	Low	High		Low	High
Ohio River Basin					
CWA 402	$0.0	$0.0		$0.0	$0.0
CWA 404 Permit Application	$0.32	$0.32			
CWA 404 Mitigation – Wetlands & Ephemeral Streams	$6.42	$15.93		$0.37[2]	$2.44
CWA 404 Mitigation -Water Quality	N/A	N/A		*not quantified*	*not quantified*
CWA 404 Reservoir Dredging	N/A	N/A		*not quantified*	*not quantified*
CWA 311 – FRP Requirements	*not monetized*	*not monetized*		*not monetized*	*not monetized*
CWA 311 – SPCC Requirements	*not monetized*	*not monetized*		*not monetized*	*not monetized*
SUBTOTAL	**$6.74**	**$16.26**		**$0.37**	**$2.44**
Lower Missouri River Basin					
CWA 402	*not monetized*	*not monetized*		*not monetized*	*not monetized*
CWA 404 Permit Application	$0.26	$0.26		N/A	N/A
CWA 404 Mitigation – Wetlands & Ephemeral Streams	$1.36	$5.34		$0.12[3]	$0.81
CWA 404 Mitigation -Water Quality	N/A	N/A		*not quantified*	*not quantified*
CWA 404 Mitigation-Reservoir Dredging	N/A	N/A		*not quantified*	*not quantified*
CWA 311 – FRP Requirements	*not monetized*	*not monetized*		*not monetized*	*not monetized*
CWA 311 – SPCC Requirements	*not monetized*	*not monetized*		*not monetized*	*not monetized*
SUBTOTAL	**$1.62**	**$5.60**		**$0.12**	**$0.81**
Rio Grande River Basin					
CWA 402	*not monetized*	*not monetized*		*not monetized*	*not monetized*
CWA 404 Permit Application	$0.11	$0.11		N/A	N/A
CWA 404 Mitigation – Wetlands & Ephemeral Streams	negligible[4]	negligible		*not monetized*	*not monetized*
CWA 404 Mitigation -Water Quality	N/A	N/A		*not quantified*	*not quantified*
CWA 404 Mitigation-Reservoir Dredging	N/A	N/A		*not quantified*	*not quantified*
CWA 311 – FRP Requirements	*not monetized*	*not monetized*		*not monetized*	*not monetized*
CWA 311 – SPCC Requirements	*not monetized*	*not monetized*		*not monetized*	*not monetized*
SUBTOTAL	**$0.11**	**$0.11**			
Total 3 Case Studies					
TOTAL (Monetized Categories)	**$8.47**	**$21.97**		**$0.49**	**$3.25**

[1] Annualized benefits are estimated at a 3% discount rate.

[2] The estimated forgone annualized benefits from reduced mitigation requirements in the Ohio River Basin range from a low of $0.27 to a high of $1.80 million at a 7% discount rate.

[3] Annualized forgone benefits from reduced mitigation requirements in the Lower Missouri River Basin range from a low $0.09 to a high $0.60 at a 7% discount rate.

[4] The estimated annual mitigation cost savings range from $187 to $261.

Under state response Scenarios 2 and 3, total avoided costs and forgone benefit estimates decrease somewhat. Annual avoided costs across all case studies range from essentially $0 to $16 million, while annual forgone benefits range from close to $0 to slightly over $2 million.

Table ES-8: Estimates of avoided costs and forgone benefits of the potential CWA jurisdictional change from the Pre-2015 Practice to the Proposed Rule excluding the impact from states that are likely to continue the 2015 rule practices (Scenarios 2 & 3)

	Annual Avoided Costs (2017$ millions)		**Annual Forgone Benefits (2017$ millions)**	
	Low	**High**	**Low**	**High**
Ohio River Basin				
CWA 402	$0.0	$0.0	$0.0	$0.0
CWA 404 Permit Application	$0.31	N/A	N/A	N/A
CWA 404 Mitigation – Wetlands & Ephemeral Streams	$6.42	$15.93	$0.37[2]	$2.44
CWA 404 Mitigation -Water Quality	N/A	N/A	*not quantified*	*not quantified*
CWA 404 Reservoir Dredging	N/A	N/A	*not quantified*	*not quantified*
CWA 311 – FRP Requirements	*not monetized*	*not monetized*	*not monetized*	*not monetized*
CWA 311 – SPCC Requirements	*not monetized*	*not monetized*	*not monetized*	*not monetized*
SUBTOTAL	**$6.73**	**$16.25**	**$0.37**	**$2.44**
Lower Missouri River Basin				
CWA 402	*not monetized*	*not monetized*	*not monetized*	*not monetized*
CWA 404 Permit Application	<$0.01	<$0.01	N/A	N/A
CWA 404 Mitigation – Wetlands & Ephemeral Streams	$0.00	$0.00	$0.00	$0.00
CWA 404 Mitigation -Water Quality	N/A	N/A	*not quantified*	*not quantified*
CWA 404 Mitigation-Reservoir Dredging	N/A	N/A	*not quantified*	*not quantified*
CWA 311 Compliance	*not monetized*	*not monetized*	*not monetized*	*not monetized*
CWA 311 Compliance	*not monetized*	*not monetized*	*not monetized*	*not monetized*
SUBTOTAL	**<$0.01**	**<$0.01**	**$0.00**	**$0.00**
Rio Grande River Basin				
CWA 402	*not monetized*	*not monetized*	*not monetized*	*not monetized*
CWA 404 Permit Application	$0.11[3]	$0.11	N/A	N/A
CWA 404 Mitigation – Wetlands & Ephemeral Streams	negligible[4]	negligible	*not monetized*	*not monetized*
CWA 404 Mitigation – Water Quality	N/A	N/A	*not quantified*	*not quantified*
CWA 404 Mitigation – Reservoir Dredging	N/A	N/A	*not quantified*	*not quantified*
CWA 311 – FRP Requirements	*not monetized*	*not monetized*	*not monetized*	*not monetized*
CWA 311 – SPCC Requirements	*not monetized*	*not monetized*	*not monetized*	*not monetized*
SUBTOTAL	**$0.11**	**$0.11**	**$0.00**	**$0.00**
Total 3 Case Studies				
TOTAL (Monetized Categories)	**$6.84**	**$16.36**	**$0.37**	**$2.44**

[1] Annualized forgone benefits are estimated at a 3% discount rate.
[2] The estimated forgone annualized benefits from reduced mitigation requirements in the Ohio River Basin range from a low of $0.27 to a high of $1.80 million at a 7% discount rate.
[3] Estimated annual reduction in 404 permit application costs under Scenario 3 is zero.
[4] The estimated annual mitigation cost savings range from range of $187 to $261 under Scenario 2 and zero under Scenario 3.

Stage 2 National Analysis

The case studies demonstrate that data limitations constrain the agencies' ability to quantify and value the effects of the proposed rule on the section 402 and 311 programs across the country, but that it is possible to quantify and value at least some of the potential effects of the proposed rule through the CWA 404 program nationwide. Accordingly, to evaluate the impacts of the Stage 2 analysis under the proposed rule at the national level, the agencies focused on 404 program impacts of the proposed rule for which data are sufficient to develop quantitative estimates. The approach incorporates the predicted state response under various scenarios (see Section III.C.1). Inputs for this analysis were derived using the same approach as described for the case studies (see Section IV.B.2.2.2), which relies on 404 permit data from the Corps' ORM2 database to identify aquatic resources and permits potentially affected by the proposed rule. To estimate cost savings, the agencies used the same methodology described in Section IV.B.2.2.2.1. To estimate forgone benefits, the agencies used a meta function benefits transfer to value forgone wetland mitigation (see Section III.C.2).

Table ES-9: Total national estimated CWA section 404 related annual cost savings (Millions 2017$)

Cost Type	Scenario 0[1]		Scenario 1[2]		Scenario 2[3]		Scenario 3[4]	
	Low	High	Low	High	Low	High	Low	High
Permit Cost Savings	$26.6	$26.6	$16.0	$16.0	$10.6	$10.6	$2.4	$2.4
Mitigation Cost Savings	$209.9	$470.0	$118.6	$249.7	$101.9	$204.3	$25.3	$60.2
Total	**$236.5**	**$496.6**	**$134.6**	**$265.7**	**$112.5**	**$214.9**	**$27.6**	**$62.6**

[1] Includes all states except Hawaii.

[2] Includes Alaska, Alabama, Arkansas, Arizona, Colorado, Delaware, Georgia, Iowa, Idaho, Kansas, Kentucky, Louisiana, Missouri, Mississippi, Montana, North Carolina, North Dakota, Nebraska, New Mexico, Nevada, Oklahoma, South Carolina, South Dakota, Texas, Utah, Wisconsin, West Virginia, and Wyoming

[3] Includes Alaska, Alabama, Arkansas, Arizona, Colorado, Delaware, Georgia, Idaho, Kentucky, Missouri, Mississippi, Montana, North Dakota, New Mexico, Oklahoma, South Carolina, South Dakota, Texas, Utah, and Wyoming

[4] Includes Arizona, Idaho, Kentucky, Mississippi, and South Dakota

To estimate forgone benefits, the agencies relied upon a wetland valuation meta-analysis function. The meta-analysis uses the results of multiple wetland valuation studies to derive an underlying valuation function that can be adjusted and applied nationally (see Section III.C.2).

Table ES-10: Total national estimated CWA section 404 related annual forgone benefits (Millions 2017$)

Scenario	Mean WTP per household per acre (2017$)	Mean estimate of forgone benefits (Millions 2017$)	Lower 5th WTP per household per acre (2017$)	Lower 5th estimate of forgone benefits (Millions 2017$)	Upper 95th WTP per household per acre (2017$)	Upper 95th estimate of forgone benefits (Millions 2017$)
Scenario 0[1,2]	$0.0231	$135.6	$0.0001	$0.7	$0.0453	$300.3
Scenario 1[1,3]	$0.0192	$46.8	$0.0001	$0.3	$0.0422	$104.0

Table ES-10: Total national estimated CWA section 404 related annual forgone benefits (Millions 2017$)

Scenario	Mean WTP per household per acre (2017$)	Mean estimate of forgone benefits (Millions 2017$)	Lower 5th WTP per household per acre (2017$)	Lower 5th estimate of forgone benefits (Millions 2017$)	Upper 95th WTP per household per acre (2017$)	Upper 95th estimate of forgone benefits (Millions 2017$)
Scenario 2[1,4]	$0.0211	$41.7	$0.0001	$0.2	$0.0463	$92.7
Scenario 3[1,5]	$0.0236	$6.9	$0.0001	<$0.1	$0.0504	$14.2

[1] Annual average mitigation reduction based on permits issued in years 2011-2015 with mitigation requirements on waterways determined to be RPWWN-type wetlands or ephemeral streams. Excludes permits issued for mitigation or restoration activities because the main purpose of these activities is to restore or enhance ecosystem services provided by water resources as opposed to dredge and fill activities that lead to permanent or temporary losses of ecosystem services.

[2] Includes all states except Hawaii.

[3] Includes Alaska, Alabama, Arkansas, Arizona, Colorado, Delaware, Georgia, Iowa, Idaho, Kansas, Kentucky, Louisiana, Missouri, Mississippi, Montana, North Carolina, North Dakota, Nebraska, New Mexico, Nevada, Oklahoma, South Carolina, South Dakota, Texas, Utah, Wisconsin, West Virginia, and Wyoming.

[4] Includes Alaska, Alabama, Arkansas, Arizona, Colorado, Delaware, Georgia, Idaho, Kentucky, Missouri, Mississippi, Montana, North Dakota, New Mexico, Oklahoma, South Carolina, South Dakota, Texas, Utah, and Wyoming.

[5] Includes Arizona, Idaho, Kentucky, Mississippi, and South Dakota.

The estimated section 404 related cost savings from avoided permit applications and mitigation generally exceed forgone benefits of wetlands. This is true for all four state response scenarios the agencies analyzed and under most cost or WTP assumptions. For example, under Scenario 2, annual cost savings range between $112.5 million and $214.9 million (under low and high cost assumptions), compared to estimated forgone benefits of $41.7 million (based on mean WTP). One exception is Scenario 0 for which forgone benefits based on the 95th percentile of the WTP for wetlands are greater than the lower bound of estimated cost savings.

I. Introduction and Overview

The U.S. Environmental Protection Agency and Department of the Army ("the agencies") are proposing a rule to revise the definition of the term "waters of the United States." "Waters of the United States" is a foundational term establishing the jurisdictional scope of the Clean Water Act (CWA). The agencies are proposing to establish six categories of jurisdictional waters and would define eleven exclusions for features that would not be subject to federal CWA jurisdiction. Waters that currently are outside the scope of CWA jurisdiction or would be following a change to the definition of "waters of the United States" may be subject to separate state or tribal authorities. The definition of "waters of the United States" was last changed on June 29, 2015 when the agencies issued a final rule entitled amending Clean Water Rule: Definition of "Waters of the United States" (hereinafter referred to as the 2015 Rule). 80 FR 37054.

In addition, on February 28, 2017, the President issued Executive Order 13778 entitled "Restoring the Rule of Law, Federalism, and Economic Growth by Reviewing the 'Waters of the United States' Rule." The Executive Order directs the EPA and the Army to review the 2015 Rule and to issue a proposed rule rescinding or revising the 2015 Rule as appropriate and consistent with law. The Executive Order also directs the agencies to "consider interpreting the term 'navigable waters' . . . in a manner consistent with" Justice Scalia's plurality opinion in *Rapanos v. United States*, 547 U.S. 715 (2006).

This proposed rule is the second step in a two-step approach to implementing the Executive Order. On July 27, 2017, the agencies issued the "Step One" notice of proposed rulemaking (82 FR 34899) that proposed to repeal the 2015 Rule and recodify the regulatory text that governed prior to the promulgation of the 2015 Rule, consistent with Supreme Court decisions and informed by applicable guidance documents and agency practice, and which the agencies had been implementing in certain parts of the country since the U.S. District Court for the District of North Dakota preliminarily enjoined the 2015 Rule in the 13 States that challenged the rule in that court.[1] On July 12, 2018, the agencies published a supplemental notice of proposed rulemaking to clarify, supplement, and seek additional comment on the Step One notice of proposed rulemaking. 83 FR 32227. In this "Step Two" rulemaking, the agencies are proposing a new definition of "waters of the United States."

This Economic Analysis (EA) assesses the impacts of the proposed changes to the definition of "waters of the United States" based on the potential effects to CWA programs that rely on the definition of "waters of the United States." In this EA, the agencies describe how the proposed regulation compares to the baseline of the 2015 Rule. The 2015 Rule is the current definition of "waters of the United States" in the Code of Federal Regulations. However, as discussed further in the preamble, the 2015 Rule is enjoined in 28 states where the pre-2015 regulations are currently being implemented. Therefore, the agencies also describe how the proposed regulation compares to an alternate baseline of pre-2015 practice which represents the pre-2015 regulations as implemented consistent with Supreme Court decisions and informed by applicable guidance documents and longstanding agency practice.

[1] Alaska, Arizona, Arkansas, Colorado, Idaho, Missouri, Montana, Nebraska, Nevada, New Mexico, North Dakota, South Dakota, and Wyoming. The agencies note that Iowa is now also subject to the preliminary injunction issued by the District of North Dakota. See Order, North Dakota v. EPA, No. 3:15-cv-59 (D.N.D. Sept. 18, 2018). See the Resource and Programmatic Assessment for a more robust discussion of the litigation involving the 2015 Rule and the rule's status.

Unlike many environmental regulations, this proposed rule is not correcting a market failure. Instead, the agencies are proposing this rule to provide clarity and regulatory certainty to states, tribes, the regulated community, and the public as to the scope of CWA jurisdiction as described more fully in the preamble for the proposed rule.

A separate Resource and Programmatic Assessment (RPA) (available in the docket on Regulations.gov at Docket Id. No. EPA-HQ-OW-2018-0149 for this proposed rule) outlines the agencies' assessment of the potential effects of the proposed definition on the regulation of aquatic resources across the country, as well as the potential effects on CWA programs and certain other programs under other federal statutes. The RPA also provides snapshots of the applicable regulatory and legal framework currently in place in states and some tribes to provide context for how aquatic resources are regulated. The two documents together present a comprehensive assessment of this rule's potential impacts.

I.A Summary of the Potential Changes in CWA Jurisdiction Due to the Proposed Rule

I.A.1 The 2015 Rule

At the time of publication of this proposed rule, the 2015 Rule is currently being implemented in 22 states, the District of Columbia, and the U.S. Territories and is the existing regulation in the Code of Federal Regulations. As such, it serves as the baseline for analysis in this EA. The 2015 Rule defines "waters of the United States" to include:

- Traditional navigable waters (TNWs);
- Interstate waters including interstate wetlands;
- Territorial seas;
- Impoundments of jurisdictional waters;
- Tributaries of the above waters;
- Adjacent waters of the aforementioned waters;
- Similarly situated regional waters found to have a significant nexus; and
- Certain waters with a case-specific significant nexus.

The 2015 Rule identifies certain waters that can be "waters of the United States" only where a case-specific determination has found a significant nexus between the water and TNWs, interstate waters, or the territorial seas. The agencies specify five types of waters (prairie potholes, Delmarva and Carolina bays, pocosins, western vernal pools in California, and Texas coastal prairie wetlands) that the agencies had determined to be "similarly situated" in watershed that drains to the nearest TNW, interstate water, or territorial sea, and thus would be considered in combination with waters of the same subcategory within the point of entry watershed in a significant nexus analysis (referred to as (a)(7) waters). In addition, the 2015 Rule specifies that waters located within the 100-year floodplain of a TNW, interstate water, or the territorial seas, and waters located within 4,000 feet from the high tide line or the ordinary high water mark of TNWs, interstate waters, the territorial seas, impoundments, or covered tributaries may be found to have a significant nexus on a case-specific basis, but the agencies would need to make a determination of "similarly situated" waters on a case-by-case basis. These are referred to as (a)(8) waters. The 2015 Rule sets forth nine functions relevant to these case-specific significant nexus analyses.

The agencies exclude specified waters from the definition of "waters of the United States" in the 2015 Rule, carrying forward the existing exclusions for prior converted cropland and waste treatment systems. The 2015 Rule creates additional exclusions from the definition of "waters of the United States," including for certain waters and features that have been generally considered to not be "waters of the United States" in practice (*e.g.*, exclusion for certain ditches that are not located in or draining wetlands); for additional types of ditches; for groundwater and erosional features; for stormwater control features constructed to convey, treat, or store stormwater; and for cooling ponds that are created in dry land.

In the 2015 Rule, the agencies define a tributary as a water that (1) contributes flow, either directly or through another water (including an impoundment), to a TNW, interstate water, or the territorial seas, and (2) that is characterized by the presence of physical indicators of bed and banks and an ordinary high water mark. All perennial, intermittent, and ephemeral streams that meet the definition of tributary are "waters of the United States" under the 2015 Rule.

Under the 2015 Rule, all adjacent waters, including wetlands, are jurisdictional where the waters are adjacent to a TNW, interstate water, territorial sea, jurisdictional impoundment, or a jurisdictional tributary, and where the water meets that rule's definition of adjacent. The 2015 Rule carries forward the definition of "adjacent"—waters that are bordering, contiguous, or neighboring the aforementioned waters—and it also defines "neighboring" and includes open waters such as lakes and ponds as adjacent. The 2015 Rule defines "neighboring" to mean:

- all waters located within 100 feet of the ordinary high water mark of (1) through (5) water,
- all waters located within the 100-year floodplain of a (1) through (5) water and not more than 1,500 feet from the ordinary high water mark of such water, and
- all waters located within 1,500 feet of the high tide line of a (1) or (3) water, and all waters within 1,500 feet of the ordinary high water mark of the Great Lakes.

The definition of "adjacent" in the 2015 Rule does not include those waters in which established, normal farming, silviculture, and ranching activities occur. Wetlands and farm ponds in which normal farming activities occur, as those terms are used in section 404(f) of the CWA and its implementing regulations, would not be *per se* jurisdictional as "adjacent" waters. Instead, waters in which normal farming, ranching, and silviculture activities occur would be subject to case-specific review.

I.A.2 Alternate Baseline of Pre-2015 Practice

The agencies are currently implementing the definition of "waters of the United States" under the definition promulgated in 1986[2], see 51 FR 41206 (Nov. 13, 1986), as informed by Supreme Court

[2] For convenience, the agencies refer to the Corps' regulations as opposed to the EPA's. EPA codification of the definition of "waters of the United States" is found at 40 CFR 110.1, 112.2, 116.3, 117.1, 122.2, 230.3, 232.2, 300.5, 401.11, and Appendix E to Part 300.

decisions in *United States v. Riverside Bayview Homes (Riverside Bayview), Solid Waste Agency of Northern Cook County v. United States (SWANCC),* and *Rapanos v. United States (Rapanos)* and agency guidance documents in 28 states.[3] Because the pre-2015 practice is being implemented in certain parts of the country, the agencies have identified it as an alternate baseline for analysis in this EA.

In 2007, the agencies issued joint memorandum entitled, "Clean Water Act Jurisdiction Following the U.S. Supreme Court's Decision in *Rapanos v. United States* and *Carabell v. United States*," providing guidance to their respective staffs on implementing *Rapanos.* The guidance was reissued on December 2, 2008, with minor changes (hereinafter the *Rapanos* Guidance).[4] Under the *Rapanos* Guidance, the agencies determine that a water may be jurisdictional if it meets either the plurality's or Justice Kennedy's standard for jurisdictional waters. "Relatively permanent" waters ("RPWs") are interpreted in the guidance documents as tributaries[5] that typically flow year-round or have continuous flow at least seasonally (*e.g.*, typically three months).[6] Wetlands that have a "continuous surface connection" are those that are directly abutting (*e.g.*, they are not separated by upland, a berm, dike, or similar feature from the water of the United States to which they are adjacent).

Under the *Rapanos* Guidance, the agencies assert jurisdiction over the following waters without the need for further analysis:

- TNWs;
- Wetlands adjacent to TNWs;
- Non-navigable tributaries of TNWs that are relatively permanent where the tributaries typically flow year-round or have continuous flow at least seasonally (*e.g.*, typically three months); and
- Wetlands that directly abut such tributaries.

The agencies assess whether the following waters are jurisdictional based on a case-specific analysis to determine whether they have a significant nexus with a TNW:

- Non-navigable tributaries that are not relatively permanent;

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[3] *United States v. Riverside Bayview Homes*, 474 U.S. 121, 131-35 & n.9 (1985); *Solid Waste Agency of Northern Cook County v. United States*, 531 U.S. 159 (2001); *Rapanos v. United States*, 547 U.S. 715 (2006).

[4] *See* U.S. EPA and U.S. Army Corps of Engineers. Clean Water Act Jurisdiction Following the U.S. Supreme Court's Decision in *Rapanos v. United States & Carabell v. United States* at 1 (Dec. 2, 2008), *available at* https://www.epa.gov/sites/production/files/2016-02/documents/cwa_jurisdiction_following_rapanos120208.pdf.

[5] For purposes of the *Rapanos* Guidance, a tributary includes natural, man-altered, or man-made water bodies that carry flow directly or indirectly into a traditional navigable water.

[6] The agencies have further clarified that three months for seasonal flow was provided as an example in the guidance, and the agencies have flexibility under the guidance to determine what seasonally means in a specific case. For instance, in one case, the agencies found that two months of continuous flow was seasonal at a particular site in a particular region of the country. *See* "Memorandum to Assert Jurisdiction for NWP-2007-945," *available at* http://www.usace.army.mil/Portals/2/docs/civilworks/regulatory/cwa_guide/NWP-2007-945.pdf.

- Wetlands adjacent to non-navigable tributaries that are not relatively permanent; and
- Wetlands adjacent to, but that do not directly abut, a relatively permanent non-navigable tributary.

Under the *Rapanos* Guidance, the agencies generally do not assert jurisdiction over the following features: swales or erosional features (*e.g.*, gullies, small washes characterized by low volume, infrequent, or short duration flow) or ditches (including roadside ditches) excavated wholly in and draining only uplands and that do not carry a relatively permanent flow of water. Consistent with the *Rapanos* Guidance, a significant nexus analysis assesses the flow characteristics and functions of the tributary itself and the functions performed by all wetlands adjacent to the tributary, including consideration of hydrologic and ecologic factors, to determine if they significantly affect the chemical, physical, and biological integrity of downstream TNWs. Under pre-2015 practice, the agencies interpret TNWs or (a)(1) waters to encompass tidal waters, including tidally-influenced ditches and wetlands. The agencies issued guidance in 2007 regarding which waters the agencies consider to be TNWs.[7]

The agencies interpret all wetlands that are bordering, contiguous, or neighboring other jurisdictional waters to be jurisdictional per the definition of "adjacent" that existed in the regulations prior to the 2015 Rule (hereinafter referred to as the 1980s regulations). In the *Rapanos* Guidance, the agencies clarified that they consider wetlands adjacent if they meet one of three criteria: 1) there is an unbroken surface or shallow sub-surface connection to jurisdictional waters; 2) they are physically separated from jurisdictional waters by man-made dikes or barriers, natural river berms, beach dunes, and the like; or 3) their proximity to a jurisdictional water is reasonably close, supporting the science-based inference that such wetlands have an ecological interconnection with jurisdictional waters. Non-jurisdictional ditches and other features like swales can contribute to a surface hydrologic connection between a wetland and the water to which it is adjacent.

The *Rapanos* Guidance does not address waters not at issue in the *Rapanos* case, including interstate waters, the territorial seas, and the "(a)(3)" provision for nonnavigable, isolated, intrastate waters. The (a)(3) provision was addressed in the 2001 *SWANCC* decision and the agencies' subsequent 2003 *SWANCC* guidance.[8] Since the 2001 decision in *SWANCC*, the agencies have generally not asserted jurisdiction over nonnavigable, isolated, intrastate waters using the (a)(3) portion of the regulations.

The 1980s regulations define "waters of the United States" to include interstate waters, including interstate wetlands. Under the pre-2015 practice, interstate waters are therefore "waters of the United States" even if they are not navigable for purposes of federal regulation under (a)(1) and do not connect to such waters. In the Operation and Maintenance Business Information Link, Regulatory Module (ORM2), these waters are captured under other categories in the approved jurisdictional determination (AJD) form, including categories for TNWs, tributaries (RPWs or non-RPWs), adjacent wetlands (those adjacent to a TNW, directly abutting an RPW, adjacent to but not directly abutting an RPW, or adjacent to non-RPWs),

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[7] *See* "U.S. Army Corps of Engineers Jurisdictional Determination Form Instructional Guidebook, Appendix D, 'Traditional Navigable Waters,'" *available at* http://www.usace.army.mil/Portals/2/docs/civilworks/regulatory/cwa_guide/app_d_traditional_navigable_waters.pdf.

[8] *See* 68 FR 1991, 1995 (January 15, 2003), *available at* https://www.epa.gov/sites/production/files/2016-04/documents/swancc_guidance_jan_03.pdf.

and impoundments of jurisdictional waters. The CWA and the agencies' 1980s regulations include "the territorial seas" as "waters of the United States." The territorial seas are also considered to be TNWs under pre-2015 practice and are portrayed as such in the ORM2 database

Under pre-2015 practice, impoundments of jurisdictional waters remain jurisdictional. Impoundments were not addressed in the *Riverside Bayview, SWANCC*, or *Rapanos* Supreme Court decisions. Under pre-2015 practice, the agencies implement two longstanding exclusions from the definition of "waters of the United States." Prior converted cropland and waste treatment systems have been excluded from the definition of "waters of the United States" since 1993 and 1979 respectively. Excluded waters are non-jurisdictional and not subject to the regulatory programs of the CWA. The agencies have also interpreted certain waters to be non-jurisdictional in preamble language explaining the 1980s regulations[9] and in the *Rapanos* Guidance. The 1986 preamble language states that generally the agencies do not consider certain waters, such as artificially irrigated areas which would revert to upland if the irrigation ceased or certain artificial stock water ponds created on dry land, to be waters of the United States. The *Rapanos* Guidance states that the agencies generally will not assert jurisdiction over the following features: swales or erosional features (*e.g.*, gullies, small washes characterized by low volume, infrequent, or short duration flow) and ditches (including roadside ditches) excavated wholly in and draining only upland and that do not carry a relatively permanent flow of water.

I.A.3 The Proposed Rule

The agencies now propose that the definition of "waters of the United States" encompasses the following waters:

- TNWs, including the territorial seas;
- Tributaries of TNWs;
- Ditches that are TNWs or certain ditches that satisfy the conditions of the tributary definition;
- Lakes and ponds that are TNWs, that contribute perennial or intermittent flow to a TNW in a typical year, or that are flooded by a TNW, tributary, jurisdictional ditch, or impoundment in a typical year;
- Impoundments of jurisdictional waters; and
- Wetlands adjacent to the aforementioned waters.

The agencies propose to continue to include traditional navigable waters (including tidal waters) as "waters of the United States." The proposed rule incorporates "the territorial seas" into the (a)(1) or TNW category to simplify the regulation, but otherwise does not change the text of the prior two categories. This proposal is consistent with how the Corps captures such waters on its *Rapanos* AJD form and in its ORM2 database under pre-2015 practice. The proposed rule eliminates interstate waters as a separate category of jurisdictional waters. Interstate waters would be jurisdictional only if they meet another

[9] *See* 51 FR 41206, 41217 (Nov. 13, 1986).

category of jurisdictional waters under the proposal (*e.g.*, if they are TNWs, tributaries of TNWs, adjacent wetlands, etc.).

The agencies' proposal continues to include tributaries of TNWs as "waters of the United States" The proposed rule defines tributary to mean:

> A river, stream, or similar naturally occurring surface water channel that contributes perennial or intermittent flow to a water identified in paragraph (a)(1) of this section in a typical year either directly or indirectly through a water(s) identified in paragraphs (a)(2)-(6) of this section or through water features identified in paragraph (b) of this section so long as those water features convey perennial or intermittent flow downstream. A tributary does not lose its status as a tributary if it flows through a culvert, dam, or other similar artificial break or through a debris pile, boulder field, or similar natural break so long as the artificial or natural break conveys perennial or intermittent flow to a tributary or other jurisdictional water at the downstream end of the break. The alteration or relocation of a tributary does not modify its status as a tributary as long as it continues to satisfy this definition.

Perennial is defined as surface water flowing continuously year-round during a typical year. Intermittent is defined as surface water flowing continuously during certain times of a typical year and more than in direct response to precipitation (*e.g.*, seasonally when the groundwater table is elevated or when snowpack melts). Ephemeral is defined as surface water flowing or pooling only in direct response to precipitation (*e.g.*, rain or snow fall). The proposed rule's definition of tributary includes only those rivers and streams that contribute perennial or intermittent flow to a TNW in a typical year.

The proposed rule includes ditches that are TNWs (including tidal ditches); ditches constructed in a tributary or that relocate or alter a tributary as long as those ditches also satisfy the conditions of tributary definition; and ditches constructed in an adjacent wetland as long as those ditches also satisfy the conditions of tributary definition. The term "ditch" is defined as an artificial channel used to convey water. In the 2015 Rule baseline and the alternate baseline, ditches are not included as a separate category of jurisdiction, but instead are "waters of the United States" where they meet the criteria under one of the categories for jurisdiction (*e.g.*, are TNWs, tributaries, etc.).

The proposed rule includes certain lakes and ponds as a separate category of "waters of the United States." Lakes and ponds are considered "waters of the United States" under the proposal where they are TNWs, contribute perennial or intermittent flow to a TNW in a typical year either directly or indirectly through another jurisdictional water or through water features that are excluded from this proposed rule so long as those water features convey perennial or intermittent flow downstream, or are flooded in a typical year by a TNW, tributary, jurisdictional ditch, jurisdictional lake or pond, or impoundments of jurisdictional waters. The agencies propose to continue to include impoundments of jurisdictional waters as "waters of the United States."

The proposed rule includes as "waters of the United States" adjacent wetlands—defining adjacent as those wetlands that abut or have a direct hydrologic surface connection in a typical year to TNWs, jurisdictional ditches, jurisdictional lakes or ponds, or impoundments of jurisdictional waters. Abut means to touch at least at one point or side of a TNW, tributary, jurisdictional ditch, jurisdictional lake or pond, or jurisdictional impoundment. A direct hydrologic surface connection occurs as a result of inundation from a TNW, tributary, jurisdictional ditch, jurisdictional lake or pond, or jurisdictional impoundment or via perennial or intermittent flow between a wetland and a TNW, tributary, jurisdictional ditch, jurisdictional lake or pond, or jurisdictional impoundment. Wetlands physically separated from a TNW, tributary, jurisdictional ditch, jurisdictional lake or pond, or jurisdictional impoundment by upland or by dikes, barriers, or similar structures and also lacking a direct hydrologic surface connection to such waters are not adjacent.

The agencies propose to retain the two pre-existing exclusions for prior converted cropland and waste treatment systems, though with modifications to the regulatory text. The agencies are proposing for the first time to define prior converted cropland in the regulatory text and to clarify that a designation of "prior converted cropland" for purposes of the CWA no longer applies if the area has been abandoned and reverted to wetland. The agencies also propose to define waste treatment systems to include all components, including lagoons and treatment ponds (such as settling or cooling ponds), designed to convey or retain, concentrate, settle, reduce, or remove pollutants, either actively or passively, from wastewater prior to discharge (or eliminating any such discharge).

Also excluded from the definition of "waters of the United States" are any waters or water features that are not explicitly included as "waters of the United States;" groundwater, including groundwater drained through subsurface drainage systems; ephemeral features and diffuse stormwater run-off such as directional sheet flow over upland; ditches that are not specifically included as categorical "waters of the United States;" artificially irrigated areas that would revert to upland should application of irrigation water to that area cease, including fields flooded for rice or cranberry growing; artificial lakes and ponds constructed in upland, such as water storage reservoirs, farm and stock watering ponds, and log cleaning ponds, and that are not jurisdictional lakes, ponds, or impoundments; water-filled depressions created in upland incidental to mining or construction activity, and pits excavated in upland for the purpose of obtaining fill, sand, or gravel; stormwater control features excavated or constructed in upland to convey, treat, infiltrate, or store stormwater run-off; and wastewater recycling structures constructed in upland, such as detention, retention and infiltration basins and ponds, and groundwater recharge basins.

I.A.4 Comparison of Scope of Jurisdiction between the 2015 Rule, the Pre-2015 Practice, and the Proposed Rule

In this section, the agencies describe potential changes to the CWA jurisdictional status of categories of waters that would occur under the proposed rule relative to the 2015 Rule and pre-2015 practice. The agencies utilized the Operation and Maintenance Business Information Link, Regulatory Module (ORM2), which is the Army Corps of Engineers' internal database system that documents CWA section 404 application and permit data, including information on jurisdictional determinations, to help inform the evaluation of potential change in jurisdictional scope when comparing pre-2015 practice to the proposed rule. The agencies are not using data from ORM2 for approved jurisdictional determinations (AJDs) that were made under the 2015 Rule for this analysis. The relatively small number of AJDs made under the 2015 Rule before it was stayed by the courts or in states where the stay was recently lifted is not a representative sample when compared to the large numbers of AJDs documented in ORM2 under pre-2015 practice, which the agencies continued to implement nationwide from October 2015 to August 2018 and currently continue to implement in certain states during the various judicial stays of the 2015 Rule. The agencies were also concerned about using AJD information reflecting the categories of waters that the agencies would have found jurisdictional or non-jurisdictional under the 2015 Rule because a disproportionate number of the AJDs finalized under the 2015 Rule involve exclusions and non-significant nexus determination categories.

Although the agencies have jurisdictional data on where they have determined on a case-by-case basis if particular waters are or are not "waters of the United States," [10] they are not aware of any datasets that fully depict the jurisdictional extent of waters under the 2015 Rule or pre-2015 practice, and note that all data carry unavoidable uncertainties and associated limitations. The agencies considered using publicly-available data from two particular national datasets which are widely used and recognized as the best available national datasets that map waters and wetlands (*i.e.*, the National Hydrography Dataset (NHD) at high resolution and the National Wetlands Inventory (NWI)) to assess the potential extent of waters whose jurisdictional status might change as a result of the proposed rule. However, neither the NHD nor the NWI datasets are able or designed to portray the jurisdictional status of waters under the CWA. In addition, the NHD high resolution does not distinguish between intermittent and ephemeral streams nationwide; they are only distinguished in parts of the arid West and other limited areas[11] where data stewards have provided such differentiation.[12] Further, these datasets do not use terms that directly correspond to the categories of jurisdictional and excluded waters in the proposed rule. Therefore, these datasets have technical limitations that the agencies believe render them unsuitable for use in conducting a national cost-benefit analysis for this proposed rule.

Accordingly, the agencies present a qualitative analysis of the potential changes between the proposed rule and the 2015 Rule baseline, as well as the alternate baseline of the pre-2015 practice. The agencies discuss these limitations further in the Resource and Programmatic Assessment (RPA) for the Proposed Rule and solicit comment on what other datasets may be utilized to quantify the potential change in jurisdiction between the proposed rule and the two baselines for this analysis.

To avoid redundancy, the agencies combine the descriptions of the potential changes under the 2015 Rule baseline and the alternate baseline. When this document refers to categories used in the 2015 Rule or pre-2015 practice, the agencies are specifically referring to the categories as they are implemented under the 2015 Rule or as they are implemented under the pre-2015 regulatory regime. For example, when discussing "tributary" under pre-2015 practice, the agencies are using that term as it is implemented under the 1980s regulations and subsequent guidance and do not mean to use the term as it defined in the 2015 Rule (or in the proposed rule).

I.A.4.1 Traditional Navigable Waters (TNWs) and Territorial Seas

The agencies propose to continue the regulation of traditional navigable waters (TNWs or (a)(1) waters), including waters subject to the ebb and flow of the tide. The proposed rule does make a modification in

[10] *See, e.g.*, the Corps' ORM2 database and the EPA's Clean Water Act Approved Jurisdictional Determinations website, available at: https://watersgeo.epa.gov/cwa/CWA-JDs/.

[11] In other parts of the country, ephemeral streams may often be mapped as intermittent in the NHD high resolution or are not mapped at all.

[12] The NHD datasets are regularly updated and maintained through stewardship partnerships with states and other collaborative bodies, such as federal agencies. An agency in each state manages the maintenance activities within the state, and updates are made available in the national dataset. For example, the U.S. Forest Service and the Bureau of Land Management were some of the first data stewards to add ephemeral streams within certain federal lands to the NHD.

the regulatory text as compared to both baselines by adding the territorial seas to the (a)(1) category, but that proposed change in the regulatory text does not have an effect on which waters would be regulated as TNWs. According to ORM2 data for FY13-FY17, 17,630 waters were determined to be jurisdictional as TNWs under pre-2015 practice. This number includes any tidal wetlands that the Corps has determined are (a)(1) waters, but the agencies are unable to parse out how many of these determinations may have been for such wetlands.

I.A.4.2 Interstate Waters

The agencies propose to remove interstate waters as a separate category of "waters of the United States," which is a change from both baselines. With this proposed change, interstate waters would be jurisdictional only if they otherwise meet one of the categories under the proposed rule (*e.g.*, if they are TNWs, tributaries of TNWs, etc.). Interstate waters, including wetlands and ephemeral waters, are jurisdictional under the 2015 Rule. Under pre-2015 practice, any waters that are part of a state or international boundary or that cross state or international boundaries may be considered jurisdictional as interstate waters. The proposed rule would reduce the number of waters considered to be jurisdictional as interstate waters as compared to the 2015 Rule and the alternate baseline. This proposed change also would result in potential changes in jurisdiction for wetlands adjacent to interstate waters, tributaries of interstate waters and their adjacent wetlands, and impoundments of the above waters and any adjacent wetlands to those impoundments, where such waters do not otherwise meet the proposed definition of "waters of the United States."

The agencies are unable to quantify the potential change in jurisdiction under the proposed rule relative to the 2015 Rule or pre-2015 practice with respect to interstate waters, because interstate waters are not identified as a distinct category in publicly available data sets or ORM2.

I.A.4.3 Impoundments

The agencies propose to continue to include impoundments of jurisdictional waters in the definition of "waters of the United States." The number of impounded waters that are jurisdictional would change under the proposed rule because certain waters that are impounded would be no longer jurisdictional. For example, impoundments of those ephemeral streams determined to be jurisdictional under the 2015 Rule by virtue of meeting that rule's "tributary" definition and/or under pre-2015 practice via a significant nexus analysis would have also been jurisdictional under those two regulations. Such impoundments would not be jurisdictional under the proposed rule.

The impoundments of certain interstate waters, their tributaries, and wetlands adjacent to such waters that may have been jurisdictional under both baselines but would no longer be jurisdictional under the proposal, would thus no longer be jurisdictional. In addition, certain other wetlands and ephemeral streams would no longer be jurisdictional under the proposed rule that may have been jurisdictional under the 2015 Rule and/or pre-2015 practice. Therefore, impoundments of such wetlands and ephemeral streams would not be jurisdictional under the proposed rule. As discussed previously, the agencies have not analyzed AJDs for the 2015 Rule and are unable to quantify the potential change in jurisdiction of impoundments as compared to the 2015 Rule baseline.

According to ORM2 data from FY13-FY17, 751 waters were determined to be jurisdictional impoundments under pre-2015 practice. Based on these ORM2 data, 7.5 percent of impoundments were located on non-RPWs. However, non-RPWs as implemented under pre-2015 practice do not directly correlate with ephemeral streams. Some percentage of non-RPWs are intermittent streams that are not seasonal but that would be included as jurisdictional waters under the proposed rule. ORM2 data are not available for impoundments of interstate waters that might not be jurisdictional under the proposed rule, or for impoundments of tributaries of such interstate waters and wetlands adjacent to such waters. Thus, the agencies cannot quantify the potential change in jurisdiction of impoundments as compared to pre-2015 practice based on ORM2 data.

I.A.4.4 Tributaries

As proposed, tributaries may be perennial or intermittent rivers, streams, or similar naturally occurring surface water channel, while ephemeral features would not be jurisdictional. Under the proposed rule, such waters must contribute perennial or intermittent flow to a TNW in a typical year either directly or indirectly through other jurisdictional waters or through the proposed excluded waters so long as those water features convey perennial or intermittent flow downstream. This represents a change from both pre-2015 practice and the 2015 Rule with respect to how intermittent and ephemeral streams are considered, as discussed further. Some perennial streams may also no longer be considered “waters of the United States” compared to both baselines, as described below. Because ditches are proposed as a separate category of jurisdictional waters under the proposal, they are discussed in the next section.

Under the 2015 Rule, all streams that meet the definition of tributary (*i.e.*, contribute flow to a TNW, interstate water, or territorial sea and have the physical indicators of a bed and banks and an ordinary high water mark), regardless of flow regime, are jurisdictional without the need for a case-specific significant nexus evaluation. As compared to the 2015 Rule, the proposed rule would not find any ephemeral features jurisdictional, including those ephemeral streams meeting the 2015 Rule’s definition of tributary. In addition, some perennial and intermittent streams would not be considered jurisdictional under the proposed rule that may be jurisdictional under the 2015 Rule if such waters convey perennial or intermittent flow to TNW in a typical year. For example, in some parts of the country, streams may be perennial or intermittent at the headwaters but become ephemeral downstream due to natural conditions (*e.g.*, losing streams) or due to anthropogenic alterations (*e.g.*, water withdrawals). Such perennial or intermittent waters would not be jurisdictional under the proposed rule but would be jurisdictional under the 2015 Rule so long as they are characterized by the presence of the physical indicators of a bed and banks and an ordinary high water mark and contribute flow to a TNW at some unspecified time.

Under pre-2015 practice, all tributaries that are RPWs and non-RPW tributaries that have a significant nexus with a TNW are jurisdictional. RPWs include waters that are perennial as well as intermittent waters that are seasonal. Non-RPWs include non-seasonal intermittent tributaries and ephemeral tributaries. Perennial RPWs do not require further analysis. Seasonal RPWs are also jurisdictional under pre-2015 practice, but as a matter of policy the Corps conducts a significant nexus determination for such waters for documentation purposes. Under pre-2015 practice, the unit of analysis of the significant nexus evaluation is the individual tributary (the entire reach of the stream that is of the same order) and any wetlands that are adjacent to that reach of the tributary. As compared to pre-2015 practice, the proposed rule would not regulate any of the ephemeral streams found to be jurisdictional based on a case-specific significant nexus evaluation. The proposed rule would potentially regulate non-seasonal intermittent tributaries that may have been found to be non-jurisdictional after a case-specific significant nexus evaluation. In addition, the proposed rule would not regulate perennial or intermittent streams that flow into ephemeral features before flowing to a TNW, whereas such waters would be jurisdictional under pre-2015 practice if they are RPWs or are non-RPWs that have a significant nexus.

The agencies are unable to quantify what the change in jurisdiction for tributaries would be as compared to the 2015 Rule or pre-2015 practice on a national scale due to the lack of information on the extent of ephemeral streams[13] and the fact that ephemeral streams are not categorically jurisdictional under pre-2015 practice. The agencies expect, however, that in portions of the country where ephemeral streams are more prevalent (*e.g.*, the arid West), the change would be greater relative to other parts of the country. The agencies are also unable to quantify how many perennial or intermittent streams have ephemeral reaches that would render such waters non-jurisdictional under the proposed rule.

Tributaries evaluated under pre-2015 practice are categorized as either RPWs or non-RPWs. In ORM2, RPWs are not further categorized into seasonal intermittent or perennial RPWs, so separating these two components of RPWs to identify a subset for the baseline would be impracticable. In ORM2 from FY13-FY17, 15,980 waters were determined to be jurisdictional as RPWs under pre-2015 practice. The agencies anticipate that the proposed rule would not change the jurisdictional status of most of these RPWs, and that they would continue to be jurisdictional under the proposed rule. As discussed previously, there may be some RPWs that would no longer be jurisdictional under the proposed rule because they do not convey perennial or intermittent flow to a TNW in a typical year.

Data from ORM2 indicate that many but not all non-RPWs are jurisdictional under pre-2015 practice. From FY13-FY17, 3,776 waters in ORM2 were determined to be jurisdictional non-RPWs after a case-specific significant nexus evaluation, while 2,012 non-RPWs were determined to be non-jurisdictional after a case-specific significant nexus evaluation. The agencies are unable to approximate what percentage of currently jurisdictional non-RPWs are ephemeral streams and therefore would no longer be jurisdictional under the proposed definition of "waters of the United States." In addition, the agencies are not able to quantify the extent of non-RPWs that are intermittent tributaries that were determined to be non-jurisdictional under pre-2015 practice that could be included as "waters of the United States" under the proposed rule. There may be some intermittent non-RPWs found to have a significant nexus under pre-2015 practice that would no longer be jurisdictional under the proposed rule because they do not convey perennial or intermittent flow to a TNW in a typical year.

I.A.4.5 Ditches

The proposed rule differs from both the 2015 Rule and pre-2015 practice with regard to ditches, as the agencies are proposing a category of jurisdictional ditches. Ditches that would be jurisdictional under the proposed rule include ditches that satisfy any of the conditions to be an (a)(1) water (*e.g.*, ditches that are traditional navigable waters, including tidal ditches); ditches constructed in a tributary or that relocate or alter a tributary as long as those ditches also satisfy the conditions of the tributary definition; and ditches constructed in an adjacent wetland as long as those ditches also satisfy the conditions of the tributary

[13] Note that only those ephemeral streams meeting the 2015 Rule's definition of tributary would be jurisdictional as a tributary under that Rule.

definition. All other ditches are proposed to be excluded from the definition of "waters of the United States."

Under the 2015 Rule, a ditch is jurisdictional if it is a TNW (including tidal ditches), an interstate water, or a tributary (so long as it is not excluded). The 2015 Rule excludes 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; and ditches that do not flow, either directly or through another water, into a TNW, interstate water, or the territorial seas. Under pre-2015 practice, a ditch is jurisdictional if it is a TNW (including tidal ditches), an interstate water, a relatively permanent tributary, or a non-relatively permanent tributary that has a significant nexus and is not constructed in dry land (*e.g.,* is constructed in a wetland or another aquatic resource). Under pre-2015 practice, ditches are not explicitly excluded in rule text; however, ditches (including roadside ditches) excavated wholly in and draining only upland and that do not carry a relatively permanent flow of water are generally not jurisdictional.

The proposed rule's inclusion of ditches that are TNWs (including tidal ditches) does not represent a change from either baseline.

Under the proposed rule, interstate ditches would not be jurisdictional unless they meet one of the proposal's three criteria for jurisdictional ditches. Interstate ditches under both baselines would be jurisdictional. There may be some interstate ditches or ditches that contribute flow to interstate waters that would be jurisdictional as tributaries under the 2015 Rule or pre-2015 practice that would not be jurisdictional under the proposed rule. In addition, there may be some ditches that drain wetlands that would be considered jurisdictional under the 2015 Rule or pre-2015 practice that would not be jurisdictional under the proposed rule, where the wetlands do not meet the criteria to be adjacent under the proposal and/or where those ditches do not satisfy the conditions of the proposal's tributary definition. There may be some perennial or intermittent ditches that would be jurisdictional under the 2015 Rule that would not be jurisdictional under the proposed rule if such ditches do not convey perennial or intermittent flow to a TNW in a typical year.

Under the proposed rule, ditches constructed in tributaries, that alter or relocate a tributary, or that are constructed in the proposed rule's definition of adjacent wetlands would be jurisdictional, so long as such ditches also satisfy the conditions of the tributary definition under the proposal. Such waters are also jurisdictional under the 2015 Rule. Under pre-2015 practice such ditches are jurisdictional if they are an RPW or if they have a significant nexus to a TNW. Similar to the proposed definition of tributaries, there may be some non-RPW intermittent ditches that alter or relocate a tributary or are constructed in tributaries or adjacent wetlands and meet the conditions of the proposed rule's definition of tributary that would be jurisdictional under the proposal but are not jurisdictional under pre-2015 practice because they do not have a case specific significant nexus. However, the agencies are unable to quantify this potential change. In addition, some perennial and intermittent ditches would be jurisdictional under pre-2015 practice (*e.g.,* where they are RPWs or have a significant nexus) that would not be jurisdictional under the proposed rule if such ditches do not convey perennial or intermittent flow to a TNW in a typical year.

Under both baselines, the agencies do not consider whether a ditch is constructed in a water that meets the definition of "waters of the United States" when determining if it is jurisdictional, but under the proposed rule, the agencies would need to make such a consideration. For example, if a ditch is draining a wetland, that wetland would not need to meet the definition of adjacent for the ditch to be considered jurisdictional under pre-2015 practice, so long as the ditch is either an RPW or is a non-relatively permanent tributary that has a case-specific significant nexus.

Finally, under the proposed rule, no ephemeral ditches would be jurisdictional, which is a change from both baselines. The agencies are not able to quantify these differences, however, for reasons already discussed.

The agencies are unable to estimate the potential change in jurisdiction for ditches using either the ORM2 data or the NHD and NWI data. As previously discussed, the agencies have not analyzed ORM2 data for the 2015 Rule AJDs. ORM2 does not track ditches separately as a category for jurisdiction, so the data cannot be used to determine which ditches the agencies have found to be jurisdictional under pre-2015 practice that would not be jurisdictional under the proposed rule.

I.A.4.6 Lakes and Ponds

Under the proposed rule, the following lakes and ponds would be jurisdictional:

1. lakes and ponds that are TNWs;
2. lakes and ponds that contribute perennial or intermittent flow to a TNW in a typical year[14] either directly or indirectly through tributaries, jurisdictional ditches, other jurisdictional lakes and ponds, jurisdictional impoundments, or adjacent wetlands or through water features identified in the proposed rule as exclusions so long as those water features convey perennial or intermittent flow downstream; and
3. lakes and ponds that are flooded by a TNW, tributary, jurisdictional ditch, other jurisdictional lake or pond, or jurisdictional impoundment in a typical year.

Under the 2015 Rule, lakes and ponds that are adjacent are jurisdictional. Adjacent is defined in the 2015 Rule to mean “bordering, contiguous, or neighboring.” Lakes and ponds that would be jurisdictional under the proposed rule would also be jurisdictional as adjacent waters under the 2015 Rule. However, the 2015 Rule would also include as jurisdictional additional lakes and ponds that do not meet the proposed rule’s definition of “waters of the United States.” The 2015 Rule includes as “adjacent” ephemeral lakes and ponds as well as lakes and ponds that are not flooded by a jurisdictional water in a typical year, so long as those waters meet that rule’s definition of “adjacent.” In addition, certain lakes and ponds would be jurisdictional under the 2015 Rule that would not be jurisdictional under the proposed rule if such waters do not convey perennial or intermittent flow to a TNW in a typical year. Thus, the proposed rule would include fewer lakes and ponds as jurisdictional than the 2015 Rule, but this change cannot be quantified.

Under pre-2015 practice, all relatively permanent lakes and ponds that are considered tributaries are regulated as “waters of the United States,” and would continue to be jurisdictional under the proposed rule. The agencies anticipate that these types of lakes and ponds would be jurisdictional because they

[14] The term *typical year* means within the normal range of precipitation over a rolling thirty-year period for a particular geographic area.

contribute perennial or intermittent flow either directly to a TNW or indirectly through an otherwise jurisdictional water or through an excluded feature that conveys perennial or intermittent flow downstream. In addition, under pre-2015 practice, non-relatively permanent lakes and ponds that are considered tributaries undergo a case-specific significant nexus evaluation to determine their jurisdictional status. These non-RPW lakes and ponds would include both non-seasonal intermittent waters as well as ephemeral lakes and ponds. Some but not all ephemeral lake and pond tributaries are found to be jurisdictional under pre-2015 practice. Those ephemeral lakes and ponds that are tributaries under pre-2015 practice would be non-jurisdictional under the proposed rule. Non-seasonal intermittent lakes and ponds that are tributaries would be considered jurisdictional under the proposed rule. Some but not all these non-seasonal intermittent lake and pond tributaries are found to be jurisdictional under pre-2015 practice. Thus, the agencies assume that there may be a change in jurisdiction between pre-2015 practice and the proposed rule for such non-seasonal intermittent lakes and ponds that are tributaries, but this change cannot be quantified. In addition, certain lakes and ponds would be jurisdictional under the pre-2015 practice (*e.g.*, where they are RPWs or have a significant nexus) that would not be jurisdictional under the proposed rule if such waters do not convey perennial or intermittent flow to a TNW in a typical year.

Available data from ORM2 on the status of lakes and ponds that are tributaries under pre-2015 practice is discussed in the "Tributaries" section above. The agencies are not able to easily parse from the available AJD data under pre-2015 practice if the tributary at issue is a lake, a pond, or a stream, as there is no field in ORM2 for the project manager to denote this. The agencies are therefore not able to estimate the percentage of non-relatively permanent lake and pond tributaries which are deemed jurisdictional under pre-2015 practice. Furthermore, as discussed above in the "Tributaries" section, the data do not further indicate if a non-RPW water is a non-seasonal intermittent water or ephemeral feature, further complicating any quantification of potential change for this category of waters. The agencies are also unable to quantify how many lakes and ponds are connected to TNWs through ephemeral reaches that would render those lakes and ponds non-jurisdictional under the proposed rule

I.A.4.7 Adjacent Wetlands

Under the proposed rule, adjacent wetlands are wetlands that abut or have a direct hydrologic surface connection to a TNW (including the territorial seas), a tributary, a jurisdictional ditch, a jurisdictional lake or pond, or a jurisdictional impoundment in a typical year. These are wetlands that are among those that are contiguous and/or bordering under the 2015 Rule and are directly abutting under pre-2015 practice. The proposed rule would exclude most wetlands that are "neighboring" per the 2015 Rule and most that are not directly abutting per pre-2015 practice. The proposal also does not include wetlands separated from "waters of the United States" by dikes or barriers, natural river berms, beach dunes, and the like as adjacent wetlands, except where such wetlands have a direct hydrologic surface connection to a TNW, tributary, jurisdictional ditch, jurisdictional lake or pond, or jurisdictional impoundment in a typical year.

Under the 2015 Rule, all waters, including wetlands, adjacent to a TNW, interstate water, territorial sea, a tributary (as defined in that rule), or impoundment of a jurisdictional water are considered "waters of the United States." The 2015 Rule defines adjacent as bordering, contiguous, or neighboring. The 2015 Rule defines neighboring as:

(i) All waters located within 100 feet of the ordinary high water mark of a water identified in paragraphs (a)(1) through (5) of this section. The entire water is neighboring if a portion is located within 100 feet of the ordinary high water mark;

(ii) All waters located within the 100-year floodplain of a water identified in paragraphs (a)(1) through (5) of this section and not more than 1,500 feet from the ordinary high water mark of such water. The entire water is neighboring if a portion is located within 1,500 feet of the ordinary high water mark and within the 100-year floodplain;

(iii) All waters located within 1,500 feet of the high tide line of a water identified in paragraphs (a)(1) or (a)(3) of this section, and all waters within 1,500 feet of the ordinary high water mark of the Great Lakes. The entire water is neighboring if a portion is located within 1,500 feet of the high tide line or within 1,500 feet of the ordinary high water mark of the Great Lakes.

The 2015 Rule includes more streams as tributaries than the proposed rule as well as more ditches as "waters of the United States," and therefore, also covers more wetlands adjacent to those 2015 Rule tributaries. Under the 2015 Rule, wetlands that are part of an ongoing farming, ranching, or silvicultural operation are not "adjacent," but may be jurisdictional based on a case-specific significant nexus analysis. In addition, the 2015 Rule's definition of adjacent would include more wetlands as adjacent than the proposed definition of adjacent. Some wetlands considered neighboring under the 2015 Rule would have a direct hydrologic surface connection to jurisdictional waters to in a typical year, but many other neighboring wetlands would not have a direct hydrologic surface connection as defined in the proposed rule. The 2015 Rule also includes wetlands separated from jurisdictional waters by dikes, berms, barriers, or similar structures as adjacent, without regard as to whether the wetlands have a direct hydrologic surface connection to those jurisdictional waters. Thus, the proposed rule would include fewer wetlands as "waters of the United States" than the 2015 Rule. The agencies are unable to quantify the proposed rule's reduction in jurisdiction of adjacent wetlands compared to the 2015 Rule.

Under pre-2015 practice, wetlands that are adjacent include wetlands that are bordering, contiguous, or neighboring a "water of the United States" per the 1980s regulations, including wetlands behind a berm, constructed barriers, and the like. Not all adjacent wetlands are jurisdictional under pre-2015 practice. The *Rapanos* Guidance states that adjacent wetlands are evaluated differently depending on the water to which they are adjacent (TNWs, RPWs, and non-RPWs). Under pre-2015 practice, wetlands adjacent to RPWs are analyzed in different ways, depending on whether they are directly abutting. Adjacent wetlands that directly abut an RPW are jurisdictional without the need for further analysis under pre-2015 practice. Wetlands adjacent to but not directly abutting an RPW require a case-specific significant nexus analysis to determine their jurisdictional status. Similarly, all wetlands adjacent to non-RPWs require a case-specific significant nexus evaluation to determine their jurisdictional status.

Pre-2015 practice includes more streams as tributaries than the proposed rule as well as more ditches as "waters of the United States," and therefore, also covers more wetlands adjacent to those pre-2015 practice tributaries. Pre-2015 practice also includes wetlands separated from jurisdictional waters by dikes, berms, barriers, or similar structures as adjacent, without regard as to whether the wetlands have a direct hydrologic surface connection to those jurisdictional waters. Under pre-2015 practice such wetlands that are adjacent to TNWs are *per se* jurisdictional, while such wetlands that are adjacent to RPWs and non-RPWs are jurisdictional when they have significant nexus. The proposed rule would potentially regulate wetlands adjacent to non-seasonal intermittent tributaries that may have been found to be non-jurisdictional under pre-2015 practice after a case-specific significant nexus evaluation.

The agencies analyzed data in ORM2 from FY13-17 for AJDs for adjacent wetlands conducted under pre-2015 practice. The ORM2 database under pre-2015 practice includes the following categories of adjacent wetlands: wetlands adjacent to TNWs, wetlands that directly abut RPWs, wetlands adjacent to but that do not directly abut RPWs, and wetlands adjacent to non-RPWs. Although the agencies did not analyze ORM2 data for AJDs conducted under the 2015 Rule, for comparative purposes the agencies do narratively describe the differences between the proposed rule and both baselines for each previously mentioned category of adjacent wetlands.

Data in ORM2 from FY13-FY17 indicate that 5,261 waters were determined to be jurisdictional as wetlands adjacent to TNWs under pre-2015 practice. For these AJDs, the agencies cannot parse out directly from available data whether a wetland is abutting or not abutting, because the AJD forms only have a field to indicate whether the wetland is adjacent but not what type of adjacency. To better assess the potential effect of the proposed rule on the CWA jurisdiction of wetlands adjacent to TNWs under pre-2015 practice, 25 of the 38 Corps Districts examined specific AJD ORM2 data for wetlands adjacent to TNWs (all but 38 of the 5,261 wetlands adjacent to TNWs were completed in those 25 Corps Districts) to assess whether the wetlands are abutting or not abutting a TNW. Some Corps Districts examined all AJDs for this wetland category from FY13-FY17, while other Corps Districts analyzed a random sample of AJDs. The Corps examined 3,581 of the 5,261 wetlands adjacent to TNWs in the analysis.[15] The Districts used AJD hard copies, information in the administrative file, remote tools, as well as experience with regional resources and the specific review area in this analysis to determine whether the wetlands were adjacent and abutting, or whether they were considered neighboring or were behind a berm or similar feature. Finally, the determinations of whether wetlands were abutting or not abutting were compiled in spreadsheets, and the agencies used this raw data to calculate the following statistics.

The Corps Districts found that 55 percent of wetlands adjacent to TNWs in the AJDs that were evaluated were abutting (*i.e.*, touching) and 45 percent of wetlands adjacent to TNWs in the AJDs that were evaluated were not abutting.[16] According to the analysis of the wetlands adjacent to TNWs reviewed by the Corps Districts, about 10 percent of wetlands adjacent to TNWs that do not abut the TNW have a surface connection to the TNW via a culvert or tide gate. Such wetlands would most likely have a direct hydrologic surface connection under the proposed rule and would thus presumably meet the agencies' proposed definition of adjacent. The agencies do not have additional information to estimate how many of the other wetlands adjacent to TNWs would be found jurisdictional under the proposed rule due to a direct hydrologic surface connection where they otherwise do not abut. Because the proposed rule would include as adjacent wetlands only those non-abutting wetlands that have a direct hydrologic surface connection, fewer wetlands adjacent to TNWs would be considered jurisdictional as compared to both baselines. The agencies are unable to quantify this change.

[15] *See* Appendix A.

[16] The agencies have placed in the docket as a "Supporting Document" a table of the Corps wetlands adjacent to TNW determinations that were evaluated listed by their Department of the Army (DA) Number. Docket materials are available at https://www.regulations.gov/ (Docket ID: EPA-HQ-OW-2018-0149).

Under pre-2015 practice, from FY13-FY17, 11,203 waters were determined to be jurisdictional wetlands directly abutting an RPW. These wetlands would also be jurisdictional under the 2015 Rule. The agencies do not anticipate that the proposed rule would change the jurisdictional status of these wetlands as compared to either baseline.

Under pre-2015 practice, the agencies' data indicate that most wetlands that are adjacent to but that do not directly abut RPWs are found to be jurisdictional following a significant nexus analysis. In ORM2 from FY13-FY17, there were 3,939 adjacent wetlands that do not directly abut an RPW, and thus required additional jurisdictional analysis. Of these, 3,834 waters were determined to be jurisdictional because they had a significant nexus, and 105 were found non-jurisdictional because they lacked a significant nexus – meaning approximately 97 percent of such wetlands were determined to be jurisdictional under pre-2015 practice. Under the 2015 Rule, wetlands that meet the definition of adjacent, which is broader than the proposed definition, would be considered as "waters of the United States." As compared to the proposed rule, these wetlands would not be jurisdictional unless they have a direct hydrologic surface connection to the jurisdictional water in a typical year. The agencies have no additional information about the extent of such wetlands, but anticipate that many such wetlands would lack such a connection. Thus, compared to both baselines, fewer wetlands would be jurisdictional under the proposed rule for this category of wetlands where they do not abut the RPW and lack a direct hydrologic surface connection to the RPW in a typical year.

Available data from AJDs indicate that under pre-2015 practice, most wetlands adjacent to non-RPWs have been determined to be jurisdictional after a case-specific significant nexus analysis that considered both the non-RPW and its adjacent wetlands. In ORM2 from FY13-FY17, 1,681 waters were determined to be jurisdictional wetlands adjacent to a non-RPW[17] and 152 wetlands adjacent to a non-RPW were determined to be non-jurisdictional – 92 percent of wetlands adjacent to non-RPWs were determined to be jurisdictional. The agencies are not able to further parse out which of these non-RPWs were intermittent or ephemeral or to parse out which adjacent wetlands are abutting. Thus, the agencies are unable to quantify what the change in jurisdiction would be for this category of wetlands as compared to the proposed rule. Wetlands abutting intermittent non-RPWs or that have a direct hydrologic surface connection to intermittent non-RPWs in a typical year would be jurisdictional under the proposed rule. Wetlands adjacent to ephemeral non-RPWs and wetlands that do not have a direct hydrologic surface connection to intermittent non-RPWs in a typical year would not be jurisdictional under the proposed rule. Thus, compared to both baselines, fewer wetlands would be considered jurisdictional under the proposed rule for this category of wetlands, but the agencies are not able to quantify this change.

I.A.4.8 Nonnavigable, Isolated, Intrastate Waters

Nonnavigable, isolated, intrastate waters would not be considered "waters of the United States" under the proposed rule. They would expressly fall into the proposed rule's first exclusion for waters not identified in the proposal's categories of "waters of the United States." As noted previously, since the Supreme Court's decision in 2001 in *SWANCC*, the agencies have not determined jurisdiction based on the (a)(3) category of the 1980s regulations. Some of these waters that have been determined to be non-

17 The non-RPWs were also determined to be jurisdictional in these cases, as under pre-2015 practice the agencies evaluate the tributary along with any adjacent wetlands for a case-specific significant nexus.

jurisdictional under pre-2015 practice would be determined jurisdictional under the 2015 Rule either because they meet that rule's definition of adjacent or under a case-specific nexus analysis under the (a)(7) (for similarly situated regional waters) or (a)(8) categories.

In ORM2 from FY13-FY17, 20,353 waters were determined to be non-jurisdictional non-navigable, isolated, intrastate waters under pre-2015 practice. As compared to pre-2015 practice, the agencies do not anticipate that there will be a change in jurisdiction for nonnavigable, isolated, intrastate waters. There may be a change as compared to the 2015 Rule baseline, but the agencies are not able to quantify that change and have not analyzed data from ORM2 for AJDs conducting using the 2015 Rule.

I.A.4.9 Waters Excluded from the Definition of "Waters of the United States"

The proposed rule would explicitly exclude waters that are not included in the definition of "waters of the United States." The prior sections of this chapter discuss the potential effects of the proposal's definition of "waters of the United States" on waters that may have been determined to be jurisdictional under one or both baselines that may not be jurisdictional under the proposed rule. This section addresses potential effects of the proposed rule's exclusions compared to exclusions under each of the baselines. Where the agencies assume no changes or limited changes when comparing the exclusions identified in paragraph (b) of the proposal and those of pre-2015 practice or the 2015 Rule, there is no further discussion. For example, many of the water features that the 2015 Rule specifically excludes and that are generally not considered "waters of the United States" under pre-2015 practice would not be included in the proposed definition of "waters of the United States" and therefore would be excluded under (b)(1) of the proposed definition. In addition, groundwater, including groundwater drained through subsurface drainage systems, is excluded in the both the proposed rule and the 2015 Rule, and such groundwater, though not specifically excluded in the regulatory text, is not considered a "water of the United States" under pre-2015 practice.

Under pre-2015 practice, the agencies do not record in the ORM2 database if a water is excluded from the definition of "waters of the United States" due to one of the regulatory exclusions. Such waters may be entered into the database as "uplands." However, other aquatic resources or features that the Corps determines to not meet the regulatory definition of "waters of the United States" are also categorized as "uplands" in the database. The Corps conducted 14,357 upland determinations in FY13-17 under pre-2015 practice. The agencies are unable to query ORM2 to determine how many waters have been determined to meet an exclusion from the definition of "waters of the United States" under pre-2015 practice. After the 2015 Rule was finalized, the ORM2 database was updated to track when waters were determined not to be "waters of the United States" due to the exclusions under the 2015 Rule, but the agencies have not analyzed the 2015 Rule AJDs for the reasons previously stated.

<u>Ephemeral Features and Diffuse Stormwater Run-off</u>

The proposed rule would exclude ephemeral features and diffuse stormwater water run-off, including directional sheet flow over upland from the definition of "waters of the United States." As previously discussed, the exclusion for all ephemeral features represents a change from both pre-2015 practice and the 2015 Rule. For example, pre-2015 practice includes those ephemeral streams that contribute flow to downstream TNWs as jurisdictional where they have a case-specific significant nexus, and the 2015 Rule includes as jurisdictional ephemeral streams that meet that rule's definition of tributary. The agencies are unable to estimate the change in jurisdiction from either baseline due to this portion of the exclusion in the proposed rule. The exclusion for diffuse stormwater runoff does not represent a change, as diffuse stormwater water run-off (including directional sheet flow over upland) is not considered jurisdictional under either baseline.

Ditches

In terms of the exclusions for ditches, all ditches that are not identified in the ditch category of "waters of the United States" are excluded in the proposed rule. The discussion of the change from both baselines is included in the "Ditch" section above; the agencies are unable to quantify potential changes as a result of the proposed ditch exclusion.

Prior Converted Cropland

The proposed rule continues to exclude all prior converted cropland. The proposed rule defines prior converted cropland as "any area that, prior to December 23, 1985, was drained or otherwise manipulated for the purpose, or having the effect, of making production of an agricultural product possible. EPA and the Corps will recognize designations of prior converted cropland made by the Secretary of Agriculture. An area is no longer considered prior converted cropland for purposes of the Clean Water Act when the area is abandoned and has reverted to wetland, as defined in paragraph (c)(15) of the proposal. Abandonment occurs when prior converted cropland is not used for, or in support of, agricultural purposes at least once in the immediately preceding five years. For the purposes of the Clean Water Act, the EPA Administrator shall have the final authority to determine whether prior converted cropland has been abandoned." Wetlands are defined as "areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas."

Neither the 2015 Rule nor pre-2015 practice define "prior converted croplands," nor do they explain when cropland can lose the prior converted designation. However, the preamble to EPA and the Corps' 1993 regulations provided that land would lose its prior converted status if it is abandoned and it exhibits wetland characteristics.[18] Subsequently, a 2005 Memorandum to the Field issued by the Army and USDA states that a certified prior converted cropland determination remains valid as long as the area is devoted to an agricultural use.[19] The memorandum further states that if the land changes to a non-agricultural use, the prior converted determination no longer applies and a new jurisdictional determination is required. the 2005 memorandum did not clearly address the abandonment principle that the agencies had been implementing since the 1993 rulemaking. The change in use policy was never promulgated as a rule and

[18] 58 FR 45034 (August 25, 1993). The agencies summarized the abandonment provision by explaining that prior converted cropland is considered to be abandoned unless at least once in every five years the area has been used for the production of an agricultural commodity, or the area has been used and will continue to be used for the production of an agricultural commodity in a commonly used rotation with aquaculture, grasses, legumes or pasture production.

[19] "Memorandum to the Field: Guidance on Conducting Wetland Determinations for the Food Security Act of 1985 and Section 404 of the Clean Water Act," February 25, 2005. Available at https://prod.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs143_007869.pdf.

was declared unlawful by one district court because it effectively modified the 1993 preamble language without any formal rulemaking process.[20]

The proposed definition of prior converted cropland is consistent with guidance for prior converted cropland included in the preamble to the 1993 amendment to the regulatory definition of "waters of the United States" to categorically exclude "prior converted croplands" (58 FR 45033). Not all cropland eligible for the proposed CWA prior converted cropland exclusion has been mapped and officially designated by U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS). Further, the agencies note that NRCS is statutorily prohibited from sharing data and information on program participants and their land, even with other federal agencies.[21] In addition, the agencies do not document in ORM2 when waters meet the prior converted cropland exclusion under pre-2015 practice, so no agency data exist to provide estimates on the current extent of prior converted cropland. Therefore, it is likely that not all land that qualifies by statute as prior converted cropland has been formally designated as such.

To establish a baseline and estimate any potential effect of the proposed rule language, the agencies would need to have estimates of the acreage of prior converted cropland that would lose the prior converted designation if it were subject to the abandonment principles and, of such abandoned prior converted cropland, how much has reverted to wetlands. The agencies would then need to establish the acreage of the abandoned prior converted cropland that has reverted to wetlands, and the acreage of the wetlands that would meet the proposed definition of adjacent wetlands. Because fewer wetlands would likely be jurisdictional under the proposed rule compared to both baselines, it is therefore likely that there would be fewer wetlands that would now be considered "abandoned" and also subject to the CWA under the proposed rule.

Under both baselines, prior converted cropland loses its status as an excluded water under the CWA if it is either abandoned or if it is subject to a change in use. The proposed rule would clarify that the only way for prior converted cropland to lose its status as an excluded water under the CWA is when the area is abandoned and has reverted to a wetland meeting the regulatory definition of "wetlands." The proposal further clarifies that prior converted cropland is abandoned if it is not used for, or in support of, agricultural purposes at least once in the immediately preceding five years. The agencies note that most prior converted cropland should not regain wetland status since it is generally manipulated to such a degree that wetland conditions would not return. As is the practice under both baselines, where wetland conditions do not return, the area would not be subject to the CWA. However, where wetland conditions do return, a new jurisdictional determination would be required to determine if the wetlands would be adjacent as proposed. Since the agencies would no longer apply the change in use provision as used under both baselines to prior converted cropland, fewer wetlands may be identified as jurisdictional under the proposed rule compared to both baselines. Under both baselines, "change in use" did not require that the

[20] *New Hope Power Co. v. U.S. Army Corps of Eng'rs*, 746 F. Supp. 2d 1272, 1282 (S.D. Fla. 2010).

[21] Section 1619 of the Food, Conservation, and Energy Act of 2008 prohibits USDA, its contractors, and cooperators, from disclosing information provided by an agricultural producer or owner of agricultural land concerning the agricultural operation, farming or conservation practices, or the land itself, in order to participate in a USDA program, as well as geospatial information maintained by USDA with respect to such agricultural land or operations, subject to certain exceptions and authorized disclosures. Covered information may only be shared with other federal agencies outside USDA for specific purposes under a cooperative program, *i.e.*, not for general regulatory or enforcement purposes.

area not be used for agricultural purposes at least once in the immediately preceding five years (this time requirement was only in place for the abandonment provision); change from an agricultural to a non-agricultural use could occur immediately.

Artificially Irrigated Areas, Artificial Lakes and Ponds, and Water-Filled Depressions

The proposed rule includes an exclusion for artificially irrigated areas, including fields flooded for rice or cranberry growing, that would revert to upland should application of irrigation water to that area cease. The text of the exclusion changes somewhat from that of the 2015 Rule's exclusion and the 1986 preamble language used under pre-2015 practice by combining factors from two of the 2015 Rule's exclusions and from two of the 1986 preamble's categories of waters that are generally not jurisdictional into one category and by adding fields flooded for cranberry growing.[22] In spite of the differences in the language for the proposed exclusion, the agencies anticipate that there will be no or little change as compared to both baselines.

The proposed rule includes an exclusion for artificial lakes and ponds constructed in upland, such as water storage reservoirs, farm and stock watering ponds, and log cleaning ponds, and that are not jurisdictional lakes and ponds or jurisdictional impoundments under the proposal. The proposed rule differs from the 2015 Rule and pre-2015 practice by identifying water storage reservoirs as an additional excluded type of artificial lakes and ponds, and does not specifically include cooling ponds in this exclusion. Cooling ponds are specifically included in the definition of waste treatment systems in the proposed rule, which are discussed below. The proposed rule text also differs somewhat from pre-2015 practice where these features are to be used exclusively for the stated purposes. Artificially water storage reservoirs are not specifically excluded in the 2015 Rule and are not specifically listed as a category of water that is generally not jurisdictional in the 1986 preamble. Therefore, there could be waters excluded under the proposed rule that would not be excluded under either baseline. The agencies are unable to quantify that change.

The proposed rule's exclusion for water-filled depressions created in upland incidental to mining or construction activity, and pits excavated in upland for the purpose of obtaining fill, sand, or gravel is not appreciably different from the 2015 Rule's exclusion for water-filled depressions, and the agencies anticipate no change from the 2015 Rule for this exclusion. The proposed exclusion differs from the text of the 1986 preamble language used under pre-2015 practice for waters that are generally not jurisdictional, as the 1986 preamble includes additional specifications that such waters are generally non-jurisdictional unless and until the construction or excavation operation is abandoned and the resulting body of water meets the definition of "waters of the United States." Therefore, there could be waters excluded under the proposed rule that would not be excluded under pre-2015 practice. The agencies are unable to quantify that change.

Stormwater Control Features

[22] "Fields flooded for rice growing" under pre-2015 practice would likely be considered features that are generally non-jurisdictional, as they would be "[a]rtificial lakes or ponds created by excavating and/or diking dry land to collect and retain water and which are used exclusively for such purposes as…rice growing." 51 FR 41217 (November 13, 1986). Such fields are explicitly excluded in the 2015 Rule.

The proposed rule's exclusion for stormwater control features differs from the 2015 Rule's exclusion in that the 2015 Rule limited such exclusions to features that convey, treat, or store stormwater run-off, while the proposal's exclusion added the term "infiltrate." There is no such exclusion for stormwater control features under pre-2015 practice, though some stormwater features may be considered and found non-jurisdictional on a case-specific basis. The agencies are unable to quantify the magnitude, if any, of such a change.

Wastewater Recycling Structures

The proposed rule excludes wastewater recycling structures constructed in upland, such as detention, retention and infiltration basins and ponds, and groundwater recharge basins. The 2015 Rule contains a similar exclusion for wastewater recycling structures constructed in dry land that does not specifically include basins and ponds used for infiltration but does specify that the exclusion applies to percolation ponds built for wastewater recycling and water distributary structures built for wastewater recycling. The agencies anticipate that there would be no practical difference between the two exclusions, as the exclusions generally apply to wastewater recycling structures constructed in upland. Such waters are likely not considered jurisdictional under pre-2015 practice unless they are connected to the tributary network, and even then, some such waters could be considered as excluded under the exclusion for waste treatment systems.

Waste Treatment Systems

The agencies propose to continue the exclusion for waste treatment systems but with textual changes from both baselines. The agencies propose to revise the text in the waste treatment system exclusion to read just "waste treatment systems" and propose to define waste treatment systems for the first time to include all components, including lagoons and treatment ponds (such as settling or cooling ponds), designed to convey or retain, concentrate, settle, reduce, or remove pollutants, either actively or passively, from wastewater prior to discharge (or eliminating any such discharge). The agencies do not intend for this proposed rule to change pre-2015 practice or application under the 2015 Rule regarding the waste treatment system exclusion. Thus, the agencies anticipate no change from either baseline for the exclusion for waste treatment systems.

I.A.5 Summary

As discussed in this section, the agencies' analysis indicates that the largest potential effects associated with the proposed rule policies would be to wetlands and ephemeral streams. Not all wetlands are jurisdictional under the 2015 Rule or pre-2015 practice. Similarly, not all ephemeral streams would be "waters of the United States" under the 2015 Rule or pre-2015 practice, but the agencies anticipate that in those instances where ephemeral streams would have been found jurisdictional under the pre-2015 practice, their jurisdictional status would change under the proposed rule. Some intermittent and perennial streams may also no longer be jurisdictional under the proposed rule that may be jurisdictional under the 2015 Rule and pre-2015 practice, if such streams do not convey perennial or intermittent flow to a TNW in a typical year. In addition, there could be a subset of interstate waters, their tributaries, and impoundments of the above waters that were jurisdictional under the 2015 Rule and pre-2015 practice that would not be jurisdictional under the proposed rule according to the proposed elimination of interstate waters as a separate category of jurisdictional waters.

The proposed rule would likely not affect the scope of jurisdictional TNWs, most perennial streams, or many intermittent streams. As discussed above, the agencies anticipate that the proposed rule would decrease the number of jurisdictional wetlands and impoundments, and the scope of lakes and ponds that are jurisdictional would likely be smaller when compared to the pre-2015 practice.

The agencies recognize that some of the waters that would not be subject to CWA jurisdiction under the proposed rule would be otherwise regulated under state or tribal authorities and programs. This is discussed further in Section II.B and in the RPA.

I.B Overview of Economic Analysis

The legal uncertainty of the 2015 Rule creates the need for two economic baselines. The primary baseline reflects the 2015 Rule being in effect. A second alternate baseline is the pre-2015 regulations as implemented consistent with Supreme Court decisions and informed by applicable guidance documents and longstanding agency practice (*i.e.*, the 2015 Rule not being in effect). This regulatory regime was in place immediately prior to the 2015 Rule, and the agencies continued to administer these regulations pursuant to judicial stays of the 2015 Rule[23]. The agencies are currently implementing the pre-2015 practice in those 28 states where the 2015 Rule is enjoined, and this is the regulatory regime that the agencies have proposed to recodify in Step 1.[24] This alternate baseline reflects the fact that the 2015 Rule has never been in effect nationwide.

The agencies have applied a two-stage analysis for the economic analysis for the proposed rule to revise the definition of "waters of the United States" to make the best use of limited local and national level water resources information available to inform stakeholders and the public about the potential implications of these proposed actions. The agencies confronted limitations in a critical dataset that they determined would not allow analysis of the proposed rule from the primary baseline directly to the proposed policy. The agencies considered conducting a geospatial analysis of the regulatory options and identifying specific waterbodies that would potentially no longer be jurisdictional. However, the database which the agencies understood to be the most comprehensive and nationally-consistent geospatial surface hydrology data available, the National Hydrography Dataset,[25] does not differentiate between waterbody types at a sufficiently refined level nationally to make accurate policy-relevant distinctions. The proposed rule would exclude ephemeral features from federal jurisdiction (but would cover intermittent and perennial "tributaries" as defined in the proposal); thus, systematic analysis of available national datasets could not accurately portray the potential effects of the proposed definition on streams nationwide. Additionally, the National Wetlands Inventory (NWI) does not use the agencies' regulatory definition of wetlands, further complicating the task of modeling the potential effects of the proposed rule. Finally, certain waters are not categorically jurisdictional under pre-2015 practice (*e.g.*, non-relatively permanent waters such as all ephemeral streams and some intermittent streams), and the jurisdictional status of such waters must be determined using a case-specific significant nexus analysis. As a result, the agencies do

[23] *See In re EPA & Dep't of Def. Final Rule*, 803 F.3d 804 (6th Cir. 2015) (staying 2015 Rule nationwide on October 9, 2015); *North Dakota v. EPA*, 127 F. Supp. 3d 1047 (D.N.D. 2015) (issuing preliminary injunction against 2015 Rule in 13 states on August 27, 2015, prior to the rule's effective date).

[24] *See* "Definition of 'Waters of the United States' Recodification of Pre-Existing Rules," 82 FR34899 (Proposed July 27, 2017).

[25] United States Geological Survey (USGS), https://nhd.usgs.gov/, accessed April 17, 2018.

not believe that they can identify the universe of federally regulated waters under the pre-2015 practice in order to establish a comparative baseline of jurisdictional waters. See Section II.C and the proposed rule's RPA for more detailed discussion of the data limitations.

Instead, the agencies are analyzing the effects of the proposed policy in two discrete stages. The first stage (hereafter Stage 1) assesses the potential impacts of moving from the 2015 Rule to the pre-2015 baseline (*i.e.*, repealing the 2015 Rule and recodifying the prior regulations), and entails a less comprehensive set of waters being considered "waters of the United States." For the Stage 1 analysis, the agencies can use the original 2015 Rule economic analysis as a starting point, and thus pursue a quantitative assessment limited to Stage 1. However, several significant changes to the 2015 Rule analysis are made to account for the incorporation of existing state laws and programs that regulate water and potential state governance responses, as well as other analytic changes incorporating better information in assessing the potential benefits and costs of the Stage 1 effects.

The second stage (hereafter Stage 2) examines the potential costs and benefits of moving to a new definition under the proposed rule from the pre-2015 baseline. Due to the analytic and data challenges discussed throughout, the agencies provide a series of qualitative analyses, three detailed quantitative case studies, and a national CWA 404 program analysis. The agencies determined that a qualitative analysis and a series of case studies, where waters potentially could be assessed on a smaller scale in specific locations, was the best available alternative for applied empirical work estimating the potential benefits and costs of this proposed rule. Focusing on smaller geographic scales allows the analyses to focus on areas with better than average data availability, and when possible, to utilize additional location specific data sources. The results of the case studies illustrate that only data for the CWA 404 program are available and suitable for conducting a national level analysis. The national CWA 404 program analysis does not provide the total avoided costs and forgone benefits of the proposed rule (CWA section 402, 311 and other programs are not captured), but it does allow for a direct comparison between the estimated impacts of the Stage 1 and Stage 2 analyses and does provide national totals for the CWA 404 program. The outputs of the two-stage analysis were determined to be the best way to illustrate the expected impact of the 2015 Rule being in effect nationwide (*i.e.*, the sum effect of both stages) and of the 2015 Rule not being in effect (*i.e.*, Stage 2 only). The alternate pre-2015 baseline is important to consider given the legal uncertainty of the 2015 Rule.

Dividing the EA into two stages allows the agencies to examine the potential effects of the proposed change that maximizes the use of available information. Together, these two stages describe the potential effects of moving from the 2015 Rule to the proposed rule. The agencies solicit comment on the overall approach to conducting this economic analysis including whether they should consider conducting additional case studies and whether there are methods by which they can aggregate the quantitative results from the three case studies to a nationwide estimate.

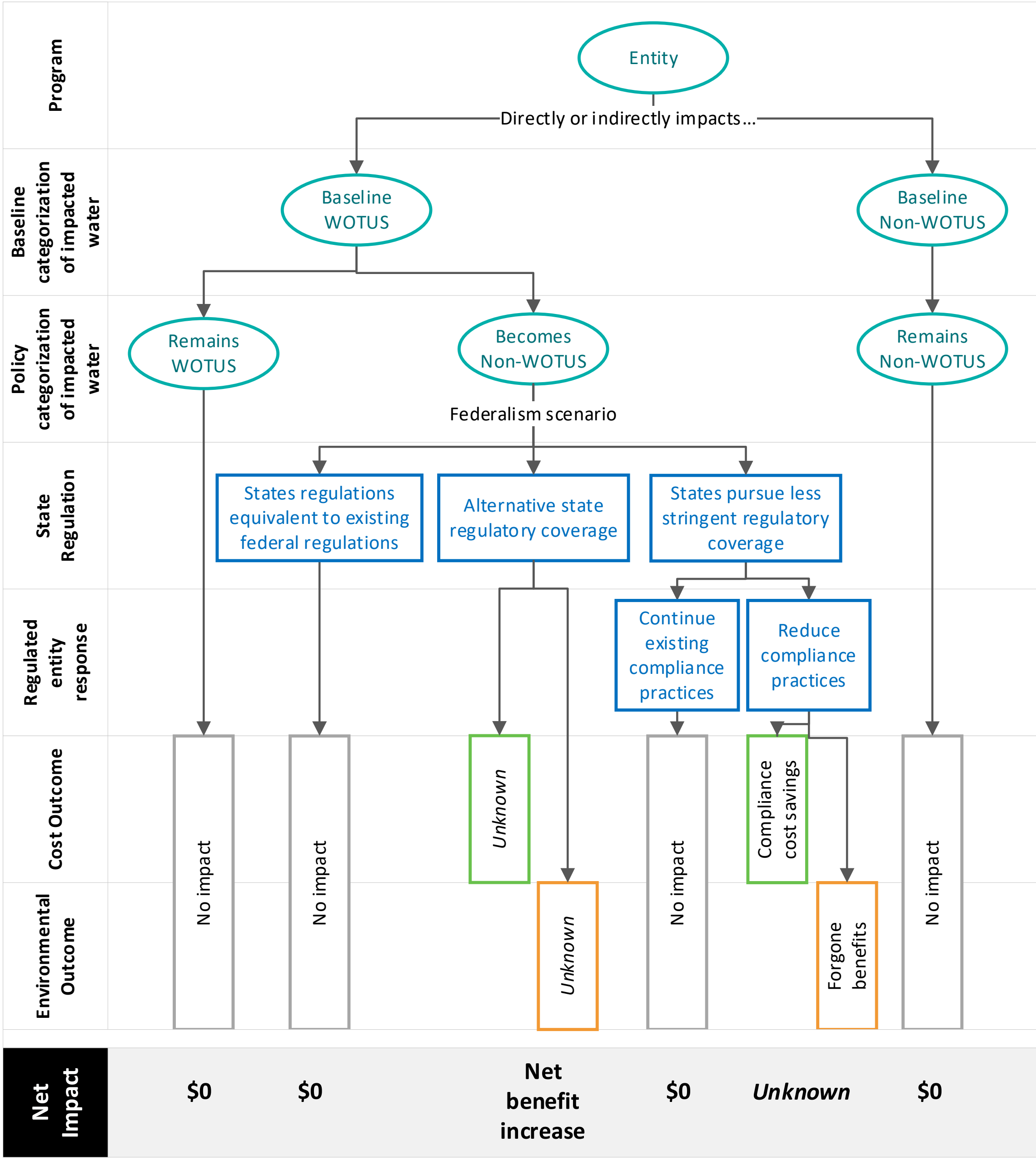
Although there might appear to be a correlation between the analysis of the 2017 proposed rule to repeal the 2015 Rule and recodify the prior regulations ("Step 1") and the 2018 proposed rule to revise the definition of "waters of the United States" ("Step 2") and Stages 1 and 2 of this analysis, the agencies are adopting the nomenclature of "Stages" here, because this *full* document is the analysis of the proposed Step 2 rule considering both of the two possible states of the world. However, the Stage 1 analysis, found in Section III, should be considered distinct from an analysis of the Step 1 rule; the agencies are not modifying or finalizing that rule with this action. Should the agencies finalize the Step 1 rule in the future, the agencies would finalize an economic analysis focused on the Step 1 rule and refer to *it* as the economic analysis of the Step 1 final rule.

II. Discussion and Analyses of the Major Causes of Uncertainty

The first section of this EA systematically outlines the complexity and various layers of uncertainty regarding the potential implications of the proposed change in the regulatory regime. The final economic welfare implications of this proposed rule will be a function of the amount, type, and location of water resources that change CWA jurisdictional status, the level of water resource regulation undertaken by individual states and tribe before and in response to the proposed change, and the responses of regulated entities to the proposed change. Tree-diagrams like the one in Figure II-1 provide a systematic framework for understanding and qualitatively analyzing the potential implications of the proposed rule, and provide a useful introduction to the subsequent analyses that go into further detail regarding one or several layers of uncertainty. As shown in the stylized example in Figure II-1, the potential effects of the proposed change in the jurisdictional status of waters can range from having a minimal and possibly zero impact, to yielding savings in compliance costs and losses in environmental benefits.[26] In some cases, the proposed rule may result in an increase in net benefits.

[26] *See* Section IV for analogous diagrams and qualitative analyses specific to three key CWA programs potentially affected by the proposed rule (sections 402, 404, and 311).

Figure II-1: Stylized tree diagram of potential impacts from proposed rule.



In the simplest case, as shown in the rightmost branch in Figure II-1, if an entity (*e.g.*, a development project, manufacturing facility, or state transportation project) impacts a water that is not considered a "water of the United States" in the baseline regulatory regime, then it is also assumed not to be a "water of the United States" under the proposed rule, and hence there would be no changes in the compliance costs incurred by that entity nor in the environmental benefits experienced. Therefore, there is no impact to society in this situation.

At the other extreme, in the leftmost branch of Figure II-1, if an entity impacts a water that is considered a "water of the United States" in the baseline, and this water is also considered a "water of the United States" under the proposed rule, then there will also be no change in regulatory requirements, and thus no change in compliance costs or environmental benefits. Again, in this situation there is a zero-net impact to society. As described in the program specific analyses in Section IV, many categories of baseline activities regulated under the CWA sections 401, 402, 303(d), 404, and 311 will likely fall into this type of situation and continue to be regulated by the CWA under the proposed rule.

The cases of interest are those where an entity directly or indirectly impacts a water that is considered a "water of the United States" under the baseline regulatory regime but would no longer be considered a "water of the United States" under the proposed rule. Generally, the state/tribal governments could take one of three actions in response to the proposed rule. First, a state or tribe's current regulatory regime under state or tribal law may already be as comprehensive, or more comprehensive, than that of the federal government. It is also possible that a state or tribe will revise its current laws and regulations to address these waters and continue the actions required by the CWA in the baseline. In either case, state or tribal requirements would fully address any regulatory difference in the wake of the proposed change in what waters are considered a "water of the United States." This will result in no change in compliance costs to the regulated community and no change in environmental benefits.

It is important to emphasize that any shift in regulatory administration, implementation, and enforcement from the federal government to states or tribes represents a transfer in administrative costs. If federal and state or tribal administrative costs are similar, the net impact should be roughly zero in the long-run. However, there could be significant short-run, and possibly long run, costs to states and tribal governments to build, expand, and maintain the necessary regulatory infrastructure. To the extent that state, tribe, or local cost of implementing an expanded regulatory framework are greater than the previous federal expenses, net benefits could decrease. It is also possible that the state and local management costs could be borne most directly by state and local tax payers, although the data necessary to estimate the size and distribution of the tax impacts was not available for use in this analysis. The agencies recognize that this would be more of an issue in some programs than others (*e.g.*, oil spill response under the 311 program), and is described in more detail in the program specific analyses in Section IV and in the state response analysis in Section II.A.

Another potential outcome is a federalism scenario, where states, tribes, and local governments who may be more knowledgeable of the local factors that can influence the environmental and economic values of the waterbodies in their jurisdiction can allocate resources more efficiently than the federal government to focus programs on aquatic resources of relatively higher environmental and social value. Depending on whether the newly non-jurisdictional water would be regulated, the compliance costs for an individual water resource could increase or decrease accordingly. And in turn, the corresponding environmental benefits could increase or decrease

A final scenario is that states or tribes would invoke a less comprehensive regulatory regime in response to the change in CWA coverage, or not implement any state or tribal regulations beyond federal requirements. For example, some states and all tribes are currently not authorized to implement the NPDES program, and so they would potentially not have the capacity (staff and resources) to regulate discharges to waters that would no longer be jurisdictional. These states or tribes may opt to not build such a capacity depending on the preferences of their residents and budget constraints, or the fact that they currently have legal requirements to not regulate beyond the CWA. [27] In such cases, unless regulated entities continue to behave as if still regulated (due to fixed costs already incurred, fear of future liability, or goodwill with local citizens), there will likely be avoided costs to the regulated community and forgone benefits to the public. Whether the net effect is positive or negative would depend on whether the resulting cost-savings are greater than the absolute value of the forgone environmental benefits. Regulated entities' potential responses are more thoroughly described in Section II.B and under the program specific discussions in Section IV.A.

Overall, the generalized tree diagram here (Figure II-1) and program specific tree-diagrams in Section IV.A provide a systematic and transparent organization to the qualitative discussion. These diagrams convey that in many cases the potential net effects could be minimal. Quantifying the frequency in which the scenarios in any branches of the tree take place, not to mention the magnitude of any resulting costs and benefits, is extremely difficult. Doing so requires data and well-informed assumptions regarding the current characterization of waters nationwide, the potential changes in "waters of the United States" across the country, and the potential response of state and tribal governments and the regulated entities across the various CWA programs and regulated waters. In addition, such a quantitative analysis faces the usual challenges of trying to model, quantify, and monetize the potential costs and benefits. For these reasons, the agencies pursue qualitative analyses organized around each of the key layers of uncertainty (as discussed through the remainder of Section II) and around key CWA programs where the agencies would expect to see potential effects (see Section IV.A).

II.A Potential State and Tribal Regulator Response

The CWA programs outlined in this section, including the section 303 water quality standards program, the section 311 Oil Spill Prevention program, the section 401 certification program, the section 402 National Pollutant Discharge Elimination System (NPDES) permit program, and the section 404 permit program for the discharge of dredged or fill material, rely on the definition of "waters of the United States" for program implementation. A revised definition of "waters of the United States" would affect these federal programs as implemented at the state or tribal level. Potential effects of this rule, however, will vary based on a state's or tribe's independent legal authority and programs under its own state or tribal law to regulate aquatic resources. Please refer to the Resource and Programmatic Assessment for a more in-depth discussion of these and other programs potentially affected by this rule.

II.A.1 Implementation of the CWA at the State Level

The purpose of this section is to summarize the current status of CWA programs in the states and describe how that information is used to characterize the states' potential responses regarding waters that would no longer be jurisdictional under the CWA following a revised definition. The agencies recognize that the federal and state laws and programs can be duplicative with some states having more stringent

[27] For example, to prepare for NPDES authorization, the state of Alaska created a capacity building plan that increased the full-time equivalents (FTEs) allocated to the program by nearly 50 percent (ADEC 2008); the state of Idaho anticipated more than doubling the relevant staff (IDEQ 2017); and the state of Massachusetts estimates that authorization would require over 100 FTE (MassDEP 2013).

requirements than the federal regulations. How these programs are administered and affect the water pollution source behavior will depend on the requirements or permits issued.

I.A.1.1 CWA Section 401 Water Quality Certification Program

All 50 states, the District of Columbia, and the territories of the United States have 401 certification programs which provide the states authority to approve, disapprove, or conditionally approve federal permits and licenses issued within their state. States vary in their implementation of CWA section 401 authority; some states involve themselves in federal permitting activities and make informed certification decision, while others often waive their certification authority over federal permits and licenses. For purposes of this analysis, the agencies assume that state approaches to section 401 certification are unlikely to change following a new jurisdictional rule.

The authority of states under section 401 corresponds directly to the issuance of federal permits and licenses within the state. Any change in the scope of the "waters of the United States" definition would alter the frequency with which the federal government issues permits and licenses for activities affecting "waters of the United States." In turn, this will potentially affect how often states can exercise their authority under section 401. In other words, if the federal government reduces the jurisdictional scope under the CWA (*e.g.*, fewer section 404 permits issued), it would not issue as many permits, and the states would not issue as many section 401 certifications. This would result in states issuing fewer section 401 certifications but is unlikely to change how states approach the section 401 process.

I.A.1.2 CWA Section 402 National Pollutant Discharge Elimination System

The CWA section 402 NPDES permit program is administered by the EPA, unless states have received authorization for the program. Forty-seven states and the U.S. Virgin Islands have authority to administer the NPDES program.[28] States may be approved for all or some of the major components of an NPDES program: biosolids, pretreatment, federal facilities, and general permits and basic municipal and industrial permits. Seven states are fully authorized for all components of the NPDES program.[29] Forty states have authority over one or more of the NPDES program components, with EPA administering the other components.[30] Currently, the EPA issues all NPDES permits in the three states that do not have authority for the NPDES program as well as all permits in the District of Columbia, all U.S. Territories (excluding the U.S. Virgin Islands), and on virtually all tribal reservation lands.[31]

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[28] Idaho has recently been approved to run its own NPDES program, effective July 1, 2018, and will be taking over administration of the program in four phases over four years.

[29] Those states with fully authorized programs are: Arizona, Michigan, Ohio, Oklahoma, South Dakota, Utah, and Wisconsin.

[30] Those states with partial NPDES authorization are: Alabama, Alaska, Arkansas, California, Colorado, Connecticut, Delaware, Florida, Georgia, Hawaii, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Minnesota, Mississippi, Missouri, Montana, Nebraska, Nevada, New Jersey, New York, North Carolina, North Dakota, Oregon, Pennsylvania, Rhode Island, South Carolina, Tennessee, Texas, Vermont, Virginia, Washington, West Virginia, and Wyoming.

[31] The three states are Massachusetts, New Hampshire, and New Mexico. At present, no tribes have authorization for a tribal NPDES permitting program. Maine is authorized to issue NPDES permits on some tribal lands.

The agencies are aware that many states issue discharge permits under state law that are separate from the scope of the federal NPDES program. These state programs may already regulate state waters that are not considered "waters of the United States" or could be used to do so in the future. At this time, the agencies do not have sufficient information to determine the extent of these programs. Should federal CWA jurisdiction change, these authorized state programs may continue issuing permits as they have been for discharges into waters outside the scope of CWA jurisdiction. Alternatively, if the discharge is no longer into a "water of the United States," states may modify existing NPDES permits to recognize that the receiving waterbody of concern is further away from the pollutant discharge point requiring an NPDES permit.

I.A.1.3 CWA Section 404 Dredged and Fill Permit Program

The CWA section 404 permitting program regulates the discharge of dredged or fill material into "waters of the United States" including wetlands. The Corps administers the day-to-day program in tribal reservation lands, the District of Columbia, and all U.S. Territories, as well as in the 48 states that have not assumed the program. To date only New Jersey and Michigan have assumed the section 404 program for those "waters of the United States" within their borders that are assumable,[32] meaning that the EPA has approved their administration of a state dredged and fill program in lieu of the federal section 404 program administered by the Corps.

In addition to the section 404 program, 30 states have some form of dredged and fill permitting programs for state inland waters, which vary in scope and do not necessarily address waters already covered under section 404.[33] The other 21 states rely on the section 401 certification program to address dredged and fill activities that are permitted by the Corps in inland waters. Those states with a state dredged and fill program may have a greater capacity to administer dredged and fill permitting for "waters of the state," including waters that would not be considered "waters of the United States" based on the changes to CWA jurisdiction in this proposal.

The agencies note that the presence of a state program that regulates dredged and fill activities does not necessarily indicate that the state program parallels or regulates waters equivalent to the geographic scope and range of activities regulated under CWA section 404. Section 404 regulates a wide variety of activities that result in the discharge of dredged and fill material to any water that is a "water of the United States." State dredged and fill programs vary widely in what types of waters and activities they regulate, with states often relying on a range of laws and regulations that are targeted to different waters and activities.[34] While some of these programs may regulate more broadly than the geographical

[32] CWA section 404(g) authorizes states, with approval from the EPA, to assume authority to administer the 404 program in some, but not all, "waters of the United States," within their borders. Section 404(g)(1) describes the waters over which the Corps must retain administrative authority even after program assumption by a state or tribe.

[33] Thirty states have explicit authority to issue permits for dredged and fill activities in inland waters: California, Connecticut, Florida, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Nevada, New Hampshire, New Jersey, New York, North Carolina, Ohio, Oregon, Pennsylvania, Rhode Island, Tennessee, Vermont, Virginia, Washington, and Wisconsin. The agencies have identified the presence of these programs in state laws and regulations, but did not attempt to characterize how the states implement these programs or what effects these programs have on a state's aquatic resources.

[34] *See* footnote 68 (in Section II) and Appendix B of the Resource and Programmatic Assessment for more details.

jurisdiction of the CWA, they often do not regulate all types of waters or activities covered by section 404 of the CWA. However, the existence of these state dredged and fill programs serves as an indicator of a state's interest and capacity in regulating dredged and fill activities within waters of their state. As a result, the economic analysis has made the simplifying assumption that states with existing programs, regardless of scope, are likely to have the capacity and interest to regulate waters that may no longer be jurisdictional following a change in the definition of "waters of the United States."

I.A.1.4 CWA Section 303(c) Water Quality Standards and 303(d) Impaired Waters Listing and Total Maximum Daily Load Program

Currently, all states and 45 tribes have approved federal water quality standards (WQS) under CWA section 303(c). Under CWA section 303(d) and the EPA's implementing regulations, states are required to assemble and evaluate all existing and readily available water quality-related data and information and submit a list of impaired waters to the EPA every two years. For waters identified on a section 303(d) list, states must establish Total Maximum Daily Loads (TMDLs) for all pollutants preventing or expected to prevent attainment of relevant WQS. While several tribes have expressed interest in obtaining 303(d) TAS authority, none have submitted applications for 303(d) TAS to date.

