Scientists Endorse *Connectivity of Streams and Wetlands to Downstream Waters* as a Clear, Accurate, and Thorough Compilation of the Best Available Science

Science Advisory Board Review Panel
Attn: Dr. Thomas Armitage, Designated Federal Officer (DFO)
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U.S. Environmental Protection Agency
1200 Pennsylvania Avenue NW
Washington, DC 20460

Re: Scientists Comments on *Connectivity of Streams and Wetlands to Downstream Waters*: Docket ID No. EPA-HQ-OA-2013-0582

As scientists who have spent careers studying streams and wetlands, we applaud the Environmental Protection Agency for issuing a thorough and solid report that documents the connectivity of streams and wetlands to downstream waters. We recognize the importance of compiling the best available science on wetlands and streams in order to inform policy decisions that guide national efforts to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters." We appreciate the rigorous peer review underway by the Science Advisory Board (SAB) and the SAB panel of external peer-reviewers. We respectfully submit for your consideration these comments on the report, ***Connectivity of Streams and Wetlands to Downstream Waters: A Review and Synthesis of the Scientific Evidence*** **("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 members of the National Academy of Sciences and its scientific Boards, presidents, past-presidents, and members of national scientific organizations, and leading researchers on the ecology, water quality, and biota associated with rivers, streams, and wetlands.

Overview

In the following paragraphs, we address the SAB's technical charge to the review panel:

- The clarity and technical accuracy of the draft EPA report overall and its conceptual framework;
- Whether the literature cited, the findings, and the conclusions reflect the best available science with respect to stream connectivity and effects;
- Whether the literature cited, the findings, and the conclusions reflect the best available science with respect to the downstream connectivity and effects of floodplain wetlands and open-waters; and
- Whether the literature cited, the findings, and the conclusions reflect the best available science with respect to the downstream connectivity and effects of "unidirectional" wetlands and open-waters located outside of floodplains.

Overall, the Connectivity Report is clear, technically accurate, largely comprehensive in its literature review, and establishes a strong presentation of the best currently available science on the physical, chemical, and biological connections by which streams, wetlands, and open-waters affect downstream waters such as rivers, lakes, and oceans.

We see opportunities for strengthening and clarifying certain aspects of report, as we explain below. We note that the report's literature cited section includes no 2013 publications, probably due to the extensive vetting this draft report has already undergone. We believe that there are additional relevant peer-reviewed articles published in 2013 and we urge the panel to incorporate these more recent publications. While our joint comments here reflect our overarching consensus comments, many of us and our colleagues may individually submit additional recommendations, particularly for supplementing the relevant scientific literature on this important issue of wetland and stream connectivity.

I. <u>The draft report is clear and technically accurate overall and in its conceptual framework</u>.

A. The draft report is grounded in well-established core scientific principles relevant to how water moves within watersheds.

The draft report is clear and technically accurate in its assessment of connectivity as a foundational concept in hydrology and freshwater ecology. We support the focus on material transport at the core of the conceptual framework, including the following:

> The structure and function of downstream waters are highly dependent on the constituent materials contributed by and transported through water bodies located elsewhere in the watershed. Most of the materials in a river, including water, sediment, wood, organic matter, nutrients, chemical contaminants, and certain organisms, originate outside of the river, from upstream tributaries, wetlands, or other components of the river system, and are transported to the river by water movement, wind, or other means. Therefore, streams and wetlands fundamentally affect river structure and function by altering transport of various types of materials to the river. This alteration of material transport depends on two key factors: (1) connectivity (or isolation) between streams, wetlands, and rivers that enables (or prevents) the movement of materials between the system components; and (2) functions within streams and wetlands that supply, remove, transform, provide refuge for, or delay transport of materials.
> Connectivity Report at 1-4.

B. Two core principles that warrant greater emphasis and explanation in the conceptual framework are those of aggregation and the use of the watershed as the appropriate geographic context.

We agree with report statements of this aggregation principle, including the following:

> …[T]o understand the health, behavior, and sustainability of downstream waters, the

effects of small water bodies in a watershed need to be considered in aggregate. The contribution of material by a particular stream and wetland might be small, but the aggregate contribution by an entire class of streams and wetlands (e.g., all ephemeral streams in the river network) might be substantial." Connectivity Report at 1-14.

The overall strength of a connection, and the magnitude of its downstream effect, are the result of the cumulative effect of multiple, individual water bodies whose hydrology and ecology are tightly coupled with the local and regional geological and biological processes that formed them. Connectivity Report at 6-3.

However, the report would be strengthened by highlighting this principle in the conceptual framework and more carefully linking it in the framework to the discussions of integrated river systems and networks and the mechanisms of material transport to and from streams and wetlands.

Overall, this report clearly presents its findings and conclusions, and summarizes and helpfully repeats them at key junctures throughout the report. It provides context, graphics, tables, and case studies to explain its findings, and it supports its findings and conclusions with scientific evidence, models, and case studies contained in over 1,000 peer-reviewed scientific articles. In sum, the draft report is clear and technically accurate overall and in its conceptual framework.

II. The findings, the conclusions, and the literature cited generally reflect the best available science with respect to stream connectivity and effects.

We concur with the report's conclusions with respect to stream connectivity and effects, including its core conclusion that:

All tributary streams, including perennial, intermittent, and ephemeral streams, are physically, chemically, and biologically connected to downstream rivers via channels and associated alluvial deposits where water and other materials are concentrated, mixed, transformed, and transported. Connectivity Report at 1-3, 1-6, 6-1.

We concur with the key findings with respect to stream connectivity and effects, including the following:

Headwaters convey water into local storage compartments such as ponds, shallow aquifers, or river banks and into regional and alluvial aquifers. These local storage compartments are important sources of water for baseflow in rivers. The ability of streams to keep flowing even during dry periods typically depends on the delayed (lagged) release of local groundwater, also referred to as shallow groundwater, originating from these water sources, especially in areas with shallow groundwater tables and pervious subsurfaces. Connectivity Report at 1-7.

