

# Idaho Department of Environmental Quality

Revision of Idaho's  
Human Health Criteria for Arsenic  
Docket No. 58-0102-1801  
November 5, 2020

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# Outline

- Rulemaking Review
- Monitoring Update
- Criteria Options
- Next Steps
- Questions/Discussion



1992	1995	1999	2010	2016	2018	2023
National Toxics Rule	Idaho Revises	Idaho Adopts MCL	Idaho Revises to new MCL	EPA reconsiders, disapproves	Idaho initiates rulemaking, EPA and NWEA modify consent decree	New state or Federal Criteria



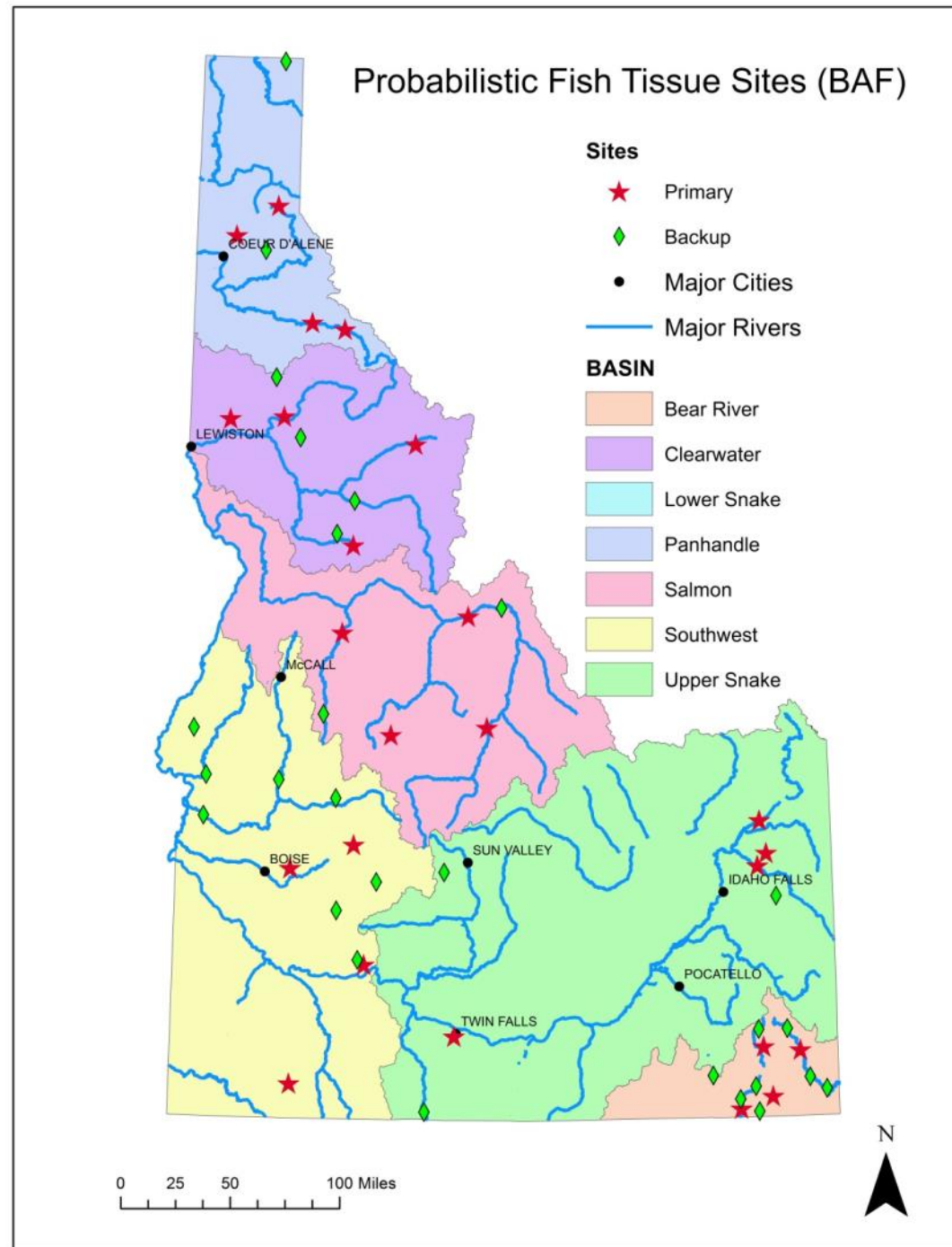
# Monitoring

- Probabilistic Arsenic Accumulation in Fish
- Targeted Ambient in Water



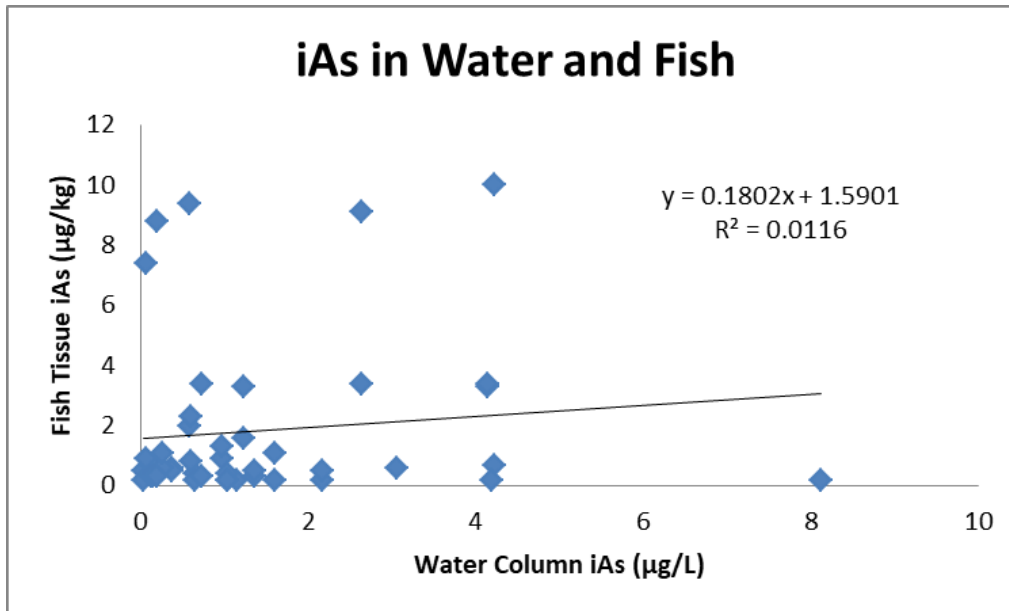
# Probabilistic As Accumulation

- 24 Sites
