

# Idaho Department of Environmental Quality

Revision of Idaho's  
Human Health Criteria for Arsenic  
Docket No. 58-0102-1801  
April 15, 2020

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# Outline

- Review Rulemaking
- Review Timeline
- Monitoring Results
  - Targeted Water
  - Fish Tissue
- Request for Feedback
- Next Steps



# Human Health

Recreation

Domestic Water  
Supply

Fish Only

Fish + Water



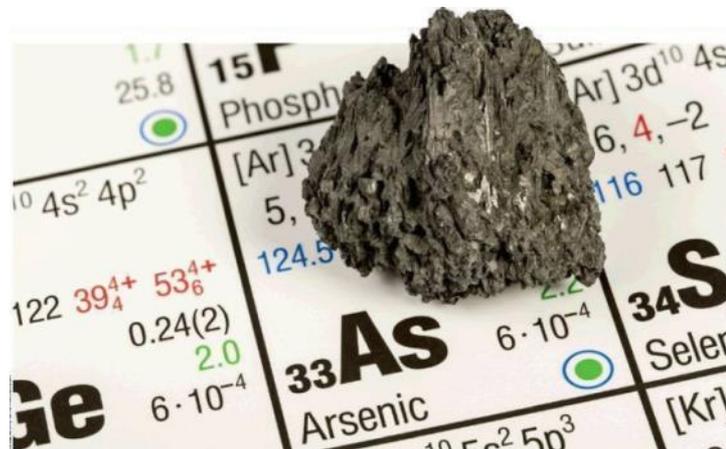
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Idaho Department of Environmental

# Overview of Rulemaking

- Previous Meetings
  - April 19, 2018
  - May 23, 2018
  - June 27, 2018
  - July 13, 2019
  - November 20, 2019



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



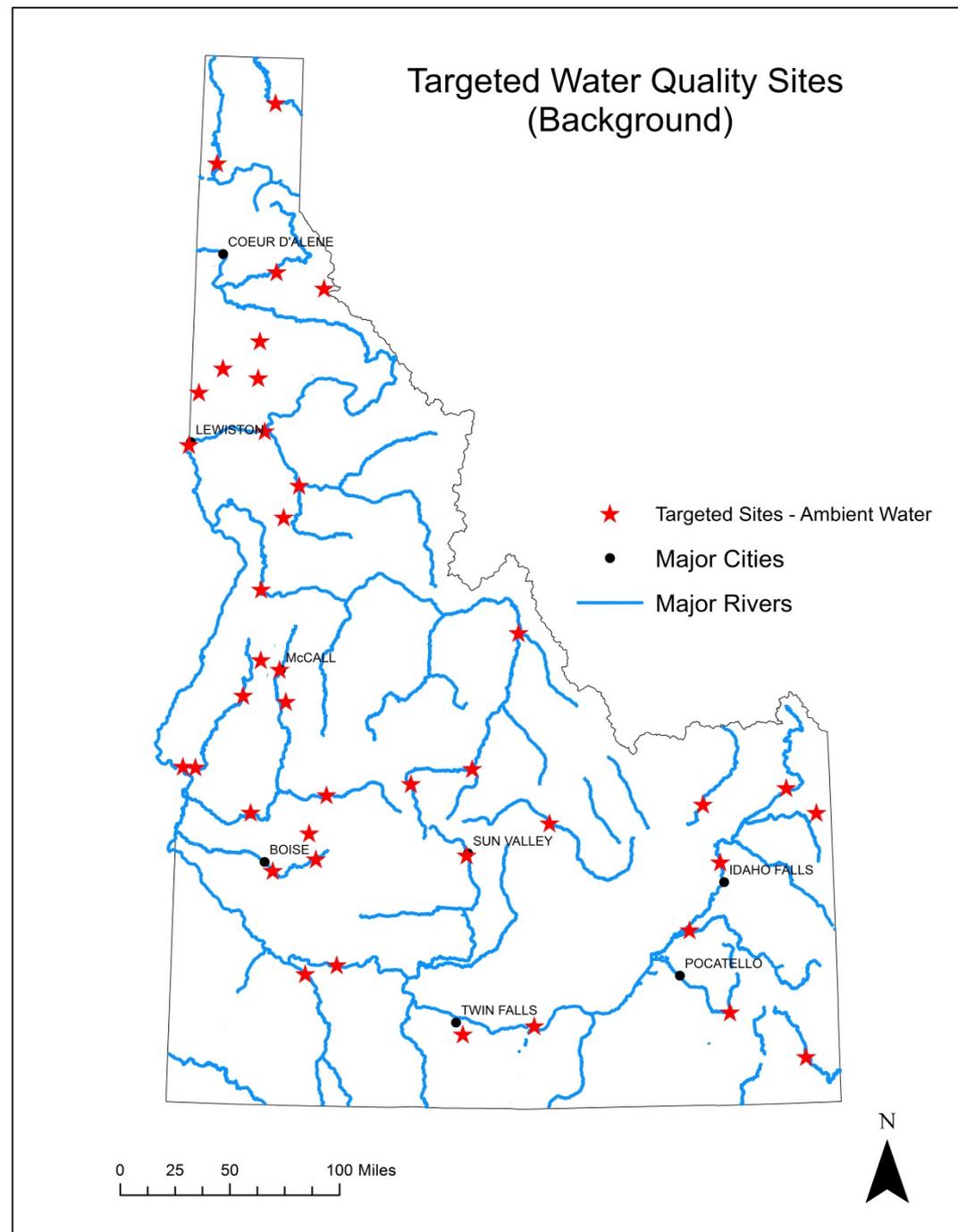
# Monitoring

- Targeted Ambient in Water
- Probabilistic Arsenic Accumulation in Fish



# Targeted Ambient Arsenic

- Monthly total and inorganic in water
- Easily accessible throughout year
- Areas of interest
- Above major anthropogenic sources
- Spread throughout state



# Monitoring Results - Targeted

Monthly samples from August 2019-February 2020

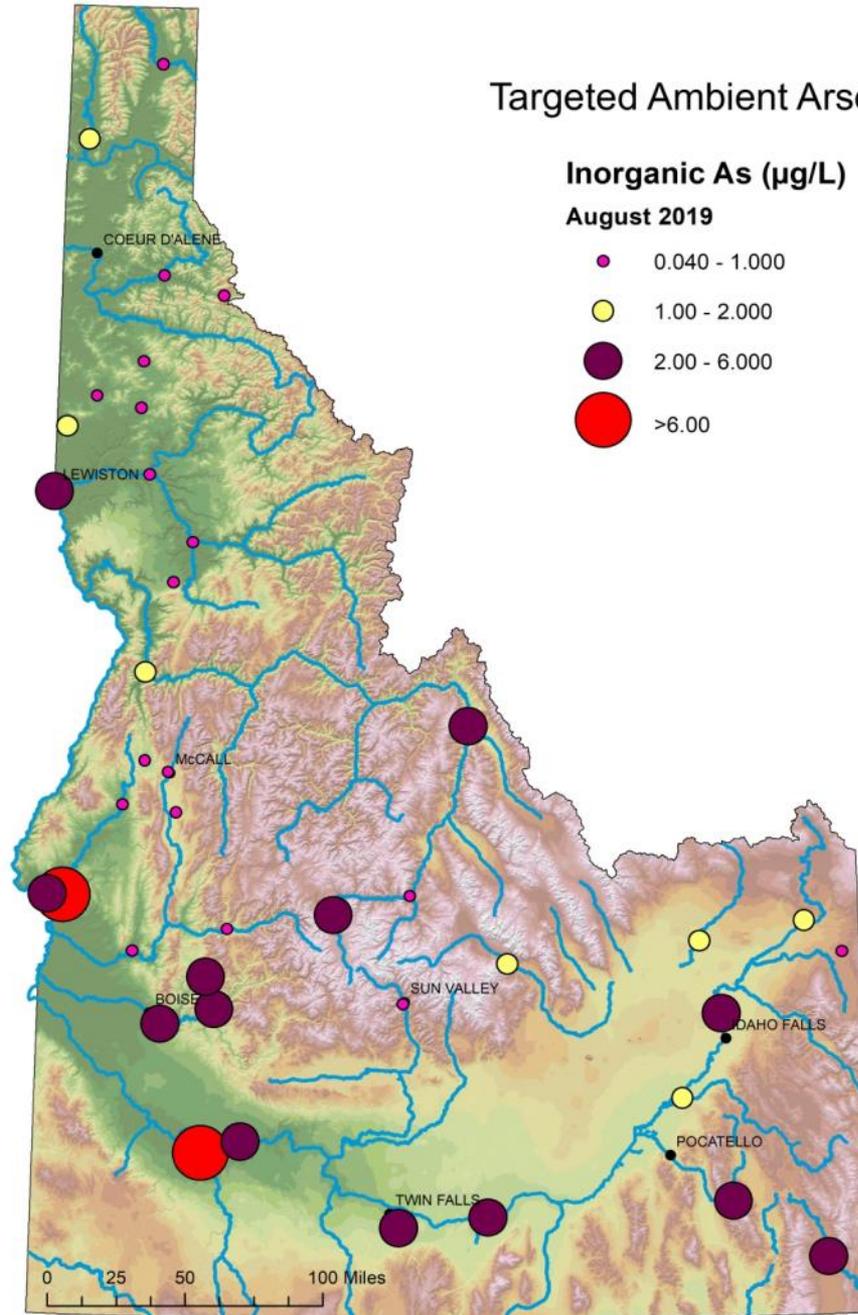
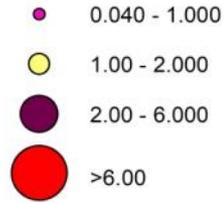
iAs ( $\mu\text{g/L}$ )	Aug	Sep	Oct	Nov	Dec	Jan	Feb
N	40	40	36	39	38	37	37
Range	0.05 – 11.90	0.05 – 9.48	0.04 – 19.80	0.04 – 16.30	0.04 – 14.30	0.05 – 15.30	0.05 – 12.60
Geo Mean	0.88	0.76	0.65	0.71	0.65	0.68	0.69
Avg	1.97	1.71	1.87	1.78	1.76	1.77	1.65



# Targeted Ambient Arsenic

## Inorganic As ( $\mu\text{g/L}$ )

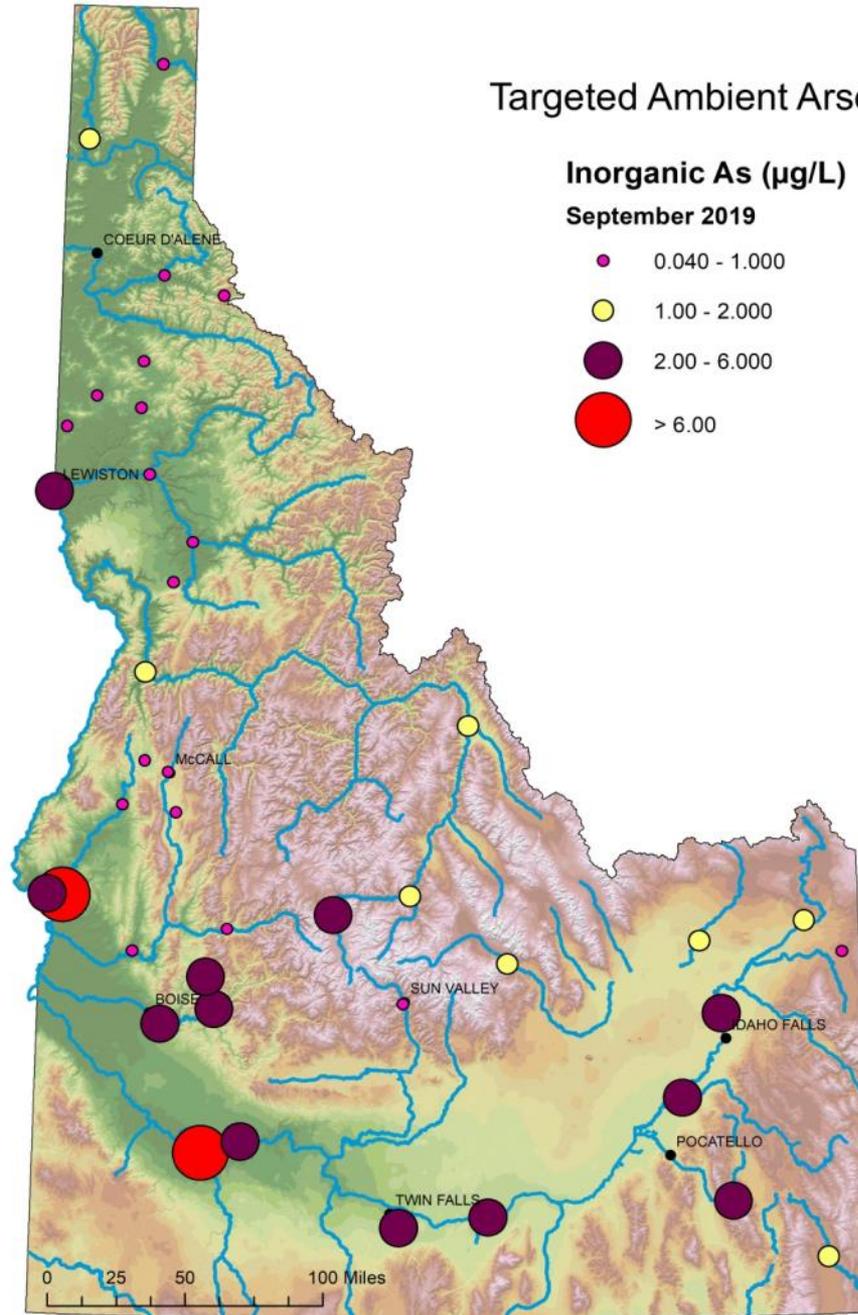
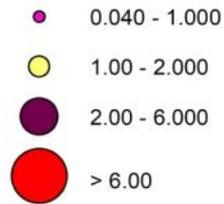
August 2019