States and tribes may develop standards under state or tribal law for waters that are not "waters of the United States," but they would not be in effect for CWA purposes. States and many authorized tribes already have WQS that do or could apply to waters that are currently outside the scope of CWA jurisdiction. If federal CWA jurisdiction were to change for certain waters under the proposed rule, such states could apply their WQS as a matter of state law, and authorized tribes could apply their WQS to the extent their authority under tribal law would allow.

I.A.1.5 CWA Section 311 Oil Spill Prevention, Preparedness, and Response

Implementation of the CWA section 311 program cannot be delegated to states or tribes. Thus, the scope of the section 311 programs is tied to the extent of "waters of the United States." Coordination with states or tribes is a part of the program's implementation by EPA Regions. For spill response, the Oil Pollution Act of 1990 (OPA) authorize the Oil Spill Liability Trust Fund (OSLTF) to reimburse costs of assessing and responding to oil spills in "waters of the United States." Funding from the OSLTF allows for an immediate response to a spill, including containment, countermeasures, cleanup, and disposal activities. The OSLTF is not available to reimburse costs incurred by states or tribes to clean up spills, as well as costs related to business and citizen impacts (*e.g.*, lost wages and damages), for spills to waters not subject to CWA jurisdiction.

Generally, all states have a program that covers at least some of the areas included in section 311. These programs vary from state to state in their requirements, coverage, and process. Additionally, all states have some mechanism, with a large variety of approaches, for oil spill cleanup reimbursement from responsible parties, with 46 states providing for clean-up cost recovery, 45 states allowing for some form of civil penalties, and 34 with trust funds to aid in cleanup. The agencies do not have sufficient information at this time to assess how these state programs and funding mechanisms may be affected by a revised definition of "waters of the United States."

I.A.1.6 Waters of the State

Each state has its own definition of "waters of the state," and many states define similar types of areas and aquatic resources as "waters of the state." A few states also reference "waters of the United States" within their definitions of "waters of the state." All state definitions are more inclusive than past and current definitions of "waters of the United States" in at least some way. Most state definitions also include some combination of groundwater and artificial waters. Very few states mention flow requirements in their definitions, but the ones that do define "waters of the state" as those waters which flow perennially, seasonally, and intermittently. Some states may choose not to regulate all waters within the scope of their definition of "waters of the state," often including exemptions in their regulations for certain types of "waters of the state," for certain industries, or for certain types of permits. Effectively, about half of the states regulate at least some waters beyond the scope of federal CWA requirements.

Most states have a definition of wetlands in their state laws and regulations. While these definitions also vary widely in exact language, they all either recite, reference, incorporate, or outline similar factors as the federal regulatory definition of wetlands. Some are more inclusive than the federal regulatory definition, while others incorporate the exact federal factors of a wetland. Many states have different wetland definitions for tidal, nontidal, coastal, and freshwater wetlands. It is apparent that isolated waters and wetlands are rarely specified under these definitions; however, at least 20 states have programs to cover all or some "isolated" wetlands. The agencies do not have sufficient information at this time to conclude that only those 20 states cover some or all "isolated" wetlands.

I.A.1.7 State Conditions and Requirements

States retain authority under the CWA to determine what kinds of aquatic resources are regulated under state law to protect the interests of the state and their citizens. State environmental agencies and some local governments may use existing state legal authorities to address certain water resources that do not meet the definition of "waters of the United States." As noted above, about half of states regulate at least some waters beyond the scope of federal CWA requirements. There are also some state laws that constrain a state's authority to regulate more broadly than the federal "floor" set by the CWA. Whether a state actually regulates more broadly is not necessarily controlled by the presence or absence of state determinations that federal standards are sufficient.

Thirteen states have adopted laws that require their state regulations to parallel federal regulations.[35] The agencies note that these state laws address the sufficiency of federal CWA standards beyond simply geographic jurisdiction. For example, some state laws included in this discussion only limit the application of state regulations to certain industries, types of resources, or types of permits. Thus, five of these states still regulate some waters that are not considered within the scope of "water of the United States." The remaining eight states do not regulate waters beyond the scope of federal regulation.

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[35] The 13 states that require their regulations to parallel federal regulations are: Arizona, Colorado, Idaho, Iowa, Kentucky, Minnesota, Mississippi, North Carolina, Oregon, South Dakota, Texas, Virginia, and Wisconsin.

Twenty-three states have adopted laws that require extra steps or findings of benefits to impose state regulations beyond federal requirements.[36] The effects of these laws vary widely, depending on their exact requirements and how they are implemented in a given state. Some of these regulations effectively restrict state authority to regulate waters more strictly than federal CWA requirements; other "extra step" laws appear to have no noticeable effect on state regulations that are broader in scope than federal CWA requirements. Eight of these 23 states are also included in the 13 states above that have determined that federal standards are sufficient. Of the 15 states that only have the "extra step" requirements, nine regulate some waters that are not covered by the federal CWA. The other six states with these requirements have not established regulations for waters outside the scope of the CWA.

The remaining twenty-two states and the District of Columbia do not appear to have any laws that address state regulations outside the scope of the CWA. Eleven of these states regulate waters beyond the scope of the CWA, while the other 11 states and the District of Columbia do not.[37]

Some states may adjust their current practices in light of a revised definition of "waters of the United States." The agencies are not able to predict what changes might result from the proposed rule. The agencies are aware that there are currently, and have been in the past, bills before state legislatures to either add or repeal laws that address the scope of state regulation compared to federal requirements. While future legislative changes could affect waters that are not "waters of the United States" in the future, the agencies will not speculate on the outcomes of these efforts and instead are focused in this chapter on the information that is available to the agencies at this time.

II.A.2 Environmental Federalism

Changing the definition of "waters of the United States" in a way that reduces the amount of aquatic resources under federal jurisdiction effectively hands sole regulatory authority of those resources to the states and tribes. States and tribes can respond by maintaining an equivalent level of regulation over those resources or allowing those resources to be managed without permitting and regulation, or in a less complete or less stringent way so that the result is between the two bounding cases. The balance of regulatory authority over environmental resources between centralized and local governments and the result when that balance changes is a question of environmental federalism.

I.A.1.8 Lessons Learned from the Literature

To help the agencies better understand the environmental federalism literature, the EPA commissioned a comprehensive literature review report (Fredriksson, 2018). The report reviews literature on environmental federalism and political economy, focusing on that which is most relevant for the potential

[36] The 23 states that have requirements for extra steps or findings are: Arkansas, Colorado, Florida, Idaho, Indiana, Iowa, Kentucky, Maine, Maryland, Minnesota, Montana, Nevada, New Jersey, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, Tennessee, Utah, Virginia, West Virginia, and Wisconsin.

[37] ELI (2013), State Constraints: State-Imposed Limitations on the Authority of Agencies to Regulate Waters Beyond the Scope of the Federal Clean Water Act, available at https://www.eli.org/sites/default/files/eli-pubs/d23-04.pdf. The agencies note that this report has been criticized as inaccurate and recognize its limitations as a definitive resource. *See, e.g.,* Comments of the Waters Advocacy Coalition on the Environmental Protection Agency's and U.S. Army Corps of Engineers' Proposed Rule to Define "Waters of the United States" Under the Clean Water Act EPA-HQ-OW-2011-0880 (November 13, 2014) at 7 - 11. Docket ID: EPA–HQ–OW–2011–0880–14568, available at https://www.regulations.gov/document?D=EPA-HQ-OW-2011-0880-14568.

change in regulatory control of waters under the CWA. The author describes several theoretical predictions and summarizes the literature.

- *Efficiency of Decentralization*: The seminal paper by Oates and Schwab (1988) suggests that, to the extent benefits and costs are contained within the state jurisdiction, decentralized state policymaking can be more efficient than national policies. Decentralized policymaking has efficiency enhancing properties – state regulators have a better ability and more flexibility to produce the highest returns (benefits less costs) for their citizens. However, their model assumes no transboundary pollution, many jurisdictions, perfectly mobile capital and immobile labor, a homogenous population, perfect information, production costs and benefits that are locally internalized, and welfare maximizing local governments. Some real-world modifications, such as transboundary pollution, fewer mobile firms (imperfect competition) or jurisdictions, transportation costs, different policy instruments, and various political economy pressures, change Oates and Schwab's main result. In general, the theoretical literature argues that decentralization can yield inefficiently weak regulations (Dijkstra and Fredriksson, 2010).[38]

  Local regulators may have superior information regarding local conditions and may therefore implement more efficient regulations (Levinson, 2003). Environmental dimensions may also be closely related to other local issues such as urban planning, favoring a decentralized approach (Sjöberg, 2016). On the other hand, environmental protection may involve economies of scale, which favors a centralized system (Adler, 2005). The central government likely has an advantage in supporting research in environmental science and pollution control technologies (Oates, 2001). Seabright (1996) argues that decentralization reduces policy coordination but raises the accountability of government.

- *Race to the Bottom*: Local jurisdictions may engage in strategic policymaking to attract and retain mobile industry and jobs, raise wages and expand the local tax base. The fear is that such capital (investment) competition could lead to sub-optimally weak environmental regulations under decentralized systems. The literature review finds that most of the results in the empirical literature fail to support a race to the bottom.[39] If a race occurs, it may take more complicated forms. For example, states may respond only to changes in neighboring states with more stringent policies. A state's regulatory stringency is pulled upward by neighbors which already have stricter policies. However, changes in neighbors with weaker regulations have no impact. This asymmetrical result contradicts the race-to-the-bottom hypothesis.

- *Political Economy*: To understand and predict actual policy outcomes, it is critical to take the political pressures on policy into account. The majority political party (in the U.S. Congress, or in state capitals), tends to favor the social welfare of its home districts (its constituency) over other minority districts. Helland (1998) finds evidence that local special interests influence enforcement effort when national policy is delegated to the state level.

[38] Dijkstra and Fredriksson (2010) limit their review to models in which pollution does not cross jurisdictional boundaries and in which labor and households are immobile between jurisdictions.

[39] *See also* Oates (1997, 2002).

Given the literature's findings, states and tribes are likely to manage their environmental resources with the benefit of local knowledge and with the welfare of their constituents in mind. A race to the bottom is presumed to be unlikely to occur once states and tribes assume authority over aquatic resources. Effective regulation of the resources, however, requires the political capital and fiscal resources to do so. As such, the best indication of how states will exercise their authority as the federal government retracts its jurisdiction is how they have exercised existing authority in the past and whether the infrastructure to manage the regulatory programs already exists. The agencies collected data on these factors and the following sections summarize the data sources and how they inform our analysis.

I.A.1.9 State Snapshots and Listening Sessions

The agencies compiled information on state wetland and surface water programs and regulations to describe the breadth of state authorities and to provide a current picture of federal and state regulatory management of aquatic resources. Information was drawn from multiple state and federal sources, as well as from previous analyses undertaken by independent associations and institutions. Definitions for state and territorial waters, including wetlands, were drawn from online directories of regulatory titles and codes, therefore pulled directly from state laws. Information on state and territorial water laws and programs was found through state and territorial agency websites, and information on the various CWA programmatic areas (303, 311, 401, 402, and 404) was drawn from EPA and Corps websites, numerous publications, maps, and from EPA regional staff. These summaries were shared with state and territorial agencies for corrections and the agencies welcome further comments to ensure the accuracy of the information.[40]

I.A.1.10 Status and Trends Report on State Wetland Programs in the Unites States

The Association of State Wetland Managers (ASWM) has prepared state wetland program summaries approximately every 10 years starting in the 1980s. The most recent report (ASWM, 2015) relies on information from past state summaries (both by ASWM and the Environmental Law Institute), state and federal reports, websites, and other related resources and compiles this information into draft state summaries. ASWM conducted verification phone calls and correspondence via email with 50 states, attempting to ensure that information for each state summary is up-to-date for the status of state wetland program activities as of December 2014.

Information compiled in this report focuses on four core elements. They are: 1) wetland regulation, 2) wetland monitoring and assessment, 3) wetland water quality standards, and 4) voluntary wetland restoration. Wetland regulation is the element most relevant from this report to anticipating potential state responses to changes to the "waters of the United States" definition. States take one of three approaches to

[40] *See* the supporting "Resource and Programmatic Assessment for the Revised Definition of 'Water of the United States' Proposed Rule, Appendix B" for additional details on the state snapshot summaries.

regulating wetlands: 404 assumption,[41] state-level dredged and fill programs for inland waters in addition to 401 certifications, and primarily relying on 401 certifications.[42]

It is reasonable to assume that there will be little or no change to the permitting process in New Jersey, one of the two states that has assumed section 404 permitting authority. In Michigan, unless the state legislature passes new legislation, it is reasonable to assume that there will be at least some change to the permit process correlating to the proposed change in CWA jurisdiction, as the state currently limits its permit program to the jurisdictional scope of the CWA.[43] The other states that have developed their own dredged and fill programs may choose to expand their programs to cover waters that would no longer be considered "waters of the United States" under a revised definition. States that rely primarily on 401 certifications to address dredged and fill activities may or may not develop a state-level permitting program for non-jurisdictional waters.

I.A.1.11 State-Imposed Limitations on the Authority of Agencies to Regulate Waters Beyond the Jurisdictional Scope of the Clean Water Act

The agencies collected information from several sources to characterize states ability to regulate waters beyond the jurisdictional scope of the CWA. The main source is the State Snapshot analysis presented in the RPA for this rule.[44] Alternate sources of information, including an Environmental Law Institute (ELI) report that "examines [the] limitations imposed by state law that could constrain the ability of state agencies" to regulate water resources in the absence of CWA regulation (ELI, 2013)[45] were also consulted to corroborate and supplement the information in the agencies' State Snapshot analysis found in Appendix B of the RPA. The agencies recognize that these summaries do not necessarily capture all the

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[41] Although only two states (Michigan and New Jersey) have assumed the 404 permitting program to date, states and tribes have recently expressed significant interest in assuming the program. *See, e.g.,* Final Report of the Assumable Water Subcommittee (May 2017).

[42] Five of these states issue permits for dredged and fill activities in coastal waters and wetlands. However, the agencies have concluded that inland programs are more indicative of a state's capacity to address waters that may no longer be federally jurisdictional.

[43] Passed in 2013, PA 98 states: "Sec. 30101a. For the purposes of this part, the powers, duties, functions, and responsibilities exercised by the department because of federal approval of Michigan's permit program under section 404(g) and (h) of the federal water pollution control act, 33 USC 1344, apply only to "navigable waters" and "waters of the United States" as defined under section 502(7) of the federal water pollution control act, 33 USC 1362, and further refined by federally promulgated rules and court decisions that have the full effect and force of federal law. Determining whether additional regulation is necessary to protect Michigan waters beyond the scope of federal law is the responsibility of the Michigan legislature based on its determination of what is in the best interest of the citizens of this state." EPA found fourteen of the provisions in PA 98 reduced the geographic or permitting scope of the state program to be inconsistent with the CWA, but the Governor has asked for reconsideration and approval of these.

[44] *See* the supporting "Resource and Programmatic Assessment for the Revised Definition of 'Water of the United States' Proposed Rule, Appendix B" for additional details on the state snapshot summaries.

[45] *See* Appendix I of the ELI report.

complexities of state programs and solicit additional information on state water programs and regulation to further the agencies' understanding.[46]

II.A.3 State Response Categories

For purposes of this analysis, the agencies assume states will have a continuum of different responses to a change in CWA jurisdiction based on legal and other constraints, though the states' responses are difficult to predict. The agencies expect some states could reduce the scope of their programs to align with a change in federal jurisdiction because of these constraints. In states with legal constraints, the agencies would expect both avoided costs and forgone benefits from a change in the definition if certain waters are no longer jurisdictional. In states that regulate waters, including wetlands, more broadly than the federal definition, the agencies would expect little to no direct effect on costs or benefits. Many, if not most, states are likely to fall in between these extremes (see below for more discussion of this point). And while most states have been authorized to administer at least some, if not all, parts of the NPDES program, states that are not authorized (or not authorized for a given part) may have different responses.

State responses may differ from those that would be predicted based purely on *existing* state regulation and legislation. For example, during the agencies' discussions with co-regulators, several states indicated that they may change their laws to regulate waters that might no longer be jurisdictional under the CWA. These responses are even more difficult to predict than those described.

I.A.1.12 Regulation of Dredged and Fill Material

The commissioned literature review (Fredriksson (2018)) identified the variables most commonly used in the federalism literature that are useful in anticipating how states could respond to the proposed definition of "waters of the United States." An available subset of these variables is used to characterize potential state responses regarding dredged or fill permitting and perform sensitivity analyses on the results. The reports on state responses and the data on which they are based indicate that the following variables will have the strongest bearing on the way states are likely to respond:[47]

- *State-level dredged and fill program:* Twenty-eight states have such permitting programs for inland wetlands and other waters. While none of the reports referenced above evaluate the extent of state-level dredged and fill permitting programs, their existence serves as an indication that they are more likely to regulate some wetlands and other waters that would no longer be subject to the federal section 404 program.

[46] While the ELI report is a readily available summary of potential limitations imposed by state law that could constrain states to regulate waters in the absence of federal regulation, commenters on the then-proposed 2015 Rule have identified numerous shortcomings and inaccuracies of the analysis and results that may limit the degree to which the agencies can rely upon it. *See, e.g.,* Comments of the Waters Advocacy Coalition on the Environmental Protection Agency's and U.S. Army Corps of Engineers' Proposed Rule to Define "Waters of the United States" Under the Clean Water Act EPA-HQ-OW-2011-0880 (November 13, 2014) at 7 - 11. Docket ID: EPA–HQ–OW–2011–0880–14568, available at https://www.regulations.gov/document?D=EPA-HQ-OW-2011-0880-14568

[47] State enforcement capabilities would also possibly be important in determining state responses, however no measure of enforcement capability was available for use in this analysis. Following Circular A-4, in situations where full information is not available the appropriate treatment is to assume full compliance. The agencies do not believe including enforcement would change the decision on the proposed rule.

- *Regulate waters more broadly than CWA:* In some cases, the definition of "waters of the state" is broader than the baseline definition of "waters of the United States." In those states, it is likely that states will continue to regulate or address some wetlands and/or other waters that would not be jurisdictional under the proposed rule. "Waters of the state" designation is distinct from the stringency of water quality standards and the permitting program in that state but may be a useful indicator that some regulation or non-regulatory program is likely to be in place for those wetlands and other waters following the change in jurisdiction.

- *Legal limitations:* While state legislatures may be able to change applicable legal restrictions, if a state prohibits or requires additional justification for a state rule that imposes requirements beyond a corresponding federal law, those restrictions are a useful indicator that states are unlikely to regulate wetlands and other waters that would no longer be "waters of the United States." Although the State Snapshots presented in the RPA (and other data sources) document several types of legal provisions, for the purposes of this analysis, the agencies are treating such legal provisions as a binary variable.

The agencies used the criteria noted above[48] to place states in one of four likely response categories, recognizing that any categorization must rely on simplifying assumptions given the variation and complexity of state laws and programs (Table II-1).

Table II-1: Dredged/fill categorization criteria

Category	State regulatory indicators	Likely Response
1	State has broad legal limitations on regulating aquatic resources	Likely to reduce regulatory practices
2	Does not have state-level dredged and fill program; does not define waters of the state more broadly than CWA; and does not have broad legal limitations on regulating aquatic resources.	State programs are likely to provide some regulatory coverage of waters that would no longer be "waters of the United States" and may reduce aquatic resource permitting practices
3	Has either a state-level dredged and fill program or defines waters of the state more broadly than CWA; and does not have broad legal limitations on regulating aquatic resources	State programs are likely to provide some regulatory coverage of waters that would no longer be "waters of the United States" and may continue baseline permitting practices
4	Has a state-level dredged and fill program and defines "waters of the state" more broadly than CWA	Likely to continue baseline dredged/fill permitting practices

Table II-2 reports the criteria for each state in columns 2 through 4 using '0' to indicate a negative and '1' to indicate the affirmative. Column 5 reports the resulting likely-response category.

[48] It has also been suggested that the quantity of water resources found in a state may help determine their response, but no clear pattern was discernable in scoping exercises. A breakdown of the quantity of water resources by state can be found in Appendix A.

Table II-2: Dredged/Fill regulation criteria and likely-response category

State	Has a State dredge and fill program (inland)	Regulates waters more broadly than the CWA requires	Does not have broad legal limitations	Likely-response category
Alabama	0	0	1	2
Alaska	0	0	1	2
Arizona	0	0	0	1
Arkansas	0	0	1	2
California	1	1	1	4
Colorado	0	0	1	2
Connecticut	1	1	1	4
Delaware	0	0	1	2
Florida	1	1	1	4
Georgia	0	0	1	2
Hawaii	0	0	1	2
Idaho	1	0	0	1
Illinois	1	1	1	4
Indiana	1	1	1	4
Iowa	1	0	1	3
Kansas	1	0	1	3
Kentucky	1	0	0	1
Louisiana	1	0	1	3
Maine	1	1	1	4
Maryland	1	1	1	4
Massachusetts	1	1	1	4
Michigan	1	1	1	4
Minnesota	1	1	1	4
Mississippi	1	0	0	1
Missouri	0	0	1	2
Montana	0	0	1	2
Nebraska	0	1	1	3
Nevada	1	0	1	3
New Hampshire	1	1	1	4
New Jersey	1	1	1	4
New Mexico	0	0	1	2
New York	1	1	1	4
North Carolina[1]	1	1	0	3
North Dakota	0	0	1	2
Ohio	1	1	1	4
Oklahoma	0	0	1	2
Oregon	1	1	1	4
Pennsylvania	1	1	1	4
Rhode Island	1	1	1	4
South Carolina	0	0	1	2
South Dakota	0	0	0	1
Tennessee	1	1	1	4
Texas	0	0	1	2
Utah	0	0	1	2
Vermont	1	1	1	4
Virginia	1	1	1	4

Table II-2: Dredged/Fill regulation criteria and likely-response category

State	Has a State dredge and fill program (inland)	Regulates waters more broadly than the CWA requires	Does not have broad legal limitations	Likely-response category
Washington	1	1	1	4
West Virginia	0	1	1	3
Wisconsin[1]	1	1	0	3
Wyoming	0	0	1	2

[1] The existence of a legal limitation on state authority to regulate beyond the scope of the CWA does not always prohibit a state from regulating waters beyond those protected by the CWA. See section on additional state conditions and requirements in the Resource and Programmatic Assessment. Rather the existence of these limitations presents an additional factor for states to address. This in turn may make it more difficult for states with such a limitation to readjust their protection of state waters following the proposed rule. For purposes of this analysis, any state with such a limitation that has not already expanded its regulation of state waters beyond the scope of the CWA is assumed to not do so under any change to the definition of "waters of the United States," and is accordingly placed in response category 1. Any states that have already expanded their regulatory scope, specifically North Carolina and Wisconsin, will be assumed to continue such practices. Thus, for purposes of this analysis, North Carolina and Wisconsin were placed in category 3 to reflect both their broader scope and the existence of legal limitations that may affect any future attempts to increase regulation of state waters.

I.A.1.13 Categorizing State Responses: Surface Waters Discharge Permitting

Like the study of dredged and fill regulation, a subset of variables that are most informative are used to characterize potential state responses related to regulation of surface waters and perform sensitivity analyses on the results. Reviewing the reports on state responses and the data on which they are based, the following variables likely have the strongest bearing on how states could respond.[49]

- *State authorization*:[50] A critical determinant of potential state responses to a change in "waters of the United States" jurisdiction is if they are authorized to administer NPDES programs for surface waters under the CWA. At the time the agencies completed this analysis, three states (Massachusetts, New Hampshire, and New Mexico), the District of Columbia, and every U.S. Territory except the U.S. Virgin Islands, were not authorized to run the section 402 program under the CWA. All remaining states and the U.S. Virgin Islands are authorized to implement the NPDES program and issue permits. The agencies assume that states without authorized programs would be less likely to have the capacity to regulate additional waters beyond those that are defined as a "waters of the United States."

- *Coverage of waters*: Some states have restrictions limiting regulated waters to the requirements of the CWA; other states regulate more broadly than required by the CWA. The former states are assumed to be less likely to regulate beyond the CWA (especially if they have legal provisions, as

[49] State enforcement capabilities would also possibly be important in determining state responses, however no measure of enforcement capability was available for use in this analysis. Following Circular A-4, in situations where full information is not available the appropriate treatment is to assume full compliance. The agencies do not believe including enforcement would change the decision on the proposed rule.

[50] Source: https://www.epa.gov/npdes/npdes-state-program-information.

discussed below). The latter states are assumed to be more likely to continue to regulate waters that could become non-jurisdictional under the CWA.

- *Legal limitations:* If a state prohibits or requires additional justification for a state rule that imposes requirements beyond a corresponding federal law, it is assumed that state would be less likely to create the programs necessary to continue NPDES activities on waters that would no longer be jurisdictional. Although the State Snapshots presented in the RPA (and other data sources) document several types of legal provisions, for the purposes of this analysis, the agencies are treating such legal provisions as a binary variable.

Table II-4 presents a summary of this information for the 50 states plus the District of Columbia. Although the same criteria (legal criteria and whether the state regulates more broadly than the CWA) are presented for all states, the states (plus the District of Columbia) without NPDES authorization are less experienced in regulating discharges into waters and may have legal or capacity barriers in regulating waters that are not subject to federal jurisdiction. The remaining states can be classified based on the absence of broad legal restrictions and whether they regulate waters more broadly than the CWA requires. States with one but not both classifiers are placed in a middle category, representing uncertainty in state responses. States with higher scores can be interpreted as being more likely to continue to regulate waters that would no longer be jurisdictional.

The agencies used the criteria noted above to place states in one of three likely response categories (Table II-3).

Table II-3: Surface water discharge permitting categorization criteria

Category	State regulatory indicators	Likely Response
1	State does not define waters of the state more broadly than CWA and has broad legal limitations on regulating aquatic resources; or state does not have NPDES authorization	Likely to reduce regulatory practices
2	NPDES-authorized state that either defines waters of the state more broadly than CWA or does not have broad legal limitations on regulating aquatic resources	State programs may provide partial regulatory or non-regulatory coverage of waters that would no longer be "waters of the United States" and may reduce surface water permitting practices
3	NPDES-authorized state that defines waters of the state more broadly than CWA and does not have broad legal limitations on regulating aquatic resources	State programs are likely to provide partial regulatory coverage of waters that would no longer be "waters of the United States" and may continue baseline regulatory practices

Table II-4 reports the criteria for each state in columns 2 through 4 using '0' to indicate a negative and '1' to indicate the affirmative. Column 5 reports the resulting likely-response category.

Table II-4: Surface water regulation criteria and likely-response category

State	NPDES Authorization	Regulates waters more broadly than the CWA requires	Does not have broad legal limitations	Likely response
Alabama	1	0	1	2
Alaska	1	0	1	2
Arizona	1	0	0	1
Arkansas	1	0	1	2
California	1	1	1	3
Colorado	1	0	1	2
Connecticut	1	1	1	3
Delaware	1	0	1	2
District of Columbia	0	0	1	1
Florida	1	1	1	3
Georgia	1	0	1	2
Hawaii	1	0	1	2
Idaho	1	0	0	1
Illinois	1	1	1	3
Indiana	1	1	1	3
Iowa	1	0	1	2
Kansas	1	0	1	2
Kentucky	1	0	0	1
Louisiana	1	0	1	2
Maine	1	1	1	3
Maryland	1	1	1	3
Massachusetts	0	1	1	2
Michigan	1	1	1	3
Minnesota	1	1	1	3
Mississippi	1	0	0	1
Missouri	1	0	1	2
Montana	1	0	1	2
Nebraska	1	1	1	3
Nevada	1	0	1	2
New Hampshire	0	1	1	2
New Jersey	1	1	1	3
New Mexico	0	0	1	1
New York	1	1	1	3
North Carolina[1]	1	1	0	3
North Dakota	1	0	1	2
Ohio	1	1	1	3
Oklahoma	1	0	1	2
Oregon	1	1	1	3
Pennsylvania	1	1	1	3
Rhode Island	1	1	1	3
South Carolina	1	0	1	2
South Dakota	1	0	0	1
Tennessee	1	1	1	3
Texas	1	0	1	2
Utah	1	0	1	2
Vermont	1	1	1	3

Table II-4: Surface water regulation criteria and likely-response category

State	NPDES Authorization	Regulates waters more broadly than the CWA requires	Does not have broad legal limitations	Likely response
Virginia	1	1	1	3
Washington	1	1	1	3
West Virginia	1	1	1	3
Wisconsin[1]	1	1	0	3
Wyoming	1	0	1	2

[1] The existence of a legal limitation on state authority to regulate beyond the scope of the CWA does not always prohibit a state from regulating waters beyond those protected by the CWA. See section on additional state conditions and requirements in the Resource and Programmatic Assessment. Rather the existence of these limitations presents an additional factor for states to address. This in turn may make it more difficult for states with such a limitation to readjust their protection of state waters following the proposed rule. For purposes of this analysis, any state with such a limitation that has not already expanded its regulation of state waters beyond the scope of the CWA is assumed to not do so under any change to the definition of "waters of the United States," and is accordingly placed in response category 1. Any states that have already expanded their regulatory scope, specifically North Carolina and Wisconsin, will be assumed to continue such practices. Thus, for purposes of this analysis, North Carolina and Wisconsin were placed in category 3 to reflect both their broader scope and the existence of legal limitations that may affect any future attempts to increase regulation of state waters.

I.A.1.14 Caveats to State Categorization

The potential responses described above are intended to provide insight to whether and how states may regulate waters that would no longer be jurisdictional based on the proposed definition of "waters of the United States" and the agencies solicit comment on their assumptions. There are, however, several caveats to that characterization that deserve mention.

- *Stringency limitations:* Some states that currently have legal limitations may remove or modify those limitations following a revised definition of "waters of the United States" so that the difference in regulation created by a new definition could be filled either partially or completely by state-level regulation.

- *Trans-boundary benefits:* While it is possible that states operating with better information on the potential benefits and costs would regulate more efficiently for their own constituents, they are also less likely to consider benefits that accrue outside of their borders. This could include cases where waters flow out of the state. Another situation where this is relevant is where non-use benefits accrue to residents of other states.

- *Limited state resources and political influences:* Some states could develop new programs or expand existing ones to address waters that would no longer be jurisdictional based on the proposed definition of "waters of the United States." Not all states will have the resources to staff and manage the new or expanded programs and may not be able to conduct quality benefit-cost analyses as a result. As the literature review (Fredriksson 2018) pointed out, decentralized programs are also more likely to be swayed by political influences which could distort the regulatory process in ways that are detrimental to social welfare.

The cumulative direction of these caveats with regards to potentially addressing non-jurisdictional waters and the resulting social welfare impacts is ambiguous. So, rather than bounding the potential effect on one side they combine to increase the uncertainty surrounding potential state responses. As such, the base case of the categorization of states will be based on the current regulatory regime at the state level and sensitivity analyses will be used to explore the range of possible state responses on potential benefits and costs of the proposed change in CWA jurisdiction. Recognizing that the Fredriksson report provides an important basis for the categorizations, the agencies will conduct an external peer review of this report prior to issuing a final regulation.

II.B Response of Regulated Entities

The generic tree diagram Figure II-1 illustrates potential effects of the proposed rule on regulated entities (*i.e.*, facilities, permit or plan holders) and potentially affected water resources. The potential responses of regulated entities are likely to vary across CWA programs and depend on the type of permit or regulatory requirement, the industry sector or activity, attributes of the potentially affected waters — notably whether the waters would fall outside of CWA jurisdiction — the range of likely state responses, as well as industry standards, recommended practices, and a regulated entity's decision on pollution prevention measures it voluntarily implements.

An entity may decide to continue its current compliance practices, perhaps because compliance mainly entails fixed costs that were already incurred or because reducing current abatement activities is costlier than simply continuing current abatement activities. Fear of future liability and goodwill with local citizens may also be factors. Regardless of the motivation, if an entity voluntarily continues baseline compliance practices, then there would be no change in cost or environmental outcomes, and the net effect would be zero.

In contrast, an entity could decide to reduce its costs by reducing or potentially eliminating any baseline compliance practices. Doing so would result in cost-savings to the regulated entity and foregone environmental benefits to society more broadly. Whether the net effect is positive or negative would depend on whether the resulting cost-savings are greater than the absolute value of the forgone environmental benefits.

Section IV of this document presents program-specific tree diagrams for the three major CWA programs analyzed: sections 402, 404, and 311 programs. The diagrams illustrate the range of potential outcomes depending on regulated entities' responses to each of these programs. There may be gradations within each general category of entity response. The number of determining factors and outcomes highlight the uncertainties inherent in trying to quantify these impacts. Ideally, the analysis would quantify the frequency, costs, and benefits of the outcomes corresponding to each branch in the diagram, but that is not possible at every level of the tree diagram for all three programs due to data limitations.

II.C Data and Analytic Uncertainties

In addition to uncertainty in the response of states and regulated entities to changes in CWA jurisdiction, limitations of the available data affected the agencies' ability to conduct national level analyses regarding the potential effect of the proposed rule and contributed to uncertainty in results presented in the following sections. The agencies attempted to use the U.S. Geological Survey's NHD at high resolution and the U.S. Fish and Wildlife Service's (U.S. FWS) NWI to estimate the potential effect of the proposed rule on certain water types across the country. The datasets represent the best national datasets of the potential location and extent of streams, rivers, lakes, ponds, and wetlands of which the agencies are aware. The agencies considered using the NHD to represent streams and the NWI to represent wetlands in this economic analysis to estimate national costs and benefits. However, because neither is a regulatory dataset, even where streams and wetlands are identified in the datasets the question of CWA jurisdiction under both baselines and the proposed rule cannot be answered. For example, the proposed rule differentiates between intermittent and ephemeral flow for purposes of federal regulatory jurisdiction under the CWA, but the NHD generally does not differentiate between streams with intermittent or ephemeral flow in much of the country. Likewise, the NWI does not contain information that would allow the agencies to identify wetlands that meet or do not meet the baseline or proposed regulatory definitions of adjacent, such as whether there is a berm between the wetland and the nearest river, and if so, what kind of surface hydrologic connections, if any, are present.

- *High-resolution NHD*: The high-resolution NHD represents the water drainage network of the United States as mapped at a scale of 1:24,000 or better (1:63,360 or better in Alaska). The data are maintained in partnership with states and other stewards. While the high-resolution NHD is the most comprehensive and most detailed nationally-consistent representation of the hydrographic network, it does not include a comprehensive or regionally representative categorization of all waterbodies that may be covered under the CWA. For example, in many regions of the United States, some NHD Stream/River flowlines are unclassified for hydrographic category, meaning that the NHD does not further classify them as perennial, intermittent, or ephemeral. In some states, streams in selected quadrangles are uniformly assigned to the perennial category even though other nearby quadrangles show differences among streams. Outside of the southwestern United States and other limited areas where data stewards have provided updated data, the dataset generally does not differentiate between intermittent and ephemeral streams – ephemeral streams in those areas are generally mapped as intermittent or may not be mapped at all.[51] For these reasons, the agencies are not able to accurately identify waters that may change jurisdictional status under the proposed rule using the NHD. Given the nature of the data and these analyses, these limitations would likely result in inaccurate estimation of the potential effects of the proposed in the scope of CWA jurisdiction. The agencies used NHD data from March 2017 for all states except California, which were September 2017 data.[52] See the Resource and Programmatic Assessment for additional information about the limitations of the dataset.

- *National Wetlands Inventory (NWI)*: The agencies attempted to rely on a combination of the NWI and high-resolution NHD to identify wetlands that may change jurisdictional status under the proposed rule. Like the NHD, while the NWI is the best national dataset of the potential extent of wetlands across the country of which the agencies are aware, it has limitations. The NWI does not

[51] Table A-1 in Appendix A provides a summary of the available high resolution NHD data broken down by stream type per state. The incomplete mapping of ephemeral streams is clearly evident in the table through the numerous states with missing or zero ephemeral stream miles mapped. As previously noted it is not possible to determine if ephemeral streams in these states are mapped as intermittent streams or simply not mapped.

[52] U.S. Geological Survey. 2007-2018. National Hydrography Dataset available at https://nhd.usgs.gov, accessed March 2017 and September 2017.

map all wetlands and sometimes maps wetlands that do not exist on the ground. At its best, NWI only approximates the location and boundaries of a Cowardin wetland type (Cowardin *et al*., 1979). The NWI was not intended or designed for regulatory purposes. NWI uses the Cowardin wetland classification system, which is broader in scope than wetlands that meet the agencies' regulatory definition of wetland. For CWA purposes, a water must have three specific factors to be classified as a wetland: hydric soils, hydrophytic vegetation, and hydrology. Specifically, the longstanding regulations define wetlands as "those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas."[53] That definition would not change under the proposed rule. Also, the wetland boundaries as mapped in NWI do not equate to wetland delineation boundaries per the 1987 Corps wetland delineation manual[54] and its regional supplements. To properly apply the delineation manual for CWA purposes, one must conduct on-the-ground inspection. Wetlands that meet the regulatory definition of wetland would also need to meet additional proposed regulatory requirements (such as the conditions for applying the term "adjacency" as proposed) before they would be considered "waters of the United States."

As described in the RPA (p. 14), and the RPA's Appendix A, the NWI contains a Water Regime Modifier in the classification of wetlands and deepwater habitats, which provides a description in general terms of hydrologic characteristics. For example, "Temporarily Flooded" is defined as when surface water is present for brief periods (from a few days to a few weeks) during the growing season, but the water table usually lies well below the ground surface for most of the season. "Intermittently Flooded" in NWI indicates that surface water is present for variable periods without detectable seasonal periodicity, and that weeks, months, or even years may intervene between periods of inundation. "Seasonally Flooded" means that surface water is present for extended periods (generally for more than a month) during the growing season, but is absent by the end of the growing season in most years; when surface water is absent, the depth to substrate saturation may vary considerably among sites and among years. The agencies have interpreted Water Regime Modifiers "Temporarily Flooded" and "Intermittently Flooded" in the NWI as describing ephemeral streams, and "Seasonally Flooded" as describing intermittent streams. Note that not all features are assigned a Water Regime Modifier.

To approximate the NWI wetlands that might be more likely to meet the CWA regulatory definition of wetland for this analysis, the agencies contemplated identifying vegetated NWI wetlands as a potential surrogate. These wetland types are more likely to meet the regulatory definition of "wetlands" than non-vegetated NWI wetlands. To estimate the NWI wetlands that are likely to be abutting rivers, streams, lakes, and ponds mapped in NHD, the agencies contemplated performing an intersection analysis of the two datasets. Because the NWI is one of the largest polygonal datasets in the nation and national analyses of the data are challenging and

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[53] 33 CFR 328.3(b) and 40 CFR 232.2.

[54] U.S. Army Corps of Engineers. 1987. Corps of Engineers Wetlands Delineation Manual. Wetlands Research Program Technical Report Y-87-1. Department of the Army, Vicksburg, VA. *Available at* https://el.erdc.dren.mil/elpubs/pdf/wlman87.pdf.

time-consuming, the agencies determined that to attempt an analysis they would need to rasterize (*i.e.,* convert into pixels) the NWI data so that they could aggregate NWI wetlands that are touching each other into one feature. The agencies considered converting NWI polygon features to raster cells (*i.e.,* grids of pixels) at a 30-meter resolution and then attributing features of the polygon with the maximum combined area of overlap with the raster cell to the entire cell. The agencies then considered attempting to associate wetlands with the nearest stream category (ephemeral, intermittent, or perennial) derived from the NHD flowlines. NHD flowlines would have been converted into 30-meter raster cells. All "ArtificialPath" features in NHD would have been attributed as "Other" for this analysis. However, after deliberation, the agencies agreed that all these steps introduced sufficient confounders such that any analytical use of the data would be inconclusive for purposes of indicating potential changes in federal jurisdiction.

Additionally, because the NHD does not distinguish between intermittent and ephemeral streams nationwide, the analysis would have treated wetlands that are physically connected to both intermittent and ephemeral streams as non-jurisdictional under the proposed rule even though the proposed definition would include as jurisdictional those wetlands that abut intermittent waters meeting the proposed "tributary" definition. This assumption would directly result in an overstatement of the quantity of wetlands becoming non-jurisdictional. As is the case for streams, CWA approved jurisdictional determinations are done on an individual basis and cannot be approximated by combining NWI data with high-resolution NHD.

- *Jurisdictional status of certain waters under pre-2015 practice*: In addition to the limitations of the NHD and NWI datasets, the agencies face the confounding factor of not knowing the current jurisdictional status of certain waters as a category, including:

  - Non-navigable tributaries that are not relatively permanent;
  - Wetlands adjacent to non-navigable tributaries that are not relatively permanent; and
  - Wetlands adjacent to but that do not directly abut a relatively permanent non-navigable tributary.

  According to the *Rapanos* Guidance, such waters are not categorically jurisdictional. Rather, the agencies must conduct a case-specific significant nexus analysis to determine their jurisdictional status. It is not possible for the agencies to perform a comprehensive national-scale significant nexus analysis for purposes of this EA. As a result, the agencies did not find a reasonable way to identify the universe of federally regulated waters under the pre-2015 practice in order to establish a comparative baseline of jurisdictional waters. This EA does not analyze the benefits and costs of the new treatment of ditches.

- *Other state, tribal, and federal programs*: The analysis does not account for other programs that may address affected resources associated with non-jurisdictional waters. For example, more than one-third of the United States' threatened and endangered species live only in wetlands, and nearly half use wetlands at some point in their lifecycle (U.S. EPA, 2017). Wetlands and other aquatic resources designated as critical habitats will remain subject to the Endangered Species Act (ESA) Section 9(a)(1)(B) which makes it unlawful for any person to "take" any fish or wildlife species listed under the ESA. Therefore, activities in wetlands and other aquatic resources may require engagement with the U.S. Fish and Wildlife Service or the National Marine Fisheries Service, which could lead to project modification or mitigation requirements.

- *Universe of regulated facilities and activities*: Data on the universe of regulated facilities and activities varies in the level of detail and coverage. For example, data on facilities or activities subject to general permits or facilities with minor status under the section 402 program are limited to the permit information included in the EPA's Integrated Compliance Information System National Pollutant Discharge Elimination System (ICIS-NPDES) database (see Section IV.A.1 for detail). Some industrial facilities or activities subject to section 402 requirements may be underrepresented in the database if states did not provide relevant permit information. Permit data maintained in the ORM2 database by the Corps under the section 404 program (see Section IV.A.2) provide high-level characteristics of the projects such as the type of project and permitted impacts in acres or linear feet. However, the affected waters are not always described in sufficient detail to determine how the proposed changes in the "waters of the United States" definition would have (counterfactually) changed the requirements in previously issued 404 permits. As discussed in Section IV.A.3, there is no universal reporting requirement for the CWA section 311 Spill Prevention, Control, and Countermeasure (SPCC) program, and the agencies therefore rely on estimates related to prior SPCC rulemakings and imputed data for a subset of facilities that have been inspected to characterize SPCC-regulated facilities. The agencies also have detailed information on facilities required to submit a Facility Response Plan (FRP) to the EPA.

- *Facility and activity coordinates*: The analyses are limited by the availability and accuracy of geographical coordinates to relate program impacts to streams and wetlands. First, some facilities or activities have missing or invalid coordinates. For permitted 402 dischargers, available coordinates can be those of the facility and not necessarily the outfall. This contributes to potential errors when determining the receiving waterbody. Some impacts, such as oil spills, can potentially affect different waterbodies depending on the location within the facility where the spill originates and the size of the spill.

- *Locations of future permitted facilities or activities*: Data on existing facilities and activities may not accurately represent the distribution of future facilities or activities. For example, construction and development activity accounts for an estimated sixteen percent of permitted discharges under the 402 program and the majority of activities covered under the section 404 program. The location of future construction and development activities can only be estimated to scale too coarsely to be useful in analyzing the potential effects of this proposed rule (even if the agencies had accurate maps of affected wetlands).

- *Methods to value changes in environmental outcomes*: The agencies typically rely on benefit transfer from existing studies to value changes in ecosystem services provided by aquatic resources due to implementation of CWA programs. Applicability of the existing wetland valuation studies to specific geographic location, type of wetlands and ecosystem services, and the research methods used in the original studies, constrained the agencies' ability to value potential wetland losses to selected geographic locations only (see Sections III.C.2 and IV.B for detail).

These data issues limit the agencies' ability to conduct a national-level analysis to evaluate 1) waters potentially changing jurisdictional status; 2) relationship between these waters and facilities and activities covered under the CWA; and 3) potential impacts of changes in the level of regulation of jurisdictional and non-jurisdictional waters. With hundreds of thousands of facilities or permitted activities covered under CWA programs, it is not possible to review and analyze characteristics of individual facilities or activities contained in permits to assess how their particular requirements may change under a revised "waters of the United States" definition. For these reasons, the agencies relied on updating the 2015 Rule economic analysis for Stage 1 and on qualitative descriptions, case studies, and a national analysis of the CWA 404 program in Stage 2. The agencies solicit comment on this approach to evaluating the costs and benefits of the proposed rule and if there are alternative approaches that would be appropriate for use in this type of economic analysis.

III. Stage 1 Analyses: CWA Jurisdictional Change from the 2015 Rule to the Pre-2015 Practice

As previously described, rather than addressing a market failure, this proposal addresses an alternative federalism arrangement concerning jurisdiction of the CWA and this EA assesses the potential benefits and costs of this action. The agencies examined a similar issue in the 2015 Rule, which increased the CWA jurisdiction, and again in 2017 when the agencies proposed to repeal that same 2015 Rule and recodify the prior regulations. Those analyses provide a potential starting point for evaluating this current proposal. This EA adopts and modifies the 2015 methodology in the Stage 1 analysis (which assesses the benefits and costs of a baseline of the 2015 Rule to the pre-2015 practice).

The 2015 Rule economic analysis[55] relied on the assumption that the change in CWA jurisdiction due to the rule affected all CWA programs proportionally for purposes of estimating costs and benefits. The agencies estimated a percentage change in CWA jurisdiction, and then for many programs simply multiplied that percentage change by previously estimated CWA program costs and benefits, adjusting for the change in the program size. While this assumption allowed for the estimation of national benefits and costs of the 2015 Rule, the resulting estimates may have been significantly over-stated. This EA adopts this assumption of proportionality to allow for a comparison with the 2015 Rule and its 2017 proposed repeal, but it also updates estimates to 2017$ and corrects a few errors in the 2015 analysis.

The Stage 2 change in CWA jurisdictional waters, moving from the pre-2015 practice regulatory regime to the proposed rule, does not adopt this proportionality assumption. That is, the impact of the second stage on different aquatic resource types is not expected to equally impact all CWA programs. Instead, the Stage 2 analysis relies on qualitative descriptions and conceptually more complete and rigorous case studies.

The following sections first summarize the methodologies used in the 2015 Rule and the 2017 proposed repeal, then explain the major concerns the agencies now have with the original methodologies, and then finally describe the updated analysis and results.

III.A Summary of the Analyses Used in the 2015 Rule and its 2017 Proposed Repeal

In the economic analysis for the 2015 Rule, the agencies projected an increase in the jurisdiction of the CWA by identifying several previously determined non-jurisdictional waters and wetlands and categories of waterbodies that could potentially be considered jurisdictional under the 2015 Rule, dependent on case-specific analysis (*see* Section 4 of the economic analysis for the 2015 Rule for details). This estimate was for purposes of calculating additional costs to regulated entities and benefits associated with the rule, rather than an analysis of how the scope of CWA jurisdiction changed. It was estimated that the 2015 Rule would result in an increase of waters, including wetlands, that are within the scope of CWA jurisdiction of between 2.84 percent and 4.65 percent in total. The estimated increase in jurisdiction over

[55] U.S. Environmental Protection Agency and U.S. Department of the Army. 2015. *Economic Analysis of the EPA-Army Clean Water Rule*. Docket ID EPA-HQ-2011-0880-20866. Available at https://www.regulations.gov/document?D=EPA-HQ-OW-2011-0880-20866.

certain categories of waters and certain states, however, was estimated to be larger than this overall average increase.

The estimated increase in jurisdiction was anticipated to provide benefits and costs to the nation by increasing the reach of a number of CWA programs covered under sections 303, 311, 401, 402, and 404. The 2.84 percent to 4.65 percent increases in overall CWA jurisdiction were used to then estimate the total costs and benefits of that rule. Specifically, the total costs and benefits from the most recent regulatory impact analysis for each of the affected CWA programs were first adjusted to 2014 dollars, then the program sizes were adjusted to reflect sector growth or realized information on the size of the sector, and finally, those estimates were simply multiplied by the estimated 2.84 percent and 4.65 percent increase in CWA jurisdiction to calculate an estimated range of costs and benefits for each CWA program under the 2015 Rule. The costs and benefits across programs were then summed to estimate the nationwide costs and benefits of the 2015 Rule. The 2017 proposed repeal of the 2015 Rule simply assumed that the previously estimated costs were now avoided costs and the previously estimated benefits were now forgone benefits (and expressed in 2017 dollars).

The one exception to the application of the 2015 Rule methodology laid out above to the 2017 proposed repeal was the wetlands benefits category. Wetlands benefits were estimated to accrue as part of the expected increase in mitigation under the CWA section 404 dredged and fill permitting program. Section 404 requires applicants to avoid and minimize impacts to jurisdictional waters. In cases where impacts are unavoidable, it requires that the impacts be mitigated, for example, either through the restoration of aquatic resources or through the enhancement of other existing aquatic resources. Individual permits were assumed to be required to mitigate two acres for every one acre disturbed, although the resulting ecosystem services and values held by society were assumed to be provided on a one to one basis. In other words, this 2-for-1 acres requirement assumed for permits was meant to account for the fact that mitigated wetlands may not be as productive at providing valued ecosystem services as the wetland being developed, on a per acre basis. Half of the expected general permits were assumed to require 2-for-1acre mitigation, while the other half were assumed to require no mitigation. The overall general permit per acre mitigation ratio was therefore 1-for-1.

However, wetland benefits were determined to be too uncertain to monetize in the 2017 proposal. Instead, wetlands benefits were described qualitatively. (See Section 3.1 of the Economic Analysis for the 2017 Proposal.) The rationale for omission of calculating these forgone benefits is stated in the Economic Analysis for the 2017 proposal:

> “In the case of the forgone benefits of wetland protection the agencies believe the cumulative uncertainty in this context is too large to include quantitative estimates in the main analysis for this proposed rule. However, the agencies are confident that the forgone benefits of wetlands protection are greater than zero” (EPA 2017, p. 9)

III.B Potential Biases in the 2015 Rule and its 2017 Proposed Repeal

Since publication of the final 2015 Rule, the agencies have received information through filings in litigation against the 2015 Rule and comments received in response to the 2017 proposed rulemaking suggesting that the estimate of the average estimate of a 2.84 to 4.65 percent increase in jurisdictional determination may not accurately reflect the potential costs and benefits associated with the first stage of this economic analysis (*see* Section II.C.3 of the Supplemental notice of proposed rulemaking, 83 FR 32227, July 12, 2018).

Some commenters suggested that the increase in jurisdictional waters could be substantially larger than the average for certain categories of waters or in certain states. For instance, the agencies estimated that 34.5 percent of "isolated waters" (identified as "other waters" in the Corps' FY13 and FY14 ORM2 database representing six percent of the aquatic resources) could have become jurisdictional under the 2015 Rule, after having been determined not jurisdictional under pre-2015 practice. In addition, certain states, particularly those in the arid West, could see significant, much larger than average expansions of federal jurisdiction over streams. In the FY13–FY14 ORM2 records for Arizona, 709 of 1,070 total streams (66.3 percent) were determined to be non-jurisdictional. For Arkansas, 116 of 213 total streams (54.5 percent) were determined to be non-jurisdictional. In South Dakota, North Dakota, Nevada, New Mexico, and Wyoming, 8.5 percent, 9.2 percent, 13.2 percent, 16.7 percent, and 57.1 percent of streams in the FY13–FY14 ORM2 database, respectively, were identified as non-jurisdictional. [56] To the extent that these percentages reflect the increase in jurisdictional coverage from the 2015 Rule, the costs and benefit based on the average increase in federal jurisdiction is potentially underestimated.

In contrast, there may be reasons to believe that the estimated costs and benefits of the 2015 rule were overstated. The assumptions in the 2015 Rule were designed to maximize the estimated costs and benefits of that rule's definition of the "waters of the United States" so as to not understate the potential impact of that rule. As stated in the 2015 Rule economic analysis

> "Note that waters that are currently found to be jurisdictional may also be subject to the expanded set of exclusions included in the final rule. For these and similar reasons, the agencies believe that positive jurisdictional determinations under the final rule will be less than assumed for the purposes of this economic analysis." (U.S. EPA and Department of the Army 2015, p. 8)

Fewer positive jurisdictional determinations than the analysis's 2.84 percent overall increase assumption would imply that both the estimated costs and benefits of the 2015 Rule were over-stated.[57]

Since the 2017 proposed repeal used the same assumptions as were in the 2015 Rule (with minor updating), the avoided costs and forgone benefits of that action would also be over-stated for the same reason if there are fewer positive jurisdictional determinations. In addition, a potentially more important reason, discussed earlier in this economic analysis, may be that state, and tribal governments may choose to regulate waters at a level consistent with or above that associated with the 2015 Rule. This was explicitly recognized in the 2015 Rule economic analysis.

[56] See "Supporting Documentation (Analysis of Jurisdictional Determinations for Economic Analysis and Rule)" in the Docket for the 2015 Rule (Docket ID: EPA-HQ-OW-2011-0880). Available at https://www.regulations.gov/document?D=EPA-HQ-OW-2011-0880-20877.

[57] The Stage 1 economic analysis for this proposal focuses on the 2.84 percent estimate of potential overall increase in jurisdiction, although the same changes in approach would apply to the 4.65 percent potential overall increase estimate from the 2015 Rule economic analysis.

> "This economic analysis does not account for the possibility that some states, as a matter of state law, may be considering a broader set of waters to be subject to a state's implementation of certain CWA programs. Although the extent of a state's CWA jurisdiction may not be smaller than the definition of waters of the U.S., states and tribes may elect to implement their water quality protection programs more broadly, according to a definition of 'waters of the state' or 'waters of the tribe.' Where individual states have elected to regulate waters more broadly, the estimated costs and benefits of this rule would be smaller than presented here (because states may already be asserting jurisdiction over waters for which this analysis presumed jurisdiction was not generally asserted in practice)." (U.S. EPA and Department of the Army, 2015, p. 4)

If states previously regulated waters more broadly than the federal government required, then the cost and benefits of the 2015 Rule and avoided costs and forgone benefits of the 2017 proposal would be potentially overestimated.

Another reason why the cost and benefits of both the 2015 Rule and 2017 proposed repeal may have been overestimated is that both analyses assumed that the rule would affect entities regulated under the CWA in direct proportion to the percent change in positive jurisdictional determinations. For example, a 2.84 percent increase in positive jurisdictional determinations implied a 2.84 percent increase in CWA section 402 CAFO permits and implementation. In effect, these analyses assumed that CAFO, stormwater construction and other activities currently regulated under the CWA are distributed exactly the same way across both large, navigable waterways as well as along adjacent wetlands, open waters, non-navigable tributaries (including streams and ditches), and other aquatic resources in the 2015 Rule's case-specific categories. Given that the waterbodies subject to these actions are not perennial waters and therefore not as well suited to many industrial or agricultural discharge uses, this proportional assumption may not be appropriate. This, too, was explicitly recognized in the 2015 analysis.

> "It is also unlikely that new CAFOs and stormwater-relevant construction would be built on newly jurisdictional waters without decreases in construction or CAFO activities elsewhere." (U.S. EPA and Department of the Army, 2015, p. xi)

In a similar fashion, the estimated benefits and costs from the 2015 Rule and the 2017 Proposal assumed that the percentage increase in costs and benefits of increased positive jurisdictional determinations were equal to the percentage increase in regulated activities. For example, the estimated 2.84 percent increase in CAFO permit and implementation activity was assumed to result in a 2.84 percent of the costs and benefits of the 2003 CAFO rule. It is not clear, a priori, whether this assumption would imply an overestimate or underestimate of the costs and benefits in the 2015 Rule and the 2017 Proposal. If the marginal benefits of regulating water decline as smaller waterbodies are regulated (which would be a common assumption of a diminishing marginal benefits) then the benefits of the 2015 Rule and 2017 Proposal may be overstated. If the costs of regulating increases as smaller water bodies are regulated (an assumption of increasing marginal costs) then the costs of these two actions would have been underestimated.

III.C Updated Analysis of the Repeal of the 2015 Rule

For the reasons stated above, a revision to earlier analyses for the first stage of this proposed action is appropriate. However, not all the factors described can be addressed. This analysis uses some of the same basic approach as was used for both the 2015 analysis and the 2017 proposal, including the estimated 2.84 percent increase in jurisdiction under the 2015 Rule (but not the 4.65 percent), but it does make several important improvements.

III.C.1 Incorporation of State Responses

The 2015 analysis and the 2017 proposed repeal analysis did not account for potential state behavior regulatory actions in response to a change in CWA jurisdiction. Both analyses implicitly assumed that states always adjust regulatory regimes to match the federal jurisdictional level anytime there is a change in federal jurisdiction. It is important to note that states' water quality and dredged and fill programs can work independently, and both must therefore be considered. States may be more or less protective in their programs depending on a variety of factors, including their constituents' preferences and the types of resources located within their boundaries.

As described in Sections II.A, there are number of possible ways that states could respond to changes in CWA jurisdiction. States may adjust their regulatory programs to match any changes in federal CWA jurisdiction. If CWA jurisdiction is reduced and states followed suit, states and regulated entities would avoid costs and the public would forgo water quality and wetland benefits. At the other extreme, state-level baseline regulations may be broader than the federal requirements. In this case, if CWA jurisdiction is reduced at the federal level, states may simply maintain their broader, baseline regulations. It is also possible that if CWA jurisdiction is reduced at the federal level, a state may choose to revise its current state laws and programs to continue the baseline actions required by the federal government. In both last two cases, state requirements would fully fill any regulatory gap in the wake of a change in the definition of "water of the United States." This state "gap-filling" would result in no change in compliance costs to the regulated community and no change in environmental benefits (that is, neither avoided costs nor forgone benefits would occur), suggesting a zero-net impact in the long-run. The agencies emphasize, however, that if states do make regulatory changes to maintain the previous federal baseline level of CWA jurisdiction then the states will likely incur some transition costs in the short-run, and some of the cost of running programs will be transferred from the federal government to the states. The cost to states could be more or less than the federal government.

Another potential outcome is a federalism scenario. In this scenario, when requirements imposed by the federal government are altered, state and local governments may be able to find more efficient ways of managing local resources. This is in line with the theory of "fiscal federalism."[58] States are more likely to be knowledgeable about which waters their local constituents' value and may more efficiently manage them. States can choose to allocate more resources to manage high-valued waters and wetlands and reduce regulation on less valued waters and wetlands. Depending on whether a newly characterized non-jurisdictional water is highly or lowly valued, states may choose to regulate or not regulate it and the compliance costs could increase or decrease, respectively. And in turn, the corresponding environmental benefits could increase or decrease. In *either* case, however, net benefits will increase, assuming a state

[58] For example, see Oates, W. E. (1999). *An essay on fiscal federalism*. Journal of economic literature, 37(3), 1120-1149, or Oates, W. E. (1998). *On the welfare gains from fiscal decentralization*. University of Maryland, Department of Economics.

can more efficiently allocate resources towards environmental protection due to local knowledge of amenities and constituent preferences (*see* Section II.A for details).

In short, potential state responses to a change in the definition of a "water of the United States" fall along a continuum and depend on legal and other constraints. Furthermore, these responses may differ for surface water programs and dredged/fill permit programs. States that have laws defining "waters of the state" to be no broader than "waters of the United States" cannot currently regulate past the Federal definition. Cost savings and forgone benefits from these states should be included in the costs and benefits of the Stage 1 action. In contrast, states that have regulations of surface waters, including wetlands, that are as broad or broader than the 2015 Rule may not be affected by the Stage 1 action. Therefore, no cost savings or forgone benefits should be assumed for these. States that fall in between these extremes can be evaluated by either including or excluding them from the estimating of cost savings and forgone benefits.

Section II.A discussed how the agencies categorized state regulations of dredged and fill permitting programs and surface waters discharge permitting programs. These categorizations can be used to evaluate possible state responses to a change in the definition of the "waters of the United States." State regulation of dredged and fill programs is assumed to affect the costs and benefits of CWA section 404 permitting and section 404 wetland and stream mitigation. State regulation of surface water discharge programs is assumed to affect the costs and benefits of CWA section 402 CAFO, stormwater, and pesticide regulation; section 311 compliance; and section 401 administration.

State responses to dredged and fill regulation were classified into one of four categories:

- *Category 1* – States likely to reduce dredged/fill permitting practices or do not have dredged/fill permitting programs. The costs and benefits from CWA section 404 permitting and wetland mitigation is included in this analysis.

- *Category 2* – States likely to provide partial regulatory coverage of waters that would no longer be "waters of the United States" and may reduce their regulatory practices. The costs and benefits from CWA section 404 permitting and wetland mitigation are assessed using a sensitivity analysis by either including or excluding them from the analysis.

- *Category 3* – States likely to provide partial regulatory coverage of waters that would no longer be "waters of the United States" and may continue baseline regulatory and non-regulatory practices. The costs and benefits from CWA section 404 permitting and wetland mitigation for these states are assessed using a sensitivity analysis by either including or excluding them from the analysis

- *Category 4* – States likely to continue baseline dredged/fill permitting practices. The costs and benefits from CWA section 404 permitting and wetland mitigation for these states are excluded from this analysis.

State responses to surface water regulation were classified into one of three categories for NPDES-authorized states:

- *Category 1*– States that do not regulate waters more broadly than the CWA and have broad legal restrictions are likely to reduce baseline practices as a consequence of this action. The costs and benefits from CWA sections 402, 311, and 401 are included in this analysis.

- *Category 2* – States that regulate waters more broadly than the CWA or do not have broad legal restrictions may continue their baseline practices. The costs and benefits from CWA sections 402, 311, and 401 for these states are assessed using a sensitivity analysis by either including or excluding them from the analysis.

- *Category 3* – States that regulate waters more broadly than the CWA and do not have broad legal restrictions are likely to continue baseline practices. The costs and benefits from CWA sections 402, 311, and 401 are excluded from this analysis.

The agencies assumed that states without NPDES authorization would generally have limited capacity to regulate discharges to waters that would no longer be jurisdictional, regardless of the category they would otherwise be placed in, so they are always placed in Category 1.

For both dredged and fill and surface water programs, states classified as Category 1 are the most *likely to reduce* their baseline practices to match a federal change in CWA jurisdiction. Impacts in these states are always *included* in the estimate of cost savings and forgone benefits. States classified as Category 4 for dredged and fill regulation and as Category 3 for surface water regulation are most *likely to continue* baseline practices even after a change in federal CWA jurisdiction. Impacts from these states are always *excluded* from cost savings and forgone benefits estimates. States classified as Category 2 and 3 for dredged and fill regulation and as Category 2 for surface water regulation fall in between these extremes; they *may reduce*, or they *may continue* their baseline practices. These states are included or excluded from the cost savings and forgone benefits estimates in a sensitivity analysis.

The various combinations of possible state responses are detailed in Table III-1 below. The sensitivity analysis will evaluate three scenarios. Scenario 1 is the most broad and includes the cost savings and forgone benefits for all states except those that are *likely to continue* their baseline practices regardless of federal action. Scenario 2 narrows the number of states used in the estimate by *excluding* states that are *likely to continue* and those that *may continue* baseline practices. Scenario 3 is the most narrow in that only *includes* states that are *likely to reduce* baseline practices to match the federal level.

Appendix B includes two additional scenarios. Scenario 0 includes all states in the estimate of cost savings and forgone benefits, regardless of the categorization of the states regulations. This scenario is included as a comparison to the 2015 Rule and the 2017 Proposal analysis. Both of those analyses included all states in the calculations. Scenario 1a excludes states that are *likely to continue* and those that *may continue* baseline dredged and fill practices but only excludes states that are *likely to continue* baseline surface water practices. This is a potentially plausible scenario, but it produces results similar to Scenario 1 so it is included in Appendix B. Table III-1 describes which categories are included or excluded from each scenario. The number in parentheses represents the number of states in each category.[59]

Table III-1: Treatment of the effect of state response on cost and benefits in the sensitivity analysis

Category (number of states)	Sensitivity Analysis			Appendix	
	Scenario 1	Scenario 2	Scenario 3	Scenario 0	Scenario 1a
Change in baseline dredged and fill practices (affects Section 404 programs)					
1 - Likely reduce (5)	Included	Included	Included	Included	Included
2 - May reduce (15)	Included	Included	Excluded	Included	Included
3 - May continue (8)	Included	Excluded	Excluded	Included	Excluded
4 - Likely continue (21)	Excluded	Excluded	Excluded	Included	Excluded
Change in baseline surface water practices (affects Sections 402, 311, and 401 programs)					
1 - Likely reduce (6)	Included	Included	Included	Included	Included
2 - May continue (20)	Included	Excluded	Excluded	Included	Included
3 - Likely continue (23)	Excluded	Excluded	Excluded	Included	Excluded

III.C.2 Wetland Mitigation Valuations Methods

A re-evaluation of the economic analysis of the 2015 Rule and its proposed repeal led to the identification of several methodological issues that need to be addressed in future analyses. The method used to value wetland mitigation acres, discussed below, and the fact that the current state regulatory regimes were not considered, discussed above, are particularly of concern as the agencies consider the 2015 EA. These issues are relevant to both the first and second stage economic analysis of this proposal and are discussed in detail below.

III.C.2.1 The 2015 Rule Wetland Valuation Methodology

The agencies identified several issues with the wetlands valuation methodology used to assess the 2015 Rule. First, the implicit baseline did not account for potential wetland development. A developer can mitigate wetland impacts through creating new wetlands, restoring existing wetlands, or preserving other existing wetlands. In the latter case, if the preserved wetlands were not under some risk of future development to begin with, then there is no actual change in wetlands from such mitigation. Ideally, the assumed baseline would include a spatially explicit projection of what wetlands would be developed and when, and this would then be compared to a policy scenario with spatially explicit projections of which wetlands are preserved as part of the 404 permit mitigation requirements. Such a task would be difficult to undertake and fraught with uncertainties.

Many other aspects of the wetland valuation methodology implemented to assess the 2015 Rule are also of concern. To value the expected change in wetland acres, the Economic Analysis for the 2015 Rule applied willingness to pay (WTP) values for preserving or expanding wetland acreage from the academic literature to the estimated changes in wetland acres resulting from the rule. The application of WTP values from the literature to a new policy setting is known as benefit transfer. The EPA's Guidelines for

[59] Hawaii and the District of Columbia were included in the state categorization exercise but were not included in the estimate of avoided costs and forgone benefits due to a lack of data. These states were also from the analyses for the 2015 Rule and 2017 Proposal.

Preparing Economic Analyses (2010) lays out requirements for performing a valid benefit transfer. The studies being transferred must first have valid and relevant results. Assuming the results are valid, studies being transferred should have a similar (1) definition of the environmental commodity being valued (including considerations like scale and the presence of substitutes); (2) baseline and extent of environmental changes; and (3) characteristics of affected populations. Many components of the 2015 analysis do not satisfy these requirements. No national level studies concerning WTP for the expansion or preservation of wetland acreage are currently available for the U.S., and the U.S. freshwater (non-coastal) wetlands valuation literature is relatively thin. While there are several wetlands valuation studies in the literature, many are context dependent and not suitable or appropriate for transfer in this analysis. Also, a large portion of the available studies do not use accepted economic valuation methods but instead rely upon estimates of annual value per acre for wetland (not based on WTP) using net factor income, replacement costs, energy-based analyses, the market value of extracted products, and other methodologies. These studies do not satisfy accepted benefit transfer study selection criteria and are therefore not appropriate to average or to transfer to other locations.

The 2015 Rule relied on estimates of WTP for wetland preservation or expansion from ten studies, most of which were state or local level studies. These were used to create a single, national WTP per acre per household values for emergent wetlands and another single, national WTP value for forested/shrub wetlands. Some studies provided multiple WTP estimates. The agencies concluded that six of the ten do not satisfy standard unit value benefit transfer study selection criteria. These six studies are described below.

- **Azevedo et al. (2000)**: The report describes two stated preference questions given to a random sample of Iowa residents on their WTP for easements to restore land to its natural wetland state. While there is a detailed discussion of the survey instrument, the report only provides two charts plotting the "% of respondents willing to pay x" against stated payment amounts presented in the surveys. Average WTP is assumed to be given by the 50th percentile of the range of stated WTP. No statistics beyond the charts are presented and no parametric estimation was conducted. No summary statistics, standard errors, or confidence intervals are reported, and it is unclear if the report was peer reviewed. Without additional detail on the underlying data and estimation results it is not possible to validate or replicate the results, and so the agencies conclude that it is not appropriate to apply the results of this study to the current context.

- **Dillman et al. (1993):** The report values three types of wetlands in South Carolina: floodplain swamps, bottomland hardwood forests, and pine plantations with scattered hardwood runners. The survey, sent to a random sample of South Carolina residents, informs respondents that the floodplain swamps provide the greatest amount and variety of wetland function, followed by the bottomland forests and pine plantations, respectively (although the ranking of the latter two does not hold across all 14 attributes used to describe the functionality and services of these wetlands). The payment vehicle is a donation to a "wetland preservation fund." Donation payment vehicles are subject to several biases including free riding and a lack of consequentiality which can exacerbate hypothetical bias. The study design does not vary the number of acres protected, telling all respondents that 2,500 acres of wetland would be protected making it difficult to conduct a scope test, at least in terms of quantity of waters impacted. The study tests for differences in WTP for the different types of wetlands using constants for two of the three types but fails to find significant effects despite differences in the provision of ecosystem services. Finally, the study does not appear to be peer reviewed. Given the issues in study design and lack of peer review, the agencies conclude that it is not appropriate to apply the results of this study to the current context.

- **Johnson and Linder (1986)**: The wetland valuation estimates presented in this paper were derived from a one percent sample of the 1982 licensed resident hunters in South Dakota. Hunters in this region often view wetlands as a recreational resource. The WTP amounts estimated in the paper therefore only apply to hunters in the South Dakota region and are not applicable to the general population. The agencies conclude that it is not appropriate to apply the results of this study to the current context.

- **Lant and Tobin (1989):** The authors investigated three different drainage basin improvement scenarios but only collected between seven and sixteen responses for each scenario. The estimates presented in this paper were intended as illustrations and not as exact estimates of population WTP. The authors explicitly state that "the comparative case study approach and small samples preclude statistical inference or precise quantitative estimates" which disqualifies the study for use in benefit transfer.

- **Poor (1999):** This paper valued unique Nebraska wetlands that were part of the North American Flyway in the state's Rainwater Basin using a double bounded dichotomous choice response format. A significant portion of the Rainwater Basin is designated as a Wildlife Refuge and attracts thousands of birdwatchers per year. The study design employs a three-way split sample, varying the scope of wetland protection across treatments. Using the split sample design, the authors conduct an external scope test and fail to find significant scope effects. External scope is a high bar and rigorous test of validity that some otherwise well-designed studies do not achieve. However, the lack of significant scope effects makes it difficult to calculate a per acre value for wetland protection. Instead, the authors apply the mean and median total WTP values to the smallest program in the experimental design (16,000) acres which provides the largest net benefit. It also results in the largest per acre value for benefit transfer. Given the ad hoc approach to deriving a per acre value, this study is not appropriate for direct unit value benefit transfer.

- **Roberts and Leitch (1997)**: This paper attempted to value Mud Lake, a managed, lacustrine wetland on the Minnesota-South Dakota border using a random sample of households who live within 30 miles of Mud Lake. The payment card format and voluntary contribution payment vehicle used in the paper are now generally not thought of as appropriate by economists. In addition, the total value estimated in the report appears to be the sum of separately estimated recreational, option, and bequest values. The current literature advocates estimating total value as opposed to summing up separate values. The authors also express reservations about their results when they state "[e]ven though the results of this study are first approximations and rest on some bold assumptions, they should provide useful benchmarks for resource managers and encourage others to develop better estimates." The agencies conclude that it is not appropriate to apply the results of this study to the current context.

Of the original ten studies used in the 2015 Rule analysis, only four clearly satisfied standard benefit transfer selection criteria. These studies included two focusing on Kentucky (Blomquist and Whitehead

(1998) and Whitehead and Blomquist (1991)), one from California (Loomis et al. (1991)), and one from Wisconsin (Mullarkey and Bishop (1999)). These four studies derived their WTP estimates from samples of state residents (although Bloomquist and Whitehead also surveyed respondents in nearby population centers outside of Kentucky). Because valid transfers require the transfer and policy cases to have similar affected populations, environmental quality, and extent of changes, the most appropriate geographic scale of transfer for these wetlands valuation study results would be at the state-level, and only to the states in which the primary studies were conducted, or arguably other states with similar populations and wetland resources. These concerns led the agencies to conclude that application of these wetlands valuation studies on a national level would lead to invalid WTP estimates.

Setting aside the validity of the wetland WTP per acre per household value estimates used in the 2015 Rule EA, the way in which the WTP estimates were applied to calculate total national benefit values was also problematic. For the 2015 analysis, the two national average wetland WTP per acre per household values, for emergent wetlands and forested/shrub wetlands, were multiplied by the number of acres changed by the rule and the assumed number of affected households to arrive at an estimate of total WTP. The number of affected households was represented by two different scenarios. In the first scenario, changes in wetland acres were assumed to only have value to households in the state in which the changed wetlands were located. This was a “state-level approach.” The second scenario was labeled a “regional approach” and relied on eight wetland regions defined by the USDA Economic Research Service and assumed all households within a given multi-state wetland region had a positive WTP for all changes in wetland acreage within their home region.[60] Both scenarios applied the same average WTP for a wetland acre within the state or region, depending on the approach, but this value dropped to zero once outside of the state or region borders.

For the regional approach, EPA used the eight wetland regions identified by USDA’s Economic Research service: Central Plains, Delta and Gulf, Mountain, Midwest, Northeast, Pacific, Prairie Potholes, and Southeast.[61] While it is certainly true that wetlands provide services that affect households outside of a state’s borders, the regional approach applied the national average WTP value for changes in wetland acres thousands of miles away. For example, the regional approach applies the willingness to pay value from residents in Tucson, Arizona, to changes in wetland acres in Boise, Idaho; and from residents in Bozeman, Montana to changes in wetland acres in Des Moines, Iowa.

The final WTP estimates for the 2015 Rule were calculated using a “blended” method that averaged the state-level and the regional WTP scenarios. There is no clear support for this blending assumption reflected in the benefit transfer literature. In particular, the regional approach that applied household WTP values to wetlands thousands of miles away is inappropriate. Several of the ten non-market valuation studies used focused on more local populations around a specific wetland. Others even focused on a

[60] The regions were USDA/ERS defined regions; *see* the 2015 Rule Final Economic Analysis, fn 25, p. 49 for additional details.

[61] Heimlich, R.E., R. Claassen, K.D. Wiebe, D. Gadsby, and R.M. House. 1998. Wetlands and Agriculture: Private Interests and Public Benefits. AER-765, U.S. Department of Agriculture Economic Research Service, Washington, D.C. Heimlich et al. (1998) assigned states to regions as follows: Central Plains (KS, NE, OK), Delta and Gulf (AR, LA, MS, TN, TX), Mountain (AZ, CO, ID, NM, UT, WY) , Midwest (IL, IN, KY, MI, MN, OH), Northeast (CT, DE, MA, MD, ME, NH, NY, PA, RI, VT, WV), Pacific (CA, OR, WA), Prairie Potholes (IA, MT, ND, NE, SD), and Southeast (AL, FL, GA, NC, SC, VA)

particular subset of the population (*e.g.*, hunters and fishermen) whose preferences are unlikely to be representative of the population more broadly.

III.C.2.2 Updated Methodology for Wetlands Benefits

It is important to emphasize that the agencies acknowledge that there are benefits to the preservation of wetlands. The proposed rule, if finalized will result in certain wetland acres becoming non-jurisdictional under the CWA. Some of these newly non-jurisdictional wetland acres may be disturbed or developed without any corresponding federal wetland mitigation to offset the losses, particularly in situations where state laws do not maintain the previous levels of regulation. The loss of these wetlands will likely result in the loss of benefits that they would have provided. However, due to the reasons above (failure to account for state governance, reliance on inappropriate studies, and questionable benefit transfer methods), the agencies believe that the methodology used to estimate wetlands benefits from the 2015 Rule is not appropriate. Instead, the agencies have developed a more appropriate methodology to estimate the amount of forgone wetland benefits that could arise as a result of this proposal.

III.C.2.2.1 Steps of Benefit Transfer

As mention above, the EPA's Guidelines for Preparing Economic Analyses (2010) lay out requirements for performing a valid benefit transfer. The first step is to describe the policy case. The second step is to then select study cases for transfer that are applicable to the policy case and produce valid estimates of willingness to pay using accepted and appropriate methods. Once study cases have been selected, the next step is to transfer their values to the policy case. There are several methods of transferring values including unit value transfers, function transfers, meta-analyses, and structural benefit transfer. The appropriate method to use will be dependent on the selected study cases. The final step is to report the results including all key judgements and assumptions used to select the case studies and transfer method used.

III.C.2.2.1.1 Describe the policy case

The proposed rule includes as "waters of the United States" adjacent wetlands—defining adjacent as those wetlands that abut or have a direct hydrologic surface connection to a non-wetland jurisdictional water in a typical year. Abut means to touch at least at one point or side of a jurisdictional water. A direct hydrologic surface connection occurs as a result of inundation from jurisdictional water to a wetland or via perennial or intermittent flow between a wetland and a jurisdictional water. Wetlands physically separated from jurisdictional waters by upland or by dikes, barriers, or similar structures and also lacking a direct hydrologic surface connection to such waters are not adjacent. In addition, the proposed rule includes as jurisdictional tributaries, rivers, streams, or similar naturally occurring surface water channels that contribute perennial or intermittent flow to a TNW in a typical year either directly or indirectly through other jurisdictional waters. A tributary does not lose its status as a tributary if it flows through a culvert, dam, or other similar artificial break.

The agencies also propose to retain the two pre-existing exclusions for prior converted cropland and waste treatment systems, though with modifications to the regulatory text, and nine other exclusions. The agencies also propose to define waste treatment systems to include all components, including lagoons and treatment ponds (such as settling or cooling ponds), designed to convey and retain, concentrate, settle, reduce and remove pollutants, either actively or passively, from wastewater or stormwater prior to discharge (or eliminating any such discharge). The agencies are proposing to clarify that a designation of "prior converted cropland" for purposes of the CWA no longer applies if the area is abandoned and has reverted to wetland.

III.C.2.2.1.2 Select study cases and apply explicit selection criteria

The foundation of any benefit transfer is the underlying studies that are being transferred. All available studies should be collected and evaluated against the necessary criteria for inclusion in the benefit transfer. Acceptable studies should be similar to the policy case (1) in their definition of the environmental commodity being valued including scale and the presence of substitutes, (2) the baseline and extent of environmental changes, and (3) the characteristics of the affected populations. Studies must also employ valid and accepted economic theory and econometric techniques.

Because wetlands potentially have significant nonuse values, they are commonly valued using stated preference methods. The complex way in which wetlands provide ecosystem services make them a particularly challenging commodity for which to elicit accurate preferences and willingness to pay values. Careful selection of studies is crucial to conducting an accurate transfer.

III.C.2.2.1.3 Transfer Values

The simplest way to transfer values is known as a unit value transfer. In this method, a point estimate of willingness to pay (WTP) from a case study is applied directly to the policy site. The point estimate can be a single value from a study or average of a small number of estimates from a few case studies. Unit value transfers should only be used in cases where the case study and policy sites are very similar. Point estimates are generally a function of several variables (*e.g.*, income, region) and simply transferring them to a new location without accounting and controlling for those difference can lead to inaccurate results.

Instead of using a single value from a case study, function transfers use the estimated function from which the case study's estimated WTP value was generated. Using the estimating function allows the transferred WTP estimate to control for factors that are known to influence WTP. While function transfers can adjust for small differences between the case study and policy area populations, they are still subject to the unit value benefit transfer requirements that the study and policy cases be similar in the type and size of the quality change and the population being evaluated.

Meta-analyses, a third type benefit transfer approach, combines and synthesizes the results from multiple valuations studies to estimate a new transfer function. Meta-analyses have the advantage of drawing information on WTP from a large number of disparate sources in order to control for a relatively large number of variables that influence WTP. Because meta-analysis controls for the confounding attributes of the underlying studies, it is sometimes possible to make use of a larger number of studies than would be considered for a unit or function transfer. There are several different forms meta-analyses may take, and the form is often determined by the type and amount of information available for use in the meta-analyses. See Johnston et al. (2015) for more details on meta-analyses and other transfer methodologies. It is important to recognize that techniques such as meta-analyses cannot correct for all study qualities or the appropriateness of the underlying studies. If the underlying studies do not provide a good match to the resource in question or do not rely on well accepted practices for questionnaire development and/or econometric techniques, those studies should be excluded from meta-analysis. Thus, the agencies carefully vetted wetland valuation studies included in the meta-analysis to support wetland valuation in Stage 1 and Stage 2 analyses presented in Section III.C.2.2.3.2.[62] Moreover, the Moeltner et al. (2018) study used in benefit transfer relied on Bayesian Stochastic Search Variable (SCSV) algorithm to test whether combining studies that valued different wetland types (i.e., freshwater and saltwater) is appropriate for benefit transfer applications focused on freshwater wetlands only. As discussed in Moeltner et al. (2018), the meta-regression model relying on freshwater studies only produced the best estimates for the purpose of this analysis.

III.C.2.2.1.4 Report Results

Information on all studies used in the benefit transfer as well as the full results should be reported. In addition, all assumptions and judgements that were made in the selection of case studies and transfer methodologies should be clearly explained. Any uncertainty in the estimates should be reported and discussed when possible.

III.C.2.2.2 Wetlands Benefits using the 2015 WOTUS Approach

The 2015 Economic Analysis reported CWA 404 wetlands benefits of $306.1 million, using a 3% discount rate. As described above, this was based on an analysis that did not account for state or tribal regulations and used a “blended” estimate of the WTP. In creating a new estimate of the forgone benefits from this action, it is important to understand how the 2015 estimate was derived and whether it is a useful point of comparison for our new estimate.

In the 2015 analysis, 22 estimates of the per household per acre WTP for wetland improvements were combined from ten studies.[63] The individual study estimates were categorized as applying to either forested wetlands (13 estimates from four studies) or emergent wetlands (9 estimates from six studies). The WTP estimate was inflated to 2014$ and the estimate was classified as an annual value or a total WTP. Total WTP values were annualized over 20 years at both the 3% and 7% rate. These studies and calculations are summarized in Table III-2 below.

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[62] The reasons for not including wetland valuation studies in the final meta-data are summarized in a memo provided in the docket for this action (Docket No. EPA-HQ-OW-2018-0149).

[63] It is important to note that six of the ten studies whose values were transferred in the 2015 analysis were found to be inappropriate for use in a unit value transfer and therefore should not have been used (see section III.C.2.1 for details). Those studies are used in this section only to illustrate the issues with the way which the 2015 Rule’s benefit transfer was conducted.

Table III-2: Summary of wetland benefit studies used to generate WTP estimates in the 2015 Rule analysis

Study (Year)	Acres	WTP Value Inflated to 2014$	Annual Value	Annual or 20-Year Annualized WTP (per household) 2014$		Annual WTP per household per acre 2014$	
				3%	7%	3%	7%
Emergent Wetlands							
Johnson and Linder (1986)	1,307,187	$626.18	No	$42.09	$59.11	$0.0000	$0.0000
Loomis et al. (1991) 1	85,000	$267.68	Yes	$267.68	$267.68	$0.0031	$0.0031
Loomis et al. (1991) 2	125,000	$441.49	Yes	$441.49	$441.49	$0.0035	$0.0035
Azevedo et al. (2000) 1	7,000	$13.75	No	$0.92	$1.30	$0.0001	$0.0002
Azevedo et al. (2000) 2	32,345	$34.37	No	$2.31	$3.24	$0.0001	$0.0001
Roberts and Leitch (1997) 1	5,000	$9.34	Yes	$9.34	$9.34	$0.0019	$0.0019
Poor (1999)	41,000	$31.76	Yes	$31.76	$31.76	$0.0008	$0.0008
Mullarkey and Bishop (1999) 1	110	$19.44	Yes	$19.44	$19.44	$0.1767	$0.1767
Mullarkey and Bishop (1999) 2	110	$34.20	Yes	$34.20	$34.20	$0.3109	$0.3109
Average				**$94.36**	**$96.39**	**$0.0552**	**$0.0553**
Forested							
Lant and Tobin (1989) 1	2,109	$46.30	Yes	$46.30	$46.30	$0.0220	$0.0220
Lant and Tobin (1989) 2	1,108	$104.22	Yes	$104.22	$104.22	$0.0941	$0.0941
Blomquist and Whitehead (1998) 1	500	$3.06	Yes	$3.06	$3.06	$0.0061	$0.0061
Blomquist and Whitehead (1998) 2	500	$6.67	Yes	$6.67	$6.67	$0.0133	$0.0133
Blomquist and Whitehead (1998) 3	500	$3.06	Yes	$3.06	$3.06	$0.0061	$0.0061
Blomquist and Whitehead (1998) 4	500	$20.30	Yes	$20.30	$20.30	$0.0406	$0.0406
Dillman et al (1993) 1	2,500	$28.25	No	$1.90	$2.67	$0.0008	$0.0011
Whitehead and Blomquist (1991) 1	5,000	$20.81	Yes	$20.81	$20.81	$0.0042	$0.0042
Whitehead and Blomquist (1991) 2	5,000	$14.03	Yes	$14.03	$14.03	$0.0028	$0.0028
Whitehead and Blomquist (1991) 3	5,000	$9.72	Yes	$9.72	$9.72	$0.0019	$0.0019
Whitehead and Blomquist (1991) 4	5,000	$12.58	Yes	$12.58	$12.58	$0.0025	$0.0025
Whitehead and Blomquist (1991) 5	5,000	$31.71	Yes	$31.71	$31.71	$0.0063	$0.0063
Whitehead and Blomquist (1991) 6	5,000	$15.52	Yes	$15.52	$15.52	$0.0031	$0.0031
Average				**$22.30**	**$22.36**	**$0.0157**	**$0.0157**

The Economic Analysis for the 2015 Rule stated that the per household per acre WTP for forest and emergent wetlands "was calculated separately for each category by taking a geometric mean of the per-acre WTP values, weighted by the number of respondents in each study," but a review of the exact calculations used suggest something different. It appears that the WTP (in 2014$) was used to calculate the implied net present value per household over a 50-year horizon for each study. This net present value was then divided by the number of acres in the study to calculate a "one-time willingness to pay per household per acre." The log of this one-time WTP value for each study was multiplied by the proportion of the study sample size to the total sample size count. The sum of this sample size proportion weighted logged (one-time) WTP was then exponentiated and then used as the overall (annual) WTP for emergent and forested acres.[64] Using this approach, emergent wetlands were valued at about one-half of a cent per acre and forested wetlands were valued between 4 and 6 cents per acre at 7% and 3% respectively (see Figure 42 in the 2015 Economic Analysis).

This analysis uses a more straightforward method to calculate the average values from these ten studies. Dividing the annual WTP by the number of acres for each study produces the annual WTP per household per acre for wetland changes at both 3% and 7%. These values are reported in the last column of Table III-2. There is a very minor difference between the 3% and 7% results because most of the studies reported annual values. Averaging across the studies produces an average value for both types of wetlands. Emergent wetlands are valued at about 5.5 cents per acre and forested wetlands are valued at about 1.6 cents per acre. These values are somewhat different than those used in the 2015 economic analysis, but the value still reflects and estimate of a few cents per acre and they are derived using what the agencies consider a more defensible approach.

While the WTP per household per acre was assumed to apply nationally in the 2015 analysis, the total benefits for each state differed because the number of households and the number of acres affected in each state differed. As described above, a combination of two approaches was used to estimate the state level benefits. The first was a state-level approach which assumed that only residents within a state's boundaries receive benefits from wetland losses offset within that state. The second approach was a regional approach which assumed that all residents within a wetland region benefit from wetland losses offset anywhere in that region. For the final 2015 Rule, the agencies used a "blended" approach which was the average of the total state-level and the total regional benefits estimates.

As described above, the regional approach applied the WTP value for changes in wetland acres thousands of miles away. Even though the state-level approach may be overly conservative because wetlands can provide services and benefits to downstream waters beyond a state's boundaries, the regional approach is inappropriate for a benefit transfer exercise because the extent of the market considered in the majority of the original studies was narrower (e.g., state population). As such, the agencies use the state-level approach results from the 2015 Rule as a point of comparison for this this benefit transfer analysis.

Using state-level approach only but using the per household per acre WTP values for wetlands of one-half cent per acre for emergent wetland and 6 cents per acre for forested wetlands from the 2015 analysis produces wetland benefits of $106.9 million. If the agencies use the state-level approach with the estimate of 1.6 cents for forested wetlands and 5.5 cents for emergent wetlands derived above indicates $96.5 million in wetland benefits from the 2015 Rule. This range, $96.5-$106.9 million, is the agencies best

[64] Page 19 of the Supporting Documentation (Analysis of Jurisdictional Determinations for Economic Analysis and Rule), found at https://www.regulations.gov/document?D=EPA-HQ-OW-2011-0880-20877 illustrate these calculations.

estimate of what the 2015 analysis should have reported for wetlands benefits. In a similar fashion, the 2017 proposed repeal of the 2015 Rule should have reported the same range in forgone wetland mitigation benefits. It is important to reemphasize that this reflects a state-level approach that assumes that all states are affected by the jurisdictional determination.

III.C.2.2.3 Updated and Revised Benefits Transfer

While the state-level approach from the 2015 Rule economic analysis is more appropriate than the blended approach, the agencies believe it is still inappropriate for benefit transfer for two reasons. First, the use of a national level average WTP value does not properly account for state level variation. If the marginal value of wetland mitigation was approximately identical across the country, then the aggregation of the 2017 proposal would be as simple as multiplying the national level mean per household per acre value times the affected households and affected acres. This is exactly what is done in the state-level approach. However, it seems unlikely that there is no regional variation in this WTP value given. Wetland benefits are, in general, a more local commodity. The market for these benefits, including the demographic profiles and cultural aspects, vary widely across the country. In addition, the conditions and quality of the benefits (*e.g.*, the ecosystem services) experienced from this mitigation is heavily dependent on the local climate and topography. Proper benefit transfer requires correcting for these differences across populations living in different areas.

Second, as described above, not all of the studies used in the 2015 analysis satisfy standard benefit transfer study selection criteria for a unit transfer, which is effectively what is being done with the state-level approach. A unit transfer assumes that the WTP at the study site is equal to the WTP at the policy site, so the commodity being valued, and the population must be similar. As detailed above, six of the ten studies used in the 2015 Rule do not meet the criteria for a unit transfer. The remaining four might be appropriate. Note that while these six studies are not appropriate for a unit transfer, they might be appropriate for a function transfer, which statistically controls for the variation of the WTP.

III.C.2.2.3.1 Unit Value Transfer

The evaluation of the studies for the 2015 Rule economic analysis produced four papers that are appropriate for a unit benefit transfer: Bloomquist and Whitehead (1998), Loomis et al (1991), and Mullarkey and Bishop (1999), and Whitehead and Bloomquist (1991). A more recent review of the wetlands valuation literature identified these four studies and an additional study, Newell and Swallow (2013) as appropriate for unit transfer. The agencies recognize that while there have been a number of meta-analyses of wetland valuations published more recently, there are no other new primary studies that assessed the valuation of wetlands that the agencies are aware of.

For example, the agencies commissioned Abt Associates to provide an overview of the wetland valuation literature in [2017]. There are a number of unexplained differences in the WTP values between the 2015 Rule and the Abt Associates review, but the Abt Associates values are more easily verified and are in a more current base year, so the Abt values are used for this benefit transfer exercise. As was done above, the agencies divide the annual WTP by the number of acres in the study to produce the annual WTP per household per acre for wetland changes for each observation. Four WTP value can be created from the five studies by averaging the per household per acre value for all the observations in each study state.[65] In this case, there is no difference in the value based on the discount rate and there is no distinction between the value for forested and emergent wetlands. The results are detailed in Table III-3 below.

Table III-3: Summary of wetland benefit studies used in the current analysis

Author	Year	Target Population	Acres	Annual WTP (2017$)	Annual WTP per household per acre (2017$)
Blomquist & Whitehead	1998	all KY HHs	500	$3	$0.0060
Blomquist & Whitehead	1998	all KY HHs	500	$8	$0.0160
Blomquist & Whitehead	1998	all KY HHs	500	$6	$0.0120
Blomquist & Whitehead	1998	all KY HHs	500	$19	$0.0380
Average					$0.0180
Whitehead & Blomquist	1991	all KY HHs	5,000	$19	$0.0038
(1) Average of Blomquist & Whitehead 1991/1998					***$0.0109***
(2) Mullarkey & Bishop	1999	all WI HHs	110	***$64***	***$0.5818***
Newell & Swallow	2013	Two townships, RI	29	$9	$0.3103
Newell & Swallow	2013	Two townships, RI	45	$12	$0.2667
Newell & Swallow	2013	Two townships, RI	60	$16	$0.2667
(3) Average Newell & Swallow					***$0.2812***
Loomis et al.	1991	all CA HHs	58,000	$258	$0.0044
Loomis et al.	1991	all CA HHs	40,000	$426	$0.0107
(4) Average of Loomis					***$0.0075***

HHs = Households

For the single unit value benefit transfer, the agencies assume that the per household WTP at the study site is equal to the WTP at the policy site. Determining the relevant extent of the market and the affected population is important in this case because projecting unit values to a larger population or spatial area than that in the study can lead to errors (Johnston et. al. 2015). As such, there appear to be two possible ways in which the unit values from Table III-3 might be applied:

1. Applying the unit values only to the state in which in the study was conducted.
2. Applying the unit values to the state in which the study was conducted and appropriate surrounding states.

The results of these unit transfer applications are detailed in Table III-4.

[65] Note that Blomquist and Whitehead (1998) and Whitehead and Blomquist (1991) both focus on the state of Kentucky so their results are averaged to create a single value.

Table III-4: Estimated total WTP by state using unit value transfers

State	Study Estimate Number	Annual WTP per household per acre (2017$)	Number of Households	Total New Impacted Acres by State	Only State of Primary Study[1] Annual Forgone State Benefits (2017$)	State and Adjacent States[2] Annual Forgone State Benefits (2017$)
KY	1	$0.0109	1,719,965	4.4	$137,417	$137,417
IL	1	$0.0109	4,836,972	51.9		$4,521,460
IN	1	$0.0109	2,502,154	17.0		$766,320
MO	1	$0.0109	2,375,611	1.3		$56,940
OH	1	$0.0109	4,603,435	88.5		$7,331,34
TN	1	$0.0109	2,493,552	5.8		$258,989
VA	1	$0.0109	3,056,058	22.9		$1,261,512
WV	1	$0.0109	763,831	33.0		$453,628
WI	2	$0.5818	2,279,768	3.3	$4,317,438	$4,317,438
IA	2	$0.5818	1,221,576	2.1		$1,472,181
MI	2	$0.5818	3,872,508	0.1		$333,354
MS	2	$0.5818	1,115,768	0.9		$576,286
RI	3	$0.2812	413,600	0.1	$17,209	$17,209
CT	3	$0.2812	1,371,087	0.1		$57,049
MA	3	$0.2812	2,547,075	0.6		$423,919
CA	4	$0.0075	12,577,498	37.3	$3,540,117	$3,540,117
AZ	4	$0.0075	2,380,990	11.1		$199,454
NV	4	$0.0075	1,006,250	54.9		$416,968
OR	4	$0.0075	1,518,938	5.8		$66,165
Total			**52,656,636**	**341.2**	**$7,957,978**	**$20,374,834**

[1] Omits values from 44 states. Some primary studies included population from the cities adjacent to the study area in addition to the state population where affected wetlands were located (*e.g.*, Blomquist and Whitehead, 1998).

[2] Omits values from 30 states

If the four unit values are applied to the four states associated with the primary study, then the monetized portion of annual forgone benefits of the 2017 proposal would be about $8 million. It is important to be explicit that this estimate omits values from 44 states where wetlands would also be impacted. If the unit values are applied to the state of the primary study and the adjacent states, the estimate of the forgone annual benefits is just over $20 million. When values are applied to adjacent states, forgone benefits from 30 states are not monetized.

III.C.2.2.3.2 Meta Function Transfer

Moeltner et al. (2018) performs a meta-analysis of wetland valuation studies to estimate a benefit function for preserving or restoring acres of wetlands. The study is an application of the methodologies developed in Moeltner et al. (2007), Moeltner and Rosenberger (2014), and Moeltner (2015). The study performs a Bayesian non-linear meta-regression that ensures the benefits function meets a set of utility theoretic validity criteria. Those criteria are: concavity of the benefits function over wetland acres, sensitivity to scope, a scope elasticity that is not restricted by the functional form of the benefit function, and the adding up condition which ensures dividing a change up into smaller increments does not affect the total benefit.

The data for the meta-regression consist of 38 observations from 17 stated preference studies identified in the 2017 Abt Associates wetlands literature review that contained WTP estimates potentially useful in a meta-analysis. The meta-data include 21 observations from 11 studies associated with freshwater wetlands. The remaining 17 cases target salt marshes or, more broadly, "coastal wetlands." The following discussion focuses on the freshwater wetlands only. Moeltner et al. (2018) provides detail on the full dataset. [66] Six of the studies value state-wide changes in wetland area and five focus on wetlands at the sub-state level. Given that the plurality of the observations in the meta-analysis are from studies conducted at the state level, the agencies estimate changes in benefits at the state level, assuming WTP for out of state changes is zero, and aggregate WTP across states ex post.

Table III-5: Studies used in the freshwater only meta-regression model in Moeltner et al. (2018)

Author	Year	Target Population	Wetland Type	Acres	WTP (2017$)
Awondo et al.	2011	Maumee Bay SP, OH, visitors	freshwater, unspec.	2,499	$193
Beran, L.J.	1995	all SC HHs	freshwater, forested	2,500	$36
Beran, L.J.	1995	all SC HHs	freshwater, forested	2,500	$27
Beran, L.J.	1995	all SC HHs	freshwater, forested	2,500	$33
Blomquist & Whitehead	1998	all KY HHs	freshwater	500	$3
Blomquist & Whitehead	1998	all KY HHs	freshwater, forested	500	$8
Blomquist & Whitehead	1998	all KY HHs	freshwater, forested	500	$6
Blomquist & Whitehead	1998	all KY HHs	freshwater, forested	500	$19
deZoysa	1995	selected MSAs, OH	freshwater, unspec.	3,000	$109
Loomis et al.	1991	all CA HHs	freshwater, unspec.	58,000	$258
Loomis et al.	1991	all CA HHs	freshwater, unspec.	40,000	$426
MacDonald et al.	1998	Atlanta region, GA	freshwater, unspec.	330	$108
Mullarkey & Bishop	1999	all WI HHs	freshwater, forested	110	$64
Newell & Swallow	2013	Two townships, RI	freshwater, forested	29	$9
Newell & Swallow	2013	Two townships, RI	freshwater, forested	45	$12
Newell & Swallow	2013	Two townships, RI	freshwater, forested	60	$16
Poor[1]	1999	all NE HHs	freshwater, unspec.	16,000	$47
Poor	1999	all NE HHs	freshwater, unspec.	41,000	$42
Poor	1999	all NE HHs	freshwater, unspec.	66,000	$47
Whitehead et al.	2009	selected counties, MI	freshwater, unspec.	1,125	$73
Whitehead & Blomquist	1991	all KY HHs	freshwater, forested	5,000	$19

HHs = Households

[1] This study is included in meta-analysis discussed in Section III.C.2.2 because the dependent variable in the meta-regression model is the total WTP per household and not per acre values

The dependent variable in the meta-regression is the natural log of household WTP for the specified change. Willingness to pay is modeled as a function of "context-defining" and "moderator" variables in the non-linear regression equation. Context-defining variables are those that are policy-relevant including

[66] The EA incorporates all the underlying studies used in Moeltner et al (2018) for completeness. Because of the concerns discussed about Poor (1999), the agency plans to refine the meta-analysis by excluding the results of this study in addition to the results currently presented. The agency expects that the results of the meta-analysis will not materially change due to the exclusion of Poor (1999).

the baseline number of acres, the number of acres preserved or restored, whether those acres are forested wetlands, and whether they were described by the primary study to provide several specific ecosystem services. Moderating variables generally refer to details on how the study was conducted and are not relevant to benefit transfer but are included to avoid omitted variable bias and/or to adjust for the study characteristics (e.g., voluntary payment, a study is not peer-reviewed) to ensure that the meta-regression function used in benefit transfer reflects the best benefit transfer practices and desired study characteristics (e.g., a peer reviewed study and non-voluntary payment such as income tax). The means and standard deviations of all explanatory variables are reported in Table III-6. The model specification used to estimate the benefit parameters for transfer (called Model 3 in Moeltner et al., 2018) is

$$y_s = X_s\beta + ln\left(\gamma^{-1}\left(exp(\gamma q_{1,s}) - exp(\gamma q_{0,s})\right)\right) + \varepsilon_s$$

$$\varepsilon_s \sim n(0, \sigma_\varepsilon^2 I_s)$$

where y_s is the natural log of WTP from study s, X_s is a vector of moderator variables from study s, $q_{1,s}$ is the post-policy wetland area, $q_{0,s}$ is the baseline wetland area, β and γ are vectors of estimated parameters, σ_ε^2 is the variance of the error term and I_s is an s-dimensional identity matrix. Moeltner (2018) tested other specifications that allow for unobserved study-level heterogeneity and observation-level heteroskedasticity but found that the model with spherical, idiosyncratic errors performed best.

Table III-6: Meta-regression variable summary from Moeltner et al. (2018)[1]

	Description	Mean	Min	Max
Lnwtp	log(total wtp in 2017 dollars)	3.56	1.05	6.06
Lnyear	log(year of data collection - oldest year +1)	1.57	0.00	2.89
Lninc	log(income in 2017 dollars)	10.97	10.64	11.48
Sagulf	1 = S-Atlantic/Gulf (AL,GA,SC,LA)	0.19	0.00	1.00
Nema	1 = NE/mid-Atlantic,(DE,MD,NJ,PA,RI)	0.14	0.00	1.00
Nmw	N/Mid-West (KY,MI,NE,OH,WI)	0.57	0.00	1.00
Local	1 = target population at sub-state level	0.33	0.00	1.00
Prov	1 = provisioning function affected	0.24	0.00	1.00
Reg	1 = regulating function affected	0.52	0.00	1.00
Cult	1 = cultural function affected	0.76	0.00	1.00
Forest	1 = forested wetland	0.52	0.00	1.00
q0	baseline acres (1000s)	40	0	220
q1	policy acres (1000s)	51	1	220
Volunt	1 = payment mechanism = voluntary contribution	0.43	0.00	1.00
lumpsum	1 = payment frequency = lump sum (single payment)	0.43	0.00	1.00
Ce	1 = elicitation method = choice experiment	0.14	0.00	1.00
Nrev	1 = study was not peer-reviewed	0.24	0.00	1.00
median	1 = wtp estimate = median	0.33	0.00	1.00

[1]Summary statistics is based on the freshwater studies only. See Moeltner et al. (2018) for saltwater and combined freshwater and saltwater datasets.

