IWRRI

Idaho Water Resources Research Institute

Intro to IWRRI

May 12th, 2026: Henry's Fork Council Meeting

Grace Peven, Ph.D., Research Scientist

University of Idaho

IWRRI connects stakeholders, students and researchers

Research complex & urgent questions

Teach the next generation of water leaders

Translate knowledge to make findings actionable

S1209 - Section 5
Prioritizing Water Research in Idaho Higher Education

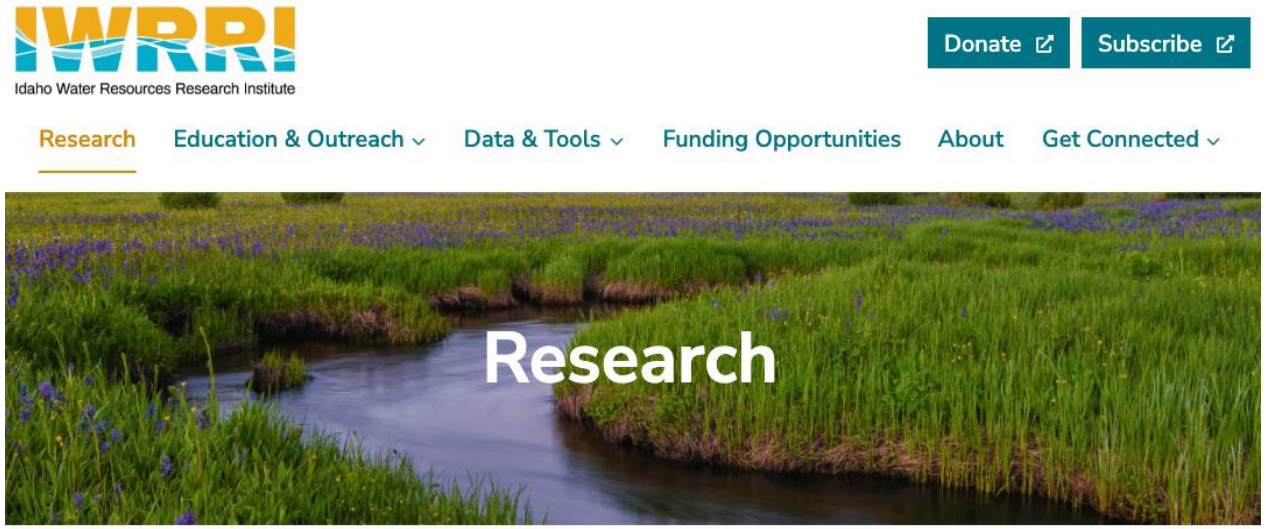
- State research allocation shall be used for the Idaho Water Resources Research Institute.
- Expenditure of these funds shall be at the direction of the IWRRI Executive Board consistent with the **Institute's research priorities.**

IWRRI shall encourage rigorous, actionable water research at all of Idaho's public institutions of higher learning and shall fund research projects accordingly.

Research Team

Meg Wolf, Kendra Kaiser, Grace Peven, Phil Margarit, Steve Powers

Research Prioritization Process



As part of its mission, the Idaho Water Resources Research Institute conducts applied water-related research. Two of the outcomes of IWRRI research are written reports and published papers. Explore this page for highlights of our research, a map with links to some of our previous reports, and recent scientific publications.

2025 Idaho Water Research Priorities

Suggest A Research Idea

Research Advisory Committee:
32 members across agencies, municipalities, industry, conservation organizations, and academic institutions

