

Nutrient Criteria For Colorado's Waters

- Need and National Interest
- Water Quality Use Impacts
- Colorado Strategy
 - Lakes/Reservoirs
 - Rivers/Streams
- Implementation
 - Interim Numeric Values
 - Source Controls

Clean Water Act

- Water quality standards shall be adopted for substances that could reasonably be expected to interfere with those designated uses adopted by the State

Section 303(C)(2)(B)

Nationwide Effort Over the Last Decade

- Hypoxic (dead zone) in coastal waters
- Excessive enrichment of inland waters
- EPA's effort at identifying protective levels [304(a) Criteria] by Ecoregion in 2000-02
- State Efforts

Nutrient Enrichment - Water Supply Impacts

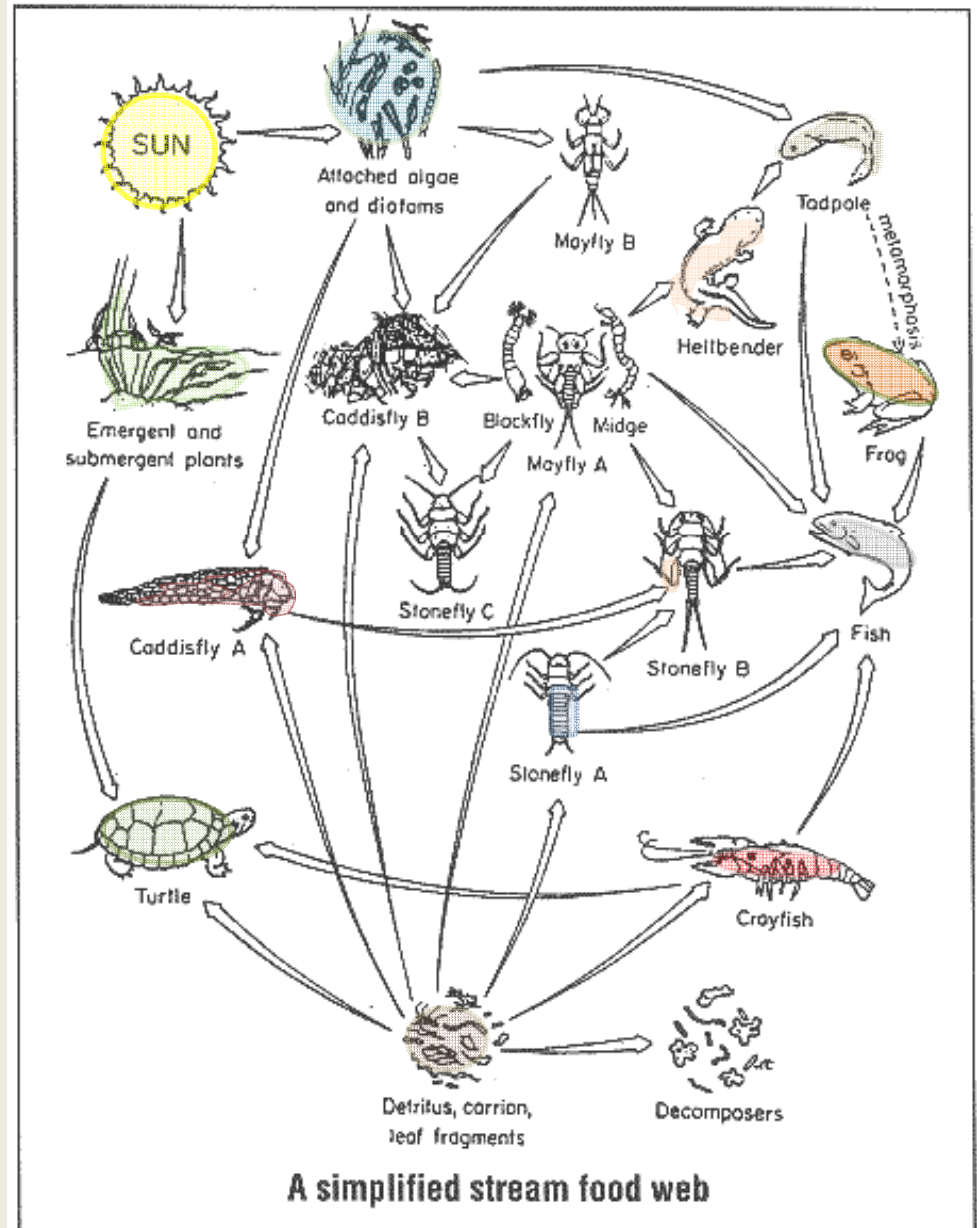
Water Supply

- Increased carcinogenic disinfection by-products
- Taste and odor



Nutrient Enrichment

– General aquatic life impacts



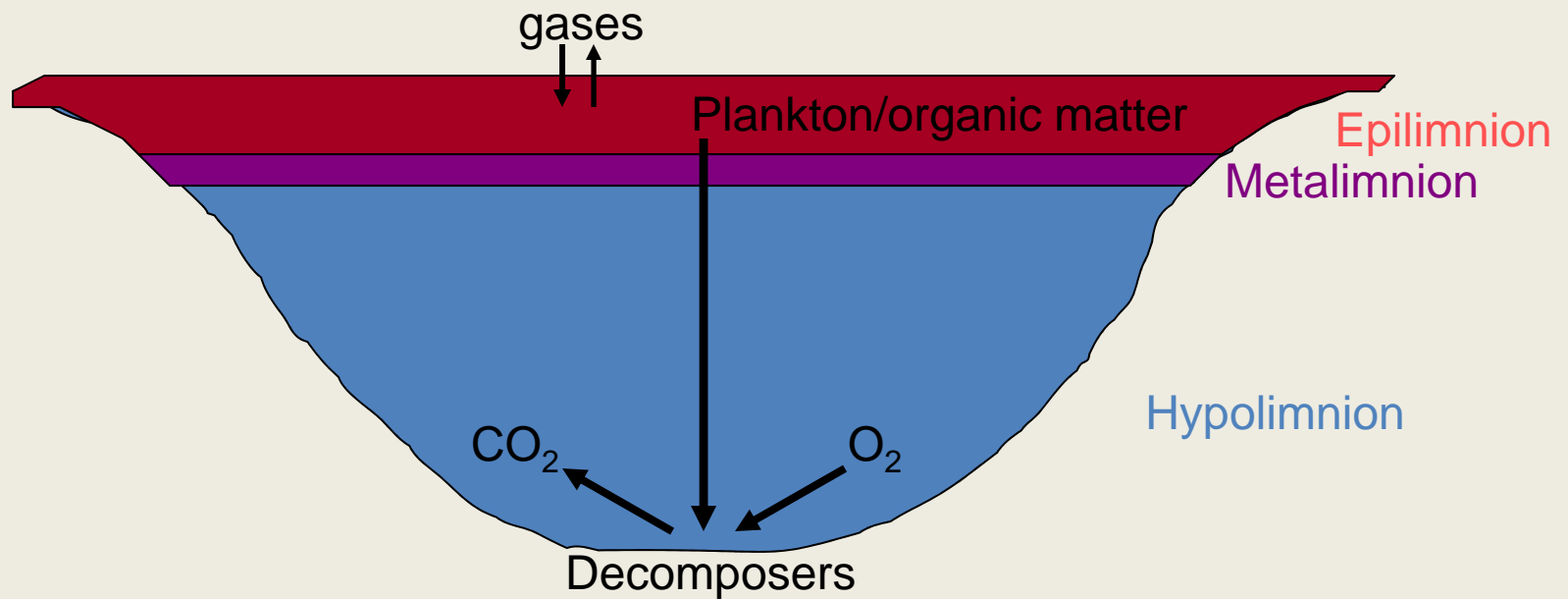
Nutrient Enrichment – Recreation and Aquatic Life Impacts

- Increased algae blooms
- Most noticeable in lakes and reservoirs
- Affects public perception
- Excessive attached vegetation in streams