The Bayesian estimation routine provides distributions for each of the estimated parameters and is performed using Gibbs sampling (Train, 2009). An additional feature of the Moeltner (2018) estimation algorithm is that primary studies that do not closely match the policy context can be included and evaluated to determine if they provide useful information to estimating the parameters of the benefits function. The algorithm which evaluates the efficiency of pooling data across different types of studies is called stochastic search variable selection (SSVS). In this application the studies being evaluated for inclusion value acres of saltwater wetlands while the most policy-relevant studies value freshwater wetlands. The author finds that values from saltwater studies diverge significantly from freshwater studies, so while that information will not contribute to the benefits function, it is an indication of validity in the primary studies in that somewhat different environmental services are valued differently by respondents to the stated preference surveys.

The posterior means and standard deviations for the parameters of the meta-regression are reported in Table III-7. Based on the estimated distributions of the parameters, the variables *local*, *regulating*, *forested*, and *provisioning*, are the strongest predictors of WTP with more than 90% of their probability mass on one side of zero. These are followed by variables for year of the study, income of the sample, and the regional variables for northeast/mid-Atlantic and midwest with more than 70% of their probability mass on one side of zero.

Table III-7: Meta-regression results from Moeltner et al. (2018)

	mean	std.	p(> 0)[1]
Constant	-0.546	3.097	0.430
context-specific			
Lnyear	-0.359	0.667	0.281
Lninc	0.211	0.363	0.723
Sagulf	-0.406	1.743	0.405
Nema	-0.784	1.538	0.295
Nmw	-1.073	1.556	0.244
Local	3.130	0.895	0.999
Prov	-2.273	0.876	0.009
Reg	1.632	0.850	0.970
Cult	-0.317	1.563	0.413
Forest	1.118	0.726	0.937
Moderators			
Volunt	-0.016	1.038	0.495
lumpsum	1.486	0.771	0.968
ϒ	0.008	0.007	0.883
σ_{ϵ}^{2}	0.474	0.260	1.000

[1]Prob(>0) equals the share of the posterior density to the right of zero.

Using the results of the meta-analysis to estimate a change in benefits for each state resulting from a change in wetland area requires the following state-specific variables: change in wetland acres because of CWA jurisdictional changes, average household income, number of households, proportion of change in acres that is forested, and region of the United States. The baseline acres in the primary studies generally referred to an area that was under consideration for restoration or preservation and is a small fraction of total statewide acres. As such, the mean value for baseline acres from the primary studies is used for q_0 which is 10,000 acres to avoid predicting out of sample. The value for q_1 for each state is 10,000 acres plus the expected change in jurisdictional wetland acres for each state. Table III-8 lists the values for each state-specific variable used in the benefit transfer.

Table III-8: State-specific benefit transfer variables

State	Average Income (2016$)	South Atlantic/Gulf	Northeast/Mid-Atlantic	Northern/Mid-West	Proportion of Forested Acres	Change in Wetland Acres
AL	47,221	1	0	0	0.9632	7.3
AK	75,723	0	0	0	0.4291	1.0
AZ	57,100	0	0	0	0.8201	11.1
AR	45,907	1	0	0	0.9676	7.3
CA	66,637	0	0	0	0.2856	37.3
CO	70,566	0	0	0	0.1648	7.7
CT	75,923	0	1	0	0.9141	0.1
DE	58,046	1	0	0	0.9311	0.1
DC	70,982	1	0	0	0.9425	0.0
FL	51,176	1	0	0	0.6875	28.6
GA	53,527	1	0	0	0.9456	4.1
HI	72,133	0	0	0	0.8991	0.0
ID	56,564	0	0	0	0.2339	0.6
IL	61,386	0	0	1	0.8032	51.9
IN	56,094	0	0	1	0.7774	17.0
IA	59,094	0	0	1	0.5192	2.1
KS	56,810	0	0	1	0.3633	10.4
KY	45,369	1	0	0	0.9157	4.4
LA	42,196	1	0	0	0.6932	1.9
ME	50,856	0	1	0	0.8966	0.1
MD	73,760	1	0	0	0.9210	2.2
MA	72,266	0	1	0	0.9060	0.6
MI	57,091	0	0	1	0.9027	0.1
MN	70,218	0	0	1	0.7107	10.7
MS	41,099	1	0	0	0.9573	0.9
MO	55,016	0	0	1	0.8054	1.3
MT	57,075	0	0	0	0.1435	27.4
NE	59,374	0	0	1	0.1765	9.9
NV	55,431	0	0	0	0.2464	54.9
NH	76,260	0	1	0	0.8448	0.1
NJ	68,468	0	1	0	0.9025	1.5
NM	48,451	0	0	0	0.4369	0.1
NY	61,437	0	1	0	0.8394	44.4
NC	53,764	1	0	0	0.9703	7.0
ND	60,184	0	0	1	0.0156	440.3
OH	53,985	0	0	1	0.7972	88.5
OK	50,943	1	0	0	0.8142	0.7
OR	59,135	0	0	0	0.2044	5.8
PA	60,979	0	1	0	0.8350	17.6
RI	61,528	0	1	0	0.9471	0.1
SC	54,336	1	0	0	0.9384	44.2
SD	57,450	0	0	1	0.0266	50.9
TN	51,344	1	0	0	0.9368	5.8

Table III-8: State-specific benefit transfer variables

State	Average Income (2016$)	South Atlantic/Gulf	Northeast/Mid-Atlantic	Northern/Mid-West	Proportion of Forested Acres	Change in Wetland Acres
TX	58,146	1	0	0	0.4585	72.2
UT	67,481	0	0	0	0.1108	11.4
VT	60,837	0	1	0	0.7913	0.4
VA	66,451	1	0	0	0.8946	22.9
WA	70,310	0	0	0	0.4797	1.2
WV	44,354	1	0	0	0.6375	33.0
WI	59,817	0	0	1	0.7921	3.3
WY	57,829	0	0	0	0.2138	2.1

Source: EPA analysis

Willingness to pay for each state is estimated using the full multi-variate distributions of the estimated parameters, generating a distribution of WTP for each state. Those distributions are summarized in Table III-9. The sum of the mean estimate of forgone benefits using the meta-analysis approach is $59.34 million, which is lower than the $96.5-$106.9 million comparison value using the state-level approach from the 2015 Rule (and is significantly lower than the $306.1 million reported in the 2015 Economic Analysis for that rule using the blended approach). Table III-9 also contains the lower 5th and upper 95th percentile WTP estimate for each state.[67] The estimated mean value derived from the meta-analysis is lower than the lower range of values derived from the value-based benefit transfer approach although the lower and upper bound estimates based on the meta-analysis are inclusive of the range of estimates based on the value transfer (see Table III-9). This result stems from the ability to tailor the meta-function to better reflect the policy scenario. In particular, the meta-regression model allows the agencies to account for the value of independent regressors like affected resource characteristics such as wetland location (*e.g.*, Mid West or New England or Mid Atlantic), the number of wetland acres affected, the ecosystem services typically provided by freshwater wetlands, and the extent of the market (e.g., state-level vs local). Similarly, it allows to estimate values assuming moderator variables reflect the best methodological practices for stated preference studies (e.g., use of non-voluntary payment mechanisms) and the agencies' preference for peer reviewed studies. Finally, the meta-regression model developed by Moeltner et al. (2018) satisfies fundamental theoretical properties, such as sensitivity to scope and adding-up condition, which may not be captured in the value-based transfer approach.

In two of the four primary state case study locations used in the unit value transfer exercise, the unit value transfers and the meta-analysis results are roughly equal. In the Kentucky case study, the unit value transfer estimate of the annual WTP per household per acre for wetlands was $0.01, while the meta-analysis estimate was $0.03. In the California case study, the unit transfer annual WTP per household per acre estimates was $0.01 compared to $0.02 for the meta-analysis. The largest difference between the unit value estimates and the meta-analysis estimates can be seen in the Wisconsin case study where the annual WTP per household per acre was estimated to be $0.58 per acre using the unit value, but only $0.01 per

[67] To be precise, the estimate of the total foregone benefits should be obtained from the full distribution of the meta-analysis rather than summing the state by state estimates. Using the full distribution, the mean estimate of total foregone benefits is $60.71 million. The lower 95th and upper 95th percentile estimates of total foregone benefits are $0.46 million and $130.42 million respectively.

acre using the mean meta-analysis. This difference results in a $4.24 million difference in total forgone benefits between the two methodologies. The unit value estimate of $0.28 WTP per household per acre annually from the Rhode Island case study is also significantly higher than the mean meta-analysis estimate of $0.05 annually per household per acre.

The agencies deployed two techniques to assess the likely foregone wetland benefits. The unit value transfer technique is a more restrictive approach to benefit transfer in that the study case and the policy case would need to be similar enough to allow for the transfer of the WTP values. The meta-analysis technique may allow wider inclusion of studies because the technique can control for confounding variables. Using the unit value transfer technique, the estimated wetland benefits that accrued to the 2015 Rule would have ranged from approximately $8 million to $20 million ($2017), depending on whether the values are applied only in the states where the studies are conducted or whether adjacent areas are included in the benefit transfer. It is important to note that the unit value transfer estimate does not represent the entire country so the total unit value transfer estimate is only a partial measure of the national wetland forgone benefits. Using the meta-analysis, the mean national wetland benefits that accrued to the 2015 Rule would have been $59 million ($2017).

Table III-9: Unit and meta-analysis based transfer results by state

				Benefit Transfer Results Based on Meta-Regression (Moeltner et al., 2018)					
State	Households	Total New Impacted Acres by State	Unit Value Transfer Foregone Benefits (2017$)	Mean WTP per household per acre (2017$)	Mean Estimate of Forgone Benefits (2017$)	Lower 5th WTP per household per acre (2017$)	Lower 5th Estimate of Forgone Benefits (2017$)	Upper 95th WTP per household per acre (2017$)	Upper 95th Estimate of Forgone Benefits (2017$)
AK	258,058	1.0		$0.020	$5,419.22	$0.000000	$0.00	$0.050	$13,419.02
AL	1,883,791	7.2		$0.030	$414,434.02	$0.000138	$1,883.79	$0.062	$853,357.32
AR	1,147,084	7.2		$0.031	$256,946.82	$0.000138	$1,147.08	$0.063	$524,217.39
AZ	2,380,990	11.1	$199,453.52	$0.035	$926,205.11	$0.000180	$4,761.98	$0.079	$2,095,271.20
CA[1]	12,577,498	37.3	$3,540,117.46	$0.017	$8,099,908.71	$0.000080	$37,732.49	$0.043	$20,262,349.28
CO	1,972,868	7.7		$0.015	$230,825.56	$0.000130	$1,972.87	$0.038	$581,996.06
CT	1,371,087	0.1	$57.048.74	$0.047	$9,597.61	$0.000000	$0.00	$0.074	$15,081.96
DE	342,297	0.1		$0.027	$1,369.19	$0.000000	$0.00	$0.061	$3,080.67
FL	7,420,802	28.6		$0.019	$4,036,916.29	$0.000105	$22,262.41	$0.043	$9,060,799.24
GA	3,585,584	4.1		$0.028	$419,513.33	$0.000241	$3,585.58	$0.060	$892,810.42
IA	1,221,576	2.1	$1,472,181.41	$0.007	$17,102.06	$0.000000	$0.00	$0.017	$42,755.16
ID	579,408	0.6		$0.017	$5,794.08	$0.000000	$0.00	$0.041	$13,905.79
IL	4,836,972	51.9	$4,521,460.16	$0.011	$2,684,519.46	$0.000077	$19,347.89	$0.024	$6,099,421.69
IN	2,502,154	17.0	$766,319.53	$0.011	$447,885.57	$0.000059	$2,502.15	$0.024	$1,005,865.91
KS	1,112,096	10.4		$0.006	$65,613.66	$0.000000	$0.00	$0.014	$162,366.02
KY[1]	1,719,965	4.4	$137,416.50	$0.028	$216,715.59	$0.000225	$1,719.97	$0.059	$448,910.87
LA	1,728,360	1.9		$0.020	$67,406.04	$0.000000	$0.00	$0.044	$146,910.60
MA	2,547,075	0.6	$423,918.91	$0.047	$71,318.10	$0.000000	$0.00	$0.076	$114,618.38
MD	2,156,411	2.2		$0.025	$118,602.61	$0.000000	$0.00	$0.056	$269,551.38
ME	557,219	0.1		$0.054	$4,457.75	$0.000000	$0.00	$0.074	$6,129.41
MI	3,872,508	0.1	$333,353.58	$0.014	$7,745.02	$0.000000	$0.00	$0.027	$15,490.03
MN	2,087,227	10.7		$0.009	$198,286.57	$0.000094	$2,087.23	$0.021	$469,626.08
MO	2,375,611	1.3	$56,939.79	$0.011	$35,634.17	$0.000000	$0.00	$0.025	$78,395.16
MS	1,115,768	0.9	$576,285.85	$0.032	$31,241.50	$0.000000	$0.00	$0.063	$62,483.01
MT	409,607	27.4		$0.015	$171,215.73	$0.000073	$819.21	$0.037	$418,618.35
NC	3,745,155	7.0		$0.029	$767,756.78	$0.000144	$3,745.16	$0.062	$1,621,652.12
ND	281,192	440.3		$0.004	$468,747.06	$0.000030	$3,655.50	$0.010	$1,211,375.14
NE	721,130	9.9		$0.005	$32,450.85	$0.000000	$0.00	$0.012	$82,208.82
NH	518,973	0.1		$0.047	$3,632.81	$0.000000	$0.00	$0.074	$5,708.70

Table III-9: Unit and meta-analysis based transfer results by state

				Benefit Transfer Results Based on Meta-Regression (Moeltner et al., 2018)					
State	Households	Total New Impacted Acres by State	Unit Value Transfer Foregone Benefits (2017$)	Mean WTP per household per acre (2017$)	Mean Estimate of Forgone Benefits (2017$)	Lower 5th WTP per household per acre (2017$)	Lower 5th Estimate of Forgone Benefits (2017$)	Upper 95th WTP per household per acre (2017$)	Upper 95th Estimate of Forgone Benefits (2017$)
NJ	3,214,360	1.5		$0.049	$231,433.92	$0.000000	$0.00	$0.076	$360,008.32
NM	791,395	0.1		$0.020	$2,374.19	$0.000000	$0.00	$0.047	$5,539.77
NV	1,006,250	54.9	$416,967.95	$0.017	$934,806.25	$0.000073	$4,025.00	$0.041	$2,278,150.00
NY	7,317,755	44.4		$0.048	$15,733,173.25	$0.000045	$14,635.51	$0.073	$23,797,339.26
OH	4,603,435	88.5	$7,331,303.82	$0.011	$4,474,538.82	$0.000068	$27,620.61	$0.024	$9,943,419.60
OK	1,460,450	0.7		$0.023	$24,827.65	$0.000000	$0.00	$0.050	$54,036.65
OR	1,518,938	5.8	$66,164.88	$0.016	$141,261.23	$0.000000	$0.00	$0.040	$347,836.80
PA	5,018,904	17.6		$0.048	$4,276,106.21	$0.000057	$5,018.90	$0.073	$6,459,329.45
RI[1]	413,600	0.1	$17,209.24	$0.054	$3,308.80	$0.000000	$0.00	$0.081	$4,963.20
SC	1,801,181	44.2		$0.028	$2,220,856.17	$0.000136	$10,807.09	$0.059	$4,737,106.03
SD	322,282	50.9		$0.004	$63,167.27	$0.000020	$322.28	$0.010	$162,430.13
TN	2,493,552	5.8	$258,988.84	$0.028	$406,448.98	$0.000173	$2,493.55	$0.060	$857,781.89
TX	8,922,933	72.2		$0.013	$8,601,707.41	$0.000083	$53,537.60	$0.032	$20,504,900.03
UT	877,692	11.4		$0.015	$145,696.87	$0.000088	$877.69	$0.036	$363,364.49
VA	3,056,058	22.9	$1,261,511.78	$0.025	$1,717,504.60	$0.000131	$9,168.17	$0.055	$3,844,520.96
VT	256,442	0.4		$0.047	$5,385.28	$0.000000	$0.00	$0.072	$8,206.14
WA	2,620,076	1.2		$0.021	$65,501.90	$0.000000	$0.00	$0.053	$165,064.79
WI[1]	2,279,768	3.3	$4,317,438.27	$0.010	$77,512.11	$0.000000	$0.00	$0.024	$177,821.90
WV	763,831	33.0	$453,628.32	$0.018	$465,936.91	$0.000091	$2,291.49	$0.041	$1,031,935.68
WY	226,879	2.1		$0.016	$7,713.89	$0.000000	$0.00	$0.040	$18,830.96
Total			**$26,150,660[2]**		**$59,416,523**		**$238,021**		**$121,700,961**

[1] Unit value transfer estimate came from a study conducted in the same state.

[2] Note that the unit value transfer exercise does not produce a comprehensive estimate of forgone benefits because more than half the states do not have appropriate unit value estimate to transfer.

III.C.3 Disaggregation of Costs and Benefits by State

The most straightforward way to take state responses to proposed changes in CWA jurisdiction into account is to estimate benefits and costs at the state level. The emphasis of the economic analysis for the 2015 Rule was national level estimates, although the analysis included a few categories of benefits and costs estimated at the state level, aggregated to and reported at the national level, with the rest of the categories being estimated directly at the national level. [68] The state-level treatment categories were stream mitigation costs, wetlands mitigation costs, and wetlands benefits, though as noted above, the agencies calculated wetlands benefits at both the state and regional level. These are the categories for which both the agencies could obtain state level data, and for which unit costs or per household benefits were expected to vary geographically. All other categories were nationally estimated and are the focus of the disaggregation to state-level analysis here. This section describes the additional analysis to disaggregate those categories of benefits and costs to the state level. The CWA programs that the 2015 Rule assumed would be affected are discussed below. It is possible that other CWA programs would be affected by the 2015 Rule and its repeal, but this analysis is limited to those programs addressed in the 2015 analysis.

The CWA section 311 program addresses oil spill prevention and preparedness, reporting obligations and response planning, and pertains to facilities that produce or store oil products, depending on volume and whether there is a reasonable expectation for an oil discharge in harmful quantities into or upon "waters of the United States" or adjoining shorelines. The EPA, the agency that administers this program, has information on the location by state of the high-risk facilities and those facilities that have been inspected. The EPA also has estimates of the overall number of facilities and the distribution by EPA Region from its latest Paperwork Reduction Act Information Collection Request (ICR) renewal and from Regulatory Impact Analyses (RIAs) related to prior SPCC rulemakings, each of which was published in the Federal Register and available for public comment. While the ICR and RIA data do not describe the universe of facilities at the state level, the agencies were able to leverage these sources to distribute the estimate of total facilities affected from the 2015 Rule analysis to each state.[69] The average number of facilities potentially affected in the first stage analysis per state is 20, but these range from 1 to 150. Unit costs per facility are not assumed to vary by location, thus, costs vary at the state level mainly because of variable activity levels.

The CWA section 402 CAFOs permitting program is implemented by states with NPDES permitting authority, or the EPA in the states that have not been authorized. The EPA compiles annual summaries on the implementation status of the NPDES CAFO regulations. The agencies used percent of total CAFOs with NPDES permits in 2016 to disaggregate to the state level the national estimates for administrative costs, compliance costs, and benefits from the 2015 economic analysis. The average number of facilities potentially affected in the first stage analysis per state is about 120, but these range from 0 to nearly 600.

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[68] Benefits and costs for the 311 program, 402 program, and parts of the 404 program are estimated at a national level and then apportioned to each state based on the amount of programmatic activity in each state. Because initial estimates are national in scope, externalities that cross state lines should in theory be included in the apportioned state totals.

[69] These assumptions and additional calculations are reported in the spreadsheet entitled "Revised Step 1 Rule Analysis" found in the docket (See Docket No. EPA-HQ-OW-2018-0149).

Unit costs per facility are not assumed to vary by location, thus, costs vary at the state level mainly because of variable activity levels.

The CWA section 402 stormwater permitting program is also implemented by states with NPDES permitting authority, or the EPA in the states that have not been authorized. The national estimates of administrative costs, compliance costs, and benefits in the economic analysis of the 2015 Rule are based on certain construction activities that are expected to generate stormwater runoff. The EPA does not have detailed and complete information at the state level on construction projects covered by a construction stormwater permit. To apportion the regional goals to the state level, the agencies used data from the U.S. Census on new residential construction starts for 2016.[70] While new non-residential construction starts are not included in the U.S. Census data, total construction generally tracks residential construction reasonably well. The average number of residential construction starts affected in the first stage analysis in states in 2016 was 3,600, with a range of 100 to 24,000. For purposes of this analysis, administrative and compliance costs and benefits per site are not assumed to vary significantly with location, thus, estimates of benefits and costs vary at the state level mainly because of variable activity levels.

While several components of the CWA section 404 permitting program were based on state-level information on wetland acres and stream miles in the economic analysis for the 2015 Rule, permitting costs were reported as a national aggregate. The Corps maintains data on section 404 permits issued; the agencies used the total number of permits in fiscal years 2011 to 2016 to estimate the annual average portion of national permitting activity that occurred in each state. The average percentage potentially affected in the first stage analysis per state is 2.0 percent, with a range from 0.1 percent to over 10 percent. CWA section 404 permitting costs are not assumed to vary significantly with location, thus, estimates of costs vary at the state level mainly because of variable activity levels.

Finally, two categories of costs were apportioned to states, by spreading those costs equally across the states. These two categories are those for which there were no readily available data denoting state differences, and are also two of the categories among the smaller costs at the national level.[71] For CWA section 401 administrative costs, the agencies have applied a weighted average cost, where the cost by level of effort is weighted by an assumed representative distribution of states by level of effort.[72] By using the weighted average cost, the agencies are able to abstract from specific knowledge of the level of effort each state applies to CWA section 401 administration. For CWA section 402 pesticide general permitting costs, the agencies could not identify a source of state-level data on the number of entities covered by a state pesticides general permit. In addition, because these two categories are among the smaller categories, having more refined data is unlikely to have a significant impact on the overall results.

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[70] *See* https://www.census.gov/construction/bps/txt/tb2u2016.txt.

[71] Two other cost categories have smaller national costs – CWA section 402 CAFOs Administration and CWA section 402 Stormwater Administration; however, these categories have implementation costs that make their overall impact larger, and the agencies were able to parse the administrative costs by state using the same data as for the implementation costs and benefits.

[72] *See* Section 7 of the 2015 economic analysis for more detail on the costs by level of effort and distribution of states by level of effort for the CWA section 401 Administration program.

III.C.4 Adjustment of Values from a Base Year of 2014 to 2017

The adjustment of values in the 2015 economic analysis from 2014 to 2017 entails two components. In the 2015 economic analysis, the size of each program (*e.g.*, number of permits) was adjusted from the year of the underlying analysis to 2014, to represent a more accurate size, before applying a factor for the percent of jurisdictional determinations expected to change from negative to positive as a consequence of the 2015 Rule. In this analysis the agencies have converted from 2014 dollars to 2017 dollars, using the CPI-U index from the Bureau of Labor Statistics.

III.C.5 Improved Estimate of the High End of the Cost Savings for CWA Section 404 Permit Application

In reviewing the calculations for the economic analysis for the 2015 Rule and 2017 Step 1 proposal for the adjustments noted above, the agencies discovered an inadvertent error in the formula for the high end estimate of the CWA section 404 permitting costs. The per-acre variable cost term from the Sunding and Zilberman (2002) study was not multiplied by the number of permits, which resulted in a significant decrease in the high-end cost estimate for 404 permitting in the 2015 and 2017 economic analyses. This error has been corrected in this analysis. This category of costs (and benefits) was the only category in which this error occurred.

III.C.6 Results and Discussion

For comparison with the 2015 Rule and the 2017 proposal, the results of this analysis, except for states' response to changes in the definition of "waters of the United States," are reported in Table B-1 in Appendix B. The results in Table B-1 are similar to those of Table 1 of the economic analysis for the Step 1 proposed rule, although they are not exactly the same. First, they include the forgone benefits from CWA section 404 wetlands mitigation using the meta function transfer (*see* Section III.C.2.2). Second, the CWA section 404 permitting costs high range estimate is significantly larger due to the correction of a previous error (*see* Section III.C.5). Third, the costs and benefits associated with other programs changed slightly (by $0.1 million to $1.0 million) due to adjusting to 2017 prices (*see* Section III.C.4).

Table III-10 to Table III-12 display the results of implementing the several scenarios of state responses described in Section II. The effect of implementing these scenarios produces smaller estimates of avoided costs and forgone benefits (as compared to the 2017 analysis), reflecting what the agencies consider to be a more realistic estimate of repealing the 2015 regulation. The assumptions here are the result of the agencies' re-examination of prior analyses and judgment that this analysis more accurately reflects the avoided costs and forgone benefits of this action. Table III-10 shows the results for Scenario 1, in which states that were already regulating waters at levels above the pre-2015 practice are excluded from the analysis.

Table III-10: Scenario 1 – Estimates of avoided costs and forgone benefits excluding the impact from states that are likely to continue their baseline dredged/fill and other surface water permitting practices

	Annual Avoided Costs (2017$ millions)		Annual Forgone Benefits (2017$ millions)	
	Low	High	Low	High
CWA 402 CAFO Administration	$0.1	$0.1	$1.7	$3.0
CWA 402 CAFO Implementation	$2.8	$2.8		
CWA 402 Stormwater Administration	$0.1	$0.1	$14.2	$18.0

Table III-10: Scenario 1 – Estimates of avoided costs and forgone benefits excluding the impact from states that are likely to continue their baseline dredged/fill and other surface water permitting practices

	Annual Avoided Costs (2017$ millions)		Annual Forgone Benefits (2017$ millions)	
CWA 402 Stormwater Implementation	$14.3	$17.8		
CWA 404 Permit Application	$15.7	$39.5	$16.7	$16.7
CWA 404 Mitigation – Wetlands	$37.7	$57.6		
SUBTOTAL	$70.7	$117.8	$32.6	$37.7
CWA 311 Compliance	$7.3	$7.3	*not quantified*	*not quantified*
CWA 401 Administration	$0.4	$0.4	*not quantified*	*not quantified*
CWA 402 Pesticide General Permit Implementation	$1.8	$2.0	*not quantified*	*not quantified*
CWA 404 Mitigation – Streams	$18.0	$36.6	*not quantified*	*not quantified*
TOTAL	$98.2	$164.2	$32.6	$37.7

These results exclude the costs and benefits for 404 permit applications and wetland mitigation for states classified as response category 4 for regulation of dredged or fill material, and it excludes the costs and benefits for all other categories for states classified as response category 3 for other surface water regulation.

Table III-10 shows that the avoided costs and forgone benefits estimates are reduced from the 2017 proposal analysis, with the largest decrease in the high range of avoided costs, and somewhat larger effects on avoided costs than on forgone benefits. Table B-2 in the Appendix to this analysis shows a slight variation on Scenario 1, also excluding states that may continue the baseline dredged/fill regulation. This scenario produces slightly lower but similar values as Scenario 1, as only a few states' responses are assumed to change.

Table III-11 shows Scenario 2, which assumes that some states without broad legal restrictions to regulate more broadly than the federal "floor" would react to regulate at the state level waters that would no longer be considered jurisdictional under the CWA. In assuming that these states would respond in this way, Scenario 2 shows results that are dramatically smaller in magnitude than the Scenario 1 results. Avoided costs in Scenario 2 are approximately 50 to 60 percent of the avoided costs in Scenario 1.

Table III-11: Scenario 2 – Estimates of avoided costs and forgone benefits excluding the impact from states that may continue their baseline dredged/fill and surface water permitting practices

	Annual Avoided Costs (2017$ millions)		Annual Forgone Benefits (2017$ millions)	
	Low	**High**	**Low**	**High**
CWA 402 CAFO Administration	$0.0	$0.0	$0.3	$0.6
CWA 402 CAFO Implementation	$0.5	$0.5		
CWA 402 Stormwater Administration	$0.0	$0.0	$1.5	$1.9
CWA 402 Stormwater Implementation	$1.5	$1.9		
CWA 404 Permit Application	$10.2	$25.5	$14.3	$14.3
CWA 404 Mitigation – Wetlands	$26.7	$42.1		
SUBTOTAL	$38.9	$70.1	$16.1	$16.8

Table III-11: Scenario 2 – Estimates of avoided costs and forgone benefits excluding the impact from states that may continue their baseline dredged/fill and surface water permitting practices

	Annual Avoided Costs (2017$ millions)		Annual Forgone Benefits (2017$ millions)	
	Low	**High**	**Low**	**High**
CWA 311 Compliance	$1.1	$1.1	*not quantified*	*not quantified*
CWA 401 Administration	$0.1	$0.1	*not quantified*	*not quantified*
CWA 402 Pesticide General Permit Implementation	$0.4	$0.5	*not quantified*	*not quantified*
CWA 404 Mitigation – Streams	$14.0	$27.8	*not quantified*	*not quantified*
TOTAL	$54.6	$99.6	$16.1	$16.8

These results exclude the costs and benefits for 404 permit applications and wetland mitigation for states classified as response category 3 or 4 for regulation of dredged or fill material, and it excludes the costs and benefits for all other categories for states classified as response category 2 or 3 for other surface water regulation.

Table III-12 shows Scenario 3, which only includes states likely to reduce their baseline dredged/fill and other surface water permitting practices. This only includes the potential effect of states which have legal restrictions or some other constraint (such as lack of permitting authorization) that limits the ability to regulate above the federal standard. Assuming that only these states would respond to the first stage of this proposed action reduces the estimated avoided costs and forgone benefits even further. Avoided costs and forgone benefits in Scenario 3 are approximately 10 percent of their respective values in Scenario 1.

Table III-12: Scenario 3 – Estimates of avoided costs and forgone benefits only including the impact from states that are likely to reduce their baseline dredged/fill and surface water permitting practices

	Annual Avoided Costs (2017$ millions)		Annual Forgone Benefits (2017$ millions)	
	Low	**High**	**Low**	**High**
CWA 402 CAFO Administration	$0.0	$0.0	$0.3	$0.6
CWA 402 CAFO Implementation	$0.5	$0.5		
CWA 402 Stormwater Administration	$0.0	$0.0	$1.5	$1.9
CWA 402 Stormwater Implementation	$1.5	$1.9		
CWA 404 Permit Application	$1.5	$3.8	$1.2	$1.2
CWA 404 Mitigation – Wetlands	$2.3	$2.9		
SUBTOTAL	**$5.9**	**$9.2**	**$3.1**	**$3.8**
CWA 311 Compliance	$1.1	$1.1	*not quantified*	*not quantified*
CWA 401 Administration	$0.1	$0.1	*not quantified*	*not quantified*
CWA 402 Pesticide General Permit Implementation	$0.4	$0.5	*not quantified*	*not quantified*
CWA 404 Mitigation – Streams	$1.7	$3.8	*not quantified*	*not quantified*
TOTAL	**$9.1**	**$14.6**	**$3.1**	**$3.8**

These results exclude the costs and benefits for 404 permit applications and wetland mitigation for states classified as response category 2, 3, or 4 for regulation of dredged or fill material, and it excludes the costs and benefits for all other categories for states classified as response category 2 or 3 for other surface water regulation.

IV. Stage 2 Analysis: CWA Jurisdictional Change from Pre-2015 Practice to the Proposed Rule

This section focuses on the second stage analysis of effects of this proposed rule, that is, the potential effects associated with going from the pre-2015 practice to the proposed definition of "waters of the United States." The Stage 2 economic analysis consists of a series of qualitative analyses and three detailed case studies and a national analysis related to the CWA section 404 program. The purpose of the qualitative analysis is to provide the best national assessment of the likely effects of this proposal without providing quantitative assessment. As stated, the agencies currently lack the data sets to quantitatively assess the likely effects of this portion of the provisions. The qualitative analysis is intended to provide information on the likely direction of the effects based on the best professional judgments of the agencies. In addition, the agencies conducted three case studies in three major watersheds to provide in-depth information on the likely quantitative assessment of the effects. The case studies have considered likely ecological effects, and their accompanying economic effects. The case studies highlight the complexity of the potential decision matrices and the depth of data and modeling requirements, requiring more sophisticated analytic framework than the framework used in the 2015 analysis. The case studies conclude that the effects of provisions going beyond the pre-2015 baseline are modest regardless of the level of state engagement in water resource protection as modeled in Scenarios 1 through 3. The anticipated combined case study cost savings range from $6.84-21.97 million (2017$, 7% discount rate), and the estimated foregone benefits $0.37-3.25 million (2017$, 3% discount rate). Finally, the agencies conducted a national analysis of the proposed changes in CWA jurisdiction on the CWA 404 program. Nationally the proposed CWA jurisdictional changes are estimated to result in between $27.6 to $265.7 million in avoided costs and between $6.9 and $46.8 million in forgone benefits.

IV.A Qualitative Assessment of Effects on CWA Programs

This section focuses on the potential effects associated with the change from the pre-2015 practice to the proposed definition of "waters of the United States." The first three subsections describe the effects on the section 402, section 404, and the section 311 programs, respectively. The fourth subsection covers other CWA programs.

IV.A.1 Section 402: National Pollutant Discharge Elimination System

Section 402 of the CWA establishes the NPDES program to authorize the discharge of pollutants from point sources to "waters of the United States," in compliance with applicable requirements and conditions. NPDES permits may incorporate different statutory and regulatory requirements depending on the source type, volume of discharge, receiving waterbody, and state/tribal water quality standards. Section 402 regulates discharges of the following categories of pollutants:

- Conventional pollutants: BOD, TSS, oil and grease, fecal coliform, and pH
- Toxic pollutants: 126 "Priority Pollutants" (40 CFR part 423), which include metals (*e.g.*, Cu, Pb, Hg) and organic compounds (*e.g.*, PCBs, dioxin)
- Non-conventional pollutants: all other pollutants (*e.g.*, chlorine, ammonia, nitrogen, phosphorus)

As discussed earlier, the NPDES permit program is administered by authorized states or the EPA. The EPA issues some NPDES permits for discharges from federal facilities,[73] most of the tribal reservation lands,[74] and U.S. Territories (except the U.S. Virgin Islands) as well as all permits in the three states that have not been authorized to administer the program (Massachusetts, New Hampshire, and New Mexico) and for certain activities in states with only partial authority. The EPA has authorized most (47) states to operate the CWA section 402 permitting program, and states assert jurisdiction over "waters of the state" which must be as inclusive as "waters of the United States" but may be more expansive.

IV.A.1.1 Overview

The CWA requires a permit for discharges of pollutants to "waters of the United States" from point sources, defined in the act as any discernable, confined, and discrete conveyances (*e.g.*, pipes, ditches, channels, concentrated animal feeding operations, or vessels). Typically, the compliance point for NPDES permits is the location where the effluent is being discharged from the facility. *See* NPDES Permit Writers' Manual at pages 8-1 to 8-5. Agencies may issue individual or general permits. Individual permits may be issued when site-specific limits, management practices, monitoring and reporting, or other facility-specific permit conditions are needed. One individual permit is issued per one applicant; the individual permit may cover several outfall points. General permits are issued when multiple dischargers require permit coverage, sources and discharges are similar, and permit conditions are relatively uniform. One general permit is issued for multiple dischargers. The permit identifies coverage area, sources covered, and administrative processes for dischargers to identify that they intend to be covered (*e.g.*, whether the applicant must submit a Notice of Intent (NOI) to seek coverage under the general permit).

The EPA's ICIS-NPDES database includes 250,040 unique permit numbers, including individual and general permits.[75] Some facilities may have more than one permit (*e.g.*, an individual permit for process wastewater and a general permit for stormwater).[76] Table IV-1 summarizes the NPDES permits by EPA Region and permit type. The majority (49,908) of the NPDES permits potentially affected by the proposed rule are general permits (including stormwater). Section IV.A.1.2 discusses the potential effects of proposed changes to the "waters of the United States" definition on the section 402 program.

Table IV-1: Estimated number of NPDES permits by EPA region

EPA Region	All NPDES Permits[1]	All Individual Permits[1]	All General Permits[1]
1	7,030	1,240	5,790
2	17,152	4,895	12,257
3	30,015	9,096	20,919

[73] In general, federal facilities are defined as buildings, installations, structures, land, public works, equipment, aircraft, vessels, other vehicles, and property, owned, constructed or manufactured for leasing to the Federal government. (https://www.epa.gov/enforcement/enforcement-and-compliance-federal-facilities)

[74] The state of Maine has authority to issue NPDES permits on the territory of two tribes.

[75] This estimate includes both active and expired permits in ICIS-NPDES since facilities with expired permits can still operate. It excludes "terminated" permits that are no longer binding. It also excludes permits that did not have valid latitude/longitude coordinates or were not truly NPDES permits (*see* Appendix A in the Resource and Programmatic Assessment for detail).

[76] In this section, "facility" refers to plants, construction sites, or other types of point source dischargers.

Table IV-1: Estimated number of NPDES permits by EPA region

EPA Region	All NPDES Permits[1]	All Individual Permits[1]	All General Permits[1]
4	81,883	8,621	73,262
5	17,207	10,042	7,165
6	26,173	5,573	20,600
7	22,467	6,394	16,073
8	15,180	1,968	13,212
9	20,560	986	19,574
10	11,472	1,153	10,319
Other[2]	901	255	646
Total	**250,040**	**50,223**	**199,817**

[1] *Source: EPA's ICIS-NPDES data, 2017*. The facility permits included in the spatial analysis are limited to those for which the ICIS-NPDES database includes latitude/longitude coordinates. The number of NPDES permits is likely to overstate the number of affected entities since each permit holder may have more than one NPDES permit (*e.g.*, industrial discharge and stormwater permits).

[2] Includes U.S. territories and tribal lands.

The EPA and state NPDES permitting agencies develop technology-based effluent limits (TBEL) for all applicable pollutants of concern. TBELs are based on national technology based effluent limitations and standards (*i.e.*, effluent limitations guidelines and standards) that are developed to establish minimum levels of pollutant controls for most direct and indirect dischargers for conventional pollutants, non-conventional pollutants, and toxic pollutants and provide equity among dischargers within categories. In the absence of national limitations and standards, TBELs are developed on a case-by-case, best professional judgment (BPJ) basis. Instead of this effluent guidelines approach, the statute provides for the EPA to establish secondary treatment standards for publicly-owned treatment works.

If TBELs are not adequate to protect water quality to meet applicable water quality standards, the CWA requires the permitting authority to include water quality-based effluent limits (WQBEL) as necessary to meet applicable state or tribal water quality standards and that are consistent with any EPA-established or EPA-approved TMDLs that may apply to the discharge. Currently, all states have state water quality standards under CWA section 303, as well as listed impaired waters and TMDLs for those impaired waters under section 303(d). If a TMDL has been developed for the receiving waterbody, states (or EPA regions) assign waste load allocation to each point source discharge and load allocation to nonpoint sources such that predicted receiving water concentrations do not exceed water quality criteria. States and tribes may develop standards for non-jurisdictional waters under state or tribal law, but these criteria are not enforceable under the CWA.[77]

[77] CWA section 402(p)(3)(B)(iii) provides for a unique standard to be used for controls of municipal separate storm sewer systems (MS4s).

IV.A.1.2 Potential Effects of the Proposed Rule on Section 402 Program

Facilities that currently have a NPDES permit under CWA section 402 or a state permit under an authorized state program can be assumed to either discharge to a "water of the United States" or to waters designated to be "waters of the state" by the authorized state in which they are located. The proposed regulation could result in a jurisdictional change to a discharger's receiving water or downstream water, and thus may result in a potential change to the discharger's permit. This is more likely the case if the state does not currently consider these receiving waters to be "waters of the state" and/or if they do not extend this status to these waters in response to a change in the definition of "waters of the United States." Facilities that consider their receiving water's status to have potentially changed can opt to: continue with their existing permit (*status quo*); formally request a permit modification;[78] or formally request to have their permit terminated.

When evaluating potential impacts from removing CWA jurisdiction on certain waters, the agencies carefully considered potential state-level and facility responses, as shown in Figure IV-1. This figure illustrates the variety of potential outcomes that could result for any single facility, and in turn the numerous complexities that would have to be addressed to quantitatively estimate the impacts of the proposed rule. Nonetheless, based on this analysis the agencies believe that the definitional change to "waters of the United States" would not greatly affect the number of facilities that operate under individual NPDES permits such as those issued for municipal wastewater treatment plants or industrial facilities. Similarly, entities covered by general permits, such as construction projects, are not likely to experience a change in their regulatory status. The exception may be in arid areas of the country where there could be a greater change in the number of jurisdictional waters. After the 2006 *Rapanos* decision, several NPDES permit holders in the Western United States asserted they no longer required a permit because of the potential non-jurisdictional status of a receiving water. The agencies are aware that in some cases such inquiries have resulted in a permitting authority determining that a discharger no longer needed a permit. There are several potential explanations for this, related to the nature of the permitted activity, state requirements, and facility-level incentives.

First, the nature of a traditional discharge permit where a facility is seeking to discharge wastewater is different from a section 404 permit (described in Section IIV.A.2 below) where a developer or landowner is, for example, seeking to fill a portion of a "water of the United States." It is possible for a CWA section 402-permitted discharger to contribute to creating a permanent water feature where there once was an intermittent stream or ephemeral features because of continuous discharge (*i.e.*, an "effluent-dependent" or "effluent-dominated" water). In these cases, which are the exception rather than the norm, this proposal may not affect jurisdiction.

Second, the EPA has authorized most (47) states to administer the CWA section 402 permitting program. In addition, some states assert state law jurisdiction over "waters of the state" which is inclusive of "waters of the United States" but may be more expansive. These state law programs can, and in some cases already do, cover waters that are not considered "waters of the United States." Should CWA jurisdiction change, states may respond in different ways. As discussed in Section II.A, state programs may choose to issue permits for non-federally regulated waters solely based on state authority. States may

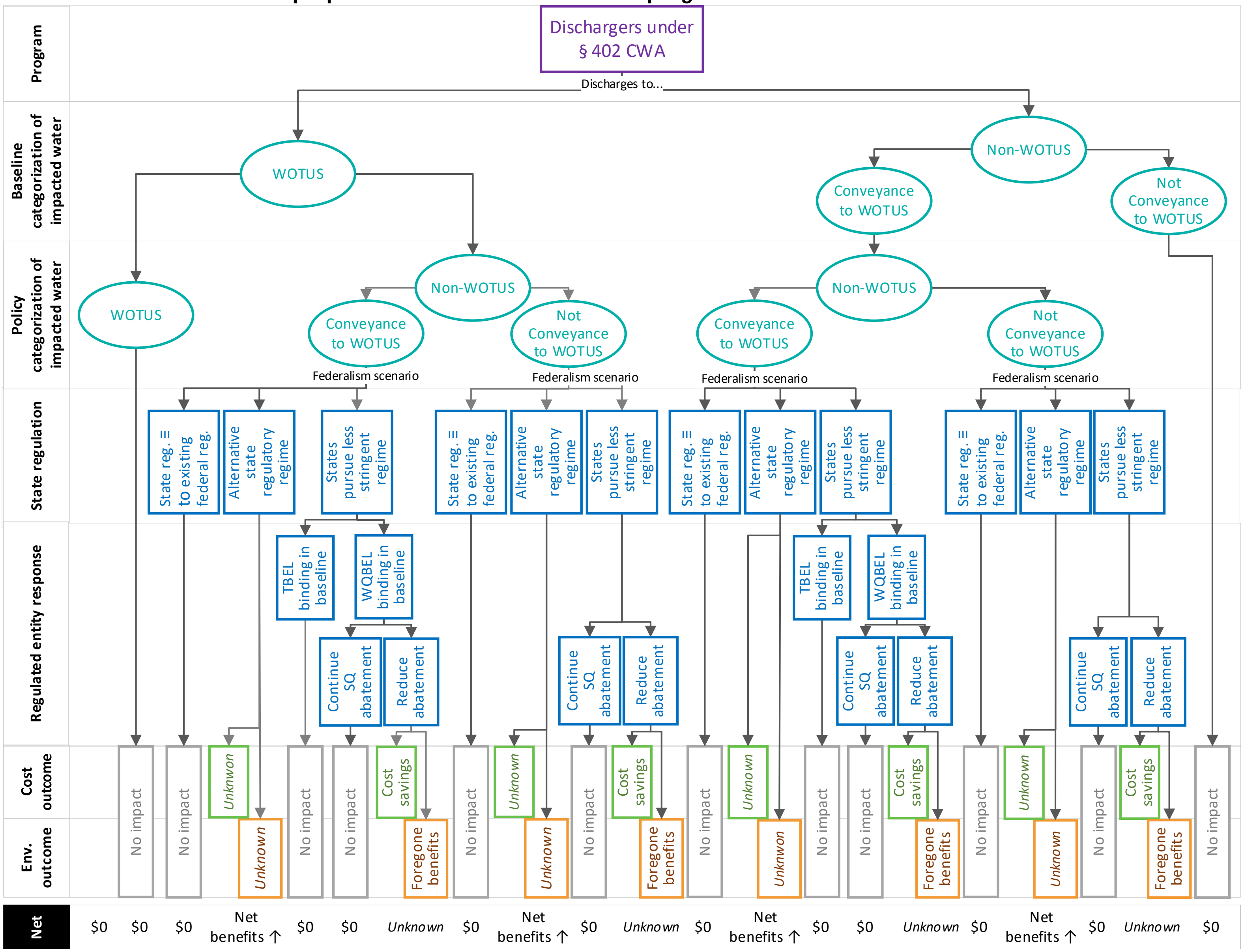
[78] This request could happen before or during their permit reissuance process.

also revise WQBELs to reflect attenuation or additional dilution farther downstream (to a water subject to the CWA) from the source of the pollutant if the discharge point is no longer into a "water of the United States." Some states (*e.g.*, California, Connecticut, Maryland, Michigan, New York, and several others) have enacted or amended laws to regulate state water resources that have lost federal oversight, or whose coverage by federal law is now uncertain.[79]

Additionally, existing facilities may have made the capital investments in wastewater treatment systems that discharge to receiving water that will no longer be their jurisdictional and may willingly continue operating under their permit and see no need to challenge jurisdictional status of the receiving waters. Depending on industry standards or recommended practices, the facility may implement treatment technologies or best management practices voluntarily but could still save on some compliance costs. The following subsections discuss in greater detail potential permittee's responses by permit type potentially affected by a change in the definition of "waters of the United States."

[79] See the supporting "Resource and Programmatic Assessment for the Revised Definition of 'Waters of the United States' Proposed Rule, Appendix B."

Figure IV-1: Potential effects of the proposed rule on CWA section 402 program.



IV.A.1.3 Potential Effects of Proposed Rule on Individual NPDES Permits

As outlined in Figure IV-1, the potential cost savings and forgone benefits of the proposed rule affecting industries or entities with section 402 permits to discharge to non-jurisdictional receiving waters will depend on multiple factors. These factors include: the state decision on whether to continue regulating newly non-jurisdictional waters to the same level as federal regulations (see Section II.A for detail), the basis for the NPDES permit (TBEL vs. WQBEL), whether the facility's discharge conveys to a "water of the United States" downstream from the non-jurisdictional receiving reach, and the facility's decision to continue voluntarily implementing controls.

Individual permit holders may already have treatment technologies in place and may willingly continue operating under the conditions set in their existing permit even though they may not require a NPDES permit in the future. New permit holders with no existing capital investments in treatment systems may make different decisions. Thus, new establishments in the affected industrial categories that would have been subject to effluent limitations are more likely to request an approved jurisdictional determination to reduce both capital and operational costs unless the state continues a similar level of regulation of the receiving waters. Reducing controls on effluent discharging to non-jurisdictional waters may have adverse water quality impacts on the receiving waters as well as downstream.

A permittee currently discharging to a jurisdictional water that is not attaining water quality standards is subject to more stringent limits based on a WQBEL which must also be consistent with any applicable wasteload allocations in a TMDL. If the receiving water becomes non-jurisdictional under a definitional change of "waters of the United States," but eventually conveys to a "water of the United States," the permittee could request a jurisdictional determination and revision of its WQBEL to account for potential dilution or attenuation of the pollutant(s) occurring between end-of-pipe and the point where the effluent enters jurisdictional waters. Under this scenario, the permittee may realize cost savings as compared to meeting the previous permit limits. Less stringent effluent limitations may have a negative impact on water quality in the receiving non-jurisdictional streams. Under the proposed rule, state water quality standards could continue to apply to the now non-jurisdictional receiving waters if state regulations apply more broadly, but these standards would not be federally enforceable and water quality monitoring would not be required by the CWA within these waters.

IV.A.1.4 General Permits

As noted above, NPDES general permits cover dischargers with similar characteristics (*e.g.*, within the same industry) within a given geographical location. In most cases, a permittee is required to complete and submit a Notice of Intent (NOI) and comply with the terms of the general permit. Each permittee receives a unique NPDES number. Because a large number of facilities can be covered under a single general permit, general permits may offer a cost-effective option for permitting agencies. Nearly 60 percent of the general permits the agencies analyzed are stormwater permits, and these are discussed in Section IV.A.1.5.

IV.A.1.5 Section 402 Stormwater Permitting

Stormwater runoff is generated when precipitation from rain and snowmelt flows over land or impervious surfaces instead of percolating into the ground. As the runoff travels (especially over paved streets, parking lots, and building rooftops), it can accumulate debris, chemicals, sediment, and/or other pollutants that may be detrimental to stream water quality; runoff can also gain velocity and be directed towards waterbodies, thus increasing the probability of these pollutants reaching a stream. Polluted stormwater runoff can harm or kill fish and other wildlife. Excess sedimentation can impair aquatic habitat, and high volumes of runoff can cause stream bank erosion. Debris can clog waterways and potentially reach the ocean where it can harm marine wildlife and degrade habitats.

Some stormwater discharges have been designated by statute, regulations, or on a case-by-case basis and require coverage under a NPDES permit. Under CWA section 402(p), the EPA implemented the stormwater program in two phases, with the Phase I rule issued in 1990 and the Phase II rule issued in 1999. The stormwater program regulates stormwater from some construction sites (*i.e.*, those disturbing one or more acres of land, or disturbing less than one acre but part of a common plan of development or sale that will disturb one or more acres), specific industrial sectors specified in the Phase I rule, and discharges from some Municipal Separate Storm Sewer Systems (MS4s). The EPA's ICIS-NPDES data used by the agencies includes 120,989 stormwater permits, including individual and general permits. Over 20 percent of the permitted dischargers analyzed (26,366) are for stormwater discharges from construction and development activities. Dischargers with unknown industry classification (missing SIC code) and in "other" categories account for 51 and 21 percent of the total stormwater permits respectively. Industrial facilities covered under an industrial stormwater permit, such as the EPA's Multi-Sector General Permit (MSGP) account for approximately five percent of stormwater permit holders. MS4s account for less than one percent of all permittees covered under the stormwater program.

IV.A.1.5.1 Construction Stormwater

In general, the NPDES stormwater program requires permits for discharges from construction activities that disturb one or more acres, and discharges from smaller sites that are part of a larger common plan of development or sale. The Construction and Development (C&D) effluent limitations guidelines (ELGs) apply to permits for stormwater discharges from all construction activities including clearing, grading, and excavation, except operations that result in the disturbance of less than one acre of land area, unless they are part of a common plan of development or sale that disturbs more than one acre (40 CFR part 122.26(b)(14)(x) and 40 CFR part 122.26(b)(15)). Under 40 CFR part 450 (the C&D ELGs), all covered entities must: (1) design, install, and maintain erosion and sediment controls; (2) initiate soil stabilization in disturbed areas immediately whenever any clearing, grading, excavating, or other earth disturbing activities have ceased; (3) design, install, and maintain pollution prevention measures to minimize the discharge of pollutants to surface waters; (4) prevent the discharge of the wastewater, fuels, oils, or other pollutants used in vehicle and equipment operations and maintenance and equipment washing; and (5) implement other BMPs to minimize adverse effects on surface water.

The agencies carefully considered the potential effect of the proposed definitional change to "waters of the United States" on the issuance of section 402 permits for stormwater from construction and development sites. As suggested by Figure IV-1, due to data limitations and the lack of a strong basis for the necessary analytical assumptions, it is not feasible to rigorously estimate the potential avoided costs to the construction industry and corresponding forgone benefits of no longer needing a section 402 permit for stormwater discharges from construction sites to non-jurisdictional waters. The agencies, however, believe that both potential cost savings to the industry and the potential environmental impacts from construction activities due to a change to the definition of "waters of the United States," as proposed, would likely to be modest in the areas where construction activities have a potential to affect both non-jurisdictional and jurisdictional waters. First, projects disturbing at least one acre of land, and which in turn require NPDES permit coverage, are presumed to be large enough to generate stormwater runoff that could reach a jurisdictional water, either directly or through a conveyance such as a municipal storm sewer, and so would be required to obtain permit coverage. Procedures typically required by construction stormwater general permits have been widely adopted as normal practices in the construction industry and, as a result, the requirements are not usually considered to impose a significant burden. A reduction in jurisdictional waters is not likely to change these circumstances for most areas of the country. The exception may be for stormwater discharges from construction sites in arid states where many streams are ephemeral (*e.g.*, Arizona, Nevada, and New Mexico) and, as a result, federal standards may not be applicable for a large portion of the state waters that may be affected by stormwater discharges from construction activities (U.S. EPA and Department of the Army 2015).

Second, states and eligible tribes may develop standards for non-jurisdictional waters under state or tribal law. Potential state and tribal responses are discussed in detail in Section II.A. Third, many states and tribes have specific designated uses and water quality criteria for ephemeral streams in their state or tribal water quality standards (WQS), which could be implemented at their discretion for waters that are not "waters of the United States." Unless a state or tribe changes their WQS to downgrade these uses, WQBEL-based NPDES permits will still be applicable if the discharge reaches state waters. Finally, even if not required by federal law, developers may implement stormwater BMPs for a variety of reasons, including the need to comply with local erosion and sediment control requirements and/or to operate in a manner consistent with industry standards, the additional time required for obtaining an exemption from section 402 permit requirements, or concerns about the public perception of operating without a permit. The agencies expect little change to compliance costs or adverse water quality impacts from construction stormwater pollution control measures required to comply with equivalent state regulations[80] or those voluntarily implemented by developers. Construction sites located in arid states that, as a result of changes in the definition of "waters of the United States" as proposed, would not be required to obtain NPDES permit coverage are most likely to realize cost savings and affect environmental quality.

IV.A.1.5.2 Industrial Stormwater

Available data are not sufficiently detailed to develop quantitative estimates of the potential cost savings and environmental impacts from stormwater discharges from regulated industrial facilities discharging to waters whose jurisdictional status could change under the proposed rule. However, qualitative analysis suggest that potential impacts may be limited. Most industrial sectors regulated under the Phase I stormwater rule are located in urbanized areas. Any permitted entity that is currently discharging to an ephemeral feature would still be required to have an NPDES permit if their discharge conveys to a jurisdictional water. However, they may request to adjust their effluent limitations to account for potential dilution or attenuation of pollutants that occurs before the discharge reaches a jurisdictional water. Regulated industrial sectors that are likely located near ephemeral streams represent a minority of the regulated industrial stormwater universe. Additionally, these types of facilities are generally large and due to their scale, they likely discharge into perennial streams (outside of the arid West). Therefore, the

[80] Section II.A provides detail on existing state programs and potential state responses to CWA jurisdictional changes.

agencies expect that industrial facilities with stormwater discharges regulated under the Phase I rule likely would continue with existing stormwater management practices, meaning there would likely be no cost savings or foregone benefits due to the proposed rule.

IV.A.1.5.3 Municipal Separate Storm Sewer Systems (MS4s)

Stormwater runoff in cities and towns is commonly transported through MS4s, from which it is often discharged, untreated, into local waters. To prevent harmful pollutants from being washed or dumped into, and being discharged from, an MS4, certain MS4s are required by law to obtain NPDES permit coverage and develop a stormwater management program (SWMP). The Stormwater Phase I rule, promulgated in 1990, requires operators of medium and large MS4s serving populations of 100,000 or more to obtain NPDES permit coverage for their stormwater discharges. The Stormwater Phase II rule, promulgated in 1999, requires regulated small MS4s in urbanized areas, as well as small MS4s outside the urbanized areas that are designated by EPA or the State, to obtain NPDES permit coverage for their stormwater discharges. Generally, Phase I MS4s are covered by individual permits and Phase II MS4s are covered by general permits. MS4 permits include terms and conditions that are adequate to meet the MS4 standard of reducing pollutant discharges from the MS4 to the “maximum extent practicable” (MEP), eliminating non-stormwater discharges to the MS4, and including other such conditions that the permitting authority deems appropriate to protect water quality.

An MS4 may have many different outfalls within its service area, some of which may discharge to waters no longer federally jurisdictional as a result of the proposed definition. However, MS4s often implement their SWMPs uniformly across their area without regard to the receiving water of a specific outfall. Thus, a change in jurisdictional status of some receiving waters is not expected to have a noteworthy effect in terms of costs or benefits, unless the proposed rule would mean that every outfall of a particular MS4 discharges to a non-jurisdictional water and that pollutants never reach a jurisdictional water. Therefore, the agencies expect little change to compliance costs or adverse water quality impacts from MS4s regulated under the EPA Phase I and Phase II stormwater rules.

IV.A.1.6 Uncertainty and Limitations

There are multiple sources of uncertainty inherent in the analysis of the potential impacts of the proposed change to the definition of “waters of the United States” on the section 402 program. First, there is significant uncertainty in the universe of entities that would be affected by a change in jurisdictional scope. The analysis presented in this report is based on the existing section 402 permits included in the EPA’s ICIS-NPDES database. The database is based on states’ reporting and may not account for all existing facilities and activities that may affect waters whose jurisdictional status might change under the proposed rule. It also does not necessarily represent all future activities that could have adverse impacts on such waters. In particular, specific locations of future construction activities as well as the potential for their stormwater discharges to affect ephemeral streams is unknown. Similarly, demand for industrial domestic wastewater treatment is driven by land development, and locations of future industrial domestic wastewater treatment facilities are not known. Second, it is impossible to predict with certainty whether states would enact new or keep existing regulations in place to regulate waters that would no longer be jurisdictional under this proposal (*see* Section II.A for detail). Third, entities that are likely to affect non-jurisdictional waters may have incentives to continue voluntarily using technologies and best management practices or to implement them in the future in the case of new activities. These incentives include, but are not limited to, industry standards, public relations, and the time required for obtaining exemption from section 402 requirements. However, new permittees motivated by potential cost savings that are likely larger than for existing permit holders may be more likely to seek jurisdictional determinations and, as a result, lead to greater realization of avoided costs and forgone benefits due to potential exemptions from the section 402 requirements.

IV.A.2 Section 404: Discharge of Dredged or Fill Material

Unless the activity is statutorily exempted,[81] the CWA prohibits discharges of dredged or fill material from a point source into "waters of the United States," including wetlands, without a permit. Such discharges are regulated under CWA section 404, which is administered by the U.S. Army Corps of Engineers with oversight by the EPA. In addition, the states of Michigan and New Jersey have assumed administration of the CWA section 404 permitting program for certain waters within their borders. The basic premise of the section 404 permitting program is that no discharge shall be permitted if (1) a practicable alternative exists that is less damaging to the aquatic environment, or (2) the discharge would cause waters of the United States to be significantly degraded.[82]

This section describes requirements of the CWA 404 program and discusses potential impacts resulting from the proposed changes to the definition of "waters of the United States."

IV.A.2.1 Overview

For a project to be permitted under the 404 program, the permittee must demonstrate that, to the extent practicable, the permittee has taken all steps to avoid impacts to wetlands and other aquatic resources, minimized potential impacts, and compensated for remaining unavoidable impacts if required. This process, commonly referred to as the mitigation sequence, applies the following mitigation steps in sequential order:

- **Avoidance:** Mitigating an aquatic resource impact by selecting the least-damaging project type, spatial location, and extent compatible with achieving the purpose of the project. Avoidance is achieved through an analysis of appropriate and practicable alternatives and a consideration of impact footprint.

- **Minimization:** Mitigating an aquatic resource impact by managing the severity of a project's impact on resources at the selected site. Minimization is achieved through the incorporation of appropriate and practicable design and risk avoidance measures.

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[81] The statutory exemptions to CWA Section 404 are set forth in subsection (f)(1). The first and most significant 404(f)(1) exemptions is for normal and ongoing farming, silviculture and ranching activities. Other examples of statutory exemptions are for maintenance, including emergency repair of recently damaged, currently serviceable structures, and for construction or maintenance of farm ponds, irrigation ditches, farm or forest roads, and temporary roads for moving mining equipment. These statutory exemptions are significantly circumscribed by the provision making them inapplicable for exemption if the activity brings an area subject to jurisdiction into a use to which it was not previously subject, where the flow or circulation of navigable waters may be impaired or the reach or waters reduced (CWA Section 404(f)(2)).

[82] *See* CWA Section 404(b)(1) and https://www.epa.gov/cwa-404/section-404-permit-program for more information.

- **Compensatory Mitigation:** Mitigating an aquatic resource impact by replacing or providing substitute aquatic resources for impacts that remain after avoidance and minimization measures have been applied. Compensatory mitigation is achieved through appropriate and practicable restoration, establishment, enhancement, or preservation of aquatic resource functions and services.

Avoidance and minimization steps assure that only projects that are the least environmentally damaging practicable alternative (LEDPA) will receive legal authority to discharge. The Corps may only permit the LEDPA (40 CFR 230.10(a)). While this sounds straightforward, there are many variables at play and they multiply in complexity depending on the type of project, the local market, the geographic context, and the type, functionality, and local importance of the aquatic resources involved.

Compensatory mitigation may be required to replace the loss of wetland and aquatic resource functions by offsetting unavoidable adverse impacts which remain after all appropriate and practicable avoidance and minimization has been achieved. There are three mechanisms for providing compensatory mitigation (listed below in order of most-to-least preferred, as established by the regulations):

- **Mitigation bank:** A site, or suite of sites, where aquatic resources are restored, established, enhanced, or preserved for the purpose of providing compensatory mitigation for impacts authorized by Department of the Army permits. Mitigation banks sell compensatory mitigation credits to permittees with regulatory requirements to offset aquatic resource impacts. The purchase of credits transfers liability for compensation from the permittee to the mitigation bank. Large compensatory mitigation banks generally provide compensation for multiple, smaller impacts.

- **In-lieu fee program:** A program involving the restoration, establishment, enhancement, or preservation of aquatic resources through funds paid to a “governmental or non-profit natural resources management entity” to satisfy compensatory mitigation requirements for Department of the Army permits. The fund payment transfers responsibility for compensation from the permittee to the in-lieu program operator. In-lieu fee programs identify and initiate projects across their service area within set timeframes from when funds are collected.

- **Permittee-responsible mitigation:** Aquatic resource restoration, establishment, enhancement, or preservation activity undertaken by the permittee (or an authorized agent or contractor) to provide compensatory mitigation for which the permittee retains full responsibility.

The agencies consider banks and in-lieu fee programs preferable to permittee-responsible mitigation because they consolidate compensatory mitigation projects where ecologically appropriate, use a watershed approach, provide a greater level of financial planning and scientific expertise, reduce temporal losses of ecological functions, increase economic efficiency, and reduce uncertainty over project success.

Two types of permits are available through the 404 program: individual permits and general permits. Individual permits are required for potentially significant impacts. The Corps evaluates potential environmental and socioeconomic effects of the proposed activity and issues a public notice that describes the proposed project. The Corps reviews all comments received and makes a final permit decision. Alternatively, letters of permission, a type of individual permit, may be used when the district engineer determines that the proposed work would be minor, would not have significant individual or cumulative impacts on the environment, and would encounter little to no public opposition.

General permits are suitable for activities that will have only minimal adverse effects individually or cumulatively. General permits authorize activities the Corps has identified as being substantially similar in nature and causing only minimal individual and cumulative environmental impacts. General permits may authorize activities in a limited geographic area (*e.g.*, county or state), a particular region of the country (*e.g.*, group of contiguous states), or the nation. The general permit process eliminates individual review and allows certain activities (*e.g.*, minor road maintenance, utility line backfill) to proceed with little or no delay, provided that the conditions for the general permit are met.

IV.A.2.2 Potential Effects of the Proposed Rule on the Section 404 Program

Under the proposed rule, the following features, among others, would not be jurisdictional: wetlands that are not adjacent to otherwise jurisdictional waters; rivers and streams that do not contribute perennial or flow to traditional navigable waters or the territorial seas; isolated lakes and ponds that are not TNWs in their own right; and certain ditches. The proposed rule could affect requirements to obtain 404 permits for certain activities in waters whose jurisdictional status would change, and for permittees to mitigate unavoidable impacts from those activities, where applicable. Absent any state, tribal, or local programs regulating these waters under their own dredged/fill programs, developers and other project proponents affecting these non-jurisdictional waters may not take the same steps to avoid impacts to wetlands and other aquatic resources, as compared to activities requiring a 404 permit in the baseline, nor would they need to demonstrate that they have minimized potential impacts to the maximum extent practicable. Further, the amount of mitigation required to offset impacts of activities would change under the proposed rule, in the absence of any similar state, tribal, or local requirements. It is not possible to assess the potential impacts of removing the minimization requirements on the types of activities that developers may pursue in the future, or on project specifications.

Data from Corps permits issued under the 404 program in fiscal years 2011 to 2015[83] indicate the amount of wetlands, streambanks, and shorelines affected by dredged or fill activities and the extent of mitigated impacts under the 404 permitting process. During this timeframe, 248,688 permits were issued under the 404 program. Permits are divided into ten different general project types: agriculture, aquaculture, development, dredging, energy generation, mining and drilling, mitigation, structure, transportation, and an "other" type. Table IV-2 provides authorized permanent impacts, temporary impacts, and mitigation requirements for each project type.

Table IV-2: Authorized impact area of CWA section 404 permits issued in 2011-2015, by project type

Project Type	Permanent Impacts		Temporary Impacts (Per Year)		Mitigation Required (Per Year)		
	Acres	Length Feet	Acres	Length Feet	Acres	Length Feet	Permits Using Credits[1]
Agriculture	583	966,813	99	73,963	311	47,383	8
Aquaculture	13,758	16,603	6,599	581	2	49	0

[83] Calendar year 2015 was the most recent complete year available at the time the agencies accessed data for use in this analysis.

Table IV-2: Authorized impact area of CWA section 404 permits issued in 2011-2015, by project type

Project Type	Permanent Impacts		Temporary Impacts (Per Year)		Mitigation Required (Per Year)		
	Acres	Length Feet	Acres	Length Feet	Acres	Length Feet	Permits Using Credits[1]
Development	19,099	2,563,048	275	108,992	9,859	278,370	990
Dredging	4,997	932,081	2,272	523,532	294	24,269	19
Energy Generation	2,320	741,194	166	93,718	676	235,181	57
Mining and Drilling	6,187	2,992,779	508	1,731,983	2,648	679,215	146
Mitigation	14,063	15,418,091	1,064	530,120	869	97,926	13
Structure	7,000	3,237,833	1,242	568,435	898	177,000	330
Transportation	13,224	5,932,043	1,994	796,314	4,592	231,032	1,546
Other	3,463	6,772,584	626	543,839	3,911	227,144	53
Total	**84,694**	**39,573,069**	**14,844**	**4,971,478**	**24,060**	**1,997,569**	**3,163**

[1] Mitigation credits are the trading medium that is used to represent the ecological gains at mitigation bank sites. The number of credits available from a mitigation bank depends on the quantity and quality of the resources that are restored, created, enhanced, or preserved. The number of acres or linear feet per credit varies among and within U.S. Army Corps Districts. This variability makes summing credits across regions inappropriate, so the number of permits utilizing mitigation credits is provided instead of total mitigation credits.

Figure IV-2 presents potential effects of the proposed rule on the section 404 program. Without CWA coverage for certain wetlands, ephemeral streams, and other waters whose jurisdictional status could change, the decision to regulate these waters will solely reside with states and tribes.[84] States and tribes could respond in the following ways (*see* "State Regulations & Review" and "Responses to regulation" in Figure IV-2):

- Regulate these waters above the levels previously required at the federal level, for example by prohibiting certain activities altogether or requiring more comprehensive mitigation actions. Some states and tribes may need to establish their own review, permitting, and verification program to ensure equivalent regulation of these waters (*see* Section II.A).
- Continue regulating non-adjacent wetlands, ephemeral streams, and other waters not jurisdictional under the proposed rule at levels equivalent to previous federal requirements. Some states and tribes may need to establish their own review, permitting, and verification program to ensure equivalent regulation of these waters (*see* Section II.A).
- Provide some regulation of these waters but at a lower level than previously required at the federal level.

[84] The agencies note that many of these features, including ephemeral streams, are not categorically jurisdictional under the pre-2015 practice and according to the *Rapanos* Guidance would have to satisfy a significant nexus analysis to be determined jurisdictional under the CWA.

- Provide no regulation of these waters once federal jurisdiction is removed.

Each state and tribe's response to a change in CWA jurisdiction would affect total impacts of the proposal. On the one hand, for states and tribes that choose to continue the same level of regulation as previously required under the CWA, the agencies assume that the annual average number of mitigation acres would remain unchanged in future years. On the other hand, for states and tribes that choose to provide no regulation beyond the new federal scope, there could be no mitigation of impacts. Impacts in states and on tribal reservations with stricter or more lenient requirements are difficult to predict since the agencies do not know how changes will affect the mitigation procedure.

Without knowing each state's and tribe's likely response to changes to the definition of "waters of the United States," the agencies can only identify states that *could* have potentially large impacts based on the authorized impact areas of 404 permits. The proposed rule, if finalized, could have a significant effect in states with large impact areas and large mitigation areas in non-coastal waters. Table IV-3 shows authorized impact areas and mitigation requirements from non-coastal 404 permits issued in 2011-2015 for each EPA region (*see* Appendix C for a breakdown by state). The states of Florida, Louisiana, Alaska, and Texas had the largest areas of authorized permanent impacts for permitted activities on non-ocean and non-tidal water resources. States with large mitigation requirements, whether in terms of acres, linear feet or credits—including Florida, South Carolina, Texas, Louisiana, and Indiana—would likely experience significant impacts from the proposed "waters of the United States" definitional changes if the states do not require similar mitigation following the change. Permits utilizing mitigation credits are presented instead of total credits because the number of acres or linear feet per credit varies among and within U.S. Army Corps Districts. Summing mitigation credits thus would not provide meaningful results.

Table IV-3: Authorized impact area of CWA section 404 permits issued in 2011-2015, excluding mitigation type permits and permits affecting resources categorized as "ocean" or "tidal."

EPA Region	Permanent Impacts[1]		Temporary Impacts[1] (Per Year)		Mitigation Required[1] (Per Year)		
	Acres	Length Feet	Acres	Length Feet	Acres	Length Feet	Permits Using Credits[2]
1	687	392,280	175	65,712	1,656	5,038	30
2	401	546,025	79	55,851	364	13,202	18
3	5,111	2,406,621	819	509,094	459	305,507	140
4	18,229	3,842,185	682	319,864	12,317	335,565	1,066
5	5,738	5,289,594	510	409,753	1,373	488,018	419
6	11,208	2,183,522	1,909	610,310	3,149	368,462	684
7	1,662	2,963,411	114	1,629,274	313	88,826	130
8	1,478	1,507,359	235	146,724	274	94,709	74
9	3,349	986,347	284	189,385	925	105,071	323
10	5,154	1,687,844	371	163,967	644	79,697	134
Total	**53,017**	**21,805,188**	**5,178**	**4,099,934**	**21,474**	**1,884,095**	**3,018**

Source: Analysis of U.S. Army Corps of Engineers' ORM2 data.

[1] The estimated impact area does not include projects from New Jersey and Michigan.

[2] Mitigation credits are the trading medium that is used to represent the ecological gains at mitigation bank sites. The number of credits available from a mitigation bank depends on the quantity and quality of the resources that are restored, created, enhanced, or preserved. The number of acres or linear feet per credit varies among and within U.S. Army Corps

Table IV-3: Authorized impact area of CWA section 404 permits issued in 2011-2015, excluding mitigation type permits and permits affecting resources categorized as "ocean" or "tidal."

EPA Region	Permanent Impacts[1]		Temporary Impacts[1] (Per Year)		Mitigation Required[1] (Per Year)		
	Acres	Length Feet	Acres	Length Feet	Acres	Length Feet	Permits Using Credits[2]
Districts. This variability makes summing credits across regions inappropriate, so the number of permits utilizing mitigation credits is provided instead of total mitigation credits.							

Several potential overall effects on the CWA section 404 permit program are possible based on a change in CWA jurisdiction as proposed:

- **Transfers:** Projects may shift away from areas containing waters that require 404 permits to areas with waters that would not be jurisdictional under the proposed rule (*e.g.*, non-adjacent wetlands and ephemeral features; *see* "Policy affected waters" in Figure IV-2). All else being constant, profit-maximizing entities will aim to avoid regulatory requirements and the associated costs. Therefore, the agencies expect that following a new definition of "waters of the United States," projects affecting "waters of the United States" to decrease and projects that affect only waters that are non-jurisdictional to increase. The potential change in the number of projects affecting both jurisdictional and non-jurisdictional waters is uncertain. As described above and depending on state, tribal, or local requirements, in cases where the project would not be subject to a federal permit, the developer may elect to not go through the same steps to minimize impacts and the length or acres of affected non-jurisdictional waters could increase as compared to the baseline. Further, as a result of projects shifting to non-jurisdictional waters, the number of projects requiring avoidance measures would decrease. However, developers may still practice avoidance measures for projects for which such actions are in the developer's best interest. The net change in impact area reductions resulting from avoidance measures is thus uncertain.

- **Lower permit and administrative costs:** Several possible scenarios would result in reduced permit costs. When projects involve only non-jurisdictional waters and no state or tribal permits are required, permit burden (including any construction delays) would be reduced at the federal level and for regulated entities. Permit burden would also be reduced when states or tribes implement less protective regulations for waters that are not "waters of the United States." For projects where the area of jurisdictional waters would be reduced as a result of the proposed change in the definition of "waters of the United States," permit burden may also be reduced because of a shift from individual permits to general permits, and fewer individual permits that may receive public hearings (*see* "Response to regulation" in Figure IV-2). The agencies anticipate that the Corps would generally incur reduced administrative actions under the proposed rule associated with the decreased permitting workload, and the regulated community would also see reduced workload in not needing to go through the permit process. The agencies are unable to predict if the workload associated with issuing approved jurisdictional determinations (JDs) would increase or decrease as a result of a change in the definition of "waters of the United States."

The Corps is usually the permitting authority for CWA section 404 permits. The states of Michigan and New Jersey have assumed administration of the CWA section 404 permitting program for certain waters and may experience similar changes, or if they maintain regulation of waters whose status as a "water of the United States" would change under their programs there may be no changes in their administrative costs. Specific changes in Corps administrative costs would include: responding to a change in the number of requests for approved JDs; an overall decrease in workload-related tasks such as permit actions, consultations, and compliance and enforcement actions; improved efficiency in issuing approved JDs due to the revised definition of "waters of the United States;" including no longer performing significant nexus analyses (*see* "Federal regulations" in Figure IV-2). The change in the number of approved JDs is uncertain; the Corps may experience an increase in approved JDs if applicants request the certainty associated with an approved JD, or a decrease in the number of approved JDs as applicants may be able to estimate jurisdiction more readily. However, the agencies would also likely need to provide program management, training, and compliance oversight associated with administering changes to the program, especially in the near term.

- **Forgone benefits:** Establishing non-adjacent wetlands, ephemeral features, certain ditches, and certain lakes and ponds, for example, as non-jurisdictional, places any potential regulation of these features solely in the hands of state and tribal governments. States that currently do not regulate these waters or choose to reduce or eliminate regulation of these waters could see larger impact areas from projects (from eliminating the minimization requirements), fewer mitigation measures, and greater wetlands acreage losses than they currently experience under federal regulations. Additionally, potential impacts of the proposed definitional changes on the types of 404 permits issued (*i.e.*, higher likelihood for general permits; likely fewer individual permits with public hearings and more individual permits with letters of permission) could result in decreased regulation of projects affecting non-jurisdictional waters. The impacts to these waters without avoidance, minimization, or compensation would result in forgone benefits over time, including habitat support, recreation, and aesthetic benefits.

IV.A.2.3 Uncertainty and Limitations

The likely response of states to definitional changes is uncertain. Past environmental policies and current state regulations offer some indication of potential policy responses, but actual responses may differ from the agencies' projections in this analysis. Differing state responses makes quantifying impacts to potential newly non-jurisdictional waters difficult. The agencies are particularly interested in additional information on state programs and potential response for this report.

In addition to uncertainties regarding state responses, the analysis is limited by the precision of the datasets available for determining water classification types. For example, as noted earlier, the high resolution NHD used to map streams for this analysis does not differentiate between intermittent and ephemeral streams nationwide, the NHD and the NWI were analyzed using 30-meter grid cells, and the NWI does not indicate whether a feature it identifies as a wetland satisfies all three criteria to meet the regulatory definition of "wetlands" (*i.e.*, hydric soils, hydrophytic vegetation, hydrology), further complicating the task of modeling the potential effects of the proposed rule.[85]

Beyond the inherent limitations of the NHD and NWI datasets, the agencies face the confounding factor of the pre-2015 practice requiring a significant nexus analysis in order to determine the jurisdictional status for certain categories of water, including: non-navigable tributaries that are not relatively permanent; wetlands adjacent to non-navigable tributaries that are not relatively permanent; and wetlands adjacent to but that do not directly abut a relatively permanent non-navigable tributary. According to the *Rapanos* Guidance, such features are not categorically jurisdictional. As a result, the agencies cannot identify the universe of federally regulated waters under the pre-2015 practice to establish a comparative baseline of jurisdictional waters. Due to these limitations and confounders, the methodology used in this analysis only provides a description of the potential effects of the proposed rule on the 404 permitting program.

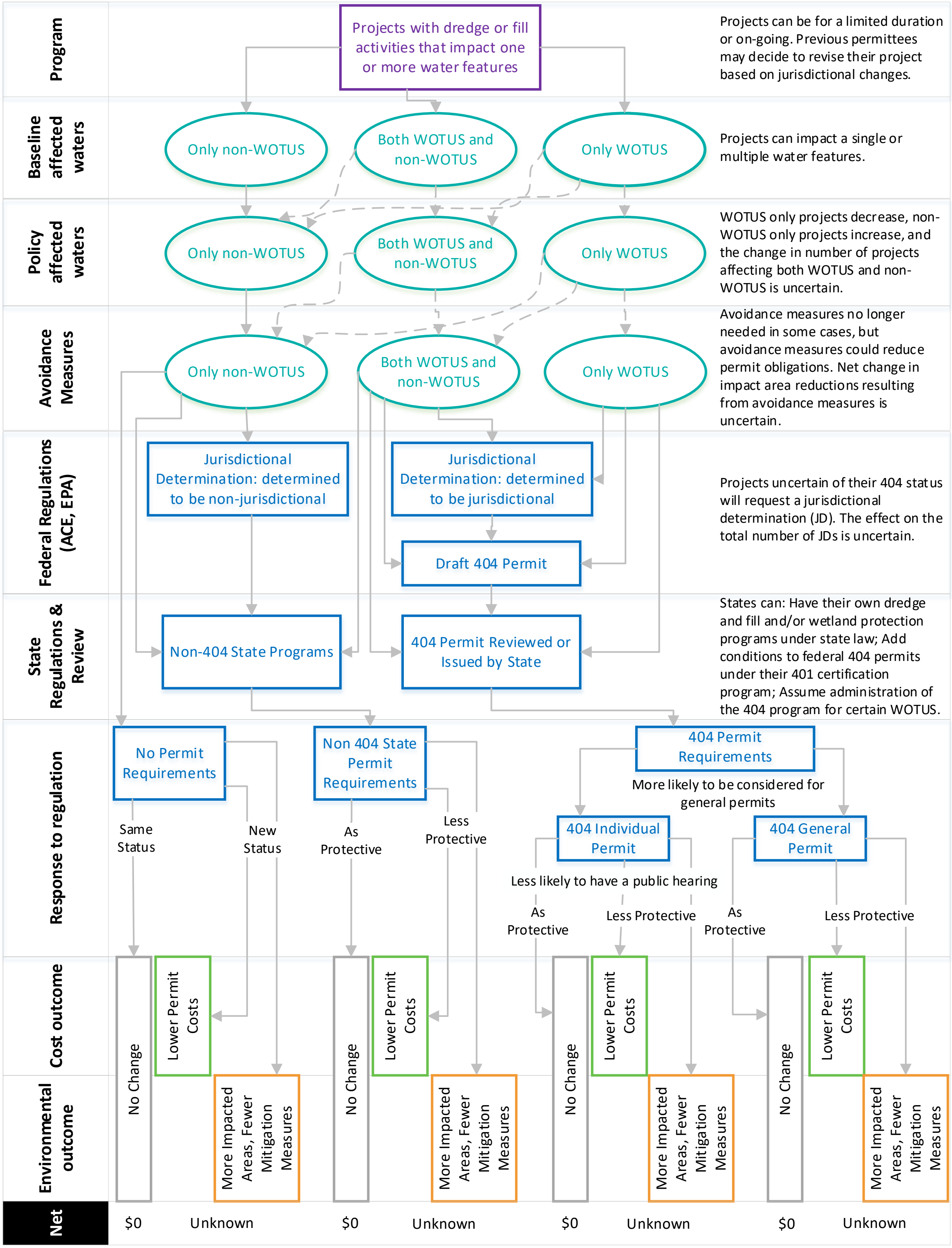
Mitigation credits complicate efforts to quantify the amount of mitigation that would be required under the proposed rule. This is because the number of acres or linear feet per credit varies among and within U.S. Army Corps districts depending on assessment practices. Converting the number of mitigation credits into a consistent unit of measure for a national analysis is thus difficult without consulting individual permits. To avoid conversion errors, the agencies summarized mitigation credit impacts separately from acre and linear feet impacts.

The response of regulated entities to a change in CWA jurisdiction as proposed is also uncertain. For instance, regulated entities may continue using a protocol that avoids and minimizes impacts to non-jurisdictional waters—regardless of state-level regulations—for example, to standardize their protocol across states. Using standardized project specifications that minimize impacts on waters may also enable developers to accelerate project approval for projects for which they are uncertain as to whether the affected resources are within CWA jurisdiction. The response of regulated entities in states with less stringent requirements would likely depend on the type of work, the stage of work (*e.g.*, planning, active, completed, an on-going basis), and the stringency of permit requirements that the entity faces in other areas.

The effect of the proposed definitional changes on permit costs is also uncertain. Reduced permit burden for non-404 projects, a shift from individual permits to general permits, and fewer individual permits requiring public hearings would all result in cost savings. The amount of cost savings depends on many factors, including state or tribal response and regulated entity response to the changes. Additionally, in the other direction, the proposed definitional changes could increase the number of jurisdictional determinations required and increase burden and construction delays. The agencies believe, however, that the proposed rule provides clearer definitions for "tributary" and "adjacent wetland" and would eliminate the case-specific significant nexus analysis needed for many waters under the pre-2015 practice, thereby reducing uncertainty regarding the scope of CWA jurisdiction.

[85] *See* the RPA Chapter 1 for additional details.

Figure IV-2. Potential effects of the proposed rule on CWA section 404 program



IV.A.3 Section 311: Oil Spill Prevention, Preparedness, Reporting and Response

CWA section 311 includes two main components that address the risk and harm from oil spills:

- Spill prevention and preparedness, which has been addressed in the EPA's SPCC and FRP regulations for non-transportation related facilities and in USCG and DOT regulations for vessels and transportation-related facilities.
- Spill notification and removal, as described under the National Contingency Plan.

This section describes each part of the program and discusses the potential impacts of proposed changes to the definition of "waters of the United States."

IV.A.3.1 Overview

Under the authority of CWA section 311, the EPA requires certain non-transportation-related facilities to prepare Spill Prevention, Control and Countermeasure (SPCC) plans if they have a reasonable potential to have a discharge of oil to navigable waters and adjoining shorelines and meet other applicability criteria including aggregate oil storage capacity (*see* SPCC rule at 40 CFR part 112). Specifically, the SPCC rule applies to facilities "engaged in drilling, producing, gathering, storing, processing, refining, transferring, distributing, using, and consuming oils and oil products, which due to its location, could reasonably be expected to discharge oil in quantities that may be harmful, as described in part 110 of this chapter, into or upon the navigable waters of the United States or adjoining shorelines..." [section 112.1(b)] where "navigable waters" (as opposed to "navigable waters of the United States") are defined at section 112.2 as waters of the United States, including the territorial seas.[86] Facilities in a broad spectrum of industry sectors are currently subject to the SPCC rule, including farms, oil production facilities, industrial sites, manufacturing plants, and retail establishments.

The agencies estimate that approximately 540,000 facilities are subject to SPCC requirements and must prepare, implement, and maintain their SPCC Plan (U.S. EPA, 2016). Approximately 40 percent of these facilities (230,000) are in the oil production sector (Table IV-4), which includes production, drilling, and workover.[87] Other industry sectors with a significant share of facilities include electric utilities (including distribution substations), real estate rental and leasing, and farms. On an ongoing basis, approximately three percent of the universe of SPCC-regulated facilities are new facilities that must develop an SPCC Plan and implement the spill prevention measures required by the regulation (*e.g.*, sized secondary containment, overfill prevention, and employee training) before they start operating and handling oil. The remaining facilities must maintain their existing plan. They must amend their Plan when there is a change

[86] The CWA [33 U.S.C. 1321(b)] sets as national policy that there "should be no discharges of oil or hazardous substances into or upon the navigable waters of the United States, adjoining shorelines, or into or upon the waters of the contiguous zone, or in connection with activities under the Outer Continental Shelf Lands Act [43 U.S.C. 1331 et seq.] or the Deepwater Port Act of 1974 [33 U.S.C. 1501 et seq.], or which may affect natural resources belonging to, appertaining to, or under the exclusive management authority of the United States (including resources under the Magnuson-Stevens Fishery Conservation and Management Act [16 U.S.C. 1801 et seq.])." While section 311 uses the phrase "navigable waters of the United States," EPA has historically interpreted it to have the same breadth as the phrase "navigable waters" used elsewhere in section 311, and in other sections of the CWA. *See* Resource and Programmatic Assessment.

[87] Workover refers to various interventions or maintenance activities on oil or gas wells such as replacing the production tubing.

in operations that materially affects the risk of a discharge and review their Plan at least once every five years.

Table IV-4: Estimated number of facilities subject to SPCC in 2016.

Sector	Number of Facilities
Oil Production	230,405
Electric Utility[1]	64,919
Real Estate Rental and Leasing	30,395
Farms[2]	21,864
Other Commercial	18,764
Retail Trade	18,158
Contract Construction	17,327
Transportation	15,846
Other Manufacturing	15,781
Arts Entertainment & Recreation	15,054
Wholesale Trade	14,883
Education	9,317
Manufacturing Facilities Using and Storing AFVOs	7,859
Other Services (Except Public Administration)	7,493
Hospitals & Other Health Care	7,239
Accommodation and Food Services	5,330
Information Finance and Insurance	4,596
Petroleum Bulk Stations and Terminals	4,405
Fuel Oil Dealers	4,225
Gasoline stations	3,715
Food Manufacturing	3,684
Warehousing and Storage	3,545
Mining	3,145
Metal Manufacturing	2,828
Chemical Manufacturing	2,654
Petroleum Refining and Related Industries	2,075
Religious Organizations	1,563
Military Installations	789
Pipelines	647
Government	613
Total	539,118

[1] Electric utility includes generation plants, distribution substations, and other types of facilities

[2] Reflects changes in SPCC applicability to farms due to the Water Resources Reform and Development Act of 2014 (WRRDA)

Source: U.S. EPA (2016)

Additionally, under the Facility Response Plan (FRP) rule at 40 CFR 112.20 *et seq*, the EPA requires a subset of SPCC facilities that could, because of their location, reasonably be expected to cause *substantial harm* to the environment by discharging oil *into or on the navigable waters or adjoining shorelines* to prepare and submit an FRP to the EPA Regional Administrator for the state where the facility is located. The EPA maintains an internal database on FRP facilities, including their locations and characteristics. Table IV-5 summarizes the number of active FRP facilities by EPA Region.

Table IV-5: Number of active FRP facilities by EPA region

EPA Region	Number of Facilities
1	133
2	203
3	283
4	531
5	527
6	956
7	259
8	225
9	278
10	407
Total	3,802

Source: U.S. EPA, Emergency Management-Oil Database, 2018

Section IV.A.3.2 discusses the potential impacts of the proposed change to the definition of "waters of the United States" on the SPCC and FRP programs.

Spill preparedness requirements also exist for onshore transportation-related facilities such as pipelines and railcars. These programs derive their authority from CWA section 311 as amended by the Oil Pollution Act (OPA) of 1990 and therefore are affected by changes in the scope of jurisdictional waters. Under 49 CFR part 194, the operator of an onshore oil pipeline that, because of its location, could reasonably be expected to cause substantial harm or significant and substantial harm to the environment by discharging oil into or on any navigable waters of the United States or adjoining shorelines must submit an oil spill response plan to Pipeline and Hazardous Materials Safety Administration (PHMSA) of the Department of Transportation. The worst-case discharge for planning purposes is the largest foreseeable discharge of oil (*e.g.*, from a pipeline rupture, fire or explosion) in adverse weather conditions (*e.g.*, rain, currents, cold temperatures). The pipeline operator needs to identify resources necessary to respond to a worst-case discharge in operator-defined response zones.[88] PHMSA has approximately 530 oil spill response plans from pipeline operators (PHMSA, as of April 30, 2018). Section IV.A.3.2.2 discusses the effects of proposed changes in the definition of "waters of the United States" on the pipeline spill preparedness program.

Under 49 CFR part 130, railroad owners or operators must prepare oil spill response plans to cover tank car shipments of petroleum oils. Among other requirements, the basic written plan must describe the manner of response to discharges that may occur during transportation; take into account the maximum potential discharge of the contents from the packaging; and identify private personnel and equipment available to respond to a discharge.

[88] 49 CFR 194.101 defines a response zone as a "geographic area along a length of pipeline or including multiple pipelines, containing one or more adjacent line sections, for which the operator must plan for the deployment of, and provide, spill response capabilities. The size of the zone is determined by the operator after considering available capability, resources, and geographic characteristics."

Under OPA, states may impose additional requirements for facility response plans as long as these requirements are at least as stringent as the federal standards. For example, both Alaska and Washington State have regulations requiring facility response plans or comprehensive contingency plans for certain large facilities such as refineries, refueling terminals, and pipelines. Both states further require public participation in the planning process to ensure that the plans appropriately reflect community concerns and priorities.

Section 311(c) of the CWA as amended by OPA of 1990 authorizes response to discharges or threats of discharges of oil. The CWA provides that the President shall ensure effective and immediate removal of a discharge or substantial threat of discharge (1) into or on navigable waters, (2) on the adjoining shorelines to the navigable waters, (3) into or on the waters of the exclusive economic zone, or (4) that may affect natural resources belonging to, appertaining to, or under the exclusive management authority of the United States. The CWA requires that oil discharges and releases of reportable quantities of hazardous substances be reported to the National Response Center (NRC), which in turn notifies the relevant federal on-scene coordinators (FOSC). FOSCs have the authority to conduct, direct and coordinate response efforts to protect the environment, public health, and worker safety and health under CWA Sections 311(c) and (e). Most oil and chemical incidents are addressed by the state, local, or tribal governments and/or by responsible parties (RPs). The FOSC determines the need for federal involvement under the CWA and the NCP.

Liability for response and cleanup costs falls to the RP if one can be identified. The Oil Spill Liability Trust Fund (OSLTF) provides funding to cover removal costs incurred by the U.S. Coast Guard and the EPA and by state and tribal governments. The OSLTF may pay for uncompensated removal costs and damages up to $1 billion per incident, of which no more than $500 million may be paid for natural resource damages. The National Pollution Funds Center (NPFC), which manages the OSLTF, seeks reimbursement from the RP for any response expenses, claims, and damage assessment initiation paid by the Fund. One of the key criteria[89] the NPFC applies when approving access to the OSLTF is whether the oil spill incident affected or substantially threatened a "water of the United States." Changing the scope of jurisdictional waters could potentially affect the EPA's ability to access the OSLTF to oversee an RP's response to an oil spill or respond to an oil spill. *See* Section IIV.A.3.2.3 for further discussion of impacts to spill notification and response programs.

IV.A.3.2 Potential Effects of the Proposed Rule on Section 311 Programs

IV.A.3.2.1 Effects on Non-Transportation-Related Spill Prevention and Preparedness

IV.A.3.2.1.1 SPCC Program

Figure IV-3 illustrates the potential impacts of the proposed rule on the SPCC program. The agencies estimate that approximately 540,000 facilities are currently subject to SPCC requirements. This estimate is based on the number of establishments in each industry sector and oil storage capacities. The estimate does not explicitly account for the location of the facilities and reasonable potential for a discharge to a "water of the United States." In determining whether a facility has a reasonable expectation of an oil discharge that could reach a "water of the United States," facility owners consider solely the geographical

[89] Other criteria include whether the substance is an oil.

and locational aspects of the facility [40 CFR 112.1(d)(1)(i)]. As the EPA describes in its SPCC Guidance, "the owner or operator should consider the location of the facility in relation to a stream, ditch, gully, or storm sewer; the volume of material likely to be spilled; drainage patterns; and soil conditions. An owner or operator may not consider constructed features, such as dikes, equipment, or other manmade structures that prevent, contain, hinder, or restrain a discharge as described in section 112.1(b), when making this determination." (U.S. EPA (2013), page 2-34)

Typically, natural conveyances or stream channels are principal spill pathways for impacts to aquatic resources in remote and undeveloped inland areas that lack engineered stormwater conveyance systems. Manufacturing facilities and other facilities located in developed areas may also affect streams through discharges to stormwater drains or other engineered conveyance systems. Given this, the agencies anticipate that owners or operators of facilities located in relatively less developed areas would be more likely to base their applicability determination on whether there is a reasonable potential for an oil discharge to reach waterbodies in the immediate proximity of the facility. Of the current universe of SPCC-regulated facilities, the agencies anticipate that the inland onshore oil production and farm sectors would be the most likely to be affected by proposed changes in CWA jurisdiction given their locations.

Following the diagram in Figure IV-3, potential jurisdictional changes for certain waters may result in a facility previously subject to the SPCC requirements in the baseline (because of reasonable potential for an oil discharge to reach waters that are currently jurisdictional) no longer being subject to 40 CFR part 112. Depending on the stringency of applicable state requirements and measures the facility may implement voluntarily (such as following industry standards or recommended practices), this change could lead some subset of these facilities to save compliance costs. Reduction in spill prevention measures could in turn increase the probability of the facility experiencing an incident that results in an oil discharge leaving the facility and causing environmental damage (also referred to as "oil spill risk" in further discussions).

At one end of the spectrum are facilities located in states with requirements equivalent to those of 40 CFR part 112 for the type of facility and oil product. Some states limit the applicability of their spill prevention requirements based on aggregate storage volume, facility type (*e.g.*, farms, production, others), and type of oil (*e.g.*, petroleum oils, non-petroleum oils). Other states reference 40 CFR part 112 explicitly. The agencies expect no change to compliance costs or spill risk for facilities required to comply with equivalent state or tribal regulations or that elect to voluntarily implement SPCC measures.

At the other end of the spectrum are facilities located in states without spill prevention requirements and that do not voluntarily follow industry standards or recommended practices. The compliance cost savings and spill risk would be larger for these facilities. The agencies anticipate that most facilities affected by a change in the definition of "waters of the United States" would fall between these two extremes. For example, facilities may choose to implement *some* spill prevention measures that are considered good engineering practices for their industry, such as secondary containment, overfill prevention, practices to ensure the safe transfer of oil to bulk storage containers, and visual inspections of bulk storage containers, even if they are not subject to 40 CFR part 112.

Applying the federalism scenarios to the SPCC program is complicated by the fact that the factors considered in the state rankings do not necessarily reflect all baseline state regulatory programs pertinent to oil spill prevention, and the scope of these programs would also depend on the industry. In addition, while other federal regulations (*e.g.*, Department of Interior requirements for leases on federal land) and state regulations may fill some gaps, a 2007 EPA study of spill prevention regulations for oil production facilities concluded that, of 17 oil producing states the EPA reviewed, none of the states had requirements that were as stringent as the SPCC rule (U.S. EPA, 2007b). The EPA's regulatory impact analysis for the 2008 amendments to the SPCC regulation researched state regulations affecting the spectrum of facilities subject to the federal SPCC rule and identified some states with complete, substantial, or partial overlap with federal requirements. The degree of state overlap was somewhat higher for larger facilities (33 percent) as compared to smaller facilities (10 percent); overall across the regulated facility universe, the EPA determined that approximately 13 percent of the SPCC burden overlapped with some state requirements (U.S. EPA, 2008; Exhibit 5-22). Accordingly, impacts of changes in the definition of "waters of the United States" are expected to be less in states that have some overlapping requirements (*e.g.*, Alaska, California, Colorado, Delaware, Georgia, Hawaii) and which are likely to continue regulating ephemeral streams and other waters that would not be jurisdictional under the CWA.[90]

[90] Ephemeral streams are not categorically jurisdictional under the pre-2015 practice. According to the *Rapanos* Guidance, the agencies conduct a significant nexus analysis for certain types of waters referred to as "non-relatively permanent waters," which includes ephemeral features and some intermittent streams. *See Rapanos* Guidance at 7 ("'[R]elatively permanent' waters do not include ephemeral tributaries which flow only in response to precipitation and intermittent streams which do not typically flow year-round or have continuous flow at least seasonally. However, CWA jurisdiction over these waters will be evaluated under the significant nexus standard[.]").

Figure IV-3: Potential effects of the proposed rule on CWA section 311 SPCC program

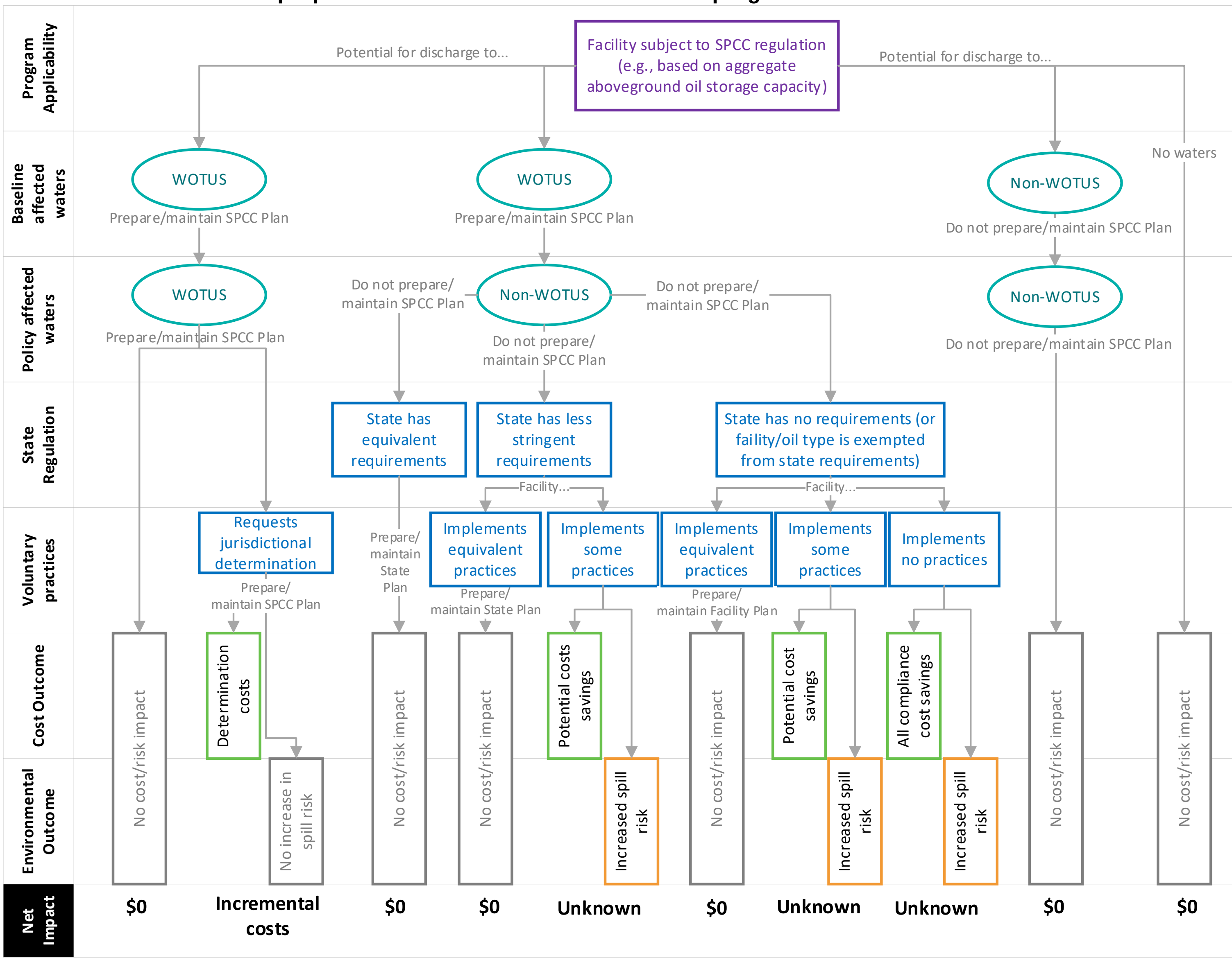


Table IV-6 provides estimates of SPCC compliance costs for various types of facilities. These costs represent average unit costs per facility for spill prevention measures required under the existing program. The magnitude of any compliance cost savings due to the proposed rule will depend in part on whether a facility already exists and complies with SPCC measures, or is a new facility. As noted above, it will also depend on any existing state requirements. A facility that implements an SPCC Plan in the baseline is unlikely to remove existing structural controls, such as secondary containment or double-walled tanks, but may avoid some ongoing compliance expenses, such as Plan review and PE-certification, container inspections and integrity testing, and employee training. By contrast, the owner of a new facility not subject to SPCC under the proposed definition could theoretically forgo structural spill prevention and control measures if not otherwise required under state, tribal, or local regulations. In practice, however, actual cost savings for new facilities may be similar to those of existing facilities, since the measures required by the SPCC rule are by now widely accepted and represent good engineering practice. For example, the agencies expect that sized secondary containment for aboveground storage tanks – a major share of capital costs attributed to the SPCC regulation – would still be part of the design of new oil-handling facilities even without an SPCC Plan requirement, since secondary containment is typically required by the Uniform Fire Code, which has generally been adopted by states. As such, cost savings for new facilities may consist mainly of the costs related to the preparation of the actual Plan (*e.g.*, documentation of the measures, Professional Engineer-certification).

Table IV-6: Estimated annualized per-facility SPCC compliance costs, by facility type and size (2017$)

Item	Storage Facilities[1, 2]				Production Facilities[1, 2]			
	I	II	III	IV	I	II	III	IV
New Facility								
Plan preparation	$6,200	$16,300	$23,500	$34,300	$5,400	$9,700	$18,900	$28,300
Sized secondary containment	$34,400	$56,900	$172,500	$361,200	$25,100	$37,600	$137,300	$462,400
Inspections and Tests	$3,700	$8,900	$24,200	$43,900	$2,400	$4,800	$9,500	$14,300
Other control measures	$45,900	$53,100	$153,700	$224,400	$5,600	$7,100	$7,400	$14,200
Training	$2,400	$4,500	$4,500	$4,500	$2,400	$4,500	$4,500	$4,500
Total	**$92,700**	**$139,600**	**$378,400**	**$668,300**	**$40,900**	**$63,600**	**$177,700**	**$523,700**
Existing Facility								
Plan maintenance	$500	$1,400	$1,900	$2,400	$500	$800	$1,100	$500
Inspections and Tests	$4,400	$9,500	$24,900	$44,600	$2,400	$4,800	$9,500	$14,300
Other control measures	$200	$200	$800	$1,100	$900	$2,200	$2,200	$8,200
Training	$2,400	$4,500	$4,500	$4,500	$2,400	$4,500	$4,500	$4,500
Total	**$7,500**	**$15,600**	**$32,200**	**$52,600**	**$6,200**	**$12,300**	**$17,400**	**$27,500**

[1] Categories I-IV correspond to oil storage capacity ranges as follows: (I) less than 10,000 gallons; (II) 10,001 to 42,000 gallons; (III) 42,001 to 1 million gallons; and (IV) greater than 1 million gallons.

