Society *for* Freshwater Science

April 12, 2019

Mr. Andrew R. Wheeler
Administrator
U.S. Environmental Protection
Agency 1200 Pennsylvania
Avenue, NW Washington, DC

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

Via regulations.gov: Docket ID No. EPA-HQ-OW-2018-0149

Re: Society for Freshwater Science Comments on proposed rule - Revised Definition of "Waters of the United States" (84 FR 4154; Docket ID No. EPA-HQ-OW-2018-0149)

CC: Michael McDavit, Oceans, Wetlands, and Communities Division, Office of Water, EPA; Jennifer A. Moyer, Regulatory Community of Practice, U.S. Army Corps of Engineers

Dear Administrator Wheeler and Assistant Secretary James:

On behalf of the Society for Freshwater Science (SFS), I respectfully submit the following comments in response to the proposed rule "Revised Definition of 'Waters of the United States" (84 FR 4154; Docket ID No. EPA-HQ-OW-2018-0149), published in the Federal Register on February 14, 2019.

The more than 1000 members of SFS focus their research and professional activities on the physical, chemical, and biological structure and function of rivers, streams, lakes, ponds, wetlands and other shallow freshwater ecosystems, including perennial to ephemeral waterbodies. SFS encourages the use of the best available science for decision-making related to freshwater ecosystems and communicates this science as necessary to inform the public, environmental managers, and decision makers. **Our Society strongly opposes the proposed rule.**

The intent of the Clean Water Act (CWA) (officially the Federal Water Pollution Control Act of 1972), is "to ***restore and maintain the chemical, physical, and biological integrity*** of the Nation's waters" (Federal Water Pollution Control Act, 33 U.S.C. 1251 et seq., Sec. 101, p. 3). However, the CWA does not indicate which waters constitute "Nation's waters", commonly called "waters of the United States" (WOTUS). The geographic extent of the WOTUS subject to regulation under the CWA has been the

focus of debate and litigation for many decades, much of the history of which is detailed in the preamble to this proposed rule. The CWA was clearly intended to protect traditionally navigable waters (TNW) such as navigable rivers, lakes, and territorial seas. Left vague in the CWA, however, was how much of the Nation's other waters (tributary or otherwise), which are integral to the physical, chemical, and biological integrity of TNW, should also be considered WOTUS for the purposes of protections under the CWA. This was a question for which scientific research and study could provide clear, non-arbitrary evidence as to the connectivity between various types of tributary/other waters and the physical, chemical, and biological integrity of TNW.

Decades of experimental and observational research, much of it conducted by SFS members, clearly demonstrates that the integrity of TNW is linked to the chemical, physical and biological integrity of tributary, riparian, and wetland ecosystems in the watershed. These findings are well understood by the scientific community across multiple disciplines; the scientific evidence spread across a range of scientific journals and technical reports. As a result, synthesis of past research relevant to the question of connectivity, as well as an abundance of new research on the topic, became the focus of connectivity research conducted by both the USEPA as well as many other agencies and academic researchers. In 2015, the Obama Administration promulgated the Clean Water Rule (CWR) supported by this abundant scientific record. USEPA published a review authored by 17 federal agency authors ("Connectivity Report")[1] and subsequently reviewed by 49 technical experts, including a 25-member Scientific Advisory Board (SAB) that included many scientist members of SFS. This synthesis of more than 1,200 peer-reviewed scientific publications was the most comprehensive, thoroughly vetted, and scientifically defensible review on this topic ever. Subsequent research has only extended and reinforced the findings of the Connectivity Report[2].