- Arsenic in fish and water



# Bioaccumulation Factor for Inorganic As

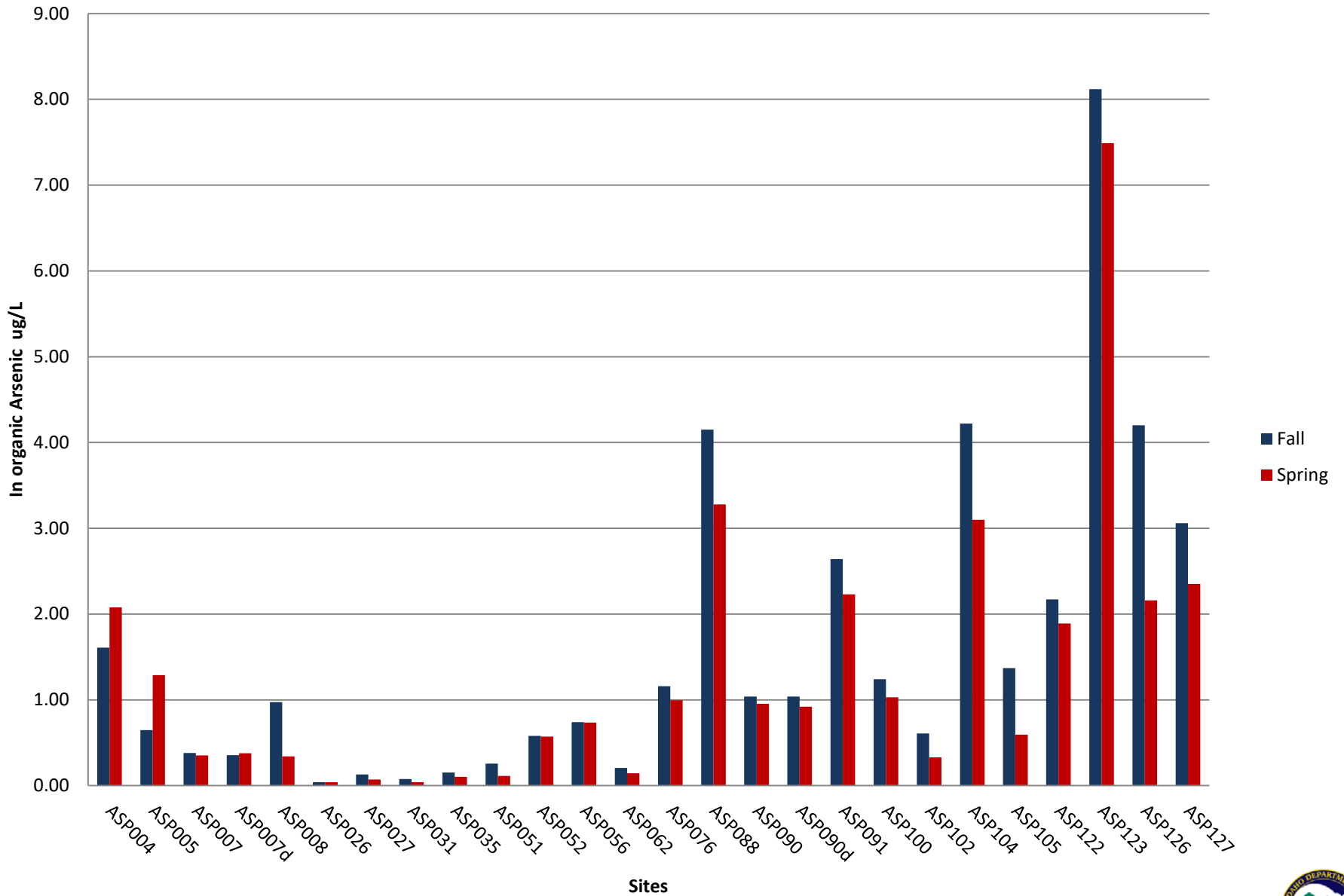
- Geometric Mean BAF = 1.12 L/kg



$$BAF = \frac{[As_{fish}]}{[As_{water}]}$$



# Inorganic Arsenic



# Fall 2019 vs. Spring 2020

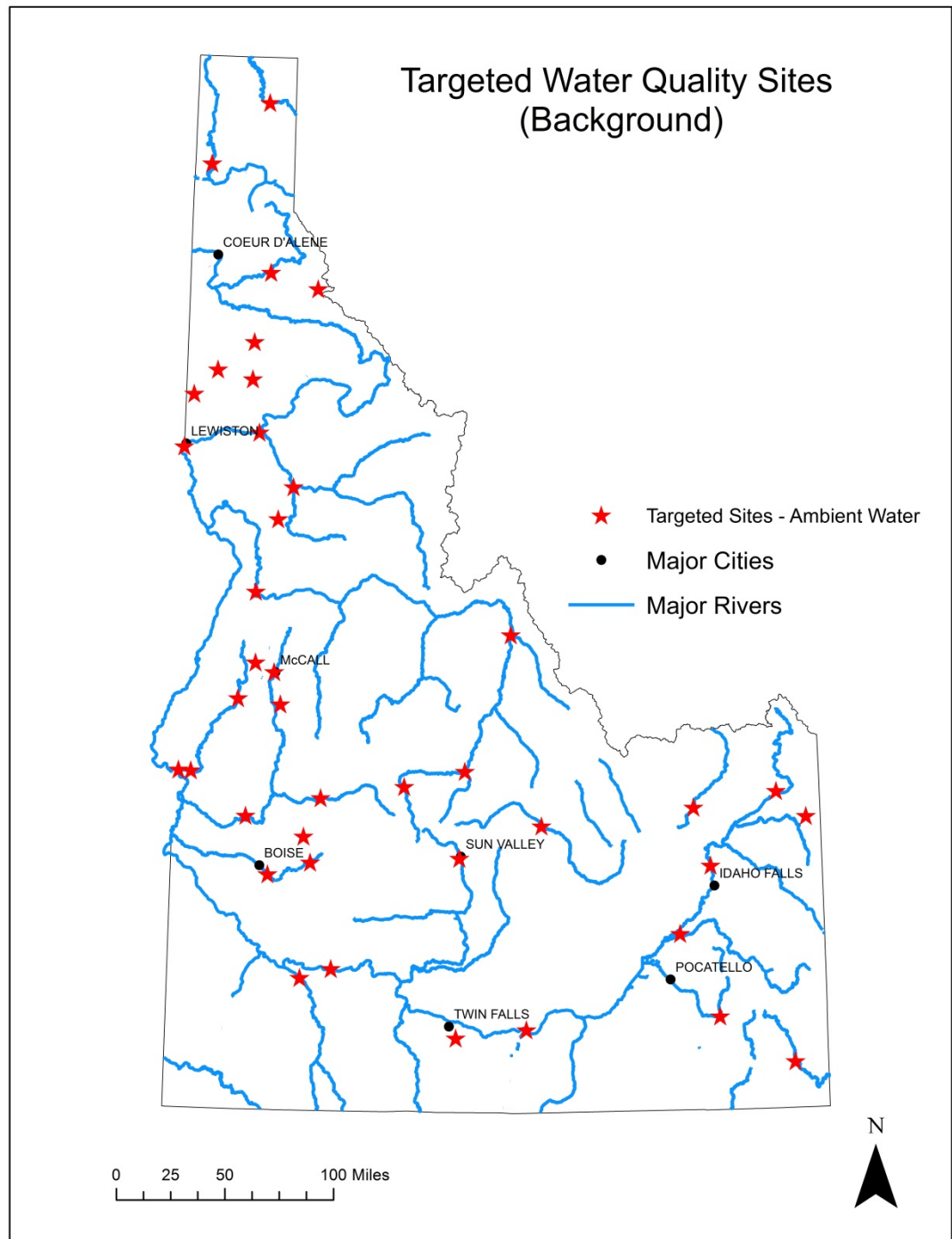
$$RPD = \frac{|R1 - R2|}{\left(\frac{R1 + R2}{2}\right)} \times 100,$$

