Columbia Basin Sustainable Water Coalition Stakeholder Meeting
Date: Thursday, March 16, 2023
Time: 10:30am – 12:30pm
Location: Moses Lake City Council Chamber, 401 S Balsam, Moses Lake

The Columbia Basin Sustainable Water Coalition, a group of water purveyors and other municipal and small community water system stakeholders, was formed in 2018 to address Columbia Basin domestic groundwater supply issues and create locally-driven recommendations that influence water delivery methods and policy that will direct resources for long-term groundwater solutions
The Coaltion's stakeholder meeting convened at 10:33am. Sara Higgins of the Columbia Basin Development League facilitated the meeting as a contractor for the Coalition.

WELCOME AND INTRODUCTIONS
Self-introductions were conducted. Attendees included approximately 30 online participants and 26 in room participants.

Licett Garbe, the new Eastern Washington Director for Senator Patty Murray, provided her contact information: Licett_garbe@murray.senate.gov; (509) 714-4409

COLUMBIA BASIN AQUIFER STORAGE AND RECOVERY
Ben Lee of Landau Associates and contractor for the Coalition introduced the meeting's presentation topic, ASR, as it related to the work the Coalition is undertaking as part of a 2022-awarded WaterSMART grant. He provided a recap of past topics stakeholder meeting topics and future topics in the context of the grant work.

Kevin Lindsey of GeoEngineers gave a summary of aquifer management through ASR and other approaches that capture water, treat it, inject it into the ground, and pump it back out when needed.

Regional Scale ASR presented by Wesley Hipke, Water Projects Section Supervisor, Idaho Water Resources – Eastern Snake Plain Aquifer Management Plan

- Regional ASR depends on regulatory environment.
- Eastern Snake Plain Aquifer (ESPA) is a critical water source for Idaho agriculture. 50% Idaho power comes from the river system.
- Discussed Prior Appropriation Doctrine, Conjunctive Administration.
- Discussed regulations and flow requirements at dams that impact water availability.
- Discussed relationship between Thousand Springs Discharge and aquifer levels – close relationship.
- Aquifer has steadily declined since 1950s.
- Still issuing water rights through 1980s because perception was there was plenty of water available. Lawsuits occurred as water availability declined.
- Goal was to stabilize aquifer, build it back up.
- Stressed importance of ESPA Comprehensive Aquifer Management Plan and adding it to State Water Plan.
- Since adoption, action items are being implemented.

- Implementation depends on CLEAR UNDERSTANDING OF THE PROBLEM, physical limitations, legal limitations and regulatory development, funding, stakeholder agreement, and MONITORING--to a) understand the issue, b) track plan implementation (because it usually won't go as planned), and c) to demonstrate to stakeholders that you are making an impact.
- FUNDING – state of Idaho funded the whole recharge program (clouding seeding is a cooperative between state, power company, water districts out of the same fund) at $10million.
- Regional solutions need to be long term, not something to implement for a few years. Requires ongoing funding and monitoring.
- Adaptive Management is very important. An unexpended obstacle to manage: Crawfish would burrow into canals and damage canal walls.
- Water availability is a significant factor. There is a big difference between the Idaho project and Columbia Basin project because Columbia Basin can't rely on runoff.
- When canals aren't being used for irrigation (winter) Idaho can use the canals for recharge.
- They pay canal companies to deliver water to recharge sites.
- In one instance, Arizona averaged $40/acre foot and California $400/acre foot for managed recharge, Idaho project is $7.70/acre foot.
- They monitor impacts of projects compared to a "do nothing" alternative. There will still be dry periods, but monitoring shows the difference.
- Aquifer storage is still declining, but slower than it would have without recharge.
- Expansion will be very expensive. Conveyance fees will increase. It will require new canals whereas initially they were able to rely on existing infrastructure.
- It is important to develop monitoring and tools to assess the impact, build in flexibility.
- There were questions and discussion about impact to water users.
- <u>Primary take-aways: Idaho and the Columbia Basin have similar needs with different aquifer systems. More upfront infrastructure to convey water would be needed in Columbia Basin as there are not as many canals available as in Idaho. Can't rely on snow pack or run off. Would also need comprehensive ASR or MAR legislation in Washington to make permitting easier for Ecology, more efficient, and cost effective. Washington state funding would be needed to implement something similar to what Idaho has, and that would require broader support than that in the Columbia Basin.</u>

Regulatory Framework Regarding ASR

- <u>Water quality standards for water injected</u> presented by Lynn Doremus, Hydrogeologist, Water Quality Program, Ecology, 4601 North Monroe Street, Spokane, WA 99205, 509-703-2830 (cell), 509-329-3518 (office), LDOR461@ECY.WA.GOV
  - <u>If you are interested in participating in the EPA funded training for Reclaimed Water Engineers Certification, contact Llynn for more information.</u>
  - Aquifer recharge projects are permitted through the Water Resources Program and Water Quality.
  - There is no authorizing legislation for aquifer storage and recovery. We have to rely on a multitude of existing regulations. As future efforts to influence legislation may develop, consider keeping Ecology's Office of the Columbia River informed and OCR's Director, Tom Tebb, informed.
  - The process includes a feasibility study, testing, data report, and a permit based on data report.
  - Regarding recovery, the amount of water that has been recharged is not the same as what can take out. Also, when water is injected, it flows away from the injection point.

    - Treated ag processing wastewater that is currently going to water crops and feed cattle could be used to recharge.
    - Processors make their own decisions of what to do with wastewater. It could be an economic benefit to a larger group paying to treat water and injecting it for recharge.
    - Ag water reuse would need to go through water reclamation permitting.
    - As efforts around
- <u>Water quality standards for withdrawal</u> presented by Steve Deem, Distribution System Engineering Specialist, DOH
    - Reclaimed water must meet drinking water standards.
    - Technical difficulties prevented the presentation from being completed.

Q&A

- Questions were asked of all speakers.

EPA Region 10 Moses Lake Superfund Site

- Allison Williams of Moses Lake introduces EPA Region 10 Superfund Site Project Manager, Piper Peterson, to briefly review the Moses Lake Superfund Site project. A project report is due at the end of April. Copies will be available to property owners where samples were taken.

CBSWC WaterSMART Grant Activity

- <u>Organizational Development Update</u>
    - CBSWC Chair Elsa Bowen introduced board members.
    - The board recently approved a 5-year strategic plan, annual year work plan, logo, and a one page "about us" flyer.
    - The board appointed Lincoln County Commissioner Jo Gilchrist to fill former Commission Mark Stedman's vacant seat.
- <u>Well Monitoring Update</u>
    - Ben Lee of Landau Associates and contractor for CBSWC reported that Landau Associates and and GeoEngineers continue work on a technical report that will include recommended options to pursue for solutions to regional groundwater issues. They have provided a report outline and recommended evaluation matrix to the board.
    - GET SLIDES FOR NOTES – GET LIST FROM BOARD MEETING NOTES
    - 5-6 wells have been selected for monitoring – Hatton, Connell, Mattawa, two in Quincy, and possibly Ritzville.
    - Four other municipal wells are supplying data – Lind, Othello, Moses Lake, Soap Lake.
    - All monitored wells are basalt wells, and this effort compliments previous work and fills gaps for existing WSU, ecology, and municipal monitoring efforts.

ADJOURN: 12:38PM

Washington State Department of Health

Columbia Basin Sustainable
Water Coalition
March 16, 2023

ASR / MAR Projects and Drinking Water Wells

Steve Deem, P.E.
Office of Drinking Water

PUBLIC HEALTH
ALWAYS WORKING FOR A SAFER AND
HEALTHIER COMMUNITY

Definitions – Departure Points

- Aquifer storage and recovery (ASR) and Managed Aquifer Recharge (MAR) are artificial processes or natural processes enhanced by humans that convey water underground.
- Although ASR and MAR are often used interchangeably, they are separate processes with distinct objectives.
- MAR is used solely to replenish water in aquifers.
- ASR is used to store water, which is later recovered for use.
- The stored water may be recovered from the same well used for injection or from nearby injection or recovery wells.
- Washington State ASR and MAR can help increase the availability of water during the summer by capturing and storing water during our wetter months when stream flows are high and water demands are low.

Regulatory Framework Regarding ASR and Drinking Water Wells

- ~~Water quality standards~~ for water injected
  - Ecology
- ~~Water quality standards~~ for withdrawal
  - DOH – Drinking Water

❖ All ASR & MAR must comply ECY WAC 173-157

❖ All ASR & MAR involving any drinking water wells or sources of supply must <u>also</u> comply DOH WAC 246-290 – drinking water regulations.

Drinking Water Regulations

- **WAC 246-290-130 Source approval.**
- ***(1)*** *Every purveyor shall obtain drinking water from the highest quality source feasible.* <u>*Every purveyor shall, prior to using a source as a public water supply, obtain approval from the department for*</u>*:*
- *(a) All new sources.*
- *(b) Previously unapproved sources.*
- *(c) Modifications to existing sources.*
- ***(2)*** *In no case may a purveyor maintain an intake or other connection between a public water system and a source of water not approved by the department.*

- Only water from DOH-approved potable water sources may be injected into any drinking water source involved in an ASR or MAR project. This applies to any proposed or existing water source. No existing drinking water source may be augmented by an ASR or MAR project without explicit DOH authorization.

Drinking Water Regulations

- Surface water sources –
  - “Water quality standards” vs. ‘Treatment Techniques’
  - Cannot test out of TT requirements!
  - Required treatment steps – design and operate 24/7/365.
  - Continuous monitoring – reporting
  - Operated by properly certified operator (different levels depending upon treatment).

Drinking Water Regulations

- Other requirements to consider:
- Water system planning – comprehensive 10 year planning documents focus on supply, capacity, infrastructure needs.
  - Required for engineering review and approval of capital projects.
  - Required for funding – SRF (state revolving fund).

Diabolical Ironclad Beetle

Steve Deem, P.E.
360-878-7625
Steve.Deem@doh.wa.gov

WATER QUALITY REGULATION OF MANAGED AQUIFER RECHARGE IN WASHINGTON STATE

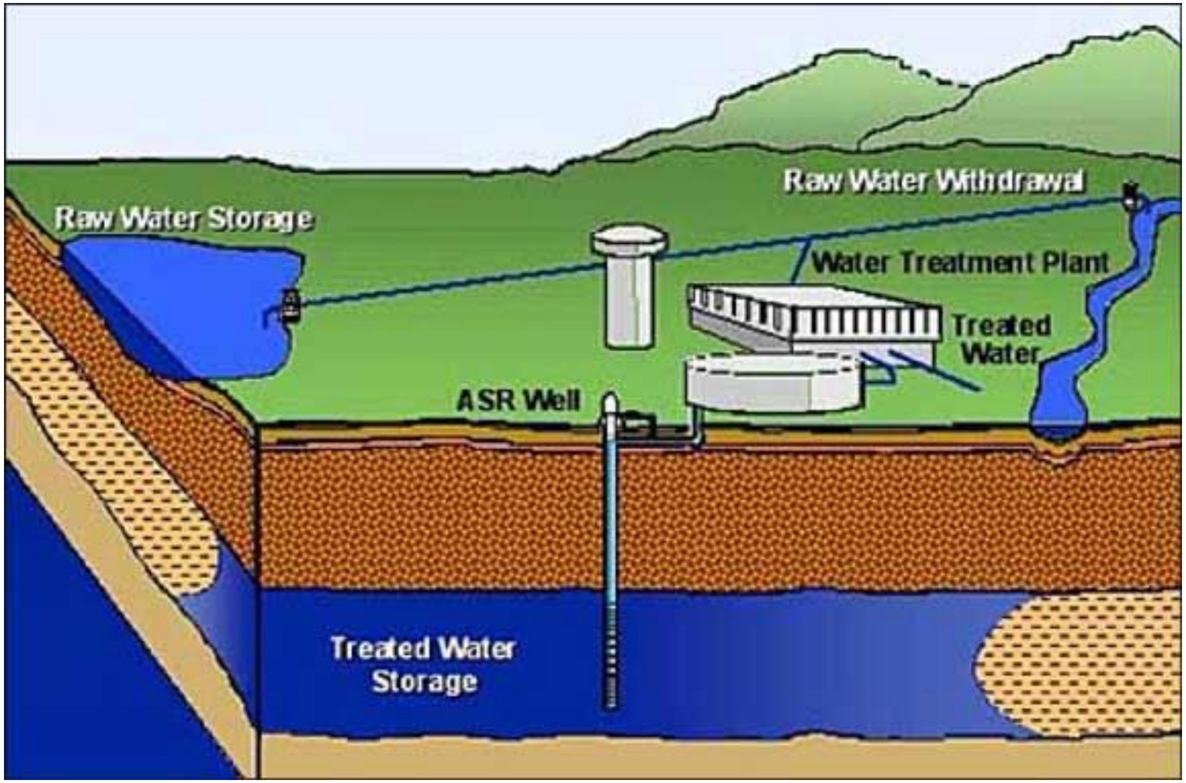
Llyn Doremus, Hydrogeologist, llyn.doremus@ecy.wa.gov
Water Quality Program, Washington Department of Ecology

Presentation Sequence

1. Managed Aquifer Recharge Components
2. ASR Permitting criteria
3. Regional considerations

ASR Components Regulation

- Source Water
- Injection well(s)
- Aquifer storage
- Monitoring wells
- Recovery wells



ASR Permitting Objective

- Generate or gather sufficient information to ensure that ASR permit(s) conditions protect future water quality and availability for human and environmental purposes.
- Ensure project compliance with the applicable laws, rules, policies and guidance.

Two Permitting Paths for Managed Aquifer Recharge Projects

Water Resources Program

- Surface Water source
- Multiple permits
  - Source water permit
  - Pilot testing approval
  - Aquifer storage permit
  - Aquifer Recovery permit
    - Designates beneficial use of recovered water

Water Quality Program

- Reclaimed Water Source
- 1 Reclaimed Water Permit
  - Water owned by entity that treats the reclaimed water
  - Ownership retained after treatment, during storage and recovery
  - Reclaimed Water Permit specifies treatment, storage, recovery & beneficial use

Applicable Washington ASR Regulations

ASR in Washington is governed by an amalgamation of existing rules and regulations

There is only guidance for ASR projects, no permitting criteria.