[1] USEPA. 2015. Connectivity of streams and wetlands to downstream waters: a review and synthesis of the scientific evidence technical report. EPA/600/R-14/475F. US Environmental Protection Agency, Washington, D.C., USA

[2] Cohen, M. J., I. F. Creed, L. Alexander, N. B. Basu, A. J. K. Calhoun, C. Craft, E. D'Amico, E. DeKeyser, L. Fowler, H. E. Golden, J. W. Jawitz, P. Kalla, L. K. Kirkman, C. R. Lane, M. Lang, S. G. Leibowitz, D. B. Lewis, J. Marton, D. L. McLaughlin, D. M. Mushet, H. Raanan-Kiperwas, M. C. Rains, L. Smith, and S. C. Walls. 2016. Do geographically isolated wetlands influence landscape functions? Proceedings of the National Academy of Sciences of the United States of America 113:1978-1986.; Colvin, S. A. R., S. M. P. Sullivan, P. D. Shirey, R. W. Colvin, K. O. Winemiller, R. M. Hughes, K. D. Fausch, D. M. Infante, J. D. Olden, K. R. Bestgen, R. J. Danehy, and L. Eby. 2019. Headwater streams and wetlands are critical for sustaining fish, fisheries, and ecosystem services. Fisheries:10.1002/fsh.10229; Fritz, K. M., K. A. Schofield, L. C. Alexander, M. G. McManus, H. E. Golden, C. R. Lane, W. G. Kepner, S. D. LeDuc, J. E. DeMeester, and A. I. Pollard. 2018. Physical and chemical connectivity of streams and riparian wetlands to downstream waters: a synthesis. Journal of the American Water Resources Association 54:323-345; Goodrich, D. C., W. G. Kepner, L. R. Levick, and P. J. Wigington Jr. 2018. Southwestern Intermittent and Ephemeral Stream Connectivity. JAWRA Journal of the American Water Resources Association 54, no. 2: 400-422; Harvey, J., J. Gomez-Velez, N. Schmadel, D. Scott, E. Boyer, R. Alexander, K. Eng, A. Kettner, C. Konrad, R. Moore, J. Pizzuto, G. Schwarz, C. Soulsby, and J. Choi. 2018. How hydrologic connectivity regulates water quality in river corridors. Journal of the American Water Resources Association. https://doi.org/10.1111/1752-1688.12691; Leibowitz, S. G., P. J. Wigington, K. A. Schofield, L. C. Alexander, M. K. Vanderhoof, and H. E. Golden. 2018. Connectivity of streams and wetlands to downstream waters: an integrated systems framework. Journal of the American Water Resources Association 54:298-322; Rains, M. C., S. G. Leibowitz, M. J. Cohen, I. F. Creed, H. E. Golden, J. W. Jawitz, P. Kalla, C. R. Lane, M. W. Lang, and D. L. McLaughlin. 2016. Geographically isolated wetlands are part of

The *major conclusions of the Connectivity Report* included the following:

- The scientific literature unequivocally demonstrates that streams, regardless of their size or frequency of flow, are connected to downstream waters and strongly influence their function.
- The scientific literature clearly shows that wetlands and open waters in floodplains and riparian areas (i.e., transitional areas between terrestrial and aquatic ecosystems) are physically, chemically, and biologically integrated with rivers via functions that improve downstream water quality. Riparian floodplains act as effective buffers to protect downstream waters from pollution and are essential components of river food webs.
- There is ample evidence that many wetlands and open waters located outside of riparian areas and floodplains, even when lacking surface water connections, provide physical, chemical, and biological functions that could affect the integrity of downstream waters. Notably, some benefits of these wetlands rely on their isolation rather than their connectivity, and evaluation of the connectivity and effects of individual wetlands or groups of wetlands are possible through case-by-case analysis.
- Variations in the degree of connectivity are determined by the physical, chemical and biological environment, and by human activities. These variations support a range of stream and wetland functions that affect the integrity and sustainability of downstream waters
- The literature strongly supports the conclusion that the incremental contributions of individual streams and wetlands are cumulative across entire watersheds, and their influence on downstream waters should be evaluated within the context of other streams and wetlands in that watershed.