	Absolute Difference ( $\mu\text{g/L}$ )	Relative Percent Difference (%)
Min	0.00	0
25 <sup>th</sup> %ile	0.008	9
Average	0.38	33
Median	0.19	24
Geomean*	0.17	21
75 <sup>th</sup> %ile	0.631	58
Max	2.04	96

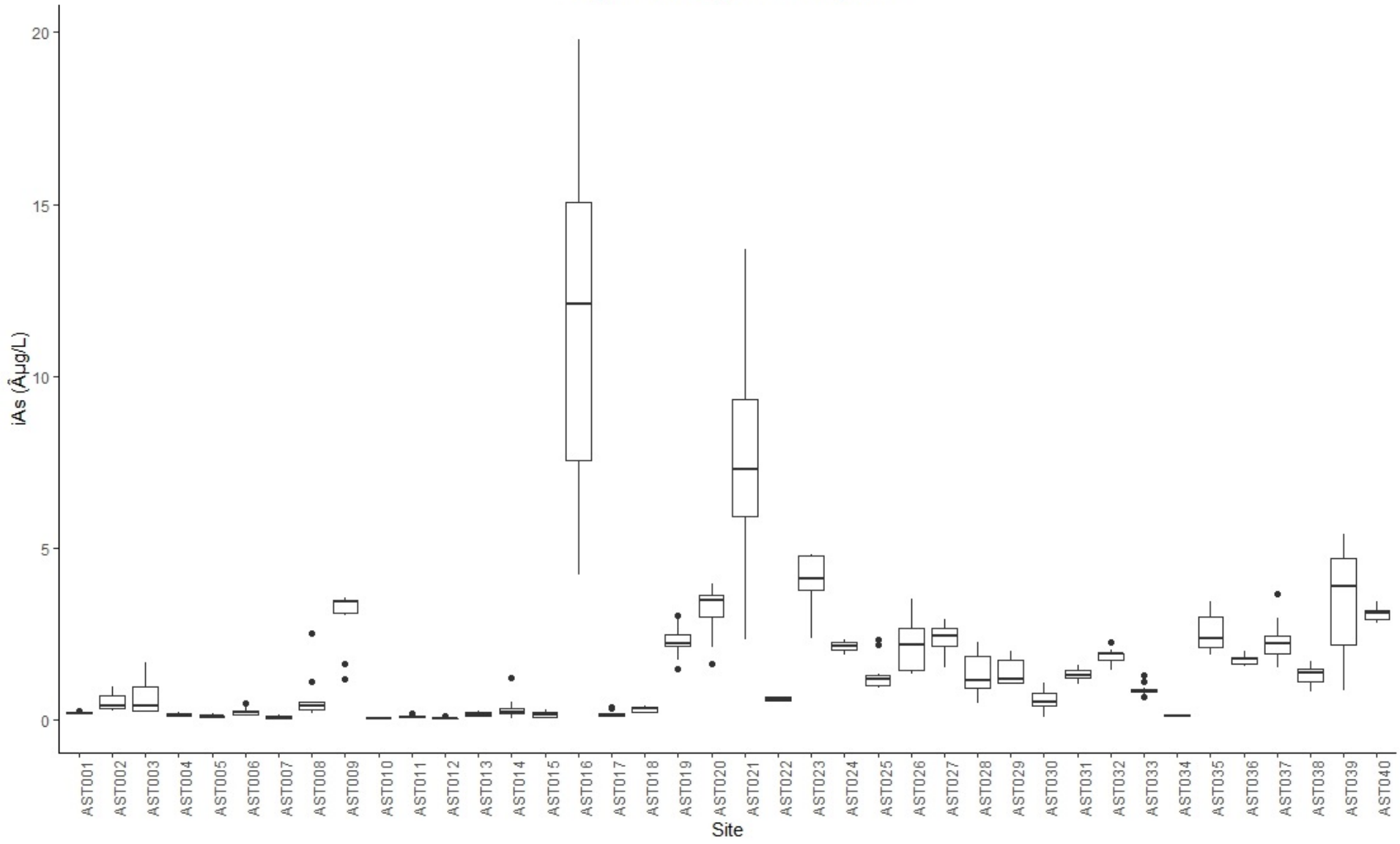


# Targeted Ambient Arsenic

- ~Monthly (2019)
- Quarterly (2020)
  