Even infrequent flows through ephemeral or intermittent channels influence fundamental biogeochemical processes by connecting the channel and shallow groundwater with other landscape elements. Infrequent, high-magnitude events are

especially important for transmitting materials from headwater streams in most river networks. Connectivity Report at 1-7, 4-1.

The connections formed by surface and subsurface streamflows act as a series of complex physical, chemical, and biological alterations that occur as materials move through different parts of the river system. The amount and quality of such materials that eventually reach a river are determined by the aggregate effect of these sequential alterations that begin at the source waters, which can be at some distance from the river. .... Stream and wetland capacities for nutrient cycling have important implications for the form and concentration of nutrients exported to downstream waters. Connectivity Report at 1-7-8.

Our review found strong evidence that headwater streams function as nitrogen sources (export) and sinks (uptake and transformation) for river networks....Thus, the role of streams in influencing nutrient loads can have significant repercussions for hypoxic areas in downstream waters. Connectivity Report at 1-8.

This review found strong evidence that headwaters provide habitat for complex life-cycle completion, refuge from predators or adverse physical conditions in rivers, and reservoirs of genetic- and species-level diversity. Connectivity Report at 1-8.

These findings and conclusions are clear, technically correct, and well-supported with citations to relevant peer-reviewed scientific literature. We note, in particular, that Section 4 of the draft report clearly, accurately, and thoroughly documents the scientific evidence of ephemeral stream connectivity, including case studies of southwestern and prairie stream systems.

III. The literature cited, the findings, and the conclusions generally reflect the best available science with respect to the downstream connectivity and effects of floodplain wetlands and open-waters, though some additional emphasis and literature is warranted.

We concur with the report's conclusions with respect to the downstream connectivity and effects of floodplain wetlands and open-waters, including its core conclusion that:

Wetlands and open-waters in landscape settings that have bidirectional hydrologic exchanges with streams or rivers (e.g., wetlands and open-waters in riparian areas and floodplains) are physically, chemically, and biologically connected with rivers via the export of channel-forming sediment and woody debris, temporary storage of local groundwater that supports base flow in rivers, and transport of stored organic matter. They remove and transform excess nutrients such as nitrogen and phosphorus (P). They provide nursery habitat for breeding fish, colonization opportunities for stream invertebrates, and maturation habitat for stream insects. Moreover, wetlands in this landscape setting serve an important role in the integrity of downstream waters because they also act as sinks by retaining floodwaters, sediment, nutrients, and contaminants that could otherwise negatively impact the condition or function of downstream waters.

Connectivity Report at 1-3, 6-1.

We concur with the key findings with respect to floodplain wetlands and open waters connectivity and effects, including the following:

> The wetland literature shows that collectively, riparian wetlands improve water quality though assimilation, transformation, or sequestration of nutrients, sediment, and other pollutants – such as pesticides and metals – that can affect downstream water quality. Connectivity Report at 1-9.
>
> Riparian and floodplain areas connect upland and aquatic environments through both surface and subsurface hydrologic flow paths. These areas are therefore uniquely situated in watersheds to receive and process waters that pass over densely vegetated areas and through subsurface zones before reaching streams and rivers. When contaminants reach a riparian or floodplain area, they can be sequestered in sediments, assimilated into the wetland plants and animals, transformed into less harmful forms or compounds, or lost to the atmosphere. Connectivity Report at 1-9.
>
> Riparian and flood plain areas can reduce flood peaks by storing and desynchronizing floodwaters. They also can contribute to maintenance of flow by recharging alluvial aquifers. Connectivity Report at 1-9.
>
> Movements of organisms connect aquatic habitats and populations in different locations – even across different watersheds – through several processes important for the survival of individuals, populations, and species, and for the functioning of the river ecosystem. For example, lateral expansion and contraction of the river in its floodplain results in an exchange of matter and organisms, including fish populations that are adapted to use floodplain habitat for feeding and spawning during high water. Refuge populations of aquatic plants in floodplains can become important seed sources for the river network, especially if catastrophic flooding scours vegetation and seed backs in other parts of the channel. Many invertebrates exploit temporary hydrologic connections between rivers and floodplain wetland habitats, moving into these wetlands to feed, reproduce, or avoid harsh environmental conditions and then returning to the river network. Connectivity Report at 1-10.

These findings and conclusions are clear, technically correct, and well-supported with citations to relevant peer-reviewed scientific literature. We believe that the findings of the report could be strengthened, and its scope and applicability made more clear, if the category of forested wetlands were to receive a more explicit treatment. This category of wetland comprises almost half of the remaining wetlands in the contiguous 48 states and, according to the latest U.S. Fish and Wildlife Service wetland status and trends report, is losing wetland acreage at a faster rate than any other wetland type. While most forested wetlands likely occur in a floodplain (bidirectional) setting, they also occur in unidirectional settings. Wherever such treatment might be placed, its explicit treatment would create a better understanding of these habitats as a category of wetland even though they may often not be flooded.

IV. The findings, the conclusions, and the literature cited, generally reflect the best science currently available with respect to the downstream connectivity and effects of "unidirectional" wetlands and open-waters located outside of floodplains, though some clarification is warranted.

A. The report's conclusions with respect to the downstream connectivity and effects of "unidirectional" wetlands and open-waters are generally accurate, but warrant clarification and refinement.

We concur with the conclusion that:

> Wetlands in landscape settings that lack bidirectional hydrologic exchanges with downstream waters (e.g., many prairie potholes, vernal pools, and playa lakes) provide numerous functions that can benefit downstream water quality and integrity. These functions include storage of floodwater; retention and transformation of nutrients, metals, and pesticides; and recharge of groundwater sources of river baseflow. The functions and effects of this diverse group of wetlands, which we refer to as "unidirectional wetlands," affect the condition of downstream waters if a surface or shallow subsurface water connection to the river network is present. Connectivity Report at 1-3-4, 1-10, 6-1.

However, we are particularly concerned with the breadth of the following conclusion in light of the scientific evidence and case studies presented in the draft report:

> The literature we reviewed does not provide sufficient information to evaluate or generalize about the degree of connectivity (absolute or relative) or the downstream effects of wetlands in unidirectional landscape settings. Connectivity Report at 1-4, 1-10-11, 5-2, 6-2.

