AGENDA

IDAHO WATER RESOURCE BOARD

Aquifer Stabilization Committee Meeting No. 2-23
Wednesday, May 31, 2023
1:00 p.m. (MT)

Water Center
Conference Rooms 602 C & D / Online Zoom Meeting
322 E. Front St.
BOISE

Board Members & the Public may participate via Zoom
Click here to join our Zoom Meeting
Dial in Option: 1(253) 215-8782
Meeting ID: 823 2643 9539 Passcode: 681191

1. Introductions and Attendance
2. ESPA Managed Recharge Follow Up on Stakeholder Perspectives
3. Metric Evapotranspiration Ground Truthing Project
4. Other Items
5. Adjourn

Committee Members: Chair Dean Stevenson, Al Barker, Brian Olmstead, and Pat McMahon.

* Action Item: A vote regarding this item may be made at this meeting. Identifying an item as an action item on the agenda does not require a vote to be taken on the item.

Americans with Disabilities
The meeting will be held in person and online. If you require special accommodations to attend, participate in, or understand the meeting, please make advance arrangements by contacting Department staff by email jennifer.strange@idwr.idaho.gov or by phone at (208) 287-4800.

322 East Front Street • P.O. Box 83720 • Boise, Idaho 83720-0098
Phone: (208) 287-4800 Fax: (208) 287-6700 Website: idwr.idaho.gov/IWRB/

ESPA Managed Aquifer Recharge Program

IWRB Aquifer Stabilization Committee

Wesley Hipke
IDWR Water Projects Section Supervisor

May 31, 2023

ESPA Camp

"Sustain the economic viability and social and environmental health of the Eastern Snake Plain by adaptively managing a balance between water use and supplies."

- Stakeholder process with all major water users
- Designed to add **<u>600,000 af/yr</u>** to the ESPA water budget
- 2009 - adopted by IWRB & added to the State Water Plan

<u>Key Components / Goals</u>

✓ **Aquifer Recharge**	250,000 af/yr avg.
✓ **Demand Reduction**	240,000 af/yr.
✓ **GW-to-SW Conversions**	100,000 af/yr.
✓ **Cloud Seeding**	

ESPA Camp - Implementation

Meet the physical goals & objectives by:

- Improving aquifer levels (stabilization & potential enhancement).
- Increasing gains in river reaches.
- Increasing water supply certainty for all users.
- Decreasing demand for litigation and administrative remedies.

Managed Recharge a Major Component

ESPA Managed Recharge Program - Goals

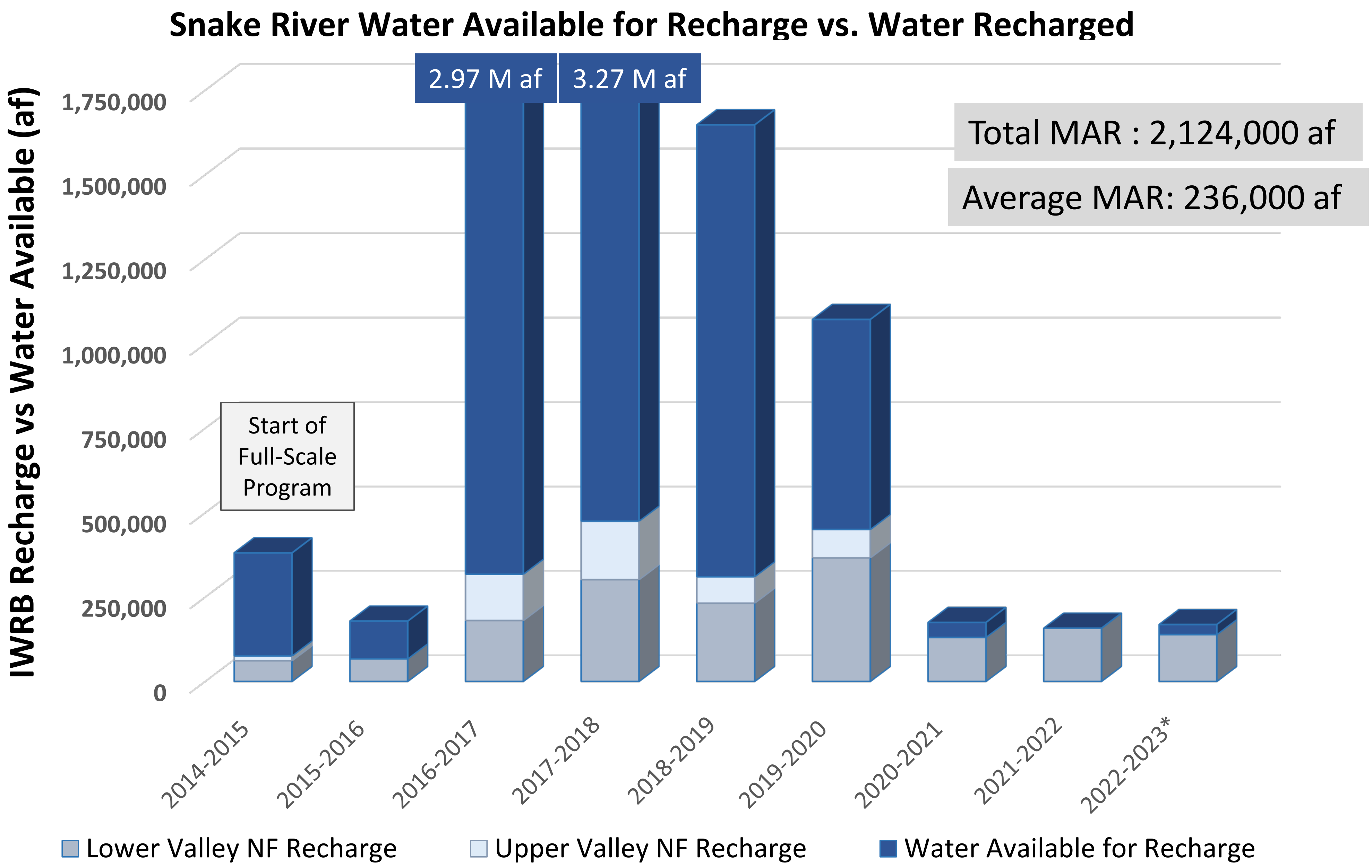
Senate Concurrent Res. No. 136 - 2016

- The State recognizes the need for managed recharge of the ESPA and resolves that the State establish a managed recharge goal of 250,000 af/year on average across the ESPA.”
- Develop managed recharge capacity to achieve 250,000 af/year on average on or before Dec. 31, 2024.”
- Increase the 100,000 af/year average ESPA CAMP Phase I target for state funded managed recharge to 250,000 af/year average recharge across the ESPA.”

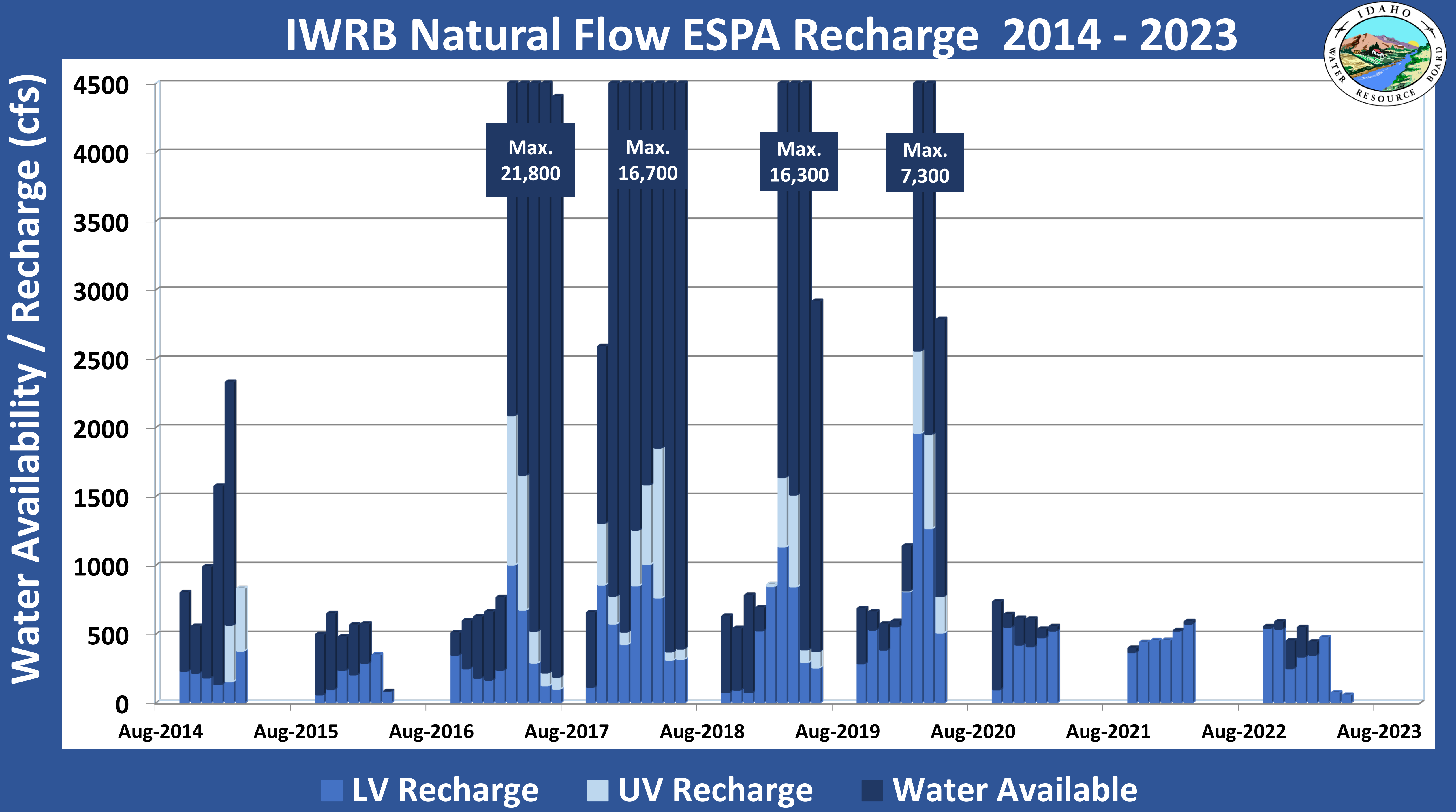
Current IWRB Recharge Status

- IWRB Natural Flow Recharge to date
- Status of the Aquifer and Reach Gains - 2022