Nutrient Enrichment

Lakes and Reservoirs Summer Stratification Process

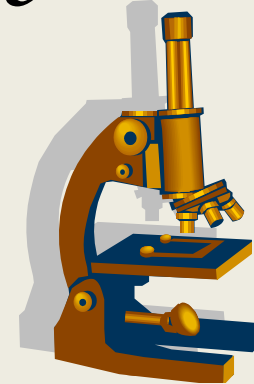


Nutrient Enrichment - Agricultural Use Impacts

- Impacts to water diversions
- Excessive attached vegetation

Colorado Strategy

- Criteria based on best possible science
- Implementation strategies that take into account cost of treatment, feasibility and environmental trade offs



Criteria Development Strategies

| <i>Use Category</i> | <i>Lakes and Reservoirs</i> |
|------------------------------------|---|
| <i>Aquatic Life</i> | <i>Select Chlorophyll a level that balances:</i> |
| <i>Recreation & Aesthetics</i> | <i>1) productivity of managed sport fisheries, 2) sustainability of the aquatic community 3) recreational and aesthetic values</i> |
| <i>Water Supply</i> | <i>Direct Use Water Supply Reservoirs: Chlorophyll a standard aimed at limiting the potential for disinfection by-product formation</i> |

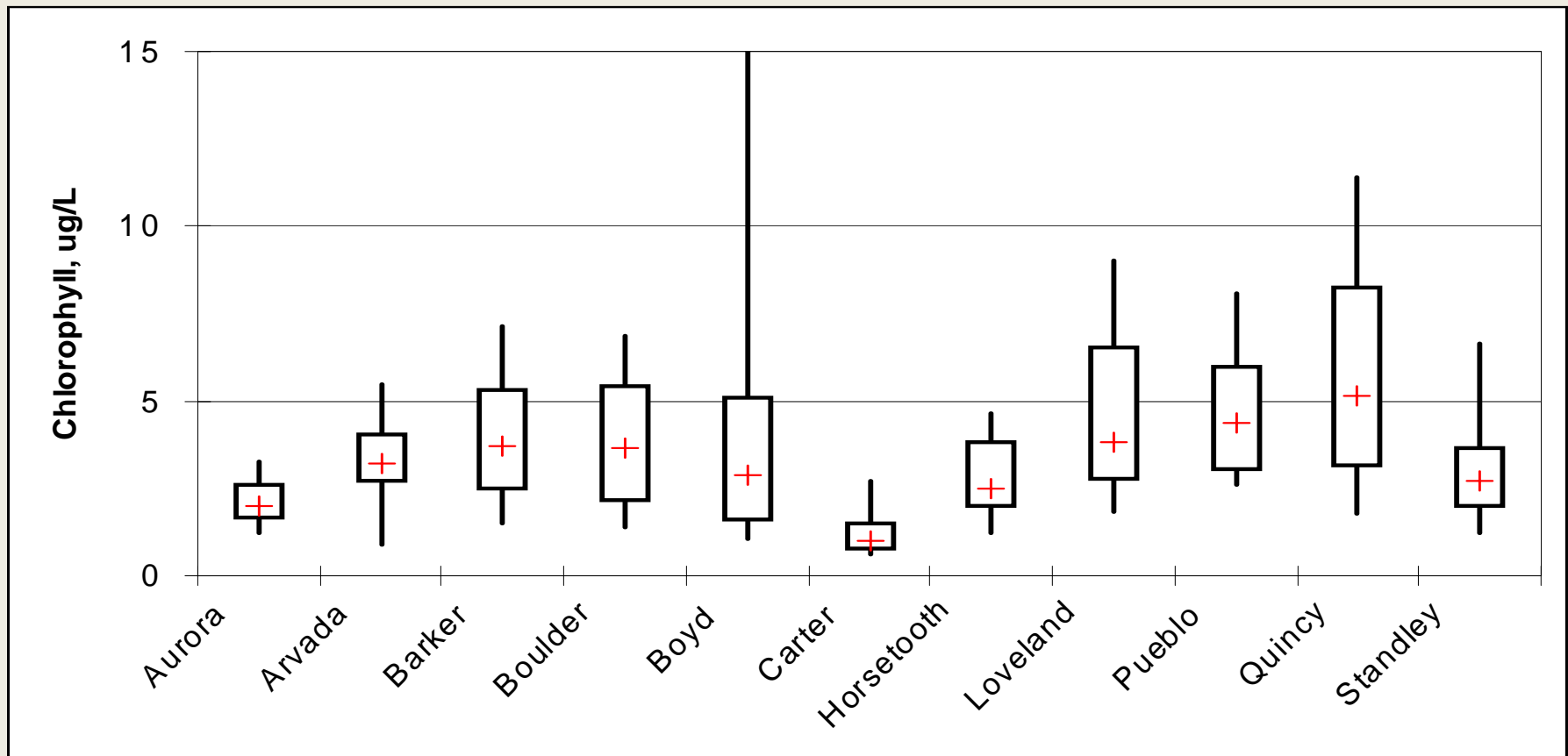
| <i>Use Category</i> | <i>Rivers and Streams</i> |
|------------------------------------|--|
| <i>Aquatic Life</i> | <i>N and P standards based on response of biological assessment measurements</i> |
| <i>Recreation & Aesthetics</i> | <i>Chlorophyll a standard based on user surveys done by other states.</i> |
| <i>Water Supply</i> | <i>Nothing at this time.</i> |