# Targeted Ambient Arsenic

## Inorganic As ( $\mu\text{g/L}$ )

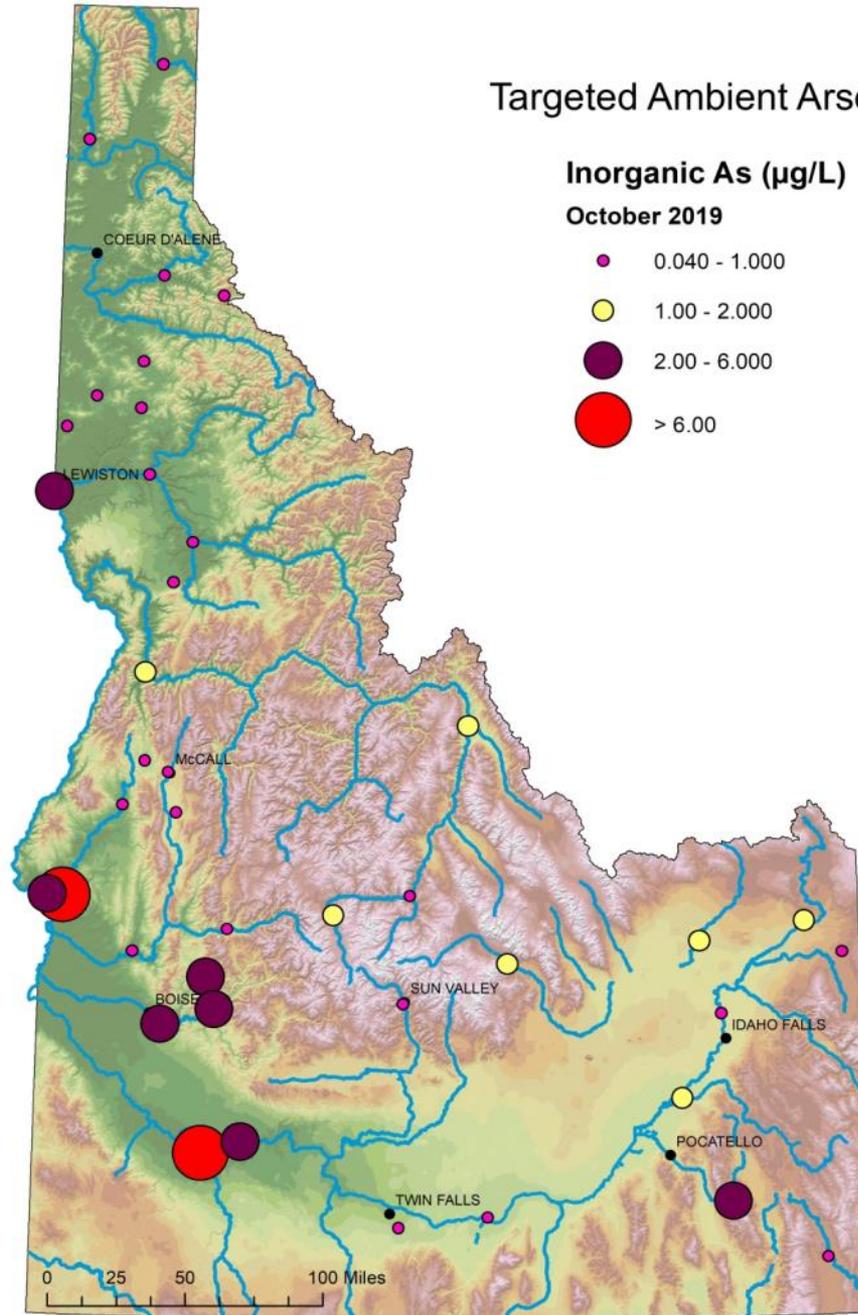
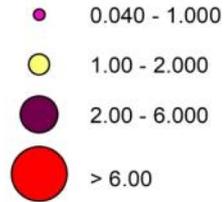
September 2019



# Targeted Ambient Arsenic

## Inorganic As ( $\mu\text{g/L}$ )

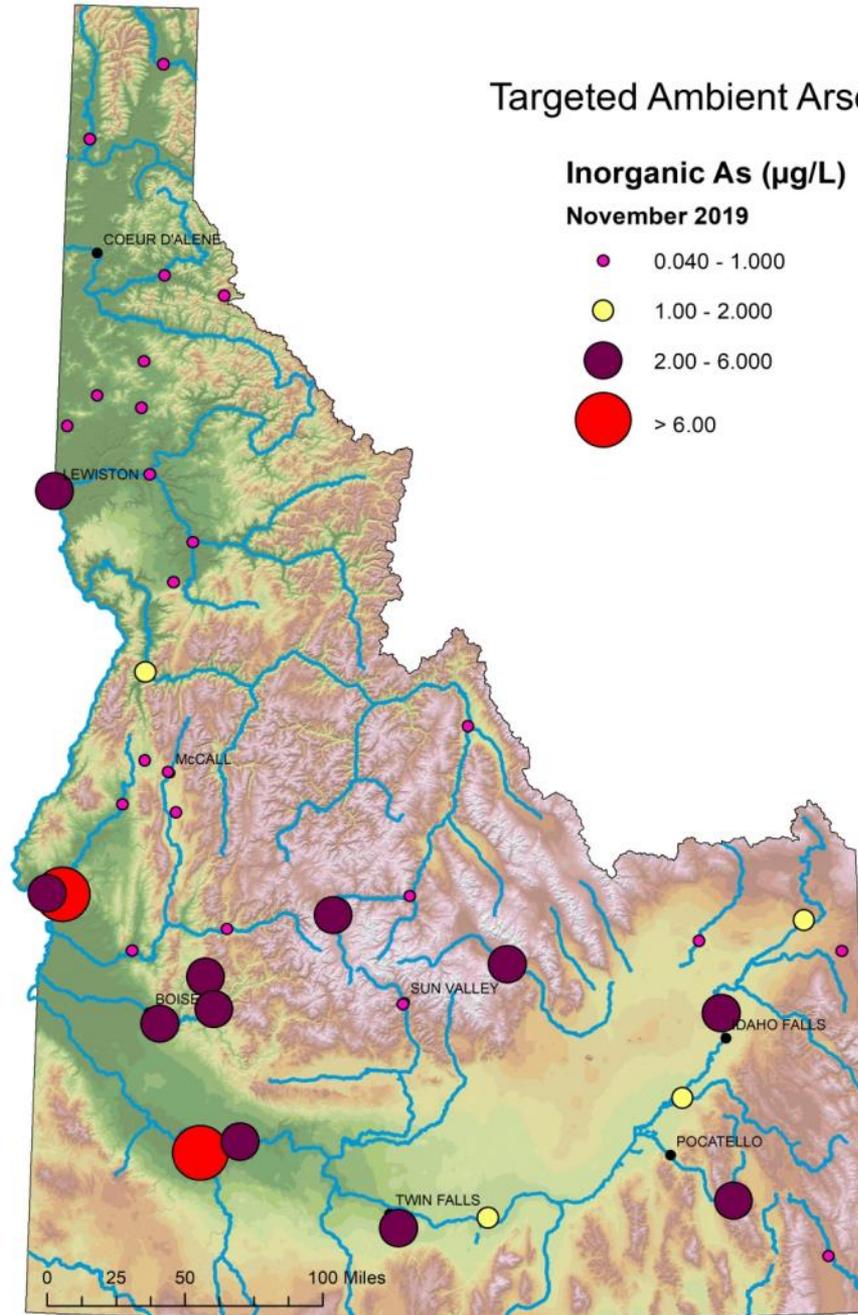
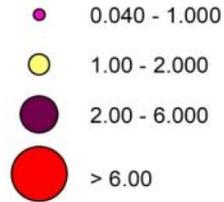
October 2019



# Targeted Ambient Arsenic

## Inorganic As ( $\mu\text{g/L}$ )

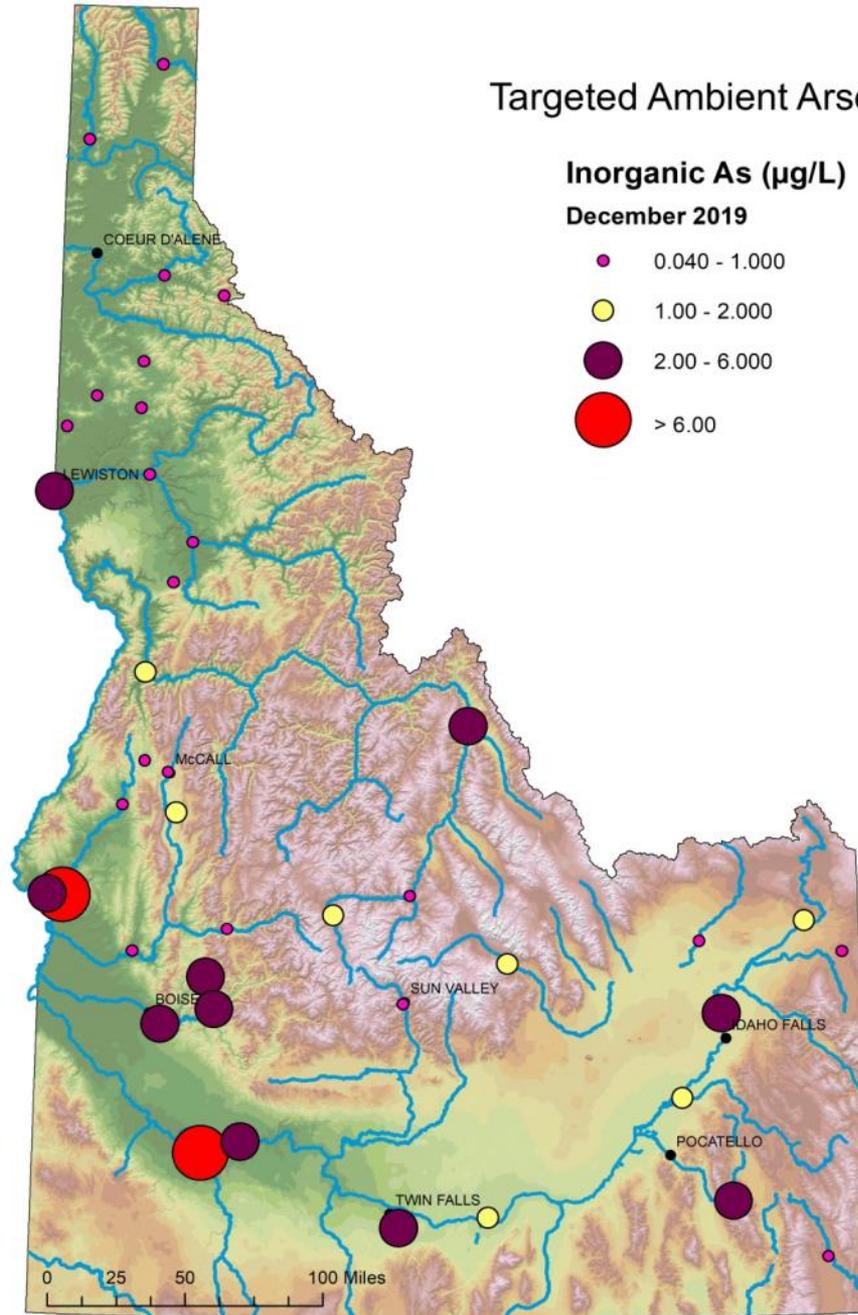
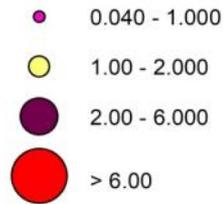
November 2019



# Targeted Ambient Arsenic

## Inorganic As ( $\mu\text{g/L}$ )

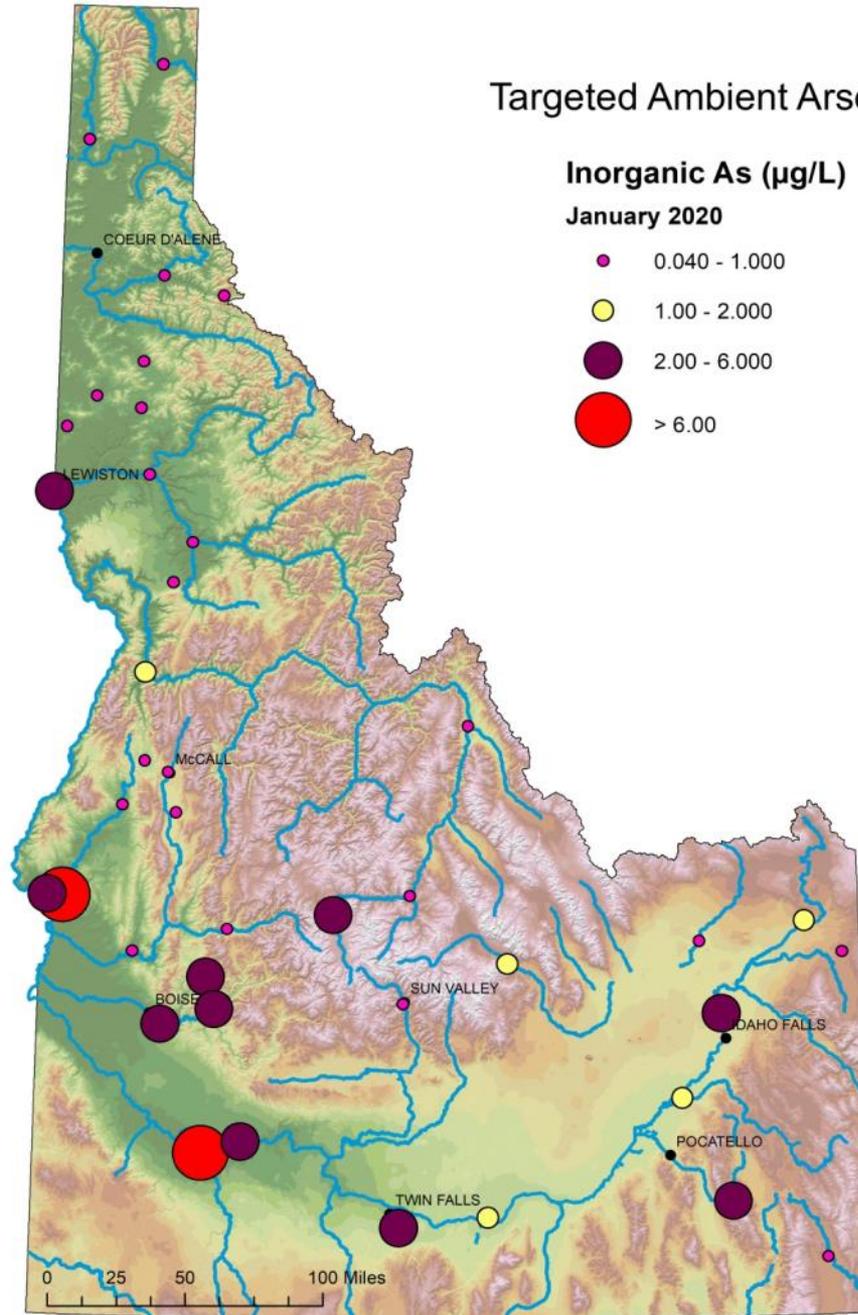
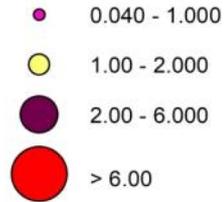
December 2019