- Accessible

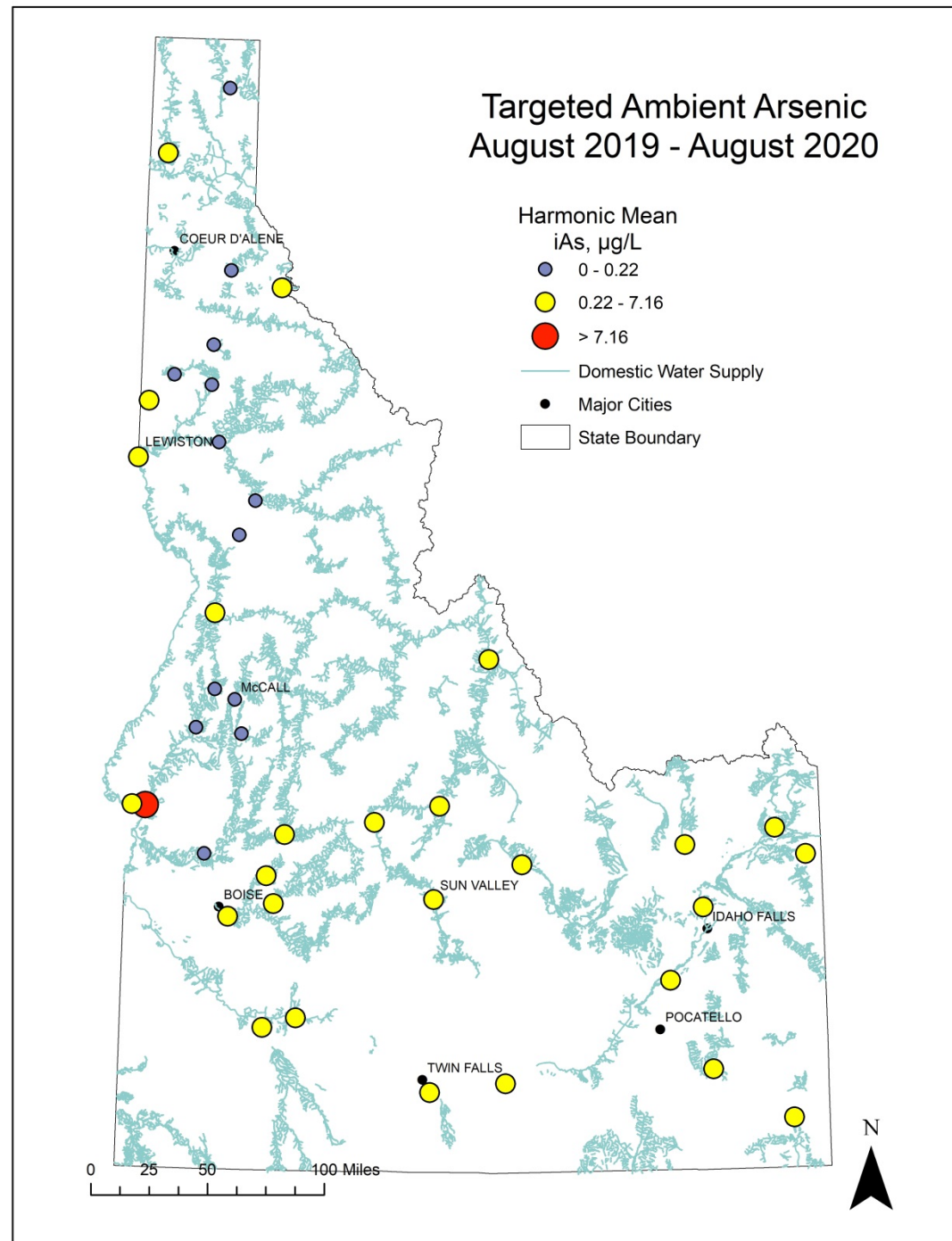


### Inorganic As, Aug 2019 - Aug 2020



# Monitoring Results - Targeted

Harmonic Mean Concentration of monthly samples from August 2019 – August 2020



# Human Health

Recreation

Domestic Water  
Supply

Fish Only

Fish + Water



+



Idaho Department of Environmental

# Idaho HHC Exposure Factors

$$AWQC = RSD \times \left( \frac{BW}{DI + (FI \times BAF)} \right)$$

$$RSD = \frac{\text{Cancer Risk Factor } (1 \times 10^{-5})}{\text{Cancer Potency Factor } (1.5 \text{ (mg/kg day)}^{-1})}$$

