ENVIRONMENTAL LAW INSTITUTE

America's Vulnerable Waters: Assessing the Nation's Portfolio of Vulnerable Aquatic Resources since *Rapanos v. United States*

An ELI Report

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Executive Summary

In the United States, wetlands, streams, and other aquatic resources are protected by a combination of federal, state, and local laws, regulations, and policies. At the federal level, aquatic resources are regulated under the Clean Water Act (CWA). The requirements of the Act apply only to "navigable waters," which are defined as "waters of the United States, including the territorial seas."[1] For most of the history of the Act, a broad definition of "waters of the United States" was used to assert jurisdiction. However, two recent Supreme Court cases have left some uncertainty around what waters can be regulated under the CWA.

In 2001, in *Solid Waste Agency of Northern Cook County (SWANCC) v. U.S. Army Corps of Engineers*[2], the U.S. Supreme Court found that CWA protections do not extend to certain "isolated" waters. By most accounts, the *SWANCC* decision resulted in a loss of protection for many geographically isolated wetlands. In 2006, in *Rapanos v. United States*[3], the Supreme Court established several CWA jurisdictional tests—including the "significant nexus with navigable waters"[4] test articulated by Justice Kennedy—to determine the types of wetlands and aquatic resources regulated under the Act. In 2008, the U.S. Army Corps of Engineers (Corps) and the U.S. Environmental Protection Agency (EPA) released guidance to identify the waters over which the agencies will assert jurisdiction categorically and on a case-by-case basis following *Rapanos*. The 2008 guidance directs the agencies to use a case-specific, significant nexus test to determine jurisdiction over 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to but that do not directly abut a relatively permanent non-navigable tributary.[5] In 2011, the Corps and EPA released draft guidance for comment, which will supersede the 2008 guidance when it is issued in final form.[6]

The uncertainty in the federal protection of freshwater resources left by *SWANCC* and *Rapanos* has heightened the importance of state regulatory and non-regulatory programs that protect aquatic resources. Waters and wetlands falling outside CWA coverage are referred to in this study as "vulnerable wetlands and aquatic resources." In order for state and local governments to effectively fill the gaps in CWA coverage, it is essential to have a well-articulated assessment of what aquatic resources are currently going without federal protection in each area of the country. Determination of the types of wetlands and waters that are no longer protected by the CWA can help target supplemental resources and programs, including non-regulatory conservation measures and compensatory mitigation. Such an assessment can also

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[1] 33 U.S.C. §1362(7).
[2] Solid Waste Agency of Northern Cook County v. U.S. Army Corps of Engineers, 531 U.S. 159, 162 (2001).
[3] Rapanos v. United States, 547 U.S. 715, 126 S.Ct. 2208 (2006).
[4] Rapanos v. United States, 126 S.Ct. 2208, 2248 (2006) (Kennedy, J., concurring in the judgment).
[5] U.S. ENVIRONMENTAL PROTECTION AGENCY & 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 1 (2008) [hereinafter The Guidance].
[6] U.S. ENVIRONMENTAL PROTECTION AGENCY & U.S. ARMY CORPS OF ENGINEERS, DRAFT GUIDANCE ON IDENTIFYING WATERS PROTECTED BY THE CLEAN WATER ACT (2011), *available at* http://water.epa.gov/lawsregs/guidance/wetlands/upload/wous_guidance_4-2011.pdf.

indicate specific ecosystem functions that are likely to be lost if vulnerable wetlands and waters are not conserved or restored.

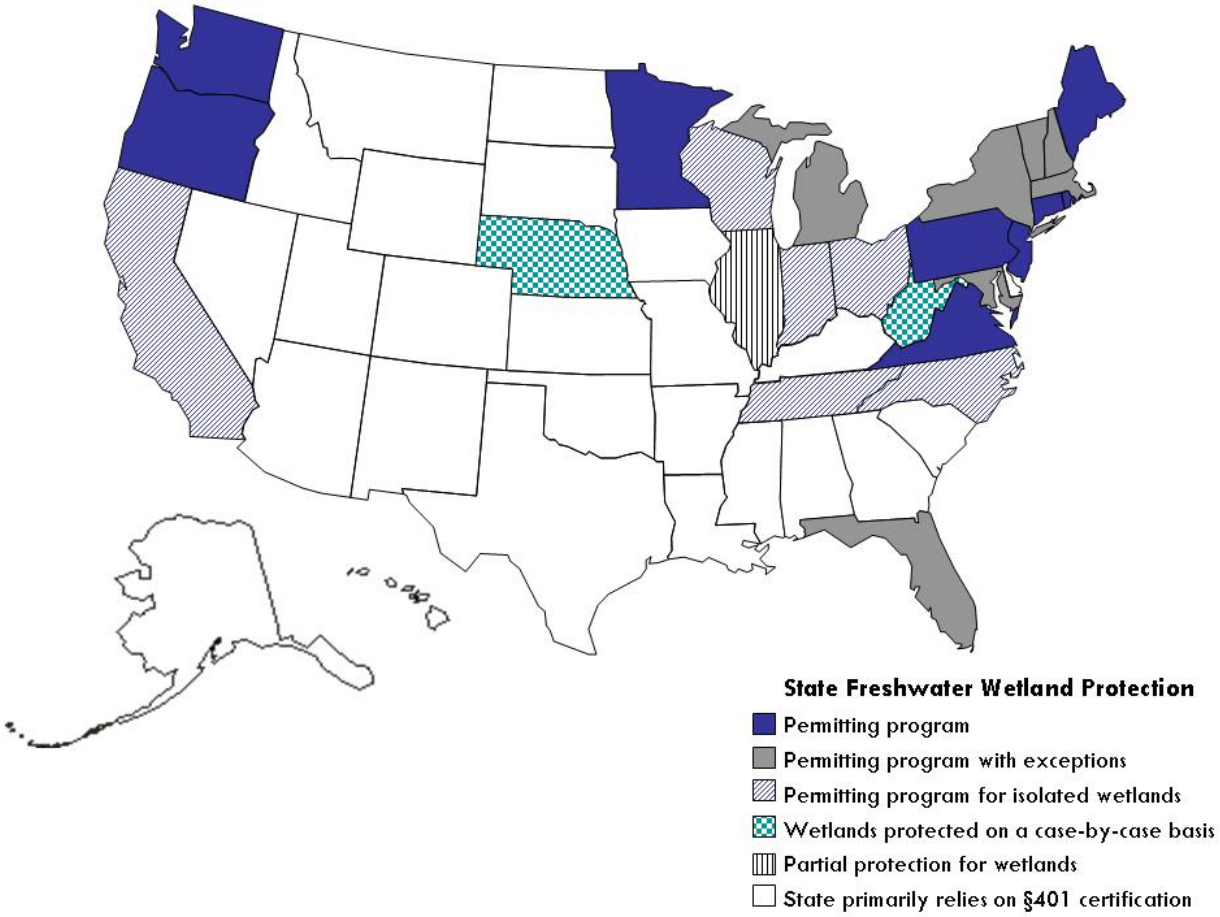
This study is the first to holistically analyze federal regulatory practices to characterize the particular wetland, stream, and other aquatic resource types that, in certain circumstances, Corps regulators have determined can no longer be regulated under the CWA following *Rapanos*. We also catalogued and analyzed the criteria and specific types of data used by Corps regulators to evaluate and apply various CWA jurisdictional standards, including Justice Kennedy's significant nexus standard.

America's Vulnerable Wetlands

To assess the nation's portfolio of vulnerable aquatic resources since *Rapanos*, we analyzed state legal authority to regulate aquatic resources, the scientific literature identifying wetlands and waters that may no longer be covered under the CWA, determinations of no jurisdiction (NJDs) issued by the Corps from 2008-2009, and state water quality certification practices as applied to these types of aquatic resources.

- **State aquatic resource regulatory authority:** Every state has at least some authority to regulate activities that affect freshwater wetlands—those most affected by jurisdictional issues under *Rapanos* and *SWANCC*. Section 401 of the CWA gives all states the authority to review federal permits for activities that may result in a discharge to a water of the United States to ensure that they do not violate the state's water quality standards. In twenty-five states, §401 certification requirements provide the primary or the sole regulatory mechanism by which states regulate activities in freshwater wetlands. Non-CWA wetlands that are not subject to Corps permitting will not come within a state's §401 review process, and thus may be left vulnerable in states with no additional legal protections.

  Twenty-five states have established legal protection for some or all *freshwater wetlands* within their borders. Eight of these states have established permitting programs broadly covering most freshwater wetlands in the state. Eight states have established permitting programs that protect many freshwater wetlands, but include defined exceptions from protection based on wetland type, size, or class. Six states have specific permitting programs for isolated waters no longer covered under the CWA after *SWANCC*. Two states afford protection for vulnerable wetlands entirely on a case-by-case basis. One state imposes regulations for state-run or state-funded projects in wetlands, including vulnerable wetlands.



- **Potentially vulnerable wetlands and waters:** The scientific literature suggests that vulnerable aquatic resource types following both Supreme Court decisions tend to include small, perennial, intermittent, and ephemeral streams—including headwaters—and geographically isolated wetlands (such as Carolina bays, prairie potholes, playa lakes, and vernal pools). These vulnerable wetlands and streams remove organic matter, nutrients, and pollutants from surface waters; provide flood storage capacity; recharge groundwater resources; and provide habitat for native species. According to the literature, the highest proportion of isolated wetlands is found in the upper Great Lakes, North-central interior, and Great Plains regions. High proportions of isolated wetlands are also found in arid and semi-arid to subhumid regions, and in karst topography. The highest proportion of intermittent/ephemeral streams is found in the arid Southwest and the Midwest.

- **Corps NJDs:** The Environmental Law Institute (ELI) examined all publicly available, online determinations of no jurisdiction (NJDs) under §404 of the CWA across the U.S. from the years 2008-2009. NJDs were available for 31 Corps regulatory districts. Nineteen of the 31 districts reported aquatic resource type or types on 50% or more of the NJDs. In many NJDs, Corps regulators only identified general wetland type (e.g., "depressional wetlands"). Some NJDs provided more specificity on aquatic resource type, such as including information on a wetland's Cowardin class or subclass. Overall, we identified a number of vulnerable aquatic resource types, including prairie potholes, bogs, Carolina bays, playas, vernal pools, and

headwater ephemeral and intermittent streams. In addition, we recorded when regulators evaluated the significant nexus standard and the criteria used to establish the absence of a significant nexus. In our study, the percentage of NJDs from individual districts that documented the use of significant nexus tests to determine jurisdiction ranged from 0% (Albuquerque, Fort Worth, Jacksonville, Memphis, Seattle, and Walla Walla) to 89% (Pittsburgh).

Significant nexus evaluations for tributaries often cited factors such as the discharge, duration, and frequency of their flow, the length of a relevant reach, the size of a reach's drainage area, or the distance from the stream to the closest downstream traditionally navigable waters (TNW). Evaluations for wetlands cited hydrologic factors such as surface or subsurface connections to nearby tributaries or location in the 100-year and/or 500-year floodplains. Significant nexus evaluations for both streams and wetlands also sometimes included a description of the route of hydrologic flow, or lack thereof, from the nonjurisdictional aquatic resource to the nearest downstream TNW. Some significant nexus assessments examined an aquatic resource's effect on water quality through consideration of surrounding land uses or the composition of riparian buffers. Less commonly, regulators evaluated a wetland or stream's ecological connectivity with waters of the United States, which included consideration of biological factors, such as ability to retain nutrients or organic matter, streamflow, a water's rapid assessment score, or detailed metrics, such as macroinvertebrate counts.

Aquatic resource types without CWA protection in Corps NJDs		
Corps district	**Top three waterbody types (number of forms)**	**Notable waterbody types**
Albuquerque	arroyo* (1); ephemeral drainages* (1)	arroyo;* ephemeral drainages*
Baltimore	emergent wetlands (3); palustrine emergent wetlands (2); depressional wetlands (2)	bog
Buffalo	depressional wetlands (26); vernal pools (8); three types with (5)	ephemeral tributaries;* vernal pools; wet meadows
Charleston	depressional wetlands (18); freshwater wetlands (15); Southeast coastal plain gum pond wetlands (2)	Carolina bays; Southeast coastal plain gum pond wetlands
Chicago	depressional wetlands (71); farmed wetlands (20); excavated pond (5)	intermittent tributary*
Detroit	depressional wetlands (12); forested wetlands (3); emergent wetlands (2)	
Fort Worth	upland ponds (8); remnant stream channels (6); fringe wetlands (2)	
Galveston	forested wetlands (26); palustrine forested wetlands (21); depressional wetlands (15)	1st order ephemeral tributaries; ephemeral channel*
Honolulu	depressional wetlands in pahoehoe lava (1); intermittent stream* (1); stormwater drainage (1)	intermittent stream*

Huntington	1st order ephemeral streams (44); emergent wetlands (20); depressional wetlands (15)	1st and 2nd order ephemeral tributaries; headwater ephemeral tributaries*
Jacksonville	depressional wetland (1); freshwater wetland (1)	
Kansas City	1st order ephemeral streams (43); farm ponds (23); emergent wetlands (17)	1st and 2nd order ephemeral/intermittent tributaries; headwater ephemeral/intermittent tributaries;* playas; swale wetlands
Little Rock	six types with (1)	
Los Angeles	ephemeral tributaries/washes* (26); 1st order ephemeral tributaries (7); palustrine wetlands (7)	1st order ephemeral tributaries; 1st order arroyo; dry lake basins; ephemeral and intermittent/perennial tributaries*
Louisville	emergent wetlands (3); farm ponds (3); three types with (2)	2nd and 3rd order ephemeral tributaries
Memphis	upland pond (1)	
New England	seep (1); palustrine emergent wet meadow (1)	seep; wet meadow
New York	depressional wetlands (15); scrub-shrub wetlands (6); two types with (2)	1st order ephemeral tributaries; groundwater-fed depressional wetland
Norfolk	ephemeral tributaries* (2); farmed wetland (1)	ephemeral tributaries*
Omaha	depressional wetlands (73); emergent wetlands (63); palustrine emergent wetlands (61)	1st, 2nd, and 3rd order ephemeral/intermittent tributaries; ephemeral, intermittent, and perennial tributaries;* glacial lakes; oxbow remnants; peat fens; playas; prairie potholes; seep wetlands; sloughs; swale wetlands; wet meadows
Pittsburgh	ephemeral tributaries* (57); emergent wetlands (16); palustrine emergent wetlands (15)	1st order ephemeral tributaries; ephemeral, intermittent, and perennial tributaries;* hillside seep-fed wetlands
Sacramento	depressional wetlands (14); artificial wetlands (8); three types with (6)	1st order ephemeral/intermittent tributaries; ephemeral and perennial tributaries;* salt grass wet meadows; seep-fed wetlands; swale wetlands; vernal pools; wet meadows
Savannah	ephemeral tributaries* (6); four types with (1)	1st order ephemeral tributaries; ephemeral tributaries*
Seattle	riparian wetlands (1); field wetlands (1)	
St. Louis	depressional wetlands (5); emergent wetlands (4); two types with (2)	
Vicksburg	five types with (1)	3rd order ephemeral tributaries; ephemeral tributaries*
Walla Walla	depressional wetlands (2)	

Wilmington	depressional wetlands (2); Carolina bay (1)	Carolina bay
* unspecified stream order		

- **State water quality certification practices:** We contacted all state §401 certification programs to determine the aquatic resource types that federal agencies are presenting or not presenting for state review in comparison with prior practices. We asked state staff to provide, based on best professional judgment or quantitative data, information on the types of potentially vulnerable aquatic resources included and not included in water quality certification applications following *Rapanos*, from January 2007 to July 2010.

State §401 program staff in several states indicated that they were no longer, or less frequently, receiving water quality certification applications for several potentially vulnerable aquatic resource types—including bogs, fens, headwater and ephemeral streams, playas, sinkholes, and vernal pools. A number of additional wetland types, such as cypress sloughs in Mississippi, Carolina bays in South Carolina, and prairie potholes in the Midwest, were identified as not being presented or being presented less frequently for water quality certification in individual states. California also reported that the Corps is not determining "clearly isolated" lakes to be jurisdictional. Meanwhile, several states (Alabama, Arkansas, California, Hawaii, Illinois, Indiana, Mississippi, Montana, New Mexico, North Dakota, South Dakota, and Texas) indicated that they still are receiving water quality certifications for intermittent/ephemeral streams in water quality certifications, indicating that the Corps is asserting jurisdiction over these resources in some instances and locations.

Aquatic resource types with no or limited §401 review	
State	**Type(s)**
Arkansas	sinkhole wetlands; central interior highlands and Appalachian sinkholes and depression ponds; Ozark-Ouachita fens; West Gulf Coastal Plain nonriverine wet hardwood flatwoods; West Gulf Coastal Plain pine-hardwood flatwoods[7]
California	ephemeral streams; eastward-draining waters; closed-basin lakes; internally draining playas; internally draining vernal pools; salt lake wetlands; salt marshes; wet prairies; and sinkholes
Colorado	fens; also have seen few, if any, permit requests for Colorado plateau hanging gardens; Inter-Mountain Basins greasewood flats; Inter-Mountain Basins interdunal swale wetlands; Inter-Mountain Basins playas; Western Great Plains closed depression wetlands; and Western Great Plains saline depression wetlands
Connecticut	bogs; woodland vernal pools; Atlantic Coastal Plain northern pondshores; Atlantic Coastal Plain northern basin peat swamps; Atlantic Coastal Plain northern dunes and maritime grasslands; North-Central Appalachian seepage fens; North-Central Interior and Appalachian acid peatlands; and North-Central Interior wet flatwoods[8]
Hawaii	bogs and vernal pools in elevated areas[9]
Indiana	sinkholes
Mississippi	cypress sloughs
Montana	smaller prairie potholes; fens; bogs; and a headwater stream[10]

[7] Based on October 2009-November 2010

[8] A respondent from Connecticut's Department of Environmental Protection noted that the state has only reviewed §401 certifications for these wetland types if "there is §404 jurisdiction over some additional element of a project."

[9] Hawaii also saw few permits for elevated bogs and vernal pools before any *SWANCC*- or *Rapanos*-induced jurisdictional changes.

New Mexico	playas and internally draining depressional wetlands
North Dakota	prairie potholes
South Carolina	Carolina bays
South Dakota	occasionally wetlands next to tributaries are nonjurisdictional
Vermont	woodland vernal pools; bogs; fens
West Virginia	some headwater streams
Wyoming	Inter-Mountain Basins greasewood flats; Inter-Mountain Basins playas; Western Great Plains closed depression wetlands; Western Great Plains open freshwater depression wetlands; Western Great Plains saline depression wetlands[11]

Aquatic resource types still reviewed for state §401 water quality certification	
State	**Type(s)**
Alabama	headwater, intermittent, and ephemeral streams (frequency unknown)
Arkansas	nonnavigable mountain streams; headwater streams; intermittent streams; and ephemeral streams[12]
California	mud flats; Central Valley vernal pools; headwater intermittent streams
Hawaii	intermittent and ephemeral streams; coastal bogs and coastal vernal pools
Indiana	sinkholes; dune wetlands; swale wetlands; headwater tributaries; also, generally wetlands in southern plains and lowland areas of the state
Illinois	headwater, ephemeral, and intermittent streams
Mississippi	ephemeral streams
Montana	headwater,[13] intermittent, and ephemeral streams; larger prairie potholes[14]
New Mexico	some entirely closed basins deemed jurisdictional;[15] headwater, intermittent, and ephemeral streams
North Dakota	intermittent and ephemeral streams
Oklahoma	oxbows; palustrine wetlands; and stock ponds[16]
South Dakota	tributaries
Texas	intermittent and ephemeral streams
Utah	salt lake wetlands; playas; and swale wetlands
West Virginia	sinkholes

Opportunities to Protect America's Vulnerable Waters

We identified a number of aquatic resource types that the Corps often determined were not protected by the CWA. Prairie potholes, playa lakes, and headwater ephemeral and intermittent streams were the most commonly cited aquatic resource types in the NJDs we reviewed. Arroyos, bogs, Carolina bays, closed-basin lakes, oxbow wetlands, Southeast coastal plain gum pond wetlands, and vernal pools were also found nonjurisdictional by the Corps, and

[10] A Montana §401 staff member recalled one case in which a headwater stream terminated in a grassy swale and was thus determined to be nonjurisdictional.
[11] Based on 1.5 years prior to August 2010.
[12] Based on data from October 2009-November 2010.
[13] *Supra* note 10.
[14] Larger prairie potholes, e.g., in northwest Montana, have been determined to support recreational activity and fishing, leading the Corps to determine them to be jurisdictional based on a connection to interstate commerce.
[15] In New Mexico, these closed basins have been determined to have national commerce connections and have thus been deemed jurisdictional waters.
[16] These water types were determined nonjurisdictional by the Corps in Oklahoma; however, the state of Oklahoma now regulates nonjurisdictional waters that meet the state's definition of "waters of the state" when they are included in a permit that also affects jurisdictional waters.

these were cited by state water quality programs as less frequently presented in §401 certification applications. These aquatic resources may be particularly vulnerable as they are often located in states with no additional jurisdiction over wetlands, streams, or lakes.

A lack of consistent data, however, hindered assessment of the nation's vulnerable aquatic resource types. A majority of the states maintain quantitative tracking databases for aquatic resource permitting. However, most of these state permitting databases do not identify and track impacts to *particular types* of wetlands, streams, or other aquatic resources. None of the states could provide quantitative information on the aquatic resource types included in federal permits presented for state review or could otherwise quantitatively analyze the vulnerable aquatic resource types in their state. Only five states specifically reported maintaining databases that track the specific wetland or stream type associated with state permit applications.

We were able to find readable NJDs for just 31 of the Corps' 38 regulatory districts. Twelve of these 31 districts, moreover, recorded aquatic resource type in less than 50% of the NJDs we reviewed. NJDs within and across Corps districts often did not use similar aquatic resource classification schemes and provided different levels of specificity for aquatic resource types, precluding a more detailed and systematic analysis of vulnerable waters.

Corps districts vary in their practice of applying the significant nexus test to "isolated" waters. Corps regulators also inconsistently applied various hydrologic and ecologic factors to support significant nexus determinations. For example, while some significant nexus evaluations included detailed, quantitative assessments of drainage areas, stream discharge, or macroinvertebrate counts, other evaluations from the same district disclosed less specific, qualitative descriptions of an aquatic resource's hydrological or ecological connectivity to a TNW. Further, many NJDs included cursory explanations of no significant nexus, such as solely reporting that a wetland was isolated, had no surface hydrologic connection to waters of the United States, or that no significant nexus existed.

Implementation of a standardized system for federal and state regulators to classify and record aquatic resource impacts that do not fall under CWA jurisdiction—such as the Cowardin system—could promote identification and quantification of vulnerable aquatic resources at local, watershed, or statewide scales. Detailed accounting for vulnerable aquatic resources could help to inform state and local governments of the quantity and types of waters that may merit additional regulatory protection.

EPA and the Corps recently released draft guidance clarifying the scope of waters that are jurisdictional under the CWA. This new guidance, which when finalized is intended to precede new agency regulations clarifying CWA jurisdiction, presents an opportunity for the agencies to standardize the criteria and detail used to evaluate and document significant nexus. While case-specific circumstances will influence the amount of detail that regulators use to evaluate particular criteria, clear explanations of why particular analysis techniques were or were not employed can increase transparency and consistency in significant nexus evaluations. Guidance and regulations that more clearly stipulate use of certain hydrologic and ecologic factors may promote more predictable evaluation of aquatic resources' significant nexus to TNWs.

Section I. Introduction

At the federal level, certain activities affecting wetlands and other aquatic resources are regulated under the Clean Water Act (CWA). The purpose of the CWA is to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters."[17] To achieve this purpose, CWA §301 prohibits the discharge of pollutants except in compliance with the Act.[18] Two permitting programs established under the Act constitute exceptions to this prohibition. The first is the National Pollutant Discharge Elimination System (NPDES) permit program, established by §402 of the Act. The NPDES permit program allows for the discharge of a pollutant into CWA-regulated waters if done in compliance with a permit.[19] The second permitting program is authorized by §404 of the CWA and regulates the discharge of "dredged or fill material"[20] in waters of the U.S. —including wetlands and other aquatic resources. The §404 program is administered by the U.S. Army Corps of Engineers (Corps) through its 38 regulatory districts, but the U.S. Environmental Protection Agency (EPA) shares responsibility for developing the environmental criteria by which the Corps evaluates permit applications.[21] EPA may also veto permits and may take enforcement actions.[22]

The requirements of the CWA apply only to "navigable waters."[23] The Act defines navigable waters as "waters of the Unites States, including the territorial seas."[24] The Act, however, does not define "waters of the United States," or indicate what types of waters might be included in the definition. Regulations issued by the Corps and EPA subsequently clarified the categories of waters that are included—including those susceptible to use in interstate or foreign commerce, tributaries of those waters, and wetlands adjacent to those waters or their tributaries.[25] For most of the history of the Act, a broad definition of waters of the United States was used to assert jurisdiction.

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[17] 33 U.S.C. §1251(a).
[18] *Id.* §1311(a).
[19] *Id.* §1342(a).
[20] *Id.* §1344.
[21] *Id.* §1344(b).
[22] *Id.* §1344(3).
[23] *Id.* §1362(7).
[24] *Id.*
[25] Per the regulation the term "waters of the United States" means (1) All waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide; (2) All interstate waters including interstate wetlands; (3) All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation or destruction of which could affect interstate or foreign commerce including any such waters: (i) Which are or could be used by interstate or foreign travelers for recreational or other purposes; or (ii) From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or (iii) Which are used or could be used for industrial purpose by industries in interstate commerce; (4) All impoundments of waters otherwise defined as waters of the United States under the definition; (5) Tributaries of waters identified in paragraphs (a) (1) through (4) of this section; (6) The territorial seas; (7) Wetlands adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs (a) (1) through (6) of this section. (8) Waters of the United States do not include prior converted cropland. 33 C.F.R. §328.3(a).

Two Supreme Court cases, however, have left some uncertainty around what waters constitute waters of the United States. In 2001, in *Solid Waste Agency of Northern Cook County v. U.S. Army Corps of Engineers (SWANCC)*, the Court found that CWA protections do not extend to certain "isolated" waters and wetlands. The case involved an appeal of a Corps' denial of a §404 permit to fill a sand and gravel pit that had turned into a wetland that was being used by migratory birds. In the ruling, the Court invalidated the 'Migratory Bird Rule'—an administrative interpretation adopted by the Corps in 1986 maintaining that the presence of migratory birds was sufficient to assert CWA jurisdiction over aquatic habitats. In *SWANCC*, the Supreme Court determined that Congress had not intended the CWA to reach "isolated ponds, some only seasonal"[26] that were located wholly within one state, where the only asserted basis for jurisdiction was their use by migratory birds.[27]

In 2006, in *Rapanos v. United States*, the Court established several sets of CWA jurisdictional tests—including the "significant nexus with navigable waters"[28] test articulated by Justice Anthony M. Kennedy—to determine the types of wetlands and aquatic resources covered by the Act. In *Rapanos*, the Court considered whether waters that do not contain, and are not adjacent to, traditional navigable waters (TNWs) are covered by the CWA.[29] The Court vacated lower court rulings that had found CWA jurisdiction over wetlands on the property of two Michigan property owners. The Justices issued five separate opinions in the case—one plurality opinion, two concurring opinions, and two dissenting opinions. Five justices (including four in the plurality and one concurring opinion) voted to overturn the lower court rulings and send the cases back to the lower courts for further consideration. The remaining four justices, in a dissenting opinion, found that the Corps' assertion of jurisdiction was a reasonable interpretation of the CWA.

The five justices constituting the majority for overturning the lower courts in *Rapanos* did not agree on a single jurisdictional test that could be applied by the lower courts. Justice Antonin Scalia, writing for the plurality, would find CWA coverage only where a wetland is adjacent to, and has a *continuous surface connection* with, a "relatively permanent"[30] body of water (RPW) that is connected to a TNW.[31] Justice Scalia's definition of an RPW excludes intermittent and ephemeral streams, but may include seasonal rivers as well as other bodies of water that may "dry up in extraordinary circumstances, such as drought."[32] Justice Kennedy, concurring with the plurality judgment to send the case back to the lower courts, would find CWA coverage when there is a significant nexus between the aquatic resources in question and a TNW. A significant nexus is found when the wetlands or waters in question make more than a

[26] Solid Waste Agency of Northern Cook County v. U.S. Army Corps of Engineers, 531 U.S. 159, 162 (2001).
[27] *Id.*
[28] Rapanos v. United States, 126 S.Ct. 2208, 2248 (2006) (Kennedy, J., concurring in the judgment).
[29] Rapanos v. United States, 126 S.Ct. 2208 (2006) (Scalia, J., plurality).
[30] *Id.*at 2226.
[31] *Id.*at 2226-27.
[32] *Id.*at 2208, 2221 n. 5.

speculative or **insubstantial** contribution to the physical, chemical, and biological integrity of downstream navigable waters.[33]

In effect, CWA jurisdiction can be established by meeting either test. Since *Rapanos*, one U.S. Court of Appeals ruled that Kennedy' significant nexus test alone governs for determining CWA jurisdiction,[34] two courts of appeals determined that Kennedy governed the facts in the case but that Scalia's continuous surface connection test could be used in future cases,[35] two courts of appeals have held that CWA jurisdiction exists where either test is satisfied,[36] and two appellate courts declined to decide which *Rapanos* tests governs.[37]

By most accounts, the *SWANCC* decision resulted in a loss of protection for many geographically isolated wetlands.[38] A number of assessments completed following *SWANCC* attempted to discern the types of wetlands and aquatic resources that may be at risk.[39] According to these assessments, vulnerable waters generally include small, perennial, intermittent, or ephemeral streams or geographically isolated wetlands.[40]

To our knowledge, there have been no holistic assessments of the types and geographic locations of aquatic resources that the Corps has determined are not regulated under the CWA following *Rapanos*. The Corps is likely to assert jurisdiction over most, if not all, coastal or tidal wetlands, as they are connected to the ebb and flow of the tides. If states and local governments are to be enabled to fill the gaps in federal coverage, and if conservationists and the public are to be able to respond to anticipated losses through appropriate means, it is essential to have a well-articulated assessment of what types of aquatic resources are currently going without federal protection in each area of the country.

The uncertainty in the federal protection of freshwater aquatic resources left by *SWANCC* and *Rapanos* has heightened the importance of state regulation. Every state has at least some

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[33] Rapanos v. United States, 126 S.Ct. 2208, 2248 (2006) (Kennedy, J., concurring in the judgment).
[34] United States v. Robison, 505 F.3d 1208 (11th Cir. 2007).
[35] United States v. Gerke Excavating, Inc., 464 F.3d 723 (7th Cir. 2006) (per curiam); Northern California River Watch v. City of Healdsburg, 496 F.3d 993 (9th Cir. 2007), *withdrawing and superseding by denial of rehearing*, 457 F.3d 1023 (9th Cir. 2006); Northern California River Watch v. Wilcox, 547 F.3d 1071, 2011 WL 238292 (9th Cir. 2011).
[36] United States v. Johnson, 467 F.3d 56 (1st Cir. 2006), *vacating* 437 F.3d 157 (1st Cir. 2006); United States v. Bailey, 571 F.3d 791 (8th Cir. 2009), *affirming* 516 F. Supp. 2d 998 (D. Minn. 2007).
[37] United States v. Lucas, 516 F.3d 316 (5th Cir. 2008); United States v. Cundiff, 555 F.3d 200 (6th Cir. 2009), *affirming* 480 F. Supp. 2d 940 (W.D. Ky. 2007).
[38] E.g. MARK PETRIE ET AL., DUCKS UNLIMITED, INC., THE SWANCC DECISION: IMPLICATIONS FOR WETLANDS AND WATERFOWLS (2001); Dennis F. Whigham & Thomas E. Jordan, *Isolated wetlands and water quality*, 23 WETLANDS 541 (2003).
[39] *See, e.g.*, PETRIE ET AL., *supra* note 38; NATIONAL RESOURCES DEFENSE COUNCIL & NATIONAL WILDLIFE FEDERATION, WETLANDS AT RISK: IMPERILED TREASURES (2002); Arnold G. Van der Valk & Roger L. Pederson, *The SWANCC decision and its implications for prairie potholes*, 23 WETLANDS 590 (2003).
[40] In this paper we define vulnerable waters to be those waters that are unregulated by the CWA following the Supreme Court's decisions in *SWANCC* and *Rapanos*. The CWA and state statutes establish permitting programs for the aquatic resources under their jurisdiction and do not necessarily permanently protect these resources. However, waters not regulated by federal or state law may be more readily dredged, filled, or otherwise impacted by development or other unregulated activities.

authority to regulate wetlands and other waters within their state. Under §401 of the CWA, all states have the authority to review and then certify, condition, or deny federal permits to ensure they do not violate the state's water quality standards or other laws. In addition, twenty-five states have established at least some additional protection for freshwater wetlands under state law. If no state law provides additional legal protection for wetlands and streams, landowners or developers may be free to dredge, fill, or discharge pollutants to waters not covered under the CWA.

