Clean Water Rule Comment Compendium
Topic 9: Comments on Scientific Evidence Supporting Rule

The Response to Comments Document, together with the preamble to the final Clean Water Rule, presents the responses of the Environmental Protection Agency (EPA) and the Department of the Army (collectively "the agencies") to the more than one million public comments received on the proposed rule (79 FR 22188 (Apr. 21, 2014)). The agencies have addressed all significant issues raised in the public comments.

As a result of changes made to the preamble and final rule prior to signature, and due to the volume of comments received, some responses in the Response to Comments Document may not reflect the language in the preamble and final rule in every respect. Where the response is in conflict with the preamble or the final rule, the language in the final preamble and rule controls and should be used for purposes of understanding the scope, requirements, and basis of the final rule. In addition, due to the large number of comments that addressed similar issues, as well as the volume of the comments received, the Response to Comments Document does not always cross-reference each response to the commenter(s) who raised the particular issue involved. The responses presented in this document are intended to augment the responses to comments that appear in the preamble to the final rule or to address comments not discussed in that preamble. Although portions of the preamble to the final rule are paraphrased in this document where useful to add clarity to responses, the preamble itself remains the definitive statement of the rationale for the revisions adopted in the final rule. In many instances, particular responses presented in the Response to Comments Document include cross references to responses on related issues that are located either in the preamble to the Clean Water Rule, the Technical Support Document, or elsewhere in the Response to Comments Document. All issues on which the agencies are taking final action in the Clean Water Rule are addressed in the Clean Water Rule rulemaking record.

Accordingly, the Response to Comments Document, together with the preamble to the Clean Water Rule and the information contained in the Technical Support Document, the Science Report, and the rest of the administrative record should be considered collectively as the agencies' response to all of the significant comments submitted on the proposed rule. The Response to Comments Document incorporates directly or by reference the significant public comments addressed in the preamble to the Clean Water Rule as well as other significant public comments that were submitted on the proposed rule.

This compendium, as part of the Response to Comments Document, provides a compendium of the technical comments about scientific evidence supporting the rule**,** submitted by commenters. Comments have been copied into this document "as is" with no editing or summarizing. Footnotes in regular font are taken directly from the comments.

Topic 9. COMMENTS ON SCIENTIFIC EVIDENCE: COMMENT SUMMARIES AND AGENCIES' SUMMARY RESPONSES

The summary essays and agency summary responses provided in this section apply to the entire compendium: Topic 9: Comments on Scientific Evidence Supporting Rule. Below each comment is a list of the appropriate summary responses(s) cited by letter, e.g. 9(a), 9(b), 9(c)…, that address what is said in that comment. Additional detail is added as necessary.

This compendium deals with comments that were related to the science supporting the Proposed Rule, including the draft Science Report, the Scientific Advisory Board (SAB) Review process and the SAB's recommendations to EPA prior to finalizing the Science Report. Many commenters expressed concerns with the process and concurrent timing of the public comment period for the Proposed Rule and the development of the science support document. Many commenters raised comments on the draft Science Report itself, as well as comments on the SAB review process and final recommendations to EPA, and comments on how the science would be used to inform the final Rule. Other commenters stated that the conclusions of the Science Report were well founded and supportive of the scope of the Proposed Rule, and felt that the Science Report and SAB review provide strong justification for the importance of headwater and tributary systems to downstream waters and a strong scientific demonstration of their connectivity to downstream waters. In addition to the responses provided in this compendium, the preamble to the final rule, the Technical Support Document (TSD), and responses in other compendiums provide further elaboration on the agencies' responses to specific subject areas. Readers should consult those documents as well in reviewing the agencies' responses to the comments in this compendium.

9(a) Proposed Rule's Public Comment Period and timing of the draft Science Report

Many commenters raised concerns that the draft Science Report was still undergoing peer review during the comment period for the Proposed Rule and was not available to the public in final form during this time. Some commenters stated that the Proposed Rule should not have been published before the SAB reviewed the draft report and EPA released the final Science Report.

Commenters raised concerns on the timing of the SAB peer review, which left only a very limited time to review the SAB's final recommendations prior to the end of the public comment period for the Proposed Rule. Several commenters pointed out that there was not enough time to provide a complete, detailed review of the scientific information supporting the Proposed Rule because of the level of detail and amount of data, even with the extensions provided.

Commenters were also concerned that the public was not given an opportunity to review or comment on revisions to the draft Science Report (i.e., the final Science Report itself) following input and review by the SAB. Several commenters recommended that EPA's final Science Report and response to the SAB's review be put out for notice and comment prior to the Rule being finalized. In addition, some commenters recommended the Final Rule also be put back out for public comments.

9(a) Agencies' Response

The agencies are committed to a rulemaking built on the best-available, peer-reviewed science, and the agencies recognized the importance of ensuring that this supporting science was available to the public as they reviewed and commented on the Proposed Rule. In order to afford the public greater opportunity to review the SAB's reports on the Proposed Rule and on the EPA's draft Science Report, and to respond to requests from the public for additional time to provide comments on the Proposed Rule, the agencies extended the public comment deadline on the Proposed Rule from July 21, 2014 to November 14, 2014. The SAB completed its review of the scientific basis of the Proposed Rule on September 30, and the SAB completed its review of the EPA' s draft Science Report on October 17, 2014.

The process for developing the Science Report also included many opportunities for the public to provide comments and input. In September 2013, EPA released a draft of the Science Report for an independent SAB review and invited submissions of public comments for consideration by the SAB panel. Over 133,000 public comments were submitted for the SAB panel's consideration. In October 2014, after several public meetings, the SAB completed its peer review of the draft Science Report. EPA revised the draft Science Report based on comments from the public and recommendations from the SAB panel. The final peer review report is available in the docket for this rulemaking, as well as on the SAB website (available at: http://yosemite.epa.gov/sab/sabproduct.nsf/AF1A28537854F8AB85257D74005003D2/$File/EPA-SAB-15-001+unsigned.pdf).

The comment period on the Proposed Rule was extended after the SAB issued its report so that the public could comment in light of the SAB's recommendations and any potential effects they may have on the rule. The success of that approach is evident in the fact that the agency received many comments addressing or reiterating the SAB's recommendations, which, as discussed below, were very supportive of the draft report's conclusions with recommendations that were mainly organizational and structural.

In total, the SAB panel held four meetings (a three-day in-person meeting in Washington, DC, in December 2013, and three four-hour public teleconferences in April, May, and June 2014). Every meeting of the SAB panel was open to the public, noticed in the *Federal Register*, and had time allotted for the public to present their views. In addition, the public had the opportunity to provide written comments to the panel prior to the meetings. The SAB Panel also compiled four draft versions of its peer review report to inform and assist the meeting deliberations that were posted on the SAB website. In September 2014, the chartered SAB conducted a public teleconference to conduct the quality review of the Panel's final draft peer review report. This report was approved at that meeting, and revisions were made to reflect the chartered SAB's review. Again, the public had the opportunity to provide both written and oral comments to the chartered SAB. The culmination of that public process was the release of the final peer review report in October 2014. All meeting minutes, draft reports and lists of the registered public speakers for the meetings are available to the public on the SAB website.

In total, 133,110 sets of written public comments were received in the Docket for the SAB Panel and chartered SAB meetings to review the Science Report (1,721 of these were unique comments that were compiled for the SAB Panel). Four sets of written public comments were

received for the SAB Panel and chartered SAB meetings on the adequacy of the scientific and technical basis of the Proposed Rule. Twenty-six individuals provided oral public comments at the SAB Panel meetings on the EPA's connectivity report. Two individuals provided oral public comments at the chartered SAB meeting on the adequacy of the scientific and technical basis of the Proposed Rule.

Based on the above, EPA is convinced that the public has had ample opportunity to participate in the development of the Science Report as well as the SAB process. The process for developing the Science Report followed standard information quality guidelines for EPA. Given the extensive public involvement throughout, and consistent with the standard information quality guidelines for the agency, EPA did not provide an additional round of comment on the revisions made following SAB review. Similarly, the agencies sought public comment on the Proposed Rule for over 200 days, and comment period was extended specifically to allow commenters time to consider the SAB's final report as they prepared their comments. This public comment period provided sufficient time to allow for commenters to assess the scientific support for the rulemaking.

Because of the importance of this area of science, EPA wanted to ensure that the draft report released for public comment was as scientifically rigorous as possible. Therefore, EPA conducted several levels of scientific review prior to releasing the report for public comment. This included internal reviews by other EPA scientists, reviews by other Federal agency scientists, and reviews by experts outside of the EPA and the Federal government. This type of review is consistent with EPA's Peer Review Handbook and the OMB Peer Review Bulletin, which state that, in some cases, an assessment may be so sensitive that it is critical that the agency's assessment achieve a high level of quality before it is publicized. In those situations, a rigorous yet confidential peer review process may be appropriate prior to public release of the assessment.

The draft of the report submitted to the SAB was the second external review draft, which benefitted from previous internal, interagency, and external reviews. The EPA internal review included reviews by EPA's Office of Research and Development (ORD), Office of Water, and Regional Office scientists. Interagency reviews included input from Army Corps scientists and managers, and consultation with USDA, and DOI representations.

The specific timeline and participants of these reviews were as follows. In February 2011, the internal review draft underwent peer consultation by peer reviewers from federal agencies (EPA, USGS, USDA, and the Army Corps of Engineers), academia and consulting groups. The internal review draft was revised to address their comments. This was followed by an external independent peer review by scientists from federal agencies, academia and consulting groups. The peer reviewers met to discuss the draft in January 2012. The first external review draft was developed in response to comments from the peer review panel, EPA scientists from OW and the regions, and scientists from the Army Corps of Engineers.

9(b) SAB Charge questions

Several commenters were concerned that the SAB was provided narrow charge questions from EPA and was not permitted to answer the charge questions drafted by members of Congress. Some commenters also felt that the SAB should have been given a charge question focusing on the scientific significance of connections, and should have been asked whether the Science Report provides sufficient guidance for determining at what point a connection becomes significant. Other commenters felt that charge questions should have asked the SAB to draw technical distinctions between jurisdictional and non-jurisdictional waters. Some commenters were concerned that the SAB panel was told explicitly by EPA not to discuss the definition of significance.

9(b) Agencies' Response

In September 2013, EPA released a draft of the Science Report for an independent SAB review. In the public notice for the first SAB public meetings, interested members of the public were invited to submit relevant comments for the SAB Panel to consider pertaining to the review materials, including the charge to the Panel. Over 133,000 public comments were received by the Docket. The charge questions were developed by the EPA, with input from the SAB Office, and were provided to members of the SAB Panel and the public. The Panel then had the opportunity to consider public comments and to discuss and finalize the charge questions.

Charge questions for the SAB Panel on the draft Science Report were focused on the clarity and technical accuracy of the Report; whether it includes the most relevant peer-reviewed literature; whether the literature has been correctly summarized; and whether the findings and conclusions are supported by the available science. The charge questions were written broadly to encourage consideration by the expert panel members of all the scientific information and conclusions in the draft report. In the Science Report, the EPA reviewed and synthesized the scientific literature on the connectivity *and* effects of streams, wetlands, and open waters on downstream waters. The majority of the report is devoted to discussion of the numerous effects these systems have on downstream water integrity. Both connectivity *and* effects were explicitly identified in the charge questions to the SAB Panel. The charge questions thus addressed the technical issues raised by members of Congress. Congress's request for the SAB to evaluate the significance of these connections for purposes of significant nexus is an issue of jurisdiction which involves considerations beyond science. These types of questions about jurisdiction go beyond the SAB's technical role in reviewing the Science Report, and were addressed in an independent exercise described below.

Because of the interest of the public in understanding how the Science Report would provide guidance to a rulemaking effort, the agency also requested the SAB undertake an additional and independent effort to review the adequacy of the scientific and technical basis of the Proposed Rule. Thus, in addition to its peer review of the draft Science Report and in a separate effort, the SAB Panel reviewed the Proposed Rule and provided its advice and comments on the proposal in

September 2014.[1] The same SAB Panel that reviewed the draft Science Report met via two public teleconferences in August 2014 to discuss the scientific and technical basis of the Proposed Rule. Panel members submitted comments to the Chair of the chartered SAB. A work group of chartered SAB members considered comments provided by panel members, agency representatives, and the public on the adequacy of the science informing the rule. This work group then led a September 2014 public teleconference of the chartered SAB to deliberate on the adequacy of the scientific and technical bases of the Proposed Rule. The public had the opportunity to provide written comments to the SAB Panel and chartered SAB prior to the public teleconferences. In addition, the public had the opportunity to provide oral comments during these teleconferences. The SAB's final letter to the EPA Administrator can be found on the SAB website and in the docket for this rule.

9(c) Stakeholder involvement

Several commenters raised concerns with the make-up of the SAB panel, noting that there was not sufficient representation from state agency experts or industry experts. One commenter recommended that the SAB include no less than 10% membership of state agency scientists on all SAB committees, subcommittees and subject matter panels. Another commenter alleged that the make-up of the committee violated the Federal Advisory Committee Act's requirement that the membership of the advisory committee be fairly balanced in terms of the points of view represented and the functions to be performed. Some of these commenters requested that the rule be withdrawn until engagement with these stakeholders occurs and additional scientific review is conducted. Commenters also suggested that the EPA seek input from stakeholders on the details and scope of the charge questions before presenting them to the SAB.

9(c) Agencies' Response

Questions about the general SAB process are beyond the scope of this action. However, EPA notes the SAB draws upon experts from many different research environments and frequently includes scientists from state governments on its review panels which are selected through a nomination process. The SAB Panel for the Review of the EPA Water Body Connectivity Report included the needed expertise to address the charge, which focused on the clarity, accuracy and completeness of the EPA literature summary rather than the regulatory implementation issues. As a result, panel expertise focused on the relevant scientific disciplines (e.g., stream and wetland ecology, fish and invertebrate biology, biogeochemistry and hydrology) and included members with considerable experience in wetland delineation and conducting field assessments to support permitting activities.

The SAB was established in 1978 by the Environmental Research, Development, and Demonstration Authorization Act (ERDDAA), to provide independent scientific and technical advice to the EPA Administrator on the technical basis for Agency positions and regulations. Advisory functions include peer review of EPA's technical documents, such as the Science Report. At the time the peer review was completed, the chartered SAB comprised more than 50

[1] U.S. EPA. 2014. 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." EPA-SAB-14-007, U.S. Environmental Protection Agency, Washington, DC. ("SAB 2014b.")

members from a variety of sectors including academia, non-profit organizations, foundations, state governments, consulting firms, and industry. To conduct the peer review, EPA's SAB staff formed an ad hoc panel to serve as the primary reviewers after considering nominations from the public. The panel consisted of 27 technical experts in array of relevant fields, including hydrology, wetland and stream ecology, biology, geomorphology, biogeochemistry, and freshwater science. Similar to the chartered SAB, the panel members are from sectors that include academia, a federal government agency, non-profit organizations, and consulting firms. The chair of the panel was a member of the chartered SAB.

The membership of the SAB panel for this review was selected on the basis of the following specified criteria. For the SAB Staff Office, a balanced committee or panel is characterized by inclusion of candidates who possess the necessary domains of knowledge, the relevant scientific perspectives (which, among other factors, can be influenced by work history and affiliation), and the collective breadth of experience to adequately address the general charge. Specific criteria used to evaluate an individual committee member include: (a) scientific and/or technical expertise, knowledge, and experience; (b) availability and willingness to serve; (c) absence of financial conflicts of interest; (d) absence of an appearance of a lack of impartiality; (e) skills working in committees, subcommittees and advisory panels; and (f) for the committee as a whole, diversity of scientific expertise and viewpoints.

The SAB process is open and transparent, consistent with the Federal Advisory Committee Act, 5 U.S.C., App 2, and agency policies regarding Federal advisory committees. Consequently, the SAB has an approved charter, which must be renewed biennially, announces its meetings in the *Federal Register*, and provides opportunities for public comment on issues before the Board. The SAB staff announced via the *Federal Register* that they sought public nominations of technical experts to serve on the expert panel: SAB Panel for the Review of the EPA Water Body Connectivity Report (via a similar process the public also is invited to nominate chartered SAB members). The SAB staff then invited the public to comment on the list of candidates for the panel. Once the panel was selected, the SAB staff posted a memo on its website addressing the formation of the panel and the set of determinations that were necessary for its formation (listed above).

9(d) The Science Report and Congressional/Supreme Court Intent

Some commenters were concerned that the assumptions in the draft Science Report were not consistent with the constitutional limits of the Clean Water Act (CWA) or the legal thresholds defined by the Supreme Court. Some commenters were concerned that the Agencies were using the draft Science Report to apply the significant nexus test beyond Kennedy's intent or to expand categorical jurisdiction beyond what was intended by Scalia. Other commenters raised concerns that Kennedy focused on wetlands as adjacent, not all waters. Some commenters noted that aggregation should also only be applied to wetlands because of Kennedy's statements. Some commenters felt that because the Science Report does not consider the significance of connections, it is contradictory to Supreme Court direction for a rulemaking. Some commenters stated that the SAB recommendations provided limited support for the Proposed Rule to regulate all Waters of the U.S.

On the other hand, some commenters stated that scientific evidence of connectivity is essential in applying Kennedy's significant nexus test, and noted that the draft Science Report provides a strong foundation for the proposed definition because it provides more than speculative or insubstantial scientific evidence of connectivity, as required by Kennedy.

Some commenters felt that the basis of the draft Science Report was flawed because it did not focus specifically on the effects to water quality in navigable waters. These commenters felt that without that specific water quality endpoint, connections would not have any relevance to the legal scope of the CWA. These commenters noted that most of the research in the Science Report does not directly and specifically address pollutant transport to and effect on the quality of navigable waters. Commenters felt that studies were irrelevant where they do not establish how connections affect water quality. For example, studies focused on the retention of flood waters are not relevant because they relate to downstream water quantity, not quality.

9(d) Agencies' Response

While a significant nexus determination is primarily weighted in the scientific evidence and criteria, the agencies also consider the statutory language, the statute's goals, objectives and policies, the case law, and the agencies' technical expertise and experience when interpreting the scope of the CWA. For this reason, the SAB was not asked to interpret the language of the Rapanos decision or to make judgments on what waters have a "significant nexus". Instead, the SAB was asked to review the science underpinning the Science Report, including peer-reviewed literature on water quality functions and the contribution of nutrients, sediment, and contaminants from upstream sources such as streams, wetlands, and open waters. Moreover, the SAB's September 30, 2014 letter to the Administrator supports the science-based conclusions in the Proposed Rule.

With regard to the commenters' concern that any effects be tied to the water quality of receiving waters, Congress enacted the CWA "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters," 33 U.S.C. § 1251(a), and this includes, but is not limited to water quality. The Science Report considered the effects of upstream waters on the chemical, physical, and biological integrity of downstream waters. All three elements can significantly influence the quality of downstream waters, not just chemical water quality effects. Peer-reviewed science and practical experience demonstrate that upstream waters, including headwaters and wetlands play a crucial role in controlling sediment, filtering pollutants, reducing flooding, providing habitat for fish and other aquatic wildlife, and many other vital chemical, physical, and biological processes in downstream waters. Also, see the Preamble.

9(e) Changes to the Science Report and Finalization of the Science Report

Many commenters wanted to know what changes were made to the draft Science Report and Proposed Rule following SAB Review. Many of these commenters reiterated recommendations made by the SAB, including to treat connectivity as a gradient, to describe measures of connectivity, to more explicitly address the scope of aggradation, to define tributary by "bed, bank and other evidence of flow", and to not rely solely on proximity or distance for adjacency.

Some commenters raised concerns that the SAB recommendations pointed to significant flaws in the Science Report and Proposed Rule. One commenter stated that the SAB review demonstrates

that the Rule is not supported by underlying science. Another commenter stated that the SAB recommendations were so substantial that revisions to the Science Report and the Rule may not reflect a "logical outgrowth" of the proposal. Several commenters wanted to know how public comments on the draft Science Report were addressed or incorporated into the final Science Report, and whether public comments were shared with the SAB during their review.

9(e) Agencies' Response

The agency's Science Report, *Connectivity of Streams and Wetlands to Downstream Waters: A Review and Synthesis of the Scientific Evidence*, was finalized in January, 2015 and the public was notified on January 15, 2015 via notice in the Federal Register. The final Science Report is available at http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=296414. The final Science Report synthesizes more than 1,300 peer-reviewed scientific publications, covers research from across the nation, and provides regional case studies in an appendix. Drafts of the report were subject to three separate rounds of peer review, which included a Scientific Advisory Board (SAB) review and public comment period. Comments from the peer review panels, state and local governments, industry, other organizations, and individual citizens were used to develop the final Science Report. EPA's Response to Comments from the SAB on the draft report is also available at http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=296414.

The SAB Panel conducted a comprehensive technical review of the Science Report and reviewed the adequacy of the scientific and technical basis of the Proposed Rule. The SAB was highly supportive of the draft Science Report's conclusions regarding streams, riparian and floodplain wetlands, and open waters, and recommended strengthening the conclusion regarding non-floodplain waters to include a more definitive statement that reflects how numerous functions of such waters sustain the integrity of downstream waters.[2]

The final Science Report and the SAB review confirmed that:

- Waters are connected in myriad ways, including physical connections and the hydrologic cycle; however, connections occur on a continuum or gradient from highly connected to highly isolated.
- These variations in the degree of connectivity are a critical consideration to the ecological integrity and sustainability of downstream waters, which are fundamental to meeting the Supreme Court's test of significant nexus.
- The critical contribution of upstream waters to the chemical, physical, and biological integrity of downstream waters results from the accumulative contribution of similar waters in the same watershed and in the context of their functions considered over time.

The final Science Report and the SAB review also confirmed that:

- Tributary streams, including perennial, intermittent, and ephemeral streams, are chemically, physically, and biologically connected to downstream waters, and influence the integrity of downstream waters.

[2] U.S. EPA. 2014. SAB review of the draft EPA report Connectivity of Streams and Wetlands to Downstream Waters: A Review and Synthesis of the Scientific Evidence. EPA-SAB-15-001, U.S. Environmental Protection Agency, Washington, DC. ("SAB 2014a.")

- Wetlands and open waters in floodplains and riparian areas are chemically, physically, and biologically connected with downstream rivers and influence the ecological integrity of such rivers.
- Non-floodplain wetlands and open waters provide many functions that benefit downstream water quality and ecological integrity, but their effects on downstream waters are difficult to assess based solely on the available science.

In response to the SAB comments, certain revisions were made to the report regarding connectivity as a gradient, which was a matter of adding greater emphasis on this gradient in the final report, and addressing connectivity in non-floodplain waters, which provided further clarification. However, these revisions did not have a significant bearing or effect on the Report's overall assessment of connectivity or conclusions that underpin the Proposed Rule. Rather, the revisions ensured that the Report include a more complete evaluation of the dynamics of connectivity and the available literature. EPA's Office of Research and Development (ORD) revised the Report text to clarify that connectivity occurs along a gradient, and can be described in terms of frequency, duration, magnitude, timing, and rate of change (e.g., Conclusion #4, p. ES-4). ORD provided additional examples of connections that vary in their relative frequencies, durations, magnitudes, and timing (predictability); and expanded our discussion of the consequences of different types and degrees of connectivity in terms of functions and effects on downstream waters.

ORD also responded to the SAB, which disagreed with the Science Report's conclusion that the literature reviewed did not provide sufficient information to evaluate or generalize about the degree of connectivity or the downstream effects of wetlands in "unidirectional" non-floodplain landscape settings. The SAB recommended that ORD revise the conclusion to better articulate: (1) what is supported by the scientific literature and (2) the issues that still need to be resolved. In response, the Science Report now includes additional functions of non-floodplain wetlands that could sustain the physical, chemical, and/or biological integrity of downstream waters. The Science Report explicitly noted that downstream effects require functions that affect material fluxes and connectivity (or isolation) that enables (or prevents) transport of materials between non-floodplain wetlands and downstream waters. The Science Report states that establishing connectivity for these wetlands is difficult because the peer-reviewed references that were reviewed infrequently evaluate such connections and rarely examine the frequency, duration, magnitude, timing, and rate of change of these connections. The Science Report concluded that the literature does not support evaluations of the degree of connectivity for specific groups of classes of wetlands and makes recommendations for studies that would rectify this situation. Regarding isolation, however, the Science Report stated that the literature reviewed allows for the conclusion that sink functions of non-floodplain wetlands will have effects on a downstream water when these wetlands are situated between the downstream water and known point or nonpoint sources of pollution. The Science Report also stated that data from emerging research not yet published could close current data gaps, e.g., advances in the fields of mapping, assessment, modeling, and landscape classification.

Finally, it is important to note that rather than suggesting significant flaws, the SAB's report was very supportive of the report and most of its conclusions (exception discussed above). While the SAB had significant comments on the report, most of this dealt with the need for additional

detail and suggestions for clarity and organization, rather than fundamental disagreements in the science.

9(f) Use of the final Science Report to inform the final Rule

Commenters wanted to know how the revised science report would inform the rulemaking process and how the final Science Report would be used to support the final Rule. Many commenters raised concerns with the draft Science Report itself or reiterated comments they had previously submitted to the SAB on the draft Science Report. One commenter felt the draft Science Report should be pared down to a very brief document containing clearly written definitions and be incorporated as part of the text of the Proposed Rule. Two commenters pointed out that the Science Report and SAB recommendations focus on streams and floodplain wetlands, not non-wetland waters in the floodplain. Thus, they felt that the science does not support categorical inclusion of adjacent non-wetland waters as Waters of the U.S.

Some commenters stated that they appreciated thorough and rigorous process EPA used to develop the science to support the proposal. One commenter noted that this was one of the most comprehensive reviews to date, with rigorous independent review process and additional review by SAB. Some commenters noted that the draft Science Report was an accurate and comprehensive synthesis that was supportive of categorical findings for tributaries and adjacent waters. These commenters noted that the draft Science Report highlights the importance of upstream waters, including tributaries and wetlands, to the health of all waters. These commenters also noted that the draft Science Report and SAB review and recommendations provide an adequate scientific demonstration of the importance of waters defined by the Proposed Rule as Waters of the U.S. and the need for their protection. Some commenters felt that the draft Science Report did a good job of synthesizing the scientific literature and the agencies developed definitions in the Proposed Rule based upon a strong scientific foundation.

Some commenters were concerned that the Science Report would be the sole basis for determining the scope of Waters of the U.S. in the Rule. Some commenters felt that the draft Science Report and its summarized literature does not determine or justify significant nexus for an expanded scope of categorical jurisdiction. Commenters felt that the Science Report and Proposed Rule did not align, and the Science Report did not support the determinations made by the agencies to justify the Proposed Rule. For example, the scientific literature does not explain how intrastate waters significantly affect downstream waters. Similarly, some commenters did not agree that there was sufficient scientific basis to assume that all adjacent waters are similarly situated enough to justify categorical inclusion. Commenters were concerned that while the draft Science Report was a science based inquiry, any science component for the Proposed Rule should be framed by the constraints of the CWA, Congressional intent and Supreme Court cases. One commenter stated that the agencies need to consider the importance of flow and define flow thresholds for significant nexus.

Several commenters raised concerns with the concept of biological connectivity. These commenters noted that biological connectivity is not relevant to the CWA's focus on protecting water quality in navigable waters, and the emphasis should be on the quality of water to restore and maintain aquatic life, not on the aquatic life itself. Some commenters pointed out that the Proposed Rule does not describe how a biological connection can be used as the basis for

significant nexus, despite its prevalence in the Science Report. Some commenters agreed that biological connections are well documented by literature, and encouraged the agencies to include biological connections as one determinant of significant nexus.

Several commenters noted that the use of waters by migratory birds and non-aquatic animals is not treated consistently in the draft Science Report and the Proposed Rule. In the draft Science Report and Appendix A of the Preamble of the Proposed Rule, use by these animals can be an important component of biological connectivity between tributaries, floodplain and non-floodplain waters and downstream waters, however the Rule states that the agencies will not use non-aquatic species or birds for making jurisdictional determinations. Some commenters agreed that biological connectivity should not include studies of terrestrial species and migratory birds because of legal precedent set forth in SWANCC.

9(f) Agencies' Response

In the final Rule, the agencies interpret the scope of "Waters of the United States" protected under the CWA based on the information and conclusions in the Science Report, other relevant scientific literature, the Technical Support Document (TSD), the relevant Supreme Court decisions, the agencies' technical expertise and experience, and the objectives and requirements of the CWA. In light of this information, the agencies made scientifically and technically informed judgments about the nexus between the relevant waters and the significance of that nexus and conclude that tributaries and adjacent waters, each as defined by the rule, have a significant nexus such that they are "water of the United States" by rule. The agencies also determined that additional waters on a case-specific basis may have a significant nexus to traditional navigable waters, interstate waters, and the territorial seas, either alone or in combination with similarly situated waters.

Significant nexus is not a purely scientific determination and neither is the agencies' interpretation of the scope of "waters of the United States;" instead the agencies' interpretation is informed by the Science Report and the review and comments of the SAB, but not dictated by them. The rule reflects the judgment of the agencies when balancing the science, the statute, the Supreme Court opinions, the agencies' expertise, and the regulatory goals of providing clarity to the public while protecting the environment and public health.

In their review of the adequacy of the science and technical basis of the Proposed Rule, the SAB concluded that the available science provides an adequate scientific basis for the key components of the Proposed Rule. The SAB noted that although water bodies differ in degree of connectivity that affects the extent of influence they exert on downstream waters (i.e., they exist on a "connectivity gradient"), the available science supports the conclusion that the types of water bodies identified as "waters of the United States" in the Proposed Rule exert strong influence on the chemical, physical, and biological integrity of downstream waters. In particular, the SAB expressed support for the Proposed Rule's inclusion of tributaries and adjacent waters as categorical Waters of the U.S. and the inclusion of "other waters" on a case-specific basis, though noting that certain "other waters" can be determined as a subcategory to be similarly situated.

The agencies have not proposed a specific minimum flow requirement for a water to be a "water of the United States." Instead, the agencies have identified the physical characteristics of bed and banks and ordinary high water mark (OHWM) as indicators of sufficient flow. The Science Report concludes that streams, regardless of their flow regime, have important effects on larger downstream waters. The SAB's final review of the Science Report strongly supports this conclusion. In their comments, the SAB found, "[t]here 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 process."

Regarding adjacent waters and wetlands, the SAB stated, "[t]he available science supports the EPA's proposal to include adjacent waters and wetlands as a waters of the United States. …because [they] have a strong influence on the physical, chemical, and biological integrity of navigable waters." *Id.* In particular, the SAB noted, "the available science supports defining adjacency or determination of adjacency on the basis of functional relationships," rather than "solely on the basis of geographical proximity or distance to jurisdictional waters." *Id.* at 2-3.

With regard to the use of biological connectivity to demonstrate significant nexus with downstream navigable waters, Section 101(a) of the CWA identifies the objective of the CWA as "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters." The biological connections among particular waters and traditional navigable waters, and their effects, can be relevant to establishing a "significant nexus" as articulated by Justice Kennedy in *Rapanos*. The biological integrity of water includes the functions those waters provide to maintain the integrity of the animal species that utilize both tributaries and their downstream navigable waters. Anadramous fish species, such as salmon, provide a helpful example. Salmon rely on small headwater streams and wetlands to spawn and to support the growth of salmon fry. As the young salmon grow, they move downstream to larger rivers and ultimately to the sea. Salmon caught in the larger rivers is a multi-billion dollar industry in the U.S. supporting tens of thousands of jobs. Protecting small headwater streams protects the biological integrity of larger downstream waters on which the salmon industry depends. This example clearly demonstrates how protection of a particular species and the waters on which they depend is consistent with maintaining the biological integrity of larger downstream waters. In all instances, it the biological connection of upstream waters to downstream waters that serves as the basis of any jurisdictional determination.

Commenters are correct that there is a difference between the scientific view of the use of waters by migratory birds and non-aquatic animals and the scope of the CWA. Biological connectivity is relevant to the extent there is an effect on the biological integrity of downstream traditional navigable waters, interstate waters, or the territorial seas. In light of the Supreme Court's decision in SWANCC that CWA jurisdiction does not extend to non-navigable, isolated, intrastate waters solely based on use by migratory birds, the agencies will not use non-aquatic species or birds for making jurisdictional determinations. See Preamble.

9(g) Viewing connectivity on a gradient

Many commenters reiterated the first major recommendations of the SAB, and felt the draft Science Report would be more scientifically accurate and useful to policy makers with revisions consistent with the SAB recommendation. These commenters concurred with the SAB that connectivity is not a binary principle, but there are varying degrees, or gradients, of connectivity. For reference, the SAB's recommendation is:

> *The Report often refers to connectivity as though it is a binary property (connected versus not connected) rather than as a gradient. In order to make the Report more technically accurate, the SAB recommends that the interpretation of connectivity be revised to reflect a gradient approach that recognizes variation in the frequency, duration, magnitude, predictability, and consequences of those connections. The SAB notes that relatively low levels of connectivity can be meaningful in terms of impacts on the chemical, physical, and biological integrity of downstream waters.*

Many commenters also raised concerns that the draft Science Report does not focus on the right question, that instead of documenting connections that are present, the Science Report should be characterizing which connections are significant, and this should subsequently be used to inform CWA jurisdiction. Many of these commenters emphasized the importance of identifying the point on the continuum of connectivity where connections become significant and thus waters would have a significant nexus with downstream traditionally navigable waters, interstate waters and territorial seas. Other commenters recommended the agencies define thresholds along this gradient where connections become significant. Some commenters questioned whether it was appropriate to treat all tributaries and adjacent waters as categorically jurisdictional in light of the SAB's recommendations to consider connectivity as a gradient, or whether the science clearly supported such a decision at all. One commenter recommended the discussion of "isolated" waters be eliminated, instead focusing on the relative degrees of connectivity. Several commenters wanted to know how additional information on connectivity gradients would ultimately be used to define the scope of CWA jurisdiction.

Many commenters raised concerns that the draft Science Report and Proposed Rule preamble relied on the presence of connections without considering their significance on the integrity of downstream waters. These commenters pointed out that the existence of a connection does not support a determination that such connectivity is significant. These commenters were concerned that the draft Science Report did not provide the agencies direction on establishing which connections are sufficient to affect the integrity of downstream waters and thus have a significant nexus. Many commenters wanted to know how the agencies planned to define the bright line of what constitutes a significant connection. They recommended that both the Science Report and the Preamble address how the agencies will identify, based upon science, circumstances in which there is a significant nexus. These commenters noted that without this, the Science Report provided no basis for the agencies to identify an upward limit on jurisdiction consistent with the legal term significant nexus and as such, it does not support the Rule.

9(g) Agencies' Response

In response to the SAB recommendations, EPA's Office of Research and Development (ORD) revised the Science Report text to clarify that connectivity occurs along a gradient, and can be described in terms of frequency, duration, magnitude, timing, and rate of change (Science Report

Sections 1.2.2, 1.2.4, 2.4, 3.3., 3.6, 4.5.2; Chapter 5; and Major Conclusion #4). ORD provided additional examples of connections that vary in their relative frequencies, durations, magnitudes, and timing (predictability); and expanded our discussion of the consequences of different types and degrees of connectivity in terms of functions and effects on downstream waters.

The final Science Report concludes that connectivity of streams and wetlands occurs along a gradient that can be described in terms of the frequency, duration, magnitude, timing, and rate of change of water, material, and biotic fluxes to downstream waters. Variations in these descriptors influence the degree of connectivity and the range of functions provided by streams and wetlands, and are critical to the integrity and sustainability of downstream waters. Connections with low values of one or more descriptors (e.g., low-frequency, low-duration streamflows caused by flash floods) can have important downstream effects when considered in the context of other descriptors (e.g., large volume or magnitude of water transfer). At the other end of the frequency range, high-frequency, low-magnitude vertical (surface-subsurface) and lateral flows contribute to aquatic biogeochemical processes, including nutrient and contaminant transformation and organic matter accumulation. The timing of an event can alter both connectivity and the magnitude of its downstream effect. For example, when soils become saturated by previous rainfall effects, even low or moderate rainfall can cause streams or wetlands to overflow, transporting water and other materials to downstream waters. Fish that use non-perennial or perennial headwater stream habitats to spawn or rear young, and invertebrates that move into seasonally inundated floodplain wetlands prior to emergence, have life cycles that are synchronized with the timing of flows, temperature thresholds, and food resource availability into those habitats. The evidence unequivocally demonstrates that the stream channels and riparian/floodplain wetlands or open waters that together form river networks are clearly connected to downstream waters in ways that profoundly affect downstream water integrity. The connectivity and effects of non-floodplain wetlands and open waters to downstream waters are more variable and/or less certain and thus more difficult to address solely from evidence available in peer-reviewed studies compared to tributaries, floodplain wetlands, and open waters of river networks, but can be determined in case-specific assessments.

The Science Report presents evidence of those connections from various categories of waters, evaluated singly or in combination, which affect downstream waters and the strength of that effect. The objectives of the Science Report are (1) to provide a context for considering the evidence of connections between downstream waters and their tributary waters, and (2) to summarize current understanding about these connections, the factors that influence them, and the mechanisms by which the connections affect the function or condition of downstream waters. The connections and mechanisms discussed in the Science Report include transport of physical materials and chemicals such as water, wood, sediment, nutrients, pesticides, and mercury; functions that adjacent waters perform, such as storing and cleansing water; movement of organisms or their seeds and eggs; and hydrologic and biogeochemical interactions occurring in and among surface and groundwater flows, including hyporheic zones and alluvial aquifers.

Although these conclusions play a critical role in informing the agencies' interpretation of the CWA's scope, the agencies' interpretive task in this rule – determining which waters have a "significant nexus" – requires the integration of this science with policy judgment and legal interpretation. It is important to note that the Clean Water Rule does not equate the existence of

any connection to the "significant nexus" standard articulated by the Supreme Court. The science demonstrates that waters fall along a gradient of chemical, physical, and biological connection to traditional navigable waters, and it is the agencies' task to determine where along that gradient to draw lines of jurisdiction under the CWA. In making this determination, the agencies must rely, not only on the body of scientific research, but also on their practical experience gained from applying science in the context of implementing the CWA during a period of over 40 years. In addition, the agencies are guided, in part, by the compelling need for clearer, and more consistent, and easily implementable standards to govern administration of the CWA, including brighter lines where feasible and appropriate.

In the Clean Water Rule, the agencies determine that tributaries, as defined ("covered tributaries"), and adjacent waters, as defined ("covered adjacent waters"), have a significant nexus to downstream traditional navigable waters, interstate waters, and the territorial seas and therefore are "waters of the United States." In the rule, the agencies also establish that defined sets of additional waters may be determined to have a significant nexus on a case-specific basis: (1) five types of waters that the agencies conclude are "similarly situated" and therefore must be analyzed "in combination" in the watershed that drains to the nearest traditional navigable water, interstate water, or the territorial seas when making a case-specific significant nexus analysis; (2) waters within 4,000 feet of the high tide line or ordinary high water mark of traditional navigable waters, interstate waters, the territorial seas, impoundments or "covered tributaries;" and (3) waters within the 100 year floodplain of a traditionally navigable water, interstate water, territorial sea. The rule establishes a definition of significant nexus, based on Supreme Court opinions and the science, to use when making these case-specific determinations.

9(h) Defining connectivity/developing metrics

Many commenters reiterated the second major recommendations of the SAB, and felt the Science Report would be more scientifically accurate and useful to policy makers with revisions consistent with this SAB recommendation. For reference, the SAB's recommendation is:

> *The SAB recommends that the EPA consider expanding the brief overview of approaches to measuring connectivity. This expansion would be most useful if it provided examples of the dimensions of connectivity that could most appropriately be quantified, ways to construct connectivity metrics, and the methodological and technical advances that are most needed.*

Many reviewers recommended that the final Science Report and Rule Preamble quantify the importance or significance of connections with downstream waters. Without addressing the significance of connections, many commenters stated that the Science Report does not provide useful guidance to the agencies as to what connections are significant and does not support the Proposed Rule.

Many commenters were concerned that the draft Science Report provides no clear definition or interpretation of connectivity. Many of these commenters felt that there would be greater clarity in determining what waters are jurisdictional if connectivity was better defined and specific measures were identified to differentiate between connections that are merely present from those that are significant. Commenters were concerned that relying only on best professional judgment would create too much subjectivity. These commenters highlighted the need to develop

measureable and definable parameters, standards, metrics, indicators or criteria to measure the importance of connections (or the degree of effects to downstream waters) and thus determine what has a significant nexus. These commenters requested that additional quantitative tools be developed and applied to individual waters. Some commenters felt that quite a bit of work still needed to be done to determine how "significant" a connection is on the connectivity gradient.

Some commenters provided specific recommendations for developing measures of connectivity, including: using structural or functional metrics to demonstrate that connectivity between wetlands and downstream waters is ecologically significant; considering a suite of parameters together, such as the types of waters, known or suspected effects on downstream waters, their location in the landscape, etc.; developing an index of connectivity using concise, measureable metrics for duration, magnitude and frequency parameters associated with hydraulic connectivity; or creating a list of variables that could be measured or estimated to assess the frequency, magnitude, and duration of connectivity that meets an objective significance threshold (stratify variables by ecoregion, biome, or physiographic/climatic classifications). Some commenters suggested specific criteria, including the magnitude and duration of water flow to, or distance to the nearest traditionally navigable water.

Several commenters recommended that the final Rule be followed with additional regulatory guidance to provide field staff with metrics and procedures to evaluate the significance of connections for case-by-case analyses. One commenter cautioned the agencies against relying on any approaches that may be too complex or data intensive to implement in the field, noting that complex approaches do not provide the same level of certainty or clarity to regulators in the field or the regulated community that more basic and applied approaches could provide.

9(h) Agencies' Response

EPA's Office of Research and Development (ORD) revised the Science Report to address the SAB panel's recommendations on defining connectivity and describing connectivity metrics. The definition of connectivity was added to the Introduction (Science Report Chapter 1) with a discussion of continuous flowpaths, connectivity gradients, and connectivity descriptors (i.e., frequency, duration, magnitude, timing, and rate of change of fluxes to and biological exchanges with downstream waters) at landscape to local scales. ORD also added a summary of the literature on metrics and approaches for measuring connectivity (Report Section 2.4.6) to supplement existing text on estimating and understanding connectivity. Data gaps and recommended studies needed to close them were discussed in Report Sections 4.5.2 and 6.2. The dimensions of connectivity that could be most appropriately quantified, ways to construct connectivity metrics, and methodological advances needed were discussed briefly in Report Sections 2.4.6 and 4.5.2, but as areas of active research (rather than established science) a full discussion of these topics was out of scope for the Science Report.

The final Science Report stated that connectivity is a foundational concept in hydrology and freshwater ecology. Connectivity is the degree to which components of a system are joined, or connected, by various transport mechanisms and is determined by the characteristics of both the physical landscape and the biota of the specific system. Connectivity for purposes of interpreting the scope of "waters of the United States" under the CWA serves to demonstrate the "nexus" between upstream water bodies and the downstream traditional navigable water, interstate water,

or the territorial sea. The scientific literature does not use the term "significant" as it is defined in a legal context, but it does provide information on the strength of the effects on the chemical, physical, and biological functioning of the downstream water bodies from the connections among tributaries, adjacent waters, and case-specific waters and those downstream waters.

As noted in response 9(g) above, significant nexus is not a purely a scientific determination and neither is the agencies' interpretation of the scope of "waters of the United States." Further, the opinions of the Supreme Court have noted that as the agencies charged with interpreting the statute, EPA and the Corps must develop the outer bounds of the scope of the CWA, while science does not provide bright lines with respect to where "water ends" for purposes of the CWA. Therefore, the agencies' interpretation of the CWA is informed by the Science Report and the review and comments of the SAB, but does not rely solely on them.

In the rule's definition of "significant nexus," the agencies identify the functions that waters provide that can significantly affect the chemical, physical, or biological integrity of traditional navigable waters, interstate waters and the territorial seas. Functions to be considered for the purposes of determining significant nexus are sediment trapping; nutrient recycling; pollutant trapping, transformation, filtering, and transport; retention and attenuation of floodwaters; runoff storage; contribution of flow; export of organic matter; export of food resources; and provision of life-cycle dependent aquatic habitat (such as foraging, feeding, nesting, breeding, spawning, use as a nursery area) for species located in traditional navigable waters, interstate waters, or the territorial seas. The effect of an upstream water can be significant even when a water, alone or in combination, is providing a subset, or even just one, of the functions listed. While the agencies agree defining significant nexus by quantified metrics would improve clarity, for the reasons discussed in the Science Report outlined above, such an approach is not supported by the science at this time.

For waters that require a case-specific significant nexus analysis, the Clean Water Rule outlines a three-step process: first, the region for the significant nexus analysis must be identified – under the rule, it is the watershed which drains to the nearest traditional navigable water, interstate water or territorial sea; second, any similarly situated waters must be identified – under the rule, that is waters that function alike and are sufficiently close to function together in affecting downstream waters; and third, the waters are evaluated individually or in combination with any identified similarly situated waters in the single point of entry watershed to determine if they significantly impact the chemical, physical or biological integrity of the traditional navigable water, interstate water or the territorial seas.

To address concerns that significant nexus analyses may not be conducted consistently, the agencies have provided more detail in the Rule regarding the definition of significant nexus and list the specific functions that will be considered in the analysis. This approach provides clear and consistent parameters for individual regulators to use in making jurisdictional determinations and provides transparency to the regulated public over which factors will be considered.

The agencies also are developing implementation guidance specific to "similarly situated" determinations under (a)(8) to assist in clarity and consistent determinations. The agencies strive to achieve consistency across the country in all districts and regions in application of the rule for

jurisdictional determinations. The agencies also recognize that there are variations that occur in geography, hydrology, climate, etc., which affect jurisdictional determinations. The initial phase of implementing the rule will require education and training for agency staff as well as other stakeholders and the regulated public, which will include regionally-based training to ensure consistent and efficient implementation of the rule.

State, tribal and local governments have well-defined and longstanding working relationships with the Corps and EPA in implementing CWA programs. The final Rule reflects the current state of the best available science and is guided by the need for clearer, more consistent and easily implementable standards to govern administration of the Act. The agencies will continue a transparent review of the science and learn from ongoing experience and expertise as the rule is implemented. The agencies plan to work with our regulatory partners on timely development of necessary training and guidance, as appropriate, to build upon existing working relationships, to inform stakeholders, and to ensure successful implementation of this rule.

9(i) Situational relevance of Science Report

Many commenters raised concerns about the generality of the Science Report and its ability to be applied at a local scale. These commenters noted various concerns and recommendations, including the need for case-by-case analyses, the need to consider regional variability, particularly in arid environments and watersheds managed for flood control, questions about connectivity of intermittent and ephemeral stream systems, and recommendations to consider additional references and information.

Some commenters recognized that the Science Report highlights the processes and interrelationships which can provide mechanisms to establish connections, but were concerned with applying those concepts universally across a broad range of categories of waters and geographic features. Some commenters noted the need for the Rule to allow for case-by-case analysis of some waters, particularly for waters outside the floodplain. One commenter was concerned that the draft Science Report does not address how to conduct case-by-case analyses. Other commenters were concerned that the Science Report does not identify how the existing literature will guide agencies in determining significance. Some commenters highlighted the need for flexibility and recommended working with States to develop tools and criteria for case-by-case analyses that are applicable to their specific resources and circumstances.

Many commenters highlighted the need to consider regional variability, temporal variability and/or site-specific factors when considering the strength of connections and effects to downstream waters, including differences in climate, hydrology, geography or other unique conditions of the water systems of each specific region. Some commenters noted that the type and degree of connectivity will vary geographically and temporally. Some commenters were concerned that, without taking into account these factors, the broadness of the report would lead to many waters having a significant nexus, even if there were specific circumstances that didn't support categorical jurisdiction.

Many commenters raised questions and concerns with how the agencies dealt with intermittent and ephemeral streams in the draft Science Report and Proposed Rule. Some commenters were concerned that intermittent and ephemeral streams were evaluated together, instead of evaluating

the relationship of ephemeral and intermittent streams to downstream waters independently. One commenter noted that the Science Report relies largely on literature from larger order tributaries, and felt that the literature from low-order intermittent and ephemeral headwater tributaries needed to be more substantial to support their categorical jurisdiction. Some commenters noted that there are varying degrees of connectivity in intermittent and ephemeral streams, particularly where they are often dry and have limited temporal connectivity. These commenters raised questions as to whether ephemeral connections can be significant, whether there may be a point within the tributary network where tributary connections become non-significant, and whether small tributaries should be considered in the Proposed Rule at all.

Many commenters raised concerns with the applicability of the draft Science Report to intermittent and ephemeral streams in extremely arid desert regions. Some commenters noted that most studies in the Science Report were from the Midwest or East Coast, with only few references addressing arid stream systems. Other commenters noted that the literature focused on larger-order arid systems, without sufficient literature documenting the smaller, low-order headwater features in the arid southwest. One commenter suggested additional references, which they felt suggested a non-linear, highly variable relationship between arid intermittent and ephemeral channels in the arid west and downstream waters. Another commenter noted that smaller, low-order ephemeral and intermittent channels in the arid West can be so variable that a relationship between a morphologic variable such as OHWM and significant nexus to a downstream traditionally navigable water is not reliable. One commenter noted that the studies demonstrating connectivity for ephemeral channels in the arid west are focused on transmission losses and recharge of regional aquifers, which create only a tenuous connection to downstream navigable waters. This commenter felt that the science does not support the conclusion that arid ephemeral waters have significant nexus, particularly where they are far removed from navigable waters. Several commenters noted that a specific research analysis focused on intermittent and ephemeral tributaries in the arid west should be included in the Science Report if these waters are to be categorically jurisdictional by rule. Other commenters felt that the science was too limited in these systems and they should not be treated categorically by rule, or that a regional approach should be taken to evaluate these systems in the arid west.

9(i) Agencies' Response

While tributaries and adjacent waters, as defined, are jurisdictional by rule, the agencies recognize that there are individual waters outside of the "neighboring" limits for adjacency where the science may demonstrate through a case-specific analysis that there exists a significant nexus to a downstream traditional navigable water, interstate water, or territorial sea. These waters are not determined jurisdictional by rule and will be evaluated through a case-specific analysis.

The SAB emphasized the importance of the regional context (e.g., geology, climate, landforms, and surficial sediments) in driving the temporal and spatial scales of hydrologic linkages, and thus degree of connectivity. Section 2.4 of the final Science Report included a detailed discussion of regional factors that influence connectivity among waters through their interactions with one another and with other factors such as human alterations and biogeogeography. The approach to case-by-case significant nexus analysis considers the regional context in determining which waters are "similarly situated," and thus should be in analyzed in combination. Under the

Clean Water Rule, waters can be considered similarly situated, where they can reasonably be expected to similarly and concurrently affect the chemical, physical, or biological integrity of downstream traditional navigable waters, interstate waters, or the territorial seas. Factors to consider include whether they are within a contiguous area of land with relatively homogeneous soils, vegetation, and landform (e.g., plain, mountain, valley, etc.) or sufficiently close to each other or to a jurisdictional water. In addition, consideration of wetland/water type and landscape location are relevant for determining if the waters are similarly situated.

With regard to State-specific circumstances, the rule covers only those waters that currently available science demonstrates possess the requisite connection to downstream waters and function as a system to protect the chemical, physical and biological integrity of those waters. The agencies recognize that the establishment of "bright line" thresholds in the rule does not in any way restrict states from considering state-specific information and concerns, as well as emerging science to evaluate the need to more broadly protect their waters under state law. The CWA establishes both national and state roles to ensure that state-specific circumstances are properly considered to complement and reinforce actions taken at the national level.

With regard to intermittent and ephemeral stream systems, the rule definition of "tributary" requires that flow must be of sufficient volume, frequency, and duration to maintain the physical characteristics of bed and banks and an ordinary high water mark. If a water lacks sufficient flow to maintain such characteristics in the face of terrestrialization processes (e.g., revegetation, soil formation) or standard agricultural practices (e.g., plowing, livestock herding), it is not considered "tributary" under this rule. While some commenters expressed concern that a feature that flowed very infrequently could meet the proposed definition of "tributary," it is the agencies' judgment that where such a feature does not form the physical indicators required under the definitions of "ordinary high water mark" and "tributary," it would not be a tributary under the rule. To further emphasize this point, the rule expressly indicates in paragraph (b) that ephemeral reaches that do not meet the definition of tributary are not "waters of the United States."

The rule includes ephemeral streams that meet the definition of tributary as "waters of the United States" because the agencies determined that such streams provide important functions for downstream waters, and in combination with other "covered tributaries" in a watershed, significantly affect the chemical, physical, and biological integrity of traditional navigable waters, interstate waters, and the territorial seas. Consistent with the scientific literature, tributaries as a group exert strong influence on the chemical, physical, 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 chemical, physical, and biological processes. As noted by the SAB:

> *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.*

> *The Board advises the EPA to reconsider the definition of tributaries because not all tributaries have ordinary high water marks. An ordinary high water mark may be absent in ephemeral streams within arid and semi-arid environments or in low gradient landscapes where the flow of water is unlikely to cause an ordinary high water mark. The Board advises the agency to consider changing the wording in the definition to "bed, bank, and other evidence of flow." In addition, tributaries are not typically defined to include lentic systems (e.g., lakes, ponds, wetlands). Thus, the EPA may want to consider whether flow-through lentic systems should be included as adjacent waters and wetlands, rather than as tributaries (SAB 2014b).*

These significant effects on traditional navigable waters, interstate waters, and the territorial seas occur even when the tributary is small, intermittent, or ephemeral. Note that the SAB advised the agency to consider changing the definition of tributary to one that would have been even broader in scope than what is included in the final rule; this means that the rule definition encompasses a subset of streams that the SAB thinks there is strong scientific evidence to support as jurisdictional under the Clean Water Act.

The final Science Report included in Sections 3.3, 3.4, and 3.5 additional references on ephemeral streams provided by the SAB. Not all ephemeral streams are "small tributaries" as implied in the comments submitted. There are ephemeral tributaries that are larger than some perennial tributaries using various means for characterizing stream size, including the average annual discharge, drainage area, or stream order.

In addition, the Science Report concludes that, "[a]lthough less abundant, the evidence for connectivity and downstream effects of ephemeral streams was strong and compelling, particularly in context with the large body of evidence supporting the physical connectivity and cumulative effects of channelized flows that form and maintain stream networks." (Science Report at 6-13). For example, ephemeral headwater streams shape river channels in traditional navigable or interstate waters by accumulating and gradually or episodically releasing stored materials such as sediment and large woody debris. These materials help structure traditional navigable and interstate river channels by slowing the flow of water through channels and providing substrate and habitat for aquatic organisms.

Moreover, the agencies have historically considered ephemeral tributaries to be "waters of the United States" where they have ordinary high water mark features. For example, several Corps' Nationwide Permits under CWA Section 404 address discharges of dredged or fill material into ephemeral waters, and the agencies' definition of "waters of the United States" prior to this rule included all tributaries without reference to flow regime.

With regard to specific comments on intermittent and ephemeral streams in arid environments, the Science Report has been edited to include several SAB recommended and other references that describe how intermittent and ephemeral streams in arid environments have physical, chemical, and biological connections to downstream waters and how these connections vary with time. In response to the SAB's recommendation, more literature regarding the importance of episodic connections between ephemeral and intermittent streams and downstream waters was added to Section B.5 and Section 3 of the final Science Report. The temporal dimension of

connectivity to downstream waters is particularly important in arid systems, where, connections between ephemeral channels and downstream waters can occur during large episodic events or incrementally over multiple events.

The final Science Report has an entire section dedicated to arid southwestern ephemeral and intermittent streams (Section B.5), and this section and the general stream section (Section 3) of the final Report included studies that demonstrated connectivity of arid headwater channels and downstream water through the transport and storage of water, sediment, organic matter, nutrients, contaminants, and organisms as well as transmission of loss and groundwater recharge (which the SAB identified among the "key linkages and exchanges" between tributary streams and downstream waters, particularly for alluvial systems in the Southwest). The SAB found the literature reviewed in the Report that describes connectivity of low order streams to be pertinent and the review to provide strong support for the conclusion that ephemeral, intermittent, and perennial streams are connected to and strongly influence downstream waters. However, it is important to also note that intermittent and ephemeral streams in extremely arid desert regions sometimes drain into closed basins that lack a traditionally navigable water, and therefore such streams would not meet the definition of tributaries.

9(j) Groundwater

Several commenters raised concerns with the use of groundwater to establish connections in the draft Science Report and Proposed Rule. Some commenters felt that groundwater and alluvial recharge should not be used to establish connectivity because groundwater is not regulated. Some of these commenters felt that the entire discussion of groundwater in the Science Report should be removed because groundwater is not regulated and its inclusion as a connection could create confusion and greater legal or regulatory uncertainty. Some commenters felt that the Rule should also exclude all groundwater, even where it serves only as a connection between surface waters. One commenter felt that studies related to groundwater are not relevant to CWA jurisdiction and was concerned that if jurisdiction can be based on a groundwater connection, then the agencies could control groundwater withdrawals to maintain such connections.

Some commenters felt there is insufficient information to make a categorical determination that waters with subsurface connection have significant nexus. These commenters noted that these connections can be difficult to quantify and define. One commenter noted that because shallow subsurface connections are difficult to identify and/or quantify, it puts the burden on a landowner to disprove they exist.

Other commenters felt that groundwater should not be categorically excluded from the CWA. They concurred with the SAB review that the draft Science Report lacks an adequate analysis of the role of groundwater on connectivity, and also recommended that the report more explicitly address the role of groundwater. One commenter recommended that groundwater be considered an "other water" where it has a documented connection and significant effect on downstream waters. This commenter noted that there are many examples where significant connections between groundwater and navigable waters have been well documented by extensive research and experience.

9(j) Agencies' Response

Because the Science Report was intended as a technical review of peer-reviewed scientific literature that does not consider or set forth legal standards (Science Report p. 1-1), it addressed scientific questions that were relevant to the policy concerns. Specifically, the report addressed questions concerning the physical, chemical, and biological connections to and effects of streams and wetlands on downstream waters (Science Report p. 1-1). From a scientific perspective, groundwater connectivity cannot be ignored in answering these questions, since it represents a major component of the hydrologic cycle by which water passes through the watershed. However, as noted in the proposed and final Rule, the agencies have never interpreted "waters of the United States" to include groundwater, and the rule explicitly excludes groundwater. In addition, the final Rule clarifies that shallow subsurface flow can be used in evaluating the connections between waters but deeper groundwater connections cannot. In any event, shallow subsurface flows and groundwater are never "waters of the United States."

The Rule does not include a specific definition of "shallow subsurface connection" with respect to depth. This is in part because there is no uniform maximum depth across the country for what constitutes a shallow subsurface connection. As described in the Rule Preamble:

> *Shallow subsurface connections move quickly through the soil and impact surface water directly within hours or days rather than the years it may take long pathways to reach surface waters.*

In their evaluation of the adequacy of the technical basis for the Proposed Rule, the SAB noted that local shallow subsurface water sources and regional groundwater sources can strongly affect connectivity. In the SAB comments on the draft Science Report, they recommended that the Science Report more explicitly address the scientific literature on the cumulative and aggregate effects of groundwater systems. They also recommended that the conceptual framework have a greater emphasis on the importance of groundwater-mediated connectivity. In response, EPA added an overview of the literature on cumulative and aggregate effects of streams, wetlands, and associated ground-water systems to the Introduction (Science Report Chapter 1).

Some commenters felt that there was insufficient information to make a categorical determination that waters with subsurface connection have significant nexus, because it is difficult to quantify and define. The Science Report did not make a determination that waters with subsurface connections categorically had effects on downstream waters. The report does state in Conclusion 3 (Science Report p. ES-3) that the functions of non-floodplain wetlands clearly affect the condition of downstream waters if a visible (e.g., channelized) surface-water or a regular shallow subsurface-water connection to the river network is present. This conclusion is based on (a) the myriad, documented functions that wetlands possess that could affect material fluxes to downstream waters (by acting as sources, sinks, lags, transformers, or refuges) if a connection exists, and (b) the supposition of a regular shallow subsurface-water connection. The report does not speak to where such shallow subsurface-water connections occur, and agrees that such connections are difficult to quantify and define (i.e., the Report concludes that the peer-reviewed references that were reviewed infrequently evaluate connections in general between wetlands and downstream waters, and rarely examine the frequency, duration, magnitude, timing, and rate of change of these connections).See also the Technical Support Document (TSD) sections VIII and IX for information regarding shallow subsurface connections.

9(k) Aggregation

Some commenters concurred with the SAB recommendations that the Science Report more explicitly describe scales of aggregation. One commenter noted that because of the limited nature of funding and research for site-specific studies, *a priori* designation of similarly situated waters and case-specific analyses using landscape-level tools are needed.

Other commenters were concerned that aggregation would allow individual waters that would not be jurisdictional alone to be considered together and thus reach the significant nexus threshold. One commenter noted that aggregation of small systems does not alter the fundamental characteristics of these systems (i.e., that their functional contribution is small), and the number of these systems does not make each individual system essential.

Some commenters felt that there was not sufficient scientific literature to demonstrate that aggregating waters creates a quantified effect or effect of sufficient magnitude to demonstrate a significant nexus. Some of these commenters felt that the concept of aggregation was speculative and does not account for spatial and temporal variability of connectivity within a watershed. One commenter noted that the scientific understanding of what is "similarly situated" is unclear and continuing to develop, and additional research would be necessary to evaluate spatial and temporal variability of connections among similarly situated waters and wetlands. Some commenters felt that significant nexus via aggregation is a difficult concept to demonstrate, and possibly even more challenging for regulated community to disprove. One commenter was concerned with making generalizations across non-floodplain waters for aggregation without understanding fully how they connect to or influence downstream waters.

9(k) Agencies' Response

The agencies agreed with the SAB that the cumulative effects of waters are fundamentally important to understanding the connectivity of streams, wetlands, and open waters to downstream waters. This aspect of the relationship between headwater streams, wetlands, and downstream waters is so fundamental to the nature of river networks and watersheds that a review of the cumulative effects of physical, chemical, and biological connections was included in the Streams and Wetlands chapters of the draft Report. In the final Report, EPA added an overview of the literature on cumulative and aggregate effects of streams, wetlands, and associated ground-water systems to the Introduction (Report Section 1.2.3). ORD also incorporated additional summaries of peer-reviewed literature that describe the aggregate and cumulative effects of headwater streams and wetlands in Report Chapters 3 and 4. One of the major conclusions of the final Science Report is that the incremental effects of individual streams and wetlands are cumulative across entire watersheds, and therefore, must be evaluated in context with other streams and wetlands.