The scientific literature summarized in the draft report indicates that, in fact, the type and degree of connectivity for certain unidirectional wetlands in certain regions or watersheds may be sufficiently consistent, significant, and demonstrable to establish their general and collective connectivity to downstream waters as a category of unidirectional wetlands, rather than simply case-by-case.

As one example, the draft report includes as a key finding (with which we concur) that, based on simulation studies of North Dakota and Minnesota watersheds, "the ability of potholes to modulate streamflow may be widespread across portions of the prairie pothole region (PPR)," and that "reducing wetland water storage capacity by connecting formerly isolated potholes through ditching or drainage to the Devils Lake and Red River basins could enhance stormflow and contribute to downstream flooding." Connectivity Report at 1-11. *See also,* 5-61.

The finding continues: "In many agricultural areas already crisscrossed by extensive drainage systems, total streamflow and baseflow *are* enhanced by directly connecting potholes to stream networks." Connectivity Report at 1-11. *See also,* 5-61.

The report's prairie potholes case study concludes with this finding, which seems to directly contradict the broadly-stated conclusion of concern quoted above:

> Given evidence in the current literature, however, when proper climatic or topographic conditions occur, or biotic communities are present that promote potential or observed connections, measurable influence on the physical, chemical, and biological condition and function of downstream waters is highly likely. Connectivity Report at 5-66.

Similar to the Prairie Pothole case study, the Carolina Bay case study includes findings based on peer reviewed scientific studies that would support the conclusion that such wetlands could be considered a class of waters that influence downstream waters, yet the conclusion at the end of that case study appears at odds with the scientific findings. *See* Connectivity Report at 5-53-57.

These findings alone indicate that the scientific literature does provide sufficient information to evaluate and generalize about the connectivity and downstream effects of wetlands in unidirectional landscape settings – at least on a regional or watershed basis.

B. We concur with the key findings with respect to the downstream connectivity and effects of "unidirectional" wetlands and open-waters, including the following:

> Water storage by wetlands well outside of riparian or floodplain areas can affect streamflow. Connectivity Report at 1-11.
>
> Unidirectional wetlands act as sinks and transformers for various pollutants, especially nutrients, which pose a serious pollution problem in the United States....[O]nsite removal of nutrients by unidirectional wetlands is significant and geographically widespread. Connectivity Report at 1-11-12. *See also* Connectivity Report at 5-30.
>
> Biological connectivity can occur between unidirectional wetlands and downstream waters through movement of amphibians, aquatic seeds, macroinvertebrates, reptiles, and mammals, including colonization by invasive species. Connectivity Report at 1-12. *See also,* Connectivity Report at 1-14.
>
> Unidirectional wetlands can be hydrologically connected directly to river networks through channels, nonchannelized surface flow, or subsurface flows. Connectivity Report at 1-12.
>
> Unidirectional wetlands occur along a gradient of hydrologic connectivity-isolation with respect to river networks, lakes, or marine/estuarine water bodies. This gradient includes, for example, wetlands that serve as origins for stream channels that have permanent surface water connections to the river network; wetlands with outlets to stream channels that discharge to deep groundwater aquifers; geographically isolated wetlands that have local groundwater or occasional surface water connections to downstream waters; and isolated wetlands that have minimal hydrologic connection to

other waterbodies (but which could include surface and subsurface connections to other wetlands). Connectivity Report at 1-12.

Individual wetlands that are geographically isolated could be connected to downstream waters when considered as a complex (a group of interacting wetlands)....[W]etland complexes could have connections to downstream waters through stream channels even when the individual wetland components are geographically isolated. Connectivity Report at 1-12.

C. We recommend several clarifications in the report's conclusions with respect to unidirectional wetlands and open-waters.

We advise the scientific review panel to clarify and refine the report's conclusions with respect to unidirectional wetlands and open-waters as follows:

- Clarify that the scientific literature does provide sufficient information to evaluate and generalize about the connectivity and downstream effects of wetlands in certain unidirectional landscape settings on a regional or watershed basis.

- Clarify and consistently apply the findings that: 1) downstream effects such as water storage and sediment removal arise from *isolation* rather than connectivity; and 2) these downstream effects arise from the connecting of previously isolated wetlands through ditching or drainage. Emphasize that these findings are well-documented in the scientific literature and should be thoroughly and consistently considered in assessing connectivity and downstream effects of unidirectional as well as bidirectional waters.

  The Connectivity Report repeatedly emphasizes that, "[b]oth connectivity and isolation have important effects on downstream waters." *See, e.g.,* Connectivity Report at 1-4, 5, 11, 13, 3-25, 3-29, 3-31, 3-48, 4-33, 4-68, 5-2, 5-30 (nutrient sinks), 5-36, 5-55, 5-61, 5-63, 5-66, 6-2, 6-3 . However, consideration of the downstream effects of wetland isolation seems to get short shrift in assessing connectivity/isolation of unidirectional wetlands and impacts on downstream waters. *See, e.g.,* Connectivity Report at 5-39 (Table 5-4), 5-41, 6-2.

- Clarify that scientific study is evolving and evidence of connectivity is increasingly emerging with respect to the downstream connectivity and effects of "unidirectional" wetlands and open-waters and that determinations with respect to the influence of these waters on downstream waters should not be static, but should take into account the most recent scientific evidence available. We expect that there are additional relevant peer-reviewed articles published in 2013, alone, and we urge the panel to incorporate these more recent publications and account for future scientific evidence to come.

- We suggest that the scientific evidence of the connectivity provided by avifauna, and perhaps other wildlife, be reviewed further and incorporated into the report to strengthen the information about the biological connectivity between wetlands and

downstream waters. Some peer reviewed literature exists that illustrates the dependency of certain bird species, during certain times of the year, on having both wetlands (unidirectional in some cases) and downstream waters within their daily ranges. These kinds of linkages should be further researched and included, and some of the signatories here will provide specific literature citations for the panel.

Conclusion

We commend EPA and the authors of the report for their thorough and well-documented review of connectivity between downstream waters and the small streams and wetlands that occur throughout the landscape. Overall, the *Connectivity Report* is clear, technically accurate, comprehensive in its literature review, and establishes a strong foundation of the best currently available science demonstrating the physical, chemical, and biological connections by which streams, wetlands, and open-waters affect downstream waters such as rivers, lakes, and oceans.

