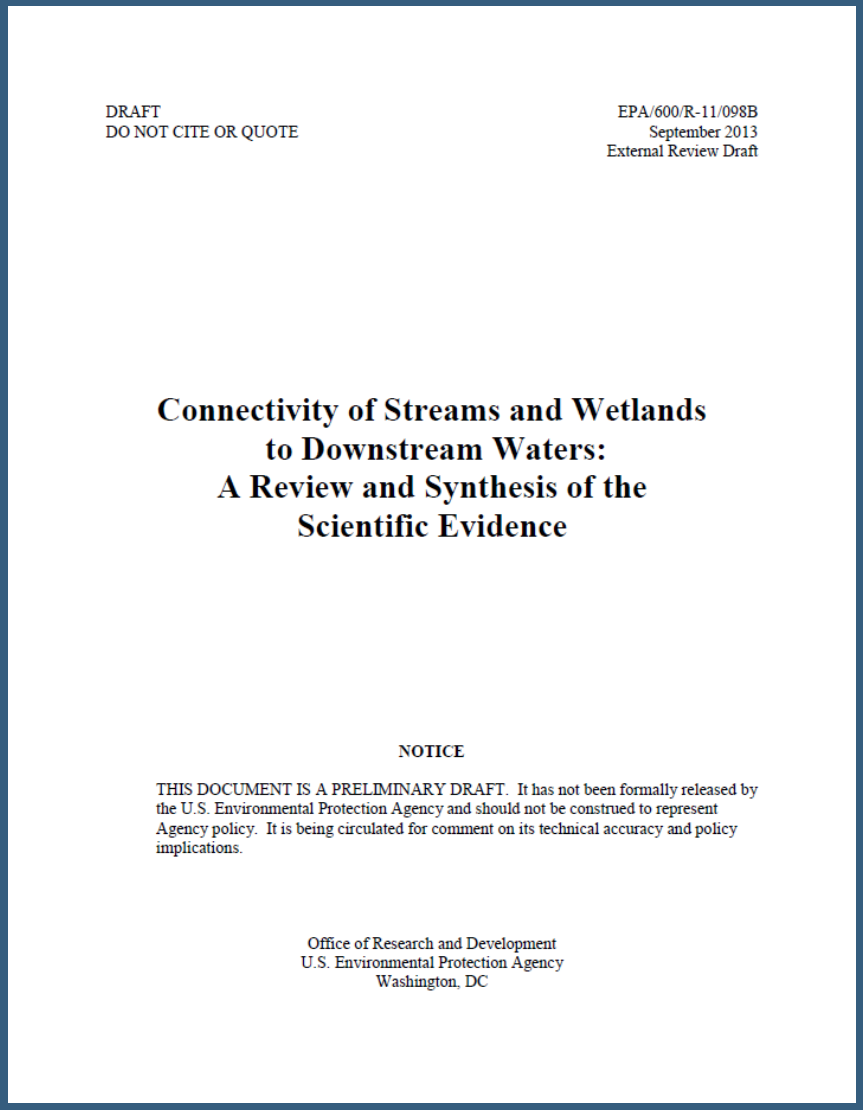

DRAFT
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EPA/600/R-11/098B
September 2013
External Review Draft

