PRELIMINARY WATERSHED MANAGEMENT PLAN

DRAFT

COLUMBIA BASIN SUSTAINABLE WATER COALITION

Stakeholder Meeting

November 16, 2023

CBSWC

columbia basin sustainable water coalition

LANDAU ASSOCIATES

GEOENGINEERS

Preliminary Watershed Management Plan

Purpose:

- Document water supply challenges in project area
- Recommend solutions for sustainable water supplies for CBSWC municipalities

Preliminary Watershed Management Plan

Agenda:

- CBSWC Background and Project Area
- Hydrogeologic Setting
- Groundwater Level Monitoring and Trends
- Alternatives for CBSWC Consideration
  - Projects
  - Tools
  - Planning
- Preferred Alternatives

Preliminary Watershed Management Plan

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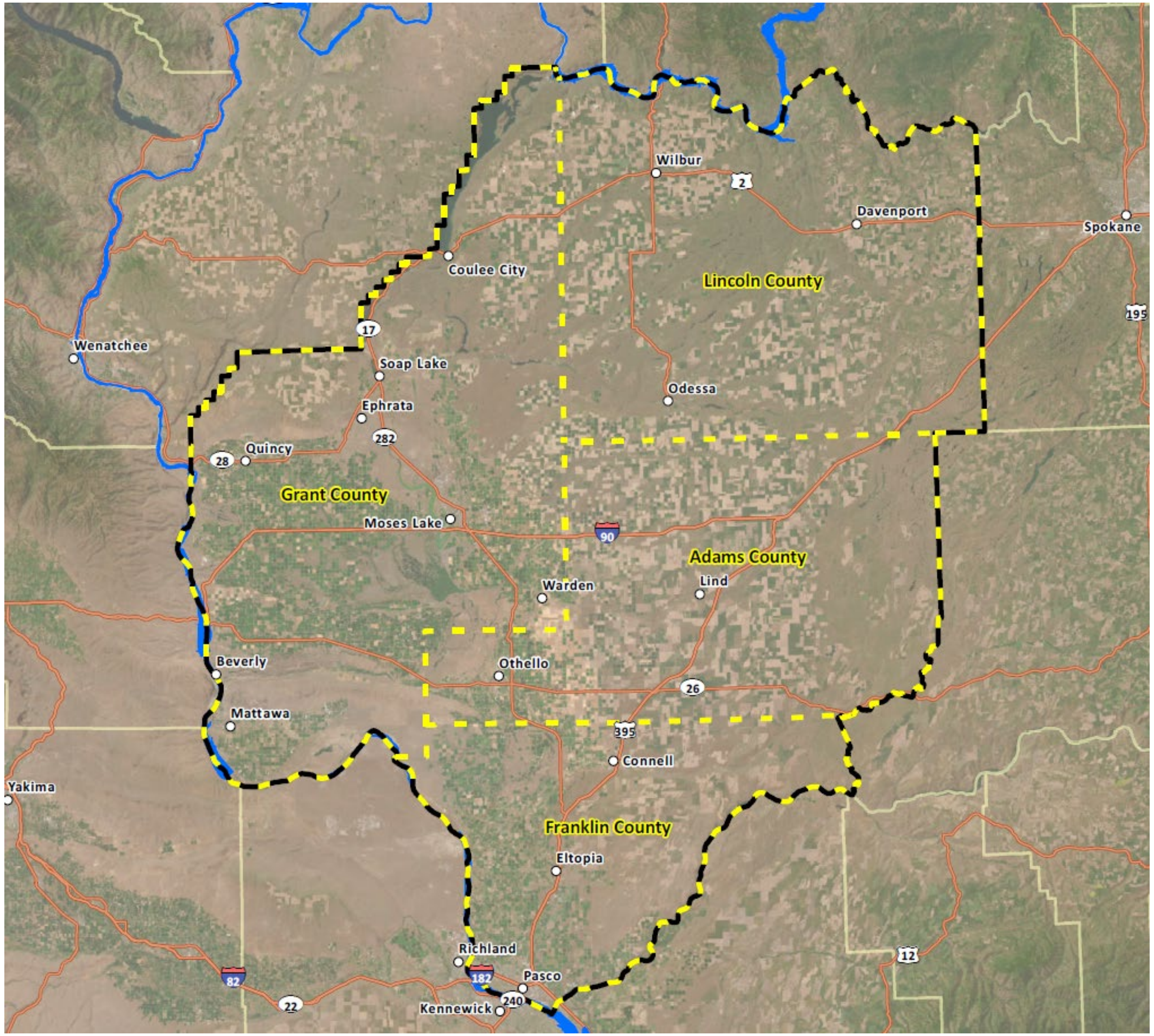
// CBSWC Background and Project Area

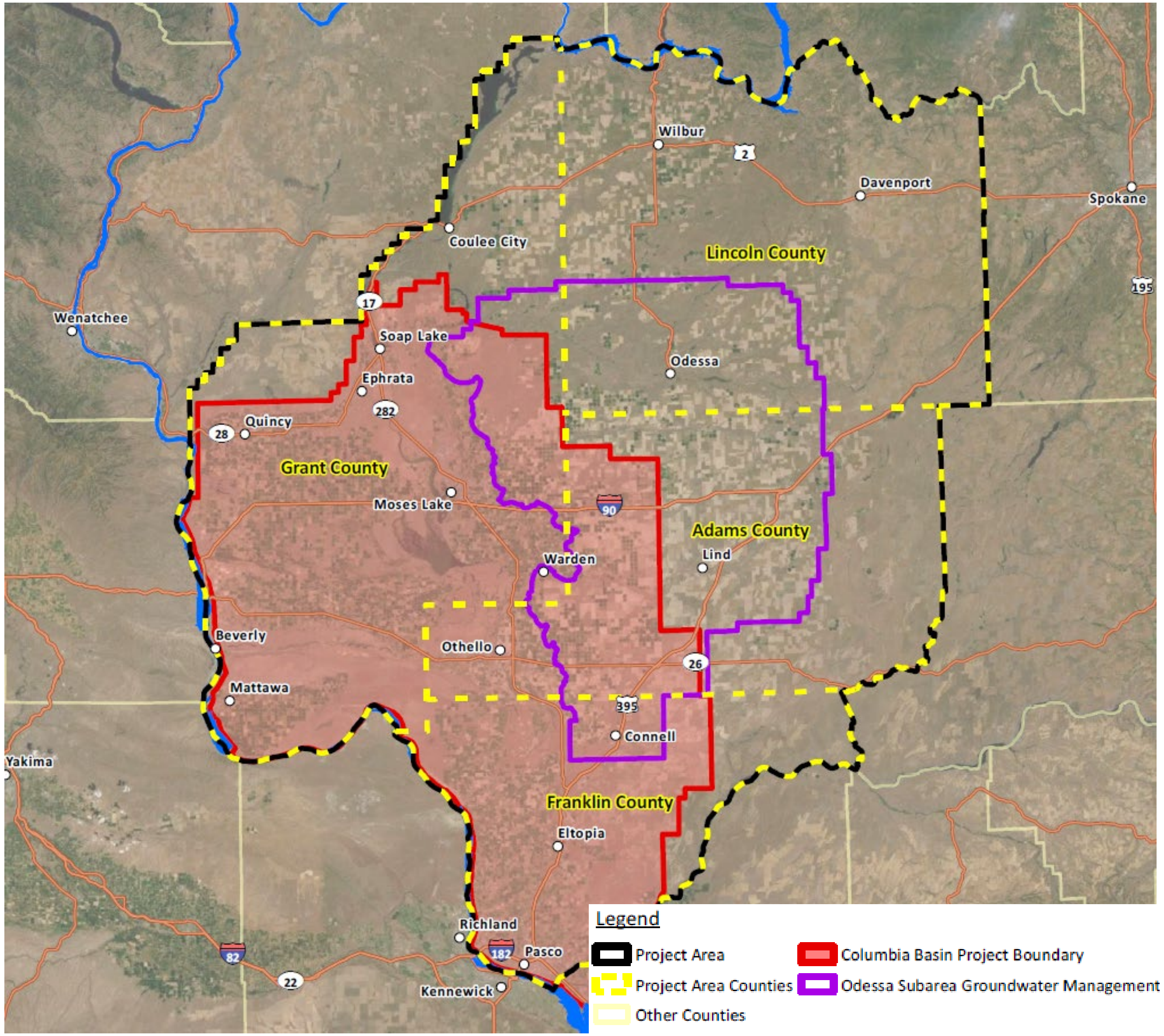
- Project Area = FLAG Counties
- ~137 Groundwater-Reliant Group A Water Systems
- ~90,000 residents
- 2018: CBSWC beginnings (coordination from WDOH, Commerce)
- 2021: USBR WaterSMART Grant for Formalization



// CBSWC Background and Project Area

Significant Influence from:

- USBR Columbia Basin Project
- Odessa Subarea Groundwater Pumping



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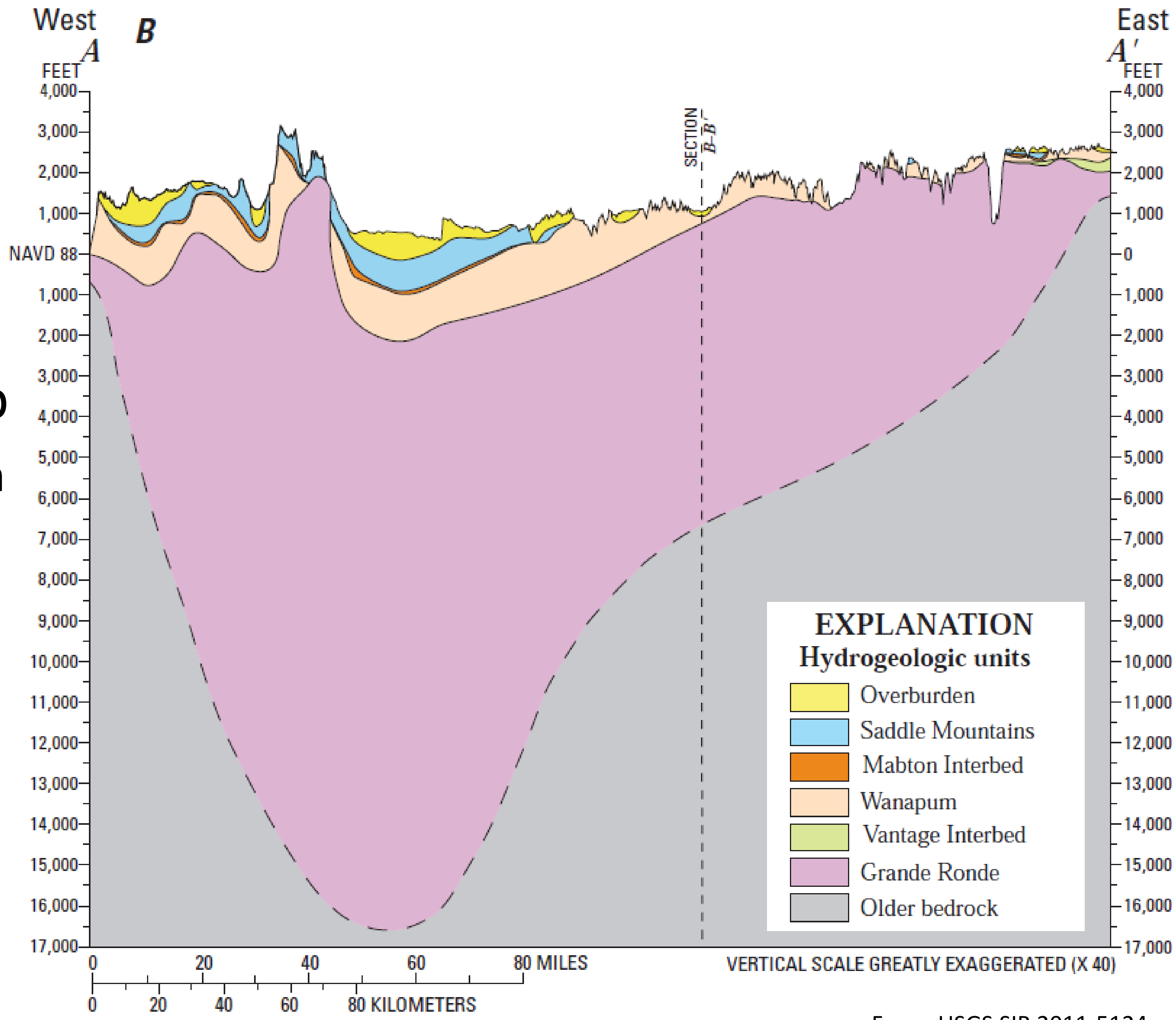
Hydrogeologic Setting

Primary HG Units:

- Overburden
- Columbia River Basalt Group
  - Saddle Mountains Formation
  - Wanapum Formation
  - Grande Ronde Formation



From: USGS SIR 2011-5124

// Hydrogeologic Setting

CRBG Extent and Near-Surface CRBG Formations

From: WA Commerce 2019

// Hydrogeologic Setting

Conceptual Groundwater Flow within CRBG Formations

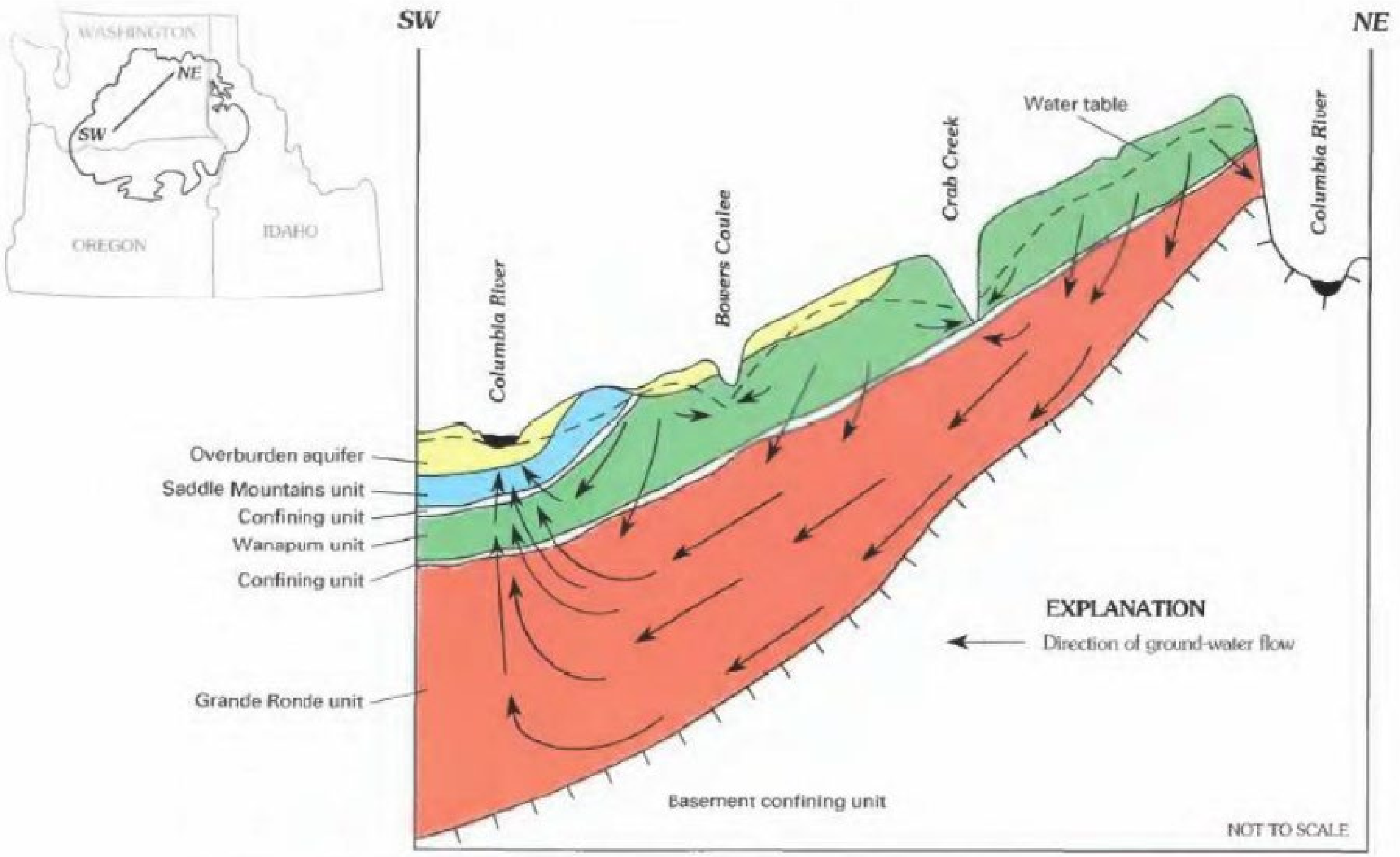


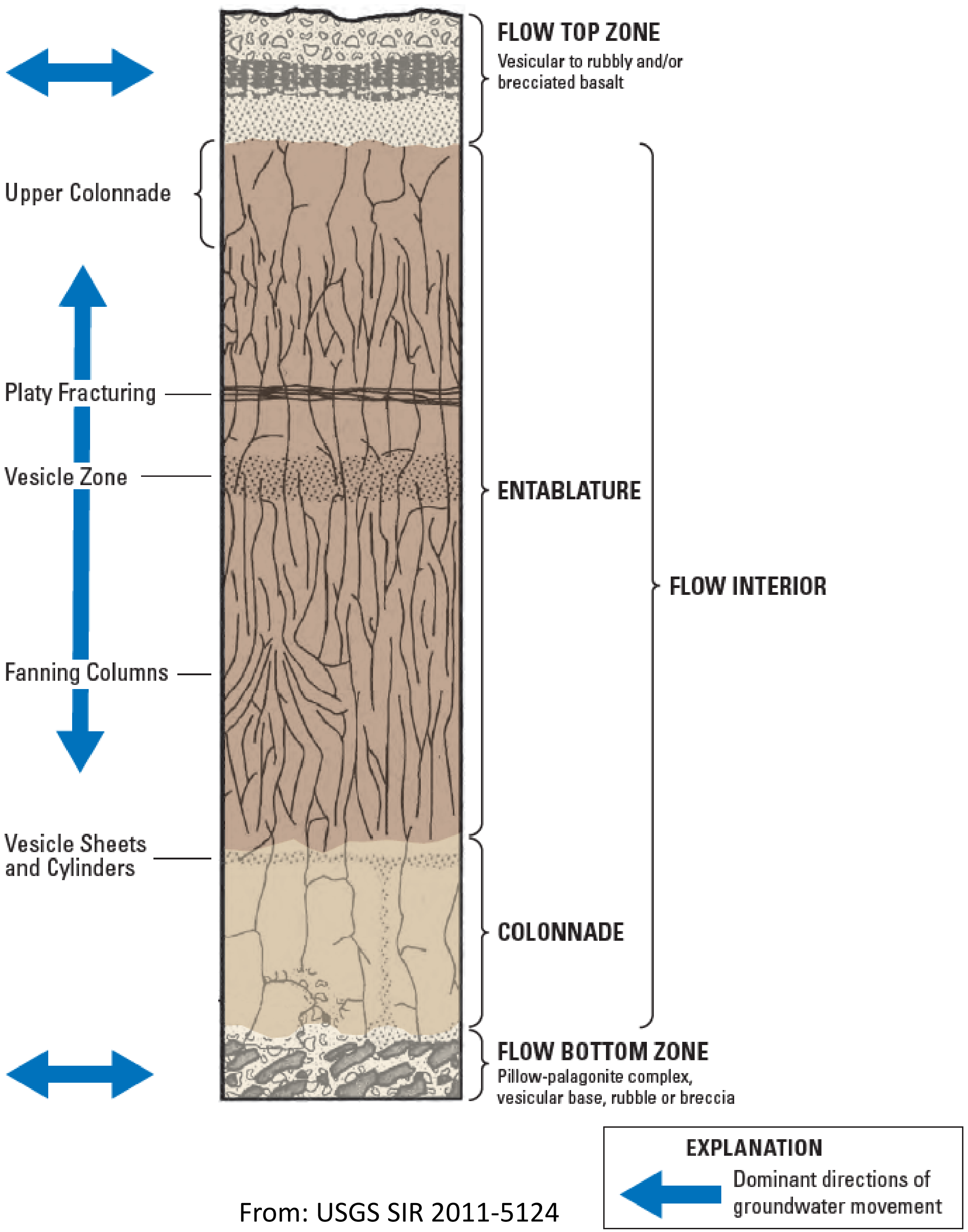
FIGURE 21.—Generalized ground-water-flow pattern in the Columbia Plateau aquifer system.

