Water Quality Standards Information Exchange, June 13, 2023

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- Please mute yourself.
- “Raise” your hand of use the chat function to be recognized if you have a question or your may type questions into the chat.
- This is an informational meeting only.
  - It will not be used to capture formal comments verbally or through the chat function.

If you are having audio problems, try calling in.

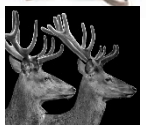
603-931-4944

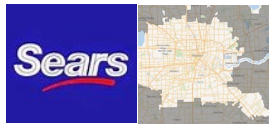
Phone Conference ID: 140300 567#

Agenda

Item	~Time	Subject	Lead by
1	5-min	Introductions/Staff Changes	Ken Edwardson
2.	5-min	WQSAC → WQSIE	Ken Edwardson
3.	5-min	Draft Summary of Jan-13, 2022 Meeting	Ken Edwardson
4.	10-min	Legislative Update – Budget	Erin Holmes/ Ted Diers
5.	10-min	EPA Update	Dan Arsenault
6.	60-min	Draft IP Rules • Arsenic – Human Health Criteria • Aluminum – Implementation • Env-Wq 1705.02 – Dilution and Conditions for Permitting • Oops • Draft "red-line" rule set discussion	Ken Edwardson
7.	5-min	Initial proposal timeline	Ken Edwardson
8.	15-min	Other Business	Ken Edwardson
9.	-	Adjourn	Ken Edwardson

Introductions/Staff Changes





- James Tilley → Water Quality Certification Supervisor (*was vacant*)
- Ted Diers → Assistant Water Division Director
- Erin Holmes → Watershed Bureau Administrator (*was Ted Diers*)
- Judy Sears Houston → Water Quality Panning Section Sup. (*was Gregg Comstock*)
- Harvey Pine → TMDL Coordinator (*was Peg Foss*)

Group Name Change

~~Water Quality Standards Advisory Committee (WQSAC)~~

now the

Water Quality Standards Information Exchange (WQSIE)

- Same content
- Same discussion
- Same sharing of ideas
- Same notifications

Legislative Update – Budget

Erin Holmes/Ted Diers

EPA Update

Dan Arsenault

Toward Triennial Review

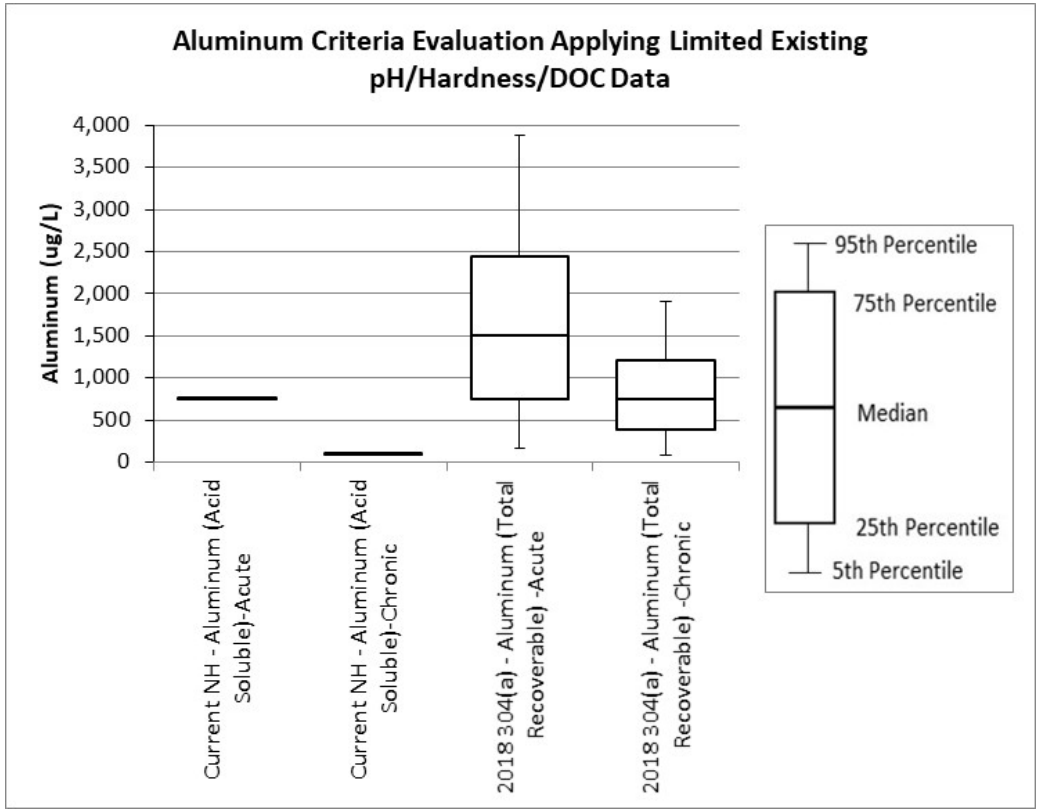
Ken Edwardson

Aluminum

- In 2018 EPA finalized new freshwater aquatic life use 304(a) guidance for total aluminum.
- The guidance relies upon a multiple linear regression (MLR) to create instantaneous criteria values.
- Data inputs are dissolved organic carbon (DOC), hardness and pH.

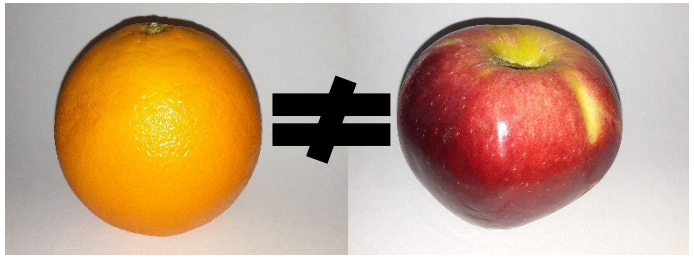
Comparability based on limited data?

(From Jan 14, 2021 Meeting)