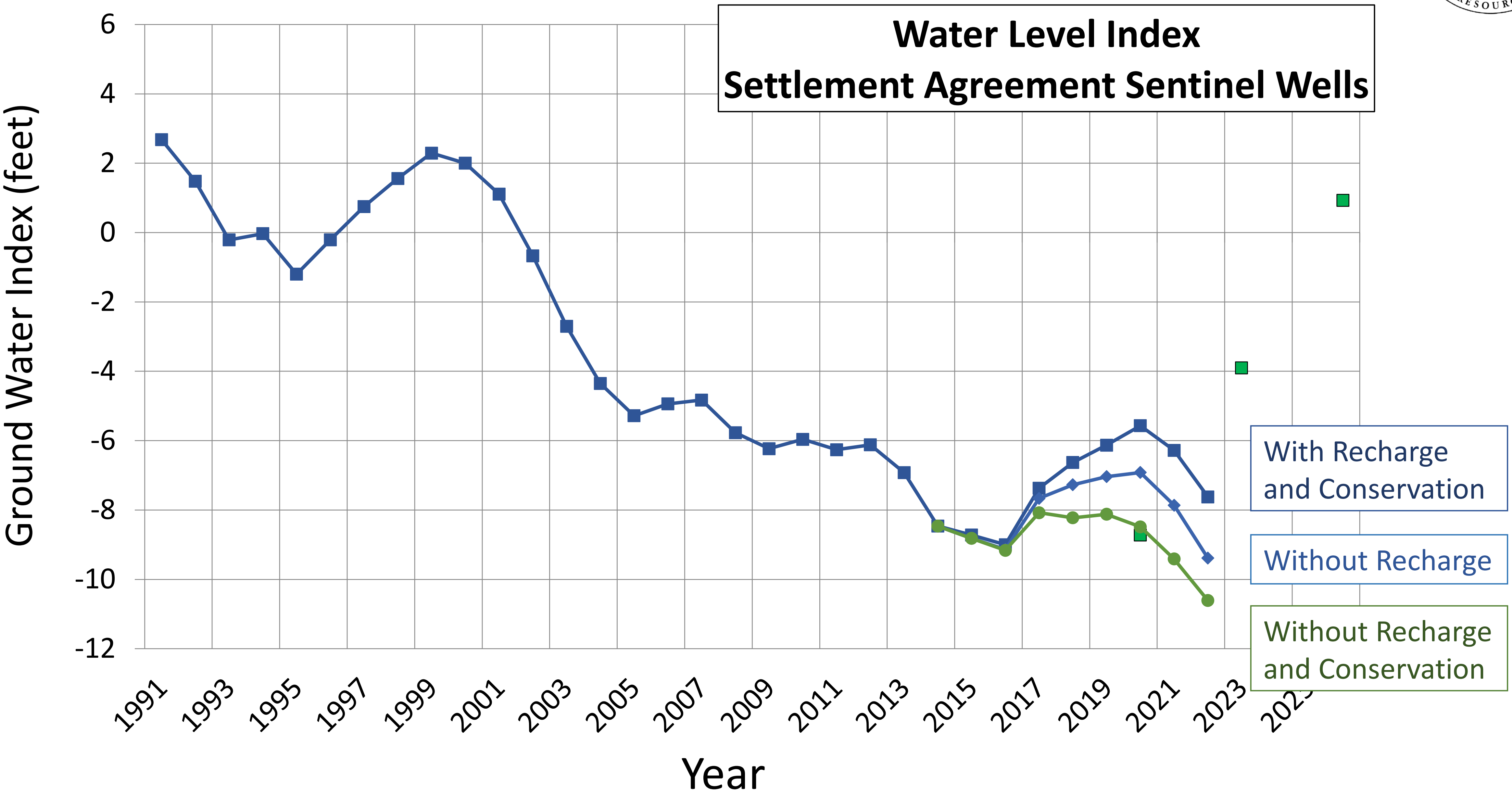
IWRB Recharge



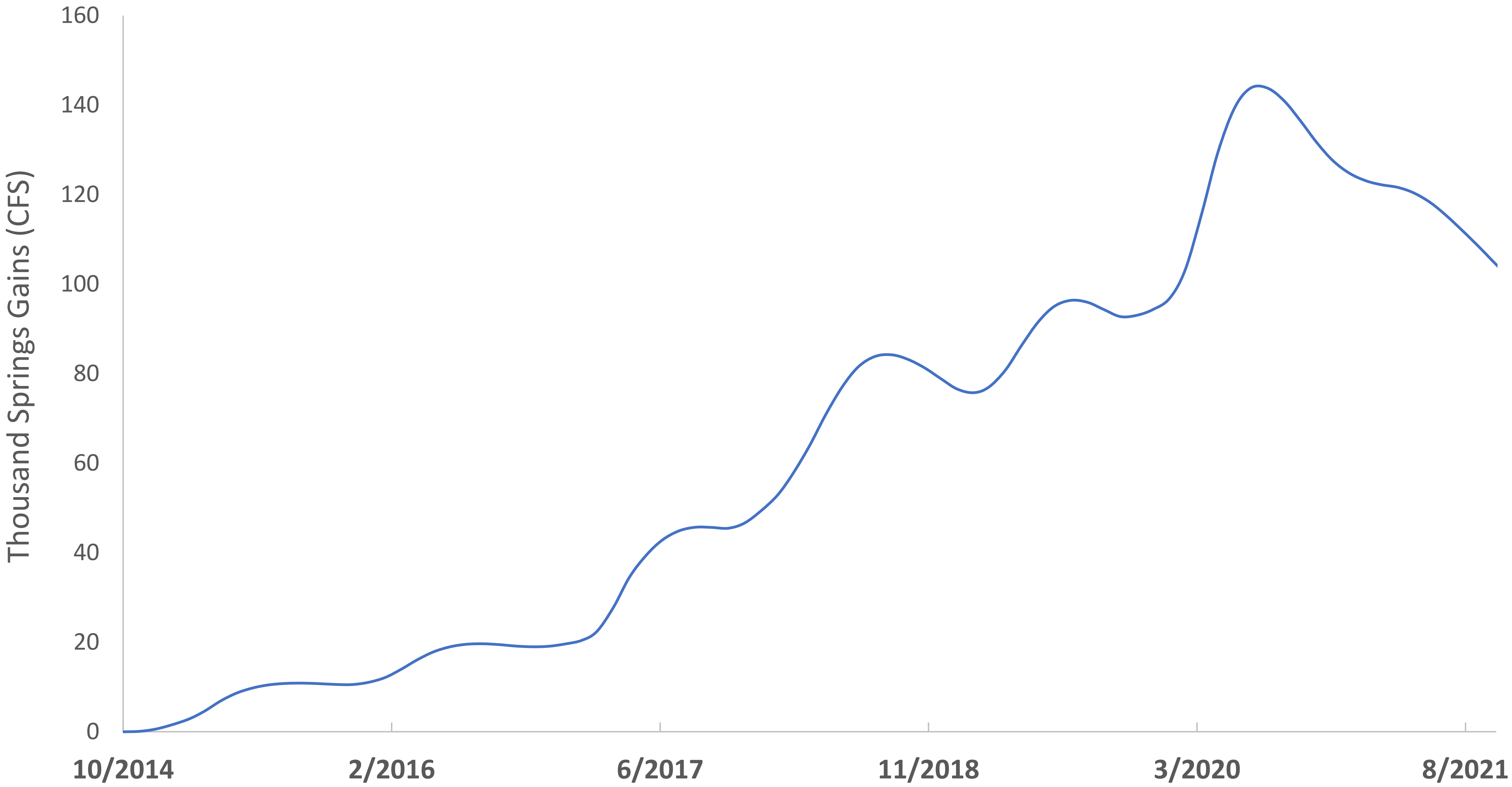
IWRB Natural Flow ESPA Recharge 2014 - 2023



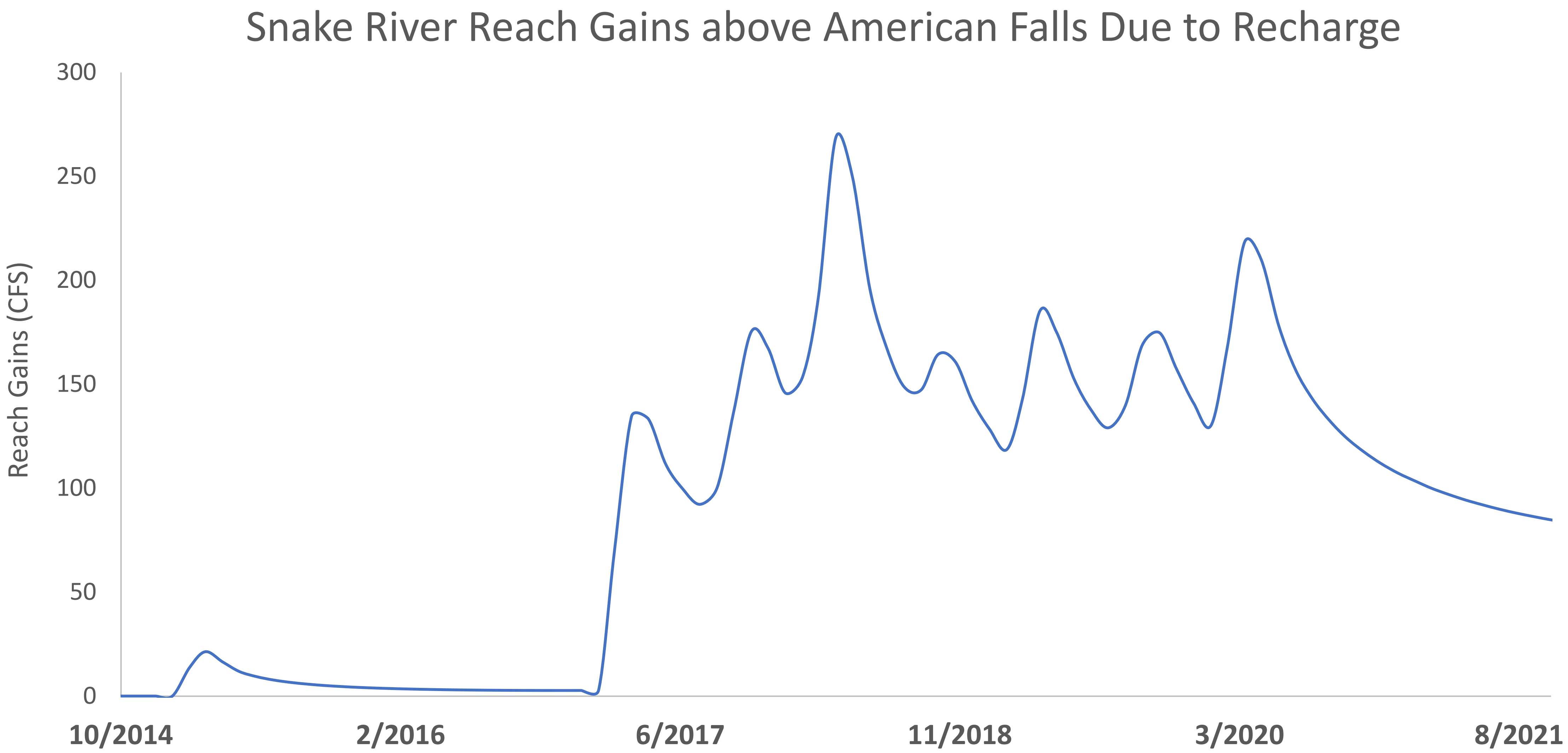
Impact to the Aquifer



"Thousand Springs" Gains Due to IWRB Recharge



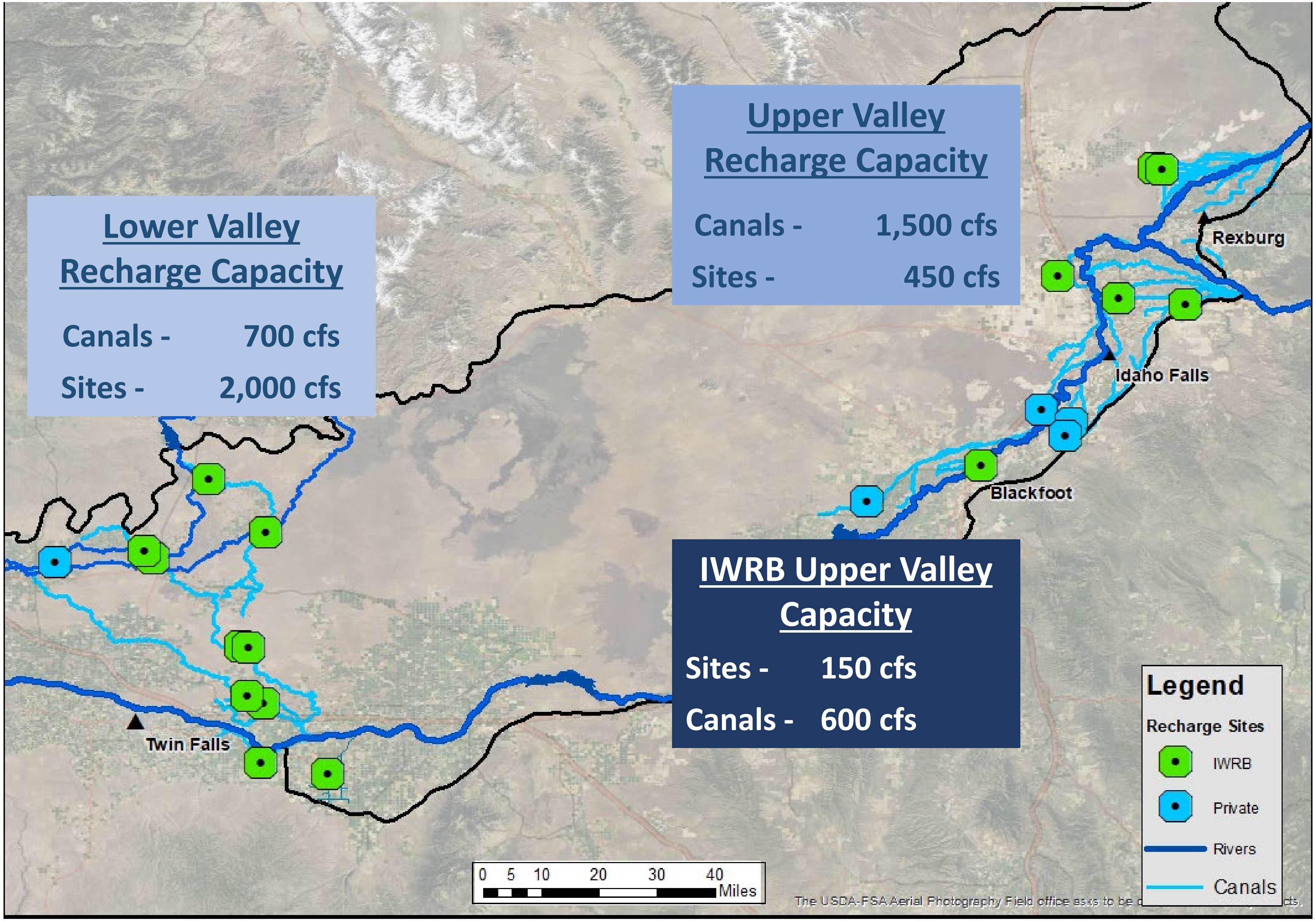
Reach gains due to recharge are highly variable



Limitations to IWRB Managed Recharge

- Managed Recharge Capacity
  - Current Capacity
  - Current Construction Projects
- Water Availability
- Operational Limitations