Identified Idaho's most pressing water challenges

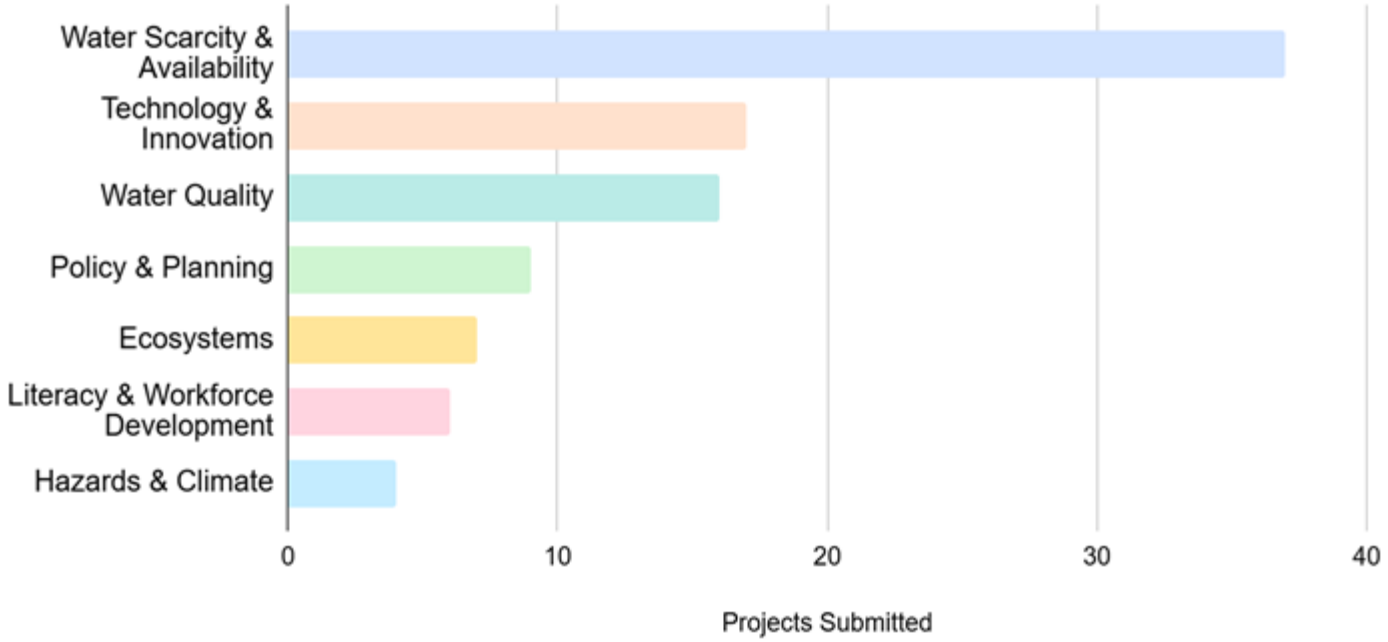
Generated 90+ research project needs

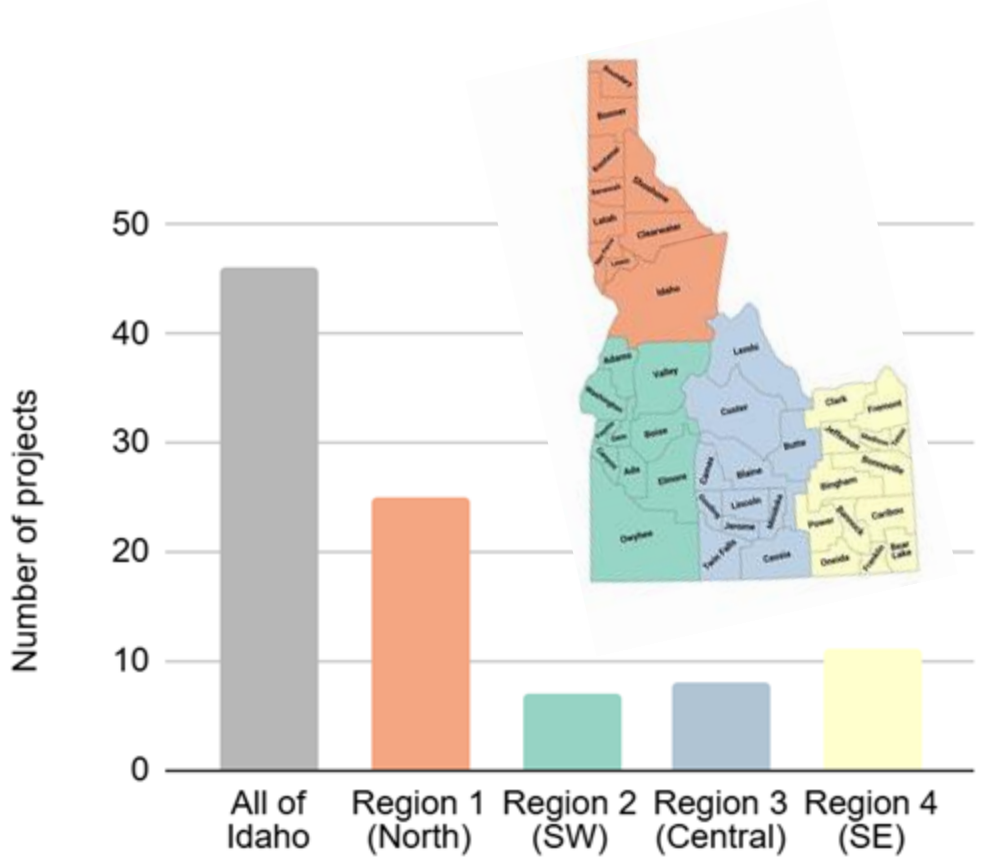
Evaluated projects based on relevance, community impact, feasibility, and geographic representation

Provided recommendations to the IWRRI Executive Board for allocation of IWRRI's legislated research funding

2025 Research Idea Submissions

Idaho Water Resources Research Institute





2025 Idaho Water Research Priorities

Idaho Water Resources Research Institute

STATEWIDE RESEARCH

Water Scarcity & Availability

- Evaluating L-band InSAR for Idaho Water Monitoring Applications*
- Enhancing Visualization of Snow Water Storage Conditions*

Water Technology & Data

- Assessing Sufficiency, Optimal Deployment, and Application-Readiness of Idaho's Hydrometeorological Observation Network*
- Integrated Water Data and Visualization Platform

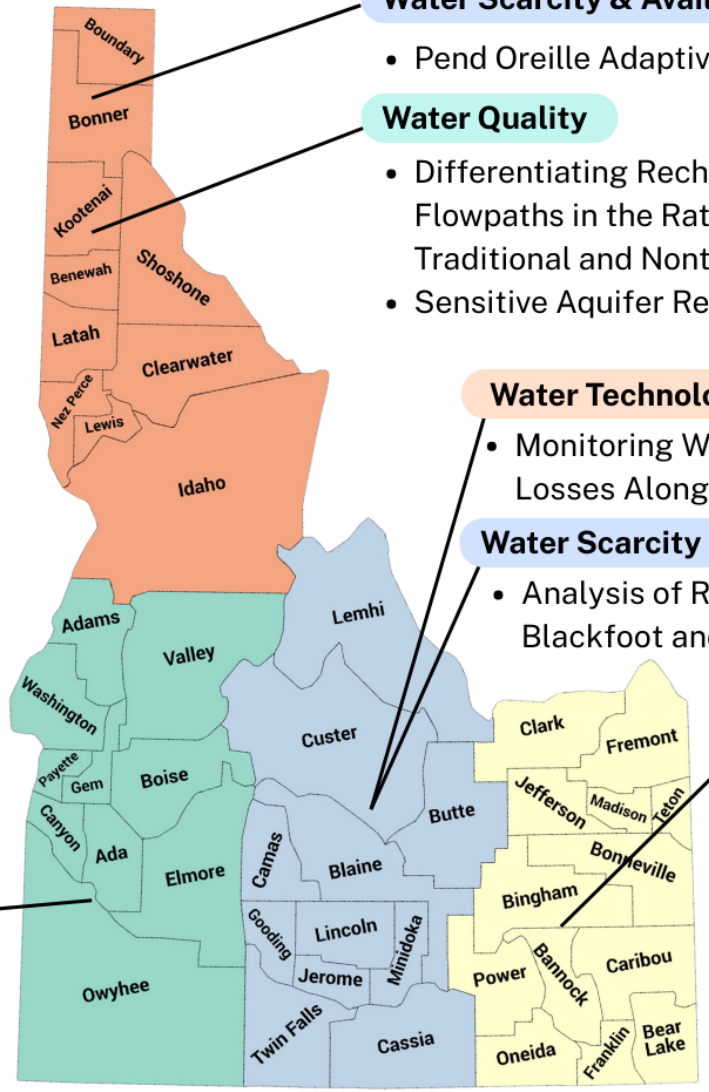
Water Quality

- Comprehensive Integration and Evaluation of Idaho Water Quality Monitoring*
- Sentinel-2 Satellite Surface Water Quality Validation
- Recycled Water and Aquifer Recharge

Water-Related Hazards

- Developing Probabilistic Flood Maps for Idaho Under Precipitation Uncertainty *

REGIONAL RESEARCH



Water Scarcity & Availability

- Pend Oreille Adaptive Lake Management Case Study

Water Quality

- Differentiating Recharge Zones and Primary Flowpaths in the Rathdrum Prairie Aquifer through Traditional and Nontraditional Groundwater Tracers*
- Sensitive Aquifer Recharge Area (SARA) Toolbox