This study is the first to holistically analyze federal regulatory practices to characterize the particular wetland, stream, and other aquatic resource types that, in certain circumstances, Corps regulators have determined can no longer be regulated under the CWA following *Rapanos*. We also catalogued and analyzed the criteria and specific types of data used by Corps regulators to evaluate and apply various CWA jurisdictional standards, including Justice Kennedy's significant nexus standard.

In Section II we note the tests that the Corps applies to determine whether particular aquatic resources come within CWA jurisdiction. Section III evaluates states' legal authority to regulate wetlands beyond the CWA. Section IV summarizes the scientific literature (further explained in Appendix 5) to determine the types, extent, geographic location, and ecosystem functions of wetlands, streams, and other aquatic resources that have been identified as potentially vulnerable.

Section V comprehensively examines CWA §404 determinations of no jurisdiction (NJDs) issued by the Corps from 2008-2009 to determine the types of aquatic resources over which the Corps is not asserting jurisdiction and the jurisdictional criteria and tests that the Corps is using to determine that waterbodies are not protected by the CWA. Based on information from 43 state §401 certification programs, Section VI identifies the aquatic resource types being presented or not presented to state programs for water quality certification under CWA §401. Section VII concludes by analyzing, on the basis of all of this information, the types of wetlands, streams, and aquatic resources vulnerable following *Rapanos*.

These results can help state and local governments target supplemental resources and programs, including non-regulatory conservation measures and out-of-kind compensatory mitigation, to appropriate waters. This analysis can also help state and local governments to identify appropriate changes to statutes or regulations to improve protection, as well as indicate what functions are most likely to be lost without additional program activities.

Section II. Agency Guidance on Jurisdictional Determinations and the Significant Nexus Test

In response to the Supreme Court decision in *Rapanos*, the EPA and the Corps developed the "Memorandum Regarding Clean Water Act Jurisdiction Following the U.S. Supreme Court's Decision in *Rapanos v. United States* & *Carabell v. United States*" (the Guidance) in 2008.[41] This section summarizes the 2008 Guidance and its implementing procedures in order to provide the context for interpreting the Corps NJDs that ELI reviewed in this study.

The Guidance identifies those waters over which the federal agencies will assert jurisdiction categorically and on a case-by-case basis. The agencies will assert jurisdiction over the following waters:

- TNWs
- Wetlands adjacent to TNWs
- Non-navigable tributaries of TNWs that are RPWs where the tributaries typically flow year-round or have continuous flow at least seasonally (e.g., typically three months)
- Wetlands that directly abut such tributaries[42]

Under the Guidance, TNWs and wetlands adjacent to TNWs are deemed categorically jurisdictional.[43] Federal regulations define adjacent as "bordering, contiguous, or neighboring."[44] A continuous surface connection is not required to establish adjacency. Wetlands are considered adjacent if 1) there is an unbroken surface connection with jurisdictional waters, even if the hydrological connection is intermittent; 2) they are physically separated from jurisdictional waters by man-made dikes or barriers, natural river berms, beach dunes, etc.; or 3) they are reasonably close to a jurisdictional water.[45] In assessing whether a wetland is "reasonably close," the proximity of a wetland is evaluated alone and not in conjunction with other wetlands in the area.[46]

The agencies will also assert jurisdiction over relatively permanent non-navigable tributaries of TNWs and wetlands that directly abut such tributaries. According to the Guidance, RPWs are "waters that typically (e.g., except due to drought) flow year-round or waters that have a continuous flow at least seasonally (e.g., typically three months)."[47] RPWs do not include tributaries "whose flow is 'coming and going at intervals…broken, fitful.'"[48] RPWs also do not include ephemeral tributaries with flow only after precipitation, and intermittent streams that do not have flow year-round or seasonally; jurisdiction of these waters is to be evaluated under the

[41] The Guidance, *supra* note 5, at 5.
[42] *Id.* at 1.
[43] *Id.*
[44] 33 C.F.R. §328.3(c).
[45] The Guidance, *supra* note 5, at 5.
[46] *Id.* at 6.
[47] *Id.* at 6-7.
[48] Rapanos v. United States, 126 S.Ct. 2208 (2006) (Scalia, J., plurality). *cited in* The Guidance, *supra* note 5, at 7.

significant nexus test.[49] Adjacent wetlands that have a "continuous surface connection"[50] to relatively permanent, non-navigable tributaries are jurisdictional and a significant nexus test is not required for the agencies to assert jurisdiction over these waters.[51]

Under the Guidance, the agencies decide jurisdiction over the following waters based on a fact-specific analysis to determine whether they have a significant nexus with a TNW:

- Non-navigable tributaries that are not RPWs
- Wetlands adjacent to non-navigable tributaries that are not RPWs
- Wetlands adjacent to but that do not directly abut a relatively permanent non-navigable tributary[52]

Waters have a significant nexus if they, either alone or in combination with similarly situated waters in the region, "have more than a speculative or insubstantial effect on the chemical, physical, or biological integrity of a traditional navigable water."[53]

Under the Guidance, field staff are instructed to consider the flow characteristics and functions of the tributary to which the wetland is adjacent, the wetland itself, and all other wetlands adjacent to the tributary when determining if the wetland has a significant nexus to downstream navigable waters. The principal considerations when determining significant nexus include flow characteristics and ecological functions.

Flow characteristics include volume, frequency and duration of flow in the tributary and the proximity of the tributary to navigable waters. Flow characteristics can be measured using hydrologic information, physical characteristics of the tributary (e.g., presence and characteristics of a reliable ordinary high water mark with a channel defined by bed and banks or shelving, wracking, water staining, sediment sorting, and scour), and contextual factors (e.g., size of watershed, average annual rainfall, average annual snow pack, slope, channel dimensions).

The second category of considerations, ecological functions, can include the extent to which a tributary and its adjacent wetlands moderate temperatures, carry pollutants, hold and release flood waters, transfer nutrients and organic carbon, provide habitat (including spawning areas for recreationally or commercially important species), and provide water quality functions (such as sediment trapping). Based on these considerations the agencies then evaluate whether the tributary and adjacent wetlands make a more than speculative or insubstantial contribution to the physical, chemical, and biological integrity of downstream navigable waters (i.e., they have a significant nexus with downstream navigable waters).[54]

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[49] The Guidance, *supra* note 5, at 7.
[50] A continuous surface connection exists where the wetland directly abuts the water – i.e., there is no separation by uplands, a berm, dike or similar feature. The Guidance, *supra* note 5, at 7.
[51] The Guidance, *supra* note 5, at 7.
[52] *Id.* at 1.
[53] *Id.* at 3, 11
[54] U.S. ARMY CORPS OF ENGINEERS & U.S. ENVIRONMENTAL PROTECTION AGENCY, U.S. ARMY CORPS OF ENGINEERS JURISDICTIONAL DETERMINATION FORM INSTRUCTIONAL GUIDEBOOK (2007) [hereinafter The Guidebook].

The agencies are to document the information collected to support a significant nexus analysis—including the flow characteristics and ecological functions—and explain the basis for concluding whether the tributary and adjacent wetlands have a significant nexus to TNW.[55]

The Guidance states that

> When applying the significant nexus standard to tributaries and wetlands, it is important to apply it within the limits of jurisdiction articulated in *SWANCC*. Justice Kennedy cites *SWANCC* with approval and asserts that the significant nexus standard, rather than being articulated for the first time in *Rapanos*, was established in *SWANCC*.…It is clear, therefore, that Justice Kennedy did not intend for the significant nexus standard to be applied in a manner that would result in assertion of jurisdiction over waters that he and the other justices determined were not jurisdictional in *SWANCC*. Nothing in this guidance should be interpreted as providing authority to assert jurisdiction over waters deemed non-jurisdictional by *SWANCC*.[56]

The agencies *generally* will not assert jurisdiction over swales or erosional features (e.g., gullies, small washes characterized by low volume, infrequent, or short duration flow), or over ditches (including roadside ditches) excavated wholly in and draining only uplands and that do not carry a relatively permanent flow of water.[57] However, these waters may still contribute to a surface hydrological connection between tributaries and TNWs and may still function as point sources of pollution under CWA §402—even if they are not themselves deemed to be jurisdictional.[58]

In conjunction with the Guidance, the agencies released a new standard form to document jurisdictional determinations (JDs) and an accompanying guidebook (the Guidebook) to help the Corps' district staff implement the new guidance.[59] The Guidebook explains the steps the Corps field staff will follow when completing JD forms and contains a flowchart that outlines the process for determining CWA jurisdiction.[60] Each district is required to post all approved JD forms on its regulatory website.[61]

In 2011, the Corps and EPA proposed new draft guidance to further clarify the scope of waters that are categorically jurisdictional under the CWA and the instances in which a significant nexus test is necessary.[62] The 2008 *Rapanos* Guidance will remain in effect until the Corps and EPA issue a new final guidance. The NJDs we examined for this study were subject to the 2008 Guidance.

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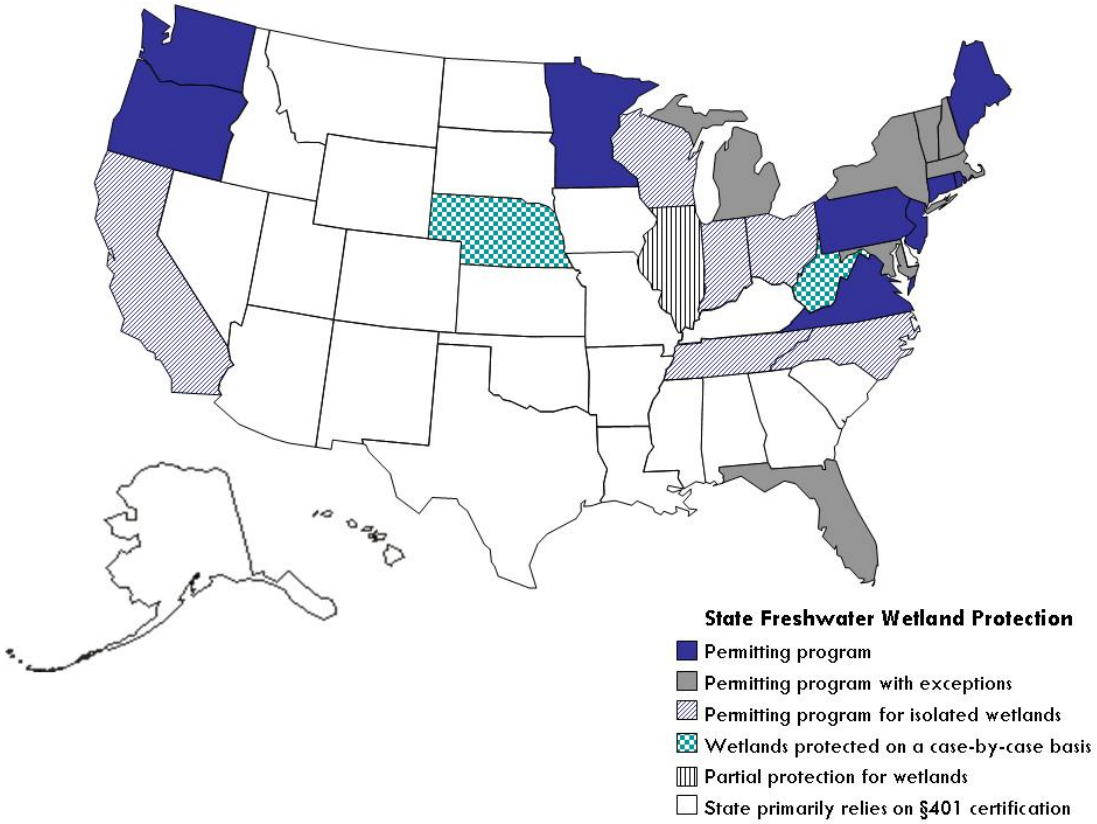
[55] The Guidance, *supra* note 5, at 11.
[56] *Id.* at 9.
[57] *Id.* at 11-12. Although these features are generally not jurisdictional, they may be determined jurisdictional through case-by-case, fact-specific analyses performed by the Corps. *See* Joshua C. Thomas, Note, *Clearing the muddy waters?* Rapanos *and the post*-Rapanos *Clean Water Act jurisdictional guidance*. 44 HOUSTON LAW REVIEW 1491, 1528 (2008).
[58] The Guidance, *supra* note 5, at 12.
[59] The Guidebook, *supra* note 54. See Appendix 4 for a sample JD form.
[60] The Guidebook, *supra* note 54.
[61] The Guidance, *supra* note 5, at 13 n.41.
[62] U.S. ENVIRONMENTAL PROTECTION AGENCY & U.S. ARMY CORPS OF ENGINEERS, *supra* note 6.

Section III. State Wetland Regulatory Programs

Freshwater wetlands and waters not within CWA jurisdiction may still be protected under state laws. Thus, the vulnerability of waters relates to both the lack of CWA jurisdiction and to the lack of state protections.

Section 401 of the CWA gives all states the authority to review federal permits and licenses for activities that may result in a discharge to a water of the United States. States may grant, grant with conditions, or deny federal permits or licenses based on their review of the proposed project's compliance with the state's approved water quality standards. For many states, §401 certification requirements provide the primary or the sole regulatory mechanism by which states regulate activities in freshwater wetlands (Table 1).[63] But non-CWA wetlands will not come within a state's §401 review process, and thus may be left vulnerable in states with no additional legal protections.

Figure 1: State freshwater wetland protection programs



[63] Twenty-five states rely primarily on §401 water quality certification to regulate and protect freshwater wetlands in the state that may not be covered by federal regulation, including Alabama, Alaska, Arizona, Arkansas, Colorado, Delaware, Georgia, Hawaii, Idaho, Iowa, Kansas, Kentucky, Louisiana, Mississippi, Missouri, Montana, Nevada, New Mexico, North Dakota, Oklahoma, South Carolina, South Dakota, Texas, Utah, and Wyoming.

Nearly all states have definitions of "waters of the state" that include wetlands and groundwater, and these definitions generally are more inclusive than the CWA. However, definitions alone do not provide regulatory protection. Some states have not authorized state natural resource or environmental agencies to regulate impacts to the wetlands, tributaries, and other surface waters that are outside of CWA jurisdiction.[64]

Twenty-five states have provided themselves with authority to regulate dredge and fill activities in some (or all) non-tidal waters of the state (Figure 1).[65] In most of these states, state-level dredge and fill regulation covers streams and lakes as well as wetlands. Eight of the 25 states have established permitting programs broadly covering most freshwater wetlands in the state. Eight additional states have established permitting programs that protect many freshwater wetlands, but include defined exceptions for protection based on wetland types, size, or class. Six states have established permitting programs specifically for isolated waters, or those no longer covered under the CWA under *SWANCC*. Further, two states offer some protection for vulnerable wetlands on a case-by-case basis; while one state imposes regulations for state-run or state-funded projects in wetlands. Table 1 describes the waters covered under state programs under various circumstances.

Freshwater Permitting Programs

Connecticut, Minnesota, New Jersey, Oregon, Pennsylvania, Rhode Island, Virginia, and Washington have established permitting programs that can comprehensively protect all or virtually all classes of freshwater wetlands. These state permitting programs have no explicit exceptions to the type, size, or classes of wetlands that are covered.

For example, Connecticut's Inland Wetlands and Watercourses Act requires a permit for activities in wetlands and watercourses.[66] Wetlands covered by the law are defined as "land, including submerged land…which consists of any of the soil types designated as poorly drained, very poorly drained, alluvial, and floodplain by the National Cooperative Soils Survey, as may be amended from time to time, of the Natural Resources Conservation Service of the United State Department of Agriculture."[67] The definition of watercourses includes marshes, swamps, bogs and all other bodies of water, including vernal and intermittent waters.[68]

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[64] In the words of Jeanne Christie, Executive Director of the Association of State Wetland Managers, "Virtually every state has a definition of state waters that includes wetlands as well as groundwater. Definitions of state waters generally go far beyond what the CWA identifies. The difference from state to state is in what states have authorized themselves to regulate." Email from Jeanne Christie, Executive Director, Association of State Wetland Managers to Rebecca Kihslinger, Science & Policy Analyst, Environmental Law Institute (April 26, 2011).

[65] Twenty-three states regulate activities in coastal/tidal waters, including California, Connecticut, Delaware, Florida, Georgia, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, New Hampshire, New Jersey, New York, North Carolina, Oregon, Pennsylvania, Rhode Island, South Carolina, Vermont, Virginia and Washington. However, for this report we focus on freshwater aquatic resource protection, as most, if not all, coastal/tidal waters are likely covered by the CWA.

[66] CONN. GEN. STAT. §22a-36-45.

[67] *Id.* § 22a-36.

[68] *Id.* § 22a-36.

Virginia adopted amendments to its Virginia Water Protection Permit program to cover filling of non-tidal wetlands. Under the program, applicants are prohibited from excavating, filling, discharging to, dumping in, or otherwise altering state waters and non-tidal wetlands without a permit.[69] The Virginia Water Protection Permit expressly covers activities in isolated wetlands that are not subject to §404 of the CWA.[70] Washington's State Water Pollution Control Act covers all waters of the state, including wetlands.[71] Under state law, if the Corps determines that a wetland is isolated and not subject to federal jurisdiction, landowners must still seek state approval for proposed wetland impacts.[72] Washington also regulates some freshwater wetlands under the Growth Management Act (GMA). Under the GMA, local governments must identify and protect critical areas for conservation purposes.[73] Wetlands—including areas with a critical recharging effect on aquifers used for potable water, fish and wildlife habitat conservation areas, frequently flooded areas, and geologically hazardous areas—are included among the areas that can be designated as "critical areas."[74]

The wetland protection laws and regulations of the states with comprehensive wetland protection statutes broadly define wetlands, often using definitions similar to the federal definition of wetlands. Federal regulations define wetlands 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."[75] This federal definition defines the habitat type that meets hydrological and ecological characteristics of a wetland. Wetlands that fall under this federal definition, however, may or may not be subject to regulation under the CWA.

Freshwater Permitting Programs with Specific Exceptions

Eight states have established permitting programs for wetlands that have varying degrees of exceptions based on wetland type, size, or class. These states include Florida, Maine, Maryland, Massachusetts, Michigan, New Hampshire, New York, and Vermont. The Florida Environmental Resource Permit program, which was authorized under the Florida Environmental Reorganization Act of 1993, regulates activities, including dredging and filling, in water resources in the state, including wetlands.[76] However, although the program may cover most freshwater wetlands, Florida's definition of wetlands excludes "longleaf or slash flatwoods with an understory dominated by saw palmetto."[77] Maryland's Non-tidal Wetlands Protection

[69] VA. CODE ANN. § 62.1-44.5.
[70] *Id.* § 62.1-44.15:21; 9 VA. ADMIN. CODE § 25-210-10.
[71] REV. CODE WASH. § 90.48.020.
[72] Washington State Department of Ecology, Focus Sheet: Isolated Wetlands – Changes in the Regulatory Process, Ecology Publication No. 00-06-020 (June 2001), *available at* http://www.ecy.wa.gov/pubs/0106020.pdf.
[73] REV. CODE WASH. § 36.70A.172.
[74] REV. CODE WASH. § 36.70A.030(5).
[75] 40 C.F.R. 232.2(r).
[76] FLA. STAT. ANN. §373, Part IV, ch. 93-213, sec. 19.
[77] *Id.* § 373.019(25).

Act requires permits for activities in non-tidal wetlands and their 25-foot buffers.[78] Like Florida, Maryland's law covers most freshwater wetlands in the state. However, activities in isolated non-tidal wetlands of less than one acre and having no significant plant or wildlife value and activities having a cumulative loss of less than 5,000 square feet of non-tidal wetlands, within a 25-foot buffer, and containing no significant plant or wildlife value, are exempt from permit and mitigation requirements, and require only a letter of exemption.[79] Similarly, Maine's Natural Resources Protection Act and its underlying regulations cover most freshwater wetlands in the state, but only regulate vernal pools that are deemed to be significant wildlife habitat.[80] Vernal pools that constitute significant wildlife habitat represent about 20-25 percent of all vernal pools in the state.[81]

Massachusetts and Michigan limit protection to those freshwater wetlands bordering on or contiguous with identified bodies of water. In Massachusetts, freshwater and coastal wetlands **bordering on** the ocean or on a creek, river, stream, or pond or other water body, any land under said waters, or any land subject to tidal action, coastal storm flowage, or flooding are regulated under state law.[82] In Michigan, wetlands are jurisdictional under state law if **contiguous** to the Great Lakes or Lake St. Clair, an inland lake or pond, or a river or stream; not contiguous, and more than five acres in size; or not contiguous, and five acres or less in size if the state determines that protection of the area is essential to the preservation of the natural resources of the state from pollution, impairment, or destruction.[83] In addition to regulating dredge and fill activities, Michigan regulates draining of wetlands.[84]

Other states, like Vermont, limit protection to certain classes of wetlands. The Vermont Wetland Rules cover only **significant wetlands** and the buffer zone surrounding a significant wetland. A significant wetland is defined as any Class I or Class II wetland that merits protection, either alone or in conjunction with other wetlands, based on an evaluation of the extent to which it serves one or more of the functions and values pursuant to Vermont's Wetland Rules.[85]

Permitting Programs for Isolated Wetlands

California, Indiana, North Carolina, Ohio, Tennessee, and Wisconsin have established additional state-level authority to regulate impacts to isolated waters or wetlands beyond federal jurisdiction. In the wake of the *SWANCC* decision, California's State Water Resource Control Board issued a memorandum reaffirming the state's protection of "isolated" waters under the Porter-Cologne Water Quality Control Act.[86] Pursuant to the memorandum, discharges—

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[78] MD. CODE ANN.., ENVIR. §§ 5-906..
[79] MD. REGS. CODE tit. 26, §23.03.01.
[80] ME. REV. STAT. ANN. tit. 38, § 480-C (West 1989, Supp. 1999); 06-096 CODE ME. R. 335 §9 (2009).
[81] University of Maine, Vernal Pool Regulation in Maine: Answers to Frequently Asked Questions, http://www.nae.usace.army.mil/reg/VernalPoolRegulationMaineFAQ.pdf.
[82] MASS. GEN. LAWS ch. 131 § 40.
[83] MICH. COMP. LAWS § 324.30301.
[84] MICH.. COMP. LAWS § 324.30304.
[85] VT. CODE R. 12 004 056 (2010); VT. STAT. ANN. tit. 10, § 902; VT. STAT ANN tit. 10, § 6025(d)(5)(A)-(K).
[86] Letter from Celeste Cantu, Executive Director, State Water Resources Control Board to Regional

including dredging, filling, or excavation—to wetlands and other waters of the state, including isolated wetlands, are regulated by the state. Proposed regulations will formalize the intent of the state to protect all waters of the state, including wetland areas and waters of the United States, from dredge and fill discharges under the Porter-Cologne Act, and would include a wetland definition and wetland delineation methods.[87] In addition, the California Coastal Act (CCA) limits dredge and fill activities in coastal wetlands to low-impact uses and prohibits "coastal-dependent development" in wetlands.[88] The CCA extends state coverage to all wetlands within the coastal zone, covering freshwater wetlands in these areas. Finally, California Fish and Wildlife's Environmental Services Division runs the "Streambed Alteration Agreements" program. Streambed Alteration Agreements are required under the California Fish and Game Code (Section 1602) in instances where construction projects would impact wetlands associated with rivers, streams, or lakes. Landowners and developers must notify the Department of Fish and Game of the proposed activity. Where the Department determines that the activity may substantially adversely affect fish and wildlife resources, a Lake or Streambed Alteration Agreement that includes the reasonable conditions necessary to protect those resources is prepared.[89]

Indiana's Department of Environmental Management administers a state permitting program covering activities in state regulated wetlands.[90] A state regulated wetland is defined as an "isolated wetland that is not an exempt isolated wetland."[91] An isolated wetland is defined as "a wetland that is not subject to regulation under Section 404(a) of the Clean Water Act."[92] Exempt isolated wetlands include some voluntary created wetlands and incidental features, as defined.[93] Under the law, some class I wetlands (wetlands where at least fifty percent of the wetland area has been disturbed or affected by human activity or development or that have only minimal wildlife or aquatic habitat or hydrologic function)[94] less than one-half acre in size and some class II wetlands (wetlands that would meet the definition of a Class I wetland if the wetland were not a rare or ecologically important type)[95] less than one-quarter acre in size may also be exempt.[96]

Wisconsin built its program on its existing administration of the §401 certification process, but extended state jurisdiction by statute to cover freshwater wetlands that no longer

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Board Executive Officers, State Water Resources Control Board (2004) (citing 2001 legal opinion from SWRCB confirming state jurisdiction over isolated wetlands), *available at* http://www.swrcb.ca.gov/water_issues/programs/cwa401/docs/isol_waters_guid.pdf.

[87] STATE WATER RESOURCES CONTROL BOARD, WETLAND AREA PROTECTION POLICY AND DREDGE AND FILL REGULATIONS (2011), *available at* http://www.swrcb.ca.gov/water_issues/programs/cwa401/docs/wrapp/wetlandstudy_v122210.pdf.

[88] CAL. PUB. RES. CODE §§ 30000-30900 (2011).

[89] CAL. FISH & GAME CODE §§ 1602.

[90] IND. CODE § 13-18-22.

[91] *Id.* § 13-11-2-221.5.

[92] *Id.* § 13-11-2-112.5.

[93] *Id.* § 13-11-2-74.5.

[94] *Id.* §13-11-2-25.8.

[95] *Id.* §13-11-2-25.8.

[96] *Id.* §13-11-2-74.5.

meet federal jurisdictional standards. The Wisconsin state legislature enacted the 2001 Wisconsin Act in response to uncertainty regarding federal jurisdiction over "isolated" wetlands after the *SWANCC* Supreme Court decision.[97] The law amends the state water quality control statute to require water quality certification for "nonfederal wetlands," which include wetlands that are "determined not to be subject to [federal] regulation…due to the decision in [*SWANCC*]" and/or wetlands that are "determined to be a nonnavigable, intrastate, and isolated wetland under the decision in [*SWANCC*]…"[98]

Wetland Protection on a Case-by-Case Basis

Two states, Nebraska and West Virginia, protect on a case-by-case basis freshwater wetlands that may not be federally protected, but these states have not established formal permitting programs for these regulated wetlands. For example, the Nebraska Department of Environmental Quality's website states that isolated wetlands "are still under the authority of the Department of Environmental Quality because isolated wetlands are included in Title 117 – Nebraska Surface Water Quality Standards."[99] The Department has established procedures "to assist project proponents who wish to avoid violating state water quality standards and potential enforcement actions;" [100] however the state has not established a permitting mechanism to protect these wetlands.[101] The state does issue letters of opinion stating whether Department staff believe a project would violate water quality regulations, and what an applicant might change to bring the project into compliance.[102] Under the West Virginia State Code, isolated wetlands are considered wetlands of the state.[103] Prior to conducting any activities in isolated wetlands, West Virginia advises that applicants must obtain all necessary approvals from the state.[104]

Permitting Program Provides Partial Protection

Illinois has a permitting program that provides partial protection for some vulnerable wetlands. The law covers wetlands in the state, but applies only to state-run or state-funded projects.[105]

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[97] WIS. STAT. ANN. § 281.36(1m)(a).
[98] *Id.* § 281.36(1m)(a).
[99] Nebraska Department of Environmental Quality, Section 401 Water Quality Certification, http://www.deq.state.ne.us/SurfaceW.nsf/Pages/S401.
[100] *Id.*
[101] Email from Terry Hickman, Nebraska Department of Environmental Quality to Philip Womble, Research Associate, Environmental Law Institute (Aug. 20, 2010)
[102] *Id.*
[103] W. VA. CODE §22-11-3(23) (2005).
[104] Letter from Thomas L. Clarke, Director, West Virginia Department of Environmental Protection Division of Mining and Reclamation, to District Engineer, U.S. Army Corps of Engineers Huntington District (September 8, 2008); Email from Lyle Bennett, West Virginia Department of Environmental Protection to Philip Womble, Research Associate, Environmental Law Institute (Oct. 15, 2010).
[105] 20 ILL. COMP. STAT. §§ 830/1-830/4.

Table 1: State wetland protection programs

Permitting Program Broadly Covering Most Freshwater Wetlands in the State

The permitting programs in these states broadly cover freshwater wetlands with no explicit exceptions for wetland type, class, or size. Many of these states define wetlands using a definition that is similar to the federal definition.

State	Authority	Waters Covered
Connecticut	Inland Wetlands and Watercourses Act *Conn. Gen. Stat. § 22a-38(15) and (16)*	Wetlands and Watercourses Notes: Wetland definition is based on soil type as designated by the National Cooperative Soils Survey; watercourses include marshes, swamps, bogs and all other bodies of water, including vernal and intermittent waters (Conn. Gen. Stat. § 22a-36).
Minnesota	Wetland Conservation Act *Minn. Stat. Ann. §103G.222*	Wetlands Notes: Wetland definition similar to federal definition. (Minn. Stat. Ann. ch. 103G.005).
	Public Waters Permitting Program *Minn. Stat. Ann. ch. 103G.211, 221*	Public Waters of the state, including Public Waters Wetlands Notes: Public waters wetlands includes types 3, 4, and 5 wetlands as defined by the U.S. Fish and Wildlife Service that are ten or more acres in size in unincorporated areas or 2 ½ or more acres in incorporated areas. (Minn. Stat. Ann. ch. 103G.005).
New Jersey	Freshwater Wetlands Protection Act *N.J. Stat. Ann. tit. 13:9, ch. 9B*	Freshwater wetlands and their buffers Notes: Freshwater wetland definition similar to federal definition (N.J. Stat. Ann. § 13:9B). The Pinelands Protection Act (N.J. Stat. Ann. §§ 13:18A-1), Hackensack Meadowlands Reclamation and Development Act (N.J. Stat. Ann § 13:17-9), and Highlands Water Protection and Planning Act (N.J. Stat. Ann. §§ 13:20-1) provide additional protection for freshwater wetlands.
Oregon	Removal-Fill Law *Or. Rev. Stat. § 196.810*	Waters of the state, explicitly includes wetlands. Notes: A permit is needed to remove or fill fifty cubic yards or more of material in any waters of the state. Wetland definition similar to federal definition (Or. Rev. Stat. § 196-800(17)).
Pennsylvania	Dam Safety and Encroachments Act *32 Pa. Cons. Stat. § 693.3*	Watercourses, streams, or bodies of water and their floodways wholly or partly within or forming part of the boundary of the state. Bodies of water include any natural lake, pond, reservoir, swamp, marsh, or wetland. Notes: Uses federal wetland definition (25 Pa. Code § 93.1).
Rhode Island	Freshwater Wetlands Act *R.I. Gen. Law §§ 2-1-18 to 2-1-25*	Freshwater wetlands as mapped, and their buffers Notes: Wetlands include marshes, swamps, bogs, ponds, rivers, river and stream floodplains and banks, areas subject to flooding or storm flowage, emergent and submergent plant communities in any bodies of fresh water including rivers and streams (R.I. Gen. Laws § 2-1-20).
Virginia	State Water Control Law and Nontidal Wetlands Act *Va. Code Ann. § 62.1-44.5*	State waters and non-tidal wetlands Notes: Covers both waters that are regulated under the CWA and activities in non-tidal wetlands that are not subject to regulation under the CWA. Federal wetland definition (VA. Code Ann. § 62.1-44.3).
Washington	State Water Pollution Control Act *Rev. Code Wash. § 90.48*	Waters of the state. Definition of waters of the state explicitly includes wetlands. Notes: If the Corps determines that a wetland is isolated and not subject to federal jurisdiction, landowners must still seek state approval for proposed wetland impacts. Wetland definition similar to federal definition (Wash. Admin. Code § 173-201A-020).
	Growth Management Act *Rev. Code Wash. § 36.70A.172*	Critical Areas for conservation purposes. Notes: Wetlands are included among those areas that can be designated as “critical areas” that local governments must identify and protect. Wetland definition similar to federal definition (Rev. Code Wash. ch. 36.70A.030).