ESPA IWRB Recharge Sites



Lower Valley Recharge Capacity

Canals - 700 cfs

Sites - 2,000 cfs

Upper Valley Recharge Capacity

Canals - 1,500 cfs

Sites - 450 cfs

IWRB Upper Valley Capacity

Sites - 150 cfs

Canals - 600 cfs

ESPA IWRB Recharge Sites

Lower Valley Recharge Capacity

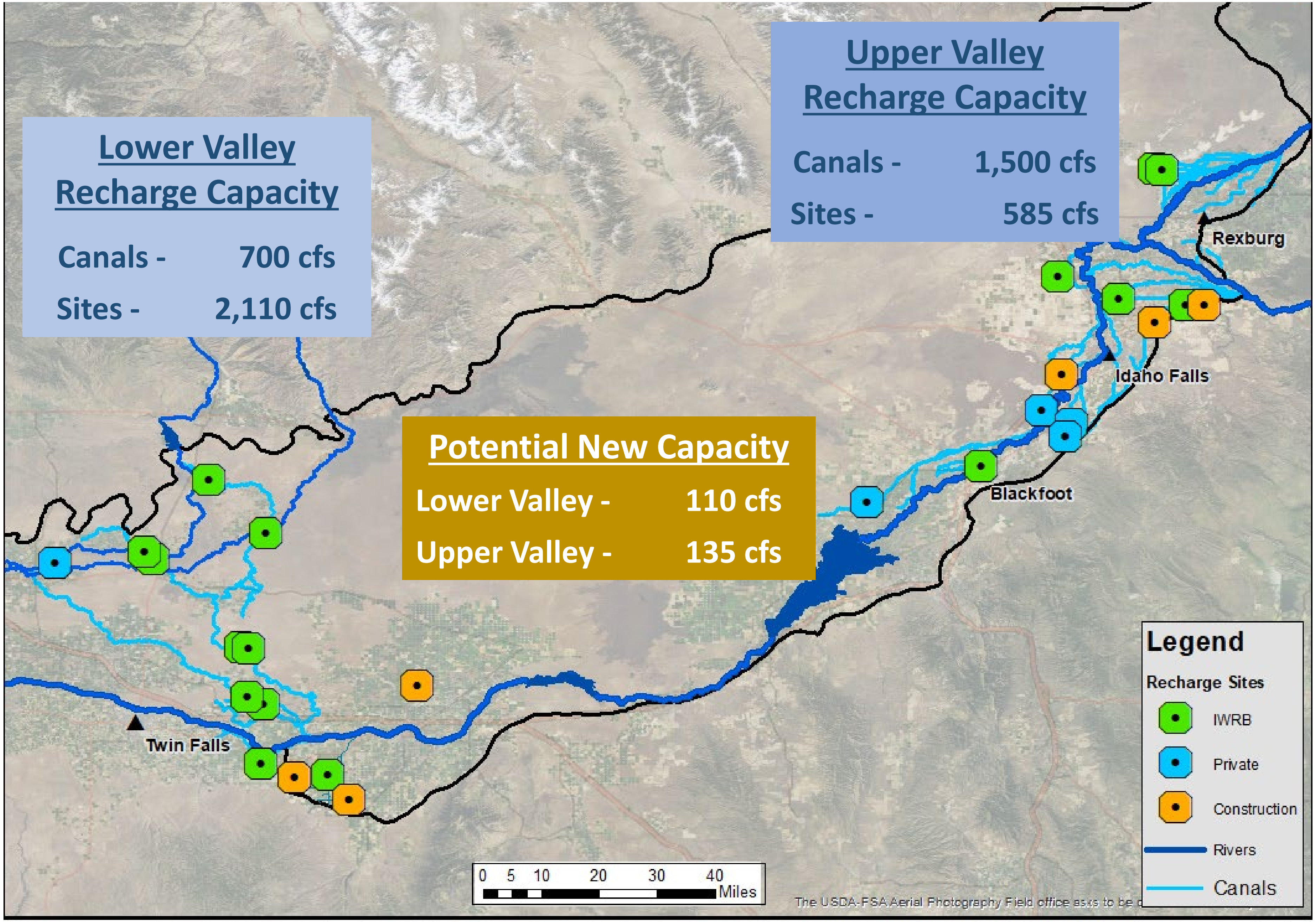
Canals -	700 cfs
Sites -	2,110 cfs

Upper Valley Recharge Capacity

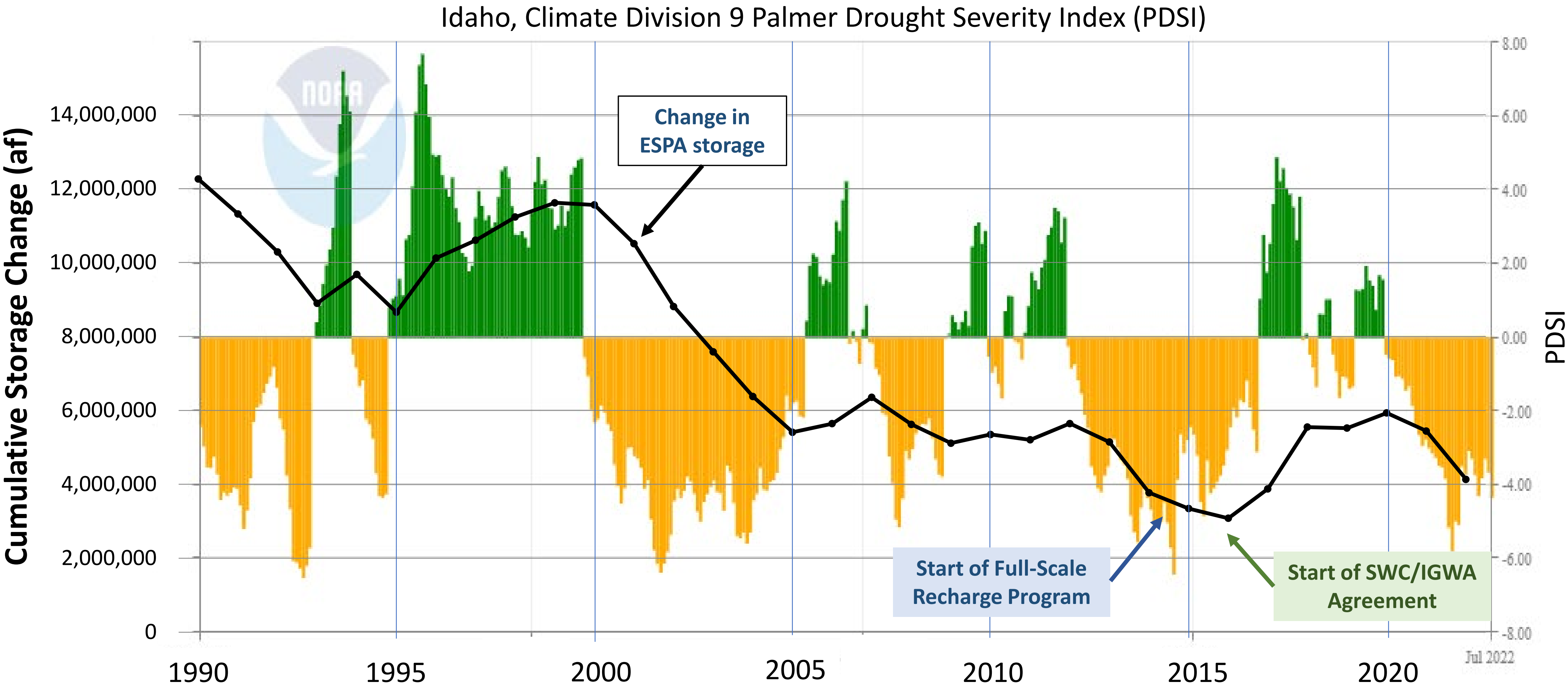
Canals -	1,500 cfs
Sites -	585 cfs

Potential New Capacity

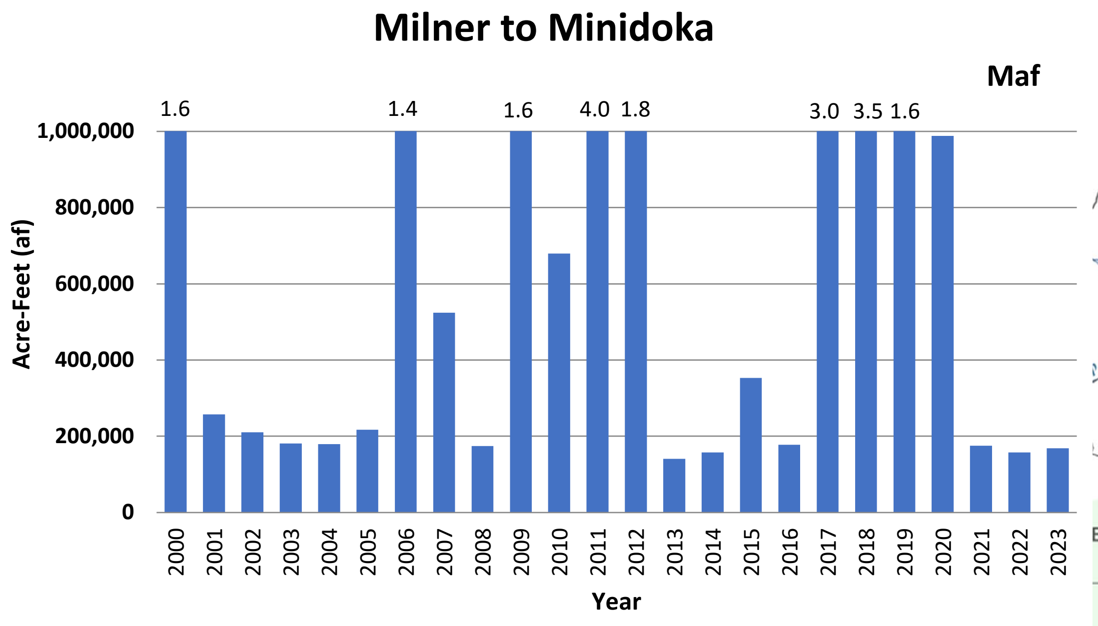
Lower Valley -	110 cfs
Upper Valley -	135 cfs

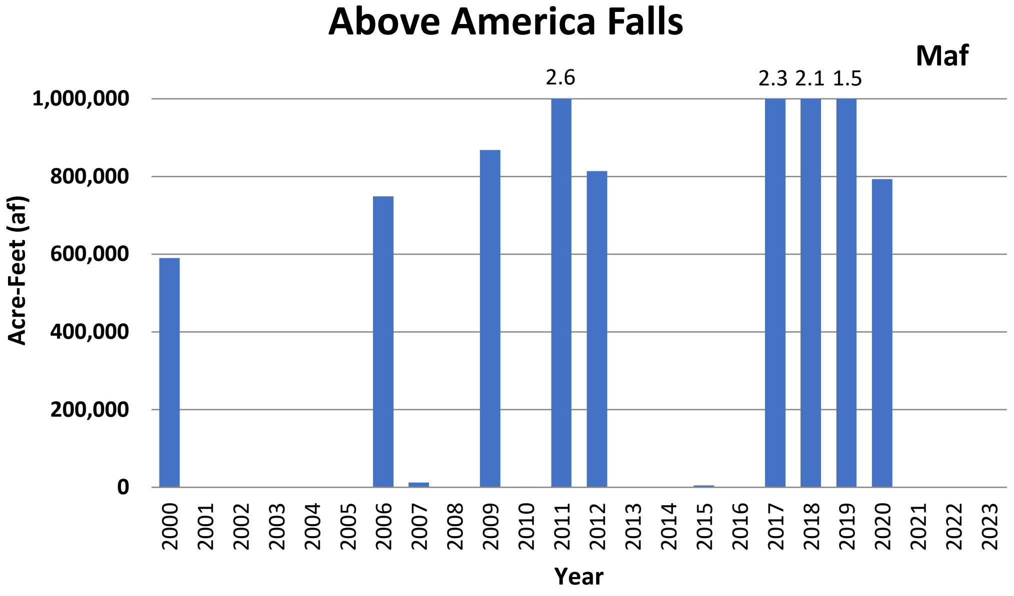


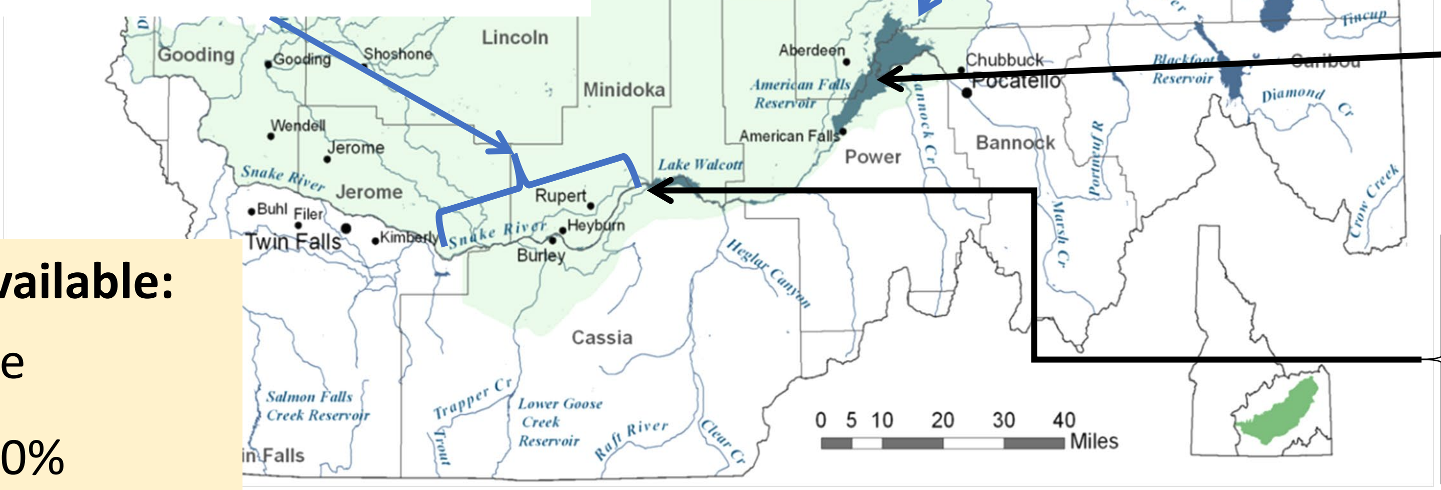
ESPA Storage Change vs Wet / Dry Periods



Water Available for Recharge in the ESPA







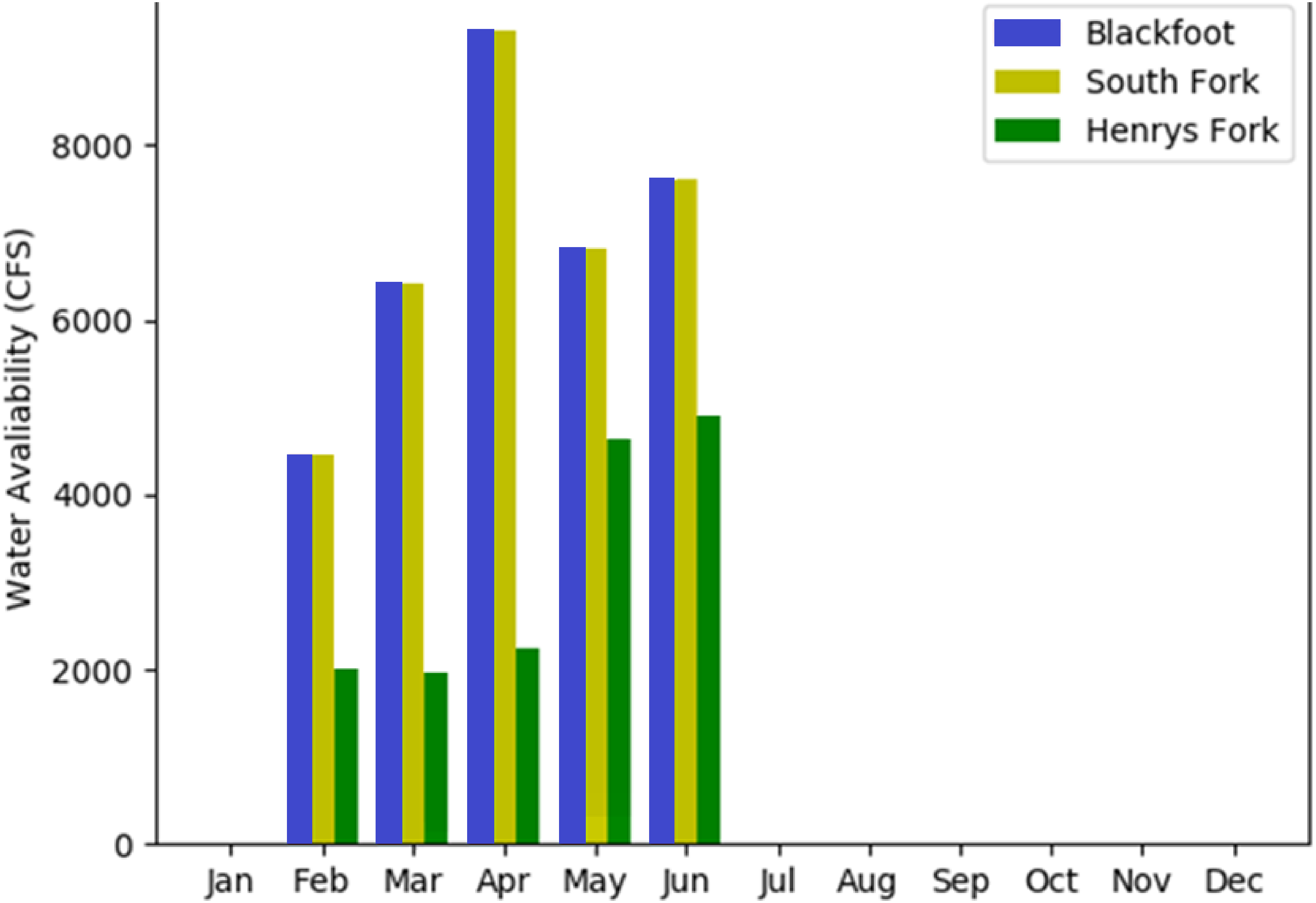
American Falls Reservoir:
1.6 million AF
1921 priority