Water Resources

- Aquifer Storage and Recovery Rule
  - Chapter 173-157 WAC
- Water Code/ Reservoir permits
  - RCW 90.03.370
- Groundwater appropriation
  - RCW 90.44

Water Quality

- Groundwater Quality Standards
  - Chapter 173-200 WAC
- State Waste Discharge permit program
  - Chapter 173-216 WAC
- Underground Injection Control (UIC) Regulation
  - Chapter 173-218 WAC
- Reclaimed water use authorization
  - RCW 90.46 (Chapter 173-219 WAC – 2017 adopted)

Underground Artificial Storage and Recovery Reservoir Permit Pre-Application Process

This is a working flow chart for coordination between OCR, WQ and WR Ecology programs during the pre-application period for potential Aquifer Storage and Recovery (ASR) projects with OCR funding agreements.

Note: Written reports in bold yellow highlight. Color coded roles: WQ in green, WR in blue and OCR in orange, DOH in purple

DEPARTMENT OF ECOLOGY State of Washington

Pre-application meeting with applicant, WQ, WR, OCR, DOH → **Feasibility Study Report with Implementation Plan** → **WQ, WR, OCR DOH review and recommendation** (WQ reviews Report and recommendation provided) → **Aquifer testing and WQ sampling QAPP** (WQ review) → **Aquifer testing and water quality characterization and Geochemical Compatibility Modeling (water-water and rock-water) Summarize in Data Collection Report** (WQ reviews report and recommends additional work) → **Additional aquifer testing & WQ characterization if needed to determine WQ criteria for project compliance** → **Decide if project will comply with WQ Criteria and WQ feedback to proponent**

No → **AKART report & Request for OPI determination** → **Reservoir Permit Application Submitted with Final compiled Feasibility Report**

→ **Additional treatment or other measures** → Yes → **Reservoir Permit Application Submitted with Final compiled Feasibility Report**

Yes → **Reservoir Permit Application Submitted with Final compiled Feasibility Report**

Pre-Application Form:
Proposed source water and water rights
- Proposed reservoir if known
- Anticipated issues
- AKART anticipated?
- List of references (background reports)
- Application approach

WQ Resources/Guidance:
- Purple Book-Reclaimed water guidance
- AKART/OPI Guidance
- Groundwater Quality Standards Imp. 9602

WR Resources/Guidance:
- WR Aquifer Test Guidance
- Applicant to discuss any permit requirements for aquifer testing with WR

General Guidance
- ASR Application Instructions
- ASR overview Flow chart
- QAPP guidance

Implementation plan includes steps and timeline to address WAC 173-157-:
- Conceptual model (-120)
- Project Operation Plan (-130)
- Legal Framework (-140)
- EAA (SEPA for full project) (-150)
- Mitigation Plan (-160)
- Monitoring plan (-170)

Assess GW quality compliance (WAC 173-200) & other WQ requirements[1], include:
- Existing WQ data on
  - Background[2] data (8 samples)
  - Injection water
  - Aquifer
  - Aquifer matrix (chip samples)
- Numerical Simulation predictions of potential geochemical reactions in aquifer
- Identify data gaps and next steps

- WQ Feedback on next steps and additional data needs from Feasibility Study report review
- Identify data gaps and ok to proceed to QAPP
- DOH check-in
- OCR and WR provide non-WQ review of Feasibility study and identify additional data gaps

Complete QAPP to address:
1) All sampling/testing:
   -aquifer test
   -WQ sampling to fill WQ data gaps
   -modeling (on case-by-case basis)
2) QAPP review by OCR, WQ, and WR, with copy to DOH, as needed)
3) OCR approves QAPP before field work.
4) Note additional QAPPs may be needed for future sampling efforts.

- Refine predicted geochemical reactions using new data
- Potential for additional geochemical modeling, as needed
- OCR, WQ, WR review of final report
- WQ reviews and recommends additional data collection, if needed
- Send to DOH for information and review (if DOH requested additional data collection)

AKART report and request for OPI.
- AKART and WQ sampling report included in Final compiled feasibility report. Feedback on OPI request and reviewed as part of final compiled feasibility report[3]

- Final report compiles all reporting to date in one document. WQ, WR, and OCR review. If part of funding agreement, OCR reviews for agreement deliverable before submittal for permit application
- Send copy to DOH for information

NOTES:
1. Refer to WQ Resources Guidance provided at pre-application meeting (ECY publications nos. 15-10-024 and 17-10-035).
2. Background groundwater quality conditions must be established according to the procedure defined in the Groundwater Quality Implementation Guidance (ECY Publication no. 96-02, Section 4.2.1.1.3). Background conditions should be used to define criteria for assessing compliance with the Groundwater Quality standards and to determine that the ASR operation is not violating anti-degradation.
3. Notes on timing/next steps: WQ issues OPI with ECY Director approval OR denial before a permit decision. Informal feedback to applicant would happen as part of application review and before preliminary permit for pilot testing. (Preliminary permit(s) for pilot testing issue after reservoir application submitted and are based on application.) Reservoir permit includes WQ criteria, monitoring & reporting.
4. WQ = Ecology Water Quality Program, WR = Ecology Water Resources Program; OCR = Ecology Office of Columbia River; DOH = WA Department of Health

V: 06.21.22
Publication #22-12-003

Feasibility Report Information

- **Chapter 173-157-110 WAC requires info on:**
  - Conceptual Model
  - Operation Plan
  - Legal framework
  - Environmental Analysis
  - Mitigation Plan
  - Monitoring Plan
- **Chapter 173-219 WAC requires same info**

ASR Reservoir Permits

***RCW 90.03.370(2)(a) and (b)* –establishes the right to store and withdraw water in groundwater**

1. Pre-approval for aquifer testing (includes QAPP)
2. Aquifer testing and data collection
3. Reservoir Permit application aquthorizes aquifer recharge operations

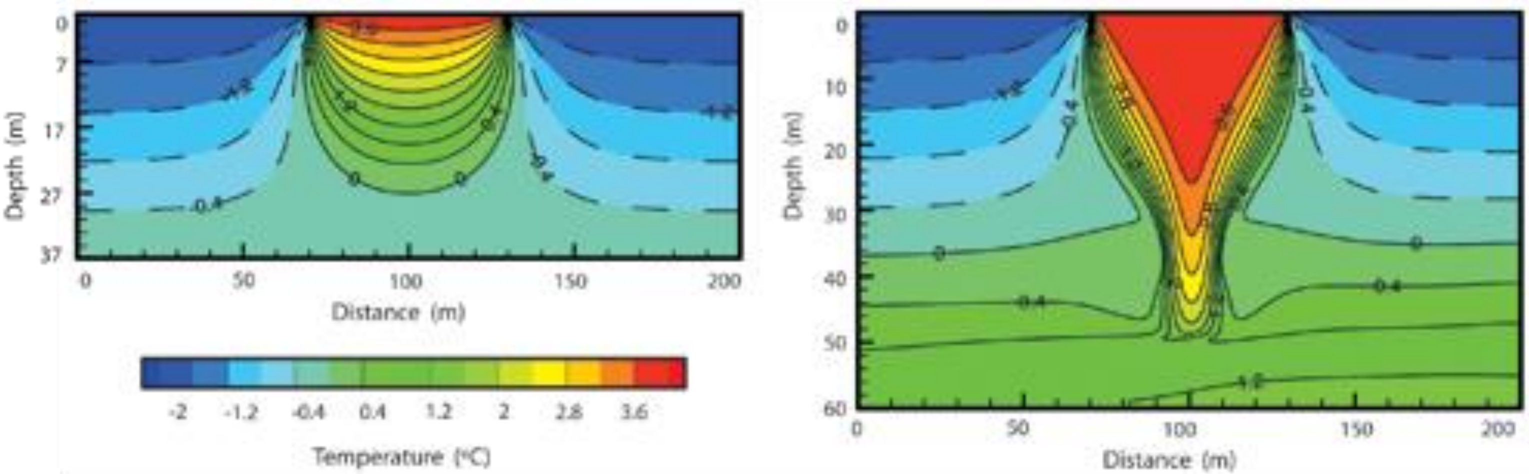
Groundwater Quality Regulation

Geochemical Reactions in Aquifers

- Biodegradation
- Oxidation or reduction
- Sorption and ion exchange
- Filtration
- Chemical precipitation
- Volatilization or photochemical reactions
- Acid – Base reactions

Groundwater Quality compliance assessed using criteria:

- Drinking water criteria
- Groundwater quality standards
- Antidegradation



Aquifer Recovery

- Water Resources Permitted recovery
- Pink drop in Pink drop out
  - Lateral and vertical extent of aquifer
  - Confined or unconfined
  - Total storage volume available
  - Groundwater movement in aquifer (flow direction and rate)
- Water Quality Permitted recovery
  - Reclaimed water source water

Columbia Basin Regional Source Water availability

1. ## Treated Wastewater from Agricultural Processing Operations

   Private Industry ownership and management (permitted by Dept of Ecology)

2. ## Columbia River Irrigation Project

   US Bureau of Reclamation & Irrigation District management

Agriculture Processors Daily discharge

Water Quality Name	City	County	average daily discharge (MGD)
JR SIMPLOT CO OTHELLO	Othello	Adams	2.1
MCCAIN FOODS INC	Othello	Adams	2.37
SVZ USA INC	Othello	Adams	0.1
LAMB WESTON Foods Pasco	Pasco	Franklin	4
CAREFREE MEATS	Basin City	Franklin	0.006
LAMB WESTON Foods Connell	Connell	Franklin	1.34
PASCO INDUSTRIAL	Pasco	Franklin	2.76
PACIFIC COAST CANOLA	Warden	Grant	0.028
BASIC AMERICAN FOODS	Moses Lake	Grant	1.42
JR SIMPLOT CO MOSES LAKE	Moses Lake	Grant	1.7
NATIONAL FROZEN FOODS - MOSES LAKE	Moses Lake	Grant	1.01
NATIONAL FROZEN FOODS - QUINCY	Quincy	Grant	0.21
JR SIMPLOT WALLULA	Wallula	Walla Walla	NA
TYSON FRESH MEATS	Wallula	Walla Walla	1.9
Dischargers to WARDEN/OB3 Treatment Operations			
LAMB WESTON BSW	Warden	Grant	0.63
WASHINGTON POTATO	Warden	Grant	0.52
COUNTRY MORNING FARMS	Warden	Grant	0.008
TOTAL ERO Daily Discharges (million gallons per day)			***20.102***

Reclaimed Water Permits

Information required for permit application

- Feasibility Analysis
- Conceptual Model Framework
- Pilot Test
- *Engineering Design*

Permit authorizes

- Discharge of reclaimed water to groundwater
- Reclaimed water recovery from groundwater
- Beneficial Use(s) of recovered water

Reclaimed Water Design Project

- Ecology Coordination with UW School of Public Health on EPA funding proposal
- Develop reclaimed water treatment WA Engineering Certification (CEU)
- Project proposal includes
  - demonstration of certification training
  - Engineering design of reclaimed water treatment systems
- Partnership with interested Columbia Basin communities to implement reclaimed water treatment (& potentially ASR) to address the declining water supplies
- Separate Federal infrastructure funding for reclaimed water treatment facility construction

United States Environmental Protection Agency

MENU

Search EPA.gov

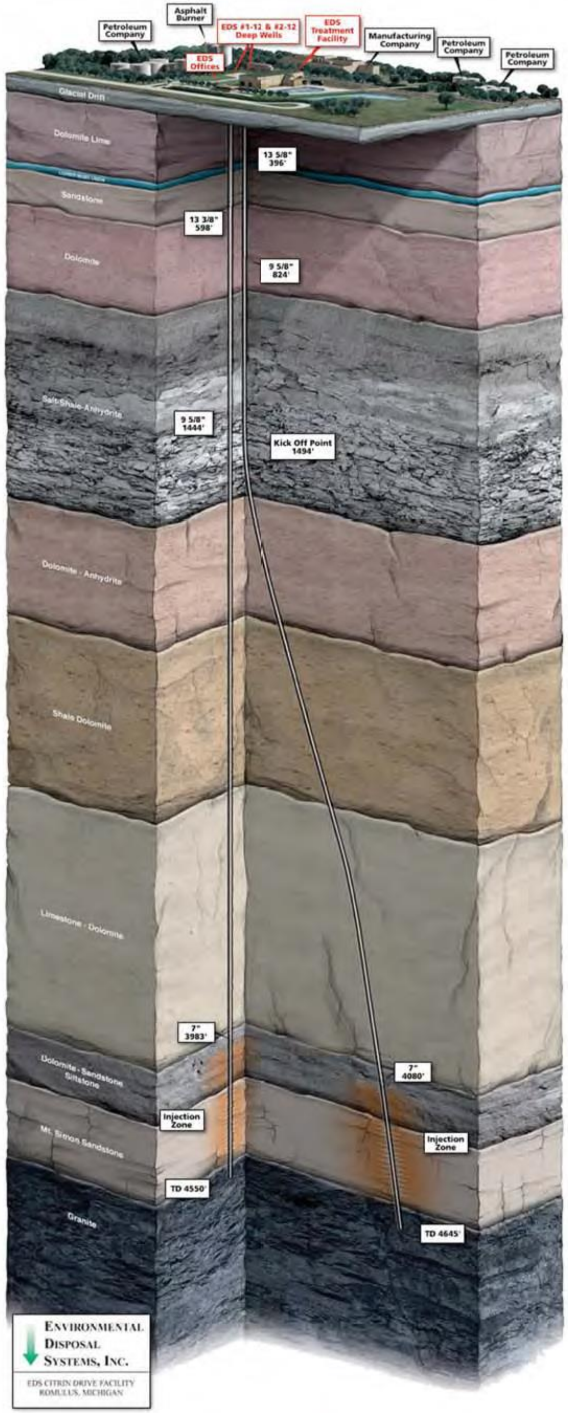
Water Infrastructure

CONTACT US <https://epa.gov/water-infrastructure/forms/contact-us-about-water-infrastructure>

