Connectivity of Streams and Wetlands to Downstream Waters and Using Science to Inform Case by Case Jurisdictional Determinations

The Clean Water Act (CWA)

- The CWA covers “navigable waters,” defined in the statute as “waters of the United States, including the territorial seas”
- The statute does not further define “Waters of the U.S.,” but leaves it to Corps and EPA to add detail through rulemaking
What’s the longstanding prior definition of Waters of the U.S.?

- Waters used in interstate or foreign commerce (past, present and future) (e.g. traditional navigable waters)
- Interstate waters, including interstate wetlands
- Intrastate waters, where their use, degradation, or destruction could affect interstate commerce
- Impoundments of waters of the U.S.
- Tributaries of above waters
- Territorial seas
- Wetlands adjacent to above waters

How did the Supreme Court affect implementation of these regulations?

Protection for many of the nation’s streams and wetlands has been confusing, complex, and time-consuming as the result of Supreme Court decisions in SWANCC (2001) and Rapanos (2006).
Development of the Clean Water Rule

• On April 21, 2014, EPA and the U.S. Dept. of Army (Army) published a proposed rule defining “waters of the U.S.” for public comment.

• On June 29, 2015, EPA and the Army published the final **Clean Water Rule** to define “waters of the U.S.” (80 FR 37054)

  “to respond to requests from stakeholders across the country to make the process of identifying waters protected under the CWA easier to understand, more predictable, and more consistent with the law and peer-reviewed science.” (Gina McCarthy, 2015)

• On August 28, 2015, the Clean Water Rule became effective (litigation will be discussed later).

Clean Water Rule Definition of Waters of the United States

• Traditional Navigable Waters
• Interstate Waters
• Territorial Seas
• Impoundments
• Tributaries
• Adjacent Waters
• Case-Specific Significant Nexus Waters (including similarly situated regional waters)
Clean Water Rule Litigation

• On October 9, 2015, the U.S. Court of Appeals for the Sixth Circuit stayed the Clean Water Rule nationwide pending further action of the court.

• In response to this decision, EPA and the Department of Army resumed nationwide use of the agencies’ prior regulations defining the term “waters of the United States,” applying relevant case law, applicable policy, and the best science and technical data on a case-by-case basis in determining which waters are protected by the Clean Water Act.

Scientific support for the rule

*Connectivity of Streams and Wetlands to Downstream Waters: A Review and Synthesis of the Scientific Evidence*

- Synthesizes current scientific understanding of the connectivity and downstream effects of streams, wetlands, open waters
- Peer-reviewed synthesis of peer-reviewed literature
- Written for general audiences

January, 2015
Scientific support for the rule

*Connectivity of Streams and Wetlands to Downstream Waters: A Review and Synthesis of the Scientific Evidence*

1,355 publications from publicly available sources of peer-reviewed literature

> 1,150 articles from refereed journals
> 50 federal reports
> 120 scientific books, sections, or chapters

Topics Covered in the Report

- A conceptual framework for understanding watershed connectivity: A systems perspective
- **Scientific evidence** pertaining to connectivity or isolation of:
  - Non-tidal streams
  - Wetlands and certain open waters in riparian zones and floodplains
  - Wetlands outside riparian zones and floodplains, including “geographically isolated” (sensu Tiner 2003) wetlands
- **Mechanisms** by which these types of waters can alter the condition or function of downstream ecosystems
- **Landscape and climate factors** that influence connectivity
- This report is **not a policy document** and does not outline or consider policy options
Translating connectivity-related questions between policy and science

<table>
<thead>
<tr>
<th>Policy question</th>
<th>Science question</th>
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<tbody>
<tr>
<td>What <strong>tributaries</strong> have a “significant* nexus” to “traditional navigable waters”?</td>
<td>What are the connections to and effects of ephemeral, intermittent, and perennial streams on downstream waters?</td>
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<td>What “<strong>adjacent</strong>” waters have a “significant* nexus” to “traditional navigable waters”?</td>
<td>What are the connections to and effects of riparian or floodplain wetlands and open waters on downstream waters?</td>
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<tr>
<td>What categories of <strong>“other waters”</strong> have a “significant* nexus” to “traditional navigable waters”?</td>
<td>What are the connections to and effects of wetlands and open waters in non-floodplain settings on downstream waters?</td>
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* “Significant” here is a policy determination informed by science

At what scale should downstream effects be aggregated to make policy determinations about their “significance”?