Permitting Program, but with defined exceptions based on wetland type, size, or class

These states have established permitting programs to protect freshwater wetlands in the state. However, these programs each have explicit exceptions for certain freshwater wetlands based on wetland type, size, or class.

State	Authority	Waters Covered
Florida	Florida Environmental Reorganization Act of 1993 *Fla. Stat. Ann. § 373, Part IV, ch. 93-213, sec. 19*	Tidal and freshwater wetlands and other surface waters Notes: Federal Wetland definition, but longleaf or slash pine flatwoods with an understory dominated by saw palmetto are generally not protected (Fla. Stat. Ann. § 373.019(25)).
Maine	Natural Resources Protection Act *Me. Rev. Stat. Ann. tit. 38, § 480-C(1)*	Coastal sand dune systems, coastal wetlands, significant wildlife habitat, fragile mountain areas, freshwater wetlands, community public water system primary production areas, great ponds or rivers, streams or brooks as defined. Notes: Freshwater wetland definition similar to federal definition (Me. Rev. Stat. Ann. tit. 38, § 480-B(4)). Maine Natural Resources Protection Act only regulates vernal pools that are deemed significant wildlife habitat (Me. Rev. Stat. Ann. tit. 38, §§ 480-B(9-A), 480-B(10) 480-Z(7-A), 480-BB; 06-096 Code Me. R. §§ 310, 335).
Maryland	Non-tidal Wetlands Protection Act *Md. Code Ann., [Envir.] § 5-901 to 911.*	All non-tidal wetlands. Notes: Federal Wetland Definition (MD. Code Ann., Envir. § 5-901(h)(1)). However, isolated wetlands of less than 1 acre and cumulative impacts of less than 5,000 square feet are exempt from permit and mitigation requirements, but require a letter of exemption (Md. Code Ann., [Envir.] § 5-906).
Massachusetts	Wetlands Protection Act *Mass. Gen. Laws ch. 131, § 40*	Freshwater and coastal wetlands bordering on the ocean or on a creek, river, stream, or pond or other water body or any land under said waters or any land subject to tidal action, coastal storm flowage, or flooding. Notes: May not protect those freshwater and coastal wetlands not bordering on the ocean, a creek, river stream, or pond, or other water body. Bordering is not defined. Wetland definition includes meadows, marshes, swamps, bogs, areas with groundwater, flowing or standing surface water or ice provide a significant part of the supporting substrate for a plant community for at least five months of the year (Mass. Gen. Laws ch. 131, § 40).
Michigan	Goemaere-Anderson Wetlands Protection Act *Mich. Comp. Laws §§ 324.303*	Wetlands. Wetlands are jurisdictional under state law if: contiguous to the Great Lakes or Lake St. Clair, an inland lake or pond, or a river or stream; not contiguous, and more than five acres in size; or not contiguous, and five acres or less in size if the state determines that protection of the area is essential to the preservation of the natural resources of the state form pollution, impairment, or destruction. Notes: Wetland definition is similar to federal definition, but limits protection as described above (Mich. Comp. Laws §§ 324.30301).
New Hampshire	Fill and Dredge in Wetlands Act *N.H. Rev. Stat. Ann. § 482*	Bank, flat, marsh, or swamp in or adjacent to any waters of the state (the definition of waters of the state includes wetlands and waters of the U.S. as defined under the CWA). Notes: The law applies wherever fresh water flows or stands and in all areas above tidal waters …, it shall apply (in addition to great ponds or lakes of 10 acres or more in natural area as provided for in RSA 482-A:16-20 and RSA 482-A:21-25) to those portions of great ponds or lakes created by the raising of the water level of the same, whether by public or private structure, and to all surface waters of the state as defined in RSA 485-A:2 which contain fresh water, including the portion of any bank or shore which borders such surface waters, and to any swamp or bog subject to periodical flooding by fresh water including the surrounding shore (N.H. Rev. Stat. Ann. § 482-A:4).

New York	Freshwater Wetlands Act *N.Y. Envtl. Conserv. Law §§ 24-0101*	Wetlands outside the Adirondack Park greater than 12.4 acres in size and those less than 12.4 acres if they are deemed of "unusual local importance," including a 100 foot buffer. Within the Adirondack Park boundaries, wetlands greater than one acre in size or located adjacent to a body of water, including a permanent stream, with which there is free interchange of water at the surface. Notes: Jurisdiction over wetlands that are less than 12.4 acres in size and not of "unusual local importance" is up to the discretion of local governments. Definitions vary for wetlands outside and within the Adirondack Park. Wetlands are defined as lands and submerged lands commonly called marshes, swamps, sloughs, bogs, and flats supporting aquatic or semi-aquatic vegetation (with further provisions for what constitutes wetland vegetation).
	Water Resources Law *N.Y. Envtl. Conserv. Law § 15-0505*	Navigable waters of the state, includes marshes, estuaries, tidal marshes and wetlands that are adjacent to and contiguous at any point to any of the navigable waters of the state and that are inundated at a mean high water level or tide. Notes: Wetland definition included in the Freshwater Wetlands Act (N.Y. Envtl. Conserv. Law §§ 24-0101).
Vermont	Vermont Wetland Rules *10 V.S.A. § 902*	A significant wetland or buffer zone of a significant wetland. Notes: A significant wetland is any Class I and Class II wetland that merits protection, either along or in conjunction with other wetlands, based on an evaluation of the extent to which it serves one or more of the functions and values pursuant to 10 V.S.A. § 6025(d)(5)(A)-(K) and section 5 of Vermont's wetland rules (Vt. Code R 12 004 056). Class I wetland means a wetland that is identified on the Vermont significant wetlands inventory maps as a Class I wetland, or the Panel determines merit the highest level of protection. Class II wetland means a wetland other than a Class I or Class III wetland that is a wetland identified on the Vermont significant wetlands inventory maps, or the Secretary determines merits protection,…, either taken alone or in conjunction with other wetlands. Class III wetlands are wetlands that are neither Class I nor Class II wetlands. Federal wetland definition (10 V.S.A. § 902).

Permitting Program for Isolated Wetlands

These states have established permitting programs that explicitly cover isolated wetlands within the state. Many of these states define isolated wetlands as those no longer regulated under the CWA.

State	Authority	Waters Covered
California	Porter-Cologne Water Quality Control Act *Cal. Water Code § 13050(e)*	Wetlands including isolated wetlands (those not regulated under the CWA) Notes: California is in the process of updating protection for wetlands statewide (http://www.swrcb.ca.gov/water_issues/programs/cwa401/docs/wrapp/notice_wetlands.pdf)
	California Coastal Act *Cal. Pub. Res. Code §§ 30000 to 30900*	Wetlands within the coastal zone. Notes: The California Coastal Act limits dredge and fill activities in wetlands in the coastal zone, which includes some freshwater wetlands.
	Lake and Streambed Alteration Program *Cal. Fish and Game Code § 1602*	Rivers, streams, and lakes Notes: The Lake and Streambed Alteration Program requires notification of construction activities that would substantially change or use any material from the bed, channel, or bank of, or deposit or dispose of debris, waste, or other material in any river, stream, or lake. Streambed Alteration Agreements may be required for certain activities.
Indiana	State Regulated Wetlands *Ind. Code §§ 13-18-22-1*	State regulated wetlands, defined as isolated wetlands that are not exempt isolated wetlands. Notes: Exempt isolated wetlands include some voluntarily created wetlands and incidental features. The law includes size restrictions on protection for Class I and II wetlands.
North Carolina	Control of Sources of Water Pollution, Discharges to Isolated Wetlands and Isolated Waters *N.C. Gen. Stat. 143-215.1, 15A NC Admin. Code 02H.1301*	Wetlands including those not regulated under the CWA Notes: The state regulatory definition of wetlands states that "wetlands classified as waters of the state are restricted to waters of the United States, as defined by the Federal Code of Regulations" (NC Admin Code 02T.0103(46). However, North Carolina does regulate isolated wetlands pursuant to the "discharges to isolated wetlands and isolated waters" regulations (15A NC Admin Code 02H.1301) adopted in October 2001.

Ohio	Isolated Wetland Law *Ohio Rev. Code Ann. § 6111.02*	Isolated Wetlands not subject to regulation under the Federal Water Pollution Control Act Notes: The Isolated Wetland Law establishes three tiers of regulations based on wetland categories, defined according to their ecological significance and size. The three categories are associated with different levels of review, different criteria for approval or disapproval of a permit, and different mitigation requirements. There are no minimum size thresholds for wetlands protected under the Isolated Wetland Law. Statute uses federal wetland definition (Ohio Rev. Code Ann. § 6111.02(P)).
Tennessee	Tennessee Water Quality Control Act, Aquatic Resources Alteration Rule *Tenn. Code Ann. § 69-3-108, Tenn. Comp. R. & Regs. 1200-4-7*	Waters of the state, including wetlands. Notes: Federal wetland definition (Tenn Code Ann § 69-3-103(33)). State permits for these activities are either §401 water quality certifications or aquatic resource alteration permits. Aquatic Resource Alteration Permits are required for activities in wetlands that are not federally regulated.
Wisconsin	2001 Wisconsin Act 6 *Wisc. Stat. Ann. § 281.36(1m)(a)*	Nonfederal wetlands (and all waters of the state). Notes: A wetland is identified as a nonfederal wetland if 1) any discharges of dredged or fill material into the wetland are determined not to be subject to regulation under the CWA due to the decision in *SWANCC* or any subsequent interpretations of that decision by a federal agency or federal district or appellate court or 2) the wetland is determined to be a nonnavigable, intrastate, and isolated wetland under the *SWANCC* decision or any subsequent interpretations (Wisc. Stat. Ann. § 281.36(1m)(a)).

Vulnerable Wetlands are Protected on a Case-by-Case Basis

These states have no established permitting programs for freshwater wetlands, but may protect vulnerable wetlands on a case-by-case basis.

State	Authority	Waters Covered
Nebraska	The Environmental Protection Act *Neb. Rev. Stat. 81-1501*	Waters of the state, including isolated wetlands on a case-by-case basis. Notes: Federal wetland definition (Neb. Dept. of Env. Quality, tit. 120, Chp. 1 (005)). The Nebraska Department of Environmental Quality's website states that isolated wetlands "are still under the authority of the Department of Environmental Quality because isolated wetlands are included in Title 117 – Nebraska Surface Water Quality Standards." The Department has established procedures "to assist project proponents who wish to avoid violating state water quality standards and potential enforcement actions"; however there is no permitting mechanism in the state (http://www.deq.state.ne.us/SurfaceW.nsf/Pages/S401). The state does issue letter of opinions stating whether Department staff believe a project would violate Title 117 regulations and what an applicant might change to bring the project into compliance, if it is not already in compliance.
West Virginia	Water Pollution Control Act *W. Va. Code § 22-11*	Waters of the state, including isolated wetlands on a case-by-case basis. Notes: Under West Virginia State Code (§§22-11-3(23) – definition of waters of the state) isolated wetlands are considered wetlands of the state. Applicants must obtain any necessary approvals from the state prior to conducting activities in isolated wetlands (http://www.dep.wv.gov/dmr/handbooks/Documents/401%20-%20Cert%20-%20Revised401%20-%2009-08-08.pdf, Email from Lyle Bennett, West Virginia Department of Environmental Protection to Philip Womble, Research Associate, Environmental Law Institute (Oct. 15, 2010)).

Permitting Program Provides Partial Protection for Vulnerable Wetlands

Illinois regulates state-run or state-funded projects in freshwater wetlands.

State	Authority	Waters Covered
Illinois	The Interagency Wetland Policy Act of 1989 *20 Ill. Comp. Stat. §§ 830/1-830/4*	Wetlands, but the law only applies to state-run or state-funded projects Notes: Similar to federal wetland definition (20 Ill. Comp. Stat. §§ 830/1-6).

Section IV. Vulnerable wetlands and aquatic resources – What may be at risk?

We define potentially vulnerable aquatic resources as those that are not covered by the federal CWA. Using this definition, we analyzed the peer-reviewed scientific literature on the type and geographic extent of these resources, and the functions provided by these waters. We also examined reports and assessments by conservation organizations and state natural resource agencies on potentially vulnerable wetlands, streams, or other aquatic resources. This section summarizes the literature, and attempts to gather in one place what is known about vulnerable aquatic resources, their types, geographic distribution, and functions. This section summarizes the detailed information presented in Appendix 5, which gives particular attention to geographic distribution of these resources—a particularly important consideration if protection ultimately depends on state rather than federal law.

Vulnerable Aquatic Resource Types

In general, vulnerable waters tend to include small, perennial, intermittent, and ephemeral streams—including headwater streams—and geographically isolated wetlands. Table 2 shows the types and distribution of vulnerable waters identified in the literature, which are further summarized in Appendix 5. Isolated wetlands are often depressional wetland types (e.g., Carolina bays, playa lakes, vernal pools, and prairie potholes), but slope and organic flat wetland types may also be isolated.[106] Eighty-one of 276 identified wetland types in the United States have been identified as 'geographically isolated' (29 percent of identified types).[107] These wetlands represent a significant portion of the country's biodiversity, supporting 274 at-risk plant and animal species (35 percent of which are restricted to these wetland types), 86 plant and animal species listed as threatened, endangered, or candidates under the U.S. Endangered Species Act, and 279 at-risk vegetation associations (67 percent of which are not found in any other habitat types).[108]

Table 2: Potentially vulnerable waters found in different geographic regions of the United States as identified in the scientific literature and assessments by conservation organizations. See Appendix 5 for a detailed list of the types of wetlands that may be at risk—organized by state and EPA region—and for the citations for the source material used to develop this table.
Great Lakes Region (IL, IN, OH, WI, MN, MI) • *Depressional Isolated Wetland Systems*: Central Interior Highlands and Appalachian sinkhole and depression pond; kettle-hole lakes and ponds; Eastern Great Plains wet meadow, prairie, and marsh; Great Lakes dune and swale; Great Lakes wet-mesic lakeplain prairie; North-Central Interior and

[106] Scott G. Leibowitz and Tracie-Lynn Nadeau, 2003. *Isolated Wetlands: State-of-the-Science and Future Directions,* 23 WETLANDS, 663, 663-684; PATRICK COMER ET AL., NATURESERVE, BIODIVERSITY VALUES OF GEOGRAPHICALLY ISOLATED WETLANDS IN THE UNITED STATES (2005).
[107] COMER ET AL., *supra* note 106.
[108] COMER ET AL., *supra* note 106.

Appalachian acid peatland; North-Central Interior freshwater marsh; North-Central Interior wet meadow-shrub swamp; Atlantic Coastal Plain northern pondshore; Boreal-Laurentian bog; Boreal-Laurentian conifer acid swamp; Boreal-Laurentian-Acadian acidic basin fen; Northern Great Lakes interdunal wetland • *Wet Flat Isolated Wetland Systems*: North-Central Interior wet flatwoods; Great Lakes alvars; Laurentian-Acadian conifer-hardwood acid swamp • *Seepage-fed Sloping Isolated Wetland Systems*: North-Central Interior shrub-graminoid alkaline fen
Northeast (ME, MA, NH, RI, VT, NJ, NY, DE, PA, CT) • *Depressional Isolated Wetland System*s: Atlantic Coastal Plain northern basin peat swamp; Atlantic Coastal Plain northern dune and maritime grassland; North-Central Interior and Appalachian acid peatland; Boreal-Laurentian bog; Boreal-Laurentian conifer acid swamp; Boreal-Laurentian-Acadian acidic basin fen; Atlantic Coastal Plain northern bog; Atlantic Coastal Plain northern pondshore; Central Interior Highlands and Appalachian sinkhole and depression pond; Northern Great Lakes interdunal wetland; Great Lakes dune and swale; kettle ponds; palustrine open water; woodland vernal pools • *Wet Flat Isolated Wetland System*s: North-Central Interior wet flatwoods; Acadian Near-Boreal spruce flat; Laurentian-Acadian conifer-hardwood acid swamp; Great Lakes alvar • *Seepage-fed Sloping Isolated Wetland Systems*: North-Central Appalachian seepage fen, Acadian-Appalachian conifer seepage forest; Atlantic Coastal Plain northern basin swamp and wet hardwood forest; fens
Mid-Atlantic (MD, VA, WV) • *Depressional Isolated Wetland Systems*: Atlantic Coastal Plain northern dune and maritime grassland; Atlantic Coastal Plain northern basin peat swamp; Atlantic Coastal Plain northern pondshore; Atlantic Coastal Plain southern depression pondshore; Central Interior Highlands and Appalachian sinkhole and depression pond; Southeastern Coastal Plain interdunal wetland; Southern Piedmont/Ridge and Valley upland depression swamp; Delmarva pothole wetlands • *Seepage-fed Sloping Isolated Wetland Systems*: Atlantic Coastal Plain northern basin swamp and wet hardwood forest; North-Central Appalachian seepage fen; Southern Appalachian seepage wetland; Southern Piedmont granite flatrock
Midwest (KS, MO, IA, NE, SD, ND, WY, UT, MT, CO, ID, OK) • *Depressional Isolated Wetland Systems*: Boreal-Laurentian bog; Boreal-

Laurentian conifer acid swamp; Boreal-Laurentian-Acadian acidic basin fen; Eastern Great Plains wet meadow, prairie, and marsh; Great Plains prairie pothole; North-Central Interior and Appalachian acid peatland; North-Central Interior freshwater marsh; North-Central Interior wet meadow-shrub swamp; Western Great Plains closed depression wetlands; Eastern Great Plains wet meadow, prairie, and marsh; Western Great Plains saline depression wetlands; Inter-Mountain basins playa; Western Great Plains open freshwater depression wetland; Inter-Mountain basins greasewood flat; Inter-Mountain basins Interdunal swale wetland; Northern Rocky Mountain wooded vernal pool; Boreal depressional bog • *Extensive Wet Flat Isolated Wetland Systems*: Laurentian-Acadian Conifer-hardwood acid swamp; North-Central Interior wet flatwoods • *Seepage-fed Sloping Isolated Wetland Systems*: North-Central Interior shrub-graminoid alkaline fen; Colorado Plateau hanging garden
Southeast (AL, FL, GA, KY, MS, NC, SC, TN, AR, LA) • *Depressional Isolated Wetland Systems*: Central Interior Highlands and Appalachian sinkhole and depression pond; East Gulf Coastal Plain dune and coastal grassland; East Gulf Coastal Plain Northern Depression Pondshore; East Gulf Coastal Plain southern depression pondshore; East Gulf Coastal Plain sandhill lakeshore depression; Southeastern Coastal Plain interdunal wetland; Southern Coastal Plain nonriverine basin swamp; Southern Coastal Plain nonriverine cypress dome; Southern Coastal Plain sinkhole; gum ponds; pocosins; Southern Piedmont/Ridge and Valley upland depression swamp; South Florida cypress dome; Atlantic Coastal Plain southern depression pondshore; Central Florida herbaceous pondshore; Carolina bays; Floridian Highlands freshwater marsh; Atlantic Coastal Plain clay-based Carolina bay wetland; West Gulf Coastal Plain nonriverine wet hardwood flatwoods; West Gulf Coastal Plain pine-hardwood flatwoods • *Extensive Wet Flat Isolated Wetland Systems*: East Gulf Coastal Plain southern loblolly-hardwood flatwoods; South-Central Interior/Upper Coastal Plain wet flatwoods; Texas-Louisiana coastal prairie; Texas-Louisiana coastal prairie pondshore • *Seepage-fed Sloping Isolated Wetland Systems*: Atlantic Coastal Plain northern basin swamp and wet hardwood forest; North-Central Appalachian seepage fen; Southern Appalachian seepage wetland; Southern Piedmont granite flatrock; Atlantic Coastal Plain sandhill seep
Southwest (TX, NM, AZ, NV) • *Depressional Isolated Wetland Systems*: Chihuahuan-Sonoran Desert bottomland and swale grassland; North American warm desert playa; Upper Texas coast dune and coastal grassland; Edwards Plateau granitic forest,

woodland and glade; North American warm desert interdunal swale wetland; South Texas dune and coastal grassland; Southeastern Coastal Plain interdunal wetland; Western Great Plains open freshwater depression wetland; Desert springs; Inter-Mountain basins alkaline closed depression • *Seepage-fed Sloping Isolated Wetland Systems*: Sonoran Fan palm oasis
West Coast (CA, OR, WA) • *Depressional Isolated Wetland Systems*: North Pacific coastal interdunal wetland; Boreal depressional bog; Inter-Mountain basins alkaline closed depression; Northern Columbia Plateau basalt pothole ponds; Mediterranean California coastal interdunal wetlands; palustrine emergent wetlands; California Central Valley alkali sink; Inter-Mountain basins greasewood flat; and West Coast vernal pools such as the Columbia Plateau vernal pool; North Pacific hardpan vernal pool; Northern California claypan vernal pool; Northern California volcanic vernal pool; and the Modoc basalt flow vernal pool • *Extensive Wet Flat Isolated Wetland Systems*: Willamette Valley wet prairie • *Seepage-fed Sloping Isolated Wetland Systems*: Sonoran Fan palm oasis

Some of the isolated wetland types we identified are distributed broadly across multiple geographic regions of the United States, such as bogs, flatwood wetlands, and pondshores (Table 3). Other vulnerable wetland types are restricted to specific geographical regions, such as cypress domes in the Southeast, Great Lakes alvars in the Great Lakes region, prairie potholes in the Upper Midwest, west coast vernal pools in California, Delmarva potholes in the Delmarva Peninsula of Delaware, Maryland, and Virginia, and playas in the southwest (Table 3). These wetland types may no longer be protected under the CWA and thus may be at greatest risk where additional state or local regulation is absent. Still other vulnerable wetland types may not be generally isolated, but individual wetlands may be geographically isolated (e.g., pocosins and fens).

Table 3: Geographic range of isolated or potentially vulnerable wetlands in the U.S. Some isolated wetland types are distributed broadly across multiple geographic regions of the United States, while others are restricted to specific geographical regions.

Acid peatlands	Midwest, Northeast, Great Lakes Region
Acid swamps	Great Lakes Region, Midwest, Northeast
Alkaline fens	Great Lakes Region, Midwest
Acidic basin fens	Great Lakes Region, Midwest, Northeast
Bogs	Great Lakes Region, Midwest, West Coast, Northeast
Carolina bays	Southeast
Cypress domes	Southeast
Delmarva pothole wetlands	Delmarva Pennisula

Flatwood wetlands	Great Lakes Region, Midwest, Northeast, Southeast
Great Lakes alvars	Great Lakes
Interdunal and intradunal wetlands	Coastal Regions (Southeast, Great Lakes Region, Midwest, Southwest, West Coast, Northeast, Midatlantic)
Kettle hole	Great Lakes Region, Northeast
Pondshores	Great Lakes Region, Northeast, Midatlantic, Southeast
Prairie potholes	Midwest
Playas	Southwest
Seepage fens	Northeast, Midatlantic, Southeast
Swale wetlands	Midwest, Southwest, Northeast, Great Lakes Region
Vernal pools	Northeast, West Coast

Extent of Vulnerable Aquatic Resources

Although the individual extent of each vulnerable aquatic resource may be small, the aggregate length of individual vulnerable streams and the aggregate area of geographically isolated wetlands can be locally and nationally significant. It has been difficult to estimate the full extent of vulnerable waters in the U.S.—both because there is not a precise definition for vulnerable waters and because many of these resources may not appear on state and federal agency maps. Preliminary estimates indicate that as much as 59 percent of the stream miles in the U.S., excluding Alaska, may be considered intermittent/ephemeral and 53 percent of streams may be considered start reaches.[109] Approximately 20 to 25 percent of the wetland area across the U.S. may be considered isolated.[110] In some regions of the country, isolated wetlands may represent an even larger proportion of all wetlands area in the region. For example, in a study of 72 targeted sites across the country, over half of the wetland area was predicted to be isolated in eight of the study sites.[111] In another twenty-four sites, 20 – 50 percent of the wetland area was predicted to be geographically isolated.[112]

The highest proportion of isolated wetlands is found in the upper Great Lakes, North-central interior, and Great Plains regions.[113] High proportions of isolated wetlands are also found

[109] Tracie-Lynn Nadeau & Mark Cable Rains, *Hydrological connectivity between headwater streams and downstream waters: How science can inform policy*, 43 JOURNAL OF THE AMERICAN WATER RESOURCES ASSOCIATION 118, 120-22 (2007).
[110] JON KUSLER, ASSOCIATION OF STATE WETLAND MANAGERS, THE SWANCC DECISION: STATE REGULATION OF WETLANDS TO FILL THE GAP 17 (2004), *available at* http://aswm.org/pdf_lib/swancc_decision_030404.pdf.
[111] RALPH W. TINER ET. AL, U.S. FISH AND WILDLIFE SERVICE, GEOGRAPHICALLY ISOLATED WETLANDS: A PRELIMINARY ASSESSMENT OF THEIR CHARACTERISTICS AND STATUS IN SELECTED AREAS OF THE UNITED STATES (2002), *available at* http://www.fws.gov/wetlands/_documents/gOther/GeographicallyIsolatedWetlandsNI.pdf.
[112] Ralph W. Tiner, *Geographically Isolated Wetlands of the United States*, 23 WETLANDS 494 (2003) [hereinafter Tiner1].
[113] COMER ET AL., *supra* note 106.

in arid and semi-arid to subhumid regions, and in karst topography.[114] The highest proportion of intermittent/ephemeral streams is found in arid and semi-arid regions, such as Southwest and the Midwest.[115]

Following *SWANCC*, a number of states attempted to estimate the impact of the Supreme Court's decision on the protection of wetlands and other aquatic resources within their borders (Table 4).[116] For example, Delaware reported that if only navigable and directly adjacent wetlands were regulated, 50 percent of its wetlands would be omitted from CWA jurisdiction. Indiana reported that between 32 and 89 percent of wetlands would be excluded from CWA jurisdiction, depending on the definitions used for tributary and adjacency. Missouri reported that if intermittent/ephemeral stream miles were omitted from regulation, 69-76 percent of all Missouri stream miles would be affected. Montana reported that 71 percent of all stream miles would be omitted from jurisdiction if intermittent and ephemeral streams were no longer regulated under the CWA. Rhode Island reported that non-navigable tributary streams, which may be vulnerable following *SWANCC*, constitute 85 percent of the total stream miles in the state.[117]

Additional studies—conducted by state natural resource or environmental agencies and conservation organizations—have also attempted to estimate the extent of vulnerable wetlands and streams statewide or in defined geographic regions. In Tennessee, an analysis of the effects of the *SWANCC* and *Rapanos* rulings on the state's waterways found that over 50 percent of the wetlands statewide are potentially isolated.[118] In Illinois, the Illinois Department of Natural Resources estimated that about 60 percent of the state's wetlands and 12 percent of the state's remaining wetland area are isolated.[119] A Great Lakes study estimated that 24–29 percent of total wetland area and 81–88 percent of total wetlands by number are isolated.[120]

Certain types of wetlands may be isolated over a significant extent of their range. For example, 61-98 percent of wetland area and 87-99 percent of wetland number was predicted to be isolated in the prairie pothole region study of North Dakota.[121] In Texas, biologists estimate that nearly 100 percent of the playas in the Texas panhandle would be without CWA §404 protection.[122] Carolina bays are most abundant in mid-coastal South Carolina, where they extend

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[114] Tiner1, *supra* note 112.
[115] LAINIE R. LEVICK ET AL., U.S. ENVIRONMENTAL PROTECTION AGENCY, THE ECOLOGICAL AND HYDROLOGICAL SIGNIFICANCE OF EPHEMERAL AND INTERMITTENT STREAMS IN THE ARID AND SEMI-ARID SOUTHWEST (2008), *available at* http://www.epa.gov/esd/land-sci/pdf/EPHEMERAL%20STREAMS%20REPORT%20Final%20508-Kepner.pdf.
[116] See a full review of the state responses in JON KUSLER, ASSOCIATION OF STATE WETLAND MANAGERS, THE SWANCC DECISION: STATE REGULATION OF WETLANDS TO FILL THE GAP (2004).
[117] See additional estimates in Table 4 and see Appendix 5 for citations.
[118] GREG SIEDSCHLAG ET AL., NATIONAL WILDLIFE FEDERATION, TROUT UNLIMITED, AND DUCKS UNLIMITED, FIVE CASE STUDIES ON THE EFFECTS OF THE SWANCC AND RAPANOS SUPREME COURT RULINGS ON TENNESSEE WATERWAYS (2010).
[119] Ralph W. Tiner, *Estimated Extent of Geographically Isolated Wetlands in Selected Areas of the United States*, 23 WETLANDS 636 (2003) [hereinafter Tiner2]; Leibowitz & Nadeau, *supra* note 106.
[120] PETRIE ET AL., *supra* note 38; see additional estimates in Table 4 and Appendix 1.
[121] PETRIE ET AL., *supra* note 38.
[122] PETRIE ET AL., *supra* note 38.

from the coast inward to the Fall Line, which separates the Coastal Plain from the Piedmont. As much as 92 percent of Carolina bays in the upper coastal plain in the state may no longer be regulated under the CWA.[123]

These studies indicate that in states that estimated the extent or composition of aquatic resources that may have lost CWA jurisdiction after *SWANCC*, a significant percentage of state wetlands or wetland area and state stream miles may no longer be covered under the CWA and thus may be vulnerable to conversion. This may be particularly concerning in the 25 states that primarily rely on §401 of the CWA to regulate wetlands, streams, and other aquatic resources in the state.

Table 4: Statewide estimates of the extent of potentially vulnerable wetlands and streams following *SWANCC* and *Rapanos*. See Appendix 5 for a detailed list of the types of wetlands that may be at risk—organized by state and EPA region—and for the citations for the source material used to develop this table

State	Study results on vulnerable wetlands and streams
Arizona	Intermittent and ephemeral streams comprise 95% of total stream length in the state
Arkansas	52% of state stream miles are headwater streams; 63% of state stream miles are intermittent/ephemeral streams
Delaware	50% of all wetlands would not be covered under the CWA if only navigable and directly adjacent wetlands were regulated
Illinois	60% of the state's wetlands and 12% of the state's remaining wetland area (150,118 acres) may be isolated; 56% of state stream miles are headwater streams and 55% of state stream miles are intermittent/ephemeral
Indiana	9-31% of the state's water resources are isolated; 32-85% of state's waters by number could be considered isolated
Iowa	11-72% of streams and wetlands may not be regulated after *SWANCC*; 59% of state stream miles are headwater streams and 62% of state stream miles are intermittent/ephemeral
Kentucky	55% of state stream miles are headwater streams; 29% of state stream miles are intermittent/ephemeral
Louisiana	38% of state stream miles are headwater streams; 36% of state stream miles are intermittent/ephemeral
Michigan	16.7% of wetlands in state potentially lost CWA protection following *SWANCC*
Minnesota	11-92% could be removed from federal protection due to *SWANCC*, depending on the definition of isolated; 45% of state stream miles are headwater streams and 51% of state streams are intermittent/ephemeral
Mississippi	55% of state stream miles are headwater streams and 58% of state streams are intermittent/ephemeral
Missouri	33% of wetland may be isolated; 58% of state stream miles are headwater streams and 66% of state streams are intermittent/ephemeral; 69-76% of streams may no longer be regulated following *SWANCC*
Montana	71% of state stream miles are intermittent/ephemeral
Nebraska	40% of total wetland acreage in the state may be isolated; 76% of stream miles are intermittent
Nevada	88% of stream miles are intermittent
New Mexico	80% of drainages in the state are not perennial

[123] Rebecca R. Sharitz, *Carolina Bay Wetlands: Unique Habitats in the Southeastern United States*, 23 WETLANDS 550, 553 (2003).