Water Technical Assistance Request Form

OMB Control Number: 2030-0051

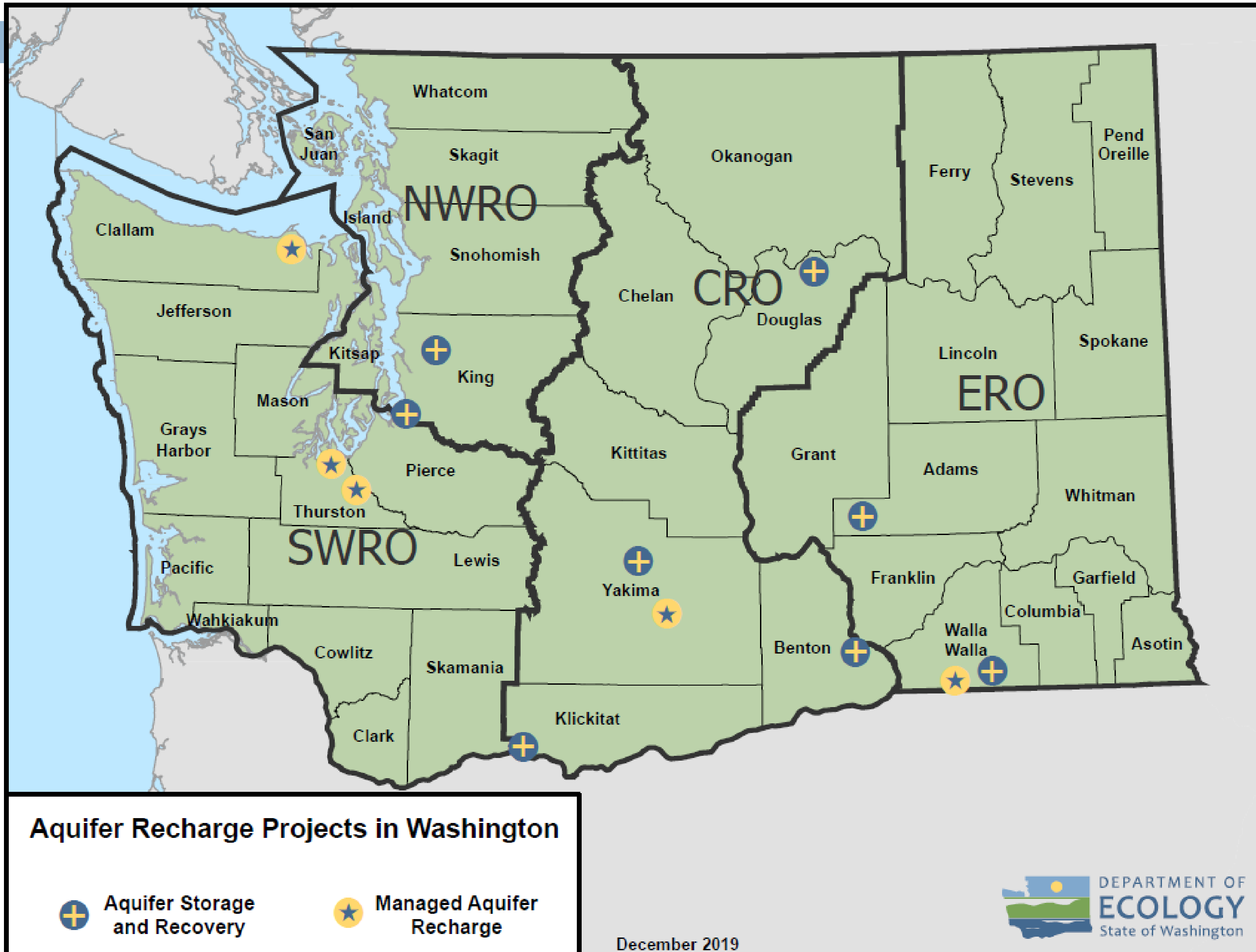
Expiration Date: 5/31/24



Washington Aquifer Recharge Projects in operation

1. **Othello ASR project**– testing underway
2. **Walla Walla ASR project** – permitted with10 years+ operation
3. **Kennewick ASR project**– permitted and operating for10 years
4. **Yakima ASR project -**
5. **Airway Heights MAR** - Reclaimed Water infiltration
6. **Walla Walla MAR** – Stiller Pond infiltration

Questions/ comments?



Overriding Public Interest Consideration

- Requires demonstration that AKART is met

AKART *(derived from the Permit Writers Handbook Ch 4)*

Excerpt from the Handbook's introduction to AKART states:

"Because AKART encompasses a complex process of engineering and economic decision-making there can be no simple definition"

- Requires that at least 1 of 3 benefits exists:

1. Alleviation of a public health concern
2. Net improvement to the environment
3. Socioeconomic benefits to the community

- The balance between water quality impacts and project benefits must justify greater project benefits than detriments
- Re-evaluate with new monitoring data every 5 years

Idaho’s Managed Aquifer Recharge Program

Columbia Basin Sustainable Water Coalition

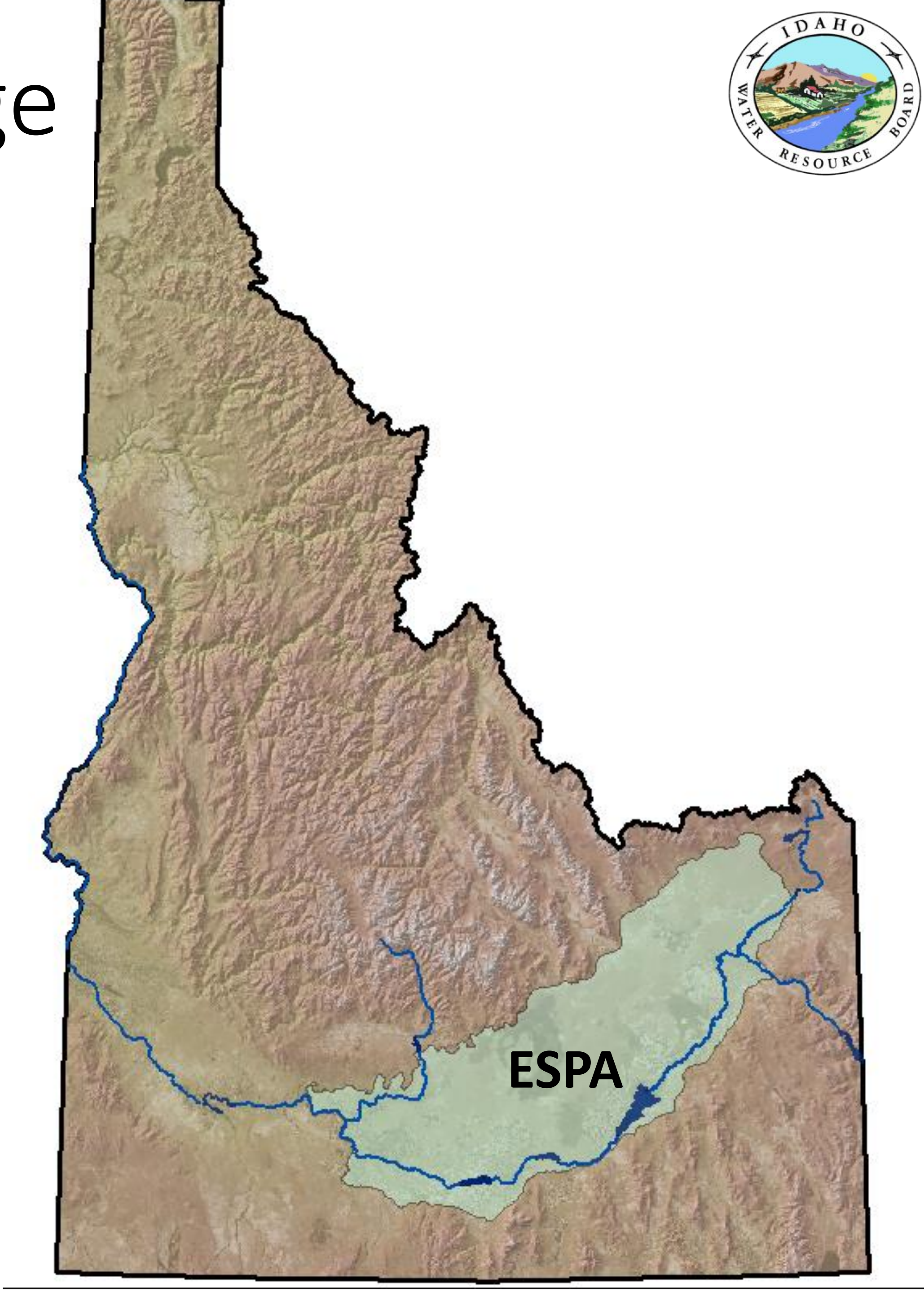
Wesley Hipke
IDWR Water Projects Section Supervisor

March 16, 2023

IWRB Managed Aquifer Recharge

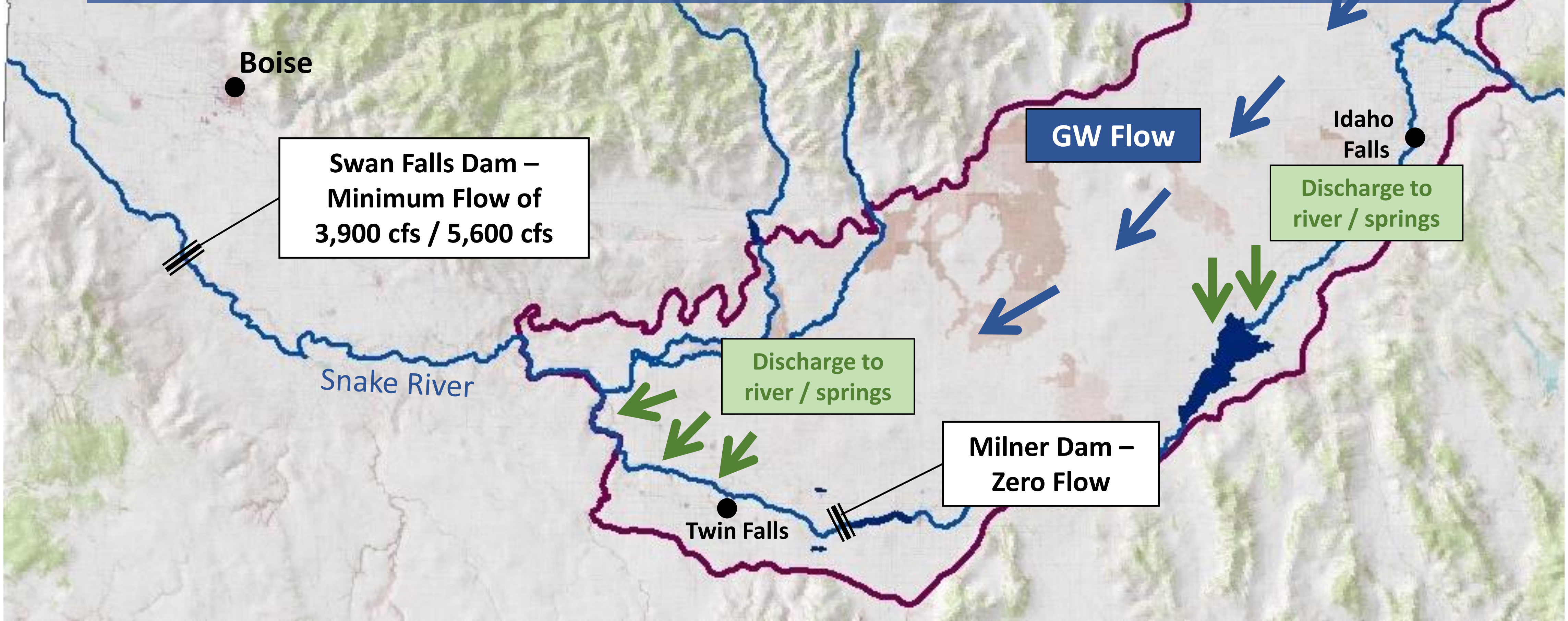
Eastern Snake Plain Aquifer

- ESPA is one of the Largest and most Productive Aquifers in the World - 10,800 mi^2
- 20% to 33% of Idaho's Economic Output (~ $10 B/yr)
- ~ 2.1 million irrigated acres (~ 60% of Idaho's total)
- Aquaculture Facilities (75% of the nations trout), Milk Production (3rd largest in the US) and Agricultural Processing (Cliff Bar, Chobani, etc…)
- ~ 50% of Idaho's power needs are met from the ESPA-Snake River system