Lakes and Reservoirs

Initial Methods

| Trophic State (OECD) | Chlorophyll, ug/L | Secchi Depth, m |
|----------------------|-------------------|-----------------|
| Oligotrophic | <2.5 | >6 |
| Mesotrophic | 2.5 – 8 | 6 – 3 |
| Eutrophic | 8 – 25 | 3 – 1.5 |
| Hyper-eutrophic | >25 | <1.5 |

Front Range Reservoirs Summer Algal Abundance



Initial Proposed Criteria Lakes and Reservoirs

| Classification | Aquatic Life | | | High Quality Water Supply |
|---|---------------------------|--------------------------------|------------------------------|----------------------------------|
| | Chlorophyll (ug/L) | Total Phosphorus (mg/L) | Total Nitrogen (mg/L) | Chlorophyll (ug/L) |
| Cold water biota | 8 | 0.02 | 0.41 | 5 |
| Warm water biota | 20 | 0.08 | 0.85 | |
| 80th percentile of summer average | | | | |

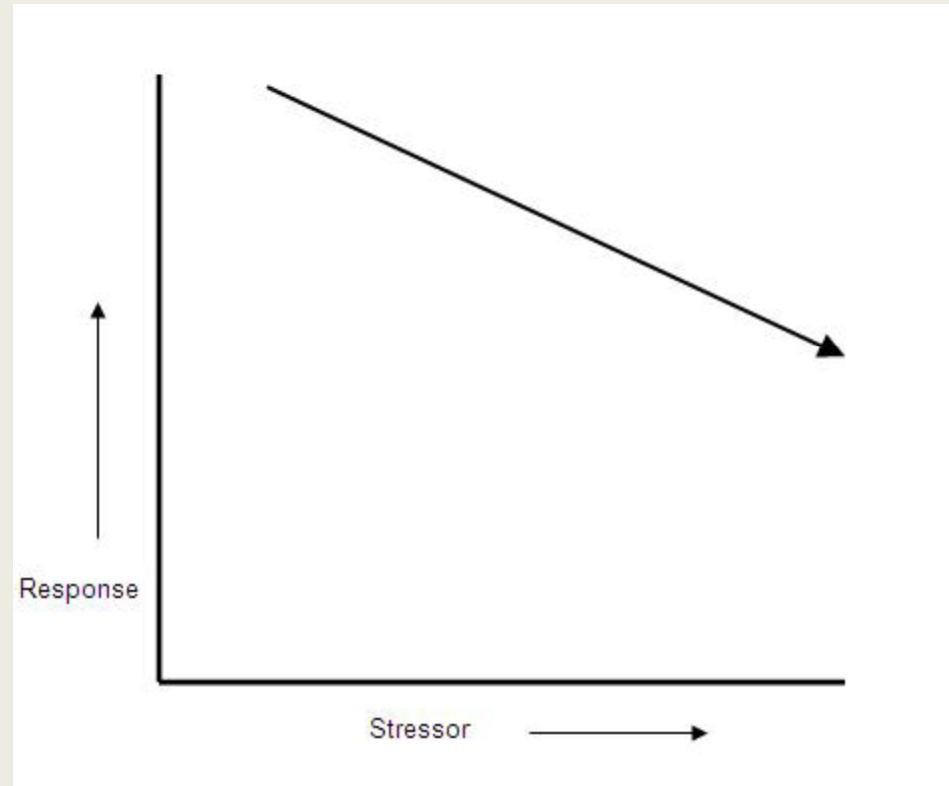
Nutrient Enrichment Rivers and Streams

- Based on response of biological assessment measurements.
