# Connecticut Department of Energy and Environmental Protection

Water Quality Criteria

EPA WQS Handbook

Narrative criteria represent conditions sufficient to restore or maintain biological, chemical or physical integrity of water body and support attainment of uses

```
        Uses
       ↗    ↖
   Criteria ↔ Standards
```

Numeric Criteria

Connecticut Department of Energy and Environmental Protection

Narrative Criteria

Connecticut Department of Energy and Environmental Protection
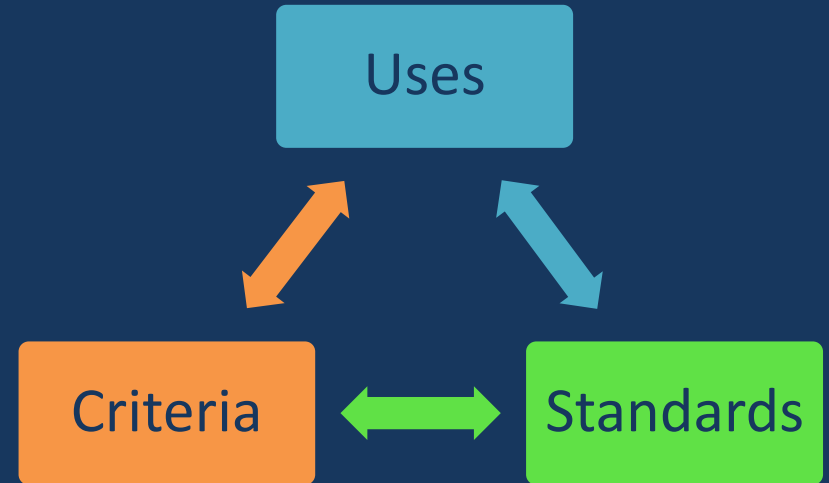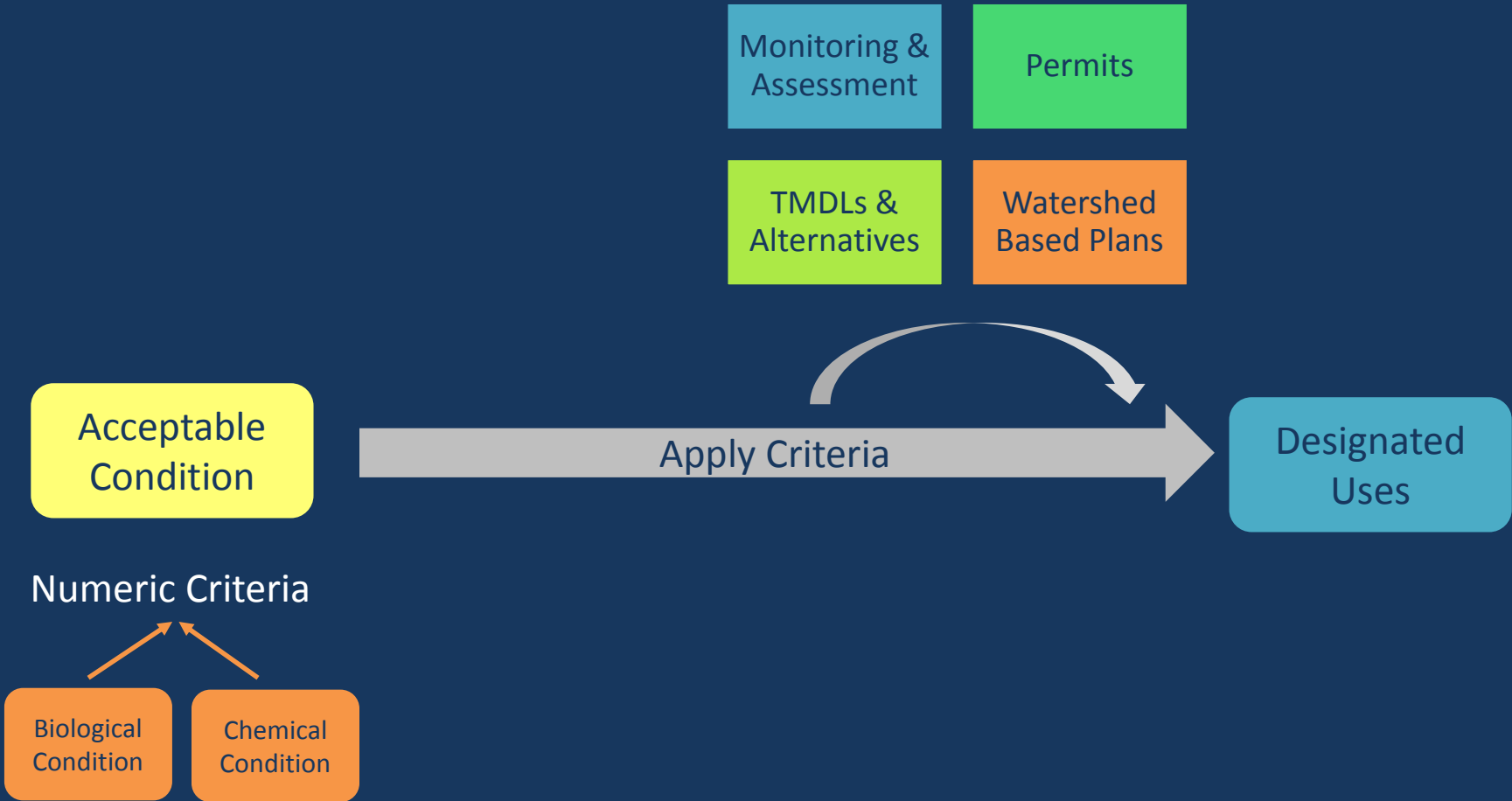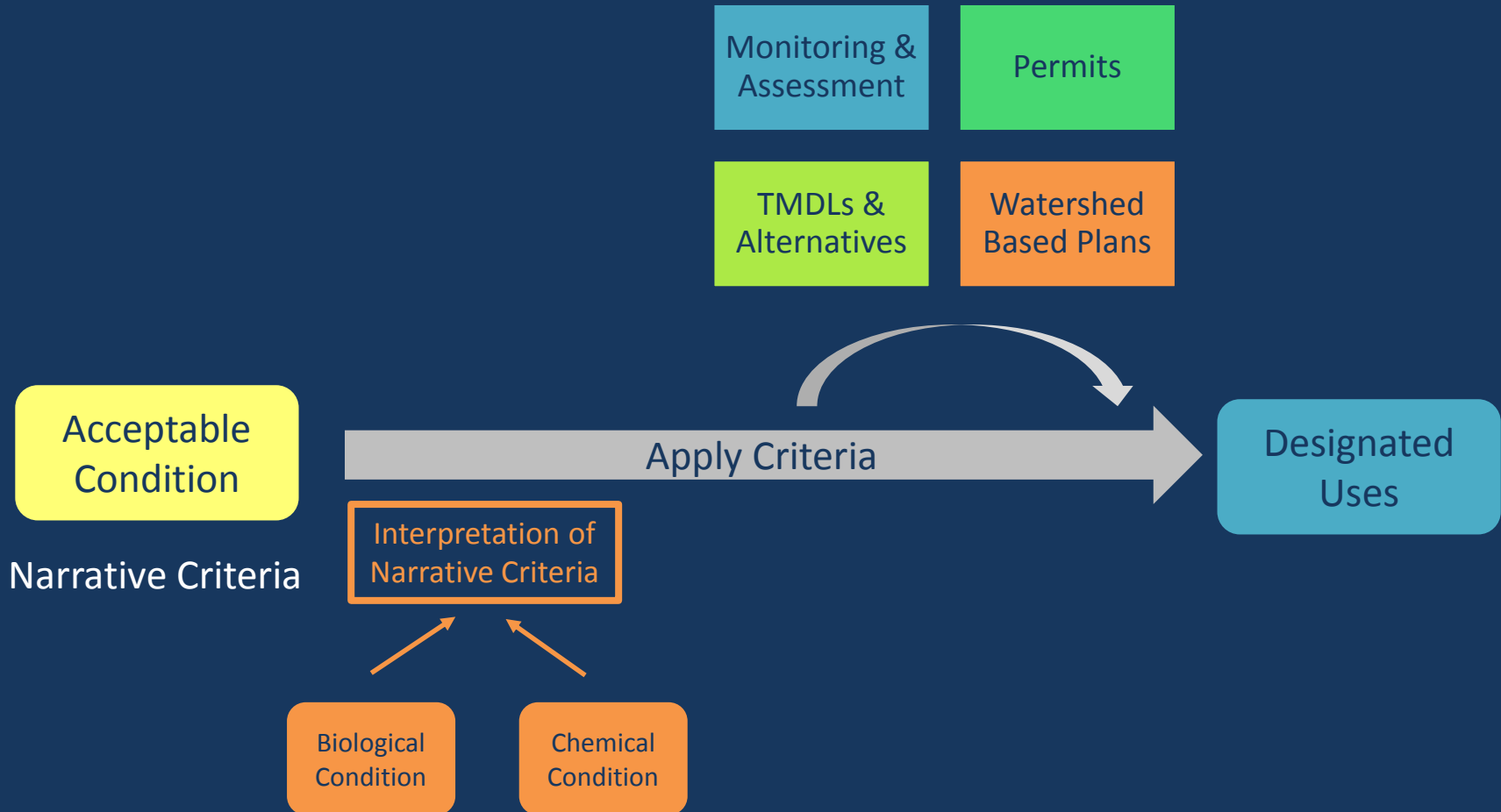
Applying Narrative Criteria In CT