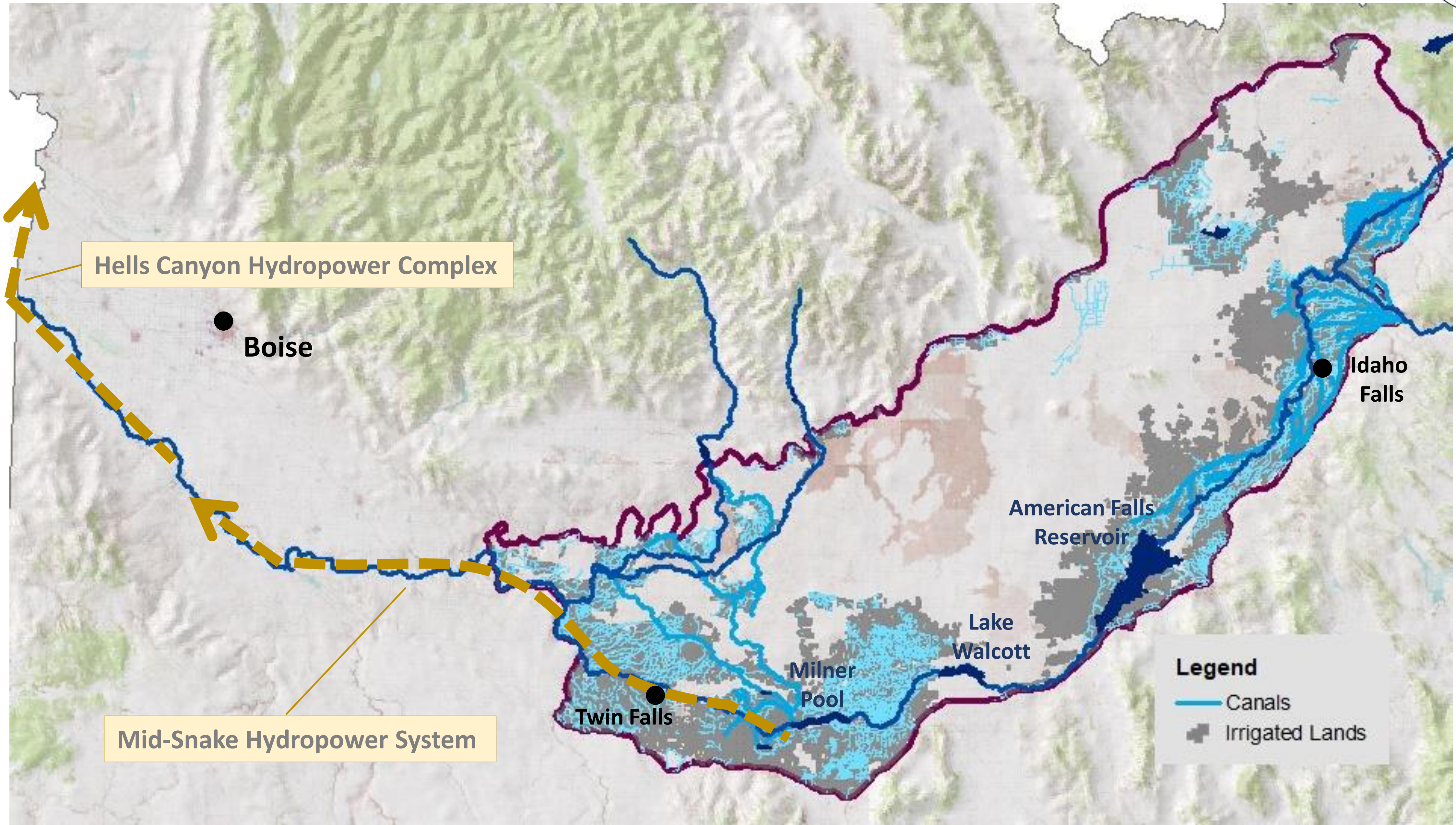


Water Flow and Administration

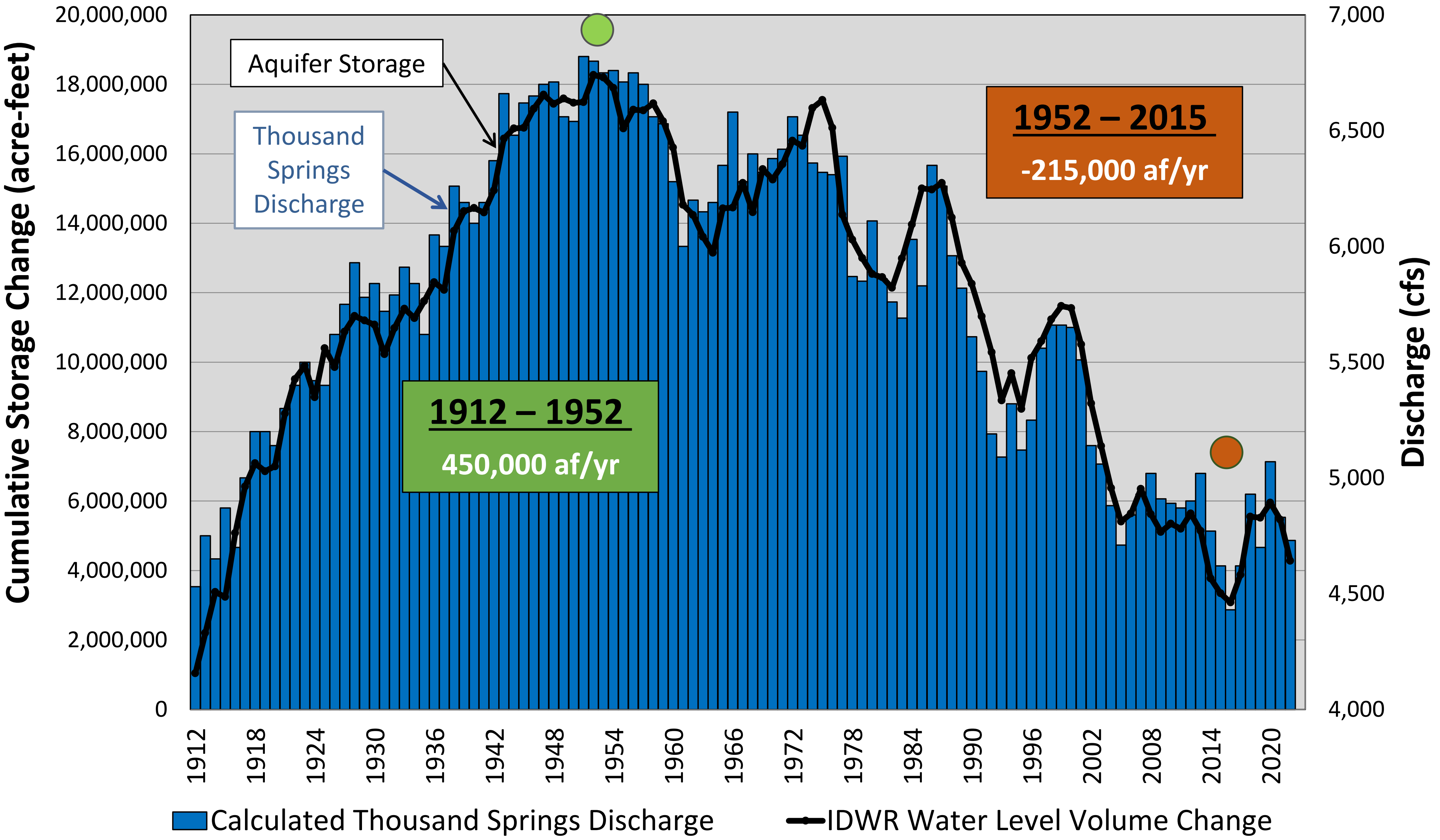
- **<u>Prior Appropriation Doctrine</u>** – “1st in time is 1st in right”
- **<u>Conjunctive Administration</u>** – surface water and ground water are administered together in priority



Interaction of Uses



ESPA Aquifer Storage & Springs Discharge



Solving the Problem

ESPA Comprehensive Aquifer Management Plan

"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 **600,000 af/yr** to the ESPA water budget
- 2009 - adopted by IWRB & added to the State Water Plan

Key Components / Goals

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

Implementation of a Management Plan

- Clear Understanding of the Problem
  - Physical Limitations
  - Legal Limitations
- Funding
- Stakeholder Agreement
- Monitoring
- Adaptive Management

ESPA Managed Recharge Program

- **Problem** – Stabilize the ESPA
  - **Physical Limitations** – Recharge Capacity?
  - **Legal Limitations -** Water Rights
- **Funding**
  - State of Idaho
- **Stakeholder Agreement**
  - ESPA CAMP
- **Monitoring**
  - Add to existing monitoring
- **Adaptive Management**

ESPA Managed Recharge Program

Water Availability:

Snake River and major tributaries

- Range 130Kaf - 5.5Maf 1.2 Maf avg,
  Usually, winter and spring runoff

Funding:

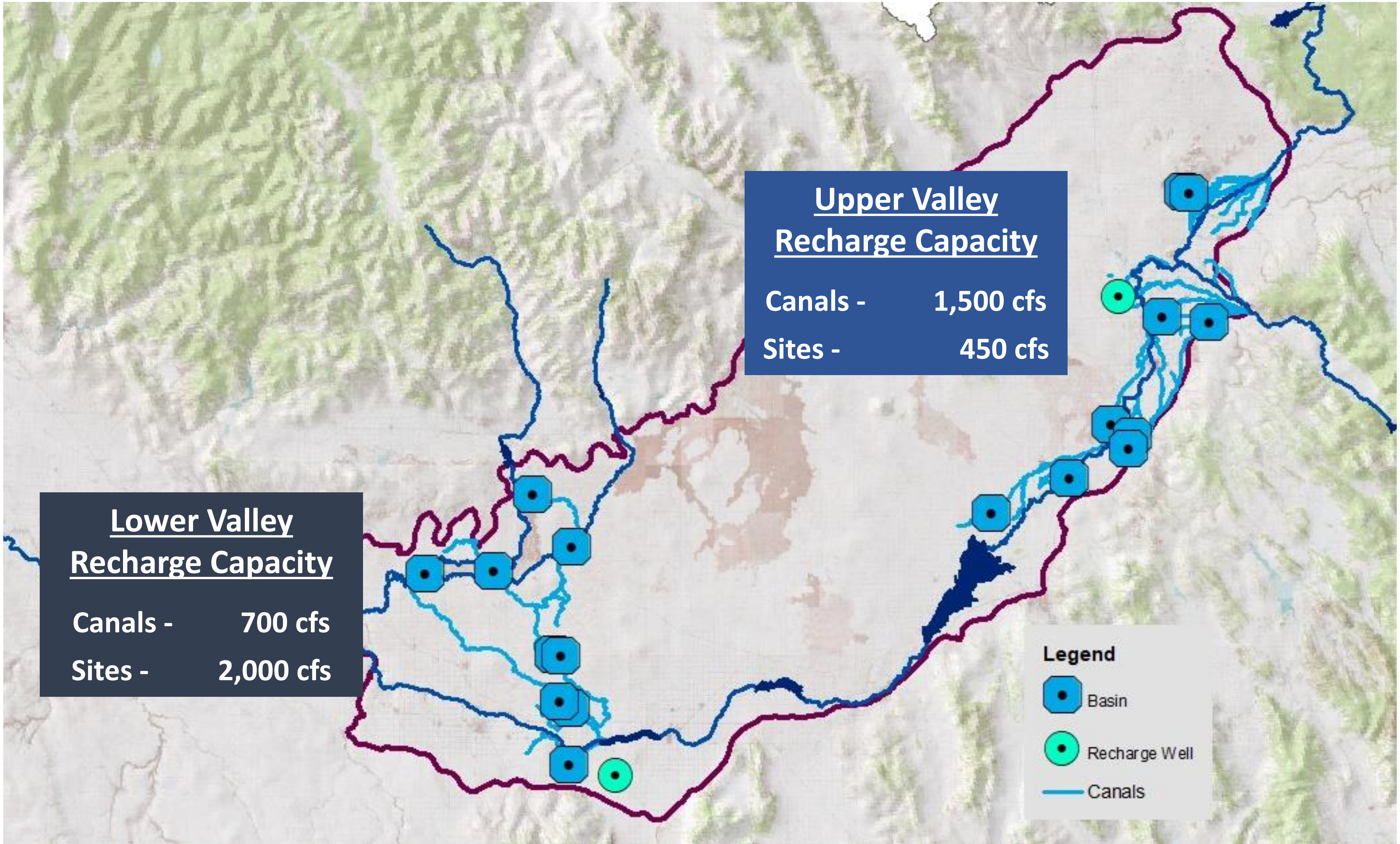
State of Idaho - aquifer stabilization throughout Idaho

- ~$10 M

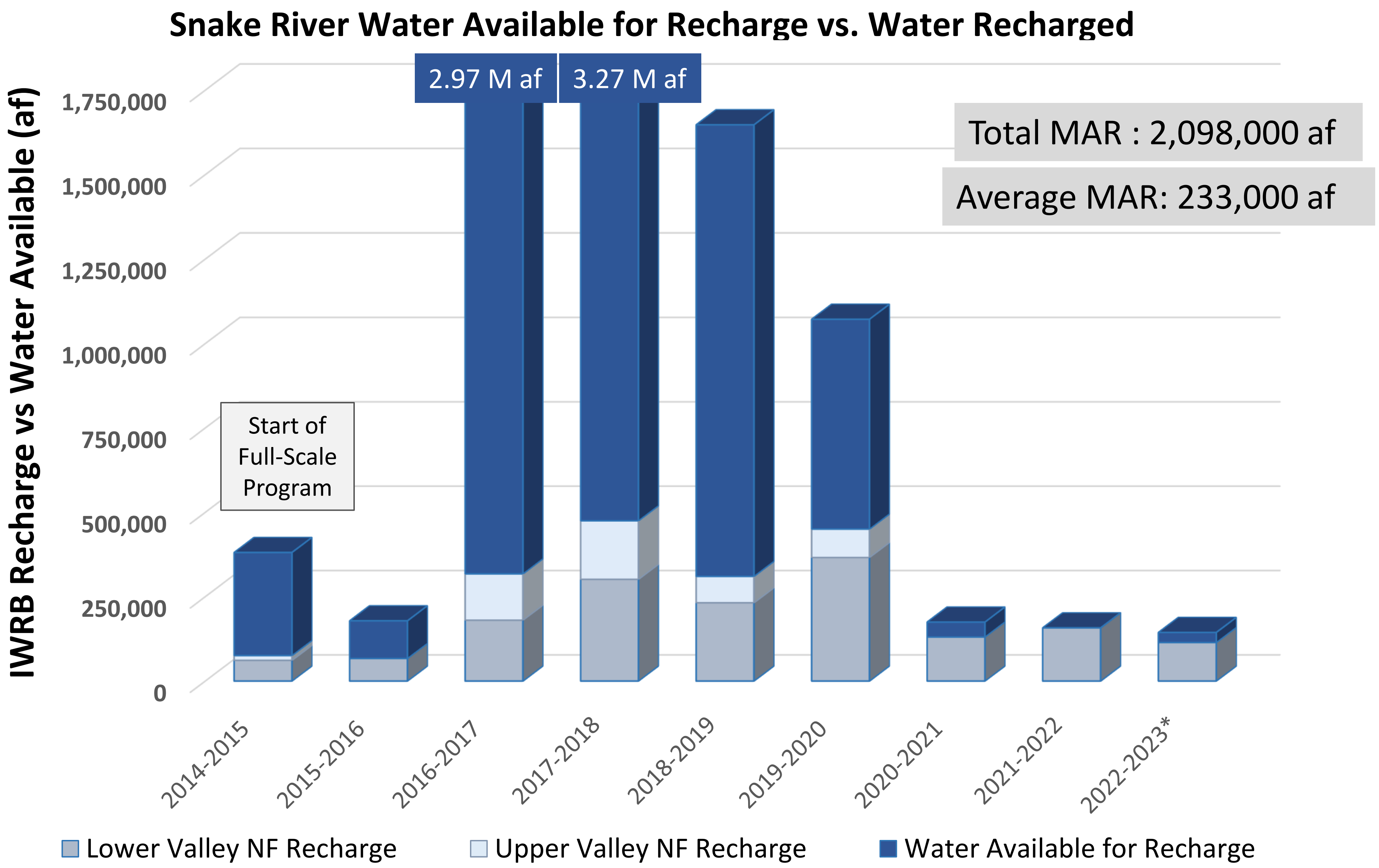
Initial Priorities:

- Increase Recharge Capacity
- Monitoring

ESPA IWRB Recharge Sites



IWRB Recharge



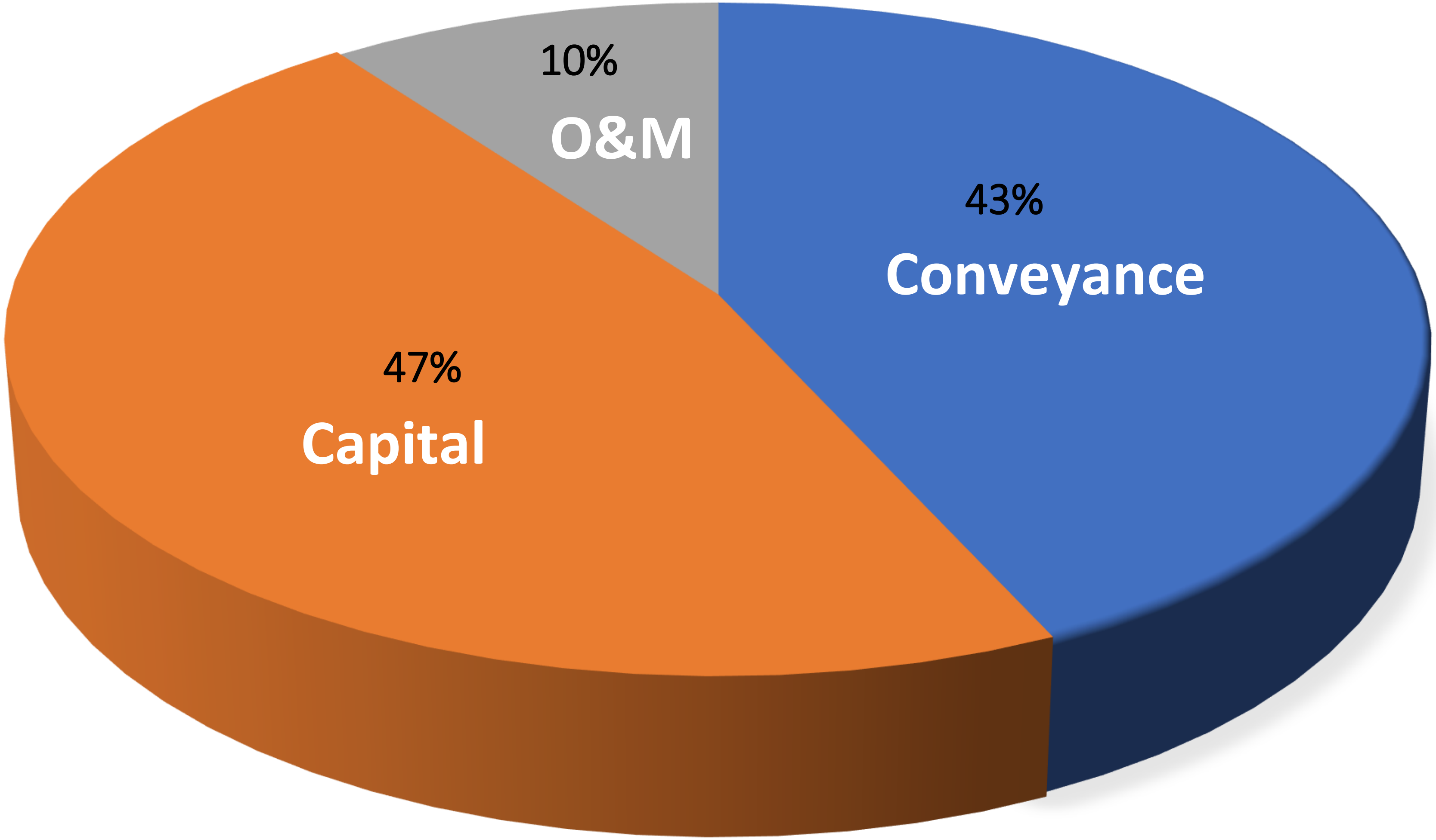
ESPA Recharge Program Expenditures

2014-2022

TOTAL - $34,828, 579

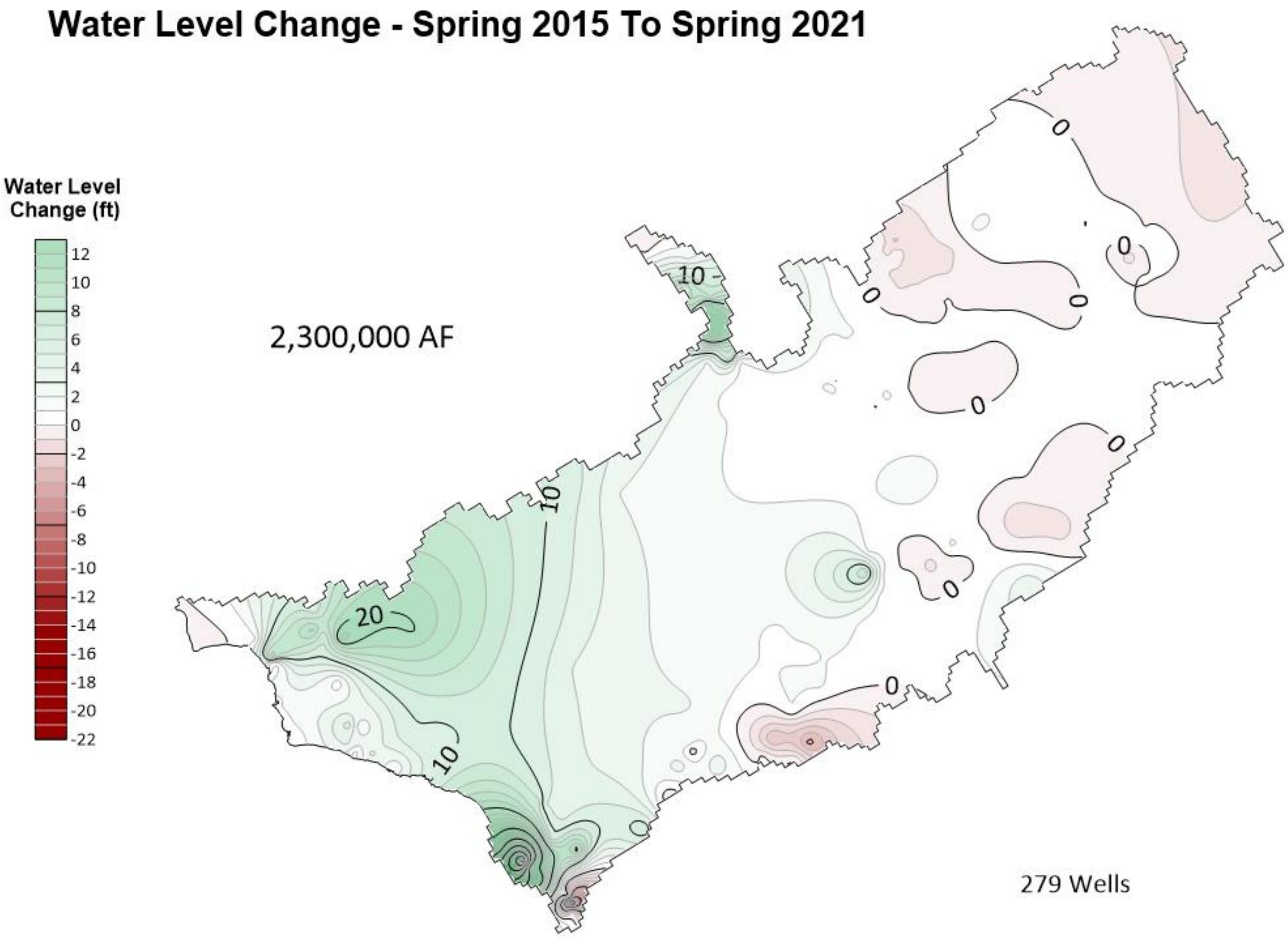
Average Yearly Cost:

Capital	$1.8 M
Conveyance	$1.7 M
O&M	$392 K

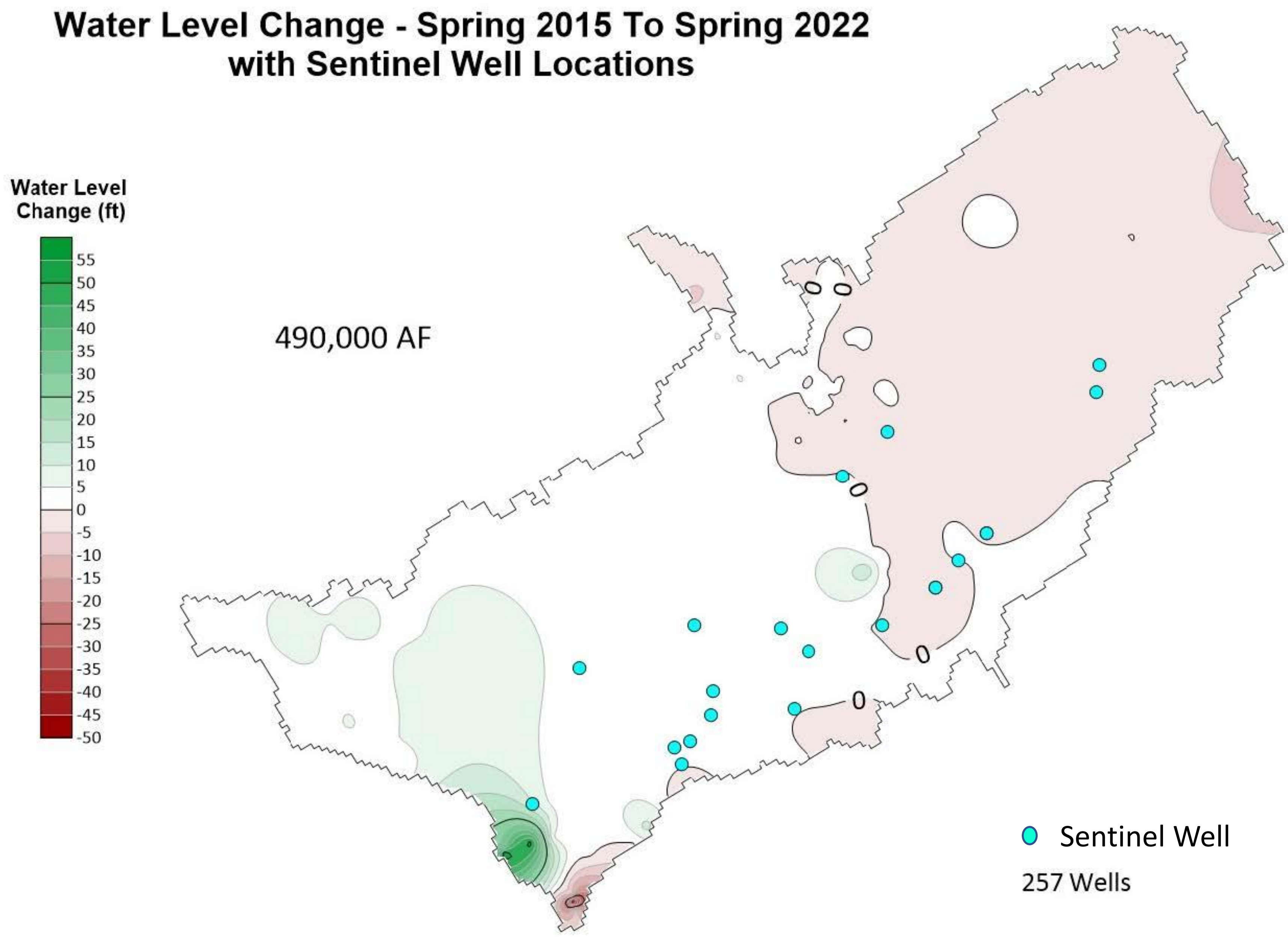


MAR Conveyance Cost per Acre-Foot: $7.70

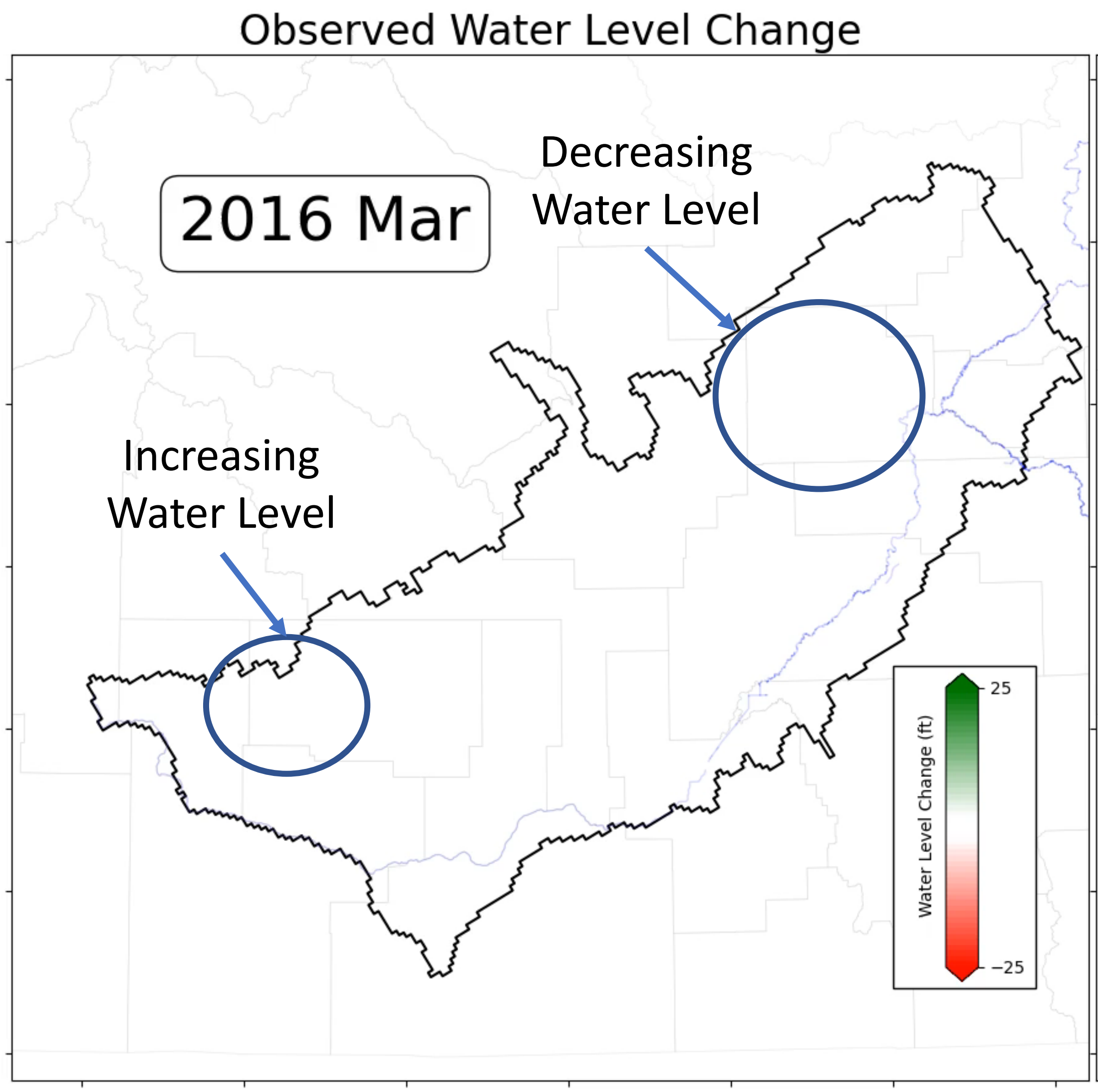
Impacts to the Aquifer

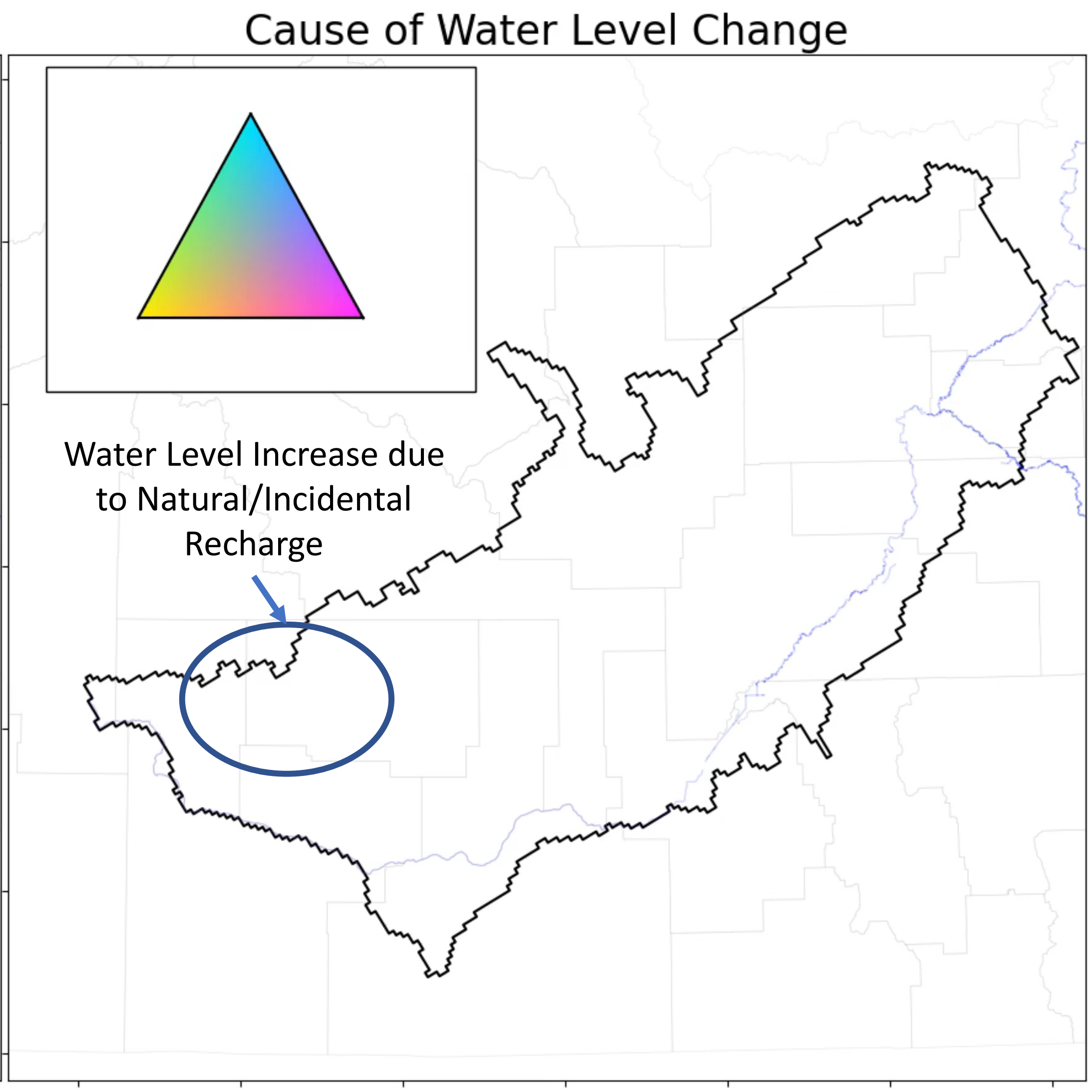


Impacts to the Aquifer

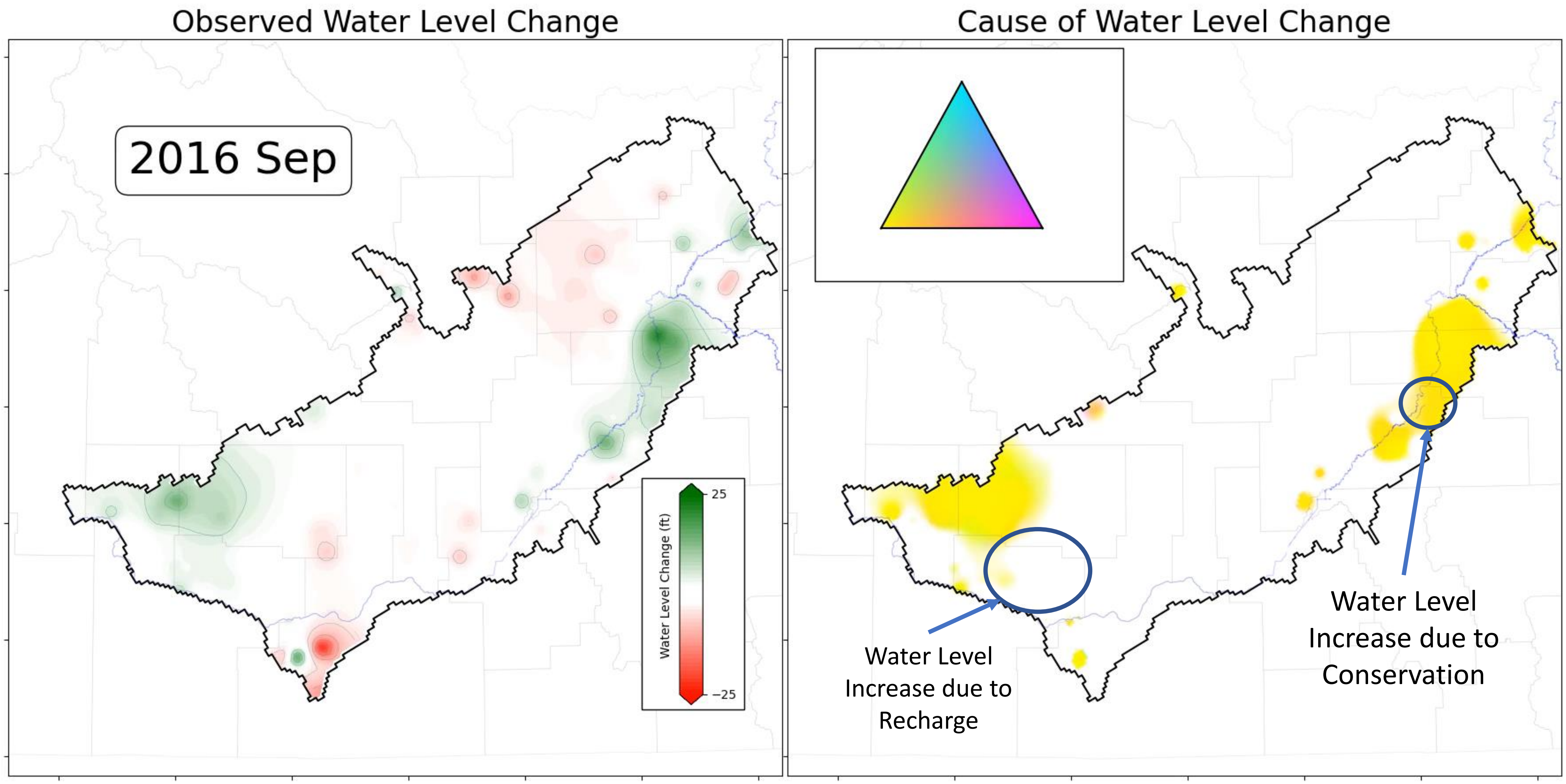


Impacts to the Aquifer

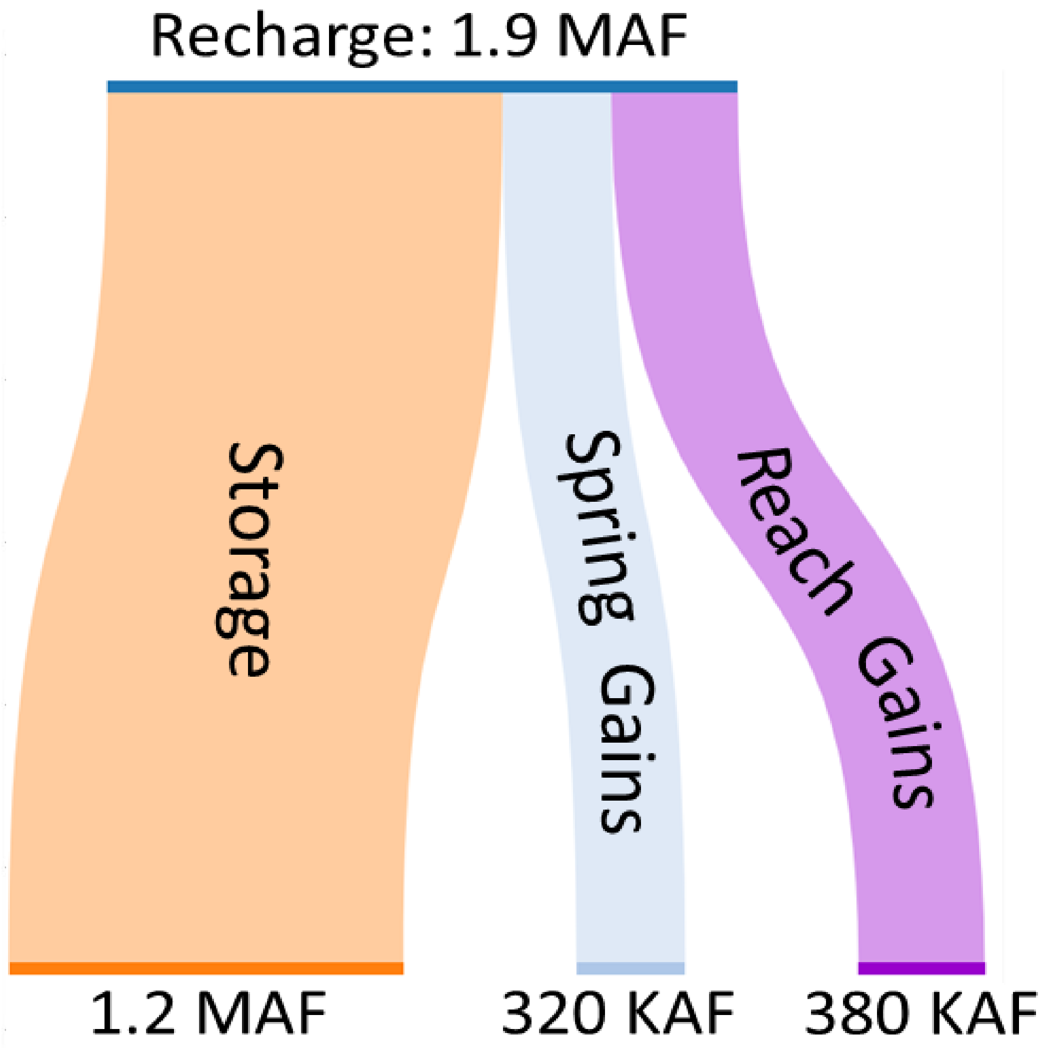


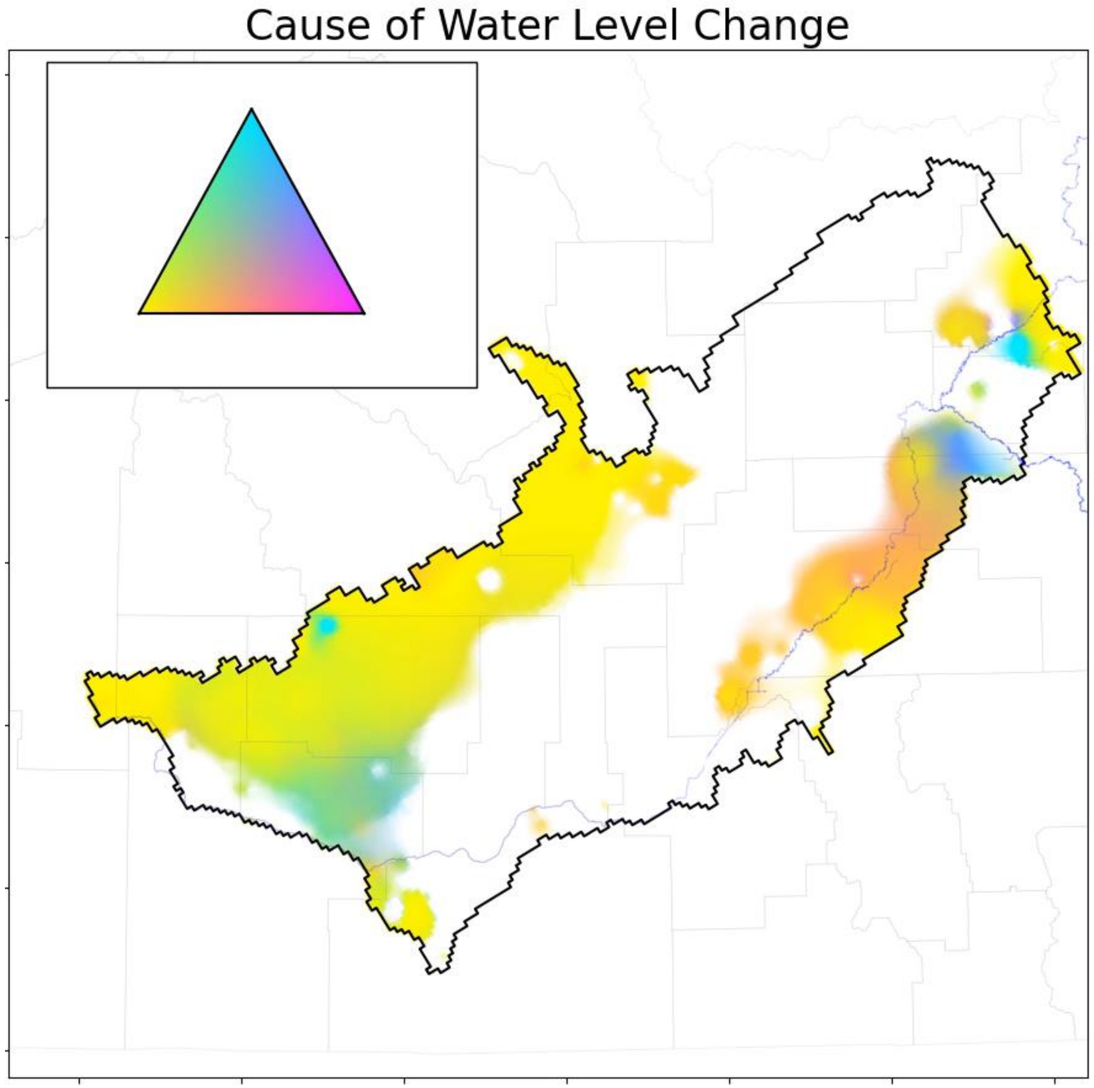


Impacts to the Aquifer

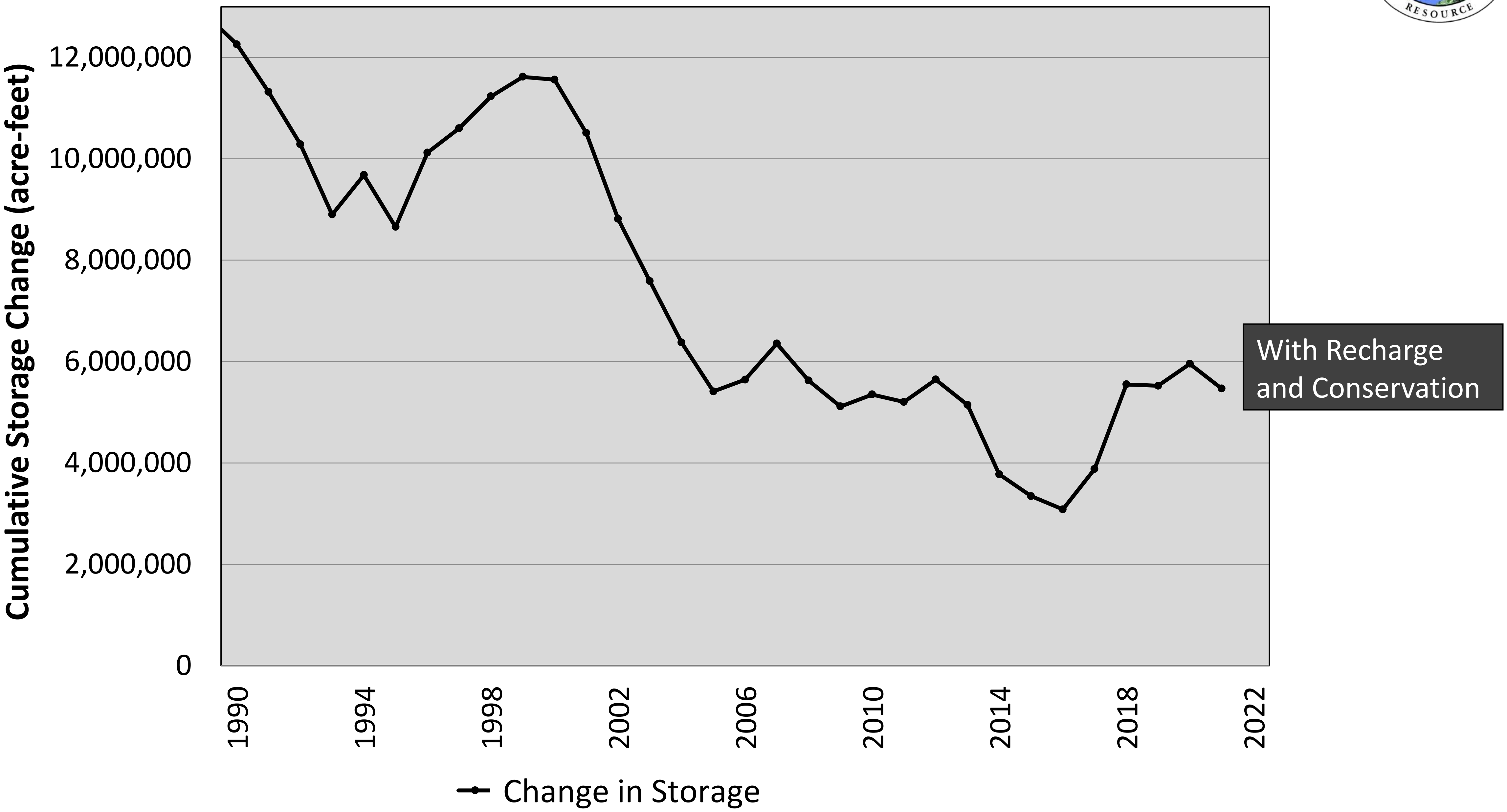


Impacts to the Aquifer

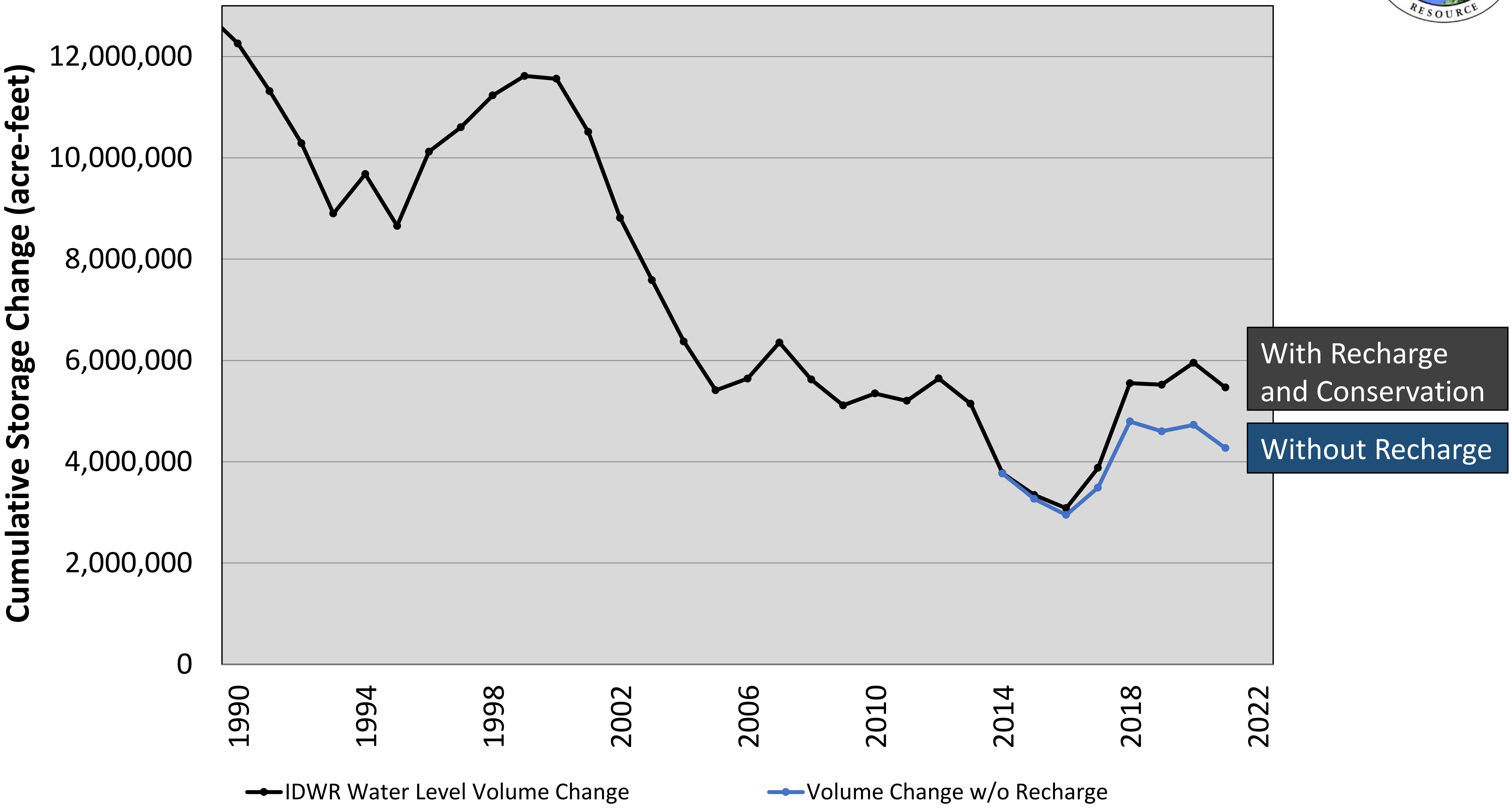




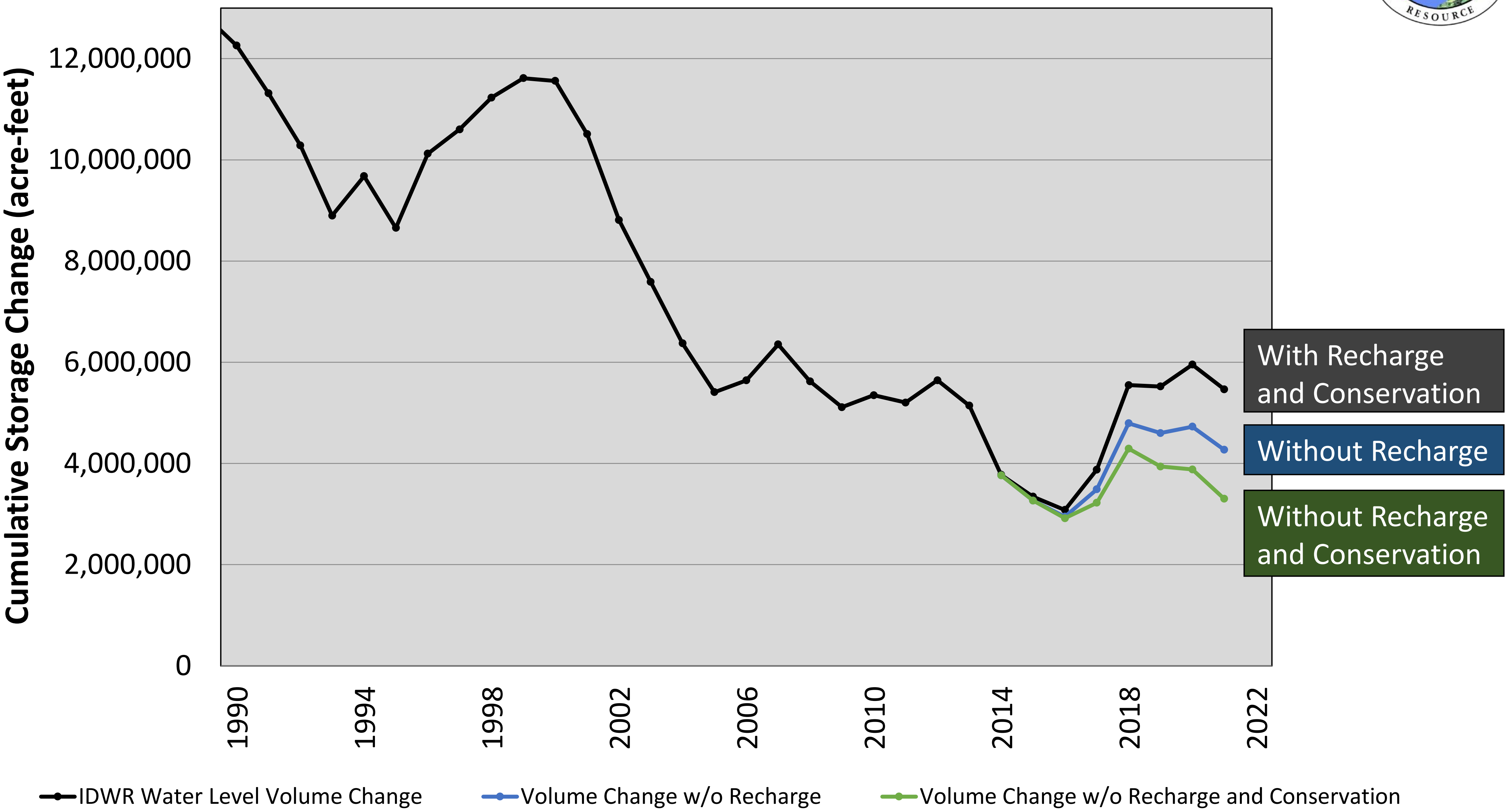
ESPA Aquifer Storage



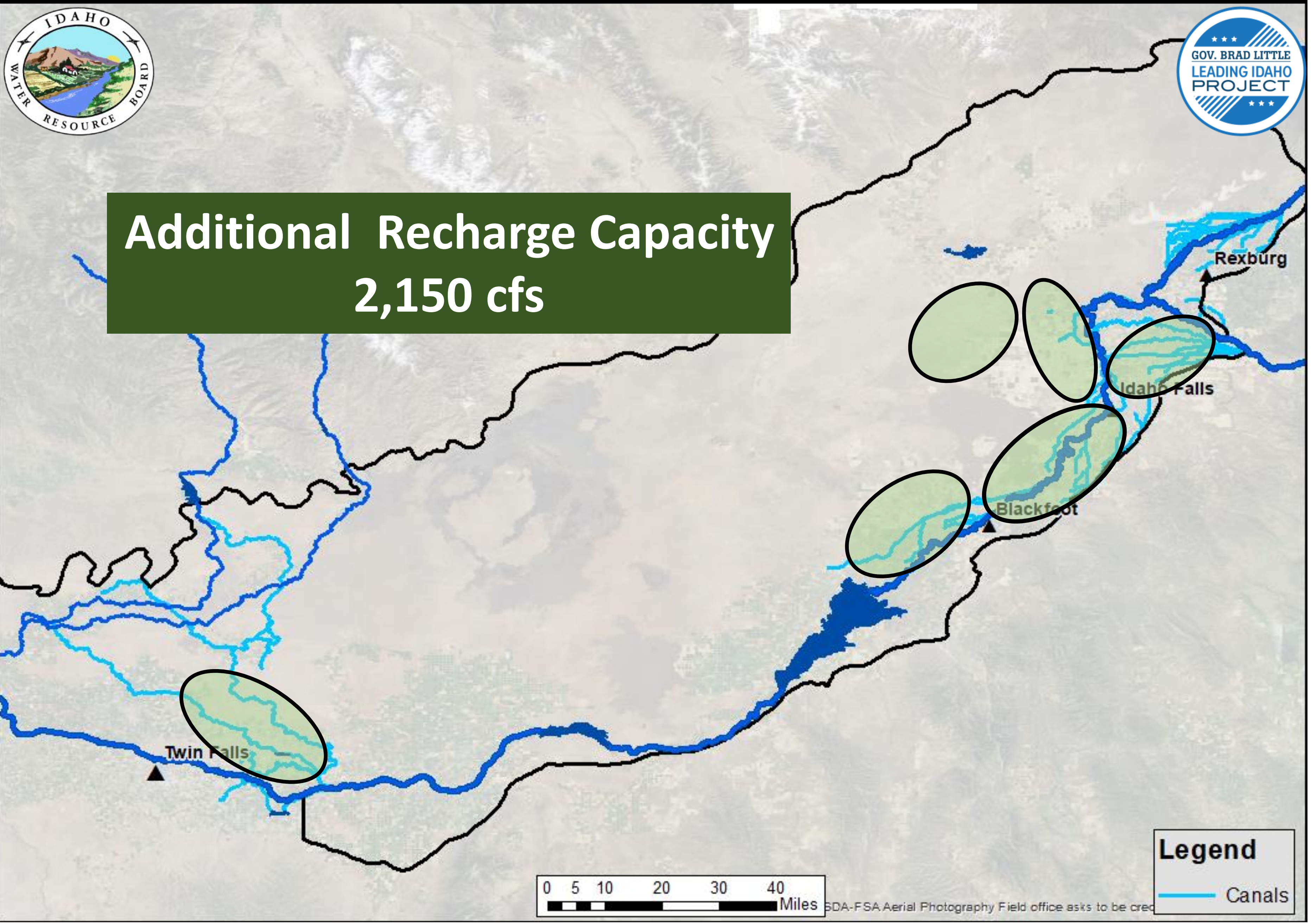
ESPA Aquifer Storage



ESPA Aquifer Storage



IWRB Max Recharge Program Build-Out



Max IWRB Recharge Buildout

- Est. Capital Cost - $700 M
- Conveyance Fees - Avg. 4 M ($1M to $12M)
- O & M Cost - ??

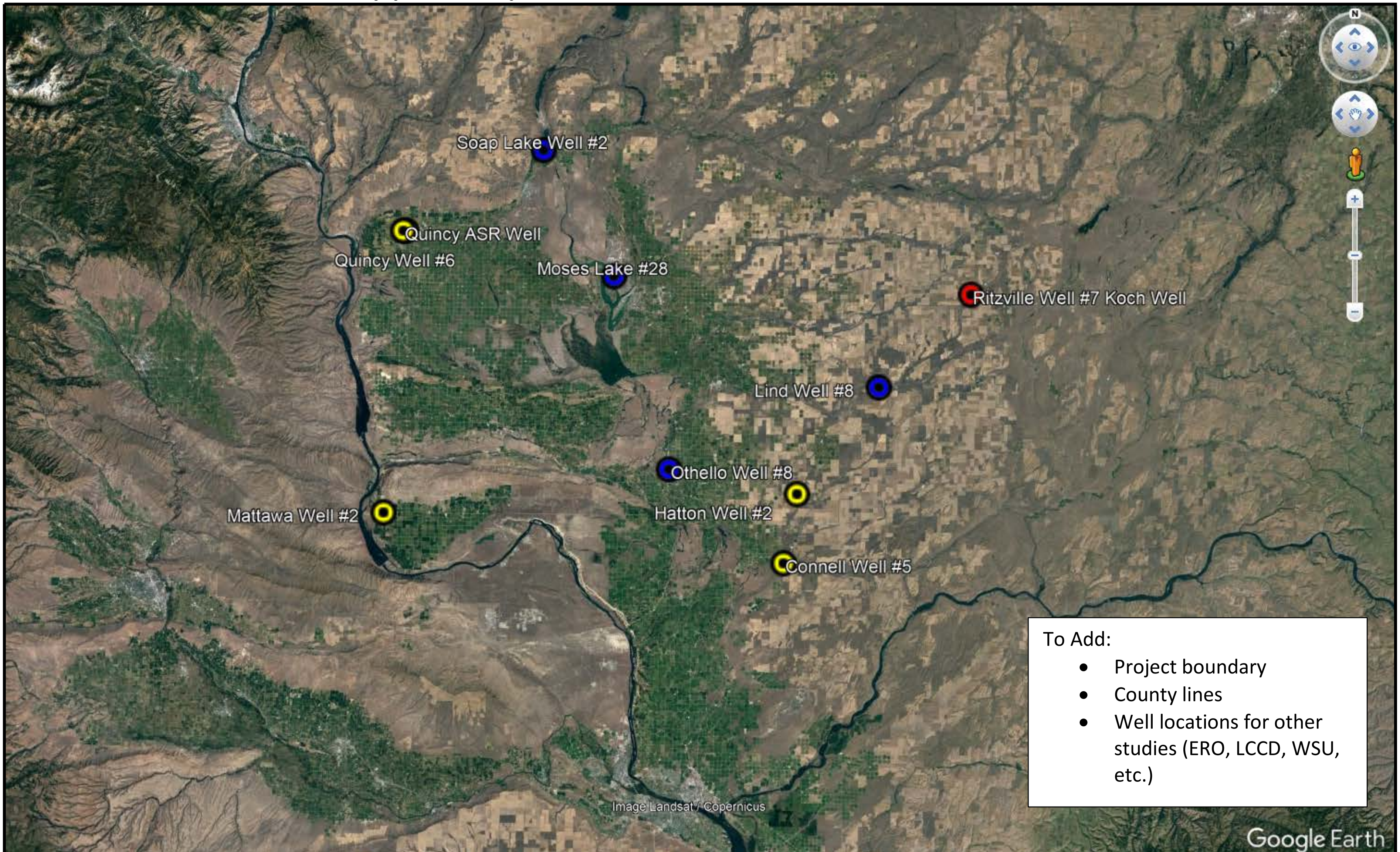
Changes in aquifer management have significantly improved aquifer conditions

Lessons Learned:

- The goal: actively managing the water resources to mitigate decades of decline - does not happen overnight.
- If possible, build in flexibility to optimize management strategies to handle changing conditions – natural and political.
- Developing the monitoring and tools to assess the impact and effectiveness of the Program.

Questions

PRELIMINARY DRAFT



To Add:

- Project boundary
- County lines
- Well locations for other studies (ERO, LCCD, WSU, etc.)