Aggregation is not speculative, but in fact, is critical to be able to account for spatial and temporal variability of connectivity. Downstream waters are the time-integrated result of all waters contributing to them. For example, the amount of water or biomass contributed by a specific ephemeral stream in a given year might be small, but the aggregate contribution of that stream over multiple years, or by all ephemeral streams draining that watershed in a given year or over multiple years, can have substantial consequences on the integrity of the downstream waters. Similarly, the downstream effect of a single event, such as pollutant discharge into a

single stream or wetland, might be negligible but the cumulative effect of multiple discharges could degrade the integrity of downstream waters. When considering the effect of an individual stream or wetland, all contributions and functions of that stream or wetland should be evaluated cumulatively. For example, the same stream transports water, removes excess nutrients, mitigates flooding, and provides refuge for fish when conditions downstream are unfavorable; if any of these functions is ignored, the overall effect of that stream would be underestimated. Spatial aggregation is also necessary because a downstream water is not affected by a single stream or wetland, but by all streams and wetlands that alter material fluxes into that downstream water.

While it is true that aggregating does not change the contribution of an individual system (e.g., if the contribution of an individual wetland is small, aggregation does not change that), it is the aggregate function of all of the system components that can be quite large. A simple example is that most of the surface water that is delivered to rivers during large floods occurs through ephemeral streams, even though each of these streams individually contributes relatively small amounts. The reason for this is because of the power law relationship between the number and size of streams; i.e., the number of streams geometrically increases as the size decreases. The capacity and distribution of intermittent and perennial streams is insufficient to deal with the large amount of water that is delivered during such storms.

9(l) Definitions

Many commenters raised concerns that the definitions used in the draft Science Report were different from the definitions used to define waters in the Proposed Rule. For example the draft Science Report relies on the Cowardin definition of wetlands, which does not require wetlands to meet all three parameters required under the regulatory definition. Similarly, commenters pointed out that the definition of tributary, floodplain and riparian area are not consistent between the Report and Proposed Rule. These commenters highlighted the confusion this creates and questioned the ability for the agencies to draw inferences from the scientific literature, where the waters being described may not be the same. Some of these commenters recommended that the Science Report use the regulatory definition of wetlands. Other commenters recommended the agencies explain in more detail how the technical vocabulary translates to the legal terminology.

Some commenters were concerned that uplands were not defined in the draft Science Report and that the broad definitions of streams, floodplains and riparian areas could include upland areas, which are not regulated under the CWA. Some commenters were concerned that the Science Report creates two new categories of wetlands, unidirectional and bidirectional.
Some commenters also raised the concern that the Science Report evaluates the connections and effects on “downstream waters” instead of specifically evaluating connections and effects on downstream traditionally navigable waters, interstate waters and territorial seas. These commenters were concerned that demonstrating connections to “downstream waters” is not a sufficient link to the legal basis for the CWA.

9(l) Agencies’ Response

The scientific literature does not use legal terms such as "traditional navigable waters," "interstate waters," or "territorial seas" to define or characterize aquatic ecosystems. The draft

and final Report prefaces clearly state that terms in the Report are used with their generally recognized scientific meanings, which are not derived from legal texts (also see Science Report Table 1-1). Further, the introductions to the draft and final Reports clearly state that as a technical review of scientific evidence, the Report does not consider or set forth legal standards for CWA jurisdiction. Given that it is a science document, it is appropriate and necessary that terminology used throughout the Report be based on scientific definitions. Definitions of technical terms are provided in the Report Glossary (Appendix A). The agencies note that evidence of strong chemical, physical, and biological connections to larger rivers, estuaries, and lakes applies to that subset of rivers, estuaries, and lakes designated in legal texts as "traditional navigable waters," "interstate waters," or the "territorial seas." Similarly, the scientific literature does not use the regulatory definition of wetlands to define or characterize wetlands. Inferences and conclusions in the Science Report apply to the Cowardin wetlands, and the Cowardin definition of wetlands encompasses a larger universe of wetlands than the regulatory definition. That means that the Science Report conclusions regarding Cowardin wetlands apply to the wetlands meeting the regulatory definition because they are merely a subset of the Cowardin wetlands. Cowardin et al. (1979) is one of the standard definitions of wetlands that is used throughout the scientific literature.

In response to recommendations from the SAB, the terms “unidirectional” and “bidirectional” wetlands were replaced with “non-floodplain” and “riparian/floodplain” wetlands throughout the Science Report. These are more commonly understood terms. However, the terms “unidirectional” and “bidirectional” are still used in places to describe hydrologic flows between non-floodplain wetlands and downstream waters (unidirectional only, i.e., water may flow from these wetlands to downstream waters but not vice-versa) and between riparian/floodplain wetlands and downstream waters (unidirectional and bidirectional). Uplands were defined in the final Science Report on page A-14.

9(m) Man-made conveyances/modifications

Some commenters stated that the draft Science Report does not adequately address man-made modifications or impediments to connectivity in the landscape. One commenter did not think that the science supports the agencies’ assertion that a significant nexus is not broken where a tributary flows through a culvert or other structure. This commenter noted that such manmade breaks can alter and sometimes reduce connectivity to the point where a tributary lacks a meaningful connection with downstream traditionally navigable waters. One commenter wanted to know whether diversions or dewatering of streams could sever a connection in tributaries.

Several commenters raised concerns about the draft Science Report’s assumption that manmade features, such as ditches, function as tributaries or adjacent waters, despite the lack of scientific references to support this assertion. These commenters felt that categorically regulating ditches as tributaries is not supported by science. Some commenters pointed out that the draft Science Report considers ditches and canals as conduits, but does not distinguish between point sources and waterbodies and provides no literature references to suggest that ditches themselves could be considered waterbodies instead of merely conduits for point source discharges. One commenter was concerned with the SAB’s comment on ditches, which noted that exclusions of ditches and erosional features are a policy matter, not a scientific one. This commenter was concerned that the agencies will remove exclusions based upon additional scientific information.

9(m) Agencies' Response

In response to the SAB recommendations, ORD has summarized additional literature discussing effects of human alterations and human-caused interruptions on the temporal dimensions of connectivity in the Science Report (see Science Report Sections 3.3 and 3.4). ORD noted in their response to the SAB that they agree that human alterations can disrupt headwater stream-downstream water connectivity and have consequences to the integrity of downstream waters. ORD has referred the readers to an existing section on human alterations (Report Section 2.4.4) and have added new text on human alterations to Report Sections 3.2, 3.3, 3.4, and 3.5. The Science Report included many of the SAB recommended references as well as others as evidence of human alterations affecting headwater stream-downstream water connectivity and associated consequences to downstream waters in Report Sections 3.2, 3.3, 3.4 and 3.5. See also: Response to SAB report section 3.1.4(f).

Based on scientific literature and data used to support the conclusions of the Science Report, the agencies recognize that many ditches provide similar functions as tributaries. In its review of the Proposed Rule, the SAB stated, "…certain other exclusions listed in the Proposed Rule and the current regulation do not have scientific justification. There is, for example, a lack of scientific knowledge to determine whether ditches should be categorically excluded," (letter by Dr. David T. Allen, Chair, Science Advisory Board to EPA Administrator Gina McCarthy, September 30, 2014). Nonetheless, while there may remain some uncertainty in the science, the agencies have determined that it is important to clarify the status of ditches to make implementation of the Act more understandable and consistent, and to reinforce long-standing practices and priorities. As a result, the rule codifies the longstanding policy of the agencies to consider certain ditches as not subject to regulatory protection as "waters of the United States."

The CWA regulates and controls pollution at its source, in part because most pollutants do not remain at the site of the discharge, but instead flow and are washed downstream through the tributary system to endanger drinking water supplies, fisheries, and recreation areas. These fundamental facts about the movement of pollutants and the interconnected nature of the tributary system demonstrate why the agencies have determined that when ditches meet the definition of tributary and contribute flow to a traditional navigable water, interstate water or the territorial seas, they have a significant nexus to the above referenced downstream waters and are themselves jurisdictional waters of the U.S. (Also see Ditch Compendium, Topic 6).

9(n) Miscellaneous Comments on Science Report

Some commenters made or reiterated comments on the draft Science Report, itself. These comments included concerns that the Science Report was incomplete, or relied on inappropriate assumptions and endpoints. Some commenters were concerned that the draft Science Report did not contain a complete literature review and provided examples of what may be missing (e.g., Alaska-specific references and references that address hydrologic isolation, such as drought) or additional references to include. One commenter noted that more discussion should be included for instances where waters may be truly isolated (e.g., some Playa Lakes). One commenter felt the study should have included references relating to best management practices, spills, erosion and sediment controls and the like which could have impacts on downstream water quality. One commenter recommended EPA describe their process for including some studies over others,

including an explanation why terrestrial ecosystems (including upland buffers) were not evaluated for their role in protecting water quality.

Some commenters raised concerns with the reliance on the potential for functions in determining connectivity. These commenters felt that relying on potential, not-observable, functions added substantial uncertainty to the regulatory process, was speculative and was not well supported. One commenter noted that the capacity to use resources does not indicate dependency on those resources. Another commenter noted that studies on pollution transport are only useful where they address an actual impact on downstream water quality, as opposed to merely highlighting the potential for transport. One commenter noted that it is the Corps practice to consider "normal circumstances" in the existing regulations.

One commenter was concerned that the draft Science Report does not distinguish ephemeral streams from other ephemeral features, thus studies relating to drainage of ephemeral features, whether a stream or not, should not be used to support categorical jurisdiction of tributaries. Several commenters concurred with underlying assumptions and conclusions in the draft Science Report, including that only in extreme and unusual circumstances are wetlands not hydrologically connected to nearby waters, that tributary streams are connected to and have effects on downstream waters, and that the literature summarized in the Science Report provides sufficient evidence to categorically include certain wetlands as Waters of the U.S.

Some commenters disagreed with the Science Report. Another commenter noted that sporadic interactions are not indicative of inseparable components or essential long-term and obligatory functional relationships. One commenter felt that proximity was an inappropriate measure to define a boundary or infer relationships between system components.

9(n) Agencies' Response

ORD expanded the description of the process used to screen, compile, and synthesize information used in the Science Report (Report Section 1.3). Linkages to terrestrial ecosystems, although critical to watershed integrity, are out of scope for this Report. The Report did include studies from Alaska and references to conditions that reduce hydrologic connectivity, including drought.

With regard to the comment about ephemeral stream features, a feature can be "ephemeral" and not meet the agencies' regulatory definition of tributary. A "tributary," as defined in the rule, must have a "bed and bank" and an "ordinary high water mark," and contribute flow either directly or through other tributaries to a traditional navigable water, interstate water, or the territorial seas, to be a "water of the U.S." Where that stream or ditch feature supports only ephemeral flow and that feature does not meet the definition of a "tributary" that feature would not be jurisdictional under the CWA as a "tributary".

As the Science Report notes (p. 1-14), in cases where direct evidence of a connection or effect was not available, then indirect evidence that suggested a connection or effect was used. This included gathering of multiple sources of evidence and conclusions drawn via logical inference, which is a standard scientific approach when more direct evidence is not available. To that end, the Science Report explains that effects of streams and wetlands on downstream waters is

dependent upon both functions that can alter fluxes of material to downstream waters and connectivity to downstream waters. Contrary to the comment that these functions are not-observable and that relying on this was not well supported, Report Chapters 3 and 4 contain myriad examples of actual, observed functions reported in the literature that streams and wetlands perform that can alter fluxes of materials to downstream waters. The comment about pollution transport only being useful where it addresses an actual impact on downstream water quality is also directly addressed by the Report when discussing actual function and potential function (p. 2-24). It provides as an example of a potential function a wetland that has a denitrification potential but where there is no input of nitrogen. The Report points out that although such potential functions do not actively affect downstream waters, they can be instrumental in protecting those waters from future impacts.

Distance is a factor that is well known to have various effects on physical and biological processes within and between system components. Sometimes this is due to the direct effect of distance. For example, diffusion of materials or heat from a central source is an inverse square function of distance. In some cases there is an indirect effect due to distance controlling how long transport of a material will take. For example, water conveyed along a longer surface flowpath will be subject to more evapotranspiration and soil infiltration, and therefore less likely to reach a stream, than water moving along a shorter surface flowpath. While these distance effects occur as a continuous function, it is a common scientific practice to use such variables to define discrete bins, which can then serve as a basis for a boundary.

9(o) Maps

A few commenters were concerned that USGS maps, LIDAR or other high definition mapping tools would be used to determine the extent or scope of Waters of the U.S. despite the agencies' comments otherwise. One commenter pointed out that the scale of maps used to identify tributaries is a critical consideration, as higher resolution maps include a greater number of stream miles, they may not be consistently used by the States and they may over represent the number of actual tributaries. This commenter also conducted a desktop analysis using high resolution imagery (LIDAR) and concluded that the Proposed Rule would lead to an increased number of potential Waters of the U.S. (because of overly broad criteria for ephemeral streams) and thus increased permitting and infrastructure impacts.

Several other commenters recommended that the agencies provide specific maps of the extent of Waters of the U.S. so that the public is fully informed on the scope of the Rule, or to verify the numbers of waters identified in the Cost Analysis.

9(o) Agencies' Response

The agencies' Rule does not include a specific delineation and determination of waters across the country that would be jurisdictional under the Rule. Consistent with the more than 40-year practice under the CWA, the agencies make determinations regarding the jurisdictional status of particular waters almost exclusively in response to a request from a potential permit applicant or landowner asking the agencies to make such a determination.

The agencies do not believe that technology will lead to an expansion of CWA jurisdiction. However, the agencies believes that such tools can help improve our understanding of our

nation's waters, including their location and the connections (or lack of connections) among these waters. As mentioned previously, jurisdictional determinations are typically made on a case-by-case basis based on a request from a permit applicant or landowner, and can use available written and graphic information, as well as field visits.

The Preamble of the final Rule notes that there are several reliable, well-established remote sensing sources of information or mapping that are currently used, and can continue to be used to assist in establishing the presence of water that contributes flow to an (a)(1) through (a)(3) water and providing evidence regarding the presence of a bed and banks and another indicator of ordinary high water mark. These tools include USGS topographic data, the USGS National Hydrography Dataset (NHD), Natural Resources Conservation Service (NRCS) Soil Surveys, and State or local stream maps, the analysis of aerial photographs, light detection and ranging (also known as LIDAR) data, and desktop tools that provide for the hydrologic estimation of a discharge sufficient to create an ordinary high water mark, such as a regional regression analysis or hydrologic modeling. These sources of information can sometimes be used independently to infer the presence of a bed and banks and another indicator of ordinary high water mark, or where they correlate, can be used to reasonably conclude the presence of a bed and banks and ordinary high water mark.

The agencies recognize that these desktop tools provide varying degrees of accuracy and image resolution. And thus, evaluations may vary depending on the tool used. As stated above, these tools will not be used to map or delineate the entire scope of waters that would be jurisdictional under the Rule, but instead used to determine site-specific features that may inform a jurisdictional determination.

9.0 SCIENTIFIC EVIDENCE SUPPORTING RULE

National Association of Flood & Stormwater Management Agencies (Doc. #13613)

9.1 The draft connectivity report appears to be based on a review of scientific literature seeking to determine the nature of connectivity. The scientific question then becomes "how are things connected?" and the research results are a documentation of theoretical connection—everything is connected. While valid for scientific research, the basis of the connectivity report is inappropriate for the development of regulations. To be effective, an administrative process requires clear boundaries and limits in light of the desired regulatory effects, federal law and the practical ability for a regulatory organization to implement any promulgated regulations. To support rulemaking for determining WOTUS, the central scientific question should have been, "where does the regulatory connection effectively stop?" Consequently, the connectivity report for the purposes of this rulemaking is flawed and its utility is questionable. Because the connectivity report is central to EPA's Proposed Rule, we request EPA reassess the scientific literature with a focus on the limits of connectivity. We recognize this is a fundamental step and reassessment will likely impact the overall schedule of the Proposed Rule. However, we believe the profound significance of WOTUS to Clean Water Act programs justifies the additional effort. (p. 2)

Agency Response: 9(e), 9(f), 9(g), 9(h), and 9(i)

Office of the City Attorneys, City of Newport News, Virginia (Doc. #10956)

9.2 On page 22196, it is clear that the general scientific conclusions in the preexisting Report will be looked to as the only consideration in making jurisdictional decisions. "The Report concludes that the scientific literature clearly demonstrates that streams, regardless of their size or how frequently they flow, strongly influence how downstream water function". In short, general conclusions based on a survey of scientific papers will be the only thing considered, regardless of the facts on the ground. This is both bad science and bad law. (p. 6)

Agency Response: 9(f) and 9(i)

CEMEX (Doc. #19470)

9.3 The draft report on the connectivity of upstream and downstream waters and the Science Advisory Board's analysis of that report do not support the Proposed Rule - they indicate that almost all upstream and downstream waters are connected and therefore provide no basis for determining which of those connections are significant and which are not. (p. 2)

Agency Response: 9(f), 9(g), and 9(h)

Natural Resources Defense Council and Southern Environmental Law Center (Doc. #10578)

9.4 Enclosed in addition to this letter, please find four documents, all of which we respectfully request that you add to the above-captioned docket for the Proposed Rule titled "Definition of 'Waters of the United States' Under the Clean Water Act."

The documents include two analyses of available literature concerning the relationship between various categories of water bodies and downstream waters. Specifically, the analyses focus on several types of waters that are commonly, though inaccurately, labeled "isolated." The analyses are titled "Evidence of Significant Impacts of Coastal Plain Depressional Wetlands on Navigable Waters" and "Physical, Chemical, and Biological Impacts of Geographically Isolated Wetlands on Waters of the United States."

Some of the literature reviewed in these analyses is additional to the literature cited in the draft report by EPA's Office of Research and Development titled "Connectivity of Streams and Wetlands to Downstream Waters: A Review and Synthesis of the Scientific Evidence." The two analytic reports were both developed by students in the River Basin Center at the University of Georgia, under contract with our organizations.

The third enclosed document is a memorandum from Paul H. Zedler, Professor of Environmental Studies (Nelson Institute for Environmental Studies) at the University of Wisconsin-Madison. NRDC contracted with Dr. Zedler to review both of the University of Georgia analyses. Dr. Zedler concluded that "the reports are highly credible, and a suitable basis for evaluating the function and value of these wetlands."

The fourth document is a letter from Professor Darold Batzer, from the Department of Entomology in the College of Agricultural and Environmental Sciences at the University of Georgia. Dr. Batzer reviewed the document titled “Evidence of Significant Impacts of Coastal Plain Depressional Wetlands on Navigable Waters.” Following his review, he

stated that he "fully concur[red] with its conclusions, and observed that the "authors did an excellent job in collating the relevant, available scientific literature, and provide a holistic appraisal of linkages (physical and biological) between southeastern depressional wetlands and rivers, lakes, and other jurisdictional wetlands."

Because the relevant legal framework identifies, as "waters of the United States," at least those categories of water bodies that collectively have significant effects on downstream navigable or interstate waters, *Rapanos* v. U.S., 547 U.S. 715 (2006), the enclosed documents will aid in the agencies' development of regulations that properly define the geographic scope of the pollution control programs of the Clean Water Act. Accordingly, we urge you to consider the scientific evidence and analysis these materials contain. (p. 1-2)

Agency Response: The agencies appreciate the comment. We reviewed the reports provided above, and have incorporated some of the references into the Technical Support Document for the Rule.

Association of State Floodplain Managers, Inc. (Doc. #19452)

9.5 The Science report is important in that it documents the scientific basis for the Proposed Rule, clearly linking the protection of waters to the need for protection as defined in the Clean Water Act. ASFPM has also reviewed the current version of the Science Advisory Board panel/committee review of the report, as well as the draft recommendations of the Science Advisory Board panel/committee and in our opinion, this report combined with the Science Advisory Board panel/committee review and recommendations provides an adequate scientific demonstration of the importance of waters defined by the Proposed Rule as Waters of the United States, and the need for their protection and protection of the riparian floodplains (when present) to prevent increased flood risk. (p. 2)

Agency Response: The agencies appreciate the comment.

Royalty Owners & Educational Coalition (Doc. #14795)

9.6 The expansive nature of the agencies' definitions of other waters, including tributaries and riparian areas, clearly supports this theory. Even the EPA synthesis of peer-reviewed scientific literature on connectivity - the document the agencies claim will guide jurisdictional decisions over other waters remains incomplete. (p. 3)

Agency Response: 9(n). As noted in 9(e), the final Science Report was modified in response to public input and SAB recommendations, including additional references. As noted in 9(f)., the SAB concluded that the available science provided sufficient basis for the key components of the Proposed Rule. Further, the agencies' response in 9(f) notes that the definitions in the Final Rule are based not only on the best available science, but also on the statute, Supreme Court decisions and agency expertise.

Trout Unlimited (Doc. #18015)

9.7 The Proposed Rule is well justified by existing, peer-reviewed science on the chemical, biological, and hydrological connections of tributaries and wetlands to traditionally navigable waters. The EPA's *Connectivity of Streams and Wetlands*, a draft of which was

released before the rule was proposed, synthesizes this existing body of research. Recently, the EPA's Scientific Advisory Board (SAB) concurred that the science contained within this document was well founded in regards to the connectivity of tributaries, including intermittent and ephemeral streams, and argued there was scientific evidence for the connectivity of wetlands and other waters. In addition, the SAB reviewed the scientific basis of the Proposed Rule itself with almost identical comments. Trout Unlimited employs a team of scientists in order to utilize the best available data and knowledge in our restoration and protection work. This team of scientists, including our own Dr. Helen Neville who submitted our comments on the connectivity report, agrees that there is strong scientific justification for the hydrological, biological, and chemical connectivity of headwater and tributary streams to downstream waters. (p. 2)

Agency Response: **The agencies appreciate the comment.**

Mobile Baykeeper (Doc. #16472)

9.8 We support the agencies' and the Science Advisory Board's ("SAB") work to document the "significant nexus" between these historically regulated waters and tributaries and adjacent waters. We agree that all of these waters (including headwaters, intermittent streams, ephemeral streams, and adjacent waters) are connected to downstream waters that are covered under the CWA, and that they should be categorically protected. (p. 2)

Agency Response: **The agencies appreciate the comment.**

Clean Up the River Environment (Doc. #19551)

9.9 The Scientific Advisory Board has only confirmed what the EPA reported and our constituents understand: water bodies are connected, and as such, connected streams and wetlands also need jurisdictional protection under the Clean Water Act. (p. 1)

Agency Response: **The agencies appreciate the comment.**

9.1 SAB AND CONNECTIVITY REPORT SPECIFIC COMMENTS

Committee on Space, Science and Technology (Doc. #16386)

9.10 EPA conducted a literature review on the connectivity of streams: The Connectivity of Streams and Wetlands to Downstream Waters: A Review and Synthesis of the Scientific Evidence.

a. Does the "connectivity" report support the Proposed Rule?

b. The Science Advisory Board recommended changes to the "connectivity" report supporting the proposed Waters of the U.S. rule, what changes to the rule have you made after considering SAB recommendations?

c. For what period of time has the public had an opportunity to review the SAB's report reviewing EPA's draft Connectivity Report before the close of comment on the proposal?

d. What changes has the EPA made to the draft report and when will the report be finalized? (p. 7)

Agency Response: **For a. see 9(f); b. see 9(e); c. see 9(c) and 9(e); d. see 9(e).**

Congress of the United States, Senate Committee on Environment and Public Works et al. (Doc. #16564)

9.11 EPA appears eager to put forward a report on the connectivity of streams and wetlands in order to justify the broad regulatory assertions contained in the proposed "waters of the United States" rule.[3] There are major concerns associated with EPA's draft "Connectivity Report,"[4] but the fundamental issue is that no amount of study can nullify the Constitution's limits to federal regulatory authority. Although the EPA and Corps' effort to invent scientific support for expanded jurisdiction is creative, jurisdiction under the CWA is a legal exercise not a scientific one.

Indeed, a federal agency may not rely on reasoning that would render the Constitution's enumeration of powers meaningless.[5] However, in the draft "Connectivity Report," EPA engages in precisely this sort of reasoning, asserting that " (a)(1) 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."[6]

There is no limit to federal regulatory authority under the draft report 's approach, which conflicts with the constitutional maxim that "activities local in their immediacy do not become interstate and national because of distant repercussions."[7] Accordingly, it is inappropriate for EPA and the Corps to rely on the draft "Connectivity Report" for this rulemaking or other regulatory contexts. (p. 6-7)

Agency Response: **9(d), 9(f), 9(g), 9(h), 9(i).**

Tennessee Valley Association (Doc. #17470)

9.12 The Agencies are proposing to establish the framework for a determination of significant nexus by documenting the scientific studies and evidence that concludes "which functions are provided by the waters and why their effects on a traditional navigable water, interstate water, or the territorial seas are significant, including that they are more than speculative or insubstantial." The draft companion report developed by the USEPA

[3] U.S. Environmental Protection Agency, *Connectivity of Streams and Wetlands to Downstream Waters: A Review and Synthesis of the Scientific Evidence*, Draft (Sept 13), available at http://yosemite.epa.gov/sab/sabproduct.nsf/fedrgstr_activites/7724357376745F48852579E60043E88C/$File/WOUSERD2_Sep2013.pdf

[4] See. e.g, Letter from Ashley Lyon McDonald (National Cattlemen's Beef Association) and Dustin Van Liew (Public Lands Council) to Ken Kopocis and Jo-Ellen Darcy re: Proposed "Waters of the US' Rulemaking at 3 (Oct. 28,2014) (Docket ID No. EPA·HQ-OW-201 I-o880) (noting that EPA' s decision to not make final "Connectivity Report" available for public comment " is inappropriate and prevents the public from being able to provide meaningful comments on the proposed rule"); and Letter from Board of Douglas County Commissioners to Hon. Gina McCarthy and Hon. Jo-Ellen Darcy re: Proposed "Waters of the U.S." Rulemaking at 3 (Oct. 14,2014) (Docket 10 No. EPA-HQ-QW-201 1-{)880) ("There are significant issues with the current draft Connectivity Report that requires the Agencies' attention before continuing with the rulemaking process.").

[5] See Morrison. 529 U.S. a1 615.

[6] Draft Connectivity Report at 6- 1.

[7] See A. L A. Schechter Poultry Corp. v. United States, 295 U.S. 495, 554 (Cardozo. J., concurring).

to present the science on connectivity, *Connectivity of Streams and Wetlands to Downstream Waters: A Review and Synthesis of the Scientific Evidence*, synthesizes more than 1,000 studies around connections among streams, wetlands, rivers and lakes. While the report is of scientific value, it is essentially an academic exercise which focuses on the capability of current state-of the-science to identify the existence of connections and does not serve as an adequate basis for providing clarity to the concept of "significant nexus". Ultimately, all water/water features are connected since eventually the science can be reduced down to the basic hydrological cycle. At the extreme, rainfall may runoff and flow downstream, percolate into the soil, or evaporate into the atmosphere - so there is an overarching connection for any water in the hydrosphere and a nexus essentially exists between all of the various watercourses and each of the resultant forms may be considered to be connected. Therefore, in our opinion, connectivity is a flawed premise on which to base this rulemaking. There is an ongoing need for measurable and definitive parameters or specifics to determine when the 'significant' threshold has been met; and as noted by EPA's Science Advisory Board (SAB), the public and regulated community need "ways to construct connectivity metrics" rather than a summary of the existing science. There is no mechanism in either the report or the Proposal for a quantification of the degree of connectivity which is a fundamental requirement for consistent implementation in the field. (p. 3-4)

Agency Response: **9(f), 9(g) and 9(h).**

Arizona Department of Water Resources (Doc. #14786)

9.13 ADWR would also like to comment on a conclusion found in the underlying report Connectivity of Streams and Wetlands to Downstream Waters : A Review and Synthesis of the Scientific Evidence (September 2013 External Review Draft) that states that tributaries and wetlands are often connected to a river or stream. While this may be true in many cases, it should be noted that there are areas within Arizona that have closed basins and dry washes that rarely, if ever, flow in a connected manner to a river or stream. (p. 2)

Agency Response: **The Final Science Report addresses endorheic or closed basin tributaries on pages 3-2 and B-49. The report cites statistics that endorheic basins represent approximately 2% of the North American continent and generate 0.15% of the continent's annual discharge. The report also notes that some endorheic streams drain into large perennial lakes such as Lake Tahoe in California and Nevada and the Great Salt Lake in Utah, which are Traditionally Navigable Waters. The Final Science Report recognized that not all tributaries have a channel connection to larger downstream waters, but those are the exception rather than the rule. As noted in 9(i), where streams drain into closed basins that lack a traditionally navigable water, interstate water or territorial sea, such streams would not meet the definition of tributaries.**

Arizona Game and Fish Department (Doc. #14789)

9.14 The draft *Connectivity* report describes in Section 4.8 a connection between the quantity of water delivered by a watershed from ephemeral and intermittent tributaries to WUS as defined in the Proposed Rule. The Department believes that water conservation or water

supply augmentation projects seeking to capture sheet flow and surface water run-off for augmentation of local water supplies might deprive downstream channels of their physical and hydrological connection to WUS. It is unclear as to how the Proposed Rule would affect local water quantity management practices, the exercise of which is reserved to the States. (p. 2)

Agency Response: As noted in 9(l), the Science Report does not use regulatory terms. Regarding how the rule would affect local water quantity management practices, see the preamble to the final rule, the TSD, and the General Comments Compendium (Topic 1).

Office of the Governor, State of Kansas (Doc. #14794)

9.15 The Smoky Hill River above Cedar Bluff Reservoir is an intermittent, classified stream identified in the Kansas Surface Water Register comprising numerous stream segments with varying designated uses.

U.S. Geological Survey has been measuring flow on the Smoky Hill River at Elkader since 1939 and 50 miles downstream near Arnold since 1950. Seasonal peaks in streamflow are seen on the river separated by extended periods of low or no flow. The flow patterns are typical of an intermittent stream in Kansas.

In August 2013, above average rains fell in Logan County (4.6"), near normal rains fell in Gove County (2.4") and below average precipitation fell in Trego County (1.25"). Flows on the Smoky Hill River at Elkader responded to rains falling the first 10 days of the month, particularly in Logan County. Less rain fell to the east in Gove and Trego counties. A second period of rainfall occurred between August 13-15, with more rain falling in eastern Gove and western Trego counties. That rainfall induced a rise in flow at the downstream Arnold station.

The first rain generated over 900 acre-feet of streamflow at Elkader during the first 12 days of August. Flows at Arnold only totaled 369 acre-feet during the same period. The second rain spurred 315 acre-feet of flow at Arnold from the 13th to the end of the month. Only 5 acre-feet of flow occurred at the upstream Elkader station during the same timeframe.

The flow patterns indicate the nature of flow along stream channels of western Kansas that see streamflow only a portion of the time. Flows from upstream are often induced vertically downward via percolation through the channel bed rather than moving in the downstream direction. The result is a losing stream. Conversely, flows seen at the downstream station, Arnold, may or may not be related to flow conditions seen upstream. More often, those flows are direct result of localized rainfall generating runoff to the Smoky Hill River. There is a degree of separation among the stream segments between the two USGS stations which contradicts the constant connectivity presupposed by the tributary provision of the Proposed Rule of the Federal agencies.

9.16 Meanwhile, the most significant water resource in the region, Cedar Bluff Reservoir seemed oblivious to flows in the major tributary leading to it in August of 2013. The relative change in pool elevation registered by the Bureau of Reclamation at the reservoir indicates the most inconsequential increase during the two flow periods. Otherwise, the pool consistently lost volume to the pervasive evapotranspiration forces

that limit the availability of surface water in western Kansas. The lack of response belies the notion of significant contribution to the lake from the upstream watershed during these runoff events. Again, flows are more than likely to be drawn downward into the underlying unconsolidated deposits of western Kansas streams than to move longitudinally and contribute flow and loads to downstream reaches.

Even this phenomenon is not constant along the Smoky Hill River. For example, rains at the end of June generated sufficient runoff at both USGS stations to create notable hydrographs and by the Fourth of July Cedar Bluff Reservoir had seen a jump in elevation of over 2.5 feet. There was still volumetric loss of flow in the downstream direction and the primary driver for the conditions was a heavy pattern of daily rain during the last weekend of June. Once rains ceased, the typical disjointed, upstream-downstream relationship in flow conveyance and loss returned to the Smoky Hill River.

These observations lend credence to the admonition of EPA's Scientific Advisory Board that stream connectivity is not a binary principle; there are varying degrees of significance to the levels of connectivity among streams, especially when surface water is limited and renders streamflow to an intermittent or ephemeral regime. (p. 12-15)

Agency Response: 9(g).

Florida Department of Environmental Protection (Doc. #15080)

9.17 The Department notes that the Connectivity Report, while establishing that there are often hydrologic connections between water features across a landscape, does not appear to expressly relate the strength of those connections in a way that clearly merges with Justice Kennedy's legal definition of "significant." The Department asks that the federal agencies clarify how their proposal considers the relative strength of individual connections on downstream water quality for purposes of applying Justice Kennedy's "significant nexus" test. (p. 3)

Agency Response: 9(d), 9(f), 9(g), and 9(h).

North Dakota Office of the Governor, et al. (Doc. #15365)

9.18 In proposing this rule, EPA and the Corps inappropriately rely on the connectivity report to establish a significant nexus on a local and situation scale. There are several problems with relying on the document this way, including:

• It lacks specific spatial points of reference to clearly move from state jurisdiction of waters of the state to a transitional point of water with federal jurisdiction;

• It does not outline a set of standards, chemical or biological, that determine at what level a connection becomes relevant;

• There are no clear means for evaluating the situational relevance of the document’s findings in a real world setting.

The connectivity report is a general literature review of a fundamental truism of hydrology and environmental science – that everything is connected to everything else. But in reference to real world application and significant nexus interpretation, it says nothing of the situational significance of any given water body or the circumstances

under which the proposed jurisdictional shift from State to federal jurisdiction is appropriate. The document demonstrates connection, but does so abstractly. It does little to quantify significance with respect to any specific hydrologic system or point of reference. In effect, the connectivity report is little more than an expansive, unpacked version of the federal jurisdictional justification cited in the findings of the failed Oberstar's Clean Water Restoration Act (CWRA).[8]

Contrary to EPA's claims, the connectivity report does not provide an appropriately scaled assessment of sufficient scale and depth that could be applied *a' priori* to local situations (i.e., the water quality significance of specific tributaries to their receiving bodies). The connectivity report also fails to consider the temporal and spatial variance effecting connectivity, which is a major factor within the wide climatic swings of the northern Great Plains and the natural hydro-chemical effects in the region. (p. 5-6)

Agency Response: 9(f), 9(g), and 9(h).

West Virginia Department of Environmental Protection (Doc. #15415)

9.19 EPA has compounded this problem by assigning the task of deciding what Justice Kennedy meant by his use of the legal term, "significant nexus," to its internal group of biologists and hydrologists who, in their "Connectivity of Streams and Wetlands to Downstream Waters: A Review and Synthesis of the Scientific Evidence Connectivity" report (hereafter, "Connectivity Report"), have broadened its application well beyond what a reading of Justice Kennedy's concurrence would ever support. Justice Kennedy used this term to establish a limitation on the federal government's overbroad assertion of CWA jurisdiction to avoid conflict with both the language of the CWA itself and the Constitution. Contrarily, EPA's internal academics, who authored the Connectivity Report, as well as the external academics, who reviewed this Report as members of EPA's Scientific Advisory Board ("SAB"), would, to borrow the language of the *Rapanos* plurality, "stretch[] the term [']waters of the United States[']beyond parody." 547 U.S., at 734.

Using the CWA's goal of restoring the chemical, physical, and biologic integrity of the nation's waters as a starting point for analyzing what a "significant nexus" may be, the EPA Connectivity Report stretches the concept of significant biologic and hydrologic connections beyond that which can be substantiated through established scientific principles and associated literature references. In terms of biologic connectivity, an ecosystem and its components are inherently connected. Such connections are

[8] The "Findings" of the Oberstar CWRA stated the following to justify the bill's definition of virtually all waters as waters of the United States (see Footnote 3 above for CWRA definition). "(4) Water is transported through interconnected hydrologic cycles, and the pollution, impairment, or destruction of any part of an aquatic system may affect the chemical, physical, and biological integrity of other parts of the aquatic system… (6)The regulation of discharges of pollutants into interstate and intrastate waters is an integral part of the comprehensive clean water regulatory program of the United States. (7)Small and intermittent streams, including ephemeral, and seasonal streams, and their start reaches comprise the majority of all stream and river miles in the conterminous United States. These waters reduce the introduction of pollutants to larger rivers and streams, affect the life cycles of aquatic organisms and wildlife, and impact the flow of higher order streams during floods." And other statements in Sec. Findings, of H.R. 2421, CWRA of 2007, at: http://www.govtrack.us/congress/bills/110/hr2421/text, accessed Oct. 2, 2014.

exemplified through biological interactions; however, the capacity for biological interactions to occur between ecosystem components does not verify functional connectedness (i.e., that the biological interactions are necessary for the persistence of the components), nor does it indicate that component habitats are similar enough to be considered as inextricably linked. In places that are far removed from traditional navigable waters, like upland areas, this inference -that potential to interact among biological components substantiates connectivity - is particularly flawed and, based upon this connectivity hypothesis, distinctions between any ecosystems, not merely "terrestrial" versus "aquatic," may be impossible to establish. Adding to potential confusion in drawing "bright lines" between such areas, for example, is the fact that, even in terrestrial ecosystems, water is an essential ingredient for life.[9] Furthermore, it is particularly disturbing that the proposed regulation's reliance on these assumptions to establish the significance of connectivity between ecosystem components (e.g., aquatic and terrestrial) very likely runs afoul of Justice Kennedy's perception of what is a "significant nexus" with traditional navigable waters as well as the *Rapanos* plurality's proscription against the federal government's "land is waters" approach of the past.

Among the several examples of biological relationships cited as evidence supporting the changes in the Connectivity Report, the concepts of adjacency, aggregation, and functional connectivity, in regard to their biological foundations, are fundamentally flawed. Longestablished biological principles have been confounded by tenuous references to facultative biological linkages that do not meet the scientific rigor necessary to verify significant connectivity (i.e., vitallsignificant dependence). The following comments highlight some of the deficiencies in the rationale used in the Connectivity Report as related to the biological aspects of adjacency, functional connectivity, and aggregation.

The inference that adjacent waters (or waters proximate to jurisdictional waters) are sufficient evidence, by some position or location, to indicate an inseparable functional (biological) relationship between the two is simply incorrect. Although adjacent waters may, in certain instances, be a functional component of jurisdictional waters, these adjacent waters may also be distinct, isolated, and lacking in clear nexus to the jurisdictional waters. Position, regardless of the terms used to define its boundaries, is an inappropriate measure to determine interdependency between waters or to infer a relationship between the systems (e.g., mesic terrestrial habitats and nearby jurisdictional waters). As boulders or rock bars in a streambed are not considered disjunct terrestrial units but are considered a part of the stream ecosystem, mesic terrestrial habitats adjacent to aquatic systems are, in fact, terrestrial and should not be regarded as aquatic simply due to their location. The concept of adjacency, as described in the Connectivity Report, fails to adequately consider the importance of physical connectivity as related to biological functions and, in exchange, describes potential relationships among proximate communities as clear evidence of their interdependence. Such examples are not demonstrative of significant biological relationships, but merely illustrate the capacity of biological communities to assimilate available resources. For example, in fluvial

[9] Indeed, NASA's efforts to locate other planets or bodies in the universe where the existence of extraterrestrial life may be possible has not focused on planets that are either too hot or too cold to support water in liquid form.

environs, waters adjacent to stream channels are often inhabited by biological communities that are quite different from communities found in the nearby jurisdictional waters. Occasionally, the distinct communities may interact (e.g., an amphibian's eggs, residing in a vernal pool, may be opportunistically depredated by stream fishes following a spate); however, sporadic interactions between the communities does not indicate that they are inseparable components of the same system or that they are essential to the long-term persistence of one another. In this case, the two distinct communities inhabiting adjacent waters are functionally independent and would most certainly persist if no such interactions were to occur. However, by their adjacent position and occasional interaction, it may be construed via the reasoning employed in the Connectivity Report that the two systems are inextricably linked, which is an incorrect conclusion. Such reasoning - that occasional interaction between biological communities indicates an essential or obligatory relationship - is widely utilized in the proposed regulation to inappropriately verity connectivity.

As stated, a major flaw in the Connectivity Report with respect to biological principles is the inference that the capacity to utilize a resource (e.g., assimilate the resource into biomass) indicates dependency on that resource and indicates that the habitat from which the resource originated is functionally connected or linked to the assimilating system. Consider a bird that dies and falls into a stream. The bird's flesh may be broken down by fully aquatic (gill-respiring) organisms and incorporated into the biomass of the aquatic life; however, the ability of the aquatic life to utilize this resource does not indicate dependence on the resource, nor does it demarcate the habitat from which the resource originated - in this case, the air or the branch upon which the bird perched - as being inextricably connected to the habitat of the biological community capable of using or assimilating the resource - the aquatic life. This example, though extraneous, is analogous to the reasoning employed in the Connectivity Report that attempts to describe biological connections as linkages mediated by organisms or organism parts. Evidencing strong biological linkages between communities based upon episodic resource utilization is an inappropriate method to determine functional connectivity.

Furthermore, a combination of the concepts of adjacency and capacity to utilize available resources also does not provide sufficient evidence to consider two environs as being significantly or inextricably connected. In a contrasting conclusion to an example cited in the Connectivity Report, consumption of micro invertebrates inhabiting inundated (adjacent) riparian areas by stream fishes in response to precipitation runoff does not indicate that either community's persistence is predicated upon the other's existence, nor does it support the rationale that both communities are similar enough to be considered a single unit. Again, this example and the others referenced in the Connectivity Report simply illustrate the capacity of biota from contrasting environs to interact and does not verify a reliance or essential-to-function connectivity among habitats.

In regard to the concept of aggregation or the collective role of smaller communities or systems to contribute essential functionality to larger aquatic systems, the contribution potential among these smaller systems has likely been misrepresented and has, therefore, led to erroneous conclusions. Most importantly, grouping multiple smaller systems does not alter the fundamental characteristics of those systems. For example, mesic terrestrial habitats and the facultative semi-aquatic communities colonizing them do not function as

aquatic systems when considered in combination or aggregate. Regardless of their prevalence, such systems and their contributing functions are finite and are limited to their fundamental nature. Aggregation of the springtail populations (Order *Collembola*) in certain mesic terrestrial areas of headwater basins, for example, does not change the potential biological contributions of the springtail populations (i.e., they can only function and be assimilated in the food web as springtails, regardless of abundance). Similarly, allochanthous detrital inputs from deciduous plants provide the basis of productivity in headwater streams; however, neither the leaves that are swept into stream channels nor the trees from which they originated indicate an aquatic environment. Without the trees, the same stream's productivity is supplied via autochanthous means and, in the absence of the stream channel, the trees would persist and provide leaf detritus to the terrestrial environment. These systems are adjacent, functionally capable of assimilating resources provided by the neighboring system, and may provide, in aggregate, a substantial quantity for resources for potential assimilation. However, no quantity of terrestrial or semi-aquatic organisms, or their parts, can be construed to function as aquatic communities or, therefore, establish a boundary of an aquatic system. (p. 3-6)

Agency Response: '9(b), 9(d), 9(e), 9(f), 9(g), 9(h), 9(i), 9(k), and 9(l). See also the Legal Compendium (Topic 10) and the TSD.

Ohio Department of Natural Resources, et al., State of Ohio (Doc. #15421)

9.20 The Science Advisory Board (SAB) in its review of the draft report titled "Connectivity of Streams and Wetlands to Downstream Waters: A Review and Synthesis of the Scientific Evidence (September 2013 External Review Draft)" states, "The SAB also recommends that the Report indicate that over sufficiently long time scales all aquatic habitats are connected to downstream waters through the transfer of water, chemicals or biota, though the magnitude and effects of these connections vary widely across wetlands." How this is reconciled with the definition of significant nexus that indicates that a connection "must be more than speculative or insubstantial" (FR, Page 22263)? (p. 18)

Agency Response: 9(d), the Legal Compendium (Topic 10) and the TSD.

State of Nevada Department of Conservation et al. (Doc. #16932)

9.21 In an attempt to resolve this situation, the Proposed Rule was accompanied by a connectivity report: a compilation of scientific studies which purported to show that all waters are connected physically, chemically or biologically, no matter how speculative or insubstantial the connection might be. EPA used the report to conclude that all water are connected, so every tributary has a significant connection and is therefore jurisdictional, regardless of size or frequency of flow.

Such a conclusion directly contradicts the Supreme Court's determinations and represents an inappropriate and unreasonable expansion of federal regulation to include insignificant streams and even dry channels which may not see water for years at a time. This overly simplistic position is unacceptable and illogical: insignificant streams cannot have significant impacts. (p. 3)

Agency Response: 9(d) and 9(i). See also the Legal Compendium (Topic 10) and the TSD.

State of Alaska (Doc. #19465)

9.22 In the Proposed Rule, EPA and the Corps based many conclusions on the 2013 draft Connectivity Report.[10] The agencies conclude that certain waters categorically have a connection (biological, chemical, or physical) to jurisdictional waters. Since the agencies erroneously view any connection as a significant connection, they conclude that such waters should therefore be jurisdictional. EPA and the Corps essentially view the Connectivity Report as a significant nexus analysis. However, at the time EPA relied upon the report, it was still undergoing peer review, and the report itself is in need of significant additional work and improvement to be relevant for Alaska.

Through testimony and written comments submitted to the SAB Peer Review Panel, the State pointed out the lack of Alaska-specific information and references about wetlands and aquatic conditions common to northern latitudes that are uncommon or entirely absent in the rest of the country (e.g., permafrost, tundra, muskegs, boreal forest spruce bogs, glaciers, massive snowfields). Additional conditions that make Alaska unique, but which are not discussed in the Connectivity Report, include complex and variable connections of groundwater in areas underlain by continuous and discontinuous permafrost, seasonal flooding at spring breakup prior to the growing season, braided outwash rivers, and cold, low-nutrient streams.[11] With 63% of the country's wetlands located in Alaska, the majority of which are associated with vast tracts of continuous or discontinuous permafrost, EPA and the Corps are remiss for not completing a rigorous review of scientific studies based on work in Alaska as part of the Connectivity Report. The State has provided examples of such studies in comments to the SAB's Peer Review Panel which are enclosed herein.

The Proposed Rule and draft Connectivity Report lack consideration of regional geomorphologic and hydrologic differences. There is a large difference between those states with a wetter climate than those with a drier climate. Tributaries and ephemeral streams will have a significant difference in appearance, seasonality, and level of input to downstream waters in a wetter climate than they would in a drier climate. Given Alaska's large geographic and climatic range, we have both situations within our borders (temperate rainforests in southeast Alaska with average annual precipitation rates of up to 153.3 inches (Ketchikan) and drier climates in the interior and northern portions of the State which receive annually less than 5 inches of "rainfall equivalent" precipitation (Barrow)) (Data from NOAA). There is also a significant difference in the impact of tributaries and ephemeral streams in a northern latitude climate. In Alaska, the majority of the waters (surface and subsurface) in nearly 2/3 of the state exist as a solid for the better part of each year. Only for the short summer season do they exhibit some of the traits and provide some of the functions normally attributed to waters and wetlands.

[10] Draft Connectivity of Streams and Wetlands to Downstream Waters: A Review and Synthesis of the Scientific Evidence, U.S. Environmental Protection Agency, Washington, D.C. 2013.

[11] For further information on these conditions, see the discussion below on "Alaska's Water and Wetlands Situation."

These attributes of northern latitude climates limit or foreclose connectivity and the potential to impact traditional navigable waters. The Proposed Rule does not consider in-state Alaska specific hydrologic regime variations, or even hydrological differences across other regions in the U.S. For example, all ephemeral and intermittent streams are classified as tributaries without regard to climate and based solely on the presence of a bed, bank, and ordinary high water mark. Due to regional differences, the State requests that EPA and the Corps continue dialogue with all the states in order to craft a Proposed Rule informed by regional differences that is beneficial for implementing the CWA programs administered by both state and federal agencies.

A rulemaking should account for regional differences, such as climate and hydrologic differences that may come into play during jurisdictional determinations. The federal agencies should consider and account for Alaska-specific differences in climate, hydrology and geography within the Proposed Rule. Given the vast differences in geography and climate among the regions, particularly for Alaska, broad national standards may not lead to reasonable assertions of federal jurisdiction. Also, in keeping with the Supreme Court's ruling in SWANCC,46 any rulemaking should include a provision that explicitly excludes isolated, intrastate, and non-navigable waters as non-jurisdictional. (p. 13-14)

Agency Response: **9(e), 9(f), 9(g), 9(h), 9(i) and 9(n). The SAB found the Science Report to be a "thorough and technically accurate review of the literature on the connectivity of streams and wetlands to downstream waters" (SAB, p. 1). The Science Report analyzed over 1,300 peer-reviewed publications and incorporated studies related to Alaskan systems (as well as other more northerly climates) in the review, including Ford and Bedford (1987), Roulet and Woo (1986), and Rovansek et al. (1996) – as referenced by the State of Alaska in their comments to the Science Report – as well as Bramblett et al. (2002), Gomi and Sidle (2003), Helfield and Naiman (2006), Rains (2011), and Callahan et al. (2015).[12]**

[12] Ford, J., B.L. Bedford. 1987. The Hydrology of Alaskan Wetlands, USA: A Review. Arctic and Alpine Research, 19:3.

Roulet, N.T., M. Woo. 1986. Hydrology of a Wetland in the Continuous Permafrost Region. Journal of Hydrology, 89:1-2.

Rovansek, J.R., L.D. Hinzman, D.L. Kane. 1996. Hydrology of a Tundra Wetland Complex on the Alaskan Arctic Coastal Plain, U.S.A. Arctic and Alpine Research, 28:3.

Bramblett, R. G., M. D. Bryant, B. E. Wright, and R. G. White. 2002. Seasonal use of small tributary and main-stem habitats by juvenile steelhead, coho salmon, and Dolly Varden in a southeastern Alaska drainage basin. Transactions of the American Fisheries Society 131:498-506.

Gomi, T., and R. C. Sidle. 2003. Bed load transport in managed steep-gradient headwater streams of southeastern Alaska. Water Resources Research 39:1336.

Helfield, J. M., and R. J. Naiman. 2006. Keystone interactions: Salmon and bear in riparian forests of Alaska. Ecosystems 9:167-180.

Rains, M. C. 2011. Water sources and hydrodynamics of closed-basin depressions, Cook Inlet region, Alaska. Wetlands 31:377-387.

Callahan, M. K., M. C. Rains, J. C. Bellino, C. M. Walker, S. J. Baird, D. F. Whigham, and R. S. King. 2015. Controls on temperature in salmonid-bearing headwater streams in two common hydrogeologic settings, Kenai Peninsula, Alaska. Journal of the American Water Resources Association: doi: 10.1111/jawr.12235.

Moffat County Board of Commissioners, Moffat County, Colorado (Doc. #7987)

9.23 As stated above, the mapping efforts of NCBA and PLC inundate the state of Colorado in new waters of the U.S. To the contrary, Appendix A "Supplemental Cost Analysis Information" shows Colorado with an additional 93 acres of wetlands and 307.4 additional linear feet of streams. The difference between independent analysis's and the published numbers in this report are so great that the EPA and Army Corps must address the inconsistency in a public document. Once again we suggest map identifying the waters of the U.S. so inconsistency does not perpetuate. Once there is clarity on the issue of what streams and tributaries will be considered waters of the U.S. Moffat County requests a chance to comment as to the economic analysis of the impacts of such changes. (p. 3)

Agency Response: 9(o). The agencies welcomed public comment on the economic analysis during the public comment period, which ended on November 14, 2014. See also Economic Analysis Compendium (Topic 11).

Beaver County Commission (Doc. #9667)

9.24 The Agencies' bid to expand their scope of jurisdiction over the nation's waters and the need to control land use activities across most of the nation is clearly evident in the fact that the EPA has taken it upon themselves to commission the development of a "Water Body Connectivity Report" and to further go to the trouble of setting up their own EPA Science Advisory Board (SAB) review of the report. It is hard to believe the outcome of this self-serving process would lead to anything but a finding that all waters are connected in one way or another, and to conclude that the Agencies must be granted jurisdiction for permitting just about every land use activity in the nation. (p. 6)

Agency Response: 9(c), 9(f), and 9(g).

Board of Supervisors, Imperial County (Doc. #10259)

9.25 Many of the newly proposed definitions are based on the findings included in the Agencies' connectivity report (CR). Incidentally, the conclusions in the CR seem to support findings of a "significant connection" in scenarios whereby connections are, at most, ephemeral. Imperial County is concerned that the CR will be used as a basis for a broad expansion of CWA authority. (p. 2)

Agency Response: 9(f), 9(g), and 9(h).

Florida Department of Agriculture and Consumer Services (Doc. #10260)

9.26 Conclusion 1 (p. 6-1) states that the literature demonstrates that streams exert a strong influence on the character and functioning of downstream waters and that all tributary streams, including perennial, intermittent, and ephemeral streams are physically, chemically, and biologically connected to downstream rivers." While we might agree with these statements, the same literature also demonstrates that the nature and degree of that influence depends on numerous complex factors, and the extent is not always quantifiable. For instance, as noted on p. 6-2 "Climate, watershed topography, soil and aquifer permeability, the number and types of contributing waters, their spatial distribution in the watershed, interactions among aquatic organisms, and human

alterations or watershed features can act individually or in concert to influence stream and wetland connectivity to, and effects on, downstream waters." From a regulatory perspective, this suggests that "one size fits all" criteria would not be appropriate, and we urge the EPA to allow states the flexibility to adopt criteria appropriate to their specific circumstances. (p. 59)

Agency Response: 9(h) and 9(i)

9.27 Conclusion 2 (p 6-2) states that wetlands with bidirectional hydrologic exchanges are also physically, chemically, and biologically connected with rivers, and that they serve an important role in the integrity of downstream waters. As for the conclusion on streams, this is also supported by the literature; however, based on the summarized literature, the caveats noted in comment 1 above regarding the nature and extent of the influence also apply here. As for streams, the use of the generic phrase "all wetlands similarly situated across a watershed" in the definition of WOTUS does not reflect the inherent heterogeneity that exists across the Nation. We urge EPA to work with states and stakeholders to develop programs with the flexibility necessary to accomplish its goals. (p. 59)

Agency Response: 9(g), 9(i), and 9(k).

9.28 Conclusion 3 (pp. 6-1 and 6-2) states that, based on the literature reviewed, for wetlands with unidirectional flow that are not connected to the river network through surface or shallow subsurface water, the type and degree of connection varies geographically and temporally, and it is difficult to generalize about their effect on downstream waters. This suggests that any assertions regarding the jurisdictional nature of such wetlands, and any associated criteria, will need to be developed on a case-by-case basis, with the appropriate site-specific information necessary to make such a determination. (p. 59-60)

Agency Response: 9(i)

9.29 Discussion in Section 6.2 and throughout the individual chapters notes the need to evaluate waters from a watershed perspective. The section further notes that case-by case analysis is technically challenging, and suggests some developing tools (e.g., high resolution data sets, improved technologies for watershed-scale analysis, methods for classifying landscape units by hydrologic behavior) will help improve our abilities. We urge EPA to work with states to help develop such tools. As a national leader in protecting water resources, it is Florida's practice to implement protection and restoration measures through a watershed approach, namely our Total Maximum Daily Load program and related Basin Management Action Plans, using the Nation's most comprehensive water quality standards and largest set of monitoring data, and sophisticated assessment methods. Any additional tools that EPA could provide to support our efforts would be greatly appreciated. (p. 60)

Agency Response: 9(h) and 9(i).

9.30 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. The functions and effects of this diverse group of wetlands, which they refer to as "unidirectional wetlands," affect the condition of downstream waters if there is a surface

or shallow subsurface water connection to the river network. However, this conclusion is qualified – the literature 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. Evaluations of individual wetlands or groups of wetlands could be possible by a case-by-case analysis. Further, other unidirectional water bodies (e.g., ponds and lakes that lack surface water inlets) may provide the same functions and similarly benefit downstream water quality and integrity. (p. 77)

Agency Response: 9(g) and 9(i).

9.31 It is abundantly clear, based on the foregoing, where the agencies have divined inspiration for the scope and terminology of the Proposed Rule. However, a scientific basis for the rule only goes so far in providing a justification for the scope of jurisdiction under the CWA. The science seems to indicate that all water will be inevitably connected and physically mixed through subsurface connection, groundwater connection, and even through the processes of evaporation, condensation, and precipitation. The agencies have extrapolated that, by virtue of that inevitable connection, the CWA authorizes regulation of all water so that every molecule of water is prevented from coming in contact with pollutants that may degrade its biological, chemical, and physical integrity, and that will then ultimately degrade other waters. (p. 77)

Agency Response: 9(d), 9(f), 9(g), 9(h) and 9(i).

Mesa County, Colorado Board of County Commissioners (Doc. #12713)

9.32 The Connectivity Report fails to establish what connections are sufficient to be considered a "significant nexus," and thus fails to provide a scientific basis for any rule defining federal jurisdiction. The report only identifies connections, without considering the significance of the connections. Mesa County requests that the Agencies revise the Connectivity Report based upon comments and concerns raised by stakeholders, finalize the report; revise the Proposed Rule pursuant to the findings and recommendations in the report; and reissue the Proposed Rule for public comment. (p. 2)

Agency Response: 9(f), 9(g), 9(h), and 9(i).

Brown County (Doc. #13603)

9.33 The scientific basis for including all tributaries was based a report examining the connectivity of streams and wetlands. The study is faulty in the following areas.

1. There is no common definition of tributary in the report, so there is no reason to believe that in the report, or in the referenced studies, that they used the definition of tributary that is included in the draft regulations.

2. The reports and studies incorrectly treated a tributary as a single unit rather than a linear system.

3. There was no study quoted that attempted to address where in the tributary water quality was predominantly based on overland flow into the channel, which would be an indicator of where physical, biological, and chemical processes in the channel would no longer have a significant nexus to water quality downstream.

4. There was no study that showed where along a tributary that items controlled by regulations pertaining to waters of the US have a significant nexus to downstream water quality.

5. The study should have included in the analysis the protections to water provided by other federal and state regulations such as oil and hazardous material spills, erosion and sediment control on construction projects, and adoption of best management practices for municipal storm water systems.

While it is partially correct that science has shown that all tributaries affect waters downstream, the study did not find where along the tributary there is a significant nexus to downstream water quality. At some point along an ephemeral tributary discharge is basically overland flow collected by the tributary, while regulation of work in the channel might have a minor impact on water quality the predominant factor is the unregulated overland flow. (p. 3)

Agency Response: 9(f), 9(g), 9(h), 9(i), 9(l), and 9(n). In the Science Report, Chapter 2 provides a characterization of river networks, which include many types of tributaries, from low-order headwater streams to mainstem rivers. The report references many studies that describe functions of different types of tributary streams that occur in different parts of the watershed and along different parts of the linear length of a river system. The purpose of the Science Report was to summarize current scientific understanding about the connectivity and mechanisms by which streams and wetlands, singly or in aggregate, affect the physical, chemical, and biological integrity of downstream waters (p. 1-1). Because the report is a technical review of peer-reviewed scientific literature, it does not consider or set forth legal standards for CWA jurisdiction. Rather, the report evaluates, summarizes, and synthesizes the available peer-reviewed scientific literature to address questions that were developed in collaboration with EPA's Office of Water to translate regulatory questions and terminology into more scientifically relevant questions and terms. The Science Report describes five key functions (source, sink, refuge, lag, and transformation) by which tributaries are connected to and affect the integrity of downstream waters. The presence of bed and bank features is evidence of surface connectivity through recurrent flow and at minimum also reflects there is transport of materials (i.e., water, sediment, dissolved constituents) to downstream waters whether the water enters the channel from overland flow, ground water exchange, or any combination. The Science Report also summarizes scientific literature that documents the downstream transport, storage, and transformation of materials (e.g., water, organic matter, contaminants, and pathogens) from ephemeral streams.

Maricopa County Board of Supervisors (Doc. #14132.1)

9.34 Based on the review by the EPA's Scientific Advisory Board (SAB), regarding the new Proposed Rules, artificial wetlands seem to have an important role in promoting biological and ecological connectivity. At the same time, however, the SAB recognizes that these features do not always provide the same ecosystem functions as natural wetlands. Subsequently, the Maricopa County recognizes and applauds the SAB's efforts in attempting to distinguish among the various natural and urban landscapes and

encourages EPA to have further discussion and review on this matter. With an increase in vegetation growth in the outlet areas, maintenance could become cost prohibitive and potentially overlaid with a myriad of mitigation restrictions which could delay or terminate activities. Without frequent maintenance, the integrity and basic function of these structures is compromised and design capacity compromised. Subsequently, the significance of artificial wetlands needs to be reviewed further by the SAB or on a case by case basis, especially in engineered channels and drains where much of the vegetation is being created by man-made drainage from residential and agricultural runoff and is limited in its extent and effect in terms of ecological and biological connectivity to downstream "waters". (p. 4)

Agency Response: 9(m). Also, with regard specifically to the comment on artificial wetlands, the final Science Report notes that detention ponds and green infrastructure are designed to slow stormwater runoff into urban streams, thereby increasing retention and processing of water, nutrients, sediment, and contaminants. Ultimately, the slowing of stormwater runoff can re-establish lateral and longitudinal connections as retention and transformation pathways, rather than the primary export pathway these connections traditionally served in urban river networks (Report Section 3.2, Box 3-1).

County of Mendocino Board of Supervisors (Doc. #14309)

9.35 There is concern that the findings from the Science Advisory Board which are compiled in the document, "Connectivity of Streams and Wetlands to Downstream Waters: A Review and Synthesis of the Scientific Evidence" (EPN600R~ll/098B, 2013), which is being utilized to inform the Proposed Rule is not available to the public in final form. (p. 4)

Agency Response: 9(a)

Cochise County Board of Supervisors (Doc. #14541)

9.36 One of the key failings in the connectivity study is a scientific presumption of connectivity for both "tributaries" and "other waters". With this presumption, the responsibility appears to fall to the US citizen to scientifically prove a negative, which is, of course, impossible.