Existing Env-Wq 1700 Criteria

Acid Soluble

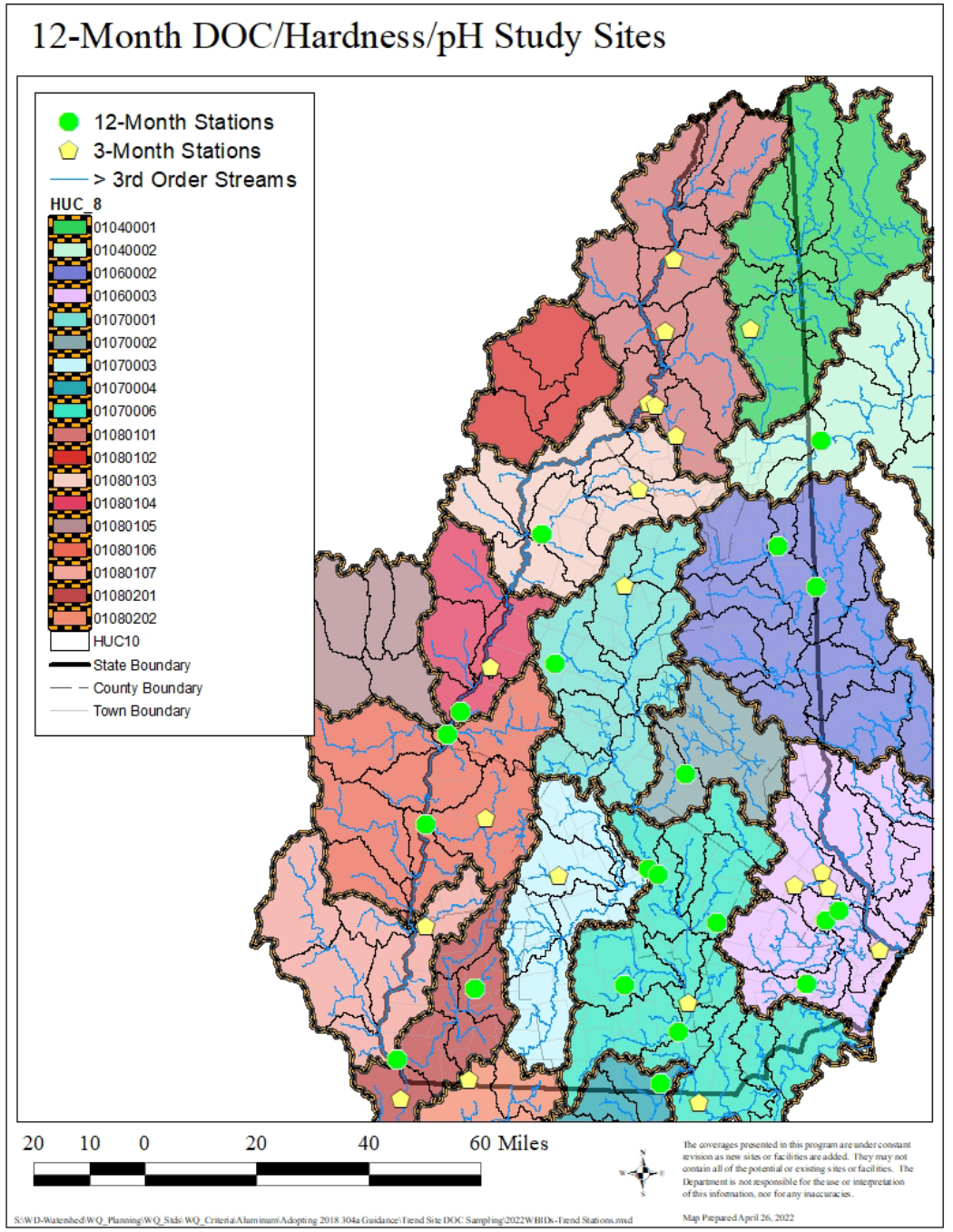


2018 304(a) Recommendations

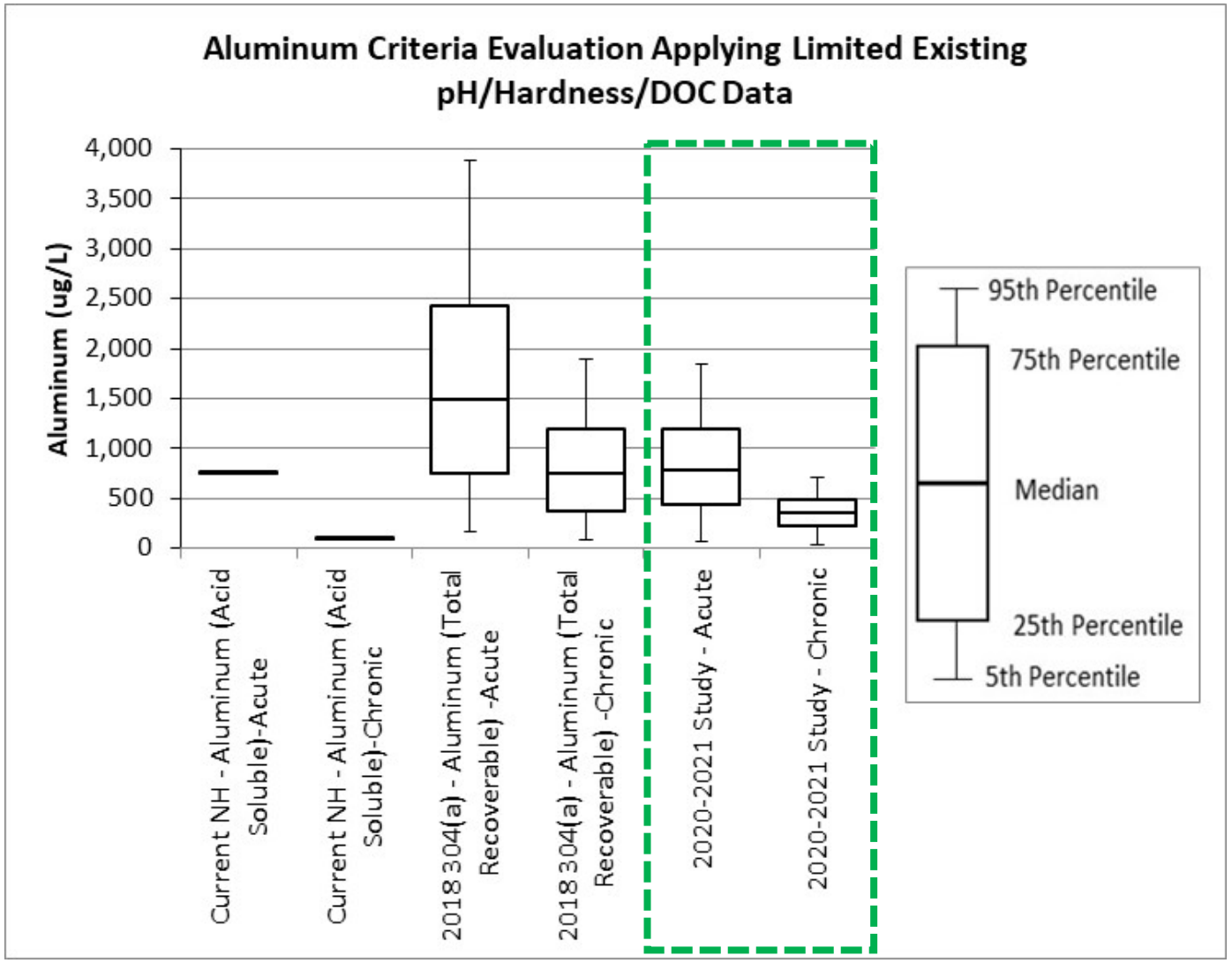
Total Recoverable Aluminum

Nov-2020 to Oct-2021

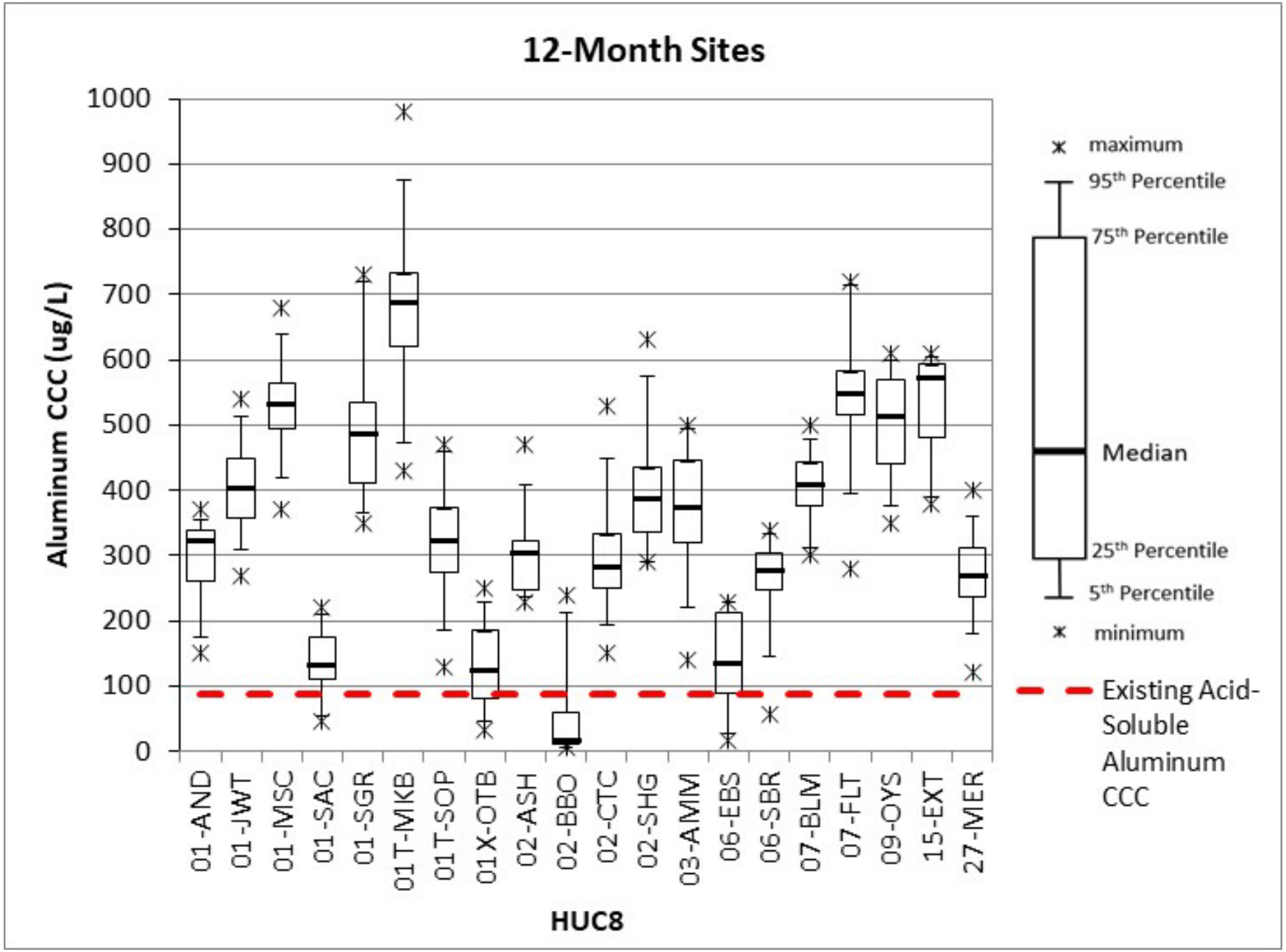
- Dissolved Organic Carbon
- Hardness
- pH
- Total Aluminum
- Color
- Specific Conductance
- Chloride
- Turbidity
- Temperature
- Dissolved Oxygen



Adding the 2020-2021 Study data

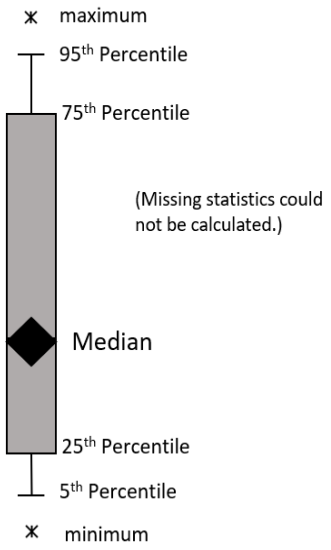


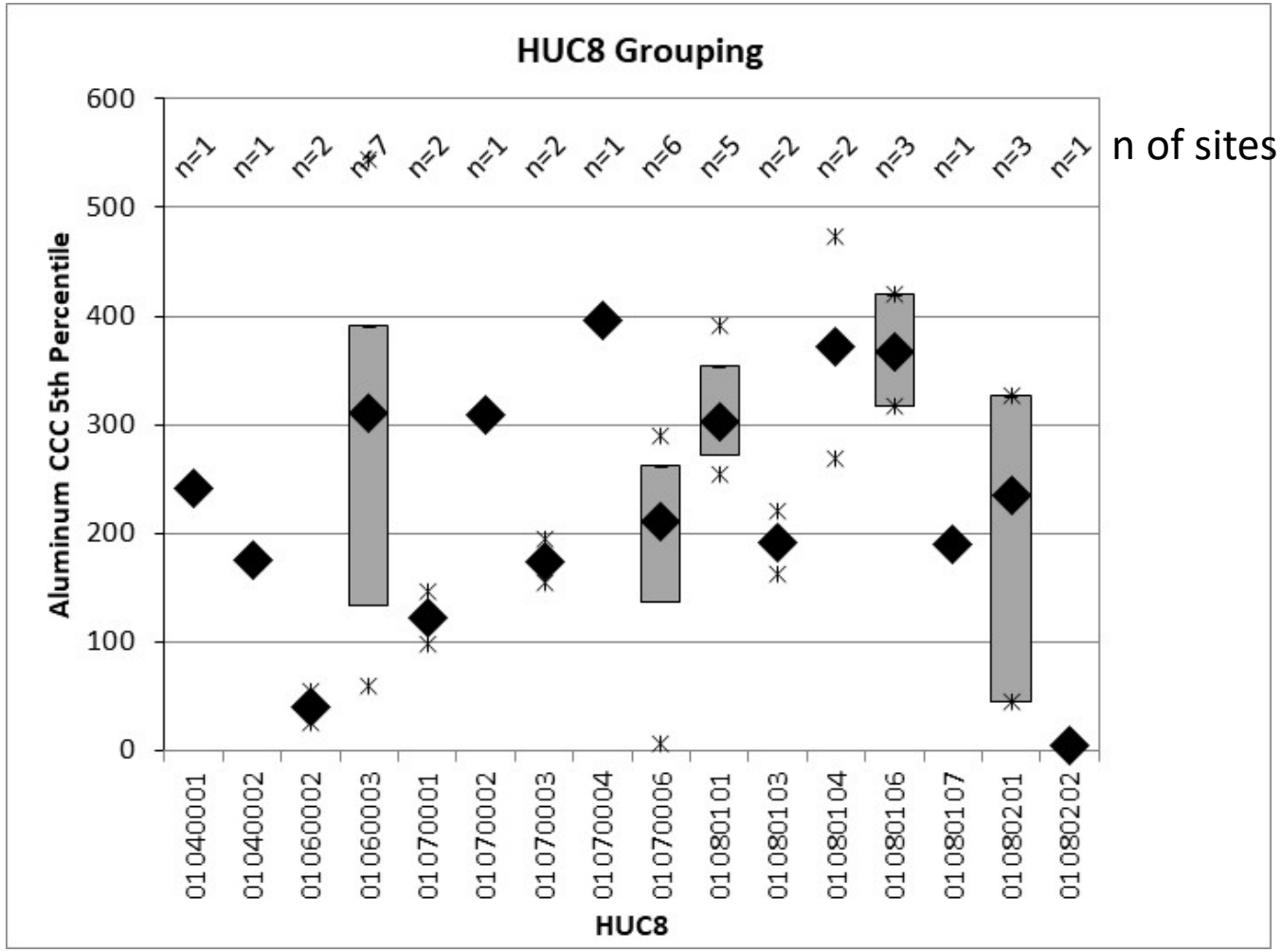
- Similar, but overall lower criteria predicted for the trend monitoring network sites.
- More representative of state flowing water diversity.



- CCC = criterion continuous concentration = chronic criterion.
- Large variability within and between stations.
- Some stations see extremely low criterion at times.