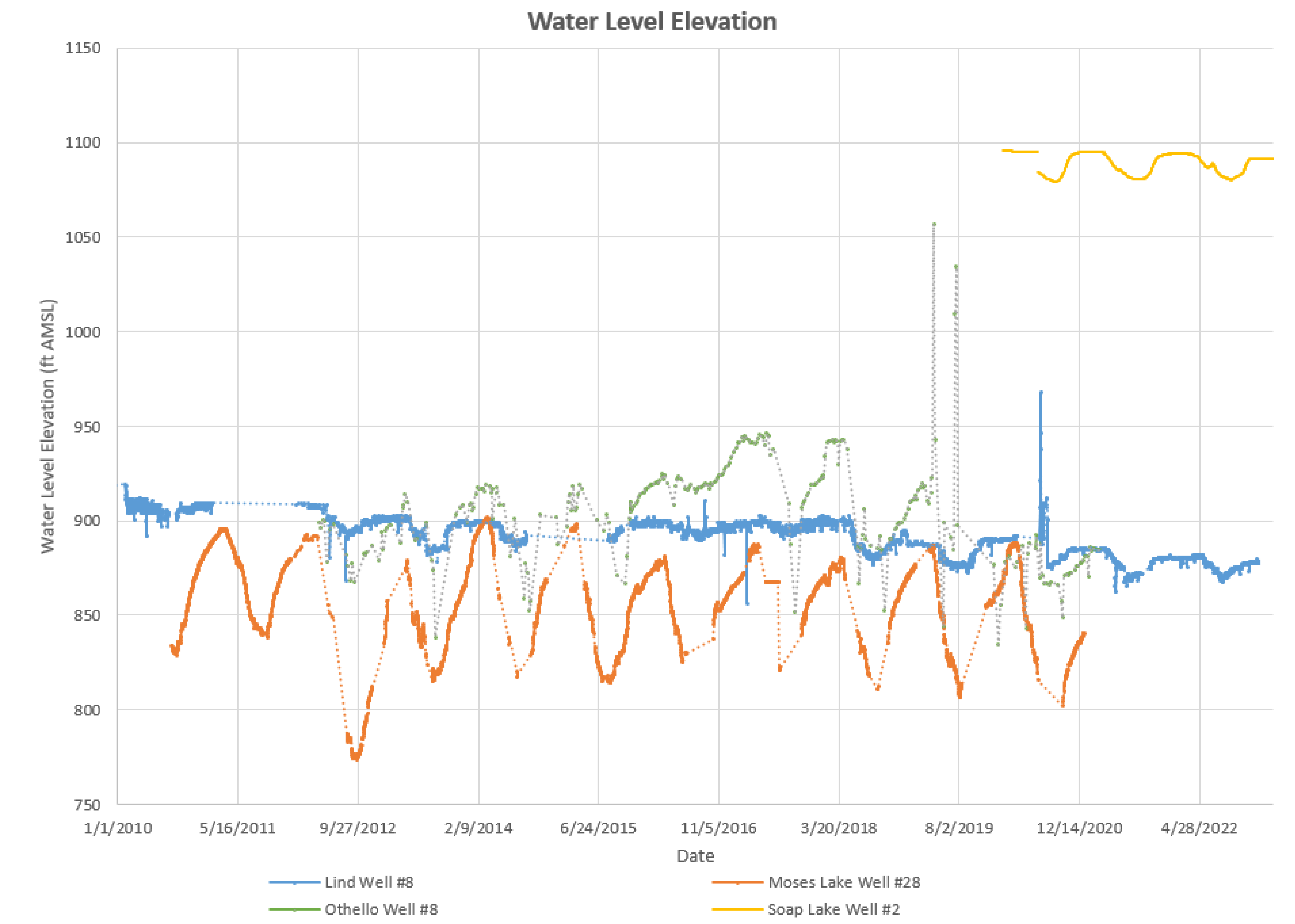
Well Monitored by CBSWC

Well Monitored by Purveyor

Well Being Assessed for Suitability

LANDAU ASSOCIATES

Columbia Basin Sustainable Water Coalition Franklin, Lincoln, Adams, and Grant Counties	**CBSWC Monitoring Well Network**	Figure 1



*Calculation of Othello Well #8 water level elevation assumes transducer height of 500ft bgs

Draft Outline for CBSWC Preliminary Watershed Management Plan

- Introduction
  - Description of project area
  - Hydrogeologic setting
  - Water supply challenges background
  - Overview of CBSWC (formation, stakeholders, mission, etc.)
- Groundwater Level Monitoring
  - Reference other regional studies
  - Data evaluation of municipality-provided data
  - CBSWC monitoring network and data
- Conceptual Solution Alternatives (with screening-level discussion of benefits and challenges)
  - Ranking Criteria (<u>each with range of possible scoring: 1 through 5?</u>)
    - Extent of Benefit
      - Regional benefit scores higher than local
    - Type of Benefit
      - Physical benefit (e.g., groundwater level stabilization) scores higher than paper benefit (e.g., planning)
    - Timing of Benefit
      - Near-term benefit scores higher than delayed benefit
    - Certainty of Benefit
      - Additional studies needed?
    - Sustainability of Benefit
      - Long-term benefit scores higher than short-term
    - Implementability
      - Consider technical and regulatory constraints