From: USGS Professional Paper 1413-B

// Hydrogeologic Setting

Lateral groundwater movement through basalt “Interflow Zones” at top/bottom of individual flow members

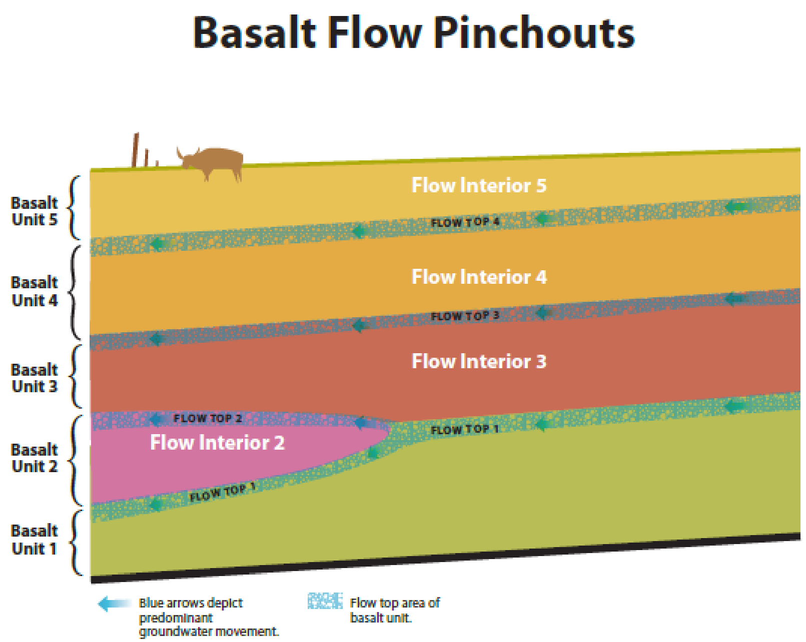
Limited groundwater movement through basalt “Flow Interiors”

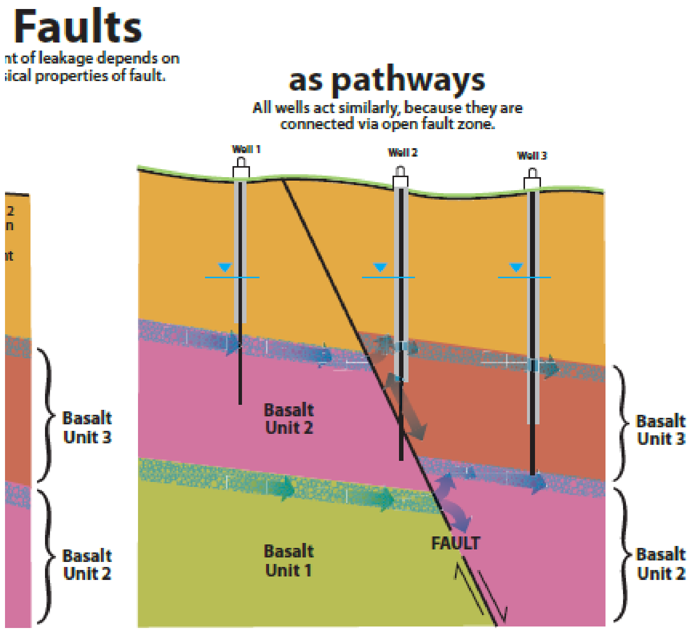


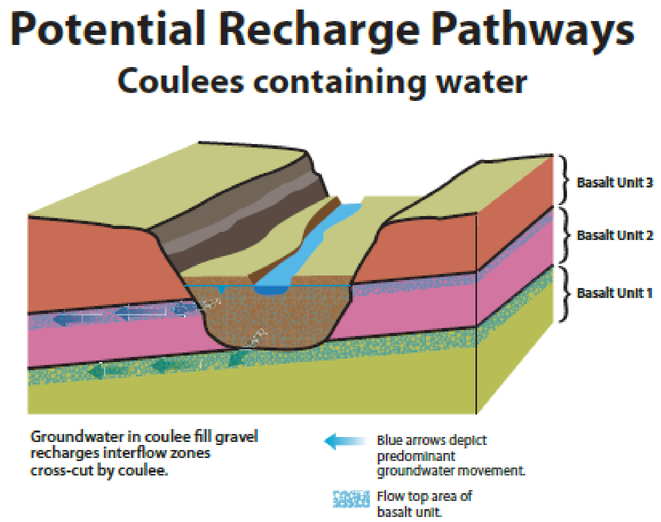
From: USGS SIR 2011-5124

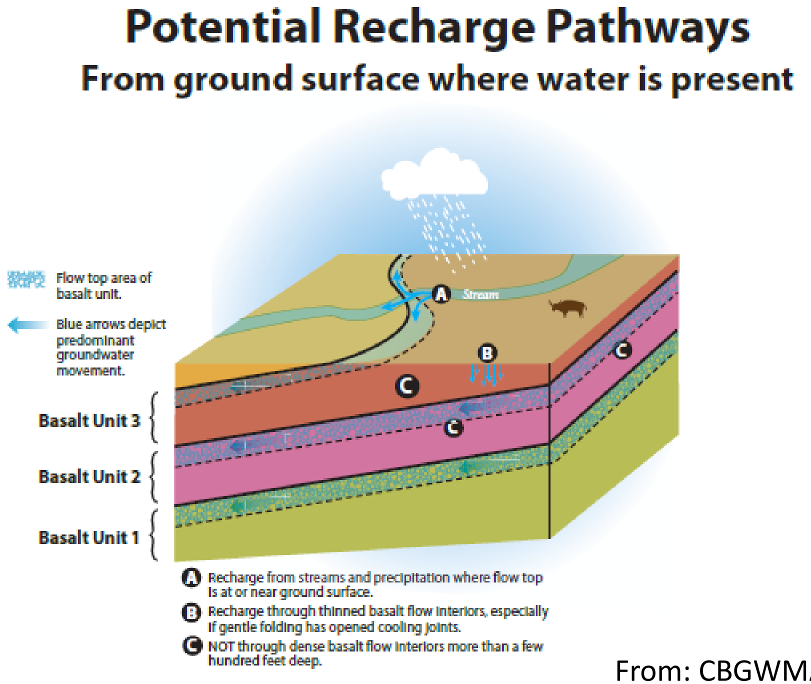
// Hydrogeologic Setting

Conceptual groundwater movement through Interflow Zones









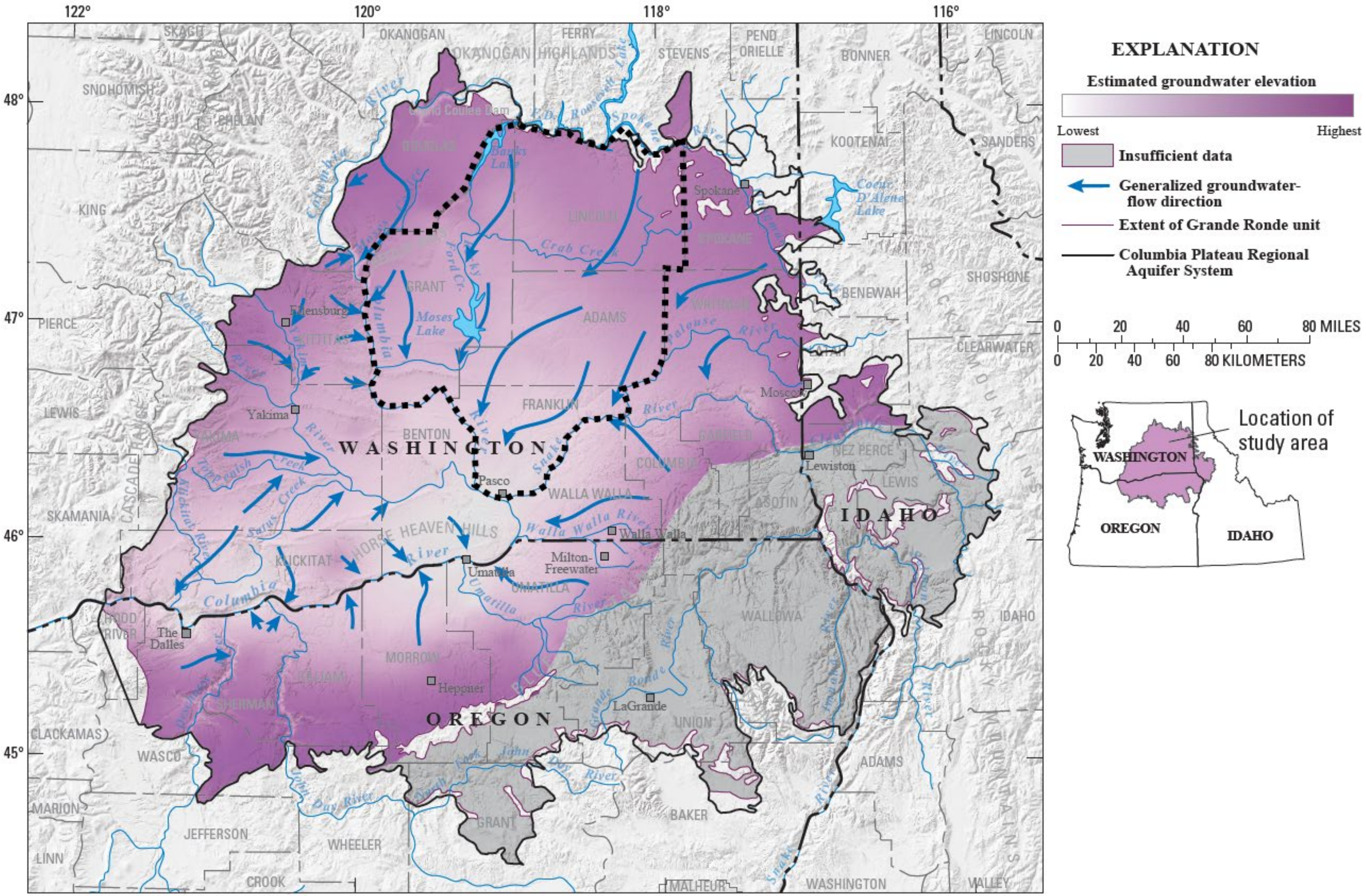
From: CBGWMA 2009

// Hydrogeologic Setting

Regional

Groundwater

Flow Patterns



Base modified from U.S. Geological Survey digital data, 1:2,000,000, 1972

Adapted From: USGS SIR 2011-5124

Preliminary Watershed Management Plan

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// Groundwater Level Monitoring and Trends