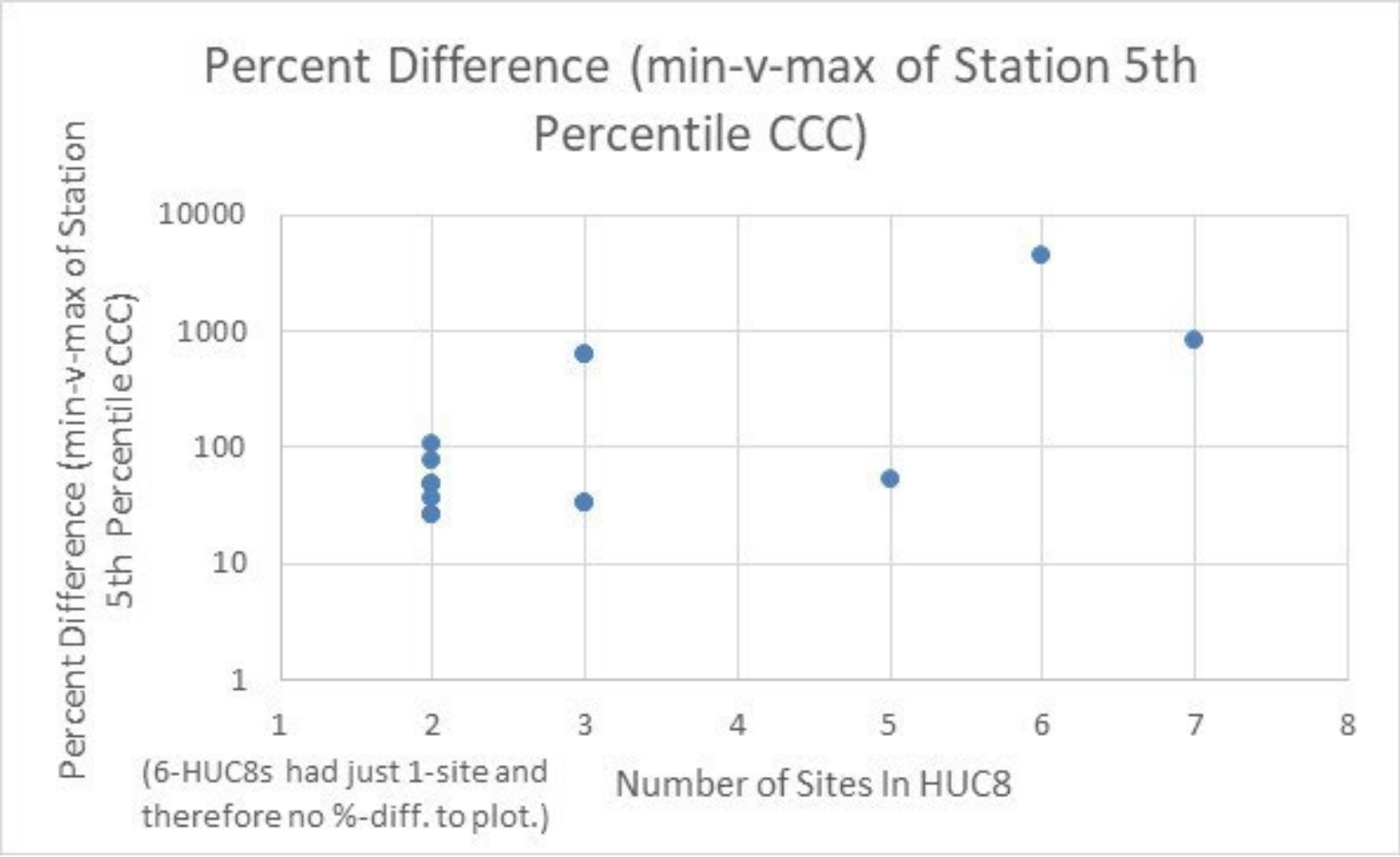
Distribution of the 5th Percentiles by HUC8





- Initial EPA guidance suggests 5th or 10th percentile be used for NPDES reasonable potential.
- Large variability within HUC8s.
- Too few sites to calculate robust statistics for most HUCs.

HUC8 Differences in the 5th Percentiles



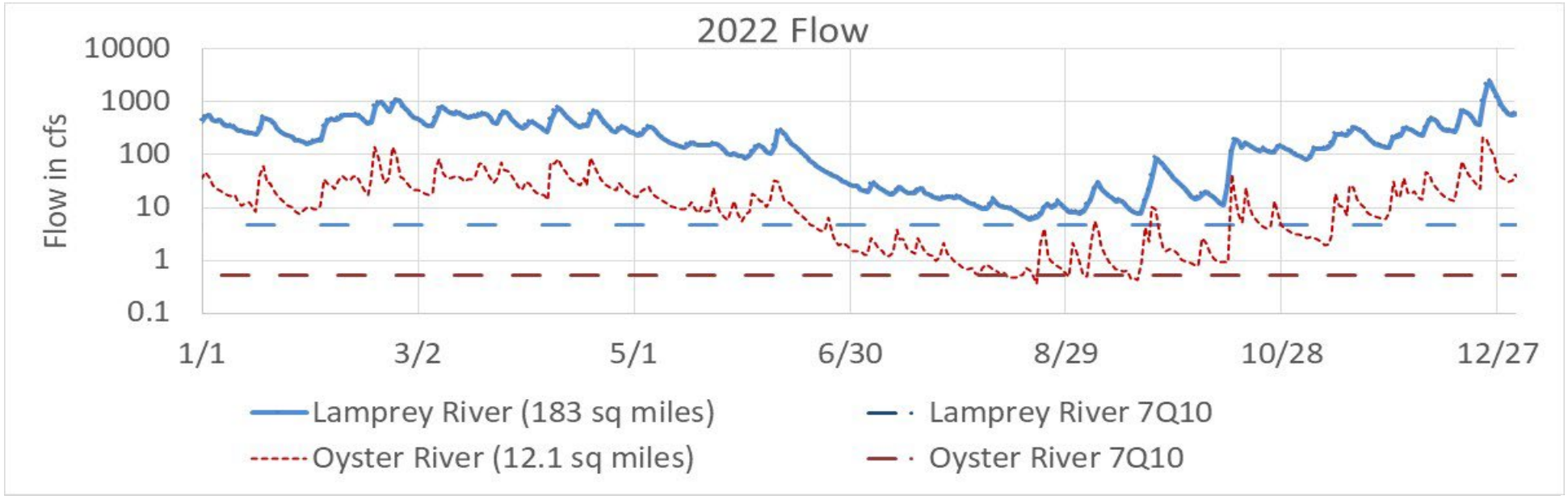
- Large variability within HUC8s.
- "Apparent" variability limited by the number of sites.
- Implication is for straight percentile based defaults to be both unprotective and hyper overprotective in a given HUC.

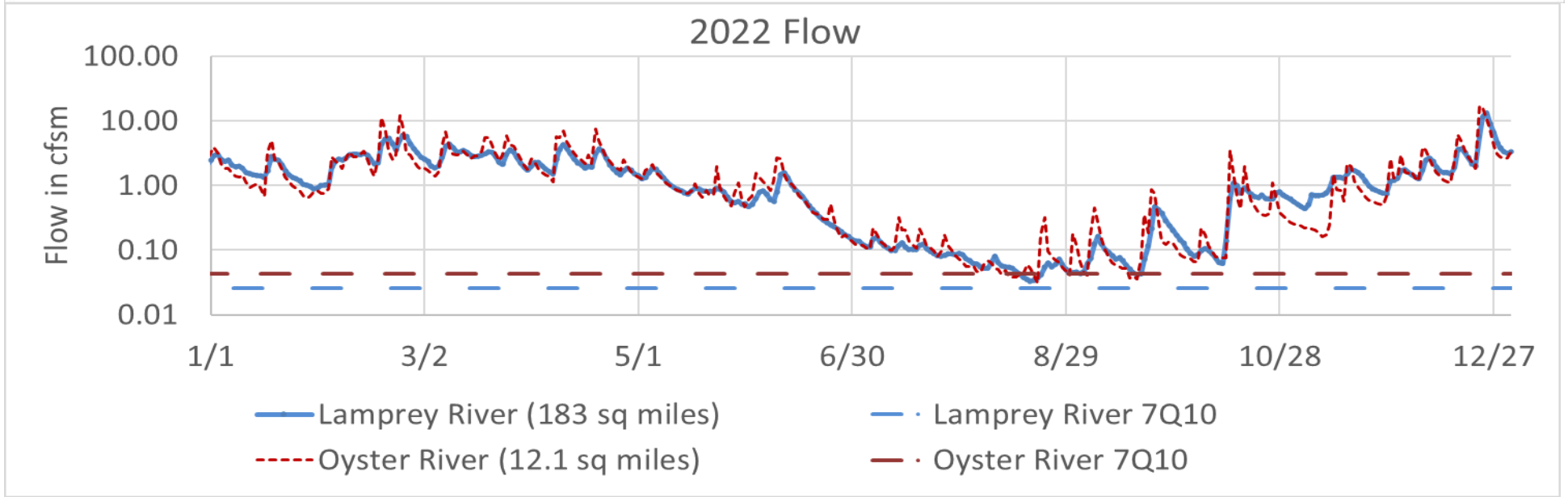
Data dive for 2018 Aluminum 304(a) criteria patterns

Cubic feet per second

-verses-

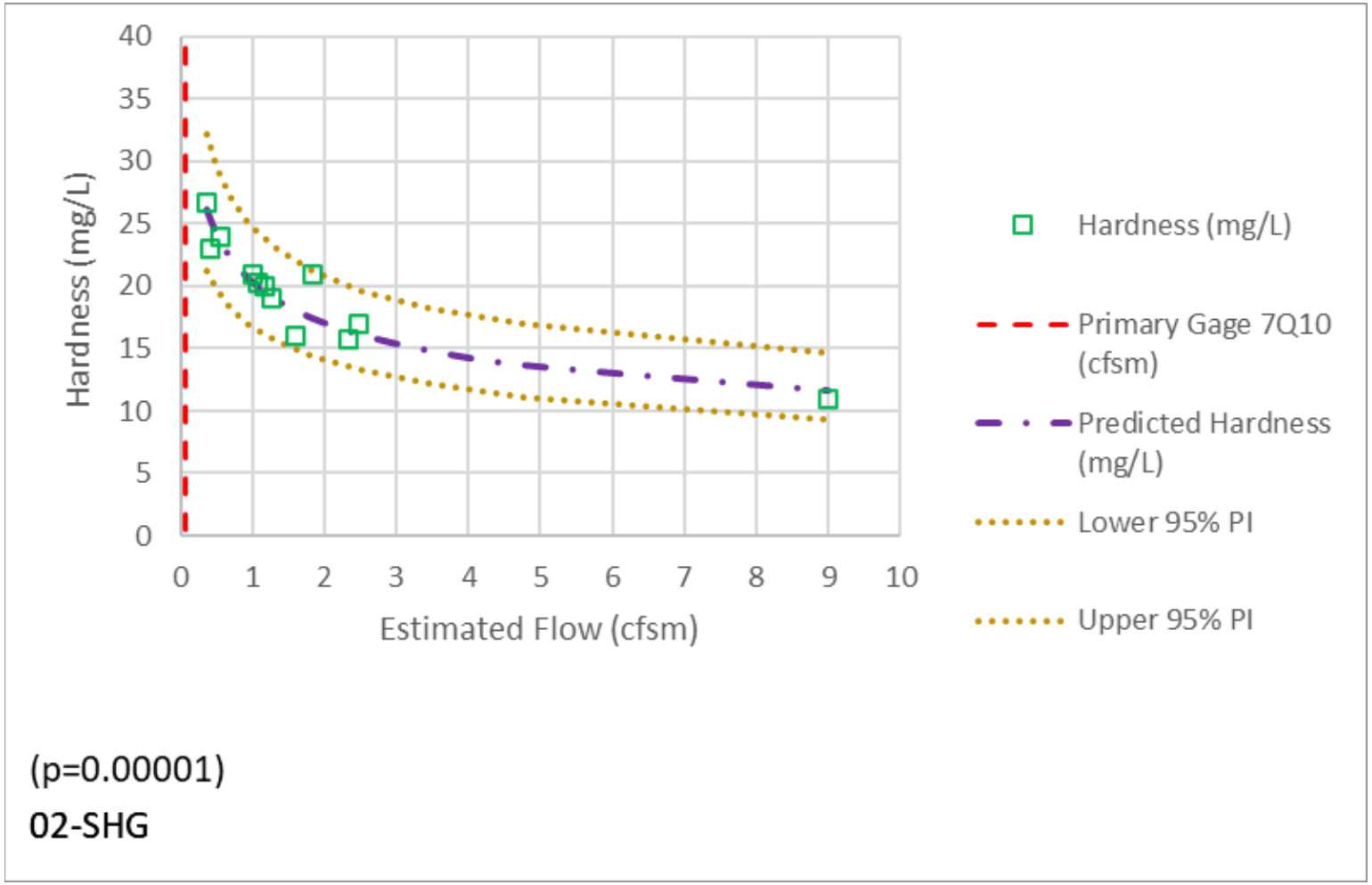
Cubic feet per second per square miles





On the majority of days, the cfsm values from the two locations are interchangeable.

