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Before the Environment and Public Works Committee of the United States Senate
Reviewing the Technical, Scientific, and Legal Basis of the Waters of the U.S. Rule
April 26, 2017

On behalf of the National Wildlife Federation, our six million members and supporters—including millions of conservation-minded hunters, anglers, and outdoor enthusiasts—and more than fifty state and territorial affiliates, we thank you for the opportunity to testify before your committee and submit this written testimony on an issue of great importance to our members and the wildlife they champion: Clean Water. The National Wildlife Federation has championed clean and healthy rivers and streams since our founding in 1936. Conserving our Nation's wetlands, streams, and rivers for fish, wildlife, and communities is at the core of our mission. We worked closely with Senator Muskie to pass the Clean Water Act in 1972 and have worked hard to fulfill its promise of clean water for all Americans ever since. We believed then—and still believe today—that the best way to improve water quality is to prevent pollution at its source, which is much cheaper than trying to remove pollution downstream. Since the *SWANCC* and *Rapanos* U.S. Supreme Court decisions issued in 2001 and 2006, respectively, we have been actively engaged in the effort to clarify the definition of "Waters of the United States" that underpins the 1972 Clean Water Act. We appreciate this opportunity to submit testimony reviewing the strong technical, scientific, legal, and public support for the Environmental Protection Agency ("EPA") and the Army Corps of Engineers ("Corps") Clean Water Rule defining "Waters of the United States" under the Clean Water Act.

We respectfully offer nine key points about the Clean Water Rule for the Committee's consideration:

1. The Clean Water Rule Responds to – and Is Consistent With – the Supreme Court's Direction in *SWANCC* and *Rapanos*.
2. The Final Clean Water Rule Clarifies and Limits -- But *Does Not Expand* – the Historic Scope of Clean Water Act Jurisdiction.
3. The Clean Water Rule is based on a state-of-the-art review of the science, incorporating the basic principles and findings of connectivity science in order to meet the goals of the Clean Water Act.
4. The Clean Water Rule Strengthens the Clean Water Act's Federal-State Cooperative Federalism Framework and Empowers States to Better Protect State Waters within this Framework
5. The Final Clean Water Rule Addresses Many of the Concerns Raised by State, Agricultural, and Small Business Stakeholders during the Extended and Rigorous Rulemaking Process.
6. The Clean Water Rule Proactively Protects Water Supplies and Reduces the Need for More

Expensive Downstream Pollution Removal Investments.

7. The Clean Water Rule's Protection of Headwater Streams and Wetlands is Essential to the Conservation of Thousands of Aquatic Species That Face Potential Extinction.
8. The Clean Water Rule Fosters Strong Local Economies and Millions of Jobs that Depend upon Clean and Abundant Water and Healthy Wetlands and Waterways.
9. The Clean Water Rule, like the Clean Water Act, Enjoys Widespread, Bi-Partisan Support.

Background: The goal of the 1972 Clean Water Act was to "restoring and maintaining the chemical, physical, and biological integrity of the Nation's waters" to ensure fishable, swimmable, drinkable waters. This has historically been a bipartisan goal and we believe it still is—and must be. For more than 40 years, driven by the Clean Water Act, we have invested in and shared responsibility for the cleanup of our rivers, streams, and iconic lakes and bays - from Puget Sound and Oregon's Williamette River to the Platte River that flows from Wyoming and Oregon through Nebraska. From the Buffalo National River in the Arkansas Ozarks to Lake Michigan, and the Chesapeake and Delaware Bays.

Whereas capital investments in water infrastructure are essential to make water supplies safe to drink and remove pollution from wastewater, the Clean Water Act is the best tool our nation has to proactively protect our water resources and reduce our long-term capital requirements. Clearly defining the "Waters of the United States" within the Act's safeguards is essential for the Act to work effectively, which is why EPA Administrators serving Republican Presidents, from Russell Train (1973-1977) to William Reilly (1989-1993), strongly supported broad protections for wetlands and streams. Republican leader Senator Howard Baker of Tennessee echoed these words of support when the Clean Water Act was amended in 1977: "[t]he once seemingly separate types of aquatic systems are, we now know, interrelated and interdependent. We cannot expect to preserve the remaining qualities of our water resources without providing appropriate protection for the *entire resource*."[1] In 1986, the Reagan administration developed the inclusive definition of waters of the United States[2] and President George H.W. Bush confirmed "no net loss" of wetlands as his administration policy in January, 1989.

Members of this Committee have historically understood the importance—and the challenges—of clearly and carefully defining the Waters of the United States in a manner that ensures the health of our critical water resources while also respecting landowners, safeguarding downstream communities, restoring fish and wildlife populations, and protecting water resources that are the foundation for a robust economy.

The Clean Water Rule was developed by the EPA and the Army Corps of Engineers after several years of stakeholder engagement and after a state-of-the-art evaluation of the science on the connectivity of wetlands and headwater streams. Sportsmen, conservation groups, and many other stakeholders submitted over one million public comments that helped to shape the final rule, which was broadly celebrated for restoring guaranteed protections to headwater streams and millions of acres of wetlands previously at greater risk of being polluted or destroyed because of legal

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[1] 123 Cong. Rec. 26,718 (Aug. 4, 1977) (emphasis added).

[2] See http://www2.epa.gov/sites/production/files/2015-06/documents/epa-hq-ow-2011-0880-20862.pdf at 37056.

confusion. We believe the rule that was developed was legally sound, scientifically supported, and represented an appropriate jurisdictional balance consistent with the Clean Water Act.

Key point: The National Wildlife Federation strongly encourages the Committee to support the Clean Water Rule. To rescind the Rule and instead use former Supreme Court Justice Antonin Scalia's plurality opinion in *Rapanos v. United States* as a basis for revision could harm the drinking water supplies of more than 117 million Americans by leaving nearly as many as 60% of U.S. streams without the protection of the Clean Water Act. At least 20 million acres of wetlands, many of which provide essential water quality, flood protection, and fish and wildlife habitat, are at risk as well. In fact, the rate of wetlands loss increased by 140% during the 2004-2009 period – the years immediately following the Supreme Court decisions. This is the first documented acceleration of wetland loss since the Clean Water Act was enacted more than 40 years ago during the Nixon administration. Such a rollback of stream and wetland protections will cause irreparable harm for fish and wildlife, hunting and fishing, the outdoor recreation economy, and clean drinking water.

Economic Benefits: Clean water is not simply good for the environment, it is essential for a thriving economy. As we document in our statement below, this rule clarifying and restoring Clean Water Act protections fosters strong local economies and millions of jobs. Healthy wetlands and streams are economic engines for local recreation-based economies. Every year 47 million Americans head to the field to hunt or fish. For example, the American Sportfishing Association reports that anglers generated more than $201 billion in total economic activity in 2011, supporting more than 1.5 million jobs—more than 30% of the total $646 billion outdoor economy. Further, in some rural, mountain communities, river recreation and related activities generate the largest share of the local economy. Indeed, throughout the headwaters states, river recreation, including boating, fishing and wildlife watching, represents billions of dollars in commerce. These fishing and river guides, outfitters, bait shops, hotels and coffee shops are true small businesses that form the backbone of many rural communities. And they depend upon clean water and healthy wetlands, lakes, and streams.

Before providing detail on our nine key points, I would like to share with the committee a bit of my experience as a former Secretary of Natural Resources of the State of Delaware related to water quality and the Clean Water Act. The State of Delaware may have limited landmass, but the challenges we face in Delaware in keeping our water resources clean, healthy, and productive—and the importance of a strong Clean Water Act as a foundation for our state efforts—are similar to those faced in states across the country. Right now more than 90% of Delaware waterways fail to meet either drinking, swimming, or fishing standards. Further, more than $100 million in additional annual investment is needed if Delaware is to achieve its water quality and flood abatement goals, which have been challenging to achieve due to toxic legacy pollution, increased stormwater runoff pollution, and pollution originating beyond Delaware's borders.

Here are a few takeaways from my home state:

- Delaware is primarily a rural state, sharing the Delmarva Peninsula with Maryland and Virginia, with hundreds of miles of headwater streams and creeks that flow (at times through shallow groundwater) either to the Chesapeake Bay on the west, the Delaware

River and estuary to the north and east, or the Inland bays associated with the Delaware beaches to the southeast.

- As in many states, the health of our economy and our residents is directly linked to the health of our natural resources. To protect the health and welfare of our Delaware residents, we must foster economic productivity while also protecting water supplies and waterways crucial to the health and welfare of all Delawareans, as well as to businesses that depend on clean water. Agriculture, including poultry production, is a key industry in Delaware, as are commercial shellfishing and manufacturing—all of which depend upon abundant clean water. Delaware also benefits from a multibillion dollar tourism economy that is fueled by healthy waterways and beaches, including a robust wildlife-based recreation economy with an estimated $325 million spent annually on wildlife recreation in Delaware annually, including $104 million on fishing alone. More than 344,000 Delaware residents and visitors participated in these recreational activities throughout the state. Further, Delaware's thriving craft beer brewing industry also relies on clean water and contributes almost $200 million to our economy every year and support more than 1,800 jobs.

- To protect Delaware's water resources, we must continue to work to reduce pollution from key sectors including development, agriculture, and industrial operations, which discharge runoff pollution into Delaware's smaller streams that more than 281,400 Delawareans (30%) depend upon for their drinking water.

- EPA estimates that 55% of Delaware's streams are headwater streams with no other streams flowing into them, and that only 11% do not flow year-round. These smaller streams are among those for which the extent of Clean Water Act protections has been questioned, particularly based on the *Rapanos* plurality jurisdictional test.

- Many of the "ditches" found in Delaware are really streams that have been relocated, straightened, enlarged or otherwise modified by humans at some point over the past 200 years. These ditch and stormwater systems connect non-navigable streams and adjacent wetlands to downstream waters, conducting pollutants downstream into the Chesapeake, Delaware, and Inland Bays.

- Commenting in support of the Clean Water Rule in 2014, former Secretary of Natural Resources and Environmental Control David Small said: "Delaware needs clear and consistent support from the EPA and Corps that irreplaceable Delmarva Bays are protected by the CWA…Delaware has authority to only regulate tidal wetlands and is dependent upon the Corps to administer CWA Section 404 to regulate non-tidal wetlands. There are diminishing resources in the Corps Philadelphia District in recent years which affects the regulatory application and enforcement of Section 404 in Delaware. These necessary resources are essential to protecting non-tidal wetlands and waters for the people of Delaware."

- Delaware has consistently supported an clear, consistent definition of Waters of the U.S. Delaware joined 34 other states in 2006 to urge the Supreme Court to uphold strong federal clean water protections and in 2003 opposed Bush administration efforts to roll back protections for small streams and wetlands. DNREC's 2014 rulemaking comments supporting the Clean Water Rule added: "The proposed rule affects the implementation of CWA Sections 303(d), 319, 402 and 404, and states need direction, clarification and consistency within the proposed rule to administer these water authorities."

Additional Background on Key Points:

1. **<u>The Clean Water Rule Responds to – and Is Consistent With – the Supreme Court's Direction in *SWANCC* and *Rapanos*</u>.**

The Clean Water Rule revises the longstanding definition of "waters of the United States" subject to the Clean Water Act in response to the Supreme Court's decisions in *Solid Waste Agency of Northern Cook County v. U.S. Army Corps of Engineers ("SWANCC")*,[3] and *Rapanos v. United States.*[4] The Environmental Protection Agency (EPA) and the Army Corps of Engineers (Corps) took on this historic rulemaking because at least two of the Supreme Court Justices clearly called for it in their *Rapanos* concurring opinions: Chief Justice Roberts[5] and Justice Breyer,[6] and a majority in *Rapanos* embraced the role of expert agency regulations to clarify which waters are – and are not – "waters of the United States."

The 2001 *SWANCC* decision was narrow. It simply precluded the Corps from asserting jurisdiction over certain ponds based solely on their use by migratory birds. It did not overturn any aspect of the existing waters of the U.S. regulatory definition, including the provision protecting waters beyond those that qualify as tributaries or adjacent wetlands. In 2006, in *Rapanos*, the Supreme Court issued a fractured (4-1-4) decision involving wetlands adjacent to non-navigable tributaries of traditional navigable waters. Importantly, the Court issued five opinions, none of which garnered a majority. In the ensuing litigation implementing the Court's opinions, Justice Kennedy's opinion establishing the "significant nexus" analysis has been widely accepted by the U.S. Courts of Appeals. Justice Kennedy's "significant nexus" test requires a showing – through regulation or case-by-case review – that the ecological linkages between smaller or more remote waterbodies and navigable waters, "alone or in combination," must be more than "speculative or insubstantial."

The Clean Water Rule closely tracks Kennedy's pivotal significant nexus test, grounding its definition of which waters are protected in science-based findings of significant nexus to traditionally navigable and interstate waters. The Federal Register preambles to the proposed and final rules include an extensive legal analysis documenting the rule's reliance on the significant nexus test. **As a binding rule, promulgated through a rigorous, transparent, and extended rulemaking process, the rule's revised definition of "waters of the United States" will provide greater certainty and consistency in jurisdictional determinations for landowners, federal and state agency field staff, and the courts. It will also ensure that longstanding clean water**

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[3] 531 U.S.159 (2001).
[4] 126 S. Ct. 2208 (2006).
[5] 547 U.S. at 757-58.
[6] 547 U.S. at 812.

protections continue to safeguard millions of wetland acres and stream miles that have been in legal limbo for more than a decade.

2. **<u>The Final Clean Water Rule Clarifies and Limits -- But *Does Not Expand* – the Historic Scope of Clean Water Act Jurisdiction</u>.**

The final rule clarifies and definitively restores Clean Water Act protection to two major categories of waters, while drawing clarifying and limiting boundaries:

1. Tributaries to traditionally navigable and interstate waters and the territorial seas. For example, intermittently-flowing headwater streams that have a defined bed and bank and ordinary high water mark, and flow to a traditionally navigable or interstate water body; and

2. Wetlands, lakes, and other water bodies located adjacent to these tributaries (including those within the 100-yr floodplain up to a maximum distance of 1,500 ft.).

