Water Quality Data Interpretation & Reporting

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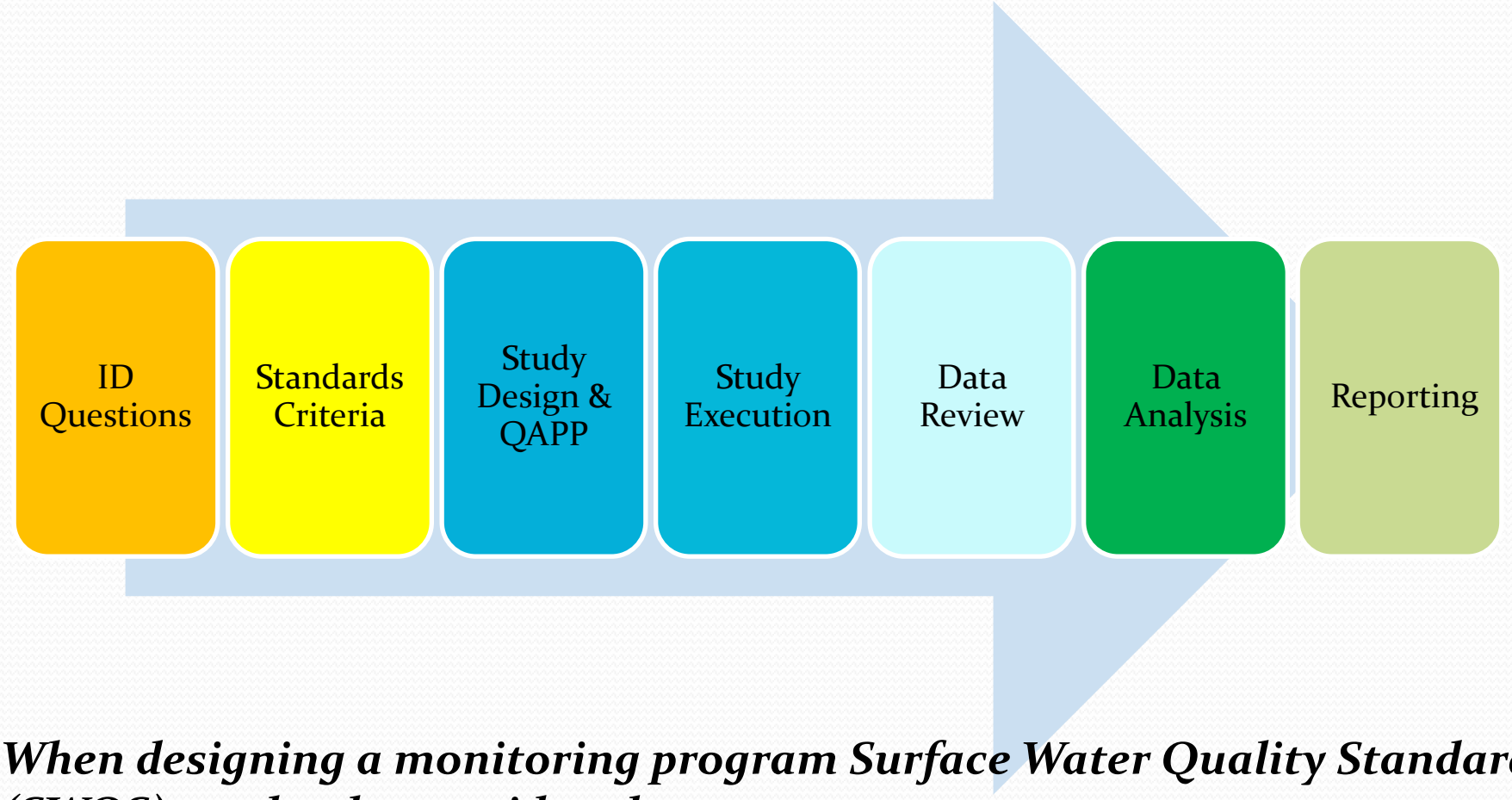
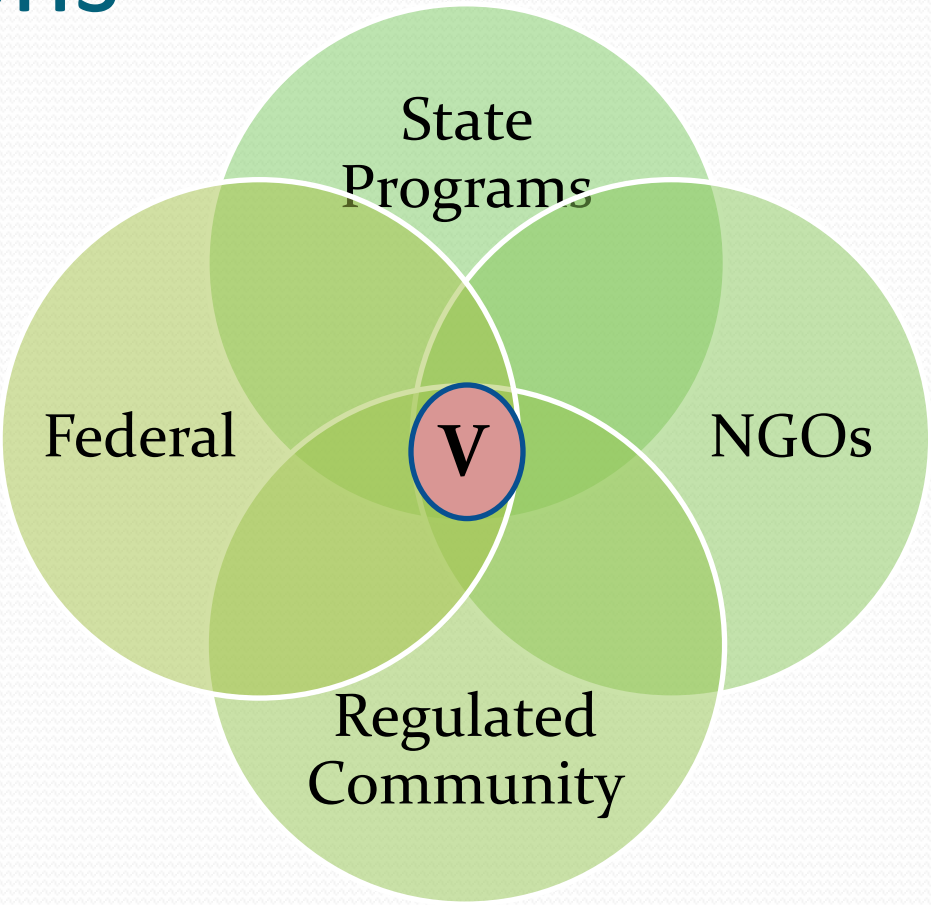
Watershed Planning Program Workshop