Water Technology & Innovation

- Monitoring Water Seepage Gains and Losses Along Irrigation Canal Systems

Water Scarcity & Availability

- Analysis of Reach Gains Between Blackfoot and Minidoka

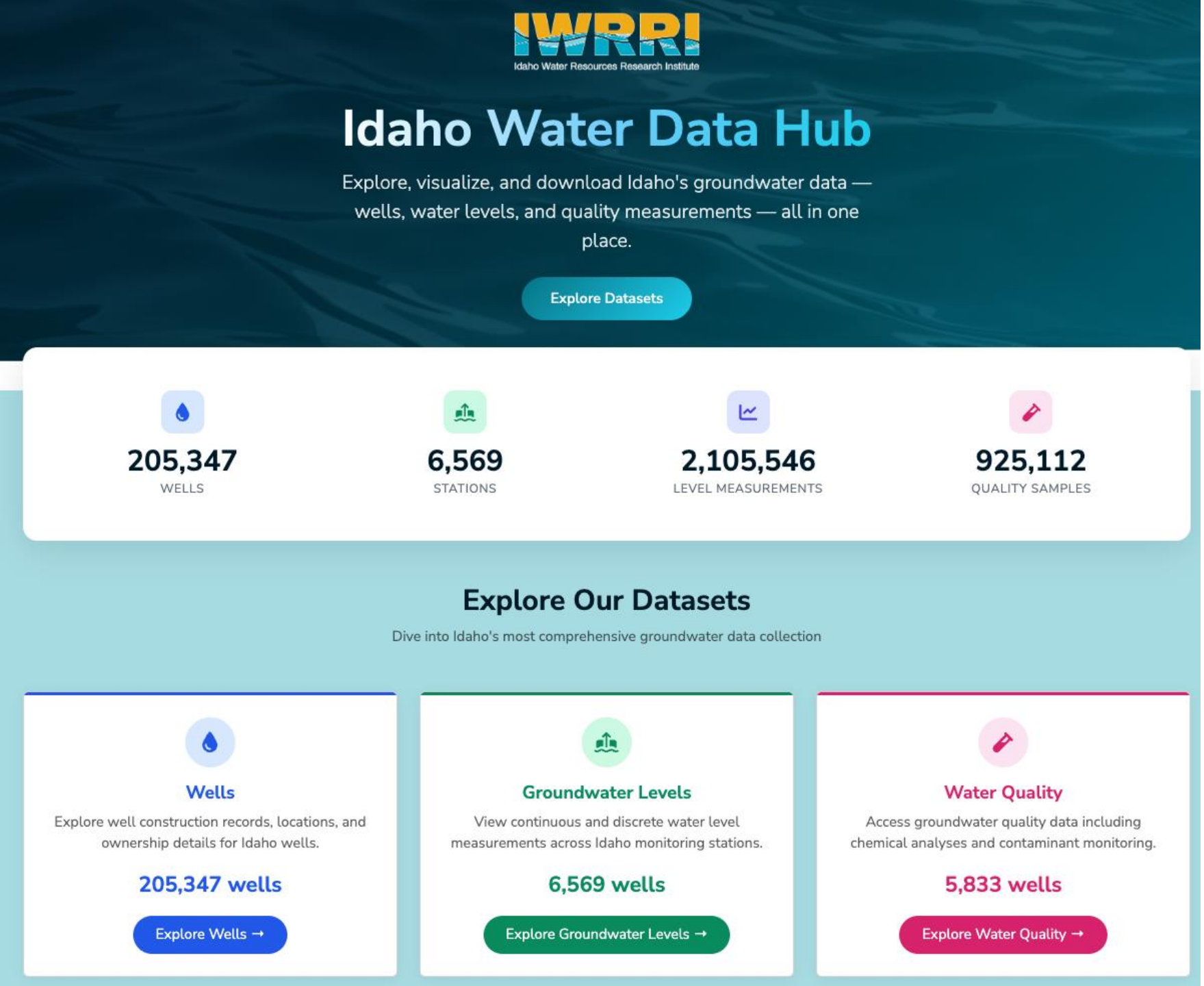
Water Scarcity & Availability

- Water Supply Analysis Below Swan Falls Dam and Major Tributaries

Water Scarcity & Availability

- Understanding Consumptive Use on the ESPA: Data Gaps, Uncertainty, and Impacts*
- ESPA Water Budget Gap Analysis
- Integrated Water Budget for the Upper Snake

Rapid Review of Current Projects



Making Idaho Water Data More Accessible

datahub.iwrri.uidaho.edu

- Initiating effort to digitize well logs from across the state using AI tools

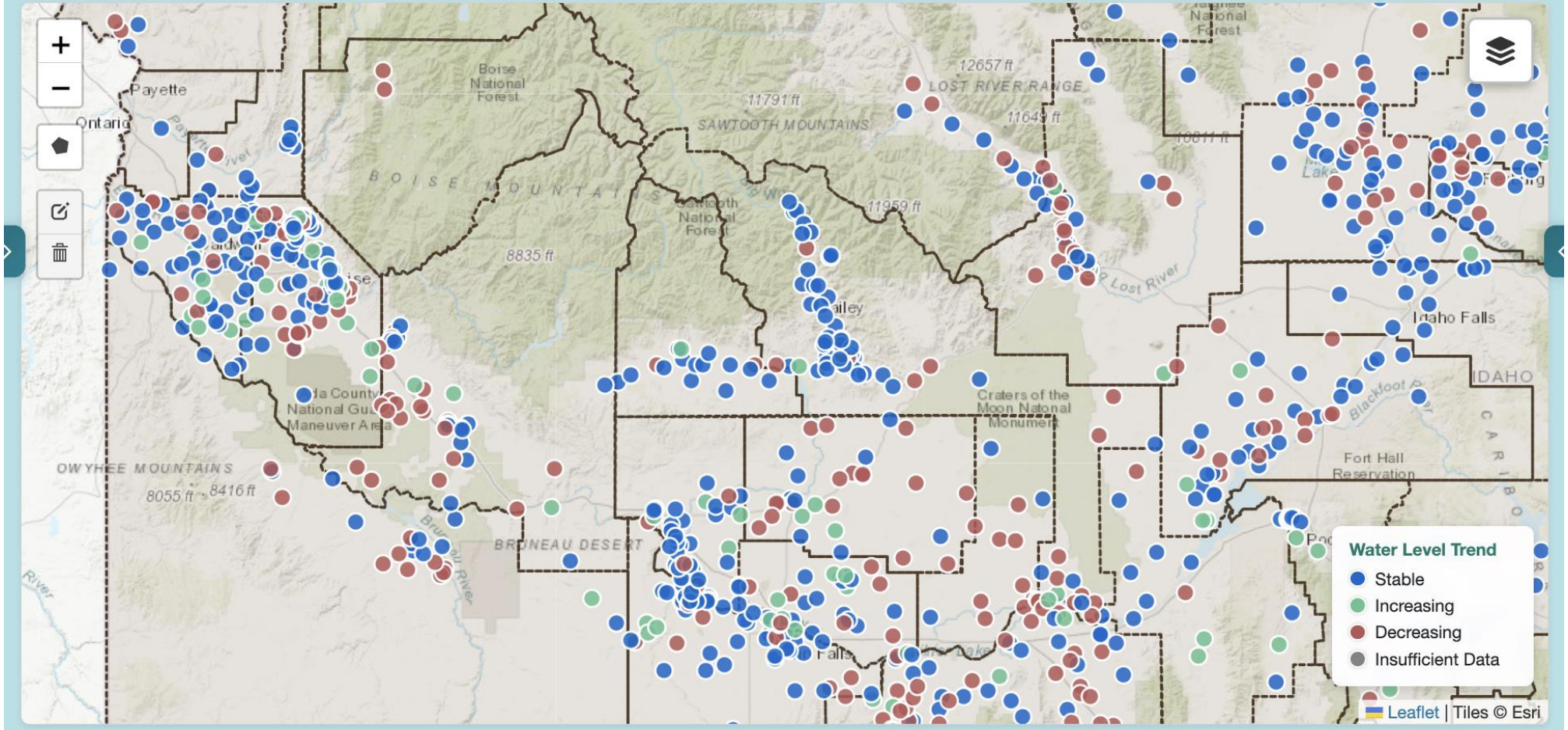
IWRRI
Idaho Water Resources Research Institute