[2] *Source*: 2002 rule baseline costs minus cost savings from the 2008 rule amendments [U.S. EPA (2008)]. Costs escalated from 2007 dollars to 2017 dollars using the employment cost index or construction cost index, depending on the type of compliance cost (*i.e.*, mostly labor or mostly constructed structures or materials).

In the analysis supporting its Information Collection Request (ICR) for the SPCC rule (U.S. EPA, 2016), the EPA estimated the annual probability of a reportable discharge meeting the criteria at 40 CFR 112.4(a)[91] at an SPCC facility at approximately one incident per year per 670 facilities (0.15 percent annual spill probability).[92] That analysis was published in two separate Federal Register notices, as required by the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 et seq.), and thus available for public comment. Forgoing SPCC prevention measures may increase the probability of a spill occurring, particularly as equipment ages and becomes more prone to failure. The increase in probability is likely greatest for facilities that are exempt from state requirements. The agencies do not have sufficient data to quantify the change, if any, in spill risk due to the proposed change in the "waters of the United States" definition at this time.

Although data of past spills at FRP facilities are available from the Plans submitted to the EPA, this is only a subset of the relevant facilities covered under CWA section 311 (3,800 out of approximately 540,000 facilities or less than one percent of the overall affected universe).[93] The EPA conducted a detailed review of the NRC dataset for Fiscal Years 2009 through 2011, including an evaluation of the causes of the incidents, the amount of oil prevented from reaching jurisdictional waters, and the amount of oil that reached jurisdictional waters. For this time frame, FRP facilities experienced 52 oil discharge incidents whereby in 16 of the incidents, oil that was discharged reached jurisdictional waters. Of the amount of oil that was discharged in the 52 incidents, about 90 percent of the oil was prevented from reaching jurisdictional waters (*i.e.*, was retained in secondary containment).

To augment the prior analysis done by the EPA, the agencies also reviewed Pollution Reports for 1,064 emergency removal actions that EPA FOSCs responded to and documented during the period of 2001 through 2017.[94] The agencies reviewed descriptions of 60 incidents[95] involving non-transportation related facilities during the period of 2014 through 2016. The average volume of oil discharged in these incidents was approximately 6,500 gallons. It is unknown how the number of incidents or volume of oil discharged would change with a change in spill prevention requirements at certain facilities. Even facilities that implement some SPCC measures are not anticipated to exhibit a zero probability of an oil discharge; in several incidents oil reached waters despite the presence of secondary containment (*e.g.*, via a storm drain or due to vandalism).

Projecting baseline and policy scenario spill risks for the broader SPCC universe would require making unsupported assumptions regarding the characteristics and distribution of activities (*e.g.*, the number and

[91] A discharge of oil occurring within any 12-month period that triggers the section 112.4 reporting requirements is: (1) A single discharge as described in section 112.1(b) of more than 1,000 U.S. gallons; or (2) Two or more discharges as described in section 112.1(b), each of which is over 42 U.S. gallons.

[92] For the 2002 rule ICR, EPA estimated that approximately 0.15 percent of all facilities would incur costs each year due to reporting requirements related to an oil discharge under section 112.4(a).

[93] A review of the NRC database for Fiscal Years 2002 through 2011 done by EPA in support of the Program Assessment Rating Tool (PART) attempted to identify oil discharge incidents at FRP facilities, but the results for Fiscal Years 2005 and 2006 were substantially affected by hurricanes, making inferences from this dataset difficult.

[94] The Pollution Reports are available at https://response.epa.gov/.

[95] EPA selected incidents overseen by EPA FOSCs between 2014 and 2016 and excluded removals that addressed historical releases or abandoned facilities, or originated from a pipeline, truck, or other transportation-related source.

location of facilities entering and existing the market, and the volumes of oil handled at those facilities), as well as data to accurately project future industry practices and state and tribal responses to the proposed rule.

IV.A.3.2.1.2 FRP Program

A subset of SPCC facilities are also subject to FRP preparedness and response requirements. Figure IV-4 illustrates the potential impacts of the proposed rule on the FRP program. Similar to the anticipated effects on the SPCC program described above, the proposed rule could potentially affect FRP facilities primarily through changes in the applicability of requirements to the facilities, but with impacts occurring at two stages: 1) changes to the overall applicability of 40 CFR part 112, and 2) changes to the FRP-specific self-identification applicability criteria at 40 CFR 112.20(f)(1).

Proposed changes in CWA jurisdiction that would exempt a facility from SPCC because the facility no longer has a reasonable potential of a discharge as described in section 112.1(b) similarly would exempt the facility from FRP requirements. The second way a change in CWA jurisdiction could affect the FRP program is through FRP applicability factors. As defined in 40 CFR 112.20(f)(1), a non-transportation related onshore facility is required to prepare and implement an FRP if:

1. The facility transfers oil over water to or from vessels and has a total oil storage capacity greater than or equal to 42,000 U.S. gallons, <u>or</u>

2. The facility has a total oil storage capacity of one million U.S. gallons or more, <u>and</u> at least one of the following is true:

    a) The facility does not have secondary containment for each aboveground storage area sufficiently large to contain the capacity of the largest aboveground tank within each storage area plus sufficient freeboard for precipitation.
    b) The facility is located at a distance such that a discharge could cause injury to fish and wildlife and sensitive environments.
    c) The facility is located such that a discharge would shut down a public drinking water intake.
    d) The facility has had a reportable discharge greater than or equal to 10,000 U.S. gallons in the last five years.

The criteria related to reportable discharges (item 2d in the list above) and to distance to sensitive environments (2b) could be affected by a change in CWA jurisdiction.[96] For example, by changing the scope of waters that trigger the "reportable discharge" applicability criterion, some FRP planholders would no longer need to prepare or maintain an FRP on the basis of their spill history. To assess the potential significance of the effects, the agencies reviewed the data available for the current 3,802 FRP planholders and found only two that had FRP status solely because of reportable spill history (*i.e.*, no

[96] The criterion related to transfers over water to or from vessels is not expected to be affected by revisions to the "waters of the United States" definition because the involvement of vessels necessarily implies navigation and therefore federally regulated waters. The secondary containment criterion is unrelated to the definition of "waters of the United States." The criterion related to public drinking water intakes refers specifically to the potential for a discharge to shut down an intake. Public drinking water system intakes are expected to draw from perennial streams which are expected to remain within scope of the CWA. The agencies note, however, that an oil discharge may also affect drinking water systems if it contaminates the sources that feed those intakes, perhaps including features the jurisdiction of which may be affected by the proposed rule.

other applicability factor). Most of the 55 FRP planholders with histories of reportable discharges also triggered one or more of the other applicability criteria, such as transfers over water (39 facilities), inadequate secondary containment (8 facilities), or potential to affect drinking water intakes (28 facilities) or sensitive environments (47 facilities).

The potential effect of a change in the definition of "waters of the United States" on sensitive environments is more difficult to assess *a priori*. The FRP regulation relies on a definition of "fish and wildlife and sensitive environments" at 40 CFR 112.2 during the applicability evaluation by a facility owner/operator and in the development of the FRP by the planholder (*e.g.*, development of the vulnerability analysis; *see* Appendix F, Section 1.4.2 of 40 CFR 112). As described in 40 CFR 112.2 and in Department of Commerce/NOAA Guidance (1994), "fish and wildlife and sensitive environments" may include wetlands, national and state parks, critical habitats for endangered/threatened species, wilderness and natural areas, marine sanctuaries and estuarine reserves, conservation areas, preserves, wildlife areas, wildlife refuges, wild and scenic rivers, recreational areas, national forests, public drinking water intakes, federal and state lands that are research natural areas, heritage program areas, land trust areas, and historical and archeological sites and parks. These areas may also include aquaculture sites, agricultural surface water intakes, and unique habitats, such as bird nesting areas, critical biological resource areas, designated migratory routes, and designated seasonal habitats. The Area Committee and the spill response Unified Command Structure may consult with the natural resource management agencies, to determine additional areas to be considered sensitive environments for the purposes of OPA. 40 CFR 112.20(g)(1) requires FRP to be consistent with the National Contingency Plan and with the applicable Area Contingency Plans. Thus, to the extent that Area Committees designated sensitive areas based on federally-regulated waters, it is possible that changes to CWA jurisdiction could alter this factor and potentially FRP applicability. The agencies did not have sufficient information about the sensitive environments considered in determining FRP applicability to assess the significance of the change. A majority of FRP planholders (2,115 facilities) identify the potential to affect sensitive environments as a determinant of FRP applicability.

Even in cases where overall FRP applicability is unaffected and the facility still needs to prepare and submit an FRP, changes in the definition of "waters of the United States" could affect the FRP harm designation assigned by the EPA Regional Administrators. The EPA Regional Administrators may categorize a facility that meets multiple criteria as higher risk, denoted as "*significant and substantial harm*." The EPA reviews all FRPs and must approve the FRP for facilities categorized as significant and substantial harm. The EPA's Emergency Management-Oil Database shows that, of the 55 FRP facilities with reportable discharge history, 52 FRP facilities are currently categorized as significant and substantial harm facilities. It is uncertain whether the EPA Regional Administrator would have categorized these facilities as lower risk (substantial harm) without the reportable spill history factor. If so, the change may reduce the burden on the EPA and facility owners related to the Plan approval process.

A revised definition of "waters of the United States" could lead some facilities to avoid FRP compliance costs. The magnitude of the savings depends on the stringency of any applicable state requirements and measures the facility may implement voluntarily in accordance with recommended industry practices. For example, FRP facility owners or operators may no longer need to maintain their FRP, maintain a contract with an oil spill removal organization (OSRO), or conduct periodic drills and exercises to maintain preparedness. Table IV-7 summarizes FRP compliance costs for existing and new facilities. These costs are unit costs (per facility) for preparing, maintaining, or implementing an FRP where required under federal regulations.

Table IV-7: Estimated per-facility FRP compliance costs (2017$)

Item	Basis	Costs
Plan preparation (new facility only)[1]	One-time	$20,000 to $40,000
Plan preparation (new facility only)[1]	Annualized[3]	$1,800 to $3,500
Plan maintenance[1]	Annual	$2,300 to $7,200
OSRO retainer[2]	Annual	$10,000
Drills and exercises[2]	Annual	$20,000

[1] *Source*: Supporting Statement for the Renewal of ICR 1630.13, OMB Control No. 2050-0135 (Docket ID EPA-HQ-OLEM-2018-0105)

[2] *Source*: Email communication from Florida Power and Light on 5/21/18.

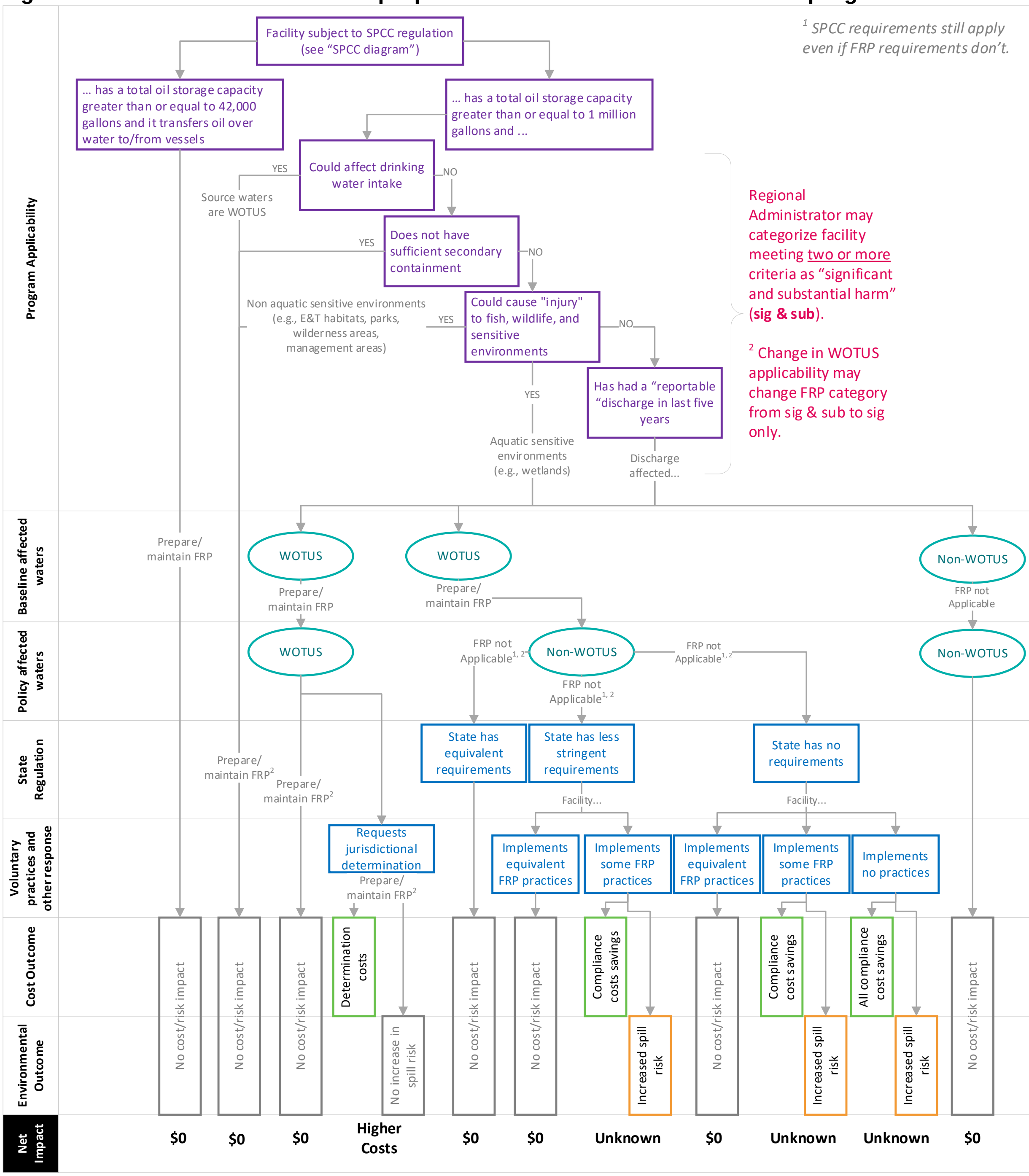
[3] Annualized over 20 years using a 7 percent discount rate.

EPA estimates the costs of developing an FRP at $20,000 to $40,000 per facility, depending on the size and complexity of operations. Costs for subsequent Plan maintenance are approximately $1,800 to $3,500 per year, costs for contracting with an OSRO are approximately $10,000 per year, and costs for drills and exercises are approximately $20,000 per year. As described in Figure IV-4, a change in CWA jurisdiction could result in certain facilities avoiding FRP-related costs in cases where the facility no longer meets applicability criteria under 40 CFR 112.20 or where the facility changes risk category (*e.g.*, from significant and substantial harm to substantial harm). The cost savings will depend in part on the changes in facility status and on any state requirements.

While a facility that is no longer required to prepare or maintain an FRP would be saving some or all of the costs in Table IV-7, forgoing these activities will reduce preparedness and could delay the response to a spill or make this response less effective and therefore increase the magnitude of environmental damages. It could also increase the risk to other resources, including transportation routes, businesses, residences – that incidentally benefit from an effective response to an oil discharge from the facility. Conversely, some facilities could elect to voluntarily maintain (or prepare) an FRP despite a change in their status and obligations under 40 CFR 112. Facility owner or operator responses to changes in CWA jurisdiction is unknown.

Available data are not sufficiently detailed to develop precise estimates of the cost savings and to quantify the associated changes in risk. The net outcome of the proposed rule is therefore uncertain. The case studies in Section IV.B assess the potential impacts of changes in CWA jurisdiction on the FRP program by analyzing the proximity of FRP facilities to waters in three selected regions and considering scenarios about potential responses by FRP facility owners or operators to the changes.

Figure IV-4: Potential effects of the proposed rule on CWA section 311 FRP program



IV.A.3.2.2 Effects on Transportation-Related Spill Prevention and Preparedness

As described in Section IV.A.3.1, the preparation of an FRP for a pipeline facility is based on the potential for a discharge to a "water of the United States" or adjoining shorelines. In a Report to Congress, PHMSA estimated that hazardous liquid pipelines cross inland waterbodies at 18,136 locations and 5,110 of these crossings are 100 feet or greater (PHMSA, 2013), but this count likely understates the number of water crossings, since it was based on a relatively coarse hydrographic dataset that would not account for most perennial and intermittent streams. Because the existing regulation gives pipeline operators the flexibility to define planning areas, it is unknown how reducing the number of jurisdictional water crossings would affect the number of FRPs that pipeline operators may develop or their planned response resources.

Pipeline integrity management (IM) requirements such as pipeline burial depth and inspection of water crossings are specific to streams at least 100 feet wide and to navigable waters. Since these waters would remain jurisdictional under the proposed rule, the proposed rule is not expected to affect these requirements.

IV.A.3.2.3 Effects on Spill Notification, Response, and Penalties

Figure IV-5, at the end of this section, illustrates the potential impacts of the proposed changes in the “waters of the United States” definition on response programs. As noted above, impact or substantial threat to a “water of the United States” is one of the key criteria determining access to the OSLTF for removal costs and uncompensated damages, along with confirming that the substance involved in the discharge is an oil, as opposed to a hazardous substance (which would be addressed by CERCLA).

The jurisdictional status of the water impacted or threatened by a discharge determines oversight authorities under the NCP and what resources are available for removal or for compensating damages. For waters that remain within CWA jurisdiction under the proposed rule, the FOSC would continue to oversee the response and removal actions. For waters that would become non-jurisdictional, oversight would fall on the states and tribes, with removal requirements depending on the state or tribal requirements for the particular aquatic resource. More than 11,000 oil spills[97] were reported to the NRC during calendar year 2017 from sources other than offshore vessels or platforms. Of these incidents, more than 7,000 reportedly affected waters in general. The number of incidents that affected or threatened waters that currently are, or would no longer be, subject to federal regulation under the proposed rule is uncertain, since notifications to the NRC generally do not provide sufficient detail on the aquatic resources at risk to determine jurisdictional status.

The agencies expect a change in CWA jurisdiction would have a limited impact on the frequency of NRC notifications. While impact or threat to waters is one of the criteria for notifying the NRC of an incident, the NRC also receives notifications for a wide range of incidents of public concern under CERCLA, Emergency Planning and Community Right-to-Know Act, and other environmental or safety regulations. Because there are potential penalties for failing to notify the NRC of a reportable incident but no adverse consequence from unnecessarily reporting an incident, NRC notification generally has become standard operating procedure for facility owners or operators.

However, changes in CWA jurisdiction could affect the response to reported incidents as responsibilities for overseeing the response to some incidents shift from the FOSC to state, local, or tribal governments.

[97] Count reflects NRC’s Calendar Year 2017 incident data involving substances with names containing the terms “oil,” “gasoline,” or “diesel.”

During the period of 2001-2017, EPA FOSCs oversaw emergency removal activities for 1,064 incidents involving the discharge of oil or substantial threat of a discharge to waters of the United States. The agencies reviewed Pollution Reports for each of these emergency oil removal actions.[98] These incidents either involved active oil discharges or substantial threat of a discharge to waters of the United States.

Under the current legal framework, the OSLTF is not available for removals or damages to non-jurisdictional waters. Changing the scope of jurisdictional waters could potentially affect the EPA's ability to access the OSLTF to oversee the RP's response to an oil spill or directly respond to an oil spill. It could also affect the availability of the Fund to states, tribes, and other parties. During the period of October 2012 through April 2018, NPFC paid a total of $52.8 million to cover expenses incurred by the EPA to respond to oil spills affecting inland waters and originating from facilities.[99] NPFC additionally paid claims for removal costs totaling $0.9 million to state and local governments and OSROs.

In some cases, non-jurisdictional waters may still be federally regulated in the event of an oil spill under other statutes, such as the Endangered Species Act (ESA), even if they would no longer be subject to CWA jurisdiction. The natural and cultural resource trustee has oversight authority for the response. However, based on the authorities that established the OSLTF, the Fund would not be available to pay for non-RP response and removal of discharged oil if the waters are not jurisdictional. Funding would need to come from the relevant appropriated budgets for parties (states and/or tribes) involved in the response activities.

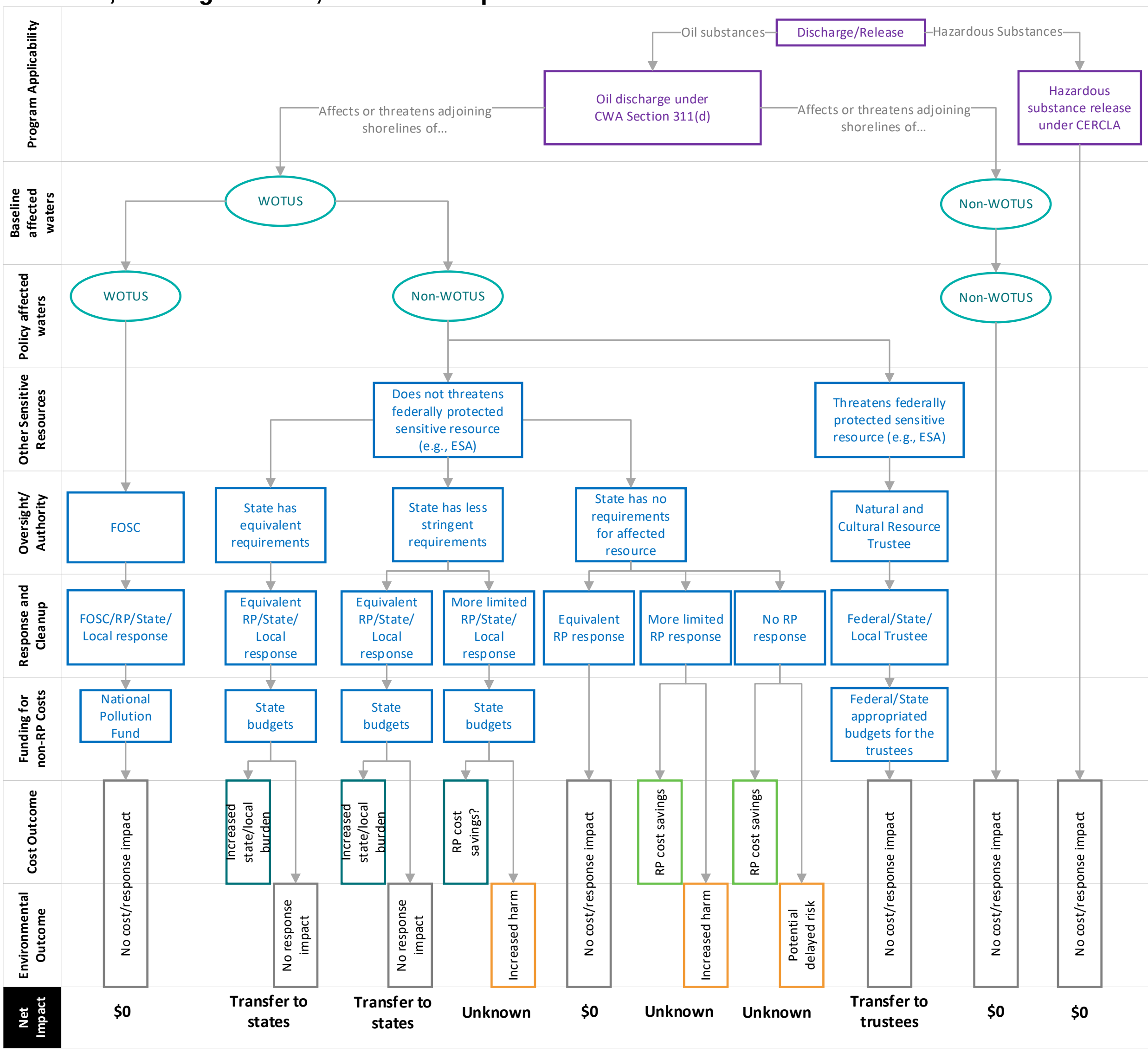
The potential for a residual threat to a "water of the United States" exists if the response to an oil spill is delayed by the absence of a direct and immediate threat to jurisdictional waters. This impact may be exacerbated by adverse weather conditions such as heavy rain or wind.

Figure IV-5 highlights different possible outcomes of changes to the scope of CWA jurisdiction, including for oil spill incidents affecting potentially new non-jurisdictional waters. These outcomes depend on the state requirements and RP actions following the incident. They range from no change (in cases where the RP assumes full responsibility for response and cleanup), to the transfer of the response burden to the state or tribe (in cases where the OSLTF is no longer available), to reduced cleanup and environmental damages and/or response delays as the relevant authorities determine whether a threat to downstream "water of the United States" exists.

[98] The Pollution Reports are available at https://response.epa.gov/.

[99] Based on data from NPFC on EPA FOSC inland cases involving facilities (excludes vessels). Source: email communication from U.S. Coast Guard, National Pollution Funds Center, April 26, 2018.

Figure IV-5: Potential effects of the proposed rule on CWA section 311 oil spill response and removals, funding sources, and other requirements.



The economic implications of these proposed changes are uncertain since they depend on the location of the spill, the stringency of state requirements, and other factors. It is possible that a RP for a spill affecting non-jurisdictional resources would reduce response costs in cases where state requirements are less stringent than the baseline federal requirements. State regulations cover the discharge to state waters or land of any substance that may be detrimental to environmental quality and are generally similar to baseline oil discharge prohibition requirements under the CWA.

Whereas the federal regulations cover spills of non-petroleum oils such as animal fats and vegetable oils (AFVOs), some state requirements focus mainly on petroleum oils and requirements for non-petroleum oils may be less stringent or may not apply. For example, Georgia defines “oil” as “including but not limited to gasoline, crude oil, fuel oil, diesel oil, lubricating oil, sludge, oil refuse, oil mixed with wastes, and another other *petroleum* related product." (Georgia Oil or Hazardous Material Spills or Releases Act (OCGA section12-14-1, emphasis added).[100] The definition does not explicitly include non-petroleum oils such as AFVOs. There may also be higher spill reporting requirement thresholds than provided by the CWA. For example, in New York, reporting is not needed when the spill involves less than a threshold amount of oil, is under control, has not reached the state's water or land,[101] and is cleaned up within two hours of discovery (New York Department of Environmental Conservation, 2018).

Accordingly, some discharges reportable under the baseline may no longer be reportable under state regulations, depending on the basis for the definition of "waters of the state." The lack of reporting requirements for certain incidents that fall outside both CWA and state requirements may increase environmental risks.

Another key difference, even where the state requirements are otherwise equivalent to those of the CWA, is the availability of resources to help defray removal costs or compensate affected parties for damages not reimbursed by the RP.

IV.A.3.3 Uncertainty and Limitations for Assessing Effects on Section 311 Program

There is significant uncertainty in the universe of facilities that could be affected by a change in CWA jurisdictional scope. The SPCC rule does not require facility owners/operators to identify themselves to the EPA, unless these facilities are subject to the RFP rule, requiring submittal of an oil spill response plan to EPA. Whereas owners or operators must comply with 40 CFR part 112 and prepare and maintain an SPCC Plan, they do not submit this Plan, a Notice of Intent (NOI), or any similar notification to the EPA. No national, state, or industry inventory of SPCC facilities exists, although the EPA has developed estimates of the universe of facilities to support rulemaking and Information Collection Requests (ICRs).

For some sectors, notably onshore oil production, detailed public data provide both the number and location of individual equipment or facility components (*e.g.*, oil wells). This information can be used to characterize the potential distribution of oil production equipment, but this does not necessarily lead to accurate identification of SPCC-regulated facility, since production tank batteries are not necessarily co-located with oil wells and are typically connected to multiple wells. For other sectors, including farms, manufacturing, and other facilities, publicly available data provide counts of facilities per county or state, but does not indicate the aggregate storage capacity to assess SPCC applicability. None of the datasets (except for inspected SPCC facilities and FRP-subject facilities) provide direct information to infer reasonable potential for a discharge.

IV.A.4 Other CWA Parts

IV.A.4.1 Section 303: Water Quality Standards and Total Maximum Daily Loads

CWA section 303 includes development of state or tribal water quality standards, assessment of water quality, and development of total maximum daily loads (TMDLs) for waters that are determined to not meet applicable water quality standards.

[100] See https://law.justia.com/codes/georgia/2010/title-12/chapter-14/12-14-1/.

[101] New York does not consider paved surfaces (asphalt or concrete) as "land."

States and tribes typically develop water quality standards for general categories of waters, including wetlands, in addition to creating site-specific standards and more generic standards that can apply broadly.

State water quality standards for waters jurisdictional under the CWA are required to be consistent with the CWA, for example in terms of designating uses, criteria to protect those uses, and anti-degradation policies. If a feature is not jurisdictional under the CWA, states and authorized tribes are not required to develop water quality standards for it. There is also no federal requirement under section 303(d) for states to assess "non-jurisdictional" waterbodies. Therefore, a change in the scope of CWA jurisdiction has the potential to increase the number of waters that are not assessed or otherwise identified as impaired pursuant to section 303(d). As a result, states would not be required to develop TMDL restoration plans for waters that are impaired but have not been so identified. This could result in reduced protection for aquatic ecosystems and public health and welfare (*see* the Resource and Programmatic Assessment for more detail).

The effect of the proposed rule on the number of waterbodies added to the impaired waters list (and subsequent TMDL development) is uncertain. States typically have a set budget for water quality monitoring and assessment and monitor only a subset of waters in any year. Since water quality sampling needs are often higher than budgets allow, this proposed rule, which may reduce the number of waters that states choose to monitor, is unlikely to motivate states to increase monitoring budgets. If non-adjacent wetlands and ephemeral features are categorically not jurisdictional, states may have opportunities to reallocate monitoring resources currently dedicated to such waters to collect data in waters that meet the proposed definitions of "tributary" and "adjacent wetlands." Under this scenario, states and tribes may be better able to allocate their resources toward waters of relatively higher environmental and social value.

Absent CWA jurisdiction, states and tribes can still choose to regulate waters irrespective of federal mandates. For example, over 90 percent of streams in New Mexico are mapped as ephemeral or intermittent and the state currently has water quality standard categories for all waters (*i.e.*, ephemeral, intermittent, and perennial). New Mexico could retain these categories, thereby regulating certain waters above the federal standard, or it could modify the water quality standards to only meet minimum CWA requirements. Even if New Mexico and other arid states do not change their water quality standards, they may no longer assess non-jurisdictional waters or develop TMDLs for them if they are impaired.

The development and revision of water quality standards is typically an ongoing process often independent from changes to the definition of "waters of the United States"—although some states, such as New Mexico, have developed standards for certain categories of waters (*e.g.* ephemeral features) that would be non-jurisdictional under the proposed rule. The agencies thus do not project additional costs relating to development or revision of water quality standards as a consequence of this proposed rule.

Changes in CWA jurisdiction could also lead to requests for changes in TMDL waste load allocations (WLAs) for point sources and load allocations (LAs) nonpoint sources and its margin of safety. TMDL revisions could shift additional pollutant reduction responsibility to those sources discharging to jurisdictional waters downstream. Given that there are currently more than 73,000 completed TMDLs nationwide, requests to revise even a small percentage of them would require significant resources to complete (U.S EPA and U.S. Department of the Army 2018).

IV.A.4.2 Section 401: State and Tribal Roles

Under section 401 of the CWA, states, authorized tribes, and interstate agencies have the authority to review and approve, condition, or deny any federal permits or licenses that may result in a discharge to "waters of the United States" within their borders, including wetlands. States, authorized tribes, and interstate agencies make their decisions to deny, certify, or condition permits or licenses primarily by ensuring the activity will comply with applicable water quality standards, effluent limitation guidelines, new source performance standards, toxic pollutants restrictions, and other appropriate water resource requirements of state or tribal law. Section 401 certification is commonly applied to CWA section 404 permits and Rivers and Harbors Act Section 10 permits issued by the U.S. Army Corps of Engineers, CWA section 402 permits in the states where the EPA issues NPDES permits, and Federal Energy Regulatory Commission licenses for non-federal hydroelectric dams. States, authorized tribes, and interstate agencies may choose to waive their section 401 certification authority, either explicitly or through the passage of time.

Under the proposed rule, the agencies estimate that the number of CWA section 404 permits would likely decrease since non-adjacent wetlands, ephemeral features, and certain lakes and ponds would not be jurisdictional under the CWA, whereas currently some of these waters would be categorically jurisdictional or found to be jurisdictional based on a significant nexus analysis. A decline in 404 permits could result in costs savings to states and authorized tribes by reducing the number of 401 reviews and required staff time. The vast majority of states have been authorized to administer section 402 of the CWA, and any cost savings that would result from the proposed rule due to section 402 permitting are discussed in Section IV.A.1. States that have not been authorized for the section 402 program and tribes authorized to administer section 401 would continue to have the opportunity to complete section 401 certification on EPA-issued 402 permits. Fewer EPA-issued 402 permits would then reduce the number of 401 reviews and associated staff time.

Fewer 404 permits as a result of a reduction in the scope of the CWA jurisdiction could affect a state or tribe's ability to regulate non-adjacent wetlands and ephemeral features via section 401 authority. For waters whose jurisdictional status would not change under the proposal, states and authorized tribes can place additional restrictions on federally-issued permits through their section 401 authority, enhancing environmental benefits and increasing costs to permittees. For instance, states may impose additional permit conditions on permits issued within watersheds of concern.

IV.A.4.3 National Pretreatment Program

The EPA and authorized NPDES state pretreatment programs approve local municipalities to perform permitting, administrative, and enforcement tasks for discharges into the municipalities' publicly-owned treatment works (POTWs). The program is designed to protect POTW infrastructure and reduce conventional and toxic pollutant levels discharged by industries and other nondomestic wastewater sources into municipal sewer systems and subsequently discharged into receiving waters. The agencies expect no impacts on the national pretreatment program from CWA jurisdictional changes since the program is already administered by municipalities and the main focus of the program is minimizing effects of industrial and other nondomestic wastewater discharges on POTW infrastructure and processes and subsequent POTW discharges to receiving waters.

IV.B Case Studies

To evaluate the potential effects of proposed changes to the definition of "waters of the United States," the agencies conducted analyses in three selected geographical areas. The analyses illustrate the potential impacts of the proposed rule on major program areas – notably on the number of facilities subject to CWA section 311 oil spill prevention and preparedness regulations, section 402 permits, and section 404 permits requiring mitigation – and on the resulting environmental effects and impacts on regulated entities. The case studies allow for more detailed evaluation of individual facilities, permits, hydrographic features, and other factors that would not be possible in a national analysis. As explained in Section I.B, the purpose of the case studies is to evaluate a range of scenarios that illustrate the potential outcomes from proposed changes in the definition of "waters of the United States" rather than develop conclusive quantitative estimates of the economic and environmental outcomes of the proposed rule.

The agencies selected the case study locations to reflect a range of ecosystems, hydrographic characteristics, and regulatory contexts, considering data availability and quality, including the availability of relevant wetland valuation studies. Additional considerations in case study selection included the fraction of waters that may be affected by the proposed rule and potential state response described in Section II.A which suggested some regions with comparatively smaller potential for impacts (see Section II.A.3 for a detailed discussion of the agencies evaluation of potential state responses to CWA jurisdictional changes). Based on the agencies' analysis of potential state responses, the agencies estimate that 23 states are likely to continue regulating non-jurisdictional[102] non-wetland surface waters, 21 may continue, and 7 may reduce regulation of such waters following the proposed rule. Reduced regulation could result in a potential increase in pollutant discharge to these waters. Twenty-one states are likely to continue regulating non-jurisdictional wetlands, eight may continue, 16 may reduce regulation of such waters, and five are likely to not regulate waters that are non-jurisdictional under the proposed rule, resulting in a reduction of wetlands compared to the baseline level.[103]

Based on the results of the potential state response analysis, the agencies prioritized geographic locations where non-permanent streams represent a relatively large fraction of waters located within the state, as mapped by the high-resolution NHD.[104] The combination of factors meant that there were no case study candidates in the Northeast and along the Pacific coast. Figure IV-6 and Figure IV-7 show selected case study watersheds against the backdrop of state responses.

[102] Non-jurisdictional in this context refers to waters that do not meet the definition of "waters of the United States."

[103] The agencies note that some states (*e.g.*, New York) may have limitations on the size of isolated wetlands they can regulate.

[104] When screening locations for case studies, the agencies initially considered the extent to which both intermittent and ephemeral waters have been delineated in the high-resolution National Hydrography Dataset since many parts of the country do not differentiate among these categories of streams, and some areas do not differentiate between ephemeral, intermittent, and perennial (*i.e.*, streams are unclassified for hydrographic category). Subsequent analyses focused on potential impacts to ephemeral streams more specifically since the proposed definition of "waters of the United States" affects these waters more specifically by categorically excluding them from federal jurisdiction.

Figure IV-6: HUC4 case study locations compared to states potential responses to CWA jurisdictional changes – section 402 program

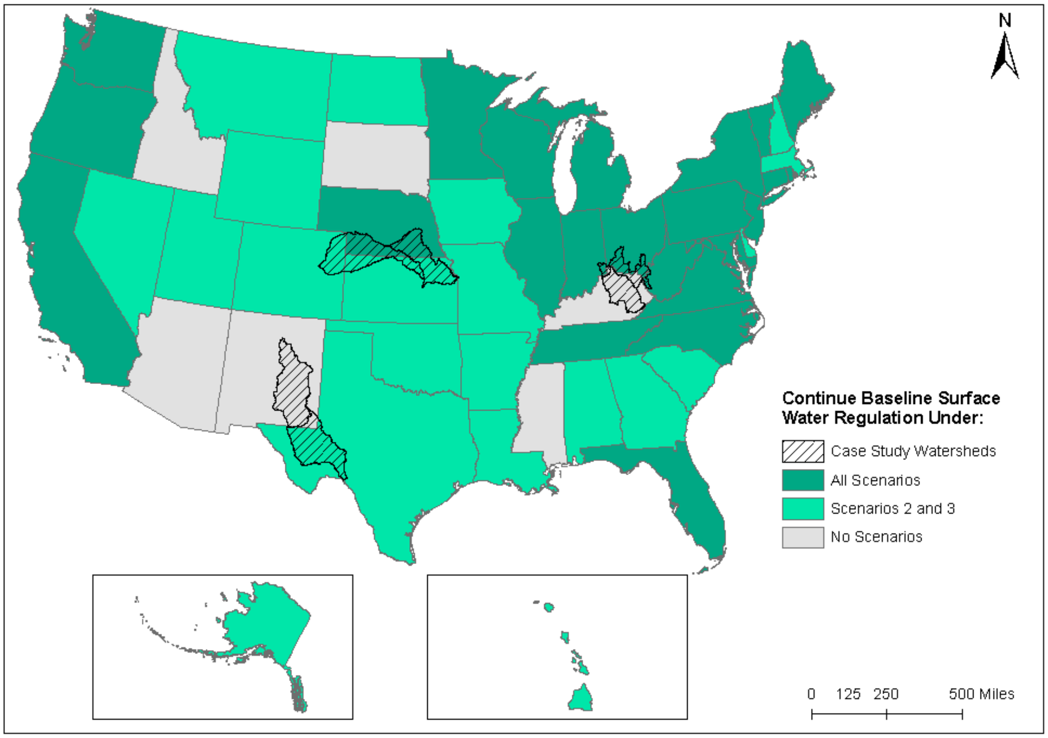
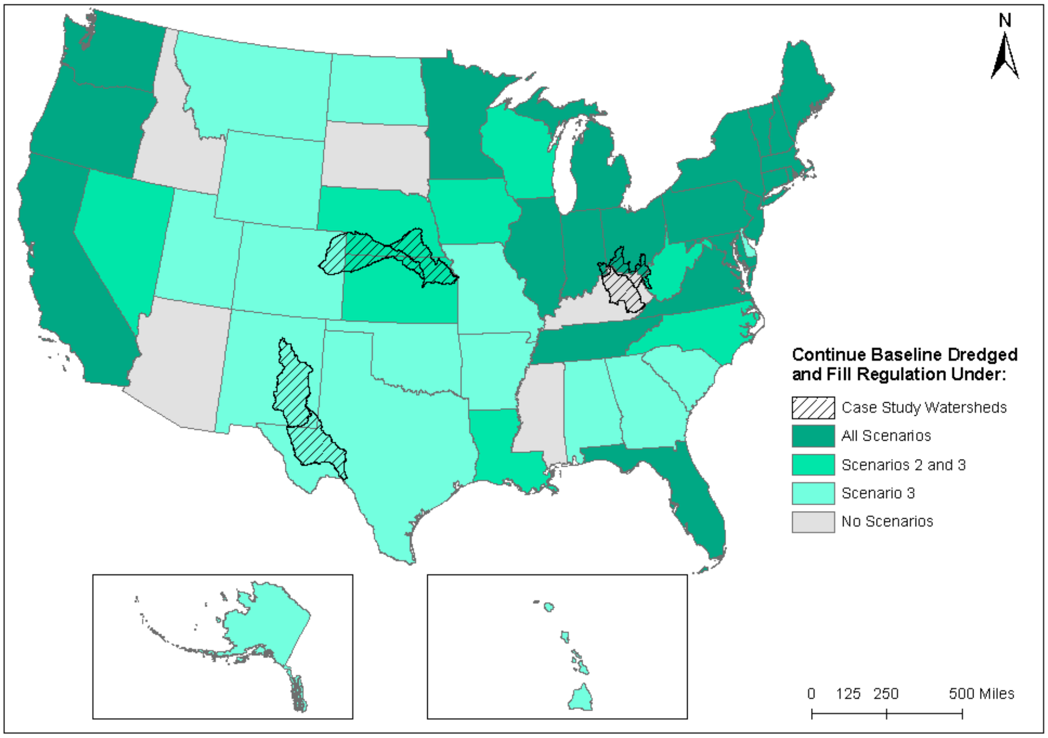


Figure IV-7: HUC4 case study locations compared to states potential responses to CWA jurisdictional changes – section 404 program



The three case study areas, as shown in Figure IV-6 and Figure IV-7 are:

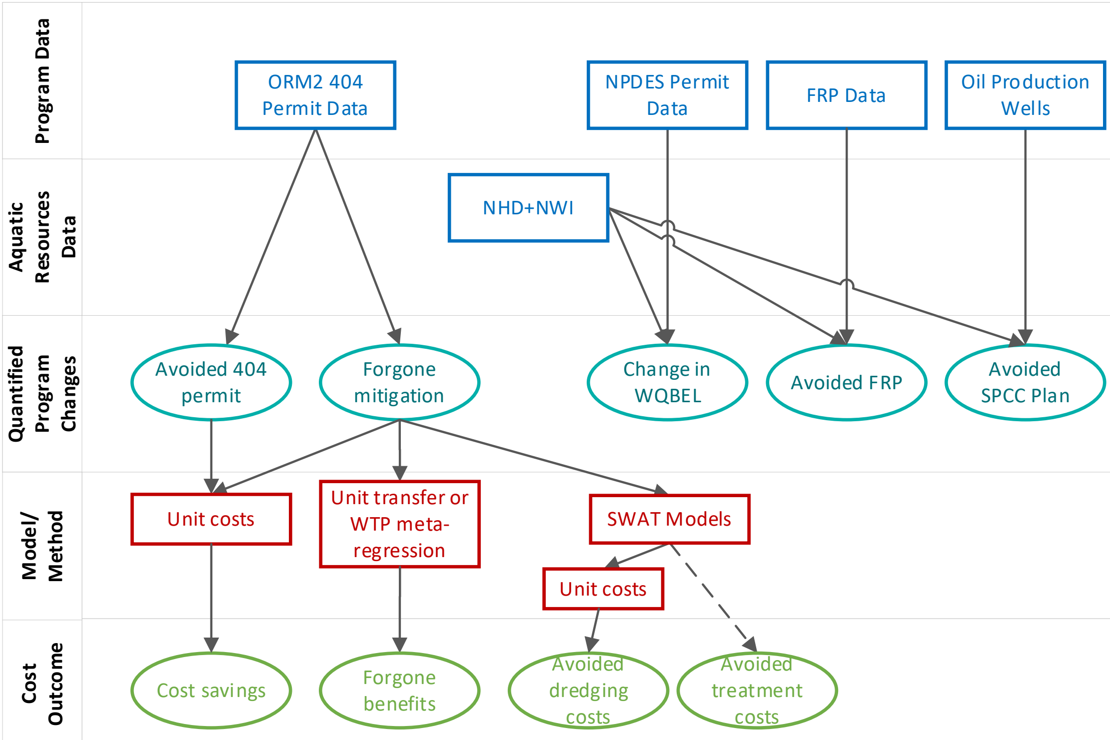
- In the Ohio River Basin:
  - HUC 0509 – Middle Ohio: The Ohio River Basin below the confluence with the Kanawha River Basin to the confluence with the Kentucky River Basin, excluding the Big Sandy, Great Miami, Guyandotte, Kentucky, Licking and Scioto River Basins. The watershed encompasses 8,850 mi^2 in Indiana, Kentucky, Ohio, and West Virginia.
  - HUC 0510 – Kentucky-Licking: The Licking and Kentucky River Basins. The watershed encompasses 10,500 mi^2 in Kentucky. The outlet of this watershed flows into watershed 0509.
- In the Lower Missouri River Basin:
  - HUC 1025 – Republican: The Republican River Basin. The watershed encompasses 24,700 mi^2 in Colorado, Kansas, Nebraska. The outlet of this watershed flows into watershed 1027.
  - HUC 1027 – Kansas: The Kansas River Basin, excluding the Republican and Smoky Hill River Basins. The watershed encompasses 15,000 mi^2 in Kansas, Nebraska, and Missouri.
- In the Rio Grande River Basin:
  - HUC 1306 – Upper Pecos: The Pecos River Basin to and excluding the Delaware River Basin. The watershed encompasses 23,500 mi^2 in New Mexico and Texas.
  - HUC 1307 – Lower Pecos: The Pecos River Basin from and including the Delaware River Basin to the confluence with the Rio Grande. The watershed encompasses 20,800 mi^2 in New Mexico and Texas.

IV.B.1 Methods

IV.B.1.1 Overview

The agencies calculated cost savings and forgone benefits based on the proposed changes in each case study area for each of the different federalism scenarios. Figure IV-8 shows the major components of the case study analysis and the data and methods used.

Figure IV-8: Case study analysis components and input data



The agencies used program specific data (permits and other programmatic data) to describe the activity in each program. In the case of the 402 and 311 programs, the agencies attempted to match program permit data to available water and wetland inventories. In most cases, data limitations resulted in qualitative descriptions of the effects on the programs. In the case of the 404 program, the agencies used the Corps' ORM2 404 permit data to determine the number of permits that would no longer be required because they affect non-jurisdictional waters under the proposed rule as well as forgone mitigation of impacts that affect non-jurisdictional waters under the proposed rule. Cost savings related to the 404 program were defined as:

1) Reduced permit costs, including application costs, permitting time costs, and impact avoidance and minimization costs, for projects no longer affecting waters regulated under the CWA, and

2) Reduced compensatory mitigation costs when impacts occur on waters no longer regulated under the CWA.

Forgone benefits included the value of lost mitigation area, monetized using area resident WTP obtained from location appropriate studies estimating WTP or from the wetland WTP meta-regression discussed in section III.C.2.2.3.2. The agencies also modeled selected environmental impacts resulting from the forgone mitigation using the Sediment and Water Assessment Tool (SWAT) model (release 659) (Arnold et al., 2012, Neitsch et al., 2011). These impacts include changes in water balance and nutrient and sediment loads and transport, which may increase drinking water treatment costs and the frequency of reservoir dredging. Dredging costs resulting from regulatory changes were noted. Other environmental impacts were not specifically monetized.

IV.B.1.2 Relating Permits and Activities to Aquatic Resources Affected by the Proposed Rule

More specifically, for each case study, the agencies first identified the facilities and activities covered under each of the three CWA programs under baseline conditions. The identified facilities and activities were then assessed to determine whether they would be affected by the changes to regulatory requirements under the proposed rule. As discussed in Section II.C, the high-resolution NHD and NWI data have significant gaps and limitations. These limitations impede the agencies' ability to categorically identify waters that will change jurisdictional status under the proposed rule in a large fraction of the United States. Therefore, where the available data were sufficiently detailed, the agencies identified affected facilities and activities using available data from the relevant program database(s) that describe the flow regime of the affected resources. These data most often reflect site-specific assessments that supported the issuance of the permit.

To assess impacts on activities permitted under the 404 program in each case study watershed, the agencies used information provided in the Corps ORM2 database. The ORM2 database records existing Corps-issued permits and associated aquatic resources determined to be jurisdictional at the time the permit was issued. The ORM2 database identifies certain tributaries as having an ephemeral flow regime (based on the code "R6-Riverine Ephemeral")[105] or wetlands that are adjacent to but that do not directly abut relatively permanent waters (based on the Water Type "RPWWN"). For purposes of this economic analysis, the agencies are assuming that all waters that had previously been found jurisdictional but that are classified as "R6" or were determined to be wetlands that are adjacent to but do not directly abut relatively permanent waters would be no longer jurisdictional under the proposed rule. The agencies acknowledge that such an assumption is imperfect, as, for example, there could be some individual waters that do not directly abut the tributary that would meet the proposed rule's definition of adjacent because they have a direct hydrologic surface connection with the tributary. While the information contained in the ORM2 database allows the agencies to identify a subset of waters that likely would no longer be jurisdictional under the proposed rule, and thereby the corresponding projects that would likely have a reduced 404 permit burden, this approach does not capture all 404 impacted waters that may change jurisdiction. Using these two categories to identify waters that have a high likelihood of experiencing a jurisdictional change should not be construed as determining that all these waters would change jurisdiction under the rule.

Data from the 402 and 311 programs can be used to identify the waters that were likely considered jurisdictional during permit and plan development, however, this information is not sufficiently detailed to identify waters that may change jurisdiction under the rule. The agencies supplemented the program databases with data from the NWI to identify facilities affecting waters that are likely to change jurisdiction under the rule. For example, for section 311 and 402 programs, the agencies considered the proximity of each facility to receiving and downstream waters potentially changing jurisdiction under the proposed definition based on NWI descriptors that may identify ephemeral waters. [106]

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[105] *See* https://www.spa.usace.army.mil/Portals/16/docs/civilworks/regulatory/Bulk%20Upload/Bulk%20Data%20Cowardin.pdf.

[106] Discharges to non-jurisdictional waters may still be regulated if their downstream flow reaches a CWA jurisdictional water.

The U.S. Fish and Wildlife Service (U.S. FWS) established the NWI program to conduct a nationwide inventory of wetlands to provide biologists and others with information on the distribution and type of wetlands to aid in conservation efforts.[107] Today, NWI is used for general mapping of wetlands and deepwater habitats and for data analyses and modeling. The NWI geospatial dataset is a mapping dataset that provides detailed information on the extent, characteristics, and distribution of wetlands and deepwater habitats across the United States. These data are primarily derived from manual aerial image interpretation. The NWI dataset is available as digital data at the 1:24,000-scale or higher throughout the country, except for large portions of Alaska (data in Alaska are at the 1:63,360-scale or higher). Digital data are currently not available for approximately 60 percent of Alaska. Additional information on the NWI is available in the RPA and RPA Appendix A.

While the NWI is the most comprehensive national dataset of the potential extent of wetlands across the country, it has limitations. The NWI does not map all wetlands and sometimes maps wetlands that do not exist on the ground. At its best, NWI only approximates the location and boundaries of a Cowardin wetland type according to the Cowardin Classification System.[108] This classification framework was created to inventory wetlands and deepwater habitats of the United States. The five "Systems" that form the highest level of the classification hierarchy are Marine, Estuarine, Riverine, Lacustrine, and Palustrine. The primary objective of this classification is to impose boundaries on natural ecosystems for the purposes of inventory, evaluation, and management. Neither the Cowardin Classification System nor the NWI which relies on it for wetland and deepwater habitat mapping purposes were intended or designed for regulatory purposes. The Cowardin definition of "wetlands" differs from the agencies' regulatory definition of "wetlands."[109] No available datasets depict the jurisdictional extent of waters of the United States under the 2015 Rule or pre-2015 practice, and all data carry unavoidable uncertainties and associated limitations. *See* RPA and RPA Appendix A.

Aquatic habitat located on stream- and riverbeds is generally mapped as "Riverine" in the NWI according to the Cowardin Classification System (Cowardin *et al.*, 1979; Federal Geographic Data Committee, 2013). The Cowardin "Riverine System" includes all wetlands and deepwater habitats contained within a channel, with two exceptions: (1) wetlands dominated by trees, shrubs, persistent emergents, emergent mosses, or lichens, and (2) habitats with water containing ocean-derived salts in excess of 0.5 ppt. A channel is "an open conduit either naturally or artificially created which periodically or continuously contains moving water, or which forms a connecting link between two bodies of standing water"

[107] U.S. Fish and Wildlife Service. "NWI Program Overview." Available at https://www.fws.gov/wetlands/nwi/overview.html.

[108] Cowardin, L. M., V. Carter, F. C. Golet, and E. T. LaRoe. 1979. Classification of Wetlands and Deepwater Habitats of the United States. U.S. Fish and Wildlife Service. FWS/OBS-79/31. Washington, DC. Available at: https://www.fws.gov/wetlands/Documents/Classification-of-Wetlands-and-Deepwater-Habitats-of-the-United-States.pdf.

[109] Cowardin *et al.* (1979) define "wetlands" as "lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water. For purposes of this classification wetlands must have one or more of the following three attributes: (1) at least periodically, the land supports predominantly hydrophytes; (2) the substrate is predominantly undrained hydric soil; and (3) the substrate is nonsoil and is saturated with water or covered by shallow water at some time during the growing season of each year." The agencies' regulations define "wetlands" as "those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas." 33 CFR 328.3(b) and 40 CFR 232.2.

(Langbein and Iseri 1960:5). Water is usually, but not always, flowing in the Riverine System (Cowardin *et al.*, 1979; Federal Geographic Data Committee, 2013).

The Riverine System is divided into four Subsystems: Tidal, Lower Perennial, Upper Perennial, and Intermittent. Each is defined in terms of water permanence, gradient, substrate, and the extent of floodplain development. All four Subsystems are not necessarily present in all stream or rivers. The Cowardin Classification System identifies the Riverine Subsystems as follows:

- ***Tidal* (R1).** This Subsystem extends from the upstream limit of tidal fluctuations down to the upper boundary of the Estuarine System, where the concentration of ocean-derived salts reaches 0.5 ppt during the period of average annual low flow. The gradient is low and water velocity fluctuates under tidal influence. The stream bottom is mainly mud with occasional patches of sand. Oxygen deficits may sometimes occur and the fauna is similar to that in the Lower Perennial Subsystem. The floodplain is typically well developed.

- ***Lower Perennial* (R2).** This Subsystem is characterized by a low gradient. There is no tidal influence, and some water flows all year, except during years of extreme drought. The substrate consists mainly of sand and mud. Oxygen deficits may sometimes occur. The fauna is composed mostly of species that reach their maximum abundance in still water, and true planktonic organisms are common. The gradient is lower than that of the Upper Perennial Subsystem and the floodplain is well developed.

- ***Upper Perennial* (R3).** This Subsystem is characterized by a high gradient. There is no tidal influence, and some water flows all year, except during years of extreme drought. The substrate consists of rock, cobbles, or gravel with occasional patches of sand. The natural dissolved oxygen concentration is normally near saturation. The fauna is characteristic of running water, and there are few or no planktonic forms. The gradient is high compared with that of the Lower Perennial Subsystem, and there is very little floodplain development.

- ***Intermittent* (R4).** This Subsystem includes channels that contain flowing water only part of the year. When the water is not flowing, it may remain in isolated pools or surface water may be absent.

The habitat that occurs in non-perennial streams that are mapped in the NWI is typically classified within the Riverine Intermittent (R4) subsystem. The Cowardin Classification System that the NWI uses does not have an “Ephemeral” subsystem.

Under the Cowardin Classification System, Water Regime Modifiers are used for all nontidal parts of the Riverine System. Water Regime Modifiers are defined as:

- ***Permanently Flooded.*** Water covers the substrate throughout the year in all years.

- ***Intermittently Exposed.*** Water covers the substrate throughout the year except in years of extreme drought.

- ***Semipermanently Flooded.*** Surface water persists throughout the growing season in most years. When surface water is absent, the water table is usually at or very near the land surface.

- ***Seasonally Flooded.*** Surface water is present for extended periods (generally for more than a month) during the growing season, but is absent by the end of the season in most years. When surface water is absent, the depth to substrate saturation may vary considerably among sites and among years.
- ***Seasonally Flooded-Saturated.*** Surface water is present for extended periods (generally for more than a month) during the growing season, but is absent by the end of the season in most years. When surface water is absent, the substrate typically remains saturated at or near the surface.
- ***Seasonally Saturated***. The substrate is saturated at or near the surface for extended periods during the growing season, but unsaturated conditions prevail by the end of the season in most years. Surface water is typically absent, but may occur for a few days after heavy rain and upland runoff.
- ***Continuously Saturated***. The substrate is saturated at or near the surface throughout the year in all, or most, years. Widespread surface inundation is rare, but water may be present in shallow depressions that intersect the groundwater table, particularly on a floating peat mat.
- ***Temporarily Flooded.*** Surface water is present for brief periods (from a few days to a few weeks) during the growing season, but the water table usually lies well below the ground surface for most of the season.
- ***Intermittently Flooded.*** The substrate is usually exposed, but surface water is present for variable periods without detectable seasonal periodicity. Weeks, months, or even years may intervene between periods of inundation. The dominant plant communities under this Water Regime may change as soil moisture conditions change. Some areas exhibiting this Water Regime do not fall within our definition of wetland because they do not have hydric soils or support hydrophytes. This Water Regime is generally limited to the arid West.
- ***Artificially Flooded.*** The amount and duration of flooding are controlled by means of pumps or siphons in combination with dikes, berms, or dams. The vegetation growing on these areas cannot be considered a reliable indicator of Water Regime. Examples of Artificially Flooded wetlands are some agricultural lands managed under a rice-soybean rotation, and wildlife management areas where forests, crops, or pioneer plants may be flooded or dewatered to attract wetland wildlife. Neither wetlands within or resulting from leakage from man-made impoundments, nor irrigated pasture lands supplied by diversion ditches or artesian wells, are included under this Modifier. The Artificially Flooded Water Regime Modifier should not be used for impoundments or excavated wetlands unless both water inputs and outputs are controlled to achieve a specific depth and duration of flooding.

For Riverine Intermittent features, the NWI restricts the Water Regime Modifiers to “Temporarily Flooded,” “Seasonally Flooded,” and “Intermittently Flooded” which are identified by codes R4SBA (Riverine, Intermittent, Streambed, Temporarily Flooded), R4SBC (Riverine, Intermittent, Streambed, Seasonally Flooded), and R4SBJ (Riverine, Intermittent, Streambed, Intermittently Flooded), respectively.[110]

Neither the Cowardin Classification System nor the NWI were created to identify the flow regime of rivers and streams (*i.e.*, perennial, intermittent, or ephemeral). Nevertheless, the agencies have attempted to distinguish intermittent and ephemeral streams within the Riverine Intermittent classification using the Water Regime Modifiers given that they provide a description in general terms of riverine hydrologic characteristics. "Temporarily Flooded" is defined as when surface water is present for brief periods (from a few days to a few weeks) during the growing season, but the water table usually lies well below the ground surface for most of the season (Cowardin *et al.,* 1979; Federal Geographic Data Committee, 2013). "Intermittently Flooded" in NWI indicates that surface water is present for variable periods without detectable seasonal periodicity, and that weeks, months, or even years may intervene between periods of inundation (*Id*.). The "Intermittently Flooded" Water Regime Modifier is "generally limited to the arid West." (*Id*.) "Seasonally Flooded" means that surface water is present for extended periods (generally for more than a month) during the growing season, but is absent by the end of the growing season in most years; when surface water is absent, the depth to substrate saturation may vary considerably among sites and among years (*Id.*).

The agencies recognize that none of the Riverine Intermittent Water Regime Modifiers expressly describes ephemeral features, but believe that the modifiers may serve as proximates for use in identifying non-perennial flow regimes. Specifically, the agencies believe "Temporarily Flooded" (R4SBA) and "Intermittently Flooded" (R4SBJ) categories may represent ephemeral streams, and the "Seasonally Flooded" (R4SBC) category may represent intermittent streams. Photographs in Cowardin *et al.* (1979) of "Intermittently Flooded" streams, for example, appear to be ephemeral, with the description of one of the streams reading, "Streambeds such as this are common throughout the arid West. They carry water for brief periods after snowmelt and following rainstorms which are irregular and unpredictable in occurrence" (*See id.* at Plates 38 and 39). Based upon this interpretation, the agencies have used streambed habitat mapped as R4SBA (Riverine, Intermittent, Streambed, Temporarily Flooded) and R4SBJ (Riverine, Intermittent, Streambed, Intermittently Flooded) in the NWI as proximates for ephemeral streams for the section 311 and 402 analyses in the following Case Studies. Note that not all features are assigned a Water Regime Modifier.

The Corps does not use official Cowardin System Classification codes to identify ephemeral features for the purposes of 404 permit ORM2 data entry. Rather, in June 2009, the Corps added a non-Cowardin classification code "R6," entitled "Riverine, Ephemeral," to identify ephemeral aquatic resources.[111] The Corps created the R6 code to provide clarity to field staff when identifying ephemeral waters for entry into the ORM2 database. Because the Corps' ORM2 database categorizes ephemeral features explicitly using the R6 designation, the agencies used ORM2-identified R6 features to identify ephemeral streams for the section 404 analyses within the Case Studies.

The agencies solicit comment regarding the assumptions and validity of the use of Cowardin Classification System codes R4SBA and R4SBJ to identify ephemeral features for use in the Case Study

[110] *See* https://www.fws.gov/wetlands/documents/NWI_Water_Regime_Restriction_Table.pdf.

[111] *See* https://www.spa.usace.army.mil/Portals/16/docs/civilworks/regulatory/Bulk%20Upload/Bulk%20Data%20Cowardin.pdf.

section 311 and section 402 analyses. More specifically, given the “Temporarily Flooded” category includes streams where surface water may be present for “a few weeks,” and the “Temporarily Flooded” definition implies there may be times when the water table is above the ground surface, the agencies seek comment whether waters identified as “Temporarily Flooded” would more appropriately be classified as intermittent rather than ephemeral for purposes of the agencies’ analyses. Additionally, the agencies seek comment whether the “Temporarily Flooded” category covers both intermittent and ephemeral streambeds and cannot be used to distinguish between the two for purposes of the agencies’ analyses. Finally, given the Corps ORM2 database does not parse out “Riverine Intermittent” (R4) codes into ephemeral and intermittent features, but instead uses an entirely new “Riverine, Ephemeral” category (R6) to identify ephemeral aquatic resources, the agencies solicit comment whether it is appropriate to bifurcate the “Riverine Intermittent” subsystem into ephemeral and intermittent features for purposes of the agencies’ analyses.

As discussed in Section II.C, the high resolution NHD maps ephemeral streams for several basins in the southwest region of the country, so for the Rio Grande Basin case study in Section IV.B.4, the agencies also used the high-resolution NHD data to identify ephemeral streams potentially affected by the regulated facilities.

Table IV-8 summarizes the criteria the agencies used to identify existing permits and plans that affect waters anticipated to change jurisdictional status under the proposed rule.

Table IV-8: Criteria used to identify waters affected by CWA program activities that may change jurisdictional status under the proposed rule

Basis for Determination	Criterion	Baseline Status	Likely Status under Proposed Definition
402 Impacts (based on feature analyzed as receiving the permitted discharge)			
Based on NWI (Cowardin Code) of water feature closest to outfall			
Riverine[1]	R4SBA	Jurisdictional	Non-Jurisdictional
	R4SBJ	Jurisdictional	Non-Jurisdictional
	All Others	Jurisdictional	Jurisdictional (No change)
Non-tidal wetland	All	Varies (unable to determine categorically)[2]	Varies (unable to determine categorically)
Tidal wetland	All	Jurisdictional	Jurisdictional (No change)
404 impacts (based on affected aquatic resource requiring mitigation)			
Based on ORM2 Name Field[3]			
Stream	R6-Riverine, ephemeral[4]	Jurisdictional	Non-Jurisdictional[5]
	Others – perennial flow regimes	Jurisdictional	Jurisdictional (No change)
	Others – intermittent flow regimes	Jurisdictional	Varies (unable to determine categorically)[6]
	Others – Flow regime not specified	Jurisdictional	Varies (unable to determine categorically)[6]
Non-tidal wetland	All	Jurisdictional	Varies (unable to determine categorically)[6]
Tidal wetland	All	Jurisdictional	Jurisdictional (No change)

Table IV-8: Criteria used to identify waters affected by CWA program activities that may change jurisdictional status under the proposed rule

Basis for Determination	Criterion	Baseline Status	Likely Status under Proposed Definition
Based on ORM2 Water Type Field			
Wetland	RPWWN	Jurisdictional	Non-jurisdictional[7]
Based on Additional Information from NWI-NHD Adjacency Analysis[8]			
Non-tidal wetland	Not Abutting	Jurisdictional	Non-jurisdictional[7]
	Abutting	Jurisdictional	Varies (unable to determine categorically)[5]
311 Impacts (based on features located within half mile of the facility)			
Based on NWI (Cowardin Code) of water features within a half-mile of the facility			
Riverine	R4SBA	Jurisdictional	Non-Jurisdictional
	R4SBJ	Jurisdictional	Non-Jurisdictional
	All Others	Jurisdictional	Jurisdictional (No change)
Non-tidal wetland	All	Varies (unable to determine categorically)	Varies (unable to determine categorically)
Tidal wetland	All	Jurisdictional	Jurisdictional (No change)
Based on high-resolution NHD where flow attributes are available			
Stream/river	Ephemeral	Jurisdictional	Non-Jurisdictional
	All Others	Jurisdictional	Jurisdictional

[1] The agencies have interpreted streambeds identified in the NWI with Cowardin codes R4SBA (Riverine, Intermittent, Streambed, Temporarily Flooded) or R4SBJ (Riverine, Intermittent, Streambed, Intermittently Flooded) as ephemeral, and streambeds with Cowardin code R4SBC (Riverine, Intermittent, Streambed, Seasonally Flooded) as intermittent.

[2] The 402 permit information only provides outfall coordinates but does not identify the type of water receiving the discharge or not it is considered a water of the United States. An outfall only needs to discharge to a feature that conveys to a water of the United States.

[3] All affected waters are "Jurisdictional" in the baseline since the database includes only issued 404 permits.

[4] In June 2009, the Corps added a classification code to ORM2 – R6 (Riverine, Ephemeral) for ephemeral aquatic resources. This code is used to document the presence of ephemeral streams. This is not a class in the Cowardin Classification System but was added for Corps data entry purposes.

[5] This category includes some wetlands that directly abut non-RPWS, including ephemeral streams. For purposes of this analysis, the agencies assumed that all waters classified as R6 were non-wetland waters that would be excluded under the proposed rule. Note that wetlands with ephemeral hydrology would not automatically be excluded under the proposed rule.

[6] The agencies may be understating the impacts of the proposed rule for these waters since available data are not sufficiently detailed to determine status categorically.

[7] The agencies may be overstating the impacts of the proposed rule for these waters since some wetlands that are non-abutting will still meet the proposed definition of adjacent if they have a direct hydrologic surface connection in a typical year, but available data are not sufficiently detailed to determine how often this occurs.

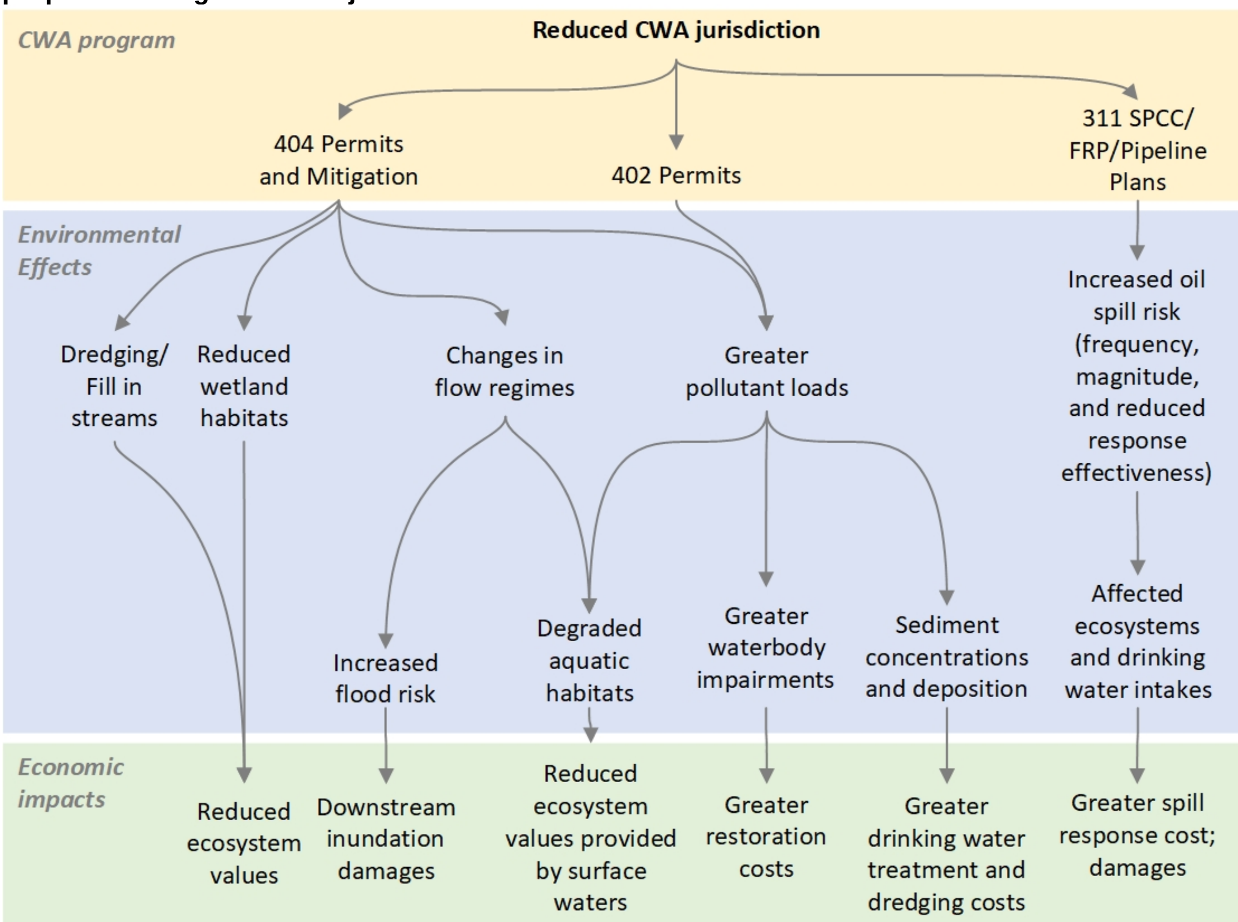
[8] Included only in the sensitivity analysis (see Appendix E). The primary analysis is based on ORM2 data only.

As noted in the rightmost column in Table IV-8, available data are not sufficiently detailed for some waters to predict a change in jurisdictional status under the proposed rule. Because of this uncertainty, the agencies focused the primary analysis detailed in this section on those permits and facilities that could be identified with a high degree of certainty as affected by the proposed rule based on program data. The agencies also conducted a sensitivity analysis that includes a broader set of affected resources, notably non-abutting wetlands identified based on the overlay of the high-resolution NHD data and NWI wetlands. Appendix E provides the results of this sensitivity analysis.

IV.B.1.3 Costs and Environmental Effects of Jurisdictional Changes

The agencies then evaluated the impacts of these proposed changes on compliance costs, stream flows, water quality, drinking water treatment, endangered and threatened species habitats, and other ecosystem services. The agencies quantified and monetized the impacts where possible given the available data and methods. Figure IV-9 illustrates the types of potential impacts resulting from changes in wetland and stream CWA jurisdiction, permitted pollutant discharges, and spill prevention and preparedness.

Figure IV-9: Overview of potential environmental impacts to selected CWA programs from proposed changes in CWA jurisdiction for certain waters.



Note: This figure assumes no state responses to changes in CWA jurisdiction. The analysis in Section II.A suggests that many states will continue to regulate newly non-jurisdictional waters, thereby reducing any potential impacts from the changes in CWA jurisdiction.

The proposed changes to CWA jurisdiction could have a wide range of impacts on the ecosystem services provided by aquatic resources, including decline in wildlife habitat quantity and quality, downstream inundation damages, greater drinking water treatment and dredging costs, greater spill response cost and damages. Impacts specific to each CWA program are briefly summarized below and assessed in more detail in each case study.

- Pollutants discharged to surface waters are known to have negative impacts on human health, wildlife habitat, and economic productivity. A change in scope of CWA jurisdiction could lead to less stringent limits for point sources under section 402 if they discharge to newly non-jurisdictional waterbodies.[112] This could result in reduced protection for aquatic ecosystems and public health and welfare. The value of forgone benefits under section 402 associated with a potential increase in pollutant loadings from point sources depends on the specific pollutants discharged (*e.g.*, toxic vs. conventional), the type of ecosystems services provided by the affected waterbodies (*e.g.*, drinking water source, fishing area, aquatic habitat), presence of substitute sites, and the public value of ecosystem services provided by water resources.

- Compensatory mitigation required under section 404 offsets unavoidable negative impacts on wetlands and other aquatic resources from any dredging and filling projects. The anticipated decrease in the number of section 404 permits or permittee obligations would reduce the required compensatory mitigation. As a result, water quality in rivers, streams, and lakes may degrade as a result of pollutant loading from newly non-jurisdictional waters; loss of wetlands and streams without corresponding mitigation; or loss of impact reduction, minimization, and other requirements previously provided under section 404 program. Water quality degradation may adversely affect species habitat, costs of drinking water treatment and reservoir maintenance, as well as human uses of downstream water resources (*e.g.*, fishing). Loss of wetland area may also increase downstream flood risk. To estimate flow and water quality changes downstream from affected activities, the agencies developed a series of watershed models for analysis using the Soil and Water Assessment Tool (SWAT) (Arnold et al., 2012, Neitsch et al., 2011). The SWAT model projections capture the impacts of potential changes in wetland acres, including riparian areas and wetlands abutting ephemeral streams and non-abutting wetlands, due to potentially reduced mitigation requirements under the CWA section 404 program.

- Oil spills present a risk to ecological and human health. Less stringent regulatory requirements for spill prevention and preparedness may lead to more frequent or larger oil spills and reduce the effectiveness of immediate response actions following a spill (*e.g.*, by delaying the response). Several oil components are toxic to humans. Consequences of an oil discharge include direct costs for cleanup and remediation and environmental damages such as loss of wildlife and habitats. These damages depend on the type of oil, size of the spill, prevailing conditions and spill circumstances, and affected environments.

The agencies solicit comment on all aspects of these case studies, including the assumptions of expected state responses and data sources.

[112] Discharges into non-jurisdictional waters will still be regulated if the discharges eventually flow to a jurisdictional water. In such cases discharge limits may become less stringent if the increased distance to a jurisdictional water allows for dissipation of some of the discharge.

IV.B.2 Case Study 1: Ohio River Basin

This case study includes the middle portion of the Ohio River that runs along the border of Ohio, Kentucky, and Indiana. The Middle Ohio and Kentucky-Licking watersheds stretch across several ecoregions, primarily the Western Allegheny Plateau, Interior Plateau, and Eastern Corn Belt Plains. According to the Commission for Environmental Cooperation (CEC, 2011), these ecoregions are characterized by a mid-latitude, humid climate with hot summers and mild to cold winters. Annual precipitation ranges from 860 to 1470 mm (33.9 to 57.9 inches). Primary land uses include forests, cropland, and coal mining, with some urban development.

Figure IV-10 and Figure V-10 show maps of the HUC 0509 and HUC 0510 case study watersheds, respectively. Note that the outlet of watershed HUC 0510 flows into watershed HUC 0509, along with the watersheds delineated by HUCs 0503, 0505, 0506, 0507, and 0508.

Figure IV-10: Map of HUC 0509 – Middle portion of the Ohio River Basin showing high-resolution NHD water features and NWI wetlands in relation to state boundaries, populated areas, and major roads.

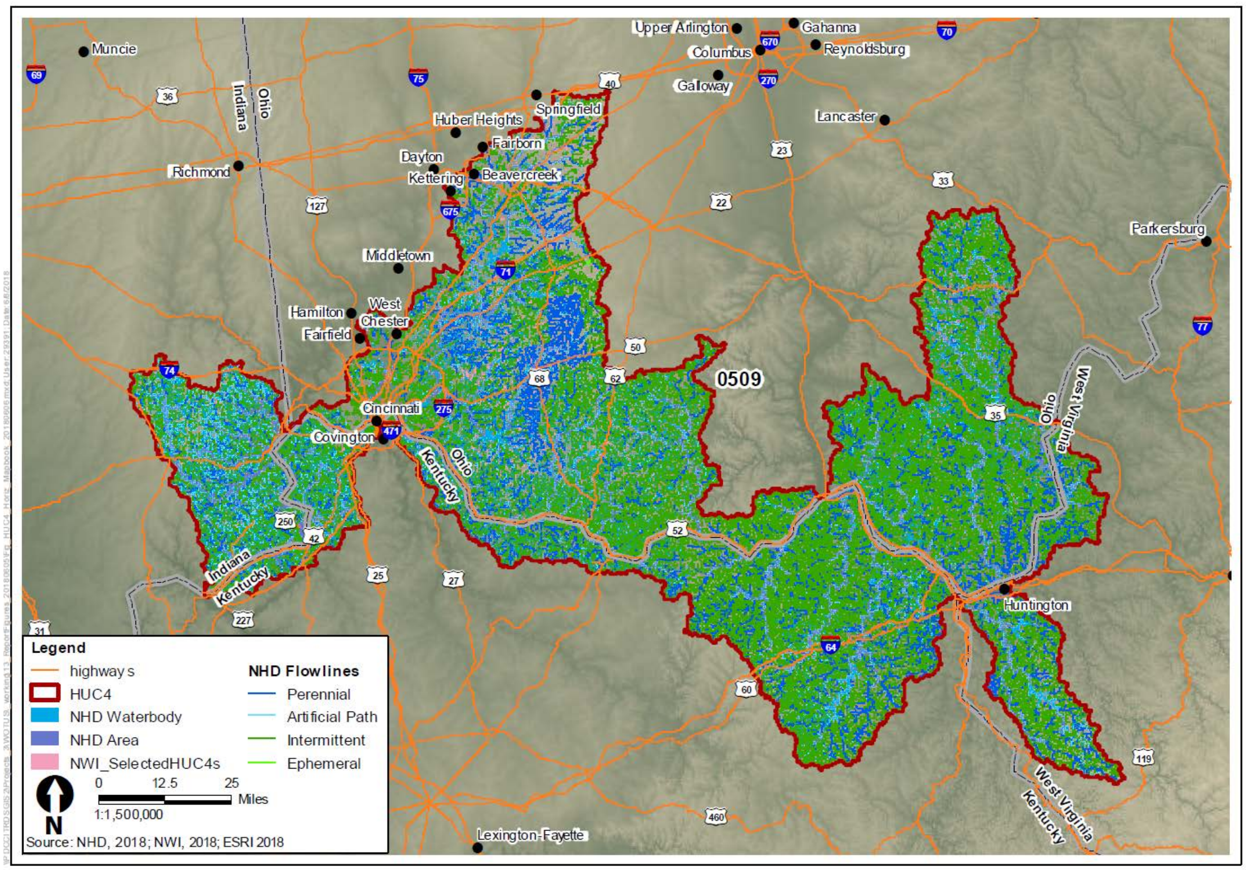
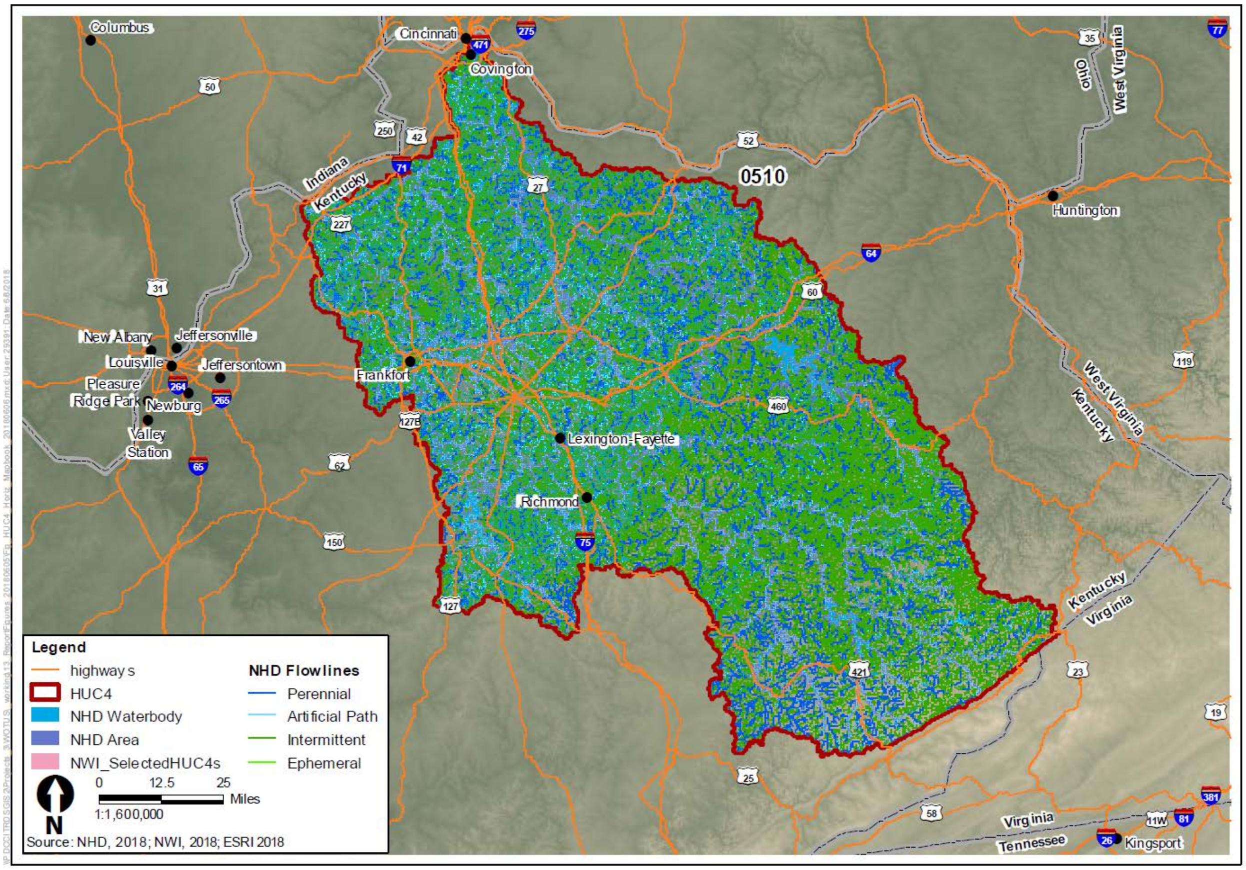


Figure IV-11: Map of HUC 0510 – Licking and Kentucky River Basins showing high-resolution NHD water features and NWI wetlands in relation to state boundaries, populated areas, and major roads.



IV.B.2.1 Aquatic Resources Characteristics

Table IV-9 summarizes the hydrography within the case study watersheds in terms of the number of stream miles in each flow category and acres of non-abutting and abutting wetlands (as discussed below) as represented in the high resolution NHD and NWI data, respectively. As presented in the table, 54 to 62 percent of all stream miles within the two watersheds are either ephemeral or intermittent, and 19 percent to 22 percent of all wetland acres are non-abutting (*i.e.*, not touching or intersecting perennial, intermittent, or ephemeral NHD streams).

The small number of miles of ephemeral streams within the two watersheds (none in HUC 0510 and two miles in HUC 0509) is due to the lack of specific flow regime categorization in the high resolution NHD data rather than the absence of such streams. Wetlands were estimated to be either abutting or non-abutting based on analyzing the proximity of NWI wetland features to waters delineated in the high resolution NHD. Chapter I in the Resources and Programmatic Assessment (Aquatic Resource Analysis) describes the approach the agencies used to determine adjacency. As mentioned in Section II.C, these estimates are only approximations and the agencies did not consider the data to be sufficiently accurate in this region to analyze the potential impacts of the proposed regulation.

Table IV-9: Hydrographic profile of case study watersheds in the Ohio River Basin

Feature type	Feature attributes	HUC 0509		HUC 0510	
		Miles or Acres	Percent of total	Miles or Acres	Percent of total
NHD Streams (miles)	**Total Mapped**	38,277	100%	26,895	100%
	Perennial	7,627	20%	6,917	26%
	Intermittent	20,548	54%	16,547	62%
	Ephemeral	2	0%	-	0%
	Artificial path	3,351	9%	3,389	13%
	Other[1]	6,749	18%	42	0%
NWI Wetlands (acres)	**Total Mapped**	53,316	100%	15,824	100%
	Abutting	41,358	78%	12,793	81%
	Non-abutting	11,958	22%	3,031	19%

[1] Includes canals/ditches, aqueducts, and other features without attributes.

The values are based on the agencies' geospatial analysis of NHD and NWI data and reflect gaps in NHD stream attributes.

IV.B.2.2 Program Changes

IV.B.2.2.1 Section 402

Table IV-10 presents the number of NPDES permits[113] issued in the Ohio River Basin by the most common industry categories. The number of permits issued in the two case study watersheds includes 914 individual permits and 2,441 general permits. As mentioned in Section II.C, the agencies judged the NHD data as insufficient for estimating the jurisdictional status of waterways since the dataset does not map most ephemeral streams or classifies those that are mapped as intermittent in the case study watersheds.[114] To estimate those permitted discharges that might be affected by the proposed rule, the agencies relied on 402 permit locational information and the NWI data on the flow regime of the receiving waters.[115] The agencies used the Cowardin classification code (Cowardin *et al*. 1979; Federal Geographic Data Committee, 2013) assigned to the NWI resource closest to the coordinates of permitted outfalls to approximate the flow regime of the receiving waters. The Cowardin Classification System subdivides waters, which include but are not limited to wetlands, into systems, subsystems, classes, subclasses, and dominance types, and includes Water Regime Modifiers (seasonally flooded, intermittently flooded, etc.) for classes and subclasses.

As further described in Section II.C, the NWI contains a Water Regime Modifier in the classification of wetlands and deepwater habitats, which provides a description in general terms of hydrologic characteristics. The agencies have interpreted streambeds identified in the NWI with Cowardin codes

[113] Data on regulated facilities or activities subject to individual permits or general permits under the Section 402 program is primarily from the EPA's Integrated Compliance Information System National Pollutant Discharge Elimination System (ICIS-NPDES) database. ICIS-NPDES is an information management system maintained by the EPA's Office of Compliance to track permit compliance and enforcement status of facilities regulated by the National Pollutant Discharge Elimination System (NPDES) under the CWA. ICIS-NPDES data are available for download from EPA's Enforcement and Compliance History Online website at https://echo.epa.gov/tools/data-downloads.

[114] *See* the Resource and Programmatic Assessment for additional errors in the dataset.

[115] The agencies used a two-step approach to identify 402 discharges to ephemeral streams. First, the agencies used NHD dataset to determine whether receiving waters are perennial. Second, for non-perennial waters, the agencies used NWI data on the flow regime to distinguish between intermittent and ephemeral streams.

R4SBA (Riverine, Intermittent, Streambed, Temporarily Flooded) or R4SBJ (Riverine, Intermittent, Streambed, Intermittently Flooded) as ephemeral, and streambeds with Cowardin code R4SBC (Riverine, Intermittent, Streambed, Seasonally Flooded) as intermittent. If the Cowardin classification code of the receiving water was either R4SBA (Riverine, Intermittent, Streambed, Temporarily Flooded) or R4SBJ (Riverine, Intermittent, Streambed, Intermittently Flooded), the agencies assumed the permitted discharge to likely be to an ephemeral water.

Based on this analysis, all NPDES permits in the case study areas affect streams with permanent or intermittent flow regimes. However, because the NHD data did not consistently distinguish between intermittent and ephemeral streams and NWI data are also subject to limitations, some discharges may be affecting ephemeral streams. See Section II.C for more details on data limitations.

Table IV-10: Section 402 individual permits (SIC codes in parentheses) issued in case study watersheds in the Ohio River Basin

Industry category	Individual Permits[1]			General Permits[1]		
	Total number of NPDES permits	Permits with discharge point near ephemeral streams[2]		Total number of NPDES permits[1]	Permits with discharge point near ephemeral streams[2]	
		Number of permits	Percent of all permits		Number of permits	Percent of all permits
HUC 0509						
Sewerage Systems (4952)	156	0	0%	206	0	0%
Water Supply (4941)	28	0	0%	11	0	0%
Industrial Domestic Wastewater Treatment[3]	55	0	0%	194	0	0%
Construction and Development[4]	10	0	0%	282	0	0%
Other Categories[5]	253	0	0%	156	0	0%
Missing SIC Codes	11	0	0%	11	0	0%
Total	**513**	**0**	**0%**	**860**	**0**	**0%**
HUC 0510						
Industrial Domestic Wastewater Treatment[3]	115	0	0%	158	0	0%
Construction and Development[4]	31	0	0%	743	0	0%
Asphalt Paving Mixtures and Blocks (2951)	1	0	0%	25	0	0%
Sewerage Systems (4952)	67	0	0%	0	0	0%
Other Categories[5]	187	0	0%	648	0	0%
Missing SIC Codes	0	0	-	7	0	0%
Total	**401**	**0**	**0%**	**1,581**	**0**	**0%**
Total, both watersheds	**914**	**0**	**0%**	**2,441**	**0**	**0%**

Table IV-10: Section 402 individual permits (SIC codes in parentheses) issued in case study watersheds in the Ohio River Basin

Industry category	Individual Permits[1]			General Permits[1]		
	Total number of NPDES permits	Permits with discharge point near ephemeral streams[2]		Total number of NPDES permits[1]	Permits with discharge point near ephemeral streams[2]	
		Number of permits	Percent of all permits		Number of permits	Percent of all permits

[1] Source: EPA's ICIS-NPDES data, 2017. The facility permits included in the spatial analysis are limited to those for which the ICIS-NPDES database includes latitude/longitude coordinates. For permits with multiple SIC codes, only one SIC code was retained, with manufacturing industries prioritized, to avoid double-counting.

[2] The agencies used the Cowardin classification code in NWI to determine whether 402 discharges are likely to affect ephemeral streams (*i.e.*, the agencies interpreted Cowardin codes R4SBA and R4SBJ as ephemeral; *see* Section IV.B for more detail).

[3] Includes SIC Codes 6513, 6514, 6515, 7011, 7032, 7033, 8211, 8221, 8641, and 8661.

[4] Includes SIC Codes 1629, 1794, 6552, 1611, 1799, 1521, 1522, and 1623.

[5] Includes multiple categories, such as Aggregate Mining (1422, 1423, 1429, 1442, 1446, 1459, 1474, 1475, 1481, 1499), Surface Coal Mining (1221, 1222), Motor Vehicle Parts, Used (5015), Gasoline Service Stations (5541), Ready-Mixed Concrete (3273), Scrap and Waste Materials (5093), Refuse Systems (4953), Petroleum Bulk Stations and Terminals (5171), Electric Services (4911), Animal Feeding Operations (211, 212, 213, 214, 219, 241, 251, 252, 253, 254, 259, 271, 272, 279), Industrial Organic Chemicals (2869), Trucking Facilities (4212, 4231), Sawmills and Planning Mills (2421), Farm Supplies (5191), and Civic, Social, and Fraternal Associations (8641).

NPDES permits in the case study area were issued in three states in HUC 0509 (Kentucky, Ohio, and West Virginia) and one state in HUC 0510 (Kentucky). Based on potential state responses and different analytic scenarios described in Section II.A.3, Ohio and West Virginia are expected to regulate 402 permitted discharges to waters beyond the CWA under Scenarios 1, 2 and 3, while Kentucky is not anticipated to regulate 402 discharges to waters beyond the CWA under any scenarios. This means under all federalism scenarios in the Ohio River Basin, only Kentucky may experience any regulatory changes due to a change in CWA jurisdiction. Therefore, even if some of the 402 permits may affect ephemeral streams, these discharges will be regulated in two of the three states where case study watersheds are located.

Given that none of the 402 permits in HUC 0509 and HUC 0510 are likely to be affected by the proposed rule, the agencies do not anticipate potential reduction in treatment costs and corresponding increases in loading to receiving waters, nor the potential costs for the NPDES authority that may arise from recalculating permitted limits[116] to account for dilution.

IV.B.2.2.2 Section 404

The agencies relied on the Army Corps of Engineers' ORM2 database to identify 404 permits affecting waters that may no longer be jurisdictional under the proposed rule. For each permit, the ORM2 database

[116] Several of the common industry categories in the Ohio River Basin have technology-based effluent limitations (TBELs), including construction and development, sewage systems (secondary), and asphalt paving mixtures and blocks. The industrial domestic wastewater treatment and water supply industries do not have national TBELs. For facilities in these two industry categories, effluent limitations are either water quality-based (WQBELs) for pollutants with applicable water quality standards, or TBELs based on the best professional judgement of the permit writer (U.S. EPA; 2011).

provides information about affected waters, permanent and temporary impacts, and mitigation requirements. Under the proposed rule, ephemeral streams and wetlands that are adjacent to but that do not directly abut relatively permanent waters will likely no longer be jurisdictional under the CWA. The agencies identified permits affecting these waters using the following methodology:

1) Ephemeral streams: The Cowardin classes field in the Corps' ORM2 database includes information about river/stream type (perennial, intermittent, or ephemeral). The agencies classified any stream with a "Riverine, Ephemeral" (R6) class as an ephemeral stream. Whenever the Cowardin code field did not specify stream type, the agencies assumed that the stream would remain jurisdictional under the proposed rule, which could possibly result in an underestimation of potentially affected waters.

2) Wetlands adjacent to but not directly abutting permanent waters: The agencies used the water type field in the Corps' ORM2 database to select wetlands with a RPWWN water type. The RPWWN water type identifies wetlands that are adjacent to but do not directly abut relatively permanent waters.

The agencies consider recent section 404 permitted activity to be the best predicter of the future location and type of activities potentially subject to section 404 permitting. Table IV-11 summarizes section 404 permits issued in 2011-2015 within the two selected watersheds of the Ohio River Basin. The table includes permits that required mitigation and potentially affected ephemeral streams or wetlands adjacent to but not directly abutting permanent waters. As presented in the table, the agencies' geospatial analysis shows 55 permits in HUC 0509 and 38 permits in HUC 0510 issued by the Corps with impacts that required mitigation on waters potentially affected by the proposed "waters of the United States" definitional changes. Permanent impacts resulting from 404 permits included annual averages of 2.9 acres and 18,466 linear feet in HUC 0509 and 1.0 acre and 12,458 linear feet in HUC 0510. Most permit impacts occurred in Ohio and Kentucky for this case study. Ohio is likely to regulate waters beyond the CWA (*i.e.*, impacts excluded in Scenarios 1, 2, and 3) according to the assumptions previously stated. Kentucky is assumed to be less likely to regulate waters that are no longer jurisdictional under the CWA (*i.e.*, impacts included in all three scenarios).

Table IV-11: Section 404 permits issued in case study watersheds in the Ohio River Basin (2011-2015)

State	# Permitted Projects	# Permits with mitigation requirements potentially affected by proposed change in definition of "waters of the United States"[1, 2]	Permanent impacts		Average Temporary impacts	
			Acres	Length Feet	Acres	Length Feet
HUC 0509						
IN	101	10	0.00	0	0.55	0
KY	226	15	4.54	41,122	0.00	0
OH	351	30	9.76	51,209	0.19	3,009
WV	141	0	0.00	0	0.00	0
Total	**819**	**55**	**14.30**	**92,331**	**0.74**	**3,009**
Avg. per year	**164**	**11**	**2.86**	**18,466**	**0.15**	**602**

Table IV-11: Section 404 permits issued in case study watersheds in the Ohio River Basin (2011-2015)

State	# Permitted Projects	# Permits with mitigation requirements potentially affected by proposed change in definition of "waters of the United States"[1, 2]	Permanent impacts		Average Temporary impacts	
			Acres	Length Feet	Acres	Length Feet
HUC 0510						
KY	967	38	5.13	62,288	0.04	2,261
Total	**967**	**38**	**5.13**	**62288**	**0.04**	**2,261**
Avg. per year	**193**	**8**	**1.03**	**12,458**	**0.01**	**452**

[1] Values based on permits with mitigation requirements on waterways determined to be RPWWN-type wetlands or ephemeral streams. Excludes permits issued for mitigation or restoration activities because the main purpose of these activities is to restore or enhance ecosystem services provided by water resources as opposed to dredge and fill activities that lead to permanent or temporary losses of ecosystem services.

[2] Number of permits includes permits with mitigation requirements that affect at least one water determined likely to no longer jurisdictional under the CWA under the proposed rule.

The 404 program has an explicit national policy of "no net loss" in wetlands and other aquatic resources. Mitigation is designed to compensate for the loss of wetlands and other aquatic resources by providing equivalent ecosystem functions and services. As such, the agencies assumed that any mitigation is by definition functionally equivalent to the impact it is meant to compensate, though recognize that functional equivalence may not always occur on a case-by-case basis for all mitigated impacts. The agencies therefore use total permanent impacts, rather than total acres of mitigation, to estimate reductions in mitigation requirements from the proposed CWA jurisdiction definitional changes. Table IV-12 presents expected reductions in average annual mitigation requirements in the two selected Ohio River Basin watersheds under different likely state response scenarios following the proposed "waters of the United States" definitional changes.

To estimate the expected reduction in mitigation requirements in the case study area, the agencies used estimated permanent impacts and the U.S. Army Corps of Engineers (USACE) guidance on the ratio for compensatory mitigation for Category III wetlands (U.S. Army Corps of Engineers 2014). Category III wetlands are defined as not rare or unique and usually plentiful in the watershed. The recommended compensatory ratios for Category III wetlands range from less than 1:1 to 1.5:1. This analysis uses a 1:1 ratio.[117]

As shown in Table IV-11 and Table IV-12, mitigation is also required for streams (linear feet). For streams, mitigation requirements include establishment of a riparian buffer for runoff treatment, reduction of nutrient loading from adjacent land uses, and reduction of stream temperature. Requirements for the

[117] The agencies validated this assumption using ORM2 data on about 4000 projects where the relationship between impacted acres and required mitigation acres could be isolated. This analysis excludes any projects where impacts or mitigation included linear feet values and projects where some or all of the mitigation used credits or in-lieu fees. Based on the statistical analysis of these data, the most frequently observed mitigation ratio (the mode of the distribution) is 1:1 and median ratio is 1:5: 1.

riparian buffer width vary from state to state. The state of Ohio requires a minimum buffer width of 50 feet on each side of the stream, while West Virginia uses a site-specific assessment and Kentucky does not provide a specific guidance on the buffer width (ELI 2016). To estimate the expected average reduction in riparian area mitigation, the agencies assumed that buffer establishment requirements for ephemeral streams would be lower compared to the minimum requirements in Ohio since these requirements do not distinguish among different stream types.[118] Based on the minimum buffer zone requirements specific to ephemeral streams from other states, the agencies assumed that a 25 feet buffer zone would be required on each side of the stream. The agencies used the 50-foot buffer (25 feet on each side) assumption to convert linear feet mitigation requirements provided in the Corps' ORM2 database to riparian acres.

Mitigation may also be required to compensate for temporary impacts (see Table IV-11). The mitigation is expected to be permanent even where the impacts are not; therefore, the reliance on permanent impacts only as proxy for estimating forgone mitigation may understate the potential changes under the proposed rule. This underestimation is likely be small since temporary impacts account for less than five percent of total impacts in both HUC 0509 and HUC 0510.

The agencies also note that the estimated reduction in average mitigation requirements per year are based on 404 permits issued in 2011-2015 and therefore may not be representative of future impacts on water resources or mitigation requirements. Section IV.B.5 provides more detailed discussion of uncertainty inherent in this analysis.

Table IV-12: Estimated changes in average mitigation required per year in the Ohio River Basin, by policy scenario

State	Expected Reduction in Average Mitigation Acres per Year[1]			Expected Reduction in Average Mitigation Length Feet per Year[1]			Expected Reduction in Average Mitigation Riparian Acres per Year[1,3]		
	Scenario 0	Scenario 1	Scenarios 2 & 3[2]	Scenario 0	Scenario 1	Scenarios 2 & 3[2]	Scenario 0	Scenario 1	Scenarios 2 & 3[2]
HUC 0509									
IN	0.0	0.0	0.0	0	0	0	0.0	0.0	0.0
KY	0.9	0.9	0.9	8,224	8,224	8,224	9.4	9.4	9.4
OH	2.0	0.0	0.0	10,242	0	0	11.8	0.0	0.0
Total	**2.9**	**0.9**	**0.9**	**18,466**	**8,224**	**8,224**	**21.2**	**9.4**	**9.4**
HUC 0510									
KY	1.0	1.0	1.0	12,458	12,458	12,458	14.3	14.3	14.3
Total	**1.0**	**1.0**	**1.0**	**12,458**	**12,458**	**12,458**	**14.3**	**14.3**	**14.3**

[1] Values based on permits with mitigation requirements on waterways determined to be RPWWN-type wetlands or ephemeral streams. Excludes permits issued for mitigation or restoration activities because these permits do not result in the loss of ecosystems services provided by wetlands and streams. Permanent acre and linear feet impacts provided in the ORM2

[118] There is no consensus among scientists whether areas adjacent to ephemeral streams/rivers as should be called riparian (called xeroriparian). The main argument for including areas adjacent to ephemeral streams/rivers, in the definition of riparian areas is that these areas have "many" of the characteristic ecological functions performed by true riparian areas adjacent to perennial (called hydroriparian) and intermittent (called mesoriparian) streams. The counter argument is that xeroriparian areas do not provide a full spectrum ecological function performed by riparian areas adjacent to perennial and intermittent streams (Zaimes et al. 2007). In this report, the agencies refer to the areas adjacent to ephemeral streams as "riparian."

Table IV-12: Estimated changes in average mitigation required per year in the Ohio River Basin, by policy scenario

State	Expected Reduction in Average Mitigation Acres per Year[1]			Expected Reduction in Average Mitigation Length Feet per Year[1]			Expected Reduction in Average Mitigation Riparian Acres per Year[1,3]		
	Scenario 0	Scenario 1	Scenarios 2 & 3[2]	Scenario 0	Scenario 1	Scenarios 2 & 3[2]	Scenario 0	Scenario 1	Scenarios 2 & 3[2]

database are used to estimate mitigation requirements. The agencies assumed a 1:1 ratio for compensatory requirements based on the USACE guidance (U.S. Army Corps of Engineers 2014).

[2] Scenarios 2 and 3 are combined because all values are identical.

[3] Based on mitigation lengths where impacts in linear feet are converted to acres by multiplying total linear feet by an average total buffer width of 50 feet (25 feet on each side of the stream) and converting square feet to acres.