# Targeted Ambient Arsenic

## Inorganic As ( $\mu\text{g/L}$ )

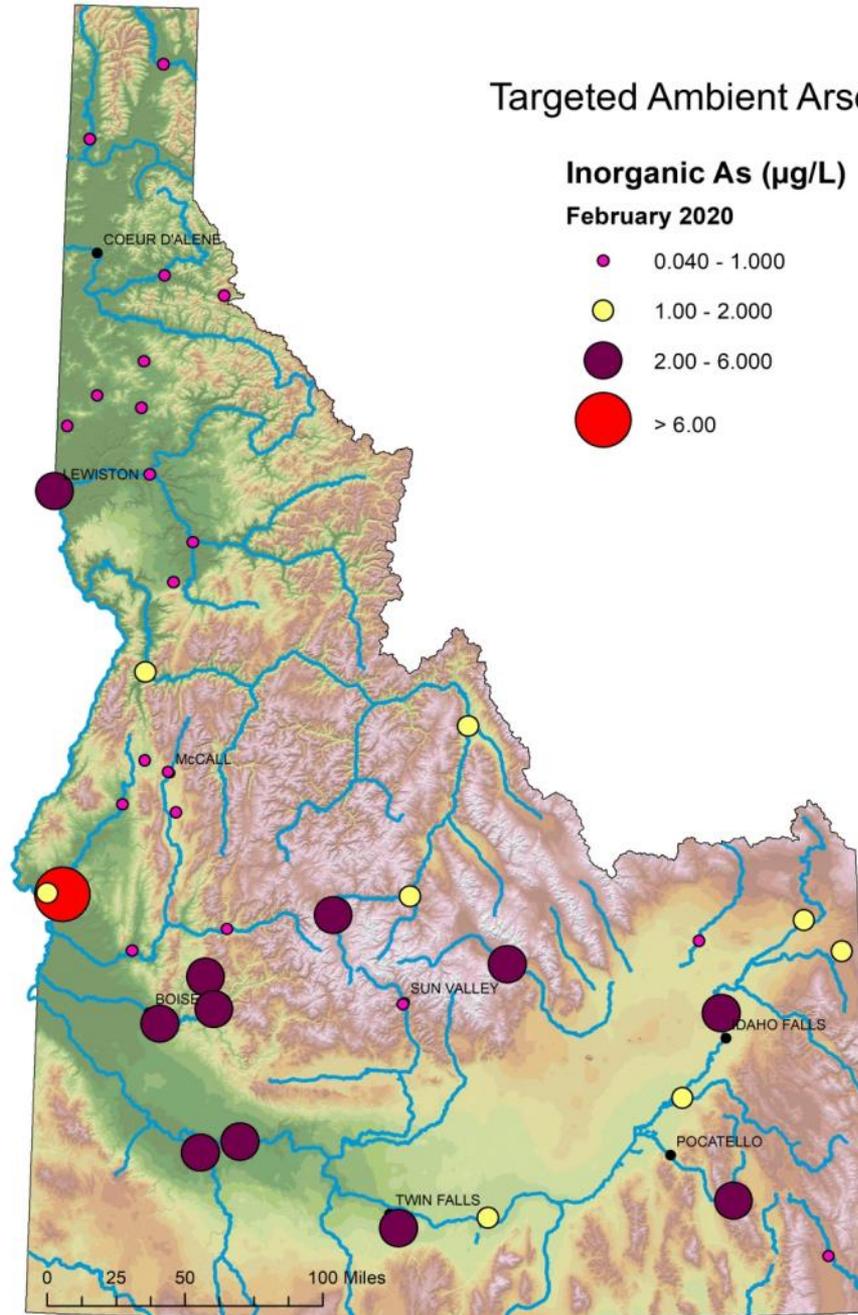
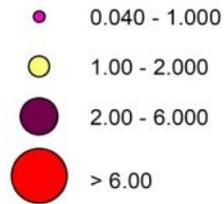
January 2020



