United States Environmental Protection Agency

Office of Water
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Fact Sheet: Draft Field-Based Methods for Developing Aquatic Life Criteria for Specific Conductivity

Summary

EPA is soliciting public comments for 60 days on its draft document, *Field-Based Methods for Developing Aquatic Life Criteria for Specific Conductivity* (SC). Elevated water salinity, or ionic concentration as measured by SC has been shown to negatively impact aquatic life in freshwaters. Once this document is final, states and authorized tribes located in any region of the country may use the methods to develop field-based SC criteria for adoption into water quality standards. The draft methods are not a regulation and do not impose legally binding requirements. The methods would provide assistance to states in developing science-based SC criteria that reflect ecoregional- or state-specific factors such as background SC and ionic composition. The draft methods underwent two external peer reviews.

What is specific conductivity?

SC is a measure of a mixture of dissolved ions (salts) in water. As ionic concentration increases, SC increases. "Specific" conductivity indicates that a measurement has been standardized to 25°C, a reference temperature. Measuring SC in the field is fast and inexpensive. Many state and federal water resource programs routinely monitor SC in freshwater systems.

How does elevated conductivity impact freshwater organisms?

Increased levels of salts (as measured by SC) disrupt the life cycle of freshwater organisms. Some freshwater organisms can adjust to saltier waters, but many are unable to cope with extreme ranges of salinity. Water with high salt concentrations is toxic to some stream organisms, changing the composition and concentrations of salts in the body that are necessary for tissues and organs to support biological functions.

What causes elevated conductivity in freshwater systems?

The sources of ions in streams and lakes may be natural, reflecting soils and geology, or as the result of human activities. Mixtures of ions that increase SC are associated with multiple sources, including discharge from wastewater treatment facilities, surface mining, oil and gas exploration, runoff from urban areas, and discharge of agricultural irrigation return waters, among others. The two most common ionic mixtures in streams are those dominated by either chloride anions (Cl^-) or those dominated by bicarbonate (HCO_3^-) plus sulfate (SO_4^{2-}) anions.

What is the basis for the draft field-based methods?

EPA's draft methods are based on effects observed in streams with different levels of SC and take into account natural variation in background SC and the aquatic species adapted to it. The draft document describes how to derive protective field-based aquatic life criteria for SC, including how to estimate a criterion continuous concentration for chronic exposures, how to estimate a maximum exposure concentration protective of acute toxicity, and how to assess geographic applicability and potential confounding factors. The draft document also includes information on SC criterion duration and frequency and case studies that illustrate key aspects of the methods.

EPA's draft methods provide flexible approaches that allow for consideration of natural variation in ionic composition and concentration. Case studies demonstrate key aspects of the methods and show that protective criteria differ across the United States and depend on background conductivity.

Among the documents EPA relied upon to develop the draft methods are EPA's *Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses* (U.S. EPA 1985) and the EPA document, *A Field-Based Aquatic Life Benchmark for Conductivity in Central Appalachian Streams* (U.S. EPA 2011a). The 2011 document, which was reviewed by EPA's Science Advisory Board (U.S. EPA 2011b), used an extensive field data set to estimate a numeric SC benchmark. New analyses and approaches described in the current draft methods document underwent independent external peer review in 2014 and 2015.

How can I view the draft document and supporting information?

EPA has established an official public docket for this action under Docket ID No. EPA-HQ-OW-2016-0353, accessed at www.regulations.gov. You may also download the document and supporting information from EPA's aquatic life criteria website at: www.epa.gov/wqc/aquatic-life-ambient-water-quality-criteria.

Where can I find more information?

Please email Colleen Flaherty at flaherty.colleen@epa.gov.

References

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