It is important for both the study and the Proposed Rule to acknowledge that connectivity falls along a continuum from non-connectivity to full connectivity and also to acknowledge that it is the responsibility of the government to fully define when a "significant nexus" occurs along that spectrum. Unfortunately, the agencies fail to identify the point on the continuum from non-connectivity to full connectivity at which a significant nexus would occur and instead the determination is left to the judgment of the agencies. (p. 1)

Agency Response: 9(g) and 9(h)

Jefferson Parish, Louisiana (Doc. #14574.1)

9.37 Even EPA's own Science Advisory Board's Review of the EPA Water Body Connectivity Report (2014), criticized the draft Report's terminology and its theory of connectivity as

"binary" (go versus no go), and recommended a gradient in connectivity (low to high). The Science Advisory Board also emphasized "strong" biological connections beyond hydrological connections (pages 58- 59). However, the Science Advisory Board criteria also conflicts with a test of Commerce Clause jurisdiction over local activity which substantially impacts interstate commerce. Such connection is clearest only for wetlands bordering truly navigable waters. Other scientific "connections" are too attenuated to meet the substantial impact test. Further, these other scientific connections are speculative for permit writers to meet and too expensive for permit applicants to address in terms of physics, hydrology, chemical and biological flow paths. Gradations, other than substantial or high, will wreak havoc on Clean Water Act programs. (p. 4)

Agency Response: 9(d), 9(f), 9(g), 9(h), and 9(i). See also Legal Compendium (Topic 10) and TSD.

Riverside County Flood Control and Water Conservation District (Doc. #14581)

9.38 The Proposed Rule is largely informed by EPA's Office of Research and Development's *Connectivity of Streams and Wetlands to Downstream Waters: A Review and Synthesis of the Scientific Evidence*. The District believes reliance on the Connectivity Report would bring about an unwarranted expansion of Waters in the arid deserts of southeastern California.

For example, the Connectivity Report examined the Upper San Pedro River basin in Arizona as a case study of intermittent and ephemeral streams in the Southwest. Rainfall in the Upper San Pedro basin, however, ranges from 12-30 inches per year. By contrast, while flows in the southeastern California desert are also ephemeral, the average annual rainfall is *much* less--- Blythe averages 4 inches per year, Indio just 3 inches. The big difference in rainfall suggests that the connectivity case study would not be applicable to the southeastern California desert. We believe that further study of connectivity in such extremely arid desert areas in California and other parts of the Southwest should be performed and that the final rule language should reflect such study. (p. 2)

Agency Response: 9(i)

9.39 Another concern is that the Connectivity Report concludes that all tributaries, including perennial, intermittent and ephemeral streams, are connected to downstream rivers via channels and associated alluvial deposits. Alluvial deposits, as shown in the exhibit taken from Page 3-6 of the Connectivity Report, should not establish CWA connectivity because underground water is not regulated by the CWA. (p. 4)

Agency Response: 9(j), the Legal Compendium (Topic 10) and the TSD.

San Bernadino County, California (Doc. #16489)

9.40 The Proposed Rule assumes that all tributaries in watersheds with navigable receiving waters have a "significant-nexus" to those receiving waters. This conclusion uses a very generalized study which fails to adequately address unique climatic and hydrogeomorphic conditions in the arid Southwest United States (Southwest), or in watersheds historically altered for flood control purposes. The scientific document cited as support for the "significant nexus" determination of tributaries is inadequate because it fails to appropriately address regional hydro-geomorphology. Specifically, the cited

document ignores existing USACE/EPA regional guidance particularly concerning the arid Southwest. The document also does not adequately address watersheds historically altered for flood control purposes. As such, DPW asserts that the Proposed Rule is an improper application of Justice Kennedy's, "significant Nexus" test from his concurring opinion in Rapanos. (p. 4)

Agency Response: 9(i) and 9(m)

Navajo County Board of Supervisors, Arizona (Doc. #19569)

9.41 One of the report's major conclusions states that all streams, regardless of size and flow, are connected. Specifically, the report states that streams, whether "individually or cumulatively, exert a strong influence on … downstream waters. All tributary streams, including perennial, intermittent, and ephemeral streams are physically, chemically, and biologically connected" to downstream waters and thus, impact water quality (1-3, 1-6, 6-1).

This conclusion is supported by both the Science Advisory Board (SAB) Panel for the Review of the EPA Water Body Connectivity report: "Nearly all Panel members agreed that even though connectivity occurs along a gradient, there is nonetheless strong scientific evidence that tributaries, as a group, have strong influence on the physical, chemical, and biological integrity of downstream waters, and therefore the available science supports making all tributaries jurisdictional under the Clean Water Act" (p. 2); and the Chartered Science Advisory Board (SAB) 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" (p. 2).

It is therefore likely that federal agencies may attempt to use the Report to provide the scientific basis to argue that all streams should be considered jurisdictional no matter the size or flow rate; and that EPA may use the connectivity report to propose new regulations with the Corps to interpret the scope of the CWA.

However, both boards noted, and the Chartered Science Advisory Board warned in its Review of the Draft EPA Report *Connectivity of Streams and Wetlands to Downstream Waters: A Review and Synthesis of the Scientific Evidence* that "the Report often refers to connectivity as though it is a binary property (connected versus not connected) rather than as a gradient," and it recommended that "the interpretation of connectivity be revised to reflect a gradient approach that recognizes variation in the frequency, duration, magnitude, predictability, and consequences of those connections" (p. 2).

Navajo County is concerned that the Report could allow federal agencies to assert jurisdiction in a blanket fashion over ephemeral and intermittent streams, based on a low connection gradient, rather than require federal agencies to identify a significant nexus for each non-navigable tributary with downstream navigable waters, per the significant nexus test established by the 2006 U.S. Supreme Court ruling in Rapanos v. United States, 547 U.S. 715, 62 ERC 1481 (2006).

Wetlands Definition

Concern Cowardin et al. (1979) define wetland according to three criteria:

1) is inundated or saturated at a frequency sufficient to support, at least periodically, plants adapted to a wet environment;

2) contains un-drained hydric soil; or

3) contains non-soil saturated by shallow water for part of the growing season.

The Energy and Water Development Appropriations Act of 1993 mandates that federal agencies use the Corps' Wetlands Delineation Manual (Jan. 1987) definition that generally requires that all three of Cowardin's criteria be present (Par. 26(c)).

The report, however, defines "wetland" as an "area that generally exhibits at least one of the following three attributes" (A22). There is no legitimate reason to use a less rigorous standard than the one outlined in the Corps' Wetlands Delineation Manual. There is even less reason for the report to discard any wetlands distinction when discussing riparian areas and floodplains (5-3 to 5-5).

Navajo County, therefore, respectfully recommends that the definition of wetlands in the report be made consistent with existing law, and that the report wetlands analysis be reevaluated in light of this change.

Wetlands Classification Concern

The report divides wetlands into classes of "riparian," "flood plain," "geographically isolated," "bidirectional," and "unidirectional." However, none of these technical categories easily maps to the existing legal categories of "adjacent" and "non-adjacent" or "isolated" wetlands.

In United States v. Riverside Bayview Homes, Inc., 474 U.S .12 1 (1985), the Supreme Court upheld part of the agencies' "adjacent wetlands" jurisdiction based on the "reasonableness" of the purported ecological connection between navigable waters and their adjacent wetlands. The Riverside Bayview's analysis was based on a scenario where wetlands physically abut water, i.e., one cannot distinguish the end of land from the beginning of water (Rapanos, plurality opinion, 547 U.S. at 74 1-42). The report appears to presume that wetlands within a river's floodplain could have such a degree of connectedness. But it does not follow, as the report also appears to suppose, that such flood plain wetlands necessarily have such connectedness, hence the failure of the report to map to existing legal categories.

Navajo County, therefore, respectfully recommends that the report explain how its technical wetland vocabulary maps to existing legal terminology.

Isolated Wetlands Concern

The report's depiction of "isolated" wetlands (1-2, 3-39) seems to infer that the agencies seek to change the meaning of "isolated" wetlands. This inference is further supported by the report's apparent claim that few if any wetlands are truly "isolated" due to geographically isolated wetlands purportedly still affecting downstream waters through hydrologic, chemical, or biological connectivity (1-14).

Indeed, the report strongly implies that "isolated wetlands" do not exist:

- "Even hydrologically isolated wetlands can influence downstream rivers by preventing water and other materials from entering the river network" (5-2);
- "Even unidirectional wetlands that are considered to be geographically isolated (i.e. completely surrounded by uplands), can have surface water outflows that connect them to other water bodies" (5-22);
- "Thus, the tern 'geographically isolated' should not be used to infer lack of hydrologic, chemical, or biological connectivity" (5-36).

Whether correct or not, this assertion has little if any relevance to new rule-making. Even the "isolated" waters in Solid Waste Agency of Northern Cook County v. US. Army Corps of Engineers, 53 1 U.S. 159 (2001) (SWANCC), were not truly isolated, in that they had an ecological connection via migratory birds to other aquatic systems. Rather, by "isolated," SWANCC meant "not adjacent," that is, not physically abutting.

The existing law stands for the proposition that non-adjacent waters fall outside of the Clean Water Act jurisdiction, regardless of the on-the-ground degree of connection they may have to other waters. Hence, the report's discussion of isolation could lead to a pernicious misunderstanding of existing law.

This concern is validated by both the Chartered Science Advisory Board and the Science Advisory Board (SAB) Panel for the Review of the EPA Water Body Connectivity Report emphasizing that "First and foremost, the panel members agreed that any definition or determination of adjacency should be based on functional relationships, not distance" (Science Advisory Board Panel, p. 3).

Navajo County, therefore, respectfully recommends that the report be revised to eliminate discussion of the relative rarity of "isolated" wetlands, and instead focus the connectivity discussion in terms of the relative degree of interconnectedness among the various classes of wetlands.

Groundwater Concern

The report repeatedly notes the importance of groundwater interactions among wetlands, streams, and large waters (5-2, 5-23 to 5-25, 5-41) and seems to infer that the agencies seek to regulate groundwater as such, which would be a significant change from existing law.

This concern is validated by both the Chartered Science Advisory Board and the Science Advisory Board (SAB) Panel for the Review of the EPA Water Body Connectivity Report emphasizing that "the science indicates that regional groundwater sources can strongly affect connectivity" (Science Advisory Board Panel, p. 3).

However, Village of Oconomowoc Lake v. Dayton Hudson Corp., 24 F.3d 962,964-66 (7th Cir. 1994) held that the Clean Water Act does not regulate discharges to groundwater. Hence, the report's discussion of groundwater could lead to a pernicious misunderstanding of existing law.

Navajo County, therefore, respectfully recommends that the report's discussion of groundwater be eliminated.

Cumulative Effects

The report repeatedly asserts that every wetland or stream considered singly or in the aggregate, substantially affects the physical, chemical, and biological integrity of downstream waters:

- "Streams, individually or cumulatively, exert a strong influence on the character and functioning of downstream waters" (1-6);
- "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" (1-14);
- "Our review supports the need for a landscape perspective of connectivity in which the effects of small water bodies in a watershed are evaluated in aggregate" (6-3);
- "Small streams [such as] first-order streams contribute approximately 60% of the total mean annual flow to all northeastern U.S. streams and rivers" (4-1);
- "First-order streams conservatively make up half of the nation's total stream length" (4-2);
- "When drainage area and stream length of headwater streams are combined … they can represent most of the river catchment and network" (4-2).

It stands to common sense that every surface-water input to an aquatic system is significant in the aggregate. Justice Kennedy's Rapanos concurrence nevertheless strongly implies that, even with new rule-making, the Clean Water Act could only encompass regulation of certain classes of "major tributaries," or "specific tributaries;" not every tributary (547 U.S. at 780-81).

Justice Kennedy was aware as well that "isolation" is a matter of degree (782), yet nevertheless concluded that certain classes of wetlands and other features must be held to be legally "isolated" notwithstanding a minor connection: "Under the analysis described earlier … mere hydrologic connection should not suffice in all cases; the connection may be too insubstantial for the hydrologic linkage to establish the required nexus with navigable waters as traditionally understood" (784-85).

The report, however, seems to ignore this important built-in limitation of the Clean Water Act scope. The report states: "Although an individual low-order stream can have less connectivity than a high-order stream, a river network has many more low-order streams, which can represent a large portion of the watershed … thus, the magnitude of the cumulative effect of these low-order streams can be significant" (3-41). This statement contradicts Justice Kennedy's point that the agencies' existing regulations are infirm precisely because they cover such low-order streams carrying only "low volumes of water." Although

> Justice Kennedy's concurrence does anticipate the aggregation of wetlands (Rapanos, 547 U.S. at 780) it does not for tributaries (780-81).
>
> Navajo County, therefore, respectfully recommends that the report's discussion of cumulative effects be limited to wetlands, and that the report's discussion of tributaries be refocused on identifying characteristics of "major tributaries" based on their volume of flow, proximity to navigable waters, or other relevant considerations. (p. 6-9)

Agency Response: **9(d), 9(f), 9(g), 9(h), 9(j), 9(k), and 9(l). The purpose of the Science Report was to summarize current scientific understanding about the connectivity and mechanisms by which streams and wetlands, singly or in aggregate, affect the physical, chemical, and biological integrity of downstream waters (p. 1-1). Because the report is a technical review of peer-reviewed scientific literature, it does not consider or set forth legal standards for CWA jurisdiction. Rather, the report evaluates, summarizes, and synthesizes the available peer-reviewed scientific literature to address questions that were developed in collaboration with EPA's Office of Water to translate regulatory questions and terminology into more scientifically relevant questions and terms. Given that it is a science document, it is appropriate and necessary that terminology used throughout the Report be based on scientific definitions. Cowardin et al. (1979) is one of the standard definitions of wetlands that is used throughout the scientific literature.**

Butte County Administration, County of Butte, California (Doc. #19593)

9.42 The EPA's Science Advisory Board (SAB) noted in their advice and comments on the Proposed Rule in a letter to EPA dated September 30, 2014 that the CWA excludes groundwater, including groundwater drained through subsurface drainage systems, from federal regulation. The SAB states that, while the CWA excludes groundwater from regulation, a point of law that is reiterated in the Proposed Rule as well as in the current regulation, there is no scientific justification to support such exclusion. The SAB goes on to state that "the available science shows that groundwater connections, particularly via shallow flow paths in unconfined aquifers, can be critical in supporting the hydrology and biogeochemical functions of wetlands and other waters."[13]

> While the SAB may conclude that the "available science" may prove that groundwater is connected to traditional navigable waters in some circumstances, it is also clear that Congress intended that the CWA not address nor regulate groundwater even if connected to navigable waters that are regulated under the CWA. As we point out in our issues with the new definition of "adjacent" (see below), subsurface groundwater connections are not subject to CWA jurisdiction and are clearly excluded from regulation under the Act. The Proposed Rule should be consistent with this statutory limitation of the CWA on federal regulation of groundwater. (p. 4)

Agency Response: **9(d) and 9(j). See also the TSD, especially sections VIII and IX.**

[13] [EPA-SAB-14-007] Science Advisory Board letter to EPA Administrator Gina McCarthy dated September 30, 2014 re: 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"

California State Association of Counties (Doc. #9692)

9.43 While CSAC admires the agencies' comprehensive scientific study, the conclusions could be problematic due to the broad implications on the agencies' jurisdictional reach. The following excerpts from the main conclusions of the CR are addressed in turn:

"The scientific literature demonstrates that streams, individually and cumulatively, exert a strong influence on the character and functioning of downstream waters. All tributary streams, including perennial, intermittent, and ephemeral streams, are chemically, physically, and biologically connected to downstream rivers via channels and associated alluvial deposits where water and other materials are concentrated, mixed, transformed, and transported."

This finding suggests that all tributary streams, regardless of how frequent the stream is, are categorically connected to downstream rivers in every scenario. The CR also seems to purport the connection is not only real and appreciable, but always "significant."

"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 chemically, physically, and biologically connected with rivers via the export of channel-forming sediment and woody debris, temporary storage of local groundwater that supports baseflow in rivers, and transport of stored organic matter."

In the same vein as the above comment, this CR conclusion is very broad and could be used to assert jurisdiction wherever the agencies find any "bidirectional hydrologic exchange," even if such a connection is not significant. (p. 5)

Agency Response: 9(f), 9(g), 9(h), and 9(i).

9.44 Definitions implicated by CR findings:

- Neighboring: "…or waters with a shallow subsurface hydrologic connection or confined surface hydrologic connection to such a jurisdictional water."
- Riparian area: "…influence the exchange of energy and materials between those ecosystems." This factor gives potentially unlimited scope for the inclusion into WOUS jurisdiction, given the connectivity findings. While the riparian area may not be jurisdictional in and of itself, it can be used to link a WOUS to an isolated water, making the isolated water jurisdictional.
- Significant Nexus: "…significantly affects the chemical, physical, or biological integrity of a water identified in paragraphs (a) (1) through (3)…" The passage goes on to state that in order for an effect to be significant, it must be more than speculative or insubstantial. The wording from the connectivity report saying there is a "strong influence on the character and functioning of downstream waters" makes it seem as through the "significant" effect is not a high bar to attain. Many waters could become jurisdictional given the broadness of the connectivity report. (p. 5-6)

Agency Response: 9(f), 9(g), 9(h), and 9(l).

National Association of Conservation Districts (Doc. #12349)

9.45 It is NACD's policy to oppose any measure that expands jurisdiction of the CWA. Therefore, if EPA and USACE proceed with the Proposed Rule, we request that it be confined to current jurisdictional boundaries. As we stated in our earlier comments related to the Connectivity Report, we do not recommend that the report serve as the sole basis in future rulemaking to expand the jurisdiction of the CWA beyond the Supreme Court decisions, especially in the realm of defining significant nexus. Otherwise, nearly every body of water in the country could be subjected to the full force of federal CWA. (p. 2)

Agency Response: 9(d), 9(f), 9(g), 9(h), 9(i), and 9(l).

Colorado Stormwater Council (Doc. #12981)

9.46 There are significant issues with the current draft Connectivity Report that requires the Agencies' attention before continuing with the rulemaking process.

• First, the Connectivity Report does not evaluate connectivity in a regulatory context, i.e., what connections are sufficient to be considered a "significant nexus." The Connectivity Report fails to establish any scientific basis for determining the existence of a "significant nexus," and thus fails to provide a scientific basis for any rule defining federal jurisdiction. Instead, the report identifies only the presence of connections, without considering the significance of those connections.

• Second, the Connectivity Report does not address how the Agencies plan to conduct case-by-case reviews for determining jurisdiction of water bodies located outside floodplains.

• Finally, the Connectivity Report ignores the law-that the Supreme Court has rejected that the idea that a "significant nexus" is established by any hydrological connection. The report does not identify how the existing connectivity literature will guide the Agencies in determining and justifying the idea of a "significant nexus" and therefore the expansion of the scope of their jurisdiction under the CWA. According to law established by recent decisions by the Supreme Court, the CWA regulates navigable water and certain other waters with a "significant nexus" to navigable waters. All other water must be left to the states to regulate. (p. 6)

Agency Response: 9(d), 9(f), 9(g), 9(h), 9(i), and 9(l). See also Legal Compendium (Topic 10) and TSD.

County Commissioners Association of Pennsylvania (Doc. #14579)

9.47 We also believe that the underlying science of the Proposed Rule has not been fully vetted by the agencies in collaboration with the public to allow the rule to move forward. A public comment period should be opened on the final Connectivity Report when the report is finalized with the SAB recommendations attached, with further public comment on the Proposed Rule after the Connectivity Report is finalized as well. (p. 11)

Agency Response: 9(a)

Western Urban Water Coalition (Doc. #15178)

9.48 We note that most of the studies used in the Draft Connectivity Report are based in the Midwest or the East Coast. There is very little discussion about the special conditions that characterize wetlands and ephemeral or intermittent streams in the arid Western United States.

On October 16, 2014, WUWC representatives met with EPA officials to discuss several of the issues of interest to WUWC regarding the Proposed Rule and the Draft Connectivity Report. In the meeting, EPA officials again made clear their reliance on the Draft Connectivity Report for the scientific information and conclusions needed to support the Proposed Rule's assumption that ephemeral and intermittent tributaries are jurisdictional by rule. This issue is very important to WUWC and on which we strongly disagree with the Proposed Rule. After much discussion with the EPA officials, WUWC agreed to provide more information as to why ephemeral and intermittent drainages in the arid West should not be considered jurisdictional by rule and how the Proposed Rule's assumption is not supported by the Draft Connectivity Report. WUWC has done additional work on this issue and now provides its own critique of the Proposed Rule and the Draft Connectivity Report in the attached comment paper prepared by ERO Resources Corporation for Perkins Coie, LLP, legal counsel to WUWC (Attachment 1). We request strong consideration of the attached study and its recommended changes for the Final Rule language that takes into account the special hydrogeological conditions that characterize the arid Western United States. In support of this Attachment, WUWC also submits a study prepared by SWCA Environmental Consultants dated November 12, 2014, critiquing the Draft Connectivity Report and analyzing past Corps' jurisdictional determinations in the arid West that found no significant nexus with TNWs (Attachment 2).

In the arid West, the question of jurisdiction under the CWA typically does not focus on larger, higher-order drainages. The issue of questionable jurisdiction resides with the commonly occurring smaller lower-order dry ephemeral and intermittent drainages. No specific research has been conducted in support of the Proposed Rule's assumption that ephemeral and intermittent tributaries in the arid West should be jurisdictional by rule. Only a few of the 1,016 references in the Draft Connectivity Report include research with any applicability to low order headwater streams in the arid West. Of these studies, none make any specific attempt to view headwaters in the context of their importance, let alone relative importance, to downstream surface waters. Information applicable to smaller lower-order dry ephemeral and intermittent drainages such as that found in Fluvial Processes in Dryland Rivers (Graff 1988) were not presented and discussed in the Draft Connectivity Report. The Graff reference, focused specifically on dryland drainages, demonstrates that the use of an ordinary high water mark (OHWM) to determine that an ephemeral or intermittent channel in the arid West is a "tributary" and therefore has a significant nexus to a TNW, is not supported by observation, studies or the literature. Inclusion of this information could have provided the basis for the Draft Connectivity Report to disclose the differences for such systems in the arid West. This, in turn, could have informed the Proposed Rule and led to a regional approach for addressing ephemeral and intermittent channels in the arid West. As demonstrated in the attached reports, there is no scientific information presented in the Draft Connectivity Report that

supports treating ephemeral and intermittent channels in the arid West as jurisdictional by rule. In fact, there are references (not included in the Draft Connectivity Report) that demonstrate the opposite. Ephemeral and intermittent channels in the arid West are so variable that a simple relationship between a morphologic variable such as an OHWM and significant nexus to a TNW is not reliable. (p. 4-5)

Agency Response: 9(f), 9(g), 9(h), 9(i), and 9(k). Also, thank you for providing the attachments for our consideration. With regard to the analysis of past Corps jurisdictional determinations, it is important to note that under the Rapanos Guidance, streams were evaluated individually for significant nexus. As noted in 9(k), the agencies recognize that the cumulative effects of waters are fundamentally important to understanding the connectivity of streams, wetlands, and open waters to downstream waters. As such, aggregation of these systems together is critical to be able to account for spatial and temporal variability of connectivity. As noted in 9(i), the Science Report was modified in response to SAB comments to include additional references for arid streams and to better describe how intermittent and ephemeral streams in arid environments have physical, chemical, and biological connections to downstream waters and how these connections vary with time (Report Sections 3.3, 3.4, 3.5 and B.5.). In response to the SAB's comments, the final Science Report included SAB-recommended scientific peer-reviewed references (including Graf 1988). Among the scientific references on low order streams in the arid West that were cited in the final Science Report were, in fact, other publications by Dr. William Graf (Graf et al. 1991, Graf 1994). These publications documented how metal and radionuclide contaminants bounded to sediments were transported from low order ephemeral stream channels long distances to downstream rivers.

9.49 Moreover, the Draft Connectivity Report does not necessarily correlate science with the legislative language, legislative intent, Supreme Court precedent or agency objectives under the CWA. To support the finding that all "tributaries," all "adjacent waters," and certain "other waters" have a "significant nexus" the Draft Connectivity Report evaluated scientific studies, many of which examined biological connections between bodies of water, or water retention, without examining impacts on the quality of navigable water. (p. 6)

Agency Response: 9(d), 9(f), 9(g), 9(h), and 9(i)

Western Urban Water Coalition (Doc. #15178.1)

9.50 In fact, a review of the literature cited in the connectivity report demonstrates that the few references of research applicable to the arid West suggest a non-linear, highly variable relationship. Only a few of the 1,016 references in the connectivity report include research with applicability to low order headwater streams in the arid West (SWCA 2014b). The studies that occur within or are applicable to the arid West tend to focus on aquifer recharge. The articles cited that are applicable to the arid West do not make any specific attempt to view headwaters in the context of their importance, let alone relative importance, to downstream surface waters. It was striking that the most categorically pertinent literature presented was on topics that do not have much applicability to determining the significance of small streams' downstream connectivity to larger

tributaries. Collectively, the number of applicable research to validate a significant connection between all small arid headwaters and navigable or interstate waters is strikingly low. The available data and literature simply does not definitively conclude that streams on the scale we are concerned with exert a strong, let alone measureable influence on downstream tributaries (SWCA 2014b).

In other words, no specific research has been conducted in support of the Proposed Rule's assumption that ephemeral and intermittent channels in the arid West should be jurisdictional by rule. References such as Fluvial Processes in Dryland Rivers (Graf 1988), discussed in Section 2.4.2, were not included and discussed in the connectivity report. Presentation of this information could have provided the basis for the connectivity report to disclose the differences for such systems in the arid West which could have informed the Proposed Rule and led to a regional approach for addressing ephemeral and intermittent channels in the arid West.

Failing to include such references in the connectivity report is compounded by the SAB ignoring comments on ephemeral headwater streams in the arid West from members of the SAB panel for the Review of the EPA Water Body Connectivity Report. Panel members Dr. Josselyn and Dr. Murphy provided comment that it was scientifically unsupported to claim that all headwater streams, particularly in the arid West, had a significant nexus with downstream waters (individual comments from members of the SAB Panel for the Review of the EPA Water Body Connectivity Report attached to the September 2, 2014 Memorandum from Dr. Amanda D. Rodewald, to Dr. David Allen regarding Comments to the chartered SAB on the Adequacy of the Scientific and Technical Basis of the Proposed Rule Titled "Definition of 'Waters of the United States' under the Clean Water Act").

Dr. Murphy added a statement he believed necessary to inform the SAB of the gradient of variability of ephemeral streams in the arid West. Dr. Murphy noted that this variability occurs in the magnitude, duration, frequency and predictability of flow in ephemeral streams and creates a strong gradient in the effects of headwater ephemeral streams on downstream jurisdictional waters. For this reason, Dr. Murphy commented that inclusion by rule of all ephemeral tributaries, regardless of size or flow duration, is not scientifically justified. (p. 20-21)

Agency Response: **9(e), 9(f), 9(g), 9(h), 9(i), and 9(k). Several of these studies, including Graf 1988, were added following recommendations from the SAB. The SAB found the literature reviewed in the report that describes connectivity of low order streams to be pertinent and the review to provide strong support for the conclusion that ephemeral, intermittent, and perennial streams are connected to and strongly influence downstream waters. With regard to the individual SAB comments, it is agency policy to ensure that scientific documents undergoing SAB review respond to all final SAB recommendations. Oral or written comments provided by individual panel members during the SAB peer review process leading up to the final consensus recommendations are taken under advisement but do not constitute official recommendations and thus there is no obligation to respond to those comments.**

Washington State Water Resources Association (Doc. #16543)

9.51 A significant concern of the NWRA is tied to the manner in which the agencies have attempted to support the rulemaking proposal with the findings of the Connectivity Report and the Science Advisory Board (SAB) review thereof. Though the NWRA agrees that the proposal needs a sound scientific basis, the agencies have evidently forgotten that the science component must be framed by the language of the Act itself, Congressional intent, and existing Supreme Court interpretations of the Act.

It readily appears from the content of the Connectivity Report and the SAB material produced to date that the technical experts are treating this as a purely science based inquiry without regard to any of the above constraints. In other words, the sole question in their minds is whether there exists any quantifiable connection between the different types of waters being examined and a TNW, be it a hydrologic connection, a chemical connection or a biological connection, so long as it is measureable. It makes no difference whether the nature of the connection is tenuous, whether the connection manifests itself over a hundred or even thousands of years, whether there is a recognizable return interval for the OHWM, whether the waters in question hold implications for interstate commerce, or whether the nexus is established through a migrating bird or a mobile lizard. Most telling, it makes no difference whether there will, or will not, be a demonstrated "water quality" impact, the very foundational premise for agency authority under the Act. Each of the Act's goals, as listed in section 101(a), references, in one way or another, the control of the discharge of pollutants or the control of nonpoint pollution. This concept is simply missing from the scientific analysis as presented. Justice Kennedy's admonition that "the required nexus must be assessed in terms of the statute's goals and purposes," Rapanos at 2248, has been ignored.

Rather, hydrology has now become the central focus of the "nexus" analysis despite the "state deference" language of sections 101 and 510 of the Act, despite Congresses' express intent to maintain state sovereignty over water resources, despite the Act's mandate to protect the quality of navigable waters for identified designated uses through the control of the discharge of pollutants, and despite Supreme Court opinions that: (i) rejected federal jurisdiction over non-navigable, isolated intrastate waters; (ii) expressly provided that the word "navigable" cannot be read out of the Act; and (iii) found that, at the very least there must exist more than a speculative or insubstantial connection to a TNW for a waterbody to be found jurisdictional.

The agencies misplaced reliance on the work of the scientific community was most recently underscored in the correspondence to the Administrator from the SAB. In that correspondence, the SAB took issue with the groundwater exclusion, expressed consternation that activities which "drain" wetlands are not jurisdictional, supported the "inclusion" of certain artificial ponds and reflecting ponds, questioned why "gullies and rills" are not jurisdictional, and opposed excluding any groups of waters that "may influence" downstream waters. The SAB also proposed that "adjacency" be determined on the "basis of functional relationships," some of which would evidently have nothing to do with water quality per se, but evidently center on ecological functions and land use determinations. It is apparent from these statements that the charge to the scientific community was fatally flawed.

Neither the scientific community nor the agencies are in a position to rewrite the law through regulatory action, but this proposal and the scientific responses thereto nevertheless appear to be an attempt to accomplish just that. (p. 15-16)

Agency Response: 9(b), 9(d), 9(e), 9(f), 9(g), 9(h), 9(i), 9(j), and 9(l). See also Legal Compendium (Topic 10) and TSD.

Water Advocacy Coalition (Doc. #7981)

9.52 During the comment period, there has been significant discussion over EPA maps that rely on data from the U.S. Geological Survey (USGS) and appear to depict the scope of CWA jurisdiction.[14] The Coalition commends Rep. Lamar Smith and the U.S. House of Representatives Committee on Science, Space, and Technology, for making these maps publicly available and requesting that EPA enter the maps and related information into the rule making docket.[15] Unfortunately, these maps are just the tip of the iceberg, as they depict only a fraction of the land and waters that would be subject to federal CWA jurisdiction under the Proposed Rule.

In yet another blog post, EPA states that these maps "do not show the scope of waters ... proposed to be covered under EPA's Proposed Rule" and "cannot be used to determine Clean Water Act jurisdiction-now or ever."[16] But why not? The Proposed Rule effectively provides that the Agencies intend to treat all perennial, intermittent, and ephemeral streams asperse jurisdictional (no case-specific analysis), and the preamble indicates that the Agencies will identify tributaries using USGS maps and other appropriate information.[17] How , then, can the Agencies claim that these maps do not show the scope of streams subject to federal CW A jurisdiction under the Proposed Rule?

Indeed, these maps indicate a total of approximately 8.1 million miles of perennial, intermittent, and ephemeral streams across the 50 states, all of which would be categorically regulated as tributaries under the Proposed Rule. And, these maps show only a subset of the land and waters that would be jurisdictional under the Proposed Rule, because they do not depict all of the other features, such as ditches and adjacent ponds, that would be categorically jurisdictional, or "other waters" that could be jurisdictional if the Agencies find a significant nexus. These USGS maps, and EPA's casual dismissal of their significance, demonstrate that, as suggested by Rep. Lamar Smith, the public is "getting the run-around" and has not been provided with significant information needed to meaningfully comment on the Proposed Rule. (p. 7)

Agency Response: 9(o)

[14] See http://science.house.gov/epa-maps-state-2013#overlay-context.
[15] See Letter from the Honorable Lamar Smith, Chairman, U.S. House of Representatives Committee on Science, Space, and Technology, to the Honorable Gina McCarthy, Administrator, U.S. EPA (Aug. 27, 2014), http://science.house.gov/sites/republicans.science.house.gov/files/documents/08-27-2014%20Science%20Committee%20Chairrnan% 20Smith%20to% 20Administrator"/o20McCarthy_O.pdf
[16] Tom Reynolds, Mapping the Truth, EPA Connect Blog (Aug. 28, 2014), http:/fbiog.epa.gov/epaconnect/2014/08/mapping -the-truth/.
[17] 79 Fed. Reg. at 22,202.

Georgia Chamber of Commerce (Doc. #14430)

9.53 The maps seem to show a lot of potential ways and places to interpret or designate a regulated waterway of the United States somewhere. Maps serve as a tool for visualizing how water flows across our nation and in regions of the country and EPA should be required to incorporate into these maps the reach of its Proposed Rule so that the rulemaking process is fully informed with all relevant data points. (p. 15)

Agency Response: 9(o)

California Building Industry Association et al. (Doc. #14523)

9.54 These assumption- and individual-judgment-rich terms are undefined in the Proposed Rule. Aside from the ambiguity and uncertainty of applying them in the field, it would be impossible for any purported scientific study to anticipate and incorporate every possible judgment call by Corps staff in the field throughout the country and defensibly make a categorical declaration of jurisdiction. (p. 24)

Agency Response: 9(i) and 9(l). See also preamble to final rule.

9.55 And, astoundingly, at least one commenter from the SAB Panel reports: "During the SAB Review, the panel was explicitly told not to discuss the definition of significance . . . ." SAB Panel Comments on the Proposed Rule at 58 (Dr. Mark Murphy comments). (p. 25)

Agencies' Response: 9(b)

American Foundry Society (Doc. #15148)

9.56 The fundamental tenets of the Proposed Rule are based on an EPA report entitled, "Connectivity of Streams and Wetlands to Downstream Waters: A Review and Synthesis of the Scientific Evidence" (Report). The report purports to establish a scientific basis that isolated, rarely existing "waters" are connected to more traditional navigable waters, and, therefore subject to CWA jurisdiction. In essence, this is an attempt to establish a statutory nexus for asserting all-encompassing jurisdictional authority over a very broad range of categories of waters and geographic features. EPA and the Corps are claiming that areas where water is present, as infrequently as once every few years, should be subject to CWA permit requirements because the water could potentially be connected to navigable waters. Such a claim stretches CWA jurisdiction beyond statutory authority and practical implementation.

While the processes and inter-relationships identified in the report provide mechanisms to establish potential chemical, biological and physical ties between waters, the idea of a universally applicable mechanism for every water or drainage feature that exists on the landscape lacks any sort of scientific robustness. Given the financial and potential criminal liabilities associated with violating the CWA, the connectivity of an area to a navigable water is best established on a case-by-case basis. This vague concept of connectivity cannot be applied universally to all areas and navigable waters, thereby defeating the agencies' stated purpose of avoiding case-by-case determinations for waters of the U.S. (p. 3)

Agency Response: 9(d), 9(f), 9(g), 9(h), and 9(i).

Federal StormWater Association (Doc. #15161)

9.57 While the agencies cite their own recent scientific studies to support expanding federal jurisdiction, the studies cited and the Proposed Rule do not align and the draft report cannot support the factual determinations made by the agencies to justify the Proposed Rule. (p. 2)

Agency Response: 9(e) and 9(f)

Federal Water Quality Coalition (Doc. #15822.1)

9.58 The Draft Connectivity Report includes studies that focus on the life cycle, habitat, and movement of animals and insects. The Draft Connectivity Report identifies connections between bodies of water based on these animals and insects, calling this "biological connectivity." Draft Connectivity Report at 3-28. However, these studies, including studies of invertebrates, fish, phytoplankton, and the life cycle and movement of animals generally are not relevant to the CWA's provisions.[18] The Draft Connectivity Report cites a study of the transport of live salmon or their carcasses by brown bears as a connection between streams and riparian areas.[19] It cites a study of the movement of muskrats to establish connections between farm ponds and streams.[20] It cites a study of the carcasses of anadromous fish to make the case that nutrients can be transported by biota.[21] The SAB Panel charged with reviewing the Draft Connectivity Report recommended adding references to a study of the impacts of the excretions of Franklin Gulls when nesting in cattails.[22] However, none of these studies or the connections they document is relevant to the Act's focus on protecting the quality of navigable waters from human-related discharges of pollutants.[23]

The goals of the CWA include restoring and maintaining "biological integrity of the Nation's waters." However, that goal, and the Act itself, are focused on the quality of water necessary to restore and maintain aquatic life, not on the aquatic life itself. Thus, to use the brown bear example cited above, nothing in that study provides any insight into water quality, or impacts of upstream waters on the ability of navigable water to maintain a healthy population of aquatic life. In fact, none of the studies in the Draft Connectivity Report finding "biological connectivity" based on the life cycle, habitat, and movement

[18] See generally studies cited in sections 4.5, 4.7.2.4, and 4.7.3.3 relating to the movement of organisms actively and passively from streams to downstream waters; studies cited in sections 4.5 and 4.7.3.3 related to the movement of organisms from downstream waters to upstream waters; studies cited in sections 5.3.3, 5.4.4, 5.6.3.3, 5.8.3.3, 5.9.3.2 related to wetlands as sources of organisms, including plants, invertebrates, amphibians, reptiles, and fish, to downstream waters; studies cited in sections 5.3.3.2, 5.6.3.3 related to riparian/floodplain wetlands as feeding habitat for riverine organisms, such as fish, during periods of overbank flow; studies cited in section 5.3.3.1 related to wetlands as sinks for seeds and plant fragments deposited via overbank flow; studies cited in sections 5.3.3.2, 5.4.4 relating to wetlands as refuge for fish, aquatic insects, or other lotic organisms; studies cited in sections 5.4.4, 5.7.3.3, 5.9.3.2 relating to wetlands as habitat and breeding grounds.
[19] Draft Connectivity Report, at 3-8.
[20] Id. at 5-32.
[21] Id. at 3-27.
[22] October 17, 2014 SAB Review of the Draft EPA Report on Connectivity of Streams and Wetlands to Downstream Waters: A Review and Synthesis of the Scientific Evidence, at 52 (hereinafter "SAB Report Review").
[23] See supra pp. 18-21.

of animals and insects can be used to identify a connection to downstream navigable waters that has any legal significance under the CWA. The Supreme Court made this point very clearly in SWANCC[24] and it was reiterated by the plurality opinion in Rapanos. [25]

In a small concession to the holding in SWANCC, in Appendix B ("Legal Analysis") the preamble to the Proposed Rule states that use of habitat by non-aquatic species or by migratory birds will not be used when making a jurisdictional determination for "other waters."[26] However, ignoring the rationale of SWANCC, that the presence and migration of biota do not suffice as a foundation for jurisdiction, the agencies rely on the presence and migration of aquatic species, including insects, as relevant to determining jurisdiction throughout the Proposed Rule, including for "other waters." Furthermore, Appendix A ("Scientific Evidence") of the preamble makes it clear that non-aquatic species and migratory birds were used to determine that all tributaries and all adjacent waters, as categories, have a significant nexus to downstream waters and are per se jurisdictional.[27] The Draft Connectivity Report also is replete with references to studies of nonaquatic species and migratory birds.[28] For example, it asserts:

> Migratory birds are known for dispersing over very large distances, and they both (1) consume and excrete viable plant seeds (Murkin and Caldwell, 2000; Amezaga et al., 2002; Figuerola and Green, 2002), and (2) move between geographically isolated wetlands and river networks, depending on temporally dynamic habitat availability (Murkin and Caldwell, 2000 and references therein; Haukos et al., 2006).[29]

Accordingly, the record that the agencies have relied on includes studies that are not related to the protection of the quality of navigable waters and even includes studies that the agency lawyers agree cannot be used to establish jurisdiction on a case-by-case basis. This record does not support the Proposed Rule. (p. 36-38)

<u>Agency Response:</u> : 9d and 9(f). See also the preamble to the final rule, the TSD, and the Legal Compendium (Topic 10).

9.59 The Draft Connectivity Report also discusses studies that focus on "hydrologic connectivity." If, as a result of hydrologic connectivity, pollutants may be carried from upstream surface water to downstream navigable waters, then hydrologic connectivity may be relevant to a determination whether upstream surface water has a relatively permanent connection to downstream navigable waters that is significant. However,

[24] The Supreme Court has clearly said that use of body of water by a migratory bird does not establish a significant nexus to navigable water. SWANCC, at 172. The same conclusion would apply to any flora or fauna.
[25] See supra n. 78 and accompanying text.
[26] 79 Fed. Reg. at 22214.
[27] 79 Fed. Reg. at 22231 and 22234 (muskrats and flying insects creating connections for tributaries); 79 Fed. Reg. at 22239 (terrestrial species in riparian areas), 22240 (movement of animals move back and forth between riparian or floodplain waters and the river network); and 22245 (use of adjacent water by migratory birds).
[28] The Draft Connectivity Report references use of water by migratory birds specifically thirteen times and use by birds generally ten additional times, citing numerous studies. The SAB panel reviewing the report recommends even greater reliance on the movement of animals. See, e.g., SAB Report Review, at 18, 20, and 30.
[29] Draft Connectivity Report, at 5-31 to 5-32.

studies related to the flow of water alone are not relevant to CWA goals. Water is not a pollutant.[30] The CWA does not address the ability to either supply or withhold water. In fact, Congress has made it very clear that the CWA addresses only water quality, not water quantity.[31]

Accordingly, studies related to the volume of water contributed by streams or wetlands are not relevant to CWA jurisdiction.[32] Similarly, the function of upstream areas as "sinks" that can hold water also is irrelevant to any evaluation of CWA jurisdiction.[33]

Even studies regarding the transport of pollutants do not support a categorical conclusion that a connection always exists that is relevant to CWA jurisdiction. The SAB panel that reviewed the Draft Connectivity Report made a similar point. The panel agreed that "at sufficiently large spatial and temporal scales, all waters and wetlands are connected."[34] However, the panel also noted that connections exist along a gradient and recommended that the agencies recognize that "connections may not be relevant if they do not have important effects on the physical, chemical, and/or biological integrity of downstream waters."[35]

Accordingly, the record that the agencies have compiled shows that the existence of hydrologic connectivity of "tributaries" or "adjacent waters" does not support their determination that such connectivity is "significant." This is another reason why the record fails to support the Proposed Rule. (p. 38-39)

Agency Response: 9(e), 9(f), 9(g), 9(h) and 9(n). See also the preamble to the final rule, the Legal Compendium (Topic 10), and the TSD.

9.60 Some of the studies cited in the Draft Connectivity Report examine the augmentation of flow to navigable waters by groundwater, as a basis for establishing connections. Groundwater is regulated and controlled by states. It is not a water of the United States.[36] The only regulatory role EPA has in the protection of drinking water aquifers is through a permitting regime for underground injection wells under the Safe Drinking Water Act. The ability to regulate something is the ability to control it. If CWA jurisdiction can be based on groundwater and its supply of flow to navigable waters, then EPA could control

[30] Virginia Department of Transportation v. EPA, No. 1:12-CV-775, (E.D. Va., 01/03/2013) (vacating a TMDL that purported to regulate flow of water under the Clean Water Act as a surrogate for pollutants).
[31] CWA § 101(g).
[32] See generally, studies cited in sections 5.3.1.1, 5.4.2.1, 5.6.3.1, 5.7.2.3, 5.8.3.1 related to wetlands as sources of downstream water; studies cited in section 5.3.1.1 relating to the ability of wetlands to temporarily store water following overbank flow, which then can move back to the stream over time as baseflow due to wetland storage capacity.
[33] See generally, studies cited in sections 4.3.1, 4.8.3, 4.8.4.2, 4.8.5.1 relating to how streams divert surface flow from downstream waters via infiltration into underlying soil and evapotranspiration to the atmosphere; studies cited in sections 5.3.1.1, 5.4.2.3, 5.8.3.1 relating to how wetlands can be sinks for water by intercepting overland or subsurface flow; studies cited in section 5.4.2.3 related to the impact of wetlands storage capacity on the time for stream discharge to rise and fall in response to a precipitation event.
[34] SAB Report Review, at 17.
[35] SAB Report Review, at 5 ("The Report also should recognize that all aquatic habitats have some degree of connection, although such connections *may not be relevant* if they do not have important effects on the physical, chemical, and/or biological integrity of downstream waters.") (emphasis added).
[36] See, e.g., Village of Oconomowoc Lake v. Dayton Hudson Corp., 24 F.3d 962, 965 (7th Cir. 1994).

ground water withdrawal to maintain such flows. However, EPA has no such authority. As noted above, the disposition of water resources remains with the states. See CWA § 101(b) and (g). Accordingly, studies relating to groundwater are not relevant to CWA jurisdiction. (p. 40)

Agency Response: 9(j). See also Legal Compendium (Topic 10) and TSD.

9.61 In numerous places, the Draft Connectivity Report refers to land, not water. It does so in the discussion of wetlands, riparian areas, and flood plains. In section 101(b) of the CWA Congress chose to "recognize, preserve, and protect the primary responsibilities and rights of States to prevent, reduce, and eliminate pollution, to plan the development and use (including restoration, preservation, and enhancement) of land and water resources, and to consult with the Administrator in the exercise of his authority under this chapter." As discussed above, Congress added section 101(g) to the Act to forestall efforts by federal agencies to use the CWA for purposes such as "Federal land use planning, plant siting and production planning purposes."[37]

Unfortunately the Draft Connectivity Report does not distinguish between land and water when identifying connections. Under the report, a wetland is defined as:

> An area that generally exhibits at least one of the following three attributes (Cowardin et al., 1979): (1) is inundated or saturated at a frequency sufficient to support, at least periodically, plants adapted to a wet environment; (2) contains undrained hydric soil; or (3) contains nonsoil saturated by shallow water for part of the growing season.[38]

Under the Corps' wetlands delineation manual, an area must demonstrate all three characteristics to be considered a wetland, not just one, so this definition encompasses areas that are not considered wetlands under federal regulations. Accordingly, any study of an area of land identified as a wetland based on this definition is not relevant to the CWA.[39]

The Draft Connectivity Report finds connections via riparian areas. Riparian areas are defined as:

> Transition areas or zones between terrestrial and aquatic ecosystems that are distinguished by gradients in biophysical conditions, ecological processes, and biota. They are areas through which surface and subsurface hydrology connect water bodies with their adjacent uplands. They include those portions of terrestrial ecosystems that significantly influence exchanges of energy and matter with aquatic ecosystems. Riparian areas are adjacent to perennial, intermittent, and ephemeral streams, lakes, and estuarine-marine shorelines.[40]

This definition describes land, not water. In fact, in the Draft Connectivity Report the term "riparian area" is distinct from the term "riparian wetland." Accordingly, any

[37] See supra p. 19.
[38] See Draft Connectivity Report Appendix A.
[39] See generally studies cited in sections 5.4.2.1, 5.9.3.1, and 5.8.3.1 relating to wetlands as sources of water via overland flow.
[40] See Draft Connectivity Report, Appendix A.

connections based on the identification of a riparian area are not relevant to CWA jurisdiction.

The Draft Connectivity Report also finds connections via floodplains. Floodplain is defined as:

> A level area bordering a stream or river channel that was built by sediment deposition from the stream or river under present climatic conditions and is inundated during moderate to high flow events. Floodplains formed under historic or prehistoric climatic conditions can be abandoned by rivers and form terraces.[41]

Again, this definition describes land, not water. Furthermore, this definition provides no limit on the size of a storm required to turn land into water. Under this definition, huge areas of the United States would be considered floodplain, therefore connected to downstream waters, and therefore jurisdictional waters of the United States. The Draft Connectivity Report suggests the agencies are promoting this interpretation by defining "uplands" as both (1) "Higher elevation lands surrounding streams and their floodplains," and (2) "Within the wetland literature... any area that is not a water body and does not meet the Cowardin et al. (1979) three-attribute wetland definition."[42] Under the first definition, floodplains and uplands are mutually exclusive. This is inconsistent with the interpretation of the term "upland" used in the Corps' 2012 nationwide permits.[43] However, by failing to define uplands, the agencies fail to explain whether uplands can exist in the floodplain. One thing is clear: the definition of floodplain is so broad that it should have no role in identifying what waters are subject to CWA jurisdiction.

Finally, the preamble references to "ephemeral streams" and "ephemeral tributaries" provide no basis for distinguishing between these drainage features and other uplands. "Ephemeral stream" is defined in the Draft Connectivity Report as: "A stream or river that flows briefly in direct response to precipitation."[44] Water is found everywhere during and following storm events. Accordingly, any area of land could be considered an ephemeral stream under the Draft Connectivity Report. Thus, studies relating to drainage from ephemeral features, whether called a stream or not, do not provide a basis for identifying waters that are subject to the CWA.[45] (p. 40-42)

Agency Response: **9(d), 9(f), 9(g), 9(h), 9(i), 9(l), and 9(n).**

9.62 Just as the Draft Connectivity Report does not distinguish between land and water, it also does not distinguish between bodies of water and point sources. For example, the Draft Connectivity Report discusses the flow of water through tile drains and through ditches. Tile drains may be point sources.[46] Ditches are specifically defined as point sources in the

[41] Id.
[42] Id.
[43] 77 Fed. Reg. at 10244 ("We acknowledge that floodplains provide important ecological functions and services, but it must also be understood that most areas within 100- year floodplains are not subject to Clean Water Act jurisdiction, because a large proportion of the area within 100-year floodplains consists of uplands.").
[44] See Draft Connectivity Report, Appendix A.
[45] See studies cited in section 4.8 relating to upland recharge and ephemeral drainages.
[46] However, tile drains will usually be exempt agricultural discharges. See Pacific Coast Federation of Fishermen's Association, et al. v. Bureau of Reclamation, Case No. CIV S-2:11-2980-KJM-CKD (E.D.CA Sept. 16, 2013).

CWA.[47] Point sources cannot be waters of the United States.[48] If they were, a discrete conveyance for the discharge of pollutants would be a water of the United States, and water flowing in the conveyance would have to meet applicable water quality standards. As a result, many cities and industrial facilities would have to discontinue the use of open conveyance systems and would be compelled to install pipes to manage storm water and industrial wastewater. Further, water flowing from a point source that is also a water of the U.S. would be a water transfer that is not subject to NPDES permit regulations, reducing water quality protection.[49] This result is not consistent with the CWA. Accordingly, studies finding connections based on point sources are not relevant.[50] (p. 42-43)

Agency Response: 9(m). The approach that some ditches may be considered simultaneously both a point source, covered by an NPDES permit, and a water of the U.S., reflects the CWA itself as well as longstanding agency policy. For example, MS4s often are made up of a combination of jurisdictional waters and non-jurisdictional features. If a ditch that is part of an MS4 meets the definition of tributary and is not otherwise excluded, it is a water of the U.S. Section I of the TSD provides the legal framework under which a ditch could be considered both a point source and a "water of the United States." See the Ditches Compendium (Topic 6).

9.63 The Draft Connectivity Report cites some studies relating to the transport of pollutants from upstream waters to downstream waters. The potential to transport pollutants at levels that would prevent navigable water from attaining CWA goals may establish a substantial impact on a highway of commerce that could support CWA jurisdiction. However, not all pollutant transport is substantial (the test under the Commerce Clause) or significant (if the test under Justice Kennedy's opinion in *Rapanos* were the law of the land). Absent a determination of substantial impact or a metric that identifies which impacts are significant and which are not, EPA cannot, even under its own interpretation of *Rapanos*, draw categorical conclusions from these studies. As discussed below, the SAB panel that reviewed the Draft Connectivity Report made the same observation, recommending that the agencies quantify the effects of connections on a gradient and noting that "connections may not be relevant if they do not have important effects on the physical, chemical, and/or biological integrity of downstream waters."[51]

9.64 In *Arkansas v. Oklahoma*, the Supreme Court upheld an EPA determination that a discharge cannot violate a water quality standard requiring no degradation of water quality unless "the discharge effected an 'actually detectable or measurable' change in water quality." 503 U.S. 91, 111 (1992). Applying this standard, upstream water could be

[47] See CWA § 502(14).
[48] For example, in the 1990 preamble to the Phase 1 regulation, EPA stated that stormwater runoff into municipal sewers (including MS4-controlled ditches, roads, storm drains, etc.) is not a discharge of a pollutant into a WOTUS. 55 Fed. Reg. 47,900, 47,997 (Nov. 16, 1990).
[49] 40 C.F.R § 122.3(i).
[50] See generally studies cited in sections 5.4.2.1, 5.7.3.1, 5.8.3.1, 5.3.1.1, 5.4.2.1, 5.6.3.1, 5.7.2.3, 5.7.3.1, 5.8.3.1 5.2.3 relating to water provided via subsurface drains ("tile drains") or surface ditches.
[51] SAB Report Review, at 5 ("The Report also should recognize that all aquatic habitats have some degree of connection, although such connections may not be relevant if they do not have important effects on the physical, chemical, and/or biological integrity of downstream waters.").

subject to CWA jurisdiction based on its nexus to downstream navigable waters only if pollutants from the upstream water could result in an actually detectable or measurable change in the quality of downstream navigable water.

Dr. Murphy, one of the SAB Panel members who reviewed the Proposed Rule, makes the same point. According to Dr. Murphy:

> Water quality criteria are an explicit result of measuring what constitutes a scientifically significant nexus between a surface water pathway exposure and a resident aquatic species. There is no better way of assessing the impact of a watershed connection than its potential to degrade the water quality of receiving waters or violate water quality standards for those waters. Yet no reference to either water quality standards or the science for setting them appears in the Proposed Rule.[52]

Most of the studies identified in the Draft Connectivity Report that address pollution transport do not address impact on the quality of water in downstream navigable waters.[53] Accordingly, such studies cannot be used to help policy-makers identify the jurisdictional boundaries of the CWA. (p. 43-44)

Agency Response: **Regarding the comment on *Arkansas v. Oklahoma,* the test at issue in that case (whether there would be a detectable impact downstream from a new or increased discharger upstream) is not the test at issue here. In addition, based on the SAB panel's recommendations, the Final Science Report explicitly and repeatedly addresses the fact that systems represent a gradient of connectivity (see 9(e), 9f, and 9(g)). As described in those essay responses, the Science Report does not assess a mere nexus to downstream waters, but also examines the degree of connection and effect. While recognizing the fact that systems occur along a gradient of connectivity, the SAB panel still concluded that there is strong scientific evidence that all tributaries (including ephemeral and intermittent streams) and adjacent waters and wetlands exert strong influence on the physical, chemical, and biological integrity of downstream waters. Pollutant transfer between streams, wetlands, and open waters is considered an example of a chemical linkage between and among these systems. Some commenters may have been confused by the terminology of the Science Report – "connectivity" does not mean a mere hydrologic connection. The term connectivity is defined in the Science Report as the degree to which components of a watershed are joined and interact by transport mechanisms that function across multiple spatial and temporal scales. Connectivity is determined by the characteristics of both the physical landscape and the biota of the specific system. The Science Report found strong evidence supporting the central roles of the physical, chemical, and biological connectivity of streams, wetlands, and open waters—encompassing varying degrees of both connection and isolation—in maintaining the structure and function of downstream waters, including rivers,**

[52] Attachment to September 2, 2014, Memorandum from Dr. Amanda D. Rodewald, to Dr. David Allen, "Comments to the chartered SAB on the adequacy of the Scientific and Technical Basis of the Proposed Rule Titled "Definition of 'Waters of the United States' Under the Clean Water Act," at 93 (hereinafter SAB Rule Review).
[53] See generally, studies cited in chapter 4 relating to the transport of debris and chemicals.

lakes, estuaries, and oceans. The Science Report also found strong evidence demonstrating the various mechanisms by which material and biological linkages from streams, wetlands, and open waters affect downstream waters, classified here into five functional categories (source, sink, refuge, lag, and transformation; discussed below), and modify the timing of transport and the quantity and quality of resources available to downstream ecosystems and communities. Thus, the currently available literature provided a large body of evidence for assessing the types of connections and functions by which streams and wetlands produce the range of observed effects on the integrity of downstream waters. The SAB found, "[t]here is strong scientific evidence to support the EPA's proposal to include all tributaries within the jurisdiction of the CWA. 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 process." Likewise, regarding adjacent waters and wetlands, the SAB stated, "[t]he available science supports the EPA's proposal to include adjacent waters and wetlands as a waters of the United States. …because [they] have a strong influence on the physical, chemical, and biological integrity of navigable waters."

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9.65 The significant nexus analysis is the lynchpin concept of the agencies' Proposed Rule, but the rule provides no metrics or criteria for determining significance. This is also a major problem with the Connectivity Report that served as the scientific basis for the Proposed Rule.[54] The Science Advisory Board ("SAB") tasked an ad hoc panel of experts with review of the Connectivity Report, and the SAB Panel produced a report with numerous recommendations to improve the Connectivity Report.[55] One of the SAB Panel's main recommendations was that the Connectivity Report be revised to consider connections in terms of a connectivity gradient rather than treating connectivity as a binary property (connected versus not connected).[56] The SAB Panel "recommends that the interpretation of connectivity be revised to reflect a gradient approach that recognizes variation in the frequency, duration, magnitude, predictability, and consequences of connections."[57] Although the Proposed Rule's preamble acknowledges the gradient in some instances, its categorical assertions of jurisdiction over tributaries and adjacent waters do not account for instances where features may fall very low on the connectivity gradient.

[54] See Waters Advocacy Coalition, "Comments on the U.S. EPA Draft Report: Connectivity of Streams and Wetlands to Downstream Waters: A Review and Synthesis of Scientific Evidence," Docket No. EPA-HQ-OA-2013-0582, at 6-7 (Nov. 6, 2013) (incorporated by reference herein) ("WAC Comments on Connectivity Report").
[55] See SAB, Panel for the Review of the EPA Water Body Connectivity Report, SAB Review of the Draft EPA Report Connectivity of Streams and Wetlands to Downstream Waters: A Review and Synthesis of the Scientific Evidence, EPA-SAB-15-001 (Oct.17, 2014), http://yosemite.epa.gov/sab/sabproduct.nsf/WebBoard/AF1A28537854F8AB85257D74005003D2/$File/EPA-SAB-15001+unsigned.pdf ("SAB Panel Review of Connectivity Report") (attached hereto as Exhibit 5).
[56] SAB Panel Review of Connectivity Report, Exhibit 5 at 2.
[57] Id. at 3. Indeed, the gradient approach to connectivity is recommended at least 28 times in the SAB Panel Review of the Connectivity Report.

Rather, the preamble and the Connectivity Report focus on the ability to simply identify the presence of connections. As explained by GEI Consultants in their report, the Proposed Rule is based on the agencies' "underlying assumption that any observable connection with a downstream water . . . regardless of frequency, duration, magnitude, predictability, and consequences, significantly affects the integrity of downstream waters."[58] Indeed, the SAB Panel, which was also tasked with reviewing the Proposed Rule, raised this concern, noting, "Panel members generally found that the term 'significant nexus' was poorly defined . . . and that the use of the term 'significant' was vague."[59] Dr. Michael Josselyn raised this issue, explaining that "the Proposed Rule focuses on finding evidence of a connection; not evidence that such a connection actually plays a role in affecting the biological integrity of the navigable water in question."[60] (p. 34-35)

Agency Response: **9(f), 9(g), 9(h), 9(i), and 9(k). Also, the commenter above was concerned that because the agencies did not provide metrics to quantify when chemical, physical, or biological effects amount to a significant nexus, the Proposed Rule is based on simple identification of the presence of connections and is therefore inconsistent with Justice Kennedy's opinion. First, neither Justice Kennedy's opinion nor any Circuit Court to address this issue required metrics or quantification of the waters' effects on the downstream chemical, physical or biological integrity. As noted above, the Circuit Courts have held that the term "significant" as used by Justice Kennedy was not intended to require statistical significance. *Precon Dev. Corp., Inc. v. U.S. Army Corps of Eng'rs,* 2015 U.S. App. LEXIS 3704 * 6 (4th Cir. March 10, 2015) (*Precon II)* (unpublished decision). The Fourth Circuit has noted that the standard "is a 'flexibly ecological inquiry,'" and that "[q]uantitative or qualitative evidence may support [applicability of the CWA]." *Precon II,* 2015 U.S. App. LEXIS 3704 * 6 (4th Cir. March 10, 2015). The same court also has clarified that the burden of establishing applicability of the CWA should not be "unreasonable." *Precon,* 633 F.3d at 297. While the appellate courts have accepted laboratory analysis or quantitative or empircal data (*Donovan,* 661 F.3d at 186); *Northern California Riverwatch,* 496 F.3d at 1000-1001), the appellate courts have not required such quantitative evidence. *Precon,* 633 F.3d at 294 ("We agree that the significant nexus test does not require laboratory tests or any particular quantitative measurements in order to establish significance"); *Cundiff,* 555 F.3d at 211 ("Though no doubt a district court could find such evidence persuasive, the Cundiffs point to nothing – no expert opinion, no research report or article, and nothing in any of the various *Rapanos* opinions – to indicate that [laboratory analysis] is the sole method by which a significant nexus may be proved"). The appellate courts have accepted a variety of evidence, including but not limited to, photographs, visual observation of stream condition, flow and**

[58] GEI Consultants, "Scientific Comments on U.S. EPA's Definition of 'Waters of the United States' Under the Clean Water Act; Proposed Rule," at 2 (Sept. 26, 2014) ("GEI Report") (attached hereto as Exhibit 6).
[59] Exhibit 7, Rodewald Memo at 6; SAB Panel Member Comments on Proposed Rule at 6 (Comments of Dr. Genevieve Ali) ("The draft rule does include a definition for 'significant nexus'; however I find it rather vague and subject to interpretation.").
[60] SAB Panel Member Comments on Proposed Rule, Exhibit 7 at 47 (comments of Dr. Michael Josselyn).

morphology, studies, dye tests, scientific literature, maps, aerial photographs, and remote sensing data. *Lucas,* 516 F.3d at 326-27. *See also Deerfield Plantation Phase II-B Property Owners Ass'n,* 2012 U.S. App. LEXIS 26402 *5 (in addition to conducting two site visits, Corps relied upon infrared aerial photography, agency records, a county soil survey, a topographic map and a wetland inventory); *Donovan,* 661 F. 3d at 185-86.