Idaho Water Data Hub

Explore open water datasets

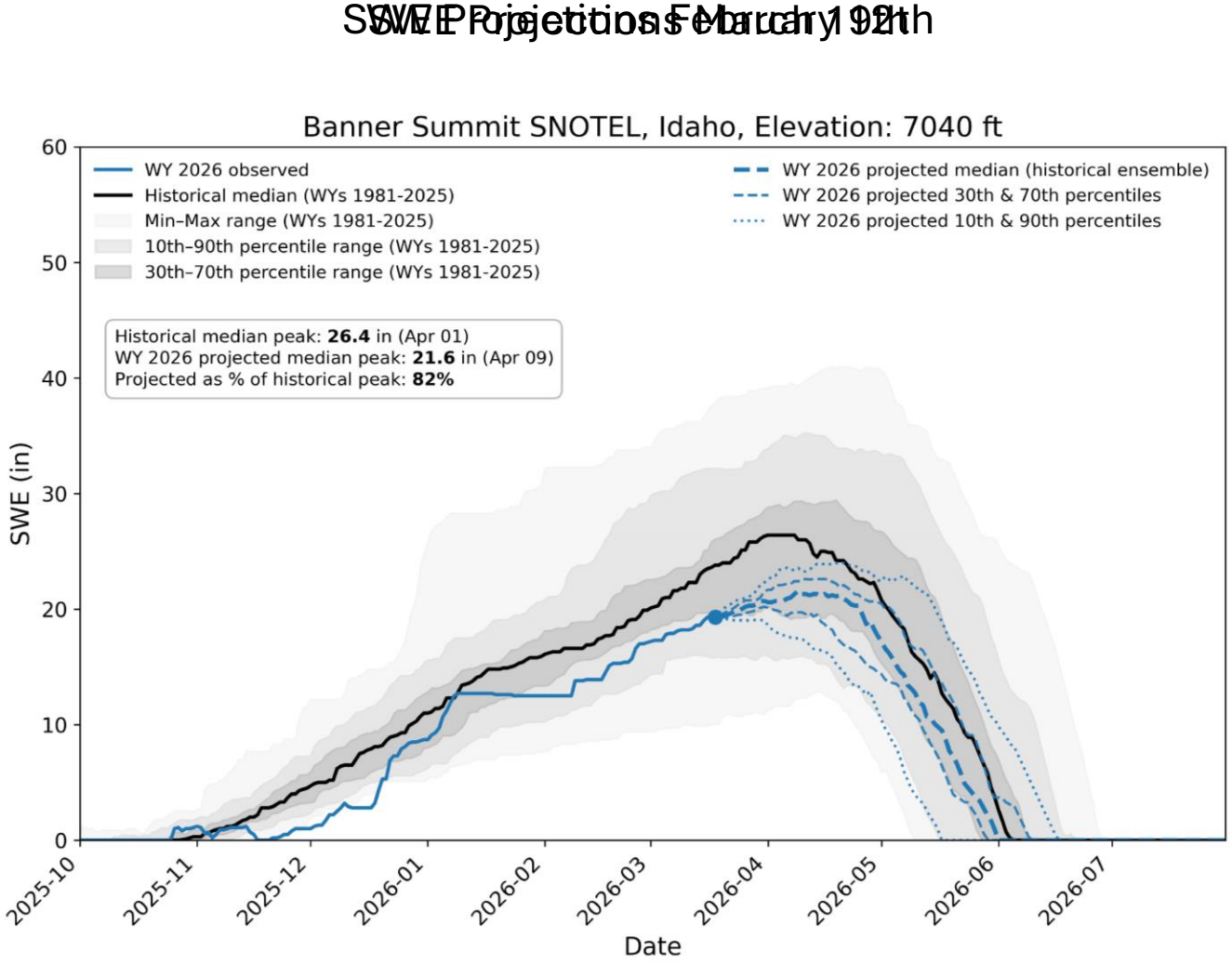
Home | Datasets | Take a Tour | Visit IWRRI

Filters | Visualize Data | Viewing Groundwater Levels Dataset



Statewide Topic: Water Quantity

- Development of Tools to Visualize Projections of Snowpack Levels (BSU)



Figures: Otto Lang, PhD, BSU Postdoctoral Researcher

Monitoring Opportunities

- Assessing Idaho's weather and climate monitoring systems to identify gaps and opportunities for improvement (UI, ISU, BSU)
- Evaluating a new remote sensing dataset (L-band InSAR) to track- snow depth using Lidar (BSU)

