

Overview of Numeric Nutrient Criteria Development

This document provides a basic overview of how numeric nutrient criteria are developed, including background on the Clean Water Act and relevant regulatory programs.

Clean Water Act

The Clean Water Act provides a connected toolbox of regulatory programs through which federal agencies, states, tribes, and territories work to restore and maintain the integrity of surface waters.

| | Water Quality Standards 33 USC § 1313(c) | Assessment and Reporting 33 USC § 1313(d)(1)(A) | Restoration Planning 33 USC § 1313(d)(1)(C) | Discharge Permitting 33 USC § 1342 |
|-----------------|--|---|--|--|
| Purpose | Protect public health or welfare, enhance water quality, and restore and maintain chemical, physical, and biological integrity | Identify waters not attaining standards and thus not protecting uses | Set allowable pollutant loads to a listed waterbody | Set allowable levels of pollutants in point source discharges |
| Function | Specify waterbody designated uses, criteria to protect such uses, and anti-degradation policies | Monitor water quality, identify waters not meeting standards, and rank restoration priority | Calculate and allocate Total Maximum Daily Loads (TMDLs), including margin of safety | Issue National Pollutant Discharge Elimination System (NPDES) permits with technology and water quality-based limits |

Regulatory partners play different roles in implementing these programs:

- **Congress** passes and modifies the overarching laws or statutes, including the Clean Water Act.
- **Federal agencies** propose and codify regulations, provide guidance on how to implement them, and have other delegated authorities, such as regulatory oversight.
- **States, territories, and authorized tribes** propose and adopt new or revised regulations, such as water quality standards, that EPA then approves or disapproves. Experts and the public may provide input.

Water Quality Standards

Standards describe the desired condition of a water body and how it will be protected or achieved.

| | |
|-------------------------|--|
| Designated Uses | Reflect management goals and expectations for waterbody use (e.g., recreation, source of drinking water, protection of fish, shellfish, and wildlife) taking into consideration downstream water quality standards 40 CFR 131.10 |
| Criteria | Protect the most sensitive designated use through a numeric value or narrative description 40 CFR 131.11 |
| Anti-degradation | Maintain existing uses and protect high quality waters and waters of exceptional recreational or ecological significance 40 CFR 131.12 |
| General Policies | Specify other policies that affect water quality standards, such as mixing zones, low flow conditions, and variances 40 CFR 131.13 |

For more information, see the [U.S. EPA Water Quality Standards Academy](#)

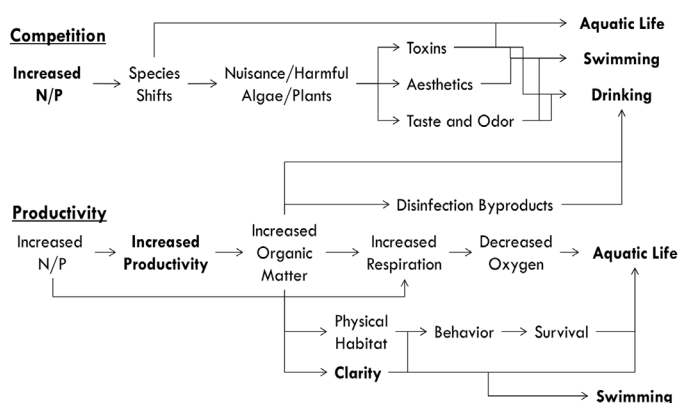
Numeric Nutrient Criteria

Numeric nutrient criteria identify levels (e.g., concentrations) of nitrogen and phosphorus in surface waters that are protective of designated uses, specifying magnitude (e.g., 0.067 mg/L), duration

(e.g., seasonal mean), and frequency (e.g., never exceed). Establishing numeric values can facilitate additional actions to control nutrients, such as updating assessment lists, calculating maximum pollution loads, and writing permits.

Deriving Numeric Nutrient Criteria

To develop numeric nutrient criteria, it is important to first define what waterbody characteristics need to be protected and select assessment endpoints sensitive to nutrients and representative of desired waterbody conditions. Criteria can be applied to single waterbodies or groups that are physically and/or biologically similar.



Example pathways through which nutrients can affect waterbody uses

Scientific evidence supports the adoption of nutrient criteria for both nitrogen (N) and phosphorus (P) to protect designated uses.¹

Different approaches may be used to derive criteria values. Analysis should consider data quality and suitability, relationship strength, confounding variables, and multiple lines of evidence, where available.

| Mechanistic Modeling | Empirical Modeling (Stressor Response) | Reference Condition | Other |
|--|---|---|--|
| Mathematical model of environmental processes able to estimate system response to management changes | Empirical relationship between nutrient concentration and response measure(s) | Based on data from sites or time periods known to support designated uses | Scientific literature, expert judgment, weight of evidence, or other defensible approaches |

Because the Clean Water Act directs states to set criteria that are protective of waterbody designated uses, other factors such as cost, feasibility, and technology are not considered at this stage.

Support for Deriving Criteria

The Clean Water Act authorizes EPA to provide support to co-regulatory partners for water quality criteria development. (33 USC § 1314)

- EPA publishes [Recommended Ambient Water Quality Criteria for Nutrients](#) that states, territories, and authorized tribes can adopt or use to develop geographically specific criteria.
- EPA’s [Nutrient Scientific Technical Exchange Partnership & Support \(N-STEPS\) Program](#) and [N-STEPS Online](#) provide technical guidance on nutrient criteria development.

Water Quality Standards Review

States, territories, and authorized tribes submit water quality standards adopted under state, territorial, or tribal law to the relevant EPA Regional Office for review. Standards are only considered applicable for Clean Water Act purposes once approved by EPA. An overview of the [review process](#) is available on EPA’s website.

Disclaimer

These materials are for educational purposes and do not substitute for statutes, regulations, policy, or guidance. Please contact your [regional nutrient coordinators](#) with questions about these topics.

¹ [Preventing Eutrophication: Scientific Support for Dual Nutrient Criteria](#)