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

NOTICE

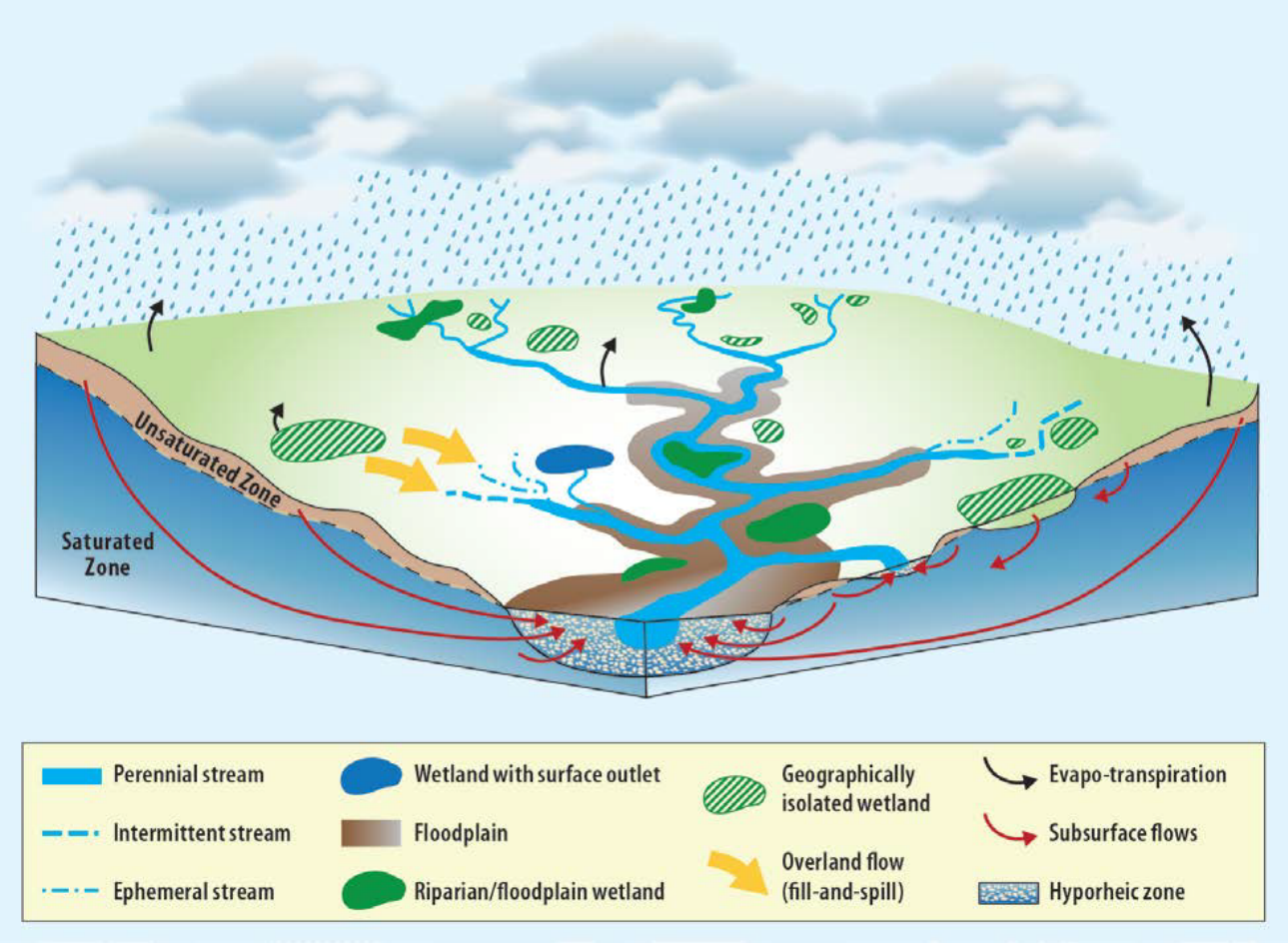
THIS DOCUMENT IS A PRELIMINARY DRAFT. It has not been formally released by the U.S. Environmental Protection Agency and should not be construed to represent Agency policy. It is being circulated for comment on its technical accuracy and policy implications.

Office of Research and Development
U.S. Environmental Protection Agency
Washington, DC

EPA CONNECTIVITY REPORT - STATUS AND DISCUSSION OF COMMENTS

June 18, 2014

Background


Unsaturated Zone
Saturated Zone
Perennial stream
Intermittent stream
Ephemeral stream
Wetland with surface outlet
Floodplain
Riparian/floodplain wetland
Geographically isolated wetland
Overland flow (fill-and-spill)
Evapo-transpiration
Subsurface flows
Hyporheic zone

Public Comments

- Report fails to provide concise measurable metrics or parameters that could be used by EPA to determine when a connection between waters is sufficient enough to establish a significant nexus
- Report fails to meaningfully address industrialized and man-made features

Background

Science Advisory Board

- 3 Day public meeting
  - December 16 -18
- 3 Public teleconferences
  - April 28, May 2, June 19
- Initial draft report & 2 updates sent to EPA
  - March 25, April 23 & June 5

SAB's task

- Comment on clarity and technical accuracy of report
- Determine if it includes the most relevant peer-reviewed literature
- Whether the literature was correctly summarized
- Establish whether the Reports findings and conclusions are supported by available science

Favorable SAB Recommendations

Address connectivity as a gradient

- Report views connection as being present or absent
- Binary perspective suggests any connection significantly affects the biological, physical or chemical integrity of downstream waters
- Using a gradient approach, the Report should "…recognize the variation in strength, duration and magnitude, and consequences of those connections."
- Terminal salt lakes and playas cited as example wetlands that have weak hydrologic connections

Favorable SAB Recommendations

Quantify connectivity

- Report conclusions that streams are physically, chemically, and biologically connected should be quantified whenever possible
- The magnitude, frequency, and durations of the connections should be specified to the degree possible from the literature
- EPA should identify future research, technological, and methodological needs that will improve the ability to understand and estimate connectivity