IWRRI
Idaho Water Resources Research Institute

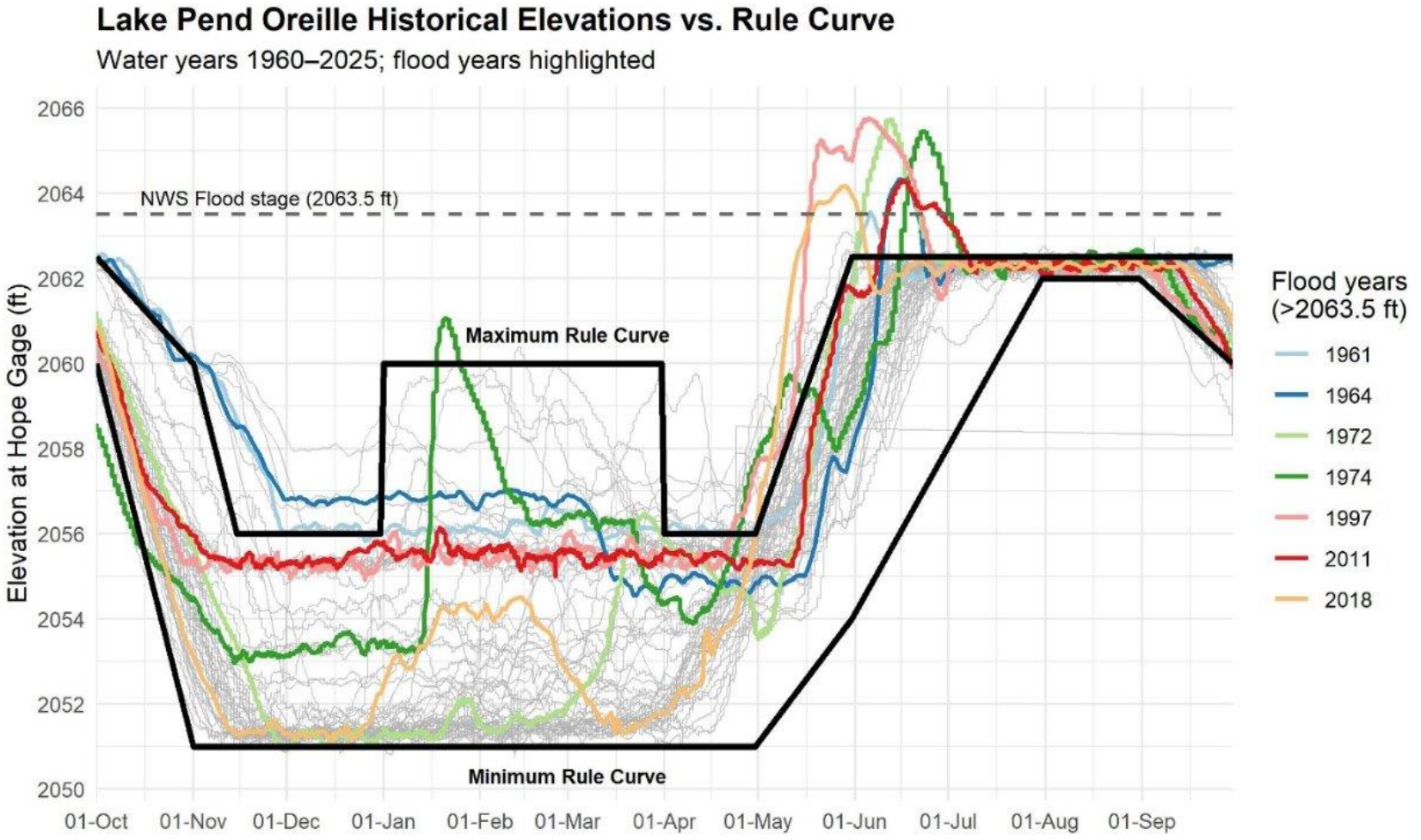
Statewide Topics: Water Quality

- Sentinel-2 Satellite Surface Water Quality Validation (IWRRI)
- Water Quality Implications of MAR through Injection Wells & Recycled Water (IWRRI)
- Sensitive Aquifer Recharge Area Toolbox (IWRRI)
- Comprehensive Integration and Evaluation of Idaho's Water Quality Monitoring (UI)
- Differentiating Recharge Zones and Primary Flowpaths in the Rathdrum Prairie Aquifer through Traditional and Nontraditional Groundwater Tracers (UI)

Steve Powers, PhD, IWRRI Research Scientist

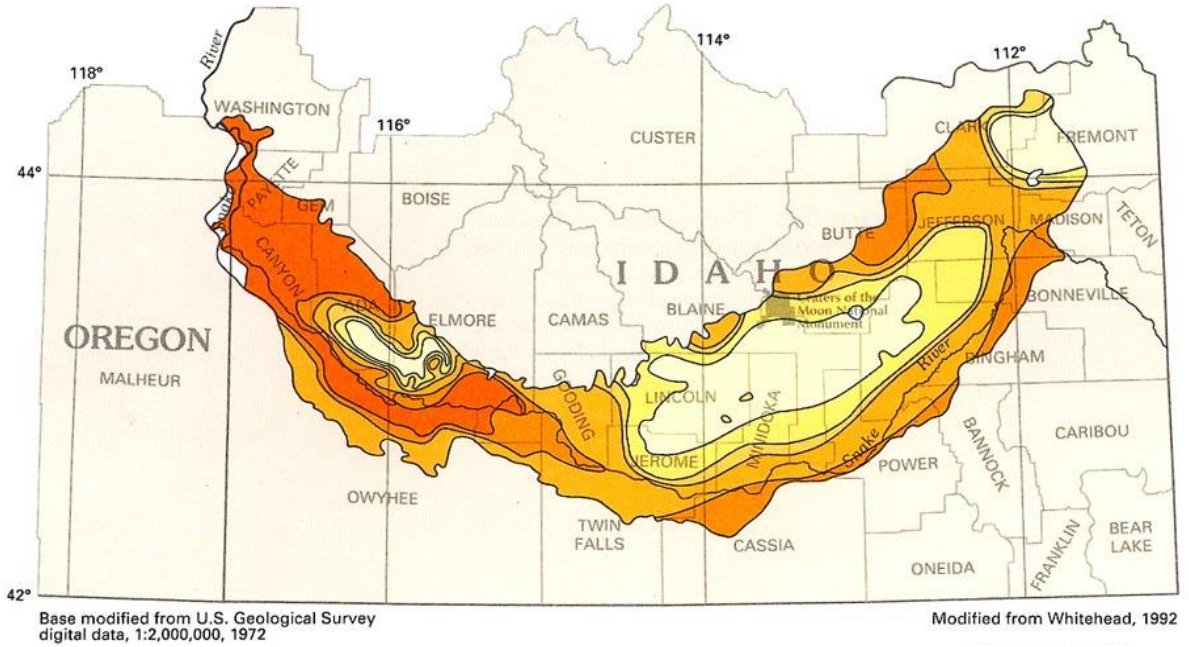
Adaptive Reservoir Management – Lake Pend Oreille Case Study

- Quantify Inflow-Flood Relationships to Support Flexible Lake Level Management in the Pend Oreille Basin (IWRRI)



IWRRI ESPA and Eastern Idaho Priorities

- **Evaluate aquifer recovery strategies to support reach-gains**
- **Quantify headwater contributions** entering the ESPA and quantify changes through time
- **Identify gaps and opportunities to reduce uncertainty in water budgets** to inform long-term management in the ESPA
- **Leveraging IWRRI expertise to support near-term planning:** Developed curtailment forecasts to help prepare and adapt in advance