New York	11% of state stream miles are intermittent/ephemeral
North Dakota	61-98% of wetland area and 87-99% of wetland number predicted to be isolated in the prairie pothole region
Ohio	60% of state streams are headwater streams and 45% do not flow year round
Rhode Island	85% of state stream miles are non-navigable tributary streams
South Carolina	9-10% of state's wetland area is potentially vulnerable; 16% of wetlands would not be regulated if intermittent streams were not used to determine jurisdiction. As much as 92% of Carolina bays in the upper coastal plain in the state may be vulnerable.
Tennessee	Over 50% of wetlands statewide are potentially isolated; 60% of streams are small headwater streams; 18% of streams are intermittent/ephemeral
Texas	75-79% of state stream miles are intermittent. Estimated that nearly 100% of playas in the Texas panhandle are without CWA protection.
Virginia	Up to 43% of the state's wetlands may not be regulated under the CWA
Wisconsin	24% of state's wetlands may be considered isolated; 53% of state stream miles are headwater streams and 45% of state stream miles are intermittent/ephemeral

Functions Provided by Vulnerable Aquatic Resources

Despite their often small size, vulnerable streams and wetlands can have a large influence on watershed function. They remove organic matter, nutrients, and pollutants from surface waters; provide flood storage capacity; recharge groundwater resources; and provide habitat for native species. Water sources, mechanism of water loss, geochemistry of underlying substrate, hydrogeomorphic setting, and distance between wetlands can affect the functions of vulnerable wetlands.[124]

We reviewed the scientific literature and reports compiled by wetland and stream scientists, natural resource agencies, and conservation organizations to determine the landscape functions that may be lost if vulnerable wetlands and aquatic resources are converted or degraded (Table 5).

Hydrology

Vulnerable streams and wetlands moderate downstream flow by storing water during periods of high flow and releasing water during periods of low flow. In the Northeast, for example, headwater streams provide 55 percent of the mean annual water volume to fourth-and higher-order streams and rivers.[125] Headwater streams and vulnerable wetlands also can play a particularly important role in local groundwater recharge.[126] For example, Delmarva potholes can store large amounts of water during wet periods and then redirect flow during dry periods to recharge local and regional groundwater systems.[127] Similarly, prairie potholes contribute

[124] Leibowitz & Nadeau, *supra* note 106.
[125] JUDY L. MEYER ET AL., AMERICAN RIVERS AND SIERRA CLUB, WHERE RIVERS ARE BORN: THE SCIENTIFIC IMPERATIVE FOR DEFENDING SMALL STREAMS AND WETLANDS (2003).
[126] Garth van der Kamp & Masaki Hayashi, *The Groundwater Recharge Function of Small Wetlands in Semi-Arid Northern Prairies*, 8 GREAT PLAINS RESEARCH 39 (1998).
[127] Tiner1, *supra* note 112.

substantially to local and regional groundwater flows.[128] Vulnerable water resources also can be important sources of surface water. Some isolated wetlands fed by groundwater discharge, such as desert spring wetlands, can provide valuable sources of surface water in otherwise dry areas.[129]

For many isolated wetlands, precipitation and groundwater recharge may be significant sources of water inflow, and evapotranspiration may be a major cause of water loss. However, many geographically isolated wetlands may still have hydrologic connections to other wetlands and streams through groundwater or through surface connections during times of high water availability.[130]

Isolated wetlands also store water during periods of high moisture availability, helping to attenuate runoff during peak flows and prevent flooding. It is estimated that prairie potholes in the Devil's Lake Basin of North Dakota, which cover just 15 percent of the landscape, can store as much as 72 percent of the total runoff of a 2-year storm event and 41 percent of the runoff from a 100-year storm event.[131] Delmarva potholes can also provide temporary storage of surface waters, helping to reduce flooding in the watershed.[132] It is estimated that South Carolina's isolated wetlands store 4.58 billion gallons of water.[133]

Water quality

Vulnerable waters also play an important role in water quality by processing nutrients and preventing sediments and organic matter from reaching downstream waters. Headwater streams may be particularly successful at trapping nutrients in debris dams and large amounts of sediment may settle out in ephemeral stream ponds rather than being carried downstream.[134] Isolated wetlands are often found at low points in the watershed and thus collect debris and sediments from runoff and act as sinks for nutrients and pollutants. Vulnerable wetlands also may be crucial to the cycles of various nutrients in a local landscape. Isolated wetlands, such as cypress domes, can contribute nutrients to downstream systems through intermittent surface-water outflows.[135]

The water filtering capabilities of small, isolated wetlands can benefit much larger water systems. Indeed, a small area of wetland sediment can strongly influence water quality in a watershed by effectively filtering nitrate and sulfate through microbial processes occurring in

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[128] Donald O. Rosenberry & Thomas C. Winter, *Dynamics of water-table fluctuations in an upland between two prairie-pothole wetlands in North Dakota*, 191 JOURNAL OF HYDROLOGY 266 (1997).
[129] Tiner1, *supra* note 112.
[130] Tiner1, *supra* note 112.
[131] A.P. Ludden et al., *Water Storage Capacities of Natural Wetland Depressions in the Devils Lake Basin of North-Dakota,* 38 JOURNAL OF SOIL AND WATER CONSERVATION 45, 45-48 (1983).
[132] Tiner1, *supra* note 112; Patrick J. Philips & Robert J. Shedlock, *Hydrology and Chemistry of Ground Water and Seasonal Ponds in the Atlantic Coastal Plain in Delaware*, 141 JOURNAL OF HYDROLOGY 157, 157-178 (1993).
[133] SOUTHERN ENVIRONMENTAL LAW CENTER, AT RISK: SOUTH CAROLINA'S "ISOLATED" WETLANDS 2003-2004, (2004), *cited with approval in* KAREN CAPPIELLA & LISA FRALEY-MCNEAL, CENTER FOR WATERSHED PROTECTION, THE IMPORTANCE OF PROTECTING VULNERABLE STREAMS AND WETLANDS AT THE LOCAL LEVEL (2007).
[134] MEYER ET AL., *supra* note 125.
[135] Whigham & Jordan, *supra* note 38.

sediments.[136] Prairie potholes, for example, provide important nitrogen sinks in the landscape, reducing nitrogen loads within a basin by as much as 80 percent.[137] Small, deep wetlands also tend to be particularly effective at removing phosphorus.[138] Groundwater-sourced isolated wetlands, such as fens, can also moderate the temperature of receiving waters.[139]

Biological integrity

Finally, vulnerable streams and wetlands provide critical habitat for plants and animals, including specialists that are adapted to specific conditions or may be found in only a small geographic range. These waters also provide habitats for other organisms that use the waters seasonally or for a portion of their life history cycle, and for imperiled species, including several listed under the U.S. Endangered Species Act.[140] Many types of isolated wetlands – including vernal pools, fens, and Florida's karst ponds – may also provide habitats for endemic species.[141] Vulnerable streams may also be important for spawning and nursery habitats, feeding areas, refuge from predators, and movement corridors.[142]

Vulnerable wetlands can support high local and regional species diversity due to small-scale environmental heterogeneity in moisture, size, landscape position, and depth within sites or among individual wetlands.[143] Species richness in isolated wetlands can be as high as much larger wetlands.[144] In fact, a single Carolina bay can support more than 100 species of aquatic insects.[145] The temporal variability of wet-dry cycles in many isolated wetlands, such as vernal pools, Carolina bays, playa lakes, and prairie potholes, can be important for species that require wet conditions for portions of their life-cycles, but dry conditions for most of the year.[146] Seasonal variation in moisture can also cause seasonal variation in community structure in the wetland.[147]

Small, isolated wetlands can also help to maintain connectedness between faunal populations. Isolated wetlands provide habitat connectivity for some species of amphibians that

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[136] Stefanie L. Whitmire, & Stephen K. Hamilton, *Rapid Removal of Nitrate and Sulfate by Freshwater Wetland Sediments*, 34 JOURNAL OF ENVIRONMENTAL QUALITY 2062, 2062-2071 (2005).
[137] William G. Crumpton & L. Gordon Goldsborough, *Nitrogen Transformation and Fate in Prairie Wetlands*, 8 GREAT PLAINS RESEARCH 57, 57-82 (2008).
[138] Lars-Anders Hansson et al., *Conflicting demands on wetland ecosystem services: nutrient retention, biodiversity or both?*, 50 FRESHWATER BIOLOGY 705, 705-714 (2005).
[139] Barbara L. Bedford & Kevin S. Godwin, *Fens of the United States: Distribution, characteristics, scientific connection versus legal isolation*, 23 WETLANDS 608, 608-629 (2003).
[140] MEYER ET AL., *supra* note 125.
[141] Leibowitz & Nadeau, *supra* note 106.
[142] MEYER ET AL., *supra* note 125.
[143] Leibowitz & Nadeau, *supra* note 106.
[144] Raymond D. Semlitsch, *Size does matter: The value of small isolated wetlands*, 22 NATIONAL WETLANDS NEWSLETTER 5, 5-7 (2000).
[145] Douglas A. Leeper & Barbara E. Taylor, *Insect emergence from a South Carolina (USA) temporary wetland pond, with emphasis on the Chironomidae (Diptera)*, 17 JOURNAL OF THE NORTH AMERICAN BENTHOLOGICAL SOCIETY 54, 54–72 (1998).
[146] J. Whitfield Gibbons, *Terrestrial habitat: A vital component for herpetofauna of isolated wetlands*, 23 WETLANDS 630 (2003).
[147] Leibowitz & Nadeau, *supra* note 106.

use isolated wetlands as stepping stones for dispersal and recolonization of suitable habitats.[148] The interconnectedness of smaller wetlands is also important to waterfowl that rely on many different smaller bodies of water to graze for food.[149]

Table 5: Ecosystem functions of notable vulnerable wetland and stream types. This table summarizes the hydrologic, water quality, and biological functions provided by vulnerable aquatic resources. See citations in text.

Type of aquatic resource	Functions
Carolina bays	• Can support more than 100 species of aquatic insects • Temporal variability of wet-dry cycles important for species that require wet conditions for portions of their life-cycles, but dry conditions for most of the year
Cypress domes	• Contribute nutrients to downstream systems through intermittent surface water outflows
Delmarva potholes	• Store large quantities of water during wet periods and redirect flow during dry periods to recharge local and regional groundwater systems • Provide temporary storage of surface waters, which reduces flooding
Desert springs	• Provide valuable sources of surface water in otherwise dry areas
Fens	• Moderate temperatures of receiving waters • Provide habitat for endemic species
Florida karst ponds	• Provide habitat for endemic species
Headwater streams	• Northeast U.S.: Provide 55% of the mean annual water volume to fourth-and higher-order streams and rivers • Particularly effective at removing nutrients and sediment • Important spawning and nursery habitats, feeding areas, refuge from predators, and movement corridors
Playa lakes	• Temporal variability of wet-dry cycles important for species that require wet conditions for portions of their life-cycles, but dry conditions for most of the year
Prairie potholes	• Contribute substantial groundwater flows to local and regional aquifers • Devil's Lake Basin of North Dakota (covers 15% of landscape): Can store as much as 72% of total runoff for a 2-year storm and 41% of runoff for a 100-year storm • Provide important nitrogen sinks, reducing nitrogen loads within a basin by up to 80% • Temporal variability of wet-dry cycles important for species that require wet conditions for portions of their life-cycles, but dry conditions for most of the year

[148] Semlitsch, *supra* note 144; James P. Gibbs, *Importance of small wetlands for the persistence of local populations of wetland-associated animals*, 13 WETLANDS 25 (1993).
[149] James P. Gibbs, *Wetland Loss and Biodiversity Conservation*, 14 CONSERVATION BIOLOGY 314, 314-317 (2001).

Vernal pools	• Provide habitat for endemic species • Temporal variability of wet-dry cycles important for species that require wet conditions for portions of their life-cycles, but dry conditions for most of the year

Section V. U.S. Army Corps of Engineers Determinations of No Jurisdiction (2008-2009)

To assess the types of aquatic resources that, in certain circumstances, have fallen outside federal protection under the CWA, we reviewed publicly available NJDs issued by the Corps from 2008-2009.[150] The Corps conducts JDs in order to determine whether or not a project site includes jurisdictional waters. Each Corps regulatory district (Figure 2) is required to post all approved JD and NJD forms on its regulatory website.[151] In total, 31 of the Corps' 38 regulatory districts posted readable NJDs on their websites.[152] Twenty-eight of these districts posted NJDs that included potentially jurisdictional wetlands, streams, or other aquatic resources (i.e., resources that were not categorized as uplands, not categorically excluded from jurisdiction by guidance, or do not satisfy the Corps' regulatory definition of a wetland). Overall, we examined 2,723 NJDs and recorded information on the aquatic resource types identified by Corps regulators and the specific tests and data that Corps regulatory staff used to determine that particular aquatic resources were excluded from federal CWA jurisdiction.[153]

Methods

Potentially Jurisdictional Waters

We evaluated NJDs that contained potentially jurisdictional wetlands, streams, or other aquatic resources. We considered NJDs to include potentially jurisdictional waters when they included any aquatic resource that could have been determined to be "waters of the United States" had it satisfied one or more of the following jurisdictional tests:

- Aquatic resource crosses state lines
- Aquatic resource is a TNW
- Wetlands are adjacent to TNWs
- Streams are continuously flowing bodies of water or RPWs that flow into TNWs

[150] When NJDs did not include a date of final determination, we used the date of field/desk determination as the final date when available.

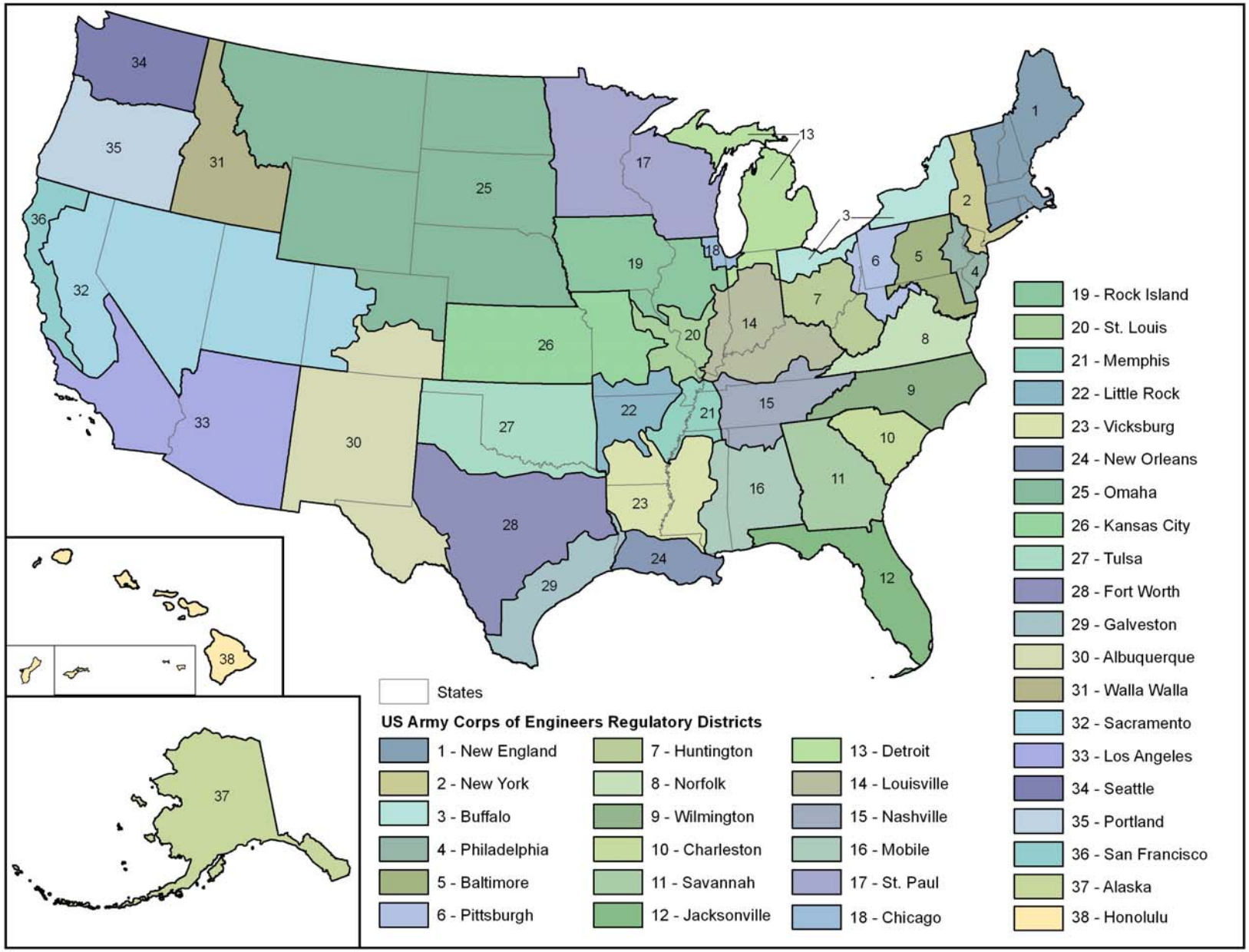
[151] The Guidance, *supra* note 5, at 13 n.41.

[152] Although the Corps' Alaska District provided NJDs from 2008-2009 on their website, many of these NJDs were scanned in a way that blacked out checkboxes on the NJD forms. In these forms we could not discern the jurisdictional tests and other determinations used to decide that particular aquatic resources were nonjurisdictional, precluding analysis of the Alaska District's forms. *See* Alaska District, U.S. Army Corps of Engineers, Approved Jurisdictional Determinations (July 15, 2011), http://www.poa.usace.army.mil/reg/ApprovedJDs.htm.

[153] The database is available upon request. In our analysis of the Corps' NJD forms, we recorded data from each individual form that Corps regulators completed, even if multiple forms were associated with the same Corps project number. When possible, however, we removed redundant NJD forms that addressed findings of no jurisdiction for the same aquatic resources.

The total number of NJD forms varied substantially across the 28 Corps districts we reviewed, ranging from five forms in New England, Seattle, and Walla Walla to 430 forms in Omaha. Ten of the 28 districts we analyzed posted over 100 NJDs that were finalized in 2008–2009, while nine districts made available fewer than 25 NJDs from the same time period. Mobile, Philadelphia, and San Francisco Districts provided NJDs from 2008-2009 on their regulatory websites, but zero of these NJDs included potentially jurisdictional waters (for explanation of 'potentially jurisdictional waters,' see "Methods").

Figure 2: U.S. Army Corps of Engineers Regulatory Districts



- Aquatic resource demonstrates a significant nexus to a TNW
- Degradation or destruction of the aquatic resource would affect interstate or foreign commerce[154]

We excluded NJDs where Corps regulatory personnel determined that an entire project site consisted of uplands or contained no aquatic resources. We also did not consider NJDs that included waters that did not satisfy the Corps' regulatory definition of a wetland.[155] When the Corps determined that a particular aquatic resource was categorically nonjurisdictional and did not subsequently conduct any further CWA jurisdictional tests, we did not consider that NJD to include potentially jurisdictional waters.[156] Finally, we did not consider an NJD as including potentially jurisdictional waters if the NJD form did not include adequate information to determine if a project site contained aquatic resources. For example, some NJDs merely noted that "there are no waters of the U.S." on a site or that a site contains "no jurisdictional waters" and include no further detail on the characteristics of the project site or additional jurisdictional tests used to determine that the site did not merit CWA jurisdiction.

In total, we evaluated 1,418 NJDs with potentially jurisdictional waters from 28 Corps districts.

Data Collection

We calculated the number of NJD forms that included information on aquatic resource type or classification and compiled the types of aquatic resources identified as outside of CWA jurisdiction by district. We considered NJDs to include information on the type or classification of an aquatic resource if the Corps provided more descriptive information than simply noting that the project site contained wetland(s), stream(s), pond(s), or lake(s). Table 6 and Appendix 2 list the specific types of aquatic resources included in the NJDs in each regulatory district.

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[154] ENVIRONMENTAL LAW INSTITUTE, THE CLEAN WATER ACT JURISDICTION HANDBOOK: 2007 EDITION 25-26 (2007), *available at* http://www.elistore.org/Data/products/d17_08.pdf.
We determined that waters *could* have been jurisdictional under one of these tests if the Corps documented conducting one of these jurisdictional tests for a particular waterbody.

[155] The regulatory definition of a wetland, as defined by the hydrologic, hydric soil, and hydrophytic vegetation criteria was established in the 1987 USACE Wetland Delineation Manual and appropriate regional supplements. *See* WATERWAYS EXPERIMENT STATION, U.S. ARMY CORPS OF ENGINEERS, CORPS OF ENGINEERS WETLANDS DELINEATION MANUAL (1987), *available at* http://el.erdc.usace.army.mil/elpubs/pdf/wlman87.pdf.

[156] Under the 2008 *Rapanos* Guidance, generally, "swales, erosional features (e.g. gullies) and small washes characterized by low volume, infrequent, and short duration flow" and "ditches (including roadside ditches) excavated wholly in and draining only uplands and that do not carry a relatively permanent flow of water" are not jurisdictional. *See* The Guidance, *supra* note 5, at 11-12. However, since the Guidance only notes that these types of aquatic resources are *generally* nonjurisdictional, if the Corps documented the use of further tests to evaluate the jurisdictional status of one of these waters (e.g., interstate commerce test, significant nexus test), we determined that this NJD *did* include potentially jurisdictional waters. Corps regulatory staff also occasionally deem artificial wetlands, streams, or ponds or waters with no ordinary high water mark or with no defined bed and bank categorically nonjurisdictional, and then did not subsequently evaluate these waters under any other jurisdictional tests. We did not consider NJDs containing these waters to include potentially jurisdictional waters.

We also tabulated the number of NJD forms that documented the presence of isolated wetland(s), stream(s), or other aquatic resource(s). NJD forms were considered to include geographically isolated aquatic resources if regulators checked the box in Section III.F of the NJD form for "isolated waters with no substantial nexus to interstate (or foreign) commerce" or if isolated water(s) were specifically noted elsewhere in the form. We also recorded the number of NJDs that indicated the use of the substantial nexus test—assessing whether degradation or destruction of the particular water would affect interstate or foreign commerce. The use of the substantial nexus test was often noted in a checkbox in Section III.F of the form or sometimes in another part of the form.

Finally, we recorded the specific jurisdictional tests that Corps staff documented in determining that aquatic resources did not qualify as "waters of the United States." We recorded whether regulatory staff documented use of a significant nexus test to decline jurisdiction. Corps staff documented the significant nexus evaluation in different locations on the JD form, including:[157]

- Section III.C: Significant Nexus Test section where Corps regulators document the information used to determine the presence or absence of a significant nexus.
- Section III.F: Check box where Corps regulators can indicate if a particular NJD includes water(s) that do not meet the significant nexus standard and prompts Corps regulators for an explanation of the lack of a significant nexus.[158]
- Elsewhere in form: Corps regulatory personnel sometimes specifically noted the significant nexus evaluation in other sections of an NJD (e.g., Section II.B.2 or VI.B).[159]

Results

Number of NJDs Across Districts

Substantial variation was found in the number of publicly available NJD forms across the 28 districts. Thirteen districts[160] posted fewer than 15 NJD forms with potentially jurisdictional waters. In contrast, four districts[161] posted over 100 of NJDs with potentially jurisdictional waters.[162] See Appendix 3 for a table of each district's total number of NJDs and total number of NJDs with potentially jurisdictional waters.

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[157] For a sample JD form, see Appendix 4.

[158] For example, if regulators determine that a geographically isolated wetland does not have a significant nexus to a TNW, they can include this information in Section III.F.

[159] We only counted an NJD as including a significant nexus elsewhere if it specifically used the words "significant nexus" to describe the jurisdictional standard that a particular waterbody did not attain.

[160] Albuquerque, Baltimore, Honolulu, Jacksonville, Little Rock, Memphis, New England, Norfolk, Seattle, St. Louis, Vicksburg, Walla Walla, Wilmington

[161] Chicago, Galveston, Huntington, Omaha

[162] While many NJD forms only included a single wetland, stream, or pond for which the Corps was presenting findings of no jurisdiction, others grouped as many as 459 waterbodies into a single form. *See* Los Angeles District, U.S. Army Corps of Engineers, Approved Jurisdictional Determination Form SPL-2007-415-SLP; JD-4 (Mar. 27, 2009), http://www.spl.usace.army.mil/regulatory/SWANCC/200700415-SLP-JD4.pdf.A number of NJD forms also did not specify the exact number of waterbodies that were determined to be nonjurisdictional, precluding any overall data summaries based on the number of waterbodies evaluated instead of the number of NJD forms.

A high percentage of the NJDs we reviewed included waters that regulators indicated were geographically isolated (Figure 3). In 21 of the 28 districts we reviewed, over 75 percent of the NJD forms included water(s) that regulators labeled as geographically isolated, and in three districts, between 50 and 75 percent of NJD forms included isolated water(s). In only four districts[163] was the percentage of NJD forms that indicated the presence of geographically isolated water(s) less than 50 percent of the total number of NJDs we reviewed. Notably, in some of the districts (e.g., Kansas City—41.05 percent isolated, Huntington—51.59 percent isolated, and Pittsburgh—28.05 percent isolated) lower percentages of isolated waters were likely due to a high proportion of NJDs with streams. Although nonjurisdictional streams rarely flow continuously, they usually exhibit surface connections with downstream components of their stream networks, making it relatively uncommon for regulators to deem that tributaries were geographically isolated.

Vulnerable Aquatic Resource Types

Wetland or aquatic resource type was recorded at different frequencies and with different specificity across districts (Figure 4). Three Corps districts[164] recorded an aquatic resource type in 100 percent of the NJDs we reviewed. Ten other Corps districts[165] provided descriptive information on the type of waterbody in 75 percent or more of reviewed NJDs. In contrast, four Corps districts[166] provided aquatic resource type information in 25 percent or fewer of the NJDs we reviewed. For example, the Savannah district only provided aquatic resource type in 14 percent of their 72 qualifying NJDs.

Some NJDs included very general information on aquatic resource type (e.g., depressional wetlands, freshwater/palustrine wetlands) while others included specific resource type or Cowardin class information (e.g., prairie pothole, coastal plain gum pond, 1st order ephemeral tributaries). For example, some NJDs only noted the presence of depressional wetlands (sixteen districts),[167] palustrine/freshwater wetlands (five districts),[168] emergent wetlands (ten districts),[169] scrub-shrub wetlands (five districts),[170] forested or wooded wetlands (four districts),[171] roadside wetlands (two districts),[172] and farmed wetlands (four districts).[173]

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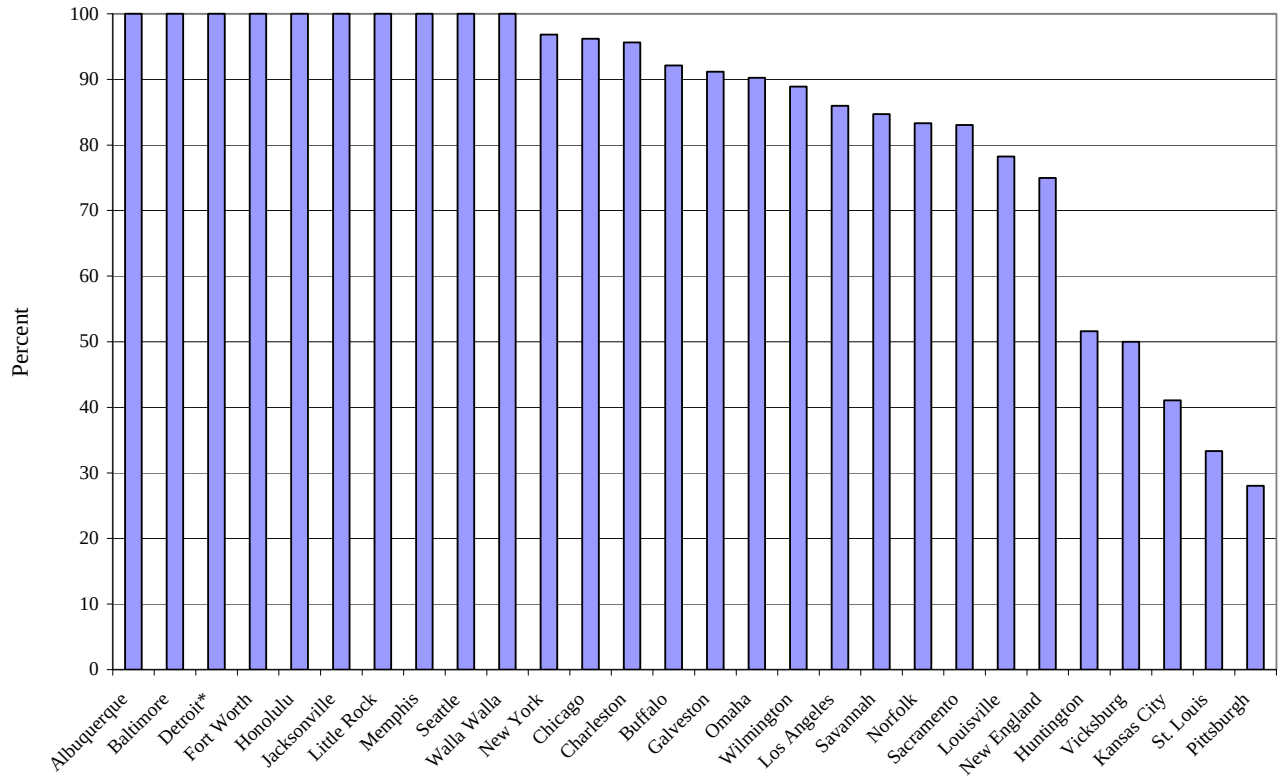
[163] Kansas City, Pittsburgh, St. Louis, Vicksburg
[164] Albuquerque, Memphis, St. Louis
[165] Baltimore, Chicago, Honolul, Kansas City, Little Rock, Los Angeles, Omaha, Pittsburgh, Sacramento, Vicksburg
[166] Jacksonville, New England, Norfolk, Savannah
[167] Baltimore, Buffalo, Charleston, Chicago, Detroit, Galveston, Honolulu, Huntington, Jacksonville, Little Rock, New York, Omaha, Pittsburgh, Sacramento, Walla Walla, Wilmington,
[168] Charleston, Galveston, Jacksonville, Los Angeles, New York
[169] Baltimore, Buffalo, Galveston, Huntington, Kansas City, Los Angeles, Louisville, New York, Omaha, Sacramento.
[170] Buffalo, Huntington, Kansas City, Little Rock, New York.
[171] Detroit, Galveston, Huntington, Buffalo.
[172] Omaha, Pittsburgh. This doesn't indicate that these were the only districts with roadside wetlands, but that these were the only districts to record aquatic resource type as a roadside wetland without further detail. One additional NJD in the St. Louis district included a more detailed description of a roadside wetland.
[173] Chicago, Huntington, Norfolk, Omaha. Four districts (Galveston, Louisville, Sacramento, Buffalo) included a more detailed description of a farmed wetland. Vicksburg also included an NJD that detailed a nonjurisdictional, farmed tributary.