Long Island Sound TMDL
(December 2000)
Basis: WQ Model linking DO to N

Nitrogen	lbs/day
# Facilities	79
% WQB Permit	100%
Baseline	57,589
Goal	21,023
2016	17,488
2017	16,775
2018	22,246
% Reduction Achieved	67%
% Reduction Goal	63%

NPDES trading program implemented through a general permit & Nitrogen Credit Trading Board

1999

0.0 - 1.0 mg/L
1.0 - 2.0 mg/L
2.0 - 3.0 mg/L
3.0 - 4.0 mg/L
4.0 - 5.0 mg/L
5.0 + mg/L

2018
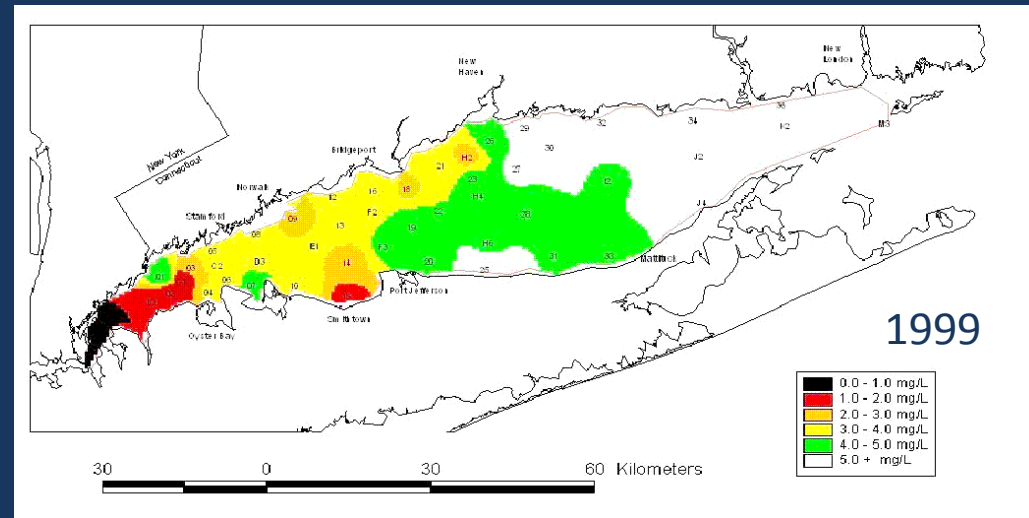
Nitrogen Control Program for Long Island Sound
www.ct.gov/deep/nitrogencontrol