ESPA, Source: USGS

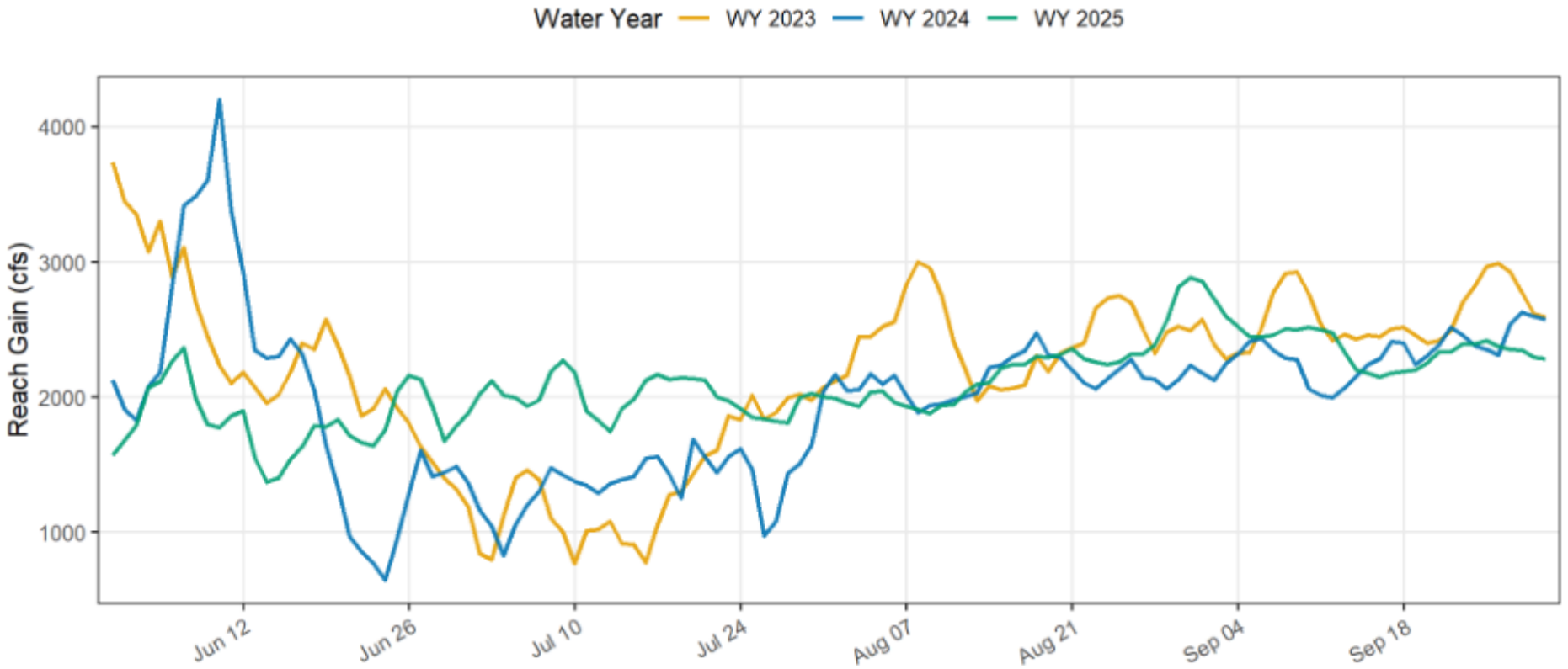
Blackfoot – Minidoka Reach Gains

Question: What management actions drive reach-gains in the Blackfoot to Minidoka reach?

Step-wise approach:

1) Calculate reach-gains
2) Explore correlations with tributaries
3) **Opportunities for development of process-based, higher-resolution modeling tools**

2023-2025 WD01 Reach-Gains

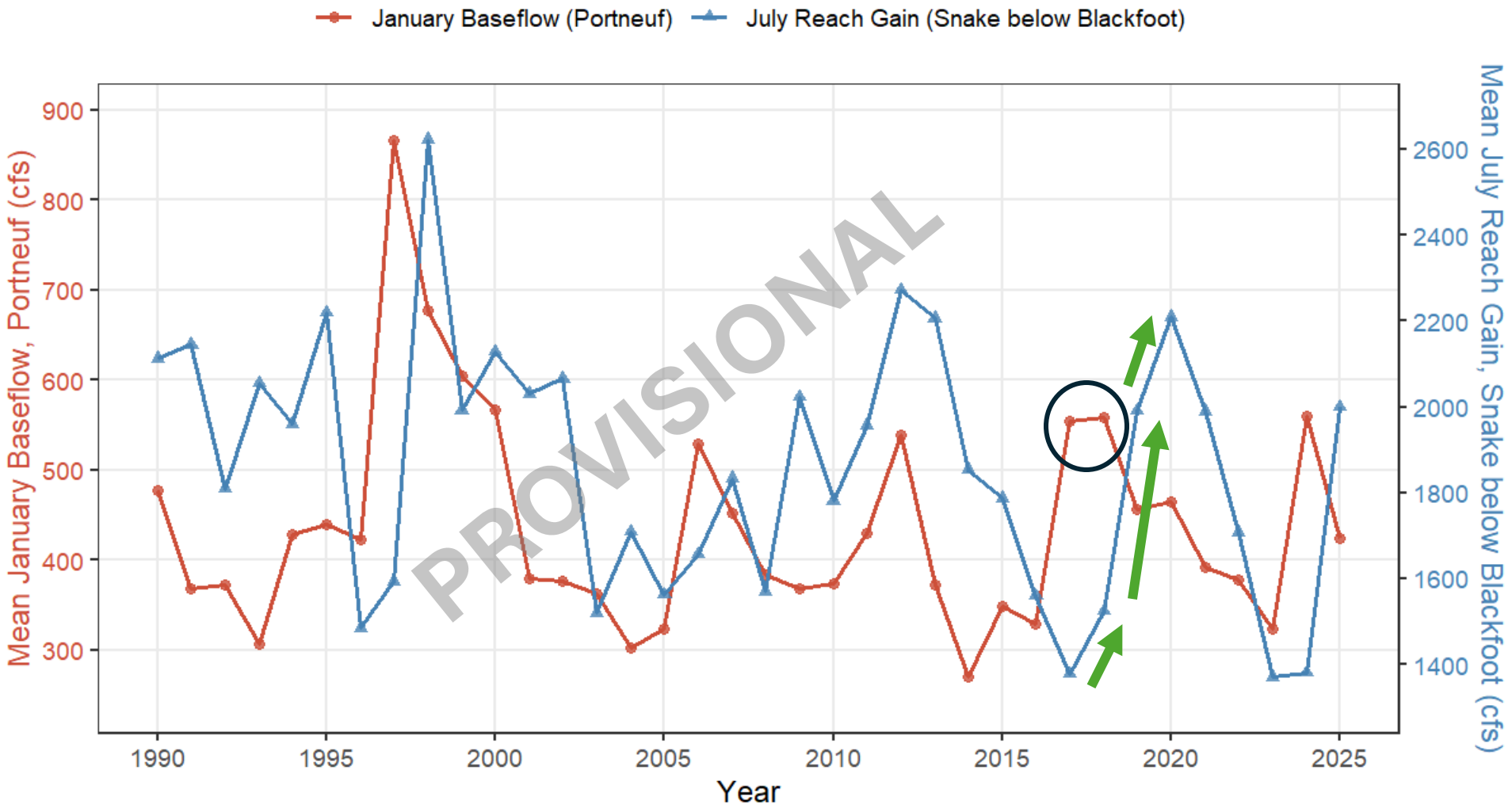


Drivers:

- Water supply from the headwaters / tributaries
- Water management activities

**Data directly from WD01*

Evaluation of correlation between Portneuf Baseflow & July reach-gains



Big water years in the tributaries contribute to higher reach-gains, lagged by about a year

Figure: Meg Wolf

The correlation between Portneuf baseflow & July reach-gains is not sufficient to capture variability