- Multi-Metric Index (MMI) of biological condition using Macroinvertebrates



Stressor Response Relationship

- Increase stressor =>
Decrease response
- Stressor = Nutrients
 - TN and TP
- Response = Biological Condition
- Select threshold based on acceptable level of response

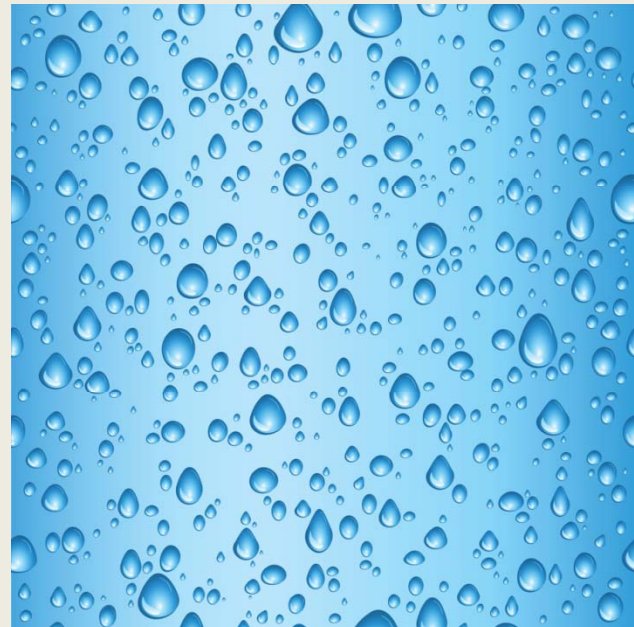


Revised Proposed Criteria Rivers and Streams

| Classification | Aquatic Life | | Recreation |
|-------------------------|------------------------------------|----------------------------------|---|
| | Total Phosphorus (mg/L) | Total Nitrogen (mg/L) | Chlorophyll * (mg/m²) |
| Cold water biota | 0.11 | 0.40 | 150 |
| Warm water biota | 0.16 | 2.0 | |
| * attached algae | | | |

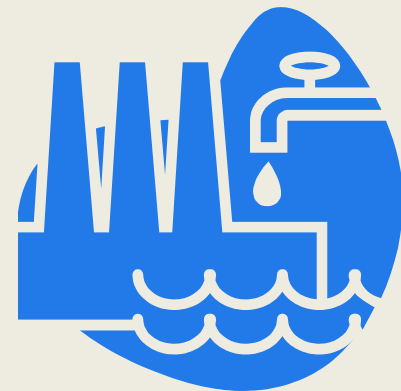
Nutrient Numeric Criteria Development Summary

- Lakes and Reservoirs
 - Aquatic Life and Recreation
 - High Quality Water Supply
- Rivers and Streams
 - Aquatic Life
 - Recreation