Hardness – vs – Flow
Souhegan River Example



- Hardness is strongly predicted by flow.
- Hardness is highest at low flows.

Ratio of Sampled Concentration to Station Median – Site Example: 27-MER, hardness

Month-Year	Hardness (mg/L)
Nov-20	14
Dec-20	11
Jan-21	12
Feb-21	15
Mar-21	12
Apr-21	8.8
May-21	10.6
Jun-21	16.1
Jul-21	11
Aug-21	13
Sep-21	14
Oct-21	12.6

Hardness median across dates = 12.3 mg/L

Month-Year	Ratio Station Sample:Station Median - [Hardness]
Nov-20	1.14
Dec-20	0.89
Jan-21	0.98
Feb-21	1.22
Mar-21	0.98
Apr-21	0.72
May-21	0.86
Jun-21	1.31
Jul-21	0.89
Aug-21	1.06
Sep-21	1.14
Oct-21	1.02

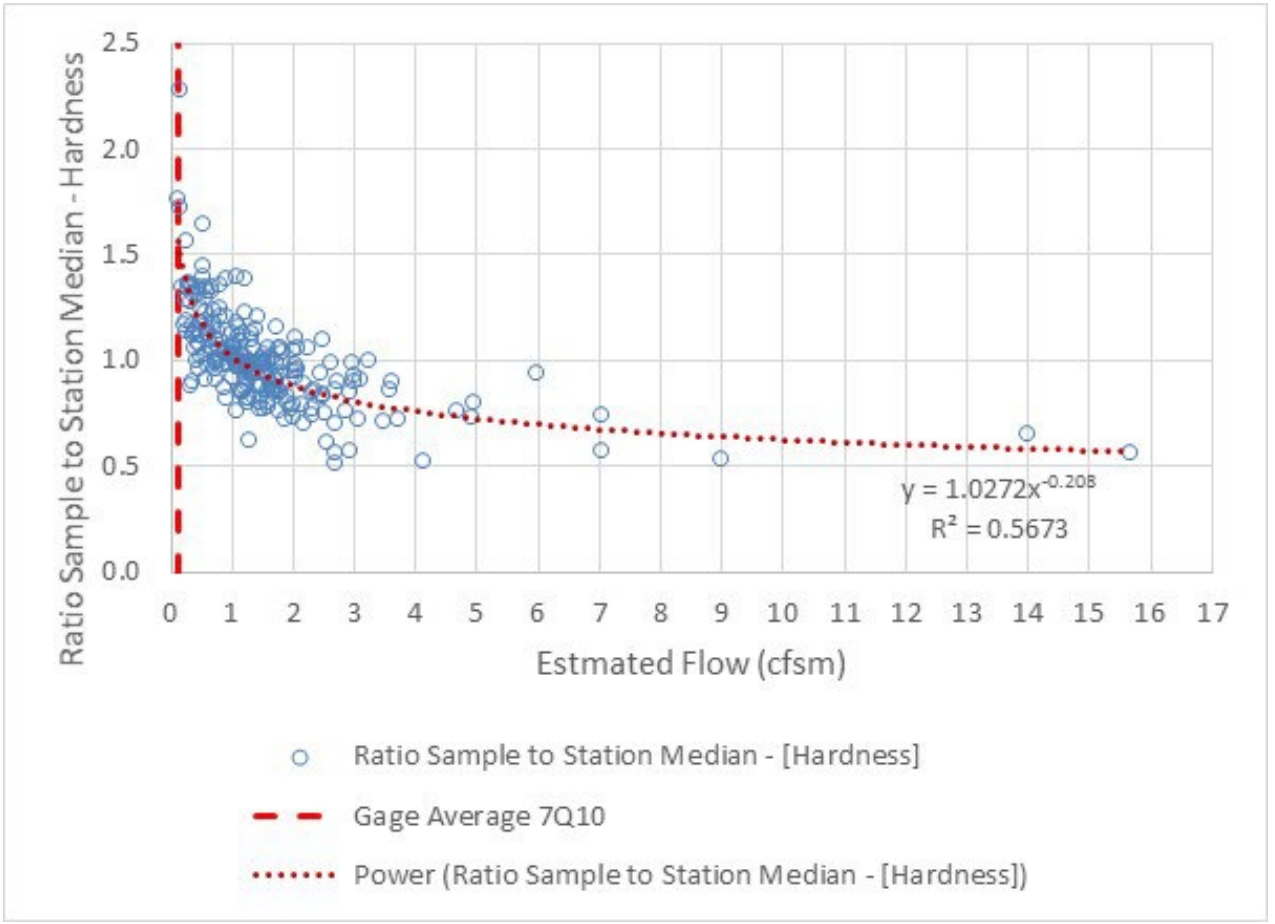
>1 → Sample is over the site median

=1 → Sample equals site median

<1 → Sample is below site median

Hardness – vs – Flow
Based on the 12-Month Sites

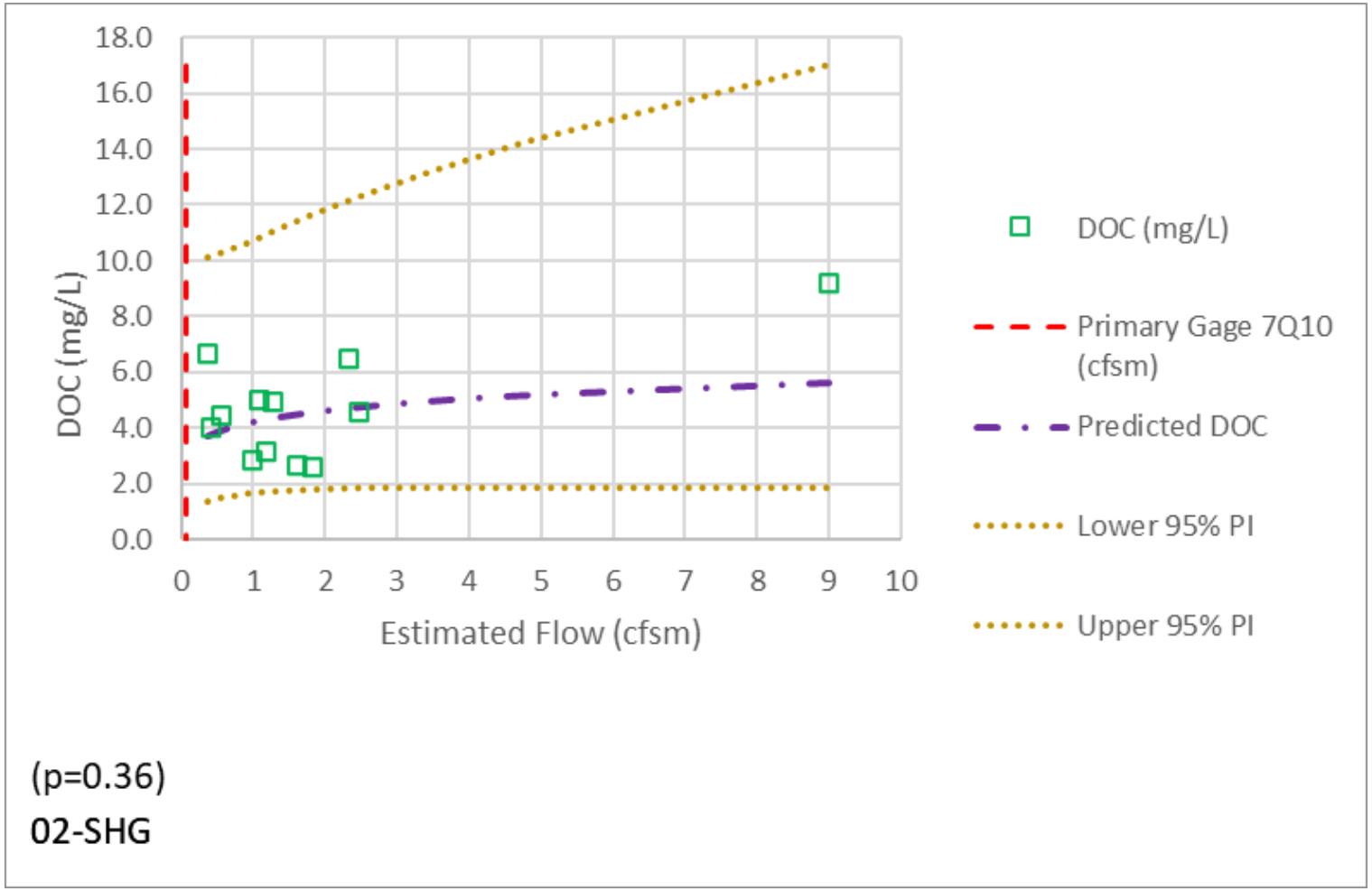
- 20 of 20, Hardness increases with decreasing flow
  - 17 of 20, significant at p<0.05
  - 2 of 20, p>0.5 & <0.10
  - 1 of 20, p>0.10



Hardness – vs – Flow
Statewide Relationships?