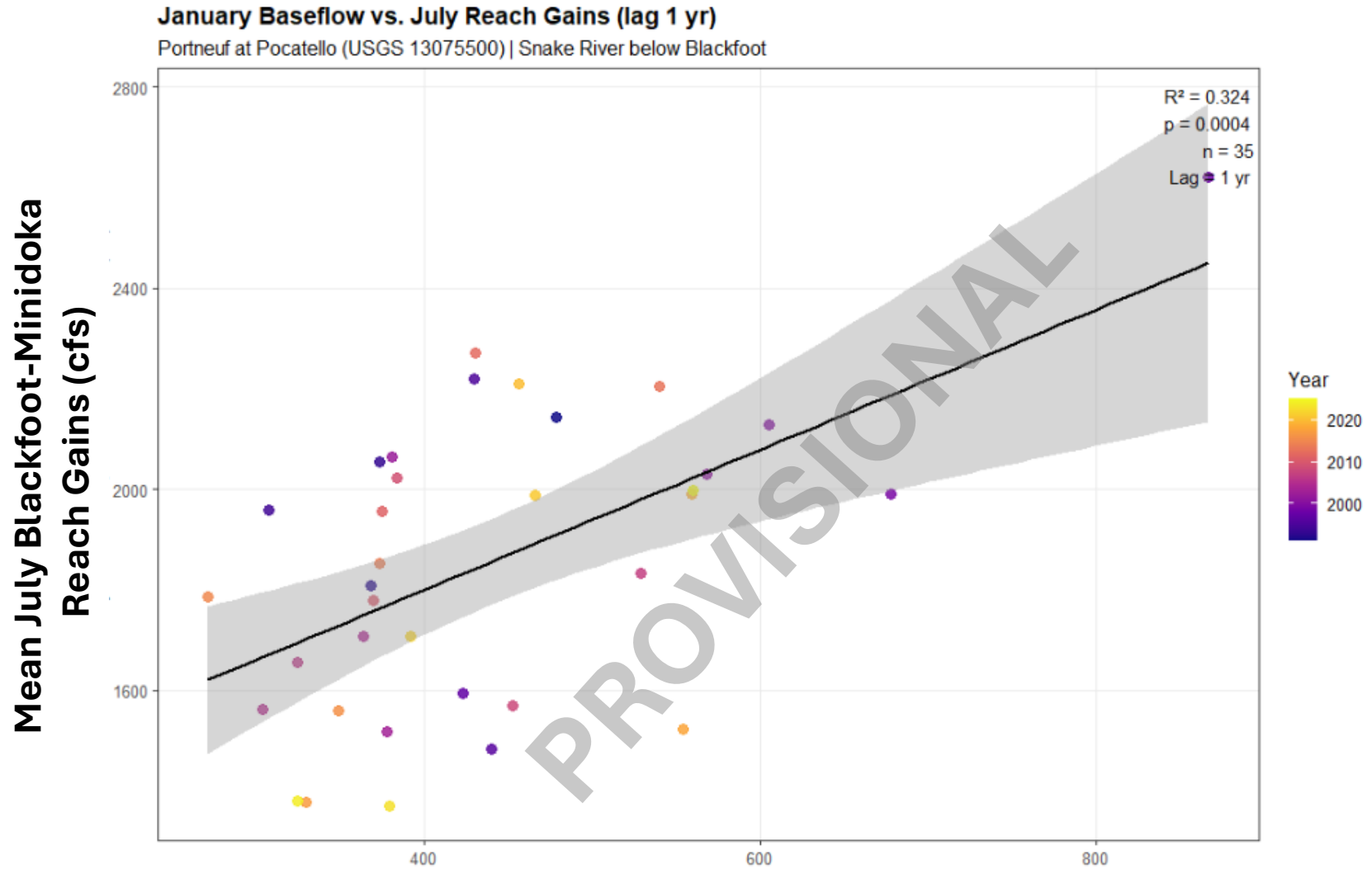
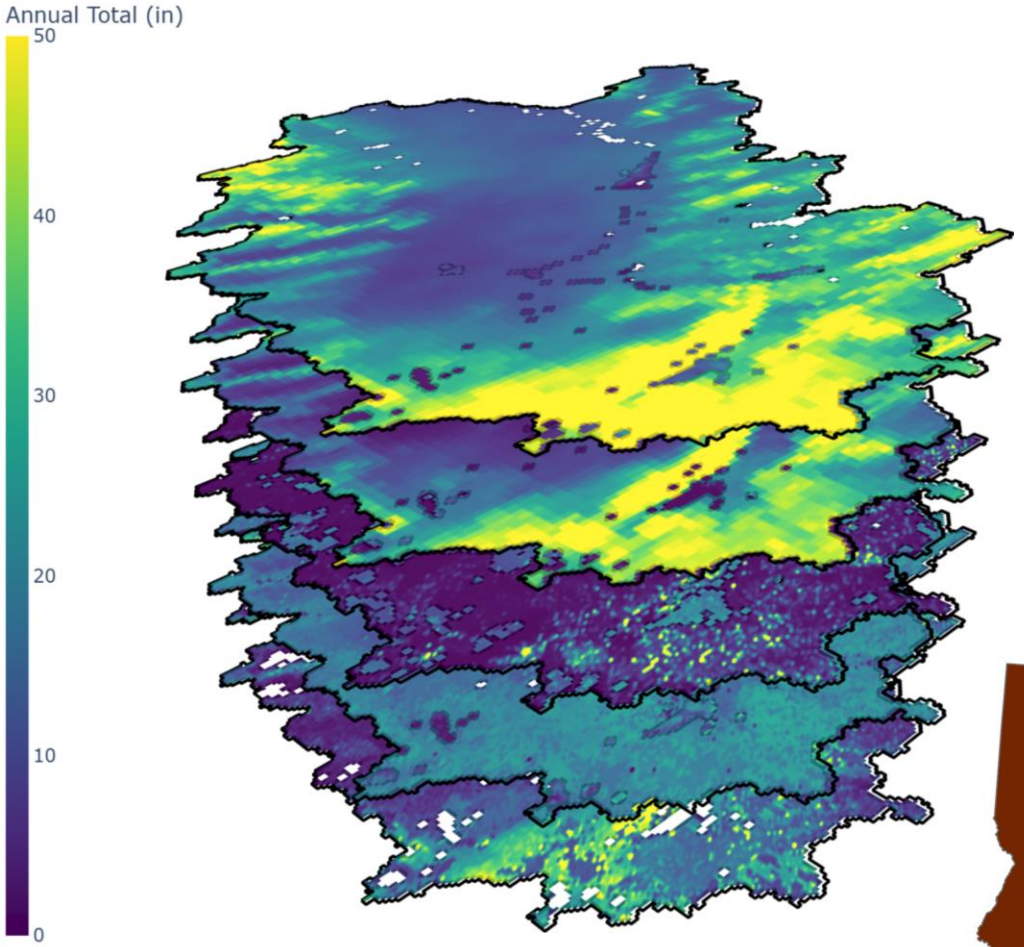


Figure: Meg Wolf

Blackfoot-Minidoka Modeling Ideas

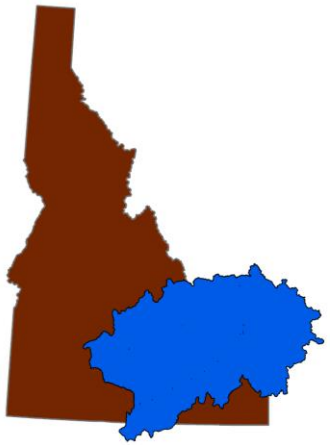
- Develop, calibrate, and quantify uncertainty in a sub-model of ESPAM, implemented at a finer spatial resolution
- Evaluate the hydrologic response to historic climatic variability and management strategies
  - Test scenarios using uncertainty analysis to understand the probable range of impact from each driver (i.e. groundwater conservation efforts contributed 70-90% of the change compared to climatic changes)
- Detailed work plan to be determined with input from technical experts and stakeholders
- How to explore state of the art modeling approaches and novel developments without having “competing models” or litigation