With respect to the comment that without quantifying "significant" the agencies are asserting jurisdiction based on the presence of connections that are the equivalent of "any hydrologic connection," the agencies disagree with both the characterization of the science and the suggestion that the jurisdictional conclusions reflected in the rule are based on mere hydrologic connections. First, the science did not assess a mere nexus to downstream waters, but also examined the degree of connection and effect. Some commenters may have been confused by the terminology of the Science Report – "connectivity" does not mean a mere hydrologic connection. The term connectivity is defined in the Science Report as the degree to which components of a watershed are joined and interact by transport mechanisms that function across multiple spatial and temporal scales. Connectivity is determined by the characteristics of both the physical landscape and the biota of the specific system. The Science Report found strong evidence supporting the central roles of the physical, chemical, and biological connectivity of streams, wetlands, and open waters—encompassing varying degrees of both connection and isolation—in maintaining the structure and function of downstream waters, including rivers, lakes, estuaries, and oceans. The Science Report also found strong evidence demonstrating the various mechanisms by which material and biological linkages from streams, wetlands, and open waters affect downstream waters, classified here into five functional categories (source, sink, refuge, lag, and transformation; discussed below), and modify the timing of transport and the quantity and quality of resources available to downstream ecosystems and communities. Thus, the currently available literature provided a large body of evidence for assessing the types of connections and functions by which streams and wetlands produce the range of observed effects on the integrity of downstream waters. Regarding tributaries, the SAB found, "[t]here is strong scientific evidence to support the EPA's proposal to include all tributaries within the jurisdiction of the CWA. 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 process." Regarding adjacent waters and wetlands, the SAB stated, "[t]he available science supports the EPA's proposal to include adjacent waters and wetlands as a waters of the United States. …because [they] have a strong influence on the physical, chemical, and biological integrity of navigable waters." *Id.* See also response at the end of this Compendium.

9.66 The lack of metrics to measure the importance of connections was a common concern raised by the SAB Panel.[61] The SAB Panel's Review of the Connectivity Report specifically requested that EPA revise the report to "discuss approaches to measuring or otherwise quantifying connectivity."[62] As Dr. Allison Aldous noted, "Specific scientifically grounded, objective methods must be put in place to draw the line between those waters having or not having a significant nexus to other jurisdictional waters . . . [E]valuating the technical accuracy of the definition is difficult in the absence of clear criteria."[63] Dr. Siobhan Fennessy also raised this concern, stating that the Proposed Rule "require[s] the development of methods to determine when a nexus is significant, including metrics based on hydrologic, chemical, and biological connectivity."[64] Other panel members had similar concerns.[65] (p. 35-36)

Agency Response: **See response to comment above. Also, the Science Report (p. ES-3) found that wetlands and open waters in non-floodplain landscape settings provide numerous functions that benefit downstream water integrity, and that these non-floodplain wetlands occur along a gradient of connectivity. On one end of the spectrum, the functions of non-floodplain wetlands clearly affect the condition of downstream waters if a visible (e.g., channelized) surface-water or regular shallow subsurface-water connection to a river network is present. Non-floodplain wetlands without such visible surface-water or regular subsurface-water connections occupy the other end of the connectivity spectrum, and the Science Report found that generalizations about their specific effects on downstream waters are difficult because information on both connectivity and function are needed. However, the Science Report concluded that the "…cumulative influence of many individual wetlands within watersheds can strongly affect the spatial scale, magnitude, frequency, and duration of hydrologic, biological, and chemical fluxes or transfers of water and materials to downstream waters." The SAB (p. 56) similarly noted that while non-floodplain wetlands may individually have "minimal connections to downstream waters, the cumulative impact of these diffuse connections is *tremendously important* [emphasis added] to the maintenance of downstream biota and ecosystem integrity."**

[61] SAB Panel Review of Connectivity Report, Exhibit 5 at 11 ("It would be useful to provide examples of the various dimensions of connectivity that are most appropriately quantified, ways to construct connectivity metrics (e.g., retrospective or prospective analyses, model simulations, spatial analyses), and the scientific methodological, and technical advances most needed to understand and estimate connectivity.").
[62] Id. at 14.
[63] Id. at 2 (comments of Dr. Allison Aldous).
[64] Id. at 31 (comments of Dr. Siobhan Fennessy) ("A key question is where, along the gradient of connectivity, do the effects of other waters becomes significant.")
[65] See, e.g., id. at 47 (comments of Dr. Michael Josselyn) ("A section may need to be added to the Final Science Report that addresses what type of connections should be evaluated and the methods by which these connections can be measured . . . . I concur with an approach that is more quantitative."); id. at 90-91 (comments of Dr. Mark Murphy) ("if [the proposed rule] is to have any defensible basis in science," "[t]he significance of the connection must be defined by the likelihood of a measureable effect . . . ."); id. at 101 (comments of Dr. Duncan Patten) ("[T]here is little or no explanation (science or legal) of what 'significant effect' means.").

9.67 The APA requires that an agency make findings that support its decision, and "those findings must be supported by substantial evidence."[66] The significant nexus analysis is the lynchpin concept of the agencies' Proposed Rule, but the agencies' significant nexus findings and determinations are not supported by the science. The Connectivity Report, the agencies' purported scientific basis for the Proposed Rule, and the preamble's Appendix A fail to address the "significance" of connections between waters. Instead, the agencies' "scientific support" for the Proposed Rule focuses on the ability of science to simply identify the presence of connections.[67] Both the Connectivity Report and the preamble's Appendix A ignore the fundamental questions: What is a significant nexus? How do the agencies identify, based on science, circumstances in which there is a significant nexus?

Nor did EPA allow the expert SAB Panel reviewing the Connectivity Report to evaluate whether the report adequately addresses the significance or importance of connections it identifies. EPA's technical charge questions to the SAB Panel were focused on verifying the technical accuracy of the report's findings that streams and most wetlands are connected to downstream waters. EPA did not, however, ask the important questions about the scientific significance of these connections for the health or integrity of downstream waters. Recognizing that EPA failed to ask these critical questions, the U.S. House of Representatives Committee on Science, Space, and Technology, pursuant to its authority under the Environmental Research, Development and Demonstration Authorization Act ("ERDDAA"), provided the SAB Panel with additional charge questions that asked the SAB Panel to evaluate the scientific significance of the connections for downstream waters.[68] EPA dismissed Congress's letter and additional charge questions, claiming that the questions "go beyond the scientific review that is the expert technical panel's statutory focus."[69] EPA directed the SAB Panel to ignore Congress's charge questions and answer only those questions provided by EPA. Even more concerning, as SAB Panel members noted, "During the SAB Review, the panel was explicitly told not to discuss the definition of significance . . ."[70] or "the Proposed Rule itself."[71] As a result, neither the Connectivity Report, nor the SAB Panel's review of the report, addresses the significance of connections for downstream waters – the central issue for the agencies' proposed waters of the United States rule. Narrow charge questions are not the only way that EPA controlled the SAB review process. Through a Freedom of Information Act ("FOIA") request, we obtained communications between EPA Office of Water officials and the SAB. Even the limited redacted documents we received show that this process was not independent and that EPA strong-armed the SAB

[66] Burlington Truck Lines, Inc. v. United States, 371 U.S. 156, 168 (1962); see also Motor Vehicle Mfrs. Ass'n of U.S. v. State Farm Mut. Auto. Ins. Co., 463 U.S. 29, 43 (1983).
[67] See GEI Report, Exhibit 6 at 2. This major issue was noted in WAC's comments on the Connectivity Report. See WAC Comments on Connectivity Report, at 6-7.
[68] Letter from the Honorable Lamar A. Smith, Chairman, U.S. House of Representatives Committee on Science, Space, and Technology, to Dr. Amanda Rodewald, Chair, Science Advisory Board Panel for the Review of the EPA Water Body Connectivity Report (Nov. 6, 20
[69] Letter from Laura Vaught, Associate Administrator, EPA Office of Congressional and Intergovernmental Relations, to the Honorable Lamar Smith (Dec. 16, 2013)
[70] SAB Panel Member Comments on the Proposed Rule, Exhibit 7 at 91 (comments of Dr. Mark Murphy).
[71] Id. at 48 (comments of Dr. Michael Josselyn).

scientists into validating the Connectivity Report and the Proposed Rule.[72] Nor did the internal EPA or SAB review of the Connectivity Report comply with the requirements of the Information Quality Act.[73]

Moreover, on September 2, 2014, the SAB Panel released comments on the adequacy of the scientific and technical basis of the Proposed Rule.[74] The SAB Panel members raised a number of serious concerns about the Proposed Rule's definitions and categories of regulation. For example, "Panel members generally found that the term 'significant nexus' was poorly defined . . . and that the use of the term 'significant' was vague."[75] Panel members also questioned the adequacy of scientific support for several of the rule's definitions and exclusions. For instance, "Panelists generally agreed that many research needs must be addressed in order to discriminate between ditches that should be excluded and included."[76]

In addition, the Proposed Rule draws conclusions for certain categories of waters, including "tributaries" and "adjacent waters," based on a Connectivity Report that uses different terminology and definitions that do not necessarily align. As panel member Dr. Michael Josselyn noted, "definitions used in the Proposed Rule differ from those used in the Draft Science Report and could lead to differences in the interpretation of the science as it relates to the proposed legal definitions."[77] For example, Dr. Josselyn points out that the Connectivity Report uses a definition of "tributaries" that relies on the presence of flowing water (or varying volume), whereas the Proposed Rule includes any feature that possesses a bed, bank, and OHWM. Id. These definitions are very different. Dr. Amanda Rodewald also notes this discrepancy and expresses concern that the Proposed Rule "expand[s] what is commonly thought of as a tributary to any type of water."[78] Conclusions drawn for "tributaries" in the Connectivity Report may not necessarily be true for all features (e.g., ditches and ephemeral drainages) that the Proposed Ruletreats as "tributaries."[79] Similarly, the Connectivity Report uses the Cowardin definition of "wetland," which allows for an area to be classified as a wetland if it has only one of three characteristics (hydrology, hydrophytes, or hydric soils), rather than the federal regulatory definition which requires an area to exhibit all three characteristics to be classified as a wetland.[80] The Proposed Rule does not change the federal regulatory

[72] See EPA Documents Produced in Response to Freedom of Information Act Request Regarding Science Advisory Board Review of Connectivity Report and Proposed Rule (disc attached hereto as Exhibit 18).
[73] Treasury and General Government Appropriations Act for Fiscal Year 2001 (Public Law 106-554) at § 515.
[74] Rodewald Memo, Exhibit 7 at 6.
[75] Id.
[76] Id. at 7.
[77] SAB Panel Member Comments on Proposed Rule, Exhibit 7 at 42 (comments of Dr. Michael Josselyn).
[78] Id. at 108 (comments of Dr. Amanda Rodewald) ("One concern that I have relates to what seems to be different definitions of tributary used in the scientific review and the rule. The scientific review focused on perennial, ephemeral, and intermittent streams, whereas the rule seems to include a wide range of waters, including lakes, ponds, ditches, and impoundments.").
[79] See SAB Panel Member Comments, Exhibit 7 at 43 (comments of Dr. Michael Josselyn) ("The tributary definition in the Proposed Rule also includes other features such as flood control channels, some ditches, underground stormwater drainage works that are not part of, nor discussed in, the Draft Science Report.")
[80] See Connectivity Report at 3-6; see also 33 C.F.R. § 328.3(b); 1987 Corps of Engineers Wetlands Delineation Manual at 9 (Jan. 1987), available at http://el.erdc.usace.army.mil/elpubs/pdf/wlman87.pdf.

definition of "wetland," but the underlying Connectivity Report uses a different definition. This inconsistent terminology is yet another problem with publishing a Proposed Rule that was drafted before review of the Connectivity Report was complete.

And, as recently as September 26, 2014, a member of the chartered SAB questioned why neither the Connectivity Report nor the SAB review assessed the level of importance of connectivity. He stated, "EPA scientists should consider where along the connectivity gradient there is an impact of sufficient magnitude to impact downstream waters," and noted that, although there is a continuum, scientists are depended upon to make determinations of significant or critical effects.[81] Substantial changes to the Proposed Rule and the Connectivity Report are needed to address these important concerns raised by the SAB Panel. And the public must be given the opportunity to review and comment on any such revisions.

Neither the Connectivity Report nor the preamble's Appendix A assesses or quantifies the importance of connections between tributaries, adjacent waters, and other waters and effects on downstream waters. As discussed in section II.H. and explained in the GEI Report, "the Agencies have failed to consider that for any connection, there must be a scientifically defensible method to assess the strength of connection with respect to the integrity of the downstream water . . . ."[82] It is on that scientific assessment of strength of connection that the agencies should base determinations of jurisdiction.[83] But the agencies provide "no consideration for where on that continuum the threshold for strength of connectivity or significant nexus lies."[84]

Thus, the Proposed Rule's underlying science does not provide support for:

- Making categorical significant nexus determinations for tributaries and adjacent waters;
- Asserting jurisdiction over all features that meet the Proposed Rule's definition of tributaries (e.g., ephemeral drainages, features with manmade breaks, ditches, and other manmade conveyances) or the determination that all of these features are "similarly situated"; Asserting jurisdiction over all features that meet the Proposed Rule's definition of "adjacent" based on connections to features that are not natural streams or major tributaries (e.g., ditches and other conveyances and connections via shallow subsurface flow), or the determination that all of these features are "similarly situated";
- Asserting jurisdiction over "other waters" by aggregating all "other waters" in a watershed to determine if there is a significant nexus; or
- Adopting any of the other potential "other waters" options that allow for asserting categorical jurisdiction over subcategories of "other waters."

[81] U.S. EPA Science Advisory Board Quality Review Teleconference (Sept. 26, 2014) (Statements of Dr. Michael Dourson).
[82] GEI Report, Exhibit 6 at 2.
[83] Id.
[84] Id. at 3.

> None of these determinations or assertions of jurisdiction is supported by the Proposed Rule's underlying science, which, as noted in the GEI Report, did not consider or quantify the significance of connections for downstream waters.[85] To correct this major shortcoming, the agencies should withdraw the rule, engage with stakeholders, and conduct additional scientific review. (p. 84-87)

Agency Response: **See 9(a-i) and please also see the Process Compendium (Topic 13) and the Legal Compendium (Topic 10). In addition, regarding tributaries, the SAB found, "[t]here 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 process." Regarding adjacent waters and wetlands, the SAB stated, "[t]he available science supports the EPA's proposal to include adjacent waters and wetlands as a waters of the United States. …because [they] have a strong influence on the physical, chemical, and biological integrity of navigable waters."** ***Id.***

> **The Science Report noted the incremental and cumulative effects that streams, tributaries, and adjacent waters and wetlands have on downstream systems. The Science Report found that the scientific literature unequivocally demonstrated that streams, individually or cumulatively, exert a strong influence on the integrity of downstream waters and that all tributary streams, including perennial, intermittent, and ephemeral systems, are physically, chemically, and biologically connected to downstream systems. The SAB (p. 35) concluded that the Science Report, "provides strong scientific support for these conclusions and findings."**
>
> **Regarding adjacent waters and wetlands, the Science Report (p. 4-44) concluded that the "…cumulative influence of many individual wetlands within watersheds can strongly affect the spatial scale, magnitude, frequency, and duration of hydrologic, biological, and chemical fluxes or transfers of water and materials to downstream waters." The SAB (p. 56) similarly noted that non-floodplain wetlands may individually have "minimal connections to downstream waters, the cumulative impact of these diffuse connections is *tremendously important* [emphasis added] to the maintenance of downstream biota and ecosystem integrity." Also, the Science Report (p. ES-3) found that wetlands and open waters in non-floodplain landscape settings provide numerous functions that benefit downstream water integrity, and that these non-floodplain wetlands occur along a gradient of connectivity. On one end of the spectrum, the functions of non-floodplain wetlands clearly affect the condition of downstream waters if a visible (e.g., channelized) surface-water or regular shallow subsurface-water connection to a river network is present. Non-floodplain wetlands without such visible surface-water or regular subsurface-water connections occupy the other end of the connectivity**

[85] GEI Report, Exhibit 6 at 3.

spectrum, and the Science Report found that generalizations about their specific effects on downstream waters are difficult because information on both connectivity and function are needed. However, the Science Report concluded that the "…cumulative influence of many individual wetlands within watersheds can strongly affect the spatial scale, magnitude, frequency, and duration of hydrologic, biological, and chemical fluxes or transfers of water and materials to downstream waters." The SAB (p. 56) similarly noted that while non-floodplain wetlands may individually have "minimal connections to downstream waters, the cumulative impact of these diffuse connections is *tremendously important* [emphasis added] to the maintenance of downstream biota and ecosystem integrity."

Water Advocacy Coalition (Doc. #17921.14)

9.68 Perhaps because the SAB Panel (USEPA 2014a) has stressed the need for the Agencies to recognize the connectivity gradient and to provide scientific support in other areas where it was lacking, the Agencies included a litany of citations to literature in the Proposed Rule (preamble and Appendix A) that were not included in the Connectivity Report. It is unclear the extent to which the SAB Panel has reviewed this additional literature in detail, but their comments clearly indicate that use of the terms "significance" and "significant nexus" in the Proposed Rule were vague. Therefore, as discussed in more detail in the following sections, the additional studies cited by the Agencies largely fail to assess the significance of connectivity and, therefore, do not actually provide support for the Proposed Rule's categorical assertions of jurisdiction. (p. 174)

Agency Response: 9(f), 9(g), and 9(h). Also, the Science Report (p. ES-3) found that wetlands and open waters in non-floodplain landscape settings provide numerous functions that benefit downstream water integrity, and that these non-floodplain wetlands occur along a gradient of connectivity. On one end of the spectrum, the functions of non-floodplain wetlands clearly affect the condition of downstream waters if a visible (e.g., channelized) surface-water or regular shallow subsurface-water connection to a river network is present. Non-floodplain wetlands without such visible surface-water or regular subsurface-water connections occupy the other end of the connectivity spectrum, and the Science Report found that generalizations about their specific effects on downstream waters are difficult because information on both connectivity and function are needed. However, the Science Report concluded that the "…cumulative influence of many individual wetlands within watersheds can strongly affect the spatial scale, magnitude, frequency, and duration of hydrologic, biological, and chemical fluxes or transfers of water and materials to downstream waters." The SAB (p. 56) similarly noted that while non-floodplain wetlands may individually have "minimal connections to downstream waters, the cumulative impact of these diffuse connections is *tremendously important* [emphasis added] to the maintenance of downstream biota and ecosystem integrity."

9.69 The Agencies' decision to categorically regulate most ditches as tributaries is not supported by the science. This categorical assertion of jurisdiction is based on the flawed premise that any connection, hydrological, chemical, or biological, of any strength

represents a significant nexus with regard to the jurisdictional determination. As discussed in our previous comments, the Connectivity Report considers ditches and canals only as conduits that increase the hydrological and biological connectivity between "other waters" (streams, wetlands, and prairie potholes) and downstream waters, but no scientific literature is presented that suggests ditches themselves should be considered water bodies, nor that evaluates the effects that ditches have on the integrity of downstream waters. The Connectivity Report discusses more extensive literature on the variable effects of dams on hydrological and biological flux, but only in reference to biological connections through ditches. In fact, the Connectivity Report acknowledges, "Most of these studies cite only anecdotal evidence for dispersal through ditches." (p. 174-175)

Agency Response: 9(m), also see Ditches Compendium (Topic 6).

9.70 No scientific literature was specifically cited to support the Agencies' assertion that the "significant nexus between a tributary and a traditional navigable water or interstate water is not broken where the tributary flows through a culvert or other structure." Indeed, the science actually suggests that such breaks can alter connectivity and, in some cases, may render the connections insignificant.

The Agencies assert that "structures that convey water do not affect the connectivity between streams and downstream rivers," (Proposed Rule at 22,235) but this statement is inaccurate because the literature clearly indicates that the connection between upstream and downstream waters is affected by structures such as culverts and low-head dams. The strength of connectivity is altered by conveyance structures and is sometimes reduced to the point that streams no longer have a strong connection with downstream waters, and the scientific literature supports the assertion that this lack of connection can affect migration of biota. For example, Poff et al. (2007) describes the extensive limiting effects of dams on the access of migratory fish to spawning habitat.

The Connectivity Report also includes a discussion of the effects of dams, and concludes that dams alter connectivity in multiple ways (Section 3.4.4, Human Activities and Alterations). Dams increase the hydrologic connectivity between the river and floodplain upstream through flooding, and decrease the connectivity of the river and floodplain downstream through flow mitigation, which reduces the frequency of overbank flows. The studies cited by the Agencies do not even support categorical jurisdiction where dams are present. See Greathouse et al., (2007), which does not measure the amount of remaining connectivity and Hall et al., (2011), which could be used to support the argument that dams stop all biological connectivity.

In addition, in 2011, a series of papers published in the Journal of the North American Benthological Society described studies designed to assess or restore hydrological connectivity in small streams (Keller et al. 2011). This series of papers specifically addresses the effects of culverts and small dams on the movements of biota, but it was not cited in the Proposed Rule nor in the Connectivity Report. For example, Foster and Keller (2011) tested the ability of crayfish species to migrate upstream through culverts in Michigan, and found water velocities were greater in culverts than in the nearby streams, and that the greater velocity in the culverts limited upstream migration of native crawfish more than it limited non-native crawfish. The authors concluded that that the

increased accessibility to habitat and resources held by the non-native species would likely result in the eventual decline in the native species as they compete for resources in a limited space. This study demonstrates that biological connectivity for some species is limited or even broken by culverts.

In sum, the science does not support the Agencies' assertion that a significant nexus between a tributary and a traditional navigable water is not broken where the tributary flows through a culvert or other structure, and the literature cited by the Agencies is incomplete. Such manmade breaks can alter and sometimes reduce connectivity to the point where the tributary lacks a meaningful connection with downstream traditional navigable waters. (p. 175-176)

Agency Response: **In response to SAB comments on the influence of human activity on connectivity, ORD added an overview of human alterations that affect connectivity and downstream water integrity to the Introduction of the final Science Report (Report Section 1.2.4). This overview supplements existing information about human alterations in the Streams chapter (Report Chapter 3) and Wetlands chapter (Report Chapter 4). Additional examples of human alterations that impact connectivity and downstream water integrity were added to chapters 3 and 4 (See also: response to SAB report sections 3.3.3, 3.3.4, 3.3.6, 3.6.2, and 3.7.6). The examples cited in the above comment illustrate that human modifications (dams, culverts) can disrupt biological connectivity. The comment thus seems to agree with EPA that areas upstream and downstream of the modification were originally connected and upstream areas influenced those downstream. The modification then increased biological isolation between upstream and downstream habitats—that is, the loss of pre-existing connectivity affected downstream waters. The comment also fails to acknowledge that biological connectivity is only one type of connection. As the SAB repeatedly stated, human modifications can also increase connectivity. For example, hydrologic connectivity is often increased by culverts (as is reflected by the increased water velocities in culverts in the Foster and Keller (2011) example cited above).**

Western States Land Commissioners Association (Doc. #19453)

9.71 Whereas, the draft report the EPA claim s as support for the Proposed Rule has not been finalized, has not undergone mandatory final peer review by the Science Advisory Board, and has not incorporated a rigorous analysis of the relationship of ephemeral systems to traditional navigable waters, instead lumping together ephemeral and intermittent systems as a basis to assert blanket jurisdiction over all tributaries (p. 3)

Agency Response: **9(a) and 9(e)**

Southern Nevada Home Builders Association (Doc. #3251)

9.72 The scientific conclusions and findings set forth in Connectivity Study are based on a very broad and unspecific analysis of water systems generally in the United States. The Connectivity Study fails to properly analyze or take into account any of the unique hydrologic and geographic conditions of the southwestern regions of the United States. It seems quite obvious that the river and water systems of the arid Southwest, which are comprised of various dry washes and riverbeds, ephemeral streams and washes and small

streams with limited or intermittent flows (and many of which are located significant distances from any interstate or navigable waters), require a different scientific analysis than the water systems and wetlands of the other parts of the country (such as the Pacific Northwest, the Midwest, East Coast or South). Nevertheless, the Connectivity Report seems to lump all of these river and tributary systems together into the same category without any a specific analysis or consideration of the hydrologic, geographic, climate or other unique conditions of the water systems of each specific region. As a result of these deficiencies and failures, the findings and conclusions of the Connectivity Study appear to be overstated and result in an ultimate finding that all head waters, tributaries, streams, washes, rivers and other similar features that handle water flows (regardless of the size, flow or location (i.e., distance from any "traditional navigable water" (TNW), interstate water or territorial sea) thereof are sufficiently connected to justify regulation under the CWA. (p. 1-2)

Agency Response: 9(i)

Kolter Land Partners and Manatee-Sarasota Building Industry Association (Doc. #7938.1)

9.73 The Connectivity Report falls short of providing the kind of scientific analysis necessary to establish a solid foundation for a Proposed Rule on CWA jurisdiction. Indeed, the Report merely documents the *presence* of connections between water bodies, yet fails to provide the basis needed to determine when such connections may or may not *significantly affect* downstream waters. (p. 2-3)

Agency Response: 9(b), 9(f), 9(g), and 9(h)

North Houston Association et al. (Doc. #8537)

9.74 Several studies are referenced in the Proposed Rules as the basis for "other waters" in the WGCP being similarly situated, meeting the significant nexus test. We find these studies to be quite limited in their scope, and thus limited in usefulness for determining such an important regulatory expansion, due to the broadly diverse nature of the WGCP. The few studies cited for consideration of inclusion of the WGCP as "similarly situated" are clearly not representative of the WGCP as a whole. Following are comments to specifically address issues that we have with three of the studies that touch on the WGCP and the Greater Houston area. [ ] ….

Forbes et al, 2012: Nutrient Transformation and Retention by Coastal Prairie Wetlands, Upper Gulf Coast Texas

- The Forbes study team collected baseline water quality data from 12 coastal prairie wetlands (CPW). While we understand that studies do require known quantities in order to achieve technical and quantifiable validity, the WGCP is comprised of literally thousands of depressions - remnant and natural at all elevations of the WGCP landscape. Forbes does not apply a uniform approach to selection of study wetlands up and down the slope of the watershed.
- Only half of the CPW were tested for hydrologic connection.
- Four of the six CPW are located within the 100 year floodplain (100 YFP) and are not "at dispute" as to their significant nexus status. The 100 YFP is widely used

by regulators to demonstrate significant nexus - it shows a bidirectional connection to the water body for which the 100 YFP was mapped -typically a tributary that is jurisdictional by rule.

- Forbes states sites varied in proximity to the mapped floodplain; however, Forbes also states most sites were connected to nearby TNW by channels or ditches of less than 1 kilometer (km). Direct hydrologic connections to TNW are jurisdictional by rule, as well.
- Nutrient export from the CPWs is based on the mean nutrient concentration in the CPW and not from water discharged from the CPW. Runoff influenced by heavy rainfall common to the region could skew water chemistry data as the nutrient data is a "snapshot" of the water chemistry, it does not attest to the value of chemical integrity for a TNW, perhaps far removed from the CPW for which the snapshot was taken. Forbes infers that CPW water is completely displaced by rain water in a single event; no evidence (i.e., empirical data) is provided to substantiate this inference and so no chemical assimilation can be quantified to determine if the wetland just has chemicals in its water column or if the wetland is performing a function by removing chemicals from the watershed.

Wilcox et al 2011. Evidence of surface connectivity for Texas Gulf coast depressional wetlands.

This paper takes a cluster of small wetlands on drainage in Armand Bayou Park and improperly generalizes the results to the entire Texas Gulf Coast. The paper asserts that the wetlands studied are "geographically isolated," which leads the reader to believe that these wetlands would not be jurisdictional under today's rules and practices. This is not the case; each wetland would be considered adjacent with bidirectional flow and location within the 100 YFP. Although the paper states that these wetlands are located just outside the 100 YFP this statement appears to be in error. The gauge location for the study appears to have been placed at elevation +12 feet above mean sea level (MSL). The study area is approximately 625 feet from Armand Bayou (at a point where the Bayou is tidally influenced). There is a defined channel with bed and bank connecting the study site to the Bayou. The Preliminary FEMA map shows the entire study area well within the 100YFP with a base flood elevation of +14 MSL (2 feet above the study site elevation). Also there are a variety of factors that affect the value of the study to generalize to the entire WGCP. For example, the author states that soils in the study area are "significantly wetter" than what is described for this soil type.

Conclusions from this study are very general and unclear as to whether each conclusion is made for the study area or extrapolated to the Pleistocene Texas Gulf Coastal Plain. For example, Wilcox concludes that "most of these wetlands appear to be connected by intermittently flowing channels that are vegetated with wetland plants and containing wetland soils (Jacob and Lopez 2005; Sipocz 2005); on that basis, the wetlands do not strictly meet the definition of "geographic isolation." The use of the term "channel" has regulatory implications; however, regulation thereof typically occurs only if there is bed and bank and at least intermittent flow ending in a TNW. The author implies that "most" are connected by channels; as land management practitioners in the Gulf Coast region for more than 40 years, Wilcox's statement is simply not true. The author's assertion that the

wetlands "discharge excess water downslope, and their runoff is significant" is both a simplistic statement and no different for any geographic feature that exceeds its water holding capacity, including uplands.

Other Points regarding Wilcox et al.;

- Wilcox asserts that wetlands on the Pleistocene Texas Gulf Coastal Plain are deemed geographically isolated. This assertion is misleading in that a reader could conclude that all such wetlands are not considered jurisdictional under current interpretations of regulatory guidance. Quite the contrary, wetlands located within the mapped 100 YFP are regulated as adjacent wetlands.
- The Corps/EPA should require performance of an Approved Jurisdictional Determination (JD) on each wetland before using Wilcox as a primary reference for III Ecoregion 34.
- The study site for Wilcox is approximately 625 feet from Armand Bayou whose confluence with the Galveston Bay system is approximately 2 miles downstream. From the study wetland, there is a defined bed and bank channel connecting to Armand Bayou the latter of which is considered tidal within this reach; the wetland study gauge is near the dividing line between the mapped 100 YFP and 500 YFP. Overall, the study wetland is not a wetland whose jurisdictional status is at issue in the Coastal Plain of Texas.
- A revised preliminary FEMA panel shows the entire study area well within the 100 YFP with a base flood elevation of +14 feet MSL (i.e., the study site would be 2 feet under water during a 100-year event) http://maos.riskmap6.com/TX/Harris/. Each coastal Texas County was restudied to include a storm surge such as that experienced during Hurricane Ike in 2008 and significant portions of coastal counties that were remapped by FEMA have floodplains that have extended the jurisdiction of the CWA to wetlands previously not regulated as adjacent.
- Wilcox states the soils in the study area watershed are significantly wetter than what the Natural Resources conservation Services (NRCS) describes for this soil type. This statement reiterates why this site should not be used as a typical isolated wetland; the study wetland would be considered to have significant nexus under current interpretation of guidance.
- Wilcox provides little information as to how the 20-acre watershed boundary was delineated for the study wetland. Wilcox states that the boundary was easily discernible and that water flow direction was used in some instances. Depressional wetlands along the Texas coast are by definition located in flatlands; accurately defining a very small sub-watershed requires more precision than a qualitative assessment. Across the larger WGCP, significant numbers of depressional wetlands have been leveled by land planning to facilitate the production of rice. It would be virtually impossible to determine the sub-watershed of such a wetland where the contour interval between rice paddocks is 0.2 feet.

- The wetland boundary and catchment area are important variables in the study data output; if more runoff flows into the defined catchment area, the runoff/precipitation ratio could be dramatically impacted. Such a situation begs the question: Why wasn't a stronger scientific method (e.g., such as civil survey of elevations) used to determine this boundary? Even if there was a minor ridge defining the sub-catchment basin in the study, larger rain events could cause heavy runoff through the subject wetland sub-watershed. The flat topography of the surrounding area makes it very possible that the subject watershed is significantly larger resulting in a reduced calculated runoff percentage from the catchment area. This exact circumstance is noted in the previously mentioned Enwright study.
- The study duration experienced widely variable environmental conditions - extreme drought to above normal rainfall. 24 of 45 months had zero run-off recorded; 5 of the months experienced average to above average rainfall.

Enwright et al (2011): Using Geographic information Systems (GIS) to Inventory Coastal Prairie Wetlands Along the Upper Gulf Coast, Texas

The 32 topographic quadrangle maps used are not typical of the WGCP and focus on the middle eastern portion of the Texas Gulf coast around Galveston Bay. The paper uses the same wetlands studied in Forbes (2012), with all the same attendant flaws. Again, when wetlands that are already jurisdictional are removed from consideration, the case for significant nexus is greatly diminished.

Additional Concerns:

- The 32 topo quads used for the study do not topographically or geographically represent all of the Texas Coastal Plains, particularly west of the study area.
- The 12 CPW in Enwright are the 12 base data sites used by Forbes (2012; see Forbes review above for flaws in these sites).
- The conclusion of this report states “CPWs and their catchments cover 35-40% of the land area confirming the significance of these wetlands to regional ecological processes!” When the wetlands mapped within the 100 YFP are removed from the study (i.e., these wetlands are already considered jurisdictional under current guidance), the 35-40% landmass is drastically reduced.
- Experiences in areas of the WGCP indicate a highly variable percentage of wetlands on the landscape. In the west Houston area (Katy Prairie etc., a general rule of thumb is 10-20% wetlands). Other areas are markedly different.

In summary, these three studies are being used to draw conclusions that cover a tremendously large and diverse area from the coast to hundreds of miles inland, elevations zero to hundreds of feet, with diverse geology, hydrology, soils, and biota. All of the study areas referenced in the three studies are located near the coast and many at very low elevations. Indeed the maximum elevation for any wetland studied is t35 feet MSL. Additionally, many of the wetlands in the studies are already subject to CWA jurisdiction. Overall, the limited and targeted nature of these studies do not provide sound data to conclude that the Western Gulf Coast Plain (i.e., Ill Ecoregion 34), or any sizable

sub-delineation of that Ecoregion, is clearly connected to traditional navigable waters in such a way as to have a significant nexus. (p. 6-9)

Agency Response: **9(i). The referenced papers provide examples of wetlands within a geographic setting that share certain characteristics. Further, the Wilcox et al. (2011) paper demonstrates that there are wetlands in this area that do not have connections to a stream when considered separately but are connected to a stream when considered together as a complex of wetlands. Thus these papers demonstrate that, at least in this part of the Texas coast, there are wetlands that share important characteristics and functions. It is common in scientific investigations to use case studies such as these as examples of possible behavior across a broader region, when more specific information on the broader region is unavailable. Specifically, the fact that similar characteristics and functions were observed in these three papers suggests that similarities in characteristics and functions could also be observed more broadly throughout the Texas and Gulf coasts.**

Portland Cement Association (Doc. #13271)

9.75 This fact is made clear in the SAB's September 30, 2014 letter, in which it not only confirms the scientific basis for evidence of the connectivity between downstream traditionally navigable waters and upstream ephemeral tributaries and their adjacent wetlands, but goes further and identifies even further connections which can – and it believes should - be drawn from a scientific perspective.

For example, in that letter, the SAB suggests expanding the definition of "tributary" in the rule to include features for which there is evidence of flow other than an ordinary high water mark.[86] The SAB also implies that groundwater should be used as a basis for jurisdiction[87] and then states that the CWA exclusions for groundwater are not scientifically justified.[88] It also suggests that other exclusions are not scientifically justified, such as those for ditches, gullies, rills, non- wetland swales, artificial lakes and

[86] *Id*. at 2. ("The Board advises the EPA to reconsider the definition of tributaries because not all tributaries have ordinary high water marks. An ordinary high water mark may be absent in ephemeral streams within arid and semi-arid environments or in low gradient landscapes where the flow of water is unlikely to cause an ordinary high water mark. The Board advises the agency to consider changing the wording in the definition to "bed, bank, and other evidence of flow." In addition, tributaries are not typically defined to include lentic systems (e.g., lakes, ponds, wetlands). Thus, the EPA may want to consider whether flow-through lentic systems should be included as adjacent waters and wetlands, rather than as tributaries.")

[87] *Id*. at 3 ("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.")

[88] *Id*. at 3. ("The Clean Water Act exclusions of groundwater and certain other exclusions listed in the proposed rule and the current regulation do not have scientific justification. For example, the Clean Water Act excludes groundwater, including groundwater drained through subsurface drainage systems. The available science, however, shows that groundwater connections, particularly via shallow flow paths in unconfined aquifers, can be critical in supporting the hydrology and biogeochemical functions of wetlands and other waters. Groundwater also can connect waters and wetlands that have no visible surface connections.")

ponds, reflection pools, and engineered structures.[89] In short, it concludes that science does not support excluding any waters at all from CWA jurisdiction.[90]

While these points may be correct from a scientific perspective, several are directly counter to the language of the CWA and in sum they show that science provides no basis for distinguishing between jurisdictional and nonjurisdictional waters. In short, the SAB's affirmation of the Agencies' Proposed Rule proves too much. While the Agencies would like to rely on the connectivity study and the SAB opinion as support for the Proposed Rule, they are not. If all waters are connected, even groundwater, then science in general and the connectivity study in particular provides or no guidance to the Agencies as to what connections should be considered "significant." Since they provide no distinction between jurisdictional and nonjurisdictional waters, instead deeming that all waters are connected, they do not support the jurisdictional/nonjurisdictional line that the agencies have proposed. In short, the science and the law do not mesh and EPA cannot rely on science to make what is essentially a legal and public policy decision.

Moreover, this problem is not the result of any failings of the SAB, but instead of the inadequate Technical Charge which the Agencies have given the SAB.[91] That charge essentially asks the SAB to confirm the scientific basis for the connectivity report and its conclusions. But by providing the SAB with a report that states that all waters are

[89] *Id.* at 3-4 ("The proposed rule identifies other exclusions not justified by science. There is, for example, a lack of scientific knowledge to determine whether ditches should be categorically excluded. 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. Although gullies, rills, and non-wetland swales are excluded by the rule, the proposed rule's preamble notes that these features can be important conduits for moving water between jurisdictional waters, making them important with respect to hydrological and other forms of connectivity. Also, although excluded from jurisdiction under the proposed rule, artificial lakes or ponds, or reflection pools, created by excavation, diking, or construction can be directly connected to jurisdictional waters by groundwater, which may be shallow as well as deep groundwater in unconfined aquifers. It is also not clear in the proposed rule how engineered structures would be treated, especially given changes in technology, urbanization, or economic sectors. Some examples of such changes in engineered structures include: (1) design of stormwater management systems that more closely mimic natural systems (i.e., low impact development technology); (2) demand for lower quality water sources that results in construction of desalination brine storage basins; (3) the impact of urbanization that has led to construction of artificial lakes and ponds that may have connections to downstream waters; (4) agricultural sectors that utilize aquaculture and rice paddies; and (5) expanding domestic energy production that results in construction of structures such as oil and gas tank basins and in-stream sediment ponds used to collect waste from surface coal mining.")

[90] *Id*. at 3 ("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. . . are similarly situated. . . and thus could be considered waters of the United States. . . . The Board notes, however, that the existing science does not support excluding groups of "other waters" or subcategories thereof.")

[91] The Technical Charge is available at http://yosemite.epa.gov/sab/sabproduct.nsf/fedrgstr_activites/7724357376745F48852579E60043E88C/$File/WOUS+SAB+Charge+Questions+Final+v2.pdf The Technical Charge is essentially a request for the SAB's views on (1) the clarity and technical accuracy of the draft Report and Chapter 3, (2) whether the Report includes the most relevant published peer reviewed literature with respect to ephemeral, intermittent, and perennial streams and whether that literature has been correctly summarized, (3) whether the conclusions and findings in sections 1.4.1, 1.4.2 and 1.4.3 of the Report are supported by the available science, and (4) whether the Report includes the most relevant published peer reviewed literature with respect to bidirectional and unidirectional wetlands and open waters.

connected and asking it if it can confirm that fact, the Agencies have failed to ask the SAB how to draw a distinction between jurisdictional waters and non-jurisdictional ones-i.e., between upstream waters that have a significant nexus to downstream traditionally navigable waters and those that do not. In its comments on the draft report, the SAB has implicitly recognized this problem and even suggested a potential solution. For example, in its October 17, 2014 cover letter forwarding EPA its analysis of the connectivity report,[92] the SAB notes that

The Report often refers to connectivity as though it is a binary property (connected versus not connected) rather than as a gradient. In order to make the Report more technically accurate, the SAB recommends that the interpretation of connectivity be revised to reflect a gradient approach that recognizes variation in the frequency, duration, magnitude, predictability, and consequences of those connections.[93]

Thus, since connectivity exists on a gradient and, as described above, the SAB believes that almost all upstream waters are connected with downstream, the Agencies cannot simply state that all connected waters have a significant nexus. They must identify where on this gradient waters have a "significant nexus" and where they do not. The connectivity report fails to provide any basis for such a distinction and the Agencies have failed to ask the SAB this question. Therefore the SAB's review of the connectivity report fails to provide the agencies with useful support for the Proposed Rule. (p. 10-12)

Agency Response: 9(b), 9(d), 9(f), 9(g), 9(h), 9(i), 9(j), and 9(l).

Building Industry Association of Washington (Doc. #13622)

9.76 The purported scientific literature also fails to explain how intrastate waters not previously subject to the CWA, significantly affect downstream waters; the literature appears to hastily conclude that there are connections without explaining when connections could be significant. Accordingly, this rushed, incomplete, science should not be given much weight. (p. 4)

Agency Response: 9(f), 9(g), 9(h), 9(i), and 9(l).

National Ready Mixed Concrete Association (Doc. #13956)

9.77 NRMCA asks that EPA transparently address how the final study will be integrated into the Proposed Rulemaking. While the report is an important tool, as NRMCA previously mentioned in comments on the report, we are concerned that an assessment of hydrological connectivity is not the same as an examination of what creates a "significant nexus" in line with the legal precedent from the Supreme Court. We expect EPA to use the report, with input from stakeholders and the public, to determine the line between "any nexus" and a "significant nexus" worthy of CWA protections. We suggest the agencies do outreach to stakeholder groups, similar to what they have done during the comment period on the Proposed Rule, and accept comments on how best to integrate the

[92] Available at http://yosemite.epa.gov/sab/sabproduct.nsf/WebBOARD/AF1A28537854F8AB85257D74005003D2/$File/EPA-SAB-15-001+unsigned.pdf

[93] *Id*. at p. 2. See also, id. at p. 3 ("the EPA should recognize that there is a gradient of connectivity.")

report and Proposed Rule, especially its use in addressing jurisdiction over "other waters."[94]

NRMCA is encouraged to see that the agencies have not requested comments on the definition of "wetlands" as they are using the same definition as the current regulations.[95] However, in our comments on the report we noted that: "we are concerned that the report uses a greatly expanded lexicon of wetland types in the report including 'riparian,' 'flood plain,' 'geographically isolated,' 'bidirectional' and 'unidirectional' which are not in the current legal or regulatory framework. While the scientific literature may support these distinctions, we are concerned that they will add to confusion and greater legal and regulatory uncertainty."[96] We are uncertain about how the agencies will use the information regarding connectivity from these different types of wetlands, when they are not the same as the wetlands covered under the CWA. We are concerned that utilizing the report as a basis for their regulating will inadvertently include new types of wetlands.

Generally, we would like to note that both the report and the Proposed Rule treat all wetlands, and additionally all waters, as equally ecologically valuable, and worthy of full CWA protection without making the case that they are. NRMCA agrees that some wetlands and remote water features are worthy of protection and conservation. However, not distinguishing between waters of different ecological values has caused the agencies to write imprecise, broad language that creates absurd regulatory scenarios which impose the same requirements on features designed to protect water quality, such as stormwater ditches and ponds, as they do on the waters those features are designed to protect. (p. 5-6)

Agency Response: 9(f), 9(g), 9(h), and 9(l). Also, see the preamble and TSD regarding stormwater features.

9.78 Additionally, NRMCA is extremely concerned about the agencies' use of "shallow subsurface hydrologic connection or confined subsurface hydrologic connection," to assert jurisdiction. In our comments on EPA's "Connectivity of Streams and Wetlands to Downstream Waters: A Review and Synthesis of the Scientific Evidence (September 2013)" report we noted that "… we are concerned about the emphasis on groundwater connections between waters that are cited throughout the report. Groundwater has never been considered jurisdictional under the CWA and we are concerned that its inclusion in this report will again add to confusion and greater legal and regulatory uncertainty."[97] (p. 8)

Agency Response: 9(j)

El Dorado Holdings, Inc. (Doc. #14285)

9.79 Neither the rule nor the connectivity study that supports it identify an upward limit on jurisdiction or a basis for doing so, but Justice Kennedy clearly envisioned some objective basis for determining jurisdictional status, particularly when waters were being evaluated collectively (rather than individually). (p. 7)

[94] 79 FR 22189
[95] 79 FR 22190
[96] NRMCA Comments to Docket-ID EPA-HQ-2013-0582 (November 4, 2013)
[97] NRMCA Comments to Docket-ID EPA-HQ-2013-0582 (November 4, 2013)

Agency Response: 9(f), 9(g), 9(h), and 9(k).

9.80 In the fall of 2013, EPA released a report entitled *Connectivity of Streams and Wetlands to Downstream Waters; A Review and Synthesis of the Scientific Evidence* (September 2013 external review draft, EPA/600/R-11/098B) ("***Connectivity Report***"). EPA then requested that its Science Advisory Board ("***SAB***") review the report, and the SAB convened a panel of external reviewers ("***panel***") to assist it in reviewing the Connectivity Report. The panel provided comments to the SAB on the scientific and technical basis of the Proposed Rule (see correspondence from Dr. Amanda Rodewald to Dr. David Allen, dated September 2, 2014).[98] The SAB then provided comments on that same topic to EPA (see correspondence from Dr. David Allen to EPA Administrator, Gina McCarthy, dated September 30, 2014).[99] In addition, the SAB and the panel provided comments to EPA on the draft Connectivity Report on October 17, 2014 ("***panel comments***").[100]

The SAB and the panel addressed only the scientific and technical issues raised in the connectivity report. As noted by the SAB in its September 30 correspondence to EPA (p. 4), "significant nexus is a legal term, not a scientific term." The panel made a similar point, noting in the panel comments (p. 1) that the Connectivity Report "is a scientific review and, as such, it does not set forth legal standards for Clean Water Act jurisdiction." In other words, even though EPA, the SAB and the peer reviewers had reached the somewhat unsurprising conclusion that as a scientific matter, many waters are connected to one degree or another, they were not addressing the legal question of which waters have a significant nexus (for purposes of Clean Water Act regulation) with downstream traditional navigable waters, and which do not. In fact, the question of what constitutes a "traditional navigable water" – with which the significance of any nexus should be addressed – is, unsurprisingly, not addressed in the Connectivity Report or the panel comments, given the legal (rather than scientific) nature of that term.

The "everything is connected" approach reflected in the Connectivity Report and the panel is nowhere more evident than in the panel comments' recommendation (p. 18) that the Connectivity Report highlight the flow pathway of water from "reef to ridge," with upland and groundwater flows "potentially passing through or otherwise interacting with waters and wetlands along the way." Similarly, from a scientific (rather than legal) standpoint, the SAB and the panel contend that the expansive agency proposal may not have gone far enough in regulating waters (specifically, they suggest that groundwater, ditches, gullies and rills, artificial lakes or ponds and reflecting pools, and channels without an ordinary high water mark ought perhaps to be regulated). *See* September 30, 2014 correspondence, at 2-3.

[98] Available at: http://yosemite.epa.gov/sab/sabproduct.nsf/F6E197AC88A38CCD85257D49004D9EDC/$File/Rodewald_Memorandum_WOUS+Rule_9_2_14.pdf (accessed October 1, 2014).

[99] Available at: http://yosemite.epa.gov/sab/sabproduct.nsf/RSSRecentAdditionsBOARD/518D4909D94CB6E585257D6300767DD6/$File/EPA-SAB-14-007+unsigned.pdf (accessed October 1, 2014).

[100] Available at: http://yosemite.epa.gov/sab/sabproduct.nsf/AF1A28537854F8AB85257D74005003D2/$File/EPA-SAB-15-001%20unsigned.pdf (accessed October 24, 2014).

The fact that the SAB and the panel suggest regulation of features that have never been regulated under the CWA, even prior to the *Rapanos* and *SWANCC* decisions, suggests how little their conclusions do to address the challenge presented by the *SWANCC* and *Rapanos* decisions: to distinguish between waters with a "significant nexus" to TNWs and those that have merely a "speculative or insubstantial" effect on TNWs.

Recommendation: The SAB and panel analyses should be understood for what they are: scientific assessments rather than explanations of the *legal* term "significant nexus" as used by Justice Kennedy. (p. 48-50)

Agency Response: 9(d), 9(f), 9(g), 9(h), 9(i), and 9(l).

CalPortland Company (Doc. #14590)

9.81 The Agencies' draft report on the connectivity of upstream and downstream waters and the Science Advisory Board's analysis of that report do not support the Proposed Rule – they indicate that almost all upstream and downstream waters are connected and therefore provide no basis for determining which of those connections are significant and which are not. (p. 1-2)

Agency Response: 9(f), 9(g), 9(h), 9(i), and 9(l).

Perkinscoie (Doc. #15362)

9.82 If the agencies were to take into consideration actual on-the-ground observations of these features, it would be clear that categorizing these arid headwater streams as jurisdictional is both unjustified and unwarranted. But instead of real-world observations, the mistaken proposal to categorize all of these southwest arid headwater streams as jurisdictional under the Proposed Rule is based on the conclusions of connectivity in the Draft Connectivity Report. This is problematic because the report is essentially devoid of any focus, examination, or evaluation of these types of arid headwater streams and their connectivity to other waters. As a threshold matter, the Draft Connectivity Report's study of southwestern conditions shows a fundamental lack of distinction between ephemeral washes and intermittent streams in the southwest, including their size, location, climate, topography, soil types, and other functions. This results in conclusions on the connectivity of arid headwaters that are fatally overbroad. In addition, of the 1,016 publications on which the conclusions in the Draft Connectivity Report (and, by extension, the Proposed Rule) are based, only eight include research with any applicability to low order streams in general, and only three include research on arid west headwaters in small watersheds (like the ones discussed in the SWCA Report). See SWCA Report at 3-8. Moreover, none of these eight studies make an attempt to quantify the significance of arid headwater streams· nexus (or lack thereof) to downstream waters. Because the alleged connectivity of these types of headwaters to downstream tributaries is the basis for the Proposed Rule's sweeping jurisdiction over such headwaters, the Southwest Developers urge the agencies to seriously consider the science (or the lack thereof) behind the Draft Connectivity Report's conclusions on this issue. If they do so, we are confident that the agencies will see that there are strong reasons- namely. their lack of *significant* connection to navigable waters- to remove southwest arid headwater streams from the umbrella of categorical CWA jurisdiction. (p. 2-3)

Agency Response: 9(i)

CEMEX (Doc. #19470)

9.83 The agency's reliance on its "connectivity study" essentially transforms a handpicked aggregation of scientific studies into the controlling legal interpretation of "waters of the United States. II The legal interpretation should start with the limits set out by Justice Kennedy in his Rapanos opinion and determine how scientific evidence should be interpreted to define a "bright line" between "any nexus" and "significant nexus." (p. 3)

Agency Response: 9(d). Also see the TSD.

National Association of Home Builders (Doc. #19540)

9.84 Waters exist along a continuum of connectivity from isolated to directly integrated with nearby waters.[101] Indeed, EPA's Office of Research and Development, EPA's SAB, and the Agencies themselves all recognize that connectivity between waters exists along such a gradient:

Draft Connectivity Report: "Unidirectional wetlands occur along a gradient of hydrologic connectivity-isolation with respect to river networks, lakes, or marine/estuarine water bodies."[102]

SAB Final Review of the Draft Connectivity Report: "The [Connectivity] Report often refers to connectivity as though it is a binary property (connected versus not connected) rather than as a gradient. In order to make the [Connectivity] Report more technically accurate, the SAB recommends that the interpretation of connectivity be revised to reflect a gradient approach that recognizes variation in frequency, duration, magnitude, predictability, and consequences of those connections."[103]

Proposed Rule: "There is a gradient in the relation of waters to each other, and this is documented in the [Connectivity] Report."[104]

In spite of this broad recognition, the proposal fails to acknowledge this gradient of connectivity or the points at which various connections significantly affect the chemical, physical, and biological integrity of waters and thereby satisfy Justice Kennedy's "significant nexus" test. As it is written, the Proposed Rule treats connectivity as a binary property (connected versus not connected) rather than a gradient.

Unfortunately, this approach fails to recognize the importance of variability in flow between waterbodies. Flow parameters are critical in determining how and to what degree a water significantly affects the chemical, physical, and biological integrity of

[101] Leibowitz, S.G. 2003. Isolated wetlands and their functions: an ecological perspective. Wetlands 23(3)517-531.
[102] Draft Connectivity Report at 1-12.
[103] Letter from EPA Science Advisory Board to Hon. Gina McCarthy, Subject: SAB Review of the Draft EPA Report Connectivity of Streams and Wetlands to Downstream Waters: A Review and Synthesis of the Scientific Evidence (Oct. 17, 2014) at Cover Letter (hereinafter, SAB Final Review of the Draft Connectivity Report).
[104] 79 Fed. Reg. at 22,193.

downstream waters.[105] For example, the greater the magnitude (i.e., discharge volume) of flow, the longer the duration of flow, and the greater the frequency of flow between a water and traditional navigable waters, the greater the probability that water will significantly affect the chemical, physical, and biological integrity of downstream waters. Indeed, EPA's SAB included a figure describing this phenomenon in its final review of the draft Connectivity Report (Fig. 2), where it depicts the decreasing probability of a water to affect a downstream water as the magnitude, duration, and frequency of flow between those waters decreases.[106] Importantly, the figure indicates there is a point along the connectivity gradient where connections between ephemeral streams and nonfloodplain / non-riparian wetlands become insignificant, with little or no probability of impacting downstream waters.

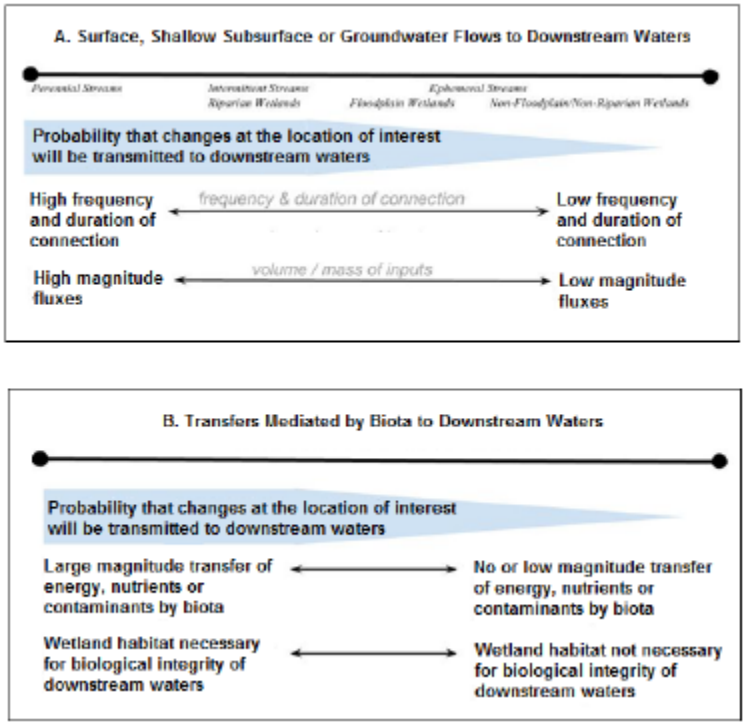

Figure 1. Hypothetical illustration of connectivity gradient and potential consequences to downstream waters. Panel A illustrates changes to downstream waters with increases in the magnitude, duration, and frequency of surface and subsurface connections. Panel B illustrates transfers mediated by biota to downstream waters. All streams (including perennial, intermittent, and ephemeral streams) have a connection to downstream waters. Within non-floodplain wetlands the degree of connectivity and implications for integrity of downstream waters vary considerably.

[105] Poff, N.L., J.D. Allan, M.B. Bain, J.R. Karr, K.L. Prestegaard, B.D. Richter, R.E. Sparks, J.C. Stromberg. 1997. The Natural Flow Regime. BioScience, Vol. 47, No. 11. 769-784; Allan. J.D. and M.M. Castillo. Stream Ecology, Second Ed. New York: Springer, 2007. Print.

[106] SAB Final Review of the Draft Connectivity Report at 54.

Figure 2: Figure 3 from EPA's Science Advisory Board's final review of the draft Connectivity Report indicating that hydrologic and biological connections between waters exist along a continuum.[107]

By failing to define "flow" and associated hydrologically and ecologically critical parameters, including magnitude, duration, and frequency, the Agencies wrongly consider all tributary flows to be equal in their ability to significantly affect the chemical, physical, and biological integrity of traditional navigable waters, interstate waters, and the territorial seas. In reality, hydrologic connectivity and the degree of subsequent physicochemical impacts on downstream waters exist along a gradient from insubstantial to significant. This gradient must be reflected in the approach the Agencies use to determine those waters that are "waters of the United States" and those that are not.

Echoing NAHB's apprehension, EPA's SAB has voiced strong concerns about the treatment of connectivity as an all-or-nothing phenomenon. In its final review of the draft Connectivity Report, the SAB as a whole stated, "the Report uses language that often suggests that connectivity is a binary property – something either present or absent, rather than a gradient. Many of the public commenters remarked that the binary perspective in the Report implies that any connectivity must significantly affect the biological, physical, or chemical integrity of downstream waters. This is not always the case. Although connectivity is known to be ecologically important even at the lower end of the gradient, the frequency, duration, predictability, and magnitude of connectivity will ultimately determine any consequences to downstream waters."[108] The SAB continued, "[T]he Report would be strengthened if it contained . . . additional review of the scientific literature that quantifies the frequency, duration, predictability, and magnitude of physical, chemical, and biological connections for each type of 'water' and *consequences of that connectivity for the physical, chemical, and biological integrity of downstream waters*, with key uncertainties made explicit. . ."[109] NAHB could not agree more.

In addition to the entire SAB, individual SAB panel members have also raised concerns regarding the binary manner in which the Agencies treat connectivity, and in turn, "significant nexus" in the Proposed Rule. Panelist Dr. Mazeika Sullivan commented, "[T]he collective scientific evidence indicates that there exists a gradient of connectivity between streams and wetlands and downstream waters. Although this gradient of connectivity is recognized at multiple locations in the Proposed Rule (e.g., 22193, 22198, 22223, 22226, 22248), this concept should figure as the conceptual backbone of the preamble in order to clearly establish the rationale for those cases where important connectivity exists and for those cases where it may not. This framework would then provide the basis on which subsequent discussion of various types of water bodies and whether or not a 'significant nexus' exists with traditional navigable water, interstate water, or the territorial seas."[110] Panelist Dr. Genevieve Ali similarly noted, "At one point in the draft rule we can read that 'a case-specific analysis allows for a determination of jurisdiction at the point on the gradient in the relationship that constitutes a 'significant

[107] Id.
[108] Id. at 9.
[109] Id. (emphasis added).
[110] 8/14/14 SAB Comments on the Proposed Rule at 84.

nexus.'' I would be in favor of more guidance being provided within the framework of the draft rule to facilitate that 'critical point' or 'threshold' determination and there again make the process more transparent to the public."[111] Panel member Dr. Mazeika Sullivan further commented, "caution is warranted in some cases when the science may not be available to adequately determine where jurisdiction should or should not be asserted . . . Along a connectivity gradient, there may exist threshold levels of connectivity above which downstream influences are impactful to water quality and below which they are not."[112]

The Agencies must listen to the scientific experts and adopt a gradient approach toward determining whether or not a water meets the requirements of Justice Kennedy's "significant nexus" test. This must be the approach followed by the Proposed Rule if it is to have a defensible basis in science. What's more, the Agencies must define thresholds along this gradient whereby connections satisfy the "significant nexus" test. Otherwise, the Proposed Rule wrongly reverts back to asserting jurisdiction based on the "any hydrologic connection" theory rejected by both Justice Kennedy and the plurality in *Rapanos*. (p. 40-43)

Agency Response: 9(f), 9(g), 9(h), 9(i), and 9(l).

9.85 According to the Proposed Rule, if a water is connected to an (a)(1) through (5) water by a "shallow subsurface hydrologic connection," that water meets the "neighboring" and, in turn "adjacent" definition and is a "water of the United States." Yet, neither the draft Connectivity Report nor the Proposed Rule describes methods to identify and/or quantify shallow subsurface flow. Moreover, both documents acknowledge that measuring shallow subsurface hydrologic connectivity is challenging. The Proposed Rule states that shallow subsurface connections are "difficult to identify and document," and "given a [water] for which a surface water connection cannot be observed, it is difficult to assess its degree of connectivity with the river network without site-specific data."[113] The draft Connectivity Report asserts that measuring connections between non-floodplain wetlands "typically requires time- and resource-intensive field studies that have limited geographic scope."[114] The fact that the Agencies and their staff scientists admit that identifying shallow subsurface connections is "difficult," "time intensive," and "resource intensive" yet do not describe any methods to measure these connections that could be used to assert CWA jurisdiction represents a significant shortcoming.

Additionally, and of particular concern among the regulated community, is that the challenge associated with measuring shallow subsurface hydrologic connections suggests that the burden to disprove a jurisdictional determination based on shallow subsurface connectivity to an "adjacent" water will not only be prohibitively expensive and time consuming, but will be squarely placed on the landowner's shoulders. Although the Agencies cannot suggest a consistent or repeatable method of tracking or tracing such connections, they may consider it reasonable to place landowners in the position of

[111] Id. at 7.
[112] Id. at 87 (emphasis added).
[113] 79 Fed. Reg. at 22,210 and 22,226.
[114] Draft Connectivity Report at 6-7.

disproving a negative? Put quite simply, the onus to disprove a jurisdictional determination must not be placed on the regulated community. At the 2014 annual meeting of the Association of Clean Water Administrators, Walt Baker, Water Quality Division Director for the Utah Department of Environmental Quality, agreed that the Agencies should be responsible for producing the evidence needed to make a positive "water of the United States" determination. Mr. Baker said, "Unless there is evidence to the contrary, the presumption should be that all waters aren't jurisdictional."[115] NAHB could not agree more.

