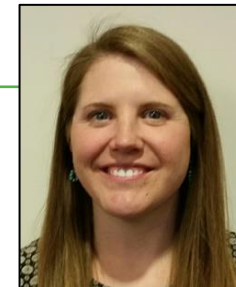


# IDWR Statewide Program Monitoring: 2021 Update

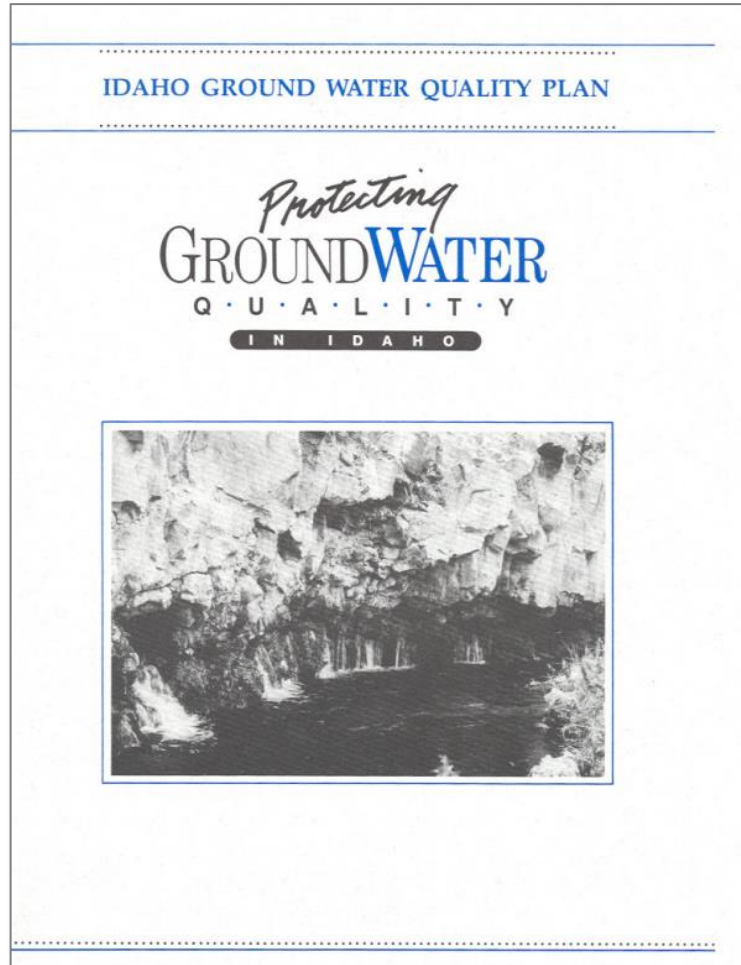
Amy Steimke & Blake Burkard, 1/20/2022



IDAHO DEPARTMENT OF  
**WATER RESOURCES**



# Groundwater Monitoring in Idaho



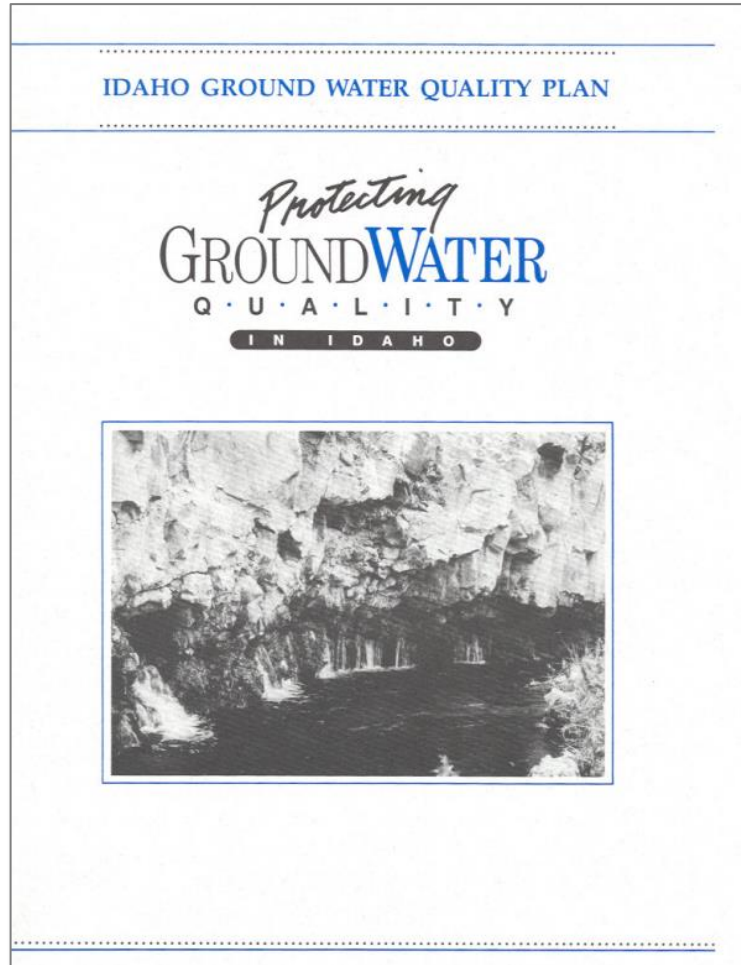
## Idaho Ground Water Quality Plan

- Authorized by Ground Water Quality Protection Act of 1989
- Approved by legislature in 1992, revised in 1996
- Lays out roles/responsibilities of agencies in Idaho
  - Includes mandate for IDWR to manage geospatial data for the state