General Monitoring Process



When designing a monitoring program Surface Water Quality Standards (SWQS) need to be considered

Different Data Collectors, Different Questions

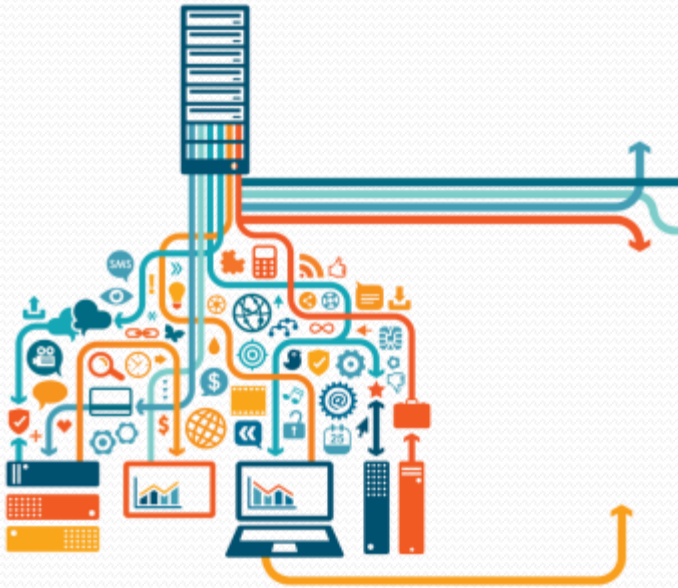


Example Monitoring Objectives/??

MassDEP and the Clean Water Act	Stakeholder Activities
1. Assess the status or condition of waters	What is the condition of the river? Does the river meet the standards for Class B waters?
2. Develop and implement pollution control strategies	What are the nutrient loads in the river that will meet standards? What are the sources?
3. Measure the effectiveness of water quality programs	How effective are the WWTP upgrades that I am implementing?