Favorable SAB Recommendations

Address functions of connectivity

- The conceptual framework used and the connections that link surface waters is adequate, but it should be expanded to include a broader discussion of water and wetland functions
- Report should explain that some functions are enhanced by connectivity, but others by relative isolation

Favorable SAB Recommendations

Demonstrate EPA did not review only favorable literature

- EPA should demonstrate that they did not ignore studies that failed to show connectivity
- Absence of references to reports that fail to show connectivity suggests bias towards certain studies
- Quantify literature supporting connectivity vs. literature that does not

Favorable SAB Recommendations

Eliminate unidirectional and bidirectional wetland classifications

- Bidirectional wetlands should be waters and wetlands in riparian/floodplain areas
- Unidirectional and geographically isolated waters and wetlands should be replaced with non-floodplain waters and wetlands
- Inconsistent with the four dimensional (longitudinal, lateral, vertical and temporal) nature of connectivity
- Agencies' report needs to be consistent with proposed rule

Favorable SAB Recommendations

Adjust terminology to account for Fact that not all floodplain and riparian areas are wetlands

- Broad discussion of floodplain systems is warranted, including an explanation of floodplain areas that can and cannot be classified as wetlands
- Terms “riparian” and “floodplain” problematic, as these terms extend beyond water bodies

Favorable SAB Recommendations

Account for range of geographic regions

- Alaska?
- Hawaii?
- Expand regional list of case studies

Favorable SAB Recommendations

Address flood frequency

- Incorporate flood frequency-floodplain inundation science into Report

Favorable SAB Recommendations

Address man-made features

- Human alteration of the hydraulic landscape
- Agricultural tiles, dams, pumping groundwater, irrigation, channelization, storm drains
- Address features that increase connectivity (ditches) or decrease connectivity (levees)
- Include references to literature on the effects of human-modified headwater streams and the consequences to downstream ecosystems

Unfavorable SAB Recommendations

Address aggregative effects of streams and wetlands on downstream waters

- Explicitly address the cumulative effects of upland streams and wetlands to downstream waters
- Particularly the spatial and temporal scales at which streams and wetlands are functionally aggregated
- Aggregation is an important concept, especially since the cumulative effects of many similarly situated waters and wetlands on down gradient waters may still be important

Unfavorable SAB Recommendations

Extend definition of connectivity to entire landscape

- Should be expanded to entire watersheds not just to waters and wetlands
- Expand Report to include a broader vision of local- to landscape-scale physical, chemical and biological exchanges

Unfavorable SAB Recommendations

Emphasize groundwater connectivity and subsurface flow

- Report should place more emphasis on the importance of groundwater connectivity
- Expand discussion of how subsurface flow may provide important connectivity functions from ephemeral streams to downstream waters
- …the Report should explain how hydraulic connectivity sustains both streams and aquifers, particularly in alluvial systems in the Southwest…

Unfavorable SAB Recommendations

Emphasize biological connectivity

- Report should more thoroughly document evidence that biota move throughout the lotic system and those movements have important effects on biological connectivity
- There should be more emphasis in the conceptual framework on the importance of groundwater connectivity and biological connectivity

Unfavorable SAB Recommendations

Eliminate geographical isolated wetlands concept

- Recommends that EPA clarify that this term does not imply functional isolation
- Recommends additional literature should be cited in Report that shows the biological connectivity of isolated wetlands
- There are no truly "isolated waters or wetlands"

Unfavorable SAB Recommendations

Emphasize connections of intermittent and ephemeral streams

- EPA should clarify in the Report how intermittent and ephemeral streams connected in space and time and the importance of those connections

Unfavorable SAB Recommendations

Make stronger statement on connectivity of isolated wetlands and waters

- SAB disagrees with EPA's conclusion that literature does not provide a basis for generalizing about the degree of connectivity for unidirectional landscapes
- SAB recommendation may provide support for the agencies to make a categorical determination that isolated waters have a significant nexus
- Eliminates case-by-case analysis

Latest SAB Recommendations

June 5 draft report to EPA

"The Report could be more useful to decision-makers if it brought more clarity to the interpretation of connectivity, especially with response to quantification of the frequency, duration, predictability, magnitude, and consequences of 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 connections."

Latest SAB Recommendations

June 5 draft report to EPA

Of interest…

"The Report was developed to inform an EPA and U.S. Army Corps of Engineers rulemaking to clarify the jurisdiction of the Clean water act. The Report is a scientific review and, as such, it does not set forth legal standards for Clean Water Act Jurisdiction."

Next Steps

SAB review of proposed rule?