## Idaho's Ground Water Quality Monitoring Programs



# Groundwater Monitoring in Idaho



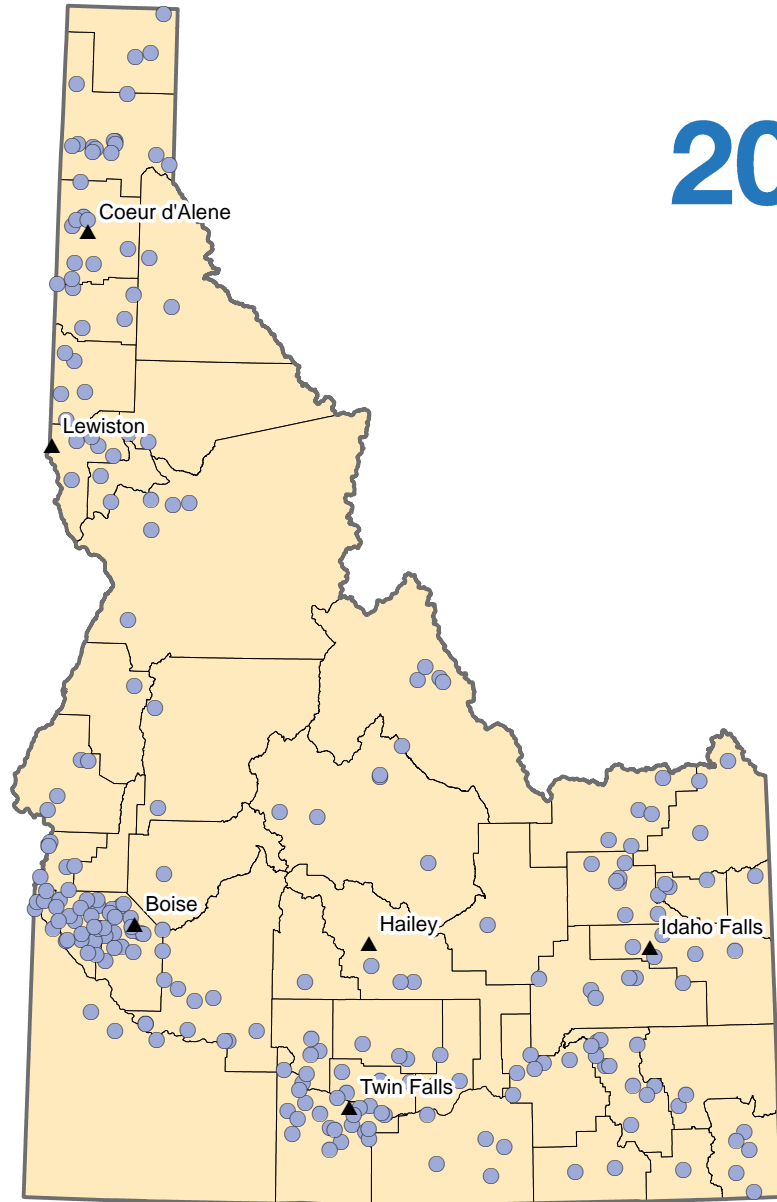
## Statewide Program Goals

- Determine quality of Idaho's groundwater
- Identify existing or emerging problems
- Determine changes in quality over time

## Idaho's Ground Water Quality Monitoring Programs



# 2021 Statewide Program




- Sampled 235 wells
  - 4 new wells were added
  - All 44 counties were sampled
  - New parameters were added
    - PFAS
    - Lithium
  - New data viewer released

# Sampling Staff

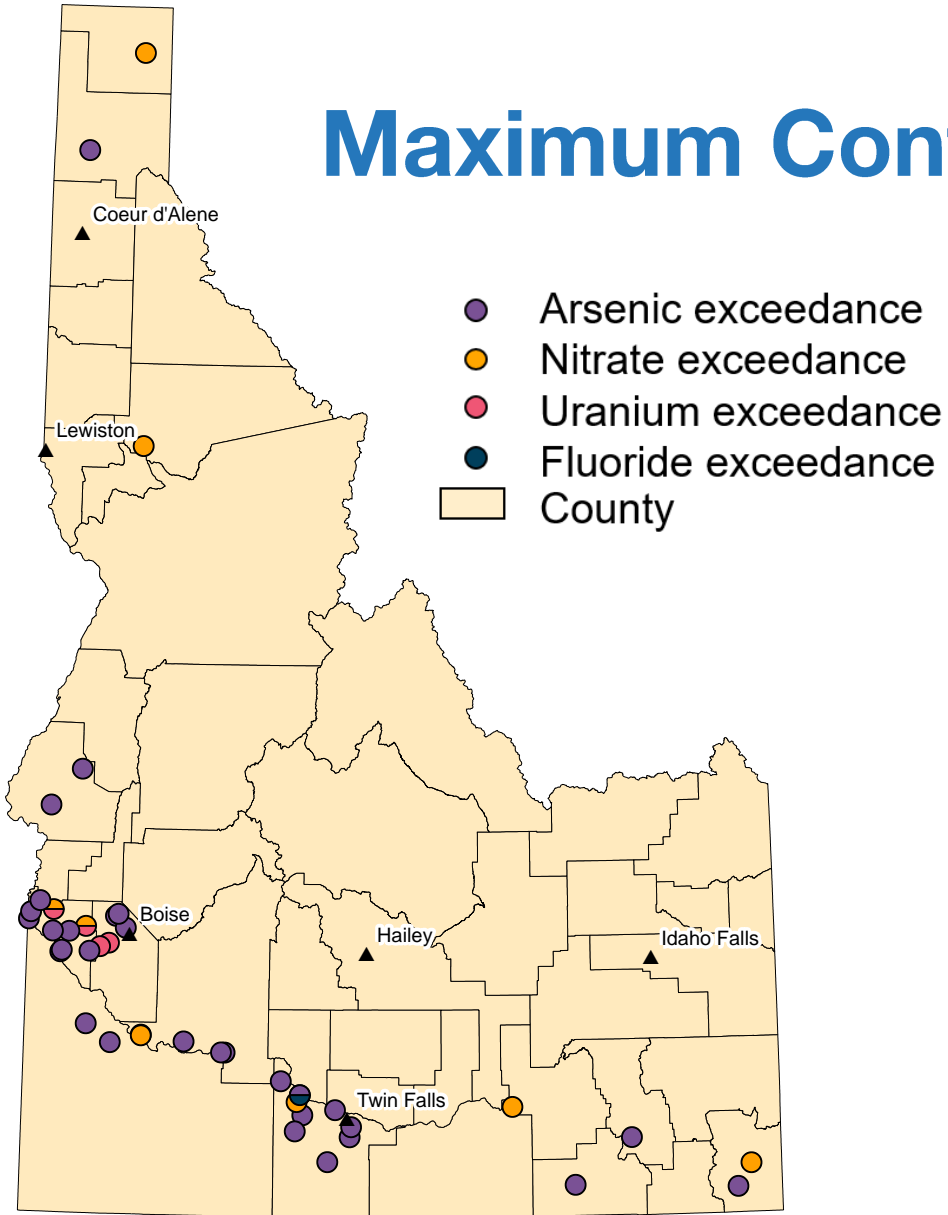


## 2021 Parameter List

Field Parameters	Metals	Emerging Contaminants
pH	Arsenic	BPA
Conductivity	Cadmium	<b>PFAS</b>
Dissolved Oxygen	Calcium	Triclosan
Temperature	Iron	<b>Pesticides</b>
Alkalinity	<b>Lithium</b>	Atrazine
<b>Common Ions</b>	Magnesium	Glyphosate
Chloride	Manganese	Metolachlor
Fluoride	Potassium	<b>Collaborative Sampling</b>
Sulfate	Selenium	N-15 isotope
Alkalinity	Silica	Methane
<b>Nutrients</b>	Sodium	
Ammonia	Uranium	
Nitrate		
Total Phosphorus		



# Maximum Contaminant Level (MCL) Exceedances



	Arsenic	Nitrate	Uranium	Fluoride
MCL	10 µg/l	10 mg/l	30 µg/l	4 mg/l
Number of wells > MCL	30	9	4	1
Percentage of wells > MCL	13%	4%	2%	<1%
Number of first time exceedances	2	2	1	0
Max value	94 µg/L	32 mg/L	40 µg/L	12.2 mg/L

A total of 41 wells, or 17% of sites sampled, had at least one MCL exceedance

# PFAS Overview

- PFAS (per- and polyfluoroalkyl substances) are man-made chemicals found in a wide range of products
- Most PFAS chemicals do not break down & persist in the environment
- EPA has set a combined health advisory of 70 ppt

## Major Sources of PFAS in the Environment

- 1) Production and Manufacturing Facilities
- 2) Fluorine-Containing Firefighting Foams
- 3) Waste Disposal
- 4) Wastewater Treatment
- 5) Commercial/Consumer Products
  - clothing and carpets
  - paper and packaging
  - non-stick cookware
  - fabric softeners
  - windshield wipers
  - personal care products
  - hydraulic fluids
  - ski/snowboard waxes

