



six and one-half (6.5) grams of fish consumed per day. Federally established final maximum contaminant levels for drinking water supply shall supersede drinking water supply criteria developed in this manner.

(N) Nutrients and Chlorophyll.

1. Definitions.

A. For the purposes of these criteria, all lakes and reservoirs shall be referred to as "lakes."

B. Lake ecoregions—Due to differences in watershed topography, soils, and geology, nutrient criteria for lakes and reservoirs will be determined by the use of four (4) major ecoregions based upon dominant watershed ecoregion. These regions were delineated by grouping the ecological subsections described in Nigh and Schroeder, 2002, *Atlas of Missouri Ecoregions*, as follows:

(I) Plains: OP1 – Scarped Osage Plains; OP2 – Cherokee Plains; TP2—Deep Loess Hills; TP3—Loess Hills; TP4— Grand River Hills; TP5—Chariton River Hills; TP6—Claypan Till Plains; TP7—Wyaconda River Dissected Till Plains; TP8— Mississippi River Hills;

(II) Ozark Border: MB2a—Crowley's Ridge Loess Woodland/Forest Hills; OZ11—Prairie Ozark Border; OZ12— Outer Ozark Border; OZ13—Inner Ozark Border;

(III) Ozark Highland: OZ1—Springfield Plain; OZ2—Springfield Plateau; OZ3—Elk River Hills; OZ4—White River Hills; OZ5—Central Plateau; OZ6—Osage River Hills; OZ7—Gasconade River Hills; OZ8—Meramec River Hills; OZ9—Current River Hills; OZ10—St. Francois Knobs and Basins; OZ14—Black River Ozark Border; and

(IV) Big River Floodplain: MB1—Black River Alluvial Plain; MB2b—Crowley's Ridge Footslopes and Alluvial Plains; MB3—St. Francis River Alluvial Plain; MB4, OZ16, TP9—Mississippi River Alluvial Plain; OZ15, TP1—Missouri River Alluvial Plain.

C. Nutrient Criteria—Nutrient criteria represent the desired condition for a water body necessary to protect the designated uses assigned in rule.

(I) Lake Ecoregion Criteria—A decision framework that integrates causal and response parameters into one water quality standard that accounts for uncertainty in linkages between causal and response parameters.

(a) Response Impairment Thresholds—Maximum ambient concentrations of chlorophyll-a (Chl-a) that are based on annual geometric means of samples collected May through September with an allowable exceedance frequency of one in three (1-in-3) years for lakes that have not been assigned site-specific criteria.

(b) Nutrient Screening Thresholds—Maximum ambient concentrations of total phosphorus (TP), total nitrogen (TN), and Chl-a that are based on the annual geometric mean of samples collected May through September. Nutrient screening thresholds represent causal and response parameter concentrations, above which an exceedance in any one year warrants further evaluation of Response Assessment Endpoints.

(c) Response Assessment Endpoints—Narrative and numeric biological response endpoints that link directly to designated use impairment.

(II) Lake Site-Specific Criteria—Maximum Ambient Concentrations of TP, TN, or Chl-a that are based on the geometric mean of a minimum of three (3) years of data and the characteristics of the waterbody.

2. This rule applies to all lakes that are waters of the state and have an area of at least ten (10) acres during normal pool condition. Big River Floodplain lakes shall not be subject to these criteria.

3. Response Impairment Thresholds are listed in Table L. Nutrient Screening Thresholds are listed in Table M. Lake Site-Specific Criteria for TP, TN, and Chl-a are listed in Table N. Additional lake site-specific criteria may be developed in accordance with subsection (5)(S) to account for the unique characteristics of the waterbody that affect trophic status, such as lake morphology, hydraulic residence time, temperature, internal nutrient cycling, or watershed contribution from multiple ecoregions.

4. All TP, TN, and Chl-a concentrations must be calculated as the geometric mean of a minimum of four (4) representative samples per year for one (1) year for purposes of comparison to lake ecoregion criteria thresholds. All samples must be collected from the lake surface, near the outflow of the lake, and during the period May 1 – September 30.

5. Lakes with water quality that exceed Response Impairment Thresholds or Lake Site-Specific Criteria identified in Tables L and N are to be deemed impaired for excess nutrients.

6. Lakes are to be deemed impaired for excess nutrients if any of the following Response Assessment Endpoints are documented to occur within the same year as an exceedance of Nutrient Screening Thresholds in Table M. The department shall collect information on Response Assessment Endpoints concurrently with collection of Nutrient Screening Threshold parameters. The department shall determine attainment of Nutrient Criteria during the biennial assessment of Missouri waters.

A. Occurrence of eutrophication-related mortality or morbidity events for fish and other aquatic organisms;

B. Epilimnetic excursions from dissolved oxygen or pH criteria;

C. Cyanobacteria counts in excess of one hundred thousand (100,000) cells per milliliter (cells/mL);

D. Observed shifts in aquatic diversity attributed to eutrophication; and

E. Excessive levels of mineral turbidity that consistently limit algal productivity during the period May 1 – September 30.

(O) All methods of sample collection, preservation, and analysis used in applying criteria in these standards shall be in accord with those prescribed in the latest edition of *Standard Methods for the Examination of Water and Wastewater* or other procedures approved by the Environmental Protection Agency and the Missouri Department of Natural Resources.

(P) Criteria to protect designated uses are based on current technical literature, especially the Environmental Protection Agency's publication, *Quality Criteria for Water*, 1986. Criteria may be modified or expanded as additional information is developed or as needed to define narrative criteria for particular situations or locations.

(Q) WET Chronic Tests. Chronic WET tests performed at the percent effluent at the edge of the mixing zone shall not be toxic to the more sensitive of at least two (2) representative, diverse species. Pollutant attenuation processes such as volatilization and biodegradation which may occur within the allowable mixing zone will be considered in interpreting results.

(R) Biocriteria. The biological integrity of waters, as measured by lists or numeric indices of benthic invertebrates, fish, algae, or other appropriate biological indicators, shall not be significantly different from reference waters. Waters targeted for numeric biological criteria assessment must be contained within the Missouri Use Designation Dataset and shall be compared to reference waters of similar size, scale within the stream network, habitat type, and aquatic ecoregion type. Reference water locations for some aquatic habitat types are listed in Table I.

(S) Site-Specific Criteria Development for the Protection and Propagation of Fish, Shellfish, and Wildlife. When water quality criteria in this regulation are either underprotective or overprotective of water quality due to factors influencing bioavailability, or nonanthropogenic conditions for a given water body segment, a petitioner may request site-specific criteria. The petitioner must provide the department with sufficient documentation to show that the current criteria are not adequate and that the proposed site-specific criteria will protect all existing and/or potential uses of the water body.