Now that I have my data what is next?

- Interpretation relative to the standards
- Function of the study design objectives
- Opportunities for other secondary uses of data



Assessment: *MassDEP Standards*

Management Goals

- Aquatic Life
- Fishable/Swimmable

314 CMR 4.0

- Waterbody Classification
- Criteria
- Antidegradation

MassDEP Numeric Criteria

- Four criteria explicitly listed in the SWQS (pH, T, DO, Bacteria)
- SWQS need to include magnitude, frequency or duration
- Reference for AWQC and Human Health for toxics

Narrative Criteria

- Many "Free From" statements in the standards that do not have criteria assigned Nutrient Example:
  - "unless naturally occurring, all surface water shall be free from nutrients in concentrations that would cause or contribute to impairment of existing or designated uses…"
  - The indicators and thresholds used to interpret impairment attributed to nutrients are in the ***Consolidated Assessment and Listing Methodology (CALM)***

SWQS and CALM

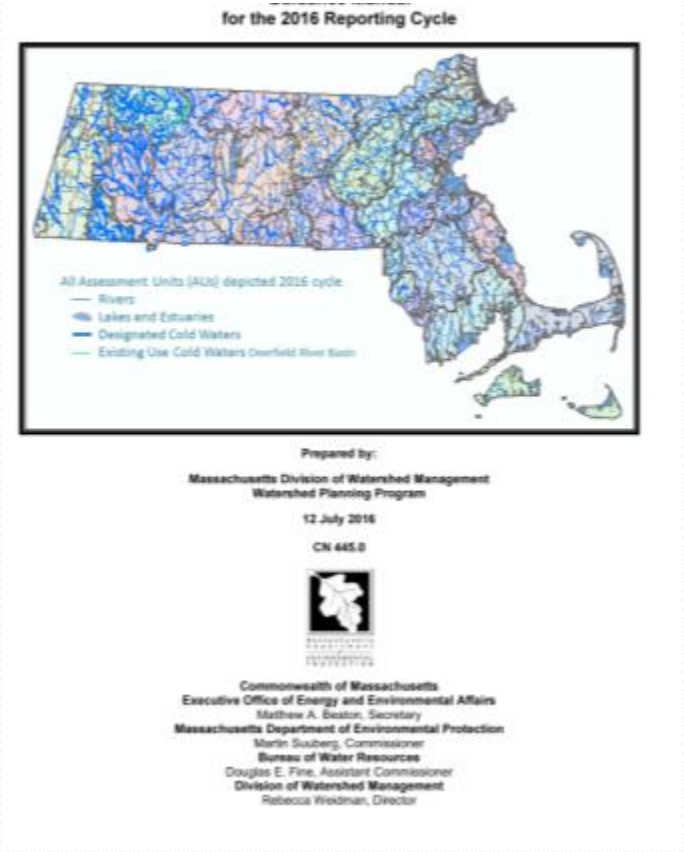
- Standards –
  - Inventory of waters (A,B, SA, SB)
  - Management goals (PWS, Aquatic Life)
  - Designated uses (CWF, ORW)
  - Criteria (numeric and narrative)
  - Antidegradation
- CALM –
  - more indicators than in the standards
  - Includes threshold, frequency and duration
  - Used to develop standards for adoption

Assessment: *CALM*

- What information is used to determine if WQS are met
- Equations/Algorithms
- Aquatic Life
  - Indicators (physical, biological, chemical)
  - by waterbody type
  - Fishery Type
  - Replication/Confidence

Recipes for data interpretation

Consolidated Assessment and Listing Methodology (CALM)