Unsubordinated hydropower rights at Minidoka Dam:
2,700 cfs
1909/1912 priority

Upper Valley Water Available:

- 48% of the time
- Over 15 Kaf - 40%

Upper Valley Recharge Water Availability



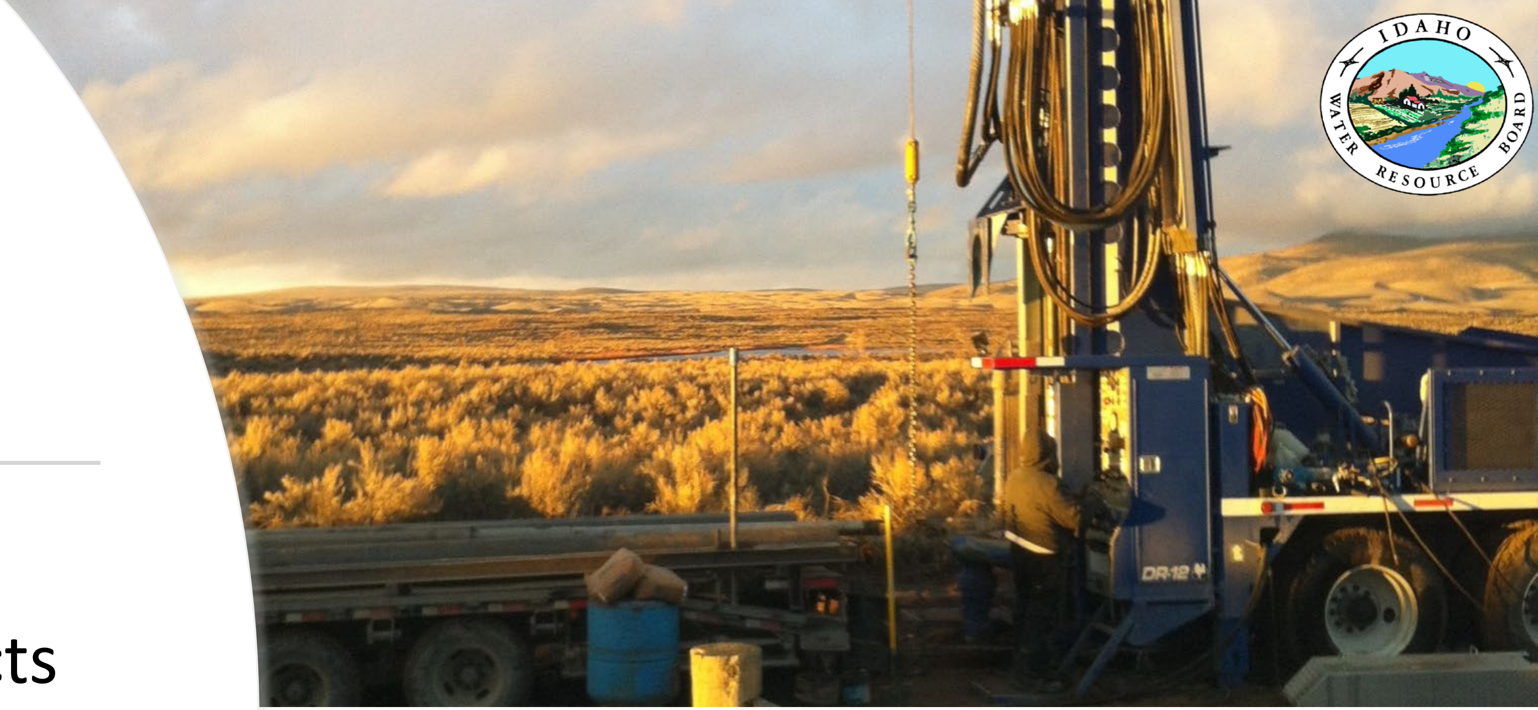
Opportunistic Strategy for Managed Recharge

Potential Issues:

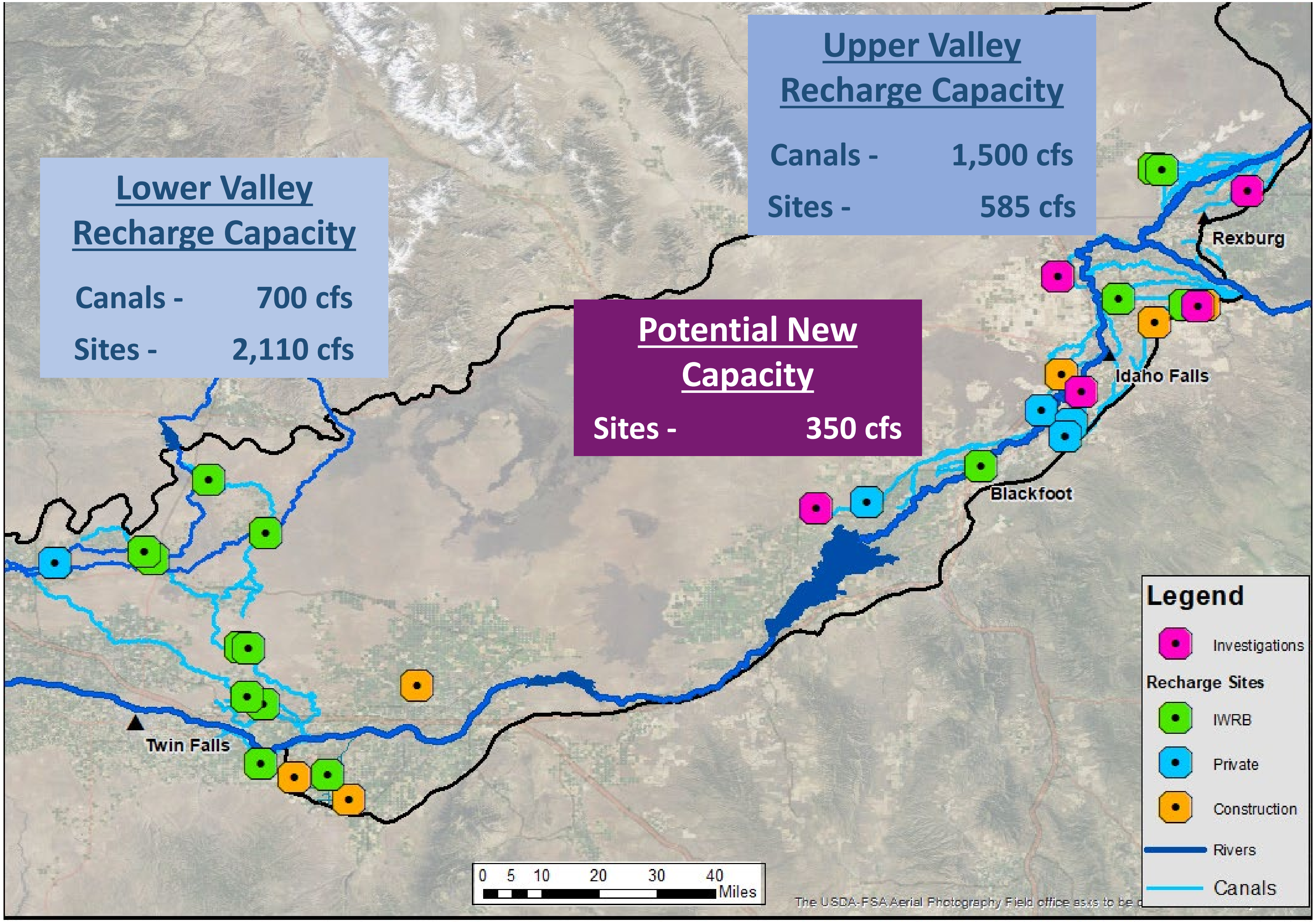
- Highly Variable Water Supply
  - Timing of water available
  - Amount of water available
- Impacts to conducting Recharge
  - Canal operations
  - Weather
  - Private Recharge
- Canal Capacities - Offsite Locations
- Partnerships are Key

What's Possible / Potential Impacts

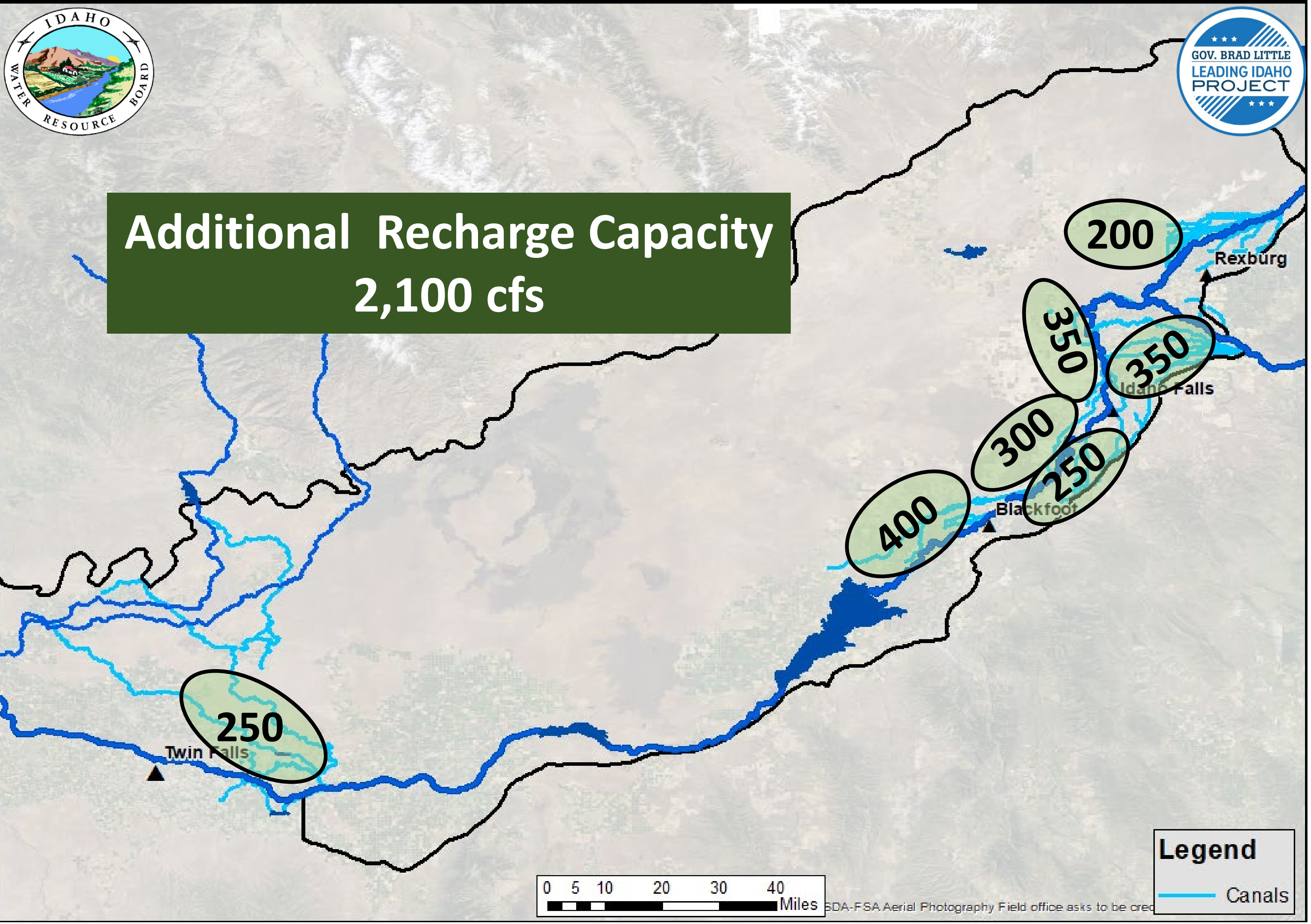
- Active Potential IWRB Projects
- Max ESPA Recharge Capacity ??
- Potential Impacts



Potential IWRB Increased Recharge Capacity



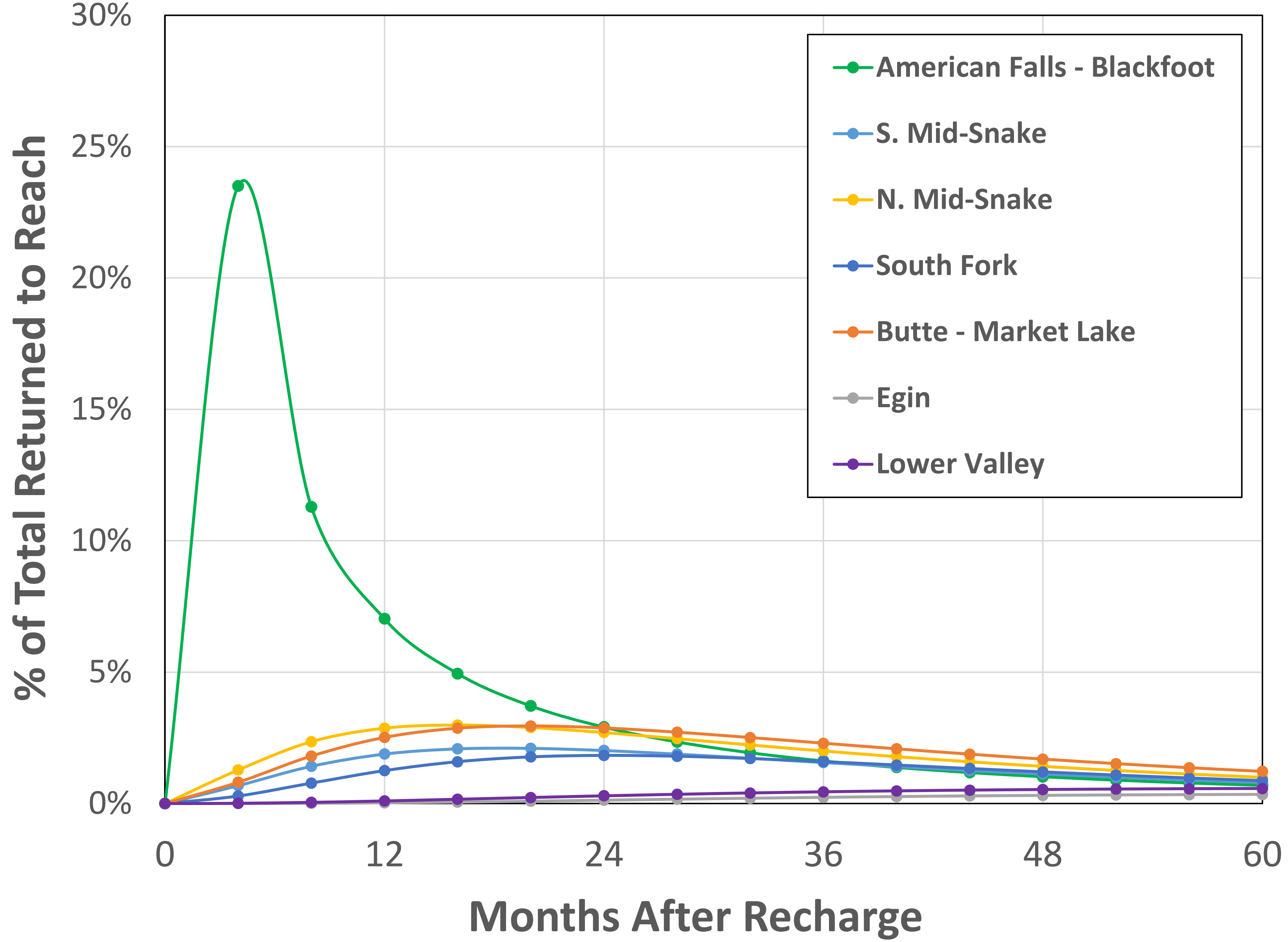
IWRB Recharge Program Build-Out ?