**BW** = Body Weight; 80 kg

**DI** = Drinking Water Intake; 2.4 L/day

**FI** = Fish Intake; 0.0665 kg/day

**BAF** = 1.12 L/kg



# Criterion Options – Fish Only (Recreation Use)

1. Calculate criteria based on Idaho exposure factors and Idaho specific BAF
2. Calculate fish-tissue based criterion
3. Water column screening
4. Hierarchical criterion – fish tissue element supersedes water column

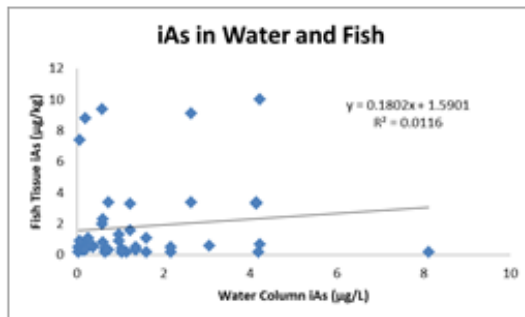
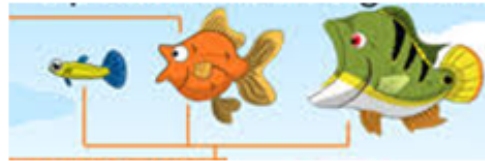


# 1. Calculate criteria based on Idaho exposure factors and Idaho specific BAF

$$F \text{ only} = \left( \frac{(1 \times 10^{-5})}{1.5 (mg/kg \text{ day})^{-1}} \right) \times \left( \frac{80 \text{ kg}}{(0.0665 \text{ kg/day} \times 1.12 \text{ L/kg})} \right)$$