On December 11, 2018, the current administration proposed a revised definition of WOTUS (Revised Definition of "Waters of the United States", 84 Fed. Reg. 31, February 14, 2019). The proposed WOTUS rule (herein, "proposed rule) would remove or decrease protections for thousands of miles of our Nation's streams and millions of acres of wetlands currently protected under the CWR[3], protections that were based on and justified by the abundant scientific record.

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the hydrological landscape. Hydrological Processes 30:153-160; Schofield, K. A., L. C. Alexander, C. E. Ridley, M. K. Vanderhoof, K. M. Fritz, B. C. Autrey, J. E. DeMeester, W. G. Kepner, C. R. Lane, S. G. Leibowitz, and A. I. Pollard. 2018. Biota connect aquatic habitats throughout freshwater ecosystem mosaics. Journal of the American Water Resources Association 54:372-399.

[3]Colvin, S. A. R., S. M. P. Sullivan, P. D. Shirey, R. W. Colvin, K. O. Winemiller, R. M. Hughes, K. D. Fausch, D. M. Infante, J. D. Olden, K. R. Bestgen, R. J. Danehy, and L. Eby. 2019. Headwater streams and wetlands are critical for sustaining fish, fisheries, and ecosystem services. Fisheries:10.1002/fsh.10229

The Society for Freshwater Science <u>strongly opposes the proposed rule</u> for several reasons including:

1) The proposed rule is scientifically indefensible; it ignores sound science, and does not provide peer-reviewed science to support its proposed changes.
2) Moreover, the proposed rule ignores the abundant scientific record supporting the 2015 CWR, including USEPA's own extensive scientific record.
3) Instead, the proposed rule relies on legal arguments rather than sound science, which ignores our current scientific understanding of watershed connectivity, interactions between tributary, wetland and downstream ecosystems, and the functions that the variety of stream and wetland ecosystems across watershed scales and the flow continuum provide to downstream waters.
4) Many elements are based on arbitrary decisions untethered from scientific reason; for example, the selection of a "typical year" versus the use of timescales important to physical, chemical, biological and ecological functional connectivity which are based on abundant scientific evidence.
5) The proposed rule would result in the loss of protection for ephemeral streams, non-wetland floodplains, and potentially even many intermittent streams and floodplain wetlands all of which have obvious, critical, and well documented contributions to the quality of downstream waters.
6) In our scientific opinion, if this proposed rule is finalized and implemented, it would result in the loss of vulnerable waters[4] and in the degradation of the physical, chemical, and biological integrity of our Nation's waters, thus violating the stated intent and goals of the CWA that USEPA is entrusted with implementing.

DETAILED COMMENTS

The proposed Role ignores the scientific record almost entirely, including USEPA's own voluminous record, and what it does include, it misrepresents. The proposed rule barely references any scientific evidence to support its decisions. The question of whether a specific water, be it ephemeral, intermittent or perennial tributary, lake, impoundment, floodplain or non-floodplain wetland, has a physical, chemical, or biological connection to another water is an inherently scientific question. Yet, almost nowhere in the proposed rule, is a scientific argument made. Moreover, the proposed rule makes almost no mention of the volume of scientific evidence (even USEPA's own sizeable record, including the Connectivity Report) that demonstrates the physically, chemically, and biologically significant nexus between ephemeral and intermittent streams and

[4]Creed, I. F., C. R. Lane, J. N. Serran, L. C. Alexander, N. B. Basu, A. J. K. Calhoun, J. R. Christensen, M. J. Cohen, C. Craft, E. D'Amico, E. DeKeyser, L. Fowler, H. E. Golden, J. W. Jawitz, P. Kalla, L. K. Kirkman, M. Lang, S. G. Leibowitz, D. B. Lewis, J. Marton, D. A. McLaughlin, H. Raanan-Kiperwas, M. C. Rains, K. C. Rains, and L. Smith. 2017. Enhancing protection for vulnerable waters. Nature Geoscience 10:809-815.