Connecticut Department of Energy and Environmental Protection
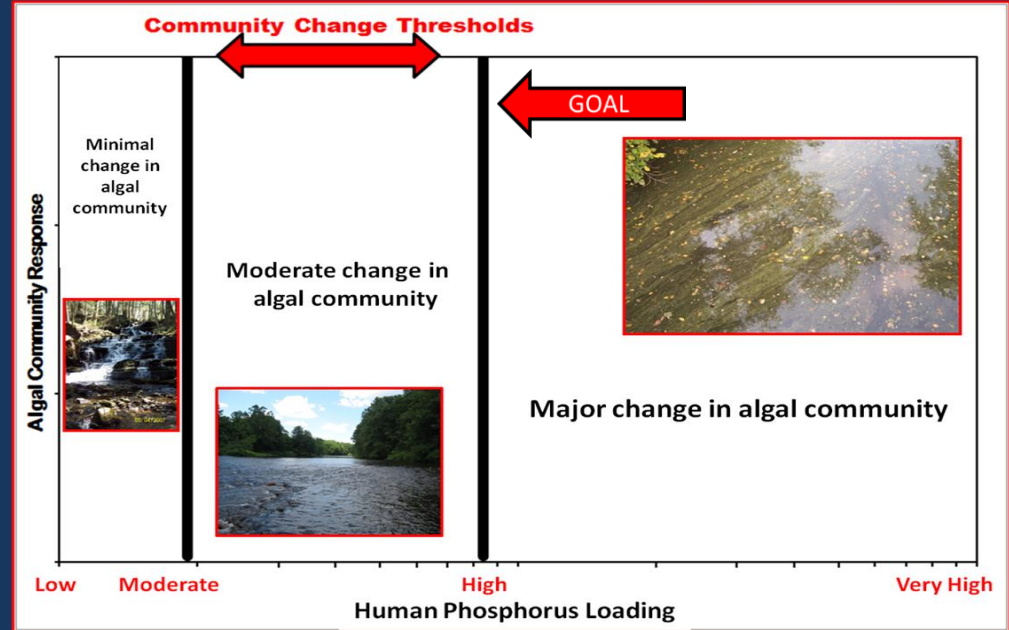
Applying Narrative Criteria in CT

Phosphorus Reduction Strategy for Inland Non-Tidal Waters
(April 2014)
Basis: Relating periphyton community health to phosphorus loads

Will be developed into a TMDL Alternative

Phosphorus	
	lbs/day
# Facilities	45
% WQB Permit	100%
Baseline	10,531
Goal	3,611
2018	9,233
% Reduction Achieved	12%
% Reduction Goal	66%

$$\text{Enrichment Factor (EF)} = \frac{\text{Total NPDES Load (lbs/day) + Land Cover Load (lbs/day)}}{\text{Forested Condition Load (lbs/day)}}$$