## Bioaccumulation Factor for Inorganic As

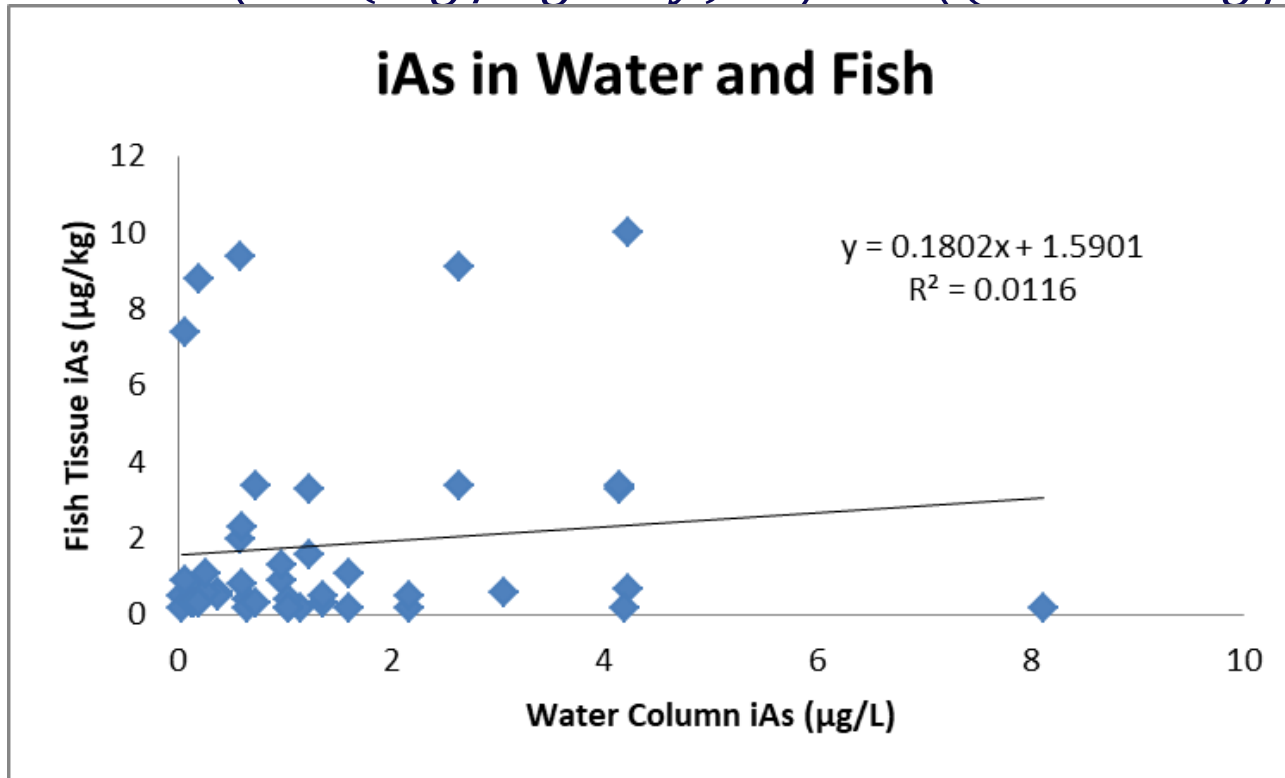
- Geometric Mean BAF = 1.12 L/kg



$$WQC = 7.16 \mu\text{g/L}$$

# 1. Calculate criteria based on Idaho exposure factors and Idaho specific BAF

$$F_{only} = \left( \frac{(1 \times 10^{-5})}{1.5 (mg/kg \text{ day})^{-1}} \right) \times \left( \frac{80 \text{ kg}}{(0.0665 \text{ kg/day} \times 1.12 \text{ L/kg})} \right)$$



**WQC =**  
**7.16  $\mu\text{g}/\text{L}$**

## 2. Calculate fish-tissue based criterion

*Fish tissue criteria*

$$= \left( \frac{(1 \times 10^{-5})}{1.5 \text{ (mg/kg day)}^{-1}} \right) \times \left( \frac{80 \text{ kg}}{\cancel{0.0665 \text{ kg/day}} \times \cancel{1.12 \text{ L/kg}}} \right)$$



***Fish tissue criteria = 8 µg/kg***

# 3. Water column screening

- Water column screening =  $7.16 \mu\text{g/L}$
- Fish Tissue criterion =  $8 \mu\text{g/kg}$



## 4. Hierarchical criterion – fish tissue element supersedes water column

- Water column element = 7.16  $\mu\text{g/L}$
- Fish Tissue element = 8  $\mu\text{g/kg}$