Max IWRB Recharge Buildout

- Lower Valley
- American Falls - Blackfoot
- N. Mid-Snake
- S. Mid-Snake
- South Fork
- Butte Market Lake
- Egin

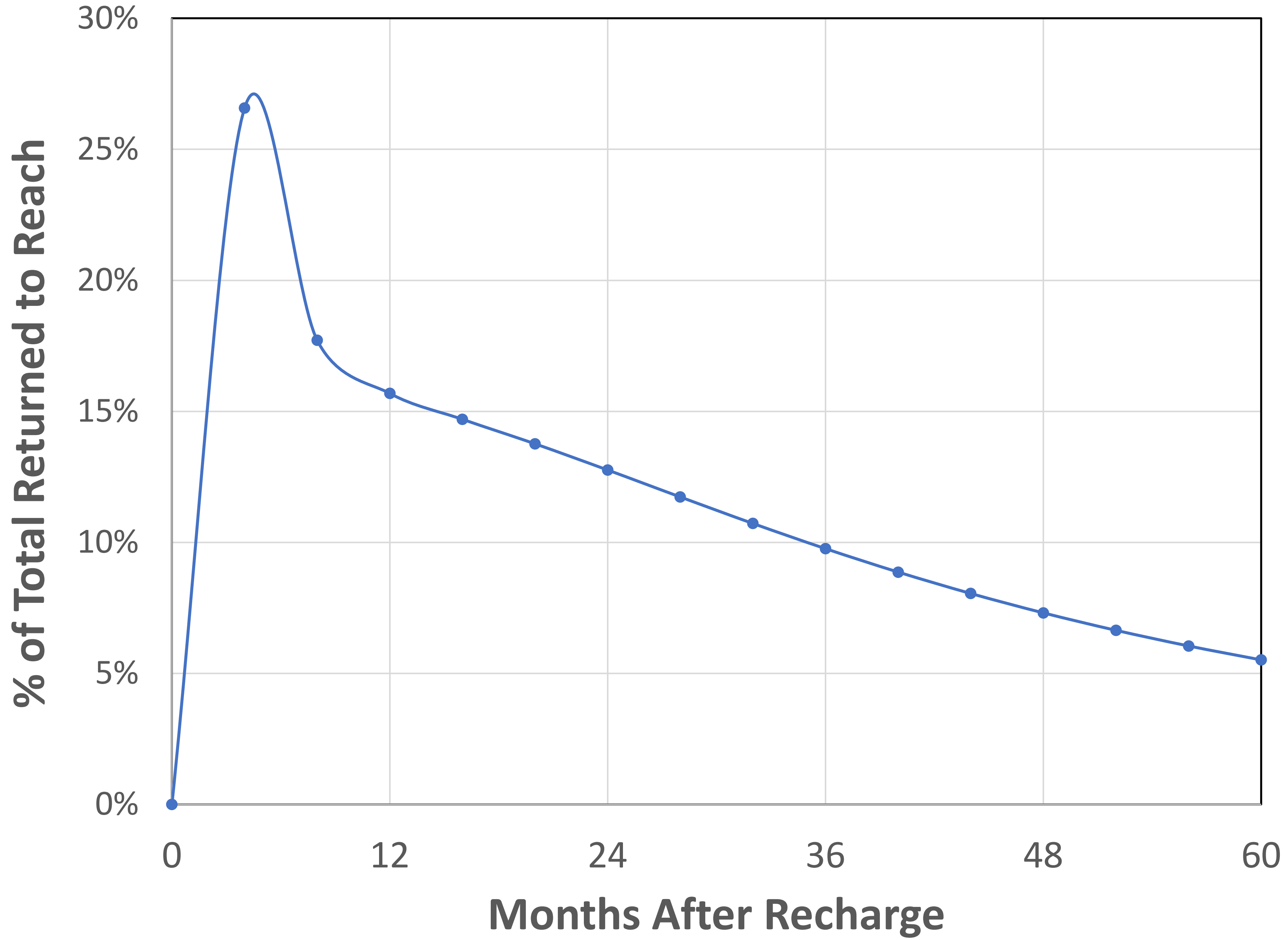
Potential Impacts from Different Recharge Areas



Percentage of Total Recharge Returned to Blackfoot-to-Minidoka Reach

- Individual Areas will have varied impact on different reaches.

Combined Impact on a Specific Reach

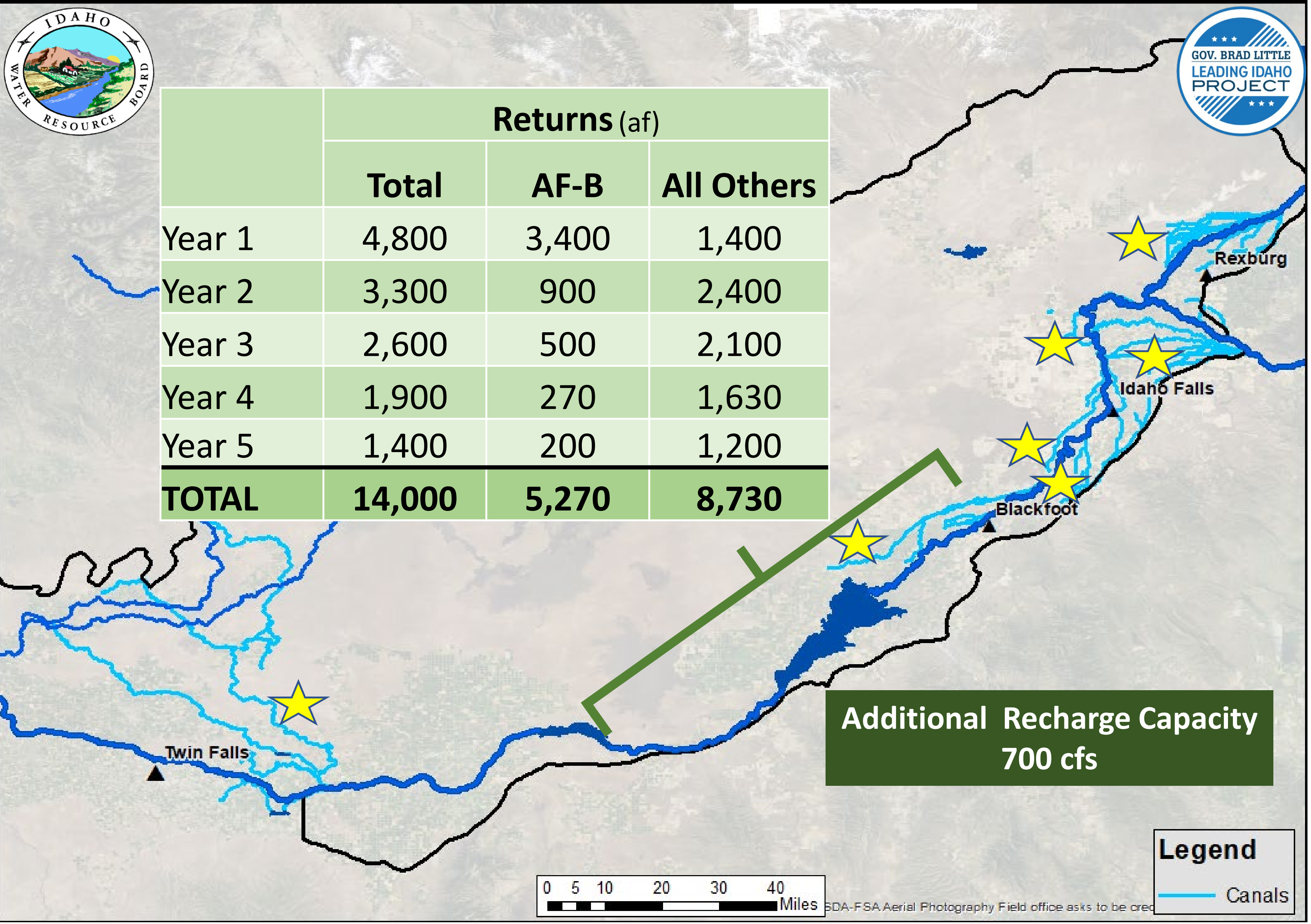


Blackfoot-to-Minidoka Reach

- Percentage of All Recharge to the reach per Trimester

Blackfoot-to-Minidoka Reach Impact

	Returns (af)		
	Total	**AF-B**	**All Others**
Year 1	4,800	3,400	1,400
Year 2	3,300	900	2,400
Year 3	2,600	500	2,100
Year 4	1,900	270	1,630
Year 5	1,400	200	1,200
TOTAL	**14,000**	**5,270**	**8,730**



IWRB Recharge

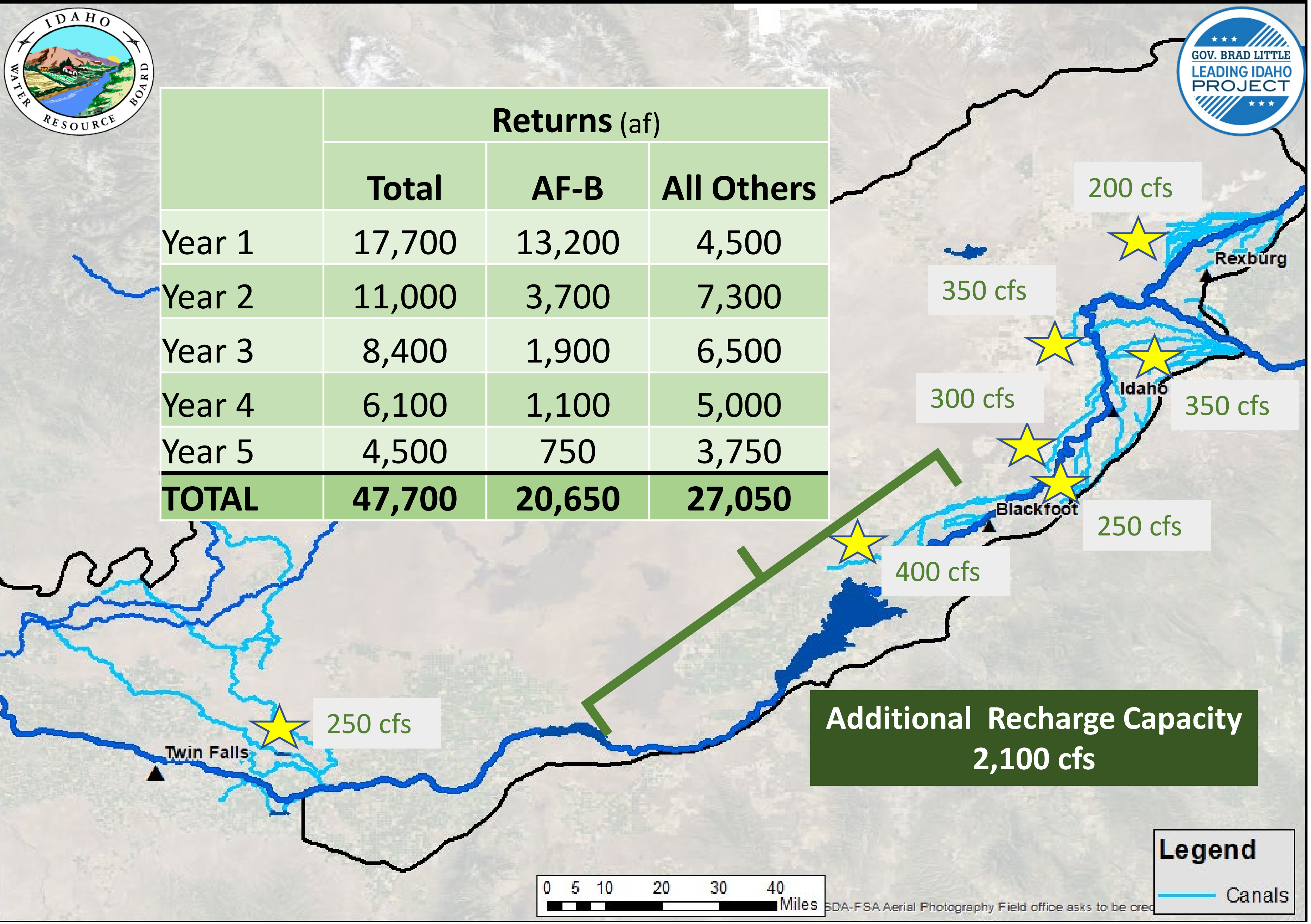
100 cfs / 30 days

Areas:

- Lower Valley
- American Falls - Blackfoot
- N. Mid-Snake
- S. Mid-Snake
- South Fork
- Butte - Market Lake
- Egin

Blackfoot-to-Minidoka Reach Impact

	Returns (af)		
	Total	**AF-B**	**All Others**
Year 1	17,700	13,200	4,500
Year 2	11,000	3,700	7,300
Year 3	8,400	1,900	6,500
Year 4	6,100	1,100	5,000
Year 5	4,500	750	3,750
TOTAL	**47,700**	**20,650**	**27,050**