Based on a careful review of the wetland science and the "significant nexus" test, the final rule also authorizes protections for waters that are "similarly situated" and located beyond river floodplains when they significantly affect downstream waters' condition. As independent scientific advisors recommended, the rule also finds that specified wetlands -- prairie potholes in the Dakotas, western vernal pools in California, Carolina and Delmarva bays and pocosins along the Atlantic coastal plain, and Texas coastal prairie wetlands along the Gulf of Mexico -- are "similarly situated" in how they provide fish and wildlife habitat, especially for waterfowl, important flood storage and drought resistance, and critical pollution filtration..

While these clarifications remove uncertainty, and better protect many wetlands and streams that have been at risk for the last decade, the fact is that the final Clean Water Rule actually *narrows* the historic scope of Clean Water Act jurisdiction, excluding protections for some wetlands and other waters protected for almost 30 years prior to 2001. Indeed, in our view, a couple of the 2015 Clean Water Rule's waters of the U.S exclusions go too far, removing protections for wetlands and other waters that the science indicates are likely to have a significant nexus to downstream traditionally navigable or interstate waters.

First and foremost, the rule deletes the pre-existing and longstanding "other waters provision that provided Clean Water Act jurisdiction over many types of waters based on their potential effect on interstate commerce. Given the breadth of the federal commerce clause power, and the Clean Water Act legislative intent to regulate to the full extent of that power, this provision provided for Clean Water Act coverage for over millions of wetland acres protected for almost 30 years prior to 2001. In response to the Court's consideration of waters' ecological links to downstream waters, EPA and the Corps deleted this section and instead expressly linked all jurisdictional "waters of the U.S." determinations to science-based findings of significant nexus to downstream waters. As a result, many of the intrastate, non-navigable, geographically "isolated" wetlands, lakes, and ponds previously covered by the Clean Water Act regulations will no longer be covered under the final Clean Water Rule.

Second, the definition of "waters of the U.S." includes – for the first time -- a clear definition

of "tributary" that both clarifies and limits Clean Water Act jurisdiction over streams, ditches, and other tributaries. To be guaranteed protection as a tributary, a waterway must have a bed, bank, and ordinary high water mark. To further clarify what is *not* a protected tributary, the final rule expressly excludes – again for the first time – several types of ditches, as well as gullies, rills, non-wetland swales, and lawfully constructed grassed waterways.

In further response to concerns from agricultural and water treatment and delivery sectors, and in addition to existing exemptions for prior converted cropland and waste treatment systems, **the final rule also explicitly excludes from the definition of waters of the U.S. other water features in dry land, including artificially irrigated areas, stormwater control features and wastewater recycling systems**.

In addition, the final rule adds physical and measurable distance limits to define adjacent waters, further narrowing jurisdiction and excluding wetlands and other waterbodies previously covered by the Clean Water Act.

And, of course, the final rule does not alter the Clean Water Act provisions generally excluding several activities from applicable permitting requirements:

- Common farming and ranching practices, including "**plowing, cultivating, seeding, minor drainage, harvesting** for the production of food, fiber, and forest products;"
- "Construction or maintenance of **farm or stock ponds or irrigation ditches, or the maintenance of drainage ditches**;"
- "**Agricultural stormwater discharges and return flows from irrigated agriculture**;"
- "Construction of **temporary sediment basins** on a construction site;" and
- "Construction or maintenance of **farm or forest roads or temporary roads for moving mining equipment.**"

3. <u>The Clean Water Rule is based on a state-of-the-art review of the science, incorporating the basic principles and findings of connectivity science in order to meet the goals of the Clean Water Act.</u>

Closely tracking Justice Kennedy's pivotal significant nexus test, the Clean Water Rule definition of which waters are protected is grounded in the agencies' science-based findings of significant nexus to traditionally navigable and interstate waters and EPA's Connectivity Report, *The Connectivity of Streams and Wetlands to Downstream Waters: A Review and Synthesis of the Scientific Evidence*.[7] Below are excerpted and summarized some of the key principles and findings of wetland and stream scientists derived from the Connectivity Report that form the scientific foundation for the Clean Water Rule. *See* Connectivity Report; Scientists Letter to the Chair and Ranking Member of the Senate Committee on Environment and Public Works, Subcommittee on Fisheries, Water, and Wildlife *re: Scientists Strongly Oppose S.1140, Legislation Undermining Needed Protections for the Nation's Streams, Wetlands, and Other Waters*, dated May 18, 2015;

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[7] *See* *https://cfpub.epa.gov/ncea/risk/recordisplay.cfm?deid=296414&CFID=56176401&CFTOKEN=47329782*

and the Amicus Curiae Brief of Dr. M. Siobhan Fennessy, Dr. Carol A. Johnston, Dr. Marinus L. Otte, Dr. Margaret Palmer, Dr. James E. Perry, Professor Charles Simenstad, Dr. Benjamin R. Tanner, Dr. Dan Tufford, Dr. R. Eugene Turner, Dr. Kirsten Work, Dr. Scott C. Yaich, and Dr. Joy B. Zedler in Support of Upholding the Clean Water Rule in *Murray Energy Corporation et al v. U.S EPA, et al* (6th Cir. January 20, 2017).

Rivers are networks, and their downstream navigable portions are inextricably linked to small headwaters just as fine roots are an essential part of the root structure of a tree or our own circulatory system is dependent on the function of healthy capillaries. Longstanding and robust scientific research (like those studies included in EPAs Connectivity Report) has demonstrated that ecological processes in navigable rivers reflect what is occurring in their headwaters as well as in associated geographically isolated wetlands, floodplains, and tributaries.

A sizable portion of a river network is in intermittent and headwater streams. In arid states such as Arizona, Utah, and Colorado, from 71 to 96% of stream miles have been classified as ephemeral or intermittent. Intermittent streams are also significant in states that receive more rainfall. In Alabama, 80% of stream miles in the National Forests are considered intermittent because they go dry during late summer or autumn; intermittent streams in Michigan comprise 48% of the length of stream channels in the state. These examples illustrate the extent of intermittent streams in river networks throughout the Nation.

As the Science Advisory Board (SAB) concluded from the 2014 *Connectivity Report:*

> **There is strong scientific evidence to support the EPA's proposal to include all tributaries within the jurisdiction of the Clean Water Act. Tributaries, as a group, exert strong influence on the physical, chemical, and biological integrity of downstream waters, even though the degree of connectivity is a function of variation in the frequency, duration, magnitude, predictability, and consequences of physical, chemical and biological processes.**

Small streams and wetlands contribute to the physical integrity of navigable rivers – they help retain water during storms and can decrease the intensity of floods. They also help recharge groundwater and other sources of water for drinking, irrigation, and industry.

Small streams and wetlands also contribute to the chemical integrity of navigable rivers –they help reduce contaminants and help with nutrient removal. For example, Delmarva bay wetlands help protect water quality and improve functions for water that flows through them to the Chesapeake Bay.

Small streams and wetlands contribute to the biological integrity of navigable rivers. They supply food resources to riparian and downstream ecosystems. Small streams are a refuge at critical life history stages or during critical times of the year for many fish species. They also serve as vital spawning and nursery habitats for many fish species including many prized sport fishes. Small streams and wetlands also provide critical habitat for a number of species.

As the SAB concluded from the 2014 *Connectivity Report:*

> **The available science supports the EPA's proposal to include adjacent waters and wetlands as waters of the United States. This is because adjacent waters and wetlands have a strong influence on the physical, chemical, and biological integrity of navigable waters.**

The SAB also advised EPA:

> **The available science, however, shows that groundwater connections, particularly via shallow flow paths in unconfined aquifers, are critical in supporting the hydrology and biogeochemical functions of wetlands and other waters. Groundwater also connects waters and wetlands that have no visible surface connections.**

The SAB also concluded:

> **The scientific literature has established that "other waters" can influence downstream waters, particularly when considered in aggregate. Thus, it is appropriate to define "other waters" as waters of the United States on a case-by-case basis, either alone or in combination with similarly-situated waters in the same region.**

The SAB further concluded:

> **There is also adequate scientific evidence to support a determination that certain subcategories and types of "other waters" in particular regions of the United States (e.g., Carolina and Delmarva Bays, Texas coastal prairie wetlands, prairie potholes, pocosins, western vernal pools) are similarly situated (i.e., they have a similar influence on the physical, biological, and chemical integrity of downstream waters and are similarly situated on the landscape) and thus are waters of the United States.**

4. <u>The Clean Water Rule Strengthens the Clean Water Act's Federal-State Cooperative Federalism Framework and Empowers States to Better Protect State Waters within this Framework</u>.

In 2006, more than 30 state attorneys general filed an amicus brief in *Rapanos* recognizing the essential Federal-State cooperative federalism framework for protecting the Nation's waters and supporting the Bush Administration's inclusive view of Clean Water Act coverage to meet the goals of the Clean Water Act. In September 2014, the State Attorneys General of New York, Connecticut, Delaware, Illinois, Maryland, Rhode Island, and Washington, and the District of Columbia submitted comments to EPA Administrator McCarthy in support of the proposed Clean Water Rule, reiterating the importance of inclusive Clean Water Act jurisdiction to protecting the waters of their states and the health and welfare of their citizens. In 2015, the States of New York, Connecticut, Hawaii, Massachusetts, Oregon, Vermont, and Washington, and the District of Columbia, reiterated these views when they moved to intervene in court in support of the Clean Water Rule.

The state attorneys general explained their interest in the Clean Water Rule as follows:

> *"First….* The health and integrity of watersheds, with their networks of tributaries and wetlands that feed downstream waters, depend upon protecting the quality of upstream headwaters and adjacent wetlands. Moreover, watersheds frequently do not obey state boundaries, with all of the lower forty-eight states having waters that are downstream of the waters of other states. Thus, coverage under the Act of ecologically connected waters secured by the Rule is essential to achieve the water quality protection purpose of the Act, and to protect Proposed Intervenor States from upstream pollution occurring outside their borders.
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> *"Second*, by clarifying the scope of "waters of the United States," the rule promotes predictability and consistency in the application of the law, and in turn helps clear up the confusing body of case law that has emerged in the wake of the Supreme Court's *Rapanos* decision. The Rule accomplishes this by reducing the need for case-by-case jurisdictional determinations and, where such determinations are needed, by clarifying the standards for conducting them. Each of the Proposed Intervenor States implements programs under the Act. Thus, the rule is of direct benefit to movants because it helps alleviate administrative burdens and inefficiencies in carrying out those programs. In addition, the rule would help the States in administering the federal dredge-and-fill program if they choose to do so. *See* 33 U.S.C. §1344 (allowing States to implement a permitting program for dredge and fill material).
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> *"Third*, the rule advances the Act's goal of securing a strong federal "floor" for water pollution control, thereby protecting the economic interests of Proposed Intervenor States and other downstream states. The Rule allows movants to avoid having to impose costly, disproportionate, and economically harmful limits on instate pollution sources to waters within their borders, in order to offset upstream discharges that would otherwise go unregulated if the upstream waters are deemed to fall outside the Act's jurisdiction and are not otherwise regulated by upstream states. **The Rule protects the economies of Proposed Intervenor States because it serves to "prevent the 'Tragedy of the Commons' that might result if jurisdictions can compete industry and development by providing more liberal limitations than their neighboring states."** *NRDC*, 568 F.2d at 1378 (quoting *Train*, 510 F.2d at 709)."[8]

On a practical level, the state of play that preceded the Clean Water Rule (reflected in EPA/Army Corps guidance from 2008) has resulted in delays, confusion and uncertainty for applicants seeking permits along with increased workloads for Corps and EPA officials. EPA's costs to enforce CWA 402, 404, and 311 have increased significantly due to the incremental resources required to assert jurisdiction post *SWANCC* and *Rapanos*.[9] Because it can be difficult to establish where the CWA applies after the Supreme Court's decisions in *SWANCC* and *Rapanos*, enforcement efforts have shifted away from small streams high in the watershed where jurisdiction is a potential issue. Post-*Rapanos* uncertainty and added time and expense is undermining Clean Water Act enforcement

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[8] NY et al Motion to Intervene (6th Cir. August 28, 2015) (emphasis added).

[9] *See* 2014 EPA Economic Analysis at 30-31, at: http://www2.epa.gov/sites/production/files/2014-03/documents/wus_proposed_rule_economic_analysis.pdf.

and the overall effectiveness of the Clean Water Act in maintaining and restoring the nation's waters.

A key attribute of the Clean Water Rule is its additional clarity, relieving federal and state agencies and landowners alike of the confusing and burdensome case-by-case jurisdictional determinations required under the guidance for plans to discharge pollutants into most wetlands and streams. Ironically, the Clean Water Rule litigation and the current stay of the final rule not only extend but actually contribute to confusion and delay by discouraging EPA and the Corps from providing things like field level training and workshops concerning the implementation of the rule. Rescinding the Clean Water Rule will only extend the confusion, delay, and inconsistencies in Clean Water Act jurisdictional determinations.

5. The Final Clean Water Rule Addresses Many of the Concerns Raised by State, Agricultural, and Small Business Stakeholders during the Extended and Rigorous Rulemaking Process.

The final Clean Water Rule is the product of four years of rigorous and transparent scientific and public policy deliberation. See the attached Timeline 2001-2016. In 2011, in the face of congressional inaction, EPA and the Corps formally launched an administrative effort to clarify the "waters of the U.S." The 2011 Proposed Guidance was the subject of extensive interagency review, economic analysis, and public notice and comment. Approximately 250,000 comments were submitted on the guidance, and these overwhelmingly supported the revised guidance.

In 2011-2012, on a parallel track, the EPA Office of Research and Development compiled a draft science report, *The Connectivity of Streams and Wetlands to Downstream Waters: A Review and Synthesis of the Scientific Evidence* (Connectivity Report).[10] This scientific report, based on peer-reviewed literature and an additional review by independent scientists, was prepared to inform the Administration's proposed rule clarifying which waters are protected under the Clean Water Act. In July 2013, the EPA Science Advisory Board (SAB) launched an SAB Expert Scientific Peer Review of the Connectivity Report.[11] In September 2013, the agencies released the Draft Connectivity of Streams and Wetlands Science Report for public comment. Also in September 2013, after holding up action on the Clean Water guidance in the Office of Management (OMB) for almost two years, the Administration sent its draft proposed Clean Water Rule to OMB for interagency review.