Respectfully Submitted,

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To the Panel for the Review of the EPA Water Body Connectivity Report:
Docket #: EPA-HQ-OA-2013-0582

As professors, scientists and researchers who study our streams, wetlands, and environment, we write to you in support of the EPA Science Advisory Board's Report, *Connectivity of Streams and Wetlands to Downstream Waters*.

Supreme Court decisions and subsequent agency guidance have created confusion and uncertainty regarding what waters are protected under the Clean Water Act. This uncertainty has left nearly 60% of our nation's streams, 20 million acres of wetlands, and the drinking water for 117 million Americans at risk of even more pollution.

The science is clear: pollution that enters an upstream waterway has a demonstrable effect on the health of the waterways it feeds into. If we don't protect the network of streams, headwaters, and wetlands upstream, we have no way of protecting some of our nation's most treasured rivers, lakes, and bays.

The goal of the Clean Water Act is "to restore and maintain the chemical, physical and biological integrity of the nation's waters." Smaller waterways – including isolated wetlands – are an integral part of the nation's network of waters, and provide numerous ecological goods and services of significant value to society. If our nation hopes to achieve the goals of the Clean Water Act, all our streams and wetlands must remain within its jurisdiction.

We urge the Science Advisory Board to finalize a strong report on the connectivity of our waters that reflects the best science available, including that which shows the importance of protecting isolated wetlands across the country.

Sincerely,

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November 6, 2013

Science Advisory Board Review Panel
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Re: Comments on ***Connectivity of Streams and Wetlands to Downstream Waters*: Docket ID No. EPA-HQ-OA-2013-0582**

Dear Dr. Armitage,

On behalf of our millions of members and supporters, we applaud the Environmental Protection Agency (EPA) for collecting scientific evidence to evaluate in detail how wetlands and headwater streams have physical, chemical, or biological linkages to downstream waters and therefore impact the integrity of our rivers, lakes, and bays.

This new report, "Connectivity of Streams and Wetlands to Downstream Waters," affirms the well-established scientific principle that the network of small interconnected wetlands and headwater streams in our watersheds are critically important to the health of our larger waters downstream. If pollutants enter wetlands and headwaters up in the mountains, they can harm aquatic life and water quality all the way down the watershed. Similarly, waters more remote from larger waterbodies can prevent downstream harm by capturing flow and waterborne pollutants.

The science review is an important first step and we hope that EPA and the Army Corps of Engineers are able to build on the Connectivity Report and ensure that it accurately reflects the functions and connections of streams and wetlands in watersheds. The universe of data and studies on small streams and wetlands is vast and the report should attempt to include as much pertinent information as possible. The strength of the report's science and conclusions may well be essential to ensuring that Clean Water Act protections cover smaller waters that influence the health of our nation's rivers, estuaries, and drinking water supplies. The report should also recognize that science, and our understanding of our nation's water resources, evolves over time, and there should be room to include new information in the future.

Our organizations were pleased to see two important principles regarding aquatic resources identified in the EPA report. First, the report lays out the case for using a watershed as the primary unit by which to determine connections and relationships between waters. Second, the report speaks to the importance of the principle of aggregation. What the scientific report shows is that while one small stream may not have a big impact on a larger downstream water, the combined effect of many small headwater streams or small wetlands can have a significant impact on the larger downstream waterbody. These two principles are very important when it comes to thinking about the complete landscape of watersheds and the aggregate effects that the loss of some waters can have on larger waterbodies.

Last, our organizations request clarification on one important point regarding so-called "unidirectional" wetlands and open waters. The scientific report correctly concludes that wetlands in unidirectional landscape settings can benefit downstream water quality and integrity, in spite of lacking bidirectional hydrologic connections with downstream waters. However, the report then includes a statement that there is not sufficient evidence, based on the literature, to evaluate the degree of connectivity or the downstream effects of wetlands in unidirectional landscapes.

In our opinion, the report includes more than enough scientific literature to establish the connectivity and downstream effects of unidirectional wetlands, at least in certain unidirectional landscape settings on a regional or watershed basis. Specifically, the science can at least be summarized as establishing that unidirectional wetlands outside of riparian/floodplain areas, when considered as a class, have a more than insubstantial aggregate effect on the chemical, physical, and biological integrity of downstream waters. Moreover, the several categories of unidirectional waters discussed in the report have an even more substantial collective impact.

We ask that the final report clarify this point.

We strongly support the administration using this science report as it develops a rulemaking to clarify the scope of the Clean Water Act's coverage. At a minimum, this rule must protect those waters science shows to be important in our nation's aquatic systems and strengthens protections for these wetlands and headwaters as "Waters of the United States" under the Clean Water Act. Please feel free to contact Navis Bermudez at nbermudez@selcdc.org or 202-828-8382 if you need additional information from any of the signatories below.

Sincerely,

Alabama Rivers Alliance
Alliance for Sustainable Communities
American Canoe Association (ACA)
American Rivers
American Whitewater
Amigos Bravos
Anacostia Watershed Society
AquAlliance
Arkansas Public Policy Panel
Arkansas Wildlife Federation
Assateague Coastal Trust/Assateague COASTKEEPER
Association of State Floodplain Managers
Audubon Chapter of Minneapolis
Audubon Minnesota
Audubon Missouri
Audubon Naturalist Society
Bastrop County Environmental Network
Berkshire Environmental Action Team
Big Blackfoot Riverkeeper, Inc.
BlueGreen Alliance
Buckeye All-State Chapter, Izaak Walton League
Buffalo Niagara Riverkeeper
Cahaba Riverkeeper
Caloosahatchee River Citizen's Association (RiverWatch)
Cannon River Watershed Partnership
Cass County Minnesota Chapter, Izaak Walton League
Cedar Prairie Sierra Group
Chattahoochee Riverkeeper
Chesapeake Bay Foundation
Chester Riverkeeper
Choctawhatchee Riverkeeper, Inc.
Citizens Campaign for the Environment
Citizens for Pennsylvania's Future
Clean Water Action
Columbia River Crab Fisherman's Association
Conservancy of Southwest Florida
Congaree Riverkeeper