- Start with the 514 river stations that have hardness data
- 95 Stations where;
  - Sampled at flow < 1 cfsm
  - Sampled at flow range > 2cfsm
  - At least 5 samples (median n = 13)
- 67 significant relationships ($p<0.05$):
  - 67 Hardness increases with decreasing flow
  - 0 Hardness decreases with decreasing flow
- 28 insignificant relationships:
  - 24 Hardness increases with decreasing flow
  - 4 Hardness decreases with decreasing flow

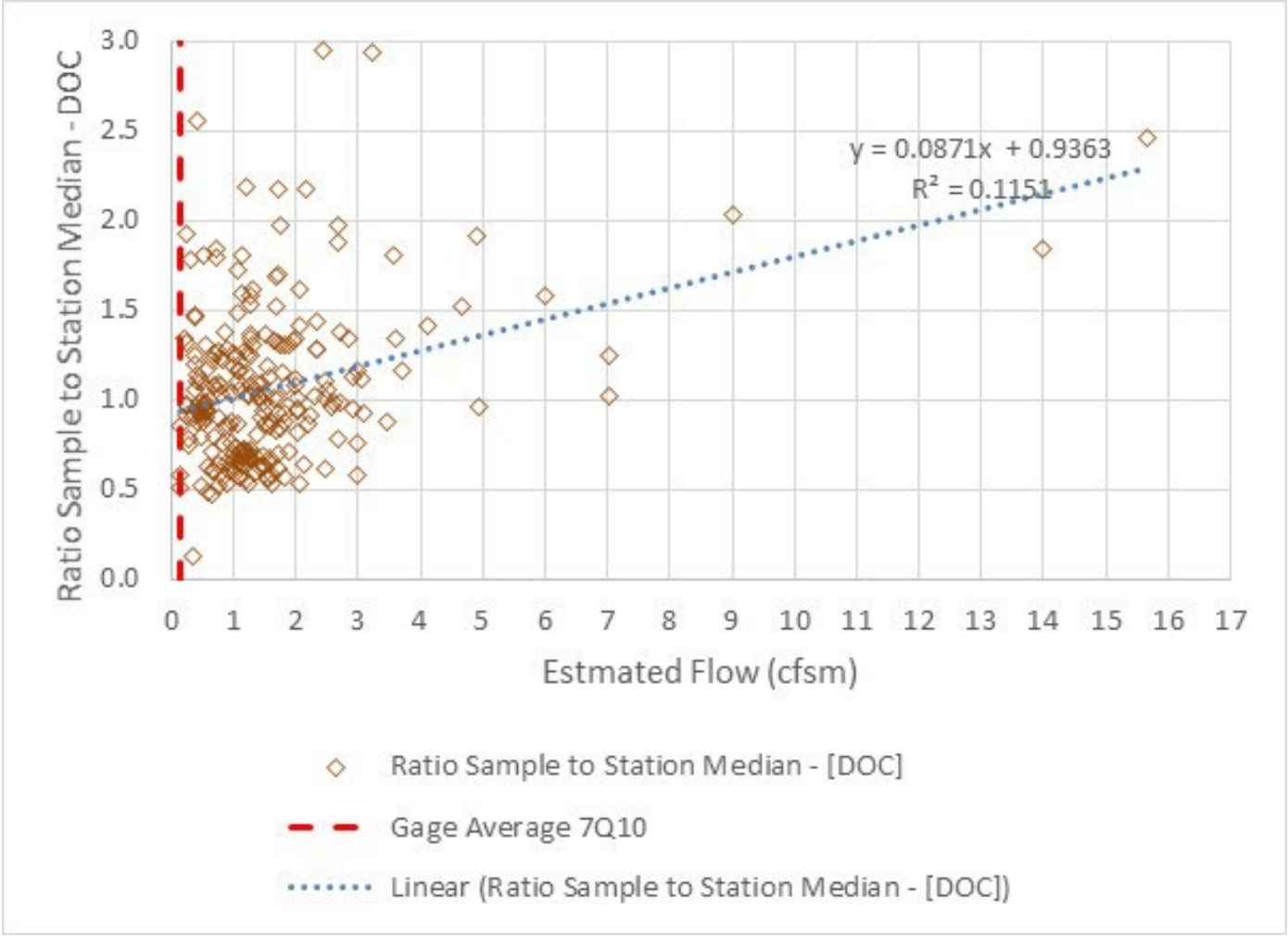
DOC – vs – Flow
Souhegan River Example



- DOC was not predicted by flow.
- No apparent pattern.

DOC – vs – Flow
Based on the 12-Month Sites

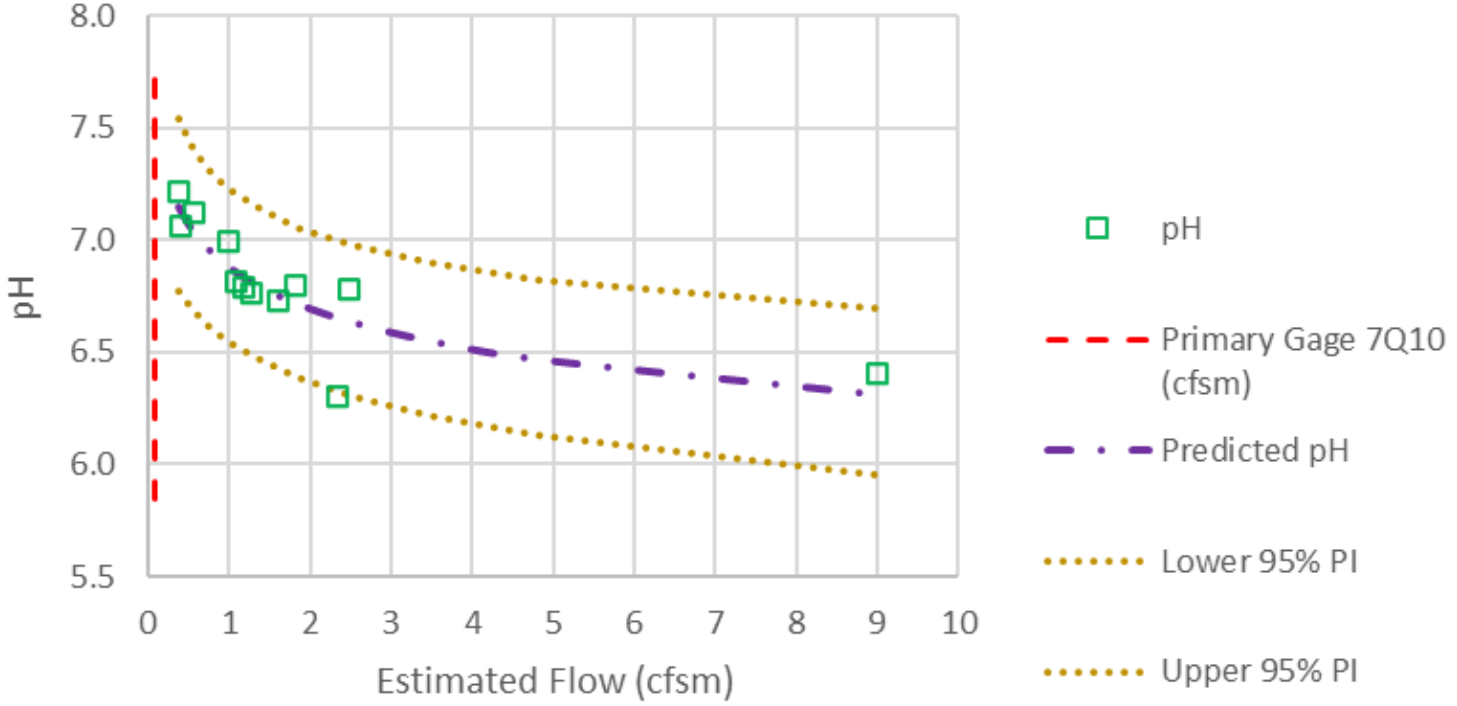
- 2 of 20, DOC increases with decreasing flow
  - 2, p>0.30
- 18 of 20, DOC decreases with decreasing flow
  - 1, p<0.05
  - 17, p>0.15



DOC – vs – Flow
Statewide Relationships?

- ??? – Not enough data to explore.

pH – vs – Flow
Souhegan River Example



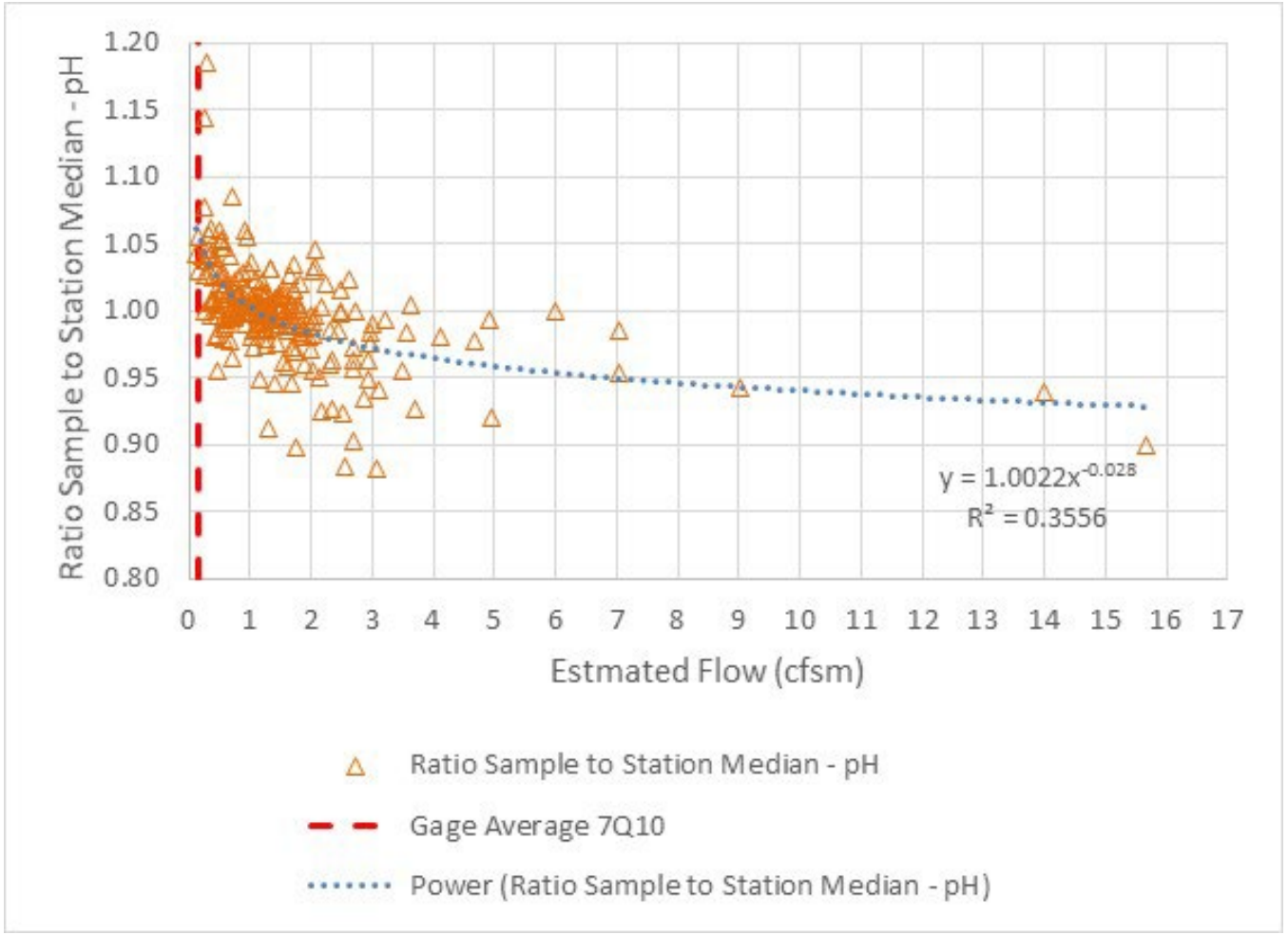
(p=0.00034)