IV.B.2.2.2.1 Cost Savings

The proposed definitional changes could result in cost savings in two ways:

1) Reduced permit costs, including application costs, permitting time costs, and impact avoidance and minimization costs, for projects no longer affecting waters regulated under the CWA, and

2) Reduced compensatory mitigation costs when impacts occur on waters no longer regulated under the CWA.

To estimate potential permit cost savings, the agencies determined the average number of individual and general 404 permits issued each year, based on permits issued from 2011 to 2015, that potentially affect only waters that would no longer be regulated as "waters of the United States" under the proposed rule. The number of permits considered in the permit cost analysis may differ from the number considered in the mitigation cost analysis. The permit cost analysis considers 404 permits that potentially affect only waters that would no longer be jurisdictional under the CWA under the proposed rule. These permits may or may not have mitigation requirements. Any permits affecting both waters likely to remain jurisdictional and waters likely to no longer be jurisdictional under the proposed rule are not considered in the cost savings analysis. The mitigation cost analysis considers permits with mitigation requirements that potentially affect at least one water likely to no longer be jurisdictional under the proposed rule, excluding permits issued for mitigation or restoration activities.

As described earlier, the agencies derived water classifications using the Corps' ORM2 404 permit database to determine whether a permit affected only waters that would no longer be jurisdictional under the proposed rule (*e.g.*, ephemeral streams, wetlands with a RPWWN water type). The agencies then multiplied the annual average number of reduced individual and general 404 permits by lower bound Corps estimates of permit costs (U.S. EPA and Department of the Army, 2015).

The Corps estimated 404 permit application costs to calculate incremental permit application costs associated with the replacement of Nationwide Permit 26 (NWP 26) with a suite of new and modified nationwide permits in the year 2000 (U.S. EPA and Department of the Army, 2015). The Corps analysis notes that the costs were developed for "typical" projects affecting up to three acres of jurisdictional waters. The agencies are only considering permit application cost savings for permits solely affecting waters affected by the proposed rule. The impacts of these permits are less than "typical" on average.[119] The agencies thus used the lower bound estimate of the Corps' permit application cost range. Table IV-13 shows the average number of estimated reduced individual and general 404 permits, Corps unit application costs, and the estimated reduction in permit applications costs for individual and general permits in the Ohio River Basin under each scenario. The Corps unit costs estimates ($14,700 per individual permit; $4,400 per general permit) are adjusted from 1999$ to 2017$ using the CPI-U.

Permits affecting only RPWWN-type wetlands and ephemeral streams were issued in four states in HUC 0509 (Indiana, Kentucky, Ohio, and West Virginia) and one state in HUC 0510 (Kentucky). Under Scenario 0, the average annual reduction in 404 permit application costs for the Ohio River Basin is approximately $0.41 million. Under Scenario 1, which includes permit reductions in Kentucky and West Virginia, permit cost savings drop to $0.32 million. Under Scenarios 2 and 3, which include permit reductions in Kentucky only, permit cost savings drop to $0.31 million.

Table IV-13: Average annual reduction in 404 permit application costs in the Ohio River Basin

Permit Type	Unit Costs from Corps NWP Analysis (2017$)	Scenario 0[1]		Scenario 1[1]		Scenarios 2 & 3[1,2]	
		Annual Average Reduction in Permits with Proposed Rule	Estimated Reduction in Permit Costs (millions 2017$)	Annual Average Reduction in Permits with Proposed Rule	Estimated Reduction in Permits Costs (millions 2017$)	Annual Average Reduction in Permit with Proposed Rule	Estimated Reduction in Permit Costs (millions 2017$)
HUC 0509							
IP	$14,700	0.0	$0.00	0.0	$0.00	0.0	$0.00
GP	$4,400	32.4	$0.14	14.0	$0.06	11.4	$0.05
Total		**32.4**	**$0.14**	**14.0**	**$0.06**	**11.4**	**$0.05**
HUC 0510							
IP	$14,700	0.0	$0.00	0.0	$0.00	0.0	$0.00
GP	$4,400	59.8	$0.26	59.8	$0.26	59.8	$0.26
Total		**59.8**	**$0.26**	**59.8**	**$0.26**	**59.8**	**$0.26**
Both Watersheds							
IP		0.0	$0.00	0.0	$0.00	0.0	$0.00
GP		92.2	$0.41	73.8	$0.32	71.2	$0.31
Total		**92.2**	**$0.41**	**73.8**	**$0.32**	**71.2**	**$0.31**

[1] Includes permits estimated to only affect waters no longer jurisdictional under the CWA under the proposed rule.

[2] Scenarios 2 and 3 are combined because all values are identical.

To estimate annual cost savings from reduced mitigation requirements, the agencies multiplied the cost of each mitigation acre or linear foot (low and high estimates) by the expected reduction in annual mitigation requirements (Table IV-12), and summed the acreage and linear feet values for each scenario. The Corps estimated state-specific per-acre costs of wetland mitigation and per linear foot estimates of stream

[119] On average, 404 permits issued between years 2011 and 2015 on freshwater resources had 0.25 permanent impact acres. During the same timeframe, permits solely impacting waters affected by the proposed rule had 0.15 permanent impact acres.

mitigation by examining published studies and survey results, making phone inquiries to Corps Districts and mitigation banks, and researching web sites (U.S. EPA and Department of the Army, 2015). A team of Corps experts developed a range of values for each state. Costs for mitigation in estuarine environments, whose jurisdictional status will not be affected by this rule, are not included where explicitly identified by mitigation bank and in-lieu fee program fee schedules. Mitigation costs for each state vary widely. Costs vary based on land acquisition costs, the nature of the work being done, demand for mitigation in the state, as well as other factors. The unit costs identified here, based on mitigation bank and in-lieu-fee program fee schedules represent fully-loaded unit costs and include the costs of land acquisition, construction work completed on site, monitoring for mitigation success, and long-term stewardship. In some cases, permittees may not purchase credits from a mitigation bank but rather complete a permittee-responsible mitigation project. The costs of this permittee-responsible mitigation project may be lower than the purchase of credits, particularly in circumstances where a mitigation project is constructed on the same tract of land as the permitted impacts. In this circumstance new land would not have to be acquired, lowering the costs of the project. Therefore, the Corps' mitigation costs estimates may be an overestimate (U.S. EPA and Department of the Army, 2015).

Table IV-14 provides annual cost savings estimates from reduced mitigation requirements in the Ohio River Basin under different policy scenarios. The annual cost savings from reduced mitigation requirements for HUC 0509 vary by scenario to account for potential state responses to the proposed definitional change. Since Kentucky is not expected to regulate waters above the federal level, the annual mitigation cost savings for HUC 0510 remain consistent across all scenarios. Annual mitigation cost savings for the Ohio River Basin under Scenario 0 range from a low of $8.18 million to a high of $30.18 million. Under Scenarios 1, 2, and 3, annual mitigation cost savings range from a low of $6.42 million to a high of $15.93 million.

Table IV-14: Annual cost savings (2017$) of reduced mitigation requirements in the Ohio River Basin resulting from the proposed definitional change, by policy scenario

State	Cost Per Acre (2017$)		Cost Per Linear Foot (2017$)		Scenario 0[1] (Millions 2017$)		Scenario 1[1] (Millions 2017$)		Scenarios 2 & 3[1,2] (Millions 2017$)	
	Low	High	Low	High	Low	High	Low	High	Low	High
HUC 0509										
IN	$50,000	$71,000	$294	$636	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
KY	$110,016	$165,024	$300	$755	$2.57	$6.36	$2.57	$6.36	$2.57	$6.36
OH	$37,500	$216,000	$165	$1,350	$1.76	$14.25	$0.00	$0.00	$0.00	$0.00
Total	**-**	**-**	**-**	**-**	**$4.33**	**$20.61**	**$2.57**	**$6.36**	**$2.57**	**$6.36**
HUC 0510										
KY	$110,016	$165,024	$300	$755	$3.85	$9.57	$3.85	$9.57	$3.85	$9.57
Total	**-**	**-**	**-**	**-**	**$3.85**	**$9.57**	**$3.85**	**$9.57**	**$3.85**	**$9.57**
Both Watersheds										
Total	**-**	**-**	**-**	**-**	**$8.18**	**$30.18**	**$6.42**	**$15.93**	**$6.42**	**$15.93**

[1] Estimated changes in average mitigation required per year are presented in Table IV-12. For each state, cost savings are calculated by multiplying the cost of each mitigation acre or linear foot (low and high estimates) by the expected reduction in annual mitigation requirements, and summing the acreage and linear feet values for each scenario.

[2] Scenarios 2 and 3 are combined because all values are identical.

Table IV-15 provides total annual 404 program cost savings[120] in the Ohio River Basin resulting from the proposed rule, under each policy scenario. Total costs savings combine the estimated reduction in permit costs and mitigation requirements. Under Scenario 0, estimated cost savings range from a low of $8.59 million to a high of $30.59 million annually. Under Scenario 1, which includes cost savings in Kentucky and West Virginia, the total estimate cost savings range from $6.74 million to $16.26 million annually. Under Scenarios 2 and 3, which only include cost savings in Kentucky, total estimated cost savings are similar to those under Scenario 1 and range from a low of $6.73 million and a high of $16.25 million annually. These estimates are subject to uncertainty discussion in Section IV.B.5. The sources of uncertainty come from data limitations and as well as parameter uncertainty used as input in this analysis (*e.g.*, the ratio used for estimating for compensatory mitigation and per unit mitigation costs).

Table IV-15: Total estimated annual cost savings in the Ohio River Basin (Millions 2017$)

HUC	Scenario 0[1]		Scenario 1[1]		Scenario 2 & 3[1,2]	
	Low	High	Low	High	Low	High
0509[3]	$4.47	$20.75	$2.63	$6.42	$2.62	$6.41
0510[3]	$4.11	$9.84	$4.11	$9.84	$4.11	$9.84
Total	**$8.59**	**$30.59**	**$6.74**	**$16.26**	**$6.73**	**$16.25**

[1] The total estimated cost savings is equal to the sum of reduction in application costs and the reduction in mitigation costs.

[2] Scenarios 2 and 3 are combined because all values are identical.

[3] For HUC 0509, Scenario 0 includes cost savings in Indiana, Kentucky, Ohio, and West Virginia. Scenario 1 includes cost savings in Kentucky and West Virginia. Scenario 3 includes cost savings in Kentucky only. For HUC 0510, cost savings remain constant across all scenarios since all permits are issued in Kentucky, a state that is not likely to regulate waters above federal requirements.

IV.B.2.2.2.2 Forgone Benefits

Reductions in mitigation requirements from the proposed change in CWA jurisdiction would result in forgone benefits. Without mitigation requirements on certain waters, the agencies anticipate a decline in total non-abutting wetland acreage, ephemeral stream miles and the riparian areas associated with ephemeral streams. The decline in water resources would result in a decline in the services that these resources provide, including fauna and flora support, flood control, water filtration, and recreation. Section IV.B.2.3.4 provides more detail on ecosystem services provided by affected resources.

To estimate the forgone benefit value of lost mitigation acres, the agencies used a benefit transfer value from Blomquist and Whitehead (1998), who used survey responses to calculate household WTP values for preserving four types of wetlands (*i.e.*, freshwater marsh, temporarily, seasonally, and permanently flooded bottomland hardwood forest) in the Western Kentucky coal field region. Because the Blomquist and Whitehead (1998) study was conducted in the same geographic area the resources valued in the original study are representative of the wetland types found in the case study area. The NWI wetlands mapper indicates that both "forested and shrub wetlands" and "freshwater emergent wetlands" are

[120] The total estimated cost savings equal the sum of reduction in applications costs and reduction in mitigation costs.

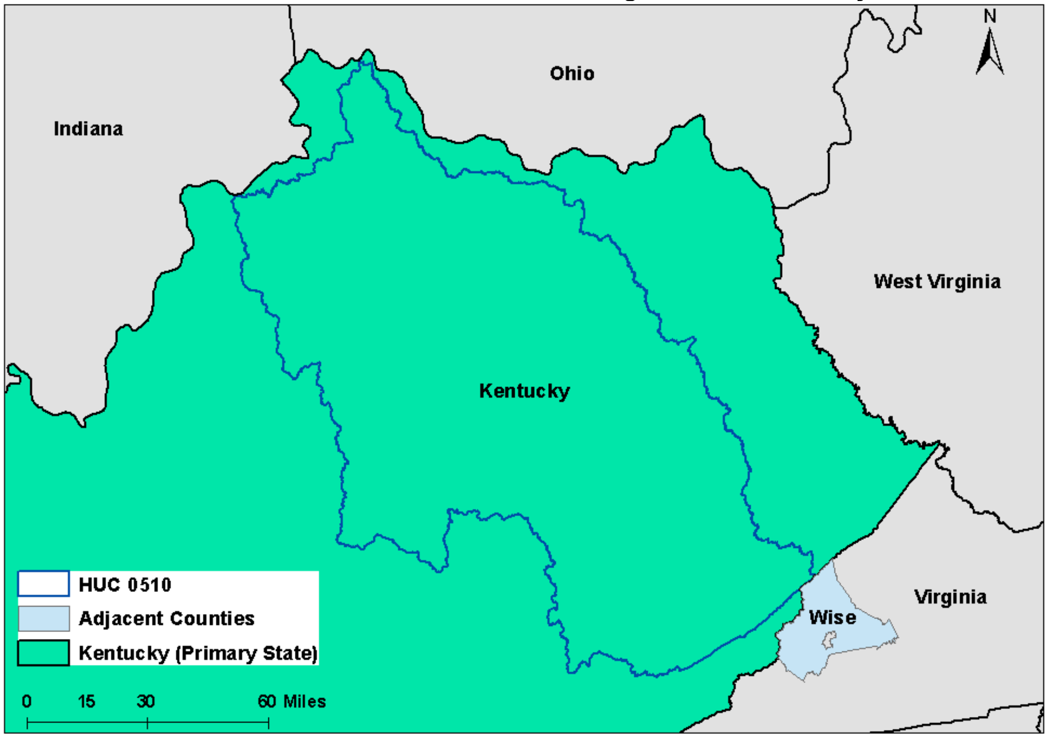
dominant in the Ohio River Basin case study area (U.S. FWS, 2018). Within the Ohio River Basin, forested wetlands provide ecosystem services similar to those valued in the original study, including hydrologic, biogeochemical, and ecological water management services and enhance habitats for several different species (University of California Association of Natural Resource Extension Professionals, 2014).

The agencies calculated per acre estimates for the four different wetland types by dividing the WTP values by 500, the number of acres respondents were told to value in the survey. The agencies used the minimum and maximum WTP values for the four types of wetlands to derive low ($0.006/acre) and high ($0.038/acre) per acre WTP values, respectively. As noted above, the agencies estimated the total wetland and riparian area lost due to reduced mitigation requirements by (1) multiplying linear feet values provided in the ORM2 database by an average total buffer width of 50 feet (25 feet on each side of the stream) and converting square feet to acres and (2) adding this value to the estimated annual loss of wetland acreage obtained from the ORM2 database based on mitigated impacts for relevant permits. The agencies then estimated annual forgone benefits by multiplying per acre WTP estimates by the total annual number of impact acres (sum of wetland acres and linear feet converted to acres) potentially affected by the proposed rule and the number of households that value required mitigation.

To determine the number of households that value the required mitigation, the agencies applied a similar methodology to the one used in Blomquist and Whitehead (1998). The survey population included all Kentucky households as well as households in four cities outside of, but bordering, western Kentucky: Evansville, IN; Clarksville, TN; Carbondale, IL; and Cape Girardeau, MO. Following Blomquist and Whitehead (1998), the agencies applied the household WTP value to all households in the watershed's primary state (Ohio for HUC 0509; Kentucky for HUC 0510) as well as households in areas adjacent to the watershed (Figure IV-12; Figure IV-13). Given that future location of 404 impacts is uncertain, the agencies used population in all counties within the affected watershed and counties adjacent to the watershed to determine potentially affected population residing outside of Kansas where the majority of 404 impacts occurred between 2011-2015.

Figure IV-12: Locations of households included in the forgone benefits analysis for HUC 0509.

Figure IV-13: Locations of households included in the forgone benefits analysis for HUC 0510.



The agencies calculated an annualized forgone benefit value based on forgone benefits from 2020 to 2039 (Eq. IV-1):

$$WTP_{Annualized} = \left(\sum_{T=2020}^{2039} \frac{HWTP_Y \times HH_Y}{(1+i)^{Y-2017}}\right) \times \left(\frac{i \times (1+i)^n}{(1+i)^{n+1} - 1}\right) \quad \textbf{Eq. IV-1}$$

Where:

$WTP_{Annualized}$	=	Annualized forgone benefit value in 2017 dollars
$HWTP_Y$	=	Annual household WTP in *Start Year* dollars for the required mitigation in year (*Y*)
HH_Y	=	Number of affected households in year (*Y*)
T	=	Year when benefits are realized
i	=	Discount rate (3 percent)
n	=	Number of periods for annualization (20 years for this analysis)

To estimate the number of affected households in future years, the agencies used projected population changes from 2015 to 2040 (Kentucky State Data Center, 2016; Ohio Development Services Agency, 2018; University of Virginia, 2017; West Virginia University, 2014) divided by the average number of people per household (U.S. Census Bureau, 2015).

Table IV-16 and Table IV-17 provide estimated annualized forgone benefits from lost mitigation requirements in the Ohio River Basin under different state response scenarios, with three percent and seven percent discount rates, respectively. HUC 0509 includes mitigation requirements in Kentucky, Ohio, and Indiana. Scenario 0 includes mitigation requirements in all three states. Under Scenarios 1, 2, and 3, only mitigation requirements in Kentucky are included. All mitigation requirements in HUC 0510 occur in Kentucky, which is not expected to regulate waters above the federal level under any scenarios. The estimated forgone benefits for HUC 0510 thus remain the same under all scenarios. Annualized forgone benefits for the Ohio River Basin under Scenario 0 range from a low of $ 0.50 million to a high of $4.52 million, while the total present value (TPV) of forgone benefits during the 2020-2039 study period ranges from $10.06 million to $90.47 million. For Scenarios 1, 2, and 3, annualized forgone benefits range from a low of $0.27 million to a high of $2.44 million, and TPV ranges from $5.43 million to $48.89 million. Similar to the estimates of avoided costs, these estimates are subject to uncertainty and limitations that are discussed in Section IV.B.5 of this report.

Table IV-16: Annualized forgone benefits (Millions 2017$) of lost mitigation requirements in the Ohio River Basin resulting from the proposed definitional change, by policy scenario (3% Discount Rate)

HUC	# Affected Households in 2020[3]	Scenario 0[1]		Scenario 1[1]		Scenarios 2 & 3[1,2]	
		Low	High	Low	High	Low	High
0509	5,170,870	$0.55	$3.65	$0.24	$1.57	$0.24	$1.57
0510	1,866,005	$0.13	$0.88	$0.13	$0.88	$0.13	$0.88
Total	**7,036,875**	**$0.68**	**$4.52**	**$0.37**	**$2.44**	**$0.37**	**$2.44**

[1] Estimated changes in average mitigation required per year are presented in Table IV-12. Forgone benefits are calculated for each scenario by multiplying total forgone mitigation values for each scenario (sum of acres and linear feet converted into acres) by the total number of affected households and the appropriate household WTP value (low: $0.006/acre; high: $0.038/acre). The agencies calculated forgone benefits for the years 2020-2039 and annualized values using a 3% discount rate.

[2] Scenarios 2 and 3 are combined because all values are identical.

[3] The agencies accounted for population growth and change in the number of households throughout the 2020-2039 study period.

Table IV-17: Annualized forgone benefits (Millions 2017$) of lost mitigation requirements in the Ohio River Basin resulting from the proposed definitional change, by policy scenario (7% Discount Rate)

HUC	# Affected Households in 2020[3]	Scenario 0[1]		Scenario 1[1]		Scenarios 2 & 3[1,2]	
		Low	High	Low	High	Low	High
0509	5,170,870	$0.41	$2.70	$0.17	$1.16	$0.17	$1.16
0510	1,866,005	$0.10	$0.64	$0.10	$0.64	$0.10	$0.64
Total	**7,036,875**	**$0.50**	**$3.34**	**$0.27**	**$1.80**	**$0.27**	**$1.80**

[1] Estimated changes in average mitigation required per year are presented in Table IV-12. Forgone benefits are calculated for each scenario by multiplying total forgone mitigation values for each scenario (sum of acres and linear feet converted into acres) by the total number of affected households and the appropriate household WTP value (low: $0.006/acre; high: $0.038/acre). The agencies calculated forgone benefits for the years 2020-2039 and annualized values using a 7% discount rate.

[2] Scenarios 2 and 3 are combined because all values are identical.

[3] The agencies accounted for population growth and change in the number of households throughout the 2020-2039 study period.

IV.B.2.2.3 Section 311

The Middle Ohio watershed (HUC 0509) includes a total of 32 FRP facilities across Indiana, Kentucky, Ohio, and West Virginia according to geospatial analysis of the EPA's internal database of FRP facilities. As noted in section II.C, the high resolution NHD data are not sufficiently complete or detailed in many parts of the United States to identify ephemeral streams that may change jurisdictional status under the proposed rule. These limitations apply to the watersheds in the Ohio River basin, as the high-resolution NHD data do not differentiate ephemeral streams in this region. For this reason, and since planning requirements consider proximity to *any* jurisdictional waters or wetlands as one factor in determining FRP applicability to a given facility, the agencies used the presence of perennial waters and wetlands abutting those waters as indication that FRP plan owners would reach the same FRP applicability determination under the proposed rule, *i.e.*, the proposed rule would have no impact on section 311 applicability to these facilities.

Of the total of 32 FRP planholders in the Middle Ohio watershed, the agencies found 30 FRP facilities with at least one perennial stream within a half-mile of the facility. The remaining two facilities are located in proximity to a wetland whose Cowardin codes indicate a perennial flow regime. Thus, the planholders would likely reach the same FRP applicability determination when assessing their facility's potential for a discharge to waters of the United States under the proposed rule given the proximity to waters within CWA jurisdiction within the planning distance.

There are six FRP facilities in the Kentucky-Licking watershed (HUC 0510), all in Kentucky. The geospatial analysis shows that all six facilities are located in close proximity to perennial streams (within a half-mile) as mapped in the high resolution NHD, in addition to also having other streams and wetlands in proximity. The presence of jurisdictional waters within the half-mile planning distance of the facilities suggests that the FRP determination would remain the same under the proposed rule even if some other waters within this radius become non-jurisdictional.

As described in Section IV.A.3, changes in the jurisdictional status of certain streams and wetlands may lead owners of some oil handling facilities to conclude that they do not pose a reasonable potential for a discharge of oil to waters of the United States. The agencies do not have sufficiently detailed information, such as facility coordinates, about facilities that prepared and maintain SPCC plans in the Ohio River watersheds to assess the potential impacts of the proposed rule on the universe of regulated facilities in the two case study watersheds.

Neither Indiana, Ohio, nor West Virginia have state-specific requirements for spill plans. Kentucky has established state-specific requirements for oil and gas facilities under 401.KAR.5:090, Control of Water Pollution from Oil and Gas Facilities. The state requirements specify that operators must develop and implement SPCC Plans "*when required under 40 CFR part 112.*" (emphasis added) Therefore, to the extent that some SPCC planholders forgo implementing the prevention measures required under SPCC, the risk of spills to ephemeral streams and other non-jurisdictional waters may increase.

Historical spill data provide limited illustration of the potential impacts. Between 2001 and 2017, EPA FOSCs oversaw responses to 31 oil spills affecting waters within the two case study watersheds. The resources affected in these incidents range from unnamed drainage ditches that flow into perennial or intermittent waterbodies to large traditional navigable waters such as the Ohio River. In one incident,[121] the discharge affected a dry creek bed but posed a threat to tributaries of the Ohio River. The EPA FOSC deployed to oversee the incident response noted that "response taken in the aftermath of the spill were effective in containing the migration of product to the immediate area downgradient of the wreck." In several incidents, the oil travelled along drainage paths before reaching a larger waterbody.

It is uncertain whether the FOSC determination to intervene due to impacts or threat to "waters of the United States" would have been different for these and other similar incidents under the proposed rule,

[121] http://www.epaosc.org/LewisUS25Spill

particularly in cases where the waters in the immediate path of the release are ephemeral streams or non-abutting wetlands.

IV.B.2.3 Potential Environmental Impacts

IV.B.2.3.1 Water Quality

To evaluate the potential water quality impacts of the proposed rule, the agencies developed models of the selected case study watersheds using the Soil and Water Assessment Tool (SWAT) (Nietsch et al. 2011). Each model encompasses roughly one 4-digit HUC watershed and delineates subbasins and reaches at the resolution of 12-digit HUCs. Land uses within each watershed are based on the 2006 National Land Cover Database (NLCD; Fry et al, 2011),[122] the 2011-2012 Cropland Data Layer (U.S. Department of Agriculture, 2015), as well as wetlands represented in the NWI. The SWAT model represents wetlands through both land cover (as provided in hydrologic response units, or HRUs) and as distinct hydrologic features within the subbasins. The SWAT models represent two main categories of wetlands in each subbasin: abutting wetlands that are hydrologically connected to the main reach of a subbasin, and non-abutting wetlands without a direct connection. The agencies used two HRU groups to represent each of the wetland land cover types, and two SWAT hydrologic features, ponds and wetlands, to represent the hydrology of the two wetland groups. The SWAT pond function was configured to represent non-abutting wetlands hydrology by specifying the aggregated subbasin area and depth of non-abutting wetlands according to the NWI data. In subbasins that include actual ponds, the wetland area was added to the ponds area since only one pond per subbasin is currently supported in SWAT. Abutting wetlands hydrology was represented by the SWAT wetlands function. By configuring the model this way, the agencies can distinguish the two wetland categories in modeling the impacts. As described below, the modeled scenarios address changes in the jurisdictional status of certain wetlands abutting streams with ephemeral flow regimes and riparian areas of ephemeral streams. The sensitivity analysis included in Appendix E also addresses changes to non-abutting wetlands. Table IV-18 describes the two models used for the Ohio River basin case study.

The agencies used estimates of potential changes in section 404 permits requiring mitigation of wetland impacts under the proposed rule (see Section IV.B.2.2.2 for details) to also specify scenario inputs for SWAT. These inputs include net changes in the number of wetland acres (including riparian areas) within each watershed due to forgone mitigation activities based on the analysis of the ORM2 permit data. They also include the associated changes in water storage and pollutant removal capacity provided by the wetlands. As discussed in Section IV.B.2.2.1, estimated changes in permitted point source discharges under section 402 are very small and the agencies therefore did not model incremental pollutant loads entering reaches within each watershed; existing point source loads were kept constant across the scenarios. The agencies further assumed no state-level regulation of waters potentially affected by the proposed rule (*i.e.*, Scenario 0).

[122] The 2006 NLCD is the most current data EPA pre-processed and incorporated into the Hydrologic and Water Quality System (HAWQS) to streamline the development of SWAT models for national-level analyses. EPA is in the process of updating HAWQS to incorporate the NCLD 2011 data and the agencies may be able to use these data in future analyses of this rulemaking.

Table IV-18: Summary of SWAT models used to estimate water quality impacts of the proposed rule in the Ohio River basin

Model characteristics	HUC 0509	HUC 0510
	Middle Ohio	Kentucky-Licking
Total watershed area (square-miles)[1]	10,754	3,706
Number of HUC12 subbasins and reach segments modeled[2]	346	106
Average annual precipitation (in/year)	48.8	52.4
Baseline land use distribution:		
% developed	6.3%	2.3%
% agriculture	28.1%	44.7%
% forested	61.7%	51.3%
% water	3.0%	1.5%
% wetlands	0.9%	0.2%
Unmitigated stream and wetland impacts[3] under the proposed rule over 20 years (acres)	481.1	145.2
Unmitigated stream and wetland impacts[3] under the proposed rule over 20 years (% of baseline acres)	0.8%	2.9%

[1] The watershed area is based on the SWAT model and may differ from the description in the introduction to Section IV.B due to the omission or inclusions of HUC12 subbasins within the scope of each watershed as delineated in SWAT.

[2] For HUC 0509, reach-level predictions also include contributions from upstream watersheds HUCs 0503, 0505, 0506, 0507, 0508, and 0510.

[3] Unmitigated wetland impacts are based on permitted permanent impacts requiring mitigation and affecting wetlands abutting ephemeral streams from 2011-2015. Following the approach described in Section IV.B.2.2.2, the agencies assumed a width of 50 feet for permitted impacts provided in linear feet in the ORM2 database. For watershed HUC 0509, the values in this table include only impacts in HUC12s subbasins of HUC 0509 and do not include impacts within the catchment of upstream tributaries which may also affect reach-level predictions in HUC 0509.

IV.B.2.3.1.1 CWA Program Impacts

The agencies simulated the watershed response to land use changes over a 20-year period, based on permitted activities shown in the ORM2 database in 2011-2015, under both the baseline (without the proposed rule) and policy scenario (with the proposed rule). The differences between model predictions for these two scenarios illustrate the potential effects of the proposed rule on HUC12 reaches downstream from potentially affected waters. The watershed model enables the agencies to look at the impacts of changes occurring within each subbasin immediately draining to the reach concurrently with cumulative effects from areas of the watershed upstream of the reach. For HUC 0509, the upstream reaches include impacts from changes modeled in HUC 0510 since this watershed drains to a tributary of the Middle Ohio River.

Table IV-19 shows the predicted wetland impacts in HUCs 0509 and 0510 specified in the SWAT model. These inputs are derived from the same analysis of the ORM2 404 permit data described in Section IV.B.2.2.2 and used in estimating cost savings and forgone benefits under the 404 program. The impacts differ from the values reported under Section IV.B.2.2.2 because of differences in the temporal scope of the analysis and geographical extent of the SWAT watershed. First, while Section IV.B.2.2.2 reports impacts over the five-year period of 2011-2015 or as annual averages, SWAT models use as inputs impacts projected over a 20-year period, which are calculated by multiplying impacts in 2011-2015 by four. Second, while the SWAT models approximately cover the extent of HUC 0509 and HUC 0510 watersheds, the boundaries do not match exactly and the SWAT models omit some HUC12 subbasins with permit impacts in the 404 data (although these HUC12 subbasins may be represented in a different SWAT model); in particular, of 5.1 acres of permanent impacts reported in the ORM2 404 database in HUC 0510, 2.8 acres (54 percent) are located in subbasins of the SWAT model for that watershed (these 2.8 acres become 11.1 acres when projected over 20 years). Similarly, only a fraction of linear impacts in the relevant HUC12 watersheds in the section 404 data is captured within the geographical extent of the SWAT model. Overall, subbasins in the SWAT model encompass about half (47 percent) of the permanent impacts reported in the section 404 data for HUC 0510. This means that while the SWAT model results can provide further understanding of the forgone benefits analyzed in Section IV.B.2.2.2, the two analyses should not be compared directly.

Table IV-19: Summary of 404 program activities in Ohio River Basin SWAT models for permits with permanent or temporary impacts to waters potentially affected by the proposed rule and with mitigation requirements over 20-year analysis period. Modeled scenario considers permanent impacts only.

Type of Potentially Affected Resource[2]	Permanent Impacts (Acres)	Permanent Impact (Linear Feet)	Total[1] Permanent Impacts (Acres)	Temporary Impact (Acres)	Temporary Impact (Linear Feet)	Total[1] Temporary Impacts (Acres)
HUC 0509						
Wetland abutting ephemeral stream	57.2	0	57.2	2.9	0	2.9
Ephemeral stream[3]	0.0	369,323	423.9	0	12,036	13.8
Total	**57.2**	**369.323**	**481.1**	**2.9**	**12,036**	**16.8**
HUC 0510						
Wetland abutting ephemeral stream	11.1	0	11.1	0.1	0	0.1
Ephemeral stream[3]	0.0	116,804	134.1	0.0	7,844	9.0
Total	**11.1**	**116,804**	**145.2**	**0.1**	**7,844**	**9.1**

[1] Represents the sum of impacts reported in acres and impacts reported in linear feet, assuming a width of 50 feet for linear impacts.

[2] See Table IV-8 for criteria used to identify affected resources that may change jurisdiction under the proposed rule.

[3] Represents forgone mitigation for impacts to riparian areas of ephemeral streams, assuming a total buffer 50 feet wide.

The ORM2 database measures authorized impacts as either areas or lengths. Following the approach in Section IV.B.2.2.2, the agencies assumed a width of 50 feet (total) for stream impact measured in linear feet and calculated the equivalent affected area. For the analysis described below, the agencies considered only forgone mitigation of permanent impacts, but temporary impacts may also require mitigation and the mitigation actions may have permanent effects. Appendix E provides the results of a sensitivity analysis that includes a wider (100 feet) riparian area for linear projects affecting ephemeral streams, forgone mitigation of temporary impacts presented in Table IV-19, and forgone mitigation of impacts to non-abutting wetlands.

The modeling baseline assumes continued regulation of some ephemeral streams and adjacent wetlands under the CWA, based on requirements contained in section 404 permits issued in 2011-2015 to mitigate permanent impacts to these waters. Not all ephemeral and intermittent streams are jurisdictional under the

2015 Rule (only those streams that meet the 2015 Rule's definition of "tributary" are jurisdictional). "Isolated" and non-perennial waters typically require a significant nexus test or other review to determine jurisdiction under pre-2015 practice. The agencies used issued 404 permits to develop inputs for the baseline scenario and therefore all waters affected by permitted activities were deemed to be jurisdictional under the definition of "waters of the United States" in effect at the time the permit was issued. This includes the ephemeral streams in Table IV-19. The modeling baseline assumes that future projects of a similar character as those in the ORM2 data set would get similar requirements over the next 20 years. Thus, under the assumed modeling baseline, a developer that permanently affects a wetland abutting ephemeral streams may be required to mitigate those impacts, for example by creating an equivalent wetland or purchasing corresponding credits, such that the wetland functions are maintained. The same would be true for stream impacts. For the purpose of modeling this scenario in SWAT, therefore, the agencies assume no net change in wetland or stream area, *i.e.*, mitigation actions replace affected waters on a one-to-one basis. While projects requiring 404 permits are diverse, for the SWAT analysis, the agencies further assume that permanent wetland and stream impacts arise from projects that increase developed areas, such as industrial development, low density residential areas, roads, etc., and replace wetlands with a mix of pervious and impervious surfaces. Conversely, the agencies assume that wetlands created through compensatory mitigation are placed on available agricultural land within the same subbasin. As such, the net effect of the modeled baseline is less agricultural land and more developed land (and not net change in wetland areas).

The agencies modelled this scenario in SWAT by increasing the areas of hydrologic response units (HRUs)[123] with developed land uses by the amount equivalent to the mitigation requirements in Table IV-19, and decreasing the areas of HRUs with agricultural land uses by the same amount. First, the agencies distributed the total changes in wetland areas across HUC12 subbasins within the watershed in proportion to existing wetland areas for those subbasins where development was also present in the SWAT model.[124] Then, the agencies applied the absolute change in acres to other land uses within each subbasin as appropriate depending on the Baseline or Policy scenario (*i.e.*, developed areas, agricultural land). Finally, within any given land use category in a HUC12 subbasin, the agencies distributed the subbasin-level change to individual HRUs in proportion to their existing area share.

In addition, because the SWAT model represents wetlands through both land use and as distinct hydrologic features within the subbasins, the agencies also adjusted the size of these features in the SWAT model to represent the scenario. Specifically, the agencies adjusted the dimensions of the two main types of wetlands in SWAT to account for the proposed policy changes and proportionally reduced the size of the catchment of each wetland.

[123] HRUs are the smallest spatial unit of analysis in the SWAT model. They are defined as unique combinations of subbasin, land use, soil, and slope within the modeled watershed.

[124] The agencies considered assigning changes in wetland areas based strictly on the HUC12 subbasins where each 404 permit was located but encountered instances where the HUC12 where the permitted activity was recorded did not have wetland land uses in the SWAT watersheds, or had fewer wetland acres than implied by mitigation activities over the 20-year analysis period. Rather than omitting some permitted activities or reassigning the permitted activities to other subbasins in an *ad hoc* manner, the agencies instead matched the total permitted activities at the HUC4 level and distributed them to the subbasins in proportion to modeled wetland land uses in subbasins where developed areas also exist.

The estimated changes due to the proposed rule are relatively small, as compared to both the total area of the watershed and the area of the affected land use type. Thus, mitigation requirements summarized in Table IV-19 total 481.1 acres in watershed 0509 and 145.2 acres in watershed 0510, which translates into 0.11 and 0.27 percent increases in the amount of development in HUC 0509 and HUC 0510, respectively, and 0.02 percent and 0.01 percent decrease in the total agricultural land in the two watersheds. The calculations are applied to each HUC12 subbasin and the magnitude of impacts therefore varies across the watersheds, as summarized in Table IV-20, which includes statistics for the subbasin with the largest absolute change.

Table IV-20: Summary of land use changes in Ohio River Basin SWAT watersheds resulting from 404 permits with permanent impacts to waters potentially affected by the proposed rule and with mitigation requirements, under baseline scenario

Land use	HUC12 Subbasins (largest absolute change)[1]		Total watershed (all subbasins)[1]	
	acres	% of existing land use	Acres	% of existing land use
HUC 0509				
Developed area	20.8	2.44%	481.1	0.11%
Agricultural area	-20.8	-0.15%	-481.1	-0.02%
HUC 0510				
Developed area	6.3	4.20%	145.2	0.27%
Agricultural area	-6.3	-0.43%	-145.2	-0.01%

[1] The number of subbasins with specified changes under the scenario is 300 in HUC 0509 (out of a total of 346 HUC12 subbasins in the watershed), and 84 in HUC 0510 (out of 106 subbasins).

The modeled Policy scenario accounts for the permanent reduction in wetland areas due to the removal of mitigation requirements for projects affecting ephemeral streams and non-abutting wetlands. The net effect of the scenario is a reduction in wetland and stream riparian areas due to forgone mitigation. Similar to the Baseline scenario described above, the agencies assumed that permitted projects result in increased developed land uses in the watershed, but this time the increase is accompanied by a net reduction in wetland areas. The agencies assumed that incremental development within each subbasin is of the same character as the existing developed land use (*e.g.*, if 70 percent of the development within the subbasin consists of low-density development, then 70 percent of the increase is assumed to be low density development). The agencies mapped the changes presented in Table IV-19 to the SWAT wetland land uses and wetland features.[125] Table IV-21 summarizes the changes by land use type. As described above, the agencies also adjusted the dimensions of SWAT wetlands to correspond to the estimated reduction in wetland and stream area within each subbasin. The potential effect of the proposed rule is thus two-fold: (1) changes in runoff/recharge and response to precipitation due to the changes in land cover, and (2) reduction in water storage and nutrient and sediment removal capacity.

[125] For the sensitivity analysis that includes impact to non-abutting wetlands, the agencies specified the changes in SWAT based on the type of wetland potentially affected by the proposed rule. Changes to wetlands abutting ephemeral streams and riparian areas were mapped to the woody wetland (WETF) land uses in SWAT and to the SWAT wetlands whereas changes to non-abutting wetlands were mapped to emergent/herbaceous wetland (WETN) land uses and to the SWAT ponds. Wetlands and ponds are standard SWAT modeling features defined at the level of individual subbasins.

Table IV-21: Summary of land use changes in Ohio River Basin SWAT watersheds resulting from 404 permits with permanent impacts to waters potentially affected by the proposed rule and with mitigation requirements, under Policy scenario

Land Use	HUC12 Subbasins (subbasin with largest absolute change)[1]		Total Watershed (all subbasins)[1]	
	acres	% of existing land use	acres	% of existing land use
HUC 0509				
Developed area	20.8	2.44%	481.1	0.11%
Wetland area[2]	-20.8	-1.05%	-481.1	-0.82%
HUC 0510				
Developed area	6.3	4.20%	145.2	0.27%
Wetland area[2]	-6.3	-3.64%	-145.2	-2.86%

[1] The number of subbasins with specified changes under the scenario is 300 in HUC 0509 (out of a total of 346 HUC12 subbasins in the watershed), and 84 in HUC 0510 (out of 106 subbasins).

[2] The difference between the percent of wetland land use affected in an individual HUC12 subbasin and for the overall watershed is due to the distribution of changes among HUC12 subbasins that have both existing wetland and developed areas. Some subbasins with wetland areas do not see changes under the modeled scenarios because they lack corresponding existing developed areas to increase. For example, in watershed HUC 0510, 89 of the 106 subbasins have existing wetlands. Of these 89 subbasins, 84 also have developed areas. The agencies distributed total wetland changes among these 84 subbasins in proportion to their existing wetland areas.

IV.B.2.3.1.2 Changes in Water Balance and Constituent Transport

Comparing SWAT outputs for the Policy scenario with those for the Baseline scenario indicates the potential net impacts of the proposed rule on the watershed and receiving streams. Those impacts – in terms of land use changes and wetland area – are first felt at the HUC12 subbasin level as changes in runoff, recharge, groundwater flows, and pollutant loadings delivered to the receiving reach. Table IV-22 summarizes changes in basin-level annual average water balance and constituent transport in the two watersheds. Table IV-23 and Table IV-24 summarize changes between the policy and baseline scenarios across subbasins within the two watersheds. Appendix D provides more detailed outputs.

Table IV-22: Summary of basin-level annual average water balance and constituent transport in Ohio River Basin SWAT watersheds

Parameter	HUC 0509				HUC 0510			
	Baseline	Policy	Change	% Change	Baseline	Policy	Change	% Change
Precipitation (mm)	1,239.00	1,239.00	0.00	0.0%	1,331.80	1,331.80	0.00	0.0%
Surface runoff (mm)	183.22	183.22	0.00	0.0%	357.12	357.12	0.00	0.0%
Lateral flow (mm)	218.70	218.69	-0.01	0.0%	78.03	78.30	0.27	0.3%
Groundwater flow (mm)	40.03	40.02	-0.01	0.0%	61.88	61.74	-0.14	-0.2%
Water yield (mm)	495.14	495.11	-0.03	0.0%	524.75	524.80	0.05	0.0%
Evapotranspiration (mm)	738.80	738.90	0.10	0.0%	739.90	739.90	0.00	0.0%
Sediment loading (ton/ha)	2.410	2.410	0.000	0.0%	1.17	1.18	0.010	0.9%
Organic N (kg/ha)	2.360	2.360	0.000	0.0%	7.008	7.010	0.002	0.0%
Organic P (kg/ha)	0.267	0.267	0.000	0.0%	0.582	0.583	0.001	0.2%

Table IV-22: Summary of basin-level annual average water balance and constituent transport in Ohio River Basin SWAT watersheds

Parameter	HUC 0509				HUC 0510			
	Baseline	Policy	Change	% Change	Baseline	Policy	Change	% Change
NO_3 in surface runoff (kg/ha)	0.954	0.954	0.000	0.0%	2.637	2.638	0.001	0.0%
NO_3 in lateral flow (kg/ha)	1.019	1.019	0.000	0.0%	0.593	0.593	0.000	0.0%
Soluble P yield (kg/ha)	0.137	0.137	0.000	0.0%	0.192	0.192	0.000	0.0%
NO_3 leached (kg/ha)	0.494	0.494	0.000	0.0%	2.535	2.535	0.000	0.0%
P leached (kg/ha)	0.009	0.009	0.000	0.0%	0.021	0.021	0.000	0.0%

Table IV-23: Estimated change in annual average subbasin water balance and constituent transport in SWAT watershed HUC 0509.

Model parameter	Number of Subbasins by Direction of Change[1]		Absolute Change			
	Increase	Decrease	Average	Median	Minimum	Maximum
Evapotranspiration (mm/yr)	277	8	0.03	0.01	-0.18	0.50
Surface runoff (mm/yr)	151	142	0.00	0.00	-0.17	0.05
Lateral flow (mm/yr)	29	257	-0.01	0.00	-0.45	0.03
Groundwater flow (mm/yr)	8	285	-0.01	0.00	-0.23	0.01
Total water yield (mm/yr)	2	286	-0.03	-0.01	-0.62	0.01
Sediment yield (ton/ha/yr)	267	23	0.000	0.000	0.000	0.008
Organic N (kg/ha/yr)	280	15	0.000	0.000	0.000	0.008
Organic P (kg/ha/yr)	280	14	0.000	0.000	0.000	0.001
NO_3 in surface runoff (kg/ha/yr)	273	22	0.000	0.000	0.000	0.002
Soluble P (kg/ha/yr)	275	21	0.000	0.000	0.000	0.000

1 Total number of SWAT HUC12 subbasins is 346. Some modeled subbasins show no change in annual average values and are not included in the counts above.

Table IV-24: Estimated change in annual average subbasin water balance and constituent transport in SWAT watershed HUC 0510.

Model parameter	Number of Subbasins by Direction of Change[1]		Absolute Change			
	Increase	Decrease	Average	Median	Minimum	Maximum
Evapotranspiration (mm/yr)	0	0	0.00	0.00	0.00	0.00
Surface runoff (mm/yr)	7	80	-0.20	-0.20	-1.00	0.06
Lateral flow (mm/yr)	84	0	0.27	0.30	0.00	1.02
Groundwater flow (mm/yr)	21	69	-0.09	-0.03	-3.65	4.30
Total water yield (mm/yr)	52	42	0.07	0.00	-2.12	3.69
Sediment yield (ton/ha/yr)	92	2	0.004	0.002	0.000	0.028
Organic N (kg/ha/yr)	88	7	0.002	0.001	-0.023	0.022
Organic P (kg/ha/yr)	78	17	0.000	0.000	-0.001	0.002
NO_3 in surface runoff (kg/ha/yr)	87	8	0.001	0.001	-0.005	0.008
Soluble P (kg/ha/yr)	40	55	0.000	0.000	0.000	0.001

1 Total number of SWAT HUC12 subbasins is 106. Some modeled subbasins show no change in annual average values and are not included in the counts above.

The direction of the changes is generally consistent with current understanding of wetland functions. Wetlands have been shown to play an important role in the biogeochemical cycling and removal of nutrients and in trapping suspended sediment. They also serve to buffer the response to storms by storing and slowly releasing surface water. Thus, all else being equal, increasing the amount of developed land within the watershed increases impervious cover, the amount of runoff generated in response to storm events, and associated nutrient and sediment loads. Accordingly, overall watershed results show an increase in lateral flow, decrease in groundwater flows, and increase in sediment, nitrogen, and phosphorus loads. The changes are relatively small (all less than one percent and many found to result in no change), which follows from the relatively small changes in land use and wetland storage specified for the policy scenario.

IV.B.2.3.1.3 Impacts to Streams

Changes within the immediate subbasin contributing to each reach affect the flow regime and water quality within the streams at the scale of HUC12 subbasins. The significance of these changes depends on their magnitude relative to other stream inputs such as point sources or contributions from upstream catchments.

The agencies compared SWAT model predictions for the Policy and Baseline scenarios to estimate changes in nutrient and sediment loadings to HUC12 streams, changes in runoff and subsurface flows, and instream constituent concentrations resulting from changes in both loads and flow regimes. Table IV-25 summarizes the direction and relative magnitude of mean annual changes over all reaches modeled in the two watersheds. Table IV-26 summarizes changes in mean annual loadings delivered to the outlet of each watershed. These results reflect the contributions from all upstream reaches and their respective catchments, as well as intervening instream processes modeled in SWAT, such as sediment deposition in stream channels and reservoirs. For HUC 0509, the results reflect changes within both the subbasins within the scope of the watershed, as well as those in HUC 0510 through tributary inputs.[126] More detailed results are included in Appendix D.

As shown in the two tables, the SWAT model outputs suggest that the proposed rule would increase nutrient and sediment loads in streams. This increase follows from the combined effects of reduced stream and wetland functions, as modeled in SWAT via the two wetland types, and land use changes described in the previous section. The relative magnitude of the changes at the scale of HUC12 reaches is attenuated by “background” contributions from point sources to these same reaches – which, in the context of this analysis, likely are not affected by the policy – and from upstream HUC12 reaches – which may or may not be affected by the policy, depending on whether the agencies modeled the changes

[126] SWAT model runs for HUC 0509 incorporate simulated flows and delivered loads at the outlet of HUC 0510 for each scenario (baseline and policy). The model run assumes no change in the contributions of other tributaries (HUCs 0503, 0505, 0506, 0507, and 0508), even though these tributaries would also see changes from forgone mitigation for some projects within the immediate catchments that affected resources that change jurisdictional status under the proposed rule. Omission of these impacts from the analysis of HUC 0509 understates the estimated impacts of the proposed rule on HUC 0509 reaches.

explicitly (*e.g.*, the agencies modeled changes in HUC 0510, but not changes affecting other tributaries to HUC 0509).

Table IV-25: Summary of predicted changes in loads transported by HUC12 reaches and in-stream concentrations within the SWAT watersheds for the Ohio River Basin

Parameter	Number of Reaches by Direction of Change[1]		Absolute and Percent Change				
	Increase	Decrease	Average Change	Median Change	Average % Change	Median % Change	Maximum % Change
HUC 0509							
Annual TN load (kg/yr)	300	12	105.5	4.5	0.01%	0.00%	0.11%
Annual TP load (kg/yr)	293	18	7.1	0.4	0.01%	0.00%	0.05%
Annual sediment load (kg/yr)	143	168	6.6	0.0	0.00%	0.00%	0.45%
Mean daily flow (cms)	13	298	-0.001	0.000	-0.01%	0.00%	0.01%
HUC 0510							
Annual TN load (kg/yr)	94	6	359.3	52.1	0.04%	0.03%	4.67%
Annual TP load (kg/yr)	90	10	20.4	3.5	0.03%	0.02%	3.10%
Annual sediment load (kg/yr)	64	36	18.2	0.0	0.04%	0.01%	4.22%
Mean daily flow (cms)	64	35	0.003	0.000	0.02%	0.00%	1.91%

1 Total number of reaches is 346 in HUC 0509 and 106 in HUC 0510. Some modeled reaches show no change in annual average values and are not included in the counts above.

Table IV-26: Predicted changes in annual average loads delivered to the outlet of Ohio River Basin SWAT watersheds

Parameter	Baseline	Policy	Change	% Change
HUC 0509				
Annual TN load (kg/yr)	280,583	280,616	33	0.01%
Annual TP load (kg/yr)	79,524	79,526	2	0.00%
Annual sediment load (ton/yr)	2,227,544	2,227,541	-3	0.00%
HUC 0510				
Annual TN load (kg/yr)	8,683,858	8,686,931	3,072	0.04%
Annual TP load (kg/yr)	714,981	715,123	142	0.02%
Annual sediment load (ton/yr)	156,983	157,203	221	0.14%

On average across the modeled reaches, the proposed rule is predicted to increase mean daily flows, loadings, and concentrations slightly as compared to the baseline. While the direction of the changes suggests that reducing CWA jurisdiction under the proposed rule could have some adverse impacts, the magnitude of these changes is small and often zero at the HUC12 spatial resolution explicitly addressed in the SWAT model.

IV.B.2.3.2 Drinking Water

According to the EPA's Safe Drinking Water Information System (SDWIS) database, 29 community water systems get their source water from intakes located within the scope of the Middle Ohio SWAT watershed (HUC 0509) and 15 community water systems get their water from sources located in the Kentucky-Licking SWAT watershed (HUC 0510).

Results from the SWAT analysis show that daily suspended sediment concentration would increase in reaches with drinking water intakes in HUC 0509 and HUC 0510 as a result of forgone mitigation of ephemeral stream and non-abutting wetland impacts.[127] The estimated changes in average daily sediment concentration range from zero to 0.3 percent in HUC 0509, with an average increase of 0.05 percent. Changes in HUC 0510 range from less than -0.1 percent to 0.1 percent, with an average of 0.02 percent. Public water systems (PWS) use a variety of treatment processes to remove sediment through filtration and the addition of coagulants. Studies of drinking water treatment costs show that increased sediment loadings, and increased pollutants bound to these sediments, are likely to increase operation costs to the affected PWS (Dearmont, McCarl, & Tolman, 1998; Holmes, 1998; McDonald, Weber, Boucher, & Shemie, 2016). Given the small predicted changes in sediment loadings, the agencies did not estimate the potential change in drinking water treatment costs.

Table IV-27: Impacts to modeled reaches with public drinking water intakes under the proposed rule in the Ohio River Basin SWAT watersheds

SWAT Watershed HUC4	Number of community water systems	Number of intakes	Number of people served	Change in daily suspended sediment concentration		
				Min	Mean	Max
0509	29	49	1,375,475	-0.03%	0.02%	0.45%
0510	15	17	290,235	-0.06%	0.03%	0.25%
Total	**44**	**66**	**1,665,710**			

Source: EPA analysis of SDWIS (2017) data. Based on intakes located in the HUC12 subbasins within the scope of SWAT models for HUC 0509 and HUC 0510. The analysis assumes that intakes are located on the main stem within each HUC12. If intakes are instead located on a tributary to the main stem, the impacts may be lower or greater than those presented here, depending on forgone mitigation within the catchment of the relevant tributary.

IV.B.2.3.3 Dredging for Water Storage and Navigation

The SWAT models identify 11 reservoirs within the Middle Ohio watershed (HUC 0509) and one reservoir in the Kentucky-Licking SWAT watershed (HUC 0510).[128] Reservoirs serve many functions, including storage of drinking and irrigation water supplies, flood control, hydropower supply, and recreation. Streams can carry sediment into reservoirs, where it can settle and cause buildup of silt layers over time. Sedimentation reduces reservoir capacity (Graf et al. 2010) and the useful life of reservoirs unless measures such as dredging are taken to reclaim capacity (Clark, et al., 1985).

SWAT model runs predict increases in sediment deposition in reservoirs, calculated as the difference between fluxes in minus fluxes out of the reservoirs, by an average of 684 tons per year, a 0.1 percent increase from the baseline sediment deposition of 515,463 tons per year in HUC 0509. In HUC 0510,

[127] There are 49 surface water intakes within the scope of SWAT model HUC 0509 and 17 intakes within the scope of SWAT model HUC 0510.

[128] The SWAT watersheds include reservoirs identified in the U.S. Army Corps of Engineers National Inventory of Dams as of October 2010.

sediment depositions are expected to increase by eight tons per year, a less than 0.1 percent increase from the baseline sediment flux of 57,025 tons per year (see Table IV-28 for detail).

Table IV-28: Summary of predicted net sediment depositions in reservoirs in the Ohio River Basin (tons/year) in 2040

HUC4	Number of reservoirs[1]	Net annual sediment deposition in reservoirs		Change relative to baseline	
		Baseline	Policy	Tons/year	Percent
0509	11	516,659	516,993	333	0.06%
0510	1	57,034	57,071	37	0.06%
Total	**12**	**573,693**	**574,064**	**370**	**0.06%**

[1] Reservoirs modeled in SWAT watersheds, based on the U.S. Army Corps of Engineers National Inventory of Dams as of October 2010.

SWAT model outputs provide the estimated difference in annual sediment deposition relative to the baseline in 2040. Annual deposition is assumed to increase or decrease linearly throughout the analysis period until it equals the estimated 2040 value. For example, in the policy scenario (no mitigation and with land use change), the annual sediment deposition increases each year, increasing the cumulative change in sediment deposited in the reservoir relative to the baseline. Once the reservoir is dredged, the cumulative change relative to the baseline is reset, as it is assumed that the reservoir is dredged to the same level it would have been previously. The cumulative change in sediment will then begin to rise again at an increasing rate until the subsequent dredge. This pattern continues according to the dredging frequency until the end of the analysis period.

The frequency of reservoir dredging is highly site-specific, depending on many factors including the average sediment concentration of the influent river or stream, the flow regime, the size of the reservoir and excess storage capacity, and any sediment routing practices. For this analysis, the agencies chose a general frequency of reservoir dredging based on information presented by the Corps in a Final Dredged Material Management Plan and Environmental Impact Statement for reservoirs in Washington (U.S. Army Corps of Engineers, 2002). The report states that "dredging cycles may vary from 2 to 10 years" (U.S. Army Corps of Engineers, 2002, p. 66). A dynamic programming simulation of effective sediment management in reservoirs found that once the capacity of a reservoir reaches its steady state, sediment dredging should be practiced annually, assuming a constant unit cost of dredging (Kawashima, 2007, p. 4).[129] Given potential economies of scale that could result in a lower unit cost, the agencies used a dredging cycle of five years and the national average unit cost of dredging ($13.76 per cubic yard) to estimate a potential increase in dredging costs of reservoirs.[130] Detailed description of the methodology used in this analysis is presented in Appendix K of Benefit Cost Analysis of the Steam Electric Effluent

[129] Because site specific studies of dredging cycles for reservoirs are not available, the agencies synthesized information from two available studies to inform their assumption regarding dredging frequency in the Ohio River Basin case studies. Given that reservoir sedimentation is a common problem across the United States and all states use standard strategies to maintain reservoir capacity (*i.e.*, reduce sediment yield from upstream, route sediments, and remove sediment deposits), the agencies believe that it is reasonable to use studies of dredging cycles from other locations in the U.S. (Randle et al., 2017).

[130] The agencies used the national average unit cost of dredging from the analysis of USACE Dredging Information System Data for the U.S. from 1998-2018. Dredging costs were converted to 2017 U.S. dollars using the Construction Cost Index.

Limitations Guidelines and Standards for Steam Electric Power Generating Point Source Category (U.S. EPA 2015a).

Table IV-29: Annualized dredging cost changes in Ohio River Basin (2017$ thousands)

HUC4	Increase in Annual Sediment (cubic yards) (2040)	3% Discount Rate ($/year)			7% Discount Rate ($/year)		
		Low	Medium	High	Low	Medium	High
0509	333	$1.7	$1.8	$1.9	$1.3	$1.5	$1.6
0510	37	$0.2	$0.2	$0.2	$0.1	$0.2	$0.2
Total	**370**	**$1.9**	**$2.0**	**$2.1**	**$1.4**	**$1.7**	**$1.8**

Increased reservoir sedimentation due to forgone mitigation of section 404 project impacts on ephemeral streams is expected to generate additional annualized dredging costs of $1,802 with a three percent discount rate, or $1,468 with a seven percent discount rate in HUC 0509. In HUC 0510, the estimated increase in reservoir sedimentation is expected to generate additional annualized dredging costs of $200 with a three percent discount rate, or $163 with a seven percent discount rate. These estimates are subject to uncertainty. For example, some states may implement erosion controls in the upstream watershed to reduce the rate of sedimentation in the affected reservoirs instead of sediment dredging (Randle et al., 2017). The cost associated with erosion control strategies may be greater or lower than the estimated dredging costs. Also, more frequent dredging may lead to higher annualized costs due to the discounting effect. See Section IV.B.5 for more detail on uncertainties in this analysis.

IV.B.2.3.4 Ecosystem Services Provided by Wetlands and Ephemeral Streams

In reviewing the Draft Connectivity Report entitled "Connectivity of Streams and Wetlands to Downstream Waters: A Review of the Scientific Evidence,"[131] EPA's Science Advisory Board (SAB) found that "[t]he literature review 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," at the same time the SAB stressed that "the EPA should recognize that there is a gradient of connectivity."[132] The SAB recommended 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."[133] As the preamble to the proposed rule describes, the SAB found perennial and intermittent streams have a greater probability to impact downstream waters compared to ephemeral streams.

[131] U.S. EPA. *Connectivity of Streams and Wetlands to Downstream Waters: A Review and Synthesis of the Scientific Evidence (External Review Draft)*. U.S. Environmental Protection Agency, Washington, DC, EPA/600/R11/098B, September 2013.

[132] Letter to Gina McCarthy. October 17, 2014. SAB Review of the Draft EPA Report Connectivity of Streams and Wetlands to Downstream Waters: A Review and Synthesis of the Scientific Evidence. Page 3.

[133] *Id*. at 2 (emphasis added).

The agencies recognize that waters within a watershed are connected along such a gradient and that the degree of connectivity among aquatic components varies along a continuum from highly connected to highly isolated (U.S. EPA 2015b). Although isolated, ephemeral streams and isolated wetlands support various ecosystem services. For example, ephemeral streams, including dry channels, have a role in supporting biodiversity. Their functions may vary depending on stream phases: water flow, pools, and dry bed. Occasional flow in ephemeral streams provides opportunities for aquatic organism dispersal. Pools may provide habitat for amphibians, snails, and insects and drinking water for wild animals, particularly during droughts (Stubbington et al. 2017). Several amphibian species found in the study area, such as the four-toed salamander, wood frog, and Ohio's state amphibian the spotted salamander, breed primarily in ephemeral wetlands not hydrologically connected to the stream network (or vernal pools), where there are fewer predators than in permanent waterbodies (Kern, Nassar, C., & Dorcas, 2013; Semlitsch & Skelly, 2007). Ephemeral streams in the Middle Ohio (HUC 0509) and Kentucky-Licking (HUC 0510) watersheds also provide habitat for state-listed threatened and endangered species, including streamside salamander listed as endangered in West Virginia and red salamanders listed as endangered in Indiana (Schneider, 2010; IUCN SSC Amphibian Specialist Group, 2014; Niemiller, et al., 2006).

IV.B.3 Case Study 2: Lower Missouri River Basin

This case study area encompasses the area along the border of Nebraska and Kansas, stretching into Colorado on the west and touching the Missouri River on the east. The Republican River and Kansas River watersheds lie mainly within the High Plains and Central Great Plains ecoregions. There are several climate zones in the area, ranging from mild mid-latitude and humid to dry steppe climates. Summers are typically hot, and winters can be mild to severe. Annual precipitation ranges from 305 to 940 mm (12 to 37 inches). Most streams in the area are intermittent, and a few are perennial. Land is primarily used for cropland. Other uses include land for grazing as well as oil and gas production (CEC, 2011).

Figure IV-14 and Figure IV-15 show maps of the HUC 1025 and HUC 1027 case study watersheds, respectively. The Republican River is a tributary to the Kansas River and therefore the outlet of watershed HUC 1025 flows into HUC 1027, along with contributions from HUC 1026.

Figure IV-14: Map of HUC 1025 – Republican River Basin showing high-resolution NHD water features and NWI wetlands in relation to state boundaries, populated areas, and major roads.

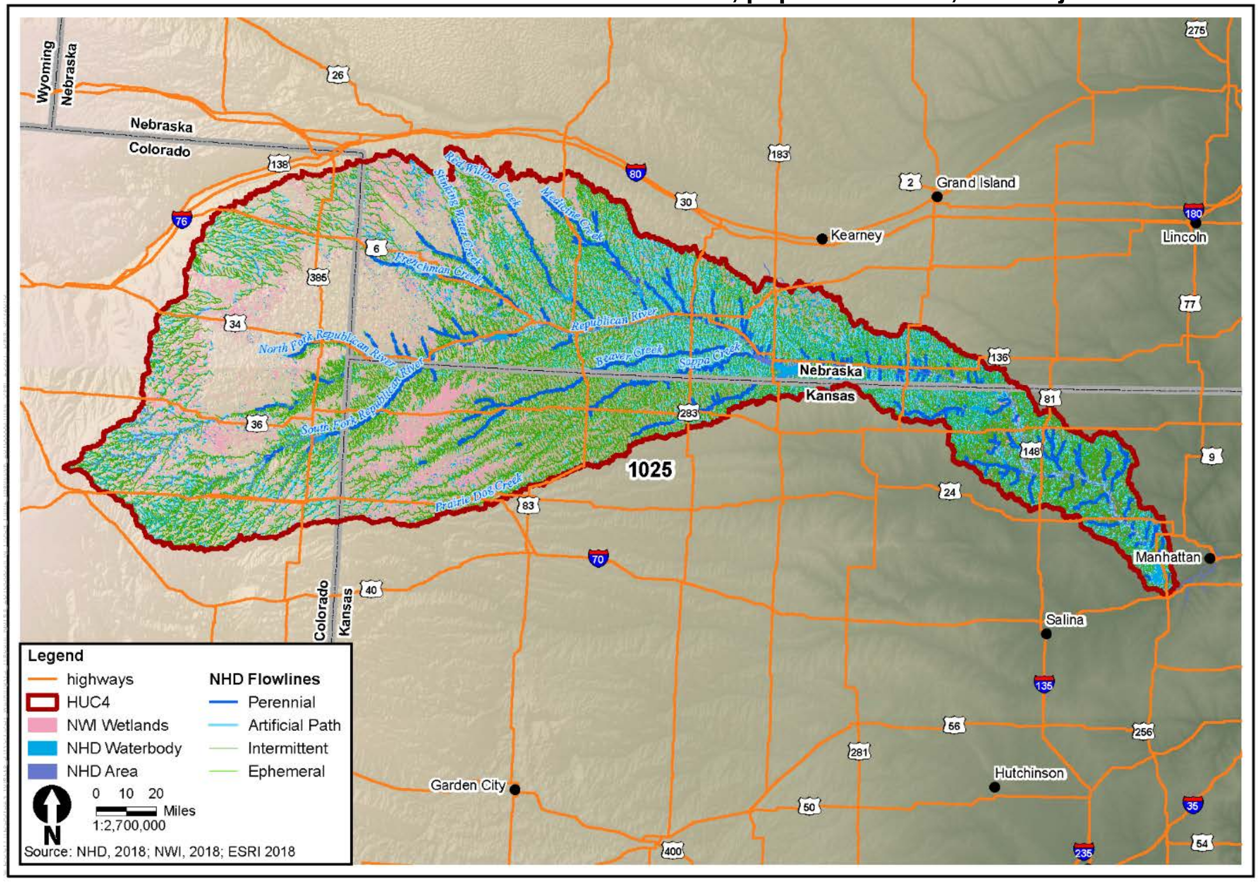
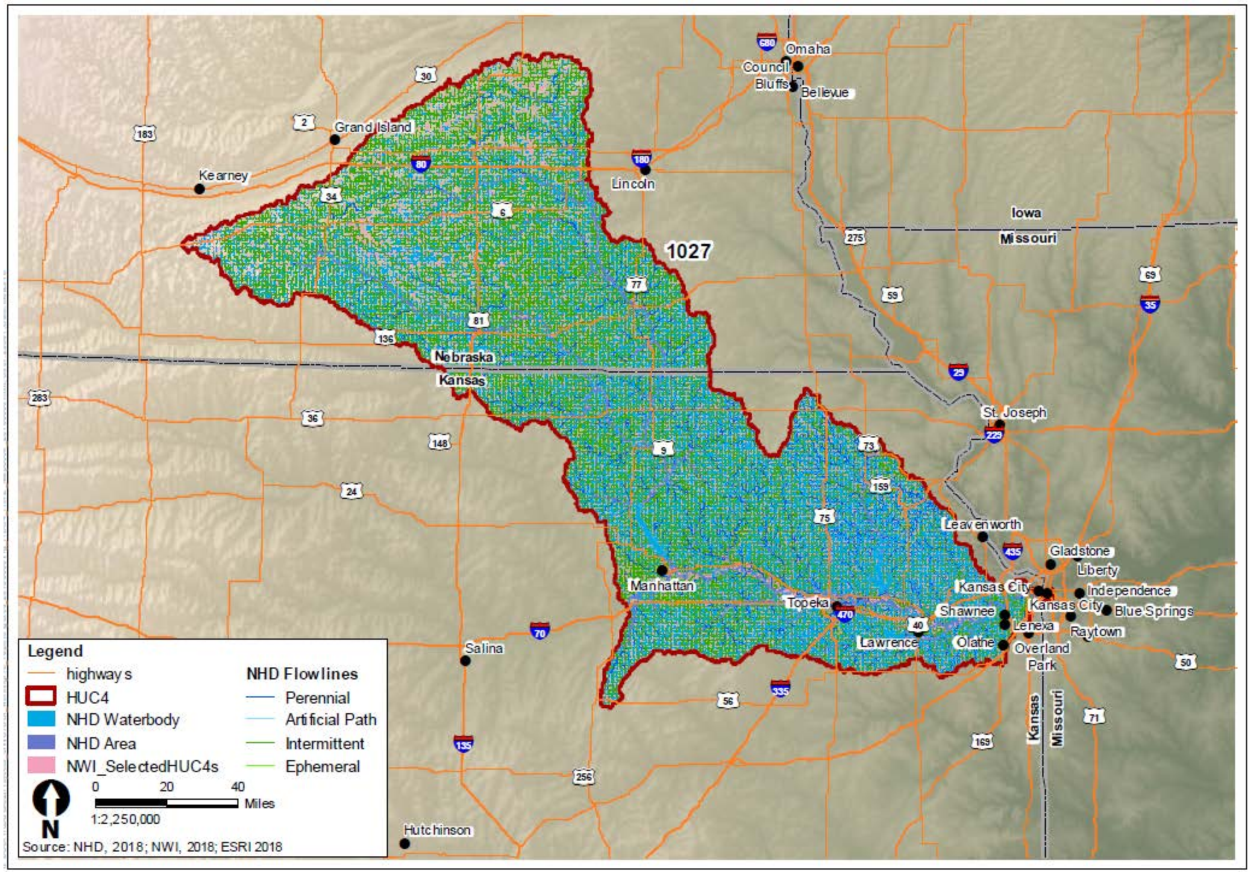


Figure IV-15: Map of HUC 1027 – Kansas River Basin showing high-resolution NHD water features and NWI wetlands in relation to state boundaries, populated areas, and major roads.



IV.B.3.1 Aquatic Resources Characteristics

Table IV-30 summarizes the hydrography within the case study watersheds in terms of the number of stream miles in each flow category and acres of non-abutting abutting wetlands based on the agencies' geospatial analysis[134] of the high resolution NHD and the NWI. As presented in the table, 77 to 86 percent of all stream miles within the two watersheds are either ephemeral or intermittent, and 11 to 17 percent of all wetland acres are non-abutting (*i.e.*, not touching, intersecting, or adjacent per the proposed rule to high resolution NHD streams).[135] As was the case for the Ohio River basin, the NHD data within the study areas generally do not differentiate streams according to their flow regime, which explains the very small number of ephemeral reach miles, relative to the total number of reach miles. To overcome this limitation in the analyses of program impacts, the agencies therefore again relied on information available in permits and in the NWI data to identify impacts to ephemeral streams, wetlands abutting ephemeral streams, and non-abutting wetlands.

[134] *See* Resource and Programmatic Assessment, Section I: Aquatic Resource Analysis for details.

[135] The agencies do not know how many wetlands that were determined to be "non-abutting" might have a direct hydrologic surface connection with a jurisdictional water and would thus be jurisdictional under the proposed rule.

Table IV-30: Hydrographic profile of case study watersheds in the Lower Missouri River Basin

Feature type	Feature attributes	HUC 1025		HUC 1027	
		Miles or Acres	Percent of total	Miles or Acres	Percent of total
Streams (miles)	**Total**	40,561	100%	37,933	100%
	Perennial	2,339	6%	5,361	14%
	Intermittent	35,031	86%	29,362	77%
	Ephemeral	1	0%	11	0%
	Artificial path	2,407	6%	2,819	7%
	Other[1]	784	2%	380	1%
Wetlands (acres)	**Total**	356,673	100%	398,436	100%
	Abutting	242,234	68%	325,484	82%
	Non-abutting	114,439	32%	72,951	18%

[1] Includes canal, ditches, aqueducts, and other features without attributes.

The values are based on the agencies' geospatial analysis of NHD and NWI data and reflect gaps in NHD stream attributes.

IV.B.3.2 Program Changes

IV.B.3.2.1 Section 402

Table IV-31 presents the number of NPDES permits issued in the Lower Missouri River Basin by the most common industry categories. The number of permits issued in the two case study watersheds includes 538 individual permits and 1,940 general permits. Twenty-eight permits in the Lower Missouri River Basin have at least one discharge near an ephemeral stream (3 individual and 25 general permits).[136] Based on the permits with SIC codes, the most common industry requiring NPDES permits with at least one discharge near an ephemeral stream in the Lower Missouri River Basin include aggregate mining (15 permits) and construction and development (4 permits).

Table IV-31: Section 402 individual permits (SIC codes in parentheses) issued in case study watersheds in the Lower Missouri River Basin

Industry category	Individual permits[1]			General permits[1]		
	Total number of NPDES permits	Permits with discharge point near ephemeral streams[2]		Total number of NPDES permits	Permits with discharge point near ephemeral streams[2]	
		Number of permits	Percent of all permits		Number of permits	Number of permits
HUC 1025						
Sewerage Systems (4952)	34	0	0%	8	1	13%
Aggregate Mining[3]	3	0	0%	21	15	71%
Construction and Development[4]	0	0	0%	47	4	9%
Ready-Mixed Concrete (3273)	0	0	0%	4	1	25%

[136] Note that none of the permits the agencies reviewed for this watershed affected waters with the code "R4SBJ." All permits shown in Table IV-31 as having a discharge point near ephemeral streams affect waters with a Cowardin code "R4SBA."

Table IV-31: Section 402 individual permits (SIC codes in parentheses) issued in case study watersheds in the Lower Missouri River Basin

Industry category	Individual permits[1]			General permits[1]		
	Total number of NPDES permits	Permits with discharge point near ephemeral streams[2]		Total number of NPDES permits	Permits with discharge point near ephemeral streams[2]	
		Number of permits	Percent of all permits		Number of permits	Number of permits
Petroleum Bulk Stations and Terminals (5171)	0	0	0%	1	1	100%
Other Categories[5]	70	0	0%	31	-	0%
Missing SIC Codes	6	2	33%	150	1	1%
Total	**113**	**2**	**2%**	**262**	**23**	**9%**
HUC 1027						
Sewerage Systems (4952)	161	0	0%	9	0	0%
Aggregate Mining[3]	24	0	0%	8	0	0%
Construction and Development[4]	1	0	0%	17	0	0%
Ready-Mixed Concrete (3273)	0	0	0%	12	0	0%
Petroleum Bulk Stations and Terminals (5171)	0	0	0%	2	0	0%
Other Categories[5]	140	0	0%	152	0	0%
Missing SIC Codes	99	1	1%	1,480	2	0%
Total	**425**	**1**	**0%**	**1,680**	**2**	**0%**
Total for both watersheds	**538**	**3**	**1%**	**1,942**	**25**	**1%**

[1] Source: EPA's ICIS-NPDES data, 2017. The facility permits included in the spatial analysis are limited to those for which the ICIS-NPDES database includes valid latitude/longitude coordinates. For permits with multiple SIC codes, only one SIC code was retained, with manufacturing industries prioritized, to avoid double-counting.

[2] The agencies used the Cowardin classification code in NWI to determine whether 402 discharges are likely to affect ephemeral streams (*i.e.*, the agencies interpreted Cowardin codes R4SBA and R4SBJ as ephemeral; *see* Section IV.B for more detail). All permits shown as having a discharge point near ephemeral streams affect waters with a Cowardin code R4SBA.

[3] Includes SIC Codes 1422, 1423, 1429, 1442, 1446, 1459, 1474, 1475, 1481, and 1499.

[4] Includes SIC Codes 1629, 1794, 6552, 1611, 1799, 1521, 1522, and 1623.

[5] Includes multiple categories, such as Asphalt Paving Mixtures and Blocks (2951), Animal Feeding Operations (211, 212, 213, 214, 219, 241, 251, 252, 253, 254, 259, 271, 272, and 279), Electric Services (4911), Industrial Domestic Wastewater Treatment (6513, 6514, 6515, 7011, 7032, 7033, 8211, 8221, 8641, and 8661), Industrial Organic Chemicals (2869), Motor Vehicle Parts, Used (5015), Refuse Systems (4953), Trucking Facilities (4212, 4231), and Water Supply (4941).

The majority of section 402 permit holders in the Lower Missouri River Basin have technology-based effluent limitations (TBELs), including sewage systems (secondary), aggregate mining, and construction and development. The ready-mixed concrete and petroleum bulk stations and terminals industries do not have national TBELs. For facilities in these two industry categories, effluent limitations are either water quality-based (WQBELs) for pollutants with applicable water quality standards, or TBELs based on the best professional judgement of the permit writer (U.S. EPA; 2011).

Of the three individual NPDES permits potentially affecting ephemeral streams, none (0) have WQBELs. Should the definition of "waters of the United States" change, a permittee subject to more stringent limits based on a WQBEL could request a revision of its WQBEL to account for potential dilution or attenuation of the pollutant(s) occurring between end-of-pipe and the point where the effluent enters jurisdictional waters. Under this scenario, the permittee may realize cost savings as compared to meeting the previous permit limits.

NPDES permits potentially affecting ephemeral waters (25 general and 3 individual) were issued in two states in the Lower Missouri River Basin (Colorado and Kansas). Colorado and Kansas are expected to regulate waters beyond the CWA under Scenario 2 (3) only.[137] All permits potentially affecting ephemeral waters thus drop from consideration under Scenario 2 (3). Section II.A describes potential state responses and different analytic scenarios in more detail.

NPDES permits issued under the ready-mixed concrete and petroleum bulk stations and terminals categories are not subject to national TBELs. In the Lower Missouri River Basin case study watersheds, two permits potentially affected by the proposed rule were issued in these categories from 2011-2015. Both of these permits were issued in Colorado and thus drop from consideration under Scenario 2 (3).

IV.B.3.2.2 Section 404

To estimate the effect of reduced mitigation requirements for non-abutting wetlands and ephemeral streams on potential cost savings and forgone benefits, the agencies used the approach described in Section IV.B.2.2.2. Table IV-32 summarizes section 404 permits issued in 2011-2015 within the Lower Missouri River Basin that required mitigation on RPWWN-type wetlands or ephemeral streams. As presented in the table, the agencies' geospatial analysis shows 40 permits in HUC 1025 and 57 permits in HUC 1027 issued by the Corps with impacts that required mitigation on waters potentially affected by the proposed changes to the definition of "waters of the United States." Permanent impacts resulting from 404 permits issued in 2011-2015 included annual averages of 0.1 acres and 6,646 linear feet in HUC 1025 and 0.9 acres and 7,873 linear feet in HUC 1027. In both case study watersheds, permit impacts occurred in Kansas and Nebraska. Kansas and Nebraska are likely to implement state regulations more stringent than the federal level (*i.e.*, impacts excluded in Scenarios 2 and 3).

Table IV-32: Section 404 permits issued in case study watersheds in the Lower Missouri River Basin (2011-2015)[1]

State	# Permitted Projects	# Permits with mitigation requirements potentially affected by proposed changes to the definition of "waters of the United States"[2]	Permanent impacts		Temporary impacts	
			Acres	Length Feet	Acres	Length Feet
HUC 1025						
CO	10	0	0.00	0	0.00	0
KS	207	38	0.63	33230	0.00	5005
NE	141	2	0.02	0	0.00	0
Total	**358**	**40**	**0.65**	**33,230**	**0.00**	**5,005**
Avg. per year	**72**	**8**	**0.13**	**6,646**	**0.00**	**1,001**

[137] Scenarios 2 and 3 are identical for the 402 program analysis.

Table IV-32: Section 404 permits issued in case study watersheds in the Lower Missouri River Basin (2011-2015)[1]

State	# Permitted Projects	# Permits with mitigation requirements potentially affected by proposed changes to the definition of "waters of the United States"[2]	Permanent impacts		Temporary impacts	
			Acres	Length Feet	Acres	Length Feet
HUC 1027						
KS	742	52	4.22	39,131	0.30	730
MO	1	0	0.00	0	0.00	0
NE	288	5	0.43	236	0.00	0
Total	**1031**	**57**	**4.65**	**39,367**	**0.30**	**730**
Avg. per year	**206**	**11**	**0.93**	**7,873**	**0.06**	**146**

[1] Values based on permits with mitigation requirements on waterways determined to be RPWWN-type wetlands or ephemeral streams. Excludes permits issued for mitigation or restoration activities because the main purpose of these activities is to restore or enhance ecosystem services provided by water resources as opposed to dredge and fill activities that lead to permanent or temporary losses of ecosystem services.

[2] Number of permits includes permits with mitigation requirements that potentially affect at least one water no longer jurisdictional under the CWA under the proposed rule.

Table IV-33 presents expected reductions in average annual mitigation requirements in the Lower Missouri River Basin under different likely state response scenarios following the proposed "waters of the United States" definitional changes. Section IV.B.2.2.2 provides detail on input data and the assumptions used in this analysis.

Table IV-33: Estimated changes in average mitigation required per year in the Lower Missouri River Basin, by policy scenario

State	Expected Reduction in Average Mitigation Acres per Year[1,2]			Expected Reduction in Average Mitigation Length Feet per Year[1,2]			Expected Reduction in Average Mitigation Riparian Acres per Year[1,2, 3]		
	Scenario 0 & 1	Scenario 2	Scenario 3	Scenario 0 & 1	Scenario 2	Scenario 3	Scenario 0 & 1	Scenario 2	Scenario 3
HUC 1025									
KS	0.1	0.0	0.0	6,646	0	0	7.6	0.0	0.0
NE	0.0	0.0	0.0	0	0	0	0.0	0.0	0.0
Total	**0.1**	**0.0**	**0.0**	**6,646**	**0**	**0**	**7.6**	**0.0**	**0.0**
HUC 1027									
KS	0.8	0.0	0.0	7,826	0	0.0	9.0	0.0	0.0
NE	0.1	0.0	0.0	47	0	0.0	0.1	0.0	0.0
Total	**0.9**	**0.0**	**0.0**	**7,873**	**0**	**0.0**	**9.0**	**0.0**	**0.0**

[1] Values based on permits with mitigation requirements on waterways determined to be RPWWN-type wetlands or ephemeral streams. Excludes permits issued for mitigation or restoration activities because these permits do not result in the loss of ecosystems services provided by wetlands and streams. Permanent acre and linear feet impacts provided in the ORM2 database are used to estimate mitigation requirements. The agencies assumed a 1:1 ratio for compensatory requirements based on the USACE guidance (U.S. Army Corps of Engineers 2014).

Table IV-33: Estimated changes in average mitigation required per year in the Lower Missouri River Basin, by policy scenario

State	Expected Reduction in Average Mitigation Acres per Year[1,2]			Expected Reduction in Average Mitigation Length Feet per Year[1,2]			Expected Reduction in Average Mitigation Riparian Acres per Year[1,2,3]		
	Scenario 0 & 1	Scenario 2	Scenario 3	Scenario 0 & 1	Scenario 2	Scenario 3	Scenario 0 & 1	Scenario 2	Scenario 3

[2] Scenarios 0 and 1 are combined because all values are identical.

[3] Based on mitigation lengths where impacts in linear feet are converted to acres by multiplying total linear feet by an average total buffer width of 50 feet (25 feet on each side of the stream) and converting square feet to acres.

IV.B.3.2.2.1 Cost Savings

To estimate permit cost savings, the agencies determined the average number of individual and general 404 permits issued each year, based on permits issued from 2011 to 2015, that potentially affect only waters no longer considered "waters of the United States" under the proposed rule. The agencies then multiplied the annual average number of reduced individual and general permits by lower bound USACE estimates of permit costs (U.S. EPA and Department of the Army, 2015). The agencies used the lower bound estimate to avoid double-counting compensatory mitigation costs.

Table IV-34 shows the average number of reduced individual and general 404 permits, USACE unit application costs, and the estimated reduction in permit applications costs for individual and general 404 permits in the Lower Missouri River Basin under each scenario. The USACE unit cost estimates ($14,700 per individual permit; $4,400 per general permit) are adjusted from 1999$ to 2017$ using the CPI-U.

Permits affecting only RPWWN-type wetlands and ephemeral streams were issued in three states in HUC 1025 (Colorado, Kansas, and Nebraska) and two states in HUC 1027 (Kansas and Nebraska). Under Scenarios 0 and 1, the average annual reduction in 404 permit application costs for the Lower Missouri River Basin is approximately $0.26 million. Under Scenario 2, which includes permit reductions in Colorado, permit cost savings drop to less than $0.01 million. Under Scenario 3, permit cost savings drop to $0 since all states are expected to regulate waters beyond the CWA.

Table IV-34: Average annual reduction in 404 permit application costs in the Lower Missouri River Basin

Permit Type	Unit Costs from Corps NWP Analysis (2017$)	Scenario 0 & 1[1,2]		Scenario 2[1]		Scenario 3[1]	
		Annual Average Reduction in Permits with Rule	Estimated Reduction in Permit Costs (millions 2017$)	Annual Average Reduction in Permits with Rule	Estimated Reduction in Permit Costs (millions 2017$)	Annual Average Reduction in Permits with Rule	Estimated Reduction in Permit Costs (millions 2017$)
HUC 1025							
IP	$14,700	0.0	$0.00	0.0	$0.00	0.0	$0.00
GP	$4,400	21.0	$0.09	0.8	<$0.01	0.0	$0.00
Total		**21.0**	**$0.09**	**0.8**	**<$0.01**	**0.0**	**$0.00**

Table IV-34: Average annual reduction in 404 permit application costs in the Lower Missouri River Basin

Permit Type	Unit Costs from Corps NWP Analysis (2017$)	Scenario 0 & 1[1,2]		Scenario 2[1]		Scenario 3[1]	
		Annual Average Reduction in Permits with Rule	Estimated Reduction in Permit Costs (millions 2017$)	Annual Average Reduction in Permits with Rule	Estimated Reduction in Permit Costs (millions 2017$)	Annual Average Reduction in Permits with Rule	Estimated Reduction in Permit Costs (millions 2017$)
HUC 1027							
IP	$14,700	1.0	$0.01	0.0	$0.00	0.0	$0.00
GP	$4,400	34.6	$0.15	0.0	$0.00	0.0	$0.00
Total		**35.6**	**$0.17**	**0.0**	**$0.00**	**0.0**	**$0.00**
Both Watersheds							
IP		1.0	$0.01	0.0	$0.00	0.0	$0.00
GP		55.6	$0.24	0.8	<$0.01	0.0	$0.00
Total		**56.6**	**$0.26**	**0.8**	**<$0.01**	**0.0**	**$0.00**

[1] Includes permits estimated to only affect waters no longer jurisdictional under the CWA under the proposed rule.

[2] Scenarios 0 and 1 are combined because all values are identical.

To estimate annual cost savings from reduced mitigation requirements, the agencies multiplied the cost of each mitigation acre or linear foot (low and high estimates) by the expected reduction in annual mitigation requirements (Table IV-33), and summed the estimated cost savings for each scenario. The agencies estimated low and high per acre and liner foot mitigation costs for each state. Table IV-35 provides annual cost savings estimates from reduced mitigation requirements in the Lower Missouri River Basin under different policy scenarios. Annual mitigation cost savings under Scenarios 0 and 1 range from a low of $1.36 million to a high of $5.34 million. Cost savings drop to $0 under Scenarios 2 and 3 since Kansas and Nebraska, the two states where all mitigation requirement reductions occur in the two case study watersheds, are expected to regulate waters beyond CWA requirements.

Table IV-35: Annual cost savings (2017$) of reduced mitigation requirements in the Lower Missouri River Basin resulting from the proposed definitional change, by policy scenario

State	Cost Per Acre (2017$)		Cost Per Linear Foot (2017$)		Scenarios 0 & 1[1,2] (Millions 2017$)		Scenario 2[1] (Millions 2017$)		Scenario 3[1] (Millions 2017$)	
	Low	High	Low	High	Low	High	Low	High	Low	High
HUC 1025										
KS	$54,000	$105,400	$90	$360	$0.60	$2.41	$0.00	$0.00	$0.00	$0.00
NE	$54,000	$105,400	$90	$360	<$0.01	<$0.01	$0.00	$0.00	$0.00	$0.00
Total	-	-	-	-	**$0.61**	**$2.41**	**$0.00**	**$0.00**	**$0.00**	**$0.00**
HUC 1027										
KS	$54,000	$105,400	$90	$360	$0.75	$2.91	$0.00	$0.00	$0.00	$0.00
NE	$54,000	$105,400	$90	$360	$0.01	$0.03	$0.00	$0.00	$0.00	$0.00
Total	-	-	-	-	**$0.76**	**$2.93**	**$0.00**	**$0.00**	**$0.00**	**$0.00**

Table IV-35: Annual cost savings (2017$) of reduced mitigation requirements in the Lower Missouri River Basin resulting from the proposed definitional change, by policy scenario

State	Cost Per Acre (2017$)		Cost Per Linear Foot (2017$)		Scenarios 0 & 1[1,2] (Millions 2017$)		Scenario 2[1] (Millions 2017$)		Scenario 3[1] (Millions 2017$)	
	Low	High	Low	High	Low	High	Low	High	Low	High
Both Watersheds										
Total	-	-	-	-	**$1.36**	**$5.34**	**$0.00**	**$0.00**	**$0.00**	**$0.00**

[1] Estimated changes in average mitigation required per year are presented in Table IV-33. For each state, cost savings are calculated by multiplying the cost of each mitigation acre or linear foot (low and high estimates) by the expected reduction in annual mitigation requirements, and summing the acreage and linear feet values for each scenario.

[2] Scenarios 0 and 1 are combined because all values are identical.

Table IV-36 provides total annual 404 program cost savings estimated in the Lower Missouri River Basin resulting from the proposed rule, under each policy scenario. Total costs savings combine the estimated reduction in permit costs and mitigation requirements. Under Scenarios 0 and 1, estimated cost savings range from a low of $1.62 million to a high of $5.60 million. Estimated cost savings drop to less than $0.01 million under Scenario 2, which includes permit cost savings in Colorado. Under Scenario 3, total estimated cost savings drop to $0.

Table IV-36: Total annual estimated cost savings in the Lower Missouri River Basin (Millions 2017$)

HUC	Scenarios 0 & 1[1,2]		Scenario 2[2]		Scenario 3[2]	
	Low	High	Low	High	Low	High
1025	$0.70	$2.50	<$0.01	<$0.01	$0.00	$0.00
1027	$0.93	$3.10	$0.00	$0.00	$0.00	$0.00
Total	**$1.62**	**$5.60**	**<$0.01**	**<$0.01**	**$0.00**	**$0.00**

[1] Scenarios 0 and 1 are combined because all values are identical.

[2] Scenarios 0 and 1 include cost savings in Kansas, Nebraska, and Colorado. Scenario 2 includes cost savings in Colorado only. Since none of the 404 permits issued in Colorado between 2011 and 2015 with impacts to waters affected by the proposed rule had mitigation requirements, Scenario 2 only includes minimal permits cost savings. Under Scenario 3, cost savings drop to zero because all states in the case study region are expected to regulate waters beyond CWA requirements.

IV.B.3.2.2.2 Forgone Benefits

To estimate the forgone benefit value associated with reduced mitigation requirements for non-abutting wetlands and ephemeral streams, the agencies relied on per household WTP values for preventing wetland losses from Blomquist and Whitehead (1998). Blomquist and Whitehead (1998) values are appropriate for the Lower Missouri watershed because the wetland types are similar to those found in the original study region (*i.e.*, freshwater marsh, temporarily, seasonally or permanently flooded bottomland hardwood). In particular, Missouri wetlands are dominated by forested and shrub swamps subject to frequent flooding from Missouri and other local rivers (MO DNR 2016). Within the southern Nebraska portion of the Lower Missouri River watershed, wetland types include both freshwater marshes (such as those within the Platte River region sandhills) and forested wetlands/swamps (such as those near the

Central Platte River in south-central Nebraska; LaGrange, 2005). Certain southern Nebraska basin wetlands are dominated by row-crop agriculture, such as those located in the Southwest Playas and the Rainwater Basin, and others are dominated by forested wetlands, such as those located near the Lower Missouri River (U.S. EPA, 2015c). The National Wetlands Inventory (NWI) wetlands mapper indicates that both “forested and shrub wetlands” and “freshwater emergent wetlands” are present in the Lower Missouri River Basin case study area (U.S. FWS, 2018). The number of wetland acres considered in the valuation scenario (500 acres) is small enough to calculate reasonable per acre WTP estimates.

To determine the number of potentially affected households, the agencies applied a similar methodology to the one used in Blomquist and Whitehead (1998). The survey population included state households where the affected wetlands were located (*i.e.*, Kentucky in the original study) as well as households in four cities outside of, but bordering, western Kentucky: Evansville, IN; Clarksville, TN; Carbondale, IL; and Cape Girardeau, MO. Following Blomquist and Whitehead (1998), the agencies applied the household WTP value to all households in the state with the majority of the watershed’s 404 impacts (Kansas for both HUC 1025 and 1027) as well as households in other counties within the watershed area and counties adjacent to the watershed (Figure IV-16; Figure IV-17). Given that future location of 404 impacts is uncertain, the agencies used population in all counties within the affected watershed and counties adjacent to the watershed to determine potentially affected population residing outside of Kansas where the majority of 404 impacts occurred between 2011-2015.

Figure IV-16: Locations of households included in the forgone benefits analysis for HUC 1025.

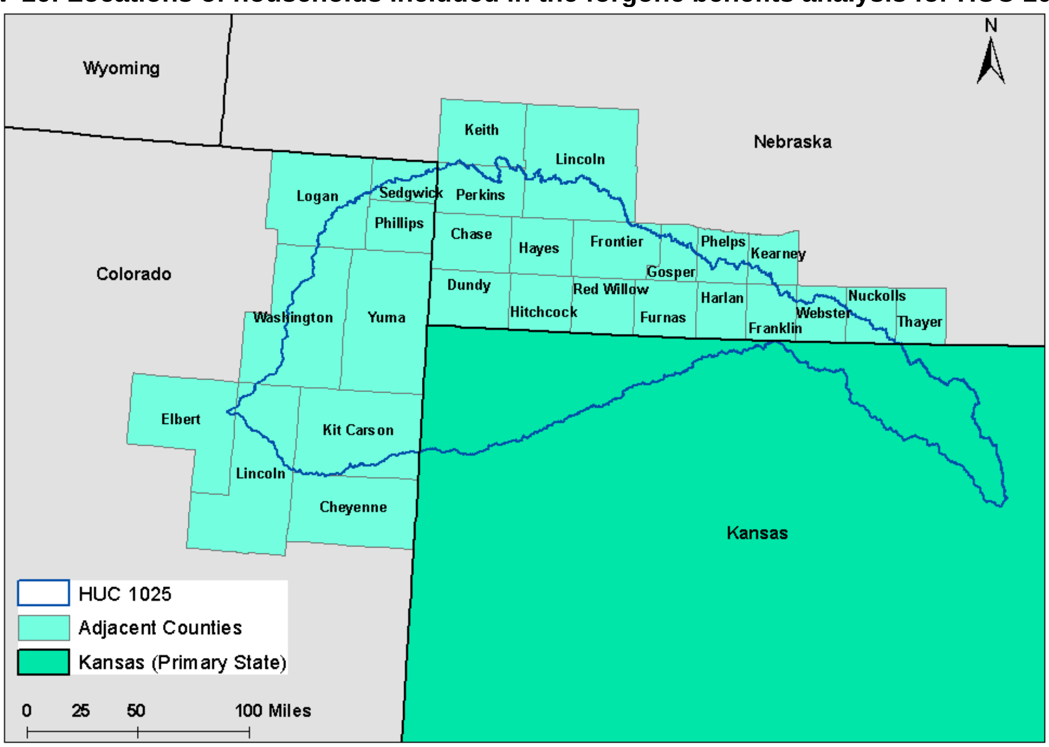
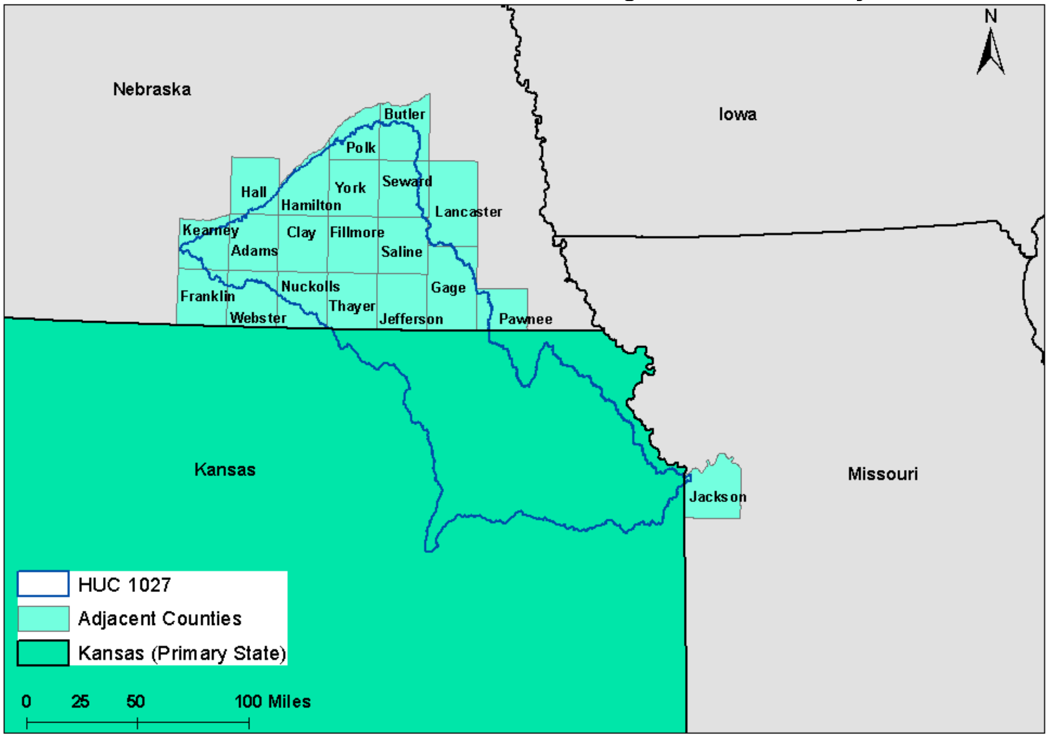


Figure IV-17: Locations of households included in the forgone benefits analysis for HUC 1027.



To estimate the number of affected households in future years, the agencies used projected population changes from 2015 to 2040 (CEDBR, 2016; State of Colorado, 2018; Missouri Office of Administration, 2008; Drozd and Deichert, 2015) divided by the average number of people per household (U.S. Census Bureau, 2015).

Table IV-37 and Table IV-38 provide estimated annualized forgone benefits from lost mitigation requirements in the Lower Missouri River Basin under different state response scenarios, with three percent and seven percent discount rates, respectively. Mitigation requirements for HUCs 1025 and 1027 occur in Kansas and Nebraska. Scenarios 0 and 1 include mitigation acres from both states. Annualized forgone benefits for the Lower Missouri River Basin under Scenarios 0 and 1 range from a low of $ 0.09 million to a high of $0.81 million, while the TPV of forgone benefits during the 2020-2039 study period ranges from $1.80 million to $16.25 million. Under Scenarios 2 and 3, the forgone benefits drop to $0 since both Kansas and Nebraska are expected to regulate waters beyond federal requirements.

Table IV-37: Annualized forgone benefits (Millions 2017$) of lost mitigation requirements in the Lower Missouri River Basin resulting from the proposed definitional change, by policy scenario (3% Discount Rate)

HUC	# Affected Households in 2020[3]	Scenarios 0 & 1[1,2]		Scenario 2[1]		Scenario 3[1]	
		Low	High	Low	High	Low	High
1025	1,264,605	$0.05	$0.30	$0.00	$0.00	$0.00	$0.00
1027	1,689,217	$0.08	$0.51	$0.00	$0.00	$0.00	$0.00
Total	**2,953,822**	**$0.12**	**$0.81**	**$0.00**	**$0.00**	**$0.00**	**$0.00**

[1] Estimated changes in average mitigation required per year are presented in Table IV-33. Forgone benefits are calculated for each scenario by multiplying total forgone mitigation values for each scenario (sum of acres and linear feet converted into acres) by the total number of affected households and the appropriate household WTP value (low: $0.006/acre; high:

Table IV-37: Annualized forgone benefits (Millions 2017$) of lost mitigation requirements in the Lower Missouri River Basin resulting from the proposed definitional change, by policy scenario (3% Discount Rate)

HUC	# Affected Households in 2020[3]	Scenarios 0 & 1[1,2]		Scenario 2[1]		Scenario 3[1]	
		Low	High	Low	High	Low	High

$0.038/acre). The agencies calculated forgone benefits for the years 2020-2039 and annualized values using a 3% discount rate.

[2] Scenarios 0 and 1 are combined because all values are identical.

[3] The agencies accounted for population growth and change in the number of households throughout the 2020-2039 study period.

Table IV-38: Annualized forgone benefits (Millions 2017$) of lost mitigation requirements in the Lower Missouri River Basin resulting from the proposed definitional change, by policy scenario (7% Discount Rate)

HUC	# Affected Households in 2020[3]	Scenarios 0 & 1[1,2]		Scenario 2[1]		Scenario 3[1]	
		Low	High	Low	High	Low	High
1025	1,264,605	$0.03	$0.22	$0.00	$0.00	$0.00	$0.00
1027	1,689,217	$0.06	$0.38	$0.00	$0.00	$0.00	$0.00
Total	**2,953,822**	**$0.09**	**$0.60**	**$0.00**	**$0.00**	**$0.00**	**$0.00**

[1] Estimated changes in average mitigation required per year are presented in Table IV-33. Forgone benefits are calculated for each scenario by multiplying total forgone mitigation values for each scenario (sum of acres and linear feet converted into acres) by the total number of affected households and the appropriate household WTP value (low: $0.006/acre; high: $0.038/acre). The agencies calculated forgone benefits for the years 2020-2039 and annualized values using a 7% discount rate.

[2] Scenarios 0 and 1 are combined because all values are identical.

[3] The agencies accounted for population growth and change in the number of households throughout the 2020-2039 study period.

IV.B.3.2.3 Section 311

Six FRP facilities are located within the Republican River watershed (HUC 1025) and an additional 36 FRP facilities are located within the Kansas River watershed (HUC 1027). The high-resolution NHD data for the case study watersheds do not accurately depict the extent of ephemeral streams in those watersheds, as some might be mapped as intermittent while others are not mapped at all. Therefore, the agencies were not able to determine the type of waters located in proximity of these facilities. However, as noted in Section IV.B.2.2.3 for Case Study 1, a facility owner may determine that FRP requirements are applicable to the facility based on reasonable potential of an oil discharge (among other criteria) which means that proximity to any jurisdictional waters is a relevant consideration even if some other waters in the vicinity of the facility are not jurisdictional.

The agencies' analysis of the 42 facilities in the two case study watersheds identified five facilities without perennial or intermittent streams in the high-resolution NHD within a half-mile of the facility and only isolated water bodies visible on aerial photos. The proposed rule may affect the FRP applicability criteria for existing planholders by changing the inventory of resources considered within the half-mile planning distance and potentially leading facility owners to conclude that their facilities do not have a reasonable potential for an oil discharge to waters of the United States. Where FRP applicability changes, the facility owners may submit a request to EPA to reconsider FRP requirements.

EPA FOSCs responded to two incidents in the Kansas River watershed HUC 1027 between 2001 and 2017. The first incident[138] was associated with a vehicle accident that released petroleum into a ditch that flows into Piper Creek. The second incident,[139] a 10-inch diesel pipeline break, was determined upon FOSC evaluation not to affect waters of the United States. The FOSC and RP identified an intermittent creek approximately 150 yards south of the pipeline source of the spill, but the creek was completely dry at the time of the response and the extent of the diesel had been contained on land. The FOSC and RP agreed to check the creek periodically to verify that no diesel has traveled there. The information available for these spills suggests that the proposed rule would be unlikely to yield a different determination regarding the response or oversight.

IV.B.3.3 Potential Environmental Impacts and Costs

IV.B.3.3.1 Water Quality

The agencies assessed the potential water quality impacts of the proposed rule using the same methodology as described for the Ohio River basin watersheds. Table IV-39 describes the two SWAT models used for this second case study. Modeled wetland impacts for HUC 1025 represent a very small share of the existing acres of wetlands in the watershed and of the overall watershed size.