In March 25, 2014, after months of interagency review, the EPA and the Army Corps of Engineers jointly proposed the formal rule clarifying and partially restoring the historic scope of waters protected under the Clean Water Act. The 2-page proposed rule text in the federal register was thoroughly explained and supported by a lengthy preamble, including both scientific and legal

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[10] *See* *https://cfpub.epa.gov/ncea/risk/recordisplay.cfm?deid=296414&CFID=56176401&CFTOKEN=47329782*

[11] *See* SAB Peer Review process at: http://yosemite.epa.gov/sab/sabproduct.nsf/fedrgstr_activites/Watershed%20Connectivity%20Report!OpenDocument&TableRow=2.1#2.

appendices, the publicly available Connectivity Science Report, and a thorough Economic Analysis. **The 200-day public comment period ended November 14, 2014.[12] Americans submitted over 1 million comments on the proposed rulemaking, and these comments were overwhelmingly in support of the rulemaking.**

In late September-early October 2014, the SAB issued reports affirming the scientific basis for the proposed rule (SAB Rule Letter) [13] and affirming – with recommendations for enhancing – the scientific accuracy of the Connectivity Report (SAB Connectivity Peer Review Letter).[14] The Connectivity Report was revised and strengthened in accordance with the SAB recommendations and was released in final form in January 2015.[15] **Both the SAB report and the Final Connectivity Report inform the agencies' final "waters of the U.S." rule.**

Throughout 2014, EPA held hundreds of stakeholder meetings, including repeated meetings with agricultural, municipal, small business entities, and other stakeholders seeking improved clarity in the rulemaking. This rigorous and transparent rulemaking process offers the best opportunity in a generation to clarify which waters are – and are not – waters of the U.S. subject to the Clean Water Act in a manner that provides significantly more clarity.

6. The Clean Water Rule Proactively Protects Water Supplies and Reduces the Need for More Expensive Downstream Pollution Removal Investments.

The United States has an estimated water infrastructure investment deficit of more than $40 billion dollars per year for the next 25 years.[16] Much of this investment is needed to treat contaminated drinking water supplies to ensure they meet basic public health standards for consumption. There is no better investment to reduce this ever growing investment deficit that preventing additional pollution in the first place. In this case an ounce of prevention is truly worth a pound of cure—and while we must continue to invest in modernizing drinking water, wastewater, and storm water systems (including significantly expanding investments in natural infrastructure like wetland and stream restoration that remove pollution), we can avoid exacerbating the problem further by

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[12] *See* EPA Waters of the U.S. rulemaking process materials at: http://www2.epa.gov/uswaters.

[13] EPA SAB letter to Administrator McCarthy, *Science Advisory Board (SAB) Consideration of the Adequacy of the Scientific and Technical Basis of the EPA's Proposed Rule titled "Definition of Waters of the United States under the Clean Water Act"* (September 30, 2014) (SAB Rule Letter) at: http://yosemite.epa.gov/sab/sabproduct.nsf/518D4909D94CB6E585257D6300767DD6/$File/EPA-SAB-14-007+unsigned.pdf

[14] EPA SAB letter to Administrator McCarthy, *SAB Review of the Draft EPA Report Connectivity of Streams and Wetlands to Downstream Waters: A Review and Synthesis of the Scientific Evidence* (October 17, 2014) (SAB Connectivity Peer Review Letter) at: http://yosemite.epa.gov/sab/sabproduct.nsf/fedrgstr_activites/AF1A28537854F8AB85257D74005003D2/$File/EPA-SAB-15-001+unsigned.pdf

[15] *Final EPA Report: Connectivity of Streams and Wetlands to Downstream Waters: A Review and Synthesis of the Scientific Evidence* (January 2015) at: http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=296414#Download

[16] http://www.infrastructurereportcard.org/cat-item/drinking-water/

reducing the amount of additional pollution that enters our water supplies.

7. The Clean Water Rule's Protection of Headwater Streams and Wetlands is Essential to the Conservation of Thousands of Aquatic Species That Face Potential Extinction.

Research shows that, of the best-known groups of U.S. species, including birds, mammals, amphibians, fish and plants—most of which depend upon healthy freshwater systems—fully one third are at risk of extinction.[17] This includes one third of the 5,743 known species of frogs, toads, salamanders and caecilians.[18] Research also shows that one-third of native freshwater fish and nearly two-thirds of native freshwater mussels are at-risk of extinction across North America.[19] Further, the conservation of wetlands and headwater streams are important to game species from waterfowl to trout. Protecting and investing in headwater streams and wetlands is one of the best investments that we can make to save America's diverse fish and wildlife resources—and prevent the need for more restrictive regulations under the Endangered Species Act.

8. The Clean Water Rule Fosters Strong Local Economies and Millions of Jobs that Depend upon Clean and Abundant Water and Healthy Wetlands and Waterways.

EPA's economic analysis demonstrates that this rule to clarify and restore clean water protections is good for the economy. EPA estimates that the change in benefits of CWA programs exceeds the costs by a ratio of greater than 1:1. The economic analysis finds that the rule will provide at least $339 million and up to $572 million annually in benefits to the public, including reducing flooding, filtering pollution, providing fish and wildlife habitat, supporting hunting and fishing, and recharging groundwater. [20]

Healthy wetlands and streams are economic engines for local recreation-based economies. Every year 47 million Americans head to the field to hunt or fish. For example, the American Sportfishing Association reports that **anglers generated more than $201 billion in total economic activity in 2011, supporting more than 1.5 million jobs**.[21] The U.S Fish and Wildlife Service estimated that duck hunting in 2006 had a positive economic impact of more than $2.3 billion, supporting more than 27,000 private sector jobs.[22]

In some rural, mountain communities, river recreation and related activities generate the largest share of the local economy. Indeed, throughout the headwaters states, river recreation, including

[17] Stein, B.A., L.S. Kutner, and J.S. Adams. 2000. *Precious Heritage: The Status of Biodiversity in the United States.* New York: Oxford University Press.
[18] http://www.natureserve.org/library/amphibian_fact_sheet.pdf
[19] "National Strategy for the Conservation of Native Freshwater Mussels" The National Native Mussel Conservation Committee. *Shellfish Research, Vol. 17, No. 5, 1419-1428, 1998.*
[20] *See* Clean Water Rule: Definition of "Waters of the United States," 80 Fed. Reg. at 37101 (June 29, 2015).
[21] American Sportfishing Association, *Sportfishing in America* (January 2013).
[22] Economic Impact of Waterfowl Hunting in the United States, Addendum to the 2006 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation, November 2008. US Fish and Wildlife Service.

boating, fishing and wildlife watching, represent billions of dollars in commerce.[23] In the Colorado River Basin portion of Arizona, Colorado, Nevada, New Mexico, Utah, and Wyoming, 2.26 million people participated in water sports in 2011, spending $1.7 billion that generated $2.5 billion in total economic output.[24]

Another indication of the economic implications of protecting the Nation's water resources is revealed in the example of the actions taken by New York City to initiate a $250 million program to acquire and protect up to 350,000 acres of wetlands and riparian lands in the Catskill Mountains to protect the quality of its water supply rather than constructing water treatment plants which could cost as much as $6-8 billion. (Dailey et al. 1999). In South Carolina, a study showed that without the wetland services provided by the Congaree Swamp, a $5 million wastewater treatment plant would be required (http://water.epa.gov/type/wetlands/people.cfm).

The kinds of waters for which the rule guarantees protection also help filter out pollution that fuels hazardous algae outbreaks. These algal "blooms" can cause health problems and inflict high economic costs. For example, Dodds et al (2009) estimated that the total annual cost of the eutrophication of U.S. freshwaters was $2.2 billion. This estimate included recreational and angling costs, property values, drinking water treatment costs, and a conservative estimate of the costs of the loss of biodiversity. Polasky and Ren (2010) cited research that estimated that if two lakes (Big Sandy and Leech) in Minnesota had an increase in water clarity of three feet, lakefront property owners would realize a benefit of between $50 and $100 million.

By any measure, clarifying and restoring clean water protections for America's waters is a good investment for healthy communities and a healthy economy.

9. <u>The Clean Water Rule, like the Clean Water Act, Enjoys Widespread, Bi-Partisan Support</u>.

Poll after poll shows broad public support for clean water, the Clean Water Act, and the Clean Water Rule. In 2015, the bi-partisan team of Public Opinion Strategies and Greenberg Quinlan Rosner Research found that **83% of hunters and anglers supported using the Clean Water Act to protect small streams and wetlands.**[25] Due to the hunting and angling focus, the poll represented a conservative sample with 49% of the overall respondents identifying with the Tea Party. Duck hunters and anglers especially care about the health of waterways and wetlands, because they provide essential habitat for all species of ducks and freshwater fish. So it's not surprising that support for this policy was strong among sportsmen and women across the political spectrum with 77% of Republicans, 79% of Independents and 97% of Democrats in favor. **Fully 89% said that the Clean Water Act has been "more of a good thing" for the country, with**

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[23] Western Resource Advocates 2014 Rule Comments.
[24] SOUTHWICK ASSOC., ECONOMIC CONTRIBUTIONS OF OUTDOOR RECREATION ON THE COLORADO RIVER & ITS TRIBUTARIES (May 3, 2012) (Table E-3), *available at* http://protectflows.com/wp-content/uploads/2013/09/Colorado-River-Recreational-Economic-Impacts-Southwick-Associates-5-3-12_2.pdf.
[25] http://www.nwf.org/~/media/PDFs/Water/2015/2015-Sportsmen-Poll/National_NWF-Sportsmen-Water-Survey_2015.pdf

majorities of every single demographic sub-group echoing this sentiment. It comes as no surprise, then, that the Clean Water Rule enjoyed overwhelming public support through the extended rulemaking process.

It is worth remembering that in 2003, in the face of strong opposition, the Bush Administration's EPA was forced to withdraw an advanced notice of proposed rulemaking to potentially remove from Clean Water Act jurisdiction many non-navigable, intrastate wetlands, streams and other waters. That spring, 39 state agencies and hundreds of thousands of individuals and organizations submitted comments urging the EPA and the Corps not to reduce the historic scope of waters protected under the Clean Water Act. Later that year, over 200 members of Congress from both parties (including Rep. Paul Ryan among others) wrote a letter to President Bush urging him "not to pursue any policy or regulatory changes that would reduce the scope of waters protected under the Clean Water Act."

CONCLUSION

The National Wildlife Federation strongly supports this historic "waters of the United States" rulemaking as legally required, good for the domestic economy, and the best chance in a generation to clarify which waters are – and are not – "waters of the United States" protected by the 1972 Clean Water Act. The final Clean Water Rule, if allowed to stand and be affirmed by the Courts, would strengthen local economies, provide greater long-term certainty for landowners, and better protect important streams and wetlands and the fish, wildlife, and communities that depend upon them, while advancing our collective efforts to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters."

ATTACHMENTS:

Clean Water Rule Timeline 2001-2016

Scientists Letter to the Chair and Ranking Member of the Senate Committee on Environment and Public Works, Subcommittee on Fisheries, Water, and Wildlife *re: Scientists Strongly Oppose S.1140, Legislation Undermining Needed Protections for the Nation's Streams, Wetlands, and Other Waters*, dated May 18, 2015

Amicus Curiae Brief of Dr. M. Siobhan Fennessy, Dr. Carol A. Johnston, Dr. Marinus L. Otte, Dr. Margaret Palmer, Dr. James E. Perry, Professor Charles Simenstad, Dr. Benjamin R. Tanner, Dr. Dan Tufford, Dr. R. Eugene Turner, Dr. Kirsten Work, Dr. Scott C. Yaich, and Dr. Joy B. Zedler in Support of Upholding the Clean Water Rule **in** *Murray Energy Corporation et al v. U.S EPA, et al* (6th Cir. January 20, 2017).

Clean Water Rule Timeline: 2001 – 2016

- **January 2001 Supreme Court decides *Solid Waste Agency of Northern Cook Cty. v. Army Corps of Engineers (SWANCC)*:** The Supreme Court held (in a 5-4 opinion) that the use of "isolated" non-navigable intrastate ponds by migratory birds was not by itself a sufficient basis to find Clean Water Act jurisdiction over such waters.

- **2002 Introduction of the Clean Water Authority Restoration Act**: A bill to amend the 1972 Clean Water Act to clarify the jurisdiction of the United States over the Waters of the United States. Essentially this same legislation was introduced in each congressional session from 2002 through 2010.

- **January 2003 Advanced Notice of Proposed Rulemaking (ANPRM) and SWANCC Guidance:** The Bush Administration's EPA issues SWANCC guidance (immediately effective without advance public notice and comment) with an advanced notice of proposed rulemaking.

- **Spring 2003 Comments Opposing ANPRM:** 39 state agencies and hundreds of thousands of individuals and organizations submitted comments urging the EPA and the Corps not to reduce the historic scope of waters protected under the Clean Water Act.

- **November 2003 Congress Opposes Narrowing CWA Jurisdiction:** Over 200 members of Congress from both parties (including Rep. Paul Ryan among others) wrote a letter to President Bush urging him "not to pursue any policy or regulatory changes that would reduce the scope of waters protected under the Clean Water Act."

- **December 2003 Withdrawal of ANPRM:** The Bush Administration abandons its rulemaking to reduce the scope of waters covered by the Clean Water Act, but retains the SWANCC Guidance, effectively removing CWA protections for an estimated 20 million so-called "isolated" wetland acres.