Objectives:

- Document current and historical conditions
- Provide data to support decision making for current and future water resource management
- Add to existing knowledge

// Groundwater Level Monitoring and Trends

CBSWC Monitoring Well Criteria:

- Open to CRBG Basalt
- Not Currently Monitored (avoid redundancy with others)
- Accessible
- Owner Willingness to Participate
- Not Regularly Pumped

Groundwater Level Monitoring and Trends

CBSWC Monitoring Well Selection:

- Reviewed 45 Prospective Wells (25 Municipalities)
- Contacted 17 Municipalities
- Conducted Select Site Visits

Groundwater Level Monitoring and Trends

CBSWC Monitoring Wells:

CBSWC Data Collection and Processing

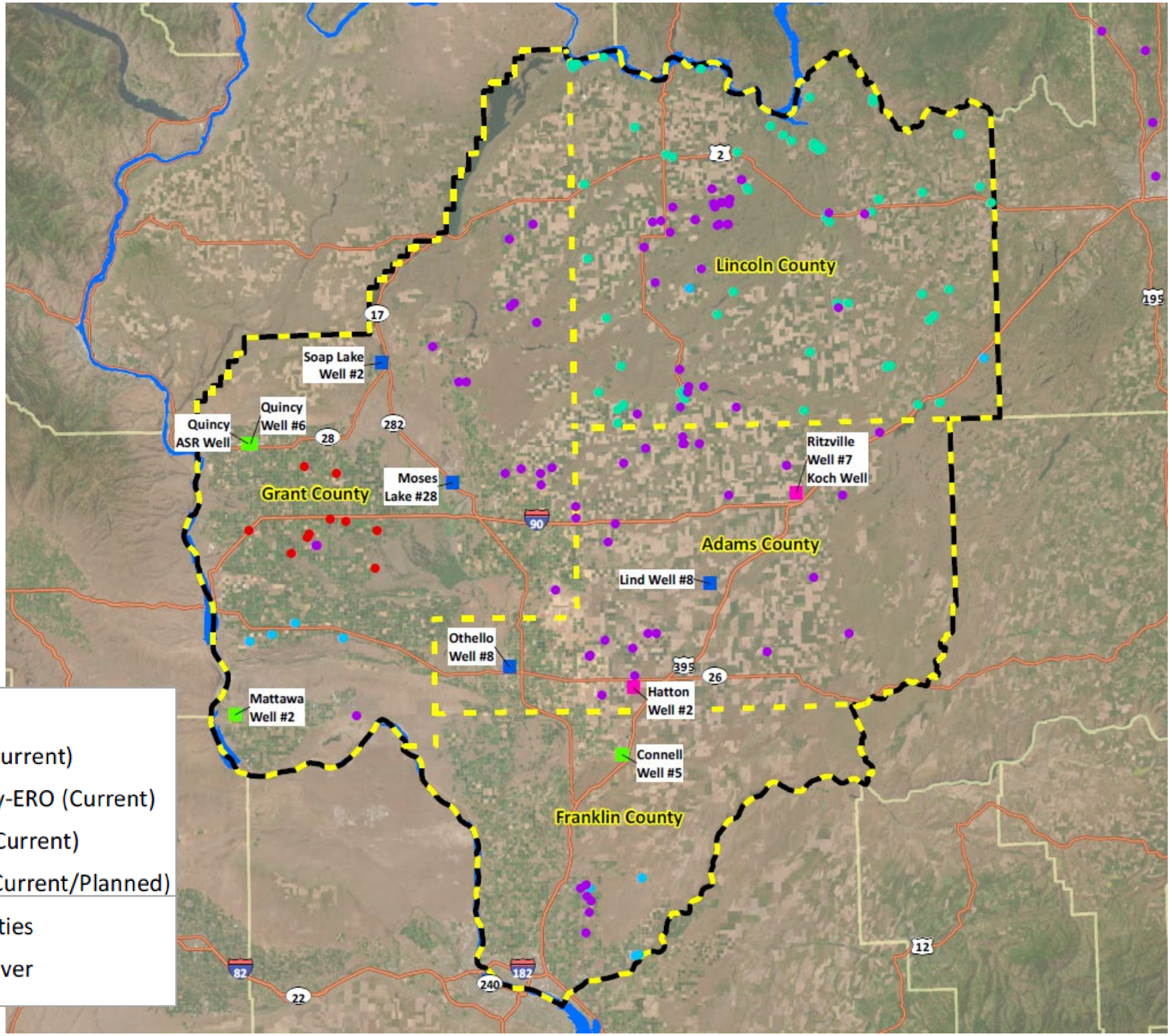
- Connell Well #5. Open interval: 420 to 990 ft bgs (Wanapum and Grande Ronde)
- Mattawa Well #2. Open interval: 526 to 993 ft bgs (Wanapum)
- Quincy Well #6. Open interval: 110 to 241 ft bgs (Wanapum)
- Quincy ASR Well. Open interval: 615 to 786 ft bgs (Grande Ronde)

Muni-Led Data Collection and CBSWC Data Processing

- Moses Lake Well #28. Open interval: 259 to 750 ft bgs (Wanapum and Grande Ronde)
- Othello Well #8. Open interval: 204 to 853 ft bgs (Saddle Mountains and Wanapum)
- Lind Well #8. Open interval: 720 to 2,034 ft bgs (Grande Ronde)
- Soap Lake Well #2. Open interval: 95 to 435 ft bgs (Grande Ronde)

// Groundwater Level Monitoring and Trends

CBSWC Monitoring Network with Other Entity Monitoring Programs

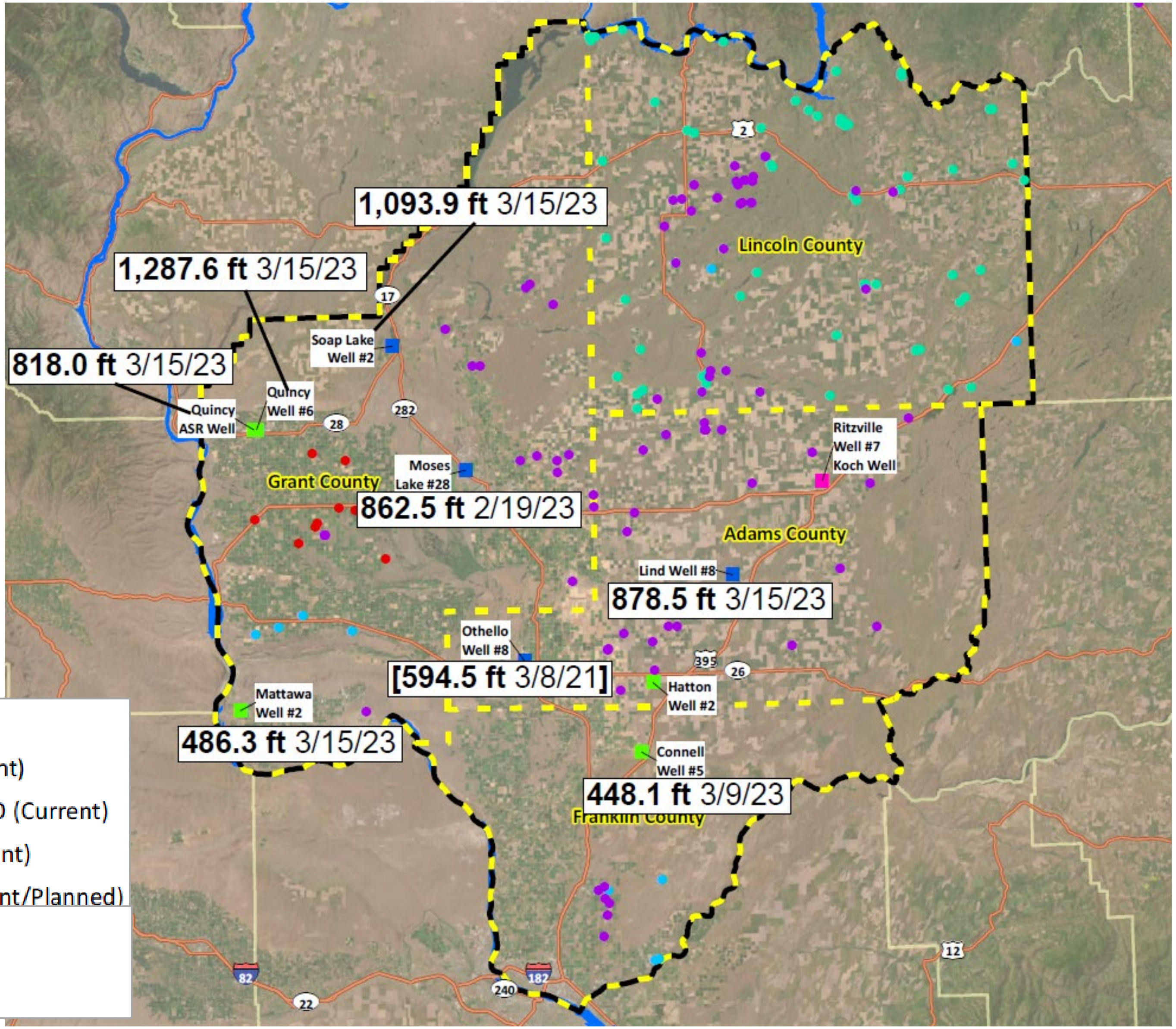


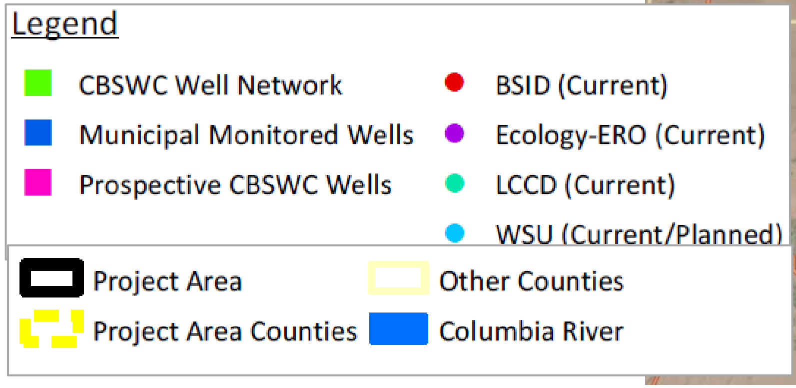
Legend

- CBSWC Well Network
- Municipal Monitored Wells
- Prospective CBSWC Wells
- BSID (Current)
- Ecology-ERO (Current)
- LCCD (Current)
- WSU (Current/Planned)
- Project Area
- Project Area Counties
- Other Counties
- Columbia River