    - Cost (relative order of magnitude)
      - Lower cost scores higher than greater cost
  - Alternatives Considered
    - Local Alternatives (touch on well modifications, new wells, storage, local ASR, etc. as potential short-term stop-gaps but note that this plan focuses on a regional approach)
    - Regional Alternatives
      - OGWRP and Full CBP Build-Out
      - Coordinated Water System Planning
      - Conservation
      - Aquifer Recharge
        - Passive Rehydration
        - Regional ASR/Deep Well Injections
      - Centralized Treatment and Distribution
      - Groundwater Monitoring
- Selected Alternatives for Recommended Implementation
  - ______________________
  - ______________________
  - ______________________
- Summary and Conclusions

Alternatives	Notes:	Extent of Benefit Regional > Local	Type of Benefit Physical > Paper	Timing of Benefit Near-Term > Delayed	Certainty of Benefit Additional studies needed?	Sustainability of Benefit Long-term > Shor-term	Implementability Consider technical and regulatory constraints	Cost Lower cost > Higher cost	Total Score
1. OGWRP and Full CBP Build-Out									**0**
2. Coordinated Water System Planning									**0**
3. Conservation									**0**
4a. Aquifer Recharge: Passive Rehydration									**0**
4b. Aquifer Recharge: ASR/Deep Well Injections									**0**
5. Centralized Treatment and Distribution									**0**
6. Groundwater Monitoring									**0**