- **June 2006 Supreme Court decides *Rapanos vs. the United States* and Carabell v. United States:** The Supreme Court issues a fractured (4-1-4) decision involving wetlands adjacent to non-navigable tributaries of traditional navigable waters. A four justice plurality found that "waters of the U.S" covers "relatively permanent, standing or continuously flowing bodies of water" (including some seasonally flowing rivers) that are connected to traditional navigable waters, as well as wetlands with a "continuous surface connection" to such relatively permanent waters. Justice Kennedy's concurring opinion disagrees with the plurality opinion, and concludes that "waters of the U.S." includes wetlands that possess a "significant nexus" with navigable waters. He finds that wetlands possess the requisite significant nexus if they "either alone or in combination with similarly situated [wet] lands in the region, significantly affect the chemical, physical, and biological integrity" of other covered waters more readily understood as navigable. Three of the various opinions urged the agencies to initiate a rulemaking clarifying the "waters of the U.S". The decision was a 4-1-4 ruling.

- **2006-2014: Federal Court Litigation on "Waters of the U.S" Mounts Post-Rapanos, adding to costly litigation, uncertainty, delay, and hampered Clean Water Act enforcement.**

- **2007-2008 Bush Administration Rapanos Guidance:** The Bush EPA issues immediately effective Rapanos Guidance without advance public notice and comment. This guidance largely ignores the Kennedy direction to base significant nexus determinations based on the combination of similarly situated waters and imposes a confusing and burdensome case-by-case jurisdictional requirement on most wetlands and streams. Modest revisions were made to the Bush Administration Guidance in 2008.

- **2009 Clean Water Restoration Act (CWRA) is favorably reported to the Senate Floor by the Senate Environment and Public Works Committee, but is stalled in Congress through 2010.** CWRA would have restored the historical scope of the Clean Water Act to those waters protected by the Act prior to the 2001 SWANCC decision, but not expanded the scope of jurisdiction beyond those covered at that time.

- **April 2011 Proposed Guidance:** EPA and the Corps proposed guidance for determining CWA jurisdiction to replace guidance issued in 2003 and 2008. The proposal also announced the agencies' plans to proceed with rulemaking. The 2011 Proposed Guidance was the subject of extensive interagency review, economic analysis, and public notice and comment. Approximately 250,000 comments were submitted on the guidance, and these overwhelmingly supported the revised guidance. The proposed guidance would provide more certain and predictable protections for many streams and wetlands by comparison to the existing 2003 and 2008 guidance documents. The 2011 guidance still required a case-specific finding of significant nexus, but it found that based on the combined downstream effects of tributaries and adjacent waters within a watershed, significant nexus and CWA jurisdiction were highly likely to be established for these categories of waters.

- **2011-2012: EPA Office of Research and Development compiles a draft science report, *The Connectivity of Streams and Wetlands to Downstream Waters: A Review and Synthesis of the Scientific Evidence*.** This scientific report, based on peer-reviewed literature and an additional review by independent scientists, informs the Administration's proposed rule clarifying which waters are protected under the Clean Water Act.

- **July 2013: EPA Science Advisory Board (SAB) Launches an SAB Expert Scientific Peer Review of the Connectivity Report.** SAB peer review process and substance available throughout process at: https://yosemite.epa.gov/sab/sabproduct.nsf/fedrgstr_activites/Watershed%20Connectivity%20Report!OpenDocument&TableRow=2.2#2.

- **September 2013: Administration Releases Draft Connectivity of Streams and Wetlands Science Report for public comment.**

- **September 2013: Administration Sends Proposed Clean Water Rule to OMB:** After holding up action on the Clean Water guidance in the Office of Management (OMB) for almost two years, the Administration sent its draft proposed Clean Water Rule to OMB for interagency review.

- **March 25, 2014: Administration Formally Proposes Clean Water Rule**: The EPA and the Army Corps of Engineers jointly propose the formal rule clarifying and partially restoring the historic scope of waters protected under the Clean Water Act. The 200+-day comment period ended November 14, 2014.

  - **EPA held over 100 meetings with state entities as well as many with agricultural and other stakeholders during the comment period:**
    - EPA Headquarters Proposed Rule Meetings/Events For Docket EPA-HQ-OW-2011-0880 (following the release of the proposed rule): http://www.regulations.gov/#!documentDetail;D=EPA-HQ-OW-2011-0880-13183
    - 2014 EPA Regional Proposed Rule Meetings/Events for Docket EPA-HQ-OW-2011-0880: http://www.regulations.gov/#!documentDetail;D=EPA-HQ-OW-2011-0880-13182

- **Summer 2014: Connectivity Report Peer-Review Wraps Up:** affirming the scientific synthesis and concluding that the scientific synthesis provides a sufficient scientific foundation for the Proposed Clean Water Rule.

- **October 17, 2014:** The Science Advisory Board's final peer review report supporting the draft Connectivity Report is formally issued.

- **November 14, 2014: Clean Water Rule public comment period ended, with over 1 million comments submitted.**

  - **EPA held dozens of meetings with stakeholders before finalizing the Clean Water Rule:** EPA Headquarters Stakeholder Meetings for Docket EPA-HQ-OW-2011-0880 Occurring After the Close of the Comment Period (November 14, 2014): http://www.regulations.gov/#!documentDetail;D=EPA-HQ-OW-2011-0880-20870

- **May 27, 2015: EPA and the Army Corps of Engineers signed the final Clean Water Rule.** The final rule was published in the federal register on June 29, 2015, available at https://www.epa.gov/sites/production/files/2015-06/documents/epa-hq-ow-2011-0880-20862.pdf and became effective on August 28, 2015.

- **October 9, 2015:** The Sixth Circuit U.S. Court of Appeals, ruling on the consolidated petitions from multiple circuits, issued a nationwide stay of the Clean Water Rule pending further resolution of the multi-district litigation challenging the rule.

- **February 22, 2016:** The Sixth Circuit panel found jurisdiction to review the merits of the Clean Water Rule. A petition to review en banc is under consideration.

- **Pending lifting of stays of the Clean Water Rule, the 2003 and 2008 guidance documents requiring cumbersome and confusing case-by-case jurisdictional determinations remain in effect.**

Case No. 15-3751/15-3799/15-3817/15-3820/15-3822/15-3823/15-3831/
15-3837/15-3839/15- 3850/15-3853/15-3858/15-3885/15-3887/15-3948/
15-4159/15-4162/15-4188/15-4211/15-4234/15-4305/15-4404

IN THE UNITED STATES COURT OF APPEALS
FOR THE SIXTH CIRCUIT

MURRAY ENERGY CORPORATION et al.,	)	In re: ENVIRONMENTAL PROTECTION AGENCY AND DEPARTMENT OF DEFENSE, FINAL RULE: CLEAN WATER RULE: DEFINITION OF "WATERS OF THE UNITED STATES," 80 FED. REG. 37,054 (JUNE 29, 2015)
Petitioners,	)	
v.	)	
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY; GINA MCCARTHY; UNITED STATES ARMY CORPS OF ENGINEERS; JOHN MCHUGH; JO-ELLEN DARCY,	)	
Respondents.	)	

On Petitions for Review of a Final Rule of the United States Environmental Protection Agency and the United States Army Corps of Engineers

Brief of Dr. M. Siobhan Fennessy, Dr. Carol A. Johnston, Dr. Marinus L. Otte, Dr. Margaret Palmer, Dr. James E. Perry, Professor Charles Simenstad, Dr. Benjamin R. Tanner, Dr. Dan Tufford, Dr. R. Eugene Turner, Dr. Kirsten Work, Dr. Scott C. Yaich, and Dr. Joy B. Zedler as Amici Curiae in Support of Respondents and in Support of Upholding the Clean Water Rule

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INTERESTS OF AMICI CURIAE[1]

Amici curiae are wetland and water scientists, actively involved in research and teaching about the fresh and estuarine waters of the United States. As practicing scientists who have spent our careers studying streams, wetlands, and other aquatic ecosystems, we—and many in our profession—have long explored the ways in which human activities that affect one part of a watershed can also affect—and damage—other parts of that watershed. In doing so, we have applied the basic tools of our profession: literature review, on-site observations, measurements, experimental manipulations, studies of "natural experiments," and modeling based on observations and our understanding of the physical sciences. Based upon these tools, we believe that current science provides sound support for the Clean Water Rule.

As scientists, we weigh in on the definition of "waters of the United States" under the Clean Water Act (CWA), 33 U.S.C. §1251 et seq. (1972), relying on our research and experience with tributaries and geographically proximate adjacent waters. In this brief, we elaborate on the scientific basis behind efforts to address human activities that alter the integrity of aquatic ecosystems. Damage to these systems can affect society in a number of ways, including: harming human welfare

[1] In accordance with Federal Rule of Appellate Procedure 29(a)(4)(E), this brief was not authored in whole or in part by a party's counsel, no party or party's counsel contributed money that was intended to fund preparing or submitting the brief, and no person—other than the amici curiae or their counsel—contributed money that was intended to fund preparing or submitting the brief.

and property via flooding, impairing human health via water pollution, loss of recreational opportunities, and threatening species, including commercial species harvested in fisheries, via water pollution and a loss of connectivity. Millennium Ecosystem Assessment, *Ecosystems and Human Well-Being: Wetlands and Water* 1–3 (José Sarukhán et al. eds., 2005); *The Economic and Market Value of Coasts and Estuaries: What's at Stake?* (Linwood H. Pendleton ed., 2008), *available at* http://www.era.noaa.gov/pdfs/052008final_econ.pdf; *see also* David Moreno-Mateos & Margaret A. Palmer, *Watershed Processes as Drivers for Aquatic Ecosystem Restoration, in Foundations of Restoration Ecology* (Margaret A. Palmer et al. eds., 2d ed. 2016). We believe that the Clean Water Rule's definition of "waters of the United States," 80 Fed. Reg. 37,054 (June 29, 2015), is a scientifically justified approach to address these impacts.

I. The Clean Water Rule is scientifically sound.

In drafting the Clean Water Rule, the U.S. Environmental Protection Agency (EPA) and the U.S. Army Corps of Engineers (Corps) utilized many methodologies employed by amici in our research and by others. The agencies studied key chemical, physical, and biological features of water systems and relied upon studies that used rigorous and respected methodologies in researching aquatic ecosystems.

A. Key chemical, physical, and biological features are used to study water systems.

An early major National Research Council report, *Wetlands: Characteristics and Boundaries* (1995), which amici Joy Zedler and Carol Johnston co-authored, outlined three structural components of wetlands that apply generally to all water systems: water, substrate (physical and chemical features), and biota (animal, plant, and microorganism life). *Id.* at 3–4; *see also* Figure 1. Each component interacts with the others to shape the functions (services) of water systems. In

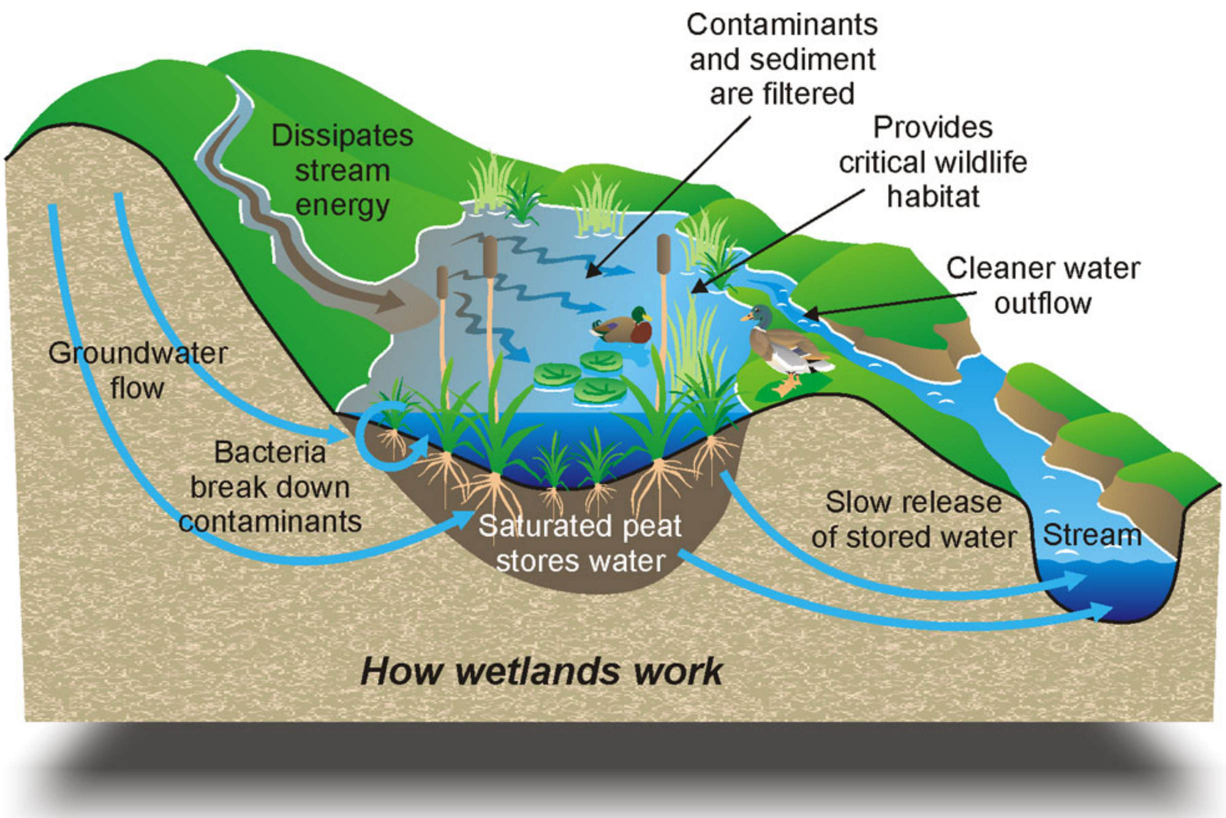

Figure 1. How Wetlands Work. Source: Delaware Wetland Monitoring and Assessment Program.

the study underlying the Clean Water Rule, the EPA and the Corps examined connections among these three factors to provide an integrated perspective on water systems. EPA Office of Research & Dev., *Connectivity of Streams and Wetlands to Downstream Waters: A Review and Synthesis of the Scientific Evidence* 1-2 to 1-19 (Jan. 2015) [hereinafter *Connectivity Report*].