Clearly, there are numerous challenges in defining, identifying, and measuring shallow subsurface connections. Additionally, considering the lack of science to demonstrate their impact on the chemical, physical, and biological integrity of downstream waters, there is no doubt that the use of subsurface connections is suspect. Given these infirmities, the Agencies must remove shallow subsurface hydrologic connections from consideration. (p. 93)

Agency Response: **9(j). Additionally, the Report acknowledges that its peer-reviewed references infrequently evaluate sub-surface connections in general between wetlands and downstream waters, and rarely examine the frequency, duration, magnitude, timing, and rate of change of these connections. However, the report does include a discussion of approaches that could be applied to measuring such connectivity, including hydrologic tracers; geostatistical modeling; and ground-water modeling (pp. 2-49 to 2-50). Regarding burden, the rule, promulgated under authority of Section 501 of the CWA, establishes a binding definition of "waters of the United States." The burden of proof is still on the federal government to demonstrate that a water is jurisdictional. That said, if a member of the public has any doubt about whether a feature is jurisdictional, that person should contact either EPA or the Corps to request a jurisdictional determination regarding the feature. Ignorance of the law is not an excuse to not follow the law, but EPA and the Corps are available to assist when any questions arise to help members of the public comply with the law. Consistent with the more than 40-year practice under the CWA, the agencies make determinations regarding the jurisdictional status of particular waters almost exclusively in response to a request from a potential permit applicant or landowner asking the agencies to make such a determination.**

9.86 The Agencies claim their "decision on how best to address jurisdiction over 'other waters' in the final rule will be informed by the final version of the EPA's Office of Research and Development synthesis of published peer-reviewed scientific literature discussing the nature of connectivity and effects of streams and wetlands on downstream waters" – that is, the draft Connectivity Report.[116] And while the draft Connectivity Report suggests "the effects of downstream waters need to be considered in aggregate,"[117] the authors present no scientific evidence to support "aggregation" as a

[115] Amena H. Saiyid, Bloomberg BNA Daily Environmental Report. "Corps, Not Permit Applicants, Should Bear Burden of Proving Jurisdiction, Official Says" (Aug. 7, 2014).
[116] 79 Fed. Reg. at 22,189.
[117] Draft Connectivity Report at 3-27.

relevant concept in connectivity or how much aggregation, both spatially and temporally, among similarly situated waters is needed to have a "significant nexus" with downstream waters. In fact, the draft Report only concludes, "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."[118] The draft Report states, "making quantitative assessments of the importance of individual stream and wetland resources within the entire river systems is difficult."[119] In fact, the draft Connectivity Report does not present *any* research comparing the impact of individual waters relative to aggregated waters on the chemical, physical, or biological integrity of downstream waters. The concept of aggregation is clearly based on speculation, not science.

Moreover, the authors of the draft Connectivity Report caution against generalizing about connectivity, and – although not explicitly stated – significant nexus, among aggregated wetlands: "Our review, which includes numerous case studies of unidirectional wetland systems . . . underlines the need to *avoid generalizations* about either connectivity or isolation based on insufficient information, *especially wetland type or class* (e.g., prairie pothole) or geographical isolation."[120] Likewise, members of EPA's SAB have also cautioned against asserting jurisdiction over "other waters" in aggregate. Panelist Dr. Michael Gooseff recognized the challenge associated with aggregating "other waters" to determine jurisdiction over "similarlysituated waters" based on a collective "significant nexus" to (a)(1) through (3) waters, commenting, " . . . the variety of these ['other waters'] and the potential connection types, strengths, and frequencies will determine both whether and how significant any connection [between 'other waters' and (a)(1) through (3) waters] could be. This variety of possibilities makes it *difficult if not impossible to broadly categorize connection type and significance*."[121] Panelist Dr. Genevieve Ali also noted, " . . . the issue with 'other waters' is that they can be . . . strongly connected or strongly isolated from downstream waters depending on the prevailing conditions. This makes the assessment of 'significant nexus' particularly difficult . . . I don't think that it would be possible to determine that certain additional subcategories of [other] waters are jurisdictional by rule."[122] Dr. Michael Josselyn of the SAB panel also recognized the challenge of asserting jurisdiction over an aggregated group of "other waters," noting, "There is considerable geologic, vegetative, and topographic variation within [a watershed] and the determination of what constitutes similarity among the tributaries within that region would be difficult. The Panel Report requested that the Corps and EPA 'more explicitly address the cumulative effects of streams and wetlands on downstream waters and the spatial and temporal scales at which

[118] Id. at 3-27 (emphasis added).
[119] Id. at 3-29.
[120] Id. at 6-3 (emphasis added).
[121] 8/14/14 SAB Comments on the Proposed Rule at 20 (emphasis added).
[122] Id. at 13.

functional aggregation should be evaluated'[[123]] and I recommend that this be reemphasized in our review of the Proposed Rule."[124]

What's more, in the preamble of the Proposed Rule, the Agencies *themselves* recognize the spatial and temporal variability of connectivity among "other waters" within a watershed, stating, "For 'other waters,' connectivity varies within a watershed and over time, making it difficult to generalize about their connections to, or isolation from, traditional navigable waters, interstate waters, and the territorial seas."[125] Despite the lack of evidence, admonition from EPA's scientists and members of the SAB, and their very own recognition that it is "difficult to generalize" about connections between "other waters" and (a)(1) through (3) waters, the Agencies propose aggregation of "similarly situated waters" to infer collective significant nexus and, in turn, jurisdiction of each individual water.

Considering there is little to no evidence supporting aggregate "significant nexus" of "similarly situated waters," it is clear that proving the cumulative significant chemical, biological, and physical effects of individual waters on downstream waters will be overly burdensome for the Agencies. Of greater concern, however, is that *disproving* a "significant nexus" call based on aggregation will be even more challenging for the regulated community (for more on this topic, see Section VII. b.) Until the Agencies present sound scientific support and methods to aggregate the impacts of "other waters" to determine jurisdiction of the CWA, they must be held to regulating waters individually. (p. 100-101)

Agency Response: 9(i) and 9(k). See also the preamble to the final rule and the TSD.

9.87 The Agencies claim that the Proposed Rule is supported by science and the draft Connectivity Report developed by EPA's Office of Research and Development that discusses the connectivity and effects of stream and wetlands on downstream waters. The Agencies have also assembled an external review panel, the Science Advisory Board (SAB), to comment on the adequacy of the science to support the conclusions reached in the draft Connectivity Report and the Proposed Rule itself. However, the scientific basis for the Proposed Rule is inadequate and the manner in which the Agencies have engaged the SAB has been inappropriate.

a. The Agencies have Based the Proposed Rule on Inadequate Science.

EPA's Office of Research and Development prepared a draft peer-reviewed synthesis of published peer-reviewed scientific literature discussing the nature of connectivity and effects of streams and wetlands on downstream waters, entitled "Connectivity of Streams and Wetlands to Downstream Waters: A Review and Synthesis of the Scientific Evidence." In the preamble, the Agencies assert the Proposed Rule is "supported by a

[123] Letter from EPA's SAB to the Hon. Gina McCarthy, Subject: SAB Review of the Draft EPA Report Connectivity of Streams and Wetlands to Downstream Waters: A Review and Synthesis of the Scientific Evidence (June 6, 2014)
at 2.
[124] 8/14/14 SAB Comments on the Proposed Rule at 26.
[125] 79 Fed. Reg. at 22,197.

body of peer-reviewed scientific literature on the connectivity of tributaries, wetlands, adjacent open waters, and other waters to downstream waters and the important effects of these connections on the chemical, physical, and biological integrity of those on downstream waters."[126] Appendix A of the preamble purportedly summarizes currently available scientific literature and the draft Connectivity Report that are part of the administrative record for the proposal and explains how this scientific information supports the Proposed Rule.

The draft Connectivity Report makes broad conclusions regarding the concept of connectivity, asserting that wetlands and streams, regardless of their size or how frequently they flow, are connected to and have important effects on downstream waters. However, the Report merely documents the *presence* of such connections and falls short of providing the basis for concluding to what extent such connections may or *may not* be of sufficient type, breadth, or magnitude to *significantly affect* downstream waters. Providing criteria by which the Agencies could determine when a water has a substantial effect on another water is crucial to any subsequent regulatory or policy determination of what constitutes a "significant nexus." The Agencies claim, "[t]he data and conclusions in the [draft Connectivity] Report concerning the strength of the relevant connections and effects of certain types of waters on downstream waters provide a foundation for the Agencies' determination that certain waters have effects on the chemical, physical, and biological integrity of traditional navigable waters, interstate waters, or theterritorial seas that are 'significant' and thus constitute a significant nexus."[127] This is simply not true; the draft Connectivity Report presents no analysis of connectivity "significance."

Asking the right questions is a central tenet and first step of any rigorous scientific inquiry. Regrettably, the draft Connectivity Report fails to address the right questions, and therefore does not adequately inform decisions about CWA jurisdiction based on specific thresholds at which waters, in accordance with Justice Kennedy's significant nexus test, "significantly affect the chemical, physical, and biological integrity of other covered waters more readily understood as 'navigable.'"[128] Until the draft Connectivity Report, or any final report, addresses questions about the *significance* of connectivity and not merely the existence of connectivity, the Report is of little value in supporting the Proposed Rule. In fact, the draft Connectivity Report serves only as an academic exercise highlighting ad nauseam what grade-schoolers learn when they are taught the water cycle, that is: water flows downhill.

Although the draft Connectivity Report does little to acknowledge the need to link connectivity with significant effects on downstream integrity, the need for such a link is clearly evident in the scientific literature. As an example of this recognized knowledge gap, Dr. Mary Freeman and colleagues, in one of the publications reviewed in the draft Connectivity Report, argue that linkages between headwaters and downstream ecosystems must be considered to understand large-scale issues such as hypoxia in the Gulf of Mexico and the global loss of biodiversity.[129] At the same time, these authors

[126] 79 Fed. Reg. at 22,190.
[127] Id. at 22,196.
[128] Rapanos, 547 U.S. at 780.
[129] Freeman, M.C., C.M. Pringle, C.R. Jackson. 2007. Hydrologic connectivity and the contribution of stream

recognize the importance of identifying thresholds of significance with respect to downstream effects: "Given the complexity of hydrologic connections, it is essential that political and legal determinations of *thresholds of connectivity* (for purposes of Clean Water Act jurisdiction) be informed by scientific understanding of headwater stream effects on ecological functions at larger scales."[130] It is regrettable that the authors of the draft Connectivity Report would reference this literature to support the already widely accepted fact that headwaters are hydrologically connected to downstream waters, yet overlook the more critical call for science to better elucidate under what circumstances these connections significantly affect the integrity of downstream ecosystems. Rather than conducting a review of existing scientific literature that merely highlights the existence of connections between streams and wetlands and downstream waters, the Agencies must focus their efforts on developing the science needed to define the thresholds of significance. Without these data, the existing science fails to adequately support the Proposed Rule.

Echoing NAHB's concerns, EPA's SAB, in its review of the draft Connectivity Report delivered to EPA Administrator Gina McCarthy on October 17, 2014, voiced apprehensions about the Report's failure to identify when connections do and do not significantly impact downstream integrity: "the Report would be strengthened if it contained . . . additional review of the scientific literature that quantifies the frequency, duration, predictability, and magnitude of physical, chemical, and biological connections for each type of 'water' and *consequences of that connectivity for the physical, chemical, and biological integrity of downstream waters*, with key uncertainties made explicit . . ." [131] Additionally, in the cover letter transmitting its review, the SAB notes, "[t]he Report often refers to connectivity as though it is a binary property (connected versus not connected) rather than as a gradient. In order to make the Report more technically accurate, the SAB recommends that the interpretation of connectivity be revised to reflect a gradient approach that recognizes variation in the frequency, duration, magnitude, predictability, and consequences of those connections."[132] It's clear from SAB's review that significant revisions to the draft Connectivity Report are needed to not only improve the scientific rigor of the Report, but more critically its usefulness in a regulatory context.

i. The Connectivity Report Fails to Cite Scientific Studies Supporting the Categorical Jurisdiction over All Streams and Most Man-Made Waters.

NAHB is concerned that the Agencies' proposed "tributary" definition would assert categorical jurisdiction over all streams, including perennial, intermittent, and ephemeral streams, while the science referenced in the draft Connectivity Report focuses largely on third and fourth order perennial streams, not first or second order intermittent and ephemeral streams of which many are not considered jurisdictional under existing guidance.[133] SAB panel member Dr. Michael Josselyn notes that as a result of these

headwaters to ecological integrity at regional scales. Journal of the American Water Resources Association 43(1):5-14.

[130] Id. at 7 (emphasis added).

[131] SAB Final Review of the Draft Connectivity Report at 9.

[132] Id. at Cover Letter.

[133] See 2008 Rapanos Guidance.

limited data, "the regulatory definition may extend further inland where connectivity has not been as well studied or documented. As we know from public comments, the inland extent of federal jurisdiction is a significant concern and the functions associated with these initial drainages are based on scientific information from larger, higher order features. These low order features may have flow for only a few hours or days following storm events and are the most likely candidates for being on the low end of the gradient where effects on downstream systems are lowest or minimal. Because of the importance of the issue on the extent of federal jurisdiction in these headwaters, the science needs to be more substantial than currently demonstrated in the Draft Science Report."[134] NAHB agrees with Dr. Josselyn and suggests the Agencies must provide sufficient data documenting the significant effect low order intermittent and ephemeral streams have on downstream waters before prematurely asserting categorical jurisdiction over these largely dry-land features.

What's more, while the Proposed Rule would categorically assert jurisdiction over many manmade features including most ditches, industrial ponds, canals, and stormwater conveyances under the "tributary," "adjacent waters, and "other waters" definitions, the draft Connectivity Report does not address the significance of man-made features on downstream waters. Nonetheless, the Report implies that during wet seasons, swales, roadside ditches, and surface field drainages are connected to perennial streams.[135] However, the Report cites no studies supporting this implication. It is clear that the science supporting federal jurisdiction over such man-made features – indeed many of which are designed to manage excess runoff, supply waterfor drinking, agricultural, and industrial needs, or treat wastewater – is unsupported and the Agencies must acknowledge this.

ii. The Concepts Presented in the Connectivity Report will Increase Regulatory Confusion.

NAHB is concerned that concepts presented in the draft Connectivity Report, or any similar final report, will only serve to increase regulatory confusion. As an example, let us compare the definitions of "tributary," "riparian area," "floodplain," and "wetland" provided in the draft Connectivity Report to those in the Proposed Rule (Table 1):

Table 1. Comparison of definitions in the Draft Connectivity Report and the Proposed Rule

Term	Draft Connectivity Report Definition	Proposed Rule Definition[136]
Tributary	A stream or river that flows into a higher-order stream or river.[137]	A water physically characterized by the presence of a bed and banks and ordinary high water mark, as defined at 33 CFR 328.3(e), which contributes flow, either directly or through another water, to a water identified in paragraphs (a)(1) through (4). In

[134] 8/14/14 SAB Comments on the Proposed Rule at 23.
[135] Draft Connectivity Report Figure 3-10 at 3-19.
[136] 79 Fed. Reg. at 22,199.
[137] Draft Connectivity Report at A-20.

Term	Draft Connectivity Report Definition	Proposed Rule Definition[136]
		addition, wetlands, lakes, and ponds are tributaries (even if they lack a bed and banks or ordinary high water mark) if they contribute flow, either directly or through another water to a water identified in paragraphs (a)(1) through (3). A water that otherwise qualifies as a tributary under this definition does not lose its status as a tributary if, for any length, there are one or more man-made breaks (such as bridges, culverts, pipes, or dams), or one or more natural breaks (such as wetlands at the head of or along the run of a stream, debris piles, boulder fields, or a stream that flows underground) so long as a bed and banks and an ordinary high water mark can be identified upstream of the break. A tributary, including wetlands, can be a natural, man-altered, or man-made water and includes waters such as rivers, streams, lakes, ponds, impoundments, canals, and ditches not excluded in paragraphs (b)(3) or (4).
Riparian Area	Transition areas or zones between terrestrial and aquatic ecosystems that are distinguished by gradients in biophysical conditions, ecological processes, and biota. They are areas through which surface and subsurface hydrology connect water bodies with their adjacent uplands. They include those portions of terrestrial ecosystems that significantly influence exchanges of energy and matter with aquatic ecosystems. Riparian areas are adjacent to perennial, intermittent, and ephemeral streams, lakes, and estuarine-marine shorelines.[138]	An area bordering a water where surface or subsurface hydrology directly influence the ecological processes and plant and animal community structure in that area. Riparian areas are transitional areas between aquatic and terrestrial ecosystems that influence the exchange of energy and materials between those ecosystems.
Floodplain	A level area bordering a stream or river channel that was built by sediment deposition from the stream or river under present climatic conditions and is inundated during moderate to high flow	An area bordering inland or coastal waters that was formed by sediment deposition from such water under present climatic conditions and is inundated during periods of moderate to

[138] Id. at A-14.

Term	Draft Connectivity Report Definition	Proposed Rule Definition[136]
	events. Floodplains formed under historic or prehistoricclimatic conditions can be abandoned by rivers and form terraces.[139]	high water flows.
Wetland	An area that generally exhibits at least one of the following three attributes (Cowardin et al., 1979): (1) is inundated or saturated at a frequency sufficient to support, at least periodically, plants adapted to a wet environment; (2) contains undrained hydric soil; or (3) contains nonsoil saturated by shallow water for part of the growing season.[140]	Those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas.

This comparison makes it clear that the draft Connectivity Report was written with different notions of what constitutes each of these geomorphic features relative to what the Agencies have in mind in the Proposed Rule. This is particularly disconcerting considering the Connectivity Report is purported to serve as the scientific underpinning of the Proposed Rule. Using different definitions in the Proposed Rule and the scientific report that is intended to support it causes confusion and suggests the Agencies are trying to fit a square peg in a round hole. Further, it completely undermines the validity of the Report as a reasonable basis for the rule. For example, the draft Connectivity Report states that a tributary is a stream or river that flows into a higher order stream or river, while the Proposed Rule expands the definition to include wetlands, lakes, and ponds that contribute flow. This will only serve to add regulatory confusion, not clarity.

In addition to the confusion the differences in definitions present, the Connectivity Report will cause regulatory uncertainty by suggesting waters have *potential* functions that can affect downstream systems. The draft Connectivity Report states that even if a stream or wetland is not currently performing a function, it has the *potential* to provide that function and, "[a]lthough potential functions do not actively affect downstream waters, they *can* play a critical role in protecting those waters from *future* impacts"[141] Thus, the Report suggests that even if a system has no demonstrable functional linkage to downstream waters at present, it should be assessed from the perspective of all the potential functions it could provide under other conditions. However, the significant nexus test cannot be based on speculative potential effects.[142] Indeed, reliance on

[139] Id. at A-5.
[140] Id. at A-22.
[141] Id. at 3-27 (emphasis added).
[142] Rapanos, 547 U.S. at 780.

potential functions will not only add substantial uncertainty to the regulatory process, it is completely inappropriate and unsupported.

iii. The Draft Connectivity Report, or any Similar Final Report, Cannot be used to Support the Proposed Rule.

The draft Connectivity Report, or any similar final report, cannot be used to support a Proposed Rule that improperly asserts that the scope of the CWA is essentially unlimited. It is undisputed that the Supreme Court rejected the EPA's and the Corps' pre-*Rapanos* interpretation of CWA authority based on a "mere hydrologic connection" theory. A Proposed Rule that attempts to return CWA jurisdiction to the pre-*Rapanos status quo* using the Connectivity Report's findings of the mere *presence* of hydrologic connectivity would be contrary to the limits that Congress and the Courts have established and would be an improper use of the Report in the rulemaking process. Ultimately, until or unless the Agencies can provide a sound scientific basis for making significant nexus determinations that recognize a gradient of connectivity, the Proposed Rule will have little science on which to rest. (p. 141-146)

Agency Response: 9(d), 9(e), 9(f), 9(g), 9(h), 9(i), 9(k), 9(l), 9(m) and 9(n). See also the preamble to the final rule and the TSD. As noted in the summary responses, the purpose of the Science Report was to summarize current scientific understanding about the connectivity and mechanisms by which streams and wetlands, singly or in aggregate, affect the physical, chemical, and biological integrity of downstream waters (p. 1-1). Because the report is a technical review of peer-reviewed scientific literature, it does not consider or set forth legal standards for CWA jurisdiction. Rather, the report evaluates, summarizes, and synthesizes the available peer-reviewed scientific literature to address questions that were developed in collaboration with EPA's Office of Water to translate regulatory questions and terminology into more scientifically relevant questions and terms. Given that it is a science document, it is appropriate and necessary that terminology used throughout the Report be based on scientific definitions. Regarding potential function, this represents the capacity of an ecosystem to perform that function under suitable conditions. For example, a wetland with high capacity for denitrification is a potential sink for nitrogen, a nutrient that becomes a contaminant when present in excessive concentrations. In the absence of nitrogen, this capacity represents the wetland's potential function. If nitrogen enters the wetland (e.g., from fertilizer in runoff), it is removed from the water; this removal represents the wetland's actual function. Both potential and actual functions play critical roles in protecting and restoring downstream waters as environmental conditions change, both as a function of natural conditions (e.g., seasonal and annual variability) and to human impacts (e.g., land use change).

9.88 The draft Connectivity Report concludes that streams and most wetlands are connected to and exert an influence on downstream waters. In preparation for soliciting the SAB's input, EPA developed Charge Questions, which can be summarized as follows:[143]

[143] Connectivity of Streams and Wetlands to Downstream Waters: A Review and Synthesis of the Scientific Evidence – Technical Charge to External Peer Reviewers at 2 – 3.

(1) Comment on the overall clarity and technical accuracy of the Connectivity Report.

(2) Was the most relevant published peer-reviewed literature included and correctly summarized?

(3) Identify studies that should be added or deleted.

(4) Are the conclusions supported by available science?

(5) Suggest alternative wording for conclusions and findings that are not fully supported.

Unfortunately, these questions are simply a broad-brush attempt at getting the SAB to take a cursory look at the draft Connectivity Report. They do not provide the SAB panel with the context needed so that their review would address key concepts that would better present the science needed to inform policy specific to CWA jurisdiction. Just as the draft Connectivity Report falls short of identifying the significance of connections between streams and wetlands and downstream waters, EPA's charge questions to the SAB responsible for reviewing the Report fail to inquire about the scientific significance of such connections on the integrity of downstream waters.

Concerned that EPA failed to ask the SAB panel the questions needed to support the Proposed Rule, the U.S. House of Representatives Committee on Science, Space, and Technology (hereinafter, House Science Committee), pursuant to its authority under the Environmental Research, Development and Demonstration Authorization Act, posed additional charge questions to the SAB requesting they evaluate the significance of connections on downstream waters.[144] Regrettably, EPA dismissed Congress's letter and additional charge questions, claiming the questions "go beyond the scientific review that is the expert technical panel's statutory focus."[145] This makes little sense. The EPA specifically chose a panel of 26 wetland and stream scientists to review a report that the Agencies knew would be used to support its proposal, yet did not allow that panel of esteemed experts to conduct an unbiased scientific review. What is particularly concerning is that one SAB panel member noted, "During the SAB Review, the [SAB] panel was explicitly told not to discuss the definition of significance . . ."[146]

At issue in the Proposed Rule is the significant nexus waters, including wetlands, have on the chemical, physical, and biological integrity of downstream waters. Yet the Connectivity Report and the questions posed to the SAB charged with reviewing the legitimacy of the Report to support the Proposed Rule fall well short of seeking to obtain the evidence necessary for the Agencies to assert federal jurisdiction over "tributaries," "adjacent waters," or "other waters" based upon Justice Kennedy's significant nexus standard. Furthermore, EPA's arrogance in ignoring Congress's charge questions to the SAB and directing the SAB not to discuss the significance of hydrologic connections on downstream waters is regrettable.

[144] 42 U.S.C. § 4365; Letter from Rep. Lamar Smith (Chairman, House Committee on Science, Space, and Technology) and Rep. Chris Stewart (Chairman, Subcommittee on Environment) to Dr. Amanda Rodewald (Chair, SAB Panel for Review of the EPA Water Body Connectivity Report) and Dr. David Allen (Chair, EPA SAB) (Nov. 6, 2013).

[145] Letter from Laura Vaught (EPA Associate Administrator) to Rep. Chris Stewart (Chairman, Subcommittee on Environment) (Dec. 16, 2013).

[146] 8/14/14 SAB Comments on the Proposed Rule at 58.

NAHB believes the SAB should be charged with determining whether or not the Connectivity Report provides the necessary guidance to determine if a water has a significant nexus to a traditional navigable water and, if so, the point at which a connection becomes "significant." Only then will the Agencies be able to determine if the Connectivity Report provides the necessary information to properly apply Justice Kennedy's significant nexus test to "tributaries," "adjacent waters," and "other waters." Without this information, the Connectivity Report only serves to support the regulation of waters based on the presence of any "mere hydrologic connection." Both the Plurality and Justice Kennedy demanded more in Rapanos. (p. 147-148)

Agency Response: **9(b), 9(f), 9(h), and 9(l).**

Kansas Independent Oil & Gas Association (Doc. #12249)

9.89 Proffering a draft report as the basis for a rulemaking proposal of this significance, is improper under the law and under reasonable logic. The agencies suggest that the compilation of such information will inform about the scientific support for the rule. The scientific literature and its message must be interpreted with a view toward the goal of Congress and the Clean Water Act. The case law explores the role of science and, as cautioned by Justice Kennedy, that assessment cannot be "speculative or insubstantial" and that there is a "reasonable inference of ecologic interconnection." [emphasis added.] The obvious risk in conducting broadly defined research is arrival upon the scientific conclusion that any and all waters of the nation influence one another affecting the function of each. By their own admission, the scientific research has an emphasis upon "strength of connections and effects to downstream waters." The scientific question assessed will define the conclusion. Presuming any scientific or technical conclusion concerning connectivity is relevant is misguided. The fact that EPA has reviewed more than a thousand scientific papers is a measure of volume only. Reference to an unfinished justification for a definition of such magnitude as "waters of the United States" is inappropriate under the Administrative Procedures Act and pursuant to the arbitrary and capricious standard of review of agency actions. The tenuous nature of this Report, which is described by the agencies as the tool for "how best to address jurisdiction over "other waters' renders this proposal incomplete and improperly published. Also, it is noteworthy that the agencies invite comment on a scientifically-based de facto connectivity analysis that would remove the need for them to "rely less on case-specific nexus evaluations". It is apparent that the agencies are pursuing a broadly defined set of jurisdictional waters. (p. 13)

Agency Response: **9(a), 9(f), 9(g), 9(h), and 9(i). See also the preamble to the final rule and the TSD.**

9.90 KIOGA reiterates our support for the comments to the ORD report as filed by the Waters Advocacy Coalition ("WAC") on November 6, 2013 concerning the draft connectivity report. Those comments raised concerns summarized as follows:

• The report provides no scientific support to make distinctions between significant connections and non-significant connections.

• The report assumes, with little scientific support, that all connections, no matter the kind, size, or frequency should be considered equal.

• The report does not account for factors of variability in connectivity, such as climate, stream size, habitat, watershed characteristics, frequency and duration of flow, or proximity to navigable waters.

• The report does not adequately address man-made modifications and natural or manmade impediments to connectivity in the landscape. The report makes the unsupported conclusion that nay wetland or water course within a riparian area or floodplain has a significant connection to downstream waters.

• The report includes overly broad definitions of streams, floodplains, and riparian areas that would include entire watersheds, including uplands.

• The report defines key terms, such as "stream" and "wetland," inconsistently with existing regulatory definitions.

• EPA and the Corps are already using the report to justify their Proposed Rule on the scope of their CWA authority, yet the report does not address the fundamental question central to that jurisdiction (namely, what connections between water bodies are significant) and is not yet final.

• As a result, the agencies should ask the correct questions first, evaluate the relevant science; and then prepare a Proposed Rule in keeping with the best known science. Instead, the agencies' rulemaking approach is premature and does not take into account the independent scientific and technical input of the Science Advisory Board on the connectivity of waters.

• Under the SAB authorizing statute, SAB review of the report should be informed by a simultaneous review of the Proposed Rule.

• EPA's charge questions are too narrow and fail to ask important questions that need to be evaluated prior to a rulemaking. Therefore, the SAB should exercise its prerogative to explore a broader list of concerns underlying connectivity. (p. 13-14)

Agency Response: 9(a), 9(b), 9(f), 9(g), 9(h), 9(i), 9(l), and 9(m).

Arizona Mining Association (Doc. #13951)

9.91 The conclusions reached by the external peer reviewers selected by EPA's Science Advisory Board to help it review the agency's report on the connectivity of streams and wetlands to downstream waters are not inconsistent with the approach suggested by Justice Kennedy. Although concluding that tributaries "as a group" (i.e., when all grouped together regardless of size, frequency of flow, duration of flow, volume of flow, proximity to TNWs, etc.) have a strong influence on the physical, chemical and biological integrity of downstream waters, the Science Advisory Board and the peer reviewers also concluded that "connectivity occurs along a gradient" and the "concept of a connectivity gradient applies to all waters, including tributaries." See letter from Dr. Amanda Rodewald to Dr. David Allen (September 2, 2014), at 2.[147] See also letter from

[147] Available at: http://yosemite.epa.gov/sab/sabproduct.nsf/F6E197AC88A38CCD85257D49004D9EDC/$File/Rodewald_Memorandum_WOUS+Rule_9_2_14.pdf.

Dr. David Allen to EPA Administrator Gina McCarthy (September 30, 2014), at 2[148] ("the degree of connectivity [between tributaries and downstream waters] is a function of variation in the frequency, duration, magnitude, predictability, and consequences of physical, chemical and biological processes"); SAB Review of the Draft EPA Report Connectivity of Streams and Wetlands to Downstream Waters: A Review of the Scientific Evidence (EPA-SAB-15-001) (October 17, 2014), at 2[149] (notion of connectivity should be "revised to reflect a gradient approach that recognizes variation in the frequency, duration, magnitude, predictability, and consequences of those connections"). (p. 4)

Agency Response: 9(f), 9(g), 9(h), 9(i) and 9(k).

Freeport-McMoRan Inc. (Doc. #14135.1)

9.92 The Draft Connectivity Study provides substantial review of the importance of the San Pedro River, but this river is not the type of feature that is of question. Rather, it is the hydrologic conveyance features at the distal ends of the channel network that are at question; not the mainstem river. Quite simply, the agencies have provided little to no substantiation that small, truly headwater features in arid landscapes have a significant nexus to downstream waters. The use of sites such as the San Pedro River to substantiate the importance of arid tributaries bears little weight on the actual question at hand: the question is not about the importance of arid rivers, the question is the relevance of the most upstream extent of minor tributaries. Indeed, a more meaningful analysis for arid landscapes would have been to work with the vast data available from Walnut Gulch (a tributary sub-watershed to the San Pedro) to develop substantive, scientific guidance on where tributaries in Walnut Gulch watershed gain significance, rather than the focus on the mainstem San Pedro River. The current draft of the Connectivity Report does not provide substantiation for the asserted importance of tributaries in the arid Southwest. (p. 2-3)

Agency Response: 9(i). Additionally, the San Pedro case study in Science Report Section B.5.4 does not focus solely on the San Pedro River itself, but evaluates the entire tributary network within the San Pedro River Basin, including the Walnut Gulch sub-watershed. The SAB review concluded "the review and synthesis of the literature describing connectivity of streams to downstream waters reflects the pertinent literature and is well grounded in current science. The literature review provides strong scientific support for the conclusion that ephemeral, intermittent, and perennial streams exert a strong influence on the character and functioning of downstream waters and that tributary streams are connected to downstream waters." In response to the SAB's recommendation more literature regarding the importance of episodic connections between ephemeral and intermittent streams

[148] Available at: http://yosemite.epa.gov/sab/sabproduct.nsf/RSSRecentAdditionsBOARD/518D4909D94CB6E585257D6300767DD6/$File/EPA-SAB-14-007+unsigned.pdf.

[149] Available at: http://yosemite.epa.gov/sab/sabproduct.nsf/02ad90b136fc21ef85256eba00436459/AF1A28537854F8AB85257D74005003D2/$File/EPA-SAB-15-001+unsigned.pdf

and downstream waters was added to Section B.5 and Section 3 of the Final Report. As the comment indicated, Walnut Gulch is a tributary to the San Pedro River and has an extensive data set and that has contributed greatly to the scientific understanding of the connections to and effects of small arid channels on larger downstream rivers. One of the coauthors of the Science Report conducts and publishes research from the Walnut Gulch USDA ARS facility. Many of the studies cited in Section B.5 (Southwestern Intermittent and Ephemeral Streams) and Section 3 (Streams: Physical, Chemical, and Biological Connections to Rivers) describe findings from Walnut Gulch, but also summarizes findings from other southwestern tribu\\taries. These include intermittent and ephemeral tributaries to the Rio Grande, including ephemeral tributaries that drain Los Alamos National Laboratory, NM which was found to transport and store radionuclides that were directly discharged as effluent and indirectly as fallout from nuclear weapons testing into ephemeral channels and thus mediating the such contaminants in the Rio Grande and its downstream reservoirs (Graf 1994, Reneau et al. 2004).

QEP Resources, Inc. (Doc. #14772)

9.93 The Connectivity Report, which is a literature review designed to lend scientific support to the proposal, appears to confuse a scientific analysis of connectivity with the legal analysis the Supreme Court has developed as to "significant nexus," and the statutorily limited definition of "Waters of the United States," and its tie to navigability. Assumptions made in the Connectivity Report don't honor that congressionally-limited scope of the Clean Water Act, therefore the conclusions drawn by the agencies from the Report are invalid. Given the flawed assumptions, and the fact that the peer review of the Report wasn't completed until very near the end of the public comment period, it is a fair conclusion that the Report appears to have been prepared more as a justification for the already-developed proposal than as a scientific document that has any use in developing policy initiatives. (p. 2)

Agency Response: 9(d), 9(h), and 9(l).

Devon Energy Corporation (Doc. #14916)

9.94 **The Overwhelming Majority of EPA's Science Advisory Board's ("SAB") Panel reviewing the Connectivity Report[150] is composed of Academic and NGO Representatives, in Direct Violation of the Federal Advisory Committee Act**.

The ultimate success of EPA's rules, and the public confidence in those rules once published, depends heavily on balanced representation of all stakeholders and experts in the subject area of concern during the rulemaking process. In recognition of this fact, Congress passed the Federal Advisory Committee Act ("FACA")[151] in 1972. §5(c) of the FACA requires that executive agencies follow the guidelines set forth in the act. These guidelines, in §5(b)(2), "Require the membership of the advisory committee to be fairly

[150] Connectivity of Streams and Wetlands to Downstream Waters: A Review and Synthesis of the Scientific Evidence; EPA Office of Research and Development, 2013.
[151] Pub. L. No. 92-463, 86 Stat 770 (1972), 5 U.S.C. App. 2, §§ 1-16.

balanced in terms of the points of view represented and the functions to be performed by the advisory committee." The makeup of the science advisory board panel reviewing the Connectivity Report informing the final rule shows that EPA has failed to meet its obligations under the Act.

EPA's Science Advisory Board Panel for the review of the EPA Water Body Connectivity Report (the "SAB Review") contains twenty-six members.[152] Of those members, nineteen members are professors at American Universities, three members are professionals from not-for-profit advocacy institutes, and three are professional environmental consultants. Devon does not question the credentials of any of the listed members, however, the requirement that membership in such a committee be fairly balanced in points of view has clearly not been met. The membership of this committee includes zero representation from any state agency. The membership also contains zero representation from experts employed in affected industries of oil and gas, agriculture, mining, construction, and manufacturing. The points of view of state agencies and industry are vital to a balanced advisory panel, yet EPA has failed to involve them.

Before finalizing the rule, EPA should provide the opportunity for state agencies and industry experts to review the connectivity report forming the basis for the review. EPA should withdraw the rulemaking because this critical review opportunity has not been afforded. (p. 2-3)

Agency Response: 9(c)

9.95 **The range in the resolution of maps that some states currently use to identify stream segments associated with WOTUS-related regulatory programs in comparison to the SAB suggestions of incorporating high-resolution maps is significant. It represents the struggle in understanding the true extent of jurisdiction in the Proposed Rule.**

As noted in the August 18, 2014 SAB Preliminary Comments of the Connectivity Report, the scale of maps used to define tributaries is a critical consideration, as the majority of ephemeral streams that meet criteria of having a bed and bank and ordinary high water mark (OHWM) may not be depicted on most existing maps. Also noted by a SAB Panel member was that it is critical that the appropriate agencies continue to invest in high-resolution mapping products that will facilitate the identification of these waters without on-site inspection.

Similarly noted in the August 14, 2014 SAB Preliminary Comments of the Connectivity Report, in regard to determining tributaries, is that map scale will be an important consideration as differences in map resolution can lead to appreciable differences in estimating the extent of the watershed.

Also, in the October 17, 2014 SAB Review of the Draft Connectivity Report, the important issue of map resolution surfaced and was mentioned throughout the Report.

[152] A full list of membership is available here: http://yosemite.epa.gov/sab/sabpeople.nsf/WebExternalSubCommitteeRosters?OpenView&committee=BOARD&subcommittee=Panel%20for%20the%20Review%20of%20the%20EPA%20Water%20Body%20Connectivity%20Report.

Further, the increasing availability of Light detection and ranging (LIDAR) digital elevation models (DEM) was discussed and the increasing ability to create more accurate water and wetlands maps, thus illustrating how new technologies may influence the scientific understanding of connectivity.

While at the same time, states like Kansas and Missouri on the basis of technical practicability and economic reasonableness have chosen use larger scale maps (greater than 1:24,000 scale).

• Kansas – Surface Water Quality Standards apply the full extent of the CWA on identified classified waters (perennial and intermittent streams). These classified streams are WOTUS and total 30,620 miles. If forced to use the high-resolution National Hydrography Dataset (NHD) at 1:24,000 scale which brings in numerous smaller order steams, stream mileage would increase to over 174,000 miles. In addition, the high-resolution NHD may grossly underestimate the number and length of drainage networks such as ephemeral streams.[153] In fact, USGS 1:24,000 scale maps under-represented drainage networks by 64.6 percent in a study. The question was asked how many additional stream miles are there using LIDAR or aerial photography likely to map drainage networks.[154]

• Missouri – if the Missouri Department of Natural Resources had to regulate all steam miles discernable at the 1:24,000 scale of the NHD, it would add an additional 158,565 miles of stream (183,591 miles to its existing classified waters network. The Missouri Department of Natural Resources decision to exclude default classification of smaller streams represented at the 1:24,000 scale was based on an evaluation of the aquatic resources of the state.[155]

It's clear based on the SAB's comments and recommendations that high-resolution mapping products like LIDAR would be needed for regulators to identify all ephemeral streams and administer WOTUS under the Proposed Rule. While at the same time, from a practicality standpoint, especially considering many of the ephemeral streams that are generated from LIDAR seldom possess flow where it might take decades or longer for rainfall-runoff to reach a more traditional navigable water, Devon respects the decision made by states such as Kansas and Missouri to not utilize high-resolution mapping data in their respective programs. Devon strongly recommends that the Agencies do not rely on high resolution mapping to identify WOTUS because of the high number of false positives that will result.

Desktop studies analyzing high-resolution imagery demonstrated considerably increased infrastructure impacts under the Proposed Rule.

[153] Levick, L., J. Fonseca, D. Goodrich, M. Herandez, 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. U.S. Environmental Protection Agency and USDA/ARS Southwest Watershed Research Center, EPA/600/R-08/134, ARS/244046, 116 pp.
[154] Heine, R. A., C. L. Land and R. R. Sengupta. 2004. Development and Comparison of Approaches for Automated Mapping of Stream Channel Networks. Annuals of the Association of American Geographers 94(3): 477-490.
[155] Missouri Department of Natural Resources Regulatory Impact Report, In Preparation for Proposing, An Amendment to 10 CSR 20-7.031, Missouri Water Quality Standards (June 3, 2011) at 35.

Devon conducted two desktop studies to evaluate potential WOTUS under the Proposed Rule assessing infrastructure intersections with 1) the high-resolution NHD (1:24,000-scale) representing what most District Corps offices currently use and 2) high-resolution Digital Elevation Models or LIDAR (5m resolution) that identifies a greater number of ephemeral streams relative to the high-resolution NHD.

The first study concerned an area (746 km2) in the Mid-Continent with 379 miles of pipelines and 63 well pads. Under the 2008 Guidance, pipelines intersected with mapped streams from the NHD data set at 418 locations (applicable NWPs applied). Under the Proposed Rule, pipelines would intersect LIDAR mapped features at 2,043 locations – nearly a 500% increase; however, approximately 35% of the LIDAR mapped features fell within cultivated fields and likely would not be jurisdictional under the new rule leaving 1,327 locations. Of those, 43 well pad site locations were within cultivated fields and likely non- jurisdictional. No mapped streams appeared to have been located within well pad site locations. In short, under the Proposed Rule as written, over 1284 sites would be jurisdictional – an increase of 300% from the 2008 Guidance.

A second study in the Delaware Basin (408 km2) in southeast New Mexico consisted of mapping 3 individual study areas consisting of 113 miles of pipelines and 222 well pad sites. Under the 2008 Guidance, pipelines intersected NHD dataset mapped streams at 5 locations that would likely be jurisdictional and fall within applicable NWPs.

The Proposed Rule would feature a considerable increase:

• Pipelines would intersect a high-resolution Digital Elevation Models mapped features at 312 locations (a 6200% increase);

• Based on aerial photographs relying on vegetation indicators, etc., 226 of the high-resolution mapped crossings did not appear to meet the definition of a tributary and would likely not be jurisdictional under the new rule leaving 86 locations (a 1700% increase).

• High-resolution features were depicted to encroach within or cross 79 well pad sites; however, based on aerial photographs, 54 of the features did not appear to meet the definition of a tributary and would likely not be jurisdictional under the new rule (leaving only a 500% increase).

• No mapped streams appears to have been located within well pad locations; and

• No National Wetland Inventory wetlands were crossed by any pipelines or within the boundaries of pad sites.

In each of these two studies, the high-resolution imagery picked up very subtle changes in topography including vegetation patterns, topographic gradients and indications of channelization. Upon closer examination of the corresponding aerial photos and topographic maps looking both upstream and downstream of the channel crossings, the highly trained wetlands consultant eliminated many of the high resolution mapped features if they didn't exhibit any indications of being a tributary.

These two studies indicated that, even under relatively conservative estimations, the Proposed Rule and its overly broad criteria for ephemeral streams would result in

infrastructure intersecting with an dramatically increasing number of potential WOTUS, and likely requiring increased permits. (p. 8-10)

Agency Response: 9(o). Thank you for providing a desktop analysis using multiple types of mapping tools. As noted in 9(o), the Agencies do not believe that technology will lead to an expansion of Clean Water Act Jurisdiction. See the preamble to the final rule and the TSD.

American Petroleum Institute (Doc. #15115)

9.96 The charge given to the SAB in its review was overly broad: "to deliberate on the adequacy of the scientific and technical basis of the Proposed Rule titled Definition of Waters of the United States under the Clean Water Act." As such, the SAB did not consider its mandate to provide a technically sound supporting definition for "significant nexus," or otherwise to specify any scientifically based limitations on waters the Agencies should consider federally jurisdictional. Thus, the SAB's efforts failed to provide any further clarity to or technical foundation for the 2014 Proposed Rule. Indeed, the Connectivity Report and the SAB review instead offered to support the theory that essentially all surface waters, however tenuously defined, are connected by physical, chemical, or ecological pathways, however indirect or remote. Neither the CWA statutory language nor any Supreme Court decisions addressing the scope of jurisdictional waters supports the Agencies' assumption that a connection, no matter how intermittent or tenuous, supports federal jurisdiction. (p. 3-4)

Agency Response: 9(b), 9(d), 9(f), 9(g), 9(h), and 9(i).

Ohio Oil & Gas Association (Doc. #15122)

9.97 The CWA clearly (as recognized in the legislation itself and through multiple U.S. Supreme Court opinions) was not intended to regulate all water of the United States. However, the Proposed Rule appears to attempt this leap — particularly with the agency's reliance on the SAB report — which only in very limited ways supports some of the agencies' conclusions. (p. 2)

Agency Response: 9(d)

Edward Wisner Donation (Doc. #15438)

9.98 Significantly, many of SAB's comments suggested significant flaws in the Proposed Rule, including the following:

(l) The Report often refers to connectivity as though it is a binary property (connected versus not connected) rather than as a gradient and that the rule needed to be revised to reflect a gradient approach that recognizes variation in the frequency, duration, magnitude, predictability and consequences of those connections.

(2) In the Report, the EPA has classified waters and wetlands as having the potential for either "bidirectional" or "unidirectional" hydrological flows with rivers and lakes. SAB found that these terms did not adequately describe the four dimensional (longitudinal, lateral, vertical, and temporal) nature of connectivity, and therefore, the SAB

recommended that the Report use more commonly understood terms that are grounded in the peer-review literature.

(3) SAB recommended that the review process become more transparent, and that the EPA should more clearly describe the approach used to screen, compile, and synthesize, the information. SAB also indicated that the Report should also clearly indicate that the definitions used for rivers, streams, and wetlands are scientific, rather than legal or regulatory definitions, and may differ from those used in the Clean Water Act and associated regulations.

(4) The SAB disagreed with EPA's conclusion that the literature reviewed did not provide sufficient information to evaluate or generalize about the degree of connectivity (absolute or relative) or the downstream effects of wetlands in "unidirectional," non-floodplain landscape settings. The SAB recommended that the EPA revise the conclusion to better articulate: (l) what is supported by the scientific literature and, (2) the issues that still need to be resolved.

Wisner submits that SAB should have been allowed to complete its review and that the Report should have been revised well before the rule was actually published. In this way, the agencies would have been able to indicate that the rule had been based upon sound and peer review scientific principles; however, as, the situation stands now, the link between the Report and the rule is questionable, thus rendering the rule without proper scientific support, contrary to the agencies' objectives. (p. 5)

Agency Response: 9(a), 9(b), 9(c), 9(e), 9(f), 9(g), 9(h), 9(i), and 9(l)

Independent Petroleum Association of New Mexico (Doc. #15653)

9.99 This document, prepared by the EPA's Office of Research and Development ("ORD") was effectively a 'data-dump' of cherry picked peer reviewed literature discussing the nature of hydrologic connectivity and effects of streams and wetlands on water sources Id. at 22190. (p. 11)

Agency Response: 9(e)

9.100 The SAB comments raising concerns are aptly summarized in the Independent Petroleum of America's comments, and repeated here, as follows:

- The report provides no scientific support to make distinctions between significant connections and non-significant connections.
- The report assumes, with little scientific support, that all connections, no matter the kind, size, or frequency should be considered equal.
- The report does not account for factors of variability in connectivity, such as climate, stream size, habitat, watershed characteristics, frequency and duration of flow, or proximity to navigable waters.
- The report does not adequately address man-made modifications and natural or man-made impediments to connectivity in the landscape.
- The report makes the unsupported conclusion that any wetland or water course within a riparian area or floodplain has a significant connection to downstream waters.
- The report includes overly broad definitions of streams, floodplains, and riparian areas that would include entire watersheds, including uplands.

- The report defines key terms, such as "stream" and "wetland," inconsistently with existing regulatory definitions.
- EPA and the Corps are already using the report to justify their Proposed Rule on the scope of their CWA authority, yet the report does not address the what connections between water bodies are significant and is not yet final.
- As a result, the agencies should ask the correct questions first, evaluate the relevant science, and then prepare a Proposed Rule in keeping with the best known science. Instead, the agencies' rulemaking approach is premature and does not take into account the independent scientific and technical input of the Science Advisory Board on the connectivity of waters.
- Under the SAB authorizing statute, SAB review of the report should be informed by a simultaneous review of the Proposed Rule.
- EPA's charge questions are too narrow and fail to ask important questions that need to be evaluated prior to a rulemaking. Therefore, the SAB should exercise its prerogative to explore a broader list of concerns underlying connectivity. (p. 11-12)

Agency Response: 9(a), 9(b), 9(f), 9(g), 9(h), 9(i), 9(l), and 9(m)

Pennsylvania Aggregates and Concrete Association (Doc. #16353)

9.101 The APA requires that an agency make findings that support its decision and that those findings must be supported by substantial evidence. The Connectivity Report, which is the agencies' stated scientific basis for the Proposed Rule, does not address the significance of connections between waters. Rather, the support for the Proposed Rule focuses on the capacity of science to identify the presence of connections. Both the Connectivity Report and the preamble's Appendix A ignore the basic questions as to what is a significant nexus and how do the agencies identify, based on science, circumstances in which there is a significant nexus? (p. 3-4)

Agency Response: 9(f), 9(g), 9(h), 9(i), and 9(l). Please also see the Process Compendium (Topic 13).

Petroleum Association of Wyoming (Doc. #18815)

9.102 The agencies also rely on the Connectivity Study prepared by the EPA Science Advisory Board to justify the expansion of categorical jurisdiction to "tributaries" that are not permanent and to "waters" and "wetlands" abutting or adjacent to such tributaries. In essence , the agencies claim that, based on science or a factual analysis , virtually any drainage feature or wetland area can possess a significant nexus to TNW, regardless of such factors as relative permanency, proximity to TNW, volumes or contributions to flow in a TNW, hydrologic setting, or even the presence of water. The agencies go even further to posit that where a "tributary" or "wetland" would fail jurisdiction by itself, a significant nexus can be established for that non-jurisdictional feature by aggregating an individual "tributary" or "wetland " with "similarly situated " "waters" to reach the significant nexus threshold , thereby transforming non-jurisdictional features into jurisdictional ones. The entire hydrologic cycle is discussed in the Connectivity Study arguably suggesting an opportunity for the agencies to attempt to indirectly assert jurisdiction over states' groundwater resources, as a base flow conditions within a stream are commonly attributed to alluvial or aquifer drainage. Furthermore, the study posits that

biological dispersal, movement of organ isms, storage of floodwater, agricultural practices in recharge zones, and geologic time, all have bearing on the quality and quantity of water traditionally considered to be WOTUS or that could be tributary to such under the Proposed Rule . Any attempt to interpret WOTUS under these types of criteria would arguably place few limits on the extent of federal jurisdiction and would clearly exceed the agencies' jurisdiction. These expansive assertions of authority are not supported by law.

The CWA and Supreme Court precedent place significant limitations on the agencies' ability to exercise jurisdiction over waters with only a remote relationship to TNW. It appears the agencies are attempting to circumvent these *legal* jurisdictional voids by attempting to demonstrate with the Connectivity Report that factually a significant nexus exists. However, the agencies cannot overcome a legal constraint with purported factual showing. Nonetheless, this is exactly what the agencies appear to be attempting to do by relying on the Connectivity Study to fill the legal gaps they cannot support under any reading of *Rapanos* and *SWANCC*.[156] Neither the *Rapanos* plurality opinion nor Justice Kennedy's concurrence authorize the agencies to exercise jurisdiction categorically over tributaries that are not relatively permanent, or adjacent wetlands, waters or other waters without a case-specific demonstration that such waters are, in fact, WOTUS. (p. 5-6)

Agency Response: 9(d), 9(g), and 9(k). See also Legal Compendium (Topic 10) and TSD.

Colorado Livestock Association (Doc. #7930)

9.103 A scientific review of the Proposed Rule states that connectivity of waters occurs as a gradient of activity, not binary (either / or) as described by the Rule. The SAB also recommends greater detail of connectivity than is included in the Rule, and specifically states that connections should be "spatially continuous physical, hydrological, chemical, and biological flowpaths."

Point: The SAB report, commissioned as part of the Proposed Rule, acknowledges the subjective nature of connectivity and recommends more descriptive empirical evidence to establish a connection between waters. The intent of the Proposed Rule was to add clarity to what is and is not defined as WOTUS, and by not formally defining connectivity and identifying specific scientific measure to determine connectivity it actually decreases clarity. Using measures for determination such as "best profession judgment" allows for full subjectivity with no basis of scientific fact. (p. 3)

Agency Response: 9(f), 9(g), and 9(h).

[156] The fact that the agencies relied on the draft Connectivity Study before it was finalized, suggests the agencies had a pre-decisional bias toward the outcome expressed in the proposed rule. By not consulting with the states in the preparation of the rule, and not including state agency representatives or other potentially impacted stakeholder groups in the Science Advisory Board process while including representatives of the environmental community, PAW believes the agencies have undermined public confidence in the Science Advisory Board process.

Alameda County Cattlewomen (Doc. #8674)

9.104 When the agencies crafted their Proposed Rule and requested its Office of Research and Development to develop this Connectivity report, the logical and fundament request to the researchers should have been to look at the importance (or "significance") of connections of these smaller waters to TNWs. It is unclear to the cattle industry how and why the agencies failed to ask the most important question that science should have informed under this regulation, "what is significance." The agencies response about that term being a legal question is weak at best. It is a legal term that requires scientific analysis. The agencies failure to even request an adequate and relevant analysis puts the entire report into the unusable category. ACCW assert that because the Connectivity report does not address the significance of connections it cannot be relied upon in the Proposed Rule. (p. 14)

Agency Response: 9(f), 9(g), and 9(h).

Michigan Farm Bureau, Lansing, Michigan (Doc. #10196)

9.105 We find several problems with the report itself and with EPA AND USACE's reliance upon it to support current rulemaking. While the hundreds of pages of scientific literature reviewed in this report do in some cases establish evidence for connectivity between various features across the landscape to jurisdictional waters, one key point missing from the report is significance. [ ]…

9.106 The *Connectivity* report, while establishing that there are often hydrologic connections between features across a landscape, fails to relate the strength of those connections to the legal analysis in a way that could be applied to Justice Kennedy's legal definition of "significant." It therefore does not provide the assurance of regulatory authority by the EPA AND USACE over a wide variety of water features across the landscape, which may have uncertain connection with jurisdictional waters (p. 2)

Agency Response: 9(f), 9(g), 9(h) and 9(i).

9.107 EPA AND USACE's analysis of the *Connectivity* report's findings is also inconsistent. While acknowledging that the significance of connection by wetlands and other waters not separated from river networks are too difficult to generalize, the agencies still purport to gauge the significance of connection across an entire landscape undefined in scope to establish jurisdiction over those waters. Regardless of whether this is done on a case by case basis, the aggregation of such waters and the lack of understanding of how they connect to or influence jurisdictional waters suggests that EPA AND USACE do not in fact have the authority under the Clean Water Act to assert jurisdiction over them without running afoul of case law identified in *Solid Waste Agency of Northern Cook County v. U.S. Army Corps of Engineers*, 531 U.S. 159 (2001) (SWANCC). (p. 3)

Agency Response: 9(d), 9(i), and 9(k).

9.108 In *Rapanos*, Justice Kennedy identified wetlands as having special, specific functions that influence water quality and therefore make them able to be included in jurisdictional authority. He made no similar identification of similar properties of other waters besides wetlands. While the EPA's *Connectivity* report reviews studies that suggest other adjacent

waters may have an impact on jurisdictional waters, it fails to categorically identify the significance of that impact. (p. 4)

Agency Response: 9(f), 9(g), 9(h), and 9(i).

9.109 EPA and USACE have proposed to define "tributaries" under the rule to clarify the waters falling under authority of the CWA. While the scientific literature cited from the Connectivity report supports the basic connectivity of headwater, ephemeral, intermittent, and other features to jurisdictional waters, the document fails to establish the significance of many of those connections. (p. 5)

Agency Response: 9(f), 9(g), 9(h), and 9(i).

Nebraska Cattlemen (Doc. #13018.1)

9.110 As a result, the Connectivity Report's conclusions (which EPA is claiming as the scientific basis for the Proposed Rule) has the effect of establishing categorical federal jurisdiction over tributary systems, riparian areas, and floodplains allowing the agencies to establish jurisdiction over such waters without conducting a case-by-case analysis on anything other than isolated waters. As discussed below, this creates a blanket jurisdictional determination without the ability to interject judgment or common sense where needed. In Nebraska, where there are large areas of agricultural land with various types of water bodies and surface features, where this will have a tremendous negative impact.

The Connectivity Report, failed to consider the significance of connectivity in direct violation and contradiction to Supreme Court direction. *See Rapanos v. Army Corps of Engineers*, 547 U.S. 715 (2006). The Report also did not analyze this connectivity in relation to "traditionally navigable waters," but rather to any "downstream water." These two defining characteristics are inextricably linked to the legal limits of the CWA and the failure of the EPA scientific data study to even consider them makes the Connectivity Report irreparably flawed and unable to be used as the scientific underpinnings for the Proposed Rule. Without the inclusion of these essential scientific components it is impossible for EPA to fully evaluate all relevant data and provide a rational connection between the facts found and regulatory choices made. As such, the use of the Connectivity Report and reliance by EPA on it is arbitrary, capricious, an abuse of discretion or otherwise not in accordance with the law. (p. 6-7)

Agency Response: 9(d), 9(f), 9(g), 9(h), 9(i), and 9(l). See also the preamble to the final rule and the TSD.

Missouri Agribusiness Association (Doc. #13025)

9.111 The Proposed Rule, and its draft connectivity study upon which much of the rule is based, refers to studies of both terrestrial species and migratory birds which is directly contrary to prior direction from the Supreme Court in SWANCC. Had EPA properly acknowledged the SWANCC decision, it would have recognized that the connectivity study's finding of "biological connectivity" has no legal significance to downstream navigable waters. (p. 2)

Agency Response: 9(f)

9.112 If we were to look at the SAB comments regarding the connectivity report, it is in fact not surprising that the SAB states that all water is connected to some undefined degree of significance. In fact, the SAB mentions the need to develop a significance 'gradient' and comments that some connections are so faint that it might take years to express the connection and only through cumulative effect of many such connections might a navigable water actually display some effect. That effect could most probably be negligible. The SAB is basically telling the agencies that a lot of work needs to be conducted to determine how 'significant' a connection is on the connectivity gradient. (p. 2)

Agency Response: **9(f), 9(g), 9(h), and 9(i).**

9.113 Most of the current research quoted in the draft connectivity study do not directly and specifically address pollutant transport to and impact on the quality of navigable waters. Accordingly, such studies cannot be used to help policy-makers identify the jurisdictional boundaries of the CWA. (p. 9)

Agency Response: **9(d), 9(f), and 9(n). As stated in the summary response essays, pollutant transfer between streams, wetlands, and open waters is considered an example of a chemical linkage between and among these systems. The Science Report found strong evidence supporting the central roles of the physical, chemical, and biological connectivity of streams, wetlands, and open waters—encompassing varying degrees of both connection and isolation—in maintaining the structure and function of downstream waters, including rivers, lakes, estuaries, and oceans. The Science Report also found strong evidence demonstrating the various mechanisms by which material and biological linkages from streams, wetlands, and open waters affect downstream waters, classified here into five functional categories (source, sink, refuge, lag, and transformation; discussed below), and modify the timing of transport and the quantity and quality of resources available to downstream ecosystems and communities. Thus, the currently available literature provided a large body of evidence for assessing the types of connections and functions by which streams and wetlands produce the range of observed effects on the integrity of downstream waters. The SAB found, "[t]here is strong scientific evidence to support the EPA's proposal to include all tributaries within the jurisdiction of the CWA. 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 process." Likewise, regarding adjacent waters and wetlands, the SAB stated, "[t]he available science supports the EPA's proposal to include adjacent waters and wetlands as a waters of the United States. …because [they] have a strong influence on the physical, chemical, and biological integrity of navigable waters."**

9.114 A general comment from the SAB is that there is a scientific basis for the fact that most all runoff has the potential to be possibly significant to some degree. This is hardly surprising. This is why the farmers and taxpayers of this country spend millions of dollars each year implementing conservation practices on uplands in order to reduce non-point source pollution and to maintain and improve water quality. The SAB actually establishes a case that the Proposed Rule is deficient. The SAB's comments, by volume, describes

more concerns and uncertainty than it provides support. Here is a sampling of these comments:

"Recognizing the myriad connections between non-floodplain and non-riparian waters and wetlands and downstream waters (via surface water, shallow subsurface flowpaths, shallow or deep ground water flowpaths, or through chemical and biological connections) with specific attention paid to the magnitude, duration, frequency, predictability, and consequences of these connections is critical to understanding that all water bodies are likely connected to some extent to downstream waters, although the degree of connectivity can vary widely."

The SAB rightly describes the 'myriad' of connections and purports a 'likely' connection to 'some extent'. This accurately describes the situation whereby the vast volumes of flowpaths project infinite variations and degrees of connectivity with some impacts being undoubtedly infinitesimally small. Much of the SAB's comments relate to the general notion that EPA does not go far enough. Some comment that ditches should not be excluded and that most ditches have the potential to deliver pollutant and thus should be WOTUS. The SAB interchanges erosional features and ephemeral streams. Below are some of those comments.

"Discriminating between shorter-term erosional features (e.g., rills and gullies) and longer-term headwater channels represents a challenge relative to mapping as well as to the nature of ecological transitions between, for example, gullies and ephemeral streams. However, to exclude these and other variable source areas from jurisdiction is not fully supported by the available science as they can be important components of integrated aquatic systems with measurable impacts to downstream systems."

"Although gullies, rills, and non-wetland swales are excluded by the rule, the Proposed Rule's preamble notes that these features are important conduits for moving water between jurisdictional waters, making them important with respect to hydrological and other forms of connectivity."

"Exclusion of ephemeral features located on agricultural land that do not possess a bed and bank due to past farming practices seem to grant an unnecessary and potentially harmful exclusion and should be reconsidered."

"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."

"Because such ditches exist in heavily agricultural areas which are subject to runoff containing high concentrations of sediments, nutrients, and pesticides, these ditches may be important for certain ecosystem services such as attenuation of nonpoint source pollution."

"When ditches in this region do flow, they move water and much agricultural run-off to Lake Erie. This can result in harmful algal blooms and the loss of drinking water (e.g., as has occurred in Toledo and surrounding areas)."