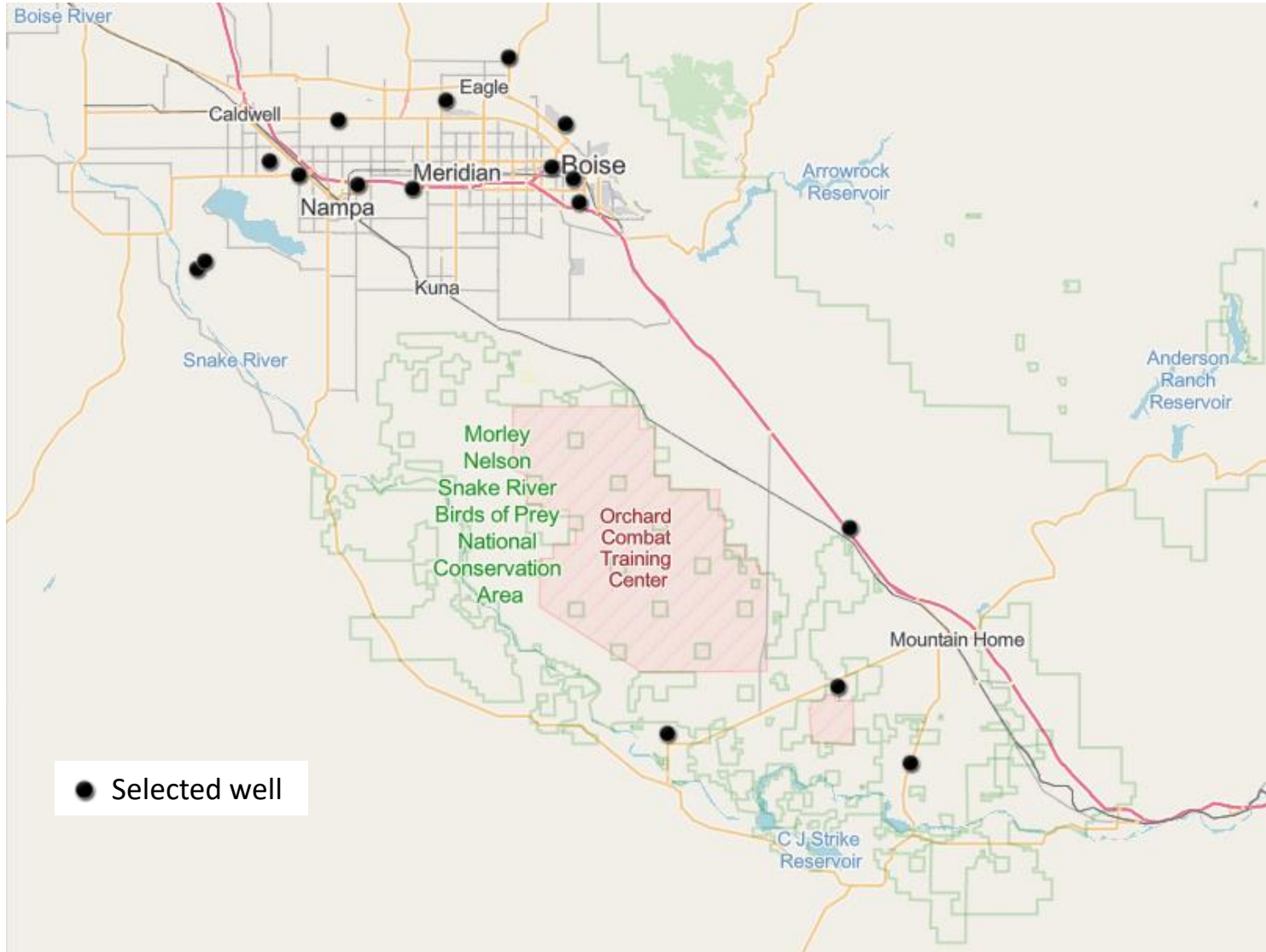
modified from <https://pfas-1.itrcweb.org/>



# New for 2021: PFAS Pilot Project

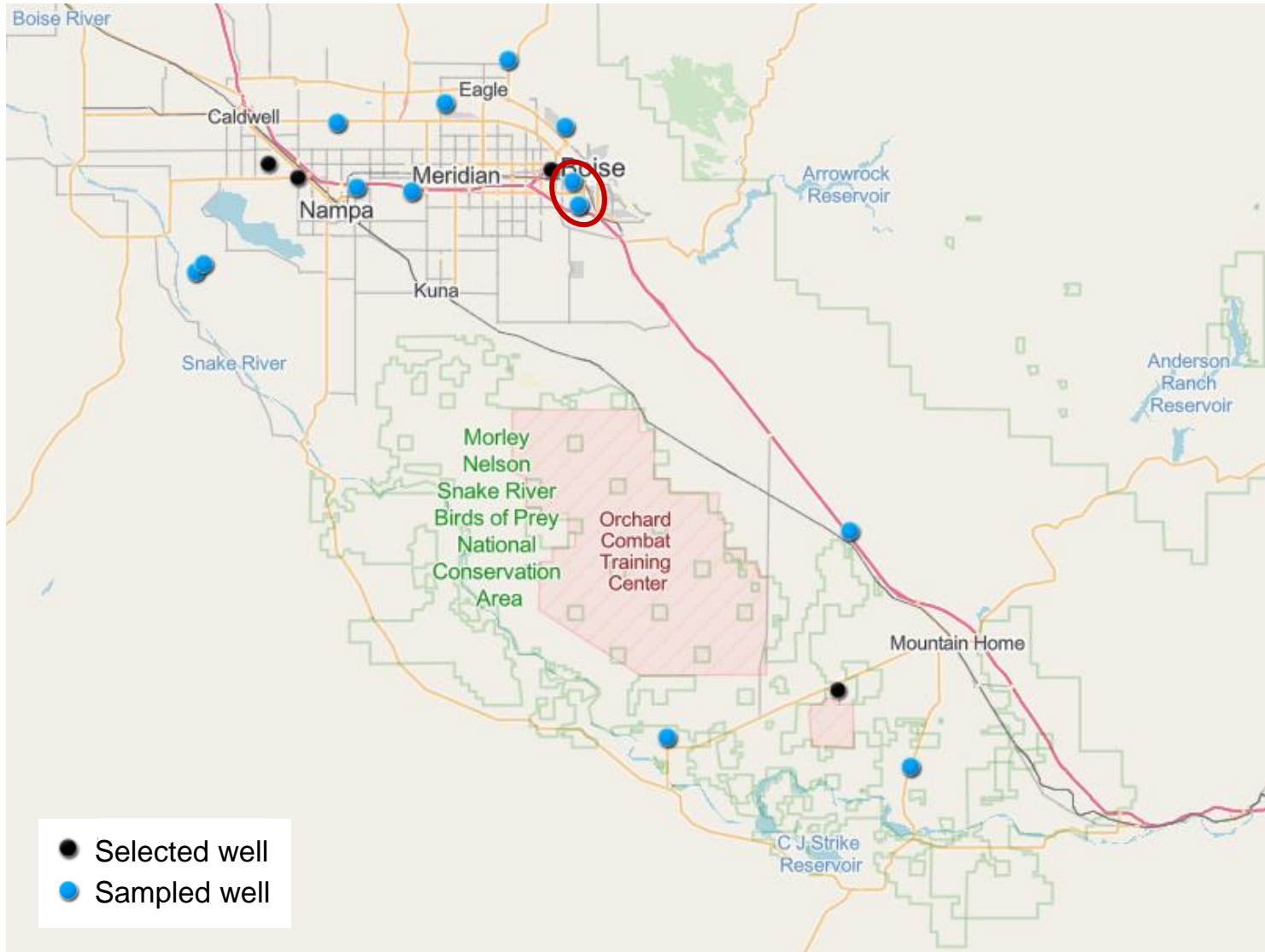
- Goal was to sample 15 wells for PFAS
- Sites were selected using the following criteria:
  - 1) Wells slated for sampling in summer 2021
  - 2) Wells near known or suspected PFAS contamination sites
  - 3) Domestic wells were preferentially selected
- Sampling was conducted by one trained team
- Used EPA method 533; samples analyzed at Anatek Labs