B. Rigorous research methods are used to study these attributes, and to study aquatic ecosystems as a whole.

The study of water systems integrates several scientific disciplines. In the context of understanding wetlands, hydrology, geology, and chemistry are used to examine how wetlands regulate stream flow, filter pollutants and sediment, incorporate excess nutrients, act to control flooding, and connect to groundwater. *See, e.g.*, Carol A. Johnston, *Sediment and Nutrient Retention by Freshwater Wetlands: Effects on Surface Water Quality*, 21 Critical Rev. Envtl. Control 491–565 (1991); Donald L. Hey & Nancy S. Philippi, *Flood Reduction Through Wetland Restoration: The Upper Mississippi River Basin as a Case History*, 3 Restoration Ecology 4–17 (2006); Peter J. Hancock et al., *Preface: Hydrogeoecology, the Interdisciplinary Study of Groundwater Dependent Ecosystems*, 17 Hydrogeology J. 1–3 (2009). Ecological research can be used to examine the role of wetlands as habitats for fish and wildlife, and their support of food webs within and among interconnected water systems. *See, e.g.*, Matthew J. Gray et al., *Management of Wetlands for Wildlife*, in 3 *Wetland Techniques:*

Applications and Management 121–80 (J.T. Anderson & C.A. Davis eds., 2013); Michael E. Sierszen et al., *Watershed and Lake Influences on the Energetic Base of Coastal Wetland Food Webs Across the Great Lakes Basin*, 38 J. Great Lakes Res. 418–28 (2012). Underlying this cross-disciplinary approach is a focus on the various methodologies noted above. We do not apply these methods independently of each other, but rather actively compare them to ensure that our results are robust and reproducible. *Cf.* David Goodstein, *How Science Works*, in Fed. Judicial Ctr., *Reference Manual on Scientific Evidence* 37, 44 (3d ed. 2011).

To study water systems, we use a wide range of sampling and analytical methods to make our on-site observations and measurements. *See* R.D. DeLaune et al., *Methods in Biogeochemistry of Wetlands* (2013). These methods include examining the chemical and physical characteristics of the waters, characterizing soil and sediment samples, and sampling plant communities. *See generally id.*; *see also Tools in Fluvial Geomorphology* (G. Mathias Kondolf & Hervé Piégay eds., 2d ed. 2016). These sampling and analytical methods are well-established, rigorous, and refined over time; we use them to enhance our understanding of the relationships between the various components of water systems.

Watershed or hydrologic studies may make use of “natural experiments” (a form of observational study), which focus on comparing a natural event or feature with areas (or times) with and without the event or feature. Fed. Judicial Ctr., *Reference Manual on Scientific Evidence* 290 (2011); *see also* Judith A. Layzer, *Natural Experiments: Ecosystem-Based Management and the Environment* (2008). In studying developed and undeveloped watersheds, for example, the assignment of subjects (e.g., watersheds) to groups (e.g., developed or not) is akin to randomization. Such natural experiments are often necessary because ethical considerations (i.e., concerns of deliberately damaging those systems), size, and cost create barriers for actual experiments on existing systems. *See* Susan Haack, *Defending Science—Within Reason: Between Scientism and Cynicism* (2003). Rather than disrupting existing systems, we look toward variations to extrapolate the effects of differences on the overall water system.

We also rely on modeling methods to enhance our understanding of the water-system relationships. *See* Nat'l Judicial Coll., *Hydrologic Modeling Benchbook* 31 (2010) (describing computer-based models as "essential" for understanding water systems). Models serve multiple purposes. First, they enable us to test our understanding of interrelationships between different components of a water system. *Id.* Second, they enable us to predict the outcomes of potential human activities that may cause damage—without modifying those systems. *Id.* Models also make it possible to study processes at scales of watersheds to continents that are too extensive to be investigated by observations alone, and to simulate scenarios of hydrologic and other wetland/watershed processes drawn from historical record. *E.g.*, Kangsheng Wu & Carol A. Johnston, *Hydrologic Comparison Between a Forested and a Wetland/Lake Dominated Watershed Using SWAT*, 22 Hydrological Processes 1431–42 (2008).

The Connectivity Report reached its conclusions using studies that applied all of these methodologies. Indeed, the EPA, in its Connectivity Report, compiled these studies in a manner to ensure the use of high-quality, relevant research. *Connectivity Report*, *supra* at 1-17; *see also* U.S. Envtl. Prot. Agency & U.S. Dep't of Army, *Technical Support Document for the Clean Water Rule: Definition of Waters of the United States* 158–63 (May 27, 2015) [hereinafter *Technical Support Document*] (describing the extensive process of peer review of the Connectivity Report itself, including the use of a panel of 27 technical experts from an array of relevant fields, as well as other public processes). Moreover, the Connectivity Report included only studies that were peer reviewed or otherwise verified for quality assurance. *Id.* The focus on high standards and verification through peer review means that the Connectivity Report used the best available science to develop the Clean Water Rule. *See* Clean Water Rule, 80 Fed. Reg. at 37,055; *see also, e.g.*, P.J. Sullivan et al., *Report: Best Science Committee, Defining and Implementing Best Available Science for Fisheries and Environmental Science, Policy, and Management*, 31 Fisheries 460, 462 (2006) (describing assurance of data quality and use of rigorous peer review as aspects of best available science).

II. "Waters of the United States" is a legal determination informed by science.

Jurisdiction under the CWA has both legal and scientific components. The CWA defines the term "navigable waters" as "waters of the United States," which has been further refined by case law, regulation, and agency guidance. There is no question that traditional navigable waters, interstate waters, and the territorial seas (hereinafter collectively referred to as "primary waters") are "waters of the United States." For other waters, such as tributaries and waters adjacent to those tributaries, scientific research plays a critical role in determining how they affect the chemical, physical, and biological integrity of primary waters, and thus their qualifications for CWA protection.

A. As a legal matter, CWA jurisdiction requires a "significant nexus" to a primary water.

While "waters of the United States" include more than primary waters, the CWA's jurisdictional scope has limits. In *Solid Waste Agency of Northern Cook County v. U.S. Army Corps of Engineers*, the U.S. Supreme Court noted that the term "navigable" has some import in CWA jurisdictional determinations. 531 U.S. 159, 172 (2001). Accordingly, agencies and courts have employed the "significant nexus" analysis, endorsed by Justice Kennedy in *Rapanos v. United States*. 547 U.S. 715, 759 (2006) (Kennedy, J., concurring in the judgment). This approach recognizes that upstream waters must be protected to ensure the integrity of primary waters. *Id.* at 774–75.

B. As a scientific matter, the Clean Water Rule's approach to "significant nexus" is sound.

The Clean Water Rule relies on the best available science to establish criteria for the requisite "significant nexus" between primary waters and other waters. Primary waters do not exist in isolation. Nat'l Research Council, *Compensating for Wetland Losses Under the Clean Water Act* 46–59 (2001). Rather, they are heavily influenced by their interactions with streams, wetlands, and open waters within their watersheds. As the Connectivity Report correctly emphasizes:

> The structure and function of downstream waters highly depend on materials—broadly defined as any physical, chemical, or biological entity—that originate outside of the downstream waters. Most of the constituent materials in rivers, for example, originate from aquatic ecosystems located upstream in the drainage network or elsewhere in the drainage basin, and are transported to the river through flowpaths[.]

Connectivity Report, *supra*, at ES-15. The Clean Water Rule appropriately defines "significant nexus" using scientifically supported functions to demonstrate strong chemical, physical, and biological connections between upstream waters and primary waters.

Scientific literature strongly supports the nine functions listed in the Clean Water Rule's "significant nexus" definition. First, each function relates to the chemical, physical, and/or biological integrity of primary waters. For example, wetlands enhance the chemical integrity of downstream waters through trapping, transforming, and filtering pollutants. *See* Carol A. Johnston et al., *The Cumulative Effect of Wetlands on Stream Water Quality and Quantity: A Landscape Approach*, 10 Biogeochemistry 105–41 (1990). Wetlands also recycle nutrients and export organic material. *See* Michael E. McClain et al., *Biogeochemical Hot Spots and Hot Moments at the Interface of Terrestrial and Aquatic Ecosystems*, 6 Ecosystems 301–12 (2003); Nathan J. Smucker & Naomi E. Detenbeck, *Meta-Analysis of Lost Ecosystem Attributes in Urban Streams and the Effectiveness of Out-of-Channel Management Practices*, 22 Restoration Ecology 741–48 (2014).

Similarly, the functions of streams, wetlands, and open waters affect the physical integrity of downstream waters. *See, e.g.*, Tim D. Fletcher et al., *Protection of Stream Ecosystems from Urban Stormwater Runoff: The Multiple Benefits of an Ecohydrological Approach*, 38 Progress in Physical Geography 543–55 (2014). These waters contribute flow to primary waters. *See, e.g.*, Carol A. Johnston & Boris A. Shmagin, *Regionalization, Seasonality, and Trends of Streamflow in the U.S. Great Lakes Basin*, 362 J. Hydrology 69–88 (2008). Research has shown that many wetlands without a year-round surface connection to primary waters flow into perennial streams a significant amount of the time, thereby contributing water and other materials downstream. *See, e.g.*, Owen T.

McDonough et al., *Surface Hydrologic Connectivity Between Delmarva Bay Wetlands and Nearby Streams Along a Gradient of Agricultural Alteration*, 35 Wetlands 41–53 (2015); Heather E. Golden et al., *Hydrologic Connectivity Between Geographically Isolated Wetlands and Surface Water Systems: A Review of Select Modeling Methods*, 53 Envtl. Modelling & Software 190–206 (2014).

Wetlands also retain and attenuate floodwaters, as well as store runoff. *See* Hisashi Ogawa & James W. Male, *Simulating the Flood Mitigation Role of Wetlands*, 112 J. Water Resources Plan. & Mgmt. 114–28 (1986); Carol A. Johnston, *Material Fluxes Across Wetland Ecotones in Northern Landscapes*, 3 Ecological Applications 424–40 (1993). In addition, they trap sediment, thereby preventing the degradation of downstream water quality. *See* Carol A. Johnston et al., *Nutrient Trapping by Sediment Deposition in a Seasonally Flooded Lakeside Wetland*, 13 J. Envtl. Quality 283–90 (1984).

The Clean Water Rule's definition of "significant nexus" also recognizes how streams, wetlands, and open waters affect the biological integrity of downstream waters. Such waters provide important foraging, nesting, breeding, spawning, and nursery habitat for species that occur in primary waters. *See* Marcus Sheaves, *Consequences of Ecological Connectivity: The Coastal Ecosystem Mosaic*, 391 Marine Ecology Progress Series 107–15 (2009); Raymond D. Semlitsch & J. Russell Bodie, *Are Small, Isolated Wetlands Expendable?*, 12

Conservation Biology 1129–33 (1998); Shannon E. Pittman et al., *Movement Ecology of Amphibians: A Missing Component to Understanding Amphibian Declines*, 169 Biological Conservation 44–53 (2014).

Connectivity refers to "the degree to which components of a watershed are joined and interact by transport mechanisms that function across multiple spatial and temporal scales." *Connectivity Report*, *supra*, at ES-6. Whether the functions of a particular stream, wetland, or open water (or a group of "similarly situated" waters) satisfy the legal threshold of "significant nexus" depends on the extent of its connectivity with primary waters. We examine the Clean Water Rule's categorical application of the "significant nexus" test below.

III. Best available science supports the Clean Water Rule's categorical treatment of tributaries.

Our research and that of other scientists demonstrates extensive connections between tributaries and their downstream primary waters sufficient to warrant categorical inclusion under the Clean Water Rule. *See* R. Eugene Turner & Nancy N. Rabalais, *Linking Landscape and Water Quality in the Mississippi River Basin for 200 Years*, 53 BioScience 563–72 (2003). The U.S. Supreme Court has held that federal agencies may craft a categorical rule to assert CWA jurisdiction over certain waters. *United States v. Riverside Bayview Homes, Inc.*, 474 U.S. 121, 135 (1985). The Court noted that so long as "it is reasonable . . . to conclude that, in the majority of cases" the category of waters has "significant effects on water quality and the aquatic ecosystem, its definition can stand." *Id.* at 135 n.9.

A. The Clean Water Rule's definition of tributary is scientifically sound.

The Clean Water Rule defines "tributary" in a manner consistent with our scientific understanding. At its most basic level, a tributary is simply a waterbody that flows into a larger waterbody. From a scientific perspective, "a tributary is the smaller of two intersecting channels, and the larger is the main stem." Lee Benda et al., *The Network Dynamics Hypothesis: How Channel Networks Structure Riverine Habitats*, 54 BioScience 413, 415 (2004). A standard stream ordering system classifies the smallest streams as first-order streams; when two streams meet, they form a second-order stream and so on. *See* Arthur N. Strahler, *Quantitative Analysis of Watershed Geomorphology*, 38 Transactions of American Geophysical Union 913–20 (1957). The smaller waters are intrinsically linked to primary waters both structurally and functionally. *See* Dennis F. Whigham et al., *Impacts of Freshwater Wetlands on Water Quality: A Landscape Perspective*, 12 Envtl. Mgmt. 663–71 (1988). Indeed, "[t]he great majority of the total length of river systems is comprised of lower-order or headwater systems." J. David Allan & María M. Castillo, *Stream Ecology: Structure and Function of Running Waters* 2 (2d ed. 2007); *see also* Ken M. Fritz et al., *Comparing the Extent and Permanence* *of Headwater Streams from Two Field Surveys to Values from Hydrographic Databases and Maps*, 49 J. Am. Water Resources Ass'n 867–82 (2013).

Under the Clean Water Rule, a "tributary . . . contributes flow, either directly or through another water" to primary waters and is "characterized by the presence of the physical indicators of a bed and banks and an ordinary high water mark." 80 Fed. Reg. at 37,105. The Clean Water Rule notes that tributaries may be natural or human-made and include "rivers, streams, [and] canals," as well as ditches that are not otherwise excluded by the Rule. *Id.* From a scientific perspective, whether a tributary is natural or human-made is immaterial; what matters is whether the water contributes flow to another waterbody.