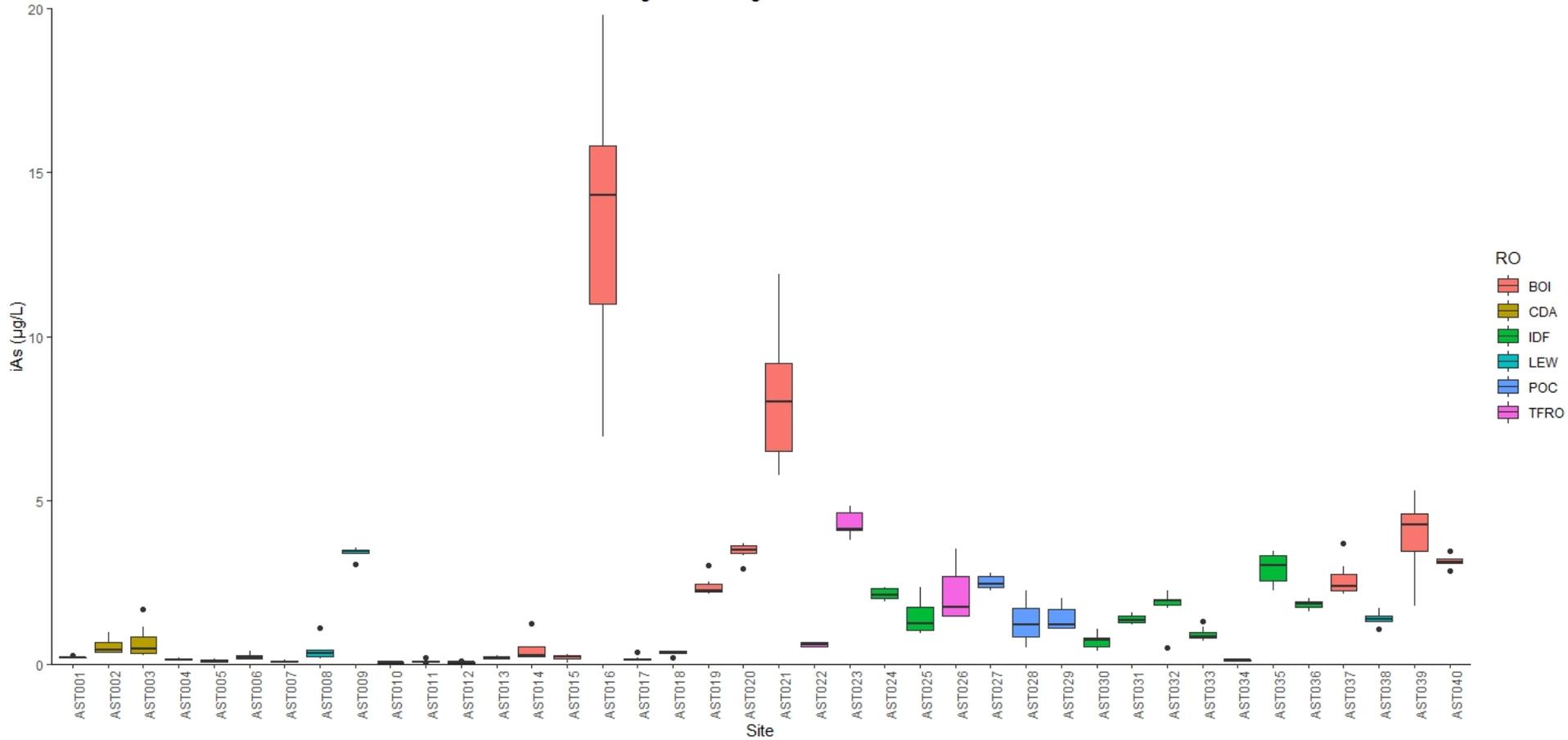
# Targeted Ambient Arsenic

## Inorganic As ( $\mu\text{g/L}$ )

February 2020



### Inorganic As, Aug 2019 - Feb 2020

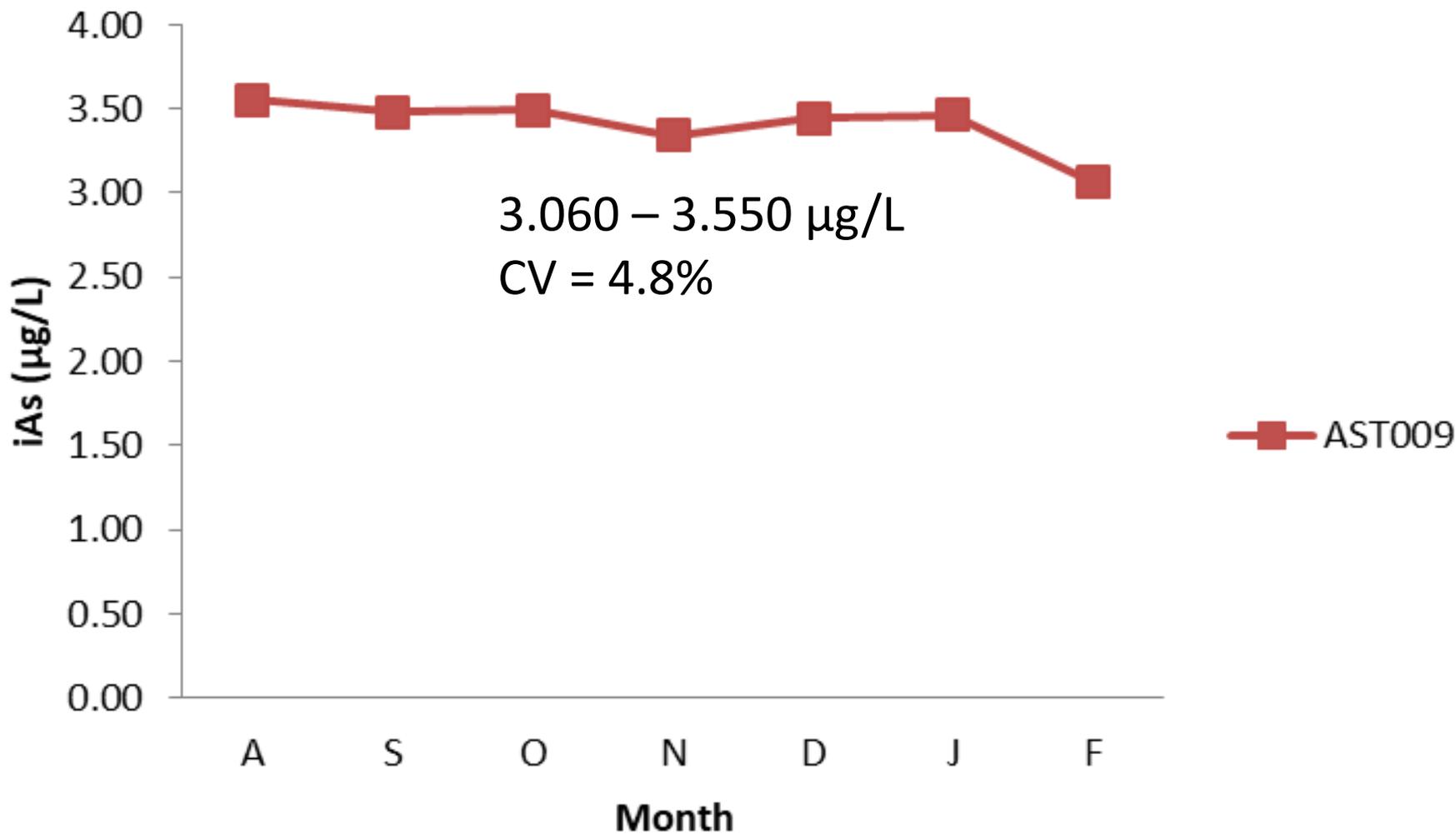


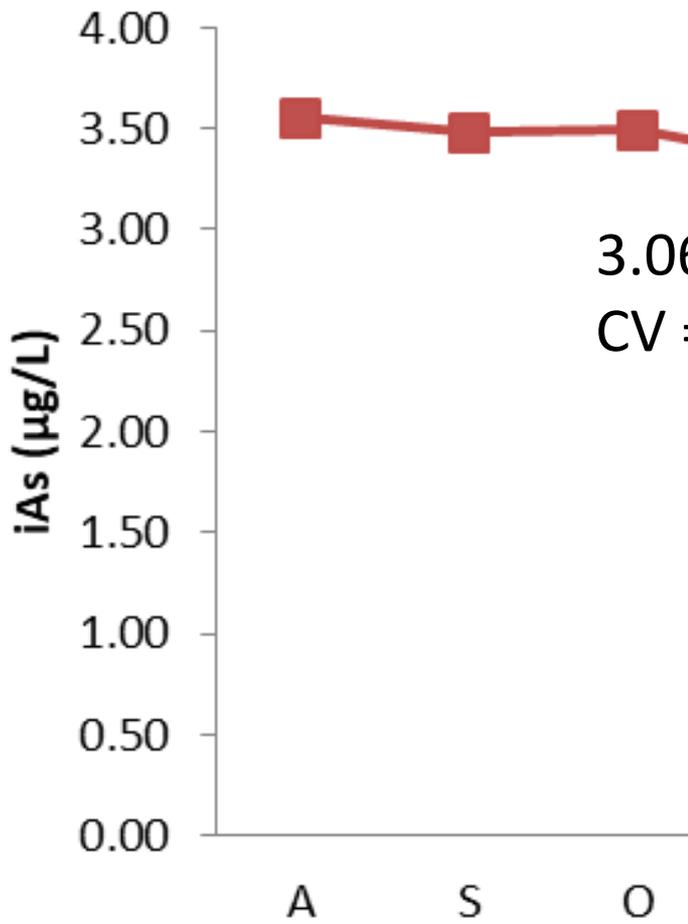
## Variability

$$CV\% = 100 \times \left( \frac{SD}{\bar{x}} \right)$$

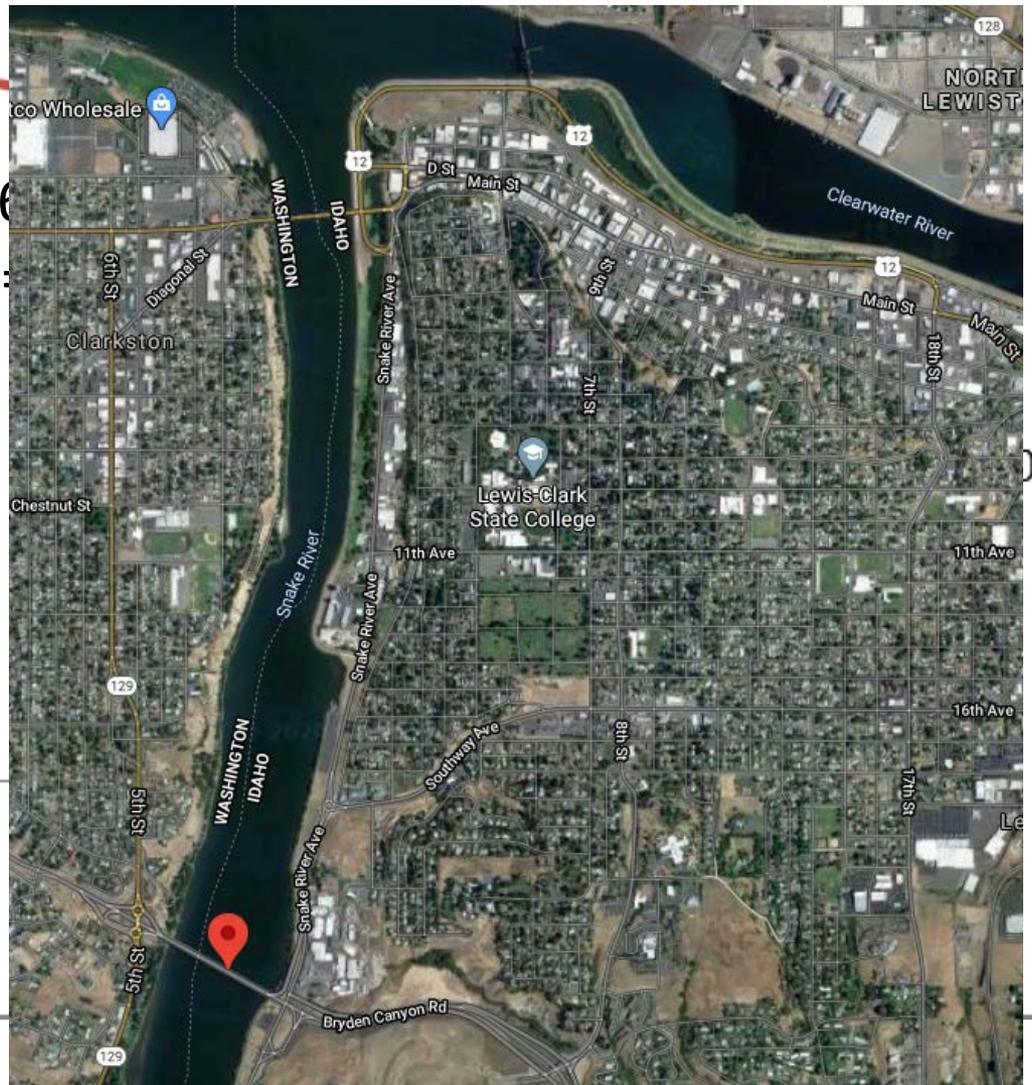
- CV's ranged from 4.8% to 86.7%
- Average CV was 30.2%

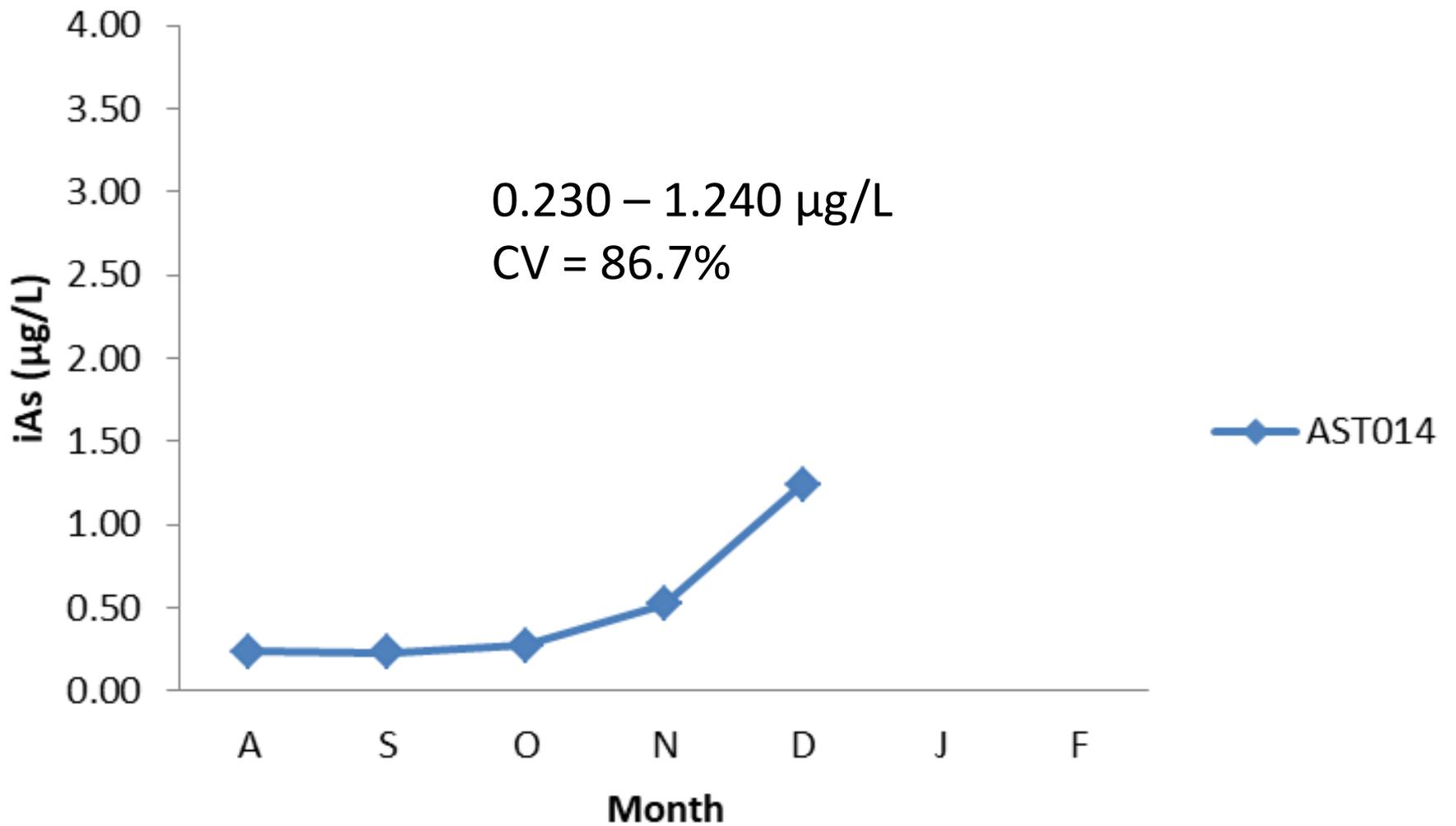






3.06  
CV =





iAs ( $\mu\text{g/L}$ )

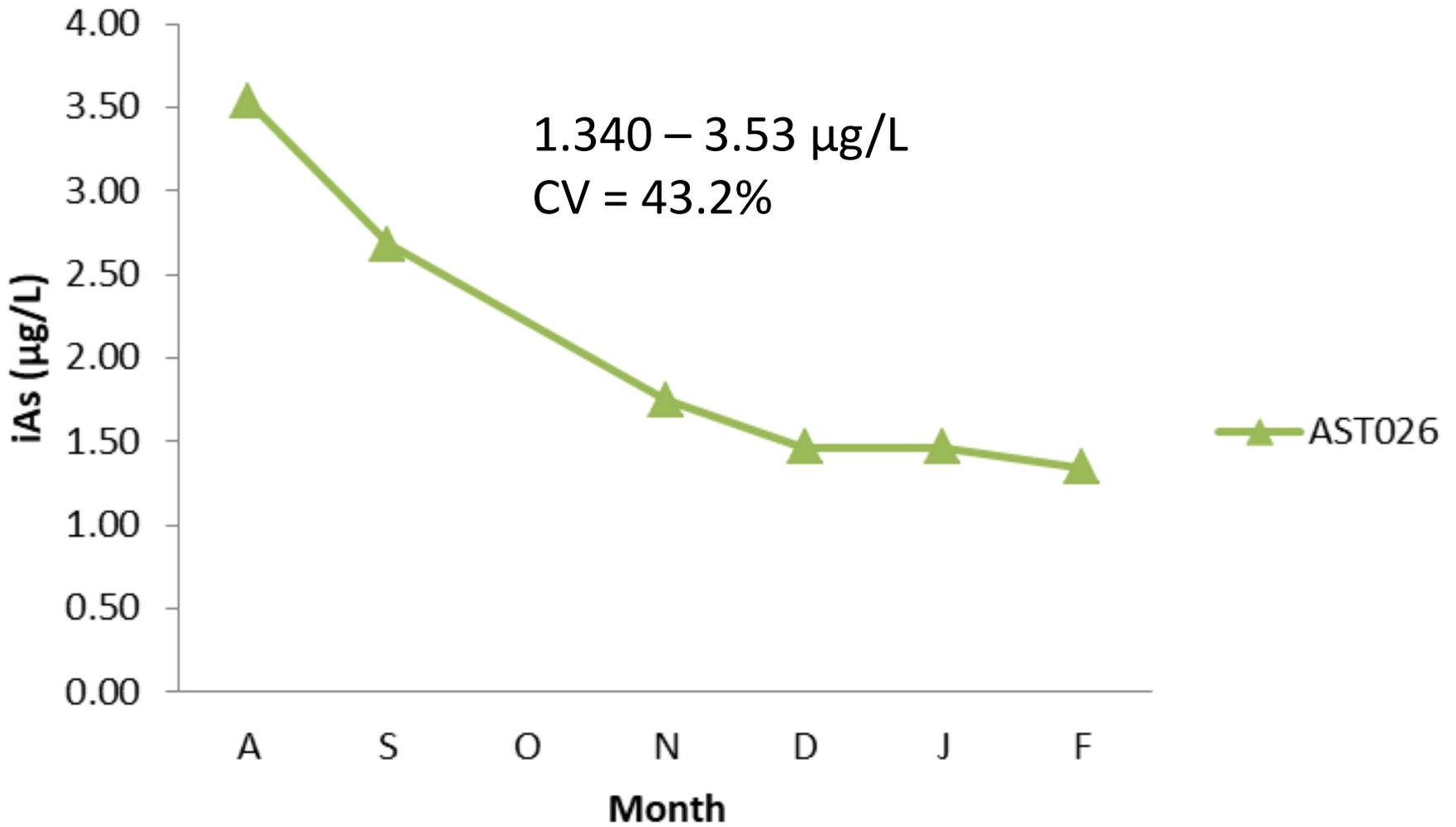
4.00  
3.50  
3.00  
2.50  
2.00  
1.50  
1.00  
0.50  
0.00