Table IV-39: Summary of SWAT models used to estimate water quality impacts of the proposed rule in the Missouri River basin

Model characteristics	HUC 1025	HUC 1027
	Republican River	Kansas River
Total watershed area (square miles)[1]	24,248.4	16,252.6
Number of HUC12 subbasins and reach segments modeled[2]	600	422
Average annual precipitation (in/year)	21.4	31.7
Baseline land use distribution:		
% developed	0.5%	2.0%
% agriculture	96.3%	85.5%
% forested	0.3%	5.1%
% water	0.6%	3.1%
% wetlands	2.3%	4.3%
Unmitigated stream and wetland impacts[3] under the proposed rule over 20 years (acres)	154.1	191.6
Unmitigated stream and wetland impacts[3] under the proposed rule over 20 years (% of baseline wetland acres)	0.04%	0.04%

[138] https://response.epa.gov/site/site_profile.aspx?site_id=8440

[139] https://response.epa.gov/site/site_profile.aspx?site_id=7346

Table IV-39: Summary of SWAT models used to estimate water quality impacts of the proposed rule in the Missouri River basin

Model characteristics	HUC 1025	HUC 1027
	Republican River	Kansas River

[1] The watershed area is based on the SWAT model and may differ from the description in the introduction to Section IV.B due to the omission or inclusions of HUC12 subbasins within the scope of each watershed as delineated in SWAT.

[2] For HUC 1027, reach-level predictions also include contributions from upstream watersheds HUCs 1025 and 1026.

[3] Unmitigated wetland impacts are based on permitted permanent impacts requiring mitigation and affecting wetlands abutting ephemeral streams and non-abutting wetlands. The agencies assumed a width of 50 feet for linear impacts. For watershed HUC 1027, the value includes only impacts in HUC12s subbasins of HUC 1025 and does not include impacts within the catchment of other upstream tributaries (HUC 1026) which may also affect reach-level predictions.

IV.B.3.3.1.1 CWA Program Impacts

Following the approach described in Section IV.B.2.3.1, the agencies used estimates potential changes in required mitigation for section 404 permits to specify changes in land use and wetland area in SWAT models. Table IV-40 shows the predicted impacts in HUCs 1025 and 1027 as defined in the SWAT model (*i.e.*, counting only permits that affected resources in HUC12 subbasins in the two SWAT HUC4 watersheds).

Table IV-40: Summary of 404 Program activities in Missouri River Basin SWAT models for permits with permanent or temporary impacts to waters potentially affected by the proposed rule and with mitigation requirements over 20-year analysis period. Modeled scenario considers permanent impacts only.

Type of Potentially Affected Resource[2]	Permanent Impacts (Acres)	Permanent Impact (Linear Feet)	Total[1] Permanent Impacts (Acres)	Temporary Impact (Acres)	Temporary Impact (Linear Feet)	Total[1] Temporary Impacts (Acres)
HUC 1025						
Wetland abutting ephemeral stream	2.3	0	2.3	0.0	0.0	0.0
Ephemeral stream[3]	0.0	132,920	152.6	0.0	20,020	23.0
Total	**2.3**	**132,920**	**154.9**	**0.0**	**20,020**	**23.0**
HUC 1027						
Wetland abutting ephemeral stream	17.5	0	17.5	1.2	0.0	1.2
Ephemeral stream[3]	0.0	151,692	174.1	0.0	2,920	3.4
Total	**17.5**	**151,692**	**191.6**	**1.2**	**2,920**	**4.6**

[1] Represents the sum of impacts reported in acres and impacts reported in linear feet, assuming a width of 50 feet for linear impacts.

[2] See Table IV-8 for criteria used to identify affected resources that may change jurisdiction under the proposed rule.

[3] Represents forgone mitigation for impacts to riparian areas of ephemeral streams, assuming a total buffer 50 feet wide.

Table IV-41 and Table IV-42 summarize the changes specified for the baseline and policy scenarios, respectively.

Table IV-41: Summary of land use changes in Missouri River Basin SWAT watersheds resulting from 404 permits with permanent impacts to waters affected by the proposed rule and with mitigation requirements, under Baseline scenario

Watershed and Land use	HUC12 Subbasins (largest absolute change)[1]		Total watershed (all subbasins)[1]	
	acres	% of existing land use	Acres	% of existing land use
HUC 1025				
Developed area	2.4	0.26%	154.9	0.20%
Agricultural area	-2.4	-0.01%	-154.9	<-0.01%
HUC 1027				
Developed area	1.4	<0.01%	191.6	0.09%
Agricultural area	-1.4	<-0.01%	-191.6	<-0.01%

[1] The number of subbasins with specified changes under the scenario is 531 in HUC 1025 (out of a total of 600 HUC12 subbasins in the watershed), and 420 in HUC 1027 (out of 422 subbasins).

Table IV-42: Summary of land use changes in Missouri River Basin SWAT watersheds resulting from 404 permits with permanent impacts to waters affected by the proposed rule and with mitigation requirements, under Policy scenario

Watershed and Land Use	HUC12 Subbasins (subbasin with largest absolute change)[1]		Total Watershed (all subbasins)	
	acres	% of existing land use	acres	% of existing land use
HUC 1025				
Developed area	2.4	0.26%	154.9	0.20%
Wetland area[2]	-2.4	-0.06%	-154.9	-0.04%
HUC 1027				
Developed area	1.4	<0.01%	191.6	0.09%
Wetland area[2]	-1.4	-0.05%	-191.6	-0.04%

[1] The number of subbasins with specified changes under the scenario is 531 in HUC 1025 (out of a total of 600 HUC12 subbasins in the watershed), and 420 in HUC 1027 (out of 422 subbasins).

[2] The difference between the percent of wetland land use affected in an individual HUC12 subbasin and for the overall watershed is due to the distribution of changes among HUC12 subbasins that have both wetland and developed areas. Some subbasins with wetland areas do not see changes under the modeled scenarios because they lack corresponding existing developed areas to increase.

IV.B.3.3.1.2 Changes in Water Balance and Constituent Transport

Table IV-43 summarizes changes in basin-level annual average water balance and constituent transport in the two watersheds of the Missouri River basin. Table IV-45 and Table IV-46 summarize changes between the Policy and Baseline scenarios across subbasins within the two watersheds. Appendix D provides more detailed outputs.

Table IV-43: Summary of basin-level annual average water balance and constituent transport in Missouri River Basin SWAT watersheds

Parameter	HUC 1025				HUC 1027			
	Baseline	Policy	Change	% Change	Baseline	Policy	Change	% Change
Precipitation (mm)	543.50	543.50	0.00	0.0%	805.00	805.00	0.00	0.0%
Surface runoff (mm)	8.33	8.33	0.00	0.0%	82.88	82.88	0.00	0.0%
Lateral flow (mm)	0.09	0.09	0.00	0.0%	2.94	2.94	0.00	0.0%
Groundwater flow (mm)	2.44	2.44	0.00	0.0%	12.99	12.99	0.00	0.0%
Water yield (mm)	10.46	10.45	-0.01	-0.1%	98.96	98.96	0.00	0.0%
Evapotranspiration (mm)	533.90	533.90	0.00	0.0%	685.40	685.40	0.00	0.0%
Sediment loading (ton/ha)	0.120	0.120	0.000	0.0%	2.370	2.370	0.000	0.0%
Organic N (kg/ha)	0.310	0.310	0.000	0.0%	2.687	2.687	0.000	0.0%
Organic P (kg/ha)	0.040	0.040	0.000	0.0%	0.317	0.317	0.000	0.0%
NO_3 in surface runoff (kg/ha)	0.013	0.013	0.000	0.0%	0.008	0.008	0.000	0.0%
NO_3 in lateral flow (kg/ha)	0.001	0.001	0.000	0.0%	0.012	0.012	0.000	0.0%
Soluble P yield (kg/ha)	0.008	0.008	0.000	0.0%	0.102	0.102	0.000	0.0%
NO_3 leached (kg/ha)	0.116	0.116	0.000	0.0%	0.190	0.190	0.000	0.0%
P leached (kg/ha)	0.005	0.005	0.000	0.0%	0.016	0.016	0.000	0.0%

Table IV-44: Estimated change in annual average subbasin water balance and constituent transport in SWAT watershed HUC 1025.

Model parameter	Number of Subbasins by Direction of Change[1]		Absolute Change			
	Increase	Decrease	Average	Median	Minimum	Maximum
Evapotranspiration (mm/yr)	338	132	0.00	0.00	-0.01	0.03
Surface runoff (mm/yr)	52	482	0.00	0.00	-0.01	0.00
Lateral flow (mm/yr)	113	410	0.00	0.00	0.00	0.00
Groundwater flow (mm/yr)	3	286	0.00	0.00	-0.02	0.00
Total water yield (mm/yr)	33	497	0.00	0.00	-0.03	0.00
Sediment yield (ton/ha/yr)	131	329	0.000	0.000	0.000	0.000
Organic N (kg/ha/yr)	246	283	0.000	0.000	0.000	0.002
Organic P (kg/ha/yr)	258	270	0.000	0.000	0.000	0.000
NO_3 in surface runoff (kg/ha/yr)	302	227	0.000	0.000	0.000	0.000
Soluble P (kg/ha/yr)	273	256	0.000	0.000	0.000	0.000

[1] Total number of subbasins is 600. Some modeled subbasins show no change in annual average values and are not included in the counts above.

Table IV-45: Estimated change in annual average subbasin water balance and constituent transport in SWAT watershed HUC 1027.

Model parameter	Number of Subbasins by Direction of Change[1]		Absolute Change			
	Increase	Decrease	Average	Median	Minimum	Maximum
Evapotranspiration (mm/yr)	375	32	0.01	0.00	0.00	0.05
Surface runoff (mm/yr)	119	300	0.00	0.00	-0.02	0.09
Lateral flow (mm/yr)	200	197	0.00	0.00	0.00	0.00

Table IV-45: Estimated change in annual average subbasin water balance and constituent transport in SWAT watershed HUC 1027.

Model parameter	Number of Subbasins by Direction of Change[1]		Absolute Change			
	Increase	Decrease	Average	Median	Minimum	Maximum
Groundwater flow (mm/yr)	6	414	0.00	0.00	-0.04	0.08
Total water yield (mm/yr)	17	403	-0.01	0.00	-0.03	0.07
Sediment yield (ton/ha/yr)	353	67	0.000	0.000	0.000	0.007
Organic N (kg/ha/yr)	366	54	0.000	0.000	0.000	0.002
Organic P (kg/ha/yr)	368	52	0.000	0.000	0.000	0.000
NO_3 in surface runoff (kg/ha/yr)	362	58	0.000	0.000	0.000	0.000
Soluble P (kg/ha/yr)	374	46	0.000	0.000	0.000	0.000

[1] Total number of subbasins is 422. Some modeled subbasins show no change in annual average values and are not included in the counts above.

IV.B.3.3.1.3 Impacts to Streams

Table IV-46 summarizes the direction and relative magnitude of mean annual changes over all reaches modeled in the two watersheds. Table IV-47 summarizes changes in mean annual loadings delivered to the outlet of each watershed. These results reflect the contributions from all upstream reaches and their respective catchments, as well as intervening instream processes modeled in SWAT, such as sediment deposition. For HUC 1027, the results reflect changes within both the subbasins within the scope of the watershed, as well as those in HUC 1025 through tributary inputs.[140] More detailed results are included in Appendix D.

As shown in the two tables, the SWAT model runs suggest that the proposed rule will increase nutrient and sediment loads in streams within the Missouri River basin. This increase follows from the combined effects of reduced wetland functions and land use change described in the previous section, but the relative magnitude of the changes impact is attenuated by “background” contributions from point sources – which, in the context of this analysis, are not affected by the policy – and from upstream reaches – which may or may not be affected by the policy, depending on the location.

Table IV-46: Summary of predicted changes in loads transported by HUC12 reaches and in-stream concentrations within the SWAT watersheds for the Missouri River Basin

Parameter	Number of Reaches by Direction of Change[1]		Magnitude of Change				
	Increase	Decrease	Average Change	Median Change	Average % Change	Median % Change	Maximum % Change
			HUC 1025				
Annual TN load (kg/yr)	125	428	-3.8	-0.1	-0.01%	0.00%	0.01%
Annual TP load (kg/yr)	153	398	-0.5	0.0	-0.01%	0.00%	0.01%
Annual sediment load (kg/yr)	165	387	-0.5	0.0	-0.01%	0.00%	0.07%

[140] SWAT model runs for HUC 1027 incorporate simulated flows and delivered loads at the outlet of HUC 1025 for each scenario (baseline and policy). The model run assumes no change in the contributions of other tributaries (HUCs 1026).

Table IV-46: Summary of predicted changes in loads transported by HUC12 reaches and in-stream concentrations within the SWAT watersheds for the Missouri River Basin

Parameter	Number of Reaches by Direction of Change[1]		Magnitude of Change				
	Increase	Decrease	Average Change	Median Change	Average % Change	Median % Change	Maximum % Change
Mean daily flow (cms)	64	480	0.000	0.000	-0.01%	0.00%	0.01%
HUC 1027							
Annual TN load (kg/yr)	379	41	25.8	2.0	0.00%	0.00%	0.03%
Annual TP load (kg/yr)	380	40	6.7	0.4	0.00%	0.00%	0.03%
Annual sediment load (kg/yr)	231	189	5.2	0.1	0.00%	0.00%	0.29%
Mean daily flow (cms)	12	408	-0.001	0.000	-0.01%	-0.01%	0.04%

[1] Total number of reaches is 600 in HUC 1025 and 422 in HUC 1027. Some modeled reaches show no change in annual average values and are not included in the counts above.

Table IV-47: Predicted changes in annual average loads delivered to the outlet of Missouri River Basin SWAT watersheds

Parameter	Baseline	Policy	Change	% Change
HUC 1025				
Annual TN load (kg/yr)	2,899,348	2,899,387	38	<0.01%
Annual TP load (kg/yr)	639,879	639,893	14	<0.01%
Annual sediment load (ton/yr)	174,827	174,746	-81	-0.05%
HUC 1027				
Annual TN load (kg/yr)	17,798,788	17,799,129	341	0.00%
Annual TP load (kg/yr)	3,790,102	3,790,203	101	0.00%
Annual sediment load (ton/yr)	2,755,694	2,755,818	124	0.00%

IV.B.3.3.2 Drinking Water

There is one public drinking water intake and one spring in the Republican River watershed (HUC 1025) and one infiltration gallery, 14 public drinking water intakes, and one spring in the Kansas River watershed (HUC 1027).

The SWAT runs predict very small changes (0.02 percent) in mean daily suspended sediment concentration in the reach used as the source for the sole drinking water intake in HUC 1025. The agencies did not quantify the changes in drinking water treatment costs but the small predicted changes in sediment concentrations are unlikely to result in material changes to these costs.

Table IV-48: Drinking Water Intakes in Lower Missouri River Study Areas

SWAT Watershed HUC4	Number of community water systems	Number of intakes	Number of people served	Change in daily suspended sediment concentration		
				Minimum	Mean	Maximum
1025	1	1	2.812	0.02%	0.02%	0.02%
1027	11	14	668,979	-0.02%	0.00%	0.03%
Total:	12	15	676,232			

Source: EPA analysis of SDWIS (2017) data.

IV.B.3.3.3 Dredging for Water Storage and Navigation

The SWAT models identify nine reservoirs within HUC 1025 and five reservoir in HUC 1027.[141] As shown in Table IV-49, the SWAT model runs predict small declines (less than 0.1 percent in HUC 1025 and less than 0.01 percent in HUC 1027) in sediment deposition in reservoirs in the watersheds, calculated as the difference between incoming sediment fluxes and outgoing fluxes.

Table IV-49: Summary of predicted net sediment depositions in reservoirs in the Missouri River Basin (tons/year) in 2040

HUC4	Number of reservoirs[1]	Net annual sediment deposition in reservoirs		Change relative to baseline[2]	
		Baseline	Policy	Tons/year	Percent
1025	9	14,979	14,970	-10	-0.07%
1027	5	6,804,648	6,804,568	-81	-0.00%
Total	14	6,819,627	6,819,538	-91	-0.00%

[1] Reservoirs modeled in SWAT watersheds, based on the U.S. Army Corps of Engineers National Inventory of Dams as of October 2010.

[2] Changes may not correspond to the differences in sediment deposition due to rounding.

The agencies used the approach described in Section IV.B.2.3.3 for Case Study 1 to estimate the change in annualized dredging costs. The estimated change in dredging costs is negligible in both HUC 1025 and HUC 1027 at less than $500 per year overall across the two watersheds. See Section IV.B.5 for more detail on uncertainties in this analysis.

IV.B.3.3.4 Ecosystem Services Provided by Ephemeral Streams

In reviewing the Draft Connectivity Report entitled "Connectivity of Streams and Wetlands to Downstream Waters: A Review of the Scientific Evidence," [142] EPA's SAB found that "[t]he literature

[141] The SWAT watersheds include reservoirs identified in the U.S. Army Corps of Engineers National Inventory of Dams as of October 2010.

[142] U.S. EPA. *Connectivity of Streams and Wetlands to Downstream Waters: A Review and Synthesis of the Scientific Evidence (External Review Draft)*. U.S. Environmental Protection Agency, Washington, DC, EPA/600/R11/098B, September 2013.

review 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," at the same time the SAB stressed that "the EPA should recognize that there is a gradient of connectivity."[143] The SAB recommended 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."[144] As the preamble to the proposed rule describes, the SAB found perennial and intermittent streams have a greater probability to impact downstream waters compared to ephemeral streams.

The agencies recognize that waters within a watershed are connected along such a gradient and that the degree of connectivity among aquatic components varies along a continuum from highly connected to highly isolated (U.S. EPA 2015b). In Missouri, generally more isolated temporary streams such as intermittent and ephemeral streams far outnumber generally more connected perennial streams (see Table IV-30 for detail). Ephemeral streams in Missouri are located above the water table year-round and flows originate primarily from precipitation runoff (U.S. Army Corps of Engineers, 2013).

Although more isolated than perennial streams and adjacent wetlands, ephemeral streams and isolated wetlands support various ecosystem services. For example, in the Lower Missouri River Basin, temporary streams provide habitat to hundreds of species of insects, snails and other invertebrates that, in turn, provide food for amphibians, reptiles, birds, and mammals. Riparian vegetation surrounding temporary streams even when they appear dry often provide the only habitat for many wildlife species, particularly in agricultural landscapes (Dasho and DiStephano, 2011). Vegetation along the banks of temporary streams also filters runoff-related non-point source pollutants, such as nitrogen and phosphorus, and prevents the runoff of such pollutants into downstream reaches.

Species that rely on temporary streams are well adapted to the wet/dry cycle. For example, the eggs of some stoneflies sometimes remain dormant for several years until streams are rewetted. Other organisms have also developed wet/drought life cycles. Missouri salamanders often prefer temporary streams to perennial streams, burrowing into wetted stream bottoms when the stream dries (Dasho and Di Stephano, 2011). Amphibian species in the Lower Missouri River floodplain such as the eastern tiger salamander, smallmouth salamander, Great Plains toad, Woodhouse's toad, and Plains spadefoot toad rely on ephemeral waterbody habitats for reproduction (U.S. Army Corps of Engineers, Kansas City District, 2017). Ephemeral waterbodies also provide habitat to threatened and endangered species. Threatened in Kansas, the Strecker's chorus frog breeds in ephemeral pools where there are no predator fish present (Fort Hays State University, 2018; Kansas Department of Wildlife, Parks and Tourism, n.d.).

IV.B.4 Case Study 3: Rio Grande River Basin

This case study encompasses the length of the Pecos River from southeast of Santa Fe, New Mexico to the Texas-Mexico border where the Pecos River meets the Rio Grande. The Upper and Lower Pecos River watersheds are located within the Southwestern Tablelands ecoregion (CEC, 2011). According to

[143] Letter to Gina McCarthy. October 17, 2014. SAB Review of the Draft EPA Report Connectivity of Streams and Wetlands to Downstream Waters: A Review and Synthesis of the Scientific Evidence. Page 3.

[144] *Id*. at 2 (emphasis added).

CEC (2011), the ecoregion is characterized by dry mid-latitude stepped climate. Mean annual precipitation is 448 mm (17.6 inches). Water is generally scarce with streams mostly ephemeral and intermittent. Land use is mostly semiarid rangeland with ranching and livestock grazing the dominant land uses, and some oil and gas production.

Figure IV-18 and Figure V-14 show maps of the HUC 1306 and HUC 1307 case study watersheds, respectively.

Figure IV-18: Map of HUC 1306 – Upper portion of the Pecos River Basin showing NHD water features and NWI wetlands in relation to state boundaries, populated areas, and major roads.

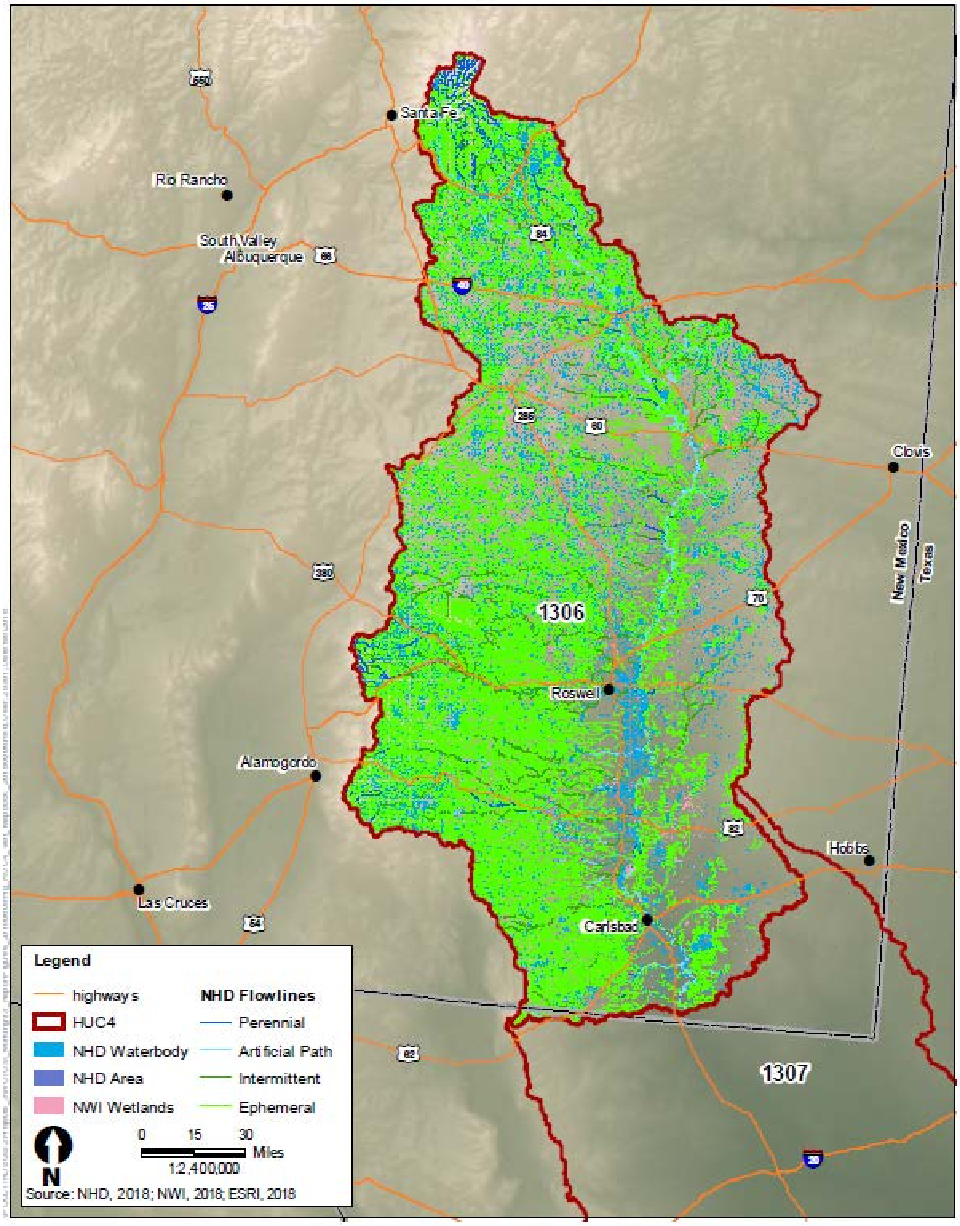
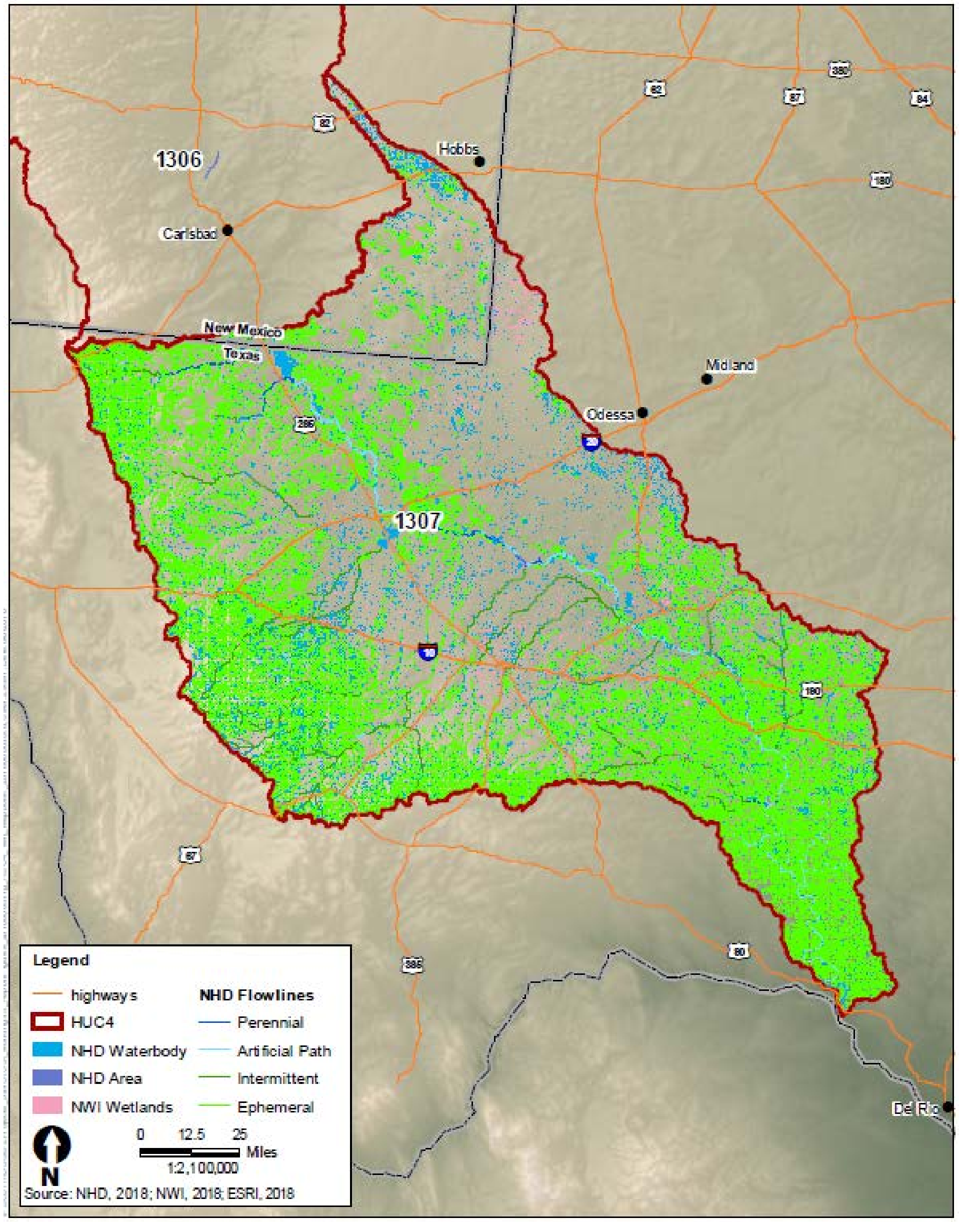


Figure IV-19: Map of HUC 1307 – Lower portion of the Pecos River Basin showing NHD water features and NWI wetlands in relation to state boundaries, populated areas, and major roads.



IV.B.4.1 Aquatic Resources Characteristics

Table IV-50 summarizes the hydrography within the case study watersheds. The data present the number of stream miles in each flow regime category, as well as acres of non-abutting and abutting wetlands according to the agencies' geospatial analysis of the high resolution NHD and the NWI.[145] The high resolution NHD data for this region differentiates stream attributes according to the stream flow regime.

[145] The agencies note that this analysis may not capture those wetlands that are not abutting a jurisdictional water but have a direct hydrologic surface connection to a jurisdictional water in a typical year and would thus meet the proposed definition of "adjacent wetlands."

As presented in the table, 85 to 91 percent of stream miles within the two watersheds are ephemeral, and 34 to 62 percent of all wetland acres are non-abutting wetlands.

Table IV-50: Hydrographic profile of case study watersheds in the Rio Grande River Basin

Feature Type	Feature Attributes	HUC 1306		HUC 1307	
		Miles or acres	Percent of total	Miles or acres	Percent of total
Streams (miles)	**Total**	35,440	100%	25,436	100%
	Perennial	872	2%	126	0%
	Intermittent	2,210	6%	947	4%
	Ephemeral	30,164	85%	23,171	91%
	Artificial path	1,252	4%	744	3%
	Other[1]	943	3%	448	2%
Wetlands (acres)	**Total**	52,652	100%	17,353	100%
	Abutting	34,593	66%	6,666	38%
	Non-abutting	18,058	34%	10,688	62%

[1] Includes canal, ditches, aqueducts, and other feature without attributes.

The values are based on the agencies' geospatial analysis of NHD and NWI data and reflect gaps in NHD stream attributes.

IV.B.4.2 Program Changes

IV.B.4.2.1 Section 402

Table IV-51 presents the number of NPDES permits issued in the Rio Grande River Basin by the most common industry categories. The number of permits issued in the two case study watersheds includes 22 individual permits and 201 general permits. Based on the permits with SIC codes, the most common industries in the Rio Grande River Basin include aggregate mining, motor vehicle parts (used), animal feeding operations, sewage systems, scrap and waste materials, ready-mixed concrete, and industrial domestic wastewater treatment. The agencies estimated that one individual permit and six general permits in the Rio Grande River Basin have at least one discharge near an ephemeral stream. None of the permits affected by the rule have SIC codes available.

Table IV-51: Section 402 individual permits (SIC codes in parentheses) issued in case study watersheds in the Rio Grande River Basin

Industry category	Individual permits[1]			General permits[1]		
	Total number of NPDES permits	Permits with discharge point near ephemeral streams[2]		Total number of NPDES permits[1]	Permits with discharge point near ephemeral streams[2]	
		Number of permits	Percent of all permits		Number of permits	Number of permits
HUC 1306						
Aggregate Mining[3]	0	0	0%	15	0	0%
Motor Vehicle Parts, Used (5015)	0	0	0%	9	0	0%
Animal Feeding Operations[4]	0	0	0%	6	0	0%
Scrap and Waste Materials (5093)	0	0	0%	6	0	0%

Table IV-51: Section 402 individual permits (SIC codes in parentheses) issued in case study watersheds in the Rio Grande River Basin

Industry category	Individual permits[1]			General permits[1]		
	Total number of NPDES permits	Permits with discharge point near ephemeral streams[2]		Total number of NPDES permits[1]	Permits with discharge point near ephemeral streams[2]	
		Number of permits	Percent of all permits		Number of permits	Number of permits
Sewerage Systems (4952)	9	0	0%	1	0	0%
Other Categories[5]	6	0	0%	31	0	0%
Missing SIC Codes	0	0	0%	105	5	5%
Total	**15**	**0**	**0%**	**173**	**5**	**3%**
HUC 1307						
Industrial Domestic Wastewater Treatment[6]	2	0	0%	0	0	0%
Ready-Mixed Concrete (3273)	0	0	0%	3	0	0%
Aggregate Mining[3]	0	0	0%	2	0	0%
Animal Feeding Operations[4]	0	0	0%	2	0	0%
Sewerage Systems (4952)	3	0	0%	0	0	0%
Other Categories[5]	2	0	0%	0	0	0%
Missing SIC Codes	0	1	0%	21	1	5%
Total	**7**	**1**	**14%**	**28**	**1**	**4%**
Total for both watersheds	**22**	**1**	**5%**	**201**	**6**	**3%**

[1] Source: EPA's ICIS-NPDES data, 2017. The facility permits included in the spatial analysis are limited to those for which the ICIS-NPDES database includes latitude/longitude coordinates. For permits with multiple SIC codes, only one SIC code was retained, with manufacturing industries prioritized, to avoid double-counting.

[2] The agencies used the Cowardin classification code in NWI to determine whether 402 discharges are likely to affect ephemeral streams (*i.e.*, the agencies interpreted Cowardin codes R4SBA and R4SBJ as ephemeral; *see* Section IV.B for more detail).

[3] Includes SIC Codes 1422, 1423, 1429, 1442, 1446, 1459, 1474, 1475, 1481, and 1499

[4] Includes SIC Codes 211, 212, 213, 214, 219, 241, 251, 252, 253, 254, 259, 271, 272, and 279

[5] Includes Asphalt Paving Mixtures and Blocks (2951), Construction and Development (1629, 1794, 6552, 1611, 1799, 1521, 1522, and 1623), Trucking Facilities (4212, 4231), and Water Supply (4941)

[6] Includes SIC Codes 6513, 6514, 6515, 7011, 7032, 7033, 8211, 8221, 8641, and 8661

Only one individual NPDES permit potentially affects ephemeral streams (NPDES ID TX0076422), and this permit is subject to WQBELs.[146] Should the definition of "waters of the United States" change, a permittee subject to more stringent limits based on a WQBEL could request revision of its WQBEL to account for potential dilution or attenuation of the pollutant(s) occurring between end-of-pipe and the

[146] Some of the common industry categories in the Rio Grande River Basin have technology-based effluent limitations (TBELs), including aggregate mining, animal feeding operations, and sewage systems (secondary). The industrial domestic wastewater treatment, motor vehicle parts, scrap and waste materials, and ready-mixed concrete industries do not have national TBELs. For facilities in these four industry categories, effluent limitations are either water quality-based (WQBELs) for pollutants with applicable water quality standards, or TBELs based on the best professional judgement of the permit writer (U.S. EPA; 2011).

point where the effluent enters jurisdictional waters. Under this scenario, the permittee may realize cost savings as compared to meeting the previous permit limits.

NPDES permits for discharges near ephemeral waters were issued in one states in HUC 1306 (New Mexico) and two states in HUC 1307 (New Mexico and Texas). Based on potential state responses and analytic scenarios described in Section II.A.3, Texas is expected to protect waters beyond the CWA under Scenarios 2 and 3, while New Mexico is not anticipated to protect waters beyond the CWA under any scenarios.

The number of permits affected by the proposed rule in HUC 1306 remains constant under all scenarios since all permits for discharges near ephemeral streams are issued in New Mexico, which is not expected to regulate waters beyond the CWA under any scenario. The number of permits affected by the rule in HUC 1307 is reduced from 2 to 1 under Scenario 2 (3). As noted above, SIC codes are not available for the affected permits and therefore it is unknown whether these permits are based on TBELs or WQBELs and as a result the effects of the proposed rule on potential cost savings and changes in pollutant discharges are highly uncertain.

IV.B.4.2.2 Section 404

Table IV-52 summarizes section 404 permits issued in 2011-2015 within the Rio Grande River Basin that required mitigation on RPWWN-type wetlands or ephemeral streams. As presented in the table, the agencies' geospatial analysis shows one permit in HUC 1306 issued by the Corps with impacts that required mitigation on waters affected by the proposed "waters of the United States" definitional changes. The annual average permanent impacts resulting from 404 permits in HUC 1306 is 0.004 acres. Permit impacts occurred in New Mexico, a state that is only expected to implement state protections more stringent than CWA requirements under Scenario 3. From 2011-2015, no permits were issued in HUC 1307 that required mitigation on waters affected by the proposed rule.

Table IV-52: Section 404 permits issued in case study watersheds in the Rio Grande River Basin (2011-2015)

State	# Permitted Projects	# Permits with mitigation requirements affected by proposed changes to the definition of "waters of the United States" [1, 2]	Permanent impacts[1]		Temporary impacts[1]	
			Acres	Length Feet	Acres	Length Feet
HUC 1306						
NM	168	1	0.018	0.0	0.000	0.0
Total	**168**	**1**	**0.018**	**0**	**0.000**	**0**
Avg. per year	**34**	**0**	**0.004**	**0**	**0.000**	**0**

Table IV-52: Section 404 permits issued in case study watersheds in the Rio Grande River Basin (2011-2015)

State	# Permitted Projects	# Permits with mitigation requirements affected by proposed changes to the definition of "waters of the United States" [1, 2]	Permanent impacts[1]		Temporary impacts[1]	
			Acres	Length Feet	Acres	Length Feet
HUC 1307						
NM	39	0	0.000	0	0.000	0
TX	6	0	0.000	0	0.000	0
Total	**45**	**0**	**0.000**	**0**	**0.000**	**0**
Avg. per year	**9**	**0**	**0.000**	**0**	**0.000**	**0**

[1] Values based on permits with mitigation requirements on waterways determined to be RPWWN-type wetlands or ephemeral streams. Excludes permits issued for mitigation or restoration activities because the main purpose of these activities is to restore or enhance ecosystem services provided by water resources as opposed to dredge and fill activities that lead to permanent or temporary losses of ecosystem services. No 404 permits in HUC 1307 meet these requirements.

[2] Number of permits includes permits with mitigation requirements that potentially affect at least one water no longer jurisdictional under the CWA under the proposed rule.

IV.B.4.2.2.1 Cost Savings

To estimate permit cost savings, the agencies determined the average number of individual and general 404 permits issued each year, based on permits issued from 2011 to 2015, that affect only waters no longer protected as jurisdictional under the proposed rule. The agencies then multiplied the annual average number of reduced individual and general permits by lower bound USACE estimates of permit costs (U.S. EPA and Department of the Army, 2015). The agencies used the lower bound estimate to avoid double-counting compensatory mitigation costs.

Table IV-53 shows the average number of reduced individual and general permits, USACE unit application costs, and the estimated reduction in permit applications costs for individual and general permits in the Rio Grande River Basin under each scenario. The USACE unit costs estimates ($14,700 per individual permit; $4,400 per general permit) are adjusted from 1999$ to 2017$ using the CPI-U.

Permits affecting only RPWWN-type wetlands or ephemeral streams were issued in one state in HUC 1306 (New Mexico) and two states in HUC 1307 (New Mexico and Texas). Reduced permit costs remain constant at $0.11 million under Scenarios 0, 1, and 2. Under Scenario 3, permit cost savings drop to $0 since both states are expected to protect waters beyond the CWA.

Table IV-53: Average annual reduction in 404 permit application costs in the Rio Grande River Basin

Permit Type	Unit Costs from Corps NWP Analysis (2017$)	Scenario 0 & 1[1,2]		Scenario 2[1]		Scenario 3[1]	
		Annual Average Reduction in Permits with the Proposed Rule	Estimated Reduction in Permits Costs (millions 2017$)	Annual Average Reduction in Permits with the Proposed Rule	Estimated Reduction in Permits Costs (millions 2017$)	Annual Average Reduction in Permits with the Proposed Rule	Estimated Reduction in Permits Costs (millions 2017$)
HUC 1306							
IP	$14,700	0.0	$0.00	0.0	$0.00	0.0	$0.00
GP	$4,400	17.0	$0.07	17.0	$0.07	0.0	$0.00
Total		**17.0**	**$0.07**	**17.0**	**$0.07**	**0.0**	**$0.00**
HUC 1307							
IP	$14,700	0.0	$0.00	0.0	$0.00	0.0	$0.00
GP	$4,400	8.0	$0.04	8.0	$0.04	0.0	$0.00
Total		**8.0**	**$0.04**	**8.0**	**$0.04**	**0.0**	**$0.00**
Both Watersheds							
IP		0.0	$0.00	0.0	$0.00	0.0	$0.00
GP		25.0	$0.11	25.0	$0.11	0.0	$0.00
Total		**25.0**	**$0.11**	**25.0**	**$0.11**	**0.0**	**$0.00**

[1] Includes permits estimated to only affect waters no longer jurisdictional under the CWA under the proposed rule.

[2] Scenarios 0 and 1 are combined because all values are identical.

Because the average annual reduction in mitigation requirements is small in the Rio Grande River Basin (0.004 acres in HUC 1306; no reductions in HUC 1307), the annual cost savings from reduced mitigation requirements is negligible. To estimate annual cost savings from reduced mitigation requirements in HUC 1306, the agencies multiplied the expected reduction in annual mitigation requirements (0.004 acres) by low ($51,850) and high ($72,490) per acre estimates for New Mexico. Annual mitigation cost savings under Scenarios 0, 1, and 2 are significantly less than $0.01 million ($187 to $261). Mitigation cost savings drop to $0 under Scenario 3 since New Mexico, the state where all mitigation requirement reductions occur in the Rio Grande River Basin, is expected to protect waters beyond CWA requirements. Because mitigation cost savings are so small, the permit cost savings values presented in Table IV-53 represent total cost savings.

IV.B.4.2.2.2 Forgone Benefits

The agencies did not estimate the forgone benefit value of lost mitigation acres for the Rio Grande River Basin case study because none of the existing wetland valuation studies were conducted in the same geographic area or provided a good match for the affected resource characteristics. The meta-analysis of wetland valuation studies developed by Moeltner et al. (2018) was also based on a set of studies conducted in different geographic areas that valued the type of wetlands not typically present in the case study watershed (*e.g.*, fresh water marshes or forested seasonally or temporary flooded wetlands). Given that the estimated reduction in mitigation requirements in the case study area is very small (annual average of 0.004 acres), the expected value of forgone benefits is likely to be small as well.

IV.B.4.2.3 Section 311

The watershed encompasses the Edwards Plateau's inland oil production area around Odessa and Midland, Texas. There were approximately 49,800 active oil wells in the two watersheds in 2018, based on data the agencies obtained from the Texas Railroad Commission and New Mexico's Oil Conservation Division. Assuming that a facility corresponds to a tank battery with an average of four producing wells per tank battery,[147] this translates into an estimated 12,400 facilities that may be subject to SPCC requirements in the baseline if they have a reasonable expectation of a discharge to "waters of the United States." Additionally, the 2012 Census of Agriculture (USDA, 2014) shows approximately 20 million acres of land in farm production and 4,000 farm establishments in the two watersheds. Based on average annual fuel expenditures by size class in the Census, the agencies estimate that approximately 160 farms may be subject to SPCC requirements in the baseline if they also have a reasonable expectation of a discharge to "waters of the United States." The proposed rule could affect an unknown share of these facilities in cases where they no longer have a reasonable expectation of a discharge to a "water of the United States."

The high-resolution NHD data in these two watersheds include attributes that distinguish ephemeral streams from those with perennial or intermittent flow regimes. In addition, the agencies obtained data on the location of wells that may be associated with onshore oil production regulated under the SPCC program. The combination of these two datasets enabled the agencies to assess the potential impacts of the proposed rule on an important subset of SPCC-regulated facilities in this region and nationally. The agencies' analysis inventoried the NHD waters and NWI wetlands located within a half-mile distance of each well. The use of a half-mile radius was informed by the planning distance used in the FRP rule to identify resources that could be affected by an oil discharge; it is not a hard rule for determining SPCC applicability.

There are approximately 49,800 oil production wells in the upper and lower Pecos River watersheds (HUC 1306 and 1307). Of these wells, approximately 24,800 wells have water bodies, including wetlands, located within a half-mile of the well. For over half of those wells (13,800 wells), the only streams within the half-mile search radius are ephemeral (*i.e.*, there are no perennial or intermittent streams). Based on this analysis, and assuming that the geographical distribution of SPCC facilities is similar to that of the wells, the agencies estimate that 3,460 oil production facilities[148] within the watershed may be farther than a half-mile from any perennial or intermittent streams, and therefore may be less likely to have a reasonable potential to discharge to waters of the United States under the proposed rule. Facility owners that determine that their facility does not have a reasonable potential of a discharge may forgo preparing or maintaining an SPCC Plan in accordance with 40 CFR 112. As presented in Section IV.A.3.2 (*see* Table IV-6), the annualized cost of maintaining an SPCC Plan for a production

[147] The 4:1 ratio of wells per tank battery follows the approach EPA used for the Regulatory Impact Analysis for the 2008 Amendments to the Oil Pollution Prevention Regulations (40 CFR PART 112) (U.S. EPA, 2007)

[148] The agencies estimated the number of facilities by assuming an average of 4 wells per facility (13,846 wells / 4 wells per facility = 3,461 facilities).

facility ranges between $6,200 and $27,500. For a new facility, the annualized cost ranges between $40,900 and $523,700. The agencies did not have sufficient data to quantify the potential increase in oil spill risk from any change in the implementation of SPCC measures.

Table IV-54: Proximity of waters to active oil production wells in the Upper and Lower Pecos watersheds

HUC4	State	Number of active oil wells	Number of wells based on proximity to waters, including wetlands, (within a half-mile radius)	
			Any stream or wetland	Ephemeral stream only
1306	NM	13,565	6,104	4,116
	TX	0	0	0
	Total	13,565	6,104	4,116
	% of total	100%	45%	30%
1307	NM	7,115	3,137	1,611
	TX	29,083	15,551	8,119
	Total	36,198	18,688	9,730
	% of total	100%	52%	27%
Total		**49,763**	**24,792**	**13,846**
% of Total		**100%**	**50%**	**28%**

Based on geospatial analysis of oil well locations obtained from Texas Railroad Commission and New Mexico Oil Conservation Commission, relative to NHD and NWI features.

The two watersheds also count a total of 16 FRP facilities, four in HUC 1306 and 12 in HUC 1307. Two of these facilities have streams categorized as perennial or intermittent in the high resolution NHD within a half-mile of the facility. The other 14 facilities have only ephemeral streams or wetlands within a half-mile of the facility. Therefore, to the extent that the proposed rule makes ephemeral streams and certain non-abutting wetlands non-jurisdictional and these are the only resources within the FRP planning distance, the agencies anticipate that these facilities could potentially seek reconsideration of FRP applicability. If so, then there may be cost savings for these facilities from not having to maintain an FRP. As presented in Section IV.A.3.2, the costs of maintaining an FRP ranges from approximately $32,300 to $37,200 (*see* Table IV-7), The agencies did not have sufficient data to quantify the potential increase in oil spill risk, but analysis of the 14 facilities shows that they all have at least one million gallons of oil storage capacity and for at least 9 facilities, an oil discharge could impact sensitive environments, according to the harm criteria provided in EPA's FRP database. Sensitive environments are Plan-specific and include transportation routes, flora and fauna, and recreational areas.

EPA FOSCs did not respond to any oil spill incidents in the Upper and Lower Pecos watersheds between 2001 and 2017.

IV.B.4.3 Potential Environmental Impacts and Costs

IV.B.4.3.1 Water Quality

As described in Section IV.B.4.2, the agencies found the projected impacts of the proposed rule on the 404 and 402 programs to be small in the upper and lower Pecos River watersheds. Given this finding of minimal changes and the scale and scope of the SWAT model, the agencies did not model water quality impacts downstream from affected wetlands and streams. While the agencies did not quantify the impacts of these changes, in general, the agencies anticipate that forgone wetland mitigation in the Rio Grande watersheds could increase pollutant loads downstream from the affected areas. These changes may in turn increase sedimentation in reservoirs, increase the turbidity of source waters, and increase the potential for and magnitude of floods.

IV.B.4.3.2 Drinking Water

According to the EPA's SDWIS database, the Upper Pecos River watershed (HUC 1306) includes 30 public drinking water facilities, including four intakes, two reservoirs, and 23 springs. There are no public drinking water facilities (intakes, springs, or others) in the Lower Pecos watershed. As described in the previous section, higher sediment loads due to reduced wetlands could increase the turbidity of source water, but these effects are expected to be small given predicted 404 program impacts.

Table IV-55: Public drinking water intakes in the Upper and Lower Pecos watersheds

HUC4	Number of intakes	Number of people served	Potential impacts from proposed rule
1306	4	37,120	Not quantified
1307	0	0	Not quantified
Total	4	37,120	Not quantified

Source: EPA analysis of SDWIS (2017) data.

IV.B.4.3.3 Dredging for Water Storage and Navigation

The agencies did not quantify the impacts of the proposed rule on reservoir sedimentation. As described above, higher sediment loads due to reduced wetlands could increase sedimentation in downstream reservoirs, but these effects are expected to be small given predicted 404 program impacts.

IV.B.4.3.4 Ecosystem Services Provided Ephemeral Streams

In reviewing the Draft Connectivity Report entitled "Connectivity of Streams and Wetlands to Downstream Waters: A Review of the Scientific Evidence,"[149] EPA's SAB found that "[t]he literature review 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," at the same time the SAB stressed that "the EPA should recognize that there is a gradient of connectivity."[150] The SAB recommended 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."[151] As the preamble to the proposed rule describes, the SAB found perennial and intermittent streams have a greater probability to impact downstream waters compared to ephemeral streams.

The agencies recognize that waters within a watershed are connected along such a gradient and that the degree of connectivity among aquatic components varies along a continuum from highly connected to highly isolated (U.S. EPA 2015b). In the semi-arid Upper and Lower Pecos watersheds (HUC 1306 and 1307), the majority of streams are ephemeral, falling toward the more isolated end of the connectivity gradient (see Table IV-50). Although these streams have different characteristics from generally more highly connected perennial streams that are in wetter environments, they perform similar hydrological and ecological functions, including moving water, sediments, and nutrients, providing connectivity within the watershed and habitat to wildlife (Levick et al. 2008).

Ephemeral streams in arid and semi-arid areas support a variety of ecosystem services. For example, ephemeral streams play an important role in replenishing groundwater in the arid West, which people in the study area heavily depend on for irrigation and drinking water supply (Levick, et al., 2008). One of the major sources of regional groundwater in the Rio Grande, for instance, is seepage from the Rio Grande, the Rio Puerco, and from the ephemeral Abo and Tijera Arroyos (U.S. EPA, 2015b).

Even during dry periods, water may always be present below the ground in ephemeral streams and accessible to a rich assemblage of plant and animal life. In arid areas ephemeral stream channels are easily recognizable by their dense corridor of vegetation that supports the disproportionately high biological diversity of desert environments relative to their total area (Warren and Anderson, 1985 as cited in Levick et al. 2008). Ephemeral stream channels (washes) with shallow ground-water zones are typically lined with trees including Fremont cottonwood, Arizona sycamore, Arizona ash, acacia, blue palo verde, or velvet mesquite and shrubs such as wolfberry or brickellbush (Hardy et al., 2004; Levick et al. 2008). Federally listed threatened plants such as Pecos sunflower also inhabit stream courses dependent on shallow groundwater (U.S. FWS 2005).

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[149] U.S. EPA. *Connectivity of Streams and Wetlands to Downstream Waters: A Review and Synthesis of the Scientific Evidence (External Review Draft)*. U.S. Environmental Protection Agency, Washington, DC, EPA/600/R11/098B, September 2013.

[150] Letter to Gina McCarthy. October 17, 2014. SAB Review of the Draft EPA Report Connectivity of Streams and Wetlands to Downstream Waters: A Review and Synthesis of the Scientific Evidence. Page 3.

[151] *Id*. at 2 (emphasis added).

Because ephemeral stream channels have a higher moisture content and more abundant vegetation than the surrounding areas, they support the greatest concentrations of wildlife in arid regions. Wildlife utilizes ephemeral stream channels with continuous vegetation for food sources, predator protection, breeding and nesting sites, shade, and movement corridors. Some species that depend on the microclimates provided by ephemeral streams cannot survive the harsh desert environment, and therefore cannot move to other suitable habitats if their homes are harmed (Levick, et al., 2008).

IV.B.5 Limitations and Uncertainty of Case Study Analyses

Several methodological and data limitations affect the case study analyses or contribute to uncertainty. These limitations are in addition to the limitations inherent to the data sources previously discussed in Section II.C. They include:

- **Case study locations may not be indicative of nationwide impacts**. Case study locations do not include watersheds predicted to see the largest changes in wetland areas or ephemeral streams and may therefore not be representative of impacts of the proposed rule across the United States. Factors considered by the agencies in selecting among case study candidates prioritized locations for which primary wetland valuation studies were available and the states were less likely to continue to regulate newly non-jurisdictional waters. While these locations show that the proposed rule will have relatively small impacts, the 404 program data used in the later national analysis identify other watersheds where a significantly greater amount of mitigation occurred in 2011-2015 to address impacts of permitted activities. Therefore, cost savings, environmental impacts, and forgone benefits in these watersheds may be larger (or smaller) than estimated for the three case studies presented in this section. The agencies welcome comment on whether the three case studies are sufficient to illustrate the impacts of the proposed rule.

- **Available data provide only an incomplete inventory of existing projects and permits affecting ephemeral streams and other waters affected by the proposed rule**. The high resolution NHD data do not consistently differentiate stream attributes according to the stream flow regime, limiting the agencies' ability to identify activities or dischargers affecting these waters in the baseline. Because of this limitation, EPA relied primarily on information provided in program databases and/or NWI wetland attributes when determining the type of affected waters. The information provided in these alternative data sources was not always sufficient to categorize the flow regime; where this was the case, the agencies assumed that these waters are not ephemeral. This may have omitted relevant activities or permits from the analysis, which would understate the impacts of the proposed rule.

- **The analysis of the 402 program uses NWI data to estimate the flow regime of receiving waters**. To estimate which permitted discharges might be affected by the proposed rule, the agencies relied on 402 permit locational information and NWI data. The agencies used the Cowardin classification code assigned to the NWI resource closest to the coordinates of permitted outfalls to approximate the flow regime of the receiving waters. If the Cowardin classification code of the receiving water was either R4SBA (Riverine, Intermittent, Streambed, Temporarily Flooded) or R4SBJ (Riverine, Intermittent, Streambed, Intermittently Flooded), the permitted discharge was assumed to likely be to an ephemeral water. The agencies used NWI instead of NHD to assess flow regime of receiving waters because the NHD dataset does not consistently distinguish between intermittent and ephemeral streams nationwide. The use of NWI data may result in an underestimate of the number of 402 permits potentially discharging to ephemeral waters, as the NWI does not map all ephemeral streams and does not include a Water Regime Modifier for all streams, which was used to determine which streams mapped in the NWI were likely ephemeral. The agencies solicit comment regarding the assumptions and validity of the use of Cowardin Classification System codes R4SBA and R4SBJ to identify ephemeral features for use in the Case Study section 311 and section 402 analyses. More specifically, given the "Temporarily Flooded" category includes streams where surface water may be present for "a few weeks," and the "Temporarily Flooded" definition implies there may be times when the water table is above the ground surface, the agencies seek comment whether waters identified as "Temporarily Flooded" would more appropriately be classified as intermittent rather than ephemeral for purposes of the agencies' analyses. Additionally, the agencies seek comment whether the "Temporarily Flooded" category covers both intermittent and ephemeral streambeds and cannot be used to distinguish between the two for purposes of the agencies' analyses. Finally, given the Corps ORM2 database does not parse out "Riverine Intermittent" (R4) codes into ephemeral and intermittent features, but instead uses an entirely new "Riverine, Ephemeral" category (R6) to identify ephemeral aquatic resources, the agencies solicit comment whether it is appropriate to bifurcate the "Riverine Intermittent" subsystem into ephemeral and intermittent features for purposes of the agencies' analyses.

- **Projects permitted in 2011-2015 may not be representative of future projects**. For the case study analysis, the agencies assumed that projects permitted under the 404 program during the period of 2011-2015 are representative of projects that may be permitted over the next 20 years in terms of the type and location of the projects, extent and character of the affected resources, and mitigation requirements. In fact, future development patterns may follow different distributions and affect locations that the agencies did not consider for this analysis. The agencies welcome comments on whether it is reasonable to use past projects as indication of future development and activities.

- **The analysis focuses on compensatory mitigation as the main change under the 404 program.** The 404 permitting process promotes preventing impacts to waters through project location and design and only where those actions are not sufficient is mitigation of the unavoidable impacts necessary. For waters that are no longer jurisdictional, the incentive to prevent or limit impacts would no longer be present. As such, impacts to existing wetlands and streams may be larger than indicated by the impacts for permitted projects, thereby understating the impacts of the proposed rule. The agencies welcome data on the likely response of developers to reduced incentives to limit impacts.

- **The analysis of the 404 program considers forgone mitigation of permanent wetland impacts only**. The analysis of avoided costs, forgone benefits, and SWAT model scenarios incorporate the impacts of forgone mitigation for permanent impacts to wetlands and omit additional mitigation that may also be needed to compensate for temporary impacts. To the extent that mitigation of temporary impacts results in the permanent protection of wetlands, the analytic scenarios may understate the impacts of the proposed rule on cost savings, forgone benefits, and water quality. Appendix E provides results of a sensitivity analysis that includes forgone mitigation of temporary impacts, among other assumptions.

- **The analysis omits impacts on isolated (non-abutting) wetlands**. Some non-abutting wetlands may have previously been found to be jurisdictional following a significant nexus determination (*e.g.*, as adjacent wetlands) and thus mitigation actions were required if these wetlands were affected by 404 permitted activities. Categorically excluding these wetlands from jurisdictional waters may negatively affect habitats for a variety of species, including amphibians and water fowl, that rely on persistent waterbodies that are not directly located on the stream network. Appendix E provides results of a sensitivity analysis that includes forgone mitigation of impacts to non-abutting wetlands, among other assumptions.

- **The analysis of the 404 program relies on the ORM2 data on permanent impacts and the mitigation ratios to estimate changes in compensatory mitigation resulting from the proposed rule**. The agencies assumed that 404 permitted projects primarily affect Category III wetlands and streams. Category III water resources are defined as not rare or unique and usually plentiful in the watershed. The recommended compensatory ratios range from less than 1:1 to 1.5:1. If pristine or otherwise unique resources are affected the mitigation ratios could range from 2:1 for Category II wetlands to 3:1 for Category I wetlands. The estimated costs and benefits are likely to be understated if Category I and II wetlands are affected. In some cases, a mitigation ratio of less than 1:1 may be required; in such cases cost savings and forgone benefits are likely to be overstated. Although the agencies validated their assumptions based on statistical analysis of ORM2 data on 4,000 projects where the relationship between impacted acres and required mitigation acres could be isolated, this analysis excluded any projects where impacts or mitigation included linear feet values and any projects where some or all of the mitigation used credits or in-lieu fees. To the extent that excluded projects used significantly different mitigation ratios, the estimated costs savings and forgone benefits could be under- or overstated.

- **The 404 permit cost savings analysis relies on Corps' estimates of permit application costs.** The Corps estimated permit application costs based on a "typical" permit. The permit application cost savings analysis for the proposed rule only includes permits solely affecting waters that change jurisdictional status under the proposed rule (*e.g.*, ephemeral streams and RPWWN-type wetlands). Since the impacts of these permits are less than "typical" on average, the agencies used the lower bound estimate of the Corps' permit application cost range. The use of the lower bound estimate may underestimate costs for larger projects or for permits in high-cost regions. Any permits affecting both waters likely to remain jurisdictional and waters likely to no longer be jurisdictional under the proposed rule are not considered in the cost savings analysis. Cost savings may be greater than estimated by the agencies in cases where eliminating some waters from permitting requirements streamlines the process and reduces overall permit costs.

- **The analysis of forgone benefits associated with reduced mitigation requirements for ephemeral streams, typically expressed in linear feet, focuses on the total ecological impacts associated with reduced riparian areas**. As noted above, requirements for the riparian buffer width vary from state to state. The agencies assumed that a 25-foot buffer zone on each stream side (50 feet total) is required around ephemeral streams in the main analysis.[152] Because some states don't specify minimum requirements for a buffer zone, while others specify a minimum requirement of a 50-foot buffer, the agencies' estimate of the lost riparian area may be overstated for some locations and understated for others. Appendix E provides results of a sensitivity analysis that uses a 100 feet buffer (50 feet on either side), among other assumptions.

- **The value of forgone benefits from reduced riparian areas around ephemeral streams could be lower or higher compared to the WTP to avoid wetland losses, depending on the role of ephemeral streams and their riparian areas in a given watershed**. Valuation of reduced mitigation requirements for wetlands and riparian areas is based on benefit transfer from a study by Bloomquist and Whitehead (1998) that valued freshwater wetlands (including riparian). Given that riparian areas adjacent to ephemeral streams perform many of the characteristic ecological functions performed by true riparian areas adjacent to perennial and intermittent streams, but may not provide a full spectrum of ecological functions (Zaimes et al. 2007), the estimated forgone benefits for the reduction in riparian areas around ephemeral streams may be overstated.

- **Transfer error may occur when benefit estimates from a study site are adopted to forecast the benefits of a policy site.** Rosenberger and Stanley (2006) define transfer error as the difference between the transferred and actual, generally unknown, value. The wetland valuation study used in benefits transfer (*i.e.*, Bloomquist and Whitehead, 1998) focused on wetlands within the Ohio River Basin. Thus, it provides nearly a perfect match to the resource characteristics considered in the analysis of forgone benefits. However, it was conducted 20 years ago and public preferences for wetland protection may change over time. It provides a good, but not a perfect match for the Lower Missouri River case study. Although the wetland types valued in the original study are the same as in the Lower Missouri River case study area, public preferences for wetland preservation may differ across states and communities, for example, due to the difference in the baseline wetland area, the importance of wetland preservation at the watershed level, and other factors. Therefore, the estimated WTP values may under- or overstate the value of foregone benefits in the case study areas.

- **Potential hypothetical bias may be present in the source study used in benefits transfer**. Following standard benefit transfer approaches, this analysis proceeds under the assumption that the source study provides a valid, unbiased estimate of the welfare measure under consideration (cf. Moeltner et al. 2007; Rosenberger and Phipps 2007).

- **The effect of distance between the affected households and the affected wetlands was not explicitly included in the analysis.** Following the Bloomquist and Whitehead study (1998), the agencies assumed that all households in the state where wetland losses occur and households in the counties adjacent to the affected resources that reside in the neighboring state hold the same average WTP value for preventing wetland losses. The agencies would expect values for water quality improvements to diminish with distance (all else equal) between the home and affected water resources. This difference is implicitly captured in the average WTP reported in the original

[152] A 50 feet buffer zone on each stream side (100 feet total) was used in the sensitivity analysis.

study. If the distribution of households by distance is different at the policy site, the estimated value of forgone benefits could be biased either upward or downward.

- **Water quality modeling focuses on environmental impacts within the immediate watershed**. The scope of the water quality models covers the HUC4 watersheds where wetland changes occur. However, the impacts of land use changes and forgone ecosystem services are not limited to these watersheds. Changes in flows and nutrients and sediments fluxes may also affect downstream waters, including in states that continue broad protections of non-jurisdictional waters. As such, the analysis understates the potential impacts of the proposed rule.

- **Water quality modeling scenarios assume wetland impacts distributed across subbasins within a watershed.** As described in Section IV.B.2.3.1, the agencies distributed changes in 404 program impacts due to the policy among all subbasins within the SWAT watershed that had both existing wetlands and developed areas. This approach of distributing total watershed changes may understate localized hydrological and water quality impacts in cases where projects are concentrated in a few subbasins within a watershed. For example, in watershed HUC 0509, the ORM2 data show mitigated wetland impacts in 33 subbasins over 5 years, whereas the agencies distributed impacts over 300 subbasins over 20 years. For watershed HUC 0510, the ORM2 data show impacts in 11 subbasins, whereas the agencies distributed the impacts over 84 subbasins for modeling purposes. The agencies request comments on alternative assumptions and ways to distribute watershed-level changes that could better represent projected development over the coming decades.

- **The water quality models use a simplified representation of wetland functions in each watershed.** As described in Section IV.B.2.3.1, the SWAT models represent wetlands through both land cover (HRUs) and as distinct hydrologic features within the subbasins. The SWAT models represent two main categories of wetlands in each subbasin: abutting wetlands that are hydrologically connected to the main reach of a subbasin, and non-abutting wetlands without a direct connection. The analysis used two HRU groups to represent each of the wetland land cover types, and two SWAT hydrologic features, ponds and wetlands, to represent the hydrology of the two wetland groups. SWAT pond functions were configured to represent non-abutting wetlands hydrology by specifying the aggregated subbasin area and depth of non-abutting wetlands according to the NWI data. In subbasins that include actual ponds, the wetland area was added to the ponds area since only one pond per subbasin is currently supported in SWAT. Abutting wetlands hydrology was represented by the wetlands function of SWAT. By configuring the model this way, the agencies can distinguish the two wetland categories in modeling the impacts, but the modeling approach otherwise models the wetlands in a spatially aggregated manner that does not account for the exact location of the wetlands within each HUC12 subbasins. The agencies would appreciate comments on this approach for modeling non-abutting and abutting wetlands with SWAT.

- **The analysis used the distance between certain oil storage or production facilities and waters as an approximate indicator of reasonable potential for a discharge for the 311 program**. There is significant uncertainty in the universe of oil storage or production facilities that could be affected by a change in CWA jurisdictional scope. The SPCC rule does not require facility owners/operators to identify themselves to the EPA. While the agencies were able to use location data for equipment associated with a small subset of the SPCC-regulated universe (oil production wells) and FRP facilities, these data provide only partial insight into the reasonable potential for a discharge of oil to "waters of the United States" that determines SPCC and FRP applicability.

Appendix E presents the results of a sensitivity analysis that evaluate the effects of different assumptions regarding the scope of 404 program impacts:

- Non-abutting wetlands: The sensitivity analysis includes impacts to wetlands determined to be non-abutting based on the agencies' analysis of high-resolution NHD and NWI data, whereas the primary analysis described in this section assumes that these wetlands have no change in jurisdictional status.
- Scope of impacts: The sensitivity analysis includes both temporary and permanent impacts, as compared to permanent impacts only in the analysis described in this section.
- Width of assumed stream riparian buffer for linear impacts: The sensitivity analysis assumes a width of 100 feet, as compared to 50 feet for the primary analysis described in this section.

IV.B.6 Discussion of Case Study Analysis Findings

Table IV-56 to Table IV-58 summarize the findings of the Stage 2 analysis across the three case study areas. In general, annual avoided costs exceed annualized forgone benefits, but as discussed in Section IV.B.5 and noted in the summary tables, limitations of the data curtailed the agencies' ability to quantify or monetize some of the environmental effects and forgone benefits of the proposed rule.

Table IV-56: Scenario 0 — Potential impacts, cost savings, and forgone benefits in the Case Study areas excluding the impact from states that may continue their baseline dredged/fill and surface water permitting practices

	Annual Avoided Costs (2017$ millions)			Annualized Forgone Benefits (2017$ millions)[1]	
	Low	High		Low	High
Ohio River Basin					
CWA 402	$0.0	$0.0		$0.0	$0.0
CWA 404 Permit Application	$0.41	$0.41		N/A	N/A
CWA 404 Mitigation – Wetlands & Ephemeral Streams	$8.18	$30.18		$0.68[2]	$4.52
CWA 404 Mitigation – Water Quality	N/A	N/A		*not monetized*	*not monetized*
CWA 404 – Reservoir Dredging	N/A	N/A		< $0.1[3]	< $0.1
CWA 311 – FRP Requirements	*not monetized*	*not monetized*		*not monetized*	*not monetized*
CWA 311 – SPCC Requirements	*not monetized*	*not monetized*		*not monetized*	*not monetized*
SUBTOTAL	**$8.59**	**$30.59**		**$0.68**	**$4.52**
Lower Missouri River Basin					
CWA 402	*not monetized*	*not monetized*		*not monetized*	*not monetized*
CWA 404 Permit Application	$0.26	$0.26		N/A	N/A
CWA 404 Mitigation – Wetlands & Ephemeral Streams	$1.36	$5.34		$0.12[4]	$0.81
CWA 404 Mitigation – Water Quality	N/A	N/A		*not monetized*	*not monetized*

Table IV-56: Scenario 0 — Potential impacts, cost savings, and forgone benefits in the Case Study areas excluding the impact from states that may continue their baseline dredged/fill and surface water permitting practices

	Annual Avoided Costs (2017$ millions)			Annualized Forgone Benefits (2017$ millions)[1]	
	Low	High		Low	High
CWA 404 Mitigation – Reservoir Dredging	N/A	N/A		negligible[5]	negligible
CWA 311 – FRP Requirements	*not monetized*	*not monetized*		*not monetized*	*not monetized*
CWA 311 – SPCC Requirements	*not monetized*	*not monetized*		*not monetized*	*not monetized*
SUBTOTAL	**$1.62**	**$5.60**		$0.12	$0.81
Rio Grande River Basin					
CWA 402	*not monetized*	*not monetized*		*not monetized*	*not monetized*
CWA 404 Permit Application	$0.11	$0.11		N/A	N/A
CWA 404 Mitigation – Wetlands & Ephemeral Streams	negligible[6]	negligible		*not monetized*	*not monetized*
CWA 404 Mitigation -Water Quality	N/A	N/A		*not quantified*	*not quantified*
CWA 404 Mitigation-Reservoir Dredging	N/A	N/A		*not quantified*	*not quantified*
CWA 311 – FRP Requirements	*not monetized*	*not monetized*		*not monetized*	*not monetized*
CWA 311 – SPCC Requirements	*not monetized*	*not monetized*		*not monetized*	*not monetized*
SUBTOTAL	**$0.11**	**$0.11**		**$0.00**	**$0.00**
Total 3 Case Studies					
TOTAL (Monetized Categories)	**$10.32**	**$36.30**		**$0.80**	**$5.33**

[1]Annualized forgone benefits are estimated at a 3% discount rate.

[2] The estimated annualized forgone benefits from reduced mitigation requirements range from a low of $0.50 to a high $3.34 million at a 7% discount rate.

[3] Estimated increase in annualized dredging costs is $2.0 thousands with a three percent discount rate, or $1.6 thousands with a seven percent discount rate.

[4]Annualized forgone benefits from reduced mitigation requirements in the Lower Missouri River Basin range from a low of $0.09 million to a high of $0.60 million at a 7% discount rate.

[5] The estimated annual change in reservoir dredging costs range from -$465 to -$512.

[6] The estimated annual mitigation cost savings range from range of $187 to $261.

Table IV-57: Scenario 1 — Potential impacts, cost savings, and forgone benefits in the Case Study areas excluding the impact from states that may continue their baseline dredged/fill and surface water permitting practices

	Annual Avoided Costs (2017$ millions)			Annual Forgone Benefits (2017$ millions)	
	Low	High		Low	High
Ohio River Basin					
CWA 402	$0.0	$0.0		$0.0	$0.0
CWA 404 Permit Application	$0.32	$0.32			
CWA 404 Mitigation – Wetlands & Ephemeral Streams	$6.42	$15.93		$0.37[2]	$2.44
CWA 404 Mitigation -Water Quality	N/A	N/A		*not quantified*	*not quantified*
CWA 404 Reservoir Dredging	N/A	N/A		*not quantified*	*not quantified*
CWA 311 – FRP Requirements	*not monetized*	*not monetized*		*not monetized*	*not monetized*

Table IV-57: Scenario 1 — Potential impacts, cost savings, and forgone benefits in the Case Study areas excluding the impact from states that may continue their baseline dredged/fill and surface water permitting practices

	Annual Avoided Costs (2017$ millions)			Annual Forgone Benefits (2017$ millions)	
	Low	High		Low	High
CWA 311 – SPCC Requirements	*not monetized*	*not monetized*		*not monetized*	*not monetized*
SUBTOTAL	**$6.74**	**$16.26**		**$0.37**	**$2.44**
Lower Missouri River Basin					
CWA 402	*not monetized*	*not monetized*		*not monetized*	*not monetized*
CWA 404 Permit Application	$0.26	$0.26		N/A	N/A
CWA 404 Mitigation – Wetlands & Ephemeral Streams	$1.36	$5.34		$0.12[3]	$0.81
CWA 404 Mitigation -Water Quality	N/A	N/A		*not quantified*	*not quantified*
CWA 404 Mitigation-Reservoir Dredging	N/A	N/A		*not quantified*	*not quantified*
CWA 311 – FRP Requirements	*not monetized*	*not monetized*		*not monetized*	*not monetized*
CWA 311 – SPCC Requirements	*not monetized*	*not monetized*		*not monetized*	*not monetized*
SUBTOTAL	**$1.62**	**$5.60**		**$0.12**	**$0.81**
Rio Grande River Basin					
CWA 402	*not monetized*	*not monetized*		*not monetized*	*not monetized*
CWA 404 Permit Application	$0.11	$0.11		N/A	N/A
CWA 404 Mitigation – Wetlands & Ephemeral Streams	negligible[4]	negligible		*not monetized*	*not monetized*
CWA 404 Mitigation -Water Quality	N/A	N/A		*not quantified*	*not quantified*
CWA 404 Mitigation-Reservoir Dredging	N/A	N/A		*not quantified*	*not quantified*
CWA 311 – FRP Requirements	*not monetized*	*not monetized*		*not monetized*	*not monetized*
CWA 311 – SPCC Requirements	*not monetized*	*not monetized*		*not monetized*	*not monetized*
SUBTOTAL	**$0.11**	**$0.11**			
Total 3 Case Studies					
TOTAL (Monetized Categories)	**$8.47**	**$21.97**		**$0.49**	**$3.25**

[1]Annualized benefits are estimated at a 3% discount rate.

[2] The estimated forgone annualized benefits from reduced mitigation requirements in the Ohio River Basin range from a low of $0.27 to a high of $1.80 million at a 7% discount rate.

[3]Annualized forgone benefits from reduced mitigation requirements in the Lower Missouri River Basin range from a low of $0.09 million to a high of $0.60 million at a 7% discount rate.

[4]The estimated annual mitigation cost savings range from $187 to $261.

Table IV-58: Scenario 2 & 3 — Potential impacts, cost savings, and forgone benefits in the Case Study areas excluding the impact from states that may continue their baseline dredged/fill and surface water permitting practices

	Annual Avoided Costs (2017$ millions)			Annual Forgone Benefits (2017$ millions)	
	Low	High		Low	High
Ohio River Basin					
CWA 402	$0.0	$0.0		$0.0	$0.0
CWA 404 Permit Application	$0.31	N/A		N/A	N/A

Table IV-58: Scenario 2 & 3 — Potential impacts, cost savings, and forgone benefits in the Case Study areas excluding the impact from states that may continue their baseline dredged/fill and surface water permitting practices

	Annual Avoided Costs (2017$ millions)		Annual Forgone Benefits (2017$ millions)	
	Low	**High**	**Low**	**High**
CWA 404 Mitigation – Wetlands & Ephemeral Streams	$6.42	$15.93	$0.37[2]	$2.44
CWA 404 Mitigation -Water Quality	N/A	N/A	*not quantified*	*not quantified*
CWA 404 Reservoir Dredging	N/A	N/A	*not quantified*	*not quantified*
CWA 311 – FRP Requirements	*not monetized*	*not monetized*	*not monetized*	*not monetized*
CWA 311 – SPCC Requirements	*not monetized*	*not monetized*	*not monetized*	*not monetized*
SUBTOTAL	**$6.73**	**$16.25**	**$0.37**	**$2.44**
Lower Missouri River Basin				
CWA 402	*not monetized*	*not monetized*	*not monetized*	*not monetized*
CWA 404 Permit Application	<$0.01	<$0.01	N/A	N/A
CWA 404 Mitigation – Wetlands & Ephemeral Streams	$0.00	$0.00	$0.00	$0.00
CWA 404 Mitigation -Water Quality	N/A	N/A	*not quantified*	*not quantified*
CWA 404 Mitigation-Reservoir Dredging	N/A	N/A	*not quantified*	*not quantified*
CWA 311 Compliance	*not monetized*	*not monetized*	*not monetized*	*not monetized*
CWA 311 Compliance	*not monetized*	*not monetized*	*not monetized*	*not monetized*
SUBTOTAL	**<$0.01**	**<$0.01**	**$0.00**	**$0.00**
Rio Grande River Basin				
CWA 402	*not monetized*	*not monetized*	*not monetized*	*not monetized*
CWA 404 Permit Application	$0.11[3]	$0.11	N/A	N/A
CWA 404 Mitigation – Wetlands & Ephemeral Streams	negligible[4]	negligible	*not monetized*	*not monetized*
CWA 404 Mitigation – Water Quality	N/A	N/A	*not quantified*	*not quantified*
CWA 404 Mitigation – Reservoir Dredging	N/A	N/A	*not quantified*	*not quantified*
CWA 311 – FRP Requirements	*not monetized*	*not monetized*	*not monetized*	*not monetized*
CWA 311 – SPCC Requirements	*not monetized*	*not monetized*	*not monetized*	*not monetized*
SUBTOTAL	**$0.11**	**$0.11**		
Total 3 Case Studies				
TOTAL (Monetized Categories)	**$6.84**	**$16.36**	**$0.37**	**$2.44**

[1]Annualized forgone benefits are estimated at a 3% discount rate.
[2] The estimated forgone annualized benefits from reduced mitigation requirements in the Ohio River Basin range from a low of $0.27 million to a high of $1.80 million at a 7% discount rate.
[3] Estimated annual reduction in 404 permit application costs under Scenario 3 is zero.
[4] The estimated annual mitigation cost savings range from range of $187 to $261 under Scenario 2 and zero under Scenario 3.

IV.C Stage 2 Quantitative Assessment of National Impacts

The case studies demonstrate that data limitations constrain the agencies' ability to quantify and value the effects of the proposed rule on the section 402 and 311 programs across the country, but that it is possible to quantify and value at least some of the potential effects of the proposed rule on the 404 program nationwide. Accordingly, to evaluate the impacts of the Stage 2 analysis under the proposed rule, the agencies focused on 404 program impacts for which data are sufficient to develop quantitative estimates at the national level. The approach incorporates the predicted state response under various scenarios (see Section III.C.1). Inputs for this analysis were derived using the same approach as described for the case studies (see Section IV.B.2.2.2), which relies on 404 permit data from the Corps' ORM2 database to identify aquatic resources and permits potentially affected by the proposed rule. To estimate cost savings, the agencies used the same methodology described in Section IV.B.2.2.2.1. To estimate forgone benefits, the agencies used a meta function benefits transfer to value forgone wetland mitigation (see Section III.C.2).

National-level results of this analysis are summarized below. Table IV-59 presents national-level cost savings from reduced permit requirements. Table IV-60 presents national-level cost savings from reduced mitigation requirements. Table IV-61 presents total national-level cost savings (sum of permit cost savings and reduced mitigation requirement savings). Table IV-62 presents forgone benefit estimates based on annual WTP for wetlands under each of the state response scenarios. State-level estimates of cost savings and forgone benefits are provided in Appendix F.

As shown in the tables, the estimated cost savings from avoided permit applications and mitigation generally exceed forgone benefits of wetlands. This is true for all four state response scenarios the agencies analyzed and under most cost or WTP assumptions. For example, under Scenario 2, annual cost savings range between $112.5 million and $214.9 million (under low and high cost assumptions), compared to estimated forgone benefits of $41.7 million (based on mean WTP). One exception is Scenario 0 for which forgone benefits based on the 95th percentile of the WTP for wetlands are greater than the lower bound of estimated cost savings.

Table IV-59: National average annual reduction in 404 permit application costs

Permit Type	Unit Costs from Corps NWP Analysis (2017$)	Annual Average Reduction in Permits with Proposed Rule	Estimated Reduction in Permit Costs (millions 2017$)
Scenario 0[1,2]			
IP	$14,700	88	$1.3
GP	$4,400	5,758	$25.3
Total		**5,846**	**$26.6**
Scenario 1[1,3]			
IP	$14,700	41	$0.6
GP	$4,400	3,509	$15.4
Total		**3,550**	**$16.0**
Scenario 2[1,4]			
IP	$14,700	28	$0.4
GP	$4,400	2,323	$10.2
Total		**2,351**	**$10.6**
Scenario 3[1,5]			
IP	$14,700	10	$0.2
GP	$4,400	499	$2.2
Total		**509**	**$2.4**

[1] Annual average permit reductions based on permits issued in years 2011-2015 estimated to only affect RPWWN-type wetlands or ephemeral streams.

[2] Includes all states except Hawaii.

[3] Includes Alaska, Alabama, Arkansas, Arizona, Colorado, Delaware, Georgia, Iowa, Idaho, Kansas, Kentucky, Louisiana, Missouri, Mississippi, Montana, North Carolina, North Dakota, Nebraska, New Mexico, Nevada, Oklahoma, South Carolina, South Dakota, Texas, Utah, Wisconsin, West Virginia, and Wyoming.

Table IV-59: National average annual reduction in 404 permit application costs

Permit Type	Unit Costs from Corps NWP Analysis (2017$)	Annual Average Reduction in Permits with Proposed Rule	Estimated Reduction in Permit Costs (millions 2017$)

[4] Includes Alaska, Alabama, Arkansas, Arizona, Colorado, Delaware, Georgia, Idaho, Kentucky, Missouri, Mississippi, Montana, North Dakota, New Mexico, Oklahoma, South Carolina, South Dakota, Texas, Utah, and Wyoming.

[5] Includes Arizona, Idaho, Kentucky, Mississippi, and South Dakota.

Table IV-60: National average annual cost savings of reduced mitigation requirements resulting from the proposed definitional change

Unit	Annual Average Mitigation Reduction under Proposed Rule	Low (Millions 2017$)	High (Millions 2017$)
Scenario 0[1,2]			
Acres	973.9	$55.5	$120.7
LF	446,282	$154.3	$349.3
Total		**$209.9**	**$470.0**
Scenario 1[1,3]			
Acres	406.1	$22.4	$42.7
LF	311,025	$96.2	$206.9
Total		**$118.6**	**$249.7**
Scenario 2[1,4]			
Acres	272.5	$18.3	$32.3
LF	225,112	$83.6	$172.0
Total		**$101.9**	**$204.3**
Scenario 3[1,5]			
Acres	53.8	$3.0	$4.4
LF	74,661	$22.3	$55.8
Total		**$25.3**	**$60.2**

[1] Annual average mitigation reduction based on permits issued in years 2011-2015 with mitigation requirements on waterways determined to be RPWWN-type wetlands or ephemeral streams. Excludes permits issued for mitigation or restoration activities because the main purpose of these activities is to restore or enhance ecosystem services provided by water resources as opposed to dredge and fill activities that lead to permanent or temporary losses of ecosystem services. Cost savings are calculated by multiplying the cost of each mitigation acre or linear foot (low and high estimates) for each state by the expected reduction in annual mitigation requirements, and summing the state-level acreage and linear feet values for each scenario.

[2] Includes all states except Hawaii.

[3] Includes Alaska, Alabama, Arkansas, Arizona, Colorado, Delaware, Georgia, Iowa, Idaho, Kansas, Kentucky, Louisiana, Missouri, Mississippi, Montana, North Carolina, North Dakota, Nebraska, New Mexico, Nevada, Oklahoma, South Carolina, South Dakota, Texas, Utah, Wisconsin, West Virginia, and Wyoming.

[4] Includes Alaska, Alabama, Arkansas, Arizona, Colorado, Delaware, Georgia, Idaho, Kentucky, Missouri, Mississippi, Montana, North Dakota, New Mexico, Oklahoma, South Carolina, South Dakota, Texas, Utah, and Wyoming.

[5] Includes Arizona, Idaho, Kentucky, Mississippi, and South Dakota.

Table IV-61: Total national estimated annual cost savings (Millions 2017$)

Cost Type	Scenario 0[1]		Scenario 1[2]		Scenario 2[3]		Scenario 3[4]	
	Low	High	Low	High	Low	High	Low	High
Permit Cost Savings	$26.6	$26.6	$16.0	$16.0	$10.6	$10.6	$2.4	$2.4
Mitigation Cost Savings	$209.9	$470.0	$118.6	$249.7	$101.9	$204.3	$25.3	$60.2
Total	**$236.5**	**$496.6**	**$134.6**	**$265.7**	**$112.5**	**$214.9**	**$27.6**	**$62.6**

[1] Includes all states except Hawaii.

[2] Includes Alaska, Alabama, Arkansas, Arizona, Colorado, Delaware, Georgia, Iowa, Idaho, Kansas, Kentucky, Louisiana, Missouri, Mississippi, Montana, North Carolina, North Dakota, Nebraska, New Mexico, Nevada, Oklahoma, South Carolina, South Dakota, Texas, Utah, Wisconsin, West Virginia, and Wyoming.

[3] Includes Alaska, Alabama, Arkansas, Arizona, Colorado, Delaware, Georgia, Idaho, Kentucky, Missouri, Mississippi, Montana, North Dakota, New Mexico, Oklahoma, South Carolina, South Dakota, Texas, Utah, and Wyoming.

[4] Includes Arizona, Idaho, Kentucky, Mississippi, and South Dakota.

Table IV-62: Total national forgone benefit estimate of reduced mitigation requirements resulting from the proposed definitional change, by policy scenario

Scenario	Households	Annual Forgone Mitigation Acres	Mean WTP per household per acre (2017$)	Mean Estimate of Forgone Benefits (Millions 2017$)	Lower 5th WTP per household per acre (2017$)	Lower 5th Estimate of Forgone Benefits (Millions 2017$)	Upper 95th WTP per household per acre (2017$)	Upper 95th Estimate of Forgone Benefits (Millions 2017$)
Scenario 0[1,2]	115,994,247	1,486.2	$0.0231	$135.6	$0.0001	$0.7	$0.0453	$300.3
Scenario 1[1,3]	45,033,201	763.1	$0.0192	$46.8	$0.0001	$0.3	$0.0422	$104.0
Scenario 2[1,4]	32,455,035	530.9	$0.0211	$41.7	$0.0001	$0.2	$0.0463	$92.7
Scenario 3[1,5]	6,118,413	139.5	$0.0236	$6.9	$0.0001	<$0.1	$0.0504	$14.2

[1] Annual average mitigation reduction based on permits issued in years 2011-2015 with mitigation requirements on waterways determined to be RPWWN-type wetlands or ephemeral streams. Excludes permits issued for mitigation or restoration activities because the main purpose of these activities is to restore or enhance ecosystem services provided by water resources as opposed to dredge and fill activities that lead to permanent or temporary losses of ecosystem services.

[2] Includes all states except Hawaii.

[3] Includes Alaska, Alabama, Arkansas, Arizona, Colorado, Delaware, Georgia, Iowa, Idaho, Kansas, Kentucky, Louisiana, Missouri, Mississippi, Montana, North Carolina, North Dakota, Nebraska, New Mexico, Nevada, Oklahoma, South Carolina, South Dakota, Texas, Utah, Wisconsin, West Virginia, and Wyoming.

[4] Includes Alaska, Alabama, Arkansas, Arizona, Colorado, Delaware, Georgia, Idaho, Kentucky, Missouri, Mississippi, Montana, North Dakota, New Mexico, Oklahoma, South Carolina, South Dakota, Texas, Utah, and Wyoming.

[5] Includes Arizona, Idaho, Kentucky, Mississippi, and South Dakota.

V. Regulatory Flexibility Act (RFA) Analysis

The Regulatory Flexibility Act (RFA, 5 U.S.C. et seq., Public Law 96-354), amended by the 1996 Small Business Regulatory Enforcement Fairness Act (SBREFA), requires the agencies to consider the economic impact that a new rule will have on small entities. The purpose of the RFA and SBREFA laws is to ensure that, in developing rules, agencies identify and consider ways to avoid undue impacts on small entities that will be affected by the regulation, whether as small entities that will be subject to regulatory requirements or as small governments that will be responsible for complying with or administering the regulation. While the RFA does not require an agency to minimize a rule's impact on small entities if there are legal, policy, factual, or other reasons for not doing so, it does require that agencies:

- Determine, to the extent feasible, the economic impact on small entities subject to the rule;
- Explore regulatory options for reducing any significant economic impact on a substantial number of such entities; and,
- Explain the ultimate choice of regulatory approach.

For any notice-and-comment rule it promulgates, the agencies must either certify that the rule "will not, if promulgated, have a significant economic impact on a substantial number of small entities" ("SISNOSE") or prepare a Regulatory Flexibility Analysis if the Agency cannot make this certification. Small entities include small businesses and small organizations as defined by SBA, and governmental jurisdictions with populations of less than 50,000.

The proposed rule is not expected to have a significant economic impact on a substantial number of small entities under the RFA. This is a deregulatory action, that reduces the jurisdictional scope of the CWA and the burden on entities regulated under the CWA that are affected by this proposed rule, including small entities, is reduced compared to the 2015 Rule and pre-2015 practice. The agencies have therefore concluded that this action will relieve regulatory burden to small entities.

V.A Entities Regulated under Clean Water Act Programs

The proposed rule will affect entities regulated under CWA programs that impact waters whose jurisdictional status will change. The agencies consider these effects because they effect how these entities comply with their CWA requirements. The potential impact of the proposed regulation on small entities is difficult to assess due to the lack of sufficient geospatial data identifying waters resources that will incur a jurisdictional change and resulting difficulty in identifying regulated activity that may be affected. The Small Business Administration (SBA) has developed size standards to carry out the purposes of the Small Business Act and are used for defining small entities under the RFA. The agencies reviewed available information on the type of entities that are regulated under the CWA section 311, 402, and 404 programs primarily affected by this proposed rule, with the purpose of identifying sectors with small entities that may incur impacts. The proposed rule is expected to result in fewer entities subject to these programs, and a reduced regulatory burden for a portion of the entities that will still be subject to these programs. As a result, small entities subject to these regulatory programs are unlikely to suffer adverse impacts due to compliance with the regulation.

Under the section 402 program, entities are covered by either an individual or general permit. The entities covered by an individual permit, whether public or private, discharge to waters of sufficient size to accommodate their effluent. Based on the results from the case study analyses, only a very small number of NPDES permitted facilities were identified as potentially discharging to a water that may be affected by the proposed rule. The agencies presume that the results from the case study analyses likely hold for the rest of the country, and that most of these waters that have permitted discharges will be unaffected by the proposed regulation. Those individual permittees that do discharge to waters that experience a jurisdictional change will still require an individual permit but may actually experience a reduction in their regulatory burden if the stringency of their limits is modified by their permitting authority. Those entities whose activities are covered by a NPDES general permit are not likely to be affected by the proposed rule. General permits are generic documents intended for a specific type of activity that can impact water resources. Obtaining coverage under a general permit typically does not require a site-specific assessment, and so takes less time and effort than an equivalent individual permit. However, with a general permit to obtain coverage the entity must accept the terms of the permit as written, and without a site-specific assessment the jurisdictional status of water resources that may be affected by the proposed rule is not a factor. As a result, the agencies generally do not anticipate that general permittees will be impacted by the proposed rule.[153] Small entities are a subset of these entities subject to general permits and they will be equally unaffected.[154]

Based on the lack of identified impacts in the three case study analyses, the agencies consider the effects on the regulated community of NPDES permit holders to be minimal to none. This finding extends to those NPDES permit holders that are small entities.

For the section 404 program, the proposed rule will reduce the number of waters under CWA jurisdiction, and this will in turn reduce the amount of avoidance, minimization, and mitigation measures necessary to obtain section 404 permit coverage, as well as a reduction in the total number of future section 404 permits. Table V-1 provides a summary list of the North American Industrial Classification System (NAICS) categories that engage in projects requiring 404 permit coverage, based on a review of national 404 permit data from 2011 through 2015. The agencies expect that the reduction in future section 404 permit obligations will result in cost savings rather than cost increases. These reductions are expected to extend to the universe of small entities required to obtain 404 permit coverage approximately equal to their existing portion of the overall 404 regulatory burden. [155]

Table V-1: CWA 404 Program NAICS Categories

NAICS Codes	NAICS Industry Description
Subsector 111	Crop Production
Subsector 112	Animal Production and Aquaculture
Subsector 113	Forestry and Logging
Subsector 211	Oil and Gas Extraction

[153] An exception may occur in arid areas of the country where a significant portion of water features may change jurisdictional status due to the proposed rule. In these areas the NPDES authority may require fewer entities to obtain general permit coverage.

[154] See above EA tables for a discussion of the total estimated avoided costs. (For example Tables IV-56 and 57)

[155] See above EA tables for a discussion of the total estimated avoided costs. (For example Tables IV-56 and 57)

Table V-1: CWA 404 Program NAICS Categories	
NAICS Codes	**NAICS Industry Description**
Subsector 212	Mining (except Oil and Gas)
Subsector 213	Support Activities for Mining
Subsector 221	Utilities
Subsector 236	Construction of Buildings
Subsector 237	Heavy and Civil Engineering Construction

The section 311 program has two main components that address the risk and harm from oil spills: spill prevention and preparedness under the SPCC and FRP programs; and spill response under the National Contingency Plan. The proposed rule may result in some facilities no longer having a reasonable potential of a discharge to a water of the United States. Table V-2 lists the NAICS categories commonly regulated under the 311 program. For these facilities the compliance burden will be reduced under the proposed rule unless they decide to voluntarily continue implementing their plan or are required to by state or tribal authorities. The agencies acknowledge that spill risks may increase for any of these facilities that reduce their future spill protection measures.

Table V-2: CWA 311 Program NAICS Categories	
NAICS Codes	**Category**
4227	Petroleum and Petroleum Products Wholesalers
2211	Electric Power Generation, Transmission, and Distribution
3241	Petroleum and coal products manufacturing
miscellaneous	Other Commercial Facilities
454311	Heating Oil Dealers
31-33	Manufacturing
Source: Renewal of Information Collection Request for the Implementation of the Oil Pollution Act Facility Response Plan Requirements (40 CFR PART 112) (EPA # 1630.12)	

Spill risk liabilities for states and tribes may increase if facilities decrease their future spill prevention measures, States and tribes may also be impacted by the proposed rule even if facility spill prevention measures do not change. For waters under federal jurisdiction, the Oil Spill Liability Trust Fund (OSLTF) is used to cover containment, clean-up, and remediation costs when a responsible party cannot be identified. For containment, clean-up, and remediation costs for spills affecting non-jurisdictional waters, states and tribes bear the financial burden when a responsible party cannot be identified. So even if the overall probability of a risk does not increase within a state or tribal jurisdiction, there may be an increased financial risk that corresponds with the proposed change in the definition of "waters of the United States." However, for the purposes of the RFA, states and tribal governments are not considered small government entities.[156]

V.B Entities Impacted by Changes in Ecosystem Services

Narrowing the scope of federal jurisdiction under the CWA may result in a reduction in the ecosystem services provided by some waters, such as less habitat, increased flood risk, and higher pollutant loads. As

[156] The RFA defines "small governmental jurisdiction" as the government of a city, county, town, township, village, school district, or special district with a population of less than 50,000 (5 U.S.C. section 601(5)).

a result, both public and private entities that rely on these ecosystem services may be adversely impacted, albeit indirectly. For example, loss of wetlands can increase the risk of property damage due to flooding. To predict if there will be significant impacts to any given sector it is important to assess which sectors may be more impacted by changes in ecosystem services.

Increases in flood risk are likely to be specific to the watersheds where the wetland losses occur and are not expected to impact a specific group or business sector. Habitat loss can have a direct effect on recreational activities such as hunting, fishing, and bird watching, depending on the type of ecosystem and species affected (*e.g.*, NAICS Code: 114210- Hunting and Trapping). Businesses that serve hunters or anglers, localities that collect admission fees or licenses, and non-profit organizations that focus on recreating within or preserving natural habitats are examples of sectors that could be affected by habitat loss, many of which could be categorized as small. Changes in water quality can also impact recreational activities and by extension those businesses and localities that support these activities (*e.g.*, NAICS Code: 423910-Sporting and Recreational Goods and Supplies Merchant Wholesalers). In addition, increased pollutant loadings can lead to higher drinking water treatment costs for localities, and for businesses that require water treatment for their production process. Higher sediment loads can impact downstream communities by increasing the need for dredging to maintain reservoir capacity and for navigation, and by shortening the useful life infrastructure damaged by increased scouring.

Potential changes in ecosystem services will be project specific and difficult to reasonably predict given the uncertainty around the magnitude of potential changes due to the proposed rule. Based on the results from the three case study analyses, it is very likely that many of these reductions in services will be small, infrequent, and dispersed over wide geographic areas, thereby limiting the significance of the financial impacts on small organizations and governments and small entities within specific business sectors. In addition, states and tribes may already address waters potentially affected by a revised definition, thereby reducing forgone benefits. For example, many states have the goal of “no net loss of wetlands” directly incorporated into their regulations.

V.C Entities Impacted by Changes in Mitigation Demand

An economic sector that will be indirectly impacted by the proposed rule are mitigation banks, and companies that provide restoration services. Mitigations banks are often limited liability companies that have been authorized by a state or federal agency to generate credits that can be used to meet the demand for mitigation, driven by state and federal regulations. Restoration services are businesses that provide the range of services needed for mitigation efforts. There customers can be mitigation banks or permittees that meet their regulatory requirements through on-site or off-site mitigation. Although primarily a business sector, there are mitigation banks owned and managed by non-profit organizations and government entities, such as state transportation departments. Businesses involved in mitigation banking and providing ecological restoration services are not contained within a single economic sector as defined by the North American Industrial Classification System (NAICS). A survey of this restoration sector, conducted in 2014 showed that many of the businesses involved in this sector fall into five categories: Environmental Consulting (NAICS: 541620); Land Acquisition (NAICS: 237210); Planning, Design, and Engineering (NAICS: 541320, 541330); Site Work (earth moving, planting) (NAICS: 237210, 237990); and Monitoring (BenDor et al, 2015).

Impacts to the mitigation banking sector and more broadly to the restoration sector would not be the direct result of these businesses complying with the proposed rule, rather they would be the indirect result of other entities coming into compliance with proposed rule. Because fewer waters would be subject to CWA jurisdiction under the proposed rule than are subject to regulation under the 2015 Rule or current practice, there would be a reduction in demand for mitigation and restoration services, under the section 404 permitting program and a corresponding reduction in revenue for the businesses. However, assessing impacts to this sector is problematic, given that this sector lacks a SBA small business definition, and many of the businesses that fall within this sector are also classified under various other NAICs categories. Existing data on 404 permits maintained by the agencies does not identify sufficient ownership and business arrangement information to determine the economic profile of mitigation bank ownership, nor does it identify specific entities involved in performing restoration work. In addition, States and Tribes may require mitigation for impacted waters no longer covered under the proposed rule, thereby reducing the future change in mitigation demand.

V.D Conclusion

Overall, the agencies consider the small entity impacts of the proposed regulation are neither significant nor substantial, based on the lack of any cost increase for those entities that must comply with regulations under the CWA sections 311, 402, and 404 programs. Impacts to the mitigation banking sector would not be the direct result of these businesses complying with the proposed rule, rather they would be the indirect result of other entities coming into compliance with proposed rule. Similarly, potential impacts to small localities, organizations, and businesses due to changes in ecosystem services are indirect effects. The agencies certify that this action will not have a significant economic impact on a substantial number of small entities under 5 U.S.C. § 605 (b) of the RFA. In making this determination, the impact of concern is any significant adverse economic impact on small entities. An agency may certify that a rule will not have a significant economic impact on a substantial number of small entities if the rule relieves regulatory burden, has no net burden or otherwise has a positive economic effect on the small entities subject to the rule. This is a deregulatory action, and the burden on all entities affected by this proposed rule, including small entities, is reduced compared to the 2015 Rule and pre-2015 practice. We have therefore concluded that this action will relieve regulatory burden to small entities.

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Appendix A: Mapped NHD Stream Mileage and NWI Wetland Acreage by State

Table A-1: Mapped NHD Stream Mileage and NWI Wetland Acreage by State: The numbers and percentages of streams and wetlands by category do not equate to a quantification of waters that will or will not be jurisdictional under the proposed rule nor do they equate to a quantification of waters that are or are not jurisdictional under the pre-2015 practice. The data are presented to illustrate the incomplete national coverage of the NHD data, particularly with regard to ephemeral streams.

State	NHD Streams								NWI Wetlands
	Perennial		Intermittent		Ephemeral[1]		Other[2]		
	Miles	% of Total	Miles	% of Total	Miles	% of Total	Miles	% of Total	Acres
AK	666,417	48%	18,624	1%	82	0%	700,893	51%	-
AL	48,075	23%	69,415	33%	0	0%	95,602	45%	4,203,980
AR	20,915	9%	89,091	40%	30	0%	111,599	50%	2,408,523
AZ	4,194	1%	35,305	7%	249,591	51%	202,384	41%	354,060
CA	44,290	7%	85,290	13%	213,359	34%	291,058	46%	3,028,618
CO	32,715	7%	151,915	34%	66,955	15%	197,296	44%	2,002,309
CT[3]	7,593	35%	1,892	9%	-	0%	12,035	56%	310,505
DC[3]	26	19%	6	4%	-	0%	103	76%	319
DE[3]	2,404	26%	1,112	12%	-	0%	5,838	62%	263,327
FL	19,337	12%	8,123	5%	2	0%	127,332	82%	12,183,132
GA[3]	44,081	23%	53,965	28%	-	0%	93,464	49%	6,548,298
HI									
IA	27,730	15%	72,310	39%	2,396	1%	82,259	45%	1,088,441
ID	54,355	30%	96,072	53%	8,551	5%	22,010	12%	1,324,822
IL	26,033	22%	78,490	65%	287	0%	15,676	13%	1,301,283
IN[3,4]	15,030	6%	33,453	13%	-	0%	217,363	82%	1,055,925
KS	19,065	10%	153,419	83%	316	0%	11,687	6%	1,899,863
KY	26,118	26%	59,695	60%	3	0%	13,133	13%	465,603
LA	34,365	25%	59,755	44%	24	0%	41,649	31%	8,028,273
MA[3]	8,519	51%	3,734	23%	-	0%	4,328	26%	695,752
MD[3]	13,399	53%	3,872	15%	-	0%	8,191	32%	814,720
ME	25,864	50%	13,413	26%	0	0%	12,893	25%	2,548,325

Table A-1: Mapped NHD Stream Mileage and NWI Wetland Acreage by State: The numbers and percentages of streams and wetlands by category do not equate to a quantification of waters that will or will not be jurisdictional under the proposed rule nor do they equate to a quantification of waters that are or are not jurisdictional under the pre-2015 practice. The data are presented to illustrate the incomplete national coverage of the NHD data, particularly with regard to ephemeral streams.

State	NHD Streams								NWI Wetlands
	Perennial		Intermittent		Ephemeral[1]		Other[2]		
	Miles	% of Total	Miles	% of Total	Miles	% of Total	Miles	% of Total	Acres
MI[3]	29,251	36%	15,136	18%	-	0%	37,753	46%	7,796,982
MN	26,461	26%	38,028	37%	1	0%	38,269	37%	10,854,648
MO[3]	22,323	12%	141,077	76%	-	0%	21,160	11%	1,386,533
MS[3]	24,376	15%	114,831	70%	-	0%	23,982	15%	3,968,569
MT	49,899	13%	304,329	78%	3,627	1%	32,901	8%	3,227,102
NC[4]	43,069	31%	49,442	35%	1	0%	47,726	34%	4,366,486
ND	5,926	7%	73,640	81%	0	0%	11,165	12%	1,508,999
NE	13,472	11%	98,408	77%	521	0%	15,144	12%	1,314,903
NH	8,281	44%	6,861	37%	3	0%	3,592	19%	310,193
NJ[3]	12,834	54%	1,064	4%	-	0%	10,081	42%	889,188
NM	7,124	3%	60,237	25%	156,822	66%	13,182	6%	363,015
NV	10,741	3%	26,141	8%	267,153	85%	11,487	4%	1,033,171
NY[3]	56,516	57%	20,921	21%	-	0%	21,236	22%	2,207,886
OH	26,905	29%	53,172	58%	9	0%	11,627	13%	538,919
OK	33,924	20%	115,235	69%	482	0%	17,777	11%	1,379,591
OR	77,102	24%	192,672	61%	23,402	7%	22,322	7%	1,895,761
PA[3]	43,800	51%	30,131	35%	-	0%	12,065	14%	544,458
RI[3]	1,224	62%	92	5%	-	0%	647	33%	60,714
SC[3]	25,819	33%	31,934	41%	-	0%	19,731	25%	3,932,560
SD	12,070	7%	135,766	82%	2,809	2%	13,957	8%	2,065,241
TN	68,240	60%	32,065	28%	254	0%	12,984	11%	1,165,666
TX	36,044	7%	346,494	65%	84,783	16%	62,472	12%	4,630,573
UT	15,117	8%	83,888	45%	71,561	39%	13,927	8%	758,798
VA	36,123	33%	55,846	51%	4	0%	17,581	16%	1,454,954

Table A-1: Mapped NHD Stream Mileage and NWI Wetland Acreage by State: The numbers and percentages of streams and wetlands by category do not equate to a quantification of waters that will or will not be jurisdictional under the proposed rule nor do they equate to a quantification of waters that are or are not jurisdictional under the pre-2015 practice. The data are presented to illustrate the incomplete national coverage of the NHD data, particularly with regard to ephemeral streams.