02-SHG

- pH is strongly predicted by flow.
- pH is highest at low flows.

pH – vs – Flow
Based on the 12-Month Sites

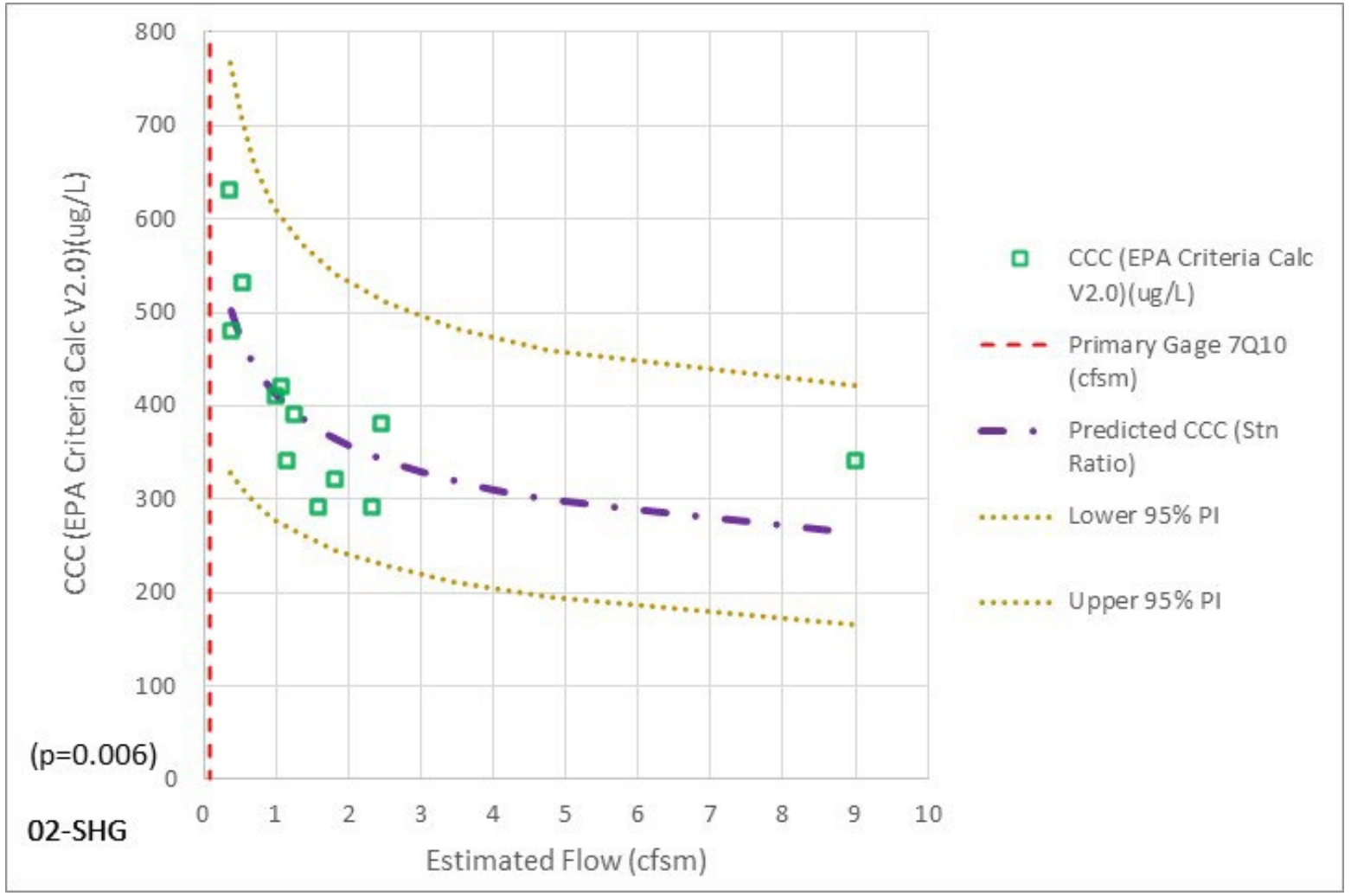
- 19 of 20, pH increases with decreasing flow
  - 15, significant at p<0.05
  - 4, p>0.10
- 1 of 20, pH decreases with decreasing flow
  - 1, p>0.30



pH – vs – Flow
Statewide Relationships?

- Start with the 2446 river stations that have pH data.
- 880 stations where;
  - Sampled at flow < 1 cfsm
  - Sampled at flow range > 2cfsm
  - At least 20 samples (median n = 49)
- 544 significant relationships ($p<0.05$):
  - 525 pH increases with decreasing flow
  - 19 pH decreases with decreasing flow
- 336 insignificant relationships:
  - 244 pH increases with decreasing flow
  - 92 pH decreases with decreasing flow

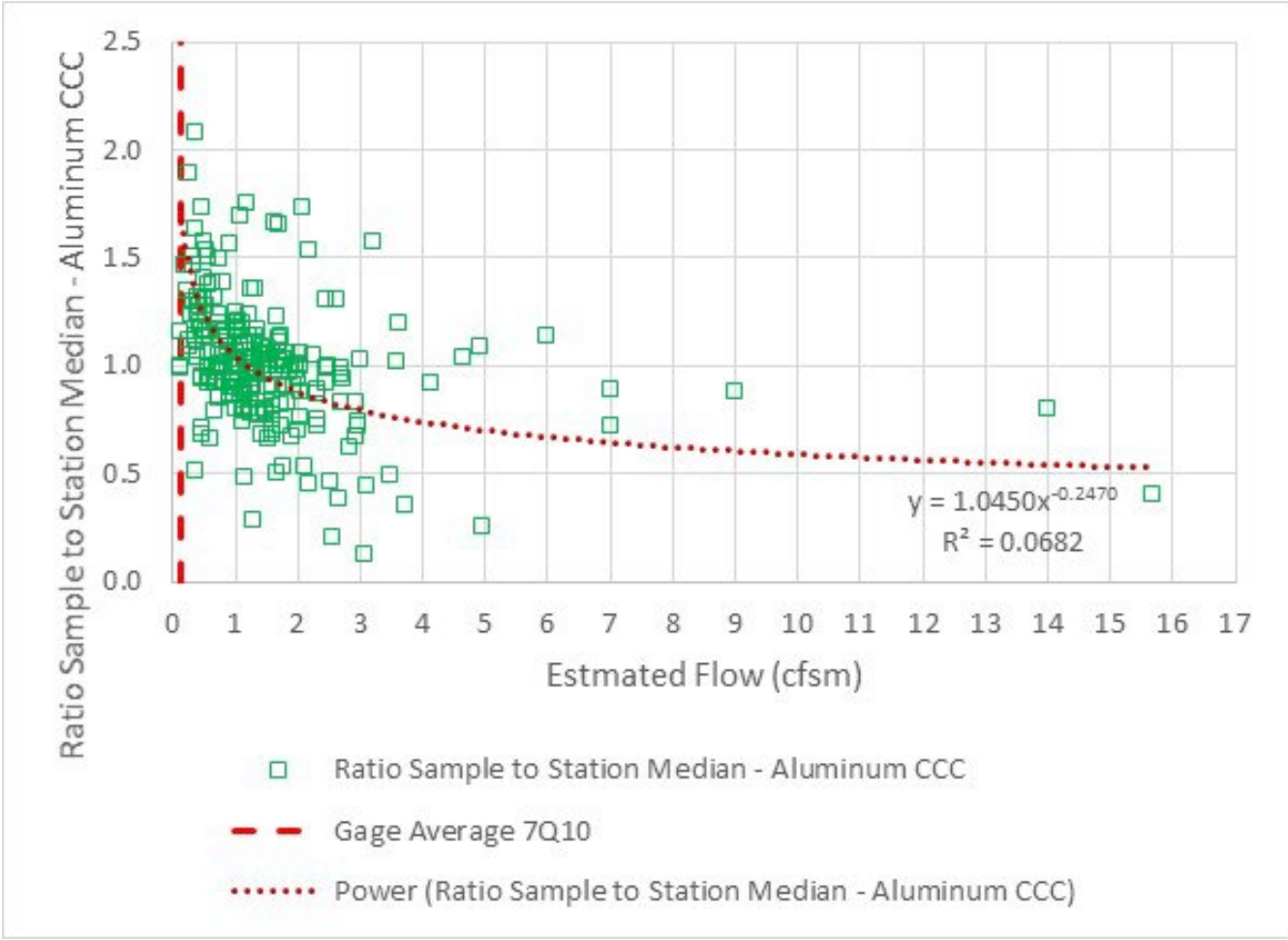
2018 Aluminum 304(a) – vs – Flow Souhegan River Example



- Aluminum instantaneous criterion is strongly predicted by flow.
- Aluminum instantaneous criterion is highest at low flows.

2018 Aluminum 304(a) – vs – Flow Based on the 12-Month Sites

- 19 of 20, Aluminum CCC increases with decreasing flow
  - 8, significant at p<0.05
  - 4, p>0.5 & <0.10
  - 7, p>0.10
- 1 of 20, Aluminum CCC decreases with decreasing flow
  - 1, p>0.25



2018 Aluminum 304(a) criteria patterns.

- Large spatial variability.
- At times, a larger temporal variability at a given site.
- In our datasets, the new criteria are inversely related to flow. That is, aluminum is predicted to be more toxic as flows increase.
- There is generally the lowest toxicity during the warmest, most biologically active, lowest flow periods.

Draft Env-Wq 1700 Aluminum Criteria

CAS Number	Chemical Name	Protection of Aquatic Life Concentration in micrograms per liter (µg/*L*)[v]				Protection of Human Health Units per Liter	
		Fresh Acute Criteria	Fresh Chronic Criteria	Marine Acute Criteria	Marine Chronic Criteria	Water & Fish Ingestion	Fish Consumption Only
7429-90-5	Aluminum	750 [s]	87 [s]	--	--	--	--

(s) The letter "s" shall indicate that ~~this value is expressed as acid-soluble aluminum~~ ***there are two methods to evaluate the aluminum criteria and*** ~~t~~***the appropriate method shall be determined as follows:***

(1) The values in Table 1703-1 are expressed as acid-soluble-aluminum and shall be used subject to (2) below.

(2) Where waterbody specific pH, dissolved organic carbon and hardness are available, sample specific total aluminum criteria shall be determined using the procedures described in the EPA publication "Final Aquatic Life Ambient Water Quality Criteria for Aluminum", EPA-822-R-18-001, dated December 2018, available as noted in Appendix B, provided that for aluminum, either of the following references may be used to calculate the site-specific criteria:

a. The "Aluminum Criteria Calculator V2.0 (Excel)(xlsm)", dated December 2018; or

b. The "Aluminum Criteria Calculator R Code and Data V2.0(R)", dated November 15, 2019.

Aluminum Implementation

- 305(b)/303(d) Assessments
- NPDES
  - Data needs
  - Calculations
  - Decision structure
  - Example

305(b)/303(d) Assessments

- Waterbody specific pH, dissolved organic carbon and hardness are available?
  - YES → MLR based total aluminum criteria applied
  - NO → Fixed acid soluble aluminum criteria applied
- Once Env-Wq 1700 is approved, revise the Consolidated Assessment and Listing Methodology (CALM) and assess per
  - 3.2.4 Use: Aquatic Life Integrity
  - Indicator 12: Water Quality Criteria for Toxic Substances in the Ambient Water

NPDES Implementation

Water Quality Data Requirements

- NPDES permit reasonable potential analysis needs to be based on site level data.
- Five years of quarterly sampling of DOC *(TOC),* pH, hardness, and total aluminum.
  - 20 samples would be a complete dataset. 17 samples would be adequately representative (85%).
- Alternatively,
  - Monthly sampling for 2-years (n=24, 21 samples would be adequately representative (85%))
  - Bi-monthly sampling for one year (n=24, 21 samples would be adequately representative (85%))
  - ….other
- Collections are to be distributed over the year and flow range.