IWRB Recharge

30 days

Areas:

- Lower Valley
- American Falls–Blackfoot
- N. Mid-Snake
- S. Mid-Snake
- South Fork
- Butte Market Lake
- Egin

Stakeholder Comments

Summary of Feedback:

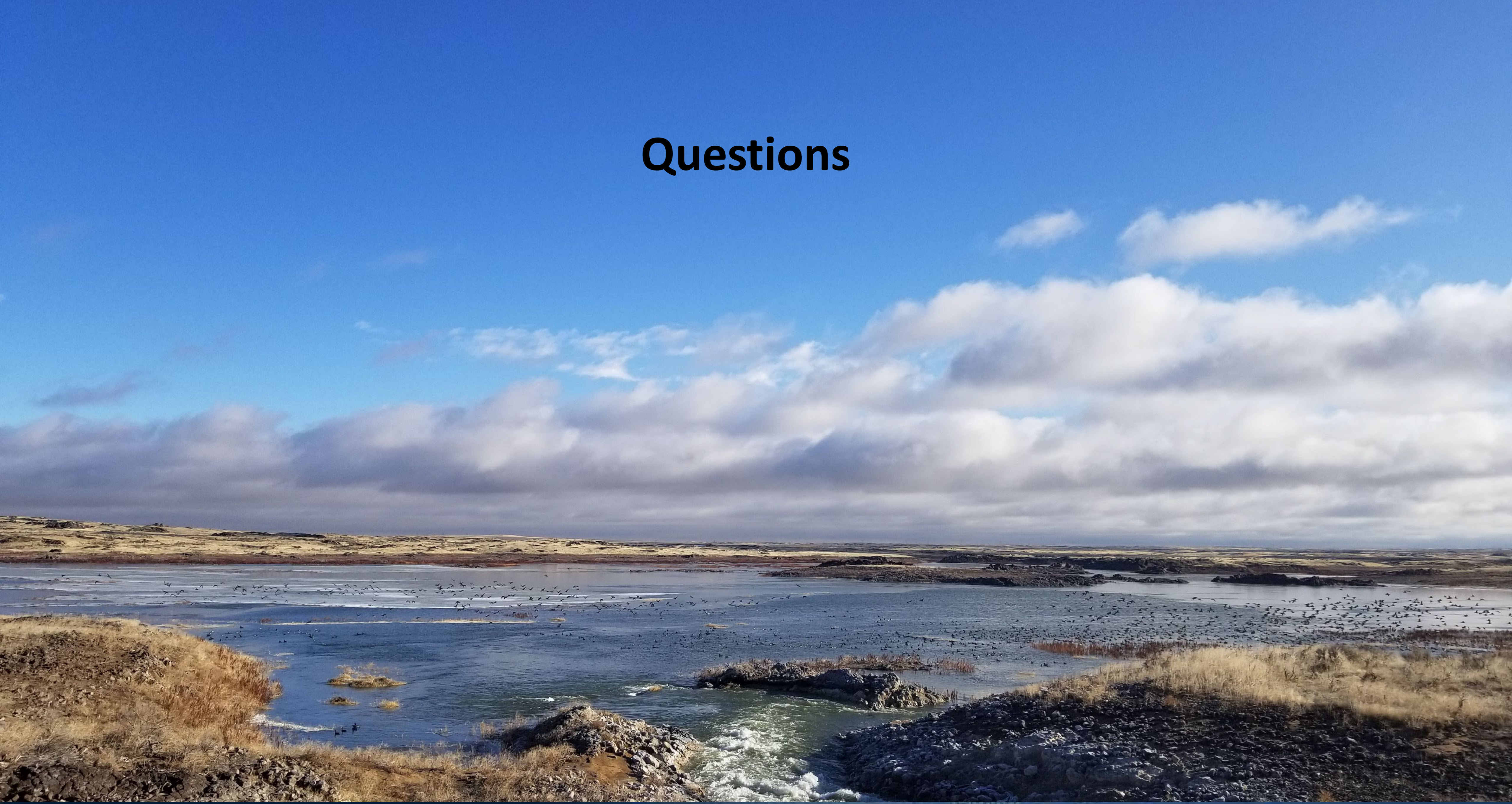
- Systems approach to Managed Recharge.
  - Not as focused on High Aquifer Retention.
  - Impacts more Important than Volume.
- Analysis of Impacts due to Recharge to optimize Program activities.
- Impacting the reaches on the Snake River below Blackfoot are a key interest.
- Recharge as much as possible when water available.

Moving Forward

Key Point for Developing the Program:

- Partnerships are crucial to the success and further development of the program.
- Flexibility will be required for Variable / “Dryer” climate.
- Further analysis and data will be required to continually evaluate and adaptively manage the Recharge Program.
- Stakeholder input is an important part of assessing the hydrologic, economic, and environmental issues related to implementing the ESPA CAMP

Questions



Evapotranspiration Ground Truthing Project

Presented to the IWRB Aquifer Stabilization Committee

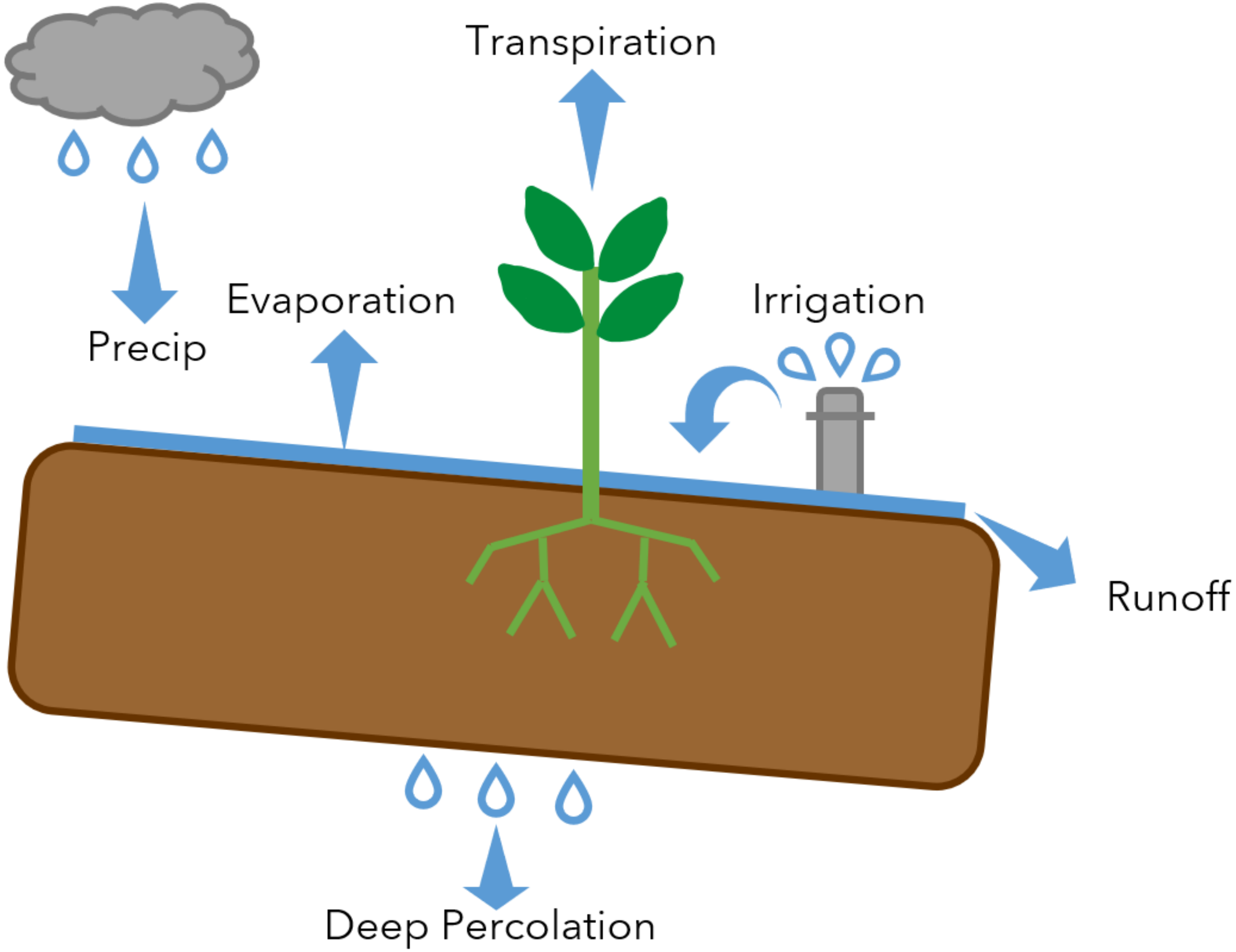
May 31, 2023

By Phil Blankenau, P.E.

Overview

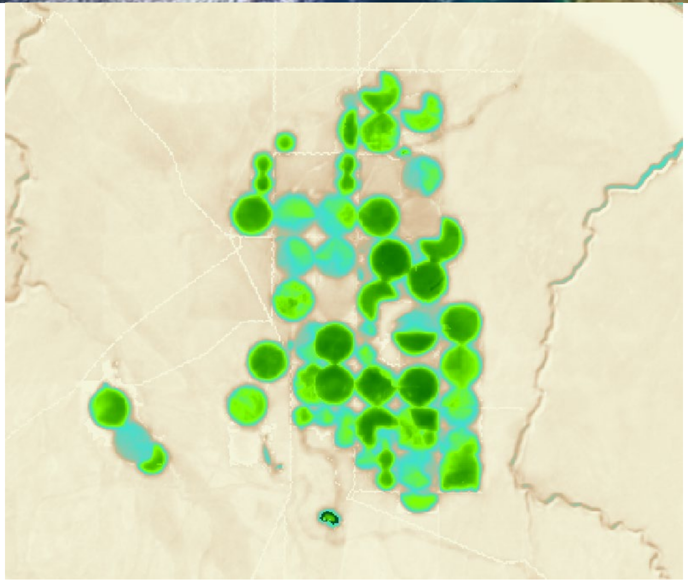
- Evapotranspiration (ET) is a large component of water budgets built into IDWR groundwater models and other projects
- IDWR modelers are concerned about the defensibility of METRIC model ET estimates
  - METRIC has not been compared to ground truth measurements in Idaho since the 1990s and is returning values higher than ET calculated by other methods
- After gathering information from neighboring states and ET experts, staff are proposing a 4-year field verification study that would cost approximately $1M

Evapotranspiration (ET) and Consumptive Use (CU)