State	NHD Streams								NWI Wetlands
	Perennial		Intermittent		Ephemeral[1]		Other[2]		
	Miles	% of Total	Miles	% of Total	Miles	% of Total	Miles	% of Total	Acres
VT[3]	22,677	86%	11	0%	-	0%	3,757	14%	86,122
WA	69,058	29%	148,082	62%	2,330	1%	21,204	9%	959,626
WI[3]	27,876	32%	42,114	49%	-	0%	16,745	19%	6,868,324
WV	21,230	39%	27,505	50%	11	0%	6,220	11%	57,052
WY	34,404	12%	197,979	69%	35,683	12%	20,774	7%	1,852,425
WA	2,002,413	21%	3,532,050	37%	1,191,051	12%	2,828,260	30%	959,626

Source: Based on analysis of NHD at high resolution and NWI data. See Section II.C for a description of the limitations of the NHD and NWI data in fully characterizing the waters that may be potentially affected by the proposed changes to the definition of "waters of the United States." The numbers and percentages of streams and wetlands by category do not equate to a quantification of waters that will or will not be jurisdictional under the proposed rule nor do they equate to a quantification of waters that are or are not jurisdictional under the pre-2015 practice.

[1] The percentages for this category represent the percentages of streams in each state that the NHD at high resolution maps as ephemeral. Zero percent for this category does not mean that the state has no ephemeral streams. Ephemeral streams are not independently mapped in many states. Often ephemeral streams are mapped in the intermittent stream category or are not mapped at all, which results in an overstatement of intermittent streams and an understatement of ephemeral streams. This table is a summary of the available NHD data and is not likely to accurately represent the types of waters in any given state.

[2] Includes unclassified streams, artificial paths, canal, ditches, aqueducts, and other feature without attributes.

[3] NHD has no stream miles mapped as ephemeral for these states. See FN 1 above.

[4] NHD has a high percentage of streams that are not classified as perennial, intermittent, or ephemeral (unclassified streams) for these states.

Appendix B: Revised Step 1 Analysis – Additional Scenarios

Table B-1: Estimates of avoided costs and forgone benefits including the impacts from all states

	Annual Avoided Costs (2017$ millions)			Annual Forgone Benefits (2017$ millions)	
	Low	**High**		**Low**	**High**
CWA 402 CAFO Administration	$0.2	$0.2		$3.9	$6.8
CWA 402 CAFO Implementation	$6.3	$6.3			
CWA 402 Stormwater Administration	$0.3	$0.3		$30.0	$38.1
CWA 402 Stormwater Implementation	$30.3	$37.7			
CWA 404 Permit Application	$29.8	$74.7		$59.4	$59.4
CWA 404 Mitigation – Wetlands	$57.4	$159.7			
SUBTOTAL	$124.2	$278.9		$93.4	$104.4
CWA 311 Compliance	$13.1	$13.1		*not quantified*	*not quantified*
CWA 401 Administration	$0.8	$0.8		*not quantified*	*not quantified*
CWA 402 Pesticide General Permit Implementation	$3.4	$3.8		*not quantified*	*not quantified*
CWA 404 Mitigation – Streams	$23.3	$46.5		*not quantified*	*not quantified*
TOTAL	$164.9	$343.1		$93.4	$104.4

These results include the potential costs and benefits for all categories for all states.

Table B-2: Scenario 1a – Estimates of avoided costs and forgone benefits excluding the impact from states that may continue their baseline dredged/fill permitting practices and are likely to continue their baseline other surface water regulatory practices

	Annual Avoided Costs (2017$ millions)			Annual Forgone Benefits (2017$ millions)	
	Low	**High**		**Low**	**High**
CWA 402 CAFO Administration	$0.1	$0.1		$1.7	$3.0
CWA 402 CAFO Implementation	$2.8	$2.8			
CWA 402 Stormwater Administration	$0.1	$0.1		$14.2	$18.0
CWA 402 Stormwater Implementation	$14.3	$17.8			
CWA 404 Permit Application	$10.2	$25.5		$14.3	$14.3
CWA 404 Mitigation – Wetlands	$26.7	$42.1			
SUBTOTAL	$54.1	$88.5		**$30.2**	**$35.3**
CWA 311 Compliance	$7.3	$7.3		*not quantified*	*not quantified*
CWA 401 Administration	$0.4	$0.4		*not quantified*	*not quantified*
CWA 402 Pesticide General Permit Implementation	$1.8	$2.0		*not quantified*	*not quantified*
CWA 404 Mitigation – Streams	$14.0	$27.8		*not quantified*	*not quantified*
TOTAL	$77.7	$126.0		**$30.2**	**$35.3**

These results exclude the costs and benefits for section 404 permit applications and mitigation for states classified as response category 3 or 4 for regulation of dredged or fill material, and it excludes the costs and benefits for all other categories for states classified as response category 3 for other surface water regulation.

Appendix C: Current CWA Section 404 Permit Impacts by State

Table C-1: Authorized impact of CWA section 404 permits issued in 2011-2015, excluding mitigation type permits and permits affecting resources categorized as "ocean" or "tidal."

State	Permanent Impacts		Temporary Impacts (Per Year)		Mitigation Required (Per Year)		
	Acres	Length Feet	Acres	Length Feet	Acres	Length Feet	Permits Using Credits[1]
AK	4,003	78,117	261	17,294	306	10,886	52
AL	623	492,030	103	56,431	106	77,765	111
AR	763	460,637	46	171,979	191	35,702	53
AZ	357	34,970	35	8,631	5	0	16
CA	2,934	917,071	242	178,621	909	102,694	305
CO	329	346,971	41	37,438	31	3,952	35
CT	65	11,572	33	413	186	3,635	2
DE	81	26,185	4	823	64	221	1
FL	12,897	391,027	207	93,558	9,301	51,244	241
GA	880	354,335	33	16,514	23	558	233
HI	3	5,840	0	64	0	0	0
IA	726	848,952	19	19,074	145	13,447	26
ID	185	402,565	6	16,945	41	6,441	6
IL	561	872,731	116	46,765	191	36,610	41
IN	1,410	1,853,584	38	55,780	637	303,744	10
KS	313	1,177,940	38	40,795	28	55,620	34
KY	460	1,048,935	19	38,482	106	67,359	43
LA	7,189	338,458	1,031	162,411	1,424	17,184	246
MA	61	351,513	84	63,825	132	538	1
MD	2,898	612,839	25	32,609	40	25,732	4
ME	305	4,260	20	0	1,079	656	12
MI	299	224,696	21	20,747	19	254	0
MN	2,030	820,610	173	55,308	173	505	214
MO	286	535,159	44	1,553,311	88	14,052	39
MS	1,320	155,233	75	25,930	283	15,507	89
MT	162	342,901	5	12,995	64	34,335	7
NC	991	558,106	209	51,530	265	13,765	242
ND	468	206,064	76	23,163	63	31,646	16
NE	337	401,360	13	16,094	52	5,707	30
NH	144	9,024	4	230	149	0	9
NJ	64	13,346	24	4,945	5	15	1
NM	110	12,298	23	8,811	13	50	0
NV	55	28,466	7	2,069	11	2,377	1
NY	337	532,679	55	50,906	359	13,187	16
OH	485	697,993	37	38,712	196	144,507	64
OK	181	145,259	16	10,235	70	32,118	4
OR	516	1,056,724	35	31,093	72	1,776	52
PA	457	692,703	301	252,293	95	43,486	6
RI	12	501	7	0	1	200	0
SC	853	195,391	24	3,751	2,162	88,406	69
SD	245	319,605	11	16,511	43	1,673	10

Table C-1: Authorized impact of CWA section 404 permits issued in 2011-2015, excluding mitigation type permits and permits affecting resources categorized as "ocean" or "tidal."

State	Permanent Impacts		Temporary Impacts (Per Year)		Mitigation Required (Per Year)		
	Acres	Length Feet	Acres	Length Feet	Acres	Length Feet	Permits Using Credits[1]
TN	205	647,128	12	33,668	71	20,961	38
TX	2,965	1,226,870	793	256,874	1,451	283,408	381
UT	149	193,037	96	54,587	47	22,873	6
VA	1,545	629,912	455	138,279	239	145,197	107
VT	100	15,410	27	1,244	109	9	6
WA	450	150,438	69	98,635	225	60,594	25
WI	953	819,980	125	192,441	157	2,398	90
WV	130	444,982	34	85,090	21	90,871	21
WY	125	98,781	6	2,030	26	230	0

Source: EPA analysis of data from USACE ORM2 database (2018).

[1] Mitigation credits are the trading medium that is used to represent the ecological gains at mitigation bank sites. The number of credits available from a mitigation bank depends on the quantity and quality of the resources that are restored, created, enhanced, or preserved. The number of acres or linear feet per credit varies among and within U.S. Army Corps districts. This variability makes summing credits across regions inappropriate, so the number of permits utilizing mitigation credits is provided instead of total mitigation credits.

Appendix D: SWAT Modeling Results

This appendix presents more detailed outputs for selected SWAT model runs to illustrate modeled changes due to the proposed rule. The selected results are for the HUC 0510 SWAT model and supplement the summary results presented in Section IV.B.2.3.1.

Figure D-1 and Figure D-2 show time series of the hydrologic response and pollutant yields for an individual HUC12 subbasin (051001010101: Headwaters of the Licking River, KY, represented as subbasin 1 in SWAT model 0510). The figures show results over a six-year period based on historical weather conditions in 2010-2015. In this subbasin the proposed rule is predicted to result in the net reduction of approximately 3.7 percent of existing wetlands. The changes affect 0.5 acres of the 24,300-acre subbasin. The changes between the two scenarios are not discernible relative to the range of predicted values. Figure D-3 and Figure D-4 isolate the impacts of the Policy by plotting the *difference* between the two scenarios. As shown in the plots, the Policy tends to result in lower surface runoff during storm events (the increases tend to coincide with high flows in Figure D-1) and slightly lower groundwater flow. The higher peaks are accompanied by higher sediment, nitrate and soluble phosphorus yields.

Figure D-5 and Figure D-6 show time series of predicted in-stream variables at the outlet of SWAT watershed 0510.

Figure D-1: Precipitation and predicted hydrologic response of subbasin 051001010101: Headwaters of the Licking River, KY under the baseline (black) and policy (red) scenarios.

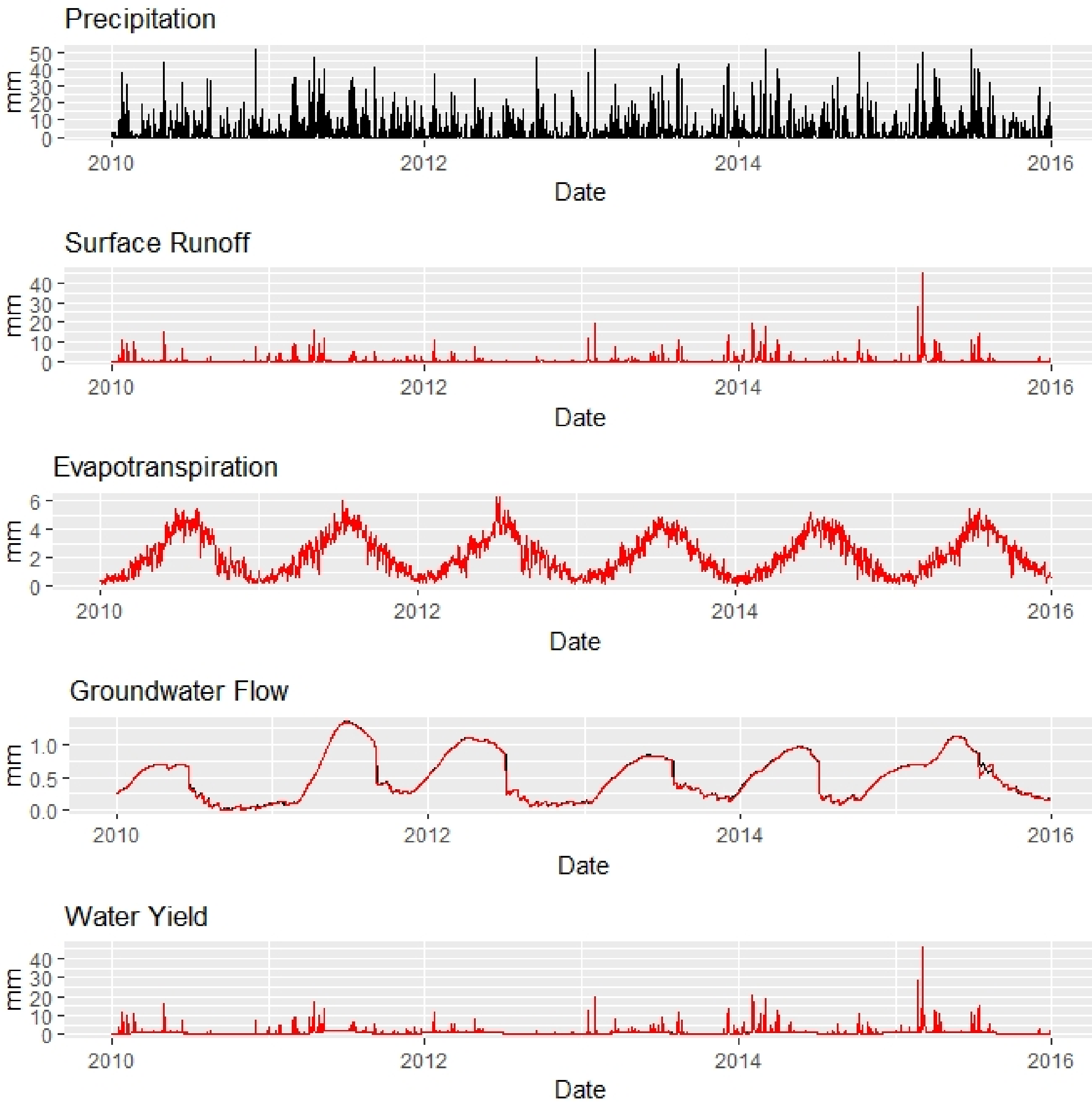


Figure D-2: Predicted sediment and nutrient yields in subbasin 051001010101: Headwaters of the Licking River, KY under the baseline (black) and policy (red) scenarios.

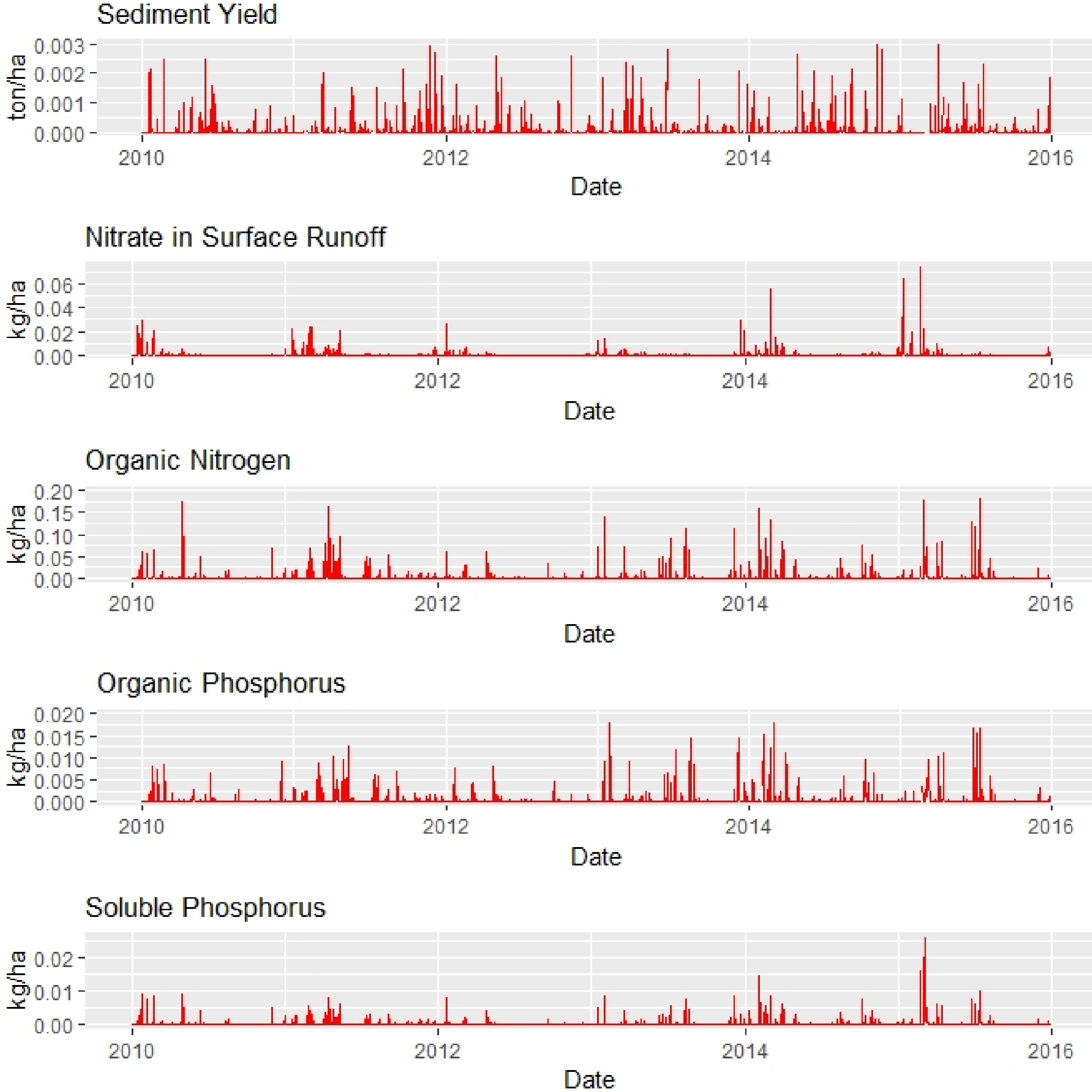


Figure D-3: Predicted *change* in hydrologic response of subbasin 051001010101: Headwaters of the Licking River, KY due to the Policy.

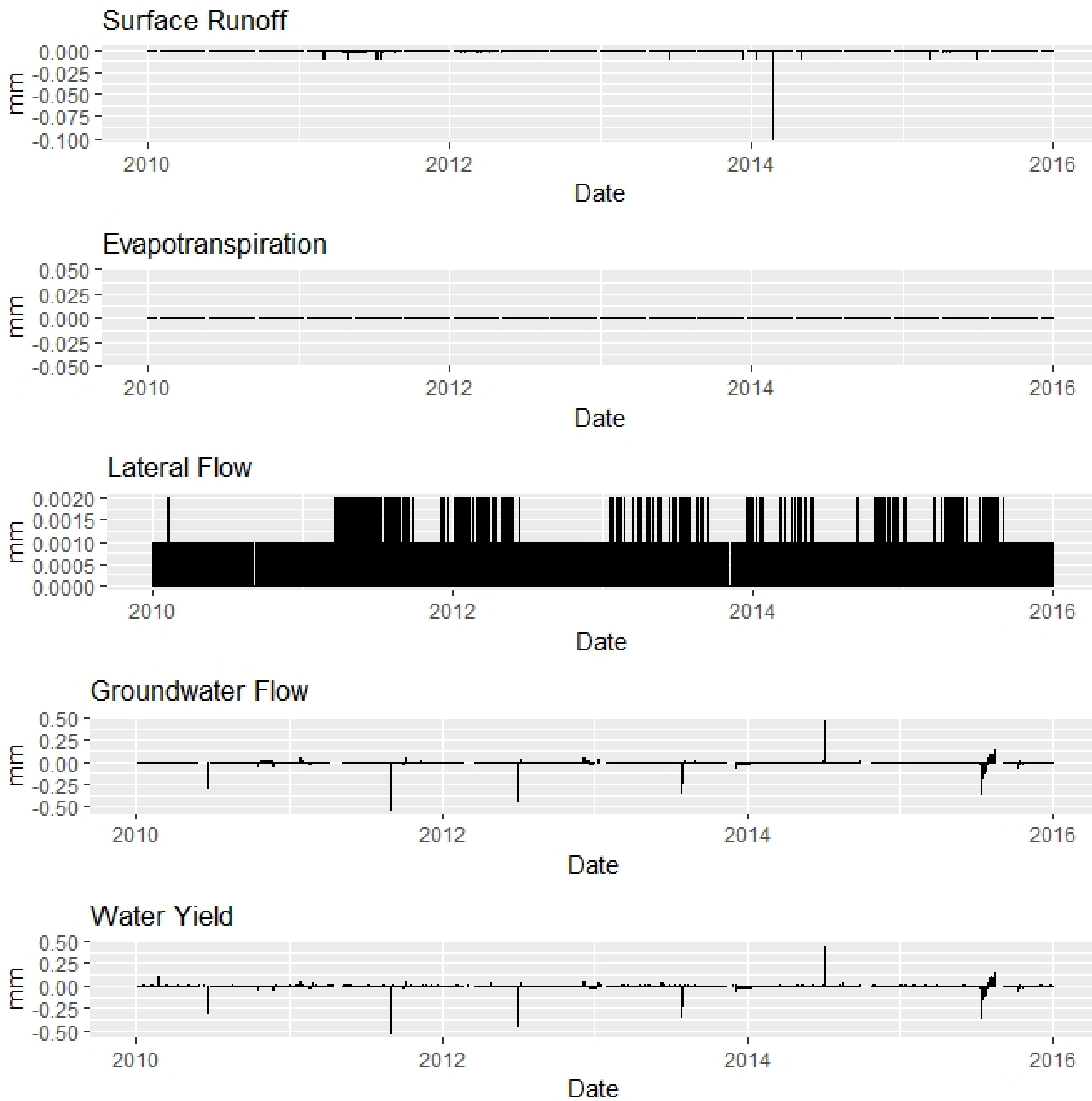


Figure D-4: Predicted *change* in sediment and nutrient yields of subbasin 051001010101: Headwaters of the Licking River, KY due to the Policy.

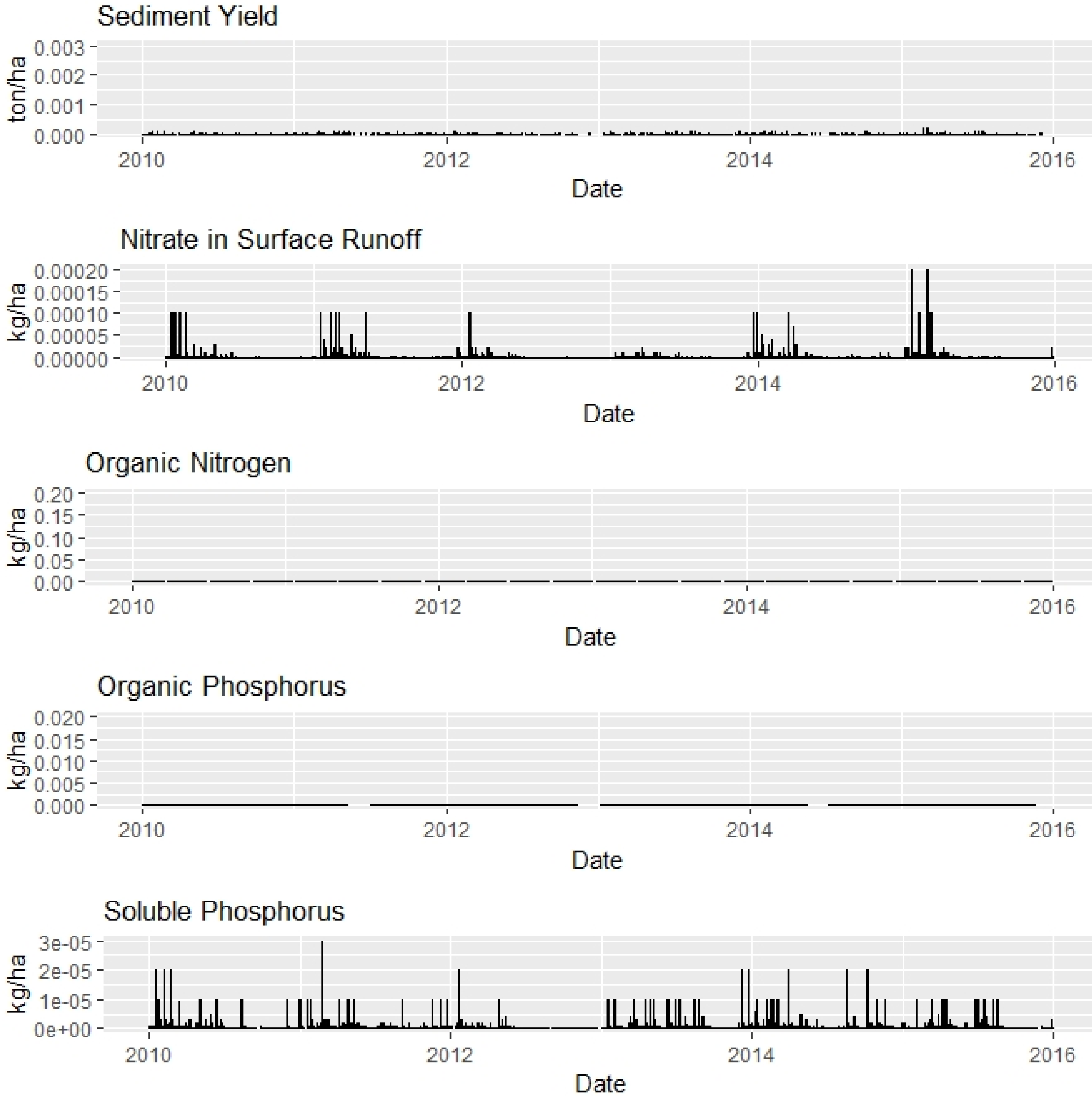


Figure D-5: Predicted daily stream flows and loads under the baseline (black) and policy (red) scenarios for the outlet of HUC 0510 (time series are generally superimposed).

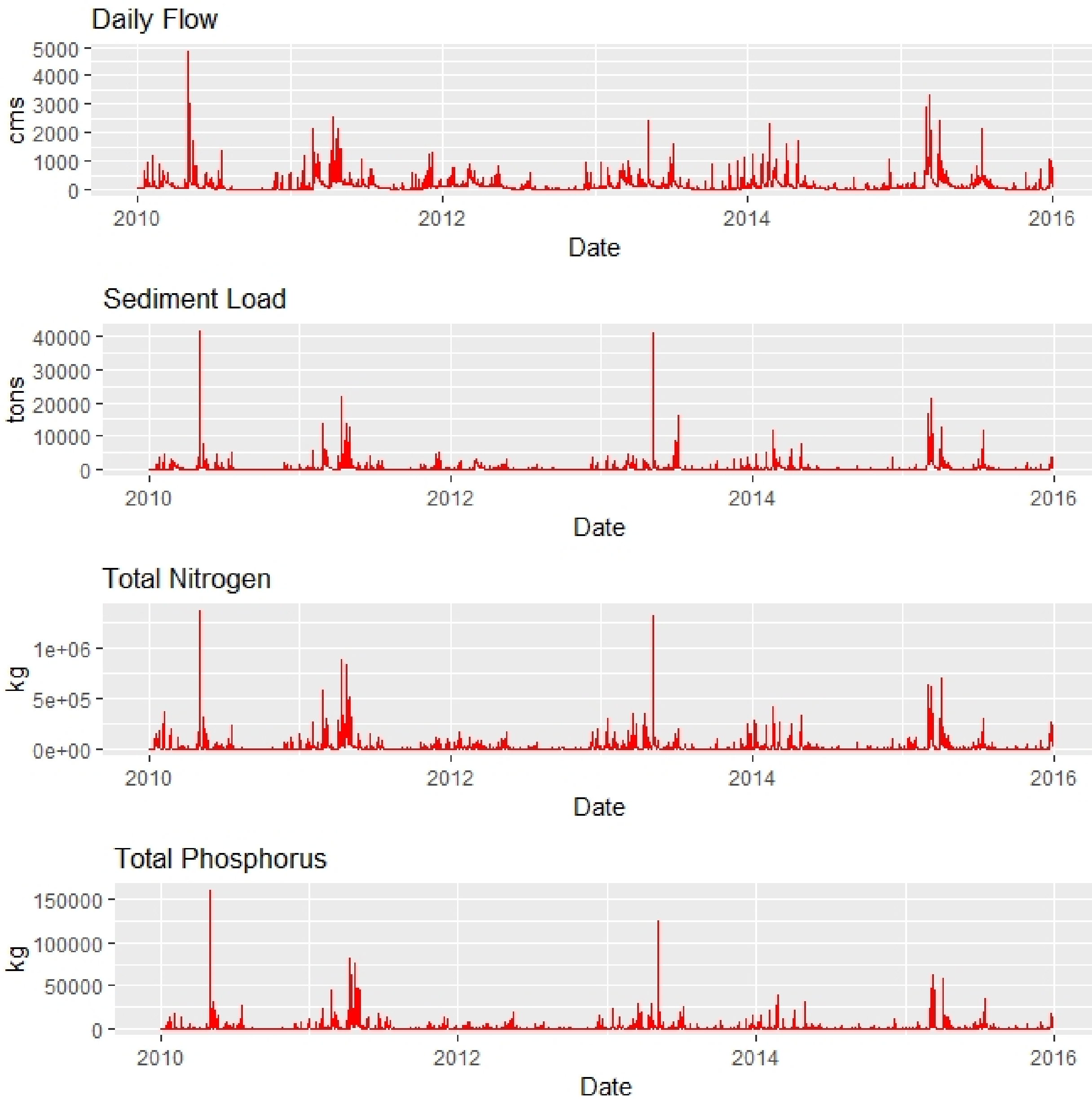
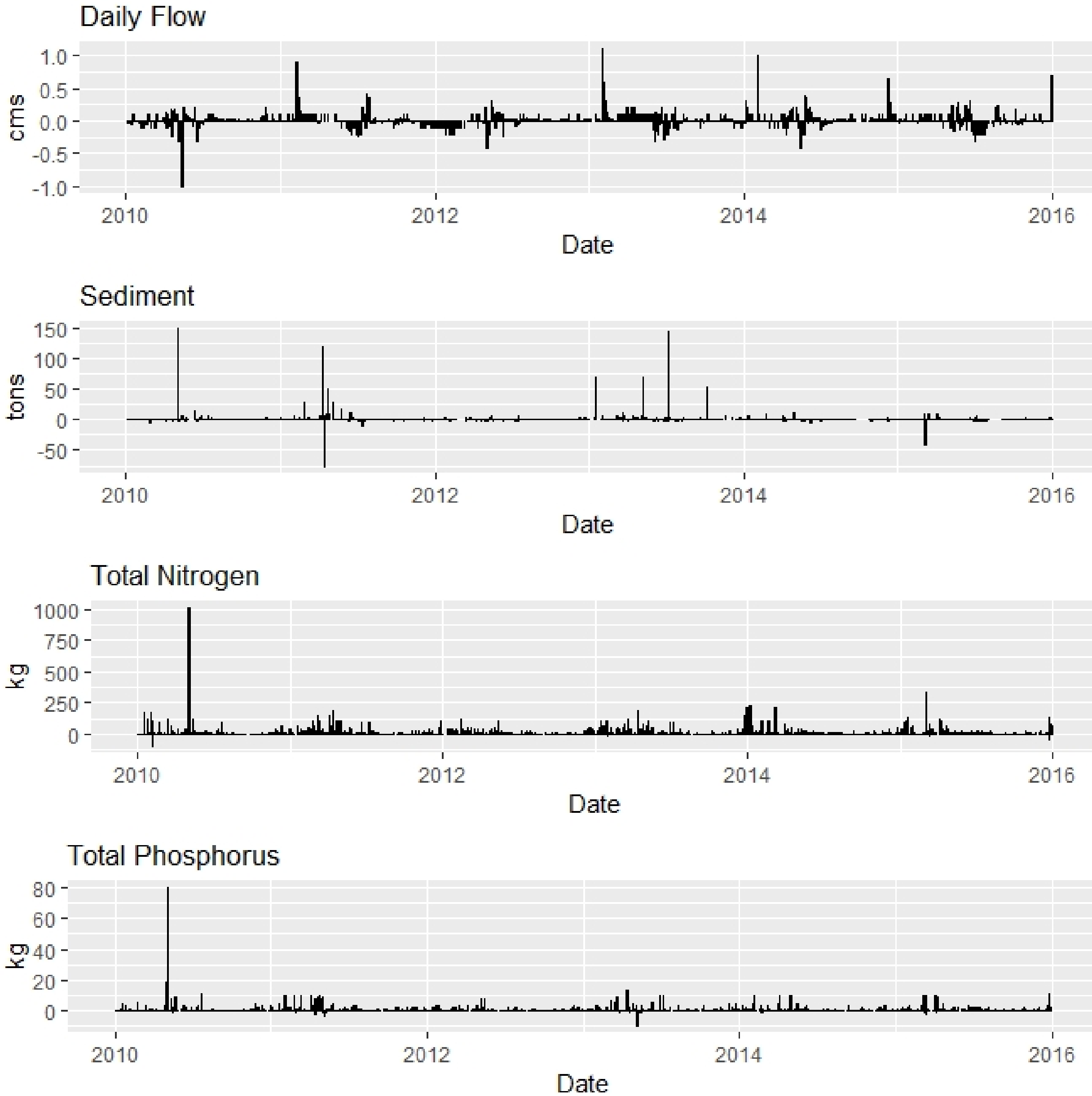


Figure D-6: Predicted *change* in daily stream flows and loads due to the policy scenarios at the outlet of HUC 0510.



Appendix E: Sensitivity Analyses

This appendix summarizes results of the agencies’ sensitivity analysis to evaluate the effects of different assumptions regarding the scope of 404 program impacts:

- **Permits affected by proposed rule**: In the main analysis, the agencies relied solely on the Army Corps of Engineers’ ORM2 database to identify 404 permits with mitigation requirements affecting waters that may no longer be jurisdictional under the proposed rule (ephemeral streams and RPWWN-type wetlands). In the sensitivity analysis, the agencies used an NHD-NWI adjacency analysis to account for the possibility of the proposed rule affecting additional non-abutting wetlands. The agencies used the following methodology to identify 404 permits affecting waters that may no longer be jurisdictional under the proposed rule:
  - **Ephemeral streams**: The Cowardin classes field in the Corps’ ORM2 database includes information about river/stream type (perennial, intermittent, or ephemeral). The agencies classified any stream with a “Riverine, Ephemeral” (R6) class as an ephemeral stream. Whenever the Cowardin code field did not specify stream type, the agencies assumed that the stream would remain jurisdictional under the proposed rule, which could possibly result in an underestimation of potentially affected waters.
  - **Wetlands adjacent to but not directly abutting permanent waters**: The agencies used the water type field in the Corps’ ORM2 database to select wetlands with a RPWWN water type. The RPWWN water type identifies wetlands that are adjacent to but do not directly abut relatively permanent waters.
  - **Additional non-abutting wetlands**: The agencies used latitude and longitude coordinates, provided in the ORM2 database, to locate waters affected by 404 permits on the NHD and NWI hydrographic networks. The agencies labeled wetlands not connected to an NHD reach as a non-abutting wetland. This methodology identified wetlands with several different water types, not just the RPWWN water type, as non-abutting.
- **Scope of impacts**: The sensitivity analysis includes both temporary and permanent impacts, as compared to permanent impacts only in the analysis described in Section IV.B
- **Width of assumed stream riparian buffer for linear impacts**: The sensitivity analysis assumes a width of 100 feet, as compared to 50 feet for the primary analysis described in Section IV.B.
- **Compensatory mitigation ratio**: The sensitivity analysis uses a 1.5:1 ratio for estimating cost savings from avoided wetland compensatory mitigation requirements (the agencies use the same 1:1 ratio used in the main analysis for estimating forgone benefits provided by wetlands and water quality impacts).

E.1 Case Study 1: Ohio River Basin

E.1.1 Section 402

Because the NHD data layer does not classify any streams as “ephemeral” in the Ohio River Basin region, the agencies did not perform a sensitivity analysis of section 402 program impacts using NHD data.

E.1.2 Section 404

Table E-1 summarizes section 404 permits issued in 2011-2015 within the two selected watersheds of the Ohio River Basin. The table includes permits that required mitigation and potentially affected ephemeral streams, non-abutting wetlands, or wetlands adjacent to but not directly abutting relatively permanent waters (RPWWN-type wetlands).

Table E-1: Section 404 permits issued in case study watersheds in the Ohio River Basin (2011-2015)[1]

State	# Permitted projects	# Permits with mitigation requirements potentially affected by changes to the definition of "waters of the United States"[2]	Permanent impacts		Average temporary impacts	
			Acres	Length feet	Acres	Length feet
HUC 0509						
IN	101	17	0.5	3,000	0.9	0
KY	226	15	4.5	41,122	0.0	0
OH	351	33	10.6	51,209	0.2	3,009
WV	141	0	0.0	0	0.0	0
Total	**819**	**65**	**15.6**	**95,331**	**1.1**	**3,009**
Avg. per year	**164**	**13**	**3.1**	**19,066**	**0.2**	**602**
HUC 0510						
KY	967	38	6.8	62,608	0.0	2,261
Total	**967**	**38**	**6.8**	**62608**	**0.0**	**2,261**
Avg. per year	**193**	**8**	**1.4**	**12,522**	**0.01**	**452**

[1] Values based on permits with mitigation requirements on waterways determined to be non-abutting wetlands, RPWWN-type wetlands, or ephemeral streams. Excludes permits issued for mitigation or restoration activities because the main purpose of these activities is to restore or enhance ecosystem services provided by water resources as opposed to dredge and fill activities that lead to permanent or temporary losses of ecosystem services.

[2] Number of permits includes permits with mitigation requirements that affect at least one water determined likely to no longer be jurisdictional under the CWA under the proposed rule.

Table E-2 presents expected reductions in average annual mitigation requirements in the Ohio River Basin under different likely state response scenarios following the proposed "waters of the United States" definitional changes.

Table E-2: Estimated changes in average mitigation required per year in the Ohio River Basin based on the sensitivity analysis methodology, by policy scenario[1,2]

State	Expected reduction in average mitigation acres per year			Expected reduction in average mitigation length feet per year			Expected reduction in average mitigation riparian acres per year[3]		
	Scenario 0	Scenario 1	Scenarios 2 & 3	Scenario 0	Scenario 1	Scenarios 2 & 3	Scenario 0	Scenario 1	Scenarios 2 & 3
HUC 0509									
IN	0.3	0.0	0.0	600	0	0	1.4	0.0	0.0
KY	0.9	0.9	0.9	8,224	8,224	8,224	18.9	18.9	18.9
OH	2.2	0.0	0.0	10,844	0	0	24.9	0.0	0.0

Table E-2: Estimated changes in average mitigation required per year in the Ohio River Basin based on the sensitivity analysis methodology, by policy scenario[1,2]

State	Expected reduction in average mitigation acres per year			Expected reduction in average mitigation length feet per year			Expected reduction in average mitigation riparian acres per year[3]		
	Scenario 0	Scenario 1	Scenarios 2 & 3	Scenario 0	Scenario 1	Scenarios 2 & 3	Scenario 0	Scenario 1	Scenarios 2 & 3
Total	**3.3**	**0.9**	**0.9**	**19,668**	**8,224**	**8,224**	**45.2**	**18.9**	**18.9**
HUC 0510									
KY	1.4	1.4	1.4	12,974	12,974	12,974	29.8	29.8	29.8
Total	**1.4**	**1.4**	**1.4**	**12,974**	**12,974**	**12,974**	**29.8**	**29.8**	**29.8**

[1] Values based on permits with mitigation requirements on waterways determined to be non-abutting wetlands, RPWWN-type wetlands, or ephemeral streams. Excludes permits issued for mitigation or restoration activities because these permits do not result in the loss of ecosystems services provided by wetlands and streams. Permanent and temporary acre and linear feet impacts provided in the ORM2 database are used to estimate mitigation requirements. For this analysis, the agencies assumed a 1:1 ratio for compensatory requirements based on the USACE guidance (U.S. Army Corps of Engineers 2014).

[2] Scenarios 2 and 3 are combined because all values are identical.

[3] Based on mitigation lengths where impacts in linear feet are converted to acres by multiplying total linear feet by an average total buffer width of 100 feet (50 feet on each side of the stream) and converting square feet to acres.

Table E-3 compares the mitigation reduction estimates using the methodology described in Section IV.B and the sensitivity analysis methodology.

Table E-3: Comparison of annual average mitigation requirements in the Ohio River Basin between the main methodology and the sensitivity analysis methodology

Impact Type	Acres[1]		Linear feet[2]		Stream riparian acres[3]		Total acreage[4]	
	Main	Sensitivity	Main	Sensitivity	Main	Sensitivity	Main	Sensitivity
HUC 0509								
Permanent	2.9	3.1	18,466	19,066	21.2	43.8	24.1	46.9
Temporary	0.0	0.2	0	602	0.0	1.4	0.0	1.6
Total	**2.9**	**3.3**	**18,466**	**19,668**	**21.2**	**45.2**	**24.1**	**48.5**
HUC 0510								
Permanent	1.0	1.4	12,458	12,522	14.3	28.7	15.3	30.1
Temporary	0.0	0.0	0	452	0.0	1.0	0.0	1.0
Total	**1.0**	**1.4**	**12,458**	**12,974**	**14.3**	**29.8**	**15.3**	**31.2**

[1] Sensitivity analysis includes permanent and temporary impact acres from RPWWN-type wetlands, non-abutting wetlands, and ephemeral streams. By contrast, the main analysis includes only permanent impact acres on RPWWN-type wetlands and ephemeral streams.

[2] Sensitivity analysis includes permanent and temporary impact linear feet on riparian areas of non-abutting wetlands, RPWWN-type wetlands, and ephemeral streams. By contrast, the main analysis includes only permanent impact linear feet on riparian areas of RPWWN-type wetlands and ephemeral streams.

[3] Sensitivity analysis converts permanent and temporary linear feet impacts to acres using a 100-foot mitigation width (50 feet on each side). By contrast, the main analysis converts permanent linear feet impacts to acres using a 50-foot mitigation width (25 feet on each side).

[4] Sum of the acres and stream riparian acres fields.

Table E-4, Table E-5, and Table E-6 present permit application cost savings, cost savings from reduced mitigation requirements, and total costs savings, respectively.

Table E-4: Average annual reduction in 404 permit application costs in the Ohio River Basin, based on the sensitivity analysis methodology[1,2]

Permit Type	Unit costs from Corps NWP analysis (2017$)	Scenario 0		Scenario 1		Scenarios 2 & 3	
		Annual average reduction in permits with proposed rule	Estimated reduction in permit costs (millions 2017$)	Annual average reduction in permits with proposed rule	Estimated reduction in permits costs (millions 2017$)	Annual average reduction in permit with proposed rule	Estimated reduction in permit costs (millions 2017$)
HUC 0509							
IP	$14,700	0.2	<$0.01	0.0	$0.00	0.0	$0.00
GP	$4,400	36.2	$0.16	14.4	$0.06	5.4	$0.02
Total		**36.4**	**$0.16**	**14.4**	**$0.06**	**5.4**	**$0.02**
HUC 0510							
IP	$14,700	0.0	$0.00	0.0	$0.00	0.0	$0.00
GP	$4,400	63.0	$0.28	63.0	$0.28	63.0	$0.28
Total		**63.0**	**$0.28**	**63.0**	**$0.28**	**63.0**	**$0.28**
Both Watersheds							
IP		0.2	<$0.01	0.0	$0.00	0.0	$0.00
GP		99.2	$0.44	77.4	$0.34	68.4	$0.30
Total		**99.4**	**$0.44**	**77.4**	**$0.34**	**68.4**	**$0.30**

[1] Includes permits estimated to only affect waters no longer jurisdictional under the CWA under the proposed rule (*e.g.*, non-abutting wetlands, RPWWN-type wetlands, and ephemeral streams).

[2] Scenarios 2 and 3 are combined because all values are identical.

Table E-5: Annual cost savings (2017$) of reduced mitigation requirements in the Ohio River Basin based on the sensitivity analysis methodology, by policy scenario[1,2]

State	Cost per acre (2017$)		Cost per linear foot (2017$)		Scenario 0 (Millions 2017$)		Scenario 1 (Millions 2017$)		Scenarios 2 & 3 (Millions 2017$)	
	Low	High	Low	High	Low	High	Low	High	Low	High
HUC 0509										
IN	$50,000	$71,000	$294	$636	$0.29	$0.60	$0.00	$0.00	$0.00	$0.00
KY	$110,016	$165,024	$300	$755	$3.85	$9.54	$3.85	$9.54	$3.85	$9.54
OH	$37,500	$216,000	$165	$1,350	$2.81	$22.66	$0.00	$0.00	$0.00	$0.00
Total	-	-	-	-	**$6.94**	**$32.80**	**$3.85**	**$9.54**	**$3.85**	**$9.54**
HUC 0510										
KY	$110,016	$165,024	$300	$755	$6.07	$15.03	$6.07	$15.03	$6.07	$15.03
Total	-	-	-	-	**$6.07**	**$15.03**	**$6.07**	**$15.03**	**$6.07**	**$15.03**
Both Watersheds										
Total	-	-	-	-	**$13.01**	**$47.83**	**$9.92**	**$24.57**	**$9.92**	**$24.57**

[1] Estimated changes in average mitigation required per year are presented in Table E-2. For each state, cost savings are calculated by multiplying the cost of each mitigation acre or linear foot (low and high estimates) by the expected reduction in annual mitigation requirements, summing the acreage and linear feet values for each scenario, and multiplying the total by 1.5. The agencies multiply the total by 1.5 to account for a compensatory mitigation requirement ratio of 1.5:1.

[2] Scenarios 2 and 3 are combined because all values are identical.

Table E-6: Total estimated annual cost savings in the Ohio River Basin, based on the sensitivity analysis methodology[1,2]

HUC	Scenario 0		Scenario 1		Scenario 2 & 3	
	Low	High	Low	High	Low	High
0509	$7.10	$32.96	$3.91	$9.60	$3.87	$9.56
0510	$6.34	$15.31	$6.34	$15.31	$6.34	$15.31
Total	**$13.45**	**$48.27**	**$10.26**	**$24.91**	**$10.22**	**$24.87**

[1] Scenarios 2 and 3 are combined because all values are identical.

[2] For HUC 0509, Scenario 0 includes cost savings in Indiana, Kentucky, Ohio, and West Virginia. Scenario 1 includes cost savings in Kentucky and West Virginia. Scenario 3 includes cost savings in Kentucky only. For HUC 0510, cost savings remain constant across all scenarios since all permits are issued in Kentucky, a state that is not likely to regulate waters above federal requirements.

Table E-7 and Table E-8 provide estimated annualized forgone benefits from lost mitigation requirements in the Ohio River Basin under different state response scenarios, with three percent and seven percent discount rates, respectively.

Table E-7: Annualized forgone benefits (Millions 2017$) of lost mitigation requirements in the Ohio River Basin based on the sensitivity analysis methodology, by policy scenario (3% Discount Rate)[1,2]

HUC	# Affected households in 2020[3]	Scenario 0		Scenario 1		Scenarios 2 & 3	
		Low	High	Low	High	Low	High
0509	5,170,870	$1.11	$7.35	$0.45	$3.00	$0.45	$3.00
0510	1,866,005	$0.27	$1.78	$0.27	$1.78	$0.27	$1.78
Total	**7,036,875**	**$1.37**	**$9.13**	**$0.72**	**$4.78**	**$0.72**	**$4.78**

[1] Estimated changes in average mitigation required per year are presented in Table E-2. Forgone benefits are calculated for each scenario by multiplying total forgone mitigation values for each scenario (sum of acres and linear feet converted into acres) by the total number of affected households and the appropriate household WTP value (low: $0.006/acre; high: $0.038/acre). The agencies calculated forgone benefits for the years 2020-2039 and annualized values using a 3% discount rate.

[2] Scenarios 2 and 3 are combined because all values are identical.

[3] The agencies accounted for population growth and change in the number of households throughout the 2020-2039 study period.

Table E-8: Annualized forgone benefits (Millions 2017$) of lost mitigation requirements in the Ohio River Basin based on the sensitivity analysis methodology, by policy scenario (7% Discount Rate)[1,2]

HUC	# Affected households in 2020[3]	Scenario 0		Scenario 1		Scenarios 2 & 3	
		Low	High	Low	High	Low	High
0509	5,170,870	$0.82	$5.44	$0.33	$2.22	$0.33	$2.22
0510	1,866,005	$0.20	$1.31	$0.20	$1.31	$0.20	$1.31
Total	**7,036,875**	**$1.02**	**$6.75**	**$0.53**	**$3.53**	**$0.53**	**$3.53**

[1] Estimated changes in average mitigation required per year are presented in Table E-2. Forgone benefits are calculated for each scenario by multiplying total forgone mitigation values for each scenario (sum of acres and linear feet converted into acres) by the total number of affected households and the appropriate household WTP value (low: $0.006/acre; high:

Table E-8: Annualized forgone benefits (Millions 2017$) of lost mitigation requirements in the Ohio River Basin based on the sensitivity analysis methodology, by policy scenario (7% Discount Rate)[1,2]

HUC	# Affected households in 2020[3]	Scenario 0		Scenario 1		Scenarios 2 & 3	
		Low	High	Low	High	Low	High

$0.038/acre). The agencies calculated forgone benefits for the years 2020-2039 and annualized values using a 7% discount rate.

[2] Scenarios 2 and 3 are combined because all values are identical.

[3] The agencies accounted for population growth and change in the number of households throughout the 2020-2039 study period.

E.1.3 Section 311

Because the NHD data layer does not distinguish between intermittent and ephemeral streams in the Ohio River Basin region, the agencies did not perform a sensitivity analysis of section 311 program impacts using NHD data.

E.1.4 Water Quality Modeling

As described in Section IV.B.2.3.1, the SWAT models do not coincide exactly with the watershed boundaries analyzed for the 404 program impacts. Table E-9 summarizes the impact of different assumptions on the sensitivity analysis inputs. Forgone mitigation in the sensitivity analysis is approximately twice that analyzed under the main analysis presented in Section IV.B.2.3.1.

Table E-9: Changes between 404 program impacts for the sensitivity scenario vs. primary scenario for the Ohio River Basin SWAT models based on permits issued 2011-2015 (5 Years)

	0509				0510			
	Area impacts to wetland abutting epheme-ral stream (Acres)	Linear impacts to epheme-ral stream (Acres)[1]	Area impacts to non-abutting wetlands (Acres)	Total	Area impacts to wetland abutting epheme-ral stream (Acres)	Linear impacts to epheme-ral stream (Acres)[1]	Area impacts to non-abutting wetlands (Acres)	Total
Total Primary Scenario	**14.3**	**106.0**	**0**	**120.3**	**2.8**	**33.5**	**0**	**36.3**
+ non-abutting wetlands	0.0	0.0	1.3	1.3	0.0	0.0	1.3	1.3
+ mitigation of temporary impacts	0.7	3.5	0.4	4.6	0.0	2.3	0.0	2.3
+ Widen buffer width (100 vs. 50 ft)	0	109.4	0	109.4	0	35.8	0	35.8

Table E-9: Changes between 404 program impacts for the sensitivity scenario vs. primary scenario for the Ohio River Basin SWAT models based on permits issued 2011-2015 (5 Years)

	0509				0510			
	Area impacts to wetland abutting epheme-ral stream (Acres)	Linear impacts to epheme-ral stream (Acres)[1]	Area impacts to non-abutting wetlands (Acres)	Total	Area impacts to wetland abutting epheme-ral stream (Acres)	Linear impacts to epheme-ral stream (Acres)[1]	Area impacts to non-abutting wetlands (Acres)	Total
Total Sensitivity Scenario	**15.0**	**218.9**	**1.7**	**235.6**	**2.8**	**71.5**	**1.3**	**75.6**

[1] Linear impacts converted to areas by multiplying the lengths by 50 feet for the Primary Scenario (Main Analysis) and by 100 feet for the Sensitivity Scenario and applying a conversion factor (1 acre = 43,560 square feet).

Table E-10 through Table E-15 present water quality modeling results for the sensitivity analysis, following the same format as used in Section IV.B for the main analysis.

Table E-10: Summary of 404 Program activities in Ohio River Basin SWAT models for permits with permanent or temporary impacts to waters potentially affected by the proposed rule and with mitigation requirements over 20-year analysis period. Modeled scenario considers both permanent and temporary impacts.

Type of potentially affected resource[2]	Permanent			Temporary			Total impacts (acres)
	Acres	Linear feet	Total[1] acres	Acres	Linear feet	Total[1] acres	
HUC 0509							
Wetland abutting ephemeral stream	62.5	0	62.5	4.4	0	4.4	64.0
Ephemeral stream	0.0	369,323	847.8	0.0	12,036	27.6	875.5
Total	**62.5**	**369,323**	**910.4**	**4.4**	**12,036**	**31.1**	**942.5**
HUC 0510							
Wetland abutting ephemeral stream	16.3	0	16.3	0.1	0	0.1	16.4
Ephemeral stream	0.0	116,804	268.1	0.0	7,844	18.0	286.2
Total	**16.3**	**116,804**	**284.5**	**0.1**	**7,844**	**18.1**	**302.6**

[1] Represents the sum of impacts reported in acres and impacts reported in linear feet, assuming a width of 100 feet for linear impacts.

[2] See Table IV-8 for criteria used to identify affected resources that may change jurisdiction under the proposed rule.

Table E-11: Summary of basin-level annual average water balance and constituent transport in Ohio River Basin SWAT watersheds for the sensitivity scenario

Parameter	HUC 0509				HUC 0510			
	Baseline	Policy	Change	% Change	Baseline	Policy	Change	% Change
Precipitation (mm)	1,239.00	1,239.00	0.00	0.0%	1,331.80	1,331.80	0.00	0.0%
Surface runoff (mm)	183.22	183.21	-0.01	0.0%	357.12	357.11	-0.01	0.0%
Lateral flow (mm)	218.70	218.87	0.17	0.1%	78.03	78.51	0.48	0.6%
Groundwater flow (mm)	40.03	39.96	-0.07	-0.2%	61.88	61.63	-0.25	-0.4%
Water yield (mm)	495.14	495.08	-0.06	0.0%	524.75	524.75	0.00	0.0%
Evapotranspiration (mm)	738.80	738.90	0.10	0.0%	739.90	740.00	0.10	0.0%
Sediment loading (ton/ha)	2.410	2.420	0.010	0.4%	1.17	1.18	0.010	0.9%
Organic N (kg/ha)	2.360	2.361	0.001	0.0%	7.008	7.013	0.005	0.1%
Organic P (kg/ha)	0.267	0.267	0.000	0.0%	0.582	0.583	0.001	0.2%
NO_3 in surface runoff (kg/ha)	0.954	0.954	0.000	0.0%	2.637	2.639	0.002	0.1%
NO_3 in lateral flow (kg/ha)	1.018	1.019	0.001	0.1%	0.593	0.594	0.001	0.2%
Soluble P yield (kg/ha)	0.137	0.137	0.000	0.0%	0.192	0.192	0.000	0.0%
NO_3 leached (kg/ha)	0.494	0.494	0.000	0.0%	2.535	2.536	0.001	0.0%
P leached (kg/ha)	0.009	0.009	0.000	0.0%	0.021	0.021	0.000	0.0%

Table E-12: Estimated change in annual average subbasin water balance and constituent transport in SWAT watershed HUC 0509 for the sensitivity scenario

Model parameter	Number of subbasins by direction of change[1]		Absolute change			
	Increase	Decrease	Average	Median	Minimum	Maximum
Evapotranspiration (mm/yr)	283	11	0.06	0.02	-0.34	0.99
Surface runoff (mm/yr)	5	295	-0.16	-0.15	-0.68	0.10
Lateral flow (mm/yr)	291	9	0.17	0.16	-0.58	0.69
Groundwater flow (mm/yr)	2	300	-0.07	-0.04	-0.51	0.05
Total water yield (mm/yr)	2	291	-0.07	-0.03	-1.27	0.00
Sediment yield (ton/ha/yr)	302	0	0.003	0.000	0.000	0.034
Organic N (kg/ha/yr)	291	10	0.001	0.000	0.000	0.018
Organic P (kg/ha/yr)	284	17	0.000	0.000	0.000	0.002
NO_3 in surface runoff (kg/ha/yr)	284	17	0.000	0.000	0.000	0.004
Soluble P (kg/ha/yr)	190	111	0.000	0.000	0.000	0.000

[1] Total number of SWAT HUC12 reaches is 346. Some modeled reaches show no change in annual average values and are not included in the counts above.

Table E-13: Estimated change in annual average subbasin water balance and constituent transport in SWAT watershed HUC 0510 for the sensitivity scenario

Model parameter	Number of subbasins by direction of change[1]		Absolute change			
	Increase	Decrease	Average	Median	Minimum	Maximum
Evapotranspiration (mm/yr)	84	0	0.05	0.02	0.00	0.43
Surface runoff (mm/yr)	8	81	-0.34	-0.34	-1.71	0.12
Lateral flow (mm/yr)	86	0	0.48	0.52	0.00	1.78
Groundwater flow (mm/yr)	11	80	-0.20	-0.10	-3.79	4.17

Table E-13: Estimated change in annual average subbasin water balance and constituent transport in SWAT watershed HUC 0510 for the sensitivity scenario

Model parameter	Number of subbasins by direction of change[1]		Absolute change			
	Increase	Decrease	Average	Median	Minimum	Maximum
Total water yield (mm/yr)	35	59	0.02	-0.02	-2.90	3.60
Sediment yield (ton/ha/yr)	92	2	0.007	0.004	0.000	0.053
Organic N (kg/ha/yr)	90	5	0.005	0.004	-0.023	0.037
Organic P (kg/ha/yr)	89	6	0.000	0.000	-0.001	0.003
NO_3 in surface runoff (kg/ha/yr)	90	5	0.002	0.002	-0.005	0.018
Soluble P (kg/ha/yr)	41	54	0.000	0.000	-0.001	0.001

[1] Total number of SWAT HUC12 reaches is 106. Some modeled reaches show no change in annual average values and are not included in the counts above.

Table E-14: Summary of predicted changes in loads transported by HUC12 reaches and in-stream concentrations within the SWAT watersheds for the Ohio River Basin for the sensitivity scenario

Parameter	Number of reaches by direction of change[1]		Magnitude of change				
	Increase	Decrease	Average Change	Median Change	Average % Change	Median % Change	Maximum % Change
HUC 0509							
Annual TN load (kg/yr)	312	3	235.7	11.9	0.03%	0.01%	0.22%
Annual TP load (kg/yr)	308	5	16.0	1.0	0.02%	0.01%	0.23%
Annual sediment load (kg/yr)	165	148	16.3	0.0	0.02%	0.00%	1.10%
Mean daily flow (cms)	13	300	-0.003	0.000	-0.01%	0.00%	0.06%
HUC 0510							
Annual TN load (kg/yr)	97	3	718.6	132.7	0.08%	0.07%	8.88%
Annual TP load (kg/yr)	96	4	40.7	9.9	0.06%	0.04%	5.91%
Annual sediment load (kg/yr)	58	42	31.7	0.0	0.06%	0.00%	6.19%
Mean daily flow (cms)	48	51	0.001	0.000	0.01%	0.00%	1.16%

[1] Total number of reaches is 346 in HUC 0509 and 106 in HUC 0510. Some modeled reaches show no change in annual average values and are not included in the counts above.

Table E-15: Predicted changes in annual average loads delivered to the outlet of Ohio River Basin SWAT watersheds for the sensitivity scenario

Parameter	Baseline	Policy	Change	% Change
HUC 0509				
Annual TN load (kg/yr)	280,556	280,626	69	0.02%
Annual TP load (kg/yr)	79,523	79,527	4	<0.01%
Annual sediment load (ton/yr)	2,227,540	2,227,531	-9	<0.01%
HUC 0510				
Annual TN load (kg/yr)	8,683,306	8,689,948	6,642	0.08%
Annual TP load (kg/yr)	714,975	715,287	312	0.04%
Annual sediment load (ton/yr)	156,983	157,386	403	0.26%

E.1.5 Dredging for Water Storage and Navigation

Table E-16 presents predicted net sediment depositions in reservoirs in the Ohio River Basin for the sensitivity scenario. Costs under the sensitivity scenario are summarized in Table E-17.

Table E-16: Summary of predicted net sediment depositions in reservoirs in the Ohio River Basin (tons/year) in 2040 for sensitivity scenario

HUC4	Number of reservoirs[1]	Net annual sediment deposition in reservoirs		Change relative to baseline	
		Baseline	Sensitivity	Tons/year	Percent
0509	11	516,560	517,559	998	0.19%
0510	1	57,034	57,076	42	< 0.1%
Total	12	573,594	574,635	1040	0.18%

[1] Reservoirs modeled in SWAT watersheds, based on the U.S. Army Corps of Engineers National Inventory of Dams as of October 2010.

Table E-17: Annualized Dredging Cost Changes in Ohio River Basin (2017$ thousands) for the Sensitivity Scenario

HUC4	Increase in annual sediment (cubic yards) (2040)	3% Discount rate ($/year)			7% Discount rate ($/year)		
		Low	Medium	High	Low	Medium	High
0509	998	$5.1	$5.4	$5.6	$3.8	$4.4	$4.8
0510	42	$0.2	$0.2	$0.2	$0.2	$0.2	$0.2
Total	1040	$5.3	$5.6	$5.8	$4.0	$4.6	$5.0

E.2 Case Study 2: Lower Missouri River Basin

E.2.1 Section 402

Because the NHD data layer does not classify any streams as "ephemeral" in the Lower Missouri River Basin region, the agencies did not perform a sensitivity analysis of section 402 program impacts using NHD data.

E.2.2 Section 404

Table E-18 summarizes section 404 permits issued in 2011-2015 within the two selected watersheds of the Lower Missouri River Basin. The table includes permits that required mitigation and potentially affected ephemeral streams, non-abutting wetlands, or wetlands adjacent to but not directly abutting relatively permanent waters.

Table E-18: Section 404 permits issued in case study watersheds in the Lower Missouri River Basin (2011-2015)[1]

State	# Permitted projects	# Permits with mitigation requirements potentially affected by proposed changes to the definition of "waters of the United States"[2]	Permanent impacts		Temporary impacts	
			Acres	Length feet	Acres	Length feet
HUC 1025						
CO	10	0	0.0	0	0.0	0
KS	207	39	0.9	33230	0.0	5005
NE	141	2	0.0	0	0.0	0
Total	**358**	**41**	**0.9**	**33,230**	**0.0**	**5,005**
Avg. per year	**72**	**8**	**0.2**	**6,646**	**0.0**	**1,001**
HUC 1027						
KS	742	67	17.1	39,131	3.1	730
MO	1	0	0.0	0	0.0	0
NE	288	10	0.8	236	3.4	0
Total	**1031**	**77**	**17.9**	**39,367**	**6.4**	**730**
Avg. per year	**206**	**15**	**3.6**	**7,873**	**1.3**	**146**

[1] Values based on permits with mitigation requirements on waterways determined to be non-abutting wetlands, RPWWN-type wetlands, or ephemeral streams. Excludes permits issued for mitigation or restoration activities because the main purpose of these activities is to restore or enhance ecosystem services provided by water resources as opposed to dredge and fill activities that lead to permanent or temporary losses of ecosystem services.

[2] Number of permits includes permits with mitigation requirements that potentially affect at least one water no longer jurisdictional under the CWA under the proposed rule.

Table E-19 presents expected reductions in average annual mitigation requirements in the Lower Missouri River Basin under different likely state response scenarios following the proposed "waters of the United States" definitional changes.

Table E-19: Estimated changes in average mitigation required per year in the Lower Missouri River Basin based on the sensitivity analysis methodology, by policy scenario[1,2]

State	Expected reduction in average mitigation acres per year			Expected reduction in average mitigation length feet per year			Expected reduction in average mitigation riparian acres per year[3]		
	Scenario 0 & 1	Scenario 2	Scenario 3	Scenario 0 & 1	Scenario 2	Scenario 3	Scenario 0 & 1	Scenario 2	Scenario 3
HUC 1025									
KS	0.2	0.0	0.0	7,647	0	0	17.6	0.0	0.0
NE	0.0	0.0	0.0	0	0	0	0.0	0.0	0.0
Total	**0.2**	**0.0**	**0.0**	**7,647**	**0**	**0**	**17.6**	**0.0**	**0.0**
HUC 1027									
KS	4.0	0.0	0.0	7,972	0	0.0	18.3	0.0	0.0
NE	0.8	0.0	0.0	47	0	0.0	0.1	0.0	0.0
Total	**4.9**	**0.0**	**0.0**	**8,019**	**0**	**0.0**	**18.4**	**0.0**	**0.0**

[1] Values based on permits with mitigation requirements on waterways determined to be non-abutting wetlands, RPWWN-type wetlands, or ephemeral streams. Excludes permits issued for mitigation or restoration activities because these permits do not result in the loss of ecosystems services provided by wetlands and streams. Permanent and temporary acre and linear feet impacts provided in the ORM2 database are used to estimate mitigation requirements. The agencies assumed a 1:1 ratio for compensatory requirements based on the USACE guidance (U.S. Army Corps of Engineers 2014).

[2] Scenarios 0 and 1 are combined because all values are identical.

[3] Based on mitigation lengths where impacts in linear feet are converted to acres by multiplying total linear feet by an average total buffer width of 100 feet (50 feet on each side of the stream) and converting square feet to acres.

Table E-20 compares the mitigation reduction estimates in the Lower Missouri River Basin using the methodology described in Section IV.B and the sensitivity analysis methodology.

Table E-20: Comparison of annual average mitigation requirements in the Lower Missouri River Basin between the main methodology and the sensitivity analysis methodology

Impact Type	Acres[1]		Linear feet[2]		Stream riparian acres[3]		Total acreage[4]	
	Main	Sensitivity	Main	Sensitivity	Main	Sensitivity	Main	Sensitivity
HUC 0509								
Permanent	0.1	0.2	6,646	6,646	7.6	15.3	7.8	15.4
Temporary	0.0	0.0	0	1,001	0.0	2.3	0.0	2.3
Total	**0.1**	**0.2**	**6,646**	**7,647**	**7.6**	**17.6**	**7.8**	**17.7**
HUC 0510								
Permanent	0.9	3.6	7,873	7,873	9.0	18.1	10.0	21.7
Temporary	0.0	1.3	0	146	0.0	0.3	0.0	1.6
Total	**0.9**	**4.9**	**7,873**	**8,019**	**9.0**	**18.4**	**10.0**	**23.3**

[1] Sensitivity analysis includes permanent and temporary impact acres from RPWWN-type wetlands, non-abutting wetlands, and ephemeral streams. By contrast, the main analysis includes only permanent impact acres on RPWWN-type wetlands and ephemeral streams.

[2] Main analysis includes permanent impact linear feet on riparian areas of RPWWN-type wetlands and ephemeral streams. Sensitivity analysis includes permanent and temporary impact linear feet on riparian areas of non-abutting wetlands, RPWWN-type wetlands, and ephemeral streams.

[3] Sensitivity analysis converts permanent and temporary linear feet impacts to acres using a 100-foot mitigation width (50 feet on each side). By contrast, the main analysis converts permanent linear feet impacts to acres using a 50-foot mitigation width (25 feet on each side).

[4] Sum of the acres and stream riparian acres fields.

Table E-21, Table E-22, and Table E-23 present permit application cost savings, cost savings from reduced mitigation requirements, and total costs savings, respectively.

Table E-21: Average annual reduction in 404 permit application costs in the Lower Missouri River Basin, based on the sensitivity analysis methodology[1,2]

Permit Type	Unit costs from Corps NWP analysis (2017$)	Scenarios 0 & 1		Scenario 2		Scenario 3	
		Annual average reduction in permits with proposed rule	Estimated reduction in permit costs (millions 2017$)	Annual average reduction in permits with proposed rule	Estimated reduction in permits costs (millions 2017$)	Annual average reduction in permit with proposed rule	Estimated reduction in permit costs (millions 2017$)
HUC 1025							
IP	$14,700	0.2	<$0.01	0.0	$0.00	0.0	$0.00
GP	$4,400	22.4	$0.10	1.0	<$0.01	0.0	$0.00
Total		**22.6**	**$0.10**	**1.0**	**<$0.01**	**0.0**	**$0.00**
HUC 1027							
IP	$14,700	2.0	$0.03	0.2	<$0.01	0.0	$0.00
GP	$4,400	40.0	$0.18	0.2	<$0.01	0.0	$0.00
Total		**42.0**	**$0.21**	**0.4**	**<$0.01**	**0.0**	**$0.00**
Both Watersheds							
IP		2.2	$0.03	0.2	<$0.01	0.0	$0.00
GP		62.4	$0.27	1.2	$0.01	0.0	$0.00
Total		**64.6**	**$0.31**	**1.4**	**$0.01**	**0.0**	**$0.00**

[1] Includes permits estimated to only affect waters no longer jurisdictional under the CWA under the proposed rule (*i.e.*, non-abutting wetlands, RPWWN-type wetlands, and ephemeral streams).

[2] Scenarios 0 and 1 are combined because all values are identical.

Table E-22: Annual cost savings (2017$) of reduced mitigation requirements in the Lower Missouri River Basin based on the sensitivity analysis methodology, by policy scenario[1,2]

State	Cost per acre (2017$)		Cost per linear foot(2017$)		Scenarios 0 & 1 (Millions 2017$)		Scenario 2 (Millions 2017$)		Scenario 3 (Millions 2017$)	
	Low	High	Low	High	Low	High	Low	High	Low	High
HUC 1025										
KS	$54,000	$105,400	$90	$360	$1.05	$4.16	$0.00	$0.00	$0.00	$0.00
NE	$54,000	$105,400	$90	$360	<$0.01	<$0.01	$0.00	$0.00	$0.00	$0.00
Total	-	-	-	-	**$1.05**	**$4.16**	**$0.00**	**$0.00**	**$0.00**	**$0.00**
HUC 1027										
KS	$54,000	$105,400	$90	$360	$1.40	$4.94	$0.00	$0.00	$0.00	$0.00
NE	$54,000	$105,400	$90	$360	$0.07	$0.16	$0.00	$0.00	$0.00	$0.00
Total	-	-	-	-	**$1.48**	**$5.10**	**$0.00**	**$0.00**	**$0.00**	**$0.00**
Both Watersheds										
Total	-	-	-	-	**$2.52**	**$9.26**	**$0.00**	**$0.00**	**$0.00**	**$0.00**

[1] Estimated changes in average mitigation required per year are presented in Table E-19. For each state, cost savings are calculated by multiplying the cost of each mitigation acre or linear foot (low and high estimates) by the expected reduction

Table E-22: Annual cost savings (2017$) of reduced mitigation requirements in the Lower Missouri River Basin based on the sensitivity analysis methodology, by policy scenario[1,2]

State	Cost per acre (2017$)		Cost per linear foot(2017$)		Scenarios 0 & 1 (Millions 2017$)		Scenario 2 (Millions 2017$)		Scenario 3 (Millions 2017$)	
	Low	High	Low	High	Low	High	Low	High	Low	High

in annual mitigation requirements, summing the acreage and linear feet values for each scenario, and multiplying the total by 1.5. The agencies multiply the total by 1.5 to account for a compensatory mitigation requirement ratio of 1.5:1.

[2] Scenarios 0 and 1 are combined because all values are identical.

Table E-23: Total estimated annual cost savings in the Lower Missouri River Basin, based on the sensitivity analysis methodology[1,2]

HUC	Scenarios 0 & 1		Scenario 2		Scenario 3	
	Low	High	Low	High	Low	High
1025	$1.15	$4.26	<$0.01	<$0.01	$0.00	$0.00
1027	$1.68	$5.30	<$0.01	<$0.01	$0.00	$0.00
Total	**$2.83**	**$9.56**	**$0.01**	**$0.01**	**$0.00**	**$0.00**

[1] Scenarios 0 and 1 are combined because all values are identical.

[2] Scenarios 0 and 1 include cost savings in Kansas, Nebraska, and Colorado. Scenario 2 includes cost savings in Colorado only. Since none of the 404 permits issued in Colorado between 2011 and 2015 with impacts to waters affected by the proposed rule had mitigation requirements, Scenario 2 only includes minimal permits cost savings. Under Scenario 3, cost savings drop to zero because all states in the case study region are expected to regulate waters beyond CWA requirements.

Table E-24 and Table E-25 provide estimated annualized forgone benefits from lost mitigation requirements in the Lower Missouri River Basin under different state response scenarios, with three percent and seven percent discount rates, respectively.

Table E-24: Annualized forgone benefits (Millions 2017$) of lost mitigation requirements in the Lower Missouri River Basin based on the sensitivity analysis methodology, by policy scenario (3% Discount Rate)[1,2]

HUC	# Affected households in 2020[3]	Scenarios 0 & 1		Scenario 2		Scenario 3	
		Low	High	Low	High	Low	High
1025	1,264,605	$0.10	$0.68	$0.00	$0.00	$0.00	$0.00
1027	1,689,217	$0.18	$1.20	$0.00	$0.00	$0.00	$0.00
Total	**2,953,822**	**$0.28**	**$1.88**	**$0.00**	**$0.00**	**$0.00**	**$0.00**

[1] Estimated changes in average mitigation required per year are presented in Table E-19. Forgone benefits are calculated for each scenario by multiplying total forgone mitigation values for each scenario (sum of acres and linear feet converted into acres) by the total number of affected households and the appropriate household WTP value (low: $0.006/acre; high: $0.038/acre). The agencies calculated forgone benefits for the years 2020-2039 and annualized values using a 3% discount rate.

[2] Scenarios 0 and 1 are combined because all values are identical.

[3] The agencies accounted for population growth and change in the number of households throughout the 2020-2039 study period.

Table E-25: Annualized forgone benefits (Millions 2017$) of lost mitigation requirements in the Lower Missouri River Basin based on the sensitivity analysis methodology, by policy scenario (7% Discount Rate)[1,2]

HUC	# Affected households in 2020[3]	Scenarios 0 & 1		Scenario 2		Scenario 3	
		Low	High	Low	High	Low	High
1025	1,264,605	$0.08	$0.50	$0.00	$0.00	$0.00	$0.00
1027	1,689,217	$0.13	$0.88	$0.00	$0.00	$0.00	$0.00
Total	**2,953,822**	**$0.21**	**$1.38**	**$0.00**	**$0.00**	**$0.00**	**$0.00**

[1] Estimated changes in average mitigation required per year are presented in Table E-19. Forgone benefits are calculated for each scenario by multiplying total forgone mitigation values for each scenario (sum of acres and linear feet converted into acres) by the total number of affected households and the appropriate household WTP value (low: $0.006/acre; high: $0.038/acre). The agencies calculated forgone benefits for the years 2020-2039 and annualized values using a 7% discount rate.

[2] Scenarios 0 and 1 are combined because all values are identical.

[3] The agencies accounted for population growth and change in the number of households throughout the 2020-2039 study period.

E.2.3 Section 311

Because the NHD data layer does not distinguish between intermittent and ephemeral streams in the Lower Missouri River Basin region, the agencies did not perform a sensitivity analysis of section 311 program impacts using NHD data.

E.2.4 Water Quality Modeling

Table E-26 summarizes the impact of different assumptions on the sensitivity analysis inputs. Forgone mitigation in the sensitivity analysis is approximately twice that analyzed under the main analysis presented in Section IV.B.3.3.1.

Table E-26: Changes between 404 program impacts for the sensitivity scenario vs. primary scenario for the Missouri River Basin SWAT models based on permits issued 2011-2015 (5 Years)

	1025				1027			
	Area impacts to wetland abutting epheme-ral stream (Acres)	Linear impacts to epheme-ral stream (Acres)[1]	Area impacts to non-abutting wetlands (Acres)	Total	Area impacts to wetland abutting epheme-ral stream (Acres)	Linear impacts to epheme-ral stream (Acres)[1]	Area impacts to non-abutting wetlands (Acres)	Total
Total Primary Scenario	**0.6**	**38.1**	**0**	**38.7**	**4.4**	**43.5**	**0**	**47.9**
+ non-abutting wetlands	0.0	0.0	0.0	0.0	0.0	0.0	6.7	6.7

Table E-26: Changes between 404 program impacts for the sensitivity scenario vs. primary scenario for the Missouri River Basin SWAT models based on permits issued 2011-2015 (5 Years)

	1025				1027			
	Area impacts to wetland abutting epheme-ral stream (Acres)	Linear impacts to epheme-ral stream (Acres)[1]	Area impacts to non-abutting wetlands (Acres)	Total	Area impacts to wetland abutting epheme-ral stream (Acres)	Linear impacts to epheme-ral stream (Acres)[1]	Area impacts to non-abutting wetlands (Acres)	Total
+ mitigation of temporary impacts	0.0	5.7	0.0	5.7	0.3	0.8	6.1	7.3
+ Widen buffer width (100 vs. 50 ft)	0	43.9	0	43.9	0	44.4	0	44.4
Total Sensitivity Scenario	**0.6**	**87.8**	**0.0**	**88.4**	**4.7**	**88.7**	**12.8**	**106.2**

[1] Linear impacts converted to areas by multiplying the lengths by 50 feet for the Primary Scenario (Main Analysis) and by 100 feet for the Sensitivity Scenario and applying a conversion factor (1 acre = 43,560 square feet).

Table E-27 through Table E-32 present water quality modeling results for the sensitivity analysis, following the same format as used in Section IV.B for the main analysis.

Table E-27: Summary of 404 Program activities in Lower Missouri River Basin SWAT models for permits with permanent or temporary impacts to waters potentially affected by the proposed rule and with mitigation requirements over 20-year analysis period. Modeled scenario considers both permanent and temporary impacts.

Type of potentially affected resource[2]	Permanent			Temporary			Total impacts (acres)
	Acres	Linear feet	Total[1] acres	Acres	Linear feet	Total[1] acres	
HUC 1025							
Wetland abutting ephemeral stream	2.3	0	2.3	0.0	0	0.0	2.3
Ephemeral stream	0	132,920	305.1	0.0	20,020	46.0	351.1
Total	**2.3**	**132,920**	**307.4**	**0.0**	**20,020**	**46.0**	**353.4**
HUC 1027							
Wetland abutting ephemeral stream	44.1	0	44.1	25.7	0	25.7	69.8
Ephemeral stream	0.0	151,692	348.2	0	2,920	6.7	354.9
Total	**44.1**	**151,692**	**392.3**	**25.7**	**2,920**	**32.5**	**424.8**

[1] Represents the sum of impacts reported in acres and impacts reported in linear feet, assuming a width of 100 feet for linear impacts.

[2] See Table IV-8 for criteria used to identify affected resources that may change jurisdiction under the proposed rule.

Table E-28: Summary of basin-level annual average water balance and constituent transport in Lower Missouri River Basin SWAT watersheds for the sensitivity scenario

Parameter	HUC 1025				HUC 1027			
	Baseline	Policy	Change	% Change	Baseline	Policy	Change	% Change
Precipitation (mm)	543.50	543.50	0.00	0.0%	805.00	805.00	0.00	0.0%
Surface runoff (mm)	8.33	8.33	0.00	0.0%	82.88	82.88	0.00	0.0%
Lateral flow (mm)	0.09	0.09	0.00	0.0%	2.94	2.94	0.00	0.0%
Groundwater flow (mm)	2.44	2.44	0.00	0.0%	12.99	12.99	0.00	0.0%
Water yield (mm)	10.46	10.45	-0.01	-0.1%	98.96	98.96	0.00	0.0%
Evapotranspiration (mm)	533.90	533.90	0.00	0.0%	685.40	685.40	0.00	0.0%
Sediment loading (ton/ha)	0.120	0.120	0.000	0.0%	2.370	2.370	0.000	0.0%
Organic N (kg/ha)	0.310	0.310	0.000	0.0%	2.687	2.687	0.000	0.0%
Organic P (kg/ha)	0.040	0.040	0.000	0.0%	0.317	0.317	0.000	0.0%
NO_3 in surface runoff (kg/ha)	0.013	0.013	0.000	0.0%	0.008	0.008	0.000	0.0%
NO_3 in lateral flow (kg/ha)	0.001	0.001	0.000	0.0%	0.012	0.012	0.000	0.0%
Soluble P yield (kg/ha)	0.008	0.008	0.000	0.0%	0.102	0.102	0.000	0.0%
NO_3 leached (kg/ha)	0.116	0.116	0.000	0.0%	0.190	0.190	0.000	0.0%
P leached (kg/ha)	0.005	0.005	0.000	0.0%	0.016	0.016	0.000	0.0%

Table E-29: Estimated change in annual average subbasin water balance and constituent transport in SWAT watershed HUC 1025 for the sensitivity scenario

Model parameter	Number of subbasins by direction of change[1]		Absolute change			
	Increase	Decrease	Average	Median	Minimum	Maximum
Evapotranspiration (mm/yr)	391	106	0.01	0.00	0.00	0.07
Surface runoff (mm/yr)	62	471	0.00	0.00	-0.03	0.00
Lateral flow (mm/yr)	126	401	0.00	0.00	0.00	0.00
Groundwater flow (mm/yr)	4	286	0.00	0.00	-0.14	0.00
Total water yield (mm/yr)	37	495	0.00	0.00	-0.14	0.00
Sediment yield (ton/ha/yr)	172	327	0.000	0.000	0.000	0.001
Organic N (kg/ha/yr)	288	244	0.000	0.000	0.000	0.002
Organic P (kg/ha/yr)	289	242	0.000	0.000	0.000	0.000
NO_3 in surface runoff (kg/ha/yr)	329	203	0.000	0.000	0.000	0.000
Soluble P (kg/ha/yr)	329	202	0.000	0.000	0.000	0.000

[1] Total number of SWAT HUC12 reaches is 346. Some modeled reaches show no change in annual average values and are not included in the counts above.

Table E-30: Estimated change in annual average subbasin water balance and constituent transport in SWAT watershed HUC 1027 for the sensitivity scenario

Model parameter	Number of subbasins by direction of change[1]		Absolute change			
	Increase	Decrease	Average	Median	Minimum	Maximum
Evapotranspiration (mm/yr)	0	0	0.00	0.00	0.00	0.00
Surface runoff (mm/yr)	238	181	0.00	0.00	0.00	0.09

Table E-30: Estimated change in annual average subbasin water balance and constituent transport in SWAT watershed HUC 1027 for the sensitivity scenario

Model parameter	Number of subbasins by direction of change[1]		Absolute change			
	Increase	Decrease	Average	Median	Minimum	Maximum
Lateral flow (mm/yr)	3	0	0.00	0.00	0.00	0.00
Groundwater flow (mm/yr)	71	312	0.00	0.00	-0.04	0.08
Total water yield (mm/yr)	193	226	0.00	0.00	-0.02	0.08
Sediment yield (ton/ha/yr)	341	79	0.000	0.000	0.000	0.007
Organic N (kg/ha/yr)	242	178	0.000	0.000	0.000	0.002
Organic P (kg/ha/yr)	232	188	0.000	0.000	0.000	0.000
NO_3 in surface runoff (kg/ha/yr)	255	165	0.000	0.000	0.000	0.000
Soluble P (kg/ha/yr)	283	137	0.000	0.000	0.000	0.000

[1] Total number of SWAT HUC12 reaches is 106. Some modeled reaches show no change in annual average values and are not included in the counts above.

Table E-31: Summary of predicted changes in loads transported by HUC12 reaches and in-stream concentrations within the SWAT watersheds for the Lower Missouri River Basin for the sensitivity scenario

Parameter	Number of reaches by direction of change[1]		Magnitude of change				
	Increase	Decrease	Average change	Median change	Average % change	Median % change	Maximum % change
HUC 1025							
Annual TN load (kg/yr)	146	409	1.9	-0.1	-0.01%	0.00%	0.28%
Annual TP load (kg/yr)	147	406	-0.3	0.0	-0.01%	0.00%	0.28%
Annual sediment load (kg/yr)	187	368	-1.1	0.0	-0.01%	0.00%	1.50%
Mean daily flow (cms)	71	477	0.000	0.000	-0.02%	-0.01%	0.01%
HUC 1027							
Annual TN load (kg/yr)	369	51	41.7	0.8	0.00%	0.00%	0.04%
Annual TP load (kg/yr)	379	41	10.2	0.2	0.00%	0.00%	0.04%
Annual sediment load (kg/yr)	318	102	7.6	0.3	0.00%	0.00%	0.04%
Mean daily flow (cms)	315	105	0.000	0.000	0.00%	0.00%	0.04%

[1] Total number of reaches is 346 in HUC 0509 and 106 in HUC 0510. Some modeled reaches show no change in annual average values and are not included in the counts above.

Table E-32: Predicted changes in annual average loads delivered to the outlet of Lower Missouri River Basin SWAT watersheds for the sensitivity scenario

Parameter	Baseline	Policy	Change	% Change
HUC 1025				
Annual TN load (kg/yr)	2,899,314	2,900,067	753	0.03%
Annual TP load (kg/yr)	639,885	640,026	142	0.02%
Annual sediment load (ton/yr)	174,826	174,767	-58	-0.03%
HUC 1027				
Annual TN load (kg/yr)	17,798,742	17,799,323	582	0.00%
Annual TP load (kg/yr)	3,790,097	3,790,239	142	0.00%
Annual sediment load (ton/yr)	2,755,689	2,755,715	26	0.00%

E.2.5 Dredging for Water Storage and Navigation

Table E-33 presents predicted net sediment depositions in reservoirs in the Lower Missouri River Basin for the sensitivity scenario. Costs under the sensitivity scenario are summarized in Table E-34.

Table E-33: Summary of predicted net sediment depositions in reservoirs in the Missouri River Basin (tons/year) in 2040 for sensitivity scenario

HUC4	Number of reservoirs[1]	Net annual sediment deposition in reservoirs		Change relative to baseline	
		Baseline	Sensitivity	Tons/year	Percent
1025	11	14,980	14,964	-16	-0.11%
1027	5	6,804,625	6,804,620	-5	-0.00%
Total	16	6,819,605	6,819,584	-21	-0.00%

[1] Reservoirs modeled in SWAT watersheds, based on the U.S. Army Corps of Engineers National Inventory of Dams as of October 2010.

Table E-34: Annualized Dredging Cost Changes in Missouri River Basin (2017$ thousands) for the Sensitivity Scenario

HUC4	Increase in annual sediment (cubic yards) (2040)	3% Discount rate ($/year)			7% Discount rate ($/year)		
		Low	Medium	High	Low	Medium	High
1025	-16	-$0.1	-$0.1	-$0.1	-$0.1	-$0.1	-$0.1
1027	-5	<-$0.1	<-$0.1	<-$0.1	<-$0.1	<-$0.1	<-$0.1
Total	**-21**	**-$0.1**	**-$0.1**	**-$0.1**	**-$0.1**	**-$0.1**	**-$0.1**

E.3 Case Study 3: Rio Grande River Basin

E.3.1 Section 402

Table E-35 presents the number of NPDES permits issued in the Rio Grande River Basin as well as permits with at least one discharge point near ephemeral waters by the most common industry categories. The number of permits with at least one discharge point near ephemeral waters is based on NHD high resolution categorizations instead of NWI Cowardin codes as used for the main analysis. As described in Section II.C, the agencies used NHD data from March 2017 for all states except California, which were September 2017 data.

Table E-35: Section 402 individual permits (SIC codes in parentheses) issued in case study watersheds in the Rio Grande River Basin

Industry category	Individual permits[1]			General permits[1]		
	Total number of NPDES permits	Permits with discharge point near ephemeral streams[2]		Total number of NPDES permits[1]	Permits with discharge point near ephemeral streams[2]	
		Number of permits	Percent of all permits		Number of permits	Number of permits
HUC 1306						
Sewerage Systems (4952)	9	1	11%	1	0	0%
Animal Feeding Operations[3]	0	0	0%	6	2	33%
Motor Vehicle Parts, Used (5015)	0	0	0%	9	7	78%
Aggregate Mining[4]	0	0	0%	15	6	40%
Construction and Development[5]	0	0	0%	5	2	40%
Other Categories[6]	6	0	0%	32	9	28%
Missing SIC Codes	0	0	0%	105	51	49%
Total	**15**	**1**	**7%**	**173**	**77**	**45%**
HUC 1307						
Industrial Domestic Wastewater Treatment[7]	2	0	0%	0	0	0%
Sewerage Systems (4952)	3	0	0%	0	0	0%
Aggregate Mining[4]	0	0	0%	2	1	50%
Ready-Mixed Concrete (3273)	0	0	0%	3	1	33%
Animal Feeding Operations[3]	0	0	0%	2	0	0%
Other Categories[6]	2	0	0%	0	0	-
Missing SIC Codes	0	0	-	21	10	48%
Total	**7**	**0**	**0%**	**28**	**12**	**43%**
Total for both watersheds	**22**	**1**	**5%**	**201**	**89**	**44%**

[1] Source: EPA's ICIS-NPDES data, 2017. The facility permits included in the spatial analysis are limited to those for which the ICIS-NPDES database includes latitude/longitude coordinates. For permits with multiple SIC codes, only one SIC code was retained, with manufacturing industries prioritized, to avoid double-counting.

[2] The agencies used FCODES in the NHD dataset to determine whether 402 discharges are likely to affect ephemeral streams.

Table E-35: Section 402 individual permits (SIC codes in parentheses) issued in case study watersheds in the Rio Grande River Basin

Industry category	Individual permits[1]			General permits[1]		
	Total number of NPDES permits	Permits with discharge point near ephemeral streams[2]		Total number of NPDES permits[1]	Permits with discharge point near ephemeral streams[2]	
		Number of permits	Percent of all permits		Number of permits	Number of permits

[3] Includes SIC Codes 211, 212, 213, 214, 219, 241, 251, 252, 253, 254, 259, 271, 272, and 279

[4] Includes SIC Codes 1422, 1423, 1429, 1442, 1446, 1459, 1474, 1475, 1481, and 1499

[5] Includes SIC Codes 1629, 1794, 6552, 1611, 1799, 1521, 1522, and 1623

[6] Includes Asphalt Paving Mixtures and Blocks (2951), Scrap and Waste Materials (5093), Trucking Facilities (4212, 4231), and Water Supply (4941)

[7] Includes SIC Codes 6513, 6514, 6515, 7011, 7032, 7033, 8211, 8221, 8641, and 8661

Table E-36 illustrates the plausible effects of state responses following a change to the definition of "waters of the United States" on the number of NPDES permits in the Rio Grande River Basin. Potential state responses and different analytic scenarios are described in Sections II.B and III.C.1. NPDES permits for discharges near ephemeral waters were issued in one state in HUC 1306 (New Mexico) and two states in HUC 1307 (New Mexico and Texas). Texas is expected to regulate waters beyond the CWA under Scenarios 2 and 3. New Mexico is not anticipated to regulate waters beyond the CWA under any scenarios.

Table E-36: Section 402 permits issued in case study watersheds in the Rio Grande River Basin potentially affected by proposed definition of "waters of the United States," by policy scenario[1,2,3]

Industry category	Individual Permits with discharge point near ephemeral streams			General Permits with discharge point near ephemeral streams		
	Scenario 0	Scenario 1	Scenario 2 (3)[4]	Scenario 0	Scenario 1	Scenario 2 (3)[4]
HUC 1306						
Sewerage Systems (4952)	1	1	1	0	0	0
Animal Feeding Operations[5]	0	0	0	2	2	2
Motor Vehicle Parts, Used (5015)	0	0	0	7	7	7
Aggregate Mining[6]	0	0	0	6	6	6
Construction and Development[7]	0	0	0	2	2	2
Other Categories[8]	0	0	0	9	9	9
Missing SIC Codes	0	0	0	51	51	51
Total	**1**	**1**	**1**	**77**	**77**	**77**
HUC 1307						
Industrial Domestic Wastewater Treatment[9]	0	0	0	0	0	0
Sewerage Systems (4952)	0	0	0	0	0	0
Aggregate Mining[6]	0	0	0	1	1	1
Ready-Mixed Concrete (3273)	0	0	0	1	1	0
Animal Feeding Operations[5]	0	0	0	0	0	0

Table E-36: Section 402 permits issued in case study watersheds in the Rio Grande River Basin potentially affected by proposed definition of "waters of the United States," by policy scenario[1,2,3]

Industry category	Individual Permits with discharge point near ephemeral streams			General Permits with discharge point near ephemeral streams		
	Scenario 0	Scenario 1	Scenario 2 (3)[4]	Scenario 0	Scenario 1	Scenario 2 (3)[4]
Other Categories[8]	0	0	0	0	0	0
Missing SIC Codes	0	0	0	10	10	10
Total	**0**	**0**	**0**	**12**	**12**	**11**
Total for both watersheds	**1**	**1**	**1**	**89**	**89**	**88**

[1] Source: EPA's ICIS-NPDES data, 2017. The facility permits included in the spatial analysis are limited to those for which the ICIS-NPDES database includes latitude/longitude coordinates. For permits with multiple SIC codes, only one SIC code was retained, with manufacturing industries prioritized, to avoid double-counting.

[2] The agencies used FCODES in the NHD dataset to determine whether 402 discharges are likely to affect ephemeral streams.

[3] See Table III-1 for description of policy scenarios.

[4] Policy scenarios 2 and 3 are identical for surface water dischargers.

[5] Includes SIC Codes 211, 212, 213, 214, 219, 241, 251, 252, 253, 254, 259, 271, 272, and 279

[6] Includes SIC Codes 1422, 1423, 1429, 1442, 1446, 1459, 1474, 1475, 1481, and 1499

[7] Includes SIC Codes 1629, 1794, 6552, 1611, 1799, 1521, 1522, and 1623

[8] Includes Asphalt Paving Mixtures and Blocks (2951), Scrap and Waste Materials (5093), Trucking Facilities (4212, 4231), and Water Supply (4941)

[9] Includes SIC Codes 6513, 6514, 6515, 7011, 7032, 7033, 8211, 8221, 8641, and 8661

E.3.2 Section 404

Table E-37 summarizes section 404 permits issued in 2011-2015 within the two selected watersheds of the Rio Grande River Basin. The table includes permits that required mitigation and potentially affected ephemeral streams, non-abutting wetlands, or wetlands adjacent to but not directly abutting permanent waters.

Table E-37: Section 404 permits issued in case study watersheds in the Rio Grande River Basin (2011-2015)[1]

State	# Permitted projects	# Permits with mitigation requirements affected by changes to the definition of "waters of the United States"[2]	Permanent impacts		Temporary impacts	
			Acres	Length feet	Acres	Length feet
HUC 1306						
NM	168	1	17.5	0	0.0	0
Total	**168**	**1**	**17.5**	**0**	**0.0**	**0**
Avg. per year	**34**	**0**	**3.5**	**0**	**0.0**	**0**
HUC 1307						
NM	39	0	0.0	0	0.0	0
TX	6	0	0.0	0	0.0	0

Table E-37: Section 404 permits issued in case study watersheds in the Rio Grande River Basin (2011-2015)[1]

State	# Permitted projects	# Permits with mitigation requirements affected by changes to the definition of "waters of the United States"[2]	Permanent impacts		Temporary impacts	
			Acres	Length feet	Acres	Length feet
Total	**45**	**0**	**0.0**	**0**	**0.0**	**0**
Avg. per year	**9**	**0**	**0.0**	**0**	**0.0**	**0**

[1] Values based on permits with mitigation requirements on waterways determined to be non-abutting wetlands, RPWWN-type wetlands, or ephemeral streams. Excludes permits issued for mitigation or restoration activities because the main purpose of these activities is to restore or enhance ecosystem services provided by water resources as opposed to dredge and fill activities that lead to permanent or temporary losses of ecosystem services. No 404 permits in HUC 1307 meet these requirements.

[2] Number of permits includes permits with mitigation requirements that potentially affect at least one water no longer jurisdictional under the CWA under the proposed rule.

Table E-38 presents expected reductions in average annual mitigation requirements in the Rio Grande River Basin under different likely state response scenarios following the proposed "waters of the United States" definitional changes.

Table E-38: Estimated changes in average mitigation required per year in the Rio Grande River Basin based on the sensitivity analysis methodology, by policy scenario[1,2]

State	Expected reduction in average mitigation acres per year			Expected reduction in average mitigation length feet per year			Expected reduction in average mitigation length feet acres per year[3]		
	Scenario 0 & 1	Scenario 2	Scenario 3	Scenario 0 & 1	Scenario 2	Scenario 3	Scenario 0 & 1	Scenario 2	Scenario 3
HUC 1306									
NM	3.5	3.5	0.0	0	0	0	0.0	0.0	0.0
Total	**3.5**	**3.5**	**0.0**	**0**	**0**	**0**	**0.0**	**0.0**	**0.0**
HUC 1307									
TX	0.0	0.0	0.0	0	0	0.0	0.0	0.0	0.0
Total	**0.0**	**0.0**	**0.0**	**0**	**0**	**0.0**	**0.0**	**0.0**	**0.0**

[1] Values based on permits with mitigation requirements on waterways determined to be non-abutting wetlands, RPWWN-type wetlands, or ephemeral streams. Excludes permits issued for mitigation or restoration activities because these permits do not result in the loss of ecosystems services provided by wetlands and streams. No 404 permits in HUC 1307 meet these requirements. Permanent and temporary acre and linear feet impacts provided in the ORM2 are used to estimate mitigation requirements. The agencies assumed a 1:1 ratio for compensatory requirements based on the USACE guidance (U.S. Army Corps of Engineers 2014).

[2] Scenarios 0 and 1 are combined because all values are identical.

[3] Based on mitigation lengths where impacts in linear feet are converted to acres by multiplying total linear feet by an average total buffer width of 100 feet (50 feet on each side of the stream) and converting square feet to acres.

Table E-39 compares the mitigation reduction estimates in the Rio Grande River Basin using the methodology described in Section IV.B and the sensitivity analysis methodology.

Table E-39: Comparison of annual average mitigation requirements in the Rio Grande River Basin between the main methodology and the sensitivity analysis methodology

Impact Type	Acres[1]		Linear feet[2]		Stream riparian acres[3]		Total acreage[4]	
	Main	Sensitivity	Main	Sensitivity	Main	Sensitivity	Main	Sensitivity
HUC 0509								
Permanent	0.02	3.51	0	0	0.00	0.00	0.02	3.51
Temporary	0.00	0.00	0	0	0.00	0.00	0.00	0.00
Total	**0.02**	**3.51**	**0**	**0**	**0.00**	**0.00**	**0.02**	**3.51**
HUC 0510								
Permanent	0.00	0.00	0	0	0.00	0.00	0.00	0.00
Temporary	0.00	0.00	0	0	0.00	0.00	0.00	0.00
Total	**0.00**	**0.00**	**0**	**0**	**0.00**	**0.00**	**0.00**	**0.00**

[1] Main analysis includes permanent impact acres on RPWWN-type wetlands and ephemeral streams. Sensitivity analysis includes permanent and temporary impact acres from RPWWN-type wetlands, non-abutting wetlands, and ephemeral streams.

[2] Main analysis includes permanent impact linear feet on riparian areas of RPWWN-type wetlands and ephemeral streams. Sensitivity analysis includes permanent and temporary impact linear feet on riparian areas of non-abutting wetlands, RPWWN-type wetlands, and ephemeral streams.

[3] Main analysis converts permanent linear feet impacts to acres using a 50-foot mitigation width (25 feet on each side). Sensitivity analysis converts permanent and temporary linear feet impacts to acres using a 100-40foot mitigation width (50 feet on each side).

[4] Sum of the acres and stream riparian acres fields.

Table E-40, Table E-41, and Table E-42 present permit application cost savings, cost savings from reduced mitigation requirements, and total costs savings, respectively.

Table E-40: Average annual reduction in 404 permit application costs in the Rio Grande River Basin, based on the sensitivity analysis methodology[1,2]

Permit Type	Unit costs from Corps NWP analysis (2017$)	Scenario 0 & 1		Scenario 2		Scenario 3	
		Annual average reduction in permits with rule	Estimated reduction in permits costs (millions 2017$)	Annual average reduction in permits with rule	Estimated reduction in permits costs (millions 2017$)	Annual average reduction in permits with rule	Estimated reduction in permits costs (millions 2017$)
HUC 1306							
IP	$14,700	0.2	<$0.01	0.2	<$0.01	0.0	$0.00
GP	$4,400	17.0	$0.07	17.0	$0.07	0.0	$0.00
Total		**17.2**	**$0.08**	**17.2**	**$0.08**	**0.0**	**$0.00**
HUC 1307							
IP	$14,700	0.0	$0.00	0.0	$0.00	0.0	$0.00
GP	$4,400	8.0	$0.04	8.0	$0.04	0.0	$0.00
Total		**8.0**	**$0.04**	**8.0**	**$0.04**	**0.0**	**$0.00**
Both Watersheds							
IP		0.2	<$0.01	0.2	<$0.01	0.0	$0.00
GP		25.0	$0.11	25.0	$0.11	0.0	$0.00

Table E-40: Average annual reduction in 404 permit application costs in the Rio Grande River Basin, based on the sensitivity analysis methodology[1,2]

Permit Type	Unit costs from Corps NWP analysis (2017$)	Scenario 0 & 1		Scenario 2		Scenario 3	
		Annual average reduction in permits with rule	Estimated reduction in permits costs (millions 2017$)	Annual average reduction in permits with rule	Estimated reduction in permits costs (millions 2017$)	Annual average reduction in permits with rule	Estimated reduction in permits costs (millions 2017$)
Total		**25.2**	**$0.11**	**25.2**	**$0.11**	**0.0**	**$0.00**

[1] Includes permits estimated to only affect waters no longer jurisdictional under the CWA under the proposed rule (*i.e.*, non-abutting wetlands, RPWWN-type wetlands, and ephemeral streams).

[2] Scenarios 0 and 1 are combined because all values are identical.

Table E-41: Annual cost savings (2017$) of reduced mitigation requirements in the Rio Grande River Basin based on the sensitivity analysis methodology, by policy scenario[1,2]

State	Cost per acre (2017$)		Cost per LF (2017$)		Scenarios 0 & 1 (Millions 2017$)		Scenario 2 (Millions 2017$)		Scenario 3 (Millions 2017$)	
	Low	High	Low	High	Low	High	Low	High	Low	High
HUC 1306										
NM	$51,850	$72,490	$294	$675	$0.27	$0.38	$0.27	$0.38	$0.00	$0.00
Total	-	-	-	-	**$0.27**	**$0.38**	**$0.27**	**$0.38**	**$0.00**	**$0.00**
HUC 1307										
TX	$54,000	$105,400	$525	$900	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Total	-	-	-	-	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**
Both Watersheds										
Total	-	-	-	-	**$0.27**	**$0.38**	**$0.27**	**$0.38**	**$0.00**	**$0.00**

[1] Estimated changes in average mitigation required per year are presented in Table E-38. For each state, cost savings are calculated by multiplying the cost of each mitigation acre or linear foot (low and high estimates) by the expected reduction in annual mitigation requirements, summing the acreage and linear feet values for each scenario, and multiplying the total by 1.5. The agencies multiply the total by 1.5 to account for a compensatory mitigation requirement ratio of 1.5:1.

[2] Scenarios 0 and 1 are combined because all values are identical.

Table E-42: Total annual cost savings in the Rio Grande River Basin, based on the sensitivity analysis methodology[1,2]

HUC	Scenarios 0 & 1		Scenario 2		Scenario 3	
	Low	High	Low	High	Low	High
1306	$0.35	$0.46	$0.35	$0.46	$0.00	$0.00
1307	$0.04	$0.04	$0.04	$0.04	$0.00	$0.00
Total	**$0.39**	**$0.49**	**$0.39**	**$0.49**	**$0.00**	**$0.00**

[1] Scenarios 0 and 1 are combined because all values are identical.