Phosphorus Reduction Strategy
www.ct.gov/deep/phosphorus

Connecticut Department of Energy and Environmental Protection

Applying Narrative Criteria in CT

2018 Assessment Methodology

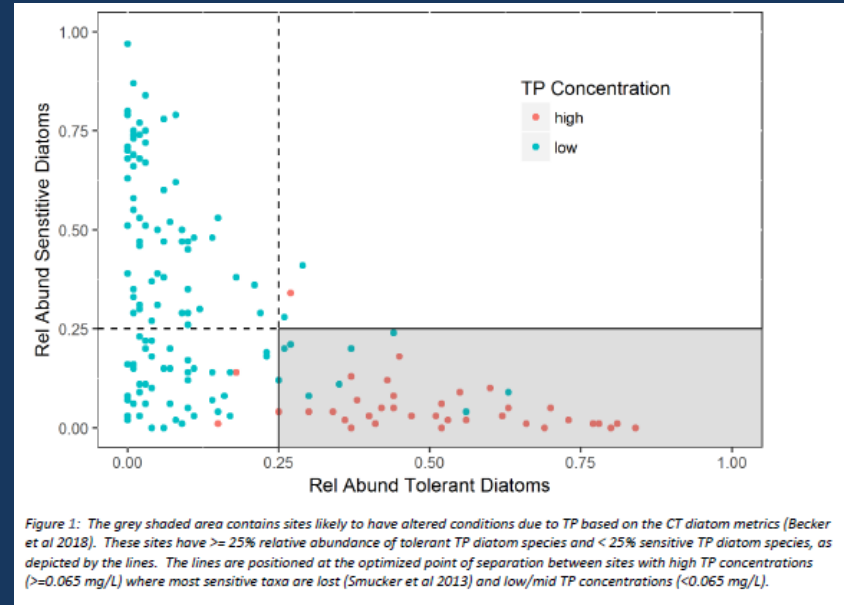Link phosphorus concentrations to periphyton community conditions

Figure 1: The grey shaded area contains sites likely to have altered conditions due to TP based on the CT diatom metrics (Becker et al 2018). These sites have >= 25% relative abundance of tolerant TP diatom species and < 25% sensitive TP diatom species, as depicted by the lines. The lines are positioned at the optimized point of separation between sites with high TP concentrations (>=0.065 mg/L) where most sensitive taxa are lost (Smucker et al 2013) and low/mid TP concentrations (<0.065 mg/L).

Measure				
AQL assessment using bugs &/or fish	IMPAIRED	IMPAIRED	SUPPORTING	IMPAIRED
TP Concentration Threshold	+	–	+	–
Inferred Diatom TP Tolerance Classification	++	––	++	++
Combined Evidence	+++	–––	+++	++–
Management Outcome	List TP as a cause	TP not a cause	Target for further study	Target for further study

+++, - - -	Convincingly supports or weakens
++, - -	Strongly supports or weakens
+, -	Somewhat supports or weakens
0	No effect (neutral or ambiguous)
NE	No evidence

CT 2018 Integrated WQ Report Appendix A-5
www.ct.gov/deep/iwqr

Connecticut Department of Energy and Environmental Protection

Applying Narrative Criteria in CT

Coastal Embayments

- Develop a model set to relate nutrients to dissolved oxygen and water clarity

- Implement: TMDL or Alternative, Permits

In Development

Lakes

- Develop a model set to relate nutrients to trophic goals, dissolved oxygen and reduction of Harmful Algal Blooms

- Implement: New Statewide TMDL, Watershed Based Plans

Why Use Narrative Criteria for Nutrients?

Numeric Criteria

- Works well for chemicals that behave similarly in different water bodies
- Have well defined bioavailability
- Best for chemicals that don't occur naturally or are present naturally in low levels
- Implementation is straight-forward

Narrative Criteria

- Works well for chemicals or conditions that behave differently in different water bodies
- Complex bioavailability
- Can be used to address chemicals or conditions that also occur naturally
- Open to legal and political challenges

Both numeric and narrative criteria can be used successfully provided they are based on strong science, clear policies and have a strong connection to Water Quality Standards and Designated Uses

Connecticut Department of Energy and Environmental Protection

Open Discussion

- What experience have you had with narrative nutrient criteria?
- Challenges?
- Successes?
- What do you need to be successful?

Translating Narrative Criteria	Relating Narrative to Uses
Permits	TMDLs & Alternatives
Monitoring & Assessment	Watershed Based Plans