Soil-Water-Balance Model



Develop and calibrate SWB for the Upper Snake:

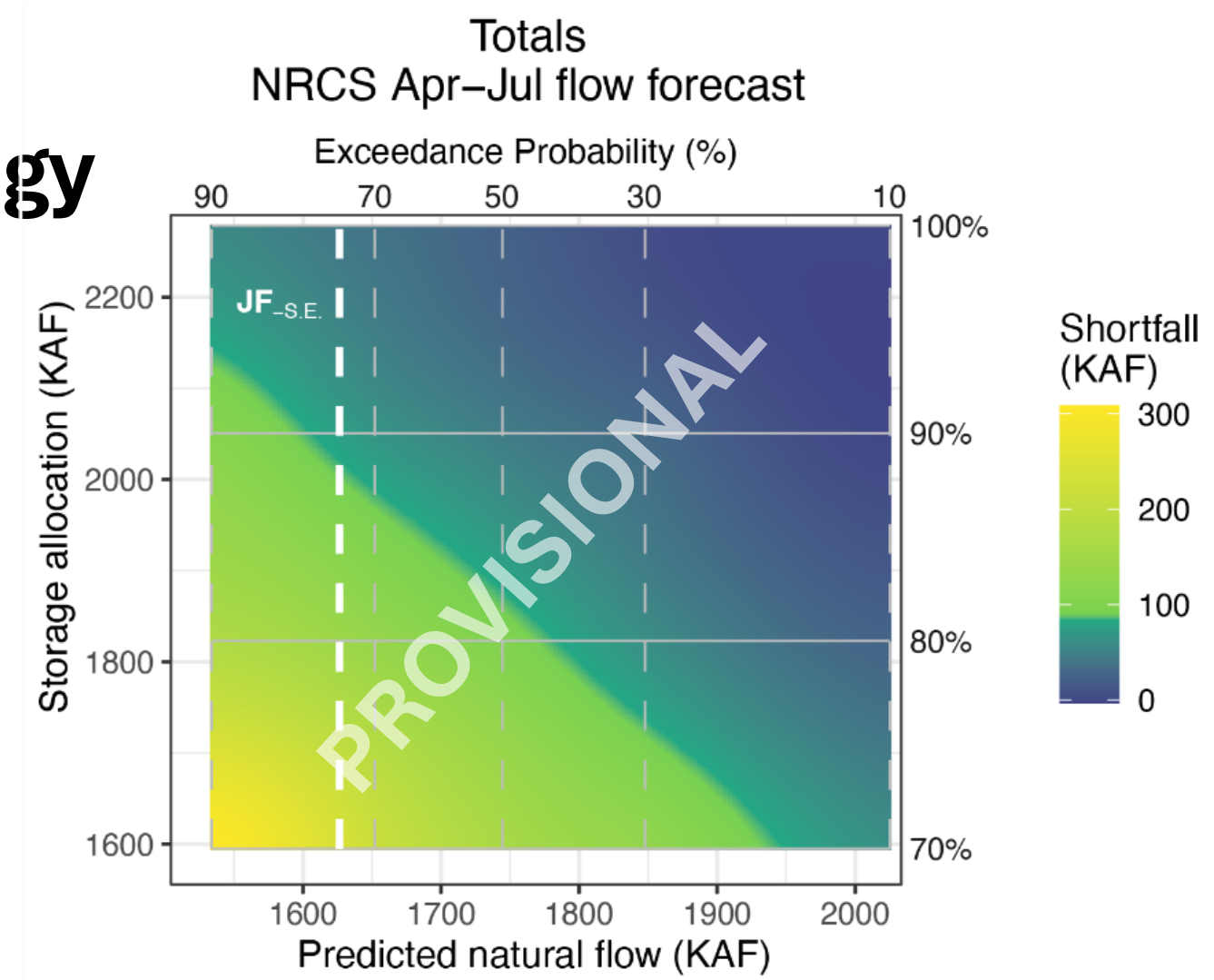
- Use a process-based model to understand drivers
- Simulate water-budget components and uncertainty ranges (daily, monthly, and annual)
- Irrigated recharge, non-irrigated land recharge, runoff, and ET



Phil Margarit, PhD
IWRRI Hydrogeologist

IWRRI Automation of Forecasting - April 1 Methodology Order

- Preview of potential shortfalls and curtailments
- Automated methodology order in R



**Findings represent estimated ranges of shortfalls and potential priority dates, they do not reflect official IDWR determinations.*

Eastern Idaho Research next steps

- Working with Technical Advisors to refine drivers of Blackfoot-Minidoka Reach-Gains Workplan
- Continue development of the Soil Water Balance model to characterize water budget components of the Upper Snake above King Hill
- Be prepared for methodology order request next year
- May 14th – IWRRI executive board meets and finalizes next year's research priorities

Education and Outreach

IWRRI
Idaho Water Resources Research Institute

- The Confluence Project
  - Year long youth science curriculum
  - 1st year in the Treasure Valley! 14th year in north Idaho
  - Youth Water Summit
- SEEP program
  - Stormwater Erosion Education Program

THE CONFLUENCE PROJECT

Hold Your Ground
Panhandle SEEP

25-26 IWRRI Accomplishments

IWRRI
Idaho Water Resources Research Institute

- Identified research priorities across the state with our 32-member Research Advisory Committee and approval from our Executive Board.
- Distributed $580,000 in funding to faculty at Boise State, Idaho State, and University of Idaho to address priority research projects.
- IWRRI is conducting research of key importance to the state through our team of research scientists.
- Continued to grow research and outreach programs across the state

IWRRI

Idaho Water Resources Research Institute

Stay Engaged!

- Sign-up for our newsletter
- Look for research updates & outcomes

gpeven@uidaho.edu

iwrri.uidaho.edu

Forecasting April 1 Methodology

Idaho Water Resources Research Institute

Water Supply Forecasts *(in March)*

Joint Forecast at Heise: (current JF is March-July): remove march volumes so the forecasts are April – July. We include percentiles from NRCS Forecasts for reference.

Natural Flow Supply Modeling: Remove outlier years, create regressions between historical natural flow at Heise and the water supply available for each entity, subtract one standard error.

Storage Allocation, Credits and Total Supply:

Using a range in place of updated numbers

Reasonable In-season Demand: Baseline Year (2018)

Shortfall Calculations & Water Right Priority

Total Shortfall = Forecast Supply – In-season Demand (for each entity)

Curtailment dates: The GW model calculates how much flow will accrue to the reach by Sept 30th if curtailed to a certain priority date. We used output from 2025 IDWR model simulations to identify approximate curtailment priority dates for a range of shortfall volumes

**Approach is separate from official IDWR determinations.*