NPDES Implementation (cont.)

Flow Data Requirements

- Scenario 1) - Direct from Nearby Gage(s)
  - Applied where a facility's 7Q10 was derived via a single or mix of local USGS gages
- Scenario 2) - Direct from Nearby Gage(s) with corroboration by a local staff gage.
  - Applied where a facility's 7Q10 was derived via some mix of local USGS gages and the Dingman equation or where local gages represent a small portion of the discharger's watershed area.
- Scenario X) - Direct from Nearby Gage(s)
  - Other methods to generate a synthetic hydrograph and 7Q10 with NHDES pre-approval where the above methods are inadequate.
- The next step is inherently very conservative to account for the difficulty in establishing accurate flow.

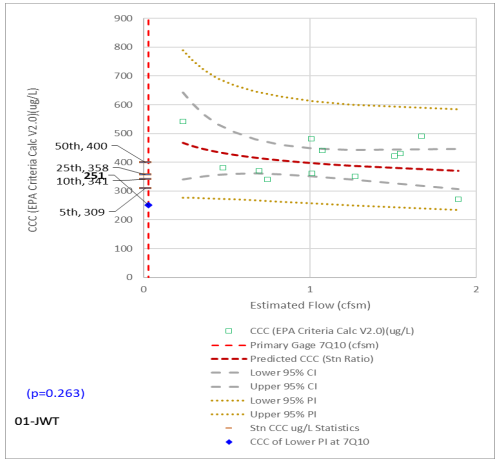
NPDES Implementation (cont.)

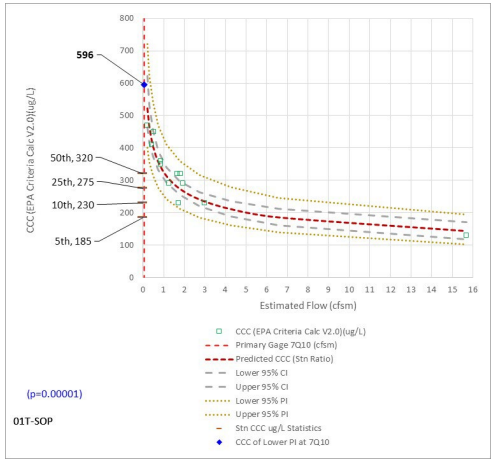
Calculations

1. Determine if **threatened or endangered species** are present, or habitat has been declared.
2. Calculate the **aluminum instantaneous criteria values (ICVs).**
3. Perform a power regression of flow (cfsm) verses aluminum CCC and determine the **95th percentile lower prediction interval**.
4. Calculate the **7Q10** for the representative gage(s) or the more site representative synthetic hydrograph depending upon the method used to generate the flow data for the power regression.
5. Calculate the **5th, 10th and 50th percentile CCC from the ICVs** for the site data.
6. Calculate the **CCC of the 95th percentile lower prediction interval at 7Q10**.

NPDES Implementation (cont.)

Application of the Analysis Output

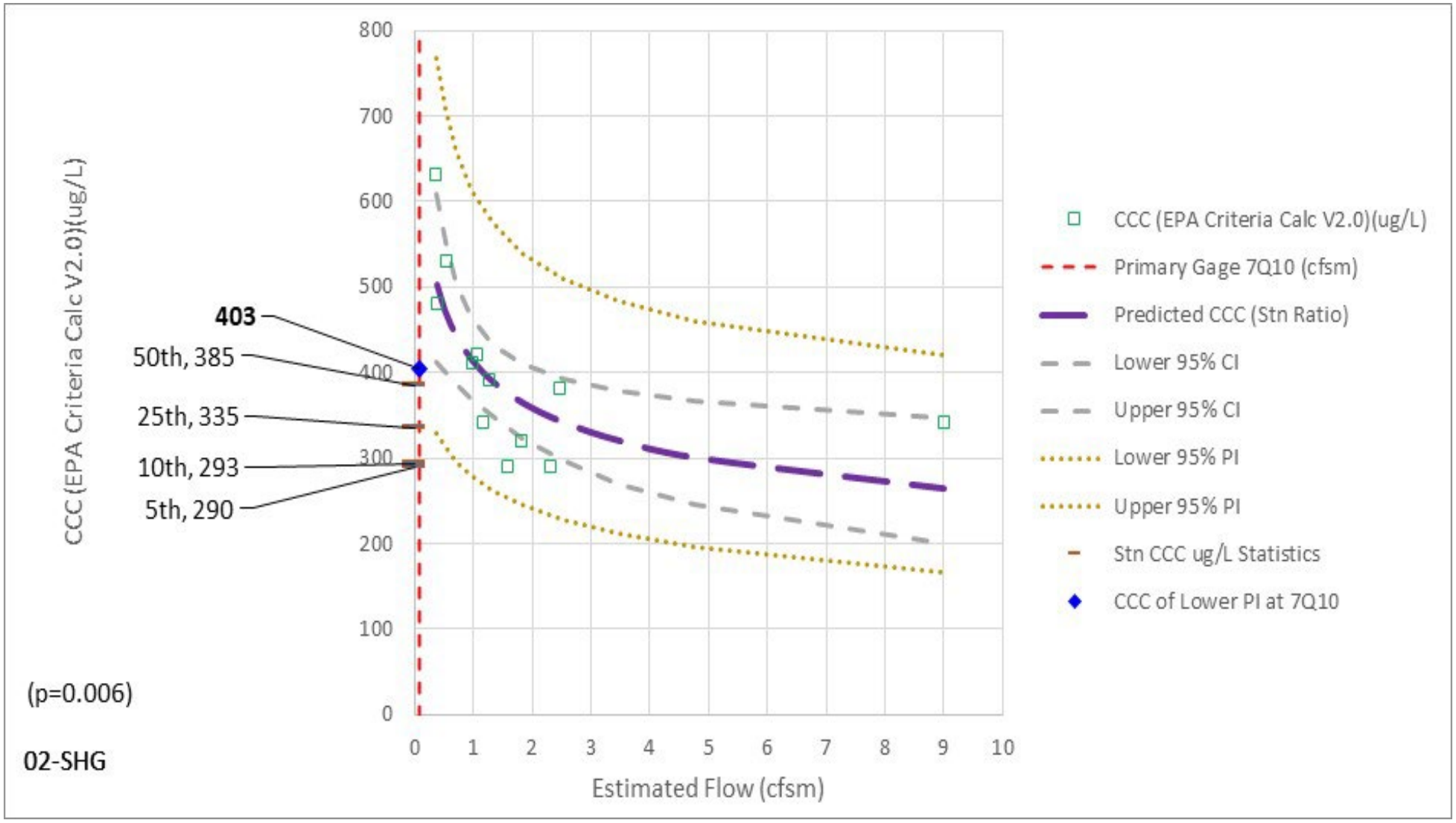




- If the power regression is insignificant (p>0.05),
  - CCC-5 where threatened or endangered species are present, or habitat has been declared.
  - CCC-10 where threatened or endangered species are not present, and habitat has not been declared.

- If the power regression is significant (p<=0.05),
  - If CCC-L95-PI > CCC-50 → CCC-50
  - If CCC-L95-PI < CCC-50 →
    - CCC-5 where threatened or endangered species are present, or habitat has been declared.
    - CCC-10 where threatened or endangered species are not present, and habitat has not been declared.

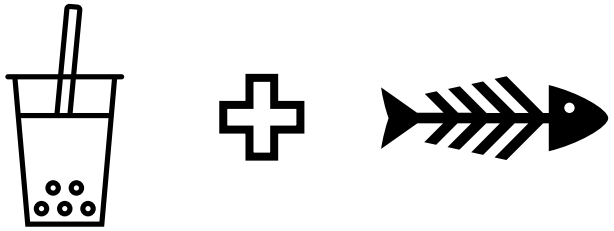
Souhegan River (02-SHG) Example



- At this site, reasonable potential would be based on 385 ug/L as the permitting criterion.
- Rate of increased dilution exceeds the decrease in the ICV.

Thoughts?

Arsenic – Human Heath Criteria (HHC)

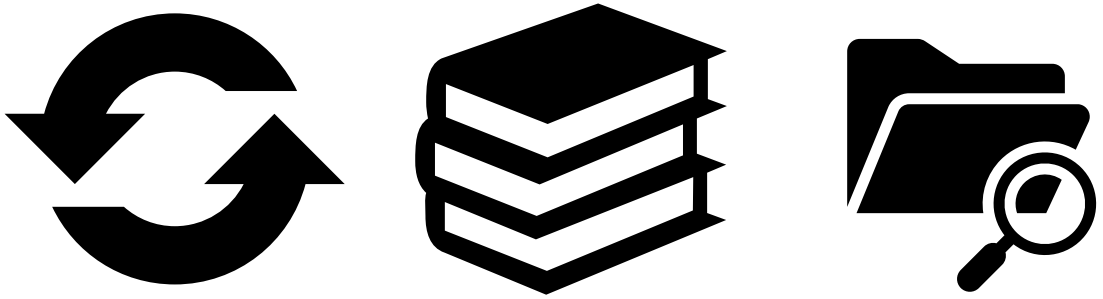
- Water and Organism Ingestion Criterion 
- Fish Consumption Only Criterion 

Arsenic HHC - Why?

- Balance Cancer Risks and Fish Consumption Benefits
- HHC is very low
  - Currently 0.140 and 0.018 µg/L for consumption of organism only and the consumption of water and organism
  - HHC <<< MCL (5 ug/L)
- Arsenic is common in New Hampshire waters but cannot tell how it compares to HHC inorganic due to DLs.
  - Portion is natural and an undefined portion is human (sources are largely legacy/old).
- NPDES permits issues upcoming. Very difficult ($$$$) to treat.

Arsenic HHC - What?

- To balance risk/benefit - Update the arsenic HHC for Env-Wq 1700 to a risk factor of 1:100,000 (10^{-5}).
- To properly account for modern inputs - Updating other equation input variables to those currently recognized as best practices and fish consumption rate specific to New Hampshire residents.