Figure 3: Percent of NJD Forms that Identified Isolated Water(s) Outside of CWA Jurisdiction, by Corps District



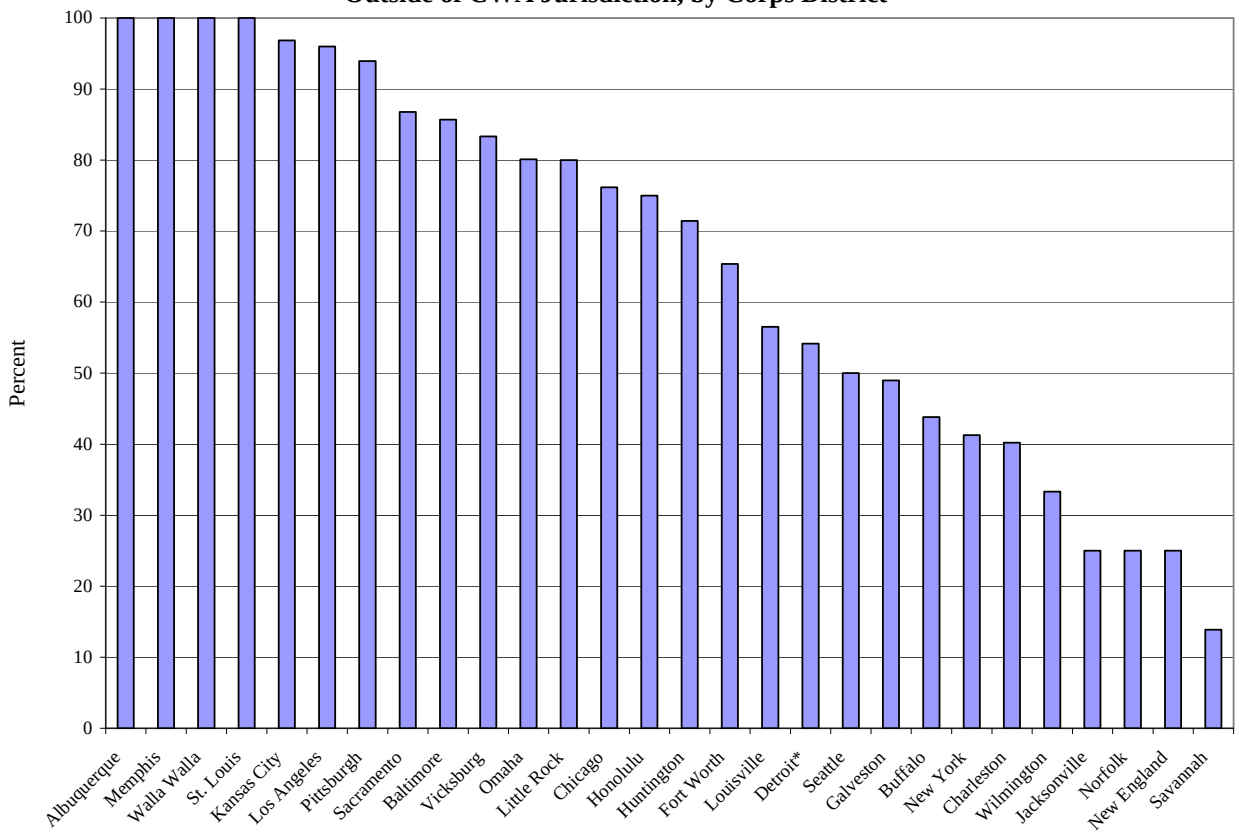
Other NJDs detailed aquatic resource type to the Cowardin class. Corps regulators in these districts described palustrine emergent (PEM) wetlands (nine districts),[174] palustrine scrub-shrub (PSS) wetlands (four districts),[175] and palustrine forested (PFO) wetlands (three districts).[176] Four districts included some NJDs that classified nonjurisdictional wetlands to at least their Cowardin subclass.[177]

Many of the types of aquatic resources specified in the NJDs we reviewed were those that have been previously identified as vulnerable in the scientific literature and reports compiled by conservation organizations (see Appendix 5). Notably, prairie pothole wetlands were identified as nonjurisdictional in 51 NJD forms in the Omaha district, which regulates much of the geographic extent of the prairie pothole region within the U.S. Another six NJDs in the Omaha district documented glacial lakes without CWA protection, which often are prairie potholes. Vernal pools constitute another frequently identified nonjurisdictional wetland type—eight NJDs included vernal pools in the Buffalo district and two NJDs included vernal pools in the Sacramento district. Playa lakes (Omaha-three NJDs, Kansas City-one NJD), remnant oxbow lakes (Omaha-two NJDs), Carolina bay wetlands (Charleston-one NJD, Wilmington-one NJD),

[174] Baltimore, Galveston, Huntington, Kansas City, New England, Omaha, Pittsburgh, Sacramento, Buffalo
[175] Galveston, New York, Omaha, Pittsburgh.
[176] Galveston, Huntington, St. Louis.
[177] Galveston, Huntington, New York, Omaha.

coastal plain gum pond wetlands (Charleston-two NJDs), a peat fen wetland (Omaha-one NJD), and a bog (Baltimore-one NJD) were also documented in the NJDs we reviewed.

Figure 4: Percent of NJD Forms that Identified Aquatic Resource Type(s)* Outside of CWA Jurisdiction, by Corps District



* We considered an NJD to include information on aquatic resource type if the form provided more detail than simply noting that a project site contained wetland(s), stream(s), pond(s), or lake(s).

Fourteen geographically diverse districts posted NJDs for headwater ephemeral tributaries.[178] High numbers of NJDs containing nonjurisdictional ephemeral tributaries were documented in Huntington (53), Kansas City (52), Omaha (43), and Pittsburgh (58). Some NJDs grouped as many as 459 nonjurisdictional ephemeral tributaries into a single permit form.[179] Notably, three of the districts that reported high numbers of NJDs for ephemeral tributaries—Huntington, Omaha, and Pittsburgh—contain portions of principal U.S. coal production regions (Appalachian Coal Basin, Powder River Basin). First order (nine districts),[180] second order (four districts),[181] and third order (three districts)[182] ephemeral tributaries were also specified in the

[178] Albuquerque, Buffalo, Galveston, Huntington, Kansas City, Los Angeles, Louisville, New York, Norfolk, Omaha, Pittsburgh, Sacramento, Savannah, Vicksburg
[179] Los Angeles District, U.S. Army Corps of Engineers, Approved Jurisdictional Determination Form SPL-2007-415-SLP; JD-4 (Mar. 27, 2009), http://www.spl.usace.army.mil/regulatory/SWANCC/200700415-SLP-JD4.pdf.
[180] Galveston, Huntington, Kansas City, Los Angeles, New York, Omaha, Pittsburgh, Sacramento, Savannah
[181] Huntington, Kansas City, Louisville, Omaha

NJDs we reviewed. Where NJDs reported the stream order of ephemeral tributaries, they were most commonly first-order waters, followed by second- and third- order tributaries.

Eight districts also noted the presence of nonjurisdictional intermittent tributaries,[183] three noted that these tributaries were first-order waters,[184] and the Louisville district posted an NJD that included a second- and third-order intermittent tributary. Finally, four districts provided individual NJDs that include perennial streams, though these were much less common than ephemeral or intermittent streams.[185]

The Los Angeles district also posted two NJDs for dry lakes in internally-draining basins. Another NJD in Los Angeles that evaluated a nonjurisdictional ephemeral tributary mentioned that a downstream dry lake would not qualify as waters of the U.S., though the NJD's project area did not include this dry lake.

Table 6: Aquatic resource types without CWA protection in Corps NJDs. This table shows the top three aquatic resource types identified in NJDs in each of the districts. The last column shows waters and wetland types explicitly found in any of the NJDs where the literature identifies them as potentially vulnerable. Where the last column is blank, it is because specific vulnerable water and wetland types could not be sufficiently linked to the terms used in the NJDs.

Corps district	Top three waterbody types (number of forms)	Notable waterbody types
Albuquerque	arroyo* (1); ephemeral drainages* (1)	arroyo;* ephemeral drainages*
Baltimore	emergent wetlands (3); palustrine emergent wetlands (2); depressional wetlands (2)	bog
Buffalo	depressional wetlands (26); vernal pools (8); three types with (5)	ephemeral tributaries;* vernal pools; wet meadows
Charleston	depressional wetlands (18); freshwater wetlands (15); Southeast coastal plain gum pond wetlands (2)	Carolina bays; Southeast coastal plain gum pond wetlands
Chicago	depressional wetlands (71); farmed wetlands (20); excavated pond (5)	intermittent tributary*
Detroit	depressional wetlands (12); forested wetlands (3); emergent wetlands (2)	
Fort Worth	upland ponds (8); remnant stream channels (6); fringe wetlands (2)	
Galveston	forested wetlands (26); palustrine forested wetlands (21); depressional wetlands (15)	1st order ephemeral tributaries; ephemeral channel*
Honolulu	depressional wetlands in pahoehoe lava (1); intermittent stream* (1); stormwater drainage (1)	intermittent stream*

[182] Louisville, Omaha, Vicksburg
[183] Honolulu, Huntington, Kansas City, Los Angeles, Louisville, Omaha, Pittsburgh, Sacramento.
[184] Huntington, Kansas City, Sacramento.
[185] Los Angeles, Omaha (3rd order perennial tributary), Sacramento, Pittsburgh.

Huntington	1st order ephemeral streams (44); emergent wetlands (20); depressional wetlands (15)	1st and 2nd order ephemeral tributaries; headwater ephemeral tributaries*
Jacksonville	depressional wetland (1); freshwater wetland (1)	
Kansas City	1st order ephemeral streams (43); farm ponds (23); emergent wetlands (17)	1st and 2nd order ephemeral/intermittent tributaries; headwater ephemeral/intermittent tributaries;* playas; swale wetlands
Little Rock	six types with (1)	
Los Angeles	ephemeral tributaries/washes* (26); 1st order ephemeral tributaries (7); palustrine wetlands (7)	1st order ephemeral tributaries; 1st order arroyo; dry lake basins; ephemeral and intermittent/perennial tributaries*
Louisville	emergent wetlands (3); farm ponds (3); three types with (2)	2nd and 3rd order ephemeral tributaries
Memphis	upland pond (1)	
New England	seep (1); palustrine emergent wet meadow (1)	seep; wet meadow
New York	depressional wetlands (15); scrub-shrub wetlands (6); two types with (2)	1st order ephemeral tributaries; groundwater-fed depressional wetland
Norfolk	ephemeral tributaries* (2); farmed wetland (1)	ephemeral tributaries*
Omaha	depressional wetlands (73); emergent wetlands (63); palustrine emergent wetlands (61)	1st, 2nd, and 3rd order ephemeral/intermittent tributaries; ephemeral, intermittent, and perennial tributaries;* glacial lakes; oxbow remnants; peat fens; playas; prairie potholes; seep wetlands; sloughs; swale wetlands; wet meadows
Pittsburgh	ephemeral tributaries* (57); emergent wetlands (16); palustrine emergent wetlands (15)	1st order ephemeral tributaries; ephemeral, intermittent, and perennial tributaries;* hillside seep-fed wetlands
Sacramento	depressional wetlands (14); artificial wetlands (8); three types with (6)	1st order ephemeral/intermittent tributaries; ephemeral and perennial tributaries;* salt grass wet meadows; seep-fed wetlands; swale wetlands; vernal pools; wet meadows
Savannah	ephemeral tributaries* (6); four types with (1)	1st order ephemeral tributaries; ephemeral tributaries*
Seattle	riparian wetlands (1); field wetlands (1)	
St. Louis	depressional wetlands (5); emergent wetlands (4); two types with (2)	
Vicksburg	five types with (1)	3rd order ephemeral tributaries; ephemeral tributaries*

Walla Walla	depressional wetlands (2)	
Wilmington	depressional wetlands (2); Carolina bay (1)	Carolina bay
* unspecified stream order		

The Corps' use of the significant nexus standard

The percentage of NJDs that indicated that a significant nexus test was performed varied among the 28 Corps districts we reviewed (Figure 5). Six Corps districts[186] did not indicate that a significant nexus tests was conducted on any of the NJDs we reviewed. Six districts[187] indicated that significant nexus tests were performed for between zero and 25 percent of the NJDs we evaluated. Meanwhile, ten districts[188] indicated a significant nexus test was performed on 50 percent or more of the NJDs we reviewed, and two districts[189] noted significant nexus on 75 percent or more of NJDs we reviewed.[190]

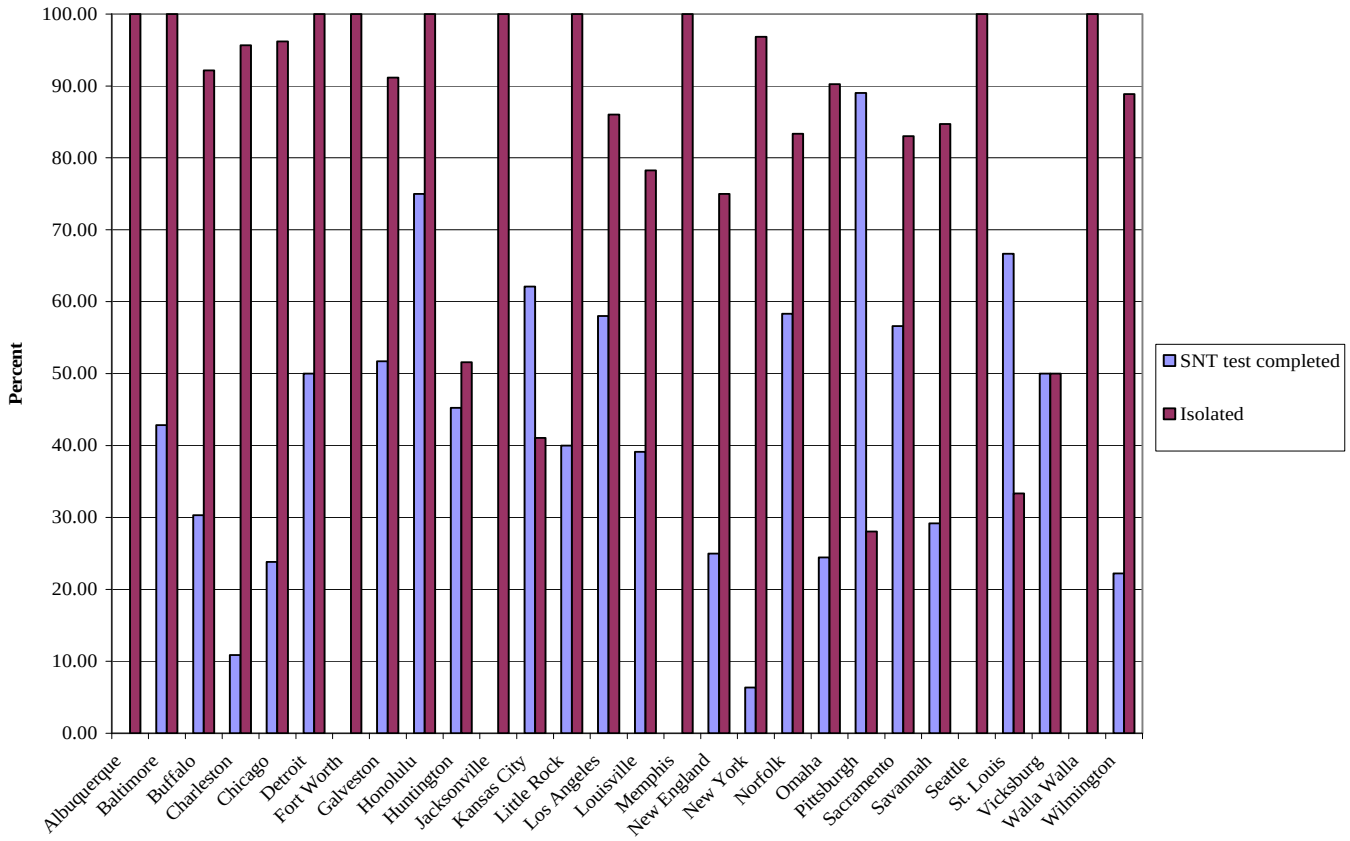
Four of the 22 districts[191] that indicated significant nexus tests were conducted never completed the significant nexus form, but indicated that the significant nexus standard was evaluated by either checking the checkbox or referring to the significant nexus test in another part of the NJD form. Another four districts[192] completed the significant nexus form in less than 15 percent of the NJDs that indicated significant nexus was evaluated. However, four districts completed the significant nexus form for 100 percent of their findings of no significant nexus,[193] and Huntington (96.49 percent), Kansas City (83.05 percent), and Pittsburgh (80.82 percent) completed the significant nexus form on over 80 percent of the NJDs that evaluated significant nexus.

The variation in the percent of NJDs that indicated significant nexus was evaluated may be due to the particular types of aquatic resources evaluated (e.g., geographically isolated waters), a Corps district's regulatory practices, or other reasons. As noted in Section II, the Guidance does not require Corps district staff to evaluate the significant nexus standard for

[186] Albuquerque, Fort Worth, Jacksonville, Memphis, Seattle, Walla Walla
[187] Charleston, Chicago, New England, New York, Omaha, Wilmington
[188] Detroit, Galveston, Honolulu, Kansas City, Los Angeles, Norfolk, Pittsburgh, Sacramento, St. Louis, Vicksburg
[189] Honolulu, Pittsburgh
[190] For statistics on the use of the significant nexus test for each Corps district, see Appendix 3.
[191] Chicago, Detroit, Honolulu, Wilmington
[192] Buffalo, Charleston, Galveston, Savannah
[193] Baltimore, New England, Norfolk, St. Louis

waters deemed geographically isolated or for other waters that are categorically excluded (Figure 5).

Figure 5: Percent of NJD Forms that Documented Using the Significant Nexus Test and Percent of NJD Forms that Documented the Presence of Isolated Waters, by Corps District



What criteria did the Corps consider in determinations of no significant nexus?

Across Corps districts, regulatory personnel provided differing levels of detail and used different methods when evaluating significant nexus. The criteria for evaluating a water's significant nexus often included the hydrologic and ecologic factors mentioned in the Guidance (e.g., volume, duration, and frequency of flow, potential to carry pollutants to TNWs or trap/filter pollutants).[194]

For tributaries, hydrologic characteristics documented for determining significant nexus include the discharge, duration, and frequency of their flow, the length of a relevant reach, the size of a reach's drainage area, and the distance, in aerial or stream miles, from the stream to the closest downstream TNW. Some NJDs declining significant nexus documented fairly detailed indicators of stream discharge, including measurements of discharge after a storm or estimated

[194] See discussion of 2008 *Rapanos* Guidance in Section II.

values of peak discharge during a 100-year flood. Less detailed indicators of stream discharge included qualitative descriptions of flow (e.g., low flow volume). Details on the duration and frequency of flow in a stream included metrics of water availability, such as annual rainfall estimates; descriptions of seasonal patterns in flow due to snowmelt; and general estimates of the number of times per year that a waterbody includes surface flow. More commonly, qualitative indicators such as lack of a consistent Ordinary High Water Mark or defined bed and bank were used as indicators for the volume, duration, and frequency of flow in a tributary. Some NJDs for tributaries assessed significant nexus by measuring drainage area or noting that the drainage area was small.

When regulators evaluated a wetland for the existence of a significant nexus, they commonly assessed the wetland's hydrologic connectivity to nearby tributaries and sometimes assessed the hydrologic connectivity of these tributaries to TNWs. Assessments of hydrologic connectivity between a wetland and a tributary often cited one or more of the following reasons: 1) the wetland had no surface hydrologic connection to a nearby tributary, 2) there was no continuous Ordinary High Water Mark between a wetland and a nearby tributary, 3) the wetland was located outside of the 100-year and/or 500-year floodplains associated with a particular tributary, 4) the wetland would only flow into a tributary via overland sheet flow, and 5) the soil type between the wetland and a tributary was not conducive to surface connectivity. Evaluations of a wetland's hydrologic connectivity also sometimes referenced the absence of a subsurface hydrologic connection to a nearby tributary. Some evaluations also asserted that no significant nexus was present because a wetland was geographically isolated. The significant nexus evaluation for both streams and wetlands also sometimes included a description of the route of hydrologic flow, or lack thereof, from the nonjurisdictional aquatic resource to the nearest downstream TNW.

Hydrologic analyses occasionally included detailed evaluations of the drainage area or peak discharge volume that a tributary contributes to the nearest downstream TNW. For example, some significant nexus evaluations included a calculation of the land area that drains to the relevant reach of a stream or to a wetland being evaluated for a significant nexus. Corps staff then evaluated this immediate drainage area as a percentage of the total land area draining to the closest TNW and cited the comparatively small drainage area of the aquatic resource in question as evidence of no significant nexus. Similarly, Corps regulators calculated the percent contribution of a tributary to the flow of the nearest downstream TNW by dividing peak discharge of a tributary by that of the TNW at the point where the tributary's flow enters the TNW, and then cited the small magnitude of this percentage in finding no significant nexus.[195]

As a measure of a wetland or stream's ecologic and hydrologic connectivity to a TNW, significant nexus evaluations sometimes provided detailed analyses of the contribution of a particular water to the water quality of a downstream TNW. Some of these significant nexus assessments included consideration of the land use composition surrounding the aquatic resource (e.g., agricultural, residential development, urban development, roadways, etc.) to evaluate the ability of the wetlands or streams to reduce sediment, nutrients, or other pollutants entering downstream TNWs. For instance, one NJD in the Omaha district reported that land use in a

[195] For analysis of the scientific rationale underlying these percentage calculations, see Section VII.

nonjurisdictional ephemeral tributary's eight square mile drainage area was "rural agricultural" and noted that "[t]he addition or transport of pollutants from [the ephemeral tributary] to the TNW is extremely unlikely because there is no urban or industrial land use in [the tributary's drainage area] now or in the reasonably foreseeable future."[196] In a few cases, regulators also mentioned the presence of a riparian buffer and its vegetative composition nearby a stream or wetland in determining that the waterbody had limited capacity to reduce downstream pollution quantities. In other cases, where downstream waters are listed as impaired under CWA § 303(d), regulators weighed the ability or inability of the concerned aquatic resources to reduce pollution in the impaired water.

Less commonly, regulators evaluated a wetland or stream's ecological connectivity with a TNW or other waters of the United States when assessing significant nexus. Evidence for ecological connectivity could be as sophisticated as detailed macroinvertebrate counts or rapid assessment scores of the biological quality of a wetland or stream site, or as simple as stating that the aquatic resource provides a "speculative or insubstantial biological connection to a TNW." In some cases, Corps regulators assessed a water's ecological connection to downstream waters by noting the limited ability of the waterbody to transport nutrients or organic matter to downstream waters. In other cases, Corps regulatory staff cited hydrologic indicators, such as infrequent streamflow, as evidence that the waters of concern do not contribute to the biological integrity of a downstream TNW.

Finally, many NJDs included brief explanations of the determination of no significant nexus. For instance, many assessments only noted that a wetland was isolated or had no surface hydrologic connection to waters of the U.S. Others noted that because the wetland of interest was adjacent to other wetlands that satisfy the regulatory definition of adjacency, the wetland of interest categorically failed the significant nexus test without further investigation of its impact on the integrity of a TNW. Several NJDs stated that a particular aquatic resource has "no significant nexus" or that the waterbody of concern has "no impact on the physical, chemical, or biological integrity of a downstream water" without including additional qualifying information. In addition, some NJDs cited interstate or foreign commerce test criteria—such as lack of use of the water by interstate or foreign travelers, lack of use of the water to take and sell seafood in interstate or foreign commerce, or lack of use of the water for industrial purposes involving interstate or foreign commerce—as rationale for finding no significant nexus. Finally, in some NJDs, Corps staff checked the significant nexus checkbox indicating no significant nexus and provided no explanation for why a particular water failed the significant nexus standard.

Interstate or Foreign Commerce Test

Corps regulatory staff commonly evaluated a water's connection to interstate or foreign commerce in findings of no jurisdiction. Most Corps districts documented no connection to interstate or foreign commerce in the large majority of NJD forms. Albuquerque, Detroit, Fort Worth, Jacksonville, Memphis, Seattle, and Walla Walla each indicated a finding of no substantial nexus to interstate or foreign commerce in 100% of their NJD forms. Most NJD

[196] Omaha District, U.S. Army Corps of Engineers, Approved Jurisdictional Determination Form NWO-2007-1550 (Jan. 3, 2008), http://www.nwo.usace.army.mil/html/od-rwy/jur/AJD20071550.pdf.

forms that assessed a water's connection to interstate or foreign commerce checked the relevant box in Section III.F of the JD form, which reads "Review area included isolated waters with no substantial nexus to interstate (or foreign) commerce." Since this box groups the determination that a particular water was geographically isolated with its lack of a connection to interstate or foreign commerce, most NJDs that indicated no nexus with interstate or foreign commerce also checked the geographically isolated waters box (Table 7). However, in some instances when Corps regulators did not document the presence of geographically isolated waters in an NJD, they separately noted the lack of a substantial nexus to commerce as a reason for denying CWA jurisdiction.

What criteria are the Corps considering in determining no connectivity to interstate or foreign commerce?

To substantiate the absence of a substantial nexus between an aquatic resource and interstate or foreign commerce, Corps regulators commonly cited the criteria set forth in Corps and EPA regulations for this test.[197] The regulations specifically note types of intrastate waters whose use, degradation, or destruction "could affect interstate or foreign commerce," such as waters that "could be used by interstate or foreign travelers for recreational or other purposes;… [waters] from which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or… [waters] which are used or could be used for industrial purpose by industries in interstate commerce."[198] In addition to these criteria, regulators sometimes documented that a water is not used to irrigate crops sold in interstate commerce as evidence of the lack of a substantial nexus. Also, in multiple NJDs, although groundwater resources connected to specific lakes were documented as valuable and used in interstate commerce, jurisdiction over these lakes was denied because the industries using this groundwater did not directly access the lake's surface water supplies.[199] However, most commonly regulators simply checked the substantial nexus box noting that a water does not have a connection to interstate or foreign commerce or only documented the lack of any connection between the waters of concern and interstate or foreign commerce without any qualifying information.

Table 7: Frequency of Corps districts' use of the interstate and foreign commerce test in NJDs and percent of NJDs with isolated waters. The JD form groups the determination that a particular water was geographically isolated with its lack of a connection to interstate or foreign commerce. Therefore, most NJDs that indicated no nexus with interstate or foreign commerce also checked the geographically isolated waters box.

Corps district	No substantial commerce nexus (%)	Isolated (%)
Albuquerque	100.00	100.00
Baltimore	85.71	100.00
Buffalo	89.89	92.13

[197] 33 C.F.R. § 328.3(3)(i)-(iii); 40 C.F.R. § 230.3(s)(3)(i)-(iii).
[198] *Id.*
[199] In fact, in some instances this groundwater was explicitly sold for water consumption in other states. *See, e.g.*, Los Angeles District, U.S. Army Corps of Engineers, Approved Jurisdictional Determination Form SPL-2008-00402-JD2 (Oct. 2, 2009), http://www.spl.usace.army.mil/regulatory/SWANCC/200800402-SLP-JD2.pdf.

Charleston	95.65	95.65
Chicago	50.48	96.19
Detroit	100.00	100.00
Fort Worth	100.00	100.00
Galveston	92.52	91.16
Honolulu	75.00	100.00
Huntington	50.00	51.59
Jacksonville	100.00	100.00
Kansas City	49.47	41.05
Little Rock	80.00	100.00
Los Angeles	70.00	86.00
Louisville	78.26	78.26
Memphis	100.00	100.00
New England	75.00	75.00
New York	85.71	96.83
Norfolk	16.67	83.33
Omaha	91.21	90.23
Pittsburgh	20.73	28.05
Sacramento	79.25	83.02
Savannah	86.11	84.72
Seattle	100.00	100.00
St. Louis	50.00	33.33
Vicksburg	50.00	50.00
Walla Walla	100.00	100.00
Wilmington	88.89	88.89

Interstate Waters Test

The Supreme Court's decision in *United States v. Bayside Homes, Inc*. and EPA and Corps regulations indicate that waters that cross state lines qualify as interstate waters that are jurisdictional under the CWA.[200] Accordingly, some NJDs reported that a particular aquatic resource did not cross state lines as a contributing reason for a finding of no jurisdiction. However, in some instances, Corps regulatory personnel found that waters that did cross state lines—for instance, a prairie pothole wetland in both North and South Dakota[201] or a dry lake located in both California and Nevada[202]—were nonjurisdictional.

[200] *See*, *e.g.*, United States v. Riverside Bayview Homes, Inc., 474 U.S. 121, 129 (1985) (upholding Corps regulation that covers "all wetlands adjacent to navigable or *interstate waters* and their tributaries") (emphasis added). *See also* 33 C.F.R. § 328.3(a)(2) (1993) (Corps/Section 404 permitting program); 40 C.F.R. § 230.3(s)(2) (1993) (EPA/Section 404 permitting program); 40 C.F.R. § 122.2 (2000) (EPA/NPDES permitting program).
[201] Omaha District, U.S. Army Corps of Engineers, Approved Jurisdictional Determination Form NWO-2007-03769-BIS Wetland #1 (Mar. 4, 2008), http://www.nwo.usace.army.mil/html/od-rnd/jur/073769BISmar1.pdf.
[202] Los Angeles District, U.S. Army Corps of Engineers, Approved Jurisdictional Determination Form SPL-2007-415-SLP-JD3 (Mar. 27, 2009), http://www.spl.usace.army.mil/regulatory/SWANCC/200700415-SLP-JD3.pdf.

Section VI. CWA §401: State Water Quality Certification

As states are authorized to review all federal permits for activities that may result in a discharge into waters under CWA jurisdiction, the types of wetlands and streams being presented, or not presented, to state programs for CWA §401 water quality certification can help to reveal trends in the types of waters over which the Corps is asserting jurisdiction.

To supplement our findings from our review of the Corps' NJDs, we consulted state water quality certification programs in all 50 states. We asked state staff, based on their best professional judgment or quantitative data, for information on the types of aquatic resources included and not included in recent certification applications. We provided state staff with a list of potentially vulnerable wetland and stream types identified in our review of the scientific and programmatic literature.[203] We consulted with state §401 certification staff to determine whether:

1. The potentially vulnerable wetland and stream types identified in ELI's literature review were being presented for §401 certification during the period of January 2007-July 2010, or during a reasonably similar period for which states had information.
2. Any trends exist in §401 certifications for these aquatic resource types during the same time period.
3. Any trends exist in §401 certifications over aquatic resource types that were not included in ELI's literature review.
4. The state maintained any quantitative data that could document federal jurisdiction over potentially vulnerable wetland and stream types.

To analyze the information we grouped the states into three categories: 1) states that primarily or solely rely on §401 to regulate impacts to freshwater wetlands, and for which CWA jurisdiction is most determinative, 2) states that operate freshwater permitting programs (with or without exceptions) or that regulate freshwater wetlands on a case-by-case basis, and 3) states with regulatory programs that specifically have jurisdiction over those geographically isolated wetlands or streams that are beyond the Corps' jurisdiction.

Federal jurisdiction is not the only variable that influences the number of §401 certifications reviewed in a state. For instance, economic activity and associated patterns in urban/suburban growth and infrastructure development can change the number of §401 certifications a state reviews over time. Therefore, an increase in the number of §401 certifications could mean either that these resources are being found jurisdictional more often than in previous practice, or that changing development patterns have resulted in an increase in the number of projects that affect these resources. States did not have the information to distinguish between these possibilities.[204]

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[203] See Section III and Appendix 5 for the results of this literature review.