// Groundwater Level Monitoring and Trends

CBSWC Monitoring Network

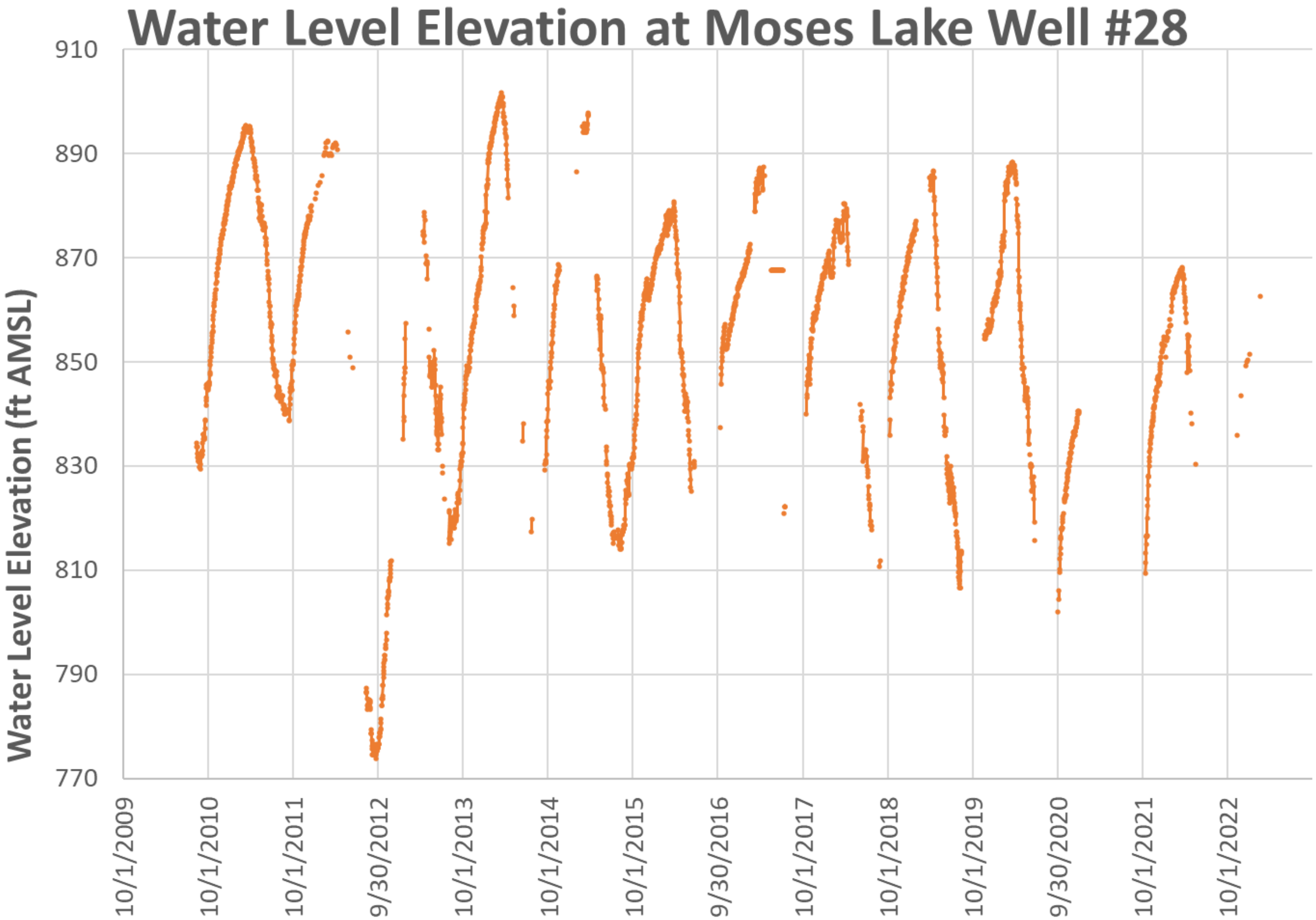




// Groundwater Level Monitoring and Trends – CBSWC Data

City of Moses Lake Well #28

- 2010 to Present
- ~1.5 ft per year decline

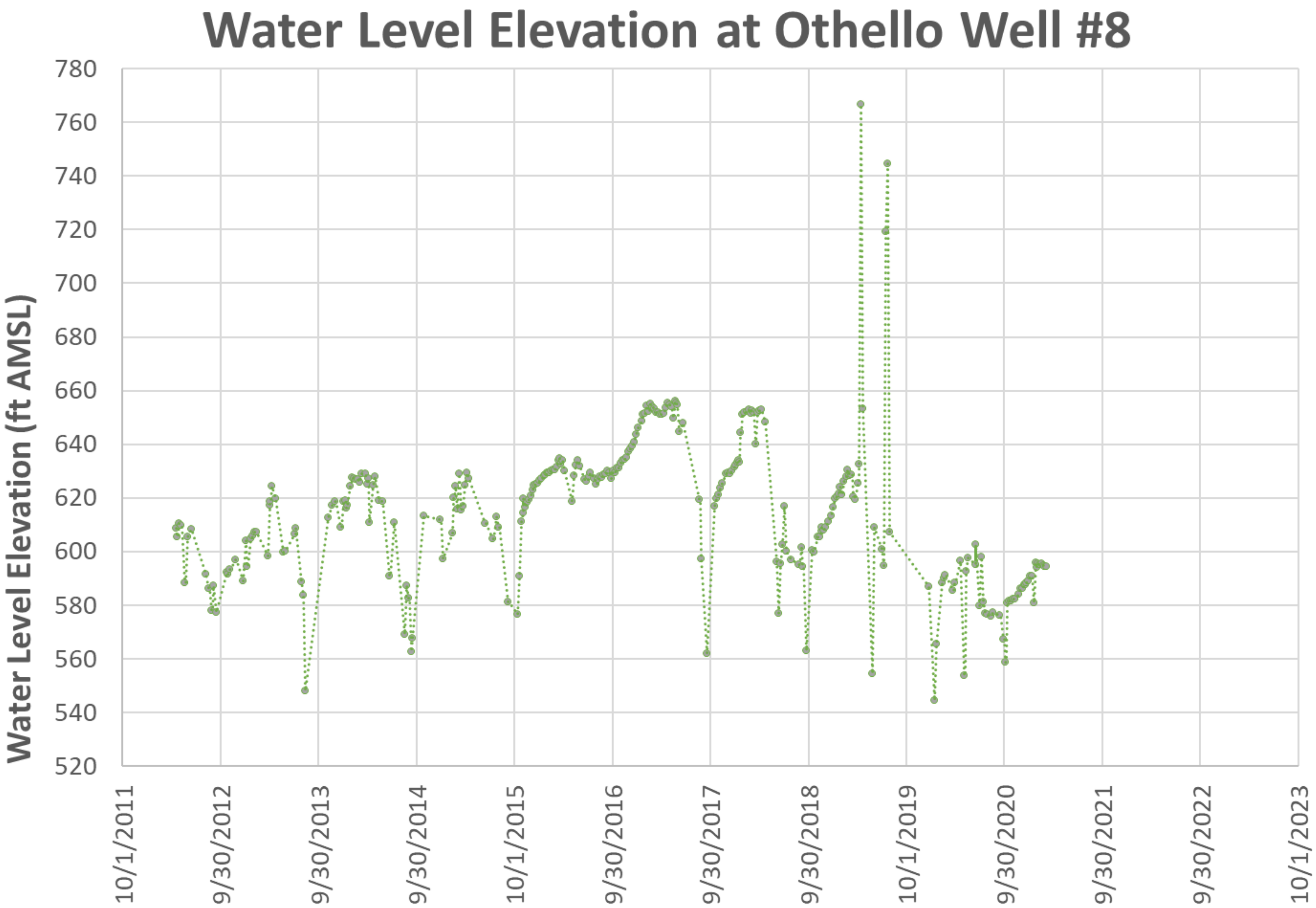


Note: Graph excludes water level evelations recorded while pump is on.

// Groundwater Level Monitoring and Trends – CBSWC Data

City of Othello Well #8

- 2012 to Present
- ~7 ft per year increase from 2012 to 2017
- ~15 ft per year decline from 2017 to 2020