Input Variables	Current Env-Wq 1700 - All waters	Revised Env-Wq 1700 -	Update Rational
Risk	10^{-6}	10^{-5}	Balancing health risks of arsenic with health benefits of fish consumption.
Body Weight (BW) (kg)	70	80	Current guidance (EPA, 2011)
cancer potency factor (q1*) (cancer slope factor) (fixed value) (per (mg/kg)/d)	1.75	1.5	Current IRIS q1* (IRIS Summary)
Drinking water intake (DW) (L/d)	2.0	2.7	Current guidance (EPA, 2019)
Fish Consumption Rate (FCR) (g/d)	6.5	92.0	95th percentile from New Hampshire 2021 survey (in pub.).
Inorganic fraction[3] (IF) (Percent)	-na-	10	Based on Oregon's work. (DEQ, 2011)
Bioconcentration Factor (BCF) (L/kg)			

Input Variables	Current Env-Wq 1700 - All waters	Revised Env-Wq 1700 - Freshwaters	Revised Env-Wq 1700 – Marine	Update Rational
Risk	10^{-6}	10^{-5}	10^{-5}	Balancing health risks of arsenic with health benefits of fish consumption.
Body Weight (BW) (kg)	70	80	80	Current guidance (EPA, 2011)
cancer potency factor (q1*) (cancer slope factor) **(fixed value) (per (mg/kg)/d)**	1.75	1.5	1.5	Current IRIS q1* (IRIS Summary)
Drinking water intake (DW) (L/d)	2.0	2.7	2.7	Current guidance (EPA, 2019)
Fish Consumption Rate (FCR) (g/d)	6.5	92.0	92.0	95th percentile from New Hampshire 2021 survey (in pub.).
Inorganic fraction[3] (IF) (Percent)	-na-	10	10	Based on Oregon's work. (DEQ, 2011)
Bioconcentration Factor (BCF) (L/kg)	44	14	26	Based on Oregon's work. (DEQ, 2011)

Math happens

Water Concentration Criteria for Fish and Shellfish Consumption

$$WCC = CF \times \frac{RF \times BW}{q1* \times BCF \times FCR \times IF}$$

Where:

WCC – Water Concentration Criteria (µg/L)

CF – Units Correction Factor (1,000 µg/mg)

RF – Risk Factor

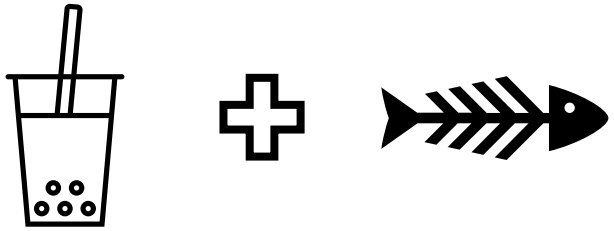
BW – Human Body Weight (kg)

q1* – Cancer Potency Factor (mg/kg-d)

BCF – Bioconcentration Factor (L/kg)

FCR – Fish or Shellfish Ingestion Rate (kg/d)

IF – Inorganic Fraction (%)



Water Concentration Criteria for Fish/Shellfish Consumption and Water Ingestion

$$WCC = CF \times \frac{RF \times BW}{q1* \times [DW + (BCF \times FCR \times IF)]}$$

Where:

WCC – Water Concentration Criteria (µg/L)

CF – Units Correction Factor (1,000 µg/mg)

RF – Risk Factor

BW – Human Body Weight (kg)

q1* – Cancer Potency Factor (mg/kg-d)

DW – Drinking Water Intake (L/d)

BCF – Bioconcentration Factor (L/kg)

FCR – Fish or Shellfish Ingestion Rate (kg/d)

IF – Inorganic Fraction (%)

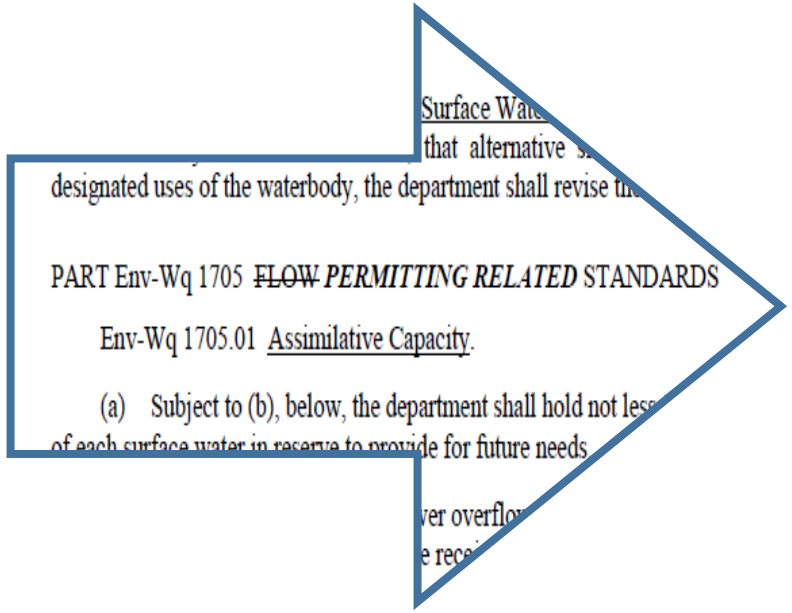
Draft Env-Wq 1700- Arsenic HHC

Criterion	Current Env-Wq 1700 - All waters	Revised Env-Wq 1700 - Freshwaters	Revised Env-Wq 1700 - Marine
Organism Only (ug/L)	0.140	4.10	2.20
Water and Organism (ug/L)	0.018	0.19	0.18

- Balance risk and benefits.
- NPDES permits issues upcoming. Very difficult ($$$$) to treat.
- Lots of new assumptions for criteria calculation.

Env-Wq 1705.02 – Dilution and Conditions for Permitting

- The revised rules set up the processes by which permits shall be written based upon a default target instream concentration, a model, or any of the other methods described.
- The ultimate approval of an approach lies in the EPA approval of a particular permit which must be protective of all designated uses.


Surface Wat
that alternative
designated uses of the waterbody, the department shall revise th

PART Env-Wq 1705 ~~FLOW~~ *PERMITTING RELATED* STANDARDS

Env-Wq 1705.01 Assimilative Capacity.

(a) Subject to (b), below, the department shall hold not less
of each surface water in reserve to provide for future needs

ver overflo
e rec

Known errors in draft Env-Wq 1700 to be corrected

- Pg 6 – Env-Wq 1702.49
  - ***Env-Wq 1702.49 "Water quality standards variance" means "water quality standards variance" as defined in 40 CFR 131.~~1~~3(o), namely a time-limited designated use and criterion for a specific pollutant(s) or water quality parameter(s) that reflect the highest attainable condition during the term of water quality standards variance.***
- Pg 10 – Env-Wq 1703.15(4)
  - ***(4) Beta Particle and Photon Radioactivity shall not exceed ~~5~~ 4 mrem/year.***

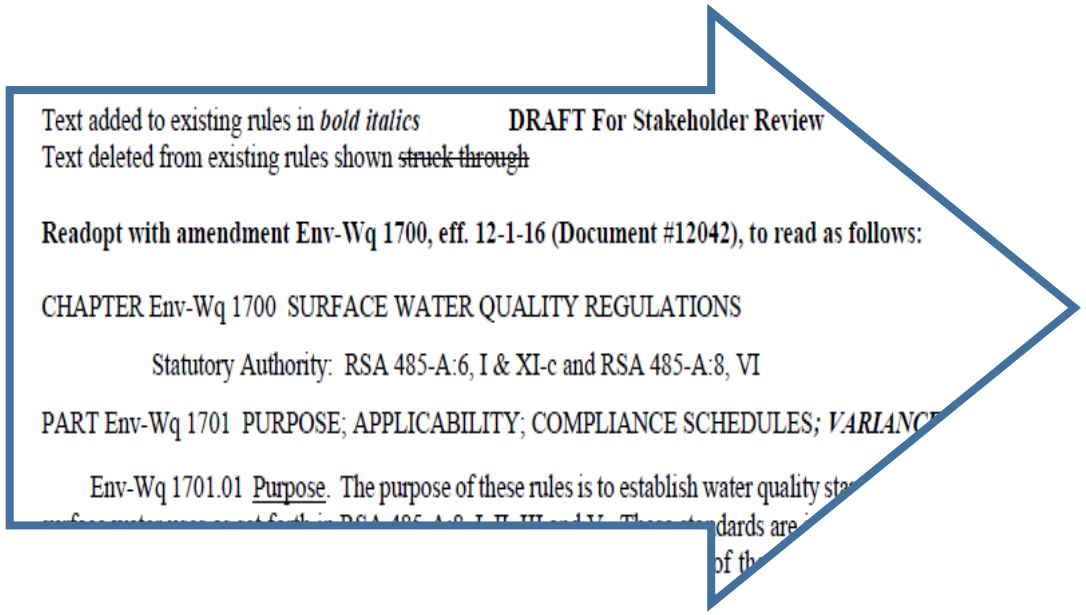
Known errors in draft Env-Wq 1700 to be corrected (cont.)

- Table 1703-01 – ug/L unless otherwise noted. Additional changes highlighted.

CASNO	Chemical Name	Water & Fish Cons.	Fish Cons. Only
207-08-9	Benzo(k) Fluoranthene	0.012	~~0.018~~ ***0.013***
57-12-5	Cyanide	~~140~~ ***4***	~~140~~ ***400***
72-55-9	DDE(4,4’)	~~0.22~~ ***0.018***	~~0.22~~ ***0.018***
72-54-8	DDD(4,4’)	~~0.31~~ ***0.12***	~~0.31~~ ***0.12***
50-29-3	DDT(4,4’)	~~0.22~~ ***0.03***	~~0.22~~ ***0.03***
60-57-1	Dieldrin	~~0.052~~ ***0.0012 ng***	~~0.054~~ ***0.0012 ng***
95-94-3	Tetrachlorobenzene 1,2,4,5	~~0.97~~ ***0.03***	~~1.1~~ ***0.03***
79-34-5	Tetrachloroethane 1,1,2,2	0.2	~~4~~ ***3***
79-01-6	Trichloroethylene	~~2.5~~ ***0.6***	~~30~~ ***7***

Annotated Env-Wq 1700

- Other sections folks would like to discuss?


Text added to existing rules in *bold italics* **DRAFT For Stakeholder Review**
Text deleted from existing rules shown ~~struck through~~

Readopt with amendment Env-Wq 1700, eff. 12-1-16 (Document #12042), to read as follows:

CHAPTER Env-Wq 1700 SURFACE WATER QUALITY REGULATIONS

Statutory Authority: RSA 485-A:6, I & XI-c and RSA 485-A:8, VI

PART Env-Wq 1701 PURPOSE; APPLICABILITY; COMPLIANCE SCHEDULES; *VARIANC*

Env-Wq 1701.01 Purpose. The purpose of these rules is to establish water quality st

dards are

of th

Toward Triennial Review - Process

Phases	Approx. Timeframe*
Pre-Rulemaking – internal review and solicit public comment. Draft initial proposal	June 2023
First Stage – 1. Water Council (tomorrow) 2. Fiscal Impact Statement 3. Rulemaking notice 4. Public hearing 5. File final proposal	June – November 2023
Second Stage – JLCAR	November 2023
CWA Submittal – EPA review and approval	December 2023

* Timeframe assumes everything goes well.

Toward Triennial Review – How to stay Informed

- Watch the NH Rulemaking Register Website
  - OLS Administrative Rules (state.nh.us)
- Watch the DES Rules/Regulatory Website
  - Public Comment Opportunities | NH Department of Environmental Services
- If you are not getting the meeting notices, get on the WQSIE e-mail distribution list
  - Send Ken Edwardson your address Kenneth.J.Edwardson@des.nh.gov

Other Business

- PFAS – National Fish Forum - fish tissue risk presentation
- Healthy Swimming Mapper
- Cyanobacteria plan –
  - 2022, HB 1066
  - monitoring, communication and outreach, watershed management, nutrient control, in-lake treatment,…
  - Policy and resource needs
- The next meeting will be the public hearing for the rules.
- Other?