downstream water quality, nor of the nexus between wetlands and downstream water quality. In the very few places where the Agencies do cite any scientific reports, they misrepresent the scientific evidence. For example, they cite a Connectivity Report SAB review conceptual model illustrating the continuum of connectivity among waters and use it to justify reduced protection for ephemeral streams and non-floodplain wetlands. This is a selective misrepresentation of the SAB intent, ignoring the overwhelming conclusions of the SAB review, including that intermittent and ephemeral streams and non-floodplain wetlands are less likely to transmit sediment and toxins to downstream waters than perennial streams and floodplain wetlands – which proves the presence and importance of their significant nexus to and role in protecting downstream water quality. The same SAB report, in fact, supported that *cumulative, low level connectivity* of such waterbodies across watersheds is critical in protecting impacts to the physical, chemical, and biological integrity of downstream waters. For example, all the sediment and nutrients stored and processed in non-floodplain wetlands and ephemeral streams in a watershed are indeed protecting downstream waters.

The overwhelming evidence indicates the proposed Role would fail to protect and will actually degrade the physical, chemical, and biological integrity of downstream waters, in direct conflict with the goals of the CWA. According to the best available science, including the USEPA's own research cited above, failure to protect ephemeral and intermittent streams, floodplain wetlands, and non-floodplain wetlands where significant nexus tests indicate connectivity, will result in adverse impacts to downstream waters. As just one small example, organic matter accumulation in ephemeral streams fuels complex food webs composed of aquatic invertebrates and amphibians that, in turn, provide energy and food to downstream food webs. As another, nutrients that enter ephemeral streams from the adjacent watershed are taken up, stored, and processed by ephemeral stream food webs. As such, the biogeochemical processes that remove dissolved nutrients (such as nitrogen and phosphorus) are preventing downstream transport, thus protecting those systems from degradation. Ephemeral streams comprise 60-80% of the streams in many parts of the United States[5]. The loss of protection for these streams means these services would be lost, the pollutants would be transported downstream and energy flow to downstream food webs would be reduced, and downstream waters would be degraded physically, chemically, and biologically.

[5]Nadeau, T. L., and M. C. Rains. 2007. Hydrological connectivity between headwater streams and downstream waters: How science can inform policy. Journal of the American Water Resources Association 43:118-133; Levick, L., J. Fonseca, D. Goodrich, M. Hernandez, D. Semmens, J. Stromberg, R. Leidy, M. Scianni, D. P. Guertin, M. Tluczek, and W. Kepner. 2008. The ecological and hydrological significance of ephemeral and intermittent streams in the arid and semi-arid American Southwest. EPA/600/R-08/134, ARS/233046. U.S. Environmental Protection Agency and USDA/ARS Southwest Watershed Research Center, Washington, D.C., USA.

The proposal to protect waterbodies that are defined as such "in a typical year" is arbitrary. Even though the decision to not protect ephemeral streams and many wetlands *is scientifically indefensible*, the decision to require that jurisdictional waters be such "in a typical year" is arbitrary. No scientific evidence is presented as to why a typical year, or annual timeframe, is protective and consistent with the intent of the CWA. Many processes in streams and wetlands occur on longer than annual timeframes. For example, the channel-forming flow in stream channels (i.e., bankfull flow) occurs on a greater than 1-year interval. As such, sediment storage and transport, including pollutants bound to those sediments, occur over longer-than-annual timeframes. Many species, which live in perennial downstream waters, rely on the presence of critical ephemeral or remote wetland habitats for feeding or reproduction on much longer than annual timeframes, returning after many years of maturation to reproduce. Many floodplains store large amounts of pollutants delivered during 10-, 20-, and even 100-year interval floods and the floodplains store these sediments for centuries. Under this scientifically-undefended proposed rule language, intermittent streams or floodplain wetlands that are only intermittent or hydrologically-connected on more than annual timescales (say, every 2-3 years) would not be protected[1]. Again, many streams important to a wide range of ecological processes are not intermittent or perennial "in a typical year", especially true in some arid regions, but even in mesic regions. Streams and wetlands telescope in inundation across different cycles of drying and wetting because of long-term climate cycles. These streams still take up and process pollutants that would otherwise degrade downstream waters, and again, many species have evolved to these longer-term, multi-annual cycles of wetting and drying. *Protecting all ephemeral, intermittent, and perennial streams with obvious physical channel features would cleanly resolve the need for complex hydrologic analyses to identify "typical year" hydrology needed under the proposed rule* and would have the further benefit of being scientifically defensible.