# Selected Sites

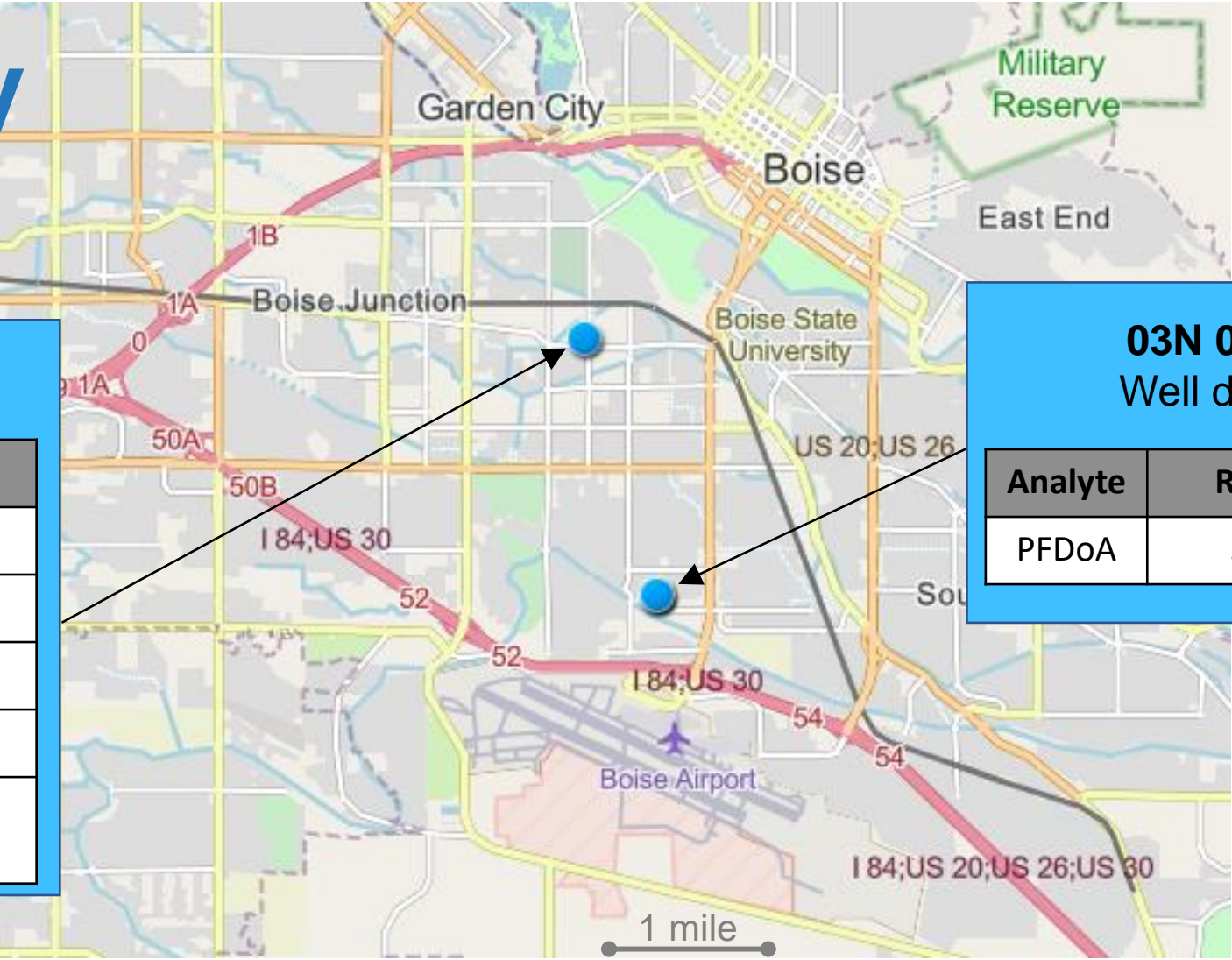
- 18 sites were identified and selected for sampling
- Sites were located near:
  - MHAFB
  - Boise & Nampa airports
  - Wastewater treatment plants
  - Landfills
- 17 domestic wells; 1 irrigation
- Well depths ranged from 32 to 600 feet



# Sampled Sites

- 13 sites were sampled
- All sites were domestic wells
- Sampling occurred June-August
- PFAS detection at two sites

# Preliminary Results



**03N 02E 16BBD1**  
Well depth: 87 feet

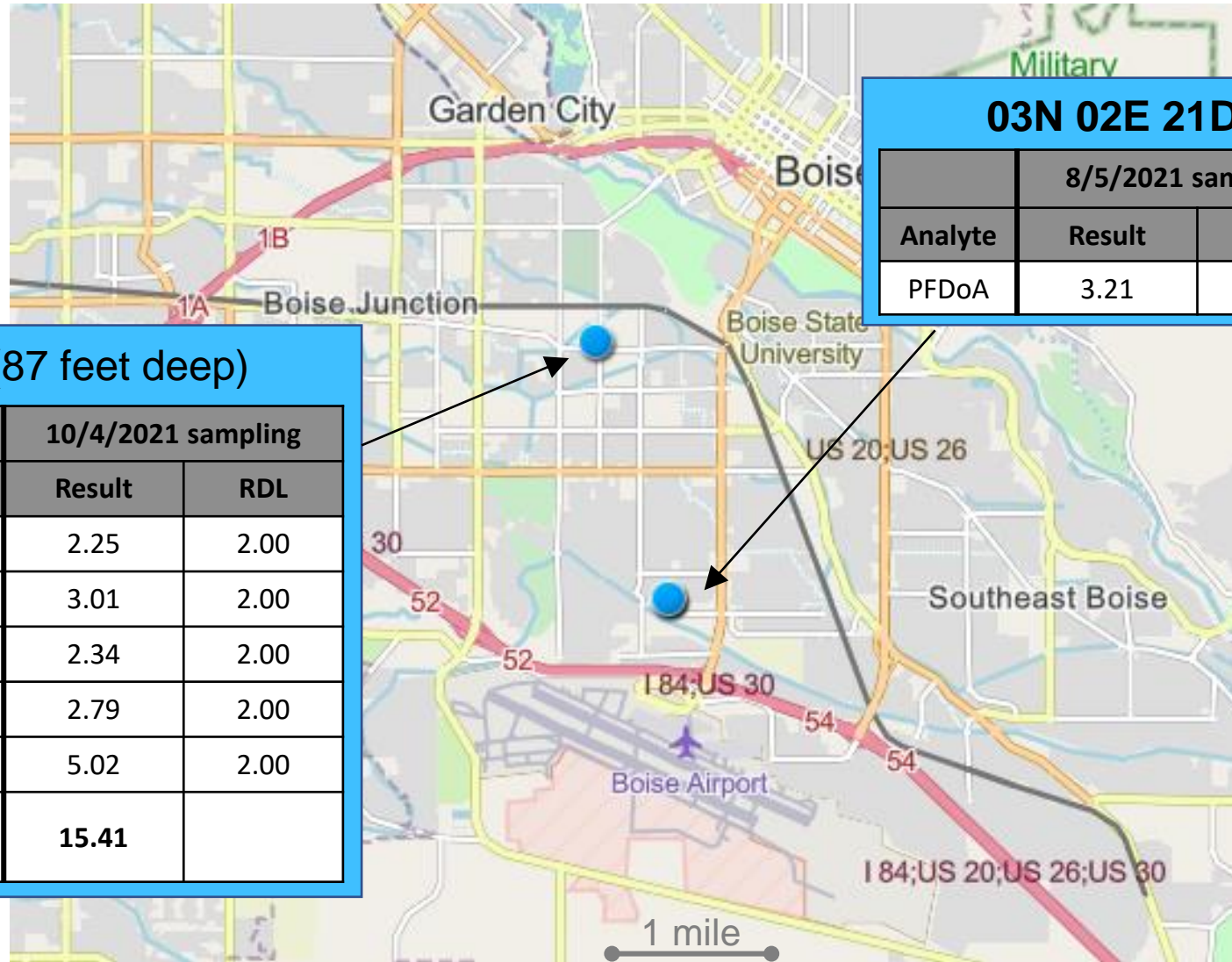
Analyte	Result	RDL
PFBS	2.84	1.75
PFHxA	1.82	1.75
PFOA	2.47	1.75
PFOS	3.06	1.75
<b>TOTAL PFAS</b>	<b>10.19 PPT</b>	