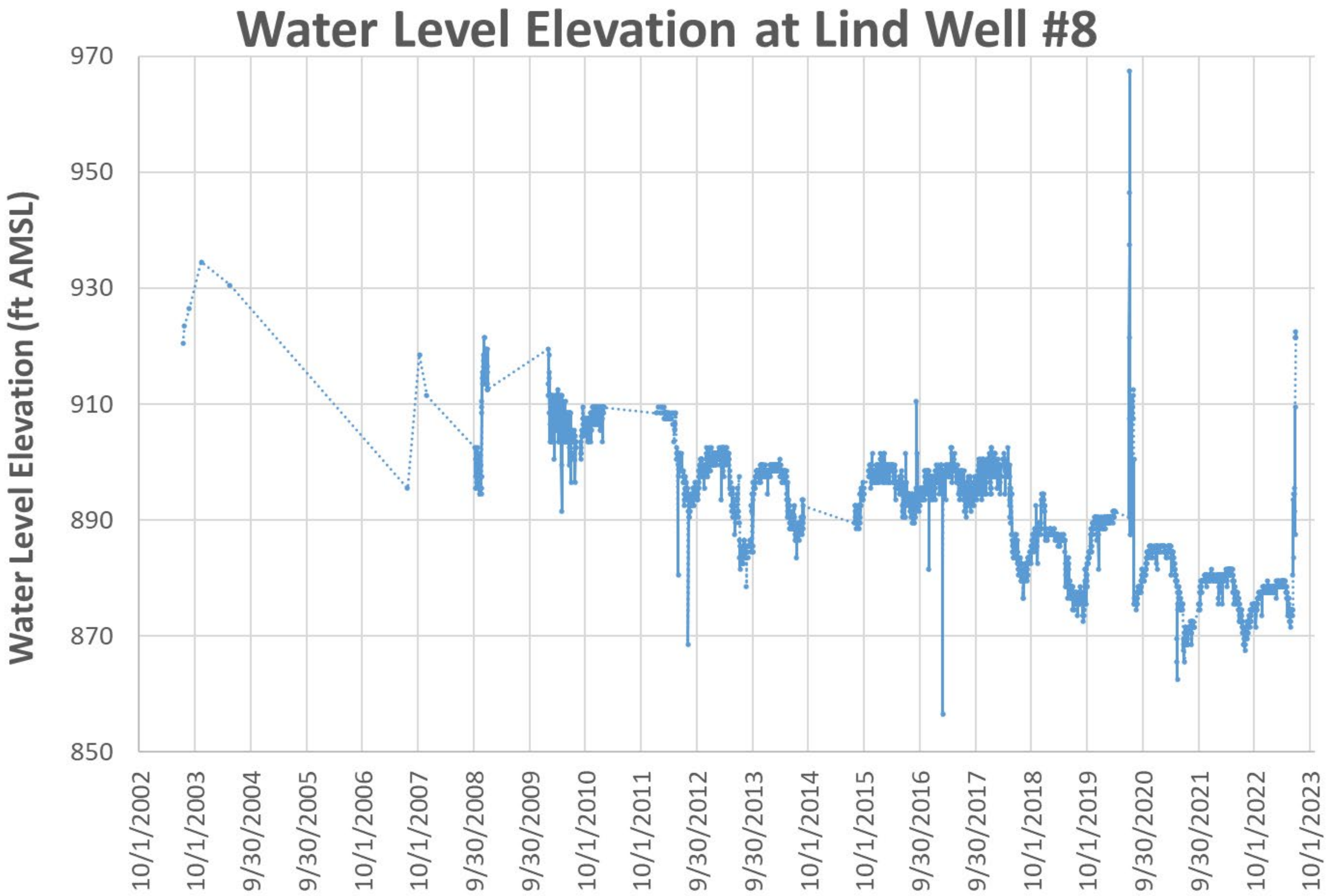
Note: Graph excludes water level evelations recorded while respective pumps are on.

// Groundwater Level Monitoring and Trends – CBSWC Data

Town of Lind

Well #8

- 2003 to Present
- ~2.7 ft per year decline

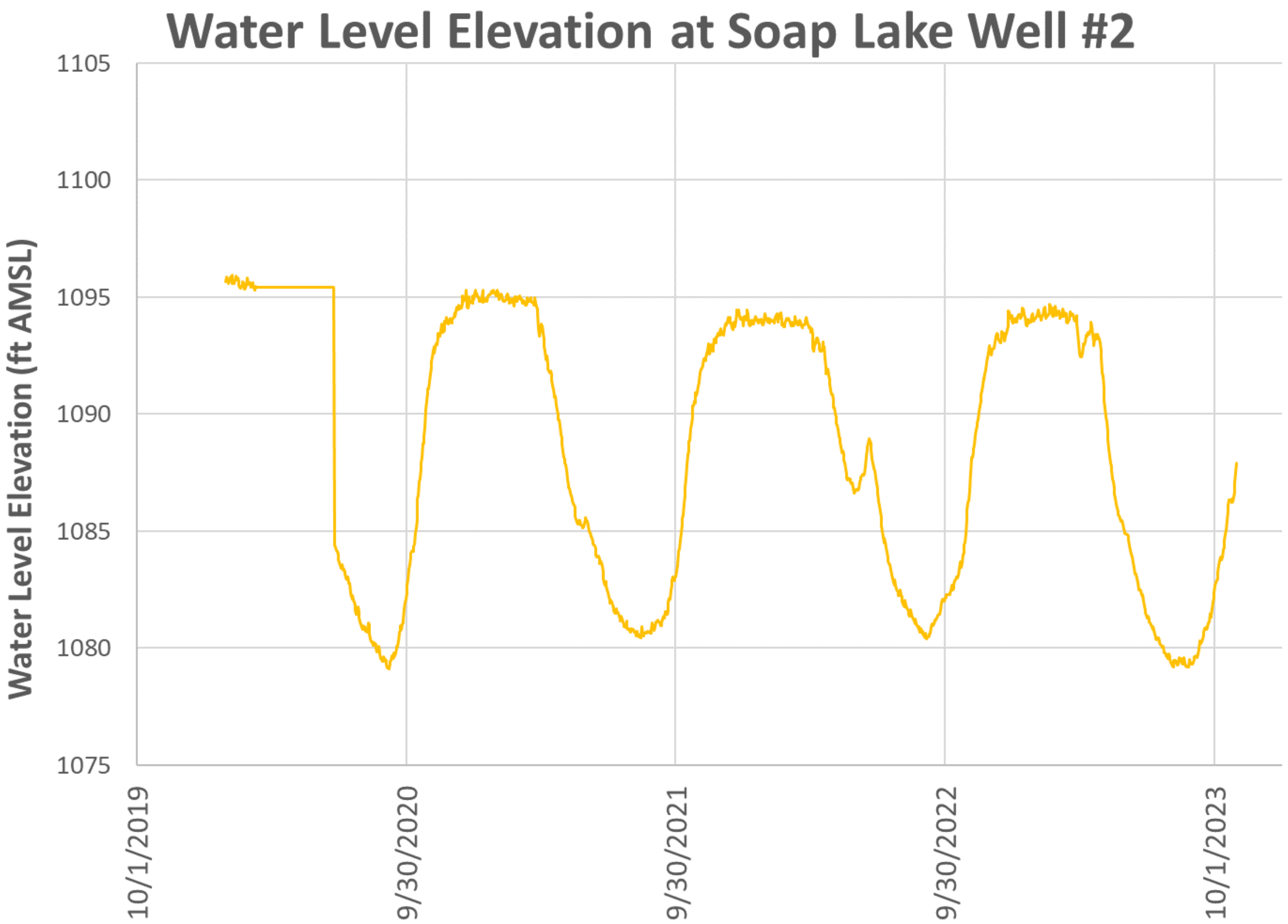


Note: Graph excludes water level evelations recorded while pump is on.

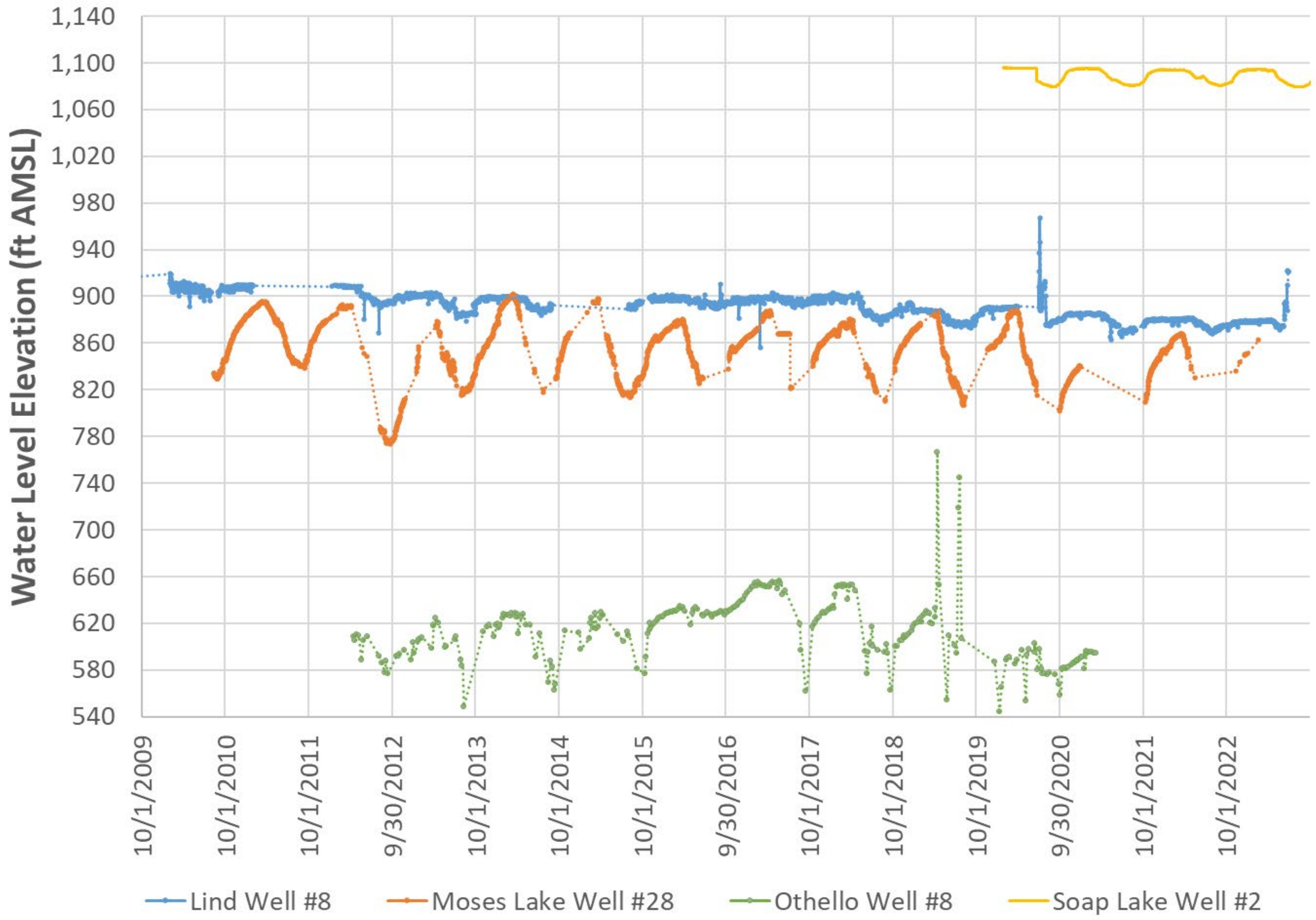
// Groundwater Level Monitoring and Trends – CBSWC Data