Using bed, banks, and ordinary high-water marks are well established, defensible means of identifying streams that are important to downstream water quality. The overwhelming science, including that published by the USEPA itself, indicates that protection of ephemeral, intermittent, and perennial streams are necessary to meet the goals of the CWA and should all be considered WOTUS as they are under the CWR. An additional convenience is that these stream types all typically *have clear and distinctive features* that can be used to identify them[6]. One approach is to identify bed, banks, and ordinary high-water marks which is an scientifically defensible, well established convention for identifying stream channels long-used by both USEPA and the Army

[6]Fritz, K.M., Johnson, B.R., and Walters, D.M.2006. Field Operations Manual for Assessing the Hydrologic Permanence and Ecological Condition of Headwater Streams. EPA/600/ R-06/126. U.S. Environmental Protection Agency, Office of Research and Development, Washington DC.

Corps of Engineers, as well as many states[7]. The Agencies should use these characteristics to define ephemeral, intermittent, and perennial stream channels, all of which should be WOTUS.

Floodplain wetlands are inherently linked to the streams and rivers to which they are adjacent and should all be protected regardless of distance and surface connection. It is axiomatic that stream floodplains are inherently connected to their streams. Streams move back and forth across their floodplains over time. Streams exchange sediment, organic material and dissolved materials with their floodplain wetlands both via surface flooding and via flow through near stream groundwater. In addition, many stream biota spend important parts of their lifecycles in floodplain wetlands. *In every facet, the physical, chemical, and biological integrity of streams depend on their floodplain wetlands.* This connection is not always surficial, it does not depend on proximity of the wetland to the stream, and it does not depend on connectivity in a "typical year". That the proposed rule would essentially protect the 1-year floodplain, and ignore the inherent connectivity provided by longer recurrence interval floodplain wetlands, is inconsistent with current scientific understanding. Contrary to the proposed Rule language on floodplain wetlands, which is not based on any scientific justification, the Agencies' should adopt the protections for floodplain wetlands provided in the CWR which are based on a large body of accepted, defensible science[1].

Non-floodplain wetlands are integral to downstream water quality. Many merit protection outright and others under a case by case analysis. The proposed rule by USEPA arbitrarily excludes all wetlands that do not abut or have a direct hydrological connection to a jurisdictional water in a typical year. We have already commented on the arbitrary nature of the "typical year" requirement. Moreover, the decision to exclude outright all wetlands that lack these characteristics is also arbitrary. The Agencies provide no scientific evidence to support why excluding such wetlands would better protect downstream waters than the current rule, which was based on a large body of available science[1]. Justice Kennedy's opinion in *Rapanos*, consistent with available science, understood that many waters that are not adjacent to, and which may not have a direct hydrologic connection to downstream waters, nevertheless are important to protecting downstream water quality and, therefore, merit protection as WOTUS. In response, Justice Kennedy proposed a significant nexus test. Moreover, the Agencies proposed rule protects waters that simply abut jurisdictional waters without a surface connection, implicitly admitting that subsurface flow connects wetlands to downstream waters as they also understood when they promulgated the 2015 CWR. What the Agencies' proposed rule does not do is understand that the available science, the same science that was