**03N 02E 21DCA1**  
Well depth: 95 feet

Analyte	Result	RDL
PFD <sub>o</sub> A	3.21	2.0

\*All values are in PPT (ng/L)  
\*\*RDL = Reporting Detection Limit

# Final Results



## 03N 02E 21DCA1 (95 feet deep)

Analyte	8/5/2021 sampling		10/4/2021 sampling	
	Result	RDL	Result	RDL
PfDoA	3.21	2.00	ND	2.00

## 03N 02E 16BBD1 (87 feet deep)

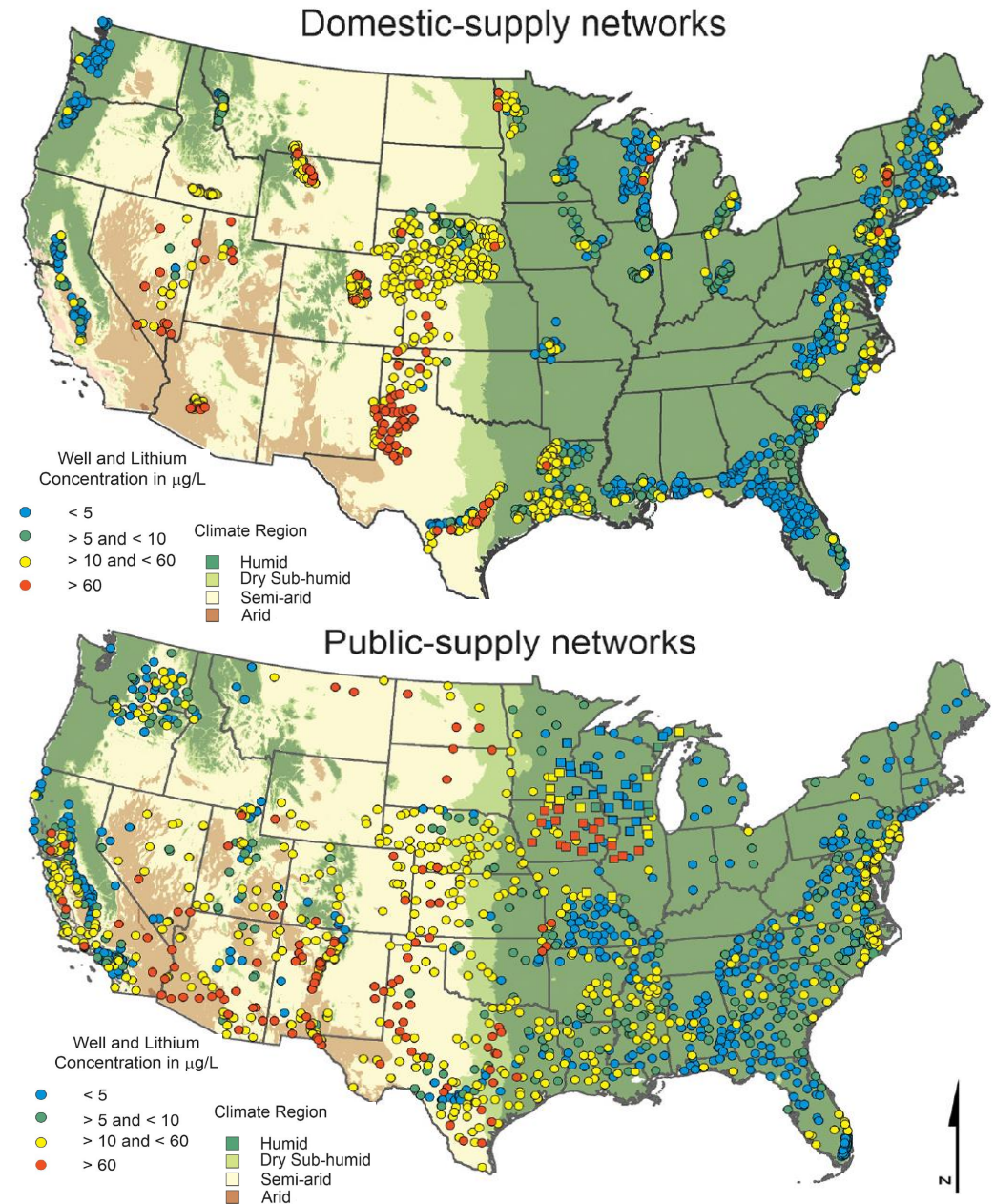
Analyte	6/22/2021 sampling		10/4/2021 sampling	
	Result	RDL	Result	RDL
PFBA	ND	1.75	2.25	2.00
PFBS	2.84	1.75	3.01	2.00
PFHxA	1.82	1.75	2.34	2.00
PFOA	2.47	1.75	2.79	2.00
PFOS	3.06	1.75	5.02	2.00
<b>TOTAL PFAS</b>	<b>10.19</b>		<b>15.41</b>	

\*All values are in PPT (ng/L)