City of Soap Lake Well #2

- 2020 to Present
- ~0.6 ft per year decline (based on non-pumping period)

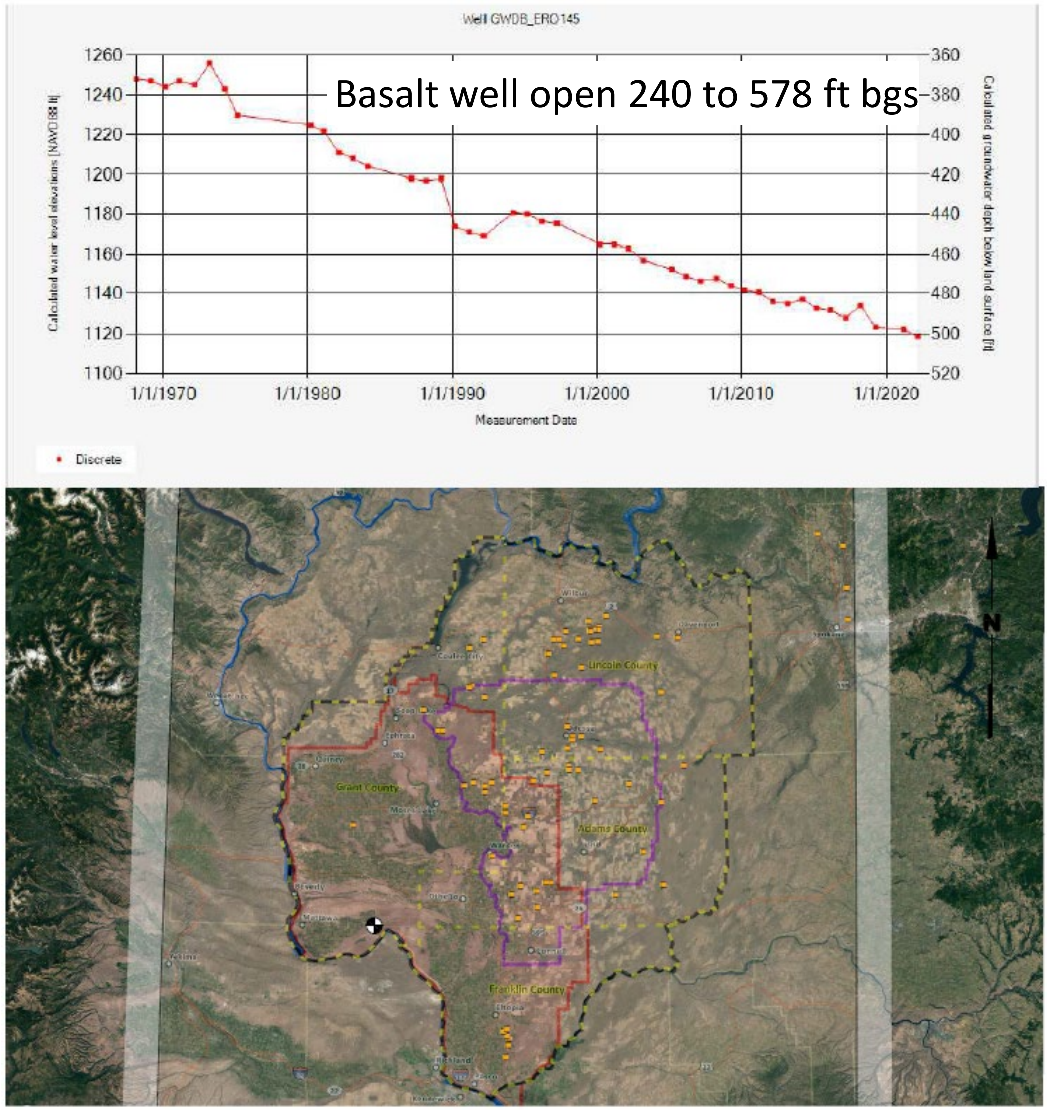


// Groundwater Level Monitoring and Trends – CBSWC Data

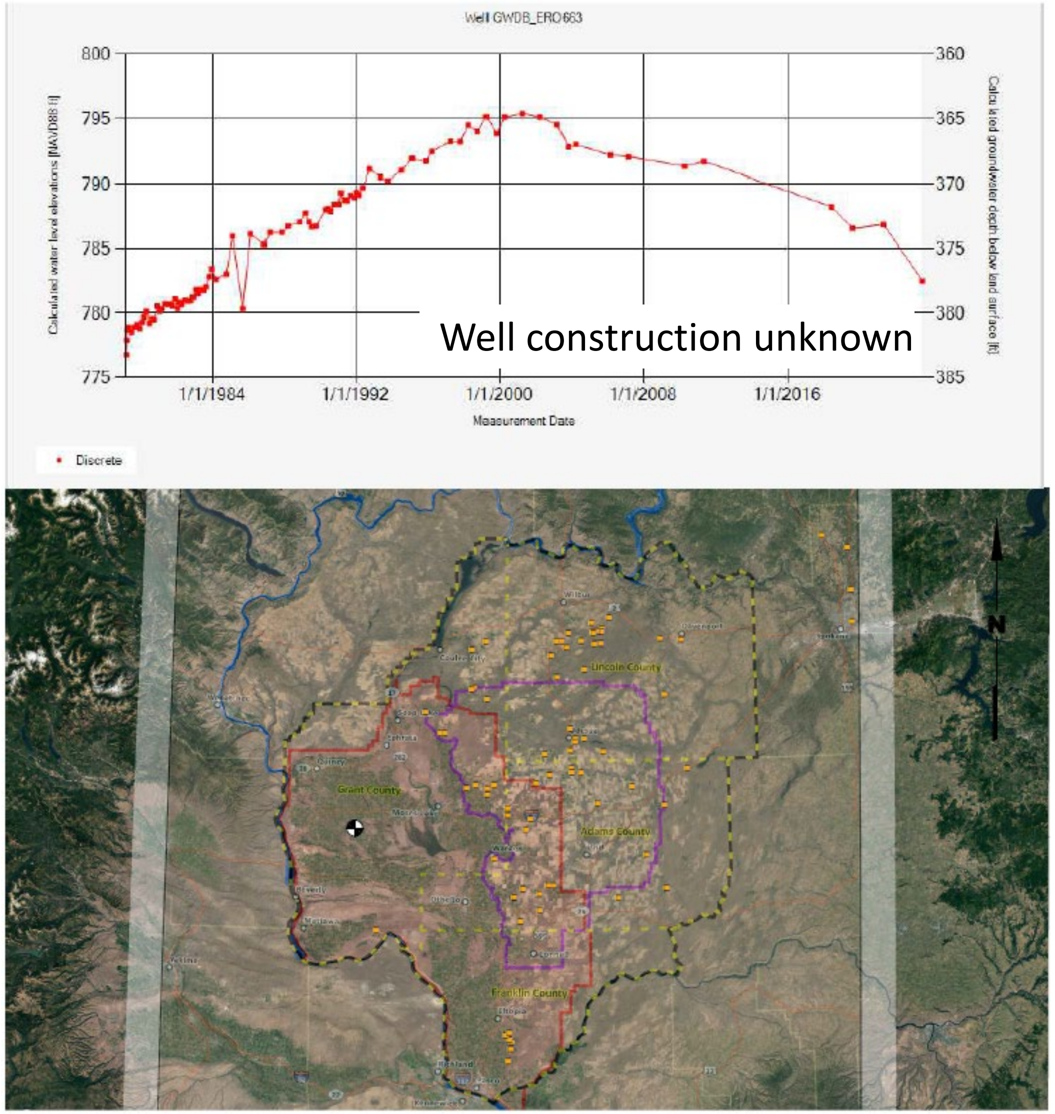


Note: Graph excludes water level evelations recorded while respective pumps are on.