Implementation - Point Sources

- *New* Discharger Specific Variance Provisions
 - Limits of technology
 - Economics
 - Other consequences
- Site Specific Standards where needed
- Compliance Schedules



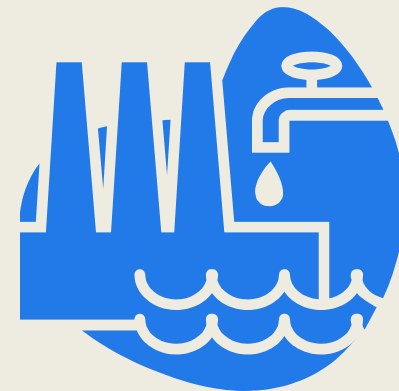
Proposed Regulatory Approach

- Proposed Regulation 31 (Basic Standards) Revisions
 - New subsection for nutrients
 - Interim Phosphorus, Nitrogen, and Chlorophyll a values
 - Exceptions to delayed implementation
 - Interim Nitrogen values use limitations



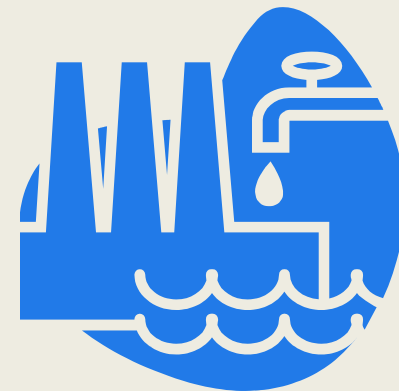
Nutrient Management Control Regulation

- Proposed Domestic WW Discharger Treatment Requirements
 - Small and/or Disadvantaged Communities
 - Discharging Prior to May 31, 2012
 - Discharging On Or After May 31, 2012
 - Non-Domestic Wastewater Treatment Works
 - Implementation Tools



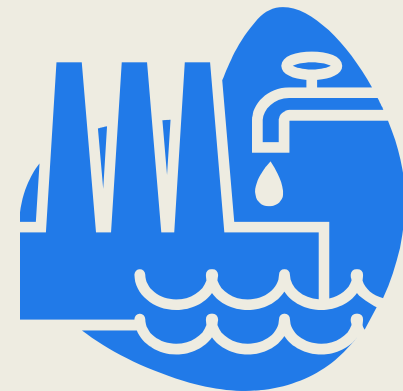
Nutrient Management Control Regulation

- Proposed MS4 Permit Requirements
 - Public education and outreach on storm water impacts
 - Pollution prevention/good housekeeping for municipal operations



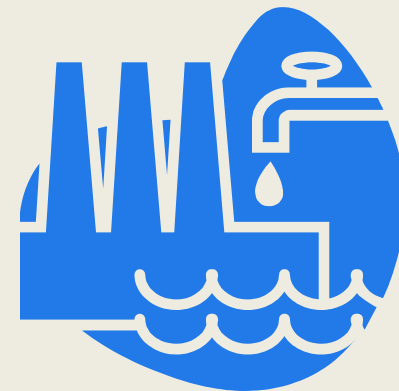
Nutrient Management Control Regulation

- Proposed Nonpoint Source Requirements
 - Best Management Practice Implementation
 - Public Information and Education
 - Additional Nonpoint Source Actions



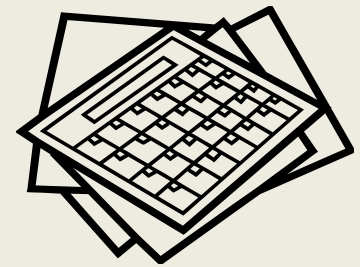
Nutrient Management Control Regulation

- Proposed Monitoring Requirements
 - Point Source Monitoring
 - Process Water Dischargers
 - Municipal Separate Storm Sewer Systems
 - NPS/Unpermitted Point Source Monitoring



Proposed Implementation Schedule

- WQCC Rulemaking Hearing – March 2012
- P and Chl a interim values – Effective 2012
- N interim value – Effective 2017
- All interim values effective 2022



Questions?

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