\*\*RDL = Reporting Detection Limit

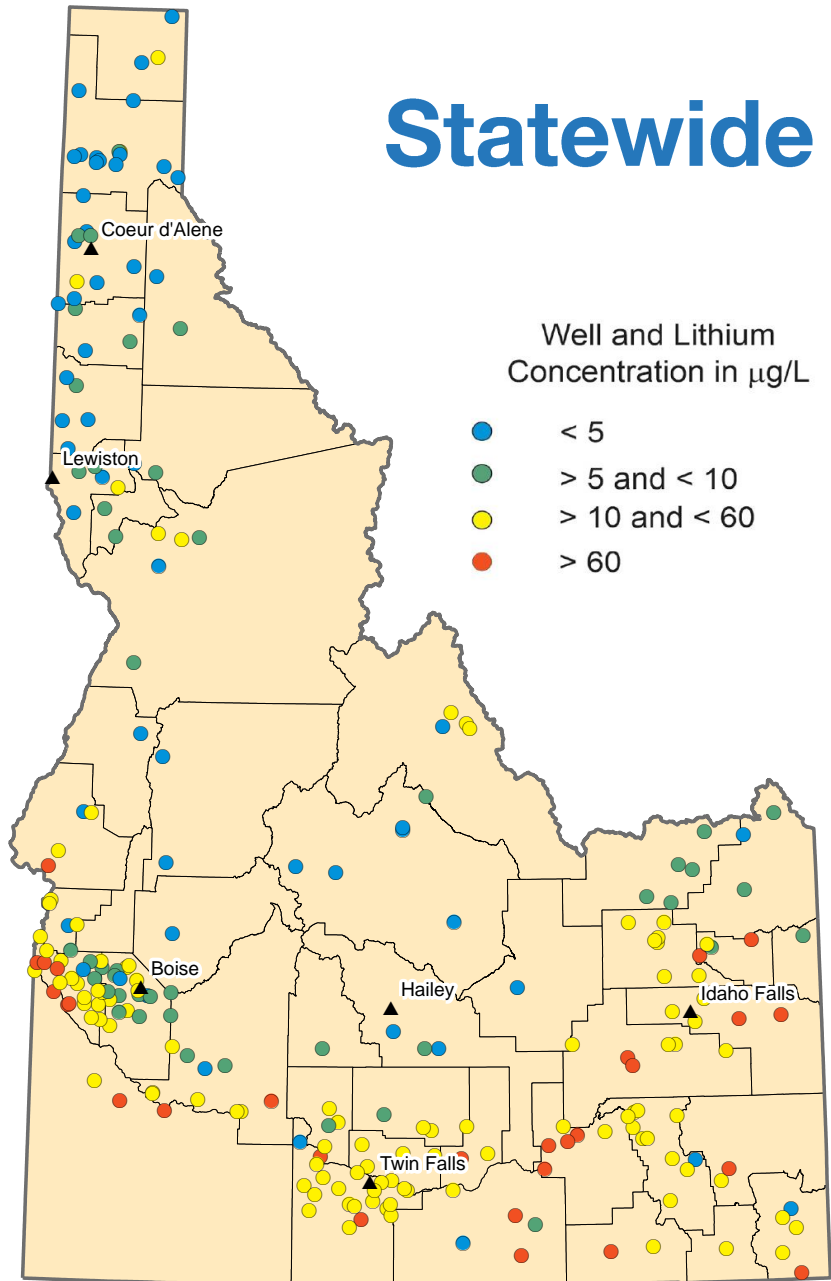
# Lithium

- USGS study<sup>1</sup> evaluated lithium concentrations in the US; data is sparse and especially lacking in Idaho
- No regulatory value exists, but the paper used two human-health benchmarks for comparison
  - 10 µg/L: Health Based Screening Level (HBSL)
    - 41% of sites in the U.S. exceeded
  - 60 µg/L: Drinking water only threshold
    - 7% of sites in the U.S. exceeded
- Authors found highest concentrations in arid regions and older groundwater; found lowest concentrations in carbonate-rock aquifers



<sup>1</sup>Lindsey, Bruce D., et al. "Lithium in groundwater used for drinking-water supply in the United States." *Science of The Total Environment* 767 (2021): 144691.