[204] State Programmatic General Permits (SPGPs) may be an additional source of confusion over the extent of federal CWA jurisdiction in applicable states. In states that utilize SPGPs, state water quality agencies evaluate permits in lieu of the Corps for specified types of aquatic resource impacts. While states operating SPGPs may know the

A. States that Primarily Use CWA §401

Twenty five states rely primarily or solely on CWA §401 to regulate freshwater aquatic resources in their state, including Alabama, Alaska, Arizona, Arkansas, Colorado, Delaware, Hawaii, Georgia, Idaho, Iowa, Kansas, Kentucky, Louisiana, Mississippi, Missouri, Montana, Nevada, New Mexico, North Dakota, Oklahoma, South Carolina, South Dakota, Texas, Utah, and Wyoming. (Alabama, Delaware, Georgia, Louisiana, Mississippi, and South Carolina operate state permitting programs in coastal or tidal regions). We received responses from all 25 states in this category (response rate=100%).[205]

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wetland, stream, or other aquatic resource types being protected on an overall basis, when permits are issued under a SPGP, the Corps does not use its jurisdictional criteria to evaluate whether the impacted waters would fall under federal regulation. SPGPs may be utilized when any state aquatic resource permitting program overlaps with federal permitting—SPGPs are used in comprehensive freshwater permitting programs and in states that have solely adopted additional regulatory oversight over coastal/tidal waters.

[205] Telephone interview with Richard Hulcher, Alabama Department of Environmental Management (Oct. 6, 2010); Email from Sean Palmer, Alaska Department of Environmental Conservation to Philip Womble, Research Associate, Environmental Law Institute (Aug. 13, 2010); Email from Debra Daniel, Arizona Department of Environmental Quality to Philip Womble, Research Associate, Environmental Law Institute (Aug. 30, 2010); Email from Jason Hooks, Arkansas Department of Environmental Quality to Philip Womble, Research Associate, Environmental Law Institute (Nov. 17, 2010); Email from Steve Gunderson, Colorado Department of Public Health and Environment to Philip Womble, Research Associate, Environmental Law Institute (Aug. 26, 2010); Email from Mark Biddle, Delaware Department of Natural Resources and Environmental Control to Philip Womble, Research Associate, Environmental Law Institute (Sep. 9. 2010); Telephone interview with Edward Chen, Hawaii Department of Health (Sep. 8, 2010); Email from Keith Parsons, Georgia Department of Natural Resources to Philip Womble, Research Associate, Environmental Law Institute (Aug. 26, 2010); Email from Johnna Sandow, Idaho Department of Environmental Quality to Philip Womble, Research Associate, Environmental Law Institute (Aug. 12, 2010); Email from Christine Schwake, Iowa Department of Natural Resources to Philip Womble, Research Associate, Environmental Law Institute (Aug. 25, 2010); Email from Scott Sattherwaite, Kansas Department of Health and Environment to Philip Womble, Research Associate, Environmental Law Institute (Sep. 9, 2010); Email from Alan Grant, Kentucky Department for Environmental Protection to Philip Womble, Research Associate, Environmental Law Institute (Aug. 26, 2010); Email from Alan Grant, Kentucky Department for Environmental Protection to Philip Womble, Research Associate, Environmental Law Institute (Aug. 27, 2010); Email from Jamie Phillippe, Louisiana Department of Environmental Quality to Philip Womble, Research Associate, Environmental Law Institute (Sep. 2, 2010); Telephone interview with Thomas Tynes, Mississippi Department of Environmental Quality (Oct. 12, 2010); Email from Carrie Schulte to Philip Womble, Research Associate, Environmental Law Institute (Sep. 1, 2010); Telephone interview with Jeff Ryan, Montana Department of Environmental Quality (Oct. 16, 2010); Email from Jean Stone, Nevada Division of Environmental Protection to Philip Womble, Research Associate, Environmental Law Institute (Aug. 24, 2010); Telephone interview with Maryann McGraw, New Mexico Environment Department (Sep. 16, 2010); Email from Neal Schaeffer, New Mexico Environment Department to Philip Womble, Research Associate, Environmental Law Institute (Sep. 16, 2010); Telephone interview with Michael Sauer, North Dakota Department of Health (Sep. 13, 2010); Email from Elena Jigoulina, Oklahoma Department of Environmental Quality to Philip Womble, Research Associate, Environmental Law Institute (Aug. 24, 2010); Telephone interview with Heather Preston, South Carolina Department of Health and Environmental Control (Oct. 12, 2010); Telephone interview with John Miller, South Dakota Department of Environment and Natural Resources (Oct. 12, 2010); Telephone interview with Mark Fisher, Texas Commission on Environmental Quality (Sep. 21, 2010); Email from Jeffrey Ostermiller, Utah Department of Environmental Quality to Philip Womble, Research Associate, Environmental Law Institute (Sep. 9, 2010); Email from Jeremy Zumberge, Wyoming Department of Environmental Quality to Philip Womble, Research Associate, Environmental Law Institute (Aug. 24, 2010).

Of the 25 states in this category, 15 (60 percent)[206] reported that they did not have adequate information to evaluate trends, or the absence of trends, in the wetland or water types presented for §401 certification following issuance of the first *Rapanos* JD guidance in June 2007.[207]

Of the remaining ten states, five (20 percent) noted no trend or minimal changes in the types of wetlands or waters being reviewed for §401 certification from 2007-2010.[208] Meanwhile, four states (16 percent) reported noticeable trends in the types of wetlands or waters being presented for §401 certification.[209] One member of Arkansas' §401 program recalled reviewing an increased number of water quality certifications for impacts to extraordinary resource waters, ecologically sensitive waters, and natural and scenic waters.[210] A member of South Carolina's §401 staff suggested that, since 2008, the Charleston Corps district has generally utilized a more inclusive significant nexus standard than it did prior to 2008.[211] A Texas §401 regulator reported an increase in the number of state water quality certification applications for impacts to intermittent and ephemeral streams following the introduction of the significant nexus test.[212] One staff member in Utah's §401 program also noted seeing a substantial increase in the number of §401 certifications requested for Great Salt Lake wetlands due to their general proximity to Utah's developing urban areas and increasing environmental stakeholder investment in this wetland type.[213]

While many of the states that primarily rely on CWA §401 could not assess *trends* in the types of aquatic resources being reviewed for §401 certification, 14 of 25 states (56 percent) were able to answer whether or not they were still receiving applications for impacts to specific potentially vulnerable types of wetlands or streams identified in our literature review or by state

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[206] Alabama, Alaska, Colorado, Georgia, Hawaii, Idaho, Iowa, Kansas, Kentucky, Louisiana, Missouri, Montana, Nevada, North Dakota, South Dakota. Hulcher, *supra* note 205; Palmer, *supra* note 205; Gunderson, *supra* note 205; Parsons, *supra* note 205; Chen, *supra* note 205; Sandow, *supra* note 205; Schwake, *supra* note 205; Sattherwaite, *supra* note 205; Grant (Aug. 26, 2010), *supra* note 205; Phillippe, *supra* note 205; Schulte, *supra* note 205; Ryan, *supra* note 205; Stone, *supra* note 205; Sauer, *supra* note 205; Miller, *supra* note 205.

[207] U.S. ENVIRONMENTAL PROTECTION AGENCY & U.S ARMY CORPS OF ENGINEERS, Memorandum for Director of Civil Works and US EPA Regional Administrators (2007), *available at* http://water.epa.gov/lawsregs/guidance/wetlands/upload/2007_6_5_wetlands_RapanosMOA6507.pdf.

[208] Arizona, Delaware, New Mexico, Oklahoma, Wyoming. Daniel, *supra* note 205; Biddle, *supra* note 205; Schaeffer, *supra* note 205; Jigoulina, *supra* note 205; Zumberge, *supra* note 205.

[209] Arkansas, South Carolina, Texas, Utah. Hooks, *supra* note 205; Preston, *supra* note 205; Fisher, *supra* note 205; Ostermiller, *supra* note 205.

[210] Based on October 2009-November 2010. Hooks, *supra* note 205.

[211] Preston, *supra* note 205.

[212] Fisher, *supra* note 205.
This Texas regulator also noted that in their tiered state permitting system, permittees have trended towards submission of more Tier 1 permits and fewer Tier 2 permits due to the perception that Tier 1 permits are easier to obtain. Similar to a Nationwide Permit, the Tier 1 permits are categorically certified by the TCEQ and are not reviewed. Tier 1 permits cover impacts to wetlands that are less than 3 acres in size and stream impacts that are less than 1500 linear feet. Fisher, *supra* note 205.

[213] Ostermiller, *supra* note 205.
In addition, while Iowa did not have enough data to assess trends in the aquatic resource types being reviewed for §401 certifications, an Iowa regulator reported a general decrease in permit applications for stream channelization projects. Schwake, *supra* note 205.

personnel.[214] Ten states (40 percent)[215] identified specific wetland or stream types that they were no longer reviewing, were reviewing infrequently, or that had been ruled federally nonjurisdictional for §401 certification (Table 8) while 11 states (44 percent)[216] identified particular aquatic resource types that were still being reviewed under §401 (Table 9).

Table 8: Aquatic resource types with no or limited review in states that primarily use §401 for freshwater permitting (2007-2010, unless noted otherwise)

State	Wetland or Stream Type(s)
Arkansas	sinkhole wetland, central interior highlands and Appalachian sinkholes and depression ponds, Ozark-Ouachita fens, West Gulf Coastal Plain nonriverine wet hardwood flatwoods, West Gulf Coastal Plain pine-hardwood flatwoods[217]
Colorado	fens; also have seen few, if any, permit requests for Colorado plateau hanging gardens, Inter-Mountain Basins greasewood flats, Inter-Mountain Basins interdunal swale wetlands, Inter-Mountain Basins playas, Western Great Plains closed depression wetlands, and Western Great Plains saline depression wetlands[218]
Hawaii	bogs and vernal pools in elevated areas[219]
Mississippi	cypress sloughs[220]
Montana	prairie potholes, fens, bogs, and a headwater stream[221]
New Mexico	playas and internally draining, depressional wetlands[222]
North Dakota	prairie potholes[223]
South Carolina	Carolina bays[224]
South Dakota	Occasionally wetlands next to tributaries are nonjurisdictional[225]
Wyoming	Inter-Mountain Basins greasewood flats, Inter-Mountain Basins playas, Western Great Plains closed depression wetlands, Western Great Plains open freshwater depression wetlands, Western Great Plains saline depression wetlands[226]

[214] Alabama, Arkansas, Colorado, Hawaii, Mississippi, Montana, New Mexico, North Dakota, Oklahoma, South Carolina, South Dakota, Texas, Utah, Wyoming.
[215] Arkansas, Colorado, Hawaii, Mississippi, Montana, New Mexico, North Dakota, South Carolina, South Dakota, Wyoming.
[216] Arkansas, Alabama, Hawaii, Mississippi, Montana, New Mexico, North Dakota, Oklahoma, South Dakota, Texas, Utah.
[217] Based on October 2009-November 2010. Hooks, *supra* note 205.
[218] Gunderson, *supra* note 205.
[219] Also saw few permits for elevated bogs and vernal pools before any *SWANCC*- or *Rapanos*-induced jurisdictional changes. Chen, *supra* note 205.
[220] Tynes, *supra* note 205.
[221] A Montana §401 staff member recalled one case in which a stream terminated in a grassy swale and was thus determined to be nonjurisdictional. Ryan, *supra* note 205.
[222] Schaeffer, *supra* note 205; McGraw, *supra* note 205.
[223] Sauer, *supra* note 205.
[224] Preston, *supra* note 205.
[225] Miller, *supra* note 205.
[226] Based on 1.5 years prior to August 2010. Zumberge, *supra* note 205.

Table 9: Aquatic resource types still being reviewed in states that primarily rely on §401 for freshwater permitting (2007-2010, unless noted otherwise)	
State	**Wetland or Stream Type(s)**
Alabama	headwater, intermittent, and ephemeral streams (frequency unknown)[227]
Arkansas	nonnavigable mountain streams, headwater streams, intermittent streams, and ephemeral streams[228]
Hawaii	intermittent and ephemeral streams; coastal bogs and coastal vernal pools[229]
Mississippi	ephemeral streams[230]
Montana	headwater,[231] intermittent, and ephemeral streams; larger prairie potholes.[232]
New Mexico	some entirely closed basins deemed jurisdictional;[233] headwater, intermittent, and ephemeral streams.[234]
North Dakota	intermittent and ephemeral streams [235]
Oklahoma	oxbows, palustrine wetlands, and stock ponds[236]
South Dakota	tributaries[237]
Texas	intermittent and ephemeral streams[238]
Utah	salt lake wetlands, playas, and swale wetlands[239]

Availability of quantitative tracking data

Although 17 of the 25 states (68 percent) that primarily rely on §401 maintain permit tracking databases, none of these state databases record the wetland or stream types associated with particular §401 certifications. Some of these states do track the number of §401 certifications they review over time.

[227] Hulcher, *supra* note 205.
[228] Based on October 2009-November 2010. Hooks, *supra* note 205.
[229] Chen, *supra* note 205.
[230] Tynes, *supra* note 205.
[231] *See supra* note 221; Ryan, *supra* note 205.
[232] Larger prairie potholes, e.g. in northwest Montana, have been determined to support recreational activity and fishing, leading the Corps to determine them to be jurisdictional due to a substantial nexus to interstate commerce. Ryan, *supra* note 205.
[233] In New Mexico, these closed basins have been determined to have national commerce connections and have thus been deemed jurisdictional waters. McGraw, *supra* note 205.
[234] Schaeffer, *supra* note 205.
[235] Sauer, *supra* note 205.
[236] These water types were determined nonjurisdictional by the Corps in Oklahoma; however, the state of Oklahoma now regulates nonjurisdictional waters that meet the state's definition of "waters of the state" when they are included in a permit that also affects jurisdictional waters. Jigoulina, *supra* note 205.
[237] Miller, *supra* note 205.
[238] Fisher, *supra* note 205.
[239] Ostermiller, *supra* note 205.

B. States with Freshwater Permitting Programs

Connecticut, Florida,[240] Illinois (for state projects), Maine, Maryland, Massachusetts, Michigan, Minnesota, New Hampshire, New Jersey, New York, Oregon, Pennsylvania, Rhode Island, Vermont, Virginia, and Washington all protect freshwater wetlands within the state to some extent. Nebraska and West Virginia assert authority to require permits if the Corps does not do so, on a case-by-case basis. Of these 19 states, we received responses from 13 state §401 water quality certification programs (response rate=68 percent).[241]

Seven of the 13 responding states (54 percent) specifically noted that they did not have enough information to assess federal jurisdiction over particular aquatic resource types.[242] Distinguishing trends or changes in federal jurisdictional practices is particularly challenging for some of these states due to joint state-federal permitting procedures and a subsequent inability to separate federal permits from state permits. States that cannot definitively separate state and

[240] In the Panhandle region of Florida, the state began regulating surface water impacts beyond federal jurisdiction in November of 2010. Email from Timothy Rach, Florida Department of Environmental Protection to Philip Womble, Research Associate, Environmental Law Institute (Aug. 23, 2010).

[241] Connecticut, Florida, Illinois, Maryland, Michigan, Minnesota, Nebraska, New Hampshire, New York, Pennsylvania, Vermont, Virginia, and West Virginia. Email from Robert Gilmore, Connecticut Department of Environmental Protection to Philip Womble, Research Associate, Environmental Law Institute (Aug. 31, 2010); Rach, *supra* note 240; Email from Timothy Rach, Florida Department of Environmental Protection to Philip Womble, Research Associate, Environmental Law Institute (Oct. 15, 2010); Email from Daniel Heacock, Illinois Environmental Protection Agency, to Philip Womble, Research Associate, Environmental Law Institute (Aug. 31, 2010); Telephone interview with Gary Setzer, Maryland Department of the Environment (Sep. 8, 2010); Email from Todd Losee, Michigan Department of Natural Resources to Philip Womble, Research Associate, Environmental Law Institute (Aug. 25, 2010); Email from Todd Losee, Michigan Department of Natural Resources to Philip Womble, Research Associate, Environmental Law Institute (Jan. 13, 2010); Telephone interview with Kevin Molloy, Minnesota Pollution Control Agency (Aug. 30, 2010); Email from David Weirens, Minnesota Board of Water and Soil Resources to Philip Womble, Research Associate, Environmental Law Institute (Sep. 7, 2010); Hickman, *supra* note 101; Email from Philip Trowbridge, New Hampshire Department of Environmental Services to Philip Womble, Research Associate, Environmental Law Institute (Aug. 30, 2010); Email from Philip Trowbridge, New Hampshire Department of Environmental Services to Philip Womble, Research Associate, Environmental Law Institute (Sep. 7, 2010); Email from Tim Post, New York State Department of Environmental Conservation to Philip Womble, Research Associate, Environmental Law Institute (Aug. 23, 2010); Email from David Goerman, Pennsylvania Department of Environmental Protection to Philip Womble, Research Associate, Environmental Law Institute (Aug. 31, 2010); Email from Alan Quackenbush, Vermont Department of Environmental Conservation to Philip Womble, Research Associate, Environmental Law Institute (Aug. 25, 2010); Email from David Davis, Virginia Department of Environmental Quality to Philip Womble, Research Associate, Environmental Law Institute (Aug. 26, 2010); Telephone interview with Lyle Bennett, West Virginia Department of Environmental Protection (Aug. 26, 2010); Telephone interview with Lyle Bennett, West Virginia Department of Environmental Protection (Sep. 16, 2010). We also received a response from Oregon, but we corresponded with Oregon's Department of State Lands, which regulates wetlands at the state level but does not operate the §401 certification program. Email from Gloria Kiryuta, Oregon Department of State Lands to Philip Womble, Research Associate, Environmental Law Institute (Sep. 28, 2010). Oregon's §401 certification program in the Department of Environmental Quality was unable to respond to our study. Email from Marilyn Fonseca, Oregon Department of Environmental Quality to Philip Womble, Research Associate, Environmental Law Institute (Aug. 25, 2010).

[242] Connecticut, Florida, Illinois, Minnesota, New Hampshire, New York, Pennsylvania.
Gilmore, *supra* note 241; Rach, *supra* note 241; Heacock, *supra* note 241; Molloy, *supra* note 241; Weirens, *supra* note 241; Trowbridge (Sept. 7, 2010), *supra* note 241; Post, *supra* note 241; Goerman, *supra* note 241.

federal permits may not be able to quantitatively determine the aquatic resource types that state laws are protecting beyond the limits of federal jurisdiction.

Two states, Nebraska and Vermont, reported seeing no trend in federal jurisdiction over certain potentially vulnerable wetland types from 2007-2010. In addition, five states spontaneously reported that any changes in federal CWA jurisdiction following the *SWANCC* and *Rapanos* cases had little practical effect on aquatic resource regulation in the state due to the states' comprehensive aquatic resource permitting programs. [243]

As part of its comprehensive freshwater permitting program, in 2002 the Virginia Department of Environmental Quality (VDEQ) entered into a Memorandum of Agreement (MOA) with the Norfolk Corps district stipulating that the Corps identify and delineate all waters, irrespective of their jurisdictional status under the CWA, on non-agricultural lands.[244] When wetlands or waters do not fall under CWA jurisdiction, the Corps informs permittees that VDEQ may require a state permit for impacts to these waters. VDEQ staff reported that "anecdotal evidence, [including] conversations with field staff, indicates that Corps staff diligently seek out isolated waters (e.g. vernal pools) while performing jurisdictional wetland determinations,"[245] so that developers are aware of any state regulated wetlands on site. VDEQ also noted that permit applicants were increasingly requesting that VDEQ perform follow-up site visits to confirm the Corps' isolated wetlands delineations. However, VDEQ's database cannot separate permits for isolated waters or other waters issued under the state's regulatory program from §401 certifications, preventing any quantitative comparison of the wetland or stream types being included under federal jurisdiction and those that only fall under state law.[246]

Several states reported trends in CWA permitting practices between 2007 and 2010. A member of West Virginia's §401 review staff reported a trend in CWA jurisdiction over sinkhole wetlands. The Corps originally determined sinkholes to be nonjurisdictional waters; however, during the last 3-4 years, they have been determined to satisfy the significant nexus test and are currently regulated under CWA §404.[247]

Three states with freshwater permitting programs identified specific wetland types that they have not reviewed, or have reviewed on a limited basis, for §401 certification from 2007-2010 (Table 10). A respondent from Connecticut's Department of Environmental Protection noted that the state has only reviewed §401 certifications for the wetland types found in ELI's

[243] Maryland, Michigan, Minnesota, New Hampshire, Pennsylvania. Setzer, *supra* note 241; Losee (Aug. 25, 2010), *supra* note 241; Molloy, *supra* note 241; Trowbridge, *supra* note 241; Goerman, *supra* note 241.
[244] MEMORANDUM OF UNDERSTANDING BETWEEN THE VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY AND THE NORFOLK DISTRICT, CORPS OF ENGINEERS CONCERNING OPERATION OF THE VIRGINIA NONTIDAL WETLANDS PROGRAM, VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY & NORFOLK DISTRICT, CORPS OF ENGINEERS (2002), *available at* http://www.deq.state.va.us/export/sites/default/wetlands/pdf/mou.pdf.
[245] Davis, *supra* note 241.
[246] Davis, *supra* note 241. Minnesota also reported that, although it had difficulty discerning trends in federal jurisdictional practices due to the state's multiple wetland and aquatic resource regulatory programs, the state had recently seen an increase in the number of government-funded aquatic resource impacts. Molloy, *supra* note 241.
[247] Bennett (Aug. 26, 2010), *supra* note 241.

literature review if "there is §404 jurisdiction over some additional element of a project."[248] Vermont reported that from 2007-2010, no §401 certifications have been issued, and no §404 permits reviewed, for impacts to woodland vernal pools, fens, and bogs.[249] A West Virginia regulator also reported that in some instances, the Corps may not assert jurisdiction over headwater streams.[250]

Finally, a member of Illinois's §401 staff reported that the state still reviewed headwater ephemeral and intermittent streams for §401 certification between 2007 and 2010. However, the state could not identify trends in the review of any aquatic resource types over the same time period.[251]

Table 10: Aquatic resource types with no or limited §401 review in states with freshwater permitting programs– even limited programs (2007-2010, unless noted otherwise)	
State	**Wetland or Stream Type(s)**
Connecticut	Connecticut bogs, woodland vernal pools, Atlantic Coastal Plain northern pondshores, Atlantic Coastal Plain northern basin peat swamps, Atlantic Coastal Plain northern dunes and maritime grasslands, north-central Appalachian seepage fens, north-central interior and Appalachian acid peatlands, and north-central interior wet flatwoods[252]
Vermont	woodland vernal pools, bogs, fens[253]
West Virginia	some headwater streams[254]

Table 11: Aquatic resource types still being reviewed under §401 in states with freshwater permitting programs – even limited programs (2007-2010, unless noted otherwise)	
State	**Wetland or Stream Type(s)**
Illinois	headwater, ephemeral, and intermittent streams[255]
West Virginia	sinkholes[256]

Availability of quantitative tracking data

All of the states we interviewed with freshwater permitting programs maintain aquatic resources permitting databases; however, only three of these states (Michigan, Minnesota,

[248] Gilmore, *supra* note 241. The wetland types that ELI's literature review identified as potentially outside federal jurisdiction in Connecticut are bogs, woodland vernal pools, Atlantic Coastal Plain Northern Pondshores, Atlantic Coastal Plain Northern Basin Peat Swamps, Atlantic Coastal Plain Northern Dunes and Maritime Grasslands, North-Central Appalachian Seepage Fens, North-Central Interior and Appalachian Acid Peatlands, and North-Central Interior Wet Flatwoods.
[249] Quackenbush, *supra* note 241.
[250] Bennett (Aug. 26, 2010), *supra* note 241.
[251] Heacock, *supra* note 241.
[252] The state has only reviewed §401 certifications for these wetland types if "there is §404 jurisdiction over some additional element of a project." Gilmore, *supra* note 241.
[253] Quackenbush, *supra* note 241.
[254] Bennett (Aug. 26, 2010), *supra* note 241.
[255] Heacock, *supra* note 241.
[256] Bennett (Aug. 26, 2010), *supra* note 241.

Virginia) specifically reported maintaining databases that track the wetland or stream type associated with permits. The three states, however, have a limited ability to assess which wetland or stream types the Corps has determined to be outside of federal jurisdiction: Michigan administers a state-assumed §404 regulatory program and so their permitting data do not reflect any trends in federal jurisdiction and the state records wetland type only when a permit requires compensatory mitigation, Minnesota's wetland impact data are submitted by local governments and are incomplete, and, as previously noted, Virginia's database does not allow users to separate federally- and state-permitted impacts.[257]

C. States with Isolated Waters Permitting Programs

California, Indiana, North Carolina, Ohio, Tennessee, and Wisconsin all have additional state-level authority to regulate impacts to isolated waters or wetlands beyond federal jurisdiction, while not operating statewide comprehensive freshwater permitting programs.[258] Of these six states, five states responded (response rate=83 percent).[259]

Regulators in four states reported seeing no trends in the types of wetlands or streams presented for §401 certification during the time period of 2007-2010.[260] A Tennessee regulator suggested that the Corps districts in their state were applying CWA jurisdiction to more waters than they did several years earlier.[261]

Two states (California and Indiana) provided information about the Corps' jurisdictional practices for specific aquatic resource types based on the §401 certification process, the states' independent permitting programs, or state interaction with the Corps (Tables 12 and 13). A staff member of California's State Water Board reported that in desert areas of the state, the Corps generally has determined ephemeral and eastward-draining waters to be nonjurisdictional, particularly when these waters lack a defined bed and bank. This California regulator also reported that the Corps has determined "clearly isolated"[262] lakes to be nonjurisdictional. The staff member also noted that in California, the Corps does not always assert jurisdiction over internally draining playas and vernal pools, salt lake wetlands, salt marshes, wet prairies, and sinks, particularly when these wetlands are located a distance from major tributaries. The

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[257] Losee (Jan. 13, 2010), *supra* note 241; Weirens, *supra* note 241; Davis, *supra* note 241.
[258] See Table 1.
[259] California, Indiana, North Carolina, Tennessee, Wisconsin. Telephone interview with Bill Orme, California State Water Resources Control Board (Oct. 12, 2010); Email from Randy Braun, Indiana Department of Environmental Management to Philip Womble, Research Associate, Environmental Law Institute (Sep. 16, 2010); Email from Ian McMillan, North Carolina Department of Environment and Natural Resources to Philip Womble, Research Associate, Environmental Law Institute (Aug. 12, 2010); Telephone interview with Ian McMillan, North Carolina Department of Environment and Natural Resources (Sep. 8, 2010); Telephone interview with Amanda Mueller, North Carolina Department of Environment and Natural Resources (Sep. 10, 2010); Email from Mike Lee, Tennessee Department of Environment and Conservation to Philip Womble, Research Associate, Environmental Law Institute (Aug. 23, 2010); Telephone interview with Cherie Hagen, Wisconsin Department of Natural Resources (Sep. 16, 2010).
[260] California, Indiana, North Carolina, Wisconsin.
Orme, *supra* note 259; Braun, *supra* note 259; McMillan (Aug. 12, 2010), *supra* note 259; Hagen, *supra* note 259.
[261] Lee, *supra* note 259.
[262] Orme, *supra* note 259.

regulator suggested that, in general, §401 certifications involving playas are presented less frequently than vernal pools or swamp marshes. However, the Corps generally claims jurisdiction over vernal pools in the Central Valley region of the state due to subsurface connectivity among within these particular vernal pool complexes. In California, according to this staff member, the Corps classifies mud flats as a special aquatic resource type and categorically grants them federal jurisdiction. Headwater intermittent streams, particularly those with a defined bed and bank, are also generally deemed jurisdictional in California.[263]

Indiana has recently reviewed §401 certifications or state isolated wetlands permits for impacts to some wetland types identified as potentially vulnerable in ELI's literature review.[264] The Corps determined sinkholes to be jurisdictional in one location and nonjurisdictional in another. The Corps extended jurisdiction to one of the sinkholes because it was a known subsurface tributary to an outstanding state resource water, the Lost River. In Indiana, the Corps has also asserted jurisdiction over dune and swale wetlands based on surface hydrological connections or, in one recent case, through a groundwater connection to an adjacent stream. Moreover, an Indiana §401 regulator reported that in general, the jurisdictional status of wetlands in the southern plains and lowland areas of the state has not changed following *Rapanos* since this portion of the state is particularly hilly and most wetlands in this area are hydrologically connected to headwater tributary systems.[265]

Table 12: Aquatic resource types with no or limited §401 review in states with isolated waters jurisdiction (2007-2010, unless noted otherwise)	
California	ephemeral streams, eastward-draining waters, closed-basin lakes, internally draining playas, internally draining vernal pools, salt lake wetlands, salt marshes, wet prairies, and sinkholes[266]
Indiana	sinkholes[267]

Table 13: Aquatic resource types still being reviewed under §401 in states with isolated waters jurisdiction (2007-2010, unless noted otherwise)	
California	mud flats, Central Valley vernal pools, headwater intermittent streams[268]
Indiana	sinkholes, dune wetlands, swale wetlands, headwater tributaries; also, generally wetlands in southern plains and lowland areas of the state.[269]

Availability of quantitative tracking data

Four of the six states with isolated waters protection programs maintain quantitative tracking databases for their aquatic resource permitting programs. However, only two of these

[263] Orme, *supra* note 259.
[264] See Appendix 5 for a complete list of the potentially vulnerable wetland and aquatic resource types in Indiana.
[265] Braun, *supra* note 259.
[266] Orme, *supra* note 259.
[267] Braun, *supra* note 259.
[268] Orme, *supra* note 259.
[269] Braun, *supra* note 259.

states—North Carolina and Wisconsin—have databases that systematically track specific types of wetlands or streams.[270] For instance, North Carolina's quantitative tracking database allows regulators to record the general aquatic resource category associated with a permit (e.g., wetland or stream) as well as classify impacts to 21 different wetland types.[271] Furthermore, two of the states we interviewed can separate state permits from federal permits within their databases, allowing quantitative analyses of temporal trends in the number and percentage of overall aquatic resource permits that include federally jurisdictional waters. [272]

[270] Mueller, *supra* note 259; Hagen, *supra* note 259.

[271] Wetland types: Bottomland hardwood forest, Converted from FMP, Depressional wetland, Estuarine woody wetland, Flood plain pool, Forested, Hardwood flat, Headwater Wetland, Herbaceous, Isolated, Mountain bog, Non-riverine swamp forest, Non-tidal freshwater marsh, Other, Pine flat, Pine Savannah, Pocosins, Riverine Swamp Forest, Salt/Brackish Marsh, Seep, Tidal freshwater marsh. Mueller, *supra* note 259.

[272] Tennessee, Wisconsin. Lee, *supra* note 259; Hagen, *supra* note 259. North Carolina could potentially separate state- from federally-granted permits if its database were cross-referenced with the Wilmington Corps district's §404 permitting database. Mueller, *supra* note 259.

Section VII. Analysis – Assessing the Nation's Portfolio of Vulnerable Aquatic Resources since *Rapanos*

Without federal protection under the CWA or state legal protection, some aquatic resources and habitats may be vulnerable to unregulated modification or destruction. If states and local governments are to fill the gaps in federal coverage, it is essential to have a well-articulated assessment of what aquatic resources are currently without federal protection in each area of the country. Our review of the scientific literature, analysis of the NJDs issued by the Corps across the country, and compilation of state experience with the types of wetlands being presented, or not presented, in §401 water quality certification applications sheds some light on the effect of the *Rapanos* and *SWANCC* decisions on the determination of jurisdiction over aquatic resources under the CWA.

Vulnerable aquatic resources – What is at risk?