A



AST014



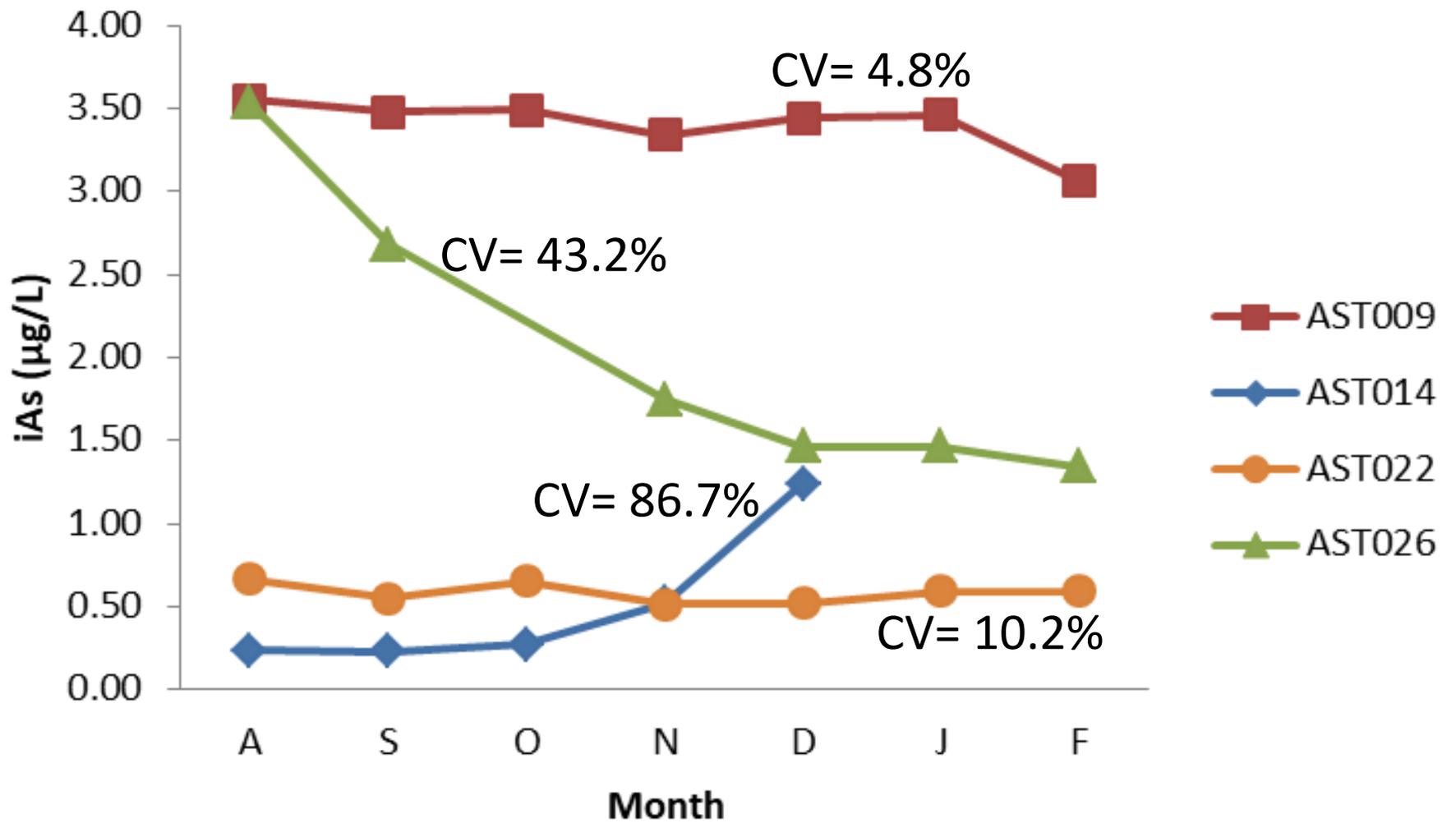


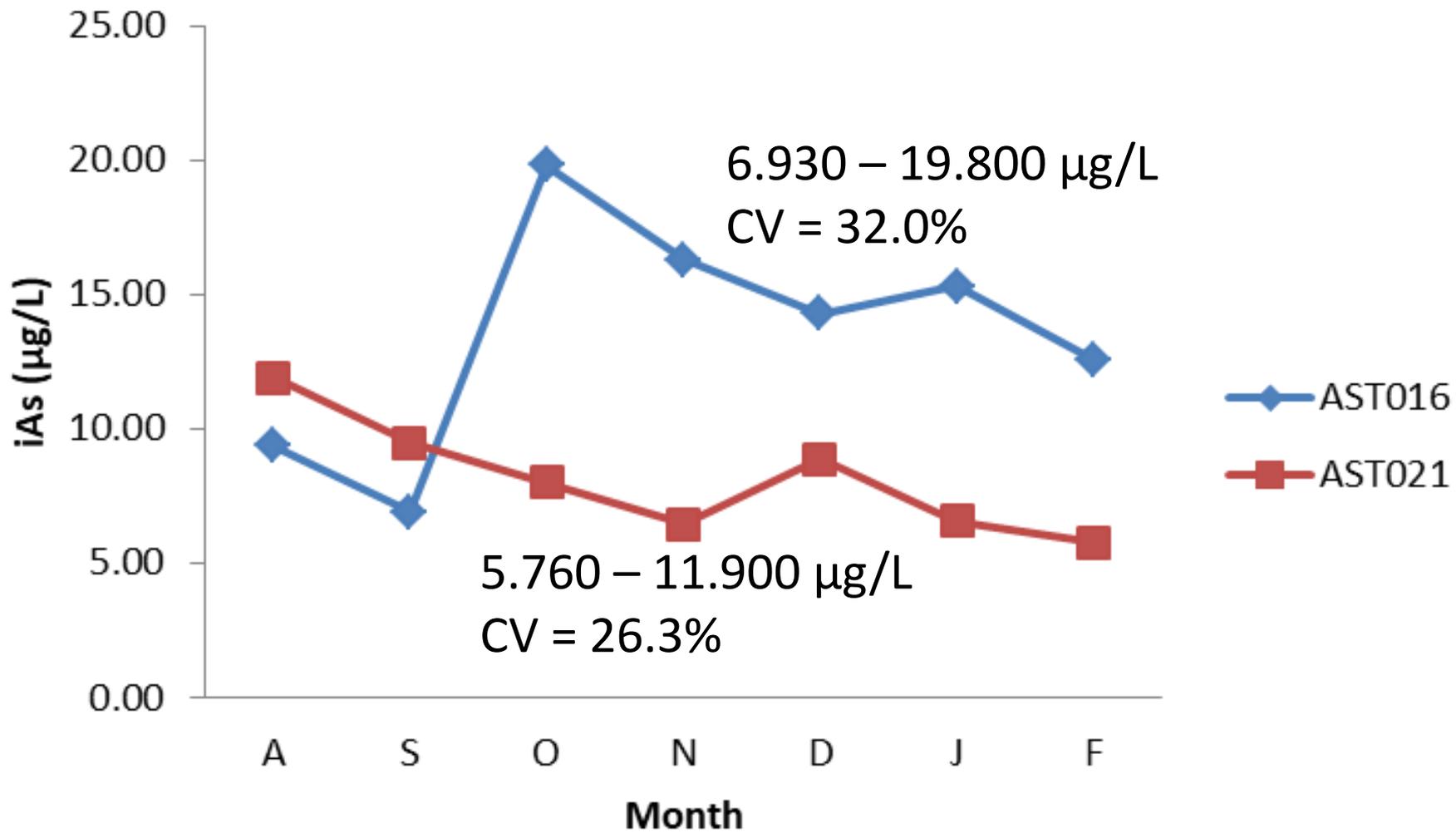
4.00  
3.50  
3.00  
2.50  
2.00  
1.50  
1.00  
0.50  
0.00

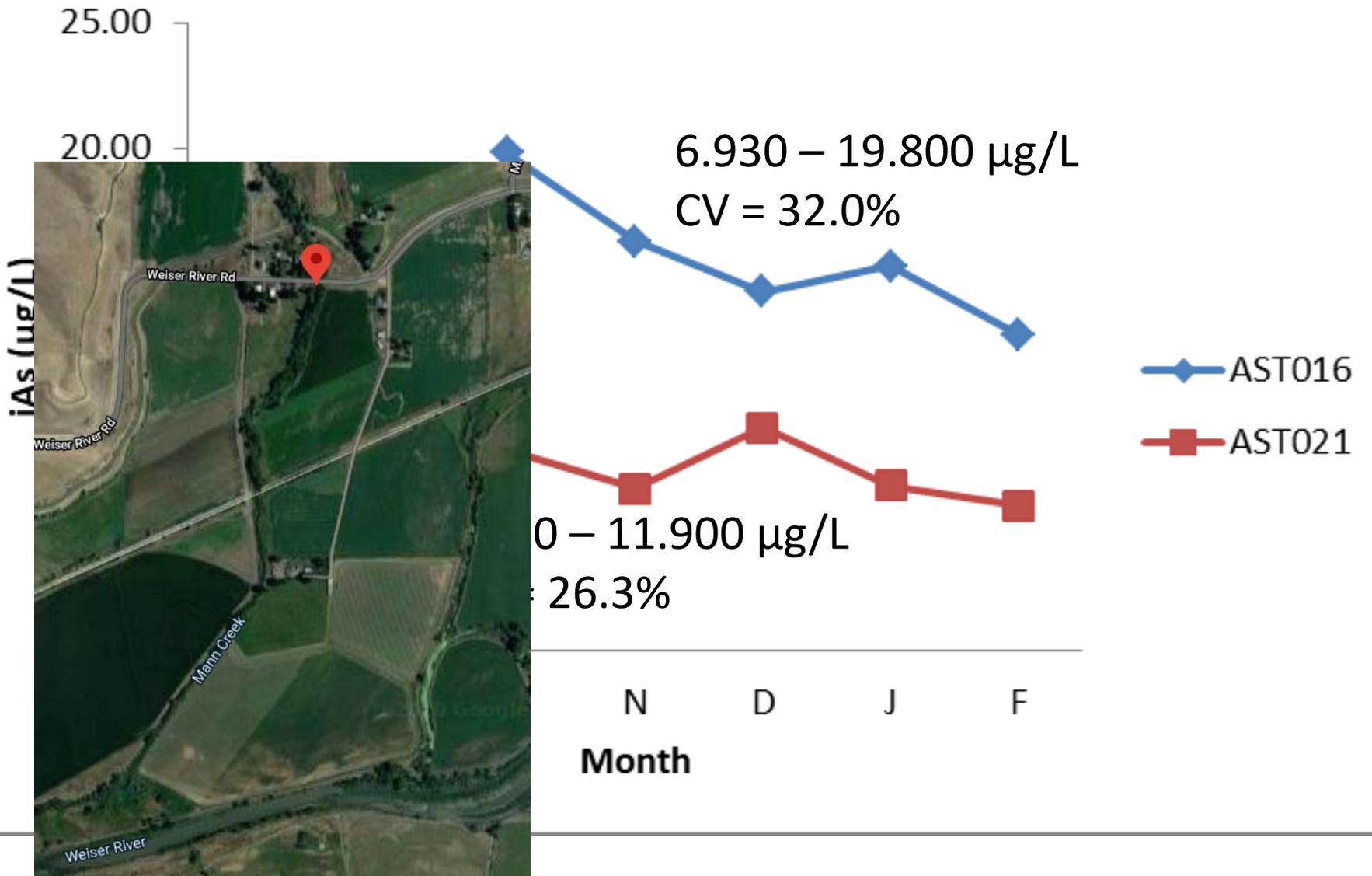
iAs ( $\mu\text{g/L}$ )

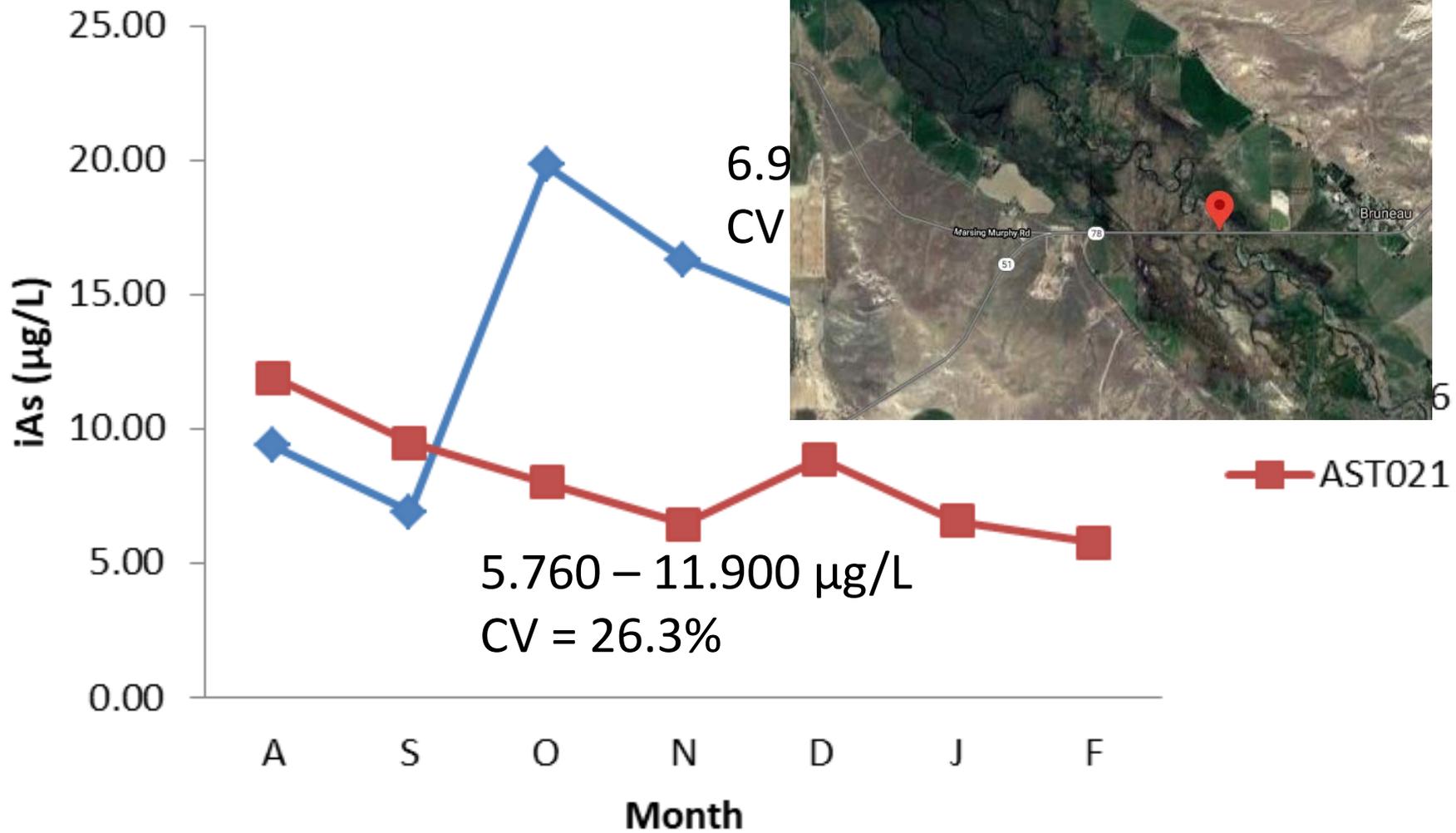
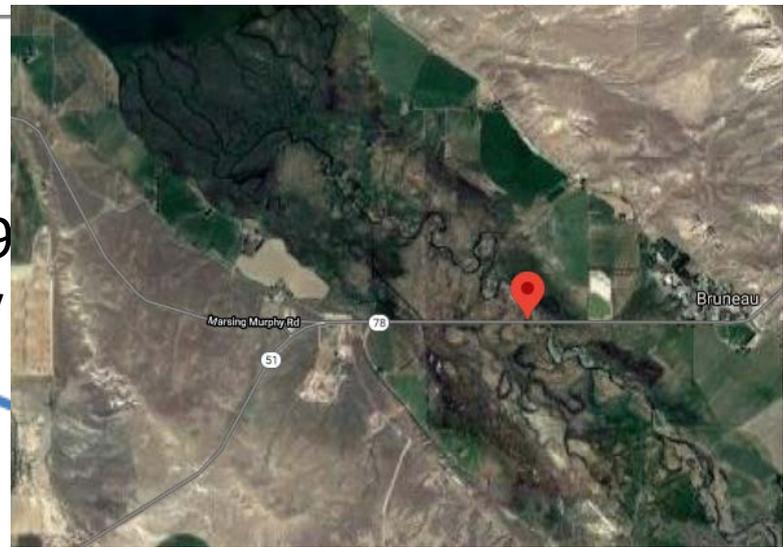
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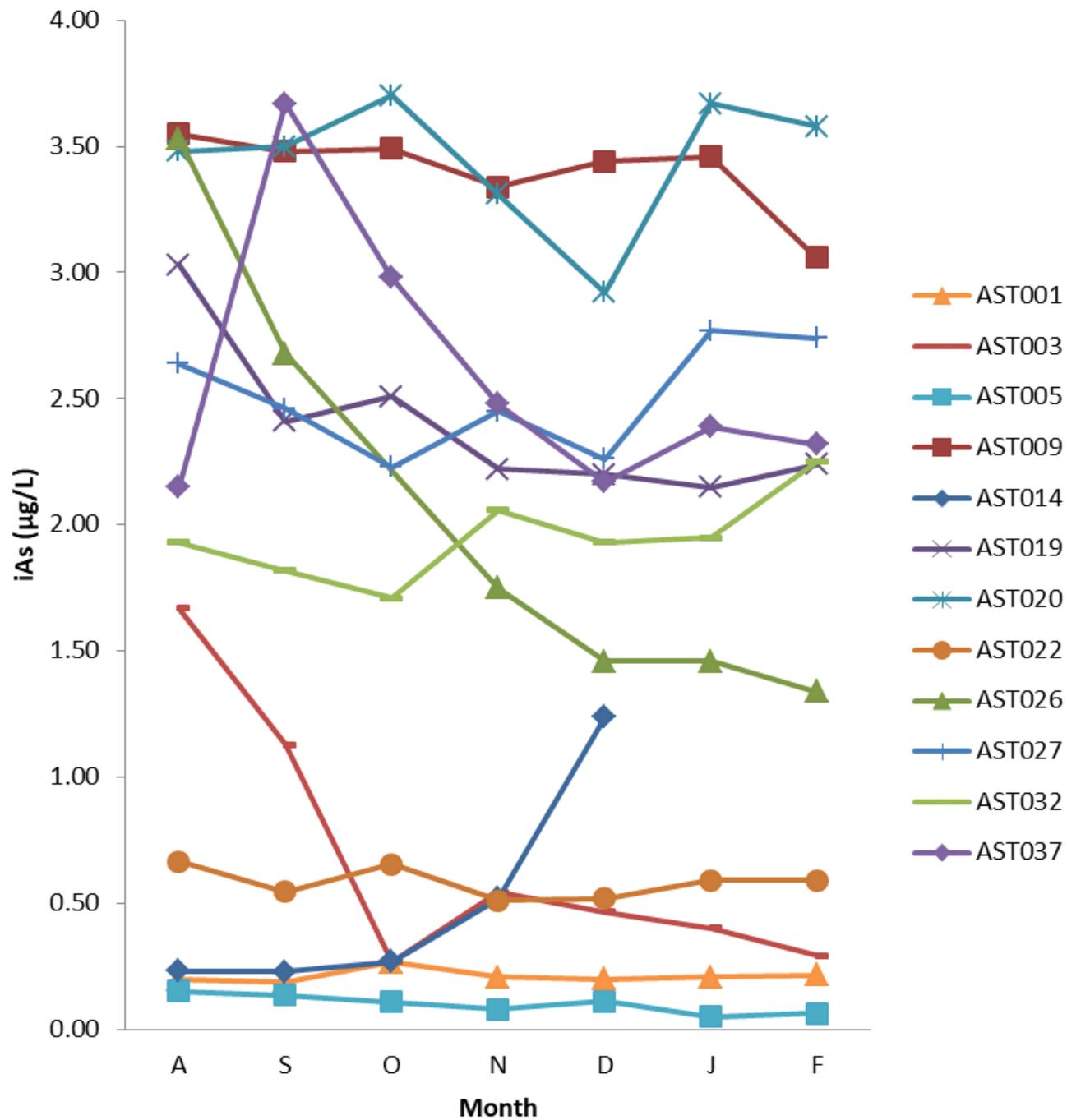