CALM Assessment: *Indicators*

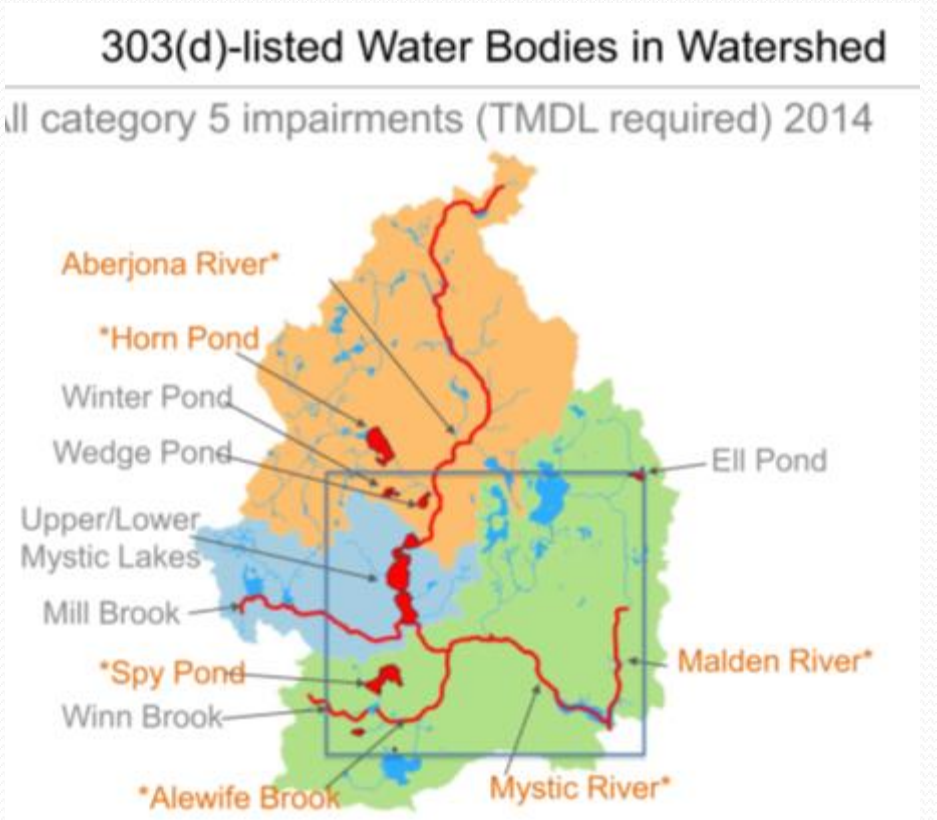
Use	Indicator
Aquatic Life	**DO , pH, Temperature**, Phosphorus, Nitrogen, Toxics (metals, ammonia, chloride, chlorine)
Aquatic Life	Benthic Macroinvertebrate, Fish Community, Primary Producers (e.g., algae, chlorophyll a)
Primary Recreation	**Bacteria** (E. coli, Enterococci) concentrations, Secchi depth
Secondary Recreation	Bacteria (E. coli, Enterococci) concentrations
Aesthetics	deposits; debris, scum; odor, color, taste , turbidity

CALM - Primary Producer Biological Screening Guidelines for Excess Nutrients

Use is Supported			Use is Impaired		
Rivers	Lakes	Estuaries	Rivers	Lakes	Estuaries
Wadeable rivers: benthic chlorophyll a samples ≤200 mg/m²*, filamentous algal cover ≤40%*, Deep rivers: phytoplankton Chlorophyll a ≤16 µg/L*, occasional non-harmful ephemeral algal blooms*, no HABs (cyanobacterial or non-cyanobacterial blooms)*	phytoplankton Chlorophyll a ≤16 µg/L*, ≤25% of the total lake area covered by non-rooted macrophyte(s) and/or algal mats/films/clumps*, occasional non-harmful ephemeral algal blooms*, no HABs (cyanobacterial or non-cyanobacterial blooms)*	Eelgrass bed habitat in AU area is increasing or fairly stable (i.e., no or minimal loss), Chlorophyll a ≤5 µg/L*, little to no macroalgae accumulations*	Wadeable rivers: benthic chlorophyll a samples >200 mg/m²*, filamentous algal cover >40%*, Deep rivers: phytoplankton Chlorophyll a >16 ug/L* cyanobacteria blooms that result in advisories (recurring and/or prolonged)	phytoplankton Chlorophyll a >16 µg/L*, >25% of the total lake area covered by non-rooted macrophyte(s) and/or algal mats/films/clumps*, cyanobacteria blooms that result in advisories (recurring and/or prolonged). These indicators may also be applied to impounded reaches of River AUs	Substantial decline in AU (= or exceed 10% of eelgrass bed area), Chlorophyll a >10 µg/L*, some macroalgae accumulations*