Under the Clean Water Rule, a water meets the definition of a tributary even if it contributes flow to a primary water through a non-jurisdictional water. This approach is also sound because the scientific definition of tributary focuses on the hydrologic connection between waters.

From a scientific perspective, the Clean Water Rule's definition of "tributary" could be considered conservative. In addition to requiring a bed and banks (channels), it also provides that a tributary must have an ordinary high water mark (OHWM). In comments to the EPA, however, the Scientific Advisory Board noted that not all tributaries have OHWMs. Ltr. from EPA Sci. Advisory Bd., to Gina McCarthy, EPA Administrator, *Science Advisory Board (SAB) Consideration* *of the Adequacy of the Scientific and Technical Basis of the EPA's Proposed Rule Titled "Definition of Waters of the United States Under the Clean Water Act"* (Sept. 30, 2014) (on file with epa.gov). The OHWM requirement (which is ultimately a limitation on what constitutes a water of the United States) is not dictated by science, but we recognize that the agencies must set boundaries along gradients to apply the CWA on a national basis.

B. Compelling scientific evidence demonstrates that tributaries significantly affect the chemical, physical, and biological integrity of primary waters.

The National Academy of Sciences has extensively documented the connections between tributaries and downstream waters. *See, e.g.*, Nat'l Research Council, *Achieving Nutrient and Sediment Reduction Goals in the Chesapeake Bay: An Evaluation of Program Strategies and Implementation* (2011); Nat'l Research Council, *Missouri River Planning: Recognizing and Incorporating Sediment Management* (2011). Scientific studies demonstrate how tributaries significantly affect the functions and integrity of downstream waters through chemical, physical, and biological interrelationships, especially regarding how physical aspects (e.g., flow) can influence chemical processes (e.g., pesticide contamination), which in turn can affect the biological features (e.g., species) of a water. Below we highlight a few examples of connections between tributaries and primary waters.

We find evidence of strong chemical connections between tributaries and downstream primary waters in the movement of contaminants and pathogens. Sediment-laden waters typically transport some contaminants (such as mercury) from tributaries to downstream waters. *See* Willem Salomons & Ulrike Förtsner, *Metals in the Hydrocycle* (1984). Waterborne pathogens (such as bacteria and viruses) that originate from agricultural and municipal wastes are also transported to downstream waters through tributaries. *See* Pramod K. Pandey et al., *Contamination of Water Resources by Pathogenic Bacteria*, 4 AMB Express (2014); Cassandra C. Jokinen et al., *Spatial and Temporal Drivers of Zoonotic Pathogen Contamination of an Agricultural Watershed*, 41 J. Envtl. Quality 242–52 (2012); Isabelle Jalliffier-Verne et al., *Cumulative Effects of Fecal Contamination from Combined Sewer Overflows: Management for Source Water Protection*, 174 J. Envtl. Mgmt. 62–70 (2016). Pathogens may pose a risk to human health, highlighting the importance of regulating and protecting tributaries to ensure the integrity of primary waters.

Tributaries also have important physical connections with downstream primary waters. The water flow from tributaries helps to create and maintain river networks. Indeed, most of the water in most rivers comes from tributaries. *See, e.g.*, Richard B. Alexander et al., *The Role of Headwater Streams in Downstream Water Quality*, 43 J. Am. Water Resources Ass'n 41–59 (2007).

Furthermore, tributaries support the metabolism of river ecosystems. For example, they export organic matter (dissolved and particulate) that is incorporated into the food webs of downstream waters, and the resulting turbid water shades and protects fish and amphibians from damage by ultraviolet radiation. *E.g.*, Paul C. Frost et al., *Environmental Controls of UV-B Radiation in Forested Streams of Northern Michigan*, 82 Photochemistry & Photobiology 781–86 (2006). Other biological connections relate to the passive and active transport of living organisms. *See* Judy L. Meyer et al., *The Contribution of Headwater Streams to Biodiversity in River Networks*, 43 J. Am. Water Resources Ass'n 86 (2007) (discussing how organisms rely on streams); Moreno-Mateos & Palmer, *supra*; Carol A. Johnston, *Beaver Wetlands*, in *Wetland Habitats of North America: Ecology and Conservation Concerns* 161–72 (Darold P. Batzer & Andrew H. Baldwin eds., 2012).

Accordingly, the Clean Water Rule's categorical treatment of tributaries reflects scientific reality.

IV. Best available science supports the Clean Water Rule's categorical treatment of adjacent waters based on geographic proximity.

Our research demonstrates that adjacent waters warrant regulation under the Clean Water Rule because of their chemical, physical, and biological connections to downstream primary waters.

A. Compelling scientific evidence demonstrates that waters within 100 feet of an OHWM significantly affect the chemical, physical, and biological integrity of primary waters.

Waters, including wetlands, ponds, oxbows, and impoundments, within 100 feet of an OHWM are "hotspots" of ecological function/processes and species diversity affecting the flux of materials (water, sediment, energy, organic matter, pollutants, and organisms) to primary waters. *See* Peter M. Groffman et al., *Down by the Riverside: Urban Riparian Ecology*, 1 Frontiers Ecology & Env't 315–21 (2003). These adjacent waters affect the movement of pollutants from uplands into streams and rivers; regulate stream temperatures, light, and flow regimes; reduce downstream flooding; and provide nursery areas and critical habitat for aquatic biota, including threatened and endangered species. *See* J. V. Ward et al., *Riverine Landscape Diversity*, 47 Freshwater Biology 517–39 (2002). Riparian wetlands act as buffers, effectively reducing concentrations of nutrients and other pollutants. For example, riparian wetlands may remove up to 100% of the nitrate-nitrogen that enters them. *See* M. S. Fennessy & J. Cronk, *The Effectiveness and Restoration Potential of Riparian Ecotones for the Management of Nonpoint Source Pollution, Particularly Nitrate*, 27 Critical Revs. Envtl. Sci. & Tech. 285–317 (1997). Nitrate is a serious water pollutant and a major contributor to coastal algal blooms, as in the Gulf of Mexico's hypoxic "dead zone," as well as nuisance algal blooms in many other surface waters. *See* William J. Mitsch et al., *Nitrate-Nitrogen Retention in the Mississippi River Basin*, 24 Ecological Engineering 267–78 (2005).

These adjacent waters can act as sources, sinks, or transformers of materials from upland habitats. As sources, adjacent waters contribute organic materials, such as leaf litter, that provide food (energy) for many in-stream species. *See* Robin L. Vannote et al., *The River Continuum Concept*, 37 Canadian J. Fisheries & Aquatic Sci. 130–37 (1980). They also carry woody debris, which increases habitat complexity and biodiversity. *See* J. David Allan, *Stream Ecology: Structure and Function of Running Waters* (1st ed. 1995); J. V. Ward et al., *Riverine Landscape Diversity*, 47 Freshwater Biology 517–39 (2002).

Adjacent waters are also major sinks for materials. By capturing and storing sediment eroded from nearby uplands, they reduce downstream sediment transport and its negative effects on fish feeding and spawning, macroinvertebrate communities, and overall habitat quality. *See* C. P. Newcombe & D. D. MacDonald, *Effects of Suspended Sediments on Aquatic Ecosystems*, 11 N. Am. J. Fisheries Mgmt. 72–82 (1991). These adjacent waters convert materials from one form to another; plants and algae can consume nutrients and bind them in their tissues, reducing the risk of downstream eutrophication. Wetlands in particular mitigate nonpoint source pollution, such as insecticides and fertilizers, thus protecting stream water quality and drinking water supplies. *E.g.*, Robert Everich et al., *Efficacy of a Vegetative Buffer for Reducing the Potential Runoff of the Insect Growth Regulator Novaluron*, in *Pesticide Mitigation Strategies for Surface Water Quality* 175–88 (2011); Mitsch et al., *supra*. Adjacent waters also slow the movement of materials and biota, by providing temporary storage of excess water during times of high precipitation to dissipate the energy of flows (reducing erosion and soil loss) and attenuate flood peaks. *See* William J. Mitsch & J. Gosselink, *Wetlands* (5th ed. 2015).

Hydrologic connections do not need to be continuous to have a substantial effect on downstream primary waters. Hydrologic connectivity involves longitudinal, lateral, and vertical exchange, and adjacent waters are intimately linked to streams and rivers both in space (i.e., proximity to the OHWM), and time (e.g., by means of high water and flood events). Seasonal high water levels increase connectivity, promoting the lateral movement of animals between lakes, wetlands, stream channels, and their adjacent waters. This facilitates use of critical spawning and nursery habitats by fish, and supports the biological integrity of the system. Many fish are sustained by varied habitats dispersed throughout the watershed for spawning, nurseries, growth, and maturation. *See* Kurt D. Fausch et al., *Landscapes to Riverscapes: Bridging the Gap Between Research and Conservation of Stream Fishes*, 52 BioScience 483–98 (2002).

Overall, the benefits of protecting waters within 100 feet of an OHWM accrue both locally (at that point on the river system) and cumulatively (at the watershed scale). The Clean Water Rule's categorical inclusion of these adjacent waters reflects scientific reality.

B. Compelling scientific evidence demonstrates that waters within 100-year floodplains significantly affect the chemical, physical, and biological integrity of primary waters.

The Clean Water Rule's coverage of waters within 100-year floodplains is based on scientific understanding of watershed dynamics. These dynamics include not only surface expressions of connectivity (floods), but also underlying hydrologic conditions.

Every primary water has a watershed, which can be described as the land area that drains into that primary water and its tributaries. *See* Paul R. Bierman & David R. Montgomery, *Key Concepts in Geomorphology* (2014). During any flood event, primary waters and their tributaries may overflow their banks. *Id.* The proportion of land that becomes obviously flooded (the "floodplain") depends upon rate and total amount of rainfall. The geographic extent of the floodplain also depends upon the watershed's topography, soil saturation, and geological characteristics. *See* W. R. Osterkamp & J.M. Friedman, *The Disparity Between Extreme Rainfall Events and Rare Floods—With Emphasis on the Semi-Arid American West*, 14 Hydrological Processes 2817–29 (2000). A landscape with more topographic relief (steeper) will have a smaller floodplain than a flatter landscape where floodwaters more readily spread outward. *See* A.D. Howard, *Modelling Channel Evolution and Floodplain Morphology*, in *Floodplain Processes* 15–62 (Malcolm G. Anderson et al. eds., 1996).

Although every flood is unique in extent and duration, we describe floodplains statistically to characterize other hydrologic (non-flooding) features. *See* G. R. Pandy & V.-T.-V. Nguyen, *A Comparative Study of Regression Based Methods in Regional Flood Frequency Analysis*, 225 J. Hydrology 92–101 (1999). For example, the "100-year floodplain" represents the land area covered by floodwaters that have a 1% chance of occurring in any given year (1/100 likelihood). This definition is entirely statistical; such floods can occur more often in a 100-year floodplain, even two years or more in a row. It is incorrect to conclude that waters on a 100-year floodplain have a connection with a primary water only once in a century because the actual hydrologic connections extend beyond surface flooding alone.

Furthermore, changes in land use can affect flood dynamics. Increasing the proportion of the landscape that is covered with impermeable surfaces (such as streets and roofs) may increase flood intensity and duration. *See* E. S. Bedan & J.C. Clausen, *Stormwater Runoff Quality and Quantity from Traditional and Low*

Impact Development Watersheds, 4 J. Am. Water Resources Ass'n 998–1008 (2009).

Floodwaters are only the surface expressions of a flood. Rainfall permeates into the soil and often moves underground toward open waterbodies, such as primary waters. *See* William M. Alley et al., *Flow and Storage in Groundwater Systems*, 296 Sci. 1985–90 (2002); Florian Malard et al., *A Landscape Perspective of Surface-Subsurface Hydrological Exchanges in River Corridors*, 47 Freshwater Biology 621–40 (2002). Groundwater movement occurs in the absence of a 100-year flood. The results from tracing techniques demonstrate how large proportions of streamflow are derived from groundwater. *E.g.*, Alley et al., *supra*.

We in the water science community understand that factors other than surface flooding determine the actual extent of hydrologic connections between waters in a floodplain. The direction of movement and the rate at which the water moves depends upon topography, geology, and rainfall. *See* Jack A. Stanford & J.V. Ward, *An Ecosystem Perspective of Alluvial Rivers: Connectivity and the Hyporheic Corridor*, 12 J. N. Am. Benthological Soc'y 48–60 (1993); Alley et al., *supra*. Impermeable subsurface layers, like clay layers under sand and/or limestone in Florida, can reduce the downward movement of water and force it to move laterally. *See* Peter W. Bush & Richard H. Johnston, *Ground-Water Hydraulics, Regional Flow, and Ground-Water Development of the Floridan Aquifer System in*

Florida and in Parts of Georgia, South Carolina, and Alabama: Regional Aquifer-System Analysis (U.S. Geological Survey, Professional Paper 1403-C, 1988), *available at* https://pubs.usgs.gov/pp/1403c/report.pdf. Often subsurface impermeable (or semi-permeable) layers are not level; they may slope toward waterbodies, and this subsurface lateral flow may re-emerge in a surface waterbody, such as a primary water. However, subsurface lateral flow can occur even without sloping impermeable layers; when more water pools in a particular subsurface location, lateral flow will occur from areas of higher pressure to areas of lower pressure, which may be river channels, wetlands, or lakes. *See* Jacob Bear, *Hydraulics of Groundwater* (2012).

Many different types of waterbodies can occur in 100-year floodplains. Tributaries and other waters can be connected to a primary river in more than one way. *See* C. Amoros & G. Bornette, *Connectivity and Biocomplexity in Waterbodies of Riverine Floodplains*, 47 Freshwater Biology 761–76 (2002). Headwaters and tributaries may flow directly into primary waters, adding organic matter and constituents that create unique water chemistry in the primary water. *See* Takashi Gomi et al., *Understanding Processes and Downstream Linkages of Headwater Systems: Headwaters Differ from Downstream Reaches by Their Close Coupling to Hillslope Processes, More Temporal and Spatial Variation, and Their Need for Different Means of Protection from Land Use*, 52 BioScience 905–16

(2002). Wetlands may border primary waters, buffering the input of floodwaters, altering the water chemistry of floodwaters and the primary water itself, and providing habitat and resources for local biota. *See* Joy B. Zedler, *Wetlands at Your Service: Reducing Impacts of Agriculture at the Watershed Scale*, 1 Frontiers in Ecology & Env't 65–72 (2003).