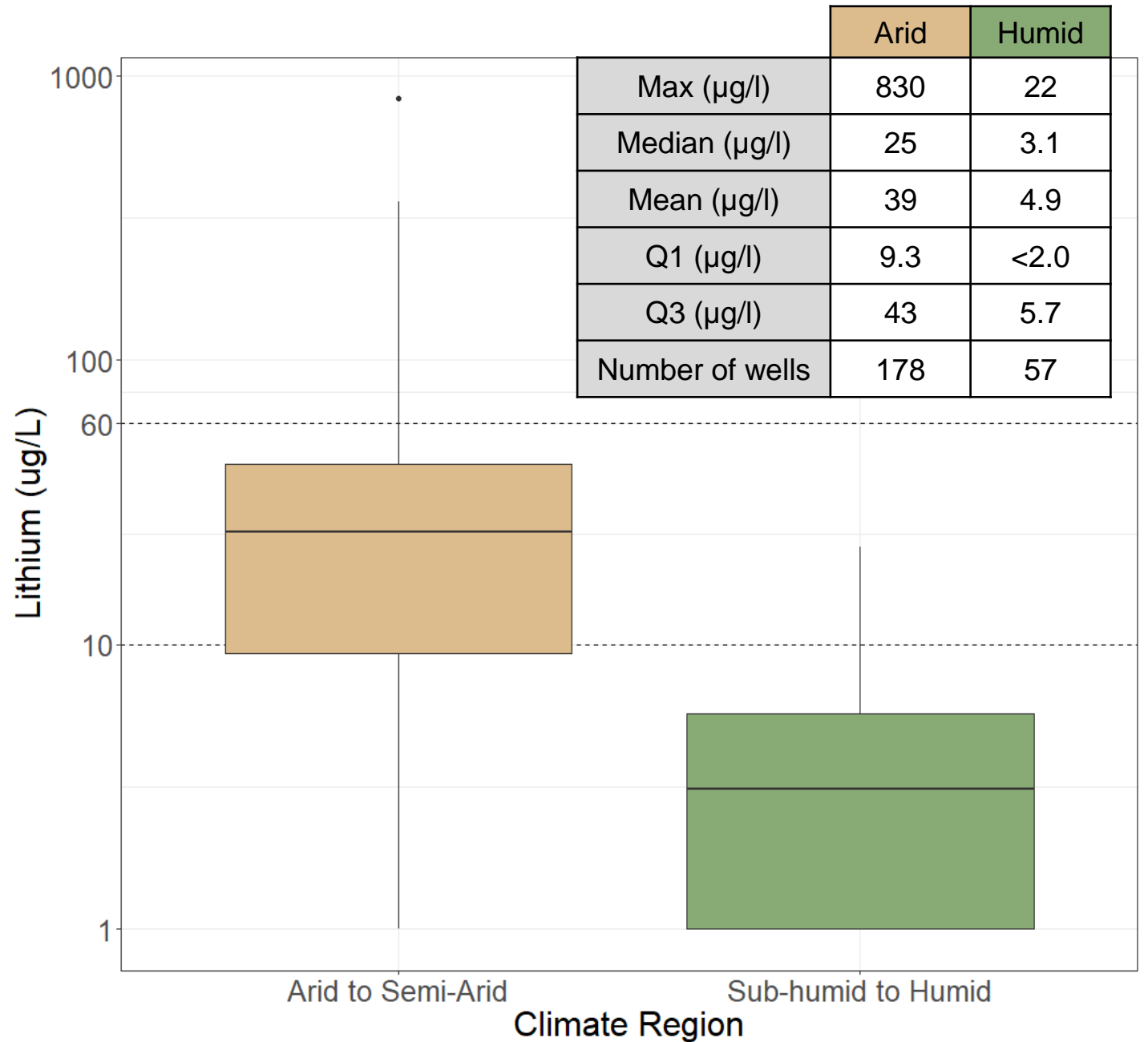
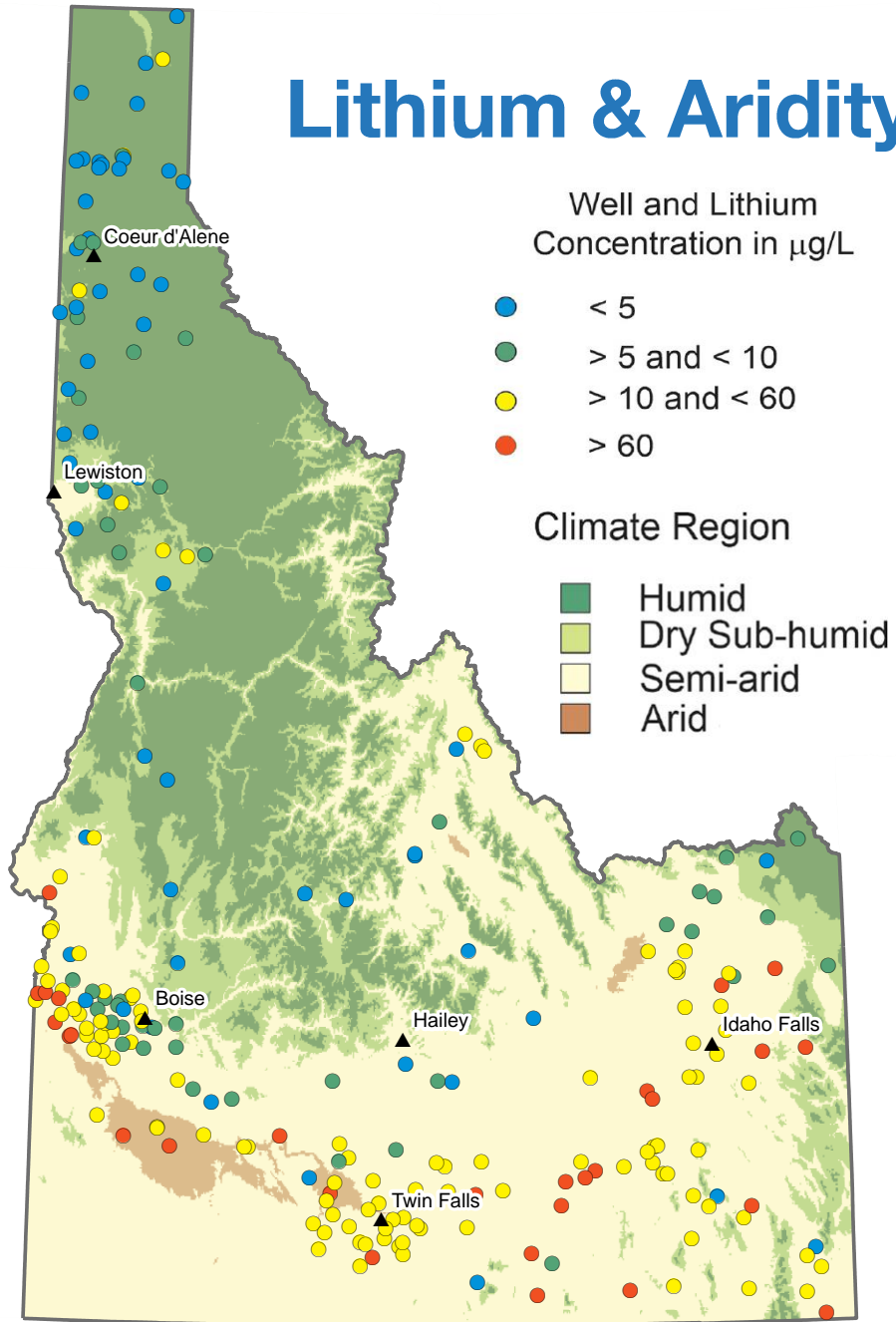
# Statewide Program Lithium Results



Lithium Statistics		Number of wells	Percentage of wells
Concentration range	0 - 5 µg/L	55	23%
	5.1 - 10 µg/L	45	19%
	10.1 - 60 µg/L	107	46%
	>60 µg/L	28	12%
Minimum value		0.15 µg/L (estimated)	
Median value		15 µg/L	
Mean value		31 µg/L	
Maximum value		830 µg/L	
Number of wells		235	

10 µg/L = Health Based Screening Level (HBSL)  
60 µg/L = Drinking-water only threshold