*\*Fish tissue supersedes water column*

Both elements would be criteria

# Criterion Options – Fish + Water (Domestic Water Supply Use)

1. Calculate criteria based on Idaho exposure factors and Idaho specific BAF
2. Narrative criteria



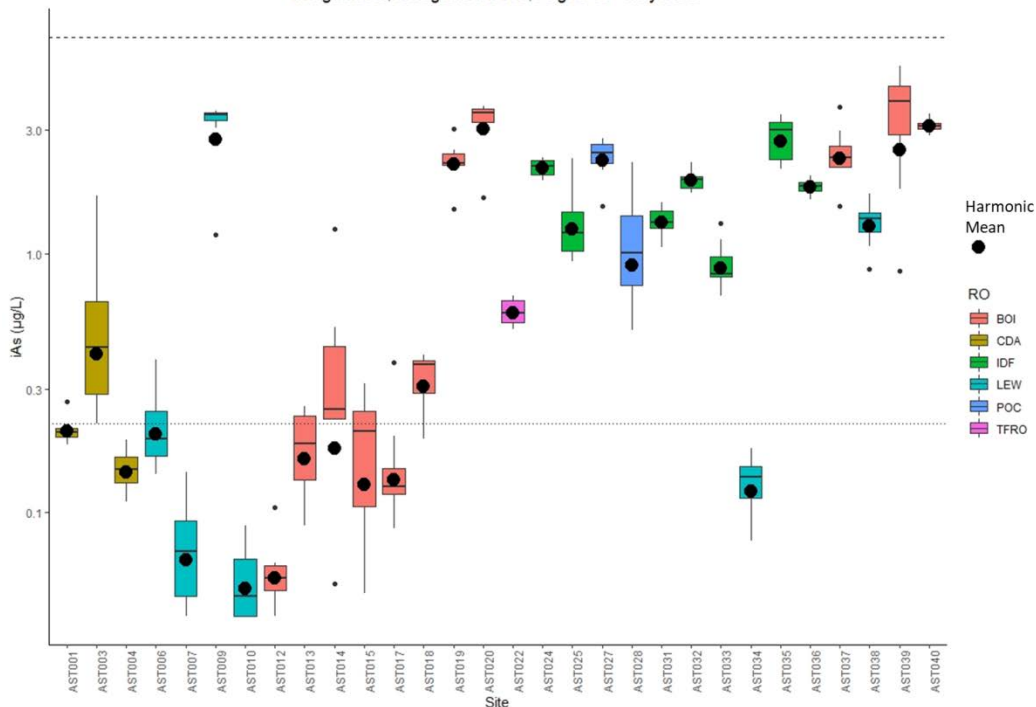
+



# 1. Calculate criteria based on Idaho exposure factors and Idaho specific BAF

$$F + W = \left( \frac{(1 \times 10^{-5})}{1.5 (mg/kg \text{ day})^{-1}} \right) \times \left( \frac{80 \text{ kg}}{2.4 \text{ L} + (0.0665 \text{ kg/day} \times 1.12 \text{ L/ka})} \right)$$

Inorganic As, Designated DWS, Aug 2019 - May 2020

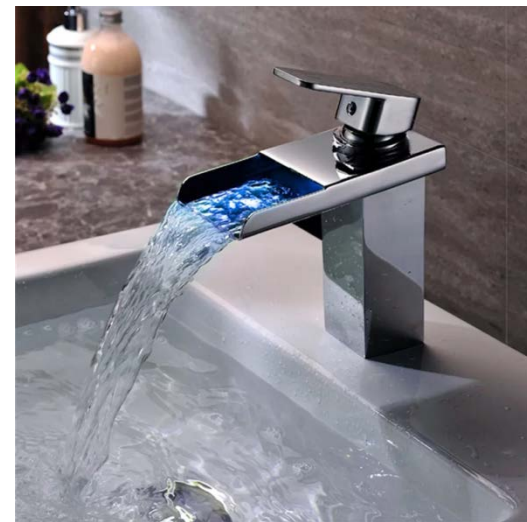


**WQC =**  
**0.22 µg/L**



# Narrative Criteria

- 58.01.02.100.03. **Domestic (DWS):** *water quality appropriate for use as untreated raw water (as defined under IDAPA 58.01.08, “Idaho Rules for Public Drinking Water Systems”) for public drinking water.*



# Narrative Criteria

- Compliance with F+W criteria for Arsenic based on not impairing the use
- Example:
  - *For waters designated as DWS, waters must be free of inorganic arsenic in concentrations that would impair the DWS use.*
  - *Inorganic arsenic must not exceed concentrations that would require additional treatment or removal prior to delivery as public drinking water.*



# Next Steps

- Review comments to options presented
- DEQ will continue quarterly monitoring at targeted sites
- DEQ will continue to monitor EPA progress on revising toxicological assessment of iAs



# Next Steps

- Begin drafting proposed rule language



# Questions/Discussion