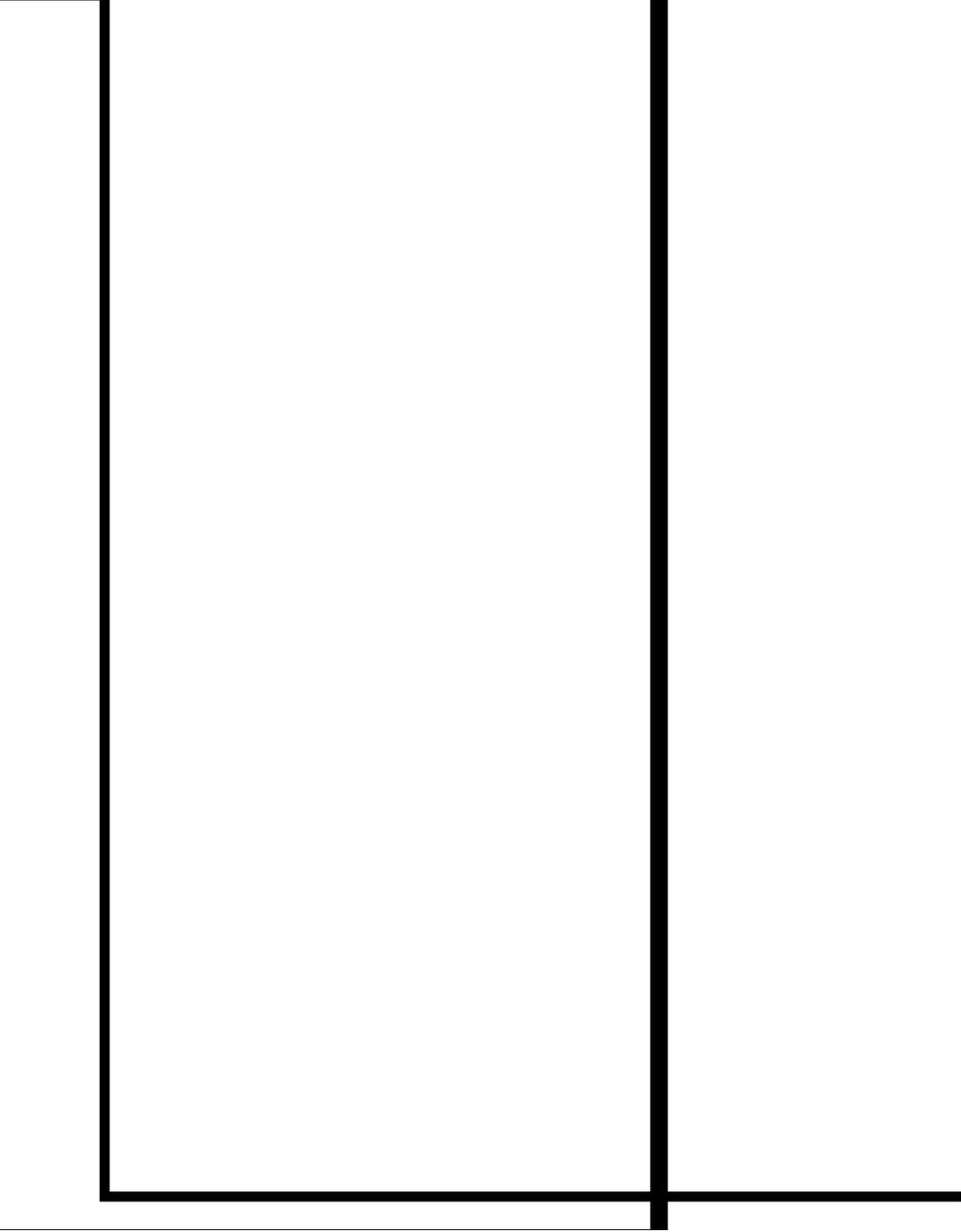






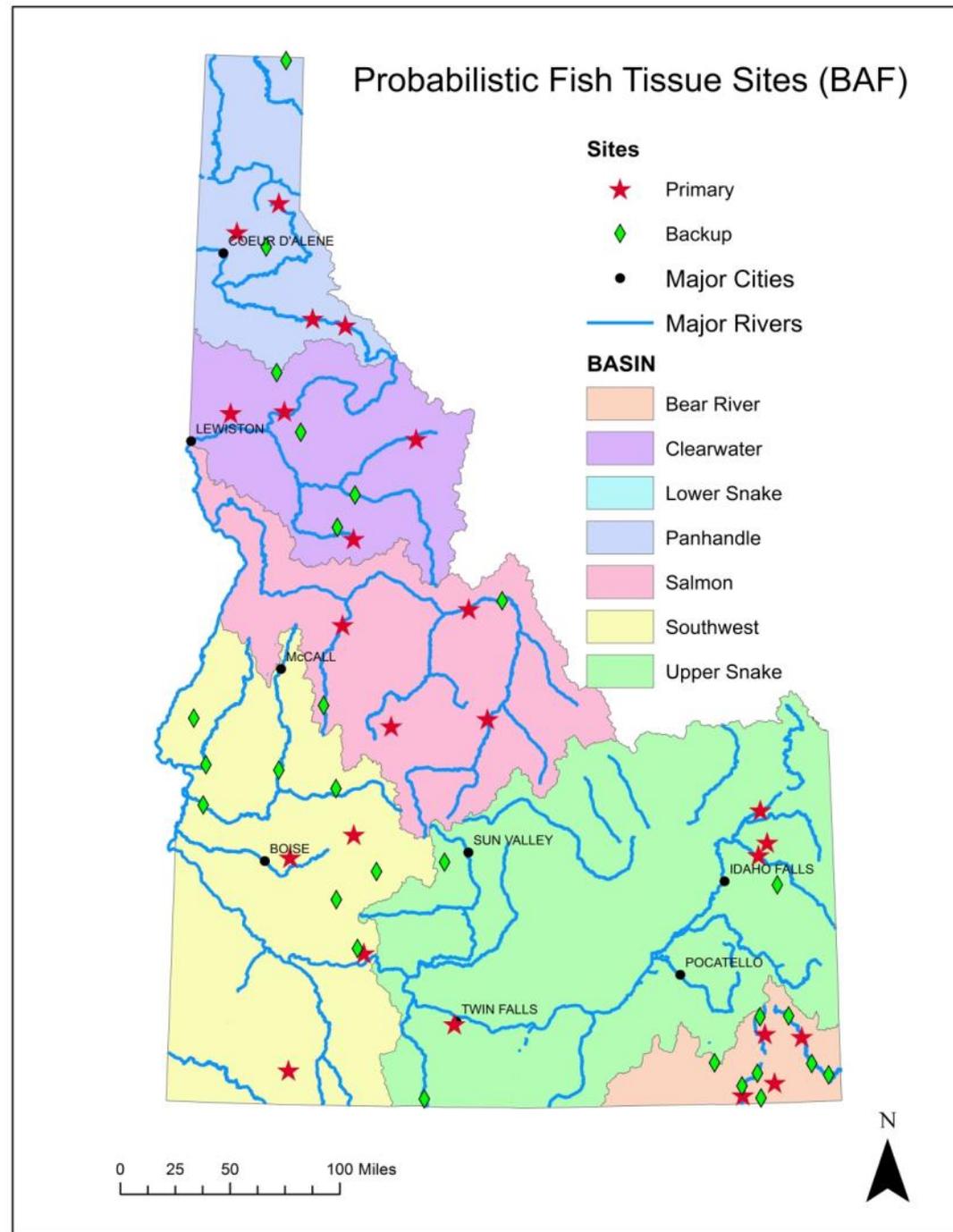






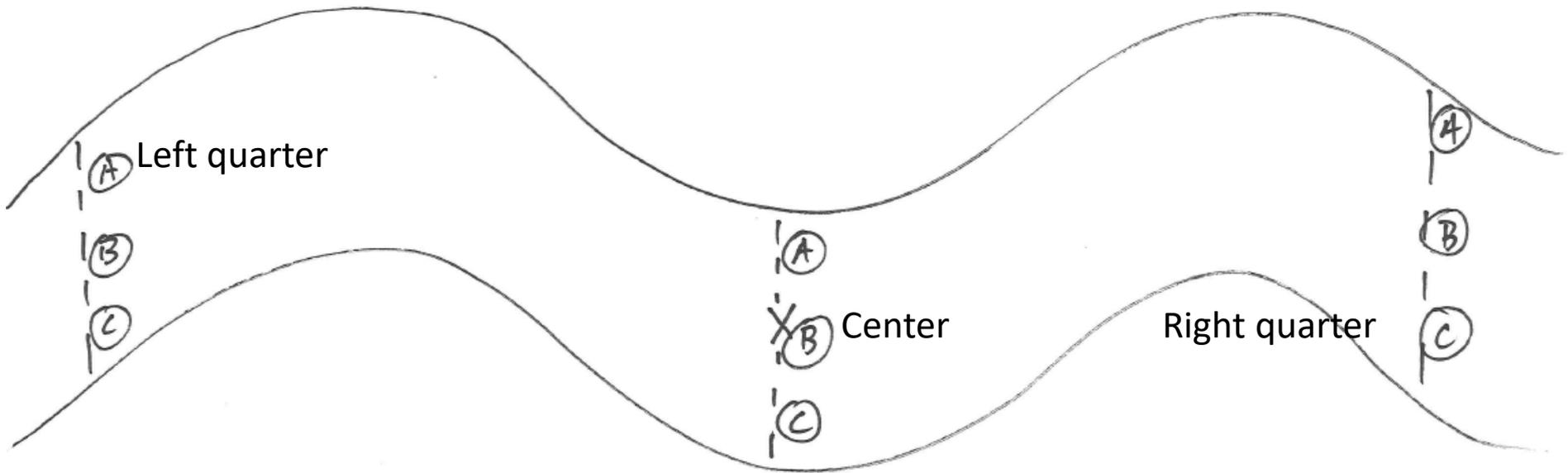
# Probabilistic As Accumulation

- 24 Sites
- Arsenic in gamefish and water



Flow 

  
40 x wetted width



# Results – Probabilistic Water Column

	Water	
	iAs ( $\mu\text{g/L}$ )	tAs ( $\mu\text{g/L}$ )
Range	0.04- 8.12	0.07- 7.25
Interquartile Range	0.26- 1.61	0.34- 2.54
Mean	1.42	1.69
Median	0.97	1.11