[2] Scenarios 0, 1, and 2 include cost savings in New Mexico and Texas. Under Scenario 3, cost savings drop to zero because both states in the case study region are expected to regulate waters beyond CWA requirements.

The agencies did not estimate the forgone benefit value of lost mitigation acres for the Rio Grande River Basin case study because none of the existing wetland valuation studies were conducted in the same geographic area or provided a good match for the affected resource characteristics. See Section IV.B.4.2.2.2 for additional details.

E.3.3 Section 311

The agencies used the high-resolution NHD data in the main analysis to estimate impacts on section 311 programs. Therefore, the results for the sensitivity analysis are the same as discussed in Section IV.B.4.2.3 for the main analysis.

E.3.4 Water Quality Modeling

As discussed in Section IV.B.4.3.1, given the small level of 404 activity in the two watersheds, the agencies did not perform SWAT model runs for this case study.

E.3.5 Dredging for Water Storage and Navigation

Because the agencies did not perform SWAT model runs for the Rio Grande case study (see Section IV.B.4.3.1), net sediment depositions and annualized dredging cost change estimates are not available.

E.4 Stage 2 Quantitative Assessment of National Impacts

Table E-43, Table E-44, and Table E-45 present national-level permit cost savings, mitigation cost savings, and total cost savings (sum of permit cost savings and reduced mitigation requirement savings), respectively, based on the sensitivity analysis methodology. Table E-46 presents forgone benefit estimates based on the sensitivity analysis methodology.

Table E-43: National average annual reduction in CWA section 404 permit application costs based on the sensitivity analysis methodology

Permit Type	Unit costs from Corps NWP analysis (2017$)	Annual average reduction in permits with proposed rule	Estimated reduction in permit costs (millions 2017$)
Scenario 0[1,2]			
IP	$14,700	250	$3.7
GP	$4,400	8,376	$36.9
Total		**8,626**	**$40.5**
Scenario 1[1,3]			
IP	$14,700	82	$1.2
GP	$4,400	4,635	$20.4
Total		**4,717**	**$21.6**
Scenario 2[1,4]			
IP	$14,700	48	$0.7
GP	$4,400	3,054	$13.4
Total		**3,103**	**$14.2**
Scenario 3[1,5]			
IP	$14,700	18	$0.3
GP	$4,400	567	$2.5
Total		**585**	**$2.8**

[1] Annual average permit reductions based on permits issued in years 2011-2015 estimated to only affect RPWWN-type wetlands, other non-abutting wetlands, or ephemeral streams.

[2] Includes all states except Hawaii and Alaska. Alaska is excluded from the sensitivity analysis methodology because the GIS layers used in the NHD-NWI adjacency analysis are only available for the conterminous United States.

Table E-43: National average annual reduction in CWA section 404 permit application costs based on the sensitivity analysis methodology

Permit Type	Unit costs from Corps NWP analysis (2017$)	Annual average reduction in permits with proposed rule	Estimated reduction in permit costs (millions 2017$)

[3] Includes Alaska, Alabama, Arkansas, Arizona, Colorado, Delaware, Georgia, Iowa, Idaho, Kansas, Kentucky, Louisiana, Missouri, Mississippi, Montana, North Carolina, North Dakota, Nebraska, New Mexico, Nevada, Oklahoma, South Carolina, South Dakota, Texas, Utah, Wisconsin, West Virginia, and Wyoming.

[4] Includes Alaska, Alabama, Arkansas, Arizona, Colorado, Delaware, Georgia, Idaho, Kentucky, Missouri, Mississippi, Montana, North Dakota, New Mexico, Oklahoma, South Carolina, South Dakota, Texas, Utah, and Wyoming.

[5] Includes Arizona, Idaho, Kentucky, Mississippi, and South Dakota.

Table E-44: National average annual cost savings of reduced CWA section 404 related mitigation requirements based on the sensitivity analysis methodology

Unit	Annual average mitigation reduction with rule	Low (Millions 2017$)	High (Millions 2017$)
Scenario 0[1,2]			
Acres	2,735.7	$256.7	$523.5
LF	600,813	$300.7	$683.8
Total		**$557.4**	**$1,207.3**
Scenario 1[1,3]			
Acres	1,267.4	$99.6	$181.6
LF	372,632	$170.8	$371.6
Total		**$270.4**	**$553.2**
Scenario 2[1,4]			
Acres	978.1	$86.8	$148.1
LF	274,261	$147.8	$309.9
Total		**$234.6**	**$458.0**
Scenario 3[1,5]			
Acres	241.7	$16.3	$23.4
LF	85,857	$38.4	$96.2
Total		**$54.7**	**$119.5**

[1] Annual average mitigation reduction based on permits issued in years 2011-2015 with mitigation requirements on waterways determined to be RPWWN-type wetlands, other non-abutting wetlands, or ephemeral streams. Excludes permits issued for mitigation or restoration activities because the main purpose of these activities is to restore or enhance ecosystem services provided by water resources as opposed to dredge and fill activities that lead to permanent or temporary losses of ecosystem services. Cost savings are calculated by multiplying the cost of each mitigation acre or linear foot (low and high estimates) for each state by the expected reduction in annual mitigation requirements, summing the state-level acreage and linear feet values for each scenario, and multiplying the total by 1.5. The agencies multiply the total by 1.5 to account for a compensatory mitigation requirement ratio of 1.5:1.

[2] Includes all states except Hawaii and Alaska. Alaska is excluded from the sensitivity analysis methodology because the GIS layers used in the NHD-NWI adjacency analysis are only available for the conterminous United States.

[3] Includes Alaska, Alabama, Arkansas, Arizona, Colorado, Delaware, Georgia, Iowa, Idaho, Kansas, Kentucky, Louisiana, Missouri, Mississippi, Montana, North Carolina, North Dakota, Nebraska, New Mexico, Nevada, Oklahoma, South Carolina, South Dakota, Texas, Utah, Wisconsin, West Virginia, and Wyoming

[4] Includes Alaska, Alabama, Arkansas, Arizona, Colorado, Delaware, Georgia, Idaho, Kentucky, Missouri, Mississippi, Montana, North Dakota, New Mexico, Oklahoma, South Carolina, South Dakota, Texas, Utah, and Wyoming

[5] Includes Arizona, Idaho, Kentucky, Mississippi, and South Dakota

Table E-45: Total national estimated CWA section 404 program related annual cost savings based on the sensitivity analysis methodology (Millions 2017$)

Cost Type	Scenario 0[1]		Scenario 1[2]		Scenario 2[3]		Scenario 3[4]	
	Low	High	Low	High	Low	High	Low	High
Permit Cost Savings	$40.5	$40.5	$21.6	$21.6	$14.2	$14.2	$2.8	$2.8
Mitigation Cost Savings	$557.4	$1,207.3	$270.4	$553.2	$234.6	$458.0	$54.7	$119.5
Total	**$597.9**	**$1,247.9**	**$292.0**	**$574.8**	**$248.7**	**$472.2**	**$57.5**	**$122.3**

[1] Includes all states except Hawaii and Alaska. Alaska is excluded from the sensitivity analysis methodology because the GIS layers used in the NHD-NWI adjacency analysis are only available for the conterminous United States.

[2] Includes Alaska, Alabama, Arkansas, Arizona, Colorado, Delaware, Georgia, Iowa, Idaho, Kansas, Kentucky, Louisiana, Missouri, Mississippi, Montana, North Carolina, North Dakota, Nebraska, New Mexico, Nevada, Oklahoma, South Carolina, South Dakota, Texas, Utah, Wisconsin, West Virginia, and Wyoming.

[3] Includes Alaska, Alabama, Arkansas, Arizona, Colorado, Delaware, Georgia, Idaho, Kentucky, Missouri, Mississippi, Montana, North Dakota, New Mexico, Oklahoma, South Carolina, South Dakota, Texas, Utah, and Wyoming.

[4] Includes Arizona, Idaho, Kentucky, Mississippi, and South Dakota.

Table E-46: Total national forgone benefit estimate of reduced CWA section 404 related mitigation requirements based on the sensitivity analysis methodology, by policy scenario

Scenario	Households	Annual forgone mitigation acres	Mean WTP per household per acre (2017$)	Mean estimate of forgone benefits (Millions 2017$)	Lower 5th WTP per household per acre (2017$)	Lower 5th estimate of forgone benefits (Millions 2017$)	Upper 95th WTP per household per acre (2017$)	Upper 95th estimate of forgone benefits (Millions 2017$)
Scenario 0[1,2]	115,994,247	4,115.0	$0.0251	$362.7	$0.0001	$1.8	$0.0493	$801.4
Scenario 1[1,3]	45,033,201	2,122.8	$0.0192	$120.7	$0.0001	$0.7	$0.0419	$266.3
Scenario 2[1,4]	32,455,035	1,607.7	$0.0212	$108.0	$0.0001	$0.6	$0.0461	$238.8
Scenario 3[1,5]	6,118,413	438.8	$0.0237	$17.5	$0.0001	$0.1	$0.0504	$35.5

[1] Annual average mitigation reduction based on permits issued in years 2011-2015 with mitigation requirements on waterways determined to be RPWWN-type wetlands, other non-abutting wetlands, or ephemeral streams. Excludes permits issued for mitigation or restoration activities because the main purpose of these activities is to restore or enhance ecosystem services provided by water resources as opposed to dredge and fill activities that lead to permanent or temporary losses of ecosystem services.

[2] Includes all states except Hawaii and Alaska. Alaska is excluded from the sensitivity analysis methodology because the GIS layers used in the NHD-NWI adjacency analysis are only available for the conterminous United States.

[3] Includes Alaska, Alabama, Arkansas, Arizona, Colorado, Delaware, Georgia, Iowa, Idaho, Kansas, Kentucky, Louisiana, Missouri, Mississippi, Montana, North Carolina, North Dakota, Nebraska, New Mexico, Nevada, Oklahoma, South Carolina, South Dakota, Texas, Utah, Wisconsin, West Virginia, and Wyoming.

[4] Includes Alaska, Alabama, Arkansas, Arizona, Colorado, Delaware, Georgia, Idaho, Kentucky, Missouri, Mississippi, Montana, North Dakota, New Mexico, Oklahoma, South Carolina, South Dakota, Texas, Utah, and Wyoming.

[5] Includes Arizona, Idaho, Kentucky, Mississippi, and South Dakota.

Table E-47 presents state-level average annual reductions in CWA section 404 permit and mitigation requirements based on the sensitivity analysis methodology, by policy scenario and state. Table E-48, Table E-49, and Table E-50 present state-level permit cost savings, mitigation cost savings, and total cost savings (sum of permit cost savings and mitigation cost savings), respectively, based on the sensitivity analysis methodology.

Table E-51 through Table E-54 present state-level forgone benefits from reduced CWA section 404 related mitigation requirements based on the sensitivity analysis methodology for Scenarios 0, 1, 2, and 3, respectively.

Table E-47: Average annual reductions in CWA section 404 permit and mitigation requirements based on the sensitivity analysis methodology, by state

State	Annual average reduction in permits with proposed rule[1]								Average annual mitigation reduction with proposed rule[2]							
	Individual Permits				General Permits				Acres				Linear feet			
	Sc. 0[3]	Sc. 1[4]	Sc. 2[5]	Sc. 3[6]	Sc. 0[3]	Sc. 1[4]	Sc. 2[5]	Sc. 3[6]	Sc. 0[3]	Sc. 1[4]	Sc. 2[5]	Sc. 3[6]	Sc. 0[3]	Sc. 1[4]	Sc. 2[5]	Sc. 3[6]
AL	4.4	4.4	4.4	0.0	45.0	45.0	45.0	0.0	88.68	88.68	88.68	0.00	48,153	48,153	48,153	0
AR	2.6	2.6	2.6	0.0	330.0	330.0	330.0	0.0	35.70	35.70	35.70	0.00	15,933	15,933	15,933	0
AZ	5.0	5.0	5.0	5.0	240.6	240.6	240.6	240.6	14.93	14.93	14.93	14.93	2,033	2,033	2,033	2,033
CA	9.0	0.0	0.0	0.0	1,077.0	0.0	0.0	0.0	53.57	0.00	0.00	0.00	110,627	0	0	0
CO	0.4	0.4	0.4	0.0	160.6	160.6	160.6	0.0	3.04	3.04	3.04	0.00	566	566	566	0
CT	0.2	0.0	0.0	0.0	45.8	0.0	0.0	0.0	5.81	0.00	0.00	0.00	0	0	0	0
DE	0.2	0.2	0.2	0.0	5.4	5.4	5.4	0.0	4.56	4.56	4.56	0.00	285	285	285	0
FL	51.2	0.0	0.0	0.0	175.8	0.0	0.0	0.0	861.87	0.00	0.00	0.00	792	0	0	0
GA	4.2	4.2	4.2	0.0	72.0	72.0	72.0	0.0	80.64	80.64	80.64	0.00	2,580	2,580	2,580	0
IA	1.0	1.0	0.0	0.0	41.4	41.4	0.0	0.0	6.69	6.69	0.00	0.00	3,305	3,305	0	0
ID	0.6	0.6	0.6	0.6	10.6	10.6	10.6	10.6	0.92	0.92	0.92	0.92	140	140	140	140
IL	5.0	0.0	0.0	0.0	208.8	0.0	0.0	0.0	32.56	0.00	0.00	0.00	11,905	0	0	0
IN	1.8	0.0	0.0	0.0	100.8	0.0	0.0	0.0	39.31	0.00	0.00	0.00	58,514	0	0	0
KS	4.4	4.4	0.0	0.0	381.2	381.2	0.0	0.0	17.40	17.40	0.00	0.00	78,904	78,904	0	0
KY	1.8	1.8	1.8	1.8	146.2	146.2	146.2	146.2	39.49	39.49	39.49	39.49	77,074	77,074	77,074	77,074
LA	12.0	12.0	0.0	0.0	316.8	316.8	0.0	0.0	172.78	172.78	0.00	0.00	3,789	3,789	0	0
MA	1.2	0.0	0.0	0.0	41.8	0.0	0.0	0.0	31.68	0.00	0.00	0.00	7	0	0	0
MD	1.0	0.0	0.0	0.0	39.2	0.0	0.0	0.0	5.17	0.00	0.00	0.00	2,432	0	0	0
ME	1.0	0.0	0.0	0.0	82.4	0.0	0.0	0.0	38.43	0.00	0.00	0.00	0	0	0	0
MI	32.6	0.0	0.0	0.0	223.2	0.0	0.0	0.0	1.92	0.00	0.00	0.00	144	0	0	0
MN	28.4	0.0	0.0	0.0	242.2	0.0	0.0	0.0	221.62	0.00	0.00	0.00	1,112	0	0	0
MO	4.2	4.2	4.2	0.0	264.8	264.8	264.8	0.0	11.73	11.73	11.73	0.00	10,578	10,578	10,578	0
MS	8.6	8.6	8.6	8.6	117.4	117.4	117.4	117.4	125.56	125.56	125.56	125.56	4,485	4,485	4,485	4,485
MT	0.2	0.2	0.2	0.0	21.6	21.6	21.6	0.0	23.72	23.72	23.72	0.00	1,004	1,004	1,004	0
NC	3.4	3.4	0.0	0.0	78.4	78.4	0.0	0.0	25.72	25.72	0.00	0.00	677	677	0	0
ND	1.2	1.2	1.2	0.0	178.0	178.0	178.0	0.0	98.05	98.05	98.05	0.00	13,004	13,004	13,004	0
NE	0.2	0.2	0.0	0.0	34.8	34.8	0.0	0.0	9.27	9.27	0.00	0.00	1,680	1,680	0	0
NH	0.2	0.0	0.0	0.0	34.4	0.0	0.0	0.0	1.87	0.00	0.00	0.00	0	0	0	0
NJ	0.2	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.83	0.00	0.00	0.00	0	0	0	0
NM	1.8	1.8	1.8	0.0	156.8	156.8	156.8	0.0	6.98	6.98	6.98	0.00	5	5	5	0
NV	0.4	0.4	0.0	0.0	37.8	37.8	0.0	0.0	2.29	2.29	0.00	0.00	924	924	0	0

Table E-47: Average annual reductions in CWA section 404 permit and mitigation requirements based on the sensitivity analysis methodology, by state

State	Annual average reduction in permits with proposed rule[1]								Average annual mitigation reduction with proposed rule[2]							
	Individual Permits				General Permits				Acres				Linear feet			
	Sc. 0[3]	Sc. 1[4]	Sc. 2[5]	Sc. 3[6]	Sc. 0[3]	Sc. 1[4]	Sc. 2[5]	Sc. 3[6]	Sc. 0[3]	Sc. 1[4]	Sc. 2[5]	Sc. 3[6]	Sc. 0[3]	Sc. 1[4]	Sc. 2[5]	Sc. 3[6]
NY	4.8	0.0	0.0	0.0	186.6	0.0	0.0	0.0	18.83	0.00	0.00	0.00	1,294	0	0	0
OH	15.0	0.0	0.0	0.0	291.2	0.0	0.0	0.0	36.80	0.00	0.00	0.00	23,263	0	0	0
OK	0.4	0.4	0.4	0.0	53.4	53.4	53.4	0.0	0.82	0.82	0.82	0.00	3,728	3,728	3,728	0
OR	4.8	0.0	0.0	0.0	37.2	0.0	0.0	0.0	31.38	0.00	0.00	0.00	524	0	0	0
PA	2.6	0.0	0.0	0.0	780.6	0.0	0.0	0.0	32.21	0.00	0.00	0.00	4,546	0	0	0
RI	0.2	0.0	0.0	0.0	12.4	0.0	0.0	0.0	0.53	0.00	0.00	0.00	0	0	0	0
SC	1.4	1.4	1.4	0.0	23.8	23.8	23.8	0.0	29.84	29.84	29.84	0.00	0	0	0	0
SD	1.8	1.8	1.8	1.8	52.0	52.0	52.0	52.0	60.80	60.80	60.80	60.80	2,124	2,124	2,124	2,124
TN	0.6	0.0	0.0	0.0	29.2	0.0	0.0	0.0	3.79	0.00	0.00	0.00	5,452	0	0	0
TX	8.6	8.6	8.6	0.0	1,077.8	1,077.8	1,077.8	0.0	312.45	312.45	312.45	0.00	89,682	89,682	89,682	0
UT	1.0	1.0	1.0	0.0	74.6	74.6	74.6	0.0	4.17	4.17	4.17	0.00	2,609	2,609	2,609	0
VA	3.8	0.0	0.0	0.0	58.0	0.0	0.0	0.0	22.74	0.00	0.00	0.00	5,148	0	0	0
VT	0.0	0.0	0.0	0.0	17.8	0.0	0.0	0.0	1.07	0.00	0.00	0.00	43	0	0	0
WA	4.2	0.0	0.0	0.0	56.8	0.0	0.0	0.0	26.39	0.00	0.00	0.00	2,378	0	0	0
WI	12.0	12.0	0.0	0.0	247.4	247.4	0.0	0.0	48.13	48.13	0.00	0.00	1,000	1,000	0	0
WV	0.4	0.4	0.0	0.0	442.6	442.6	0.0	0.0	7.01	7.01	0.00	0.00	8,092	8,092	0	0
WY	0.0	0.0	0.0	0.0	23.8	23.8	23.8	0.0	35.97	35.97	35.97	0.00	278	278	278	0
Total	**250.0**	**82.2**	**48.4**	**17.8**	**8,376.2**	**4,634.8**	**3,054.4**	**566.8**	**2,735.70**	**1,267.35**	**978.06**	**241.70**	**600,813**	**372,632**	**274,261**	**85,857**

[1] Annual average permit reductions based on permits issued in years 2011-2015 that only affect RPWWN-type wetlands, other non-abutting wetlands, or ephemeral streams.

[2] Annual average mitigation reduction based on permits issued in years 2011-2015 with mitigation requirements on waterways determined to be RPWWN-type wetlands, other non-abutting wetlands, or ephemeral streams. Excludes permits issued for mitigation or restoration activities because the main purpose of these activities is to restore or enhance ecosystem services provided by water resources as opposed to dredge and fill activities that lead to permanent or temporary losses of ecosystem services.

[3] Includes all states except Hawaii and Alaska. Alaska is excluded from the sensitivity analysis methodology because the GIS layers used in the NHD-NWI adjacency analysis are only available for the conterminous United States.

[4] Includes Alaska, Alabama, Arkansas, Arizona, Colorado, Delaware, Georgia, Iowa, Idaho, Kansas, Kentucky, Louisiana, Missouri, Mississippi, Montana, North Carolina, North Dakota, Nebraska, New Mexico, Nevada, Oklahoma, South Carolina, South Dakota, Texas, Utah, Wisconsin, West Virginia, and Wyoming

[5] Includes Alaska, Alabama, Arkansas, Arizona, Colorado, Delaware, Georgia, Idaho, Kentucky, Missouri, Mississippi, Montana, North Dakota, New Mexico, Oklahoma, South Carolina, South Dakota, Texas, Utah, and Wyoming

[6] Includes Arizona, Idaho, Kentucky, Mississippi, and South Dakota

Table E-48: Average annual reduction in CWA section 404 permit application costs based on the sensitivity analysis methodology, by state (Millions 2017$)

State	Scenario 0[1,2]			Scenario 1[1,3]			Scenario 2[1,4]			Scenario 3[1,5]		
	Individual	General	Total	Individual	General	Total	Individual	General	Total	Individual	General	Total
AL	$0.06	$0.20	$0.26	$0.06	$0.20	$0.26	$0.06	$0.20	$0.26	$0.00	$0.00	$0.00
AR	$0.04	$1.45	$1.49	$0.04	$1.45	$1.49	$0.04	$1.45	$1.49	$0.00	$0.00	$0.00
AZ	$0.07	$1.06	$1.13	$0.07	$1.06	$1.13	$0.07	$1.06	$1.13	$0.07	$1.06	$1.13
CA	$0.13	$4.74	$4.87	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
CO	$0.01	$0.71	$0.71	$0.01	$0.71	$0.71	$0.01	$0.71	$0.71	$0.00	$0.00	$0.00
CT	$0.00	$0.20	$0.20	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
DE	$0.00	$0.02	$0.03	$0.00	$0.02	$0.03	$0.00	$0.02	$0.03	$0.00	$0.00	$0.00
FL	$0.75	$0.77	$1.53	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
GA	$0.06	$0.32	$0.38	$0.06	$0.32	$0.38	$0.06	$0.32	$0.38	$0.00	$0.00	$0.00
IA	$0.01	$0.18	$0.20	$0.01	$0.18	$0.20	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
ID	$0.01	$0.05	$0.06	$0.01	$0.05	$0.06	$0.01	$0.05	$0.06	$0.01	$0.05	$0.06
IL	$0.07	$0.92	$0.99	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
IN	$0.03	$0.44	$0.47	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
KS	$0.06	$1.68	$1.74	$0.06	$1.68	$1.74	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
KY	$0.03	$0.64	$0.67	$0.03	$0.64	$0.67	$0.03	$0.64	$0.67	$0.03	$0.64	$0.67
LA	$0.18	$1.39	$1.57	$0.18	$1.39	$1.57	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
MA	$0.02	$0.18	$0.20	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
MD	$0.01	$0.17	$0.19	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
ME	$0.01	$0.36	$0.38	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
MI	$0.48	$0.98	$1.46	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
MN	$0.42	$1.07	$1.48	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
MO	$0.06	$1.17	$1.23	$0.06	$1.17	$1.23	$0.06	$1.17	$1.23	$0.00	$0.00	$0.00
MS	$0.13	$0.52	$0.64	$0.13	$0.52	$0.64	$0.13	$0.52	$0.64	$0.13	$0.52	$0.64
MT	$0.00	$0.10	$0.10	$0.00	$0.10	$0.10	$0.00	$0.10	$0.10	$0.00	$0.00	$0.00
NC	$0.05	$0.34	$0.39	$0.05	$0.34	$0.39	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
ND	$0.02	$0.78	$0.80	$0.02	$0.78	$0.80	$0.02	$0.78	$0.80	$0.00	$0.00	$0.00
NE	$0.00	$0.15	$0.16	$0.00	$0.15	$0.16	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
NH	$0.00	$0.15	$0.15	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
NJ	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
NM	$0.03	$0.69	$0.72	$0.03	$0.69	$0.72	$0.03	$0.69	$0.72	$0.00	$0.00	$0.00
NV	$0.01	$0.17	$0.17	$0.01	$0.17	$0.17	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
NY	$0.07	$0.82	$0.89	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00

Table E-48: Average annual reduction in CWA section 404 permit application costs based on the sensitivity analysis methodology, by state (Millions 2017$)

State	Scenario 0[1,2]			Scenario 1[1,3]			Scenario 2[1,4]			Scenario 3[1,5]		
	Individual	General	Total	Individual	General	Total	Individual	General	Total	Individual	General	Total
OH	$0.22	$1.28	$1.50	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
OK	$0.01	$0.23	$0.24	$0.01	$0.23	$0.24	$0.01	$0.23	$0.24	$0.00	$0.00	$0.00
OR	$0.07	$0.16	$0.23	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
PA	$0.04	$3.43	$3.47	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
RI	$0.00	$0.05	$0.06	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
SC	$0.02	$0.10	$0.13	$0.02	$0.10	$0.13	$0.02	$0.10	$0.13	$0.00	$0.00	$0.00
SD	$0.03	$0.23	$0.26	$0.03	$0.23	$0.26	$0.03	$0.23	$0.26	$0.03	$0.23	$0.26
TN	$0.01	$0.13	$0.14	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
TX	$0.13	$4.74	$4.87	$0.13	$4.74	$4.87	$0.13	$4.74	$4.87	$0.00	$0.00	$0.00
UT	$0.01	$0.33	$0.34	$0.01	$0.33	$0.34	$0.01	$0.33	$0.34	$0.00	$0.00	$0.00
VA	$0.06	$0.26	$0.31	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
VT	$0.00	$0.08	$0.08	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
WA	$0.06	$0.25	$0.31	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
WI	$0.18	$1.09	$1.26	$0.18	$1.09	$1.26	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
WV	$0.01	$1.95	$1.95	$0.01	$1.95	$1.95	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
WY	$0.00	$0.10	$0.10	$0.00	$0.10	$0.10	$0.00	$0.10	$0.10	$0.00	$0.00	$0.00
Total	**$3.68**	**$36.86**	**$40.53**	**$1.21**	**$20.39**	**$21.60**	**$0.71**	**$13.44**	**$14.15**	**$0.26**	**$2.49**	**$2.76**

[1] For each state, permit cost savings are calculated by multiplying the number of individual and general permit reductions (see Table E-48) by the unit costs from the Corps NWP analysis ($14,700 per individual permit; $4,400 per general permit).

[2] Includes all states except Hawaii.

[3] Includes Alaska, Alabama, Arkansas, Arizona, Colorado, Delaware, Georgia, Iowa, Idaho, Kansas, Kentucky, Louisiana, Missouri, Mississippi, Montana, North Carolina, North Dakota, Nebraska, New Mexico, Nevada, Oklahoma, South Carolina, South Dakota, Texas, Utah, Wisconsin, West Virginia, and Wyoming

[4] Includes Alaska, Alabama, Arkansas, Arizona, Colorado, Delaware, Georgia, Idaho, Kentucky, Missouri, Mississippi, Montana, North Dakota, New Mexico, Oklahoma, South Carolina, South Dakota, Texas, Utah, and Wyoming

[5] Includes Arizona, Idaho, Kentucky, Mississippi, and South Dakota

Table E-49: Average annual reduction in 404 mitigation requirement costs based on the sensitivity analysis methodology, by state

State	Cost per acre (2017$)		Cost per LF (2017$)		Scenario 0[1,2] (Millions 2017$)		Scenario 1[1,3] (Millions 2017$)		Scenario 2[1,4] (Millions 2017$)		Scenario 3[1,5] (Millions 2017$)	
	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
AL	$54,000	$105,400	$266	$675	$26.40	$62.77	$26.40	$62.77	$26.40	$62.77	$0.00	$0.00
AR	$30,040	$54,396	$242	$540	$7.39	$15.82	$7.39	$15.82	$7.39	$15.82	$0.00	$0.00
AZ	$54,000	$84,000	$294	$675	$2.11	$3.94	$2.11	$3.94	$2.11	$3.94	$2.11	$3.94
CA	$210,000	$384,250	$294	$675	$65.66	$142.88	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
CO	$51,850	$72,490	$90	$360	$0.31	$0.64	$0.31	$0.64	$0.31	$0.64	$0.00	$0.00
CT	$329,166	$470,629	$294	$675	$2.87	$4.10	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
DE	$34,000	$250,000	$375	$700	$0.39	$2.01	$0.39	$2.01	$0.39	$2.01	$0.00	$0.00
FL	$54,000	$105,400	$294	$675	$70.16	$137.06	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
GA	$172,000	$272,000	$878	$975	$24.20	$36.67	$24.20	$36.67	$24.20	$36.67	$0.00	$0.00
IA	$36,774	$80,711	$90	$383	$0.82	$2.71	$0.82	$2.71	$0.00	$0.00	$0.00	$0.00
ID	$42,250	$81,085	$294	$675	$0.12	$0.25	$0.12	$0.25	$0.12	$0.25	$0.12	$0.25
IL	$64,454	$105,356	$228	$599	$7.22	$15.84	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
IN	$50,000	$71,000	$294	$636	$28.75	$60.01	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
KS	$54,000	$105,400	$90	$360	$12.06	$45.36	$12.06	$45.36	$0.00	$0.00	$0.00	$0.00
KY	$110,016	$165,024	$300	$755	$41.20	$97.06	$41.20	$97.06	$41.20	$97.06	$41.20	$97.06
LA	$10,000	$60,000	$294	$675	$4.26	$19.39	$4.26	$19.39	$0.00	$0.00	$0.00	$0.00
MA	$596,041	$621,330	$100	$200	$28.32	$29.53	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
MD	$62,667	$226,667	$552	$763	$2.50	$4.54	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
ME	$250,906	$374,616	$0	$0	$14.46	$21.60	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
MI	$52,767	$130,800	$230	$993	$0.20	$0.59	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
MN	$9,294	$76,443	$294	$675	$3.58	$26.54	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
MO	$27,000	$81,000	$90	$405	$1.90	$7.85	$1.90	$7.85	$1.90	$7.85	$0.00	$0.00
MS	$26,000	$32,500	$266	$675	$6.69	$10.66	$6.69	$10.66	$6.69	$10.66	$6.69	$10.66
MT	$30,000	$37,000	$294	$675	$1.51	$2.33	$1.51	$2.33	$1.51	$2.33	$0.00	$0.00
NC	$26,445	$71,273	$297	$391	$1.32	$3.15	$1.32	$3.15	$0.00	$0.00	$0.00	$0.00
ND	$40,000	$60,000	$294	$675	$11.62	$21.99	$11.62	$21.99	$11.62	$21.99	$0.00	$0.00
NE	$54,000	$105,400	$90	$360	$0.98	$2.37	$0.98	$2.37	$0.00	$0.00	$0.00	$0.00
NH	$156,283	$220,358	$245	$735	$0.44	$0.62	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
NJ	$38,000	$300,000	$294	$675	$0.05	$0.37	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
NM	$51,850	$72,490	$294	$675	$0.55	$0.76	$0.55	$0.76	$0.55	$0.76	$0.00	$0.00
NV	$106,167	$197,806	$294	$675	$0.77	$1.62	$0.77	$1.62	$0.00	$0.00	$0.00	$0.00
NY	$72,000	$91,580	$310	$420	$2.64	$3.40	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00

Table E-49: Average annual reduction in 404 mitigation requirement costs based on the sensitivity analysis methodology, by state

State	Cost per acre (2017$)		Cost per LF (2017$)		Scenario 0[1,2] (Millions 2017$)		Scenario 1[1,3] (Millions 2017$)		Scenario 2[1,4] (Millions 2017$)		Scenario 3[1,5] (Millions 2017$)	
	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
OH	$37,500	$216,000	$165	$1,350	$7.83	$59.03	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
OK	$49,700	$60,979	$235	$555	$1.38	$3.18	$1.38	$3.18	$1.38	$3.18	$0.00	$0.00
OR	$54,500	$125,170	$42,339	$81,599	$35.84	$70.03	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
PA	$66,750	$196,895	$401	$865	$5.96	$15.41	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
RI	$462,604	$545,980	$294	$675	$0.37	$0.43	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
SC	$99,223	$171,637	$588	$683	$4.44	$7.68	$4.44	$7.68	$4.44	$7.68	$0.00	$0.00
SD	$40,000	$60,000	$294	$675	$4.58	$7.62	$4.58	$7.62	$4.58	$7.62	$4.58	$7.62
TN	$37,500	$37,500	$240	$362	$2.18	$3.17	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
TX	$54,000	$105,400	$525	$900	$95.93	$170.47	$95.93	$170.47	$95.93	$170.47	$0.00	$0.00
UT	$54,000	$105,400	$294	$675	$1.49	$3.30	$1.49	$3.30	$1.49	$3.30	$0.00	$0.00
VA	$30,000	$200,000	$375	$700	$3.92	$12.23	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
VT	$110,000	$131,549	$294	$675	$0.19	$0.25	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
WA	$69,324	$1,114,494	$294	$675	$3.79	$46.52	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
WI	$70,800	$105,400	$294	$675	$5.55	$8.62	$5.55	$8.62	$0.00	$0.00	$0.00	$0.00
WV	$120,000	$180,000	$728	$826	$10.10	$11.92	$10.10	$11.92	$0.00	$0.00	$0.00	$0.00
WY	$41,667	$50,667	$294	$675	$2.37	$3.02	$2.37	$3.02	$2.37	$3.02	$0.00	$0.00
Total					**$557.37**	**$1,207.33**	**$270.44**	**$553.17**	**$234.58**	**$458.04**	**$54.70**	**$119.54**

[1] For each state, cost savings are calculated by multiplying the cost of each mitigation acre or linear foot (low and high estimates) by the expected reduction in annual mitigation requirements (see Table E-48) and summing the acreage and linear feet values for each scenario.

[2] Includes all states except Hawaii and Alaska. Alaska is excluded from the sensitivity analysis methodology because the GIS layers used in the NHD-NWI adjacency analysis are only available for the conterminous United States.

[3] Includes Alaska, Alabama, Arkansas, Arizona, Colorado, Delaware, Georgia, Iowa, Idaho, Kansas, Kentucky, Louisiana, Missouri, Mississippi, Montana, North Carolina, North Dakota, Nebraska, New Mexico, Nevada, Oklahoma, South Carolina, South Dakota, Texas, Utah, Wisconsin, West Virginia, and Wyoming

[4] Includes Alaska, Alabama, Arkansas, Arizona, Colorado, Delaware, Georgia, Idaho, Kentucky, Missouri, Mississippi, Montana, North Dakota, New Mexico, Oklahoma, South Carolina, South Dakota, Texas, Utah, and Wyoming

[5] Includes Arizona, Idaho, Kentucky, Mississippi, and South Dakota

Table E-50: Total national estimated CWA section 404 program related annual cost savings based on the sensitivity analysis methodology, by state (Millions 2017$)

State	Scenario 0[1]		Scenario 1[2]		Scenario 2[3]		Scenario 3[4]	
	Low	High	Low	High	Low	High	Low	High
AL	$26.66	$63.04	$26.66	$63.04	$26.66	$63.04	$0.00	$0.00
AR	$8.88	$17.31	$8.88	$17.31	$8.88	$17.31	$0.00	$0.00
AZ	$3.24	$5.07	$3.24	$5.07	$3.24	$5.07	$3.24	$5.07
CA	$70.53	$147.76	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
CO	$1.03	$1.35	$1.03	$1.35	$1.03	$1.35	$0.00	$0.00
CT	$3.07	$4.30	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
DE	$0.42	$2.04	$0.42	$2.04	$0.42	$2.04	$0.00	$0.00
FL	$71.69	$138.59	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
GA	$24.58	$37.05	$24.58	$37.05	$24.58	$37.05	$0.00	$0.00
IA	$1.01	$2.91	$1.01	$2.91	$0.00	$0.00	$0.00	$0.00
ID	$0.18	$0.31	$0.18	$0.31	$0.18	$0.31	$0.18	$0.31
IL	$8.21	$16.83	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
IN	$29.22	$60.48	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
KS	$13.80	$47.10	$13.80	$47.10	$0.00	$0.00	$0.00	$0.00
KY	$41.87	$97.73	$41.87	$97.73	$41.87	$97.73	$41.87	$97.73
LA	$5.83	$20.96	$5.83	$20.96	$0.00	$0.00	$0.00	$0.00
MA	$28.52	$29.73	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
MD	$2.69	$4.73	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
ME	$14.84	$21.97	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
MI	$1.66	$2.05	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
MN	$5.06	$28.02	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
MO	$3.13	$9.08	$3.13	$9.08	$3.13	$9.08	$0.00	$0.00
MS	$7.33	$11.31	$7.33	$11.31	$7.33	$11.31	$7.33	$11.31
MT	$1.61	$2.43	$1.61	$2.43	$1.61	$2.43	$0.00	$0.00
NC	$1.72	$3.54	$1.72	$3.54	$0.00	$0.00	$0.00	$0.00
ND	$12.42	$22.79	$12.42	$22.79	$12.42	$22.79	$0.00	$0.00
NE	$1.13	$2.53	$1.13	$2.53	$0.00	$0.00	$0.00	$0.00
NH	$0.59	$0.77	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
NJ	$0.05	$0.38	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
NM	$1.26	$1.48	$1.26	$1.48	$1.26	$1.48	$0.00	$0.00
NV	$0.94	$1.79	$0.94	$1.79	$0.00	$0.00	$0.00	$0.00
NY	$3.53	$4.29	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00

Table E-50: Total national estimated CWA section 404 program related annual cost savings based on the sensitivity analysis methodology, by state (Millions 2017$)

State	Scenario 0[1]		Scenario 1[2]		Scenario 2[3]		Scenario 3[4]	
	Low	High	Low	High	Low	High	Low	High
OH	$9.33	$60.53	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
OK	$1.62	$3.42	$1.62	$3.42	$1.62	$3.42	$0.00	$0.00
OR	$36.08	$70.26	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
PA	$9.43	$18.88	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
RI	$0.42	$0.49	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
SC	$4.57	$7.81	$4.57	$7.81	$4.57	$7.81	$0.00	$0.00
SD	$4.84	$7.88	$4.84	$7.88	$4.84	$7.88	$4.84	$7.88
TN	$2.31	$3.31	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
TX	$100.80	$175.34	$100.80	$175.34	$100.80	$175.34	$0.00	$0.00
UT	$1.83	$3.64	$1.83	$3.64	$1.83	$3.64	$0.00	$0.00
VA	$4.23	$12.54	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
VT	$0.27	$0.33	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
WA	$4.10	$46.83	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
WI	$6.82	$9.89	$6.82	$9.89	$0.00	$0.00	$0.00	$0.00
WV	$12.05	$13.87	$12.05	$13.87	$0.00	$0.00	$0.00	$0.00
WY	$2.48	$3.12	$2.48	$3.12	$2.48	$3.12	$0.00	$0.00
Total	**$597.90**	**$1,247.86**	**$292.04**	**$574.77**	**$248.73**	**$472.19**	**$57.45**	**$122.30**

[1] Includes all states except Hawaii and Alaska. Alaska is excluded from the sensitivity analysis methodology because the GIS layers used in the NHD-NWI adjacency analysis are only available for the conterminous United States.

[2] Includes Alaska, Alabama, Arkansas, Arizona, Colorado, Delaware, Georgia, Iowa, Idaho, Kansas, Kentucky, Louisiana, Missouri, Mississippi, Montana, North Carolina, North Dakota, Nebraska, New Mexico, Nevada, Oklahoma, South Carolina, South Dakota, Texas, Utah, Wisconsin, West Virginia, and Wyoming

[3] Includes Alaska, Alabama, Arkansas, Arizona, Colorado, Delaware, Georgia, Idaho, Kentucky, Missouri, Mississippi, Montana, North Dakota, New Mexico, Oklahoma, South Carolina, South Dakota, Texas, Utah, and Wyoming

[4] Includes Arizona, Idaho, Kentucky, Mississippi, and South Dakota

Table E-51: Total national forgone benefit estimate of reduced CWA section 404 related mitigation requirements based on the sensitivity analysis methodology, Scenario 0

State	Households (HH)	Annual forgone mitigation acres[1]	Mean WTP /HH/acre (2017$)	Mean estimate of forgone benefits (2017$)	Lower 5th WTP/HH/acre (2017$)	Lower 5th estimate of forgone benefits (2017$)	Upper 95th WTP WTP/HH/acre (2017$)	Upper 95th estimate of forgone benefits (2017$)
AK	258,058	NA	NA	NA	NA	NA	NA	NA
AL	1,883,791	199.22	$0.0311	$11,653,593	$0.0001	$47,301	$0.0626	$23,495,366
AR	1,147,084	72.28	$0.0315	$2,614,757	$0.0001	$10,333	$0.0631	$5,234,413
AZ	2,380,990	19.60	$0.0363	$1,694,037	$0.0002	$7,072	$0.0793	$3,701,928
CA	12,577,498	307.53	$0.0175	$67,852,677	$0.0001	$351,833	$0.0433	$167,428,542
CO	1,972,868	4.34	$0.0154	$132,149	$0.0001	$686	$0.0383	$327,893
CT	1,371,087	5.81	$0.0487	$387,394	$0.0001	$446	$0.0759	$604,091
DE	342,297	5.22	$0.0275	$49,144	$0.0001	$243	$0.0584	$104,326
FL	7,420,802	863.68	$0.0196	$125,326,995	$0.0001	$661,004	$0.0431	$275,939,755
GA	3,585,584	86.56	$0.0289	$8,977,948	$0.0001	$41,108	$0.0602	$18,681,814
IA	1,221,576	14.28	$0.0071	$123,619	$0.0001	$881	$0.0170	$295,773
ID	579,408	1.24	$0.0169	$12,127	$0.0001	$58	$0.0408	$29,252
IL	4,836,972	59.89	$0.0109	$3,144,739	$0.0001	$19,539	$0.0243	$7,031,505
IN	2,502,154	173.64	$0.0107	$4,647,911	$0.0001	$27,386	$0.0237	$10,288,191
KS	1,112,096	198.54	$0.0058	$1,284,814	$0.0000	$9,275	$0.0142	$3,125,419
KY	1,719,965	216.43	$0.0290	$10,789,433	$0.0001	$44,170	$0.0590	$21,946,025
LA	1,728,360	181.48	$0.0208	$6,529,783	$0.0001	$29,407	$0.0442	$13,870,628
MA	2,547,075	31.69	$0.0492	$3,972,418	$0.0001	$4,373	$0.0757	$6,113,539
MD	2,156,411	10.76	$0.0907	$2,102,864	$0.0005	$12,589	$0.2014	$4,671,661
ME	557,219	38.43	$0.0155	$332,305	$0.0000	$270	$0.0217	$464,747
MI	3,872,508	2.25	$0.0132	$114,510	$0.0001	$617	$0.0281	$244,281
MN	2,087,227	224.18	$0.0090	$4,221,742	$0.0001	$31,031	$0.0212	$9,914,479
MO	2,375,611	36.01	$0.0113	$963,075	$0.0001	$5,469	$0.0246	$2,105,202
MS	1,115,768	135.86	$0.0322	$4,875,602	$0.0001	$17,692	$0.0632	$9,578,581
MT	409,607	26.03	$0.0155	$164,930	$0.0001	$774	$0.0373	$397,923
NC	3,745,155	27.27	$0.0301	$3,078,189	$0.0001	$13,838	$0.0622	$6,356,526
ND	281,192	127.91	$0.0039	$138,749	$0.0000	$1,038	$0.0098	$350,943
NE	721,130	13.13	$0.0046	$43,411	$0.0000	$330	$0.0115	$108,713
NH	518,973	1.87	$0.0464	$45,160	$0.0001	$49	$0.0723	$70,322
NJ	3,214,360	0.83	$0.0500	$133,320	$0.0001	$140	$0.0758	$202,203
NM	791,395	6.99	$0.0216	$119,572	$0.0001	$535	$0.0504	$279,011
NV	1,006,250	4.41	$0.0171	$76,175	$0.0001	$362	$0.0412	$183,113

Table E-51: Total national forgone benefit estimate of reduced CWA section 404 related mitigation requirements based on the sensitivity analysis methodology, Scenario 0

State	Households (HH)	Annual forgone mitigation acres[1]	Mean WTP /HH/acre (2017$)	Mean estimate of forgone benefits (2017$)	Lower 5th WTP/HH/acre (2017$)	Lower 5th estimate of forgone benefits (2017$)	Upper 95th WTP WTP/HH/acre (2017$)	Upper 95th estimate of forgone benefits (2017$)
NY	7,317,755	21.80	$0.0497	$7,935,737	$0.0000	$7,233	$0.0733	$11,686,174
OH	4,603,435	90.20	$0.0112	$4,640,886	$0.0001	$26,117	$0.0244	$10,136,912
OK	1,460,450	9.38	$0.0236	$323,171	$0.0001	$1,581	$0.0505	$691,771
OR	1,518,938	32.58	$0.0163	$807,845	$0.0001	$3,921	$0.0396	$1,960,545
PA	5,018,904	42.64	$0.0497	$10,643,350	$0.0000	$9,602	$0.0731	$15,644,600
RI	413,600	0.53	$0.0536	$11,705	$0.0001	$12	$0.0790	$17,247
SC	1,801,181	29.84	$0.0284	$1,528,072	$0.0001	$7,131	$0.0594	$3,194,982
SD	322,282	65.68	$0.0039	$83,486	$0.0000	$605	$0.0099	$209,710
TN	2,493,552	16.30	$0.0288	$1,172,058	$0.0001	$5,231	$0.0597	$2,425,124
TX	8,922,933	518.33	$0.0137	$63,570,443	$0.0001	$406,658	$0.0320	$147,775,138
UT	877,692	10.16	$0.0148	$131,579	$0.0001	$659	$0.0363	$323,957
VA	3,056,058	34.56	$0.0249	$2,633,725	$0.0001	$14,919	$0.0549	$5,794,192
VT	256,442	1.17	$0.0484	$14,477	$0.0000	$13	$0.0710	$21,205
WA	2,620,076	31.85	$0.0217	$1,811,468	$0.0001	$9,639	$0.0534	$4,452,614
WI	2,279,768	50.43	$0.0107	$1,234,438	$0.0001	$7,580	$0.0240	$2,755,008
WV	763,831	25.59	$0.0189	$368,546	$0.0001	$1,785	$0.0409	$800,166
WY	226,879	36.61	$0.0165	$137,212	$0.0001	$660	$0.0400	$331,881
Total	**115,994,247**			**$362,651,339**		**$1,843,196**		**$801,367,396**

[1] Annual average forgone mitigation acres (see Table E-48) based on permits issued in years 2011-2015 with mitigation requirements on waterways determined to be RPWWN-type wetlands, other non-abutting wetlands, or ephemeral streams. Excludes permits issued for mitigation or restoration activities because the main purpose of these activities is to restore or enhance ecosystem services as opposed to dredge and fill activities that lead to permanent or temporary losses of ecosystem services. Linear feet are converted to acres by multiplying total linear feet by an average total buffer width of 50 feet (25 feet on each side of the stream) and converting square feet to acres.

Table E-52: Total national forgone benefit estimate of reduced mitigation requirements based on the sensitivity analysis methodology, Scenario 1

State	Households (HH)	Annual forgone mitigation acres[1]	Mean WTP /HH/acre (2017$)	Mean estimate of forgone benefits (2017$)	Lower 5th WTP/HH/acre (2017$)	Lower 5th estimate of forgone benefits (2017$)	Upper 95th WTP WTP/HH/acre (2017$)	Upper 95th estimate of forgone benefits (2017$)
AK	258,058	NA	NA	NA	NA	NA	NA	NA
AL	1,883,791	199.22	$0.0311	$11,653,593	$0.0001	$47,301	$0.0626	$23,495,366
AR	1,147,084	72.28	$0.0315	$2,614,757	$0.0001	$10,333	$0.0631	$5,234,413
AZ	2,380,990	19.60	$0.0363	$1,694,037	$0.0002	$7,072	$0.0793	$3,701,928
CO	1,972,868	4.34	$0.0154	$132,149	$0.0001	$686	$0.0383	$327,893
DE	342,297	5.22	$0.0275	$49,144	$0.0001	$243	$0.0584	$104,326
GA	3,585,584	86.56	$0.0289	$8,977,948	$0.0001	$41,108	$0.0602	$18,681,814
IA	1,221,576	14.28	$0.0071	$123,619	$0.0001	$881	$0.0170	$295,773
ID	579,408	1.24	$0.0169	$12,127	$0.0001	$58	$0.0408	$29,252
KS	1,112,096	198.54	$0.0058	$1,284,814	$0.0000	$9,275	$0.0142	$3,125,419
KY	1,719,965	216.43	$0.0290	$10,789,433	$0.0001	$44,170	$0.0590	$21,946,025
LA	1,728,360	181.48	$0.0208	$6,529,783	$0.0001	$29,407	$0.0442	$13,870,628
MO	2,375,611	36.01	$0.0113	$963,075	$0.0001	$5,469	$0.0246	$2,105,202
MS	1,115,768	135.86	$0.0322	$4,875,602	$0.0001	$17,692	$0.0632	$9,578,581
MT	409,607	26.03	$0.0155	$164,930	$0.0001	$774	$0.0373	$397,923
NC	3,745,155	27.27	$0.0301	$3,078,189	$0.0001	$13,838	$0.0622	$6,356,526
ND	281,192	127.91	$0.0039	$138,749	$0.0000	$1,038	$0.0098	$350,943
NE	721,130	13.13	$0.0046	$43,411	$0.0000	$330	$0.0115	$108,713
NM	791,395	6.99	$0.0216	$119,572	$0.0001	$535	$0.0504	$279,011
NV	1,006,250	4.41	$0.0171	$76,175	$0.0001	$362	$0.0412	$183,113
OK	1,460,450	9.38	$0.0236	$323,171	$0.0001	$1,581	$0.0505	$691,771
SC	1,801,181	29.84	$0.0284	$1,528,072	$0.0001	$7,131	$0.0594	$3,194,982
SD	322,282	65.68	$0.0039	$83,486	$0.0000	$605	$0.0099	$209,710
TX	8,922,933	518.33	$0.0137	$63,570,443	$0.0001	$406,658	$0.0320	$147,775,138
UT	877,692	10.16	$0.0148	$131,579	$0.0001	$659	$0.0363	$323,957
WI	2,279,768	50.43	$0.0107	$1,234,438	$0.0001	$7,580	$0.0240	$2,755,008
WV	763,831	25.59	$0.0189	$368,546	$0.0001	$1,785	$0.0409	$800,166
WY	226,879	36.61	$0.0165	$137,212	$0.0001	$660	$0.0400	$331,881
Total	**45,033,201**			**$120,698,053**		**$657,233**		**$266,255,464**

[1] Annual average forgone mitigation acres (see Table E-48) based on permits issued in years 2011-2015 with mitigation requirements on waterways determined to be RPWWN-type wetlands, other non-abutting wetlands, or ephemeral streams. Excludes permits issued for mitigation or restoration activities because the main purpose of these activities is to restore or enhance ecosystem services provided by water resources as opposed to dredge and fill activities that lead to permanent or temporary losses of

Table E-52: Total national forgone benefit estimate of reduced mitigation requirements based on the sensitivity analysis methodology, Scenario 1

State	Households (HH)	Annual forgone mitigation acres[1]	Mean WTP /HH/acre (2017$)	Mean estimate of forgone benefits (2017$)	Lower 5th WTP/HH/acre (2017$)	Lower 5th estimate of forgone benefits (2017$)	Upper 95th WTP WTP/HH/acre (2017$)	Upper 95th estimate of forgone benefits (2017$)

ecosystem services. Linear feet are converted to acres by multiplying total linear feet by an average total buffer width of 50 feet (25 feet on each side of the stream) and converting square feet to acres.

Table E-53: Total national forgone benefit estimate of reduced CWA section 404 related mitigation requirements based on the sensitivity analysis methodology, Scenario 2

State	Households (HH)	Annual forgone mitigation acres[1]	Mean WTP /HH/acre (2017$)	Mean estimate of forgone benefits (2017$)	Lower 5th WTP/HH/acre (2017$)	Lower 5th estimate of forgone benefits (2017$)	Upper 95th WTP WTP/HH/acre (2017$)	Upper 95th estimate of forgone benefits (2017$)
AK	258,058	NA	NA	NA	NA	NA	NA	NA
AL	1,883,791	199.22	$0.0311	$11,653,593	$0.0001	$47,301	$0.0626	$23,495,366
AR	1,147,084	72.28	$0.0315	$2,614,757	$0.0001	$10,333	$0.0631	$5,234,413
AZ	2,380,990	19.60	$0.0363	$1,694,037	$0.0002	$7,072	$0.0793	$3,701,928
CO	1,972,868	4.34	$0.0154	$132,149	$0.0001	$686	$0.0383	$327,893
DE	342,297	5.22	$0.0275	$49,144	$0.0001	$243	$0.0584	$104,326
GA	3,585,584	86.56	$0.0289	$8,977,948	$0.0001	$41,108	$0.0602	$18,681,814
ID	579,408	1.24	$0.0169	$12,127	$0.0001	$58	$0.0408	$29,252
KY	1,719,965	216.43	$0.0290	$10,789,433	$0.0001	$44,170	$0.0590	$21,946,025
MO	2,375,611	36.01	$0.0113	$963,075	$0.0001	$5,469	$0.0246	$2,105,202
MS	1,115,768	135.86	$0.0322	$4,875,602	$0.0001	$17,692	$0.0632	$9,578,581
MT	409,607	26.03	$0.0155	$164,930	$0.0001	$774	$0.0373	$397,923
ND	281,192	127.91	$0.0039	$138,749	$0.0000	$1,038	$0.0098	$350,943
NM	791,395	6.99	$0.0216	$119,572	$0.0001	$535	$0.0504	$279,011
OK	1,460,450	9.38	$0.0236	$323,171	$0.0001	$1,581	$0.0505	$691,771
SC	1,801,181	29.84	$0.0284	$1,528,072	$0.0001	$7,131	$0.0594	$3,194,982
SD	322,282	65.68	$0.0039	$83,486	$0.0000	$605	$0.0099	$209,710
TX	8,922,933	518.33	$0.0137	$63,570,443	$0.0001	$406,658	$0.0320	$147,775,138
UT	877,692	10.16	$0.0148	$131,579	$0.0001	$659	$0.0363	$323,957
WY	226,879	36.61	$0.0165	$137,212	$0.0001	$660	$0.0400	$331,881
Total	**32,455,035**			**$107,959,080**		**$593,775**		**$238,760,117**

[1] Annual average forgone mitigation acres (see Table E-48) based on permits issued in years 2011-2015 with mitigation requirements on waterways determined to be RPWWN-type wetlands, other non-abutting wetlands, or ephemeral streams. Excludes permits issued for mitigation or restoration activities because the main purpose of these activities is to restore or enhance ecosystem services provided by water resources as opposed to dredge and fill activities that lead to permanent or temporary losses of ecosystem services. Linear feet are converted to acres by multiplying total linear feet by an average total buffer width of 50 feet (25 feet on each side of the stream) and converting square feet to acres.

Table E-54: Total national forgone benefit estimate of reduced CWA section 404 related mitigation requirements based on the sensitivity analysis methodology, Scenario 3

State	Households (HH)	Annual forgone mitigation acres[1]	Mean WTP /HH/acre (2017$)	Mean estimate of forgone benefits (2017$)	Lower 5th WTP/HH/acre (2017$)	Lower 5th estimate of forgone benefits (2017$)	Upper 95th WTP WTP/HH/acre (2017$)	Upper 95th estimate of forgone benefits (2017$)
AZ	2,380,990	19.60	$0.0363	$1,694,037	$0.0002	$7,072	$0.0793	$3,701,928
ID	579,408	1.24	$0.0169	$12,127	$0.0001	$58	$0.0408	$29,252
KY	1,719,965	216.43	$0.0290	$10,789,433	$0.0001	$44,170	$0.0590	$21,946,025
MS	1,115,768	135.86	$0.0322	$4,875,602	$0.0001	$17,692	$0.0632	$9,578,581
SD	322,282	65.68	$0.0039	$83,486	$0.0000	$605	$0.0099	$209,710
Total	**6,118,413**			**$17,454,685**		**$69,597**		**$35,465,497**

[1] Annual average forgone mitigation acres (see Table E-48) based on permits issued in years 2011-2015 with mitigation requirements on waterways determined to be RPWWN-type wetlands, other non-abutting wetlands, or ephemeral streams. Excludes permits issued for mitigation or restoration activities because the main purpose of these activities is to restore or enhance ecosystem services provided by water resources as opposed to dredge and fill activities that lead to permanent or temporary losses of ecosystem services. Linear feet are converted to acres by multiplying total linear feet by an average total buffer width of 50 feet (25 feet on each side of the stream) and converting square feet to acres.

Appendix F: Stage 2 Analysis State-level Results

This appendix provides state-level results of the agencies' Stage 2 quantitative assessment, summarized in Section IV.C. Table F-1 presents average annual reductions in CWA section 404 program related permit and mitigation requirements under the proposed rule, by policy scenario and state. Table F-2, Table F-3, and Table F-4 present permit cost savings, mitigation cost savings, and total cost savings (sum of permit cost savings and mitigation cost savings), respectively, by policy scenario and state.

Table F-5, Table F-6, Table F-7, and Table F-8 present forgone benefits from reduced section 404 related mitigation requirements by policy scenario and state for Scenarios 0, 1, 2, and 3, respectively.

Table F-1: Average annual reductions in CWA section 404 related permit and mitigation requirements under the proposed rule, by policy scenario and state

State	Annual average reduction in permits with proposed rule[1]								Average annual mitigation reduction with proposed rule[2]							
	Individual Permits				General Permits				Acres				Linear Feet			
	Sc. 0[3]	Sc. 1[4]	Sc. 2[5]	Sc. 3[6]	Sc. 0[3]	Sc. 1[4]	Sc. 2[5]	Sc. 3[6]	Sc. 0[3]	Sc. 1[4]	Sc. 2[5]	Sc. 3[6]	Sc. 0[3]	Sc. 1[4]	Sc. 2[5]	Sc. 3[6]
AK	1.6	1.6	1.6	0.0	20.2	20.2	20.2	0.0	13.54	13.54	13.54	0.00	0	0	0	0
AL	1.0	1.0	1.0	0.0	28.8	28.8	28.8	0.0	15.25	15.25	15.25	0.00	29,318	29,318	29,318	0
AR	2.0	2.0	2.0	0.0	310.6	310.6	310.6	0.0	18.96	18.96	18.96	0.00	15,261	15,261	15,261	0
AZ	5.0	5.0	5.0	5.0	240.0	240.0	240.0	240.0	14.45	14.45	14.45	14.45	2,033	2,033	2,033	2,033
CA	5.2	0.0	0.0	0.0	1,041.2	0.0	0.0	0.0	18.32	0.00	0.00	0.00	36,866	0	0	0
CO	0.2	0.2	0.2	0.0	108.2	108.2	108.2	0.0	1.27	1.27	1.27	0.00	472	472	472	0
CT	0.0	0.0	0.0	0.0	38.6	0.0	0.0	0.0	0.58	0.00	0.00	0.00	0	0	0	0
DE	0.0	0.0	0.0	0.0	2.2	2.2	2.2	0.0	2.33	2.33	2.33	0.00	0	0	0	0
FL	19.8	0.0	0.0	0.0	55.2	0.0	0.0	0.0	438.85	0.00	0.00	0.00	591	0	0	0
GA	2.2	2.2	2.2	0.0	48.8	48.8	48.8	0.0	35.50	35.50	35.50	0.00	1,886	1,886	1,886	0
IA	0.2	0.2	0.0	0.0	26.4	26.4	0.0	0.0	0.94	0.94	0.00	0.00	2,920	2,920	0	0
ID	0.4	0.4	0.4	0.4	5.6	5.6	5.6	5.6	0.60	0.60	0.60	0.60	140	140	140	140
IL	0.2	0.0	0.0	0.0	123.2	0.0	0.0	0.0	4.72	0.00	0.00	0.00	10,843	0	0	0
IN	0.8	0.0	0.0	0.0	83.6	0.0	0.0	0.0	16.11	0.00	0.00	0.00	51,439	0	0	0
KS	2.8	2.8	0.0	0.0	349.0	349.0	0.0	0.0	8.23	8.23	0.00	0.00	72,741	72,741	0	0
KY	1.8	1.8	1.8	1.8	141.2	141.2	141.2	141.2	13.38	13.38	13.38	13.38	67,596	67,596	67,596	67,596
LA	3.4	3.4	0.0	0.0	262.2	262.2	0.0	0.0	84.95	84.95	0.00	0.00	1,223	1,223	0	0
MA	0.2	0.0	0.0	0.0	12.0	0.0	0.0	0.0	0.56	0.00	0.00	0.00	0	0	0	0
MD	0.0	0.0	0.0	0.0	10.2	0.0	0.0	0.0	0.81	0.00	0.00	0.00	997	0	0	0
ME	0.2	0.0	0.0	0.0	32.0	0.0	0.0	0.0	2.43	0.00	0.00	0.00	0	0	0	0
MI	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.00	0.00	0.00	0.00	0	0	0	0
MN	10.4	0.0	0.0	0.0	101.8	0.0	0.0	0.0	32.80	0.00	0.00	0.00	55	0	0	0
MO	2.6	2.6	2.6	0.0	245.8	245.8	245.8	0.0	6.66	6.66	6.66	0.00	10,155	10,155	10,155	0
MS	2.8	2.8	2.8	2.8	73.8	73.8	73.8	73.8	20.80	20.80	20.80	20.80	3,329	3,329	3,329	3,329
MT	0.0	0.0	0.0	0.0	8.0	8.0	8.0	0.0	2.11	2.11	2.11	0.00	694	694	694	0
NC	0.2	0.2	0.0	0.0	14.6	14.6	0.0	0.0	4.79	4.79	0.00	0.00	0	0	0	0
ND	0.2	0.2	0.2	0.0	15.0	15.0	15.0	0.0	4.77	4.77	4.77	0.00	625	625	625	0
NE	0.2	0.2	0.0	0.0	30.8	30.8	0.0	0.0	2.27	2.27	0.00	0.00	1,186	1,186	0	0
NH	0.0	0.0	0.0	0.0	3.2	0.0	0.0	0.0	0.09	0.00	0.00	0.00	0	0	0	0

Table F-1: Average annual reductions in CWA section 404 related permit and mitigation requirements under the proposed rule, by policy scenario and state

State	Annual average reduction in permits with proposed rule[1]								Average annual mitigation reduction with proposed rule[2]							
	Individual Permits				General Permits				Acres				Linear Feet			
	Sc. 0[3]	Sc. 1[4]	Sc. 2[5]	Sc. 3[6]	Sc. 0[3]	Sc. 1[4]	Sc. 2[5]	Sc. 3[6]	Sc. 0[3]	Sc. 1[4]	Sc. 2[5]	Sc. 3[6]	Sc. 0[3]	Sc. 1[4]	Sc. 2[5]	Sc. 3[6]
NJ	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.00	0.00	0	0	0	0
NM	1.0	1.0	1.0	0.0	152.0	152.0	152.0	0.0	1.36	1.36	1.36	0.00	0	0	0	0
NV	0.4	0.4	0.0	0.0	37.6	37.6	0.0	0.0	2.29	2.29	0.00	0.00	924	924	0	0
NY	0.6	0.0	0.0	0.0	18.8	0.0	0.0	0.0	2.33	0.00	0.00	0.00	953	0	0	0
OH	1.2	0.0	0.0	0.0	187.0	0.0	0.0	0.0	13.91	0.00	0.00	0.00	20,967	0	0	0
OK	0.2	0.2	0.2	0.0	49.6	49.6	49.6	0.0	0.55	0.55	0.55	0.00	3,212	3,212	3,212	0
OR	3.6	0.0	0.0	0.0	19.8	0.0	0.0	0.0	9.95	0.00	0.00	0.00	504	0	0	0
PA	0.2	0.0	0.0	0.0	440.0	0.0	0.0	0.0	6.89	0.00	0.00	0.00	3,179	0	0	0
RI	0.2	0.0	0.0	0.0	9.6	0.0	0.0	0.0	0.53	0.00	0.00	0.00	0	0	0	0
SC	0.4	0.4	0.4	0.0	5.6	5.6	5.6	0.0	2.71	2.71	2.71	0.00	0	0	0	0
SD	0.4	0.4	0.4	0.4	38.2	38.2	38.2	38.2	4.60	4.60	4.60	4.60	1,563	1,563	1,563	1,563
TN	0.6	0.0	0.0	0.0	25.0	0.0	0.0	0.0	2.49	0.00	0.00	0.00	4,999	0	0	0
TX	6.0	6.0	6.0	0.0	736.6	736.6	736.6	0.0	110.82	110.82	110.82	0.00	86,422	86,422	86,422	0
UT	0.6	0.6	0.6	0.0	71.8	71.8	71.8	0.0	2.08	2.08	2.08	0.00	2,193	2,193	2,193	0
VA	1.6	0.0	0.0	0.0	17.4	0.0	0.0	0.0	5.82	0.00	0.00	0.00	3,539	0	0	0
VT	0.0	0.0	0.0	0.0	1.6	0.0	0.0	0.0	0.50	0.00	0.00	0.00	43	0	0	0
WA	1.6	0.0	0.0	0.0	28.4	0.0	0.0	0.0	10.15	0.00	0.00	0.00	281	0	0	0
WI	5.4	5.4	0.0	0.0	85.2	85.2	0.0	0.0	27.07	27.07	0.00	0.00	0	0	0	0
WV	0.2	0.2	0.0	0.0	380.4	380.4	0.0	0.0	3.03	3.03	0.00	0.00	6,919	6,919	0	0
WY	0.0	0.0	0.0	0.0	20.6	20.6	20.6	0.0	0.78	0.78	0.78	0.00	213	213	213	0
Total	**87.6**	**41.2**	**28.4**	**10.4**	**5,758.0**	**3,508.8**	**2,322.6**	**498.8**	**973.94**	**406.11**	**272.53**	**53.84**	**446,282**	**311,025**	**225,112**	**74,661**

[1] Annual average permit reductions based on permits issued in years 2011-2015 estimated to only affect RPWWN-type wetlands or ephemeral streams.

[2] Annual average mitigation reduction based on permits issued in years 2011-2015 with mitigation requirements on waterways determined to be RPWWN-type wetlands or ephemeral streams. Excludes permits issued for mitigation or restoration activities because the main purpose of these activities is to restore or enhance ecosystem services provided by water resources as opposed to dredge and fill activities that lead to permanent or temporary losses of ecosystem services.

[3] Includes all states except Hawaii.

[4] Includes Alaska, Alabama, Arkansas, Arizona, Colorado, Delaware, Georgia, Iowa, Idaho, Kansas, Kentucky, Louisiana, Missouri, Mississippi, Montana, North Carolina, North Dakota, Nebraska, New Mexico, Nevada, Oklahoma, South Carolina, South Dakota, Texas, Utah, Wisconsin, West Virginia, and Wyoming

Table F-1: Average annual reductions in CWA section 404 related permit and mitigation requirements under the proposed rule, by policy scenario and state

State	Annual average reduction in permits with proposed rule[1]								Average annual mitigation reduction with proposed rule[2]							
	Individual Permits				General Permits				Acres				Linear Feet			
	Sc. 0[3]	Sc. 1[4]	Sc. 2[5]	Sc. 3[6]	Sc. 0[3]	Sc. 1[4]	Sc. 2[5]	Sc. 3[6]	Sc. 0[3]	Sc. 1[4]	Sc. 2[5]	Sc. 3[6]	Sc. 0[3]	Sc. 1[4]	Sc. 2[5]	Sc. 3[6]

[5] Includes Alaska, Alabama, Arkansas, Arizona, Colorado, Delaware, Georgia, Idaho, Kentucky, Missouri, Mississippi, Montana, North Dakota, New Mexico, Oklahoma, South Carolina, South Dakota, Texas, Utah, and Wyoming

[6] Includes Arizona, Idaho, Kentucky, Mississippi, and South Dakota

Table F-2: Average annual reduction in CWA section 404 permit application costs under the proposed rule, by policy scenario and state (Millions 2017$)

State	Scenario 0[1,2]			Scenario 1[1,3]			Scenario 2[1,4]			Scenario 3[1,5]		
	Individual	General	Total	Individual	General	Total	Individual	General	Total	Individual	General	Total
AK	$0.02	$0.09	$0.11	$0.02	$0.09	$0.11	$0.02	$0.09	$0.11	$0.00	$0.00	$0.00
AL	$0.01	$0.13	$0.14	$0.01	$0.13	$0.14	$0.01	$0.13	$0.14	$0.00	$0.00	$0.00
AR	$0.03	$1.37	$1.40	$0.03	$1.37	$1.40	$0.03	$1.37	$1.40	$0.00	$0.00	$0.00
AZ	$0.07	$1.06	$1.13	$0.07	$1.06	$1.13	$0.07	$1.06	$1.13	$0.07	$1.06	$1.13
CA	$0.08	$4.58	$4.66	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
CO	$0.00	$0.48	$0.48	$0.00	$0.48	$0.48	$0.00	$0.48	$0.48	$0.00	$0.00	$0.00
CT	$0.00	$0.17	$0.17	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
DE	$0.00	$0.01	$0.01	$0.00	$0.01	$0.01	$0.00	$0.01	$0.01	$0.00	$0.00	$0.00
FL	$0.29	$0.24	$0.53	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
GA	$0.03	$0.21	$0.25	$0.03	$0.21	$0.25	$0.03	$0.21	$0.25	$0.00	$0.00	$0.00
IA	$0.00	$0.12	$0.12	$0.00	$0.12	$0.12	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
ID	$0.01	$0.02	$0.03	$0.01	$0.02	$0.03	$0.01	$0.02	$0.03	$0.01	$0.02	$0.03
IL	$0.00	$0.54	$0.55	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
IN	$0.01	$0.37	$0.38	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
KS	$0.04	$1.54	$1.58	$0.04	$1.54	$1.58	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
KY	$0.03	$0.62	$0.65	$0.03	$0.62	$0.65	$0.03	$0.62	$0.65	$0.03	$0.62	$0.65
LA	$0.05	$1.15	$1.20	$0.05	$1.15	$1.20	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
MA	$0.00	$0.05	$0.06	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
MD	$0.00	$0.04	$0.04	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
ME	$0.00	$0.14	$0.14	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
MI	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
MN	$0.15	$0.45	$0.60	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
MO	$0.04	$1.08	$1.12	$0.04	$1.08	$1.12	$0.04	$1.08	$1.12	$0.00	$0.00	$0.00
MS	$0.04	$0.32	$0.37	$0.04	$0.32	$0.37	$0.04	$0.32	$0.37	$0.04	$0.32	$0.37
MT	$0.00	$0.04	$0.04	$0.00	$0.04	$0.04	$0.00	$0.04	$0.04	$0.00	$0.00	$0.00
NC	$0.00	$0.06	$0.07	$0.00	$0.06	$0.07	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
ND	$0.00	$0.07	$0.07	$0.00	$0.07	$0.07	$0.00	$0.07	$0.07	$0.00	$0.00	$0.00
NE	$0.00	$0.14	$0.14	$0.00	$0.14	$0.14	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
NH	$0.00	$0.01	$0.01	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
NJ	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00

Table F-2: Average annual reduction in CWA section 404 permit application costs under the proposed rule, by policy scenario and state (Millions 2017$)

State	Scenario 0[1,2]			Scenario 1[1,3]			Scenario 2[1,4]			Scenario 3[1,5]		
	Individual	General	Total	Individual	General	Total	Individual	General	Total	Individual	General	Total
NM	$0.01	$0.67	$0.68	$0.01	$0.67	$0.68	$0.01	$0.67	$0.68	$0.00	$0.00	$0.00
NV	$0.01	$0.17	$0.17	$0.01	$0.17	$0.17	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
NY	$0.01	$0.08	$0.09	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
OH	$0.02	$0.82	$0.84	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
OK	$0.00	$0.22	$0.22	$0.00	$0.22	$0.22	$0.00	$0.22	$0.22	$0.00	$0.00	$0.00
OR	$0.05	$0.09	$0.14	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
PA	$0.00	$1.94	$1.94	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
RI	$0.00	$0.04	$0.05	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
SC	$0.01	$0.02	$0.03	$0.01	$0.02	$0.03	$0.01	$0.02	$0.03	$0.00	$0.00	$0.00
SD	$0.01	$0.17	$0.17	$0.01	$0.17	$0.17	$0.01	$0.17	$0.17	$0.01	$0.17	$0.17
TN	$0.01	$0.11	$0.12	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
TX	$0.09	$3.24	$3.33	$0.09	$3.24	$3.33	$0.09	$3.24	$3.33	$0.00	$0.00	$0.00
UT	$0.01	$0.32	$0.32	$0.01	$0.32	$0.32	$0.01	$0.32	$0.32	$0.00	$0.00	$0.00
VA	$0.02	$0.08	$0.10	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
VT	$0.00	$0.01	$0.01	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
WA	$0.02	$0.12	$0.15	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
WI	$0.08	$0.37	$0.45	$0.08	$0.37	$0.45	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
WV	$0.00	$1.67	$1.68	$0.00	$1.67	$1.68	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
WY	$0.00	$0.09	$0.09	$0.00	$0.09	$0.09	$0.00	$0.09	$0.09	$0.00	$0.00	$0.00
Total	**$1.29**	**$25.34**	**$26.62**	**$0.61**	**$15.44**	**$16.04**	**$0.42**	**$10.22**	**$10.64**	**$0.15**	**$2.19**	**$2.35**

[1] For each state, permit cost savings are calculated by multiplying the number of individual and general permit reductions (see Table F-1) by the unit costs from the Corps NWP analysis ($14,700 per individual permit; $4,400 per general permit).

[2] Includes all states except Hawaii.

[3] Includes Alaska, Alabama, Arkansas, Arizona, Colorado, Delaware, Georgia, Iowa, Idaho, Kansas, Kentucky, Louisiana, Missouri, Mississippi, Montana, North Carolina, North Dakota, Nebraska, New Mexico, Nevada, Oklahoma, South Carolina, South Dakota, Texas, Utah, Wisconsin, West Virginia, and Wyoming

[4] Includes Alaska, Alabama, Arkansas, Arizona, Colorado, Delaware, Georgia, Idaho, Kentucky, Missouri, Mississippi, Montana, North Dakota, New Mexico, Oklahoma, South Carolina, South Dakota, Texas, Utah, and Wyoming

[5] Includes Arizona, Idaho, Kentucky, Mississippi, and South Dakota

Table F-3: Average annual reduction in CWA section 404 related mitigation requirement costs under the proposed rule, by policy scenario and state

State	Cost per acre (2017$)		Cost per LF (2017$)		Scenario 0[1,2] (Millions 2017$)		Scenario 1[1,3] (Millions 2017$)		Scenario 2[1,4] (Millions 2017$)		Scenario 3[1,5] (Millions 2017$)	
	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
AK	$54,000	$105,400	$294	$675	$0.73	$1.43	$0.73	$1.43	$0.73	$1.43	$0.00	$0.00
AL	$54,000	$105,400	$266	$675	$8.62	$21.40	$8.62	$21.40	$8.62	$21.40	$0.00	$0.00
AR	$30,040	$54,396	$242	$540	$4.26	$9.27	$4.26	$9.27	$4.26	$9.27	$0.00	$0.00
AZ	$54,000	$84,000	$294	$675	$1.38	$2.59	$1.38	$2.59	$1.38	$2.59	$1.38	$2.59
CA	$210,000	$384,250	$294	$675	$14.69	$31.92	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
CO	$51,850	$72,490	$90	$360	$0.11	$0.26	$0.11	$0.26	$0.11	$0.26	$0.00	$0.00
CT	$329,166	$470,629	$294	$675	$0.19	$0.27	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
DE	$34,000	$250,000	$375	$700	$0.08	$0.58	$0.08	$0.58	$0.08	$0.58	$0.00	$0.00
FL	$54,000	$105,400	$294	$675	$23.87	$46.65	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
GA	$172,000	$272,000	$878	$975	$7.76	$11.49	$7.76	$11.49	$7.76	$11.49	$0.00	$0.00
IA	$36,774	$80,711	$90	$383	$0.30	$1.19	$0.30	$1.19	$0.00	$0.00	$0.00	$0.00
ID	$42,250	$81,085	$294	$675	$0.07	$0.14	$0.07	$0.14	$0.07	$0.14	$0.07	$0.14
IL	$64,454	$105,356	$228	$599	$2.78	$6.99	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
IN	$50,000	$71,000	$294	$636	$15.93	$33.86	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
KS	$54,000	$105,400	$90	$360	$6.99	$27.05	$6.99	$27.05	$0.00	$0.00	$0.00	$0.00
KY	$110,016	$165,024	$300	$755	$21.75	$53.24	$21.75	$53.24	$21.75	$53.24	$21.75	$53.24
LA	$10,000	$60,000	$294	$675	$1.21	$5.92	$1.21	$5.92	$0.00	$0.00	$0.00	$0.00
MA	$596,041	$621,330	$100	$200	$0.33	$0.35	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
MD	$62,667	$226,667	$552	$763	$0.60	$0.94	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
ME	$250,906	$374,616	$0	$0	$0.61	$0.91	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
MI	$52,767	$130,800	$230	$993	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
MN	$9,294	$76,443	$294	$675	$0.32	$2.54	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
MO	$27,000	$81,000	$90	$405	$1.09	$4.65	$1.09	$4.65	$1.09	$4.65	$0.00	$0.00
MS	$26,000	$32,500	$266	$675	$1.43	$2.92	$1.43	$2.92	$1.43	$2.92	$1.43	$2.92
MT	$30,000	$37,000	$294	$675	$0.27	$0.55	$0.27	$0.55	$0.27	$0.55	$0.00	$0.00
NC	$26,445	$71,273	$297	$391	$0.13	$0.34	$0.13	$0.34	$0.00	$0.00	$0.00	$0.00
ND	$40,000	$60,000	$294	$675	$0.37	$0.71	$0.37	$0.71	$0.37	$0.71	$0.00	$0.00
NE	$54,000	$105,400	$90	$360	$0.23	$0.67	$0.23	$0.67	$0.00	$0.00	$0.00	$0.00
NH	$156,283	$220,358	$245	$735	$0.01	$0.02	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
NJ	$38,000	$300,000	$294	$675	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00

Table F-3: Average annual reduction in CWA section 404 related mitigation requirement costs under the proposed rule, by policy scenario and state

State	Cost per acre (2017$)		Cost per LF (2017$)		Scenario 0[1,2] (Millions 2017$)		Scenario 1[1,3] (Millions 2017$)		Scenario 2[1,4] (Millions 2017$)		Scenario 3[1,5] (Millions 2017$)	
	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
NM	$51,850	$72,490	$294	$675	$0.07	$0.10	$0.07	$0.10	$0.07	$0.10	$0.00	$0.00
NV	$106,167	$197,806	$294	$675	$0.52	$1.08	$0.52	$1.08	$0.00	$0.00	$0.00	$0.00
NY	$72,000	$91,580	$310	$420	$0.46	$0.61	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
OH	$37,500	$216,000	$165	$1,350	$3.98	$31.31	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
OK	$49,700	$60,979	$235	$555	$0.78	$1.82	$0.78	$1.82	$0.78	$1.82	$0.00	$0.00
OR	$54,500	$125,170	$42,339	$81,599	$21.88	$42.37	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
PA	$66,750	$196,895	$401	$865	$1.73	$4.11	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
RI	$462,604	$545,980	$294	$675	$0.24	$0.29	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
SC	$99,223	$171,637	$588	$683	$0.27	$0.47	$0.27	$0.47	$0.27	$0.47	$0.00	$0.00
SD	$40,000	$60,000	$294	$675	$0.64	$1.33	$0.64	$1.33	$0.64	$1.33	$0.64	$1.33
TN	$37,500	$37,500	$240	$362	$1.29	$1.90	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
TX	$54,000	$105,400	$525	$900	$51.36	$89.46	$51.36	$89.46	$51.36	$89.46	$0.00	$0.00
UT	$54,000	$105,400	$294	$675	$0.76	$1.70	$0.76	$1.70	$0.76	$1.70	$0.00	$0.00
VA	$30,000	$200,000	$375	$700	$1.50	$3.64	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
VT	$110,000	$131,549	$294	$675	$0.07	$0.10	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
WA	$69,324	$1,114,494	$294	$675	$0.79	$11.50	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
WI	$70,800	$105,400	$294	$675	$1.92	$2.85	$1.92	$2.85	$0.00	$0.00	$0.00	$0.00
WV	$120,000	$180,000	$728	$826	$5.40	$6.26	$5.40	$6.26	$0.00	$0.00	$0.00	$0.00
WY	$41,667	$50,667	$294	$675	$0.10	$0.18	$0.10	$0.18	$0.10	$0.18	$0.00	$0.00
Total					**$209.87**	**$469.96**	**$118.58**	**$249.66**	**$101.90**	**$204.29**	**$25.27**	**$60.23**

[1] For each state, cost savings are calculated by multiplying the cost of each mitigation acre or linear foot (low and high estimates) by the expected reduction in annual mitigation requirements (see Table F-1), and summing the acreage and linear feet values for each scenario.

[2] Includes all states except Hawaii.

[3] Includes Alaska, Alabama, Arkansas, Arizona, Colorado, Delaware, Georgia, Iowa, Idaho, Kansas, Kentucky, Louisiana, Missouri, Mississippi, Montana, North Carolina, North Dakota, Nebraska, New Mexico, Nevada, Oklahoma, South Carolina, South Dakota, Texas, Utah, Wisconsin, West Virginia, and Wyoming

[4] Includes Alaska, Alabama, Arkansas, Arizona, Colorado, Delaware, Georgia, Idaho, Kentucky, Missouri, Mississippi, Montana, North Dakota, New Mexico, Oklahoma, South Carolina, South Dakota, Texas, Utah, and Wyoming

[5] Includes Arizona, Idaho, Kentucky, Mississippi, and South Dakota

Table F-4: Total national estimated CWA section 404 related annual cost savings, by policy scenario and state (Millions 2017$)

State	Scenario 0[1]		Scenario 1[2]		Scenario 2[3]		Scenario 3[4]	
	Low	High	Low	High	Low	High	Low	High
AK	$0.84	$1.54	$0.84	$1.54	$0.84	$1.54	$0.00	$0.00
AL	$8.76	$21.54	$8.76	$21.54	$8.76	$21.54	$0.00	$0.00
AR	$5.66	$10.67	$5.66	$10.67	$5.66	$10.67	$0.00	$0.00
AZ	$2.51	$3.72	$2.51	$3.72	$2.51	$3.72	$2.51	$3.72
CA	$19.34	$36.58	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
CO	$0.59	$0.74	$0.59	$0.74	$0.59	$0.74	$0.00	$0.00
CT	$0.36	$0.44	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
DE	$0.09	$0.59	$0.09	$0.59	$0.09	$0.59	$0.00	$0.00
FL	$24.41	$47.19	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
GA	$8.01	$11.74	$8.01	$11.74	$8.01	$11.74	$0.00	$0.00
IA	$0.42	$1.31	$0.42	$1.31	$0.00	$0.00	$0.00	$0.00
ID	$0.10	$0.17	$0.10	$0.17	$0.10	$0.17	$0.10	$0.17
IL	$3.32	$7.54	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
IN	$16.31	$34.24	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
KS	$8.57	$28.63	$8.57	$28.63	$0.00	$0.00	$0.00	$0.00
KY	$22.40	$53.89	$22.40	$53.89	$22.40	$53.89	$22.40	$53.89
LA	$2.41	$7.13	$2.41	$7.13	$0.00	$0.00	$0.00	$0.00
MA	$0.39	$0.40	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
MD	$0.65	$0.99	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
ME	$0.75	$1.06	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
MI	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
MN	$0.92	$3.15	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
MO	$2.21	$5.77	$2.21	$5.77	$2.21	$5.77	$0.00	$0.00
MS	$1.79	$3.29	$1.79	$3.29	$1.79	$3.29	$1.79	$3.29
MT	$0.30	$0.58	$0.30	$0.58	$0.30	$0.58	$0.00	$0.00
NC	$0.19	$0.41	$0.19	$0.41	$0.00	$0.00	$0.00	$0.00
ND	$0.44	$0.78	$0.44	$0.78	$0.44	$0.78	$0.00	$0.00
NE	$0.37	$0.80	$0.37	$0.80	$0.00	$0.00	$0.00	$0.00
NH	$0.03	$0.03	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
NJ	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00

Table F-4: Total national estimated CWA section 404 related annual cost savings, by policy scenario and state (Millions 2017$)

State	Scenario 0[1]		Scenario 1[2]		Scenario 2[3]		Scenario 3[4]	
	Low	High	Low	High	Low	High	Low	High
NM	$0.75	$0.78	$0.75	$0.78	$0.75	$0.78	$0.00	$0.00
NV	$0.69	$1.25	$0.69	$1.25	$0.00	$0.00	$0.00	$0.00
NY	$0.55	$0.71	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
OH	$4.82	$32.15	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
OK	$1.00	$2.04	$1.00	$2.04	$1.00	$2.04	$0.00	$0.00
OR	$22.02	$42.51	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
PA	$3.67	$6.04	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
RI	$0.29	$0.33	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
SC	$0.30	$0.50	$0.30	$0.50	$0.30	$0.50	$0.00	$0.00
SD	$0.82	$1.51	$0.82	$1.51	$0.82	$1.51	$0.82	$1.51
TN	$1.41	$2.02	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
TX	$54.68	$92.79	$54.68	$92.79	$54.68	$92.79	$0.00	$0.00
UT	$1.08	$2.02	$1.08	$2.02	$1.08	$2.02	$0.00	$0.00
VA	$1.60	$3.74	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
VT	$0.08	$0.10	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
WA	$0.93	$11.65	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
WI	$2.37	$3.31	$2.37	$3.31	$0.00	$0.00	$0.00	$0.00
WV	$7.08	$7.94	$7.08	$7.94	$0.00	$0.00	$0.00	$0.00
WY	$0.19	$0.27	$0.19	$0.27	$0.19	$0.27	$0.00	$0.00
Total	**$236.49**	**$496.58**	**$134.63**	**$265.71**	**$112.53**	**$214.93**	**$27.61**	**$62.57**

[1] Includes all states except Hawaii.

[2] Includes Alaska, Alabama, Arkansas, Arizona, Colorado, Delaware, Georgia, Iowa, Idaho, Kansas, Kentucky, Louisiana, Missouri, Mississippi, Montana, North Carolina, North Dakota, Nebraska, New Mexico, Nevada, Oklahoma, South Carolina, South Dakota, Texas, Utah, Wisconsin, West Virginia, and Wyoming

[3] Includes Alaska, Alabama, Arkansas, Arizona, Colorado, Delaware, Georgia, Idaho, Kentucky, Missouri, Mississippi, Montana, North Dakota, New Mexico, Oklahoma, South Carolina, South Dakota, Texas, Utah, and Wyoming

[4] Includes Arizona, Idaho, Kentucky, Mississippi, and South Dakota

Table F-5: Total national forgone benefit estimate of reduced CWA section 404 related mitigation requirements, Scenario 0

State	Households (HH)	Annual forgone mitigation acres[1]	Mean WTP /HH/acre (2017$)	Mean estimate of forgone benefits (2017$)	Lower 5th WTP/HH/acre (2017$)	Lower 5th estimate of forgone benefits (2017$)	Upper 95th WTP WTP/HH/acre (2017$)	Upper 95th estimate of forgone benefits (2017$)
AK	258,058	13.54	$0.0203	$70,881	$0.0001	$391	$0.0506	$176,916
AL	1,883,791	48.90	$0.0310	$2,856,426	$0.0001	$11,611	$0.0625	$5,761,209
AR	1,147,084	36.47	$0.0315	$1,319,006	$0.0001	$5,214	$0.0631	$2,640,627
AZ	2,380,990	16.79	$0.0363	$1,450,884	$0.0002	$6,057	$0.0793	$3,170,558
CA	12,577,498	60.64	$0.0175	$13,349,609	$0.0001	$69,350	$0.0432	$32,957,756
CO	1,972,868	1.81	$0.0154	$55,198	$0.0001	$287	$0.0383	$136,961
CT	1,371,087	0.58	$0.0487	$38,370	$0.0001	$44	$0.0759	$59,835
DE	342,297	2.33	$0.0275	$21,994	$0.0001	$109	$0.0584	$46,691
FL	7,420,802	439.53	$0.0195	$63,514,306	$0.0001	$336,260	$0.0429	$139,955,173
GA	3,585,584	37.66	$0.0289	$3,904,705	$0.0001	$17,886	$0.0602	$8,125,765
IA	1,221,576	4.29	$0.0071	$37,118	$0.0001	$265	$0.0170	$88,811
ID	579,408	0.76	$0.0169	$7,429	$0.0001	$36	$0.0408	$17,920
IL	4,836,972	17.17	$0.0109	$901,027	$0.0001	$5,601	$0.0243	$2,014,758
IN	2,502,154	75.15	$0.0107	$2,009,643	$0.0001	$11,852	$0.0237	$4,449,370
KS	1,112,096	91.73	$0.0058	$592,948	$0.0000	$4,285	$0.0141	$1,442,577
KY	1,719,965	90.97	$0.0289	$4,529,584	$0.0001	$18,561	$0.0589	$9,215,883
LA	1,728,360	86.35	$0.0208	$3,104,002	$0.0001	$13,991	$0.0442	$6,595,682
MA	2,547,075	0.56	$0.0492	$70,161	$0.0001	$77	$0.0758	$107,995
MD	2,156,411	1.95	$0.0316	$133,136	$0.0002	$797	$0.0703	$295,811
ME	557,219	2.43	$0.0444	$60,263	$0.0000	$49	$0.0621	$84,285
MI	3,872,508	0.00	$0.0000	$0	$0.0000	$0	$0.0000	$0
MN	2,087,227	32.86	$0.0090	$617,612	$0.0001	$4,547	$0.0212	$1,450,853
MO	2,375,611	18.32	$0.0113	$489,844	$0.0001	$2,782	$0.0246	$1,070,800
MS	1,115,768	24.62	$0.0321	$882,527	$0.0001	$3,206	$0.0631	$1,734,165
MT	409,607	2.91	$0.0155	$18,442	$0.0001	$87	$0.0373	$44,499
NC	3,745,155	4.79	$0.0301	$540,326	$0.0001	$2,429	$0.0622	$1,115,824
ND	281,192	5.48	$0.0039	$5,942	$0.0000	$45	$0.0097	$15,035

Table F-5: Total national forgone benefit estimate of reduced CWA section 404 related mitigation requirements, Scenario 0

State	Households (HH)	Annual forgone mitigation acres[1]	Mean WTP /HH/acre (2017$)	Mean estimate of forgone benefits (2017$)	Lower 5th WTP/HH/acre (2017$)	Lower 5th estimate of forgone benefits (2017$)	Upper 95th WTP WTP/HH/acre (2017$)	Upper 95th estimate of forgone benefits (2017$)
NE	721,130	3.63	$0.0046	$12,012	$0.0000	$91	$0.0115	$30,082
NH	518,973	0.09	$0.0466	$2,097	$0.0001	$2	$0.0726	$3,265
NJ	3,214,360	0.00	$0.0000	$0	$0.0000	$0	$0.0000	$0
NM	791,395	1.36	$0.0216	$23,236	$0.0001	$104	$0.0504	$54,221
NV	1,006,250	3.35	$0.0171	$57,864	$0.0001	$275	$0.0412	$139,097
NY	7,317,755	3.43	$0.0497	$1,246,601	$0.0000	$1,136	$0.0732	$1,835,837
OH	4,603,435	37.98	$0.0112	$1,952,871	$0.0001	$10,996	$0.0244	$4,266,102
OK	1,460,450	4.23	$0.0236	$145,818	$0.0001	$713	$0.0505	$312,141
OR	1,518,938	10.53	$0.0163	$261,072	$0.0001	$1,267	$0.0396	$633,619
PA	5,018,904	10.53	$0.0496	$2,623,909	$0.0000	$2,368	$0.0730	$3,857,389
RI	413,600	0.53	$0.0536	$11,705	$0.0001	$12	$0.0790	$17,247
SC	1,801,181	2.71	$0.0284	$138,978	$0.0001	$649	$0.0594	$290,601
SD	322,282	6.40	$0.0039	$8,129	$0.0000	$59	$0.0099	$20,421
TN	2,493,552	8.22	$0.0288	$591,376	$0.0001	$2,639	$0.0597	$1,223,670
TX	8,922,933	210.02	$0.0137	$25,678,927	$0.0001	$164,691	$0.0319	$59,725,635
UT	877,692	4.60	$0.0148	$59,576	$0.0001	$298	$0.0363	$146,684
VA	3,056,058	9.88	$0.0249	$753,148	$0.0001	$4,267	$0.0549	$1,656,927
VT	256,442	0.55	$0.0484	$6,872	$0.0000	$6	$0.0710	$10,065
WA	2,620,076	10.47	$0.0217	$595,425	$0.0001	$3,169	$0.0534	$1,463,637
WI	2,279,768	27.07	$0.0107	$662,555	$0.0001	$4,069	$0.0240	$1,478,793
WV	763,831	10.98	$0.0189	$158,065	$0.0001	$766	$0.0409	$343,204
WY	226,879	1.03	$0.0165	$3,844	$0.0001	$19	$0.0400	$9,300
Total	**115,994,247**			**$135,575,460**		**$713,414**		**$300,293,696**

[1] Annual average forgone mitigation acres (see Table F-1) based on permits issued in years 2011-2015 with mitigation requirements on waterways determined to be RPWWN-type wetlands or ephemeral streams. Excludes permits issued for mitigation or restoration activities because the main purpose of these activities is to restore or enhance ecosystem services provided by water resources as opposed to dredge and fill activities that lead to permanent or temporary losses of ecosystem services. Linear feet are converted to acres by multiplying total linear feet by an average total buffer width of 50 feet (25 feet on each side of the stream) and converting square feet to acres.

Table F-6: Total national forgone benefit estimate of reduced CWA section 404 related mitigation requirements, Scenario 1								
State	Households (HH)	Annual forgone mitigation acres[1]	Mean WTP /HH/acre (2017$)	Mean estimate of forgone benefits (2017$)	Lower 5th WTP/HH/acre (2017$)	Lower 5th estimate of forgone benefits (2017$)	Upper 95th WTP WTP/HH/acre (2017$)	Upper 95th estimate of forgone benefits (2017$)
AK	258,058	13.54	$0.0203	$70,881	$0.0001	$391	$0.0506	$176,916
AL	1,883,791	48.90	$0.0310	$2,856,426	$0.0001	$11,611	$0.0625	$5,761,209
AR	1,147,084	36.47	$0.0315	$1,319,006	$0.0001	$5,214	$0.0631	$2,640,627
AZ	2,380,990	16.79	$0.0363	$1,450,884	$0.0002	$6,057	$0.0793	$3,170,558
CO	1,972,868	1.81	$0.0154	$55,198	$0.0001	$287	$0.0383	$136,961
DE	342,297	2.33	$0.0275	$21,994	$0.0001	$109	$0.0584	$46,691
GA	3,585,584	37.66	$0.0289	$3,904,705	$0.0001	$17,886	$0.0602	$8,125,765
IA	1,221,576	4.29	$0.0071	$37,118	$0.0001	$265	$0.0170	$88,811
ID	579,408	0.76	$0.0169	$7,429	$0.0001	$36	$0.0408	$17,920
KS	1,112,096	91.73	$0.0058	$592,948	$0.0000	$4,285	$0.0141	$1,442,577
KY	1,719,965	90.97	$0.0289	$4,529,584	$0.0001	$18,561	$0.0589	$9,215,883
LA	1,728,360	86.35	$0.0208	$3,104,002	$0.0001	$13,991	$0.0442	$6,595,682
MO	2,375,611	18.32	$0.0113	$489,844	$0.0001	$2,782	$0.0246	$1,070,800
MS	1,115,768	24.62	$0.0321	$882,527	$0.0001	$3,206	$0.0631	$1,734,165
MT	409,607	2.91	$0.0155	$18,442	$0.0001	$87	$0.0373	$44,499
NC	3,745,155	4.79	$0.0301	$540,326	$0.0001	$2,429	$0.0622	$1,115,824
ND	281,192	5.48	$0.0039	$5,942	$0.0000	$45	$0.0097	$15,035
NE	721,130	3.63	$0.0046	$12,012	$0.0000	$91	$0.0115	$30,082
NM	791,395	1.36	$0.0216	$23,236	$0.0001	$104	$0.0504	$54,221
NV	1,006,250	3.35	$0.0171	$57,864	$0.0001	$275	$0.0412	$139,097
OK	1,460,450	4.23	$0.0236	$145,818	$0.0001	$713	$0.0505	$312,141
SC	1,801,181	2.71	$0.0284	$138,978	$0.0001	$649	$0.0594	$290,601
SD	322,282	6.40	$0.0039	$8,129	$0.0000	$59	$0.0099	$20,421
TX	8,922,933	210.02	$0.0137	$25,678,927	$0.0001	$164,691	$0.0319	$59,725,635
UT	877,692	4.60	$0.0148	$59,576	$0.0001	$298	$0.0363	$146,684
WI	2,279,768	27.07	$0.0107	$662,555	$0.0001	$4,069	$0.0240	$1,478,793
WV	763,831	10.98	$0.0189	$158,065	$0.0001	$766	$0.0409	$343,204

Table F-6: Total national forgone benefit estimate of reduced CWA section 404 related mitigation requirements, Scenario 1

State	Households (HH)	Annual forgone mitigation acres[1]	Mean WTP /HH/acre (2017$)	Mean estimate of forgone benefits (2017$)	Lower 5th WTP/HH/acre (2017$)	Lower 5th estimate of forgone benefits (2017$)	Upper 95th WTP WTP/HH/acre (2017$)	Upper 95th estimate of forgone benefits (2017$)
WY	226,879	1.03	$0.0165	$3,844	$0.0001	$19	$0.0400	$9,300
Total	**45,033,201**			**$46,836,259**		**$258,974**		**$103,950,102**

[1] Annual average forgone mitigation acres (see Table F-1) based on permits issued in years 2011-2015 with mitigation requirements on waterways determined to be RPWWN-type wetlands or ephemeral streams. Excludes permits issued for mitigation or restoration activities because the main purpose of these activities is to restore or enhance ecosystem services provided by water resources as opposed to dredge and fill activities that lead to permanent or temporary losses of ecosystem services. Linear feet are converted to acres by multiplying total linear feet by an average total buffer width of 50 feet (25 feet on each side of the stream) and converting square feet to acres.

Table F-7: Total national forgone benefit estimate of reduced CWA section 404 related mitigation requirements, Scenario 2

State	Households (HH)	Annual forgone mitigation acres[1]	Mean WTP /HH/acre (2017$)	Mean estimate of forgone benefits (2017$)	Lower 5th WTP/HH/acre (2017$)	Lower 5th estimate of forgone benefits (2017$)	Upper 95th WTP WTP/HH/acre (2017$)	Upper 95th estimate of forgone benefits (2017$)
AK	258,058	13.54	$0.0203	$70,881	$0.0001	$391	$0.0506	$176,916
AL	1,883,791	48.90	$0.0310	$2,856,426	$0.0001	$11,611	$0.0625	$5,761,209
AR	1,147,084	36.47	$0.0315	$1,319,006	$0.0001	$5,214	$0.0631	$2,640,627
AZ	2,380,990	16.79	$0.0363	$1,450,884	$0.0002	$6,057	$0.0793	$3,170,558
CO	1,972,868	1.81	$0.0154	$55,198	$0.0001	$287	$0.0383	$136,961
DE	342,297	2.33	$0.0275	$21,994	$0.0001	$109	$0.0584	$46,691
GA	3,585,584	37.66	$0.0289	$3,904,705	$0.0001	$17,886	$0.0602	$8,125,765
ID	579,408	0.76	$0.0169	$7,429	$0.0001	$36	$0.0408	$17,920
KY	1,719,965	90.97	$0.0289	$4,529,584	$0.0001	$18,561	$0.0589	$9,215,883
MO	2,375,611	18.32	$0.0113	$489,844	$0.0001	$2,782	$0.0246	$1,070,800
MS	1,115,768	24.62	$0.0321	$882,527	$0.0001	$3,206	$0.0631	$1,734,165
MT	409,607	2.91	$0.0155	$18,442	$0.0001	$87	$0.0373	$44,499
ND	281,192	5.48	$0.0039	$5,942	$0.0000	$45	$0.0097	$15,035
NM	791,395	1.36	$0.0216	$23,236	$0.0001	$104	$0.0504	$54,221
OK	1,460,450	4.23	$0.0236	$145,818	$0.0001	$713	$0.0505	$312,141
SC	1,801,181	2.71	$0.0284	$138,978	$0.0001	$649	$0.0594	$290,601
SD	322,282	6.40	$0.0039	$8,129	$0.0000	$59	$0.0099	$20,421
TX	8,922,933	210.02	$0.0137	$25,678,927	$0.0001	$164,691	$0.0319	$59,725,635
UT	877,692	4.60	$0.0148	$59,576	$0.0001	$298	$0.0363	$146,684
WY	226,879	1.03	$0.0165	$3,844	$0.0001	$19	$0.0400	$9,300
Total	**32,455,035**			**$41,671,369**		**$232,803**		**$92,716,031**

[1] Annual average forgone mitigation acres (see Table F-1) based on permits issued in years 2011-2015 with mitigation requirements on waterways determined to be RPWWN-type wetlands or ephemeral streams. Excludes permits issued for mitigation or restoration activities because the main purpose of these activities is to restore or enhance ecosystem services provided by water resources as opposed to dredge and fill activities that lead to permanent or temporary losses of ecosystem services. Linear feet are converted to acres by multiplying total linear feet by an average total buffer width of 50 feet (25 feet on each side of the stream) and converting square feet to acres.

Table F-8: Total national forgone benefit estimate of reduced CWA section 404 related mitigation requirements, Scenario 3

State	Households (HH)	Annual Forgone Mitigation Acres[1]	Mean WTP /HH/acre (2017$)	Mean Estimate of Forgone Benefits (2017$)	Lower 5th WTP/HH/acre (2017$)	Lower 5th Estimate of Forgone Benefits (2017$)	Upper 95th WTP WTP/HH/acre (2017$)	Upper 95th Estimate of Forgone Benefits (2017$)
AZ	2,380,990	16.79	$0.0363	$1,450,884	$0.0002	$6,057	$0.0793	$3,170,558
ID	579,408	0.76	$0.0169	$7,429	$0.0001	$36	$0.0408	$17,920
KY	1,719,965	90.97	$0.0289	$4,529,584	$0.0001	$18,561	$0.0589	$9,215,883
MS	1,115,768	24.62	$0.0321	$882,527	$0.0001	$3,206	$0.0631	$1,734,165
SD	322,282	6.40	$0.0039	$8,129	$0.0000	$59	$0.0099	$20,421
Total	**6,118,413**			**$6,878,552**		**$27,918**		**$14,158,947**

[1] Annual average forgone mitigation acres (see Table F-1) based on permits issued in years 2011-2015 with mitigation requirements on waterways determined to be RPWWN-type wetlands or ephemeral streams. Excludes permits issued for mitigation or restoration activities because the main purpose of these activities is to restore or enhance ecosystem services provided by water resources as opposed to dredge and fill activities that lead to permanent or temporary losses of ecosystem services. Linear feet are converted to acres by multiplying total linear feet by an average total buffer width of 50 feet (25 feet on each side of the stream) and converting square feet to acres.