What our data say about vulnerable wetland and aquatic resource types

In many NJDs, Corps regulators only identified general wetland type (e.g., depressional wetlands, palustrine/freshwater wetlands, emergent wetlands, scrub-shrub wetlands, forested or wooded wetlands, roadside wetlands, and farmed wetlands). Other NJDs included information on Cowardin class (e.g., palustrine emergent, palustrine scrub-shrub, and palustrine forested wetlands). Some NJDs, however, included more specific information on wetland type (many of which are depressional wetland types). Prairie potholes, glacial lakes, vernal pools, playa lakes, remnant oxbow lakes, Carolina bays, Southeast coastal plain gum pond wetlands, a peat fen wetland, and a bog were among the wetland types to be found nonjurisdictional by Corps regulators in various geographic locations. Prairie potholes and vernal pools were two of the most commonly cited wetland types in the NJDs we reviewed. Headwater ephemeral/intermittent tributaries were also frequently identified in NJDs. In fact, a high percentage of the NJDs we reviewed in six districts—Huntington, Kansas City, Los Angeles, Norfolk, Pittsburgh, and Savannah—included ephemeral streams.

CWA §401 program staff in multiple states also indicated that they were no longer, or less frequently, receiving water quality certification applications for several of these water types— including bogs, fens, headwater and ephemeral streams, playas, sinkholes, and vernal pools. A number of additional wetland types, such as cypress sloughs in Mississippi, Carolina bays in South Carolina, and prairie potholes in the Midwest, were identified as not being presented or being presented less frequently for water quality certification in individual states. California also reported that the Corps is not determining "clearly isolated" lakes to be jurisdictional. Several states (Arkansas, Alabama, Hawaii, Mississippi, Montana, New Mexico, North Dakota, Texas, California, Indiana), however, indicated that they still are receiving water quality certifications for intermittent/ephemeral streams in water quality certifications, indicating that the Corps is asserting jurisdiction over these resources in some instances and locations.

Many of these vulnerable wetland and stream types mirror those that were identified in the scientific literature and reports compiled by state regulators or conservation organizations

following *SWANCC* (Table 14). These articles and reports define potentially vulnerable waters to include small, perennial, intermittent, and ephemeral streams, geographically isolated wetlands, and closed-basin lakes. Our review suggests that intermittent/ephemeral streams, depressional wetland types, and closed-basin lakes remain vulnerable, at least in some locations, following *Rapanos*.

Table 14: Aquatic resource types identified as vulnerable in Corps NJDs or by state §401 staff

- **Arroyos**
  - Included in one or more NJD in the Albuquerque and Los Angeles districts.

- **Bogs**
  - Included in one NJD in the Baltimore district. Hawaii and Montana §401 staff indicated that their states were receiving few or no water quality certification applications for bogs. Bogs were identified in our review of the literature as isolated or vulnerable in the Great Lakes, Midwest, West Coast and Northeast regions.

- **Carolina bays**
  - Included in one or more NJD in the Charleston and Wilmington districts. Carolina bays were identified in our review of the literature as isolated or vulnerable in the Southeast region. South Carolina §401 staff also indicated that the state was receiving few or no water quality certification applications for Carolina bays.

- **Closed-basin lakes**
  - Included in one or more NJD in the Los Angeles district. One NJD also determined that ephemeral tributaries were nonjurisdictional under the CWA because they drained to a closed-basin lake. California §401 staff also indicated that the state was receiving few or no water quality certification applications for closed-basin lakes. However, New Mexico wetland program staff indicated that some closed basins in their state were determined to be jurisdictional based on a connection to interstate or foreign commerce.

- **Ephemeral/Intermittent Streams**
  - Included in one or more NJD in the Albuquerque, Buffalo, Galveston, Huntington, Kansas City, Los Angeles, Louisville, New York, Norfolk, Omaha, Pittsburgh, Sacramento, Savannah, and Vicksburg districts. California and West Virginia indicated that they were seeing fewer §401 water quality certification applications for ephemeral/intermittent streams. However, several states (Arkansas, Alabama, Hawaii, Illinois, Mississippi, Montana, New Mexico, North Dakota, Texas) indicated that they still are receiving water quality certifications for intermittent/ephemeral streams.

- **Oxbow wetlands**
  - Included in one or more NJD in the Omaha district.

- **Playas**
  - Included in one or more NJD in the Kansas City and Omaha districts. New Mexico wetland program staff also indicated that the state was receiving few or no water quality certification applications for playas. Playas were identified in our review of the literature as isolated or potentially vulnerable in the Southwest region.

- **Prairie potholes**
  - Included in one or more NJD in the Omaha district. The Omaha district identified prairie potholes as the waterbody in question in a significant number of the NJDs we reviewed (51 of the 307 reviewed NJDs). Another six NJDs in the Omaha district document nonjurisdictional determinations for glacial lakes, which often are prairie potholes. Montana and North Dakota §401 staff also indicated that the state was receiving few or no water quality certification applications for prairie potholes. However, Montana state staff did indicate that they are still seeing water quality certification applications for larger prairie potholes. Prairie potholes were identified in our review of the literature as isolated or potentially vulnerable in the Midwest.

- **Southeast coastal plain gum pond wetlands**
  - Included in one or more NJD in the Charleston district.

- **Vernal pools**
  - Included in one or more NJD in the Sacramento and Buffalo districts. Hawaii and California §401 staff also indicated that the state was receiving few or no water quality certification applications for vernal pools. However, California reported that Central Valley Vernal pools are still being included in §401 applications. Vernal pools were identified in our review of the literature as isolated or potentially vulnerable in the Northeast and West Coast regions.

Geographic trends in vulnerable wetland and aquatic resource types

Where states have established wetland and aquatic resource protection programs, they may cover many vulnerable freshwater wetlands, streams, and lakes. Many of the states in the Northeast, Mid-Atlantic, Great Lakes, and West Coast regions of the country have established at least some state-level protection for freshwater aquatic resources. These states' permitting programs may cover the aquatic resource types identified as vulnerable in the state. For example, the permitting programs in Connecticut, Minnesota, New Jersey, Oregon, Pennsylvania, Rhode Island, Virginia, and Washington broadly cover freshwater wetlands with no defined exceptions

for wetland type, class, or size. In addition, California, Indiana, North Carolina, Ohio, Tennessee, and Wisconsin have all established permitting programs that explicitly cover isolated waters within the state. Many of these states define isolated waters as those no longer regulated under the CWA. However, other state permitting programs, such as those in Florida, Illinois, Maine, Maryland, Massachusetts, Michigan, Nebraska, New Hampshire, New York, Vermont, and West Virginia have defined exceptions for certain freshwater wetlands or only regulate wetlands on a case-by-case basis and may thus leave some vulnerable aquatic resource types uncovered under state law.

On the other hand, twenty-five states have not established state-level protection for freshwater wetlands, streams, or lakes, and instead rely on §401 for protection of these aquatic resources. There are entire regions of the country where none of the states has established freshwater aquatic resource permitting programs (e.g., much of the Midwest, the Mountain West, Gulf Coast, and parts of the Southeast). For example, all of the states in EPA region 8 (CO, MT, ND, SD, UT, and WY) rely primarily on §401 for protection of wetlands at the state level. These states, however, include most of the nation's habitat for vulnerable prairie potholes. In addition to potholes, state §401 programs in this region identified a number of other potentially vulnerable water types, including bogs, depressional wetlands, fens, greasewood flats, headwater streams, interdunal swale wetlands, and playas. In the absence of state regulations, states in this region may need to target conservation resources towards the protection or restoration of these wetlands and streams where they have not already.

Vernal pools were identified as vulnerable in both the Sacramento and Buffalo districts. California, New York, and Ohio have established permitting programs for at least some freshwater wetlands within the state. California's state regulations likely cover most of the vernal pools in the state under the Porter-Cologne Act and Ohio's isolated wetlands regulations likely cover the state's vernal pools. However, New York's size thresholds (12.4 acres in size unless deemed of unusual local importance) may mean that some of the vernal pools in the state are unprotected and are thus vulnerable to conversion.

Jurisdictional tests

When is the significant nexus test being applied?

Of the 28 Corps districts with NJDs containing potentially jurisdictional waters, 22 documented determinations of no significant nexus to deny CWA jurisdiction in at least one NJD form.

The 2008 agency Guidance suggests that Corps regulators are not required to assess a significant nexus for those waters that were determined not jurisdictional in *SWANCC* (e.g., geographically isolated waters). However, our data show that at least some Corps districts are evaluating significant nexus for waters that they also deem to be isolated. Fifteen of the districts we reviewed indicated that a significant nexus test was performed for many of the NJDs that included wetlands or other waters that were categorized as isolated, although we could not

determine if these waters were classified as isolated before or after the significant nexus determination was completed (Figure 5).[273] In the remaining districts, it appears that the Corps did not perform significant nexus tests for most NJDs that include wetlands or other waters that were deemed to be isolated. In nine Corps districts, no NJDs containing isolated waters indicated that a significant nexus test was conducted.[274]

How is the significant nexus test being applied?

Corps regulators in different districts provided varying levels of detail and documented different methods to determine the lack of a significant nexus. Many NJDs included only brief explanations of the hydrologic or ecologic criteria evaluated. For instance, many determinations of no significant nexus for wetlands simply said that the wetland was isolated or that it had no surface hydrologic connection to a water of the U.S. Some NJDs only reported that particular aquatic resources had no significant nexus, without additional qualifying information.

When Corps regulators provided more detailed explanations for determinations of no significant nexus, supporting information often followed the general categories of hydrologic and ecologic criteria suggested in the Guidance (e.g., volume, duration, and frequency of flow, potential to carry pollutants to TNWs or trap/filter pollutants).[275] Hydrologic characteristics documented for tributaries include the discharge, duration, and frequency of their flow, the length of a relevant reach, the size of a reach's drainage area, and the distance, in aerial or stream miles, from the stream to the closest downstream TNW. When regulators evaluated a wetland's significant nexus, they commonly assessed the wetland's hydrologic connectivity to nearby tributaries and sometimes assessed the hydrologic connectivity of these tributaries to TNWs.

Both within and across Corps regulatory districts, NJDs varied in the level of detail used to describe significant nexus assessments. Significant nexus evaluations sometimes provided detailed analyses of the ability of a particular water to contribute to the water quality of a downstream TNW. Some significant nexus assessments included consideration of the land use composition surrounding the aquatic resource to evaluate the ability of the wetlands or streams to reduce sediment, nutrient, or other pollutant loads entering downstream TNWs.

One of the Corps' more detailed methods for evaluating the hydrologic component of significant nexus included evaluating the drainage area or peak drainage discharge volume of tributaries or wetlands as a percent of a TNW's entire upstream drainage basin or peak discharge. In NJDs evaluating drainage area, regulators documented calculations of the land area draining to the relevant reach of a stream or to a wetland being evaluated for a significant nexus and then evaluated this immediate drainage area as a percentage of the total land area draining to the closest TNW. Similarly, Corps regulators calculated the percent contribution of a tributary to the flow of the nearest downstream TNW by dividing peak discharge of a tributary by that of the TNW at the point of confluence between the tributary's flow and the TNW. The small

[273] Baltimore, Buffalo, Chicago, Detroit, Galveston, Honolulu, Little Rock, Los Angeles, Louisville, Norfolk, Omaha, Pittsburgh, Sacramento, Savannah, Wilmington.
[274] Albuquerque, Fort Worth, Jacksonville, Memphis, New England, Seattle, St. Louis, Vicksburg, Walla Walla.
[275] See discussion of 2008 *Rapanos* Guidance in Section II.

percentages of drainage area or flow rate from a tributary or wetland were then cited as reasons for denying a significant nexus to the TNW. Use of these percentage metrics of drainage area or discharge may underestimate the hydrologic and ecologic contribution of vulnerable aquatic resources to downstream water quality. A number of scientific studies establish that lower-order, headwater streams and their riparian wetlands remove disproportionately more sediment and nutrients from runoff than downstream rivers and wetlands.[276] For instance, in eight northeastern U.S. watersheds, wetlands associated with first-order streams were found to perform 90 percent of the watersheds' phosphorus removal functions.[277]

Less commonly, regulators explicitly evaluated a wetland or stream's ecological connectivity with a TNW or other waters of the U.S. Assessments of a water's ecological connectivity to a downstream TNW were as detailed as macroinvertebrate counts or rapid assessment scores of the biological quality of a wetland or stream site, or as basic as reporting that the wetland or stream provides a speculative or insubstantial biological connection to a TNW.

Case-specific circumstances will influence the amount of detail that regulators use to evaluate significant nexus. However, inconsistent application of methodologies and data for determining the absence of a significant nexus may lead to an unclear regulatory environment for permittees and state or local governments seeking predictable federal regulation of aquatic resources.[278] If the Corps does not consistently apply similar hydrologic and ecologic factors in its JDs within or across districts, permittees may incorrectly assume that certain types of waters are inside or outside of CWA jurisdiction. In addition, state or local government programs and conservation organizations that seek to target regulatory or non-regulatory programs to vulnerable waters may not be able to determine the types of aquatic resources for which a significant nexus will generally be found—or not found. While we cannot determine if Corps regulators weighed, but did not document, hydrologic and ecologic factors in determining that particular waters did not satisfy the significant nexus standard, our review of the Corps' documentation of NJDs indicates that districts are using inconsistent information and methodologies to evaluate significant nexus across the country.

When and how is the interstate and foreign commerce test being applied?

Corps regulators regularly evaluated aquatic resources' connection to interstate or foreign commerce as part of an NJD. Most of the NJDs we reviewed indicated that waters had no connection to interstate or foreign commerce. Generally, waters that failed the interstate and

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[276] *See, e.g.*, Richard B. Alexander et al., *Effect of stream channel size on the delivery of nitrogen to the Gulf of Mexico*, 403 NATURE 195 (2000); NATIONAL RESEARCH COUNCIL, *Watershed Setting*, COMPENSATING FOR WETLAND LOSSES UNDER THE CLEAN WATER ACT 46, 49 (2001); Paul A. Bukaveckas, *Effects of Point Source Loadings, Sub-basin Inputs and Longitudinal Variation in Material Retention on C, N and P Delivery from the Ohio River Basin*, 8 ECOSYSTEMS 825, (2005); P.J. A. Withers & Helen P. Jarvie, *Delivery and cycling of phosphorus in rivers: A review*, 400 SCIENCE OF THE TOTAL ENVIRONMENT 379 (2008).

[277] MEYER ET AL., *supra* note 125.

[278] We only analyzed NJDs and did not analyze any positive determinations of significant nexus; accordingly, our conclusions on the consistency of data and methods used to evaluate significant nexus are based solely on documentation in NJDs.

foreign commerce test were also identified as geographically isolated. When NJDs documented rationale for determining that certain aquatic resources could not affect interstate or foreign commerce, regulators typically noted standard regulatory criteria, such as that waters do not present recreational or alternative opportunities for interstate or foreign travelers, do not yield shellfish or fish that could be sold in other states or nations, or are not used by industries that participate in interstate commerce.

What issues make it difficult to identify, track, and ultimately protect vulnerable aquatic resources?

Poor data tracking at the federal and state level

Data availability is a major obstacle to effective identification, tracking and protection of vulnerable wetlands, streams, and other aquatic resources. Information on NJDs still is not consistently available across the country. We were able to download JD forms for 2008–2009 from just 31 of the 38 Corps district websites.[279] We, however, are not certain whether these 31 Corps districts posted all NJDs from these years on their websites—some of the districts provided as few as 3 NJDs online.

While the majority of forms we reviewed did include very basic descriptive information on the types of wetlands, streams, or other aquatic resources that the Corps determined to be nonjurisdictional, many forms did not record specific aquatic resource types. This lack of specificity prevented a comprehensive analysis of vulnerable wetlands, streams, or other aquatic resources. In addition, in the NJDs we reviewed, the Corps did not use standardized methods for identifying nonjurisdictional surface water types within or across its regulatory districts, which also prevented a more comprehensive analysis of vulnerable aquatic resource types.

Lack of data at the state level also made it difficult to track wetland type. A majority of the states maintain quantitative tracking databases for aquatic resource permitting. However, most of these state permitting databases do not have the capability to identify and track impacts to particular types of wetlands, streams, or other aquatic resources. Only five states specifically reported maintaining databases that track the specific wetland or stream type associated with state permits.[280] Without data on the wetland, stream, or other aquatic resource types associated with particular permits, it is difficult for states to determine which aquatic resource types are no longer under the Corps' jurisdiction.

Further, in states that maintain their own aquatic resource permitting programs, most state permit databases do not differentiate between federal and state permits. Maintaining permit databases that differentiate state and federal permits can allow states to determine the types of resources that their additional laws or regulations are protecting. Only Wisconsin indicated maintaining a database with the ability to readily discern federally jurisdictional aquatic resource types from those that were only regulated by the state.

[279] The Alaska Corps district did provide NJDs on their regulatory district; however, our analysis of this district's NJDs was precluded because some NJDs were illegible.
[280] Michigan, Minnesota, North Carolina, Virginia, Wisconsin

Lack of communication between Corps and state regulatory programs

Many of the states we interviewed indicated that it was difficult for them to identify vulnerable wetland or other aquatic resource types because there is little effort to share data between Corps districts and state wetland or water quality program staff on the types of waters being found nonjurisdictional under the CWA. Sharing of this information could help states improve their identification of the types of aquatic resources that may benefit from state-level coverage. Data sharing between the Corps and state regulators is particularly important when states approve nationwide permits (NWPs). In some cases, Corps districts provide state regulatory agencies with data describing aquatic resource impacts permitted under NWPs to give states a more complete picture of these impacts.[281]

As demonstrated in Virginia, enhanced cooperation and communication between the Corps and state permitting programs can help states to better identify and regulate waters that are not jurisdictional under the CWA. The VDEQ and the Norfolk Corps district have signed an MOA that prompts the Corps to delineate all waters, irrespective of their jurisdictional status, on non-agricultural lands. When Corps regulators identify geographically isolated waters that may not fall under CWA jurisdiction, they direct permittees to VDEQ for a state permit. According to VDEQ, anecdotal evidence, communication with field staff, and quantitative permitting data suggest that Corps regulators consistently identify isolated waters and direct permittees to VDEQ for state permits. Similar agreements could also work in states that primarily rely on §401 for freshwater resource protection, as information from the Corps could help the state to direct non-regulatory resources or compensatory mitigation to the conservation or restoration of identified vulnerable resources.

Public perception

Outreach is necessary to educate the public about federal and state regulatory oversight of vulnerable wetlands, streams, and other aquatic resources. To avoid unpermitted losses of aquatic resources, federal agencies should clearly articulate the types of waters that fall under their jurisdiction—particularly those that may satisfy the significant nexus standard—to landowners, developers, and other stakeholders. State agencies should also ensure that landowners understand the geographic coverage of any additional state-level regulatory programs.

[281] For example, a South Dakota §401 regulator mentioned that the Omaha Corps district previously provided his office with a list of projects authorized under NWPs. However, this §401 regulator noted that the Omaha Corps has not provided this list recently, perhaps due to staff turnover in the district's regulatory branch. Miller, *supra* note 205.

New *Rapanos* Guidance

EPA and the Corps recently released draft guidance and anticipate releasing final guidance clarifying the scope of waters that are categorically jurisdictional under the CWA and the instances in which a significant nexus test is necessary.[282] This new guidance, which when finalized is intended to precede new agency regulations clarifying CWA jurisdiction, presents a further opportunity for the agencies to promote more accurate accounting for permitted losses of our nation's aquatic resources. Implementation of a standardized system for federal and state regulators to classify and record aquatic resource impacts that do not fall under CWA jurisdiction—such as the Cowardin system—could promote quantification of resource losses at local, watershed, or statewide scales. Detailed accounting for losses of vulnerable aquatic resources can help to inform state and local governments of the quantity and types of waters that may merit additional regulatory and non-regulatory protection.

New CWA jurisdiction guidance and regulations also present an opportunity to standardize the criteria and detail used to evaluate and document significant nexus. While case-specific circumstances will influence the amount of detail that regulators use to apply particular criteria, clear explanations of why particular analysis techniques were or were not employed can increase transparency and consistency in significant nexus evaluations. Our review of NJDs revealed determinations that did not clearly indicate that they addressed the entire suite of relevant hydrologic and ecologic factors recommended for the significant nexus test. Guidance and regulations that more clearly stipulate use of certain hydrologic and ecologic factors may promote more predictable evaluation of aquatic resources' significant nexus to TNWs.

[282] U.S. ENVIRONMENTAL PROTECTION AGENCY & U.S. ARMY CORPS OF ENGINEERS, *supra* note 6.

Appendix 1: Regulation, Extent, and Types of Vulnerable Waters by State[283]

This appendix compares the legal authority of individual states to regulate impacts to freshwater aquatic resources with the geographic extent of potentially vulnerable wetlands and streams identified in available statewide inventories of these resources and vulnerable aquatic resources identified by state §401 program staff.

State	State Freshwater Wetlands Regulatory Authority	Statewide study of potentially vulnerable wetlands and streams	Vulnerable wetland and stream types identified by state §401 program staff
Alaska	§401 only	No statewide study available	N/A
Alabama	§401 only	No statewide study available	N/A
Arizona	§401 only	Intermittent and ephemeral streams comprise 95% of total stream length in the state	N/A
Arkansas	§401 only	52% of state stream miles are headwater streams; 63% of state stream miles are intermittent/ephemeral streams	Sinkhole Wetlands, Central Interior Highlands and Appalachian Sinkholes and Depression Ponds, Ozark-Ouachita Fens, West Gulf Coastal Plain Nonriverine Wet Hardwood Flatwoods, West Gulf Coastal Plain Pine-Hardwood Flatwoods
California	Isolated	No statewide study available	Ephemeral streams, eastward-draining waters, closed-basin lakes, internally draining playas, internally draining vernal pools, salt lake wetlands, salt marshes, wet prairies, and sinkholes
Colorado	§401 only	No statewide study available	Fens, Colorado Plateau Hanging Gardens, Inter-Mountain basins Greasewood Flats, Inter-Mountain Basis Interdunal Swale Wetlands, Inter-Mountain Basins Playas, Western Great Plains Closed Depression Wetlands, and Western Great Plains Saline Depression Wetlands
Connecticut	Comprehensive permitting program, no exceptions	No statewide study available	Connecticut bogs, woodland vernal pools; Atlantic Coastal Plain northern pondshores, Atlantic Coastal Plain northern basin peat swamps, Atlantic Coastal Plain northern dunes and maritime grasslands, north-central Appalachian seepage fens, north-central interior and Appalachian acid peatlands, and north-central interior wet flatwoods
Delaware	§401 only	50% of all wetlands would not be covered under the CWA if only navigable and directly adjacent wetlands were regulated	N/A
Florida	Comprehensive permitting program, with exceptions	No statewide study available	N/A

[283] See Appendix 5 for a detailed list of the types of wetlands that may be at risk – organized by state and EPA region – and for the citations for the source material used to develop this table. See Section VI for more detail and citations regarding vulnerable aquatic resource types identified by state §401 staff.

Georgia	§401 only	No statewide study available	N/A
Hawaii	§401 only	No statewide study available	Bogs and vernal pools in elevated areas
Idaho	§401 only	No statewide study available	N/A
Illinois	Partial protection	60% of the state's wetlands and 12% of the state's remaining wetland area may be isolated – 150,118 acres of wetlands may be isolated; 56% of state stream miles are headwater streams and 55% of state stream miles are intermittent/ephemeral	N/A
Indiana	Isolated	9 - 31% of the state's water resources are isolated, 32 - 85% of state's waters by number could be considered isolated	Sinkholes
Iowa	§401 only	11-72% of streams and wetlands may not be regulated after SWANCC; 59% of state stream miles are headwater streams and 62% of state stream miles are intermittent/ephemeral	N/A
Kansas	§401 only	No statewide study available	N/A
Kentucky	§401 only	55% of state stream miles are headwater streams, 29% of state stream miles are intermittent/ephemeral	N/A
Louisiana	§401 only	38% of state stream miles are headwater streams, 36% of state stream miles are intermittent/ephemeral	N/A
Maine	Comprehensive permitting program, with exceptions	No statewide study available	No response
Maryland	Comprehensive permitting program, with exceptions	No statewide study available	N/A
Massachusetts	Comprehensive permitting program, with exceptions	No statewide study available	No response
Michigan	Comprehensive permitting program, with exceptions	16.7% of wetlands in state removed from protection following SWANCC	N/A
Minnesota	Comprehensive permitting program, no exceptions	11-92% could be removed from protection due to SWANCC, depending on the definition of isolated; 45% of state stream miles are headwater streams and 51% of state streams are intermittent/ephemeral	N/A
Mississippi	§401 only	55% of state stream miles are headwater streams and 58% of state streams are intermittent/ephemeral	Cypress sloughs

Missouri	§401 only	33% of wetland may be isolated, 58% of state stream miles are headwater streams and 66% of state streams are intermittent/ephemeral; 69-76% of streams may no longer be regulated following SWANCC	N/A
Montana	§401 only	71% of state stream miles are intermittent/ephemeral	Prairie potholes, fens, bogs, and a headwater stream
Nebraska	Case-by-case protection	40% of total wetland acreage in the state may be isolated; 76% of stream miles are intermittent	N/A
Nevada	§401 only	88% of stream miles are intermittent	N/A
New Hampshire	Comprehensive permitting program, with exceptions	No statewide study available	N/A
New Jersey	Comprehensive permitting program, no exceptions	No statewide study available	No response
New Mexico	§401 only	80% of drainages in the state are not perennial	Playas and internally draining, depressional wetlands
New York	Comprehensive permitting program, with exceptions	11% of state stream miles are intermittent/ephemeral	N/A
North Carolina	Isolated	No statewide study available	N/A
North Dakota	§401 only	No statewide study available	Prairie potholes
Ohio	Isolated	60% of state streams are headwater streams and 45% do not flow year round	No response
Oklahoma	§401 only	No statewide study available	N/A
Oregon	Comprehensive permitting program, no exceptions	No statewide study available	No response
Pennsylvania	Comprehensive permitting program, no exceptions	No statewide study available	N/A
Rhode Island	Comprehensive permitting program, no exceptions	85% of state stream miles are non-navigable tributary streams	No response
South Carolina	§401 only	9-10% of state's wetland area is at risk; 16% of wetlands would not be regulated if intermittent streams were not used to determine jurisdiction	Carolina bays
South Dakota	§401 only	No statewide study available	Occasionally wetlands next to tributaries are nonjurisdictional
Tennessee	Isolated	Over 50% of wetlands statewide are potentially isolated; 60% of streams are small headwater streams, 18% of streams are intermittent/ephemeral	N/A
Texas	§401 only	75-79% of state stream miles are intermittent	N/A

Utah	§401 only	No statewide study available	N/A
Vermont	Comprehensive permitting program, with exceptions	No statewide study available	Woodland vernal pools, fens, and bogs
Virginia	Comprehensive permitting program, no exceptions	Up to 43% of the state's wetlands may not be covered	N/A
Washington	Comprehensive permitting program, no exceptions	No statewide study available	No response
West Virginia	Case-by-case protection	No statewide study available	Some headwater streams
Wisconsin	Isolated	24% of state's wetlands may be considered isolated; 53% of state stream miles are headwater streams and 45% of state stream miles are intermittent/ephemeral	N/A
Wyoming	§401 only	No statewide study available	Inter-Mountain Basins Greasewood Flats, Inter-Mountain Basins Playas, Western Great Plains Closed Depression Wetlands, Western Great Plains Open Freshwater Depression Wetlands, Western Great Plains Saline Depression Wetlands

Appendix 2: Vulnerable Wetland and Aquatic Resource Types Identified in NJDs, by Corps Regulatory Division and District

This appendix provides a listing of all aquatic resource types identified by Corps regulators as outside of CWA jurisdiction in each Corps district. We considered NJDs to include information on aquatic resource type—and recorded the type in this table—if the Corps provided more descriptive information than simply noting that the project site contained wetland(s), stream(s), pond(s), or lake(s).[284]

Corps division	Corps district	States in Corps district	Waterbody type
Great Lakes and Ohio River	Buffalo	NY, OH	artificial ponds; artificial wetlands; depressional emergent wetlands/marshes; depressional forested/scrub-shrub wetlands; depressional forested wetlands; depressional palustrine emergent wetlands; depressional scrub-shrub/early successional forested wetlands; depressional swale; depressional wet meadow wetlands; depressional wetlands; drainage ditches; emergent/scrub-shrub/forested wetland; ephemeral tributaries; excavated pond; stormwater management pond; retention basin; scrub-shrub herbaceous wetlands; stock pond; stormwater retention pond; vernal pools; wooded wetlands
	Chicago	IL, IN	artificial wetlands; depressional farmed wetlands; depressional palustrine wetlands; linear depressional features; depressional forested wetlands; depressional emergent marsh; depressional ponds; depressional wetlands; detention basin; ditch wetlands; ephemeral ditch; excavated pocket wetland; excavated pond; farmed wetlands; fringe wetlands; impounded sloping wetlands; intermittent drainage; intermittent wetlands; manmade ditches; pocket wetlands; quarry; stormwater basin
	Detroit	IN, MI,	depressional emergent wetlands; depressional forested wetlands; depressional open water wetlands; depressional wetlands; detention area; forested wetlands; quarry pond
	Huntington	KY, OH, WV	1st order ephemeral tributaries; 2nd order ephemeral tributaries; depressional emergent wetlands; depressional forested wetlands; depressional wetlands; emergent wetlands; ephemeral seep/ditch; excavated ditch; excavated pond; farmed wetlands; forested wetlands; forested emergent wetlands; fringe wetlands; headwater ephemeral tributaries; manmade wetlands; palustrine emergent wetlands; temporary palustrine emergent wetlands; seasonal palustrine emergent wetlands; palustrine forested wetlands
	Louisville	IL, IN, KY, OH	2nd order ephemeral tributaries; 3rd order ephemeral tributaries; borrow pits; depressional emergent wetlands; emergent wetlands; ephemeral drainage swales; ephemeral tributaries; farm pond; farmed wetlands; fringe wetlands; stormwater basins; upland pond

[284] Only NJDs with 'potentially jurisdictional water(s)' were used to compile the aquatic resource types in this table. For a more detailed description of the criteria for determining that an NJD form contained 'potentially jurisdictional waters,' see Section V.