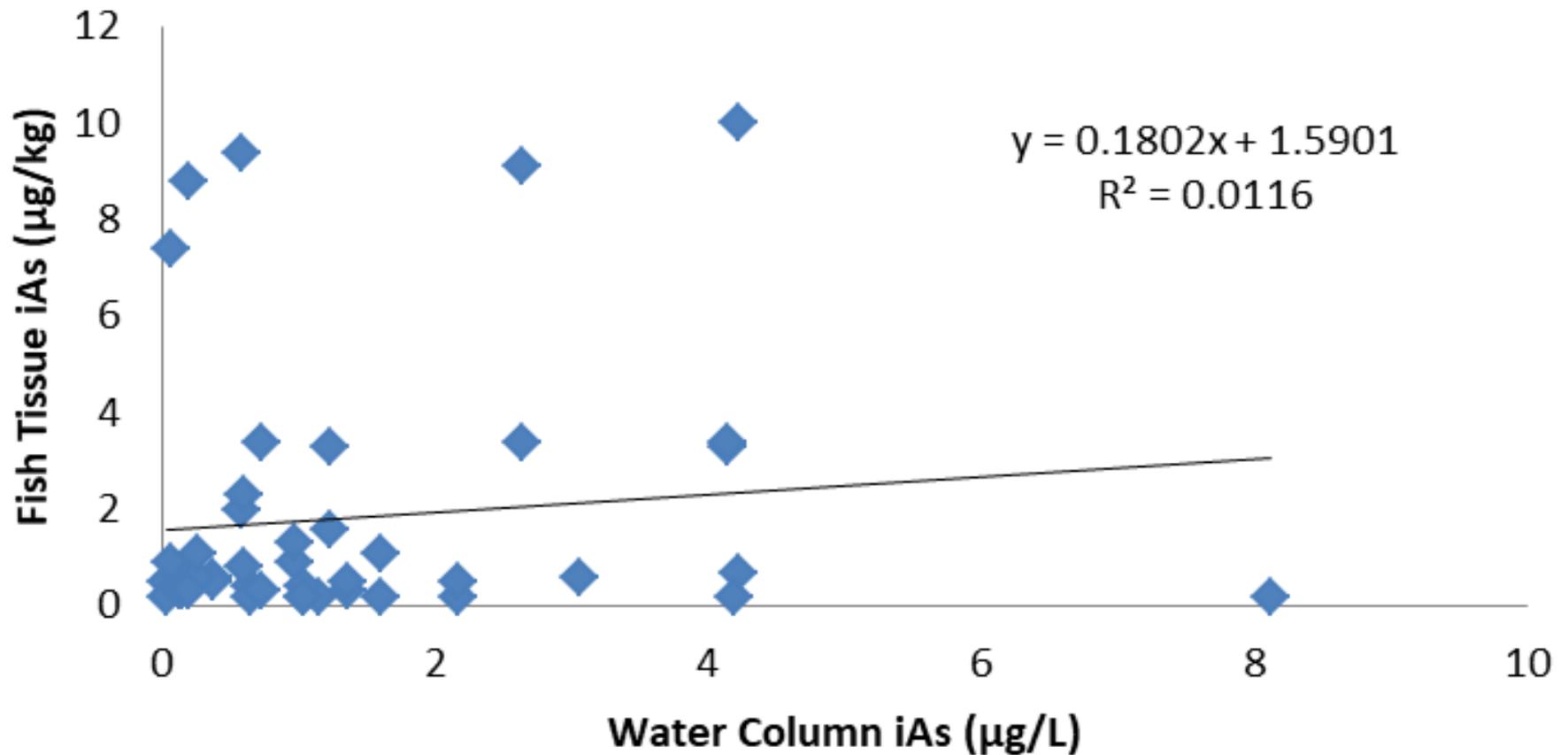


# Results – Probabilistic Fish Tissue

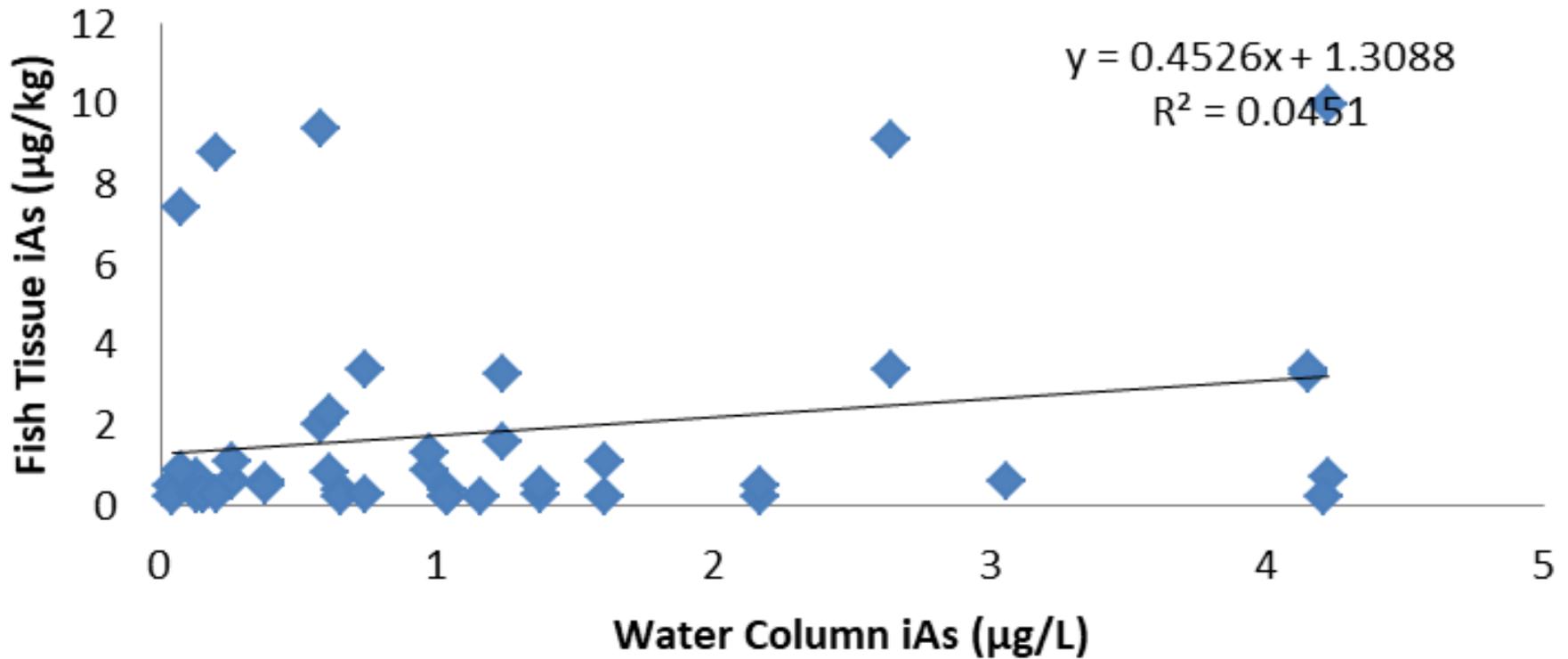
	Fish Tissue		BAF (L/kg)	
	iAs ( $\mu\text{g}/\text{kg}$ )	tAs ( $\text{mg}/\text{kg}$ )	iAs	tAs
Range	0.20- 10.00	0.00- 0.58	0.02- 97.37	0.53- 921.01
Interquartile Range	0.30- 2.00	0.02- 0.11	0.31- 3.45	18.92- 157.14
Mean	1.85	0.08	5.35	118.50
Median	0.60	0.05	1.31	42.32



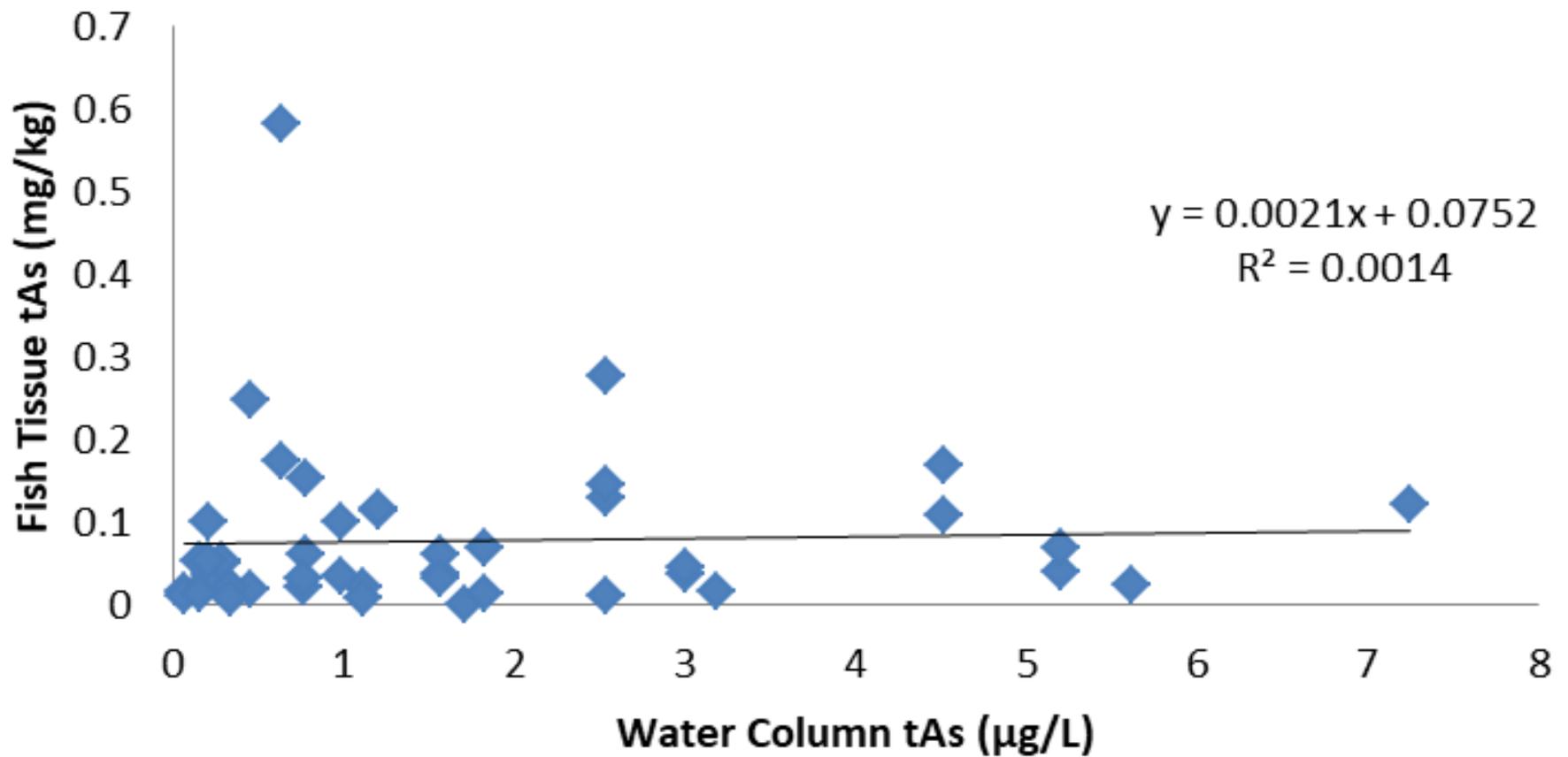
# iAs in Water and Fish



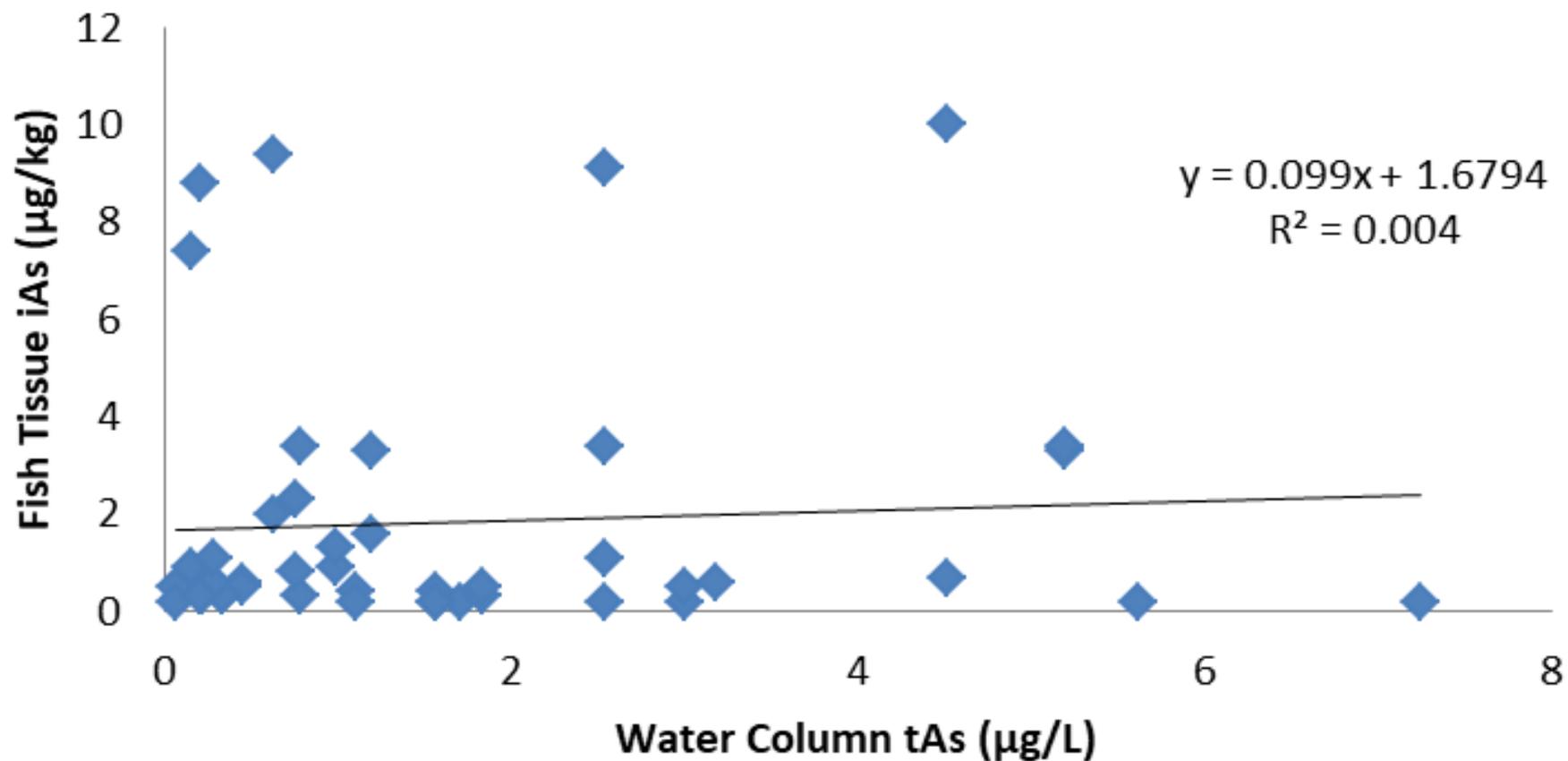
# iAs in Water and Fish (remove highest)