// Groundwater Level Monitoring and Trends – Ecology ERO Data

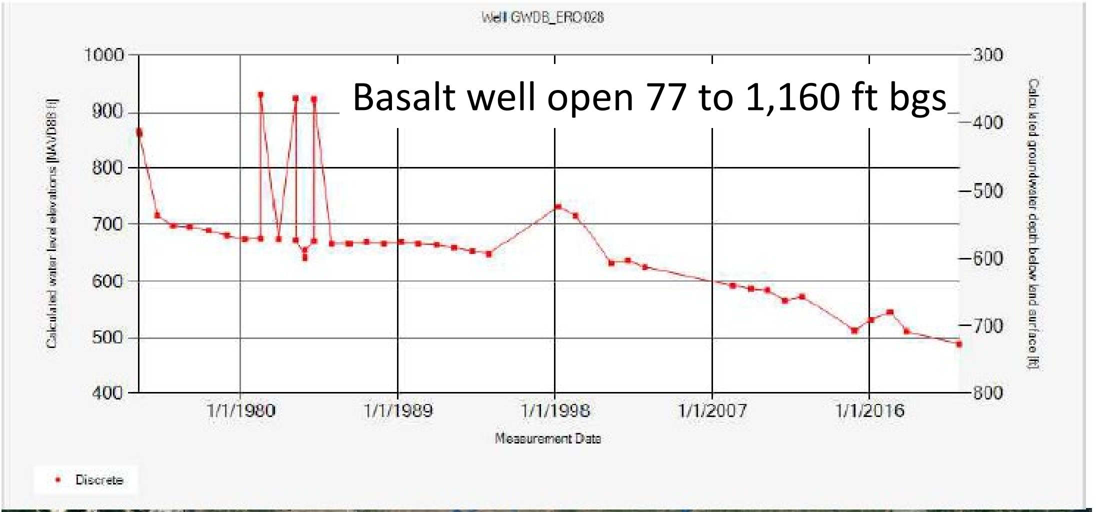


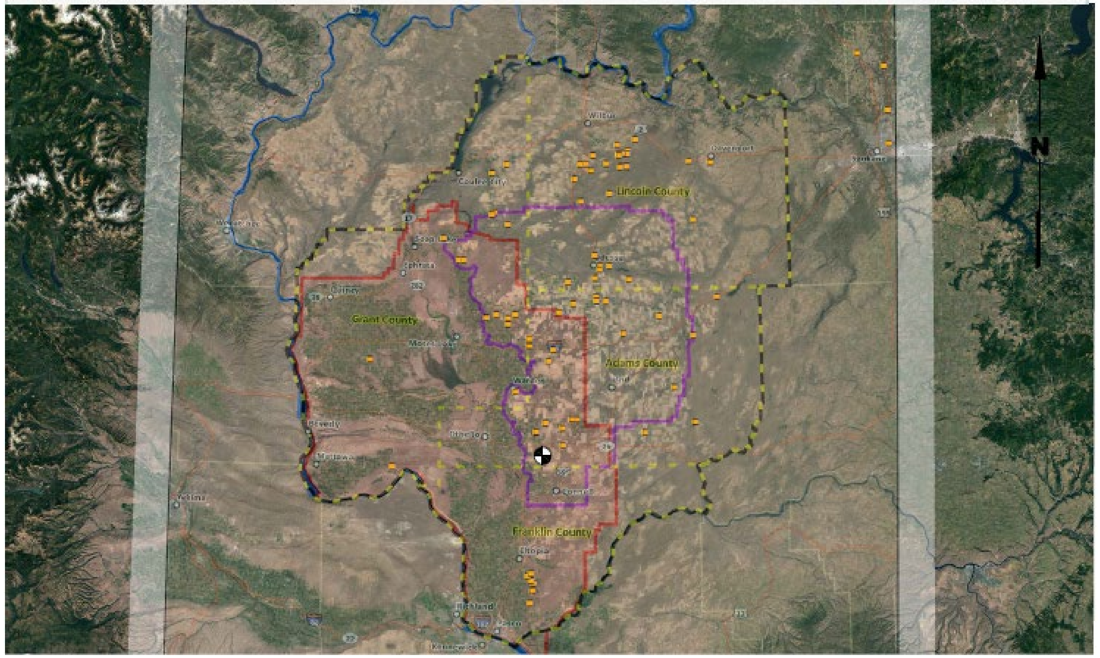
~2.5 ft per year decline (140 ft overall)



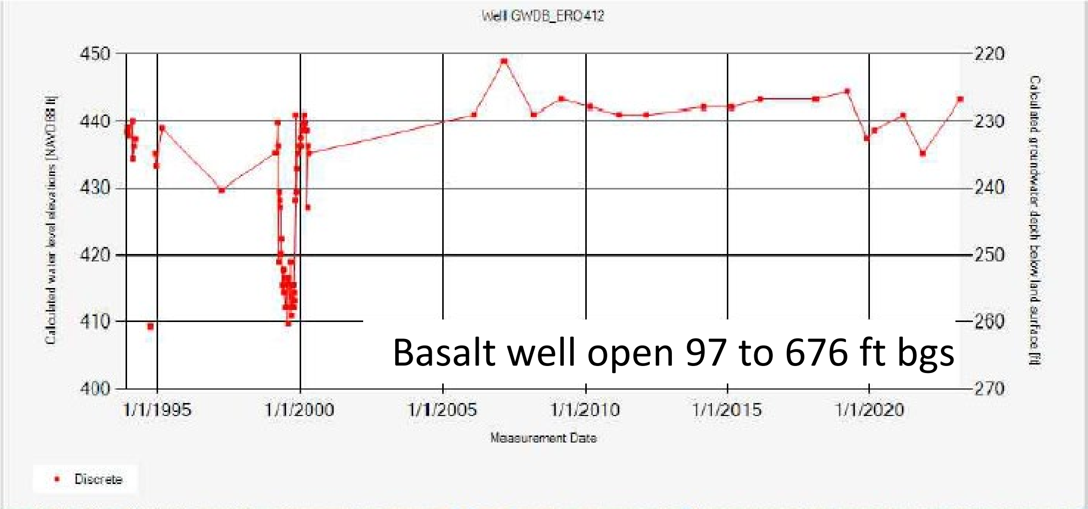
~0.8 ft per year increase, then ~0.9 ft per year decline

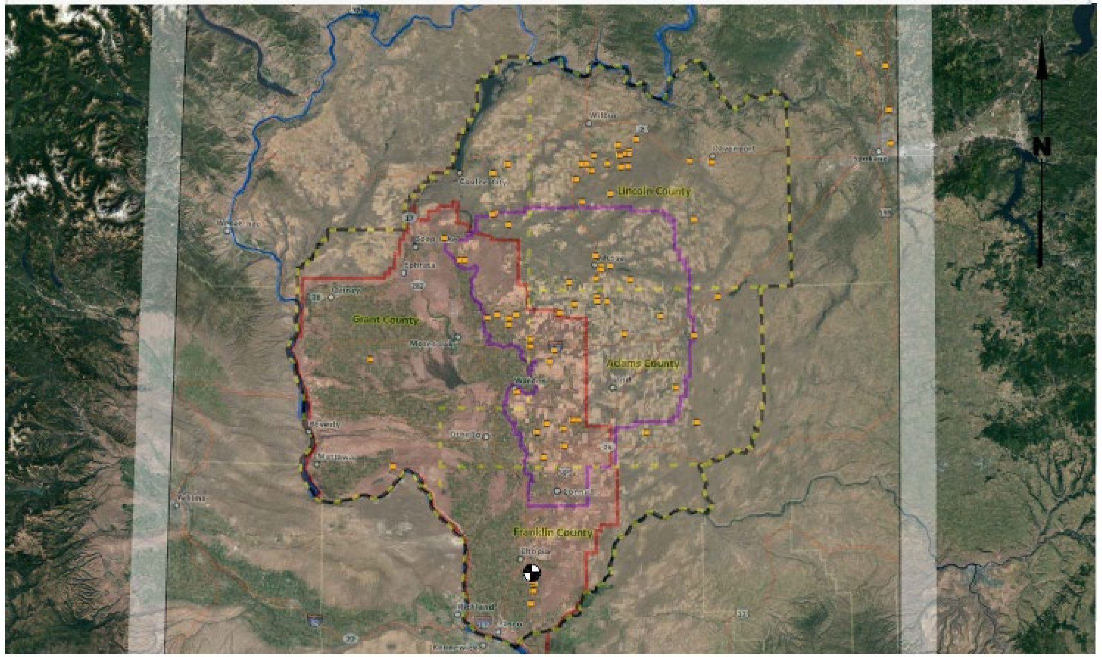
// Groundwater Level Monitoring and Trends – Ecology ERO Data





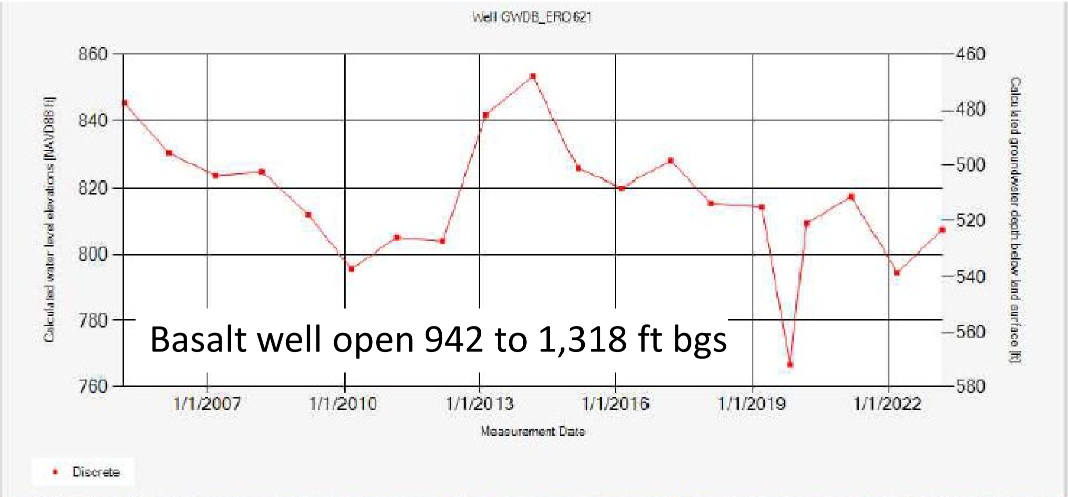
~6.2 ft per year decline (200-300 ft overall)

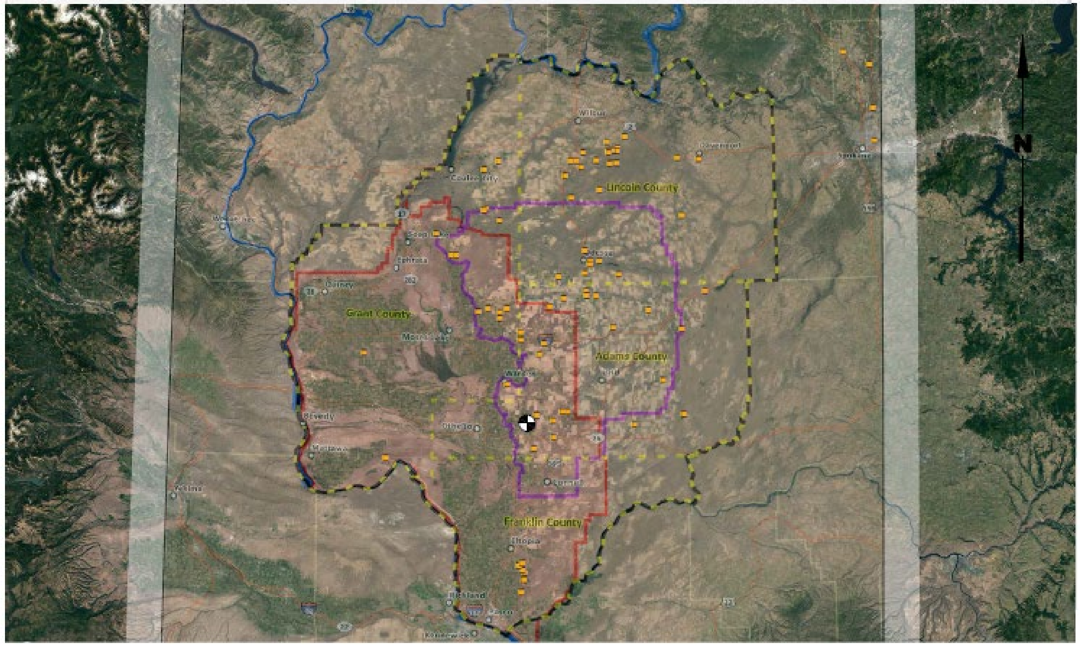