	Pittsburgh	OH, PA, WV	1st order ephemeral tributaries; abandoned erosion and sedimentation ponds; artificial ephemeral tributaries; depressional emergent wetlands; depressional palustrine emergent wetlands; depressional pond; depressional wetlands; ephemeral/intermittent tributaries; fringe wetlands; hillside seep-fed palustrine emergent wetlands; hillside seep-fed tributaries; palustrine emergent wetlands; palustrine scrub-shrub wetlands; perennial tributaries; roadside wetlands; stormwater retention pond
Mississippi Valley	Memphis	AR, IL, KY, MS, MO, TN	upland pond
	St. Louis	MO, IL	Depressional emergent wetlands; depressional forested wetlands; depressional pond; linear emergent wetland; depressional palustrine forested wetland with shrub and herbaceous cover; roadside wetland;
	Vicksburg	AR, LA, MS	3rd order artificial farmed ephemeral tributaries; ephemeral tributaries; fringe herbaceous wetlands; linear borrow pit; wooded depressional sump
North Atlantic	Baltimore	MD, PA	bog; coal wash water basin; depressional wetlands; emergent wetlands; palustrine emergent wetlands; quarry pits; sloped wetland
	New England	CT, ME, MA, NH, RI, VT	seep; palustrine emergent wet meadow
	New York	NJ, NY	1st order ephemeral tributaries; artificial wetlands; concrete, natural spring-fed pond; groundwater-fed depressional wetland; depressional wetlands; emergent wetlands; freshwater wetlands; fringe wetlands; palustrine broad-leaved deciduous scrub-shrub wetlands; palustrine scrub-shrub wetlands; scrub-shrub wetlands
	Norfolk	VA	Ephemeral tributaries; farmed wetland
Northwestern	Kansas City	KS, MO	1st order ephemeral/intermittent tributaries; 2nd order ephemeral tributaries; artificial ephemeral tributaries; artificial palustrine emergent wetlands; artificial wetlands; playa; depressional emergent wetlands; emergent scrub-shrub wetlands; emergent swale wetlands; emergent wetlands; excavated ponds; farm ponds; fringe wetlands; headwater ephemeral/intermittent tributaries; manmade ditch; manmade pond; palustrine emergent swale wetlands; palustrine emergent wetlands; railroad ditch wetlands

	Omaha	CO, MT, NE, ND, SD, WY	1st, 2nd, 3rd order ephemeral/intermittent tributaries; artificial wetlands; cement-based pond; coal bed methane ponds; farmed wetlands; depressional, seasonally-flooded palustrine unconsolidated bottom wetlands; depressional palustrine wetlands; depressional roadside wetlands; depressional wetlands; detention basin; diked-impounded wetlands; ditch wetlands; drainage ditches; dugout wetlands; emergent wetlands; ephemeral palustrine emergent wetland; ephemeral swales; ephemeral, palustrine fringe wetlands; excavated depressional pond; excavated wetlands; farm pond; farmed swale; farmed wetlands; fringe wetlands; glacier lake; grassy drainage; herbaceous palustrine emergent/scrub-shrub wetlands; linear wetlands; manmade borrow ditches; oxbow remnant wetlands; palustrine emergent semi-permanently flooded wetlands; palustrine emergent seasonally-flooded wetlands; palustrine emergent temporarily flooded wetlands; partially drained wetlands; palustrine emergent wetlands; palustrine scrub-shrub persistent wetlands; palustrine emergent aquatic bed semi-permanently flooded wetlands; peat fen wetlands; perched depressional wetlands; perennial tributaries; pit pond; playa; prairie potholes; rainwater basin wetlands; retention pond; riverine unconsolidated bottom intermittently-exposed river; riverine wetlands; roadside ditch; roadside wetlands; seasonal wetlands; herbaceous palustrine emergent and cropped wetlands; seep wetlands; semi-permanent wetlands; shallow groundwater/seepage-fed wetland; sloped wetlands; slope-positioned seep basins; sloughs; stock ponds; stormwater detention wetland; swale wetlands; temporary wetlands; transitional wetlands; upland pond; wet meadow wetlands; wooded wetland
	Seattle	WA	field wetlands; riparian wetlands
	Walla Walla	ID	Depressional wetlands
Pacific Ocean	Honolulu	HI	stormwater drainage, intermittent tributaries, depressional wetlands in pahoehoe lava
South Atlantic	Charleston	SC	Carolina bays; depressional wetlands; freshwater wetlands; freshwater forested wetlands; Southeast Coastal Plain Gum Pond Wetlands
	Jacksonville	FL	depressional wetlands, freshwater wetlands
	Savannah	GA	1st order ephemeral tributaries; drainage ditches; ephemeral roadside ditch/swale; ephemeral tributaries; ephemeral swale; swale
	Wilmington	NC	Carolina bay; depressional wetlands
South Pacific	Albuquerque	CO, NM, TX	arroyo; ephemeral drainages
	Los Angeles	AZ, CA,	1st order ephemeral tributaries; 1st order ephemeral arroyo; detention basins; dry lake; emergent wetlands; ephemeral tributaries; herbaceous emergent wetlands; intermittent/perennial tributaries; palustrine wetlands/springs; upland excavated ditches

	Sacramento	CA, CO, NV, UT	1st order ephemeral/intermittent tributaries; artificial wetlands; depressional seasonal wetlands; depressional wetlands; drainage ditch; drainage swales; emergent marshes; emergent wetlands; ephemeral tributaries; ephemeral hillside gullies; excavated wetlands; farmed wetlands; gully wetlands; intermittent ditches; irrigation ditch; irrigation/stormwater-fed drainage swales; manmade pond; mining pit wetland; open water seep; palustrine emergent wetland swales; palustrine emergent wetlands; perennial tributary; rain-fed pond; rain-fed seasonal wetlands; salt grass wet meadow wetlands; seasonal farmed wetlands; seep/spring; seep-fed depressional emergent wetlands; seep-fed depressional wetlands; seep-fed wetland; sloped wetlands; stock pond; swale wetland; vernal pools; wet meadow wetlands
Southwestern	Fort Worth	TX	fringe wetlands; irrigation ditches; remnant channel; upland pond
	Galveston	LA, TX	1st order ephemeral tributaries; depressional wetlands; detention pond; emergent wetlands; ephemeral channel; farmed wetlands; forested wetlands; freshwater, forested/shrub wetlands; herbaceous, emergent wetlands; manmade canal; palustrine emergent persistent seasonally-flooded wetland; palustrine emergent wetlands; palustrine forested wetlands; palustrine scrub-shrub wetlands; palustrine wetlands; palustrine, forested, broad-leaved deciduous, temporarily-flooded wetland; perched-slope, palustrine, forested, broad-leaved deciduous, intermittently-flooded wetlands; perched-slope, palustrine, scrub-shrub, broad-leaved deciduous, intermittently-flooded wetlands; potentially ponded, linear wetlands
	Little Rock	AR, MO	depressional wetlands; emergent scrub-shrub wetlands; herbaceous wetlands; quarry; upland ponds

Appendix 3: Summary of Key Statistics in NJD Analysis

This appendix provides summary statistics for each Corps regulatory district's NJDs. Statistics included for each district include: 1) the total number of publicly available, online CWA NJDs from the years 2008-2009; 2) the number of these NJDs that documented 'potentially jurisdictional water(s)';[285] 3) the percent of NJDs that included information on aquatic resource type;[286] 4) the percent of NJDs that documented geographically isolated water(s); 5) the percent of NJDs that documented a determination of no significant nexus; 6) the percent of NJDs that completed the significant nexus form (Section III.C);[287] 7) the percent of NJDs that noted no significant nexus elsewhere on the JD form;[288] and 8) the percent of NJDs that documented aquatic resources with no substantial nexus (lack of connection to interstate or foreign commerce). All percentage statistics are calculated as a percent of the number of each district's NJDs that contained 'potentially jurisdictional water(s).'

Corps district	Total NJDs	NJDs with potentially jurisdictional waters	Aquatic resource type included (%)	Isolated (%)	SNT test completed (%)			No substantial nexus (%)
						SNT form completed (%)	SNT mentioned or box checked, but no form (%)	
Albuquerque	26	2	100.00	100.00	0.00	0.00	0.00	100.00
Baltimore	29	7	85.71	100.00	42.86	42.86	0.00	85.71
Buffalo	105	89	43.82	92.13	30.34	4.49	25.84	89.89
Charleston	235	92	40.22	95.65	10.87	1.09	9.78	95.65
Chicago	107	105	76.19	96.19	23.81	0.00	23.81	50.48
Detroit*	35	24	54.17	100.00	50.00	0.00	50.00	100.00
Fort Worth	26	26	65.38	100.00	0.00	0.00	0.00	100.00
Galveston	206	147	48.98	91.16	51.70	2.04	49.66	92.52
Honolulu	104	4	75.00	100.00	75.00	0.00	75.00	75.00
Huntington	201	126	71.43	51.59	45.24	43.65	1.59	50.00
Jacksonville	6	4	25.00	100.00	0.00	0.00	0.00	100.00
Kansas City	250	95	96.84	41.05	62.11	51.58	10.53	49.47
Little Rock	13	5	80.00	100.00	40.00	0.00	40.00	80.00
Los Angeles	109	50	96.00	86.00	58.00	18.00	40.00	70.00

[285] For a more detailed description of the criteria for determining that an NJD form contained 'potentially jurisdictional waters,' see Section V.
[286] We considered NJDs to include information on aquatic resource type if the Corps provided more descriptive information than simply noting that the project site contained wetland(s), stream(s), pond(s), or lake(s).
[287] For a sample JD form, see Appendix 4.
[288] For a sample JD form, see Appendix 4.

Louisville	32	23	56.52	78.26	39.13	13.04	26.09	78.26
Memphis	6	1	100.00	100.00	0.00	0.00	0.00	100.00
Mobile	6	0	-	-		-		-
New England	5	4	25.00	75.00	25.00	25.00	0.00	75.00
New York	64	63	41.27	96.83	6.35	3.17	3.17	85.71
Norfolk	15	12	25.00	83.33	58.33	58.33	0.00	16.67
Omaha	430	307	80.13	90.23	24.43	11.73	12.70	91.21
Philadelphia	3	0	-	-		-		-
Pittsburgh	85	82	93.90	28.05	89.02	71.95	17.07	20.73
Sacramento	81	53	86.79	83.02	56.60	18.87	37.74	79.25
San Francisco	3	0	-	-		-		-
Savannah	83	72	13.89	84.72	29.17	1.39	27.78	86.11
Seattle	5	2	50.00	100.00	0.00	0.00	0.00	100.00
St. Louis	12	6	100.00	33.33	66.67	66.67	0.00	50.00
Vicksburg	425	6	83.33	50.00	50.00	33.33	16.67	50.00
Walla Walla	5	2	100.00	100.00	0.00	0.00	0.00	100.00
Wilmington	11	9	33.33	88.89	22.22	0.00	22.22	88.89
Range	3 - 430	0 - 307	0.00–100.00 %	28.05-100.00 %	0.00-89.02 %	0.00-71.95 %	0.00-75.00 %	16.67-100.00 %
Median	32	12	73.21 %	91.65 %	34.73 %	2.61 %	11.61 %	85.71 %
Mean	87.84	45.74	66.11 %	83.77 %	34.17 %	16.69 %	17.49 %	77.16 %

*NJDs that were in areas where MI has assumed state control of §404 permitting were excluded in all statistics except the Total NJDs figure

Appendix 4: Sample JD Form

This appendix provides an example of the JD forms that the Corps uses to determine if project sites contain waters under CWA jurisdiction.

APPROVED JURISDICTIONAL DETERMINATION FORM
U.S. Army Corps of Engineers

This form should be completed by following the instructions provided in Section IV of the JD Form Instructional Guidebook.

SECTION I: BACKGROUND INFORMATION

A. REPORT COMPLETION DATE FOR APPROVED JURISDICTIONAL DETERMINATION (JD):

B. DISTRICT OFFICE, FILE NAME, AND NUMBER:

LOCATION AND BACKGROUND INFORMATION:

State: County/parish/borough: City:
Center coordinates of site (lat/long in degree decimal format):
Universal Transverse Mercator:
Name of nearest waterbody: Cayuga Creek
Name of nearest Traditional Navigable Water (TNW) into which the aquatic resource flows:
Name of watershed or Hydrologic Unit Code (HUC):

☒ Check if map/diagram of review area and/or potential jurisdictional areas is/are available upon request.
☐ Check if other sites (e.g., offsite mitigation sites, disposal sites, etc…) are associated with this action and are recorded on a different JD form.

D. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):

☐ Office (Desk) Determination. Date:
☒ Field Determination. Date(s):

SECTION II: SUMMARY OF FINDINGS

A. RHA SECTION 10 DETERMINATION OF JURISDICTION.

There **Are no** *"navigable waters of the U.S."* within Rivers and Harbors Act (RHA) jurisdiction (as defined by 33 CFR part 329) in the review area. [*Required*]

☐ Waters subject to the ebb and flow of the tide.
☐ Waters are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce.
Explain: .

B. CWA SECTION 404 DETERMINATION OF JURISDICTION.

There **Are** *"waters of the U.S."* within Clean Water Act (CWA) jurisdiction (as defined by 33 CFR part 328) in the review area. [*Required*]

1. **Waters of the U.S.**
   a. **Indicate presence of waters of U.S. in review area (check all that apply):** [1]
      ☒ TNWs, including territorial seas
      ☐ Wetlands adjacent to TNWs
      ☐ Relatively permanent waters[2] (RPWs) that flow directly or indirectly into TNWs
      ☐ Non-RPWs that flow directly or indirectly into TNWs
      ☐ Wetlands directly abutting RPWs that flow directly or indirectly into TNWs
      ☐ Wetlands adjacent to but not directly abutting RPWs that flow directly or indirectly into TNWs
      ☐ Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs
      ☐ Impoundments of jurisdictional waters
      ☒ Isolated (interstate or intrastate) waters, including isolated wetlands

   b. **Identify (estimate) size of waters of the U.S. in the review area:**
      Non-wetland waters: ~840 linear feet: ~80-100 width (ft) and/or acres.
      Wetlands: acres.

   c. **Limits (boundaries) of jurisdiction** based on: **1987 Delineation Manual**
      Elevation of established OHWM (if known): .

2. **Non-regulated waters/wetlands (check if applicable):**[3]
   ☒ Potentially jurisdictional waters and/or wetlands were assessed within the review area and determined to be not jurisdictional.
   Explain: **Wetlands W1 and W2 were identified on the submitted wetland delineation but both were intrastate, nonnavigable, isolated waters. The wetlands have no potential to affect interstate commerce under 328.3(a)(3)(i-iii) (See Section IV B below).**

[1] Boxes checked below shall be supported by completing the appropriate sections in Section III below.
[2] For purposes of this form, an RPW is defined as a tributary that is not a TNW and that typically flows year-round or has continuous flow at least "seasonally" (e.g., typically 3 months).
[3] Supporting documentation is presented in Section III.F.

SECTION III: CWA ANALYSIS

A. TNWs AND WETLANDS ADJACENT TO TNWs

The agencies will assert jurisdiction over TNWs and wetlands adjacent to TNWs. If the aquatic resource is a TNW, complete Section III.A.1 and Section III.D.1. only; if the aquatic resource is a wetland adjacent to a TNW, complete Sections III.A.1 and 2 and Section III.D.1.; otherwise, see Section III.B below.

1. **TNW**
   Identify TNW: **Cayuga Creek**.

   Summarize rationale supporting determination: .

2. **Wetland adjacent to TNW**
   Summarize rationale supporting conclusion that wetland is "adjacent": .

B. CHARACTERISTICS OF TRIBUTARY (THAT IS NOT A TNW) AND ITS ADJACENT WETLANDS (IF ANY):

This section summarizes information regarding characteristics of the tributary and its adjacent wetlands, if any, and it helps determine whether or not the standards for jurisdiction established under *Rapanos* have been met.

The agencies will assert jurisdiction over non-navigable tributaries of TNWs where the tributaries are "relatively permanent waters" (RPWs), i.e. tributaries that typically flow year-round or have continuous flow at least seasonally (e.g., typically 3 months). A wetland that directly abuts an RPW is also jurisdictional. If the aquatic resource is not a TNW, but has year-round (perennial) flow, skip to Section III.D.2. If the aquatic resource is a wetland directly abutting a tributary with perennial flow, skip to Section III.D.4.

A wetland that is adjacent to but that does not directly abut an RPW requires a significant nexus evaluation. Corps districts and EPA regions will include in the record any available information that documents the existence of a significant nexus between a relatively permanent tributary that is not perennial (and its adjacent wetlands if any) and a traditional navigable water, even though a significant nexus finding is not required as a matter of law.

If the waterbody[4] is not an RPW, or a wetland directly abutting an RPW, a JD will require additional data to determine if the waterbody has a significant nexus with a TNW. If the tributary has adjacent wetlands, the significant nexus evaluation must consider the tributary in combination with all of its adjacent wetlands. This significant nexus evaluation that combines, for analytical purposes, the tributary and all of its adjacent wetlands is used whether the review area identified in the JD request is the tributary, or its adjacent wetlands, or both. If the JD covers a tributary with adjacent wetlands, complete Section III.B.1 for the tributary, Section III.B.2 for any onsite wetlands, and Section III.B.3 for all wetlands adjacent to that tributary, both onsite and offsite. The determination whether a significant nexus exists is determined in Section III.C below.

1. **Characteristics of non-TNWs that flow directly or indirectly into TNW**

   (i) General Area Conditions:
   Watershed size: **Pick List**
   Drainage area: **Pick List**
   Average annual rainfall: inches
   Average annual snowfall: inches

   (ii) Physical Characteristics:
   (a) Relationship with TNW:
   ☐ Tributary flows directly into TNW.
   ☐ Tributary flows through **Pick List** tributaries before entering TNW.

   Project waters are **Pick List** river miles from TNW.
   Project waters are **Pick List** river miles from RPW.
   Project waters are **Pick List** aerial (straight) miles from TNW.
   Project waters are **Pick List** aerial (straight) miles from RPW.
   Project waters cross or serve as state boundaries. Explain: .

   Identify flow route to TNW[5]: .
   Tributary stream order, if known: .

[4] Note that the Instructional Guidebook contains additional information regarding swales, ditches, washes, and erosional features generally and in the arid West.
[5] Flow route can be described by identifying, e.g., tributary a, which flows through the review area, to flow into tributary b, which then flows into TNW.

(b) General Tributary Characteristics (check all that apply):

Tributary is:
- ☐ Natural
- ☐ Artificial (man-made). Explain: .
- ☐ Manipulated (man-altered). Explain: .

Tributary properties with respect to top of bank (estimate):
- Average width: feet
- Average depth: feet
- Average side slopes: **Pick List.**

Primary tributary substrate composition (check all that apply):
- ☐ Silts
- ☐ Sands
- ☐ Concrete
- ☐ Cobbles
- ☐ Gravel
- ☐ Muck
- ☐ Bedrock
- ☐ Vegetation. Type/% cover:
- ☐ Other. Explain: .

Tributary condition/stability [e.g., highly eroding, sloughing banks]. Explain: .
Presence of run/riffle/pool complexes. Explain: .
Tributary geometry: **Pick List**
Tributary gradient (approximate average slope): %

(c) Flow:

Tributary provides for: **Pick List**
Estimate average number of flow events in review area/year: **Pick List**
Describe flow regime: .
Other information on duration and volume: .

Surface flow is: **Pick List.** Characteristics: .

Subsurface flow: **Pick List**. Explain findings: .
- ☐ Dye (or other) test performed: .

Tributary has (check all that apply):
- ☐ Bed and banks
- ☐ OHWM[6] (check all indicators that apply):
  - ☐ clear, natural line impressed on the bank
  - ☐ changes in the character of soil
  - ☐ shelving
  - ☐ vegetation matted down, bent, or absent
  - ☐ leaf litter disturbed or washed away
  - ☐ sediment deposition
  - ☐ water staining
  - ☐ other (list):
  - ☐ the presence of litter and debris
  - ☐ destruction of terrestrial vegetation
  - ☐ the presence of wrack line
  - ☐ sediment sorting
  - ☐ scour
  - ☐ multiple observed or predicted flow events
  - ☐ abrupt change in plant community
- ☐ Discontinuous OHWM.[7] Explain: .

If factors other than the OHWM were used to determine lateral extent of CWA jurisdiction (check all that apply):
- ☐ High Tide Line indicated by:
  - ☐ oil or scum line along shore objects
  - ☐ fine shell or debris deposits (foreshore)
  - ☐ physical markings/characteristics
  - ☐ tidal gauges
  - ☐ other (list):
- ☐ Mean High Water Mark indicated by:
  - ☐ survey to available datum;
  - ☐ physical markings;
  - ☐ vegetation lines/changes in vegetation types.

(iii) Chemical Characteristics:

Characterize tributary (e.g., water color is clear, discolored, oily film; water quality; general watershed characteristics, etc.).
Explain: .
Identify specific pollutants, if known: .

[6]A natural or man-made discontinuity in the OHWM does not necessarily sever jurisdiction (e.g., where the stream temporarily flows underground, or where the OHWM has been removed by development or agricultural practices). Where there is a break in the OHWM that is unrelated to the waterbody's flow regime (e.g., flow over a rock outcrop or through a culvert), the agencies will look for indicators of flow above and below the break.
[7]Ibid.

(iv) Biological Characteristics. Channel supports (check all that apply):

- ☐ Riparian corridor. Characteristics (type, average width): .
- ☐ Wetland fringe. Characteristics: .
- ☐ Habitat for:
  - ☐ Federally Listed species. Explain findings: .
  - ☐ Fish/spawn areas. Explain findings: .
  - ☐ Other environmentally-sensitive species. Explain findings: .
  - ☐ Aquatic/wildlife diversity. Explain findings: .

2. Characteristics of wetlands adjacent to non-TNW that flow directly or indirectly into TNW

(i) Physical Characteristics:

(a) General Wetland Characteristics:

Properties:

Wetland size: acres

Wetland type. Explain: .

Wetland quality. Explain: .

Project wetlands cross or serve as state boundaries. Explain: .

(b) General Flow Relationship with Non-TNW:

Flow is: **Pick List**. Explain: .

Surface flow is: **Pick List**

Characteristics: .

Subsurface flow: **Pick List**. Explain findings: .

- ☐ Dye (or other) test performed: .

(c) Wetland Adjacency Determination with Non-TNW:

- ☐ Directly abutting
- ☐ Not directly abutting
  - ☐ Discrete wetland hydrologic connection. Explain: .
  - ☐ Ecological connection. Explain: .
  - ☐ Separated by berm/barrier. Explain: .

(d) Proximity (Relationship) to TNW

Project wetlands are **Pick List** river miles from TNW.

Project waters are **Pick List** aerial (straight) miles from TNW.

Flow is from: **Pick List.**

Estimate approximate location of wetland as within the **Pick List** floodplain.

(ii) Chemical Characteristics:

Characterize wetland system (e.g., water color is clear, brown, oil film on surface; water quality; general watershed characteristics; etc.). Explain: .

Identify specific pollutants, if known: .

(iii) Biological Characteristics. Wetland supports (check all that apply):

- ☐ Riparian buffer. Characteristics (type, average width): .
- ☐ Vegetation type/percent cover. Explain: .
- ☐ Habitat for:
  - ☐ Federally Listed species. Explain findings: .
  - ☐ Fish/spawn areas. Explain findings: .
  - ☐ Other environmentally-sensitive species. Explain findings: .
  - ☐ Aquatic/wildlife diversity. Explain findings: .

3. Characteristics of all wetlands adjacent to the tributary (if any)

All wetland(s) being considered in the cumulative analysis: **Pick List**

Approximately ( ) acres in total are being considered in the cumulative analysis.

For each wetland, specify the following:

Directly abuts? (Y/N)	Size (in acres)	Directly abuts? (Y/N)	Size (in acres)

Summarize overall biological, chemical and physical functions being performed: .

C. SIGNIFICANT NEXUS DETERMINATION

A significant nexus analysis will assess the flow characteristics and functions of the tributary itself and the functions performed by any wetlands adjacent to the tributary to determine if they significantly affect the chemical, physical, and biological integrity of a TNW. For each of the following situations, a significant nexus exists if the tributary, in combination with all of its adjacent wetlands, has more than a speculative or insubstantial effect on the chemical, physical and/or biological integrity of a TNW. Considerations when evaluating significant nexus include, but are not limited to the volume, duration, and frequency of the flow of water in the tributary and its proximity to a TNW, and the functions performed by the tributary and all its adjacent wetlands. It is not appropriate to determine significant nexus based solely on any specific threshold of distance (e.g. between a tributary and its adjacent wetland or between a tributary and the TNW). Similarly, the fact an adjacent wetland lies within or outside of a floodplain is not solely determinative of significant nexus.

Draw connections between the features documented and the effects on the TNW, as identified in the *Rapanos* Guidance and discussed in the Instructional Guidebook. Factors to consider include, for example:

- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to carry pollutants or flood waters to TNWs, or to reduce the amount of pollutants or flood waters reaching a TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), provide habitat and lifecycle support functions for fish and other species, such as feeding, nesting, spawning, or rearing young for species that are present in the TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to transfer nutrients and organic carbon that support downstream foodwebs?
- Does the tributary, in combination with its adjacent wetlands (if any), have other relationships to the physical, chemical, or biological integrity of the TNW?

Note: the above list of considerations is not inclusive and other functions observed or known to occur should be documented below:

1. **Significant nexus findings for non-RPW that has no adjacent wetlands and flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary itself, then go to Section III.D: .

2. **Significant nexus findings for non-RPW and its adjacent wetlands, where the non-RPW flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D: .

3. **Significant nexus findings for wetlands adjacent to an RPW but that do not directly abut the RPW.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D: .

D. DETERMINATIONS OF JURISDICTIONAL FINDINGS. THE SUBJECT WATERS/WETLANDS ARE (CHECK ALL THAT APPLY):

1. **TNWs and Adjacent Wetlands.** Check all that apply and provide size estimates in review area:
   - ☒ TNWs: ~840 linear feet ~80-100 width (ft), Or, acres.
   - ☐ Wetlands adjacent to TNWs: acres.

2. **RPWs that flow directly or indirectly into TNWs.**
   - ☐ Tributaries of TNWs where tributaries typically flow year-round are jurisdictional. Provide data and rationale indicating that tributary is perennial: .
   - ☐ Tributaries of TNW where tributaries have continuous flow "seasonally" (e.g., typically three months each year) are jurisdictional. Data supporting this conclusion is provided at Section III.B. Provide rationale indicating that tributary flows seasonally: .

Provide estimates for jurisdictional waters in the review area (check all that apply):
- ☐ Tributary waters: linear feet width (ft).
- ☐ Other non-wetland waters: acres.
  Identify type(s) of waters: .

3. **Non-RPWs[8] that flow directly or indirectly into TNWs.**
   - ☐ Waterbody that is not a TNW or an RPW, but flows directly or indirectly into a TNW, and it has a significant nexus with a TNW is jurisdictional. Data supporting this conclusion is provided at Section III.C.

   Provide estimates for jurisdictional waters within the review area (check all that apply):
   - ☐ Tributary waters: linear feet width (ft).
   - ☐ Other non-wetland waters: acres.
     Identify type(s) of waters: .

4. **Wetlands directly abutting an RPW that flow directly or indirectly into TNWs.**
   - ☐ Wetlands directly abut RPW and thus are jurisdictional as adjacent wetlands.
     - ☐ Wetlands directly abutting an RPW where tributaries typically flow year-round. Provide data and rationale indicating that tributary is perennial in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: .
     - ☐ Wetlands directly abutting an RPW where tributaries typically flow "seasonally." Provide data indicating that tributary is seasonal in Section III.B and rationale in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: .

   Provide acreage estimates for jurisdictional wetlands in the review area: acres.

5. **Wetlands adjacent to but not directly abutting an RPW that flow directly or indirectly into TNWs.**
   - ☐ Wetlands that do not directly abut an RPW, but when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisidictional. Data supporting this conclusion is provided at Section III.C.

   Provide acreage estimates for jurisdictional wetlands in the review area: acres.

6. **Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs.**
   - ☐ Wetlands adjacent to such waters, and have when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisdictional. Data supporting this conclusion is provided at Section III.C.

   Provide estimates for jurisdictional wetlands in the review area: acres.

7. **Impoundments of jurisdictional waters.[9]**
   As a general rule, the impoundment of a jurisdictional tributary remains jurisdictional.
   - ☐ Demonstrate that impoundment was created from "waters of the U.S.," or
   - ☐ Demonstrate that water meets the criteria for one of the categories presented above (1-6), or
   - ☐ Demonstrate that water is isolated with a nexus to commerce (see E below).

E. ISOLATED [INTERSTATE OR INTRA-STATE] WATERS, INCLUDING ISOLATED WETLANDS, THE USE, DEGRADATION OR DESTRUCTION OF WHICH COULD AFFECT INTERSTATE COMMERCE, INCLUDING ANY SUCH WATERS (CHECK ALL THAT APPLY):[10]
- ☐ which are or could be used by interstate or foreign travelers for recreational or other purposes.
- ☐ from which fish or shellfish are or could be taken and sold in interstate or foreign commerce.
- ☐ which are or could be used for industrial purposes by industries in interstate commerce.
- ☐ Interstate isolated waters. Explain: .
- ☐ Other factors. Explain: .

Identify water body and summarize rationale supporting determination: .

---

[8] See Footnote # 3.
[9] To complete the analysis refer to the key in Section III.D.6 of the Instructional Guidebook.
[10] **Prior to asserting or declining CWA jurisdiction based solely on this category, Corps Districts will elevate the action to Corps and EPA HQ for review consistent with the process described in the Corps/EPA *Memorandum Regarding CWA Act Jurisdiction Following Rapanos.***

Provide estimates for jurisdictional waters in the review area (check all that apply):
☐ Tributary waters: linear feet width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: .
☐ Wetlands: acres.

F. NON-JURISDICTIONAL WATERS, INCLUDING WETLANDS (CHECK ALL THAT APPLY):
☐ If potential wetlands were assessed within the review area, these areas did not meet the criteria in the 1987 Corps of Engineers Wetland Delineation Manual and/or appropriate Regional Supplements.
☒ Review area included isolated waters with no substantial nexus to interstate (or foreign) commerce.
☒ Prior to the Jan 2001 Supreme Court decision in "*SWANCC*," the review area would have been regulated based solely on the "Migratory Bird Rule" (MBR).
☐ Waters do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction. Explain: .
☐ Other: (explain, if not covered above): .

Provide acreage estimates for non-jurisdictional waters in the review area, where the sole potential basis of jurisdiction is the MBR factors (i.e., presence of migratory birds, presence of endangered species, use of water for irrigated agriculture), using best professional judgment (check all that apply):
☐ Non-wetland waters (i.e., rivers, streams): linear feet width (ft).
☐ Lakes/ponds: acres.
☐ Other non-wetland waters: acres. List type of aquatic resource: .
☐ Wetlands: acres.

Provide acreage estimates for non-jurisdictional waters in the review area that do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction (check all that apply):
☐ Non-wetland waters (i.e., rivers, streams): linear feet, width (ft).
☐ Lakes/ponds: acres.
☐ Other non-wetland waters: acres. List type of aquatic resource: .
☐ Wetlands: acres.

SECTION IV: DATA SOURCES.

A. SUPPORTING DATA. Data reviewed for JD (check all that apply - checked items shall be included in case file and, where checked and requested, appropriately reference sources below):
☒ Maps, plans, plots or plat submitted by or on behalf of the applicant/consultant: .
☒ Data sheets prepared/submitted by or on behalf of the applicant/consultant.
☒ Office concurs with data sheets/delineation report.
☐ Office does not concur with data sheets/delineation report.
☐ Data sheets prepared by the Corps: .
☐ Corps navigable waters' study: .
☐ U.S. Geological Survey Hydrologic Atlas: .
☐ USGS NHD data.
☐ USGS 8 and 12 digit HUC maps.
☒ U.S. Geological Survey map(s). Cite scale & quad name: 1:24K; NY-Lancaster.
☒ USDA Natural Resources Conservation Service Soil Survey. Citation: NY-Lancaster; Soil Survey of Erie County, New York.
☒ National wetlands inventory map(s). Cite name: NY-Lancaster.
☐ State/Local wetland inventory map(s): .
☐ FEMA/FIRM maps: .
☒ 100-year Floodplain Elevation is: 614.13' (National Geodectic Vertical Datum of 1929)
☐ Photographs: ☐ Aerial (Name & Date): .
or ☐ Other (Name & Date): .
☐ Previous determination(s). File no. and date of response letter: .
☐ Applicable/supporting case law: .
☐ Applicable/supporting scientific literature: .
☐ Other information (please specify): .

B. ADDITIONAL COMMENTS TO SUPPORT JD: Two on-site wetlands (W1 and W2) were investigated during a July 24, 2008 site visit. These two wetland areas were located approximately 170 feet northwest of Cayuga Creek (a perennial RPW). The perimeters of these two wetland areas were walked and no evidence of a connection to waters of the United States was observed. There were no drainage channels that led from these wetland areas into Cayuga Creek and there was no evidence of water flow out of the wetland area (e.g., debris

wracking) between the wetland areas and Cayuga Creek. Additionally, these two depressional wetland areas were situated approximately 24 feet above the Cayuga Creek elevation, on top of a bluff feature. Therefore, these two wetland areas were determined to be isolated, intrastate wetlands. None of the 328.3(a)(3)(i-iii) factors are relevant in this case. The wetlands do no support recreational or other use by interstate travelers, nor do they provide habitat for fish or shellfish. The weltands offer no use for industrial or commercial purposes. The wetlands are isolated depressions on the landscape.

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