[7] NC Division of Water Quality. 2010. Methodology for Identification of Intermittent and Perennial Streams and their Origins, Version 4.11. North Carolina Department of Environment and Natural Resources, Division of Water Quality. Raleigh, NC.

sufficient to merit protection for non-floodplain wetlands in the 2015 CWR, indicates that surface connections are still not necessary for wetlands to be connected to downstream water quality. *The available science clearly supports that downstream water quality depends on the protection of many non-floodplain wetlands, and as such, the protections for non-floodplain wetlands that exist in the current CWR should be retained.* In addition, the existing science suggests that for those non-floodplain wetlands for which there may be doubt of their connectivity based on distance, a case-by-case analysis should be undertaken. This is what the CWR includes currently, and the proposed rule should adopt the same rule language. While such case-by-case analysis for those non-floodplain wetlands that are not jurisdictional under the CWR may involve more work, it enjoys the support of consistency with the Kennedy opinion, prevailing scientific evidence, the USEPA's own science, and it avoids the consequence of irreparable loss of wetlands that prove critical to downstream water quality, resulting in expensive downstream degradation. The implementation of case-by-case analysis should be retained in the proposed rule rather than omitted.

SUMMARY

The proposed rule is scientifically indefensible. It ignores more than 50 years of established science as well as the USEPA's own comprehensive and voluminous scientific record on the topic. The decisions being proposed directly conflict with that scientific evidence. **As a result, the impacts of the proposed rule will be dire, with the likely loss of protections for thousands of miles of ephemeral streams, some intermittent streams and over 16 million acres of wetlands in the conterminous U.S.**[8] These losses will include particularly vulnerable ecosystems[4] including playa lakes, prairie potholes, Carolina and Delmarva Bays, pocosins, and vernal pools[9]. Because ephemeral streams and non-floodplain wetlands constitute headwaters, the proposed rule will remove protection for already sensitive ecosystems that provision numerous ecosystem services through watersheds, including biodiversity; delivery of water, sediments, and organic material to downstream waters; filtering nutrients and improving water quality; and flood protection and mitigation[8]. **As a result, the proposed rule will directly lead to the degradation of the physical, chemical, and**

[8]Levick, L., J. Fonseca, D. Goodrich, M. Hernandez, D. Semmens, J. Stromberg, R. Leidy, M. Scianni, D. P. Guertin, M. Tluczek, and W. Kepner. 2008. The ecological and hydrological significance of ephemeral and intermittent streams in the arid and semi-arid American Southwest. EPA/600/R-08/134, ARS/233046. U.S. Environmental Protection Agency and USDA/ARS Southwest Watershed Research Center, Washington, D.C., USA.; Nadeau, T. L., and M. C. Rains. 2007. Hydrological connectivity between headwater streams and downstream waters: How science can inform policy. Journal of the American Water Resources Association 43:118-133.

[9]Lane, C. R., and E. D'Amico. 2016. Identification of putative geographically isolated wetlands of the conterminous United States. Journal of the American Water Resources Association 52:705-722.

biological integrity of water quality, in direct conflict with the goals of the Clean Water Act.

The Society for Freshwater Science is made up of scientists who study a rich variety of freshwater organisms and the services that functioning freshwater ecosystems provide. Our members include stream, river, and wetland scientists from around the nation and the world, many of whom served on the previous SAB panel that reviewed the Connectivity Report and the 2015 CWR. As a result, *we are intimately familiar with the critical role played by the CWA in protecting our Nation's waters, the science supporting the 2015 CWR, and ideally-positioned to evaluate the lack of scientific defensibility in the proposed rule.* **We strongly oppose the proposed rule, which we have determined is inconsistent with current science, is based on flawed logic, and as proposed, will certainly result in the degradation of U.S. water quality.**

Sincerely,

Jennifer Tank, President
Society for Freshwater Science