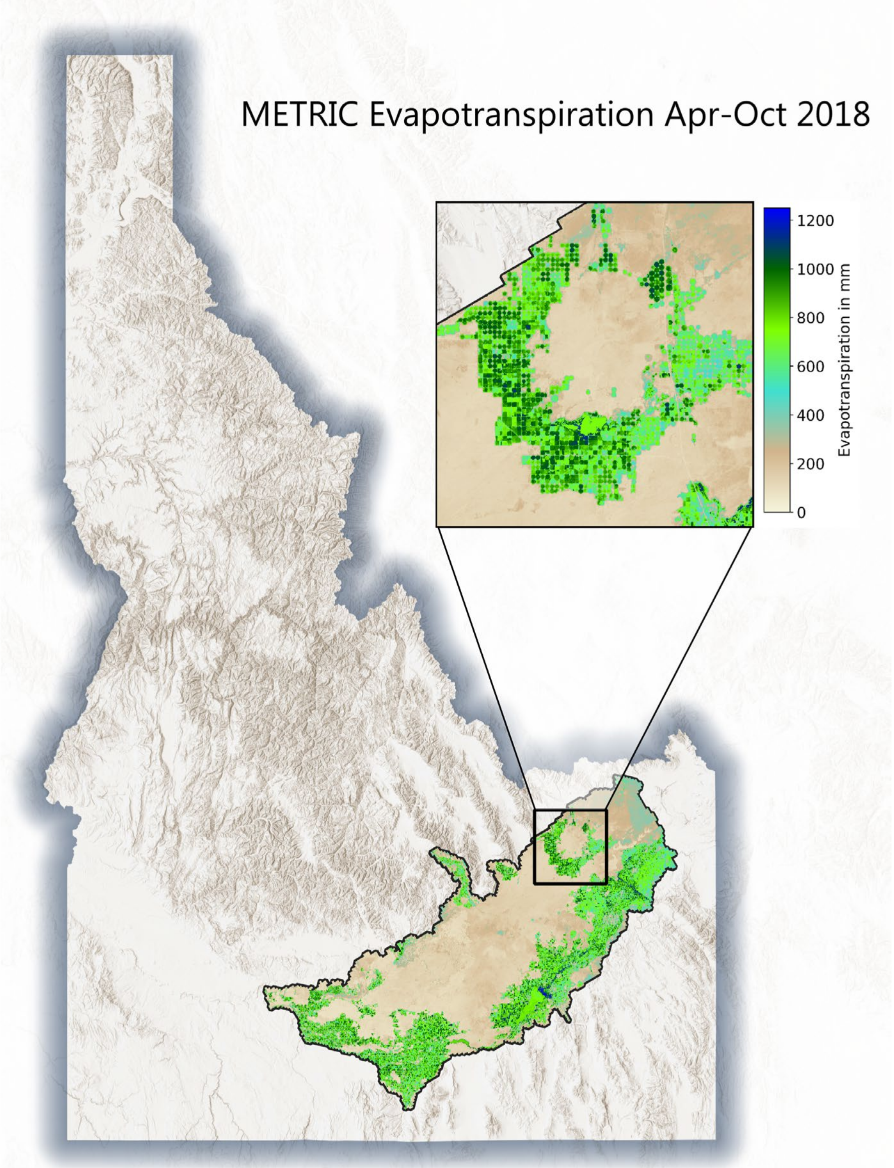


METRIC ET model

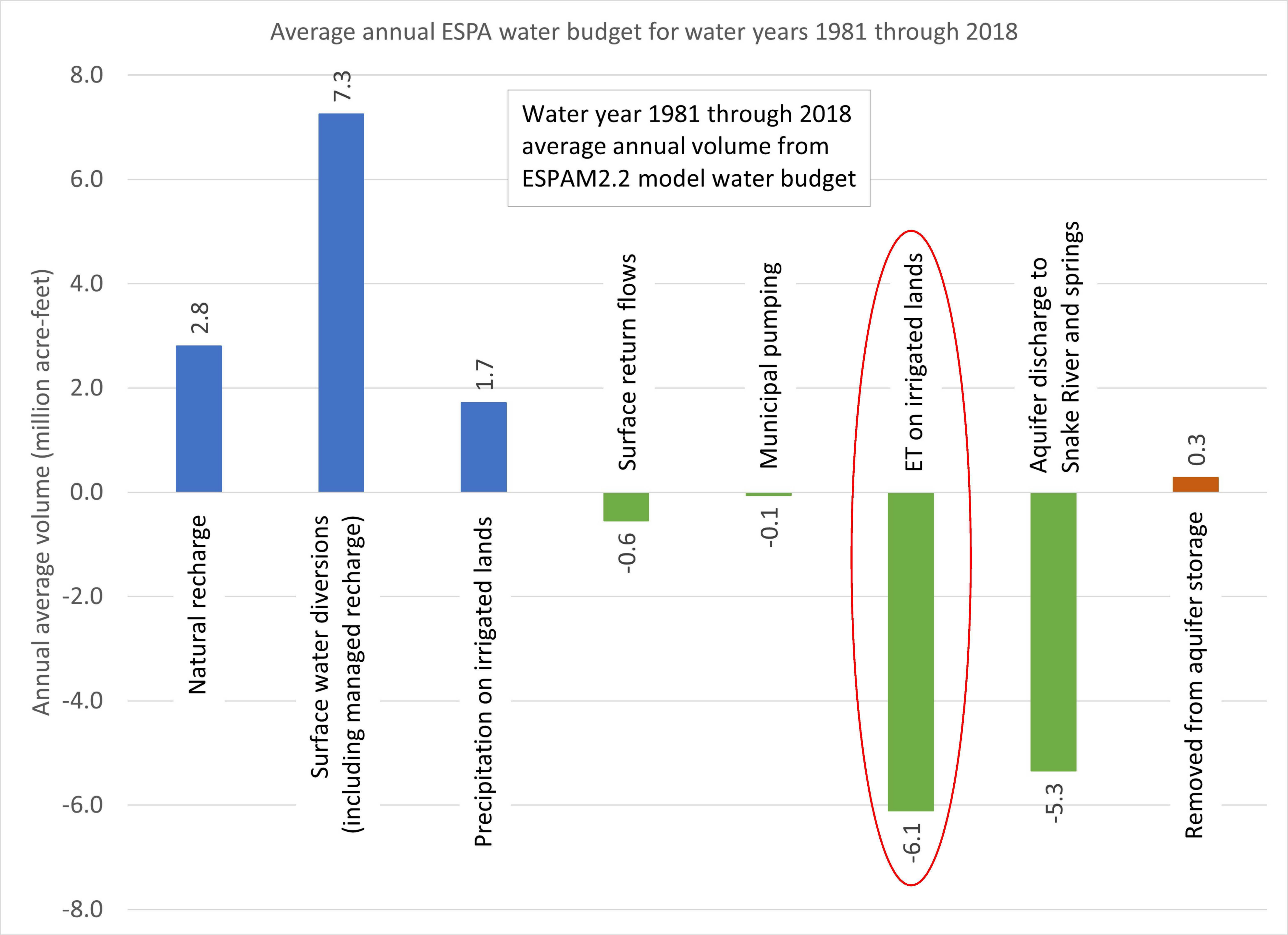
- Mapping ET at high Resolution with Internalized Calibration
- METRIC has been the remote sensing method employed by IDWR to quantify ET since 2005
- IWRB and IDWR funded METRIC datasets through Dr. Rick Allen's group for ~$100k per year
- METRIC datasets are now developed in-house



How is METRIC used



- Groundwater modeling
  - Groundwater withdrawal estimates
  - Recharge from surface water irrigation estimates
- Water budgets for basin studies
- Water right transfers
- Water Supply Bank rentals
- Delivery calls


Average annual ESPA water budget for water years 1981 through 2018
Water year 1981 through 2018 average annual volume from ESPAM2.2 model water budget
Annual average volume (million acre-feet)
8.0
6.0
4.0
2.0
0.0
-2.0
-4.0
-6.0
-8.0
Natural recharge
2.8
Surface water diversions (including managed recharge)
7.3
Precipitation on irrigated lands
1.7
Surface return flows
-0.6
Municipal pumping
-0.1
ET on irrigated lands
-6.1
Aquifer discharge to Snake River and springs
-5.3
Removed from aquifer storage
0.3

Groundwater Modeling and Basin Characterization Projects

	Fiscal Year																		since FY2017	
ACTIVE/PROPOSED MODELING PROJECT	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	**# of contracts**	**Dollar amount**
Spokane Valley - Rathdrum Prairie Aquifer	SVRP 1.0																		0	-
Eastern Snake Plain Aquifer	ESPAM 1.1			ESPAM 2.0 / ESPAM 2.1								ESPAM 2.2					ESPAM 3.0		41	$2,697,115
Wood River Valley				hydro framework / model construction				WRV 1.0			WRV 1.1				WRV 1.2				3	$231,445
Treasure Valley								hydro framework / model construction					TV 1.0					TV 1.1	8	$2,469,360
Big Lost River										hydro framework (DOE SEP #2)				model construction			BL 1.0		9	$1,575,140
Raft River												hydro framework (DOE SEP #3)			model construction				4	$1,814,500*
Mountain Home Plateau													hydro framework			model construction			3	$1,200,000*
Camas Prairie														hydro framework / model construction (= term sheet component)					2	$1,200,000*
Portneuf															hydrologic investigation				-	-
																	TOTAL		**70**	**$11,187,560**

*Cost includes estimated $500k for groundwater model construction

ET ground truthing importance

Why measure ET in the field?

METRIC is becoming less defensible
- Last field verified in Idaho in the 1990s
- Higher than respected OpenET models
- Higher than pumping data

No Ground Truth
- Hard to defend claim that METRIC is the best available science
- Several surrounding states have adopted OpenET but are ground-truthing
- Not clear which ET models to use

Ground Truth
- Compare OpenET and METRIC to ground truth data
- Improve METRIC calibration or select the best OpenET models for Idaho

What is OpenET?

- "OpenET provides open, easily accessible satellite-based ET data for improved water management" - https://openetdata.org/about/