These statements basically describe the potential effect of ditches, erosion features, and ephemeral streams on downstream water quality and ecosystems. These statements are

not germane to the issue of determining WOTUS. From a legal standpoint, from these observations, it does not follow that these landscape features should be defined as waters and considered WOTUS. Congress provided the CWA Section 319, farm bill conservation programs, and other programs for NPS control. The SAB panelists are scientists and not lawmakers or lawyers. SAB comments about the extent of WOTUS coverage is beyond scientific conversation and ventures into policymaking. This is perhaps said best by one the SAB panelist who stated:

"I can appreciate the political difficulty of extending CWA jurisdiction to these waters, and the economic hardship that such extension of jurisdiction could place on the regulated public. However, I would be remiss if I didn't point out that any decision to not cover these types of ditches is wholly a policy decision"

Indeed, the SAB comments ebbs and flow between issues of science, policy, and legal jurisdiction. Based on these comments by the SAB, without the proper respect given to the law which rightfully restrains federal powers, it should be expected that the exclusions currently in the Proposed Rule for ditches and erosion features will be short-lived. Surly very little time that will pass before there is clamoring to remove the exclusions based on 'additional scientific information'. Will the EPA, now 'informed' by the SAB, surely revisit the exclusions for ditches and erosion features as suggested by science and its SAB? Why doesn't the EPA come forth now, and boldly claim that all waters are jurisdictional as seems to be advocated by the SAB, and remove all exclusions and exceptions. Perhaps because EPA knows that would be a very obvious step too far. All pretense of retrained jurisdictional expansion would surely be gone. (p. 9-11)

Agency Response: 9(d), 9(f), 9(g), 9(h), 9(i), 9(k), 9(n), the preamble to the final rule, the TSD, and the Legal Compendium (Topic 10).

Minnesota Agricultural Water Resource Center (Doc. #14284)

9.115 We concur that connectivity should be viewed as a gradient, not a binary property. As pointed out by the SAB, variation in the frequency, duration, magnitude, predictability, and consequences of connections contribute to their relative importance. As stated by the SAB, "the report also should recognize that all aquatic habitats have some degree of connection, *although such connections may not be relevant if they do not have important effects on… downstream waters*." (emphasis added) Clearly, the agencies need to recognize that some effects are not relevant, not important and therefore outside the scope of the CWA. Failure to clearly outline which connections are important and which are not will continue to complicate the agencies' attempt to provide clarity.

The SAB also raises the issue of definitions in their "Consideration of the Adequacy of the Scientific and Technical Basis of the EPA's Proposed Rule". Specifically, the SAB discussion of the exclusion of ditches excavated wholly in uplands, draining only uplands, and having less than perennial flow states that "many ditches in the Midwest would be excluded", then notes that these ditches may drain areas that would be identified as wetlands under the Cowardin classification system. Even the SAB, with all of its extensive training and experience, is unable to clearly understand wetland definitions under the CWA. Confusion about wetland definitions abounds currently, and the Proposed Rule does little to provide clarity. (p. 1-2)

Agency Response: 9(e), 9(f), 9(g), 9(h), and 9(l). See also the preamble to the final rule and the TSD, as well as the Legal Compendium (Topic 10).

National Stone, Sand and Gravel Association (Doc. #14412)

9.116 The fundamental error with the agencies relying on this connectivity report is that this rulemaking is not interpreting a scientific term in a statute that Congress has delegated to EPA's expert judgment. Rather, the regulatory structure of the CWA depends on the definition of the statutory term "navigable waters", which has been subject to regulatory actions and litigation over the years[157], most recently in the Supreme Court's 2006 Rapanos decision where Justice Kennedy embraced and expanded on the term "significant nexus " in opining as to what the statutory term "navigable waters" means. Indeed, the SAB panel commenting on the Proposed Rule stressed that the term was "poorly defined" and "vague."[158] *Most importantly the panel recognized that "significant nexus" was not a "scientific term but a "legal term that requires a policy determination in light of the law and science*"[159] (emphasis added). Thus, the panel urged EPA to "*articulate a definition that recognizes the relative strength of downstream effects to inform the conclusions of those effects for purposes of interpreting the Clean Water Act*"[160] (emphasis added). This SAB recommendation goes to the heart of why the agencies must withdraw the Proposed Rule. The agencies have failed to articulate the distinction between "any nexus" and "significant nexus", which is essential in fairly interpreting and applying Justice Kennedy's opinion. (p. 17-18)

Agency Response: 9(d), 9(f), 9(g), 9(h), 9(i), and 9(l).

Kansas Agriculture Alliance (Doc. #14424)

9.117 In its Review of the EPA Connectivity Report, the SAB agreed with the EPA's conclusion that certain "streams and bidirectional floodplain wetlands were physically, chemically, and/or biologically connected to downstream navigable waters."[161] However, the SAB continued that the "connections should be considered in terms of a connectivity gradient," and recommended that EPA revise its Connectivity Report to "improve the clarity of the Report, better reflect the scientific evidence, expand the discussion of approaches to quantifying connectivity, and make the document more useful to decision-makers."[162]

[157] In United States v. Riverside Bayview Homes Inc., 474 U.S. 121 (1986) the court only upheld CWA jurisdiction over non-navigable adjacent wetlands that actually abutted a navigable waterway. In SWANCC 531 US 159, the Court held that CWA jurisdiction did not extent to isolated pond based on the use of that water by migratory birds.
[158] Memo form Dr. Amanda Rodewald Chair of the SAB Panel to Dr. David Allen Chair of EPA Science Advisory Board " comments to the chartered SAB on the Adequacy of the Scientific and Technical Basis of the Proposed rule titled " Definition of Waters of the United States Under the Clean Water Act, at 6 (Sept. 2, 2014) available at http://yosemite.epa.gov/sab/sabproduct.nsf/F6E197AC88A38CCD85257D49004D9EDC/$File/Rodewald_Memorandum_WOUS+Rule_9_2_14.pdf
[159] Id.
[160] Id.
[161] Administrative Procedures Act, 5 U.S.C. § 500 et seq., as amended.
[162] Rapanos v. United States, 547 U.S. 715 (2006)

The "connectivity gradient" – currently omitted from the Proposed Rule – is the essential part of the "significant nexus" analysis which allows the agencies to define and set jurisdictional parameters over non-navigable waters and wetlands. Clearly, without "connectivity gradient" considerations, EPA is incapable of accurately drawing factual and scientific distinctions of whether one body of water (or dry ephemeral creek) does, in fact, significantly affect a downstream traditional navigable water of the United States. Similarly, the SAB states that while non-floodplain wetlands "sustain the integrity" of downstream waters, the degree of that connectivity "can vary widely."[163]

On the issue of "connectivity," the SAB faults the EPA Connectivity Report, stating that it "often refers to connectivity as though it is a binary property (connected versus not connected) rather than as a gradient." In order to make the EPA Connectivity Report more "technically accurate," the SAB recommends revising the definitional parameters of "connectivity" to establish a gradient approach that "recognizes variation in the frequency, duration, magnitude, predictability, and consequences of those connections." These considerations are currently absent to any meaningful degree from the EPA Connectivity Report.[164]

This lack of fundamental considerations for connectivity gradients clearly results in imprecise calculus for establishing the jurisdictional parameters and definitions in the Proposed Rule. For that reason, the SAB recommends that EPA expand its "brief overview of approaches to measuring connectivity" by utilizing quantifiable "dimensions of connectivity" and "connectivity metrics."[165] Additionally, when redrafting the Proposed Rule, the SAB instructs EPA to include "[l]ayers of complexity … to represent important aspects of connectivity such as spatial and temporal scale."[166]

In order to give greater context to the jurisdictional parameters established by the Proposed Rule, e.g., defining where a significant nexus exists, the SAB recommends that the EPA Connectivity Report examine the "spatial and temporal scales at which streams, groundwater systems, and wetlands" become "functionally aggregated."[167] The SAB further recommends that this examination include the role of "biological connectivity, biogeochemical transformation processes, and the effects of human alteration of connectivity," factors currently functionally absent from the EPA Connectivity Report and subsequent Proposed Rule.[168] At a practical level, the SAB recommends that the EPA "use more commonly understood terms that are grounded in peer-reviewed literature."[169]

In summation, it is clear from the SAB review of the EPA Connectivity Report, and subsequent Proposed Rule, that the EPA and Corps failed to fully consider essential "connectivity gradients" as the necessary elements of Justice Kennedy's "significant nexus" test. This raises serious concerns about the assumptions underlying the entire

[163] Id.
[164] Id. at 2.
[165] Id.
[166] Science Advisory Board Review of the Draft EPA Report, *Connectivity of Streams and Wetlands to Downstream Waters: A Review and Synthesis of the Scientific Evidence*. Oct. 17, 2014, pg. 2
[167] Id.
[168] Id.
[169] Id.

Proposed Rule. For this reason, we firmly assert that the Proposed Rule should not have been published before the Science Advisory Board released its final connectivity report. We recommend that the agencies withdraw the Proposed Rule and EPA fully and judiciously review and revise its Connectivity Report. (p. 10-12)

Agency Response: 9(a), 9(d), 9(f), 9(g), 9(h), and 9(i).

Kentucky Farm Bureau (Doc. #14567.1)

9.118 The Proposed Rule also references scientific standards contained in the Connectivity Report that supports significant nexus standards base d on near proximity, hydrological connections as well as biological connections. It is odd that the Proposed Rule does not mention anywhere how a biological connection can be used as the basis for forming a significant nexus standard when it is prevalent throughout the Connectivity Report. A biological connection could include waterfowl, reptiles or even insects to form a connection and would be extremely troubling. How would a biological connection with an isolated pot hole or pond have any impact on a waterway's quality under present regulatory determinations utilizing "navigable" in defining waters of the U.S.? (p. 3)

Agency Response: 9(f)

The Mosaic Company (Doc. #14640)

9.119 Mosaic previously submitted technical comments during the SAB review of this report (see Appendix B). As stated in those comments, the draft EPA Connectivity Report provides generalizations about ecological processes and potential pathways of connectivity between streams, wetlands, and downstream waters. However, the report makes no attempt to quantify the ecological importance and/or significance of these potential connectivity pathways, nor does the report attempt to indicate how this information on connectivity could be used to clarify CWA jurisdiction. Rather, even though a number of members of the SAB sought to discuss and establish a sliding scale for a gradient of connectivity, such suggestions were quickly dismissed on SAB conference calls as not necessary. (p. 18)

Agency Response: 9(g), 9(h), and 9(i).

9.120 The draft EPA Connectivity Report discusses general and potential functions of subsurface connections without mention of quantifiable metrics that define such a connection or describe the significance of that connection. This discussion is insufficient to assert that all such waters have a significant nexus to traditional navigable waters because the EPA acknowledges the variability in distance between waters, soils, and geography affect the connectivity. Additionally, this discussion completely ignores the "significance" of any connection. [ ]…

This raises two distinct issues the agencies must resolve in the Proposed Rule. First, the peer-reviewed literature used in the draft EPA Connectivity Report describes how the subsurface connections between waters and downstream waters vary as a function of distance, topography, and geology. Yet, the Proposed Rule has made no attempt to determine when and under what circumstances a connection is determined sufficient for jurisdictional purposes. Second, the agencies discuss only connectivity and do not address or determine or quantify the significance of a connection sufficient to effect

downstream water quality and therefore justify jurisdiction under the CWA. In the SAB's 9/3012014 letter to the EPA regarding the adequacy of the science to support the Proposed Rule, the SAB urges the EPA to define adjacency on the basis of functional relationship, not proximity to a navigable water (EPA-SAB-14-007). Mosaic agrees, but the mere presence of a functional relationship is not sufficient for jurisdiction under *Rapanos*, a measure of the significance of the relationship or connection is also required. With these deficiencies the Proposed Rulemaking lacks the scientifically defensible information necessary to make the categorical determination that waters with a subsurface connection meet the significant nexus standard. (p. 23-24)

Agency Response: 9(f), 9(g), 9(h), 9(i), and 9(k).

9.121 The EPA report fails to quantify the ecological importance of connectivity and/or isolation of streams and wetlands with downstream waters. Cardno Technical Memorandum at 3. Additionally, the report fails to identify the structural and functional metrics that can be used to quantify and characterize the connection between unidirectional systems and downstream waters. As a result, the report provides little in the way of field-usable science to detect and measure connectivity for the ultimate goal of CWA regulatory purposes. To provide information that is useful for clarifying CWA jurisdiction, the EPA report should, based on peer-reviewed science, identify the objective circumstances in which the presence of connectivity between wetlands and downstream waters is ecologically significant. Id. at 5. (p. 61)

Agency Response: 9(f), 9(g), 9(h), and 9(i).

9.122 As noted in the Cardno Technical Memorandum, the EPA report suggests that "potential function" should be assessed where a system has no demonstrable functional linkage to downstream waters. See EPA report at 3-27. As Cardno points out, the significant nexus test cannot be based on speculative potential effects. See Cardno Technical Memorandum at 5. Corps practice is to look at the normal circumstances of wetlands, as required under existing regulations. See 33 C.F.R. §328.3(b).[170] Accordingly, the EPA report's discussion of potential functions could lead to improper assertions of jurisdiction over waters that have no ability to affect the quality of downstream waters. Moreover, such reliance on potential functions could add a large degree of uncertainty to the regulatory process. (p. 61)

Agency Response: 9(n). A potential function represents the capacity of an ecosystem to perform that function under suitable conditions. For example, a wetland with high capacity for denitrification is a potential sink for nitrogen, a nutrient that becomes a contaminant when present in excessive concentrations. In the absence of nitrogen, this capacity represents the wetland's potential function. If nitrogen enters the wetland (e.g., from fertilizer in runoff), it is removed from the water; this removal represents the wetland's actual function. Both potential and actual functions play critical roles in protecting and restoring downstream waters as

[170] "The term wetlands means those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas."

environmental conditions change, both as a function of natural conditions (e.g., seasonal and annual variability) and to human impacts (e.g., land use change).

9.123 The EPA report's conclusion that all streams and wetlands in floodplains or riparian areas are physically, chemically, and biologically connected to downstream waters is too broad a generalization. The report fails to account for site specificity, regional variability, or temporal variability. Rather, it treats all connections as equal regardless of their size, type, or frequency. Indeed, the EPA report focuses heavily on connectivity, providing information on how isolated systems may be connected or potentially connected, but it does not provide any discussion of instances in which systems may be truly isolated. See Cardno Technical Memorandum at 6. (p. 61)

Agency Response: 9(f), 9(g), 9(h), and 9(i). According to the Science Report (p. 4-39), hydrologists and ecologists would generally agree that all non-floodplain wetlands are interconnected to some degree and are connected with stream networks, which is why the water-cycle environment is referred to as the hydrosphere. Hydrologists and ecologists also generally agree that some areas are more connected or have a greater influence than others. As examples of systems that do not connect to the river network through surface water, the Report discusses wetlands that spill into losing streams that are completely disconnected from the river network and geographically isolated wetlands that either do not spill, or spill into an upland swale that does not enter the river network. Although such wetlands lack surface-water connections to streams and rivers, they can be connected through local, intermediate, or regional ground-water flows or through biological movement. The report also discusses closed or endorheic basins (p. 3-2), which have no surface outflows to oceans, but terminate as inland lakes, seas, playas, or pans. Endorheic basins represent only approximately 2% of the North American continent.

9.124 The EPA report defines key terms, such as "stream" and "wetland" in a manner that is inconsistent with existing regulatory definitions. It creates two new categories of wetlands—"unidirectional wetlands" and "bidirectional wetlands"—without providing any scientific or legal support for such a distinction. The EPA report uses the term "unidirectional wetlands" to refer to a diverse set of wetlands and water body types (e.g., prairie potholes, vernal pools, and playa lakes), generalizing that these wetlands provide "numerous functions that can benefit downstream water quality and integrity." EPA report at 1-10. As discussed in the Cardno Technical Memorandum, however, playa lakes should be a clear example of an isolated feature that does not have a significant connection with downstream waters. *See* Cardno Technical Memorandum at 3. It is of great concern that the EPA report seems to include aquatic features that are clearly non-jurisdictional under *SWANNC* within the broad sweep of its coverage. (p. 62)

Agency Response: 9(l), 9(n). Playa lakes are generally an example of non-floodplain wetlands that lack a channelized surface or regular shallow subsurface connection. For such wetlands, the Science Report states (pp. ES-3 to ES-4) that generalizations about their specific effects on downstream waters from the available literature are difficult because information on both function and connectivity is needed. Few scientific studies explicitly addressing connections between non-floodplain wetlands and river networks have been published in the peer-reviewed literature. Even fewer publications specifically focus on the frequency, duration,

magnitude, timing, or rate of change of these connections. In addition, although areas that are closer to rivers and streams have a higher probability of being connected than areas farther away when conditions governing the type and quantity of flows—including soil infiltration rate, wetland storage capacity, hydraulic gradient, etc.—are similar, information to determine if this similarity holds is generally not provided in the studies we reviewed. Thus, current science does not support evaluations of the degree of connectivity for specific groups or classes of wetlands. Evaluations of individual wetlands or groups of wetlands, however, could be possible through case-by-case analysis. Note that most of the literature cited by the Report for playa lakes discusses biological connectivity, rather than hydrologic connectivity; e.g., p. 4-32 to 33.

National Corn Growers Association (Doc. #14968)

9.125 The Agencies' science report on the degree of connections between TNW and upstream waters and wetlands, the Connectivity Report, does not distinguish in any scientific or quantifiable manner the relative strengths of the degree of connections that exist, nor their degree of effects. (p. 5)

Agency Response: 9(g) and 9(h).

National Pork Producers Council (Doc. #15023)

9.126 The *Connectivity Report* discusses in numerous instances connections and effects of certain types of waters on downstream waters. However, the *Connectivity Report* does not distinguish in any scientific or quantifiable manner the relative strengths of these effects, nor does it quantify or identify the gradient of effects that may exist. While that report does make mention of the existence of a "gradient" or degree of such connections and their effects, and the Agencies make mention of that minimal discussion of a gradient in the Proposed Rule's preamble (See page 22193), the Agencies did not craft any indicators or measures of the degree of these effects. Instead, the Agencies considered the *Connectivity Report's* findings that tributaries and adjacent waters have some connection to downstream waters; that they have some chemical, physical or biological effects on those TNW; and that these effects are ''significant'' "in light of the law and science" and constitute a significant nexus categorically. (See pages 22195-22196). (p. 4)

Agency Response: 9(f), 9(g), 9(h), and 9(i).

Colorado Cattlemen's Association (Doc. #15068)

9.127 CCA believes that the agencies cannot rely on EPA's Report, Connectivity of Streams and Wetlands to Downstream Waters: A Review and Synthesis of the Scientific Evidence, (Washington, DC: U.S. Environmental Protection Agency, 2013). The agencies failed to have their scientific arm focus on the most fundamental scientific matters that are inseparably linked to the legal limits of the law: "significance" of connectivity, and that connectivity to TNWs instead of "downstream waters." (p. 6)

Agency Response: 9(b), 9(f), 9(g), 9(h), 9(i), and 9(l).

Missouri Farm Bureau Federation (Doc. #15224)

9.128 The Science Advisory Board (SAB) very clearly suggests that the report fails to provide adequate scientific backing for the Proposed Rule. The SAB calls on the EPA "*to improve the clarity of the Report, better reflect the scientific evidence, expand the discussion of approaches to quantifying connectivity, and make the document more useful to decision-makers.*"[171] A major analytical flaw identified by the SAB is EPA's characterization of connectivity as a "binary property" rather than a "gradient." The SAB states, "*In order to make the Report more technically accurate, the SAB recommends that the interpretation of connectivity be revised to reflect a gradient approach that recognizes the variation in the frequency, duration, magnitude, predictability, and consequences of those connections.*"[172] (p. 2)

Agency Response: 9(g) and 9(h).

9.129 Repeatedly citing the need for more clarity, the SAB observes that the Connectivity report is a "science" rather than a "policy" document and would be more useful to "decision-makers" if the EPA provided "more clarity" on the interpretation of connectivity. (p. 7)

Agency Response: 9(h)

Packaging Corporation of America (Doc. #15515)

9.130 The Proposed Rule utilizes the not yet completed Connectivity Report as its basis for making these categorical determinations on significance. The Report, however, fails to document the significance of hydrological, chemical or biological connections and simply focuses on the actual or potential presence/absence of those connections. As a result, the Proposed Rule makes categorical findings about connectivity that leave no room for case-by-case determinations of significance. At a minimum, as the Science Advisory Board panel (SAB) previously recommended, the Report should be revised to include: (1) a conceptual framework that integrates spatially continuous hydrological, chemical and biological flow paths that connect watersheds; (2) an interpretation of connectivity that reflects variation in the frequency, duration, magnitude and predictability of connections (i.e., gradient approach to defining connectivity); and (3) terminology and concepts that adequately describe the variable nature of connectivity (e.g., longitudinal, lateral, vertical and temporal).

Only after such revisions occur and are peer-reviewed can the Connectivity Report be cited credibly and used to support regulatory definitions of "significance" applied to water features that would qualify as WOTUS. However, even then, there should be some allowance for case-by case analysis rather than broad regulatory declarations of categorical determinations, given the broad variation of potential "significance" in and among physical, chemical and biological connections. (p. 7)

Agency Response: 9(a), 9(e), 9(f), 9(g), 9(h), and 9(i).

[171] Cover letter to US EPA Administrator Gina McCarthy accompanying SAB review, October 17, 2014.
[172] *Id.*

Goehring Vineyards, Inc. (Doc. #19464)

9.131 Any regulation of wetlands must be reasonable and not push the outer boundaries of the CWA's constitutional envelope. Further, any rulemaking's, as well as the Report's, discussion of aggregation or cumulative effects should be limited in scope, applying only to wetlands and not all navigable waters. Thus, I recommend that the Report be revised to reflect this limitation. (p. 10)

Agency Response: 9(d), 9(f), 9(g), 9(h), 9(i), and 9(k). See also the preamble to the final rule, the TSD, and the Legal Compendium (Topic 10).

Chicken & Egg Association of Minnesota (Doc. #19584)

9.132 In reviewing the Science Advisory Board (SAB) review of the Draft EPA Report "Connectivity of Streams and Wetlands to Downstream Waters: A review and Synthesis of the Scientific Evidence", we concur that connectivity should be viewed as a gradient, not a binary property. As pointed out by the SAB, variation in the frequency, duration, magnitude, predictability, and consequences of connections contribute to their relative importance. As stated by the SAB, "the report also should recognize that all aquatic habitats have some degree of connection, *although such connections may not be relevant if they do not have important effects on… downstream waters*." (emphasis added) Clearly, the agencies need to recognize that some effects are not relevant, not important and therefore outside the scope of the CWA. Failure to clearly outline which connections are important and which are not will continue to complicate the agencies' attempt to provide clarity.

The SAB also raises the issue of definitions in their "Consideration of the Adequacy of the Scientific and Technical Basis of the EPA's Proposed Rule". Specifically, the SAB discussion of the exclusion of ditches excavated wholly in uplands, draining only uplands, and having less than perennial flow states that "many ditches in the Midwest would be excluded", then notes that these ditches may drain areas that would be identified as wetlands under the Cowardin classification system. Even the SAB, with all of its extensive training and experience, is unable to clearly understand wetland definitions under the CWA. Confusion about wetland definitions abounds currently, and the Proposed Rule does little to provide clarity. (p. 1)

Agency Response: 9(e), 9(f), 9(g), 9(h), 9(i), and 9(l).

Airports Council International - North America (Doc. #16370)

9.133 In advancing the Proposed Rule, the EPA is relying exclusively on its interpretation of Justice Kennedy's significant nexus test[173], bolstered with its connectivity study to expand the waters regulated by rule and the scope of other waters to be evaluated on a case-by-case basis. The scientific predicate for the regulation of tributaries and adjacent waters by rule, and the liberal threshold being applied in the case-by-case evaluation of other waters, is an overreach. The Proposed Rule's reliance on a connectivity study by

[173] Justice Kennedy's significant nexus test is satisfied if a waterway "either alone or in combination with similarly situated lands in the region, affect[s] the chemical, physical, and biological integrity of other covered waters more readily understood as "navigable" in a fashion that is not "speculative" or insignificant.

the EPA that focuses on the hydro- ecological dynamics of the water cycle on a landscape scale advances regulation based on a fundamental premise that everything in a watershed is connected at some level, ignoring the significance of these connections in context is a fatal flaw. (p. 2-3)

Agency Response: 9(f), 9(g), 9(h), and 9(i).

Department of Public Works, City of Northglenn, Colorado (Doc. #14990)

9.134 There are significant issues with the current draft Connectivity Report that requires the Agencies' attention before continuing with the rulemaking process. First, the Connectivity Report does not evaluate connectivity in a regulatory context, i.e., what connections are sufficient to be considered a "significant nexus". The Connectivity Report fails to establish any scientific basis for determining the existence of a "significant nexus," and thus fails to provide a scientific basis for any rule defining federal jurisdiction. Instead, the report identifies only the presence of connections, without considering the significance of those connections. Second, the Connectivity Report does not address how the Agencies plan to conduct case-by-case reviews for determining jurisdiction of water bodies located outside floodplains. Finally, the Connectivity Report ignores the Jaw-that the Supreme Court has rejected that the idea that a "significant nexus" is established by any hydrological connection. The report does not identify how the existing connectivity literature will guide the Agencies in determining and justifying the idea of a "significant nexus" and therefore the expansion of the scope of their jurisdiction under the CWA. According to law established by recent decisions by the Supreme Court, the CWA regulates navigable water and certain other waters with a "significant nexus" to navigable waters. All other water must be left to the states to regulate. (p. 5)

Agency Response: 9(a), 9(d), 9(f), 9(g), 9(h), 9(i), and 9(l). See also Legal Compendium (Topic 10) and TSD.

Orange County Public Works, Orange County, California (Doc. #14994)

9.135 Much of the Proposed Rule is based on the draft EPA Report Connectivity of Streams and Wetlands to Downstream Waters, dated August 11, 2014 ("Connectivity Report"). The scientific question underpinning the report appears to be how areas are connected, and is inappropriate for rulemaking. The question should be, "What are the limits of connectivity for the purpose of rulemaking?" As a result, the utility of the Connectivity Report is limited, and the basis for rulemaking is therefore flawed. EPA should re-survey the body of scientific literature with the question, "What are the limits of connectivity?" (p. 4)

Agency Response: 9(f), 9(g), 9(h), and 9(i).

SD1 (Doc. #15140)

9.136 The science reviewed in EPA’s Draft Connectivity Report (EPA 2013) is a critical underpinning and foundation of the definition of the WOTUS (USACE and EPA 2014). As such, any deficiencies in the Connectivity Report are equally represented in the definition in the Proposed Rule. Specifically, both documents do not adequately account

for regional variability and significance of the connection between water bodies, nor do they acknowledge the gradients of the connections between these bodies.

The draft Connectivity Report and the proposed definition of WOTUS both base their definitions of connectivity between water bodies as an either/or property that does not meaningfully defer in the degree or the nature of the connection across the hydrologic regimes and ecoregions of the United States. However, the patterns of rainfall, soil characteristics, and topography all influence and determine the degree and importance of connectivity on the quality and functionality of a water resource. EPA's Science Advisory Board (SAB 2014) noted this limitation in their review of the Connectivity report, stating that they found

"…that the conceptual framework in the Report is not amenable to considering connectivity in a regional context, especially for regions with unique conditions such as the permafrost regions of Alaska."

Equally of concern is the treatment of connectivity in the draft Connectivity Report as an all or nothing feature, which fails to account for the strength of the connection between water bodies. The SAB (2014) acknowledges this with the statement:

"The Report often refers to connectivity as though it is a binary property (connected versus not connected) rather than as a gradient. In order to make the Report more technically accurate, the SAB recommends that the interpretation of connectivity be revised to reflect a gradient approach that recognizes variation in the frequency, duration, magnitude, predictability, and consequences of those connections. The SAB notes that relatively low levels of connectivity can be meaningful in terms of impacts on the chemical, physical, and biological integrity of downstream waters."

The SAB (2014) report goes on further to say that:

"Although connectivity is known to be ecologically important even at the lower end of the gradient, the frequency, duration, predictability, and magnitude of connectivity will ultimately determine the consequences to downstream waters."

Failing to define geographic limits of connectivity, and proposing a simple connected/not connected test will potentially result in the proposed definition over-representing WOTUS. The development and publication of the Proposed Rule before a final review and completion of the Connectivity Report further undercuts the scientific foundation of the definition of WOTUS and results in shared deficiencies in both documents. (p. 2-3)

Agency Response: 9(f), 9(g), 9(h), and 9(i).

Arizona Public Service Company (Doc. #15162)

9.137 SAB's advice regarding the draft Connectivity Report included recommendations to revise the report to "improve the clarity of the Report, better reflect the scientific evidence, expand the discussion of approaches to quantifying connectivity, and make the document more useful to decision-makers."12 APS agrees with SAB's assertion that connectivity is non-binomial (not simply whether a water is connected or not). APS supports SAB's recommendation for the Agencies to develop a table or metric by which the degree or gradient of connectivity can be assessed. APS recommends that the following parameters be considered as metrics: type of waters included in the evaluation,

the current jurisdictional status of each water included in decision, any known and/or suspected physical, chemical, or biological effects on a traditional navigable water, flow and/or seasonality of waters, presence and location of waters located within a riparian area or floodplain, mitigation factors/costs (if applicable), and other relevant factors as determined to be important to a site-specific jurisdictional determination (JD).

Once the connectivity gradient metrics have been drafted, through cooperation with states, tribes, municipalities, regional planning groups, and other stakeholders groups, APS recommends that a guidance document be developed to describe the basis for the metrics and the procedures by which the metrics will be developed. (p. 4)

Agency Response: 9(f), 9(g), 9(h), and 9(i).

9.138 SAB concluded that there is support for the statement that "streams and 'bidirectional' floodplain wetlands" are sufficiently connected to "downstream navigable waters," although even these need to be considered in terms of a connectivity gradient.13 APS strongly recommends that the Agencies consider in the final rulemaking the fact that SAB is not including the term "all waters" when concluding the physical, chemical, and/or biological connection to downstream navigable waters. Also, APS notes again the need to define "connectivity gradient" and to develop guidance therefore in a public comment process. (p. 5)

Agency Response: 9(f), 9(g), 9(h), and 9(i).

Western States Water Council (Doc. #9842)

9.139 The states' role would also be significantly enhanced by greater state representation on EPA's Science Advisory Board (SAB), on which the agency relies to provide the scientific underpinnings for this and other regulatory decisions [ ]...

Despite the foregoing mandates and the tremendous value that would be added to the SAB processes by state participation, state agency scientists are woefully and demonstrably under-represented on the SAB, as well as on its standing and *ad hoc* committees. This is particularly true for the SAB panel that is reviewing the EPA connectivity report that will serve to inform the final CWA rule.[174] Of the 27 experts on the panel, not one is a state agency scientist or expert.[175] (p. 15-16)

Agency Response: 9(c)

9.140 The WGA and WSWC encourage congressional direction to ensure that EPA achieves more balanced SAB representation, to include state participation that constitutes no less

[174] U.S. Environmental Protection Agency, Connectivity of Stream and Wetlands to Downstream Waters: A Review and Synthesis of the Scientific Evidence, EPA/660R-11/098B, (Sept. 2013), available at: http://yosemite.epa.gov/sab/sabproduct.nsf/fedrgstr_activities/7724357376745F48852579E60043E88C/$File/WOUS_ERD2_Sep2013.pdf.

[175] U.S. Environmental Protection Agency Science Advisory Board, Members of the Panel for the Review of the EPA Water Body Connectivity Report, External Draft, available at: http://yosemite.epa.gov/sab/sabpeople.nsf/WebExternalSubCommitteeRosters?OpenView%committee=BOARD&subcommittee=Panel%20for%20the%20Review%20of%20the%20EPA%20Water%20Body%20Connectivity%20Report.

than 10% of the membership of SAB committees, subcommittees and subject matter panels. (p. 17)

Agency Response: 9(c)

9.141 We are concerned that the report may be misinterpreted inappropriately to suggest that a scientific connection between waters alone is sufficient to establish CWA jurisdiction. The report only discusses well-known scientific principles of hydrology and geohydrology regarding the interconnections between waters, but does not and cannot describe how these principles apply to the legal and institutional boundaries that Congress and the Supreme Court have placed on CWA jurisdiction.

The overriding question in the rulemaking is not one of science, but of legal authority, namely the extent of federal authority over water resources under Justice Scalia's plurality opinion and Justice Kennedy's concurring opinion in Rapanos. For example, under Justice Kennedy's test, a mere scientific connection or "nexus" between waters is not sufficient to determine CWA jurisdiction. Instead, Justice Kennedy's test requires a fact-intensive, case-by-case physical and legal inquiry to determine whether that nexus is "significant" enough to establish CWA jurisdiction. Since the report does not describe how its scientific findings apply to this test or Justice Scalia's plurality decision, it is insufficient alone to establish or support CWA jurisdiction. (p. 29)

Agency Response: 9(d), 9(f), 9(g), 9(h),9(i), and 9(l). See also Legal Compendium (Topic 10) and TSD.

Mohave Electric Cooperative, Inc. (Doc. #10953)

9.142 In addition to peer review by the SRB, the Agencies solicited comments from the public on the draft Report. The ultimate fate of those thousands of comments is unclear. Did they inform the draft Report that was presented to the SRB for peer review? Were they provided to the SRB for consideration in their review? It is assumed that the Agencies will provide a discussion of the comments, and their response, in the final rule, but the public needs some assurance that the peer review being completed by the SRB has somehow acknowledged these comments. (p. 2)

Agency Response: 9(e)

Western States Water Council (Doc. #11165)

9.143 The SAB's comments rightly question the report's treatment of connectivity as a binary property (connected versus not connected), and therefore suggests a gradient approach to this scientific question. Even where waters are deemed scientifically to be connected, this is not sufficient in and of itself to answer the legal question of whether or not such waters are or are not jurisdictional under the Clean Water Act. Justice Kennedy's "significant nexus" test in Rapanos requires a connection between waters that is more than speculative or insubstantial to establish jurisdiction. Federal CWA jurisdiction efforts should quantify "significance" to ensure that the term's usage does not extend jurisdiction to waters with a de minimis connection to jurisdictional waters.

The SAB further recommends: "The Report should assess connectivity [i.e., nexus] in terms of downstream effects with an emphasis on frequency, magnitude, duration,

predictability, and consequences of connections."[176] It would remain to be determined whether or not any such nexus is supported by enough evidence so as not to be "speculative," as well as to determine whether or not it is significant. Such decisions will sometimes be challenged and will be subjected to continuing judicial review to determine if the nexus is significant enough to support a federal assertion of jurisdiction.

The Council further notes that the 27-member SAB panel that reviewed the report did not contain any state agency scientists or experts. State water agencies employ many well-qualified scientists and other experts that could have added tremendous value to the SAB's review of the report. Moreover, state representation on the SAB panel would have appropriately recognized the states' critical role as co-regulators and would have supported the requirement in Section 5(b) of the Federal Advisory Committee Act of 1972, which states that advisory committee membership must "be fairly balanced in terms of point of view represented and the functions to be performed." (p. 2)

Agency Response: 9(c), 9(d), 9(f), 9(g), 9(h), 9(i), and 9(l).

Duke Energy (Doc. #13029)

9.144 There were several issues identified with the Connectivity Report, as included in industry comments, including the failure to provide concise, measurable metrics or parameters that could be used to determine when a connection between waters is sufficient to establish a significant nexus. In addition, several studies included in the report are irrelevant since they do not establish how these connections affect water quality. Therefore, it is unclear how this report fits into the proposed "waters of the United States" rulemaking process, even though the agencies state that the document will be used as the scientific basis for the Proposed Rule. (p. 8)

Agency Response: 9(f), 9(g), 9(h), and 9(i).

9.145 One significant concern stems from the agencies' release of the Proposed Rule before the SAB even had a chance to review the Connectivity Report and develop their list of recommendations and improvements. The agencies state that the Final Rule will not be finalized until the Connectivity Report is finalized[177], but EPA says they feel comfortable that the Report supports their proposal. However, the sequencing of these activities leaves the public to only guess as to which, if any, of the SAB recommendations might be incorporated into the Final Rule. It appears as if the Connectivity Report was developed with a pre-determined agency position instead of using the science as a neutral foundation to begin discussions on development of a Proposed Rule. (p. 68-69)

Agency Response: 9(a)

9.146 Another area of concern with the Connectivity Report is that while the Report purports to have synthesized over a thousand different studies, a majority of these studies are not relevant to the goal of the Clean Water Act (CWA), which establishes the objective of restoring and maintaining the chemical, physical and biological integrity of the Nation's

[176] SAB Review of the Draft EPA Report Titled Connectivity of Streams and Wetlands to Downstream Waters: A Review and Synthesis of the Scientific Evidence, 56 (Oct. 17, 2014).
[177] 79 Fed. Reg. at 22,189

waters. This goal, and the Act itself, are focused on the quality of water necessary to restore and maintain aquatic life, not on the aquatic life itself. However, a number of the studies included in the Connectivity Report concern establishing "biological connectivity" based on the life cycle, habitat, and movement of animals and insects, but these do not have any relevance to water quality. Therefore, these studies should not be used to identify a connection to downstream navigable waters with any legal significance under the CWA. The comments submitted by the Federal Water Quality Coalition[178] also cite several other types of studies included in the Connectivity Report that have little to no relevance to support CWA jurisdiction. (p. 69)

Agency Response: 9(f)

9.147 The Connectivity Report also doesn't address the "significance" of connections between waters for the health or integrity of downstream waters. While the draft Connectivity Report cites many peer-reviewed scientific studies that *demonstrate a nexus* in watersheds or floodplains, it fails to identify succinct, measurable environmental parameters that would provide a scientific, technical, or other rational test that employs objective measures to distinguish between a nexus and a *significant nexus*. Instead the report just focuses on the ability of science to identify the presence of connections. From early reviews of the SAB's Draft Recommendations Report, the SAB panel also recognized this deficiency, along with several other substantive changes they recommend to the Connectivity Report. For example, the first recommendation that the SAB lists is "that the interpretation of connectivity be revised to reflect a gradient approach that recognizes variation in the frequency, duration, magnitude, predictability, and consequences of those connections."[179] The Proposed Rule claims that all tributaries (including ditches and other conveyances) and "adjacent waters" should be categorically deemed jurisdictional because the nexus is significant. As stated in the Preamble, "[t]he agencies emphasize that the categorical finding of jurisdiction for tributaries and adjacent waters was not based on the *mere connection* of a water body to downstream waters, but rather a determination that the nexus, alone or in combination with similarly situated waters in the region, is significant based on data, science, the CWA, and caselaw."[180] However, without taking these key factors into account (frequency, duration, magnitude, predictability, and consequences of those connections), the SAB doesn't seem to support this blanket jurisdictional determination to all tributaries and "adjacent waters", since there are no metrics to determine when a connection would be deemed "significant" and not just merely connected. (p. 69-70)

Agency Response: 9(e), 9(f), 9(g), 9(h), 9(i), and 9(l).

9.148 Duke Energy recommends that the agencies use an approach whereby an index of connectivity can be developed, that uses concise, measurable metrics for duration, magnitude and frequency parameters associated with hydraulic connectivity, to determine

[178] See Comments of Federal Water Quality Coalition on the Proposed Rule Defining "Waters of the United States", Section III (October 20, 2014)
[179] SAB Review of the Draft EPA Report *Connectivity of Streams and Wetlands to Downstream Waters: A Review and Synthesis of the Scientific Evidence*, Draft version (August 11, 2014)
[180] 79 Fed. Reg. at 22,189 (emphasis added)

waters with "high connectivity" and those related to "dis-connectivity" to allow scientifically supportable, objective measures of a significant nexus. (p. 70-71)

Agency Response: 9(h)

Murray Energy Corporation (Doc. #13954)

9.149 In addition, the Agencies' cart-before-the-horse approach to the Proposal becomes even more problematic as we look ahead to final action. As noted below, the SAB has now called into question EPA's proposed approach for addressing connectivity. *See SAB Review of the Draft EPA Report Connectivity of Streams and Wetlands to Downstream Waters: A Review and Synthesis of the Scientific Evidence*, Draft Report, at pg. 2 (March 25, 2014) ("SAB Report") (calling for a basic shift from the current all-or-nothing approach to defining connectivity in the draft Connectivity Report to one that more appropriately and accurately recognizes relative degrees of connection).[181] Thus, having rushed to release the Proposal, the Agencies are now faced with the Hobson's choice of either substantially revising the Proposal to heed the SAB's critical recommendation – which more accurately reflects the "best available science" – or ignoring it altogether. The first choice would lead to a final rule that is not a "logical outgrowth" of the Proposal[182] and the second would lead to one that arbitrarily ignores the best available science. Clearly, neither choice is in the best interest of the American people. (p. 7)

Agency Response: 9(e), 9(f), 9(g), and 9(h).

9.150 The Connectivity Report suffers from a number of deficiencies which call into question its overall accuracy and completeness. For one, as a general matter, the Connectivity Report fails to support the sweeping assertion of jurisdiction over all headwater streams that would result from the Agencies' suggested new definition of "tributary." This particular defect was highlighted by comments provided by the Water Advocacy Coalition ("WAC"):

> Most of the science of connectivity addressing the importance of the connection of headwater streams with downstream waters has been focused on measuring the flow of resources (matter and energy) from upstream to downstream. While these studies have demonstrated that matter and energy that flow from headwater streams represent some portion of the matter and energy in downstream waters, these studies have not focused on quantifying the ecological significance of the input of specific tributaries or headwaters, alone or in the aggregate, and ultimately whether such effects could be linked directly and causally to impairment of downstream waters. The [Connectivity Report] neglects to quantify the importance of the contribution of matter and energy from upstream tributaries relative to matter and energy derived locally from sunlight and riparian areas that surround downstream waters, and it does not discuss the important temporal and

[181] Available at: http://yosemite.epa.gov/sab/sabproduct.nsf/fedrgstr_activites/5E3A5C08948B391585257CAD004CD867/$File/SAB+Connectivity+Panel+Draft+Report_3_25_14.pdf.. The draft SAB Report was not released to the public until after the Agencies issued their Proposal.

[182] *See Small Refiners Lead Phase-Down Task Force v. EPA*, 705 F.2d 506 (D.C. Cir. 1983); *American Iron & Steel Institute v. EPA*, 568 F.2d 284 (3d Cir. 1977).

geographical variation that exists in the relative contribution of matter and energy from upstream and downstream sources. Thus, the scientific review in the [Connectivity Report] has not [provided] the quantitative specificity for practical application to a single nexus. Such specificity is critically needed, and if left unaddressed, will significantly limit the practical and regulatory value of [the] report.[183]

Agency Response: 9(f), 9(g), 9(h), 9(i), and 9(k).

9.151 In addition, among other more specific flaws, the Connectivity Report lacks sufficient literature on the unique hydrologic conditions in the arid southwest on which to base a complete assessment regarding connectivity and these data gaps are not acknowledged in the draft report.[184] (p. 8)

Agency Response: 9(i)

9.152 The Agencies reach this erroneous conclusion and the underlying assumption regarding tributaries based in large part on purported scientific evidence in the draft Connectivity Report. Despite the fact that this report has not yet been finalized, EPA has concluded that the scientific consensus supports its decision to assert jurisdiction over all tributaries based on their importance and significant nexus to traditional navigable waters. See Proposed Rule at 22201. Yet, in connection with its ongoing peer-review of the Connectivity Report, the SAB recently published initial findings suggesting that EPA's basic approach to defining connectivity, including in the context of defining tributaries, is **flawed**:

The [Connectivity] Report often treats connectivity as a binary property, either present or absent, rather than as a gradient. In order to make the [Connectivity] Report more technically accurate and useful to decision makers, the SAB recommends that the interpretation of connectivity be revised from a dichotomous, categorical distinction (connected versus not connected) to a gradient approach that recognizes variation in the strength, duration and magnitude, and consequences of those connections.

See SAB Review of the Draft EPA Report Connectivity of Streams and Wetlands to Downstream Waters: A Review and Synthesis of the Scientific Evidence, Draft Report, at pg. 2 (March 25, 2014). (p. 9)

Agency Response: 9(a), 9(f), 9(g), 9(h), and 9(i).

Southern Company (Doc. #14134)

9.153 EPA should describe its process for selecting certain scientific studies over others, including its decision to focus solely on literature involving the connectivity of water

[183] *See* WAC Comments on the draft Connectivity Report, Docket ID No. EPA-HQ-OA-2013-0582-0261.

[184] *See* Comments submitted to EPA on 4/11/14 on behalf of the Howard Hughes Corporation et al., EPA ID: EPA-HQOA-2013-0582-1713:

. . . most of the studies used in the Connectivity Report are based in wetter parts of the United States, where conditions allow for more quantifiable and reliable hydrologic data. The Connectivity Report contains very little information or discussion about the special conditions that define and characterize headwater streams and wetlands in the Southwestern United States. As a result, the Connectivity Report overstates the potential nexus between the headwaters and intermittent water bodies in the Southwestern states and traditional navigable waters.

features to traditional navigable waters (TNWs), as opposed to the role of ecosystems broadly, including upland buffer zones, in protecting water quality. Wetlands, for example, often serve as sinks to pollutants such as sediments, pesticides, nutrients, phosphorus, and mercury (see Draft Connectivity Report at 5-10, 5-12, and 5-14); whereas, uplands help to filter out pollutants before they even reach a water body. EPA's failure to include scientific literature on the role of non-jurisdictional uplands in protecting the biological, chemical and physical integrity of the nation's water bodies reveals a clear selection bias. (p. 12)

Agency Response: 9(a) and 9(n).

Responsible Industry for a Sound Environment (Doc. #14431)

9.154 While the report is exhaustive and comprehensive, it does not convey a clear definition or interpretation of connectivity. Furthermore, EPA's technical charge questions to the SAB panel were focused on verifying the technical accuracy of the report's findings that streams and most wetlands are connected to downstream waters; the questions did not relate to the scientific significance of these connections for the health and integrity of downstream waters. (p. 7)

Agency Response: 9(b), 9(h), and 9(l).

9.155 It is difficult for us to provide meaningful comments to the final version of the connectivity report due to its late release. A significant amount of time and technical expertise is required to evaluate the Agencies' scientific conclusions and respond to the Agencies' inquiries regarding technical information. Such time for thoughtful input has not been provided in the current comment period. (p. 7)

Agency Response: 9(a)

Colorado Water Congress Federal Affairs Committee (Doc. #14569)

9.156 The agencies misplaced reliance on the work of the scientific community was most recently underscored in the correspondence to the Administrator from the SAB. In that correspondence, the SAB took issue with the groundwater exclusion, expressed consternation that activities which "drain" wetlands are not jurisdictional, supported the "inclusion" of certain artificial ponds and reflecting ponds, questioned why "gullies and rills" are not jurisdictional, and opposed excluding any groups of waters that "may influence" downstream waters. The Board also proposed that "adjacency" be determined on the "basis of functional relationships," some of which would evidently have nothing to do with water quality per se, but evidently center on ecological functions and land use determinations. It is apparent from these statements that the charge to the scientific community was fatally flawed. (p. 6)

Agency Response: 9(b), 9(d), 9(f)

9.157 Seek input anew from the scientific community on the connection of different types of waters, taking into consideration as part of their charge the need to focus upon "water quality" impacts or relationships, the need to identify a "gradient" of impacts or relationships, and the need to consider the constraints on jurisdiction as identified by the

Supreme Court. Seek input from the stakeholder community on the details of the scope of the charge. (p. 9)

Agency Response: 9(b), 9(c), 9(d), 9(g), and 9(h).

ERO Resources Corporation (Doc. #14914)

9.158 The connectivity report, and by extension the Proposed Rule, fails to distinguish between ephemeral drainages and intermittent streams in the arid West where there is a substantial difference between these drainage types and their potential to affect the chemical, physical, or biological integrity of WUS. Previously submitted comments on the connectivity report (WestlandResources 2013; SWCA Environmental Consultants 2014) have pointed out the generalized interpretation of key definitions the connectivity report uses to make broad conclusions about arid West hydrology. In reviewing the connectivity report and comments on the connectivity report (EPA SAB Panel 2014), it is clear that most of the discussion and information focused on "streams" and there was very little consideration given to the dry ephemeral drainages of the arid West. Research done in the arid West and cited by the connectivity report tends to focus on larger, higher-order drainages. The "jurisdictional by rule" presumption for all tributaries in the Proposed Rule is based on assumptions derived from the connectivity report that are not accurate for the arid West because for the assumption that tributaries of any size behave proportionally and, in a regional or larger context, are similar to large streams based on the data presented for those large streams. For the arid West, the questions of jurisdiction under the CWA typically does not focus on larger, higher-order drainages. The issues of questionable jurisdiction resides with the commonly occurring smaller lower-order dry ephemeral and intermittent drainages. (p. 15-16)

Agency Response: 9(i)

Utility Water Act Group (Doc. #15016)

9.159 UWAG believes that EPA characterized a few items fairly well in the Draft Connectivity Report. Below are the technical points to which we do not have significant objections.

- Within a watershed, there can be strong linkages between headwater streams and adjacent wetlands to downstream waters. These linkages provide important transport means of water itself, nutrients, coarse particulate organic matter, and biota (directly or indirectly). These linkages are particularly important when downstream waters are highly dependent on allochthonous sources of energy. As stated in the Draft Connectivity Report, the strength of the linkages varies in time and space and numerous regional and watershedspecific factors influence the presence or absence of the connections.
- Lakes, reservoirs, ponds, and wetlands can provide important functions in watersheds. They can serve as biological re-colonization sources, breeding habitat for lenticdependent fauna (or at least lentic-dependent for one life stage), and – depending on their size – mitigate and/or buffer excessive flow. For example, pulse disturbances such as natural flooding events represent a significant stressor

for biotic assemblages (Resh et al. 1988).[185] Hydrological buffers such as drainage lakes and reservoirs can taper the flushing of suspended solids and displacement of biota. But CWA jurisdiction does not turn on use of a feature by biota, whether that feature is a vernal pool or an ocean.

- Tributaries and adjacent waters can, in some instances, be sources of pollutants to downstream waters. Pollutants also can be chemically transformed and/or sequestered in these habitats via biogeochemical processes. It should be noted, however, that many pollutants are placed or deposited by atmospheric deposition (dry and/or wet) and, thus, fluvial transport may not be important in terms of the source of pollutant to downstream reaches. (p. 113-114)

Agency Response: **The agencies appreciate the comment.**

9.160 While the Draft Connectivity Report cites to many peer-reviewed scientific studies that demonstrate a nexus in watersheds or floodplains, it fails to identify succinct, measurable environmental parameters that would provide a scientific, technical, or other rational test that employs objective measures to distinguish between a nexus and a significant nexus. Site specific case studies discussed in the report offer insights into environmental variables that influence connectivity in these particular ecosystems. The report, however, should have distilled a list of variables that could be measured or estimated to assess the frequency, magnitude, and duration of connectivity that, by weight of evidence, meets an objective significance threshold. These variables could have been stratified by a number of means, including ecoregion, biome, or broad physiographic or climactic classifications. (p. 115)

Agency Response: **9(h)**

9.161 UWAG finds that the majority of scientific studies cited by EPA in the Draft Connectivity Report (and cited again by the Agencies in the Proposed Rule) discuss aspects of connectivity. The number and variety of published studies that address hydrological isolation such as drought is disproportionately minimal. Yet the scientific literature on effects of hydrological isolation (and concomitant parameters of frequency, duration, and magnitude) is not sparse. Below, UWAG cites representative published studies that discuss the environmental effects (temporal and spatial scales) of hydrological isolation.

There are many reports of plants and animals that have developed adaptations to hydrological isolation and/or extremes of dis-connectivity. These adaptations may be genetic or physiological in their origins. The fact that many species have undergone long-term selection to such habitats indicates that hydrological isolation is at least as significant as hydrological connectivity, depending on the habitat or watershed reach a particular species inhabits.

[185] Vincent H. Resh et al., The Role of Disturbance in Stream Ecology, 7 J. N. AM. BENTHOLOGICAL SOC'Y 433 (1988).

Williams (1996)[186] provides an overview of key environmental constraints on the structure and function of insects having an aquatic stage:

> The loss of water from temporary habitats imposes a potential catastrophe on aquatic fauna. Aquatic insects have countered this "terrestrialisation" of their habitat by means of physiological tolerance, migration, and life history modification.

Id. at 642.

Gomi et al. (2002),[187] similarly, report on the association between hydrological isolation and the genetic uniqueness of headwater stream fauna:

> Because of their geographical isolation, headwater systems also support genetically isolated species; thus, they support an important component of biodiversity in watersheds.

Id. at 905.

Matthews (1987)[188] reported positive relationships between minnow species' tolerance to elevated temperature and hypoxia, and stream habitat/location where the fish were collected. Fish species from intermittent, harsh headwater stream reaches were found to have higher tolerances to elevated temperature and low dissolved oxygen (laboratory exposed). The author concludes:

> Thus at both local and zoogeographic scales the results of this study suggest agreement between the responses of closely related or of coexisting fish species to physiochemical stress and the distribution of species across the earth's surface. The results reinforce concepts of Smith and Powell (1971) and others, suggesting that harshness of the environment may help sort species into assemblages and thus that the composition of stream-fish assemblages is not solely the product of biotic interactions or community regulation.

Id. at 120.

A comprehensive review of water quality, chemical attributes, and aquatic fauna and flora of intermittent prairie streams (waterbodies with high hydrological disconnectivity) is provided in Zale et al. (1989).[189]

Bond et al. (2008)[190] summarized several documented impacts of drought in streams and rivers in Australia. Regarding how drought and dis-connectivity have affected the long-term distribution of aquatic biota, the authors state:

[186] D. Dudley Williams, Environmental Constraints in Temporary Fresh Waters and Their Consequences for the Insect Fauna, 15 J. N. AM. BENTHOLOGICAL SOC'Y 634 (1996).
[187] Takashi Gomi et al., Understanding Processes and Downstream Linkages of Headwater Streams, 52 BIOSCIENCE 905 (2002).
[188] W.J. Matthews, Physicochemical Tolerance and Selectivity of Stream Fishes as Related to Their Geographic Ranges and Local Distributions, in COMMUNITY AND EVOLUTIONARY ECOLOGY OF NORTH AMERICAN STREAM FISHES 111 (1987).
[189] Alexander V. Zale et al., U.S. Fish & Wildlife Serv., The Physicochemistry, Flora, and Fauna of Intermittent Prairie Streams: A Review of the Literature, Biological Report 89(5) (Mar. 1989).

> As a perturbation, droughts occur over large (landscape) spatial scales, so they potentially threaten the survival, not only of individual aquatic organisms, but also of regional populations, or even species themselves. *Indeed, the present-day natural distributions of many native aquatic species have been strongly influenced by past natural climatic fluctuations including changing frequency, severity and duration of droughts . . . .*

Id. at 7 (emphasis added) (citations omitted).

In summary, UWAG believes that the Draft Connectivity Report provided a narrow, biased review of the scientific literature concerning the pervasive, well-documented biological and physicochemical effects associated with hydrological isolation and disconnectivity. If intermittent and ephemeral streams were as hydraulically connective as assumed by the Draft Connectivity Report and the Proposed Rule, then specialized, highly selected biota in waterbodies characterized by high disconnectivity (and scientific reports of said biological life) would be very rare. (p. 124-126)

Agency Response: **9(n). Geographic isolation is acknowledged in the Science Report as being responsible for many functions headwater streams, wetlands and open waters provide to downstream waters. These include sink and lag functions that respectively have net removal or delayed release of materials to downstream waters. A key biological function discussed throughout the Report (e.g., Sections 2.3, 3.5, 4.3.4, Appendix B) that is dependent upon periods of isolation, such as the drying or drought events the comment points out, is the refuge function. The disconnection between the tributary, wetland, or open water from the downstream waters enables the organisms to persist during periods of adverse condition then recolonize downstream waters once adverse conditions are abated. The periodic connection among populations broken by periods of isolation has been demonstrated to promote high genetic diversity. The downstream-biased dispersal and dendritic structure of river networks, whereby many headwater tributaries are isolated from one other, promotes higher levels of genetic diversity than other geographic structures (Morrissey and de Kerckhove 2009; cited in the Final Science Report on p. 3-43). Complete isolation is not the only condition in which organisms evolve adaptations and organize distributional patterns. Biological interactions, such as competition and predation, are also important. The examples provided by the comment regarding adaptations to drying have narrowly focused on those for resisting the adverse conditions in place. The comment does not acknowledge the widespread adaptations also described in many of these papers (four of which are cited in the Final Science Report) for recolonizing an area following a disturbance. The recognition of the temporary loss of hydrologic connectivity (isolation) being critically important to biological connectivity in the comment supports the Science Report conclusion that the influence of tributaries, wetlands, and open waters is the combined effect physical, chemical, and biological connections.**

[190] Nicholas R. Bond et al., The Impacts of Drought on Freshwater Ecosystems: The Australian Perspective, 600 HYDROBIOLOGIA 3 (2008).

9.162 The SAB's final review of the Draft Connectivity Report[191] is telling because it emphasizes EPA's failure to distinguish between types and degrees of connectivity in the report. The SAB emphasizes that, because the Draft Connectivity Report is intended "to inform the EPA's efforts to clarify the jurisdiction of the Clean Water Act," the report would be more useful if it focused on methods to distinguish types of water connections for purposes of establishing jurisdictional lines. SAB Review of Connectivity Report at 9. The report's "connected" or "notconnected" framework collapses the reality that connectivity is a matter of degree:

> [T]he Report could be more useful to decision-makers if it brought more clarity to the interpretation of connectivity, especially with respect to approaches for quantifying connectivity. The language used in the Report often suggests that connectivity is a binary property (connected versus not connected) rather than a gradient. The SAB recommends that the interpretation of connectivity be revised to reflect a gradient approach that recognizes variation in the frequency, duration, magnitude, predictability, and consequences of physical, chemical, and biological connections.

Id. at 2. Without any metrics or quantification of the frequency, duration, predictability, magnitude, and consequences of connectivity, the Draft Connectivity Report fails to provide any support for the Proposed Rule's "significant nexus" findings.

Indeed, the SAB highlights how the report's overly-simplistic framework for evaluating connectivity is not adequate, if applied in a policy context:

> Although the Report is a science, not policy, document, the SAB recognizes that it was written to inform the EPA's efforts to clarify the jurisdiction of the Clean Water Act. This objective of the Report should be clearly stated and more information should be included to provide greater insight on complex or nuanced issues to be addressed in evaluating connectivity. For example, throughout the Report there could be greater focus on the literature that addresses various aspects of quantifying the frequency, duration, magnitude, predictability, and consequences of connectivity. The authors might consider an approach similar to that used in the report of the Intergovernmental Panel on Climate Change (IPCC 2007), which would provide an estimate of the relative certainty of connectivity or a downstream effect . . . .

Id. at 9 (citations omitted). Overall, the SAB recommends that EPA (and hence the Agencies) consider elaboration of how connectivity is measured through "examples of the various dimensions of connectivity that are most appropriately quantified, ways to construct connectivity metrics (e.g., retrospective or prospective analyses, model simulations, spatial analyses), and the scientific, methodological, and technical advances that are most needed to understand and estimate connectivity." *Id*. at 11. Because the Draft Connectivity Report fails to focus on scientific information quantifying degrees of

[191] EPA SAB, EPA-SAB-15-001, Review of the Draft EPA Report Connectivity of Streams and Wetlands to Downstream Waters: A Review and Synthesis of Scientific Evidence (Oct. 17, 2014), available at http://yosemite.epa.gov/sab/sabproduct.nsf/fedrgstr_activites/AF1A28537854F8AB85257D74005003D2/$File/EPA-SAB-15-001+unsigned.pdf (hereinafter "SAB Review of Connectivity Report").

connectivity, it fails to provide support for the Proposed Rule's categorical assertions of CWA jurisdiction.

In addition, as noted by the SAB review, in many instances the Draft Connectivity Report causes confusion rather than provides clear scientific support for policy determinations. For example, the SAB notes "the Report is unclear about the degree to which its definitions of water and wetlands include broader portions of the landscape (e.g., whether wetlands or rivers include their floodplains)." *Id*. at 16. In addition, because the Draft Connectivity Report does not rely on the Cowardin definition of wetland (which is used for regulatory purposes), the SAB notes:

> Many public commenters have expressed concern about the potential expansion of the scope of jurisdiction of the underlying Clean Water Act – from "threeparameter" to "one-parameter" waters and wetlands. . . . These confusions and concerns could be explicitly addressed in a separate section outlining the scope of the Report immediately after the section defining connectivity. The Report should discuss the functional role of floodplains and riparian areas (i.e., the riverine landscape) regardless of their regulatory status. However, it should be made clear that this discussion does not imply an expansion of the definition of waters and wetlands under the jurisdiction of the Clean Water Act. The SAB recognizes that the Report is a scientific and not a policy document, but finds that ignoring this distinction only serves to create unnecessary confusion and concern among the readership.

Id.

Although it did not provide a formal report, the SAB's Draft Connectivity Report advisory panel also evaluated the Proposed Rule and submitted a memorandum and individual SAB panel member comments to the chartered SAB.[192] The panel conducted a teleconference on August 20-21, 2014 to discuss the Proposed Rule. The panel suggested the Agencies use a "gradient" approach for a "significant nexus" determination and criticized the Agencies' use of unclear key terms including "tributaries," "ditches" (including the distinction between "ditches" and "gullies"), and "ordinary high water mark" (which may be very regionally variable). For example, one panel member noted how it was unclear if a wetland connecting two tributaries was itself a tributary.[193] Panel members also asked numerous questions pointing to a lack of clarity in how the Proposed Rule treated groundwater, including the difference between shallow and deep groundwater and application of the proposal to areas with significant, deep groundwater systems.[194]

[192] Memorandum from Amanda D. Rodewald, Chair, SAB Panel for the Review of the EPA Water Body Connectivity Report, to David Allen, Chair, EPA SAB, "Comments to the Chartered SAB on the Adequacy of the Scientific and Technical Basis of the Proposed Rule Titled Definition of Waters of the United States Under the Clean Water Act" (Sept. 2, 2014), available at http://yosemite.epa.gov/sab/sabproduct.nsf/F6E197AC88A38CCD85257D49004D9EDC/$File/Rodewald_Memorandum_WOUS+Rule_9_2_14.pdf (hereinafter "SAB Panel Comments on Proposed Rule").
[193] Bridget DiCosmo, *EPA Appears To Reject SAB Calls To Clarify Controversial Waters Proposal*, INSIDEEPA (Aug. 25, 2014), http://insideepa.com/inside-epa/epa-appears-reject-sabcalls-clarify-controversial-waters-proposal.
[194] *Id*.

In the panel's memorandum to the chartered SAB, Dr. Amanda Rodewald noted that "[p]anel members generally found that the term 'significant nexus' was poorly defined in the Proposed Rule and that the use of the term 'significant' was vague." SAB Panel Comments on the Proposed Rule at 6. Echoing its August 20-21, 2014 discussions, in its comments, the panel noted the lack of clarity regarding the term "shallow subsurface connection." *Id*. The panel also stated that "many research needs must be addressed in order to discriminate between ditches that should be excluded and included." *Id*. at 7. Individual panel members' comments also highlighted numerous other instances where the Proposed Rule lacks clarity and requires further scientific support.