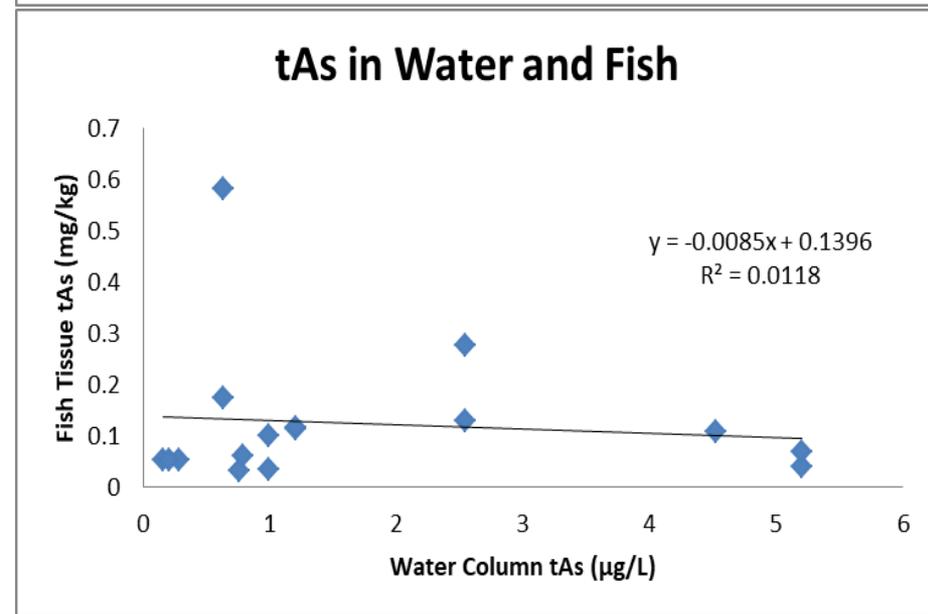
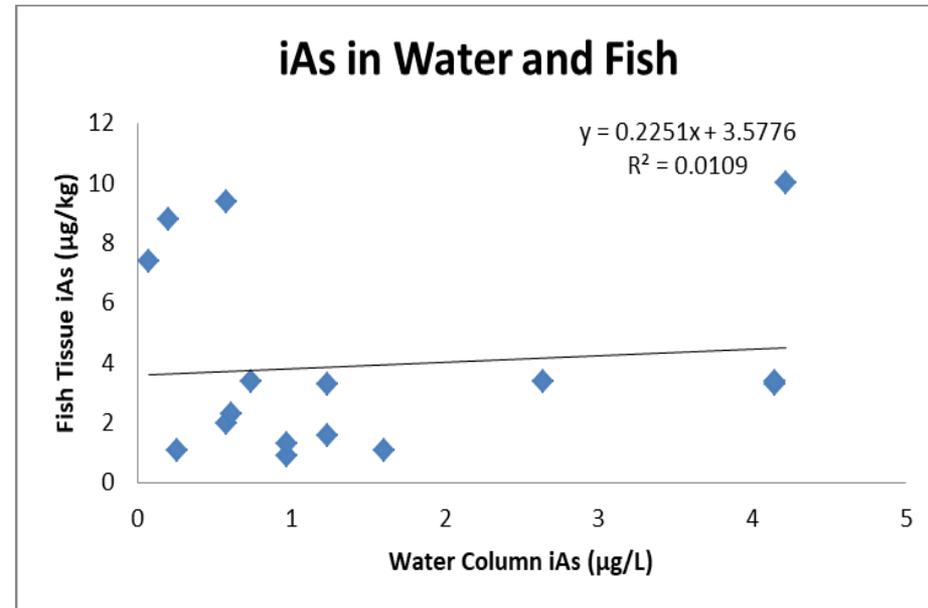
# tAs in Water and Fish



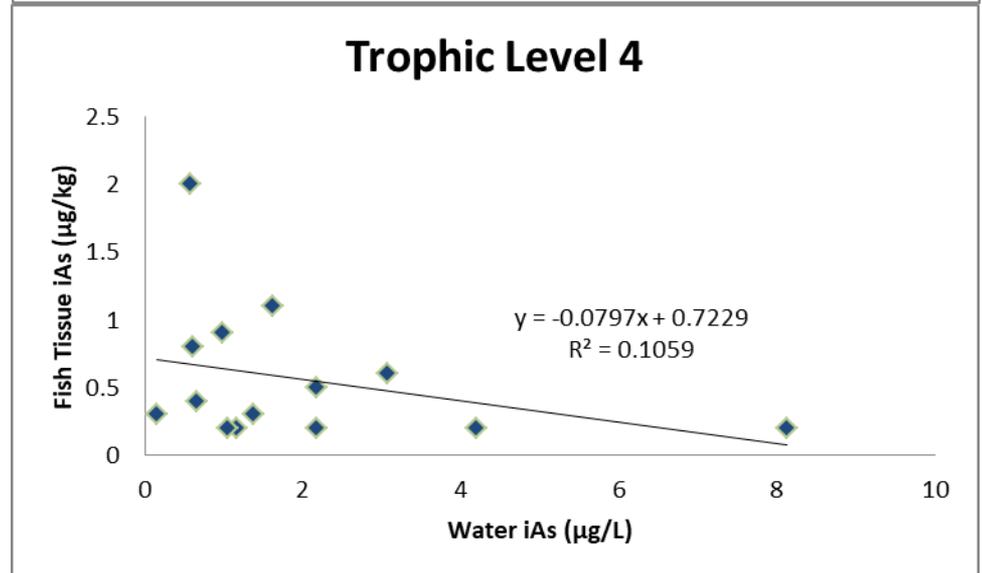
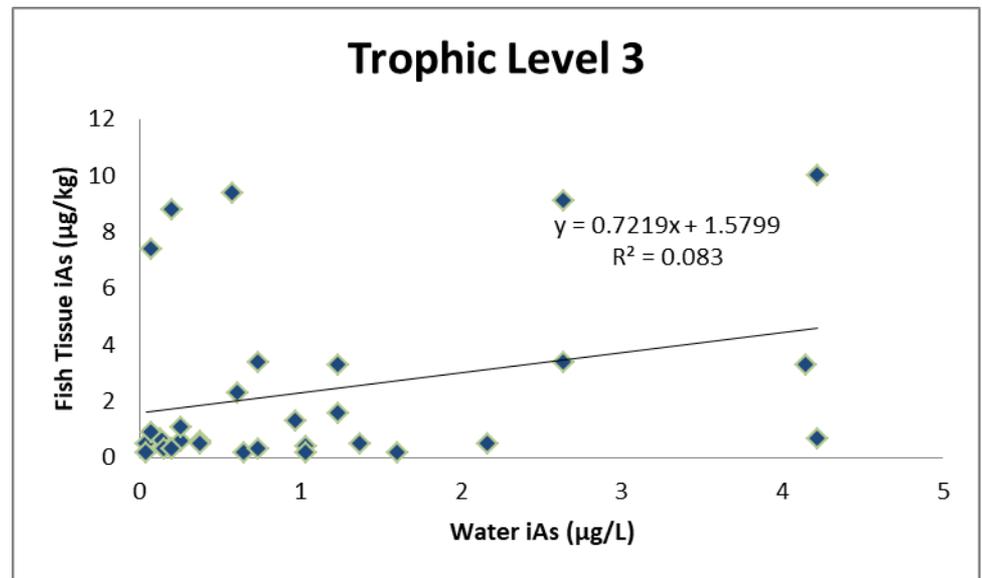
# tAs in Water vs. iAs in Fish



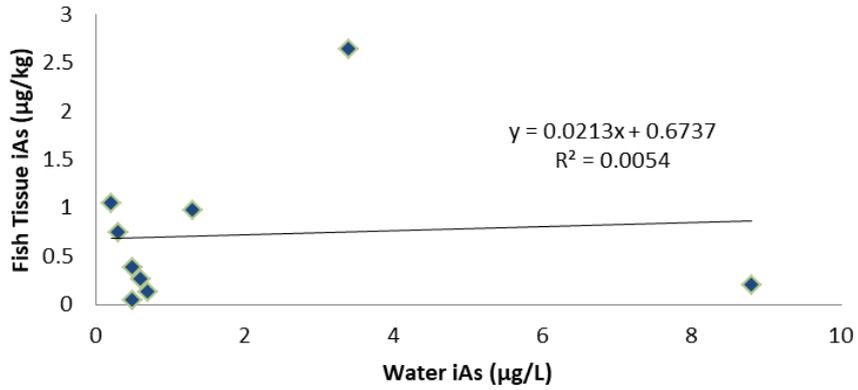
Removing results  
<MRL does not  
improve  
relationship



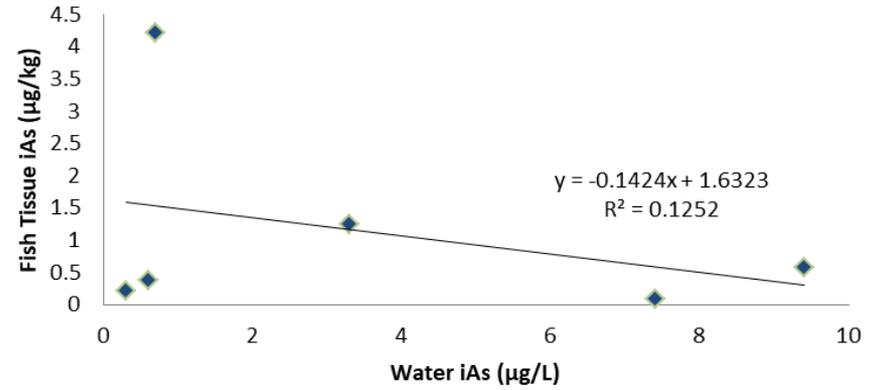
# What about feeding habit?



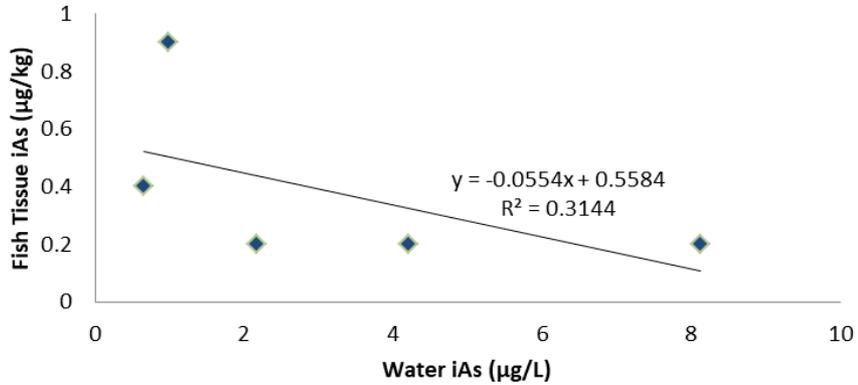
### Cutthroat Trout



### Rainbow Trout



### Brown Trout



Does species matter?



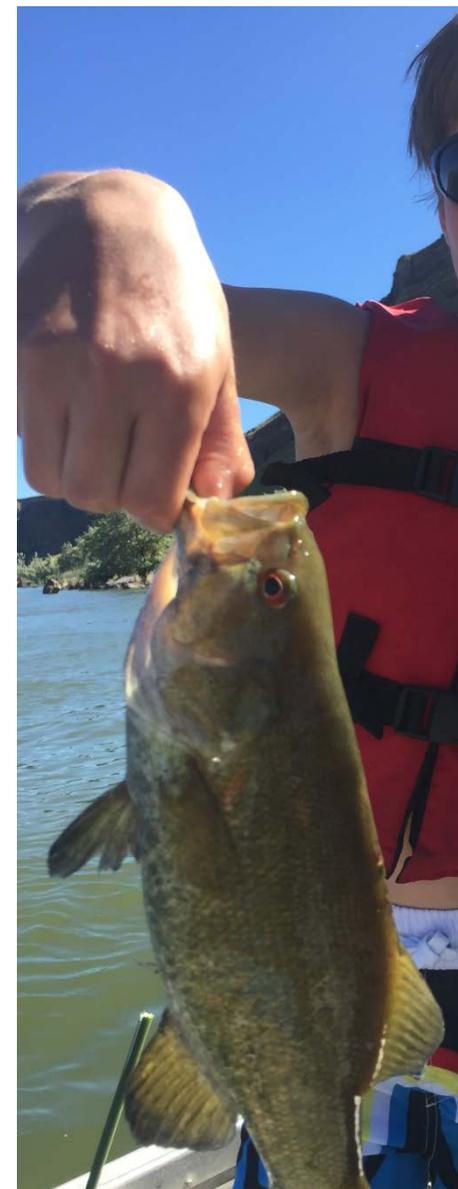
# Preliminary Conclusions

- Although iAs in water can be highly variable, that variability does not appear to be based on seasonality or geography
- We can calculate BAFs, but they are highly variable, and the source of variability is not predictable
- One-time sample of water column may lead us to over- or under-estimate actual BAF at each site



# Preliminary Conclusions

- Additional sampling could supplement our understanding of iAs in fish tissue
- May not be any relationship of iAs in water column to what consumers are exposed to through consumption of fish tissue



# Next Steps

- Continue monitoring?
  - Determine monitoring design
    - Continue probabilistic
    - Limited sites, with individual fish
    - Sites located at areas of high, low, or full range of ambient  $A_s$  conditions



# Possible Approach?

- Collect up to 10 individual fish of the same species (or Genus) from 4 to 6 sites
- Sites selected to represent range of ambient concentrations, located at or near targeted sites to leverage monthly samples



Comments due  
April 30

Questions?



Thank you