Conservation Pennsylvania
Conservation Voters of Pennsylvania
Copper River Watershed Project
Delaware Nature Society
Dwight Lydell Chapter, Izaak Walton League
Earthjustice
Endangered Habitats League
Environment America
Environmental Law & Policy Center
Farmington River Watershed Association
Florida Wildlife Federation
Foothill Conservancy
Friends of Clear Creek
Friends of Grays Harbor
Friends of the Cheat, Inc
Friends of the Cloquet Valley State Forest
Friends of the Locust Fork River
Friends of the Mississippi River
Friends of the Rivers of Virginia
Friends of the Upper Delaware
Friends of the Weskeag
Galveston Baykeeper
Grand Traverse Baykeeper
Grays Harbor Audubon Society
Gulf Restoration Network
Hackensack Riverkeeper
Hudson Riverkeeper
Idaho Rivers United
Idaho Wildlife Federation
Indiana Wildlife Federation
Interfaith Partners for the Chesapeake
Iowa Environmental Council
Iowa Wildlife Federation
Izaak Walton League of America
Jaques Chapter, MN Division, Izaak Walton League
Kansas Wildlife Federation
Kentucky Resources Council, Inc.
Kentucky Waterways Alliance
Key Environmental Solutions, LLC
Labadie Environmental Organization
Lake Erie Waterkeeper Inc.
Lake Erie Region Conservancy
Lake Pend Oreille Waterkeeper
League of Conservation Voters
Louisiana Audubon Council
Louisiana Environmental Action Network
Lower Mississippi Riverkeeper
Lower Susquehanna Riverkeeper
The Maryland Conservation Council
Massachusetts Baykeeper, Inc.
Mid-Atlantic Council, Trout Unlimited
Mid-shore Chapter, Izaak Walton League
Midwest Environmental Advocates
Milwaukee Riverkeeper
Minnesota Center for Environmental Advocacy
Minnesota Conservation Federation
Minnesota Trout Unlimited
Mississippi Wildlife Federation
Missouri Coalition for the Environment
MnDak Upstream Coalition
Mountain Watershed Association
National Audubon Society
National Committee for the New River
National Garden Club, Deep South Region
National Parks Conservation Association
National Wildlife Federation
Natural Resources Defense Council
Nature Abounds
Neighbors of the Northwest Branch of the Anacostia River
Neuse Riverkeeper Foundation
Nebraska Wildlife Federation
Nevada Wildlife Federation
New Jersey Audubon
New Mexico Wildlife Federation
New York/New Jersey Baykeeper
North Carolina Wildlife Federation
North Dakota Wildlife Federation
Northwest Environmental Advocates
Northwest Environmental Defense Center
Ohio Environmental Council
Ohio River Foundation
Olympic Forest Coalition
Pacific County Marine Resources Committee
Palm Beach County Reef Rescue
Pamlico-Tar River Foundation
Pennsylvania Chapter, Sierra Club
The Port Tobacco River Conservancy
Potomac Riverkeeper
Prairie Rivers Network
Prince William Conservation Alliance
Puget Soundkeeper Alliance
Quad Cities WATERKEEPER, INC
Raritan Riverkeeper
Renewable Resources Coalition and Foundation
The Rivanna Conservation Society
River Network
The River Project
River Source
Rogue Riverkeeper
Russian Riverkeeper
Safe Alternatives for our Forest Environment

St Louis River Alliance
San Diego Coastkeeper
San Francisco Baykeeper
San Juan Citizens Alliance
San Luis Obispo COASTKEEPER®
Save Lake Superior Association
Save Our Sky Blue Waters
Save Our Saugahatchee Inc.
Save the Poudre: Poudre Waterkeeper
Save the River
Shenandoah Riverkeeper
Sierra Club
Silver Valley Waterkeeper
South Dakota Wildlife Federation
South Fork Trinity Up-River Friends
Southeast Alaska Conservation Council
Southern Environmental Law Center
Tennessee Chapter, Sierra Club
Tennessee Clean Water Network
Tip of the Mitt Watershed Council
Toe River Valley Watch
Tualatin Riverkeepers
Virginia Conservation Network
Waccamaw Riverkeeper
Water-Culture Institute
WaterWatch of Oregon
Waterkeeper Alliance
Waterkeepers Chesapeake
West/Rhode Riverkeeper
West Virginia Highlands Conservancy
West Virginia Rivers Coalition
Western Nebraska Resources Council
Western Reserve Chapter, Izaak Walton League
Wetlands Watch
Wild Virginia
Wisconsin Wetlands Association
Wisconsin Wildlife Federation
World Temperate Rainforest Network
Wyoming Wildlife Federation
Yadkin Riverkeeper
Yell County Wildlife Federation
Youghiogheny Riverkeeper

Southern
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SouthernEnvironment.org

November 6, 2013

Science Advisory Board Review Panel
Attn: Dr. Thomas Armitage, Designated Federal Officer
EPA Science Advisory Board Staff Office (1400 R)
U.S. Environmental Protection Agency
1200 Pennsylvania Avenue, NW
Washington, DC 20460

Office of Environmental Information
Docket ID No. EPA-HQ-OA-2013-0582
Docket Mail Code: 28221T
U.S. Environmental Protection Agency
1200 Pennsylvania Avenue, NE
Washington, DC 20460

Dear Dr. Armitage,

The Southern Environmental Law Center (SELC) welcomes the opportunity to comment on the Environmental Protection Agency's (EPA) recently released draft science report entitled, "Connectivity of Streams and Wetlands to Downstream Waters: A Review and Synthesis of the Scientific Evidence." SELC appreciates the effort that went into collecting the vast scientific evidence to evaluate in great detail the physical, chemical, and biological linkages that wetlands and headwater streams have to downstream waters, ultimately influencing the health and integrity of our rivers, lakes, and bays.