# Lithium & Aridity



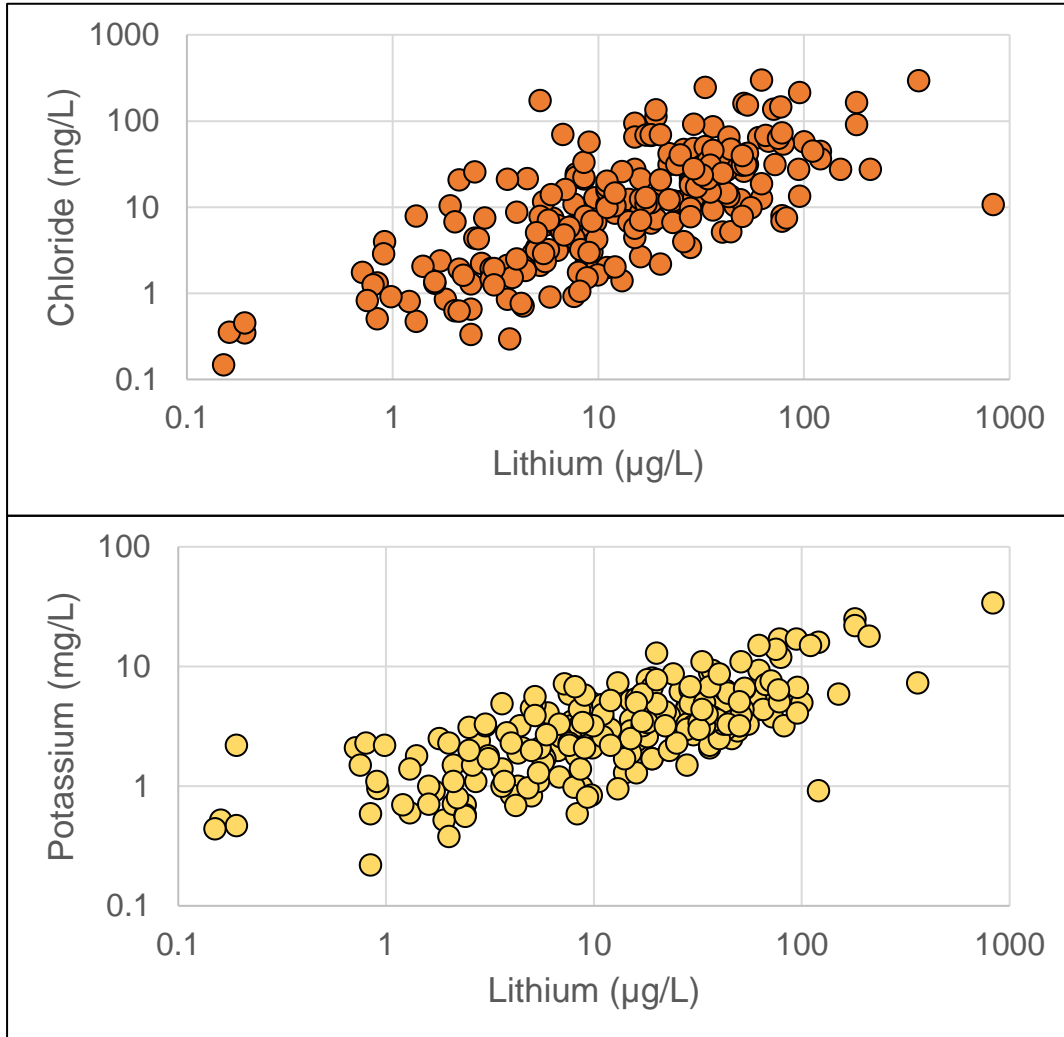


# Lithium Correlation with Other Parameters: Spearman's Correlation Coefficient

- Statistical test to measure the strength of a monotonic relationship between paired data
- Values of rho ( $\rho$ ) vary from -1 to +1
  - A value of  $\rho$  near -1 or +1 means a strong inverse or direct relationship between two variables
  - A value of  $\rho$  closer to 0 demonstrates a weak relationship
- Ran a Spearman's correlation test between lithium and other parameters sampled this season

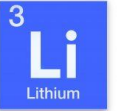
Parameter	Spearman's $\rho$
Chloride	0.72
Potassium	0.70
Sulfate	0.67
Sodium	0.64
Arsenic	0.58
Calcium	0.58
Alkalinity	0.56
Fluoride	0.54
Magnesium	0.49
Selenium	0.46
Uranium	0.36
Silica	0.35
Ammonia	0.22
Nitrate	0.20
Manganese	0.06
Phosphorus	0.02
Cadmium	0.02
Iron	0.02

# Lithium Correlation with Other Parameters: Spearman's Correlation Coefficient



Parameter	Spearman's $\rho$
Chloride	0.72
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Iron	0.02

# Future IDWR Emerging Contaminant Monitoring



thelionelectric.com

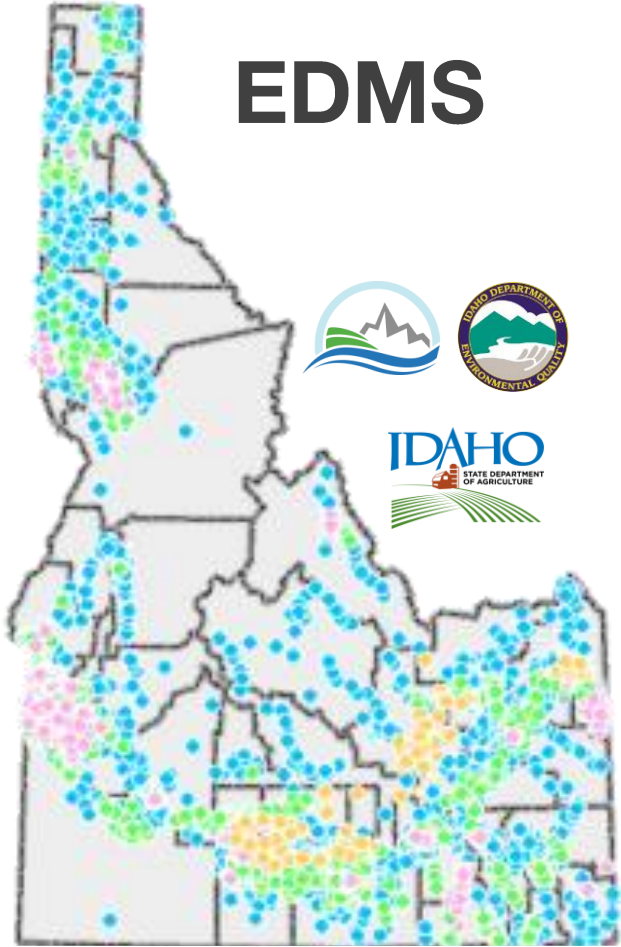
- Both Lithium and 29 PFAS chemicals added to EPA's 5<sup>th</sup> Unregulated Contaminant Monitoring Rule (UCMR5), published December 27, 2021
- IDWR plans to continue monitoring lithium at all Statewide sites and PFAS at a subset of sites to collect baseline data for the state
- We welcome input for other contaminants to add into our parameter list!




riversideca.gov

# Data Access

## EDMS



 Bulk download of groundwater quality data

## WISKI Web Portal

[idwr-groundwater-data.idaho.gov](http://idwr-groundwater-data.idaho.gov)

A screenshot of the WISKI Web Portal interface. The page title is "Groundwater Data Portal" under the "IDAHO DEPARTMENT OF WATER RESOURCES" logo. There are two main navigation buttons: "Station Overview" and "Downloads". The "Overview" section contains text explaining the portal's purpose and a note about active monitoring sites. The "Bulk Downloads (large files)" section lists three categories of data with links to zipped files: groundwater level data managed by IDWR, Sentinel Well data, and groundwater quality data from IDWR, DEQ, and ISDA. A disclaimer at the bottom states that the data is provided as a public service and is subject to revision.

**Overview**

The Groundwater Data Portal is a compilation of selected groundwater level and groundwater quality data collected by and/or managed by the Idaho Department of Water Resources (IDWR).

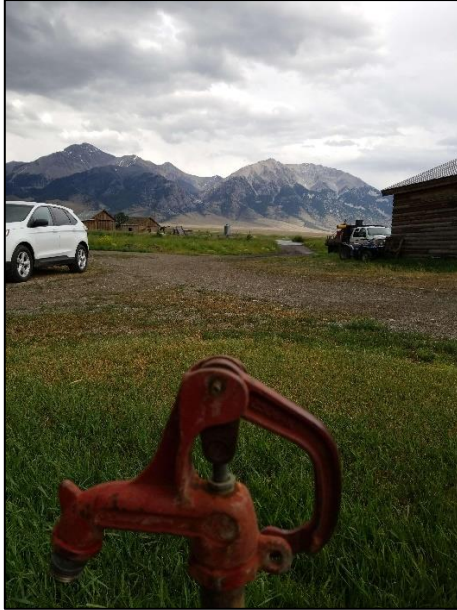
The data served in the map viewer only show **active** monitoring sites. To access all available data, use the Bulk Downloads feature below.

**Bulk Downloads (large files)**

- All groundwater level data managed by IDWR  
[Zipped file of groundwater level data](#)
- Sentinel Well data (info regarding wells [here](#))  
[Zipped file of Sentinel Well groundwater level data](#)
- All groundwater quality data from IDWR, DEQ, and ISDA; data is managed by IDWR and served from [EDMS](#)  
[Zipped file of groundwater quality data](#)

*The Idaho Department of Water Resources provides this data as a public service. The Idaho Department of Water Resources strives to ensure that all technical data and other information is accurate, complete, and in conformance with the Idaho Public Records Act. Neither the Department of Water Resources nor the State of Idaho assumes any legal responsibility for the accuracy or completeness of the information provided. Persons using information from this dataset for official purposes, or other purposes in which accuracy and completeness are required, are hereby notified that they should first verify the information with the public records or other primary sources from which the information was obtained. Data may be provisional, and are subject to revision.*

# Thanks! Questions?



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