Even other waterbodies with no obvious surface connections to primary waters may still be hydrologically connected to them. Lakes, ponds, wetlands, and streams that flow into these apparently isolated waterbodies may have no surface connections to the primary water but, in addition to storing water as previously described, can have subsurface connections through groundwater. Bear, *supra*. These subsurface connections can carry water to primary waters; for example, water seeping down out of an apparently isolated waterbody may hit an impermeable layer and move laterally until it emerges in the primary waterbody. *See* Geoffrey C. Poole, *Fluvial Landscape Ecology: Addressing Uniqueness Within the River Discontinuum*, 41 Freshwater Biology 641–60 (2002). Therefore, loss of an apparently isolated waterbody can reduce water volume and alter flow characteristics of a primary water.

Evidence for these connections can be observed in the physical and chemical properties of primary waters. *See* Malard et al., *supra*. Temperature, alkalinity, salinity, nitrate, other chemicals and pollutants, and dyes have been used as tracers to show the impact of groundwater connections to surface waters. *See* C. Soulsby et al., *Inferring Groundwater Influences on Surface Water in Montane Catchments from Hydrochemical Surveys of Springs and Streamwaters*, 333 J. Hydrology 199–213 (2007). Furthermore, additions of pollutants into apparently isolated waterbodies or disparate areas of the watershed can affect primary waters. *See* David N. Lerner & Bob Harris, *The Relationship Between Land Use and Groundwater Resources and Quality*, 26 Land Use Pol'y S265–S273 (2009). Tracer and stable isotope studies have established the path and rate of water movements in Florida, substantiating that a distant source can pollute primary waters. *See* M. Badruzzaman et al., *Sources of Nutrients Impacting Surface Waters in Florida: A Review*, 109 J. Envtl. Mgmt. 80–92 (2012). These studies highlight the chemical, physical, and biological connections between a primary water and other waterbodies that are located within its 100-year floodplain, thus justifying the inclusion of these adjacent waters in the Clean Water Rule.

C. Compelling scientific evidence demonstrates that waters within 1500 feet of high tide lines of tidally influenced primary waters or OHWMs of the Great Lakes significantly affect the integrity of these primary waters.

Scientific evidence strongly supports protecting waters located within 1500 feet of such primary waters. These waters have the same types of connections and functions as the tributaries and other adjacent waters discussed *supra*. Adjacent waters within 1500 feet of primary waters have important chemical connections to those waters. Adjacent waters that were thought to be isolated have become more saline, providing empirical data regarding the groundwater connection between adjacent waters and primary waters. *See, e.g.*, Cameron Wood & Glenn A. Harrington, *Influence of Seasonal Variations in Sea Level on the Salinity Regime of a Coastal Groundwater-Fed Wetland*, 53 Groundwater 90–98 (2014). In addition, adjacent waters in the 1500-foot zone may release freshwater into coastal waters, thereby reducing the salinity of these waters. *See, e.g.*, Fred H. Sklar & Joan A. Browder, *Coastal Environmental Impacts Brought About by Alterations to Freshwater Flow in the Gulf of Mexico*, 22 Envtl. Mgmt. 547–62 (1998).

Indeed, the inputs of groundwater into coastal waters are quite large, and groundwater can contain high levels of dissolved solids and nutrients. *See, e.g.*, Willard S. Moore, *Large Groundwater Inputs to Coastal Waters Revealed by 226-Ra Enrichments*, 380 Nature 612–614 (1996); Matthew A. Charette et al., *Utility of Radium Isotopes for Evaluating the Input and Transport of Groundwater-Derived Nitrogen to a Cape Cod Estuary*, 46 Limnology & Oceanography 465–70 (2001); J. M. Krest et al., *Marsh Nutrient Export Supplied by Groundwater Discharge: Evidence from Radium Measurements*, 14 Global Biogeochemical Cycles 167–76 (2000). As in inland systems, coastal wetlands remove nutrients, such as nitrate, thereby reducing down-gradient eutrophication in primary waters. *See* Marcelo Ardón et al., *Drought-Induced Saltwater Incursion Leads to Increased Wetland*

Nitrogen Export, 19 Global Change Biology 2976–85 (2013). Thus, adjacent waters protect and improve the quality of primary waters by removing harmful contaminants or transforming and transporting nutrients to primary waters. *See* Clifford N. Dahm, *Nutrient Dynamics of the Delta: Effects on Primary Producers*, 14 S.F. Estuary & Watershed Sci. Art. 4 (2016).

Adjacent waters also physically influence primary waters through surface and subsurface connections. *See* Figure 2. Adjacent waters contribute flow to

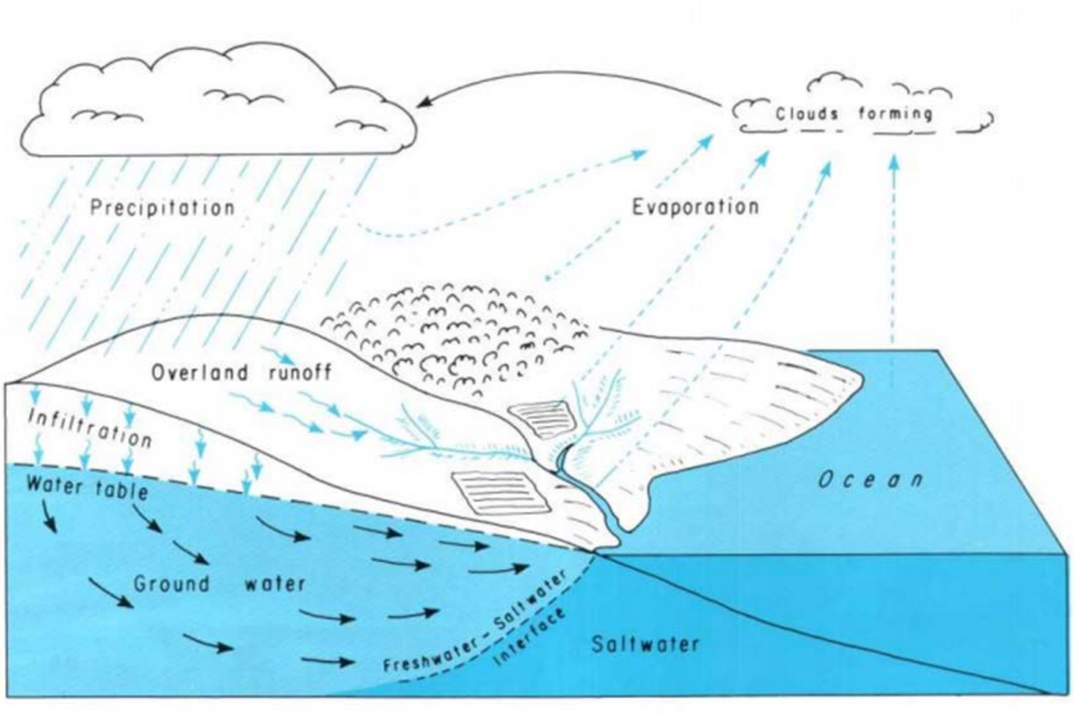

Figure 2. Freshwater-Saltwater Interface. Adapted from Ralph C. Heath, *Basic Ground-Water Hydrology* (U.S. Geological Survey, Water-Supply Paper 2220, 1998), *available* at http://pubs.er.usgs.gov/pubs/wsp/wsp2220.

nearby primary waters and retain floodwaters and sediments. *See, e.g.*, Paul M. Barlow, *Ground Water in Freshwater-Saltwater Environments of the Atlantic*

Coast (U.S. Geological Survey, Circular 1262, 2003), *available at* https://pubs.usgs.gov/circ/2003/circ1262/pdf/circ1262.pdf. Further, adjacent waters have a significant impact on the biological integrity of primary waters. Wetlands near tidally influenced primary waters can serve as a critical source of freshwater for some species that use wetlands and coastal waters. *See Technical Support Document*, *supra*, at 292–93. Adjacent wetlands, lakes, ponds, and other waters also provide important foraging and breeding habitat for coastal species. *See, e.g.*, David J. Jude & Janice Pappas, *Fish Utilization of Great Lakes Coastal Wetlands*, 18 J. Great Lakes Res. 651–72 (1992); Michael E. Sierszen et al., *A Review of Selected Ecosystem Services Provided by Coastal Wetlands of the Laurentian Great Lakes*, 15 Aquatic Ecosystem Health & Mgmt. 92–106 (2012).

Distance is but one factor that affects the connectivity between waters, and as with the other geographical distance limitations discussed *supra*, the agencies' selection of 1500 feet as the distance limitation is conservative from a scientific perspective. Indeed, waters located beyond this threshold can be chemically, physically, and biologically connected to tidally influenced primary waters or the Great Lakes. While the categorical jurisdictional line could have been drawn farther from high tide lines, we find strong scientific support connecting the majority of lakes, wetlands, ponds, and other waters located within this 1500-foot area to primary waters.

Once again, the Clean Water Rule's categorical inclusion of these adjacent waters reflects scientific reality.

V. Conclusion

The U.S. Supreme Court has held that federal agencies may protect waters on a categorical basis if most waters in that category have a significant effect on primary waters. The best available science overwhelmingly demonstrates that the waters treated categorically in the Clean Water Rule have significant chemical, physical, and biological connections to primary waters. Accordingly, we write in support of upholding the Clean Water Rule.

Date: January 20, 2017

Respectfully submitted,

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Date: January 20, 2017

/s/ Royal C. Gardner
Royal C. Gardner

CERTIFICATE OF SERVICE

I hereby certify that on January 20, 2017, I electronically filed a true and correct copy of the foregoing Brief of Dr. M. Siobhan Fennessy, Dr. Carol A. Johnston, Dr. Marinus L. Otte, Dr. Margaret Palmer, Dr. James E. Perry, Professor Charles Simenstad, Dr. Benjamin R. Tanner, Dr. Dan Tufford, Dr. R. Eugene Turner, Dr. Kirsten Work, Dr. Scott C. Yaich, and Dr. Joy B. Zedler as Amici Curiae in Support of Respondents and in Support of Upholding the Clean Water Rule with the Clerk of the Court for the United States Court of Appeals for the Sixth Circuit using the Court's appellate CM/ECF system, which will send notification of this filing to the attorneys of record.

Date: January 20, 2017

/s/ Royal C. Gardner
Royal C. Gardner

ADDENDUM

Amici Curiae Biographies[2]

Dr. M. Siobhan Fennessy is the Jordan Professor of Biology and Environmental Studies at Kenyon College where she teaches and conducts research on wetland ecosystems. She serves on the National Research Council's Water Science and Technology Board, and had been appointed to two NRC committees. A Fulbright Fellow, she was recently appointed to the Intergovernmental Platform on Biodiversity and Ecosystem Services for the global assessment of land degradation and restoration, and to the Ramsar Convention's Scientific and Technical and Review Panel.

Dr. Carol A. Johnston is a Professor at South Dakota State University, where she teaches ecology and environmental science. She served on the National Research Council's Water Science and Technology Board and on NRC committees studying wetland mitigation, wetland delineation, and watershed management. She is a Fellow of the Society of Wetland Scientists, and received the National Wetlands Award for Science Research from the Environmental Law Institute in 2009.

Dr. Marinus L. Otte is a Professor in the Department of Biological Sciences at North Dakota State University, and has been specializing in many aspects of wetland science for more than 25 years. He has worked on both coastal and inland wetlands in the United States (Minnesota, North Dakota, and South Carolina), China, Ireland, and the Netherlands. He teaches Wetland Science, Ecotoxicology, Environmental Science, and Plant Systematics. He has served as Editor-in-Chief of the scientific journal *Wetlands* since 2012.

Dr. Margaret Palmer is Director of the National Socio-Environmental Synthesis Center, a National Science Foundation and University of Maryland supported research center. A Distinguished University Professor at the University of Maryland, she oversees a research group focused on watershed science and restoration ecology. Having worked on streams, wetlands, and estuaries for more than 30 years, she is past Director of the Chesapeake Biological Laboratory, currently serves on the editorial boards of the journals *Restoration Ecology* and *Science*, and is an elected fellow of the Society for Freshwater Science.

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[2] Affiliations of amici curiae and their counsel are provided for identification purposes only.

Dr. James E. Perry is a Professor of Marine Science at the College of William and Mary's Virginia Institute of Marine Science. A past president of the Society of Wetland Scientists (SWS), he has overseen its Professional Certification Program and its Ethics Committee. He is also a member of the Coastal and Estuarine Research Federation, Ecological Society of America, and Society of Ecological Restoration. He has published over 50 peer-reviewed journal articles and book chapters.

Charles Simenstad is a Research Professor in the School of Aquatic and Fishery Sciences, at the University of Washington, where he focuses on the structure and function of tidal wetlands within the broader landscape context of estuarine and coastal ecosystems. He is Co-Editor-in-Chief of the scientific journal *Estuaries and Coasts*, serves on the Environmental Advisory Board to the Chief of the U.S. Army Corps of Engineers, and contributed to the NRC Committee on Compensating for Wetland Losses.

Dr. Benjamin R. Tanner is an Assistant Professor of Environmental Science and Studies at Stetson University, where his research focuses on wetland sediment records of environmental change. He has worked on both tidal saline and inland freshwater wetlands at multiple sites in Florida, the Carolinas, and Maine. He teaches advanced courses on wetland systems, soils and hydrology, and wetland identification and delineation.

Dr. Dan Tufford focuses his research on watershed ecology and water resources management. His work ranges from field studies to simulation modeling and includes water quality, hydrology, and landscape interactions. His recent projects include integrating climate science and water management, and watershed modeling for the North Inlet-Winyah Bay National Estuarine Research Reserve. He is currently a member of the Board of Directors for the Columbia Audubon Society and on the state Advisory Board for Audubon South Carolina.