The Connectivity Report confirms the well-established scientific principle that the network of small interconnected wetlands and headwater streams in our watersheds are critically important to the health of larger downstream waters. It is clear that pollutants entering headwaters can end up in waterways throughout the watershed. Further, wetlands and small streams can help protect downstream waters by capturing flow and waterborne pollutants.

The EPA's draft Connectivity Report successfully pulls together a large amount of data and scientific literature, and SELC hopes that the EPA and the Army Corps of Engineers will build on the Connectivity Report and ensure that it accurately reflects the functions and connections of streams and wetlands in watersheds. New connectivity information is being developed and reviewed, and there is a large universe of additional scientific information that is relevant to the assessment of connectivity between waterbodies. The Science Advisory Board should not limit itself to only the peer-reviewed literature in making these assessments. The science surrounding connectivity is essential to ensuring that smaller waters that influence the health of our nation's rivers, estuaries, and drinking water supplies receive appropriate Clean Water Act protections.

Two important principles regarding aquatic resources were identified in the Connectivity report. First, the case is made for using a watershed as the primary unit by which to determine connections and relationships between waters. Second, the report speaks to the importance of aggregation. What the science report shows is that while one small stream may not have a significant impact on

downstream water, the cumulative impact of small headwater streams and wetlands can be significant. These two principles are important in terms of thinking about the complete landscape of a watershed and the aggregate effects that the loss of some waters can have on larger waterbodies.

That said, we are concerned about the discussion of "unidirectional" wetlands and open waters in the report. The report correctly concludes that wetlands in unidirectional landscape settings can benefit downstream water quality and integrity in spite of lacking bidirectional hydrologic connections with downstream waters. But then the report includes a statement that there is insufficient evidence, based on the literature, to evaluate the degree of connectivity or the downstream effects of wetlands in unidirectional landscapes.

This conclusory statement comes on the heels of various discussions in the report that list multiple studies, documenting how unidirectional wetlands, at least in certain landscapes, impact downstream waters. As the report reveals, unidirectional wetlands outside of riparian/floodplain areas, when considered as a class, can have a significant aggregate effect on the chemical, physical and biological integrity of downstream waters.

For example, the Carolina Bay case study (see Section 5.7 of the Draft Connectivity Report) summarizes numerous scientific studies indicating that certain unidirectional waters are connected – hydrologically, biologically, and chemically – to other waters. However, in contrast, the section concludes with a statement that there is not enough evidence to support the notion that these waters are indeed connected.

The Southeast is home to Carolina Bays and a large number of smaller wetlands in the southern coastal plain. These unidirectional waters are important to maintaining the health of larger waters; helping to attenuate flood waters; and providing habitat for diverse plant and animal. Given the evidence laid out in the Connectivity Report, these waters should be considered as a class of waters that are connected to other waters.

Thus, SELC respectfully requests that the Science Advisory Board tasked with reviewing the Connectivity Report take a hard look at the Caroline Bay case study and the underlying scientific studies and make a fresh call on whether Carolina Bays should be considered a class of waters. The scientific evidence is there to support such a call, the Connectivity Report already includes the appropriate language in its discussion; the conclusion simply needs to be altered.

Thank you for accepting our comments on the Connectivity Report. SELC supports the use of this science report as the EPA and the Army Corps of Engineers develop a rulemaking that clarifies the scope of the Clean Water Act. It is essential that any rule protect the waters which science demonstrates to be important in our nation's aquatic systems, and strengthen protections for the wetlands and headwaters which support those systems as "Waters of the United States" under the Clean Water Act.

Sincerely,

Navis A. Bermudez
Deputy Legislative Director
Southern Environmental Law Center

Ditches. Ditches (including roadside ditches) excavated wholly in and draining only uplands and that do not carry a relatively permanent flow of water generally are not jurisdictional under the CWA, because they are not tributaries or they do not have a significant nexus to TNWs. If a ditch has relatively permanent flow into waters of the U.S. or between two (or more) waters of the U.S., the ditch is jurisdictional under the CWA. Even when not themselves waters of the United States, ditches may still contribute to a surface hydrologic connection between an adjacent wetland and a TNW. (For a few examples, see Photos 51 - 54).

Photo 51. A roadside ditch excavated wholly in uplands, CA. Feature is not jurisdictional under CWA.

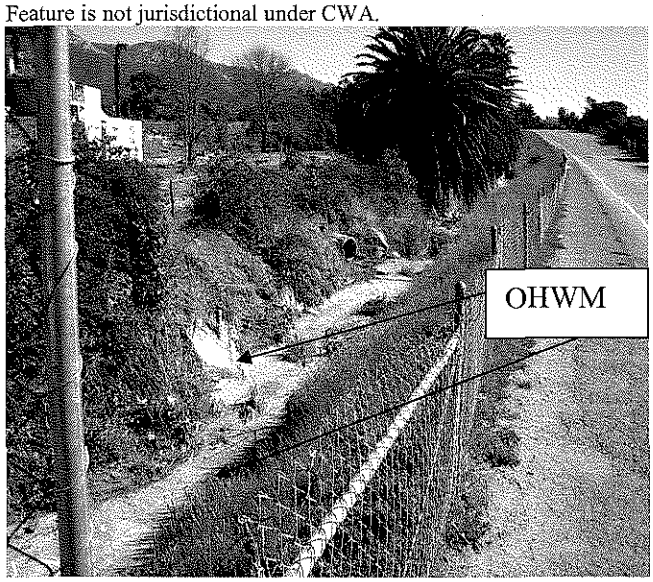
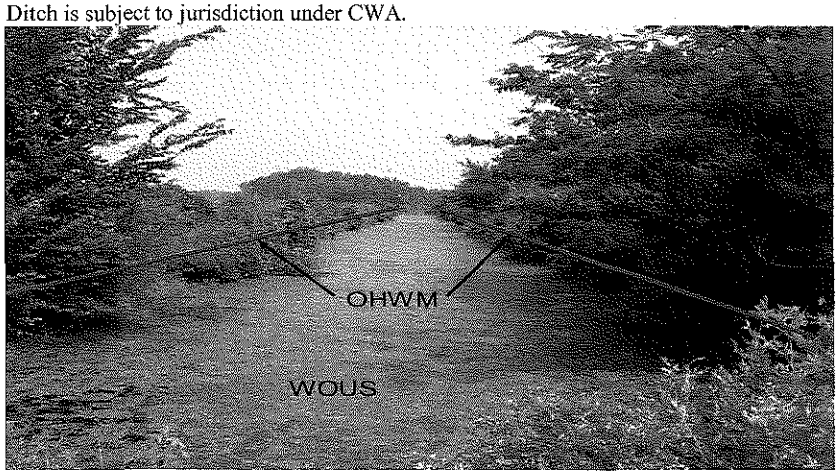


Photo 52. Ditch, an RPW, Memphis District. Ditch is subject to jurisdiction under CWA.