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Report organization

- **Chapter 1**: purpose, scientific context, and approach
- **Chapter 2**: components of a river system and watershed; the types of connections that link those components; the factors that influence connectivity; and methods for quantifying connectivity.
- **Chapter 3**: reviews literature on connectivity in stream networks and their effects on downstream waters.
- **Chapter 4**: reviews literature on the connectivity and effects of non-tidal wetlands and certain open waters on downstream waters.
- **Chapter 5**: presents case studies from published literature for Carolina and Delmarva bays, oxbow lakes, prairie potholes, prairie streams, southwestern streams, and vernal pools
- **Chapter 6**: summarizes key findings and conclusions, identifies data gaps, and research approaches that could fill those gaps.
Connectivity and functions

- Connectivity is the degree to which components of a watershed are joined and interact across multiple spatial and temporal scales.

- Five categories of functions:
  
  **Source**: the net export of materials (e.g., water and food resources);

  **Sink**: the net removal or storage of materials (e.g., sediment and contaminants);

  **Refuge**: the protection of materials (e.g., organisms);

  **Transformation**: the transformation of materials into different physical or chemical forms (e.g., nutrients and chemical contaminants);

  **Lag**: the delayed or regulated release of materials (e.g., stormwater).
Major Conclusions

1. The scientific literature unequivocally demonstrates that streams, individually or cumulatively, exert a strong influence on the integrity of downstream waters.

   **All tributaries, regardless of size or flow duration, are** physically, chemically, and biologically connected to downstream waters and strongly influence their function.

   ![Headwater of the Allegheny River](http://commons.wikimedia.org/wiki/File:Headwater_Stream_(1).jpg)

Major Conclusions (cont.)

2. Wetlands and open waters in **riparian areas and floodplains are** physically, chemically, and biologically integrated with rivers via functions that improve downstream water quality.

   These systems buffer downstream waters from pollution and are essential components of river food webs.

   ![Photo by Elizabeth Eureth](http://commons.wikimedia.org/wiki/File:Headwater_Stream_(1).jpg)
Major Conclusions (cont.)

3. Wetlands and open waters located outside of riparian areas and floodplains, even when lacking surface water connections, provide numerous functions that could affect the integrity of downstream waters.

Some benefits of these wetlands are due to their relative isolation rather than their connections.

Major Conclusions (cont.)

4. Variations in the degree of connectivity are determined by the physical, chemical and biological environment, and by human activities.

These variations support a range of stream and wetland functions that affect the integrity and sustainability of downstream waters.

Photo credits: US EPA
5. The incremental **effects of individual streams and wetlands are cumulative** across watersheds (and through time) and must be evaluated in context with other water bodies in that watershed (and with other contributions from that stream or wetland).


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Using the Science Report to inform jurisdictional determinations during the stay

- Regarding certain adjacent wetlands and non-navigable, non-relatively permanent tributaries, the 2008 *Rapanos* Guidance says the agencies will assert jurisdiction when such tributaries and wetlands have a significant nexus to a traditional navigable water.

- The analysis will assess flow characteristics and functions of the tributary itself and the functions performed by any wetlands adjacent to the tributary...

- Maps, aerial photography, soil surveys, watershed studies, local development plans, literature citations, and references from studies pertinent to the parameters being reviewed are examples of information that should assist staff in completing accurate jurisdictional determinations.
Using the Science Report to inform jurisdictional determinations during the stay

- Use the five types of functions in the Science Report (source, sink, transformation, refuge, lag) to inform significant nexus evaluations.
- Include literature citations that support the relevance of those functions in the system under review.
- Use the scientific literature to support conclusion that effects are/are not more than speculative or insubstantial.

Role of **connectivity** in maintaining the **integrity** of the nations’ waters

Questions?