In sum, the SAB review demonstrates that, in order to provide support for a policy determination on CWA jurisdiction, the Draft Connectivity Report must be substantially revised to quantify the frequency, duration, predictability, magnitude, and consequences of connections. Moreover, the SAB review demonstrates that the Proposed Rule is not supported by the underlying science. (p. 131-134)

Agency Response: 9(e), 9(f), 9(g), 9(h), 9(i), 9(j), and 9(l).

Edison Electric Institute (Doc. #15032)

9.163 The Connectivity Report includes studies that focus on the life cycle, habitat, and movement of animals and insects. The report identifies connections between bodies of water based on these animals and insects, calling this "biological connectivity." Connectivity Report at 3-28. However, these studies focus on the life cycle and movement of invertebrates, fish, phytoplankton, and other biota,[195] not navigable water quality that is the focus of the CWA. Thus, these studies cannot be used to identify a connection to downstream navigable waters that has any legal significance under the CWA.

The report also discusses studies related to the volume of water contributed by streams or wetlands[196] and the function of upstream areas as "sinks" that can hold water.[197] However, studies related to the flow of water alone are not relevant to CWA goals. Water

[195] See generally studies cited in sections 4.5, 4.7.2.4, and 4.7.3.3 relating to the movement of organisms actively and passively from streams to downstream waters; studies cited in sections 4.5 and 4.7.3.3 related to the movementof organisms from downstream waters to upstream waters; studies cited in sections 5.3.3, 5.4.4,5.6.3.3,5.8.3.3,5.9.3.2 related to wetlands as sources of organisms, including plants, invertebrates, amphibians, reptiles, and fish, to downstream waters; studies cited in sections 5.3.3.2, 5.6.3.3 related to riparian/floodplain wetlands as feeding habitat for riverine organisms, such as fish, during periods of overbank flow; studies cited in section 5.3.3.1 related to wetlands as sinks for seeds and plant fragments deposited via overbank flow; studies cited in sections 5.3.3.2, 5.4.4 relating to wetlands as refuge for fish, aquatic insects, or other lotic organisms; studies cited in sections 5.4.4, 5.7.3.3, 5.9.3.2 relating to wetlands as habitat and breeding grounds.

[196] See generally, studies cited in sections 5.3. I.! , 5.4.2.1, 5.6.3. 1,5.7.2.3,5.8.3.1 related to wetlands as sources of downstream water; studies cited in section 5.3.1. I relating to the ability of wetlands to temporarily store water following overbank flow, which then can move back to the stream over time as baseflow due to wetland storage capacity.

[197] See generally, studies cited in sections 4.3.1, 4.8.3, 4.8.4.2, 4.8.5.1 relating to how streams divert surface flow from downstream waters via infiltration into underlying soil and evapotranspiration to the atmosphere; studies cited in sections 5.3.1.1, 5.4.2.3, 5.8.3.1 relating to how wetlands can be sinks for water by intercepting overland or subsurface flow; studies cited in section 5.4.2.3 related to the impact of wetlands storage capacity on the time for stream discharge to rise and fall in response to a precipitation event.

is not a pollutant.[198] The CWA does not address the ability to either supply or withhold waters. In fact, Congress has made it very clear that the CWA addresses only water quality, not water quantity.[199] Accordingly, these studies cannot be used to identify a connection to downstream navigable waters that has any legal significance under the CWA.

The few studies in the Connectivity Report that focus on the movement of pollutants are insufficient to support a national rulemaking. In fact, the agencies admit that these studies do not even necessarily address impacts to navigable waters.[200]

Thus, while the Connectivity Report provides an overview of hydrological and ecological research, it does not provide a record that can support the expansion of federal jurisdiction proposed by the agencies. (p. 15-16)

Agency Response: 9(d) 9(f), 9(g), 9(h), and 9(n). See also the preamble to the final rule and the TSD.

American Electric Power, Inc. (Doc. #15079)

9.164 The draft connectivity report is biased towards scientific reports that highlight or demonstrate hydraulic connectivity. There are a disproportionate number of reports and technical papers cited that discuss the chemical, physical, and biological effects caused by hydraulic isolation (dis-connectivity). We believe the agencies should have conducted a balanced evaluation of hydraulic connectivity versus dis-connectivity and then determine what a "significant nexus" means from a scientific standpoint. (p. 4)

Agency Response: 9(b), 9(d), 9(e), and 9(f).

Washington County Water Conservancy District (Doc. #15536)

9.165 The WWG also believes that the Agencies' reliance on the Connectivity Report is misplaced, for several reasons.

First, as a legal matter, the Connectivity Report cannot support the Agencies' proposed definition for jurisdictional "waters of the United States." As discussed above, ecological considerations regarding "connectivity" are relevant only in evaluating jurisdiction over adjacent wetlands, not other water bodies.

Second, as a factual matter, the literature and the limited case studies cited in the Connectivity Report provide too small a sample to demonstrate that all adjacent waters throughout the country have a significant nexus. In view of the wide variety of types of waters located in different landscape settings throughout the United States, it is unreasonable for the Agencies to conclude that all adjacent waters are similarly situated enough to justify their categorical, by-rule regulation.

[198] Virginia Department a/Transportation v. EPA, NO.1: l2-CV-775, (E.D. Va., 01/03/20l3)(vacating a TMDL that purported to regulate flow of water under the Clean Water Act as a surrogate for pollutants).
[199] CWA § 101(g).
[200] 79 Fed. Reg. at 22227 (noting that the scientific literature does not distinguish between navigable and non-navigable water).

Third, some of the SAB's comments on the Connectivity Report support the WWG's position that the Agencies should revise the Proposed Rule. For example, the SAB stated that the agencies' interpretation of connectivity should be "revised to reflect a gradient approach that recognizes variation in the frequency, duration, magnitude, predictability, and consequences of those connections."[201] This statement confirms the need for the Agencies to take a more nuanced approach to defining connectivity-especially with respect to application of the connectivity construct within the significant nexus test. A "gradient approach" recognizes that connectivity occurs along an inclining slope and, in many instances; such connectivity may not rise to the requisite level of significance. This obvious truth (that not all connectivity rises to a gradient level of significance) necessitates reconsideration and revision to the categorical approach reflected by the Agencies' jurisdictional-by-rule proposal.

The SAB further stated that the Connectivity Report should "clearly indicate that the definitions used for rivers, streams, and wetlands are scientific, rather than legal or regulatory definitions, and may differ from those used in the [CWA] and associated regulations." As explained above, the Agencies' reliance on the Connectivity Report is based on the flawed premise that all legal determinations regarding jurisdiction under the CWA hinge on the Agencies' judgments regarding scientific and ecological considerations. While scientific information and ecological considerations may inform the Agencies' jurisdictional determination, the question as to whether a specific waterbody is a "water of the United States" under the CWA is fundamentally a legal judgment that precipitates a regulatory and enforcement regime. The Agencies must revise the Connectivity Report and the Proposed Rule to correctly reflect the subordinate and informing nature of scientific and ecological considerations to the legal determination as to whether a waterbody or wetland is a water of the United States under the CWA's regulatory and permitting regime.

In light of the SAB's, only recently concluded review process, and the lack of clarity regarding how the Agencies intend to evaluate the scientific evidence, the WWG strongly believes that the Proposed Rule must be withdrawn until the Connectivity Report is finalized. Any subsequent rulemaking undertaken to redefine "waters of the United States" must incorporate the findings in the finalized Connectivity Report. Therefore, the Agencies should withdraw the Proposed Rule to allow the EPA to consider the SAB's recommendations and finalize the Connectivity Report. The Agencies should not take any action to amend the definition of "waters of the United States" until after the Connectivity Report is finalized and the public has had an opportunity to comment on the final report. (p. 32-33)

Agency Response: **9(a), 9(b), 9(d), 9(e), 9(f), 9(g), 9(h), 9(k), and 9(l). See also the preamble to the final rule, the TSD, and the Legal Compendium (Topic 10), particularly Sections 10.2, 10.3, and 10.4.**

[201] Id. at 2.

National Council for Air and Stream Improvement. Inc. (Doc. #13627)

9.166 The draft and incomplete EPA "Connectivity Report" is used as the scientific basis for the Proposed Rule. However, the Proposed Rule's categorical determinations on significance are in tension with input from the Science Advisory Board review of the Report. [ ]…

The Proposed Rule utilizes the not yet completed Connectivity Report as its basis for making these categorical determinations on significance. The Report, however, fails to document the significance of physical, chemical, or biological connections and simple focuses on the actual or potential presence/absence of those comments. As a result, the Proposed Rule makes categorical findings about connectivity that leave no room for case-by-case determinations of significance. At a minimum, as the Science Advisory Board (SAB) recommends, the Report should be revised to include: (1) a conceptual framework that integrates spatially continuous physical, chemical and biological flow paths that connect watersheds; (2) an interpretation of connectivity that reflects variation in the frequency, duration, magnitude and predictability of connections (i.e., gradient approach to defining connectivity); and (3) terminology and concepts that adequately describe the variable nature of connectivity (e.g., longitudinal, lateral, vertical and temporal) (EPA-SAB-15-001, pages 2 and 3).

Only after such revisions occur and are peer-reviewed can the Connectivity Report be cited credibly and used to support regulatory definitions of "significance" applied to water features that would qualify as WOTUS. However, even then, there should be some allowance for case-by-case analysis rather than broad regulatory declarations of categorical determinations, given the broad variation of potential "significance" in and among physical, chemical and biological connections. (p. 2-3)

Agency Response: 9(a), 9(e), 9(f), 9(g), 9(i), and 9(n).

9.167 **While the SAB agrees with a majority of the Report's findings, the SAB recommends major revisions to improve the Report's clarity and scientific accuracy when describing connectivity and determining significance.**

The SAB review on the scientific and technical accuracy of the Connectivity Report was published in the Federal Register on October 17, 2014. Overall, the SAB found the Connectivity Report to be a "*technically accurate review of the literature on the connectivity of streams and wetlands to downstream waters*" (EPA-SAB-15-001, page I).

Although the SAB agrees with the Report's findings for streams (i.e., tributaries), as well as riparian and floodplain wetlands, the SAB recommends major revisions to improve the Report's clarity and scientific accuracy. The major concern expressed by the SAB was the Report's binary definition of connectivity (e.g., connected vs. not-connected) which, as noted by the SAB, fails to distinguish a gradient that "*recognizes variation in the frequency, duration, magnitude, predictability, and consequences of physical, chemical and biological connections*" (EPA-SAB15- 001, page 2). The SAB recommends that the "interpretation of connectivity be revised" to reflect this variability (EPA-SAB-15-00 1, page 2). We concur with this view of connectivity. Implementation of this recommendation would make the Report more scientifically accurate and useful to policy

makers. This is critical because the mere presence of connections says nothing about whether those connections are sufficiently significant to trigger CWA jurisdiction.

The SAB also recognized that the EPA and Corps need to identify approaches and provide examples of the "*dimensions of connectivity that could most appropriately be quantified, ways to construct connectivity metrics, and the methodological and technical*" means needed to evaluate significance (EPA-SAB-15-001, page 4). However, we remind the Agencies of the need for metrics that characterize connectivity in a manner that gives effect to Supreme Court decisions limiting the scope of CWA jurisdiction (i.e., significance of connections among wetlands, waters, and traditional navigable waters). The Proposed Rule could be significantly improved by developing and inserting analyses of science-based approaches to: (1) define, identify, and delineate wetlands, waters, and traditional navigable waters; (2) quantify connections among wetlands, waters, and traditional navigable waters; and (3) establish criteria for distinguishing significant connections from other *de minimis* connections. Preferably these approaches would be discussed in detail within the Proposed Rule or, at a minimum, within its preamble and followed with additional regulatory guidance.

As noted by the SAB, approaches to quantifying physical, chemical and biological connectivity are complex due to the diversity of hydrologic systems and therefore "*careful attention must be given to identifying the most appropriate techniques*" when determining connectivity (EPA-SAB15- 001, page 15). While the SAB has identified several potential approaches to demonstrate connectivity, we caution the Agencies about relying on complex and data intensive "graph-theory based" models and indices (e.g., Integral Index of Connectivity, Directional Connectivity Index, etc.) to assess the degree of connectivity. Outside of academic circles, the practicality, usability, applicability and cost-effectiveness (e.g., for data acquisition) of these models are unclear. Furthermore, such complex models and indices do not provide much certainty or clarity to regulators in the field or the regulated community. Undoubtedly, more basic and applied methodological approaches to assessing connectivity are available or could be developed.

Development of delineation methods and criteria could begin with a focus on practical indicators of connectivity such as: (I) distance from a wetland or waterbody to the nearest traditional navigable water; and (2) magnitude and duration of water flow from a tributary or wetland to the nearest traditional navigable water. Such a practical approach would require some effort to define, identify, and delineate the nation's waters, traditional navigable waters, and adjacent wetlands but would be consistent with the decades old approach used by the Corps for jurisdictional wetland determinations.

We also support the SAB recommendation to revise the terminology used to describe discrete categories of directionality of hydrologic flows (i.e., "bidirectional" and "unidirectional"). The Report uses these terms to describe wetlands and open waters with: (I) the potential for nontidal, "bidirectional" hydrologic flows with rivers and lakes; or (2) the potential for "unidirectional" hydrologic flows to rivers and lakes. We agree with the SAB view that these misleading and overly simplistic categories fail to adequately describe the complex and variable nature of connectivity (i.e., longitudinal, lateral, vertical and temporal). (p. 4-5)

Agency Response: **9(e), 9(f), 9(g), 9(h), and 9(l).**

9.168 **The Proposed Rule suggests that aggregating "similarly situated" waters is scientifically justified since the combined effects of these waters on downstream traditional navigable waters are often only measurable collectively for achieving a significant nexus. However, the SAB suggests that the science of aggregating similarly situated waters is not settled.**

The Connectivity Report notes that connections between waters, wetlands and traditional navigable waters can be variable and suggests that unidirectional wetlands: (1) exist on a continuum between fully isolated and completely connected to traditional navigable waters (Connectivity Report 6-2); and (2) should be considered in aggregate, as this may be the only manner in which connections can be made apparent (Connectivity Report 1-14). However, connectivity of these waters and wetlands will certainly vary temporally and be influenced by landscape features such as distance from downstream traditional navigable waters and proximity to other similar waters and wetlands.

Conceptually the aggregate significance of wetlands and waters of a "*similar nature*" (e.g., tributaries, wetlands and open waters in flood plains and isolated wetlands) to downstream traditional navigable waters for achieving a significant nexus appears reasonable (Connectivity Report 6-3 and 79 FR at 22196). However, the magnitude of aggregating downstream influences of headwater streams or "isolated" wetlands, for example, on traditional navigable waters has not been rigorously tested and scientifically validated in the peer-reviewed literature. It remains unclear what is the most scientifically justified method for aggregating waters and wetlands as the scientific understanding of "*similarly situated*" remains unclear and continues to develop. At a minimum, additional research is necessary to evaluate spatial and temporal variability of connections among "*similarly situated*" waters and wetlands. Determining whether categories of "*other waters*" are similarly situated, have a significant nexus, and are jurisdictional by rule, or whether as a class they do not have such a significant nexus and might not be jurisdictional is critical. Clearly this scientific uncertainty requires additional research, and caution is warranted when making determinations given the broad variation of potential "significance" in and among physical, chemical and biological connections. (p. 6)

Agency Response: 9(f), 9(g), 9(i), and 9(k). See also the preamble to the final rule, the Legal Compendium (Topic 10), particularly Section 10.3, and the TSD.

Chesapeake Bay Foundation (Doc. #14620)

9.169 Whether or not depressional wetlands within coastal plains are hydrologically connected to navigable waters and therefore adjacent to navigable waters is a scientific question, not a legal one. Since the *SWANCC* and *Rapanos* decisions, wetlands science has continued to evolve and the connectedness of waters that were once thought to be isolated, especially through groundwater and floodplains, is now better understood.

Much research was elegantly synthesized by EPA in the "Connectivity Report"[202]. In addition, the Southern Environmental Law Center recently presented additional scientific evidence of this connectivity in the portion of the coastal plain on the Delmarva Peninsula, much of which drains to Chesapeake Bay.[203] As such, we believe that the EPA has developed definitions based on a strong scientific foundation. (p. 4-5)

Agency Response: The agencies appreciate the comment.

National Wildlife Federation (Doc. #15020)

9.170 **There Is a Strong Scientific Foundation for the Proposed Definition of "Waters of the United States"**

A. Kennedy's Significant Nexus Test Calls for More than Speculative or Insubstantial Scientific Evidence of Connectivity to Downstream Waters.

When the Supreme Court considered the policy question of which waters were "waters of the U.S.," Justice Kennedy, author of the pivotal concurring opinion in *Rapanos*, was clearly asking for the scientific evidence of connectivity to inform the Court's line-drawing, consistent with the goals of the Clean Water Act. Several justices recognized the important functions and connections of wetlands in a watershed context, but Justice Kennedy wanted more specific evidence of how these wetlands affect downstream waters.

The agencies' finding that all tributaries have a significant nexus to TNWs, IWs, or territorial seas is fully consistent with and relevant to Justice Kennedy's significant nexus test. Justice Kennedy suggests the current definition of tributary "may well provide a reasonable measure of whether specific minor tributaries bear a sufficient nexus with other regulated waters to constitute 'navigable waters' under the Act." *Rapanos* at 2249. As to tributaries, Justice Kennedy only expresses concern about categorically extending jurisdiction, without more supporting evidence, to all *wetlands* that are adjacent to *any* waters that meet the regulatory definition of tributaries. *Id.*

The scientific evidence of connectivity (or isolation) and wetland and stream functions is essential in applying Justice Kennedy's significant nexus test. Justice Kennedy explains that wetlands perform important ecological functions, such as pollutant filtering and flood retention and "it may be the *absence* of an interchange of waters prior to the dredge and fill activity that makes protection of the wetlands critical to the statutory scheme." *Rapanos* at 2245-46 (emphasis added).

Understanding the scientific evidence of connectivity and effects in the aggregate and in a watershed context is central to the application of Justice Kennedy's significant

[202] U.S. Environmental Protection Agency, Connectivity of Streams and Wetlands to Downstream Waters: A Review and Synthesis of the Scientific Evidence, (Washington, DC: U.S. Environmental Protection Agency, 2013) (Connectivity Report).
[203] Evidence Of Significant Impacts Of Coastal Plain Depressional Wetlands On Navigable Waters, Sam Woolford and Matt Carroll, River Basin Center, Odum School of Ecology, University of Georgia, July 2014

nexus test which calls for evaluation of wetlands connectivity and effects downstream "either alone or in combination with similarly situated lands in the region." (p. 18-19)

Agency Response: **The agencies appreciate the comment.**

9.171 **B. EPA has compiled a rigorous, accurate, and comprehensive science synthesis that supports categorical findings of significant nexus for the entire tributary system, adjacent waters, and several categories of non-floodplain "other waters."**

During 2011-2012, 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*. This scientific report, based on peer-reviewed literature and an additional review by independent scientists, brings together the scientific evidence of connectivity and effect to inform the Administration's rulemaking 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. In September 2013, the Administration released its Draft Connectivity of Streams and Wetlands Science Report for public comment. The Draft Connectivity Report included, among others, the following findings:

- Streams and wetlands "fundamentally affect river structure and function by altering transport of various types of materials to the river." *Connectivity Report* at 1-4.
- These altering effects depend 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.
- The conceptual framework correctly adopts two important principles for assessing connectivity and effects to downstream waters: 1) identification of the watershed as the appropriate scale to assess connectivity and effects; and 2) recognition that to understand connectivity and effects downstream, "the effects of small water bodies in a watershed need to be considered in aggregate." *Connectivity Report* at 1-14.
- The Connectivity Report thoroughly documents and supports its conclusion that "[a]ll 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. The report includes a thorough examination of the literature with respect to ephemeral stream connectivity, particularly in the arid southwest.
- The scientific evidence supports the report's conclusion with respect to floodplain wetlands and open-waters that: "[w]etlands 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" through multiple processes, and that they

"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.

- The scientific evidence also demonstrates that shallow groundwater connections serve as hydrologic connections between surface waters and should be considered in assessing connectivity and effects on downstream waters. *Connectivity Report* at 1-7 to 1-14.
- The draft report compiles compelling scientific evidence supporting the conclusion that "uni-directional" wetlands and open-waters located outside of floodplains (e.g., many prairie potholes, vernal pools, and playa lakes) "provide numerous functions that can benefit downstream water quality and integrity" and "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.
- However, the draft report concludes that [t]he 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 1-10 to 1-11.

The Peer Review Panel met and held public meetings to discuss the draft report in December 2013. The Panel drafted and revised its peer review report through the summer of 2014, wrapping up its peer review in September 2014. Building on the Connectivity Report and the Peer Review Panel deliberations, the agencies' included in the Proposed Rule preamble a thorough discussion of the science supporting the rule, including a lengthy Scientific Evidence Appendix A, at 79 Fed. Reg. 22222-22252.

On September 30, 2014, the SAB signed and posted its letter confirming the adequacy of the scientific basis for key components of the Proposed Rule. The SAB Rule Report finds:

- There is strong scientific evidence to support the EPA's proposal to include all tributaries within the jurisdiction of the Clean Water Act.
- If anything, the use of the ordinary high water mark as part of the definition of tributary might be too restrictive.
- 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.
- Adjacent waters and wetlands should not be defined solely on the basis of geographical proximity or distance to jurisdictional waters.
- There is 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.

- As the science continues to develop, other sets of wetlands may be identified as "similarly situated."
- The existing science does not support "*excluding* groups of 'other waters' or subcategories thereof" at this juncture.
- There are concerns with excluding various features from being considered waters of the U.S., including groundwater, certain ditches (it notes there is a lack of scientific knowledge to help discriminate between ditches that should be excluded or included), various artificial features, gullies, rills, and non-wetland swales.

On October 17, 2014, the SAB issued its Final Connectivity Peer Review Report on EPA's Connectivity Report. This SAB Connectivity Peer Review Report is the culmination of many months of public review and revisions by a panel of more than 20 wetland and stream science experts.

Key Findings from the Final Connectivity Peer Review Report include the following:

- Relatively low levels of connectivity can be meaningful in terms of impacts on the chemical, physical, and biological integrity of downstream waters." Report at 2.
- Strong scientific support has been provided for the overall conclusion and related findings that ephemeral, intermittent, and perennial streams "exert a strong influence on the character and functioning of downstream waters, and indeed that all tributary streams are physically, chemically, and biologically connected to downstream waters." Report at 3.
- There is strong scientific support for the overall conclusion that "bidirectional" wetlands and waters in floodplain settings are physically, chemically, and biologically connected with rivers through multiple pathways. Additional literature could be included in the Report to bolster this conclusion and related findings. Report at 5.
- The SAB Peer Review Report disagrees with the overall conclusion that "[t]he literature 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 non-floodplain settings." Report at 6.
- "The scientific literature provides ample information to support a more definitive statement (i.e., numerous functions of non-floodplain waters and wetlands have been shown to benefit the physical, chemical, and biological integrity of downgradient waters). *Id.*

- The SAB recommends that the EPA revise the conclusion to focus on what is supported by the scientific literature and articulate the specific knowledge gaps that must be resolved (e.g., degree of connectivity, analyses of temporal or spatial variability). *Id.*
- "The SAB also recommends that the Report explicitly discuss the pathways by which non-floodplain waters and wetlands can be connected to downstream waters and state that the evaluation of connectivity should be based on the frequency, magnitude, duration, predictability, and consequences of water, material, and biotic fluxes to downstream waters and their impact on the physical, chemical and/or biological integrity of those waters." *Id.*
- The key findings concerning non-floodplain waters and wetlands "should address: the biological functions and biological connectivity of non-floodplain wetlands; differences between natural and manmade wetlands; the importance and temporal dynamics of spatial proximity as a determinant of connectivity; and the importance of cumulative or aggregate impacts of non-floodplain wetlands." *Id.*

The Connectivity Report's compilation and synthesis of over 1,000 peer reviewed scientific articles, the SAB Peer Review Panel deliberations, the Science Evidence Appendix A in the Proposed Rule preamble, and all of the scientific evidence submitted to the administrative record for this rulemaking provide a solid scientific foundation that supports categorical findings of significant nexus for the entire tributary system, adjacent waters, and several categories of non-floodplain "other waters." (p. 19-23)

Agency Response: **The agencies appreciate the comment.**

American Rivers (Doc. #15372)

9.172 Uncertain protections following the Supreme Court decisions and the resulting administrative guidance documents put the health of our rivers at risk, especially small streams and wetlands. According to EPA, over 60% of streams in the United States and millions of acres of wetlands are lacking adequate safeguards from degradation.[204] Streams and wetlands are the origin of rivers and are an integral part of our nation's river networks, and as such should be protected by the CWA.

The EPA Draft Connectivity Report concludes that, "all tributary streams, including perennial, intermittent, and ephemeral streams, are chemically, physically, and biologically connected to downstream rivers."[205] Upstream waters can impact the

[204] EPA Administrator Gina McCarthy, Clean Water Drives Economic Growth, Huffington Post, The Blog (Aug 29, 2014), http://www.huffingtonpost.com/gina-mccarthy/clean-water-act_b_5900734.html.

[205] U.S. Environmental Protection Agency, Office of Research and Development, Connectivity of Streams and Wetlands to Downstream Waters: A Review and Synthesis of the Scientific Evidence, External Review Draft 1-6 (Sep. 2013) [hereinafter EPA Draft Connectivity Report], available at http://yosemite.epa.gov/sab/sabproduct.nsf/ fedrgstr_activites/7724357376745F48852579 E60043E88C/$File/ WOUS_ERD2_Sep2013.pdf. Also See, Letter from Dr. Amanda D. Rodewald, Chair, SAB Panel for the Review of the EPA Water Body Connectivity Report to

chemical integrity of downstream waters through the transport of nutrients, dissolved organic matter, ions, as well as contaminants.[206] Physical connections include the act of transporting water, heat and energy (temperature), sediment, wood and leaves, and other materials downstream through the current.[207] Upstream waters can impact the biological integrity of downstream waters through the movement of organisms such as fish, invertebrates, plants, and even genes.[208] Wetlands are also chemically, physically, and biologically connected to downstream waters. They are intrinsically linked to rivers by providing a reserve of groundwater, a storage area for flood waters, a sink for excess nutrients, and a habitat for aquatic organisms.[209] These services help to maintain the water quality and flow of downstream waterways.

Streams are not simply conduits for transporting material, they are also able to store and process nutrients and contaminants. Chemical, physical, and biological processes that take place in tributaries help to mitigate the effect of pollutants in the water column, such as nitrogen and phosphorus. In small, shallow streams, water has greater contact with the stream bed, which is a hotspot for nutrient removal.[210]

Small streams and wetlands play an important role in the storage and transformation of nutrients and other pollutants, which helps to protect drinking water supplies for communities across the country.[211] Small streams and wetlands are the source of our nation's waters and their degradation can adversely affect all downstream waters including rivers, lakes, and bays. As headwater tributaries and wetlands are filled or paved over during land development, they lose their ability to provide important ecological functions that benefit downstream waterbodies. The loss of headwaters reduces the amount of rainwater and runoff that the stream network can handle before flooding, and the magnitude of flooding in downstream tributaries increases. Increased flooding leads to scoured channels that are prone to larger and more frequent floods, and less able to recharge groundwater, trap sediment, or recycle nutrients.[212] As a result, downstream receiving waters carry greater sediment loads, have poorer water quality, and less diverse aquatic life; all of which can lead to algal blooms, fish kills, and sedimentation.[213] This can compromise recreation, navigation, commercial and

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EPA Administrator Gina McCarthy, SAB Review of the Draft EPA Report, Connectivity of Streams and Wetlandsto Downstream Waters: A Review and Synthesis of the Scientific Evidence 26, 35 (Oct. 17, 2014) [Hereinafter SAB review of the Connectivity Report], available at http://yosemite.epa.gov/sab%5Csabproduct.nsf/AF1A28537854 F8AB85257D74005003D2/$File/EPA-SAB-15-001+unsigned.pdf.

[206] EPA Draft Connectivity Report, supra note 51, at 4-15.

[207] Id. at 4-3.

[208] Id. at 4-29.

[209] Id. at 5-6. See also, SAB review of the Connectivity Report, supra note 51, at 39.

[210] J.L. Meyer, L.A. Kaplan, J.D. Newbold, D.L. Strayer, C.J. Woltemade, J.B. Zedler, R. Beilfuss, Q. Capenter, R. Semlitsch, M.C. Watzin, & P.H. Zedler, Where Rivers are Born: The Scientific Imperative for Defending Small Streams and Wetlands. American Rivers and Sierra Club 8 (February 2007), available at http://www.americanrivers.org/assets/pdfs/ reports-and-publications/WhereRiversAreBorn1d811.pdf? 422fcb

[211] Id. at 10.

[212] Id.

[213] Id.

recreational fisheries, as well as increase the cost of water filtration for the drinking supply and industrial use.[214]

At the most basic level, the health of our rivers depends on the health of upstream waters. If a waterway is polluted, filled in, or otherwise compromised the stream network will be adversely affected. Not only will the pollutants and fill material directly harm the water but the overall effects they cause will disturb the chemical, physical, and biological processes that keep our waterways healthy. It is important that we protect our rivers as well as their tributaries and wetlands in order to optimize the health of all our waterways. (p. 11-12)

Agency Response: **The agencies appreciate the comment.**

Partners in Amphibian and Reptile Conservation (Doc. #7499.1)

9.173 Finally, we would like to offer our assistance with expansion of Table 5-2, "Partial list of amphibian and reptile species known to use both streams and unidirectional wetlands or other lentic waters" in the draft document *Connectivity of Streams and Wetlands to Downstream Waters: A Review and Synthesis of the Scientific Evidence* (EPA/600/4-11/098B; September 2013), by providing a list of additional, relevant species. If EPA would like to add an additional field to the table – connectivity distances (e.g., how far species have been known to travel between waters) - the enclosed papers would be a good starting point from which to gather information:

• *Differentiating Migration and Dispersal Processes for Pond-breeding Amphibians* by R.D. Semlitsch

• *Dispersal and the metapopulation paradigm in amphibian ecology and conservation: are all amphibian populations metapopulations?* by M.A. Smith and D.M. Green – see especially Tables 2-5

• *Terrestrial habitat requirements of nesting freshwater turtles* by D.A. Steen et al. 2012

Such a field could be useful when drafting rule language and when assessing if wetlands were close enough to tributaries to be classified as Waters of the U.S. (p. 3)

Agency Response: **Thank you. The referenced table (now Table 4-2) was not changed in the final report, which was released January 15, 2015. We have reviewed the references and cited, as relevant, in the TSD. We will also consider the additional references on connectivity distances for assessment purposes.**

National Waterways Conference, Inc. (Doc. #12979)

9.174 As noted above, EPA's connectivity report, which the agencies purport to rely on as the foundation of the Proposed Rule, has only recently undergone review at the SAB and is not final. The data released after publication of the Proposed Rule is too complex and voluminous to review during the time allowed, even with the four-week extension. At least as important, EPA has not provided a formal response to the SAB's review or indicated its view as to the legal and regulatory significance of the SAB's findings. That

[214] Id. at 12.

is critically important and something the agencies can and should publish for notice and comment prior to finalizing a rule. (p. 12)

Agency Response: 9(a), 9(c), 9(e) and 9(f).

The Association of State Wetland Managers (Doc. #14131)

9.175 The Science Report is important in that it documents the scientific basis for the Proposed Rule, clearly linking the protection of waters to the need for protection as defined in the Clean Water Act. ASWM has also reviewed the current version of the Science Advisory Board panel/committee review of the Science Report, as well as the draft recommendations of the Science Advisory Board panel/committee (SAB Report). In our opinion, this report, combined with the Science Advisory Board panel/committee review and recommendations, provides an adequate scientific demonstration of the importance of waters defined by the Proposed Rule as Waters of the United States, and the need for their protection. (p. 2)

Agency Response: The agencies appreciate the comment.

Southeastern Legal Foundation (Doc. #16592)

9.176 **The Scientific Report on which the Agencies Base the Proposed Rule is Fatally Flawed.**

Because the scientific report, titled "Connectivity of Streams and Wetlands to Downstream Waters: A Review and Synthesis of the Scientific Evidence" (the "Report"), on which the Agencies base the Proposed Rule is fatally flawed, the Agencies should recall the Proposed Rule until such time as a more definitive and appropriate scientific basis can be established.

1. The Report is Procedurally Flawed.

The scientific bases for the most dramatic conclusions in the Proposed Rule (all tributaries are jurisdictional and all adjacent waters are jurisdictional) come from the Report. As an initial matter, the Report is still in draft form because, until less than a month ago, it was still under review by EPA's Science Advisory Board (SAB). The Report was sent to SAB on the same day the Proposed Rule was sent to the Office of Management and Budget (OMB) for interagency review. As a general rule, science should always precede rulemaking so rules are based on the best science of the time consistent with any applicable statutory language.[215] In a case such as this, where science (determining what is and is not a WOTUS) should be a cornerstone of the Proposed Rule, the legal and scientific concepts are inextricably linked. The Proposed Rule cannot come before the Report is peer-reviewed by SAB and then finalized, just as the cart cannot come before the horse.

By simultaneously sending the Report to SAB and the Proposed Rule to OMB, the Agencies have denied the public a chance to meaningfully participate in the rule making process. The public comment period will close before the Report is finalized; providing

[215] See, e.g., Executive Orders 12,866 and 13,563.

no time for public review. In doing so, the Agencies have engaged in what appears to be sham-rulemaking. The Agencies reached conclusions in the Proposed Rule they hope the not-yet-finalized Report will support.[216] The Agencies should not be allowed to engage in such gamesmanship and are prohibited from doing so under the Administrative Procedure Act,[217] the Data Quality Act,[218] and certain other initiatives aimed at enhancing government transparency and expanding the use of good science, such as the Memorandum for the Heads of Executive Departments and Agencies on Transparency and Open Government,[219] Executive Order 13563 Improving Regulation and Regulatory Review,[220] and the Memorandum on Regulatory Flexibility, Small Business, and Job Creation.[221]

2. In Direct Contravention of Supreme Court Authority, the Report Relies on Connectivity between Waters as the Foundation for Determining Jurisdiction.

The *Rapanos* Court held that hydrologic connectivity cannot support jurisdiction.[222] Despite this, the Agencies designed the Report - curiously including "Connectivity" as the first word in its title - around a theory of connectivity. The Report makes broad generalizations about the inter-connectedness of upstream and downstream waters implying that any connection, regardless of its strength, matters to downstream waters. This is tantamount to "any connection counts," and is plainly contrary to the Court's holdings. Justice Kennedy demanded more: "determining the quantity and regularity of flow and proximity to [Traditional Waters] is important for assessing whether there is a significant nexus."[223]

While the Report discusses several connections between upstream and downstream waters, nowhere does it define which of those connections constitute a "significant nexus." "Absent a significant nexus, jurisdiction under the [CWA] is lacking.[224] Despite Justice Kennedy's demand for concrete indicators, the Report puts forth no metrics to inform the Agencies and regulated community what a "significant nexus" must contain. Not to be deterred by a lack of any meaningful science, the Proposed Rule eliminates the need for such metrics by determining that all connections are significant. Such a conclusion is unfounded, and the implications are far-reaching. Put another way, sweeping generalities about connections should not support a determination that a "significant nexus" exists. Instead, the Rule should rely on

[216] SAB issued a letter to EPA on September 30, 2014 determining that there exists "adequate scientific basis for key components of the proposed rule." In another curiously-timed release, SAB issued its September 30 letter prior to issuing its review of the Report which was not issued until October 17, 2014. Among other things, SAB's October 17 report "agrees with two of the three major conclusions in the Report" and suggests that EPA should make "revisions to improve the clarity of the Report," both of which imply that EPA may revise the Report. Revising the Report after the Proposed Rule has been promulgated makes little sense. The timing and procedure of both the September 30 letter and the October 17 report calls into question EPA's rulemaking process and the Proposed Rule.
[217] 5 U.S.C. Subchapter 11, § 551, etseq.
[218] 44 U.S.C. § 3501.
[219] 74 Fed. Reg. 4685 (Jan. 26, 2009).
[220] 76 Fed. Reg. 3821 (Jan. 21, 2011).
[221] Id. at 3828.
[222] See supra pp. 4-5.
[223] Rapanos, 547 U.S. at 786.
[224] ld. at 767.

science-based definitions and concrete metrics that can be uniformly applied and understood.

3. The Report Impermissibly Relies on Groundwater to Establish Jurisdiction.

The CWA divides responsibility for overseeing water between federal and state governments. Specifically, the statute states that "[i]t is the policy of Congress to recognize, preserve, and protect the primary responsibilities and rights of States ... to plan the development and use ... of land and water resources."[225] Regulation of groundwater falls to the states and cannot be jurisdictional. The Agencies recognize this in the Proposed Rule by retaining a groundwater exemption. "The following are not [WOTUS]: ... Groundwater, including groundwater drained through subsurface drainage systems."[226] If groundwater falls under state authority and is not a WOTUS, then it logically follows that groundwater should not provide a hook on which to hang federal jurisdiction. But, the Agencies did not follow that logic.

By explicitly allowing groundwater to be part of an attenuated jurisdictional chain, the Proposed Rule is introducing a new level of uncertainty to the regulated community because groundwater to surface waters "connections are often not obvious."[227] This uncertainty will expose the regulated community to additional legal liability, either the risk of regulatory enforcement or private party litigation, if the potential permittee misses or does not consider a hidden groundwater connection. The Report relies on groundwater to demonstrate connections between upstream and downstream water bodies,[228] and the Agencies rely on the Report as justification for determining that all tributaries and adjacent waters are WOTUS. Instead of finding groundwater connections irrelevant, the Proposed Rule determines that groundwater connections are dispositive in determining jurisdiction. This is an undeniable expansion of federal jurisdiction. (p. 13-17)

Agency Response: 9(a), 9(d), 9(e), 9(f), 9(g), 9(h), 9(i) and 9(j). Regarding the uncertainty and risk of legal liability, the rule, promulgated under authority of Section 501 of the CWA, establishes a binding definition of "waters of the United States." The burden of proof is still on the federal government to demonstrate that a water is jurisdictional. That said, if a member of the public has any doubt about whether a feature is jurisdictional, that person should contact either EPA or the Corps to request a jurisdictional determination regarding the feature. Ignorance of the law is not an excuse to not follow the law, but EPA and the Corps are available to assist when any questions arise to help members of the public comply with the law. Consistent with the more than 40-year practice under the CWA, the agencies make determinations regarding the jurisdictional status of particular waters almost

[225] 33 U.S.C. § 1251(b).
[226] 328.3(b)(5)(vi).
[227] Umatilla Waterquality Protective Ass'n, Inc. v. Smith Frozen Foods, Inc., 962 F. Supp. 1312, 1320 (D. Or., Apr. 9, 1997).
[228] See, e.g., "[0ur review of subsurface flows emphasized shallow (local) groundwater" (Report at 2-1); "Riparian and floodplain area connect upland and aquatic environments through both surface and subsurface hydrologic flow path" (Rep011at 1-9); "geographically isolated wetlands can be connected to the river network via ... groundwater" (Rep011at 1-14).

exclusively in response to a request from a potential permit applicant or landowner asking the agencies to make such a determination.

Endangered Habitats League (Doc. #3384.2)

9.177 EHL recognizes and applauds the EPA and Army Corps for simultaneously producing a peer-reviewed scientific synthesis of the latest and most relevant scientific literature to inform the Clean Water Protection Rulemaking process. The draft document entitled "Connectivity of Streams and Wetlands to Downstream Waters: A Review and Synthesis of the Scientific Evidence," is an exhaustive overview of science which promotes the understanding of the connectivity between tributaries, wetlands and downstream TNW. (p. 2-3)

Agency Response: The agencies appreciate the comment.

Stroud Water Research Center (Doc. #6852)

9.178 Our scientists were part of the scientific advisory panel that helped the EPA's Office of Research and Development conduct a comprehensive review of more than 1,000 peer-reviewed publications in the scientific literature. This report (U.S. Environmental Protection Agency, Connectivity of Streams and Wetlands to Downstream Waters: A Review and Synthesis of the Scientific Evidence, Washington, DC: U.S. Environmental Protection Agency, 2013) concludes: The scientific literature clearly demonstrates that streams, regardless of their size, or how frequently they flow, strongly influence how downstream waters function. (p. 2)

Agency Response: The agencies appreciate the comment.

Galveston Bay Foundation (Doc. #13835)

9.179 The related Science Advisory Board's Connectivity report, while clearly demonstrating the connectivity between tributaries, wetlands and downstream TNWs, was written and reviewed with limited input from the Gulf Coast region's scientists and water quality experts. Our watershed's soils, with a large percentage of vertisols, and high magnitude rainfall events do vary substantially from other areas in the country, resulting hydrology that can be quite different from other areas[229][230]. In the future, we would like to see greater input and review by local experts familiar with our unique hydrological system including additional research along the Gulf Coast to determine legally defensible hydrological connections. (p. 3-4)

Agency Response: 9(i)

Kansas Natural Resource Council (Doc. #14599)

9.180 Following the Supreme Court rulings on jurisdictional waters in 2001 and 2006 (SWANCC and Rapanos) it was necessary to review past court cases in conjunction with

[229] Soil Survey Staff (1998). Dominant Soil Orders and Suborders — Soil Taxonomy 1998, USDA Natural Resources Conservation Service.
[230] Miller (1964). Technical Paper No. 49 - Two- to Ten-Day Precipitation for Return Records of 2 to 100 Years in the Contiguous United States, Weather Bureau - U.S. Department of Commerce.

the scientific literature so that a coherent policy regarding jurisdictional waters could be written and administered. The forthcoming report, Connectivity of Streams and Wetlands to Downstream Waters: A Review and Synthesis of the Scientific Evidence, is welcome and will surely clarify the nature and importance of the connectedness of water across our landscapes. (p. 1)

Agency Response: **The agencies appreciate the comment.**

Common Sense Nebraska (Doc. #14607)

9.181 The draft Connectivity Report was prepared to provide a basis for determining which wetlands and water bodies are categorically within EPA and Corps jurisdiction. The "categorical" determination as opposed to the current case-by-case basis for jurisdiction decisions was reportedly an attempt to make decisions more efficiently and to provide clarity. The scientific approach in the Report was the agencies' view on physical, chemical, and biological connections between upland streams and wetlands and water bodies recognized as "traditional navigable waters".

The Connectivity Report's conclusions have the effect of establishing categorical federal jurisdiction over the following waters based on the Report's conclusions:

• A tributary system, including perennial, intermittent, and ephemeral streams because they are physically, chemically, and biologically connected to downstream rivers.

• Wetlands and open waters in riparian areas and floodplains because they are physically, chemically, and biologically connected with downstream rivers.

• The Report also concluded that the current literature is insufficient to generalize about the connectivity or downstream effects of isolated wetlands.

As a result, the Report's conclusions (which carry over to the Proposed Rule) have the effect of establishing categorical federal jurisdiction over tributary systems, riparian areas, and floodplains allowing the agencies to establish jurisdiction over such waters without conducting a case-by-case analysis on anything other than isolated wetlands. As discussed below, this creates a blanket jurisdictional determination without the ability to interject judgment or common sense where needed. In Nebraska, where there are large areas of agricultural land with various types of water bodies and surface features, this will have a tremendous negative impact. Justice Kennedy in his concurrence in Rapanos v. Army Corps of Engineers, laid out and summed up the relevant case law indicating it was an isolated wetland ""significant nexus" [or degree of impact of a connection] to waters that are or were navigable in fact or that could reasonably be so made" that made it jurisdictional under the CWA. Rapanos v. Army Corps of Engineers, 547 U.S. 715, 759 (2006).

The Connectivity Report, failed to consider the significance of connectivity in direct violation and contradiction to Supreme Court direction. *See Rapanos v. Army Corps of Engineers*, 547 U.S. 715 (2006). The Report also did not analyze this connectivity in relation to "traditionally navigable waters," but rather to any "downstream water." These two defining characteristics are inextricably linked to the legal limits of the CWA and the failure of the EPA scientific data study to even consider them makes the Connectivity Report irreparably flawed and unable to be used as the scientific underpinnings for the

Proposed Rule. Without the inclusion of these essential scientific components it is impossible for EPA to fully evaluate all relevant data and provide a rational connection between the facts found and regulatory choices made. As such, the use of the Connectivity Report and reliance by EPA on it is arbitrary, capricious, an abuse of discretion or otherwise not in accordance with the law. (p. 5-6)

Agency Response: 9(d), 9(f), 9(g), 9(i), and 9(l).

Nebraska Wildlife Federation (Doc. #15034)

9.182 The peer-reviewed scientific assessment document that was developed by an independent science team (and which forms part of the scientific basis for the Proposed Rules) concluded that only in extreme and unusual circumstances are wetlands not hydrologically connected to other nearby waters. We concur with this assessment. Research and modeling by the Nebraska Department of Resources, University of Nebraska and others are showing that there are very few truly 'isolated' wetlands in Nebraska, and that the bulk of our state's wetlands and groundwater is hydrologically connected to the stream system in Nebraska.[231] (p. 2)

Agency Response: The agencies appreciate the comment.

Los Angeles Waterkeepers (Doc. #15060)

9.183 Although the science supports the conclusion that all tributaries are physically, chemically, and biologically connected to downstream rivers,[232] it could be prohibitively burdensome, if not impossible, to demonstrate an "ordinary high water mark" in some tributaries, as is required by the Proposed Rule's definition of tributary. In fact, the SAB has explicitly informed EPA that ordinary high water marks may be absent in ephemeral streams within arid and semi-arid environments or in low gradient landscapes.[233] **Thus, the finalized rule should incorporate the Scientific Advisory Board's ("SAB") recommendation that tributaries be defined by "bed, bank, and other evidence of flow."**

To illustrate, many tributaries to the Los Angeles River and other local jurisdictional waters are characterized by wide, low-gradient concrete beds and steep concrete banks with varying degrees of low-level flows throughout most of the year and intermittent heavy flows during periods of rainfall.[234] Those tributaries' characteristics prevent the formation of "[a] clear, natural line impressed on the bank, [formation of] shelving, changes in the character of soil, [or] destruction of terrestrial vegetation" and possibly prevent any other means of demonstrating a high water line.[235] Nonetheless, the scientific

[231] See for example Geographic areas determined to have surface water hydrologically connected to groundwater for the purpose of fully appropriated or over-appropriated designations, Nebraska Department of Natural Resources, April, 2009.
[232] Connectivity Report, Executive Summary, 1-3.
[233] U.S. Environmental Protection Agency, Science Advisory Board, 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, EPA-SAB-14-007 (Sept. 30, 2014), 2.
[234] Compton Creek and Dominguez Channel and prime examples of such waterbodies. See Attachment A.
[235] See 33 CFR § 328.3(e).

literature available to EPA and the Corps support the conclusion that such tributaries to the Los Angeles River and other local jurisdictional waters have the requisite impact on the chemical, physical, and biological integrity of the waters into which they eventually flow[236] to necessitate protection under the Clean Water Act.[237]

Therefore, in light of the scientific literature available to the agencies, EPA and the Corps should incorporate the SAB's recommendation that the agencies revise the Proposed Rule's "tributary" definition.[238] Specifically, to ensure the Proposed Rule's effect is consistent with the available science and the agencies' intent, the Proposed Rule's definition of the term tributary must be revised to read "a water physically characterized by the presence of a bed and banks and other evidence of flow . . . ." (p. 3-4)

Agency Response: 9(f), 9(i), and Tributary Compendium (Topic 8). Also, as articulated in the Preamble, desktop tools are critical in circumstances where physical characteristics of bed and banks and another indicator of ordinary high water mark are absent in the field, often due to unpermitted alteration of streams. In such cases where physical characteristics of bed and banks and another indicator of ordinary high water mark no longer exist, they may be determined by using other appropriate means that consider the characteristic of the surrounding areas. Such reliable methods that can indicate prior existence of bed and banks and other indicators ordinary high water mark include, but are not limited to, lake and stream gage data, elevation data, spillway height, historic water flow records, flood predictions, statistical evidence, the use of reference conditions, or through remote sensing and desktop tools described above.

Colorado Wildlife Federation (Doc. #15119)

9.184 CWF appreciates the Science Advisory Board's (SAB) review of the science regarding the Proposed Rule. It was a very deliberative process. We were pleased that the SAB found the available science provides an adequate scientific basis for key components of the Proposed Rule and supports inclusion of adjacent waters and wetlands as "waters of the US." In addition, we support the SAB's recommendation that adjacent waters and wetlands should not be defined solely on the basis of geographical proximity or distance to jurisdictional waters. CWF also urges that important playas, such as those in the South Park area, be aggregated to allow inclusion in the rule as having a significant nexus. (p. 2)

Agency Response: Thank you for your comment. With regard to playas, all waters within 4,000 feet of the high tide line or ordinary high water mark of traditional navigable waters, interstate waters, the territorial seas, impoundments

[236] See Proposed Rule, 79 Fed.Reg. 22,188, 22,201 (proposed April 21, 2014) ("Tributaries have a significant impact on the chemical, physical, and biological integrity of waters into which they eventually flow . . . ."); see also id. at 22202 ("A tributary . . . can be a natural, man-altered, or man-made water and includes waters such as rivers, streams, lakes, ponds, impoundments, canals, and ditches not excluded in paragraph (b)(3) or (4).").
[237] Connectivity Report, Executive Summary, 1-3.
[238] U.S. Environmental Protection Agency, Science Advisory Board, 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, EPA-SAB-14-007 (Sept. 30, 2014), 2.

or "covered tributaries", and all waters within the 100 year floodplain of a traditionally navigable water, interstate water or territorial sea, can be evaluated for significant nexus. As noted in 9(h), this involves a three-step process, including determining what waters are similarly situated. Playas would be considered similarly situated, and thus aggregated for analysis, where they function alike and are sufficiently close to function together in affecting downstream waters.

Western Pennsylvania Conservancy (Doc. #15202)

9.185 The Proposed Rule relies on EPA's draft science report which provided a thorough synthesis of peer-reviewed scientific literature. This comprehensive body of literature demonstrates the scientific consensus of the related importance of tributaries, wetlands and other hydrological systems. There is clear scientific evidence of connectivity between small or temporary streams, wetlands, floodplains and other open-waters and that they affect downstream waters. We agree with the conclusions of EPA's draft science report that shows that streams are connected to and have effects on their downstream waters. They are connected hydrologically, chemically and biologically. For example, wetland areas still provide numerous downstream functions, including floodwater retention, even when bi-directional flow may not be present. (p. 2)

Agency Response: The agencies appreciate the comment.

Missouri and Associated Rivers Coalition (Doc. #15528)

9.186 While the Report documents the presence of connections between waterbodies, it appears to fail in supplying the scientific basis needed to determine when such connections may or may not significantly affect downstream waters. The voluminous amount of data released after publication of the Proposed Rule is too complex to have reviewed in the limited time allowed, and specific scientific comments cannot be provided. Instead, we offer that when policy is crafted and an implementing rule drafted all in advance of peer-reviewed sound science being published, transparency is lost and data driven decision-making has not occurred. (p. 5)

Agency Response: 9(a), 9(c), 9(e), 9(f), and 9(h).

Wisconsin Wetlands Association (Doc. #15629)

9.187 *The scientific literature summarized in the draft SAB Connectivity Report provides sufficient evidence to categorically include wetlands in certain regions or watersheds under the definition of Waters of the U.S.*

We strongly support the inclusion of such waters where sufficient peer-reviewed literature exists to evaluate and generalize about the connectivity and downstream effects of these wetlands on a regional or watershed basis. As noted by Justice Kennedy, science used to support a jurisdictional determination need not apply to just the specific waters studied, but can be generalized and applied to similar landscapes in some cases. We strongly agree and encourage the agencies to acknowledge that basic principles of watershed science can be applied broadly across similar landscapes. Because research dollars are scarce and research projects are not distributed uniformly across the country, relying solely on peer-reviewed, site-specific studies will not adequately address all

situations where the aggregate effects of other waters are likely to be significant. *A priori* designation of similarly situated waters, and case-specific analyses using landscape-level tools are also needed. (p. 4)

Agency Response: The agencies appreciate the comment.

Midwest Environmental Advocates (Doc. #16645)

9.188 However, the proposed definition is overly conservative given the established science provided in the Report.[239] This message clearly came through in the SAB review. One of the SAB reviewers' major recommendations indicates that the Report may view connectivity too narrowly:

The Report often refers to connectivity as though it is a binary property (connected versus not connected) rather than as a gradient. In order to make the Report more technically accurate, the SAB recommends that the interpretation of connectivity be revised to reflect a gradient approach that recognizes variation in the frequency, duration, magnitude, predictability, and consequences of those connections. The SAB notes that relatively low levels of connectivity can be meaningful in terms of impacts on the chemical, physical, and biological integrity of downstream waters.[240]

This is a critical component of the Report, as it will guide the implementation of the significant nexus analysis that regulators will undertake for all "other waters." (p. 2)

Agency Response: 9(e) and 9(g).

9.189 MEA strongly opposes EPA's decision to categorically exclude groundwater from the CWA. The EPA's scientific basis for the Proposed Rule—the Report—lacks adequate analysis of the role of groundwater on connectivity. This is evidence from numerous comments and recommendations in the SAB Review. Thus, EPA's decision to exclude all groundwater lacks a factual basis and is inconsistent with Supreme Court precedent. One of the SAB reviewers' key recommendations was to incorporate the literature on cumulative and aggregate effects of groundwater, wetlands, and streams on downstream waters:

The SAB recommends that the Report more explicitly address the scientific literature on cumulative and aggregate effects of streams, groundwater systems, and wetlands on downstream waters. In particular, the Report should contain a discussion of the spatial and temporal scales at which streams, groundwater systems, and wetlands are functionally aggregated. The SAB also recommends that, throughout the Report, the EPA further discuss several important issues including the role of biological connectivity,

[239] USEPA Office of Research and Development, "Connectivity of Streams and Wetlands to Downstream Waters: A Review and Synthesis of the Scientific Evidence," External Review Draft (Sept. 2013) at 1-3 ("All tributary streams, including perennial, intermittent, and ephemeral streams, are physically, chemically, and biologically connected to downstream rivers via channels and associates alluvial deposits where water and other materials are concentrated, mixed, transformed, and transported.").

[240] U.S. Environmental Protection Agency, SAB Review of the Draft EPA Report Connectivity of Streams and Wetlands to Downstream Waters: A Review and Synthesis of the Scientific Evidence (hereinafter SAB Review), EPA-SAB-15-001, cover letter at 2 (Oct. 17, 2014).

biogeochemical transformation processes, and the effects of human alteration of connectivity.[241]

The SAB reviewers note that even the Report's use of the term "downstream" reflects an inappropriately narrow view of connectivity that does not recognize the influence of groundwater.

> In this SAB report, the term "downstream" is used to refer broadly to connectivity that is both downstream and downgradient. All water (e.g., surface water, hyporheic flows, and groundwater) flows downgradient toward lesser hydraulic head than at the point of origin or point of interest. For most surface water flows, downgradient is also downstream. Sometimes the term "downgradient" is used in this SAB report to emphasize instances where hyporheic and groundwater flows are especially important.[242]

EPA's decision to stop protecting waters once they travel underground makes no rational sense, is not supported by scientific knowledge and is inconsistent with the CWA as interpreted by the Supreme Court of the United States. Rapanos addressed how the significant nexus analysis would apply to determine jurisdiction over wetlands because it was a wetland at issue in that case. But the analysis and rationale would easily extend to groundwater as well, where there is the requisite "ecological interconnection," or where groundwater "significantly affect[s] the chemical, physical, and biological integrity of other covered waters more readily understood as navigable."[243] As explained in the Report and further highlighted in the SAB review, there is ample scientific literature supporting a strong chemical, physical, and biological connection between some groundwater systems and surface waters. Even the Proposed Rule defines wetlands to include "those areas that are inundated or saturated by surface or groundwater."[244] Protecting molecules of water that make it above ground but not those that remain underground is illogical and leaves our water resources without adequate protection. Recognizing the importance of Wisconsin's waters and the interconnectedness of all waters, Wisconsin law protects all waters of the state, including "those portions of Lake Michigan and Lake Superior within the boundaries of Wisconsin, all lakes, bays, rivers, streams, springs, ponds, wells, impounding reservoirs, marshes, water courses, drainage systems and other surface water or groundwater, natural or artificial, public or private within the state or under its jurisdiction."[245] Thus, Wisconsin Pollutant Discharge Elimination System (WPDES) permits—part of Wisconsin's CWA permitting program—regulate discharges to both surface water and groundwater. This regulatory system provides more protection for drinking water sources from both surface and groundwater.

When regulating one of Wisconsin's biggest industries, and one with significant impacts on water quality and quantity, it is essential that we take a holistic approach and regulate all water resources. Some of Wisconsin's aquifers—characterized by sandy soils or karst features—are very susceptible to contamination because of the close interconnection

[241] SAB Review, cover letter at 2.
[242] SAB review, at 1 n.1.
[243] Rapanos, 547 U.S. at 780.
[244] 79 Fed. Reg. 22188, 22199 (Apr. 21, 2014) (Proposed Rules).
[245] Wis. Stat. § 283.01(20)(emphasis added).

between groundwater and surface waters. Even with Wisconsin's regulation of both surface water and groundwater pollution, these vulnerable regions have suffered serious water quality and water quantity impacts from agricultural use in Wisconsin.

In karst areas in northeastern Wisconsin, pollution from agricultural sources, including large concentrated animal feeding operations (CAFOs) that are regulated by the CWA, have created a groundwater quality crisis. A recent decision regarding the adequacy of permit terms and monitoring in a WPDES permit issued to a large CAFO in Kewaunee County, Wisconsin, reflects the need for additional groundwater protection. The administrative law judge described the situation in Kewaunee County as a "crisis with respect to groundwater quality," and concluded that "[t]he proliferation of contaminated wells represents a massive regulatory failure to protect groundwater."[246] The situation in this area begs for a more effective regulatory framework that could be provided by the CWA. And there is no scientific reason to exclude groundwater from the CWA's protections. In fact, the SAB reviewers asked for additional information in the Report on how "hydrologic connectivity sustains both streams and aquifers" in karst regions.[247]

The significant connection between navigable waters and groundwater is well established in the central sands region in Wisconsin. According to the Wisconsin Department of Natural Resources, "The region is characterized by over 800 miles of trout streams and 300 lakes. Most of these streams and lakes are highly dependent on groundwater as their primary source of water."[248] In fact, in a recent Environmental Impact Report (EIR) by a proposed large CAFO in the central sands region, the modeling demonstrates this close connection between groundwater and surface water and concludes that groundwater discharges from landspreading will affect surface water quality. The EIR provides evidence of the interconnection:

> The quality of the groundwater and surface water in the [Golden Sands Dairy (GSD)] Project Area is similar due to the close interconnection between groundwater and surface water. Both surface water and groundwater in the area are calcium-magnesium bicarbonate waters typically with total dissolved solids concentrations of less than 200 milligrams per liter (mg/L). As surface water in the region primarily originates from groundwater discharge to streams, surface water quality at a point in a stream can reflect the quality of groundwater in upstream areas.[249]

The modeling done for the EIR further concludes that the CAFO's operations will result in nutrient pollution of nearby surface waters, since the groundwater discharges to those waters:

[246] In the Matter of the Wisconsin Pollutant Discharge Elimination System Permit No. WI-0059536-03-0 (WPDES Permit) Issued to Kinnard Farms, Inc., Town of Lincoln, Kewaunee County, Case No. IH-12-071 (Wis. Div. Hrg's and App. Oct. 29, 2014), attached as Exhibit A.
[247] SAB Review, at 4.
[248] See Wisconsin Department of Natural Resources, Central sands strategic analysis, available at http://dnr.wi.gov/topic/EIA/CSSA.html.
[249] S.S. Papadopulos & Associates et. al, Environmental Impact Report Golden Sands Dairy Saratoga Township Wisconsin at 66 (March 2014), available at http://dnr.wi.gov/topic/AgBusiness/documents/GoldenSands/EIR/, attached as Exhibit B.

> For purposes of this analysis it was then specified that water infiltrating to the water table beneath the GSD Agricultural Crop Fields converted from pine plantation would have an average nitrate concentration of 8 mg/L and that precipitation infiltrating elsewhere in the contribution areas would have a nitrate concentration at background concentrations. During periods when Sevenmile Creek is dry upstream of Rangeline Road, it was calculated that the average nitrate concentration at County Road Z would increase from 0.3 mg/L under existing conditions to 1.6 mg/L after approximately 20 years of operation of the GSD Project. Average nitrate concentration in Tenmile Creek under existing conditions at Rangeline Road is approximately 3.8 mg/L and this average concentration is calculated to increase to about 4.15 mg/L after about 20 years of operation of the GSD Project. If the GSD Nitrogen Balance overestimates the nitrogen available to leach to groundwater, as the Port Edwards calculations did, nitrate concentrations at the water table beneath the converted GSD Agricultural Crop Fields would be 5 mg/L, rather than 8 mg/L, and the projected nitrate concentrations in Sevenmile Creek and Tenmile Creek at County Road Z would be 1.1 mg/L and 4.0 mg/L, respectively.[250]

As demonstrated in these cases, there are several regions in Wisconsin where the connection between groundwater and surface water is very clear and documented by extensive research and experience. It is illogical to ignore groundwater's influence on navigable waters.

A better approach is to categorize groundwater as an "other water" that may be jurisdictional under the CWA when there is a demonstrated significant nexus to navigable waters. Instead, the EPA has decided to turn a blind eye to the intimate connections between some groundwater and navigable waters, and refused to provide jurisdiction even where there is evidence of a significant nexus. "The agencies would not retain the authority to determine that any of these waters was a 'water of the United States' because it would otherwise be jurisdictional under section (a)."[251] This is not supported by Rapanos and is inconsistent with a recent federal court decision in which the court found "[t]here is nothing inherent about groundwater conveyances and surface water conveyances that requires distinguishing between these conduits under the Clean Water Act."[252] (p. 2-6)

Agency Response: 9(i), 9(j) and 9(k)

Audubon Society of Greater Denver (Doc. #16934)

9.190 According to the Scientific Advisory Board (SAB) report, biological connections between ephemeral streams, intermittent streams and isolated wetlands and downstream waters are well documented by the literature. Materials are moved via biota from one to the other, as are nutrients and other substances that provision downstream habitats.