For each specific request relating to ditches or similar features, field staff will need to make a case-by-case determination on jurisdictional status of resource.

Photo 53. Drainage ditch, an RPW, South Atlantic Division. Ditch excavated in wetlands; ditch is subject to jurisdiction under CWA. Yellow lines mark approximate location of OHWM.

Photo 54. A ditch, constructed in uplands, WA. Ditch conveys water from a nearby wetland to a stream through a storm water outfall pipe. Red lines mark approximate location of OHWM.

For each specific request regarding ditches or similar features, field staff will need to make a case-by-case determination on jurisdictional status of resource.

EXHIBIT E

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF COLUMBIA

STATE OF NEW YORK, et al. **Plaintiffs,** **and** **HEARTH, PATIO & BARBECUE ASSOCIATION,** **Proposed Plaintiff-Intervenor,** **v.** **GINA MCCARTHY, in her official capacity as Administrator, U.S. Environmental Protection Agency, and** **ENVIRONMENTAL PROTECTION AGENCY,** **Defendants.**	**No. 13-cv-1553 (GK)**

DECLARATION OF TIMOTHY N. SEATON

I, Timothy N. Seaton, declare under penalty of perjury as follows:

1. I am the founder and owner of Timely Construction, Inc. ("Timely Construction"), an Oregon corporation based in Washington and established in 1990. I also have a financial interest in and work regularly with Empire Masonry Heaters, Inc. of Scottsville, NY ("Empire"). I make this Declaration based on my personal knowledge in support of the Hearth, Patio & Barbecue Association's ("HPBA") Motion to Intervene as a Plaintiff in this litigation.

2. My company, Timely Construction, is a member of HPBA through its regional affiliate the Northwest Hearth Patio & Barbecue Association ("NWHPBA"), having first joined in May 2005. For the 2012 calendar year only, this membership was transferred to Western Masonry Heater and Oven LLC, a masonry heater retail business I started with a partner but

which is no longer in existence. From March 2008 until March 2013, I served as chair of what was then known as the "Masonry Heater Caucus" within HPBA, now called the "Masonry Heater Sub-Section" of HPBA's Wood & Pellet Hearth Appliance Section. Timely Construction is currently a member of HPBA's Masonry Heater Sub-Section, and I am also an active member of NWHPBA's board.

3. I am a third-generation masonry contractor with a degree in civil engineering and professional training in healthy home construction. Timely Construction has two primary product offerings: high-efficiency masonry heaters and wood-fired bake ovens. Masonry heaters are residential wood-burning appliances derivative of a type of traditional European fireplace technology, and are known for their high efficiency and clean-burning qualities. As owner and founder of Timely Construction, I am involved in every aspect of the business, including the day-to-day work to design and build masonry heater products. I also run the business-side of the company, and have closely followed economic and regulatory developments that might affect my business and the industry in which Timely Construction competes.

4. Given my education and engineering background, I also have a strong interest and significant experience in efforts related to the development of test methods for masonry heaters. Since 2005, I have been an active member of the ASTM E06.54.05 Masonry Heater Task Group (serving as Secretary over much of this period) and remain directly involved in ongoing work to develop masonry heater test methods.

5. When EPA established existing New Source Performance Standards ("NSPS") for residential wood heaters in 1988, masonry heaters were exempt from regulation by virtue of the NSPS's exclusion of appliances that weigh over 800 kilograms. This exemption was carved into the NSPS because EPA lacked a workable method for testing particulate matter emissions from

appliances of such size and weight. An unintended result of this exemption has been a tendency by state and local jurisdictions to assume that the absence of NSPS coverage means that masonry heaters are not clean-burning, a perception that could not be further from the truth.

6. As a result of this misperception, states and localities have made it increasingly difficult for masonry heaters to be installed in and sold to customers in their jurisdiction. As indicated in the attached timeline tracking industry's advocacy efforts ("Exhibit 1"), by 2003, a number of state air quality jurisdictions, including jurisdictions in California and Montana, began to require that appliances be "EPA-certified," something which was impossible for masonry heaters in light of the NSPS's exemption. As the years have gone by, masonry heaters continue to be marched out of one jurisdiction after another based on rules requiring EPA certification.

7. A non-exclusive list of jurisdictions that, to the best of my knowledge and belief, do not allow or heavily (and non-uniformly) regulate masonry heaters is attached ("Exhibit 2"). My knowledge of these jurisdictions derives from my own personal experiences, including multiple occasions on which Timely Construction attempted to sell a masonry heater but was precluded from doing so. Being located in the West, I am especially familiar and affected by with those jurisdictions in California which currently ban masonry heaters. New restrictions continue to be proposed and implemented in other locations.

8. In those jurisdictions where masonry heaters have been allowed to be sold and installed, such permission has often come at a substantial cost. In many instances, a jurisdiction's allowance of masonry heaters has been the result of hundreds of hours of time and significant financial resources spent meeting with regulators in person to prevent them from taking action that would either expressly or indirectly bar masonry heaters. In particular, I and my employees have frequently attended hearings in California, Oregon, and Washington, as well

as at least once in Colorado. The time, travel, and work in connection with such advocacy efforts alone have cost me an estimated $8,000 to $10,000 per year.

9. State-by-state testing requirements imposed in the absence of federal regulation result in additional costs to my business. In Washington and Colorado, for example, I am required to have my products tested in accordance with each jurisdiction's own distinct set of requirements. Such testing is both time- and cost-intensive. These expenses would be significantly diminished by the existence of EPA-issued, national test methods which would steer states and localities toward more uniform requirements and eliminate the need for repetitive and expensive state-by-state testing.