EDF ENVIRONMENTAL DEFENSE FUND Finding the ways that work

Google Earth Engine

NASA

DRI

USGS

UNIVERSITY of NEBRASKA–LINCOLN

HabitatSeven

USDA ARS

University of Idaho

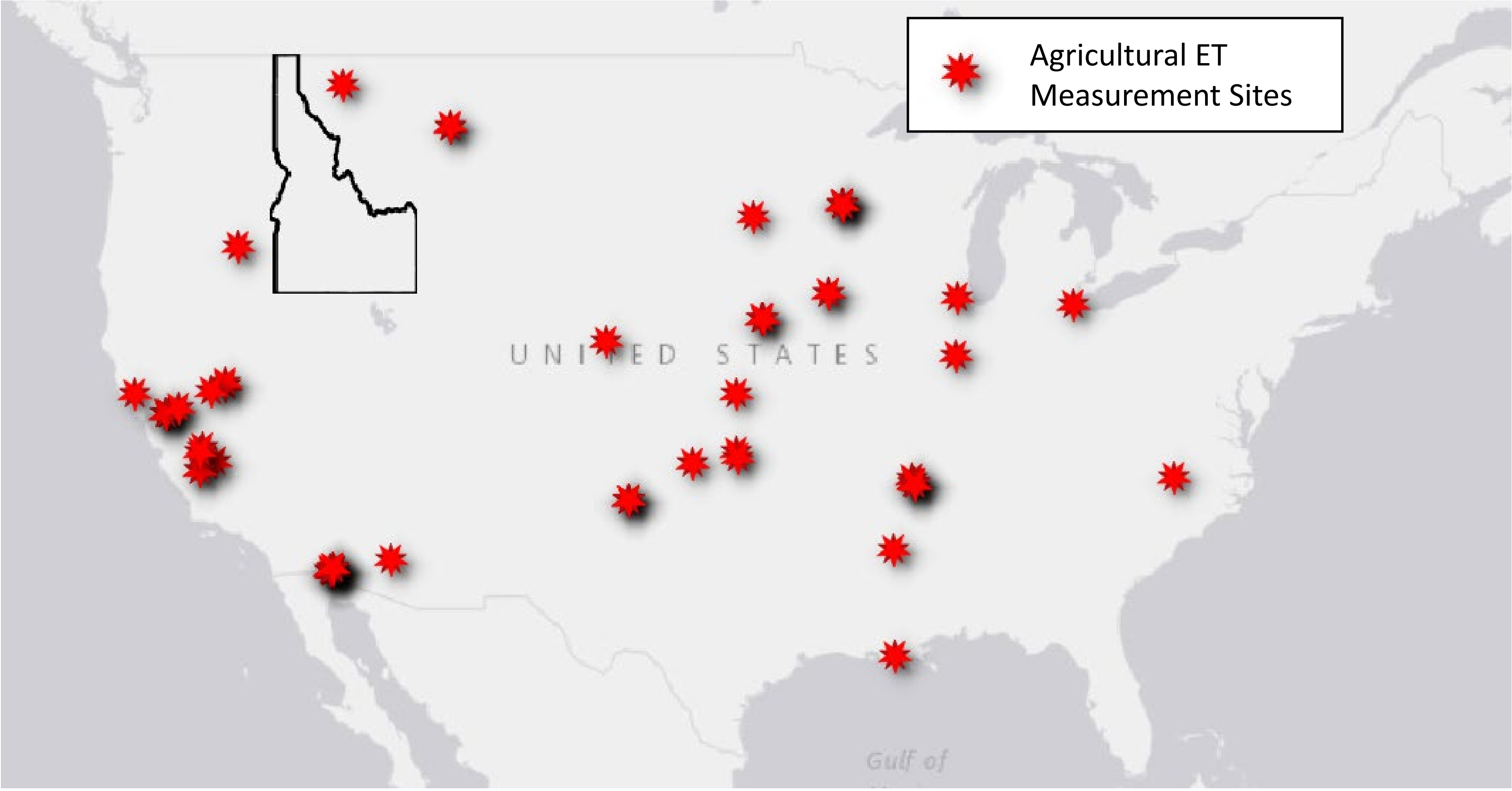
UNIVERSITY OF MARYLAND 1856

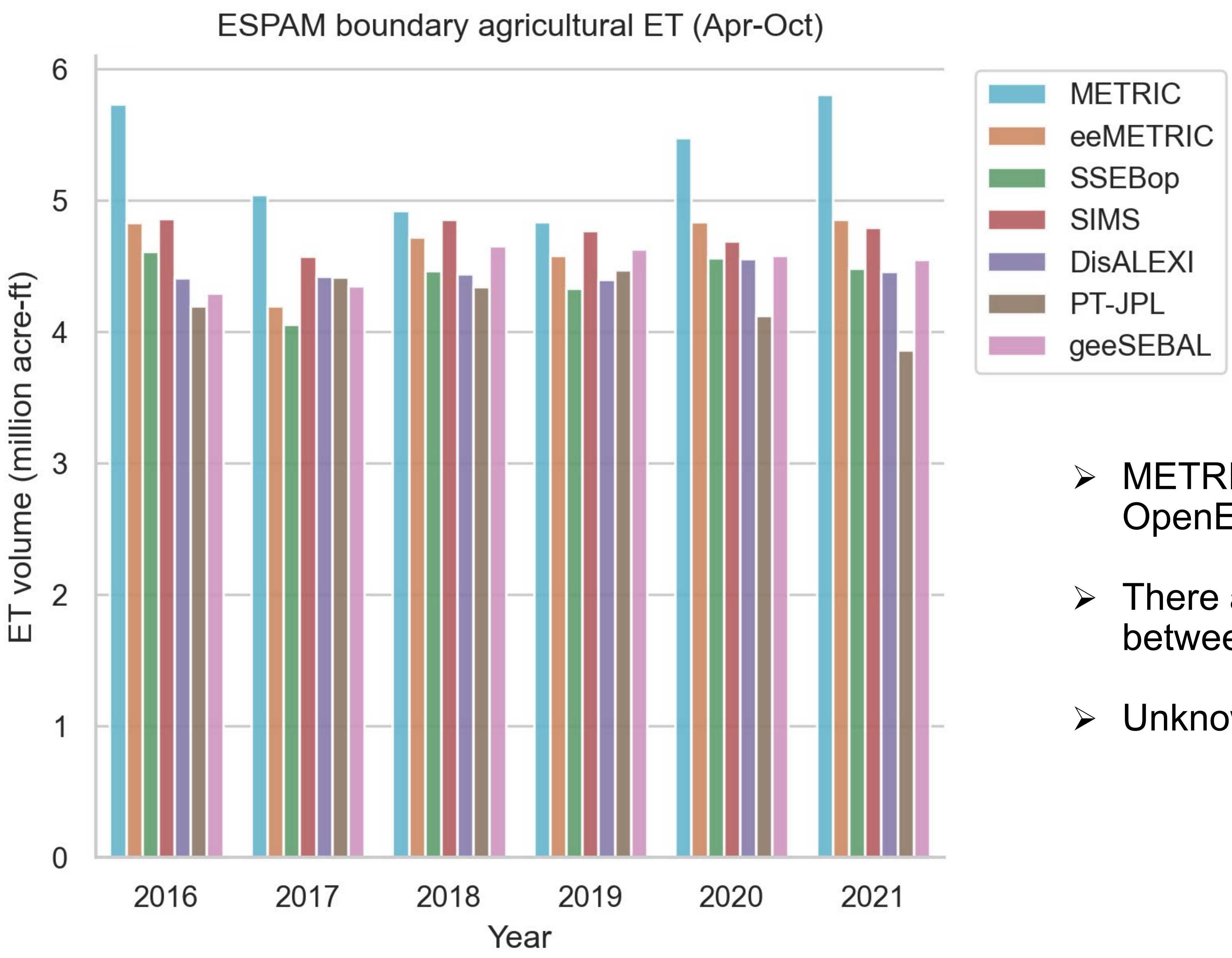
WISCONSIN UNIVERSITY OF WISCONSIN–MADISON

California State University MONTEREY BAY

UFRGS UNIVERSIDADE FEDERAL DO RIO GRANDE DO SUL

OpenET ground truthing locations



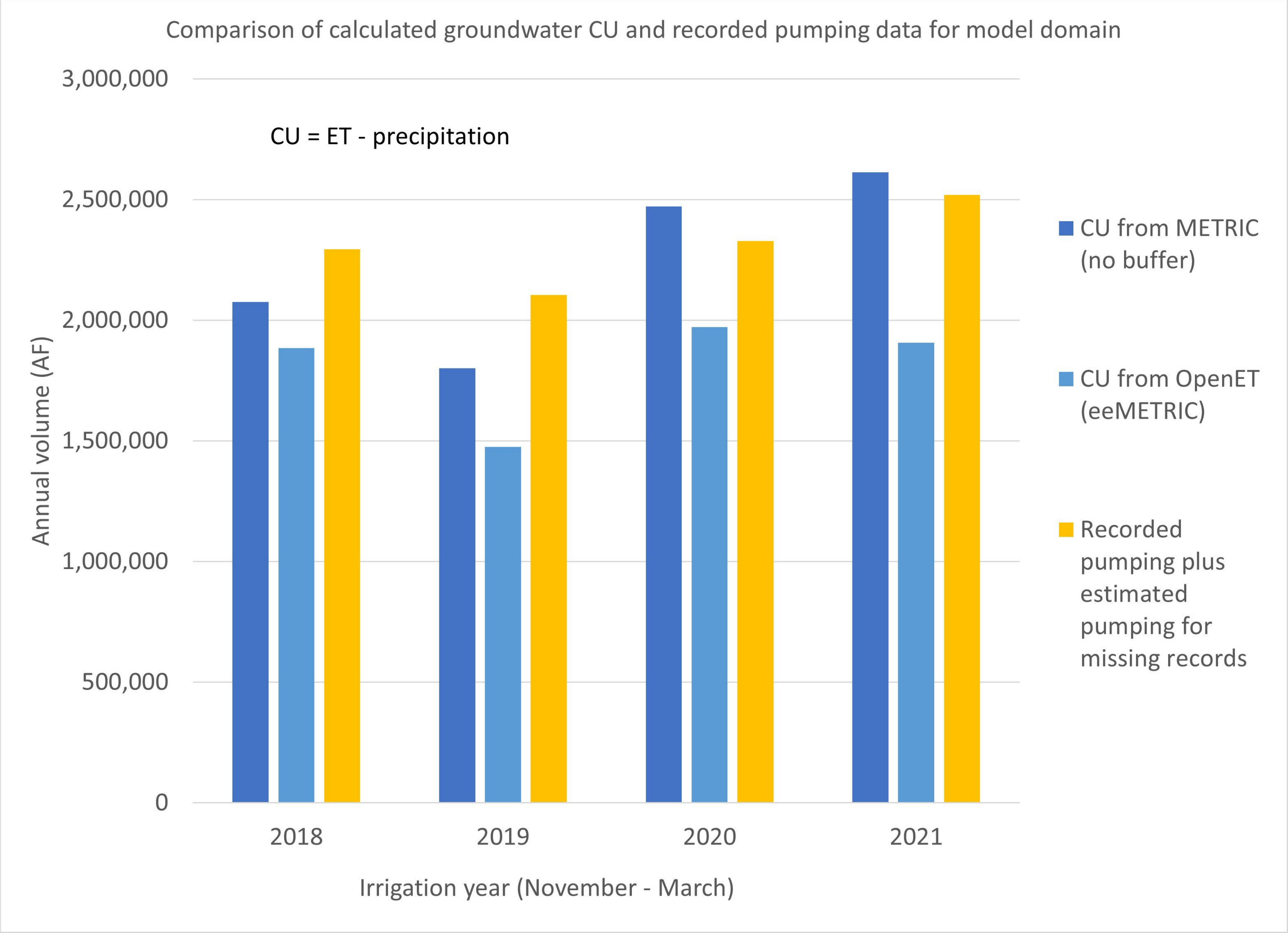


OpenET compared to METRIC

- METRIC is higher than all OpenET models
- There are large differences between OpenET models
- Unknown which quantity is correct

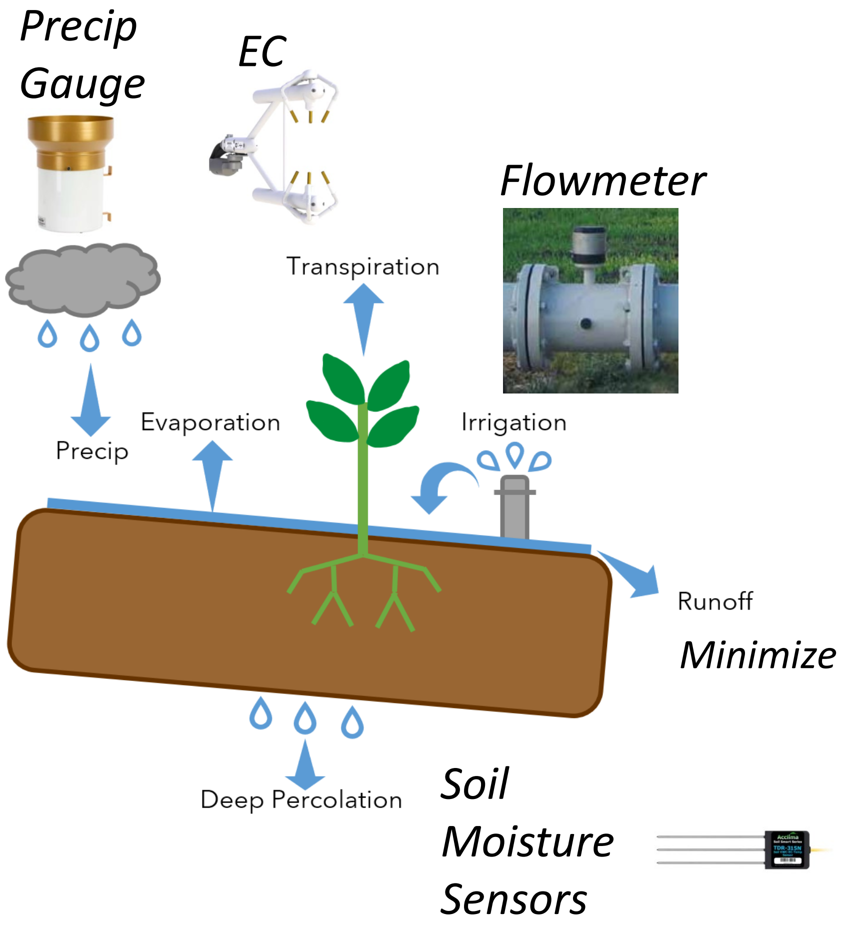
Pumping comparisons

- IDWR compared consumptive use (CU) calculated using METRIC and OpenET data to flowmeter data
- CU using METRIC sometimes exceeds pumping



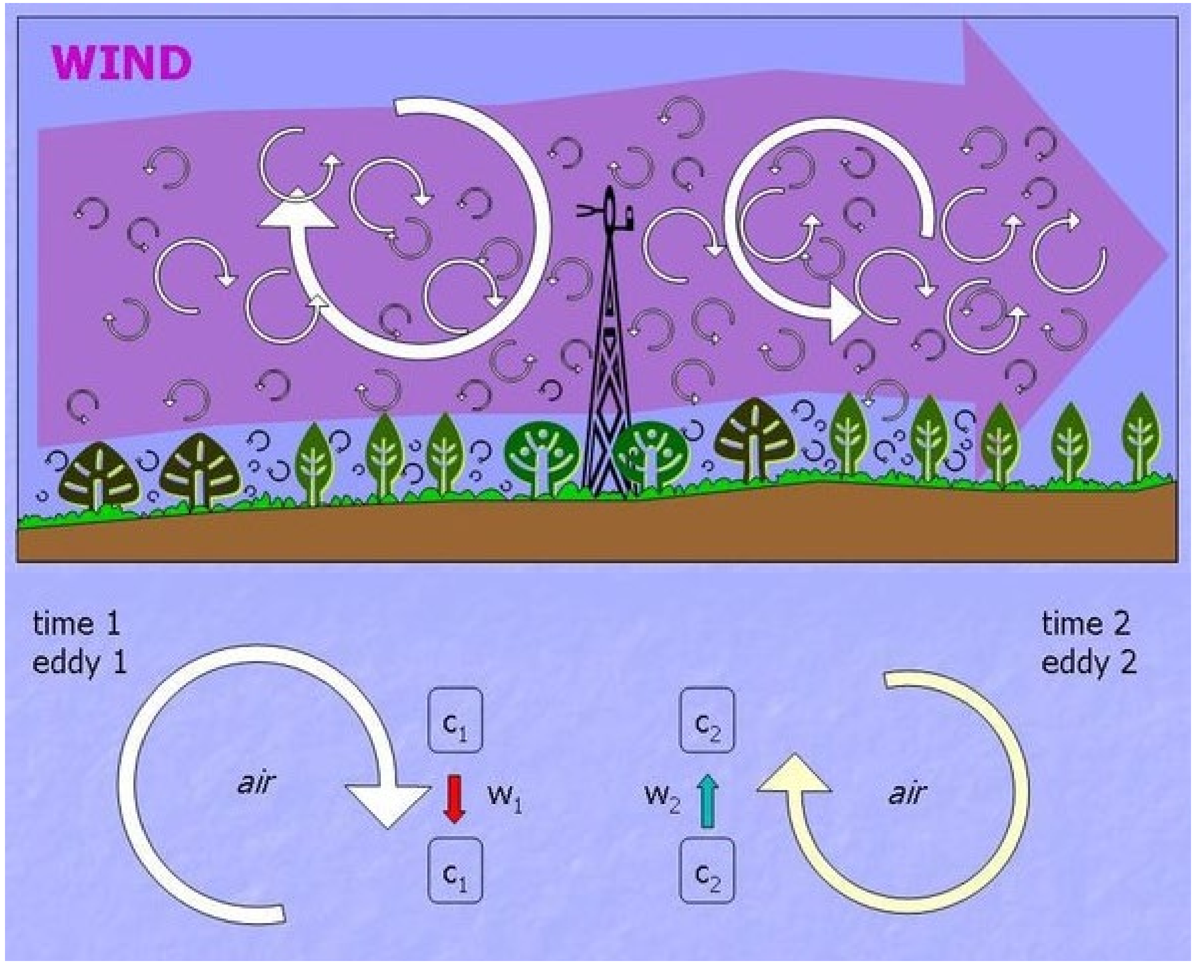
Proposed Solution - Measure ET and CU

Install 3 eddy covariance (EC) stations along with flowmeters, soil moisture sensors, and precipitation gauges



How does EC work?

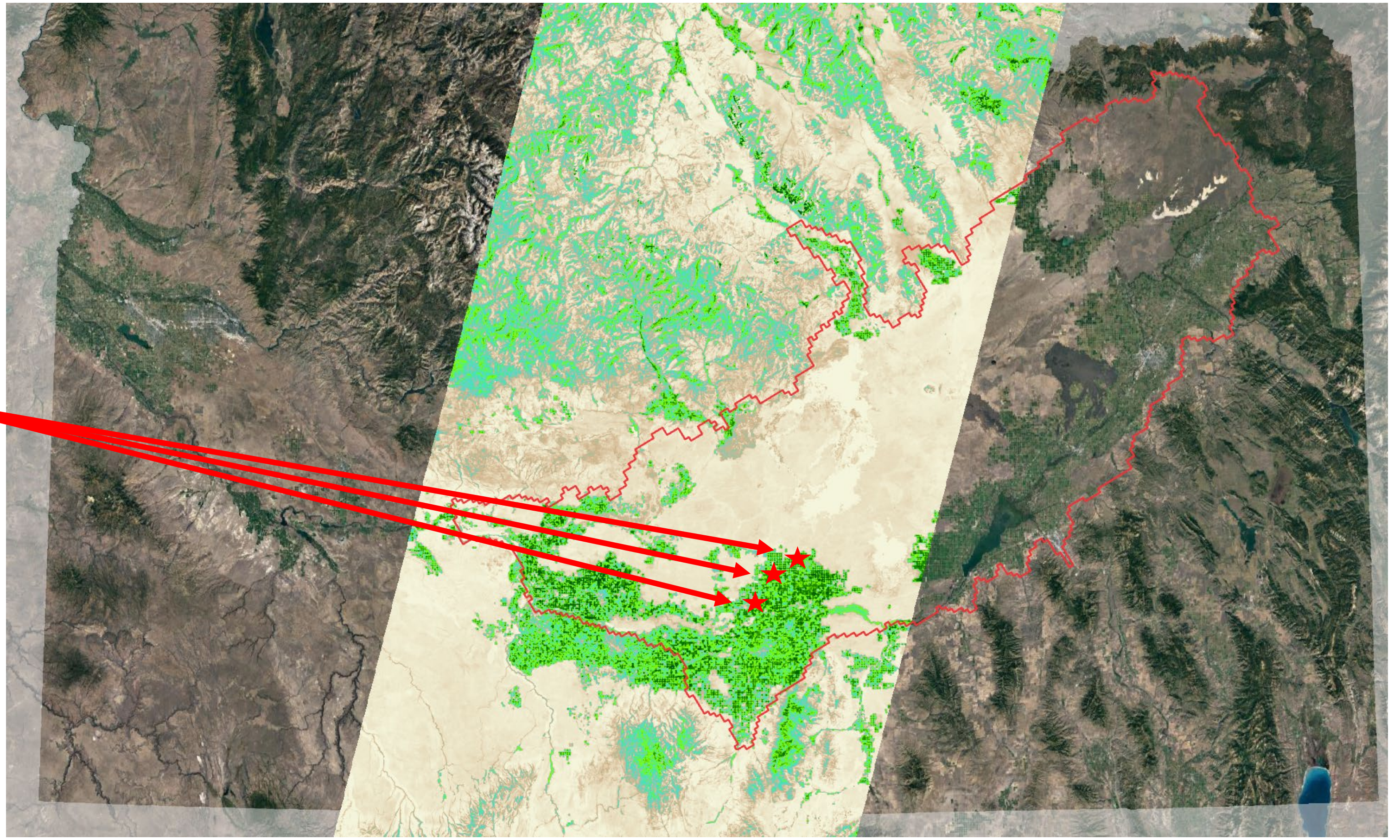
- ➢Wind moves in eddies
- ➢Measuring the wind velocity and vapor concentration of eddies we can find the mean vertical flux
- ➢ET is the difference between the mass of water moving up and the mass moving down



https://en.wikipedia.org/wiki/Eddy_covariance

The value of ground truth data

- Preserves the defensibility of our ET modeling
- Enables data-driven modeling decisions



Proposed Project and Budget

- Total proposed budget is $1,000,000 over four years
- Year 1: develop agreements, determine sites, purchase equipment, build stations
- Years 2-4: operate sites, collect and process data, develop reports and comparisons

Item	Total
Eddy covariance station hardware	$ 250,000.00
Installation, calibration, maintenance, uninstallation, raw data processing and storage	$ 650,000.00
Data post-processing, QAQC, remote sensing comparisons, and reporting	$ 100,000.00
Total	**$ 1,000,000.00**


Questions?