[250] S.S. Papadopulos & Associates et. al, Environmental Impact Report Golden Sands Dairy Saratoga Township Wisconsin at 82-83 (March 2014), available at http://dnr.wi.gov/topic/AgBusiness/documents/GoldenSands/EIR/, attached as Exhibit B.
[251] 79 Fed. Reg. 22188, 22218 (Apr. 21, 2014) (Proposed Rules).
[252] Hawai'i Wildlife Fund v. Cnty. of Maui, __ F.Supp.2d __ , 2014 WL 2451565 at *13 (D. Ha. 2014).

Organisms and species move between different habitats to complete their life cycles; thus ephemeral and intermittent streams and isolated wetlands are essential for the survival of many species that occur in downstream habitats. We thus encourage the agencies to include biological connections – the movement of biota – as one determinant of a "significant nexus" between isolated or non-floodplain wetlands, ephemeral streams, and intermittent streams and the traditional "waters of the US." (p. 2)

Agency Response: 9(f)

Society for Freshwater Science (Doc. #11783)

9.191 We begin by complimenting the United States Environmental Protection Agency ("The Agency") for the thorough and rigorous process used in developing the science to support this proposal. This scientific work included one of the most comprehensive reviews to date, a detailed and extensive report providing the content and implications of that comprehensive review[253], commitment to a rigorous independent review process, and an additional review by the EPA SAB (ongoing). We praise the Agency for the scope, extent, and quality of its science. (p. 2)

Agency Response: The agencies appreciate the comment.

National Association of Flood & Stormwater Management Agencies (Doc. #19599)

9.192 The draft connectivity report appears to be based on a review of scientific literature seeking to determine the nature of connectivity. The scientific question then becomes "how are things connected?" and the research results are a documentation of theoretical connection—everything is connected. While valid for scientific research, the basis of the connectivity report is inappropriate for the development of regulations. To be effective, an administrative process requires clear boundaries and limits in light of the desired regulatory effects, federal law and the practical ability for a regulatory organization to implement any promulgated regulations. To support rulemaking for determining WOTUS, the central scientific question should have been, "where does the regulatory connection effectively stop?" Consequently, the connectivity report for the purposes of this rulemaking is flawed and its utility is questionable. Because the connectivity report is central to EPA's Proposed Rule, we request EPA reassess the scientific literature with a focus on the limits of connectivity. We recognize this is a fundamental step and reassessment will likely impact the overall schedule of the Proposed Rule. However, we believe the profound significance of WOTUS to Clean Water Act programs justifies the additional effort. (p. 2)

Agency Response: 9(d), 9(f), 9(g), and 9(h).

Environmental Technology Consultants (Doc. #2597)

9.193 The referenced document on connectivity is to vague and general, and lacks actionable definitions in many areas. Also the practice of having a rule reference an outside

[253] U.S. Environmental Protection Agency (USEPA). 2013. Connectivity of Streams and Wetlands to Downstream Waters: A Review and Synthesis of the Scientific Evidence. US Environmental Protection Agency, Washington, D.C. EPA/600/R-11/098B.

document for important definitions is a poor way to write rules. The connectivity document should be pared down to a 5 pages or less of clearly written definitions and then incorporated as part of the text of the Proposed Rule.

The connectivity document is so broad and vague in it's scope to the point where any puddle could be reasonably argued to have a significant nexus to some distant navigable water body. It is also much to long and disjointed to be included as part of a rule. (p. 2)

Agency Response: 9(d), 9(f), 9(g) and 9(i).

Wetland Science Applications, Inc. (Doc. #4958.2)

9.194 The entire "connectivity study" (Study) that supposedly is the scientific basis for the Proposed Rule was fatally flawed. The issue that should have been studied was not whether the landscape is connected, but rather whether the connections that exist are significant. (p. 1)

Agency Response: 9(f), 9(g), 9(h), and 9(l).

9.195 The data and science (as discussed in the Connectivity Study and that I have found independently) do NOT support the conclusion. This conclusion certainly is NOT supported by the connectivity study for ephemeral channels far removed from Section 10 waters. The Study provides essentially no functional connection to Section 10 waters for ephemeral waters far removed, especially those in the arid west. Most of the discussion in the study relative to ephemeral channels and transmission loss is centered on the recharge of regional aquifers. While recharge of regional aquifers is an important topic, its relevance to connectivity to navigable waters is questionable. Furthermore, it is a consideration that more appropriately belongs to the States under the Constitution and Section 101(b) of the CWA. The Study acknowledges that transmission losses reduce down stream flooding. This is specifically because many arid ephemeral flows never travel more than a short distance before they completely dissipate.1 Thus, most ephemeral flow in arid channels never reaches navigable waters of the United States that are any appreciable distance away. (p. 3-4)

Agency Response: 9(e), 9(f), 9(g), 9(h), and 9(i). As stated in the essay responses, the SAB review concluded "the review and synthesis of the literature describing connectivity of streams to downstream waters reflects the pertinent literature and is well grounded in current science. The literature review provides strong scientific support for the conclusion that ephemeral, intermittent, and perennial streams exert a strong influence on the character and functioning of downstream waters and that tributary streams are connected to downstream waters." In response to the SAB's recommendation more literature regarding the importance of episodic and incremental connections between ephemeral and intermittent streams and downstream waters was added to Section B.5 and Section 3 of the Final Report. These studies demonstrate connectivity of arid headwater channels and downstream waters not only through transmission of loss and ground water recharge (which the SAB identified among the "key linkages and exchanges" between tributary streams and downstream waters, particularly for alluvial systems in the Southwest) but also the transport and storage of surface water, sediment, organic matter, nutrients, contaminants, and organisms. The literature presented in the Final Science Report

indicated connections between ephemeral channels and downstream waters can occur during large episodic events or incrementally over multiple events. The presence of bed and banks linking ephemeral arid channels to downstream waters is physical reflection of surface connectivity. The maintenance of channel form indicates that fluvial connectivity (described in terms of frequency, duration, magnitude, and timing) is effective enough to outweigh terrestrialization processes (e.g., soil formation, revegetation) or standard land practices (e.g., plowing, hearding livestock). Channels may have apparent disruptions to bed and bank features (e.g., bedrock outcrops, braided channels, flow-through wetlands) associated with changes in the material and gradient over and through which water flows. The continuation of bed and banks downgradient from such disruptions is evidence of the surface connection with the channel that is upgradient of the perceived channel disruption.

RT Environmental Services (Doc. #4985.2)

9.196 As non-field based regulatory approaches toward wetlands have failed in the past, it is paramount that there be a sound basis to go forward, and relying on the "Connectivity Report" alone, without documenting conditions in the field, I am concerned will likely to cause damage to the overall Federal Wetlands Program, and, to the current wetlands requlatory programs implemented at the state level. (p. 2)

Agency Response: 9(f) and 9(h).

9.2 APPENDIX A COMMENTS

Uintah County, Utah (Doc. #12720)

9.197 The information presented in Appendix A is supposed to be the initial summary of "scientific evidence", both real and contrived. The Agencies concede that this information is subject to change and is only partially complete, both in content and the "peer review" process. What is missing from the regulation is how this information will be applied. Even if we were to assume the "scientific information" was in fact based in real science, there is no indication as to how the Agencies can or can't use the information to reach a reasoned decision. (p. 3)

Agency Response: 9(e) and 9(f). See also the TSD. Appendix A has been replaced by the Technical Support Document (TSD).

Waters Advocacy Coalition (Doc. #17921.14)

9.198 Indeed, the studies cited by the Agencies do not match the regulatory language in the Proposed Rule. In Appendix A (at 22,235), the Agencies make many strong statements and broad conclusions about ditches and other man-made features as tributaries, and the importance and certainty of their significant nexus with downstream waters, but the science does not support these categorical assertions. The studies cited by the Agencies in the Proposed Rule related to ditches were not cited in the Connectivity Report, and focus primarily on a single type of ditch: the agricultural drainage ditch.

These studies did not address or quantify the strength of connections between agricultural ditches and downstream waters, let alone all types of ditches in the U.S., and therefore they do not support categorical jurisdiction over ditches and other man-altered tributaries. For example, Strock et al. (2007) and Schmidt et al. (2007), two of the citations in the Appendix A, reported research on nitrogen transport and nitrogen processing that can occur in ditches, and the reduction in nitrogen loss that can be achieved through agricultural management practices. Although eutrophication was broadly discussed, these studies did not attempt to quantify the effects of ditches on downstream integrity, and therefore are not useful to support the Agencies categorical jurisdiction over ditches. In another study, Smiley et al. (2008) make the point that agricultural ditches typically were designed as conduits for water and were not designed with considerations for water quality and aquatic biota. Smiley et al. suggest that management practices could be implemented such that agricultural ditches could be designed and managed to provide better habitat for biota. While this research suggests that with better management practices some ditches might provide biological habitat, the study did not discuss the strength or consequences of connectivity, biological, hydrological, or chemical, between ditches and downstream waters. None of the studies cited by the Agencies to support categorical jurisdiction over ditches made any attempt to quantify the effects of ditches on downstream integrity. Therefore, the Agencies cannot rely on these studies to support the determination that all man-made and man-altered tributaries, including ditches, have a significant nexus to downstream waters and therefore should be jurisdictional by rule. In conclusion, there is a disconnect between the science cited and the text of the Proposed Rule. (p. 175)

Agency Response: **9(m). Also see Ditch Compendium (Topic 6).**

9.199 In the context of "other waters," the Connectivity Report supports an aggregation approach to "other waters," but acknowledges that for aggregated waters, the strength of connection and the magnitude of downstream effect are variable; there is a gradient of connectedness. Yet, the Proposed Rule, including the new science cited in Appendix A, does not consider where along that continuum the significant nexus occurs. The studies cited by the Agencies merely support the idea that any aggregation of small effects to downstream waters will result in a measurable and, by the Agencies' reasoning, significant effect. In addition, watershed size differed among the studies cited, and there are likely spatial or watershed-boundaries on the level above or below which aggregation would be considered significant. As discussed in Section 1.0 of this memorandum, the Agencies do not provide a consistent framework for determination of effect "significance" on the integrity of downstream waters. As a result, these studies do not provide support for the Agencies to reach a consistent determination of how much aggregation is sufficient to justify a jurisdictional determination.

For example, Leibowitz (2003) supports the concept of functional aggregation, stating that even though downstream effects of individual wetlands may be hard to detect, evaluating them in aggregate helps to determine any watershed-level effects. The author also supports the classification of "significant nexus" for a collection of wetlands, or plausibly another group of "non-adjacent waters," if they result in significant effects on downstream waters. However, Leibowitz does not define "significant effect." Rather, Leibowitz states the need for the future development of assessment models that could

provide explicit descriptions of functional linkages between "isolated wetlands" and waters of the United States, and states that a landscape perspective should be required when evaluating the off-site effects of a wetland or other "isolated" water on a water of the United States. Thus, Leibowitz is advocating the very framework for determination of significance or strength of connectivity that we have argued is lacking in the Connectivity Report and in the Proposed Rule.

For all of these reasons, the science cited by the Agencies does not provide or support any type of standard method for determining when aggregated effects are significant. This is a major flaw with the Agencies' approach to "other waters," and will likely lead to inconsistent case-by-case determinations in the field. (p. 177)

Agency Response: **9(g), 9(h), and 9(k). The science looking into connections between streams and wetlands and downstream waters is fairly new, and there have not been a large number of studies examining these interactions directly. One implication of this is we often had to make use of indirect evidence that suggested a connection or effect. Similarly, the Report acknowledges (p. 2-50) that the research community has not reached a consensus regarding the best methods or metrics to quantify or predict hydrologic or chemical connectivity. EPA and partners in the USGS and academia are currently working on developing such approaches. In the meantime, the Science Report does discuss (pp. 2-49 to 2-51) approaches for quantifying connectivity that could include aggregate effects (e.g., geostatistical modeling; coupled surface water-ground water modeling; graph theoretic approaches). See also response at the end of this Compendium.**

The Mosaic Company (Doc. #14640)

9.200 Appendix B of the Proposed Rule and the draft EPA Connectivity Report discuss general methods used in the scientific literature to aggregate waterbodies to evaluate their function (79 Fed. Reg. at 22,247). This is used to justify the aggregation approach for jurisdiction of "Other Waters". However, many of the peer-reviewed sources used in this justification concern streams and hydrologically connected wetlands, waters that do not fall in the "Other Waters" category of the Proposed Rule. Few studies referenced refer to isolated wetlands and the only function mentioned in the literature that they serve in aggregate is flood retention (79 Fed. Reg. at 22,247). Again, the issue is that if a given "other water" is shown to meet the significant nexus standard, it would be found to be jurisdictional, but if does not meet the significant nexus test, aggregating it with other similar waters will not change the effect on downstream traditional navigable waters. (p. 25)

Agency Response: **9(k). While we recognize that the scientific literature does not differentiate adjacent waters from non-adjacent waters, for administrative purposes, the analysis of CWA jurisdiction will require the agencies to differentiate these waters. As noted in the Preamble, while a water's connections to the (a)(1) through (a)(3) water through (a)(5) through (a)(7) waters can be considered in the significant nexus analysis in order to determine whether the functions of the (a)(8) waters are provided downstream, only the functions of the water, along with any similarly situated waters, being evaluated under (a)(8) on downstream water integrity can be included in the significant nexus analysis.**

Water Advocacy Coalition (Doc. #17921)

9.201 The Proposed Rule Asserts Categorical Jurisdiction Without Legal or Scientific Support and Arbitrarily Shifts the Burden of Proof from Agencies to the Public.

As discussed above, the Proposed Rule and the Connectivity Report both recognize that connectivity occurs on a gradient, but the Proposed Rule gives no consideration for where on that continuum the threshold for significant nexus lies.85 Instead, without scientific support or legal justification, the Proposed Rule finds that *all* "tributaries" and *all* "adjacent waters" have a significant nexus to jurisdictional waters and, therefore, are *per se* jurisdictional.86

The agencies lack scientific support for their categorical assertions of jurisdiction over all waters that meet their definition of "tributary" or "adjacent water." The Connectivity Report and the Proposed Rule's categories of jurisdiction are framed in terms of a binary approach (connected/jurisdictional versus not connected/non-jurisdictional), without consideration of "variation in the frequency, duration, magnitude, predictability, and consequences of connections."87 The regulation of these categories of jurisdiction *by rule* violates the gradient principle emphasized by the SAB Panel. As noted by Dr. Mark Murphy, the inclusion by rule of all tributaries and adjacent waters "is not scientifically justified by the published literature, the Connectivity report or the SAB review."88 Dr. Michael Josselyn agreed, pointing out that "if the science demonstrates a gradient in ecological function," there would be situations in which significant nexus cannot be assumed.89 Similarly, the GEI Report explains, "all tributaries and adjacent waters exist on a gradient of connectivity, and the science has not identified the point on that gradient (i.e. the strength of connectivity) where the significant nexus falls."90 Thus, the GEI Report concludes, "the existing scientific literature and analyses presented by EPA do not support these categorical jurisdictional determinations."91 Nor is this approach supported by *Rapanos* or other existing judicial precedent.

Agency Response: 9(g), 9(h), and 9(i). Also, as recommended by the SAB, the final Science Report repeatedly acknowledges that connectivity occurs along a gradient (e.g., see Section 5.8). Even given this gradient, however, the SAB found that "[t]here is strong scientific evidence to support 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 process." The SAB made a similar statement regarding adjacent waters and wetlands, stating that "[t]he available science supports the EPA's proposal to include adjacent waters and wetlands as waters of the United States. ...because [they] have a strong influence on the physical, chemical, and biological integrity of navigable waters."

9.202 Indeed, the science does not demonstrate that treating ephemeral features as waters of the United States will have benefits for downstream waters. As Dr. Michael Josselyn notes, "These low order features may have flow for only a few hours or days following storm events and are the most likely candidates for being on the low end of the [connectivity] gradient. . . . ."108 These are not features with significant effects on downstream

navigable waters. The State of Missouri, for instance, determined, based on a U.S. Geological Survey ("USGS") analysis, that data did not exist to support a significant connection between ephemeral streams and aquatic uses.109 Accordingly, the State of Missouri (with EPA approval) determined that it would not set water quality standards for certain ephemeral streams.110 Similarly, if ephemeral drainages are now jurisdictional "waters of the United States," as proposed, Kansas estimates a more than four-fold increase from 32,000 miles of streams to 134,000 miles of streams that will be "waters of the United States" and therefore subject to water quality standards.111 Neither the Connectivity Report nor Appendix A of the preamble demonstrates that ephemeral features have significant chemical, physical and biological effects on TNWs. Instead, the agencies have not assessed the significance of these connections and have ignored the caution from the SAB Panel that "temporal and spatial predictability of connectivity is especially important to quantify when assessing potential for downgradient effects in systems without permanent or continuous flowpaths."112 Dr. Michael Josselyn of the SAB Panel notes that "the science needs to be more substantial than currently demonstrated in the Draft Science Report" for the agencies to assert jurisdiction over ephemeral drainages.113 Indeed, these "very small drainages" "are not usually considered in the scientific studies that deal with headwater streams," and the agencies should recognize the "uncertainty and limits of the scientific knowledge" with respect to these features.114 As Dr. Mark Murphy of the SAB Panel observed, "inclusion by rule of all ephemeral tributaries, 'regardless of size or flow duration,' is not scientifically justified."115 Furthermore, by asserting jurisdiction over such attenuated waters and potentially wet features, the agencies will misuse their limited resources and the limited resources of the States and regulated community. For all these reasons, ephemeral drainages should not be considered "waters of the United States."

Moreover, the Proposed Rule's treatment of wetlands, lakes, and ponds as tributaries (even if they lack bed, bank, and OHWM) expands the concept of tributary to essentially any type of water. The common understanding of a tributary is that it is a stream that feeds into a larger stream or river. Few would consider a pond, lake, or wetland to be a tributary in common parlance. Many members of the SAB Panel raised this issue in their review of the Proposed Rule.116 The agencies provide no support for treating non-stream waters, such as wetlands, lakes, and ponds, as tributaries. By including them in the (a)(5) tributary definition, the Proposed Rule allows for jurisdiction over "adjacent waters" in the same floodplain or riparian area or that have a subsurface connection with these wetlands, lakes, and ponds. Again, this stretches the "tributary" definition too far.

Finally, waters should not be considered tributaries regardless of manmade and natural breaks "*for any length*." The GEI Report notes that "the science does not support the Agencies' assertion that a significant nexus between a tributary and a traditional navigable water is not broken where the tributary flows through a culvert or other structure."117 Moreover, the SAB Panel noted that the Connectivity Report lacked sufficient information on the influence of human alterations on connectivity and "generally exclude[d] the many studies that have been conducted in human-modified stream ecosystems."118 Such breaks can sever connectivity, even when a channel can be identified upstream.119 Dr. Mark Murphy points out that such categorical jurisdiction regardless of breaks is not scientifically justified, stating that "OHWM indicators are discontinuous because *flow paths* are discontinuous and connectivity across them can

drop to a near-zero significance."120 As the preamble notes, for example, dams cut off flow and store water for any number of reasons, such as flood control, irrigation water supply, and energy generation. *See* 79 Fed. Reg. at 22,235. It is quite a leap for the agencies to determine that the waters behind such dams categorically have significant physical, chemical, and biological effects on downstream traditional navigable waters.121 Allowing for *per se* jurisdiction regardless of breaks for any length expands the concept of "tributary" beyond what the science supports and would include intrastate waters that lack meaningful connection to traditional navigable waters.

Agency Response: 9(i), 9(m) and 9(o). As stated in the summary responses, the SAB concluded that there was "strong scientific support" demonstrating the effect of tributaries, as a group--including both ephemeral and intermittent streams--on downstream waters. Regarding treatment of ponds, lakes and wetlands as tributaries, the final Rule treats tributary ponds and wetlands as adjacent waters, not tributaries. As noted in 9(g), the scientific evidence unequivocally demonstrates that the stream channels and riparian/floodplain wetlands or open waters that together form river networks are clearly connected to downstream waters in ways that profoundly affect downstream water integrity. Regarding human alterations on connectivity, the comment suggests that systems that were initially connected are disconnected by human modifications. Although such modifications may decrease certain types of connectivity (e.g., an impoundment decreasing biological connectivity), other modifications actually increase connectivity (e.g., the SAB acknowledges repeatedly that ditches and culverts can increase connectivity). Whether connectivity is increased or decreased by these human modifications, there is sound scientific support for resulting effects on downstream waters.

9.203 The Proposed Rule determines that all waters within the floodplain or riparian area of a jurisdictional water or that have a shallow subsurface hydrological connection to a jurisdictional water categorically have a significant nexus and will be jurisdictional by rule. *Id.* at 22,207. The science does not support such a categorical determination. As the GEI Report explains, "adjacent waters exist on a gradient of connectivity, and the science has not identified the point on that gradient (i.e., the strength of connectivity) where the significant nexus falls."148 Thus, the agencies fail to provide scientific analysis or references that support the proposed *per se* regulation of all adjacent waters.

Agency Response: The rule does not define "adjacent waters" to include all waters that have a shallow subsurface connection as adjacent, however such connections can be used for a case-specific analysis (see 9(j)).

9.204 As noted by Dr. Emily Bernhardt of the SAB Panel, "There are considerable differences in the scope of protection depending upon whether regulators consider a 1 year or 500 year flood return interval to delineate a floodplain."149

Agency Response: This statement does not suggest that use of one of these flood return intervals is better supported by the science; it simply states that the scope of protection for adjacent waters--for which the SAB concludes there is strong scientific support--will differ based on how floodplains are delineated.

9.205 Ponds within a floodplain or riparian area, or that have subsurface hydrological connections to jurisdictional waters, should not be *per se* jurisdictional. Neither the

Connectivity Report nor Appendix A of the preamble provides scientific support for a finding that such features categorically have a "significant nexus" with navigable waters.156

Agency Response: **The rule does not define "adjacent waters" to include all waters that have a shallow subsurface connection as adjacent, however such connections can be used for a case-specific analysis (see 9(j)).**

9.206 **Shallow subsurface hydrologic connection:** Under the Proposed Rule, waters can be "adjacent" and therefore jurisdictional if they have a "shallow subsurface hydrologic connection" to jurisdictional waters, but the agencies do not define that term. What is meant by "shallow"? Twelve inches? Five feet? Does "shallow subsurface hydrological connection" include manmade surface connections? Are there any limitations on the distance of the subsurface connection between the "adjacent" water and the nonnavigable water? Where does the shallow subsurface connection end and groundwater begin? The SAB Panel explained that "the preamble of the Proposed Rule did not provide a clear understanding of what are considered to be 'shallow' subsurface connections."159 As one SAB Panel member noted, "Groundwater flowpaths can be in the shallow subsurface, where flow is limited in the soil, and where water flows from one water body to another in hours to weeks."160 Does this not suggest that the Proposed Rule is actually regulating groundwater?

Agency Response: **9(j)**

9.207 Looking at all "other waters" within a watershed is too broad and not supported by science. As Dr. Michael Josselyn of the SAB Panel noted, the watershed of the nearest navigable water "could be a very large area that may drain significant portions of a single State."162 Even small Hydrologic Unit Code ("HUC")-10 watersheds, which the preamble recommends for use in the arid West, are typically between 40,000 and 250,000 acres in size (i.e., approximately 60-390 square miles). *See* 79 Fed. Reg. at 22,212. As Dr. Josselyn noted, "It would be hard to argue that including all the [waters] within such a large area in one grouping would not have an effect on the downstream water."163 In addition, the agencies' proposed aggregation of all "similarly situated" features within a watershed is not supported by the science. The GEI Report explains that "the Agencies' aggregation approach is not based on a scientific evaluation of whether aggregated effects result in a significant nexus."164 The studies cited by the agencies to support their aggregation principle support the notion that aggregation of small effects to downstream waters can result in a "measurable" effect, but "these studies do not provide support for the Agencies to reach a consistent determination of how much aggregation is sufficient to justify a jurisdictional determination."165 The Proposed Rule's failure to provide a scientifically defensible standard method for determining when aggregated effects are significant "will likely lead to inconsistent case-by-case determinations in the field."166

Agency Response: **9(k). The Science Report noted the incremental and cumulative effects that streams, tributaries, and adjacent waters and wetlands have on downstream systems. The Science Report found that the scientific literature unequivocally demonstrated that streams, individually or cumulatively, exert a strong influence on the integrity of downstream waters and that all tributary streams, including perennial, intermittent, and ephemeral systems, are physically,**

chemically, and biologically connected to downstream systems. The SAB (p. 35) concluded that the Science Report, "provides strong scientific support for these conclusions and findings."

> **Regarding adjacent waters and wetlands, the Science Report (p. 4-44) concluded that the "…cumulative influence of many individual wetlands within watersheds can strongly affect the spatial scale, magnitude, frequency, and duration of hydrologic, biological, and chemical fluxes or transfers of water and materials to downstream waters." The SAB (p. 56) similarly noted that non-floodplain wetlands may individually have "minimal connections to downstream waters, the cumulative impact of these diffuse connections is *tremendously important* [emphasis added] to the maintenance of downstream biota and ecosystem integrity."**

9.208 For all of the reasons discussed above, the proposed "other waters" standard will lead to broad assertions of jurisdiction over isolated features that may have no meaningful connection with TNWs. Yet many of the alternative options presented by the agencies would have similarly overreaching results and are likewise unsupported by the science.167 The agencies request public comment on four alternative approaches for "other waters": (1) determine that "other waters" within particular "ecoregions" or "hydrologic-landscape regions" are similarly situated by rule and have a significant nexus; (2) determine by rule that certain additional subcategories of "other waters" (e.g., prairie potholes, western vernal pools) are jurisdictional; (3) determine that no "other waters" are similarly situated; and (4) determine that all other waters in a watershed are similarly situated. *See* 79 Fed. Reg. at 22,215-17.

The agencies state that they "might adopt any combination" of these "other waters" alternatives for the final rule. *Id.* at 22,215.168 But alternatives (1), (2), and (4), which would each allow for categorical jurisdiction over "other waters" in some way, are just as, if not more, overreaching than the Proposed Rule's approach. And, as the SAB Panel has recognized, these alternative approaches are not supported by the science.169 The GEI Report concludes that "the Ecoregion and hydrologic landscape-unit approaches both suffer from being too broad, and are not placed within a consistent framework of determining significance."170 The ecoregion approach, for example, could render an entire watershed jurisdictional, thereby greatly increasing the need for Corps permits. The GEI Report estimates that "the extent of area proposed to be covered using the Ecoregion concept covers nearly a quarter of the country."171 In addition, with the "ecoregions" or "hydrologic-landscape regions" approaches, the preamble provides that the agencies would consider all "other waters" within an ecoregion or hydrologic-landscape region as "similarly situated" and would determine by rule that they have a significant nexus. 79 Fed. Reg. at 22,215. As noted by the GEI Report, treatment of different categories of "other waters" features (e.g., prairie potholes, isolated wetlands) that do not perform similar functions as "similarly situated" is not supported by the science.172 Nor does the science support the establishment of *per se* jurisdiction over subcategories of other waters (e.g., prairie potholes, vernal pools).173

<u>Agency Response:</u> 9(f), 9(g), 9(h), 9(i), and 9(k). Also, the Science Report (p. ES-3) found that wetlands and open waters in non-floodplain landscape settings provide numerous functions that benefit downstream water integrity, and that these non-

floodplain wetlands occur along a gradient of connectivity. On one end of the spectrum, the functions of non-floodplain wetlands clearly affect the condition of downstream waters if a visible (e.g., channelized) surface-water or regular shallow subsurface-water connection to a river network is present. Non-floodplain wetlands without such visible surface-water or regular subsurface-water connections occupy the other end of the connectivity spectrum, and the Science Report found that generalizations about their specific effects on downstream waters are difficult because information on both connectivity and function are needed. However, the Science Report concluded that the "…cumulative influence of many individual wetlands within watersheds can strongly affect the spatial scale, magnitude, frequency, and duration of hydrologic, biological, and chemical fluxes or transfers of water and materials to downstream waters." The SAB (p. 56) similarly noted that while non-floodplain wetlands may individually have "minimal connections to downstream waters, the cumulative impact of these diffuse connections is *tremendously important* [emphasis added] to the maintenance of downstream biota and ecosystem integrity."

9.209 **Review of Adequacy of the Science Supporting the Proposed Rule Is Ongoing.** The APA requires that an agency give notice of a Proposed Rule setting forth "either the terms or substance of the Proposed Rule or a description of the subjects and issues involved," 5U.S.C. § 553(b), and "give interested persons an opportunity to participate in the rule making through submission of written data, views, or arguments . . .," *id.* § 553(c). Under APA notice and comment requirements, "[a]mong the information that must be revealed for public evaluation are the technical studies and data upon which the agency [relies in its rulemaking]." *American Radio Relay League, Inc. v. F.C.C.*, 524 F.3d 227, 236 (D.C. Cir. 2008) (internal quotations omitted). As courts have recognized, "[i]t is not consonant with the purpose of a rulemaking proceeding to promulgate rules on the basis of inadequate data, or on data that, to a critical degree, is known only to the agency." *Portland Cement Ass'n v. Ruckelshaus*, 486 F.2d 376, 393 (D.C. Cir. 1973). Rather, the "most critical factual material" used by the agency must be subjected to informed comment to "ensure that agency regulations are tested through exposure to public comment . . . ." *American Radio Relay League*, 524 F.3d at 236. By publishing and taking comment on the Proposed Rule before the Connectivity Report, which is touted as the underlying scientific support for the Proposed Rule, is final, the agencies have not complied with this critical APA requirement.

The agencies have assured the public that the final regulatory action related to CWA jurisdiction will be based on the final version of the Connectivity Report. *See* 79 Fed. Reg. at 22,190, 22,222. But throughout the comment period, the draft Connectivity Report was undergoing review by the SAB Panel. In late September 2014, the chartered SAB performed a quality review of the SAB Panel's draft conclusions on the draft Connectivity Report and submitted a letter with recommendations to the EPA Administrator.195 On October 17, 2014, the SAB submitted final recommendations for revisions to the Connectivity Report, which incorporated the final report of the SAB Panel, to EPA Administrator Gina McCarthy. EPA now has the opportunity to make changes to the Connectivity Report based on the SAB's recommendations. Through its comments and report, the SAB Panel has recommended numerous substantive changes to the Connectivity Report.196 This process will not be completed in time for the public to

review and comment on the final Connectivity Report in their comments on the proposed waters of the United States rule. The agencies should have taken a coordinated and reasoned approach to develop a Proposed Rule following the SAB's peer review of the report and EPA's release of a final Connectivity Report.

Even the SAB Panel members are baffled by the agencies' decision to proceed with a rule before review of the underlying science is complete. Dr. Mark Murphy of the SAB Panel explained:

I must say I am puzzled as to why EPA has decided to release the Proposed Rule before receipt of our review of the Connectivity Report . . . . The usual protocol in science is not to release a report before the review is complete, the purpose being to allow a frank and honest appraisal of the work before positions are 'hardened' . .

. . The sequence employed by EPA suggests to the public that there is no critical input needed by the SAB -- just a few minor additions. . . . In point of fact, the SAB Review suggested that some major additions be made to the Connectivity Report.197

Other members of the SAB Panel echoed this concern. Dr. Siobhan Fennessy, for example, noted,

I was surprised by the release date of the draft rule and to see that it does not reflect many of the suggestions made by the SAB panel to strengthen the EPA Connectivity Report. . . .[T]he timing of the release . . . possibly weakens the value of the SAB process, which is designed to strengthen the scientific basis upon which the draft rule is based.198

Agency Response: 9(a)

9.3 SUPPLEMENTAL COMMENTS ON SCIENTIFIC EVIDENCE SUPPORTING RULE

Board of Supervisors of Apache County (Doc. #10579)

9.210 Wetlands Classification Concern

The report divides wetlands into classes of "riparian," "flood plain," "geographically isolated,""bidirectional," and "unidirectional." However, none of these technical categories easily maps to the existing legal categories of "adjacent" and "non-adjacent" or "isolated" wetlands.

In *United States v. Riverside Bayview Homes, Inc.*, 474 U.S .12 1 (198S), the Supreme Court upheld part of the agencies' "adjacent wetlands" jurisdiction based on the "reasonableness" of the purported ecological connection between navigable waters and their adjacent wetlands. The Riverside Bayview's analysis was based on a scenario where wetlands physically abut water, i.e., one cannot distinguish the end of land from the beginning of water (Rapanos, plurality opinion, 547 U.S. at 74 1-42). The report appears to presume that wetlands within a river's floodplain could have such a degree of connectedness. But it does not follow, as the report also appears to suppose, that such flood plain wetlands necessarily have such connectedness, hence the failure of the report to map to existing legal categories.

Apache County, therefore, respectfully recommends that the report explain how its technical wetland vocabulary maps to existing legal terminology. (p. 7)

Agency Response: 9(d) and 9(l). See also the preamble to the final rule, the Legal Compendium (Topic 10), and the TSD.

9.211 Isolated Wetlands Concern

The report's depiction of "isolated" wetlands (1-2,3-39) seems to infer that the agencies seek to change the meaning of "isolated" wetlands. This inference is further supported by the report's apparent claim that few if any wetlands are truly "isolated" due to geographically isolated wetlands purportedly still affecting downstream waters through hydrologic, chemical, or biological connectivity (1-14).

Indeed, the report strongly implies that "isolated wetlands" do not exist:

"Even hydrologically isolated wetlands can influence downstream rivers by preventing water and other materials from entering the river network" (5-2);

"Even unidirectional wetlands that are considered to be geographically isolated (i.e. completely surrounded by uplands), can have surface water outflows that connect them to other water bodies" (5-22);

"Thus, the tern 'geographically isolated' should not be used to infer lack of hydrologic, chemical, or biological connectivity" (5-36).

Whether correct or not, this assertion has little if any relevance to new rule-making. Even the "isolated" waters in *Solid Waste Agency of Northern Cook County v. US. Army Corps of Engineer*s, 53 1 U.S. 159 (2001) (SWANCC), were not truly isolated, in that they had an ecological connection via migratory birds to other aquatic systems. Rather, by "isolated," *SWANCC* meant "not adjacent," that is, not physically abutting.

The existing law stands for the proposition that non-adjacent waters fall outside of the Clean Water Act jurisdiction, regardless of the on-the-ground degree of connection they may have to other waters. Hence, the report's discussion of isolation could lead to a pernicious misunderstanding of existing law.

This concern is validated by both the Chartered Science Advisory Board and the Science Advisory Board (SAB) Panel for the Review of the EPA Water Body Connectivity Report emphasizing that "First and foremost, the panel members agreed that any definition or determination of adjacency should be base on functional relationships, not distance" (Science Advisory Board Panel, p. 3).

Apache County, therefore, respectfully recommends that the report be revised to eliminate discussion of the relative rarity of "isolated" wetlands, and instead focus the connectivity discussion in terms of the relative degree of interconnectedness among the various classes of wetlands. (p. 7 – 8)

Agency Response: 9(d), 9(f), and 9(g)

9.212 Groundwater Concern

The report repeatedly notes the importance of groundwater interactions among wetlands, streams, and large waters (5-2,s-23 to 5-25,s-41) and seems to infer that the agencies seek to regulate groundwater as such, which would be a significant change from existing law.

This concern is validated by both the Chartered Science Advisory Board and the Science Advisory Board (SAB) Panel for the Review of the EPA Water Body Connectivity Report emphasizing that "the science indicates that regional groundwater sources can strongly affect connectivity" (Science Advisory Board Panel, p. 3).

However, *Village of Oconomowoc Lake v. Dayton Hudson Corp*., 24 F.3d 962,964-66 (7th Cir. 1994) held that the Clean Water Act does not regulate discharges to groundwater. Hence, the report's discussion of groundwater could lead to a pernicious misunderstanding of existing law.

Apache County, therefore, respectfully recommends that the report's discussion of groundwater be eliminated. (p. 8)

Agency Response: 9(j)

9.213 Cumulative Effects

The report repeatedly asserts that every wetland or stream considered singly or in the aggregate, substantially affects the physical, chemical, and biological integrity of downstream waters:

"Streams, individually or cumulatively, exert a strong influence on the character and functioning of downstream waters" (1-6);

"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" (1-14);

"Our review supports the need for a landscape perspective of connectivity in which the effects of small water bodies in a watershed are evaluated in aggregate" (6-3);

"Small streams [such as] first-order streams contribute approximately 60% of the total mean annual flow to all northeastern U.S. streams and rivers" (4-1);

"First-order streams conservatively make up half of the nation's total stream length" (4-2);

"When drainage area and stream length of headwater streams are combined ... they can represent most of the river catchment and network" (4-2).

It stands to common sense that every surface-water input to an aquatic system is significant in the aggregate. Justice Kennedy's Rapanos concurrence nevertheless strongly implies that, even with new rule-making, the Clean Water Act could only encompass regulation of certain classes of "major tributaries," or "specific tributaries;" not every tributary (547 U.S. at 780-81).

Justice Kennedy was aware as well that "isolation" is a matter of degree (782), yet nevertheless concluded that certain classes of wetlands and other features must be held to be legally "isolated" notwithstanding a minor connection: "Under the analysis described earlier ... mere hydrologic connection should not suffice in all cases; the connection may

be too insubstantial for the hydrologic linkage to establish the required nexus with navigable waters as traditionally understood" (784-85).

The report, however, seems to ignore this important built-in limitation of the Clean Water Act scope. The report states: "Although an individual low-order stream can have less connectivity than a high-order stream, a river network has many more low-order streams, which can represent a large portion of the watershed ... thus, the magnitude of the cumulative effect of these low-order streams can be significant" (3-41). This statement contradicts Justice Kennedy's point that the agencies' existing regulations are infirm precisely because they cover such low-order streams carrying only "low volumes of water." Although Justice Kennedy's concurrence does anticipate the aggregation of wetlands (Rapanos, 547 U.S. at 780) it does not for tributaries (780-81).

Apache County, therefore, respectfully recommends that the report's discussion of cumulative effects be limited to wetlands, and that the report's discussion of tributaries be refocused on identifying characteristics of "major tributaries" based on their volume of flow, proximity to navigable waters, or other relevant considerations. (p. 9)

Agency Response: 9(d), 9(f), 9(g), 9(h), 9(i), and 9(k).

N. Bowers (Doc. #11344)

9.214 Comments on report: Connectivity of Streams and Wetlands to Downstream Waters.

The scientific basis for including all tributaries was based a report examining the connectivity of streams and wetlands. The study is faulty in the following areas.

1. There is no common definition of tributary in the report, so there is no reason to believe that in the report, or in the referenced studies, that they used the definition of tributary that is included in the draft regulations.
2. The reports and studies incorrectly treated a tributary as a single unit rather than a linear system.
3. There was no study quoted that attempted to address where in the tributary water quality was predominantly based on overland flow into the channel, which would be an indicator of where physical, biological, and chemical processes in the channel would no longer have a significant nexus to water quality downstream.
4. There was no study that showed where along a tributary that items controlled by regulations pertaining to waters of the US have a significant nexus to downstream water quality.
5. The study should have included in the analysis the protections to water provided by other federal and state regulations such as oil and hazardous material spills, erosion and sediment control on construction projects, and adoption of best management practices for municipal storm water systems.

While it is partially correct that science has shown that all tributaries affect waters downstream, the study did not find where along the tributary there is a significant nexus to downstream water quality. At some point along an ephemeral tributary discharge is basically overland flow collected by the tributary, while regulation of work in the channel might have a minor impact on water quality the predominant factor is the unregulated overland flow. (p. 1)

Agency Response: **9(f), 9(g), 9(h), 9(i), 9(l), and 9(n). In the Science Report, Chapter 2 provides a characterization of river networks, which include many types of tributaries, from low-order headwater streams to mainstem rivers. The report references many studies that describe functions of different types of tributary streams that occur in different parts of the watershed and along different parts of the linear length of a river system. The purpose of the Science Report was to summarize current scientific understanding about the connectivity and mechanisms by which streams and wetlands, singly or in aggregate, affect the physical, chemical, and biological integrity of downstream waters (p. 1-1). Because the report is a technical review of peer-reviewed scientific literature, it does not consider or set forth legal standards for CWA jurisdiction. Rather, the report evaluates, summarizes, and synthesizes the available peer-reviewed scientific literature to address questions that were developed in collaboration with EPA's Office of Water to translate regulatory questions and terminology into more scientifically relevant questions and terms. The Science Report describes five key functions (source, sink, refuge, lag, and transformation) by which tributaries are connected to and affect the integrity of downstream waters. The presence of bed and bank features is evidence of surface connectivity through recurrent flow and at minimum also reflects there is transport of materials (i.e., water, sediment, dissolved constituents) to downstream waters whether the water enters the channel from overland flow, ground water exchange, or any combination. The Science Report also summarizes scientific literature that documents the downstream transport, storage, and transformation of materials (e.g., water, organic matter, contaminants, and pathogens) from ephemeral streams.**

J. Courtwright (Doc. #11652)

9.215 I found the EPA's "Connectivity of Streams and Wetlands to Downstream Waters: A Review and Synthesis of the Scientific Evidence" to be a very a thorough review of the scientific evidence in support of the proposed clarifications. Specifically, this document clearly shows that headwater perennial, intermittent, and ephemeral streams, and floodplain wetlands have a "significant nexus" with navigable waters, and that Clean Water Act protection needs to be provided for these systems to restore and maintain the chemical, physical, and biological integrity of the nation's waters. (p. 1)

Agency Response: **The agencies appreciate the comment.**

M. Seelinger (Doc. #12879)

9.216 The proposed rule does by way of reference to the EPA Science Advisory Board (SAB) Connectivity Report delve into the concept of "nexus." The SAB report ostensibly argues that all bodies of water are connected to all other bodies of water. At a very fundamental level this is true. However, the SAB report does not address the concept of which of these connections or nexus are "significant" as described by Justice Kennedy. If it is assume that all waters are connected and that there is no procedure to distinguish these connections as significant, then are we to assume that all connected water bodies are considered ""Waters of the US?" (p. 2)

Agency Response: **9(f), 9(g), 9(h), and 9(i).**

Freeport-McMoRan Inc. (Doc. #14135.1)

9.217 The San Pedro River is Not Necessarily Characteristic of Arid Systems: In the EPA's Draft Connectivity Report[254], the scientists and agencies drafting the report relied largely on the San Pedro River in Arizona for their assertions of how arid streams function. Or as the Draft Report states, "The heavily studied Upper San Pedro Basin in southeastern Arizona is discussed in detail as it provides a well understood example of the hydrologic behavior and connectivity of rivers common to the southwestern United States where ephemeral and intermittent tributaries comprise the majority of the basin's stream reaches." However, as we show below, the San Pedro does not necessarily behave hydrologically like an immediately adjacent watershed—the Santa Cruz. In fact, they behave quite differently. It is unclear how representative the San Pedro River is of the broader arid Southwest when it is so dissimilar to the nearby Santa Cruz River and many of the rivers in the region. (p. 2)

Agency Response: 9(i)

Erika Brotzman (Doc. #15010)

9.218 C. A comprehensive body of scientific literature supports the "significant nexus" as the test to apply to the hydrologic cycle among "navigable" and non-navigable waters.

The Corps' "ecological judgment about the relationship between waters and their adjacent wetlands" deserves certain deference and latitude in determining jurisdiction under the CWA.[255] The science including, the Connectivity Report reviewed by SAB, along with the proposed rule's definition of "tributaries" satisfies Kennedy's "significant nexus" test.[256] 9 A hydrologic cycle is comprised of connected ecosystems; the hydrologic cycle biologically and chemically influences water in downstream rivers, lakes, and estuaries; and physically affects water flow, sedimentation and erosion.[257] Using science and understanding of the hydrologic cycle, non-navigable "tributaries" have a "significant nexus" if they significantly affect the physical, chemical, and biological integrity "navigable" waters. In addition, small, intermittent, and ephemeral tributaries, tributary lakes, ponds, and wetlands, and man-made or man-altered tributaries can affect the physical, chemical, and biological integrity "navigable" waters.

[254] Connectivity of Streams and Wetlands to Downstream Waters: A Review and Synthesis of the Scientific Evidence.
Draft as of September, 2013. Office of Research and Development, USEPA, Washington, DC.
[255] *Riverside*, at 134.
[256] The proposed rule defines "tributaries" as: a water physically characterized by the presence of a bed and banks and ordinary high water mark, as defined at 33 CFR 328.3(e), which contributes flow, either directly or through another water, to a water identified in paragraphs (a)(1) through (4). In addition, wetlands, lakes, and ponds are tributaries (even if they lack a bed and banks or ordinary high water mark) if they contribute flow, either directly or through another water to a water identified in paragraphs (a)(1) through (3). A water that otherwise qualifies as a tributary under this definition does not lose its status as a tributary if, for any length, there are one or more man-made breaks (such as bridges, culverts, pipes, or dams), or one or more natural breaks (such as wetlands at the head of or along the run of a stream, debris piles, boulder fields, or a stream that flows underground) so long as a bed and banks and an ordinary high water mark can be identified upstream of the break. A tributary, including wetlands, can be a natural, man-altered, or man-made water and includes waters such as rivers, streams, lakes, ponds, impoundments, canals, and ditches not excluded in paragraph (b)(3) or (4).
[257] ENVIRONMENTAL LAW INSTITUTE, at 34-35.

Accordingly, discharging pollutants into tributaries can cause irreversible adverse impacts on the hydrologic balance, surrounding ecosystems, and "navigable" waterways. Due to the integrated system of a hydrologic community, the "significant nexus" test is an appropriate measure of the "evil" of pollution the CWA aims to remedy. (p. 7 – 8)

Agency Response: **The agencies appreciate the comment.**

Pennsy Supply, Inc. (Doc. #15255)

9.219 The proposed rulemaking relies on a Connectivity Report that is not final. Even EPA's own Science Advisory Board reviewing the Report, has made statements regarding EPA's lack of transparency and true intent of proposing a rule before the Report is final. (p. 2)

Agency Response: **9(a)**

Dow Chemical Company (Doc. #15408)

9.220 (…)even if the scientific studies cited by the agencies to support their rule could form a basis for expanded federal jurisdiction, the studies cited and the proposed rule do not align and the draft report cannot support the factual determinations made by the agencies to justify the rule. (p. 4)

Agency Response: **9(f), 9(g), 9(h), and 9(i).**

Clean Wisconsin (Doc. #15453)

9.221 We commend the agencies for using the "Connectivity of Streams and Wetlands to Downstream Waters: A Review and Synthesis of the Scientific Evidence" report and the input of the Science Advisory Board to base this rulemeking on current, peer-reviewed scientific data. [...]

However, the absence of current scientific evidence of connectivity of a given water body should not preclude consideration of CWA protection. A lack of current evidence of the connectivity of a water body, such as a unidirectional wetland, does not mean that the water body has no effect on adjacent waters. Therefore, the final rule should allow for case-by-case determination of water bodies with potential impact on water quality, rather than categorically excluding them from protection based on a lack of current data. (p. 1-2)

Agency Response: **The agencies appreciate the comment. Also, see 9(g), 9(h), 9(i).**

GBMC & Associates (Doc. #15770)

9.222 The rule should clarify that ordinary high water marks alone do not qualify a stream to be defined as a water of the United States. Regulation of the upper reaches of many of these ephemeral streams that primarily have the function of transporting storm water runoff (including constituents contained in the runoff) is beyond the scope of the original intent of the definition of waters of the United States. We request that in the USACE response to these comments that they clarify what qualifies as OHW features and bed and banks. Please include photos of small first order tributaries that qualify and some that do not. (p. 3)

Agency Response: **OHWM manuals exist for the Arid Southwest and Western Mountains Regions – these manuals provide additional information on how to determine OHWM and also include numerous photos of OHWM features. The USACE Regulatory Guidance Letter No. 05-05 lists OHW indicators and the USACE Jurisdictional Determination Form Instructional Guidebook has pictures of OHWM from different regions throughout the US. See the Tributary Compendium (Topic 8) for additional information. [[pzf]]**

Anonymous (Doc. #16094)

9.223 Whereas compensatory mitigation does not protect the environmental health of Appalachian streams and rivers for future generations, Appendix A of the proposed rule identifies and discusses the importance of perennial, intermittent, and ephemeral streams on the character and functioning of downstream waters:

All tributary streams, including perennial, intermittent, and ephemeral streams, are chemically, physically, or biologically connected to downstream rivers Headwater streams (headwaters) are the most abundant stream type in most river networks, and supply most of the water in rivers... Streams are biologically connected to downstream waters by dispersal and migration of aquatic and semi-aquatic organisms that use both up- and downstream habitats during one or more stages of their life cycles, or provide food resources to downstream communities. Chemical, physical, and biological connections between streams and downstream waters interact via processes such as nutrient spiraling, in which stream communities assimilate and chemically transform large quantities of nitrogen and other nutrients that would otherwise increase nutrient loading downstream.

Headwater streams are the source of approximately 60% of the total mean annual flow to all northeastern U.S. streams and rivers. Contributions to baseflow are important for maintaining conditions that support aquatic life in downstream waters. Headwater streams shape river channels by accumulating and gradually or episodically releasing stored materials such as sediment and large woody debris. These materials provide substrate, habitat for aquatic organisms, and slow the flow of water through channels.

Connectivity between streams and rivers provides opportunities for materials, including nutrients and chemical contaminants, to be sequentially altered as they are transported downstream.

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.

The importance of the physical and biological functions of Appalachian headwater streams cannot be overstated. I believe that both the proposed rule and the Connectivity of Streams and Wetlands to Downstream Waters EPA report clearly establish that these other waters if that is how Appalachian headwater streams are to be defined should continue to be considered jurisdictional waters of the United States. However, clarification of the scope of waters of the United States protected under the CWA is essential, and its scope should include headwater streams. The evidence for this conclusion is consistent with the current science and the CWA. (p. 1 – 2)

Agency Response: **The agencies appreciate the comment. Also, see 9(i).**

Texas Association of Builders (Doc. #16516)

9.224 Finally, the proposal asserts jurisdiction based on inadequate science. The Agencies purport that the rule is supported by a scientific literature review discussing the connectivity and effects of streams and wetlands on downstream waters (hereinafter, "Connectivity Report"') The Connectivity Report falls short of providing the kind of scientific analysis necessary to establish a solid foundation for a proposed rule on CWA jurisdiction. Indeed, the Report merely documents the presence of connections between waterbodies, yet fails to provide the basis needed to determine when such connections may or may not significantly affect downstream waters. (p. 2 – 3)

Agency Response: **Agencies' Response: 9(f), 9(g), 9(h), and 9(i).**

Arizona Rock Products Association (Doc. #17055)

9.225 (…) The proposed rule is based on an incomplete technical analysis that has not been subject to appropriate peer review or public comment. An accurate scientific analysis will show that the practices of the construction materials industry protect downstream waters and such practices should be exempt from the Clean Water Act. The proposed rule not only ignores this fact, but will make it more difficult to construct and maintain beneficial controls. (p. 2)

Agency Response: **9(a), 9(f), and 9(i).**

J. Dillard (Doc. #18907)

9.226 You state:

> The agencies propose a rule that is clear and understandable and that protects the nation's waters, consistent with the law and currently available scientific and technical expertise.
>
> Comments:
>
> Science must be specific to the region and the Waters of the United States. Data from areas without the hydrology of the region, is science mis-used. California has a database called Cal-Adapt that starts the process is site-specificity. (p. 3)

Agency Response: **9(i)**

ATTACHMENTS AND REFERENCES

Comments included above in this document discuss the Proposed Rule, and some include citations to various attachments and references, which are listed below. The agencies do not respond to the attachments or references themselves, rather the agencies have responded to the substantive comments themselves above, as well as in other locations in the administrative record for this rule (e.g., the preamble to the final rule, the TSD, the Legal Compendium). In doing so, the agencies have responded to the commenters' reference or citation to the report or document listed below as it was used to support the commenters' comment. Relevant comment attachments include the following:

Batzer, D. Letter of Review of "Evidence of Significant Impacts of Coastal Plain Depressional Wetlands on Navigable Waters." (Doc. #10578.3)

Cochise County, Arizona. Comments on the Connectivity of Streams and Wetlands to Downstream Waters: A review and synthesis of the scientific evidence. November 6, 2013. (Doc. #14541, p. 4-13)

Comment on the EPA Proposed Rule "Definition of Waters of the United States Under the Clean Water Act" and "Draft EPA Report Connectivity of Streams and Wetlands to Downstream Waters: A Review and Synthesis of the Scientific Evidence" - SWCA Project No. 28680 (Doc. #15362, p. 4)

Comments on US EPA (2013) Draft Report "Connectivity of Streams and Wetlands to Downstream Waters: A Review and Synthesis of Scientific Evidence" (Doc. #13951.1)

Compton Creek and Dominguez Channel and prime examples of such waterbodies. See Attachment A. (Doc. #15060, p. 7)

Exhibit 7, Rodewald Memo at 6; SAB Panel Member Comments on Proposed Rule at 6 (Comments of Dr. Genevieve Ali) ("The draft rule does include a definition for 'significant nexus'; however I find it rather vague and subject to interpretation."). (Doc. #17921.14)

GEI Consultants, "Scientific Comments on U.S. EPA's Definition of 'Waters of the United States' Under the Clean Water Act; Proposed Rule," at 2 (Sept. 26, 2014) ("GEI Report") (attached hereto as Exhibit 6). (Doc. #17921.14)

Hammond, D., K. Robbins, and D. Durbin. Technical Comments Regarding: Connectivity of Streams and Wetlands to Downstream Waters: A Review and Synthesis of the Scientific Evidence. Submitted to Mosaic Fertilizer, LLC. November 5, 2013. (Doc. #14640, p. 64-70)

Letter from WAC, FWQC, and UWAG, to Amanda Rodewald, Ph.D., Chair, SAB Panel for the Review of the EPA Water Body Connectivity Report (Dec. 11, 2013), EPA-HQOA-2013-0582-1640 (Doc. #15016.1, p. 194)

Robert J. Pierce, Wetland Science Applications, Inc., Excerpt from Transmission Losses Study (2008). (Doc. 4958.2, p. 14)

SAB Panel Member Comments on Proposed Rule, Exhibit 7 at 47 (comments of Dr. Michael Josselyn). (Doc. #17921.14)

SAB, Panel for the Review of the EPA Water Body Connectivity Report, SAB Review of the Draft EPA Report Connectivity of Streams and Wetlands to Downstream Waters: A Review and Synthesis of the Scientific Evidence, EPA-SAB-15-001 (Oct.17, 2014), http://yosemite.epa.gov/sab/sabproduct.nsf/WebBoard/AF1A28537854F8AB85257D74005003D2/$File/EPA-SAB-15001+unsigned.pdf ("SAB Panel Review of Connectivity Report") (attached hereto as Exhibit 5). (Doc. #17921.14)

UWAG, Comments on EPA's Draft Report Connectivity of Streams and Wetlands to Downstream Waters: A Review and Synthesis of the Scientific Evidence (Nov. 6, 2013), EPA-HQ-OA-2013-0582-0265 (Doc. #15016.1, p. 159)

Woolford, S., S. Bonney, and R. Pringle. *Physical, Chemical, and Biological Impacts of Geographically Isolated Wetlands on Waters of the United States.* Natural Resources Defense Council. October 2014. (Doc. #10578.1)

Woolford, S. and M. Carroll. *Evidence of Significant Impacts of Coastal Plain Depressional Wetlands on Navigable Waters.* Southern Environmental Law Center. July 2014. (Doc. #10578.2)

Zedler, P. Comments on "Physical, Chemical, and Biological Impacts of Geographically Isolated Wetlands on Waters of the United States"and "Evidence of Significant Impacts of Coastal Plain Depressional Wetlands on Navigable Waters." (Doc. #10578.4)

In addition, commenters submitted the following relevant references. These are copied into this document as they were submitted by commenters. HW has not verified the references, or the validity of hyperlinks.

A. L A. Schechter Poultry Corp. v. United States, 295 U.S. 495, 554 (Cardozo. J., concurring). (Doc. #16564, p. 7)

Alexander V. Zale et al., U.S. Fish & Wildlife Serv., The Physicochemistry, Flora, and Fauna of Intermittent Prairie Streams: A Review of the Literature, Biological Report 89(5) (Mar. 1989). (Doc. #15016, p. 126)

Amena H. Saiyid, Bloomberg BNA Daily Environmental Report. "Corps, Not Permit Applicants, Should Bear Burden of Proving Jurisdiction, Official Says" (Aug. 7, 2014). (Doc. #19540, p. 94)

Attachment to September 2, 2014, Memorandum from Dr. Amanda D. Rodewald, to Dr. David Allen, "Comments to the chartered SAB on the adequacy of the Scientific and Technical Basis of the Proposed Rule Titled "Definition of 'Waters of the United States' Under the Clean Water Act," at 93 (hereinafter SAB Rule Review). (Doc. #15822.1, p. 44)

Bridget DiCosmo, EPA Appears To Reject SAB Calls To Clarify Controversial Waters Proposal, INSIDEEPA (Aug. 25, 2014), http://insideepa.com/inside-epa/epa-appears-reject-sabcalls-clarify-controversial-waters-proposal. (Doc. #15016, p. 134)

Comments of Federal Water Quality Coalition on the Proposed Rule Defining "Waters of the United States", Section III (October 20, 2014) (Doc. #13029, p. 69)

Comments submitted to EPA on 4/11/14 on behalf of the Howard Hughes Corporation et al., EPA ID: EPA-HQOA-2013-0582-1713. (Doc. #13954, p. 8)

Cover letter to US EPA Administrator Gina McCarthy accompanying SAB review, October 17, 2014. (Doc. #15224, p. 2)

Cowardin et al. (1979) (Doc. #19569, p. 7)

Differentiating Migration and Dispersal Processes for Pond-breeding Amphibians by R.D. Semlitsch (Doc. #7499.2)

Dispersal and the metapopulation paradigm in amphibian ecology and conservation: are all amphibian populations metapopulations? by M.A. Smith and D.M. Green – see especially Tables 2-5 (Doc. #7499.3)

D. Dudley Williams, Environmental Constraints in Temporary Fresh Waters and Their Consequences for the Insect Fauna, 15 J. N. AM. BENTHOLOGICAL SOC'Y 634 (1996). (Doc. #15016, p. 124)

Enwright, et al (2011): Using Geographic information Systems (GIS) to Inventory Coastal Prairie Wetlands Along the Upper Gulf Coast, Texas (Doc. #8537, p. 8)

EPA Administrator Gina McCarthy, Clean Water Drives Economic Growth, Huffington Post, The Blog (Aug 29, 2014), http://www.huffingtonpost.com/gina-mccarthy/clean-water-act_b_5900734.html. (Doc. #15372, p. 11)

Evidence Of Significant Impacts Of Coastal Plain Depressional Wetlands On Navigable Waters, Sam Woolford and Matt Carroll, River Basin Center, Odum School of Ecology, University of Georgia, July 2014 (Doc. #14620, p. 5)

Freeman, M.C., C.M. Pringle, C.R. Jackson. 2007. Hydrologic connectivity and the contribution of stream headwaters to ecological integrity at regional scales. Journal of the American Water Resources Association 43(1):5-14. (Doc. #19540, p. 142)

Forbes et all, 2012: Nutrient Transformation and Retention by Coastal Prairie Wetlands, Upper Gulf Coast Texas (Doc. #8537, p. 6)

Hawai'i Wildlife Fund v. Cnty. of Maui, __ F.Supp.2d __ , 2014 WL 2451565 at *13 (D. Ha. 2014). (Doc. #16645, p. 6)

Heine, R. A., C. L. Land and R. R. Sengupta. 2004. Development and Comparison of Approaches for Automated Mapping of Stream Channel Networks. Annuals of the Association of American Geographers 94(3): 477-490. (Doc. #14916, p. 9)

Jacob and Lopez 2005 (Doc. #8537, p. 7)

Leibowitz, S.G. 2003. Isolated Wetlands and Their Functions: An Ecological Perspective. Wetlands 23:517-531. (Doc. #17921.14, p. 177)

Letter from Ashley Lyon McDonald (National Cattlemen's Beef Association) and Dustin Van Liew (Public Lands Council) to Ken Kopocis and Jo-Ellen Darcy re: Proposed "Waters of the US' Rulemaking at 3 (Oct. 28,2014) (Docket ID No. EPA·HQ-OW-201 I-o880) (noting that EPA' s decision to not make final "Connectivity Report" available for public comment " is inappropriate and prevents the public from being able to provide meaningful comments on the Proposed Rule"); and Letter from Board of Douglas County Commissioners to Hon. Gina McCarthy and Hon. Jo-Ellen Darcy re: Proposed "Waters of the U.S." Rulemaking at 3 (Oct. 14,2014) (Docket 10 No. EPA-HQ-QW-201 1-{)880) ("There are significant issues with the current draft Connectivity Report that requires the Agencies' attention before continuing with the rulemaking process."). (Doc. #16564, p. 6)

Letter from the Honorable Lamar Smith, Chairman, U.S. House of Representatives Committee on Science, Space, and Technology, to the Honorable Gina McCarthy, Administrator, U.S. EPA (Aug. 27, 2014), http://science.house.gov/sites/republicans.science.house.gov/files/documents/08-27-2014%20Science%20Committee%20Chairrnan% 20Smith%20to% 20Administrator"/o20McCarthy_O.pdf (Doc. #7981, p. 7)

Letter from Laura Vaught (EPA Associate Administrator) to Rep. Chris Stewart (Chairman, Subcommittee on Environment) (Dec. 16, 2013). (Doc. #19540, p. 148)

Letter from Rep. Lamar Smith (Chairman, House Committee on Science, Space, and Technology) and Rep. Chris Stewart (Chairman, Subcommittee on Environment) to Dr. Amanda Rodewald (Chair, SAB Panel for Review of the EPA Water Body Connectivity Report) and Dr. David Allen (Chair, EPA SAB) (Nov. 6, 2013). (Doc. #19540, p. 148)

Levick, L., J. Fonseca, D. Goodrich, M. Herandez, 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. U.S. Environmental Protection Agency and USDA/ARS Southwest Watershed Research Center, EPA/600/R-08/134, ARS/244046, 116 pp. (Doc. #14916, p. 8)

Memo form Dr. Amanda Rodewald Chair of the SAB Panel to Dr. David Allen Chair of EPA Science Advisory Board " comments to the chartered SAB on the Adequacy of the Scientific and Technical Basis of the Proposed Rule titled " Definition of Waters of the United States Under the Clean Water Act, at 6 (Sept. 2, 2014) available at http://yosemite.epa.gov/sab/sabproduct.nsf/F6E197AC88A38CCD85257D49004D9EDC/$File/Rodewald_Memorandum_WOUS+Rule_9_2_14.pdf (Doc. #14412, p. 17)

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