10. In addition, EPA's continued delay in issuing final standards for masonry heaters impedes my ability and the ability of others in the industry to plan over the long-term. While it is clear that EPA now intends to include masonry heaters in its eventual NSPS, until EPA issues a rule indicating what standards, rules, and test methods will apply, I am unable to invest in and move forward with new product testing and other projects.

11. By 2008, the masonry heater industry had grown increasingly aware that more formal EPA recognition of masonry heaters as clean-burning devices was needed in order to address the issues described above. A voluntary EPA program for masonry heaters (like that in place for fireplaces) was considered for a time, but for a variety of reasons, such a program did not come to fruition. Since then, many within the industry have concluded that the only way to secure wide recognition for masonry heaters, foster greater uniformity in requirements, and escape the growing number of state and local bans or non-uniform state and local requirements is for masonry heaters to become regulated under the NSPS. As a result, both I personally and others in the industry have urged EPA to include masonry heaters in a revised NSPS. In light of

such discussions, EPA made the decision to include masonry heaters in its forthcoming NSPS in June 2009.

12. Over four years have passed since that decision was made. EPA's continuing delay in completing its revision of the NSPS and issuing a rule extending to masonry heaters results in continuing injury to my business. Timely Construction continues to be limited in its ability to sell to customers in areas where masonry heaters are banned. In addition, where masonry heaters are allowed, Timely Construction must continue to comply with a patchwork of state and local requirements with regard to testing and other issues. If EPA were to complete its revision process and establish clear standards for masonry heaters, the EPA regulations could preclude new bans and non-uniform requirements, and provide the predicate for the masonry heater industry to reopen the debate about appropriate regulation of this appliance category with the many jurisdictions that now ban or unduly restrict them. These developments could free Timely Construction from many of the regulatory constraints now in place, and would permit sales to a much wider market. In addition, EPA regulations would provide the benefits and cost savings of increased certainty and national uniformity.

I declare under penalty of perjury that the foregoing is true and correct. Executed on October 31, 2013.

Timothy N. Seaton

EXHIBIT 1

SHORT TIMELINE OF MASONRY HEATER INDUSTRY EFFORTS WITH EPA:

1989-1990	Efforts to develop a masonry heater emissions test begin with a series of tests performed at Virginia Polytechnic Institute's lab.
1991-1992	EPA audits in home testing of five masonry heaters by EPA accredited OMNI Labs using their AWES field testing equipment developed for EPA research.
1992	EPA includes masonry heaters in its Best Available Control Methodology document AP42.
1993-2004	Washington State rules for fireplaces begin; testing method written by OMNI Labs. Washington eventually extends to masonry heaters although test method is not adequate. Colorado commissions Tiegs of OMNI to develop its test method and begins regulation. State air quality jurisdictions begin to enforce "EPA certified" only including California and Montana jurisdictions.
2003-2004	HPBA begins work with EPA on developing a voluntary fireplace agreement including developing test methods in ASTM. Masonry heater members participate recognizing the potential for expanding any program developed to masonry heaters.
2005	At meeting in EPA's Triangle Park, NC, EPA accepts HPBA's fireplace test method, is receptive to masonry heaters and asks for more masonry heater data, HPBA works with the industry to develop a strategy as part of its fireplace work. Test method development moves to ASTM task groups.
2006-2007	Testing of masonry heaters is done in EPA accredited labs with support from MHA, HPBA, and individual manufacturers.
2008	HPBA summarizes all masonry heater testing data test data in a white paper submitted to EPA (Bob Ferguson authors).
2009	EPA and portion of the industry consider a voluntary program for masonry heaters. EPA ultimately backs away. HPBA Masonry Heater Caucus urges EPA to include masonry heaters in its revised NSPS.
2009-2010	Ultimately EPA decides to include masonry heaters as part of NSPS process. HPBA works with MHA and AMHOP to develop NSPS proposal.
2011	ASTM masonry heater testing standard completed with EPA participation. Masonry Heater Caucus tasked by HPBA to develop a final NSPS proposal as part of overall strategy.
June 2012	HPBA submits masonry heater NSPS proposal to EPA.

EXHIBIT 2

Jurisdictions Restricting Masonry Heaters

A non-exclusive list of jurisdictions that prohibit masonry heaters includes:

California

1. Bay Area Air Quality Management District ("BAAQMD") (San Francisco and environs): Allows only EPA certified appliances.
2. Kern County: Allows only pellet and EPA certified appliances.
3. City of Los Altos: Allows only pellet stoves and EPA certified appliances.
4. Marin County: Defers to the BAAQMD, and allows only pellet and EPA certified appliances.
5. San Joaquin Valley Unified Air Pollution Control District: Allows only pellet and EPA certified appliances.
6. Tahoe Regional Planning Agency (Lake Tahoe and environs): Exempts pellet stoves but otherwise allows only EPA certified appliances.

Other

1. Jackson, Wyoming
2. Numerous jurisdictions in, among other places, Colorado, Arizona, Utah, Idaho, and Montana.

A non-exclusive list of other jurisdictions that heavily and non-uniformly regulate masonry heaters includes:

1. Maricopa County Air Pollution Control District: Allows masonry heaters and other devices only which meet "performance standards that are equivalent to the standards in 40 CFR 60, Subpart AAA as amended through July 1, 1998, and that is approved by the Control Officer and the Administrator of EPA".
2. Mendocino County Air Quality Management District: Allows masonry heaters, but requires a 10" veneer which essentially makes any masonry heater built in conformity to be unable to perform its function.
3. San Luis Obispo County Air Pollution Control District: Has approved four masonry heater models (based on Washington and Colorado testing), but refuses to approve any more.
4. Northern Sonoma Air Pollution Control District (Napa and environs): Formally allows EPA certified or District-approved masonry heaters, but the district has refused to approve any masonry heater.
5. Missoula City/County Health Department in Montana: Allows only pellet stoves inside the city limits. Outside the city limits, only one masonry heater model by the largest manufacturer Tulikivi has been approved, after petitioning based on the model's Washington testing.