Dr. R. Eugene Turner is the 71st Boyd Professor in the Louisiana State University System where he teaches restoration and wetland ecology courses and maintains a healthy research program. He has been Chair or Co-Chair of the INTECOL Wetlands Working Group (WWG) since 1976, Executive Board Member of INTECOL and of the non-profit Green Lands, Blue Waters, and serves on various national scientific committees, and two editorial boards. He has been on NRC committees including the Committee on Compensating for Wetland Losses.

Dr. Kirsten Work is a Professor in the Stetson University Biology Department. Over the course of her career, she has studied a broad range of freshwater systems, from lakes in the upper Midwest and Alaska to streams, rivers, and reservoirs in the Great Plains to springs, lakes, and wetlands in Florida. She is particularly interested in the role of disturbance aquatic on ecosystem function. Her current studies focus on fish diversity in Florida springs.

Dr. Scott C. Yaich has worked in the field of wetland conservation for over 30 years, has been a Certified Wetland Scientist, and is a Certified Wildlife Biologist. He worked as the Wetlands and Waterfowl Program Coordinator, Chief of Wildlife Management, and Assistant Director of Conservation for the Arkansas Game and Fish Commission, and as a specialist in wetland habitat conservation for the U.S. Fish and Wildlife Service. He also served as staff and Council member of the North American Wetlands Conservation Council.

Dr. Joy B. Zedler is Professor Emerita (Botany and Aldo Leopold Professor of Restoration Ecology) at the University of Wisconsin-Madison. She continues to publish her wetland ecology research, to advise on Adaptive Restoration, and to help edit two journals, *Restoration Ecology* and *Ecosystem Health and Sustainability*. She is a member of the California Delta's Independent Science Board and a Trustee of the Wisconsin Chapter of The Nature Conservancy. She served on four NRC committees and chaired its Committee on Mitigating Wetland Losses.

Revised and submitted for the record 5.28.15
with additional scientist signatures

May 18, 2015

The Honorable Dan Sullivan
Chairman
Subcommittee on Fisheries, Water, and Wildlife
Committee on Environment and Public Works
U.S. Senate
Washington, D.C. 20510

The Honorable Sheldon Whitehouse
Ranking Member
Subcommittee on Fisheries, Water, and Wildlife
Committee on Environment and Public Works
U.S. Senate
Washington, D.C. 20510

Re: Scientists Strongly Oppose S.1140, Legislation Undermining Needed Protections for the Nation's Streams, Wetlands, and Other Waters

Chairman Sullivan and Ranking Member Whitehouse:

The undersigned scientists strongly oppose S.1140, misleadingly titled the "Federal Water Quality Protection Act." S.1140 would derail a near-final rulemaking process to clarify the Clean Water Act. The rulemaking has the potential to restore longstanding protections for millions of wetlands and headwater streams that contribute to the drinking water of 1 in 3 Americans, protect communities from flooding, and provide essential fish and wildlife habitat.

Of central concern to us as scientists is that the bill disregards the rigorous science on which the Clean Water Rule is based, hamstringing the agencies' ability to protect many of the small, seasonal, and rain-dependent streams, water bodies nearby such tributaries, and various other waters the science shows are critical to water quality.

As scientists who have spent careers studying streams and wetlands, we are aware of the need to restore protections for these aquatic ecosystems under the Clean Water Act. For years now we have urged the Administration to address this issue through a rulemaking to clarify which waters are protected. To inform this critically important rulemaking, we have joined many of our colleagues in contributing to the Environmental Protection Agency's ambitious connectivity science report, *Connectivity of Streams and Wetlands to Downstream Waters: A Review and Synthesis of the Scientific Evidence* (2014). We have contributed to the underlying peer-reviewed scientific studies, informal reviews of the draft Connectivity Report, and the formal Science Advisory Board peer review of the Connectivity Report. The undersigned are professional scientists with broad knowledge and expertise in stream and wetland ecosystems, including their physical structure, chemistry, and biology. The scientists who have signed this letter include leading researchers on the ecology, water quality, and biota of rivers, streams, and wetlands.

Now, just as the agencies are on the verge of finalizing this important science-based rulemaking, S. 1140 would not only derail this rulemaking, but seeks to prohibit any future rulemaking that does not meet its "principles;" "principles" that disregard the connectivity science – as well as the goals, framework, and legislative intent of the 1972 Clean Water Act. S. 1140 hamstrings the agencies' ability to protect many of the small, seasonal, and rain-dependent streams, water bodies nearby such tributaries, and various other waters the science shows are critical to "maintaining and restoring the physical, chemical, and biological integrity of the nation's waters."

Wetland and stream science has consistently demonstrated the importance of small streams and wetlands for flood control, groundwater recharge, reducing concentrations of pollutants in drinking water sources, reducing erosion, and providing essential habitat for plant and animal species, all of which provide significant public benefit.

Below, borrowing from our 2011 letter to the Council on Environmental Quality, and updated with quotes from the Science Advisory Board 2014 letter to the Environmental Protection Agency regarding the scientific basis of the proposed rule, we briefly outline basic principles and findings of connectivity science that are rejected by S. 1140, but must be reflected in the Clean Water Rule in order to meet the goals of the Clean Water Act:

1. Rivers are networks, and their downstream navigable portions are inextricably linked to small headwaters just as fine roots are an essential part of the root structure of a tree or our own circulatory system is dependent on the function of healthy capillaries. The small intermittent stream is not isolated from the mighty river. Longstanding and robust scientific research has demonstrated the longitudinal connectivity of river networks, i.e., that **ecological processes in navigable rivers reflect what is occurring in their headwaters as well as in associated geographically isolated wetlands, floodplains, and tributaries.**

2. **A sizable fraction of channel length in a river network is in intermittent and headwater streams.** In arid states such as Arizona, Utah, and Colorado, from 71 to 96% of stream miles have been classified as ephemeral or intermittent. Intermittent streams are also significant in states that receive more rainfall. In Alabama, 80% of stream miles in the National Forests are considered intermittent because they go dry during late summer or autumn; intermittent streams in Michigan comprise 48% of the length of stream channels in the state. These examples illustrate the extent of intermittent streams in river networks throughout the Nation.

3. As the SAB concluded from the 2014 *Connectivity Report:*

   There is strong scientific evidence to support the EPA's proposal to include all tributaries within the jurisdiction of the Clean Water Act. Tributaries, as a group, exert strong influence on the physical, chemical, and biological integrity of downstream waters, even though the degree of connectivity is a function of variation in the frequency, duration, magnitude, predictability, and consequences of physical, chemical and biological processes.

4. From a wetland perspective, the EPA and Army Corps of Engineers estimate that over 20 million acres of wetlands in the contiguous 48 states could be considered "geographically isolated." Despite often not having a connection to navigable waters that is direct or that exists throughout the year, **the scientific literature demonstrates that these wetlands**

are nevertheless often interconnected with navigable waters and are often not ecologically and/or hydrologically isolated.

5. As the SAB concluded from the 2014 *Connectivity Report:*

   The available science supports the EPA's proposal to include adjacent waters and wetlands as waters of the United States. This is because **adjacent waters and wetlands have a strong influence on the physical, chemical, and biological integrity of navigable waters. Importantly, the available science supports defining adjacency or determination of adjacency on the basis of functional relationships, not on how close an adjacent water is to a navigable water. The Board also notes that local shallow subsurface water sources and regional groundwater sources can strongly affect connectivity.** Thus, the Board advises the EPA that adjacent waters and wetlands should not be defined solely on the basis of geographical proximity or distance to jurisdictional waters.

6. The SAB also concluded:

   The scientific literature has established that "other waters" can influence downstream waters, particularly when considered in aggregate. Thus, it is appropriate to define "other waters" as waters of the United States on a case-by-case basis, either alone or in combination with similarly-situated waters in the same region.

7. The SAB further concluded:

   There is also adequate scientific evidence to support a determination that certain subcategories and types of "other waters" in particular regions of the United States (e.g., Carolina and Delmarva Bays, Texas 18 coastal prairie wetlands, prairie potholes, pocosins, western vernal pools) are similarly situated (i.e., they have a similar influence on the physical, biological, and chemical integrity of downstream waters and are similarly situated on the landscape) and thus are waters of the United States.

8. And furthermore:

   … [A]s the science continues to develop, other sets of wetlands may be identified as "similarly situated." The Board notes, however, that **the science does not support excluding groups of "other waters" (or subcategories of them, e.g., Great Plains playa lakes) that may influence the physical, chemical and biological integrity of downstream waters.**

9. The SAB also advised EPA:

The available science, however, shows that groundwater connections, particularly via shallow flow paths in unconfined aquifers, are critical in supporting the hydrology and biogeochemical functions of wetlands and other waters. Groundwater also connects waters and wetlands that have no visible surface connections.

10. And that:

    …[T]here is a lack of scientific knowledge to help discriminate between ditches that should be excluded or included. For example, many ditches in the Midwest would be excluded under the proposed rule because they were excavated wholly in uplands, drain only uplands, and have less than perennial flow. However, these ditches may drain areas that would be identified as wetlands under the Cowardin classification system and may provide certain ecosystem services."

11. **Small streams and wetlands contribute to the physical integrity of navigable rivers.** They provide hydrologic retention capacity (i.e., the ability to hold and store water), and when they have been eliminated as a result of human activity, the frequency and intensity of flooding increases downstream, and base flows are lower. For example, studies have shown that the loss of two-thirds, or about 14 million acres, of prairie pothole wetlands (considered within the "geographically isolated wetland" designation) has contributed significantly to increases in the flooding and associated damages of the Red River and other navigable rivers of the region. Small streams and wetlands also improve water quality by storing eroded sediment, thereby reducing downstream sediment transport during storms, and are critically important in recharging groundwater and other sources of water for drinking, irrigation and industry.

12. **Small streams and wetlands also contribute to the chemical integrity of navigable rivers.** These are the channels of the drainage network in closest contact with the soil and are the sites of extensive chemical and biological activity that influences water quality downstream. Small streams and wetlands are the sites of active uptake, transformation, and retention of nutrients; their degradation results in increased downstream transport of nutrients, which can result in eutrophication (e.g., nuisance algal blooms) of downstream rivers, lakes, and estuaries. Nutrients and contaminants enter streams from non-point sources primarily during storms, and it is during storms when small streams and wetlands are most likely to contain water and provide nutrient removal services. Likewise, Delmarva bay wetlands provide similar water quality protection and improvement functions for water that flows through them in transit to the Chesapeake Bay. Likewise, playa lake wetlands of the southern Great Plains, a class of "geographically isolated wetland," collect and improve the quality of water that ultimately filters through them and recharges the Ogallala aquifer, which provides drinking and irrigation water for eight states.

13. **Small streams and wetlands contribute to the biological integrity of navigable rivers.** They supply food resources to riparian and downstream ecosystems. For example,

invertebrate inhabitants of headwater streams are sources of food to fish, and emerging aerial adults of aquatic insects provide food for birds and bats. Small streams provide a thermal refuge at critical life history stages or during critical times of the year for many fish species. They also serve as vital spawning and nursery habitats for many fish species including many prized sport fishes. Small streams and wetlands also provide critical habitat for unique and threatened species of invertebrates, amphibians and fishes. For example, prairie potholes provide the breeding habitat that produces an estimated 50-70% of the total annual duck production in North America. Approximately one-half of the continent's bird species are wetland-dependent or associated, and most of these are migratory birds shared across international borders and by all states in each of the four flyways covering the U.S.

Small streams and wetlands are an integral part of the nation's network of waters, and provide numerous ecological goods and services of significant value to society. Although they may not have a permanent or direct hydrologic connection to a navigable river, they have a demonstrable functional connection with and a direct impact on the physical, chemical, and biotic integrity of navigable rivers.

On the basis of decades of scientific research, it is clear that small streams and wetlands are not isolated or unrelated to the ecological integrity of navigable waterways. If our nation hopes to achieve the goals of the Clean Water Act, small streams and wetlands must remain within its jurisdiction.

S. 1140 rejects these key scientific principles and findings, undermining our ability to protect and restore our nation's streams, lakes, rivers, wetlands and bays.

- **Many streams would be harder to protect.** The bill would include streams identified in a USGS data set that, among other limitations, doesn't generally pick up streams that are less than a mile long. The bill erects an enormous hurdle to including additional streams, requiring a showing that pollutants from any single stream reach would degrade water quality in a navigable waterway.

- **Wetlands bordering tributary streams would also be hard to protect** – the bill appears to require a wetland-by-wetland analysis of their capacity to prevent pollutants moving into navigable waterways.

- **So-called "isolated" waters would not be protected.** The bill would exclude any "isolated pond, whether natural or manmade," and would only allow the protection of wetlands that are "next to" other protected waterways. The effect of these exemptions would be to allow dumping of wastes into wetlands or ponds, even with substantial groundwater connections to other waterways, and even if they help keep downstream waters safe and clean by trapping flood water or filtering out pollution.

- **The bill appears to exclude certain long-protected water bodies by narrowly defining "body of water" to ignore many man-made tributaries, even where they**

essentially function as natural streams, and even though such waters have significant impacts on downstream waters.

- **The bill rejects jurisdiction based on the use of waters by fish, wildlife, or any "organism,"** despite the science and the law supporting protections based on biological factors, such as for waters providing fish spawning grounds.

- **The bill ignores the science and the law supporting protections based on physical factors, such as for upstream waters contributing to or helping abate downstream flooding.**

- **The bill also rejects the strong science affirming that the collective function of these waters is closely related to downstream water quality.**

We are on the verge of securing a scientifically sound Clean Water Rule that will bolster the effectiveness of the Clean Water Act in maintaining and restoring our nation's waters. We urge Congress to support the agencies' final Clean Water Rule, respecting decades of robust scientific literature that demonstrate the critical role of aquatic systems and clarifying and restoring longstanding protections for these vital waters by clarifying their coverage under the Clean Water Act.

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cc: Administrator McCarthy, Environmental Protection Agency
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Secretary Vilsack, United States Department of Agriculture
Secretary Jewell, United States Department of Interior
Chair Christy Goldfuss, Council on Environmental Quality