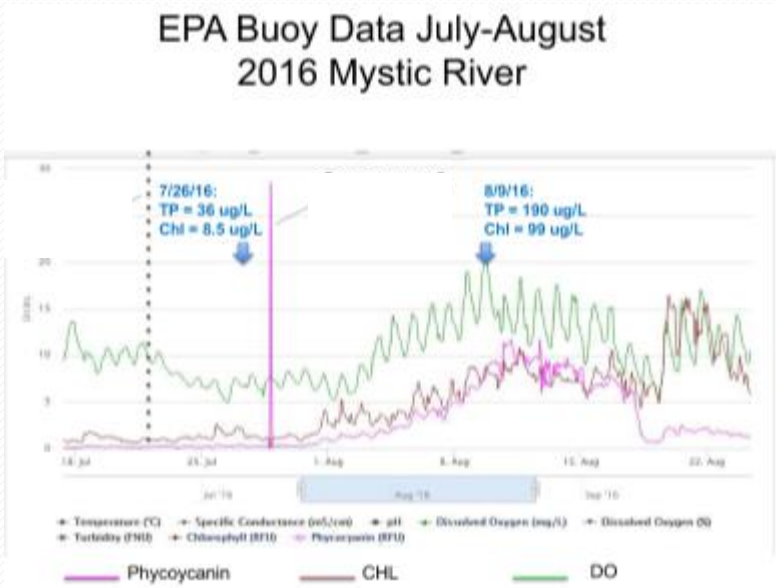
Implement Pollution Control:

- What standards/targets?
- What is the extent of the impairment?
- What are the sources of pollution?
- What is the load that will restore water quality?
- What combination of measures will meet the load?



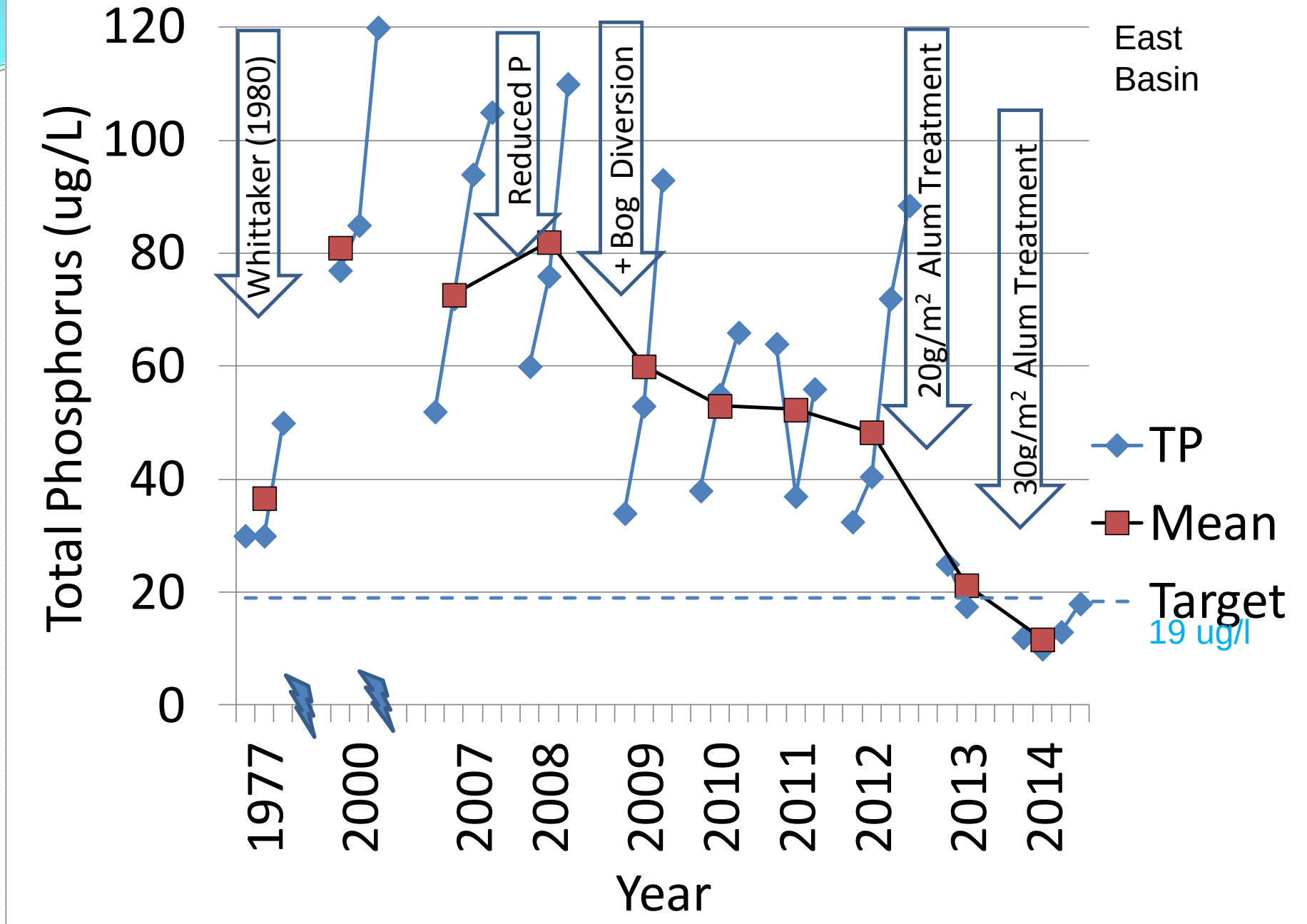
Mystic River – Example Targets

- Mean chlorophyll-a: <10 ug/L
- Peak chlorophyll-a: <18.9 ug/L
- Total Phosphorus lakes/impoundments: <0.050 mg/L
- Total Phosphorus streams: <0.100 mg/L



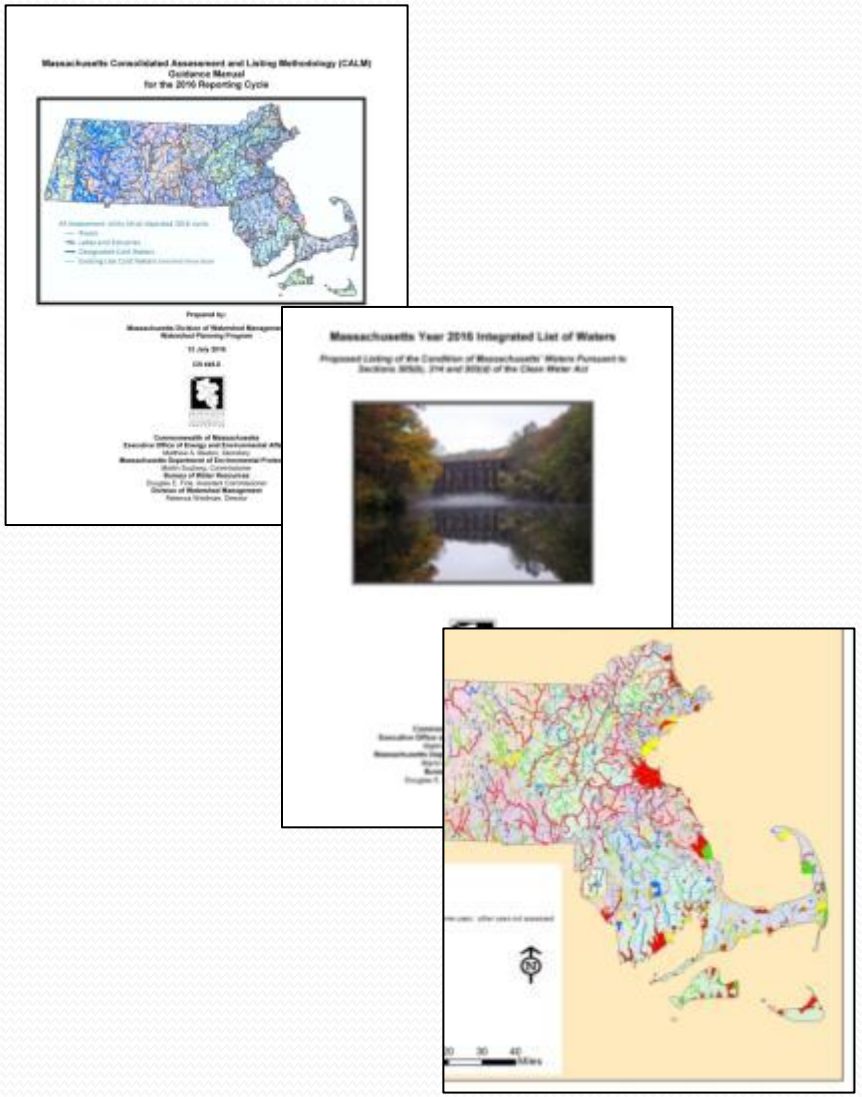
Is Water Quality Improving?

- White Island Pond impaired for phosphorus
- Source (stormwater and cranberry bogs)
- Partners implemented BMPs
  - decreased use of fertilizer
  - Alum treatment


East Basin
Total Phosphorus (ug/L)
120
100
80
60
40
20
0
Whittaker (1980)
Reduced P
+ Bog Diversion
20g/m² Alum Treatment
30g/m² Alum Treatment
TP
Mean
Target
19 ug/l
1977
2000
2007
2008
2009
2010
2011
2012
2013
2014
Year

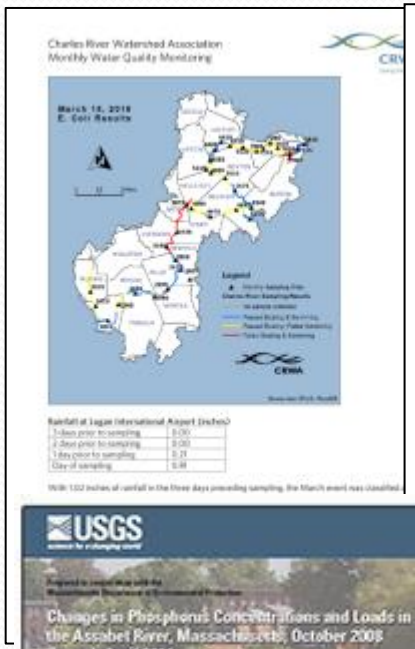
MassDEP Reports

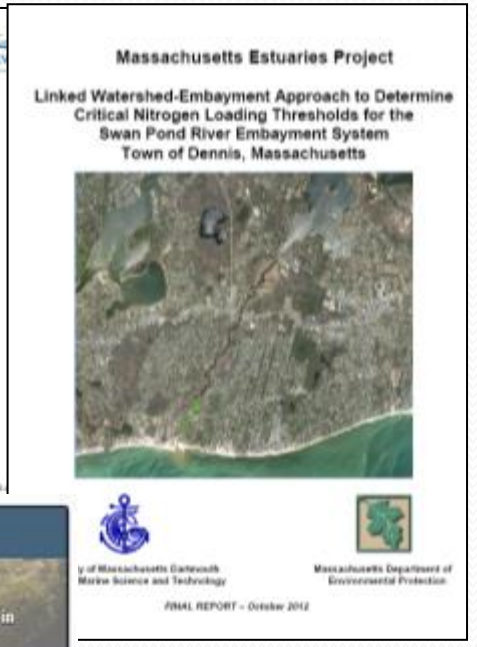
- Integrated Report
- Comprehensive Assessment and Listing Methodology (CALM)
- Assessment Reports
- Technical & TMDL Reports
- QAed Data
- GIS Layers
- dep/water/watersheds/water-quality-assessments.html

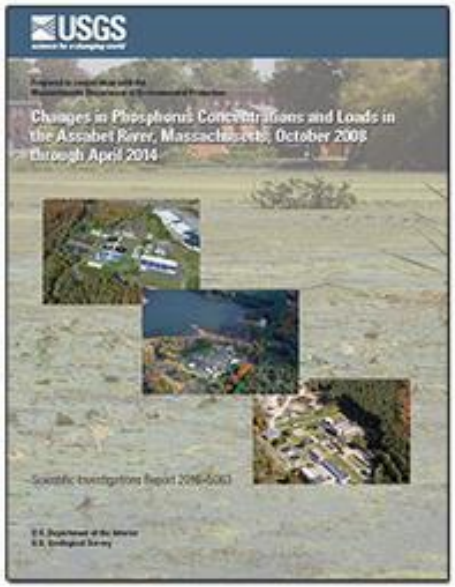


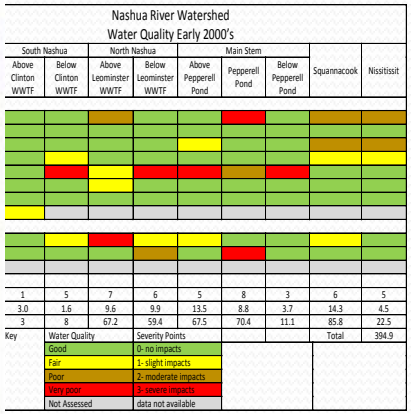
Permit Holders/NGO /Consultants Reports

- Technical Reports
- QAed Data
- Discharge monitoring reports
- MS4 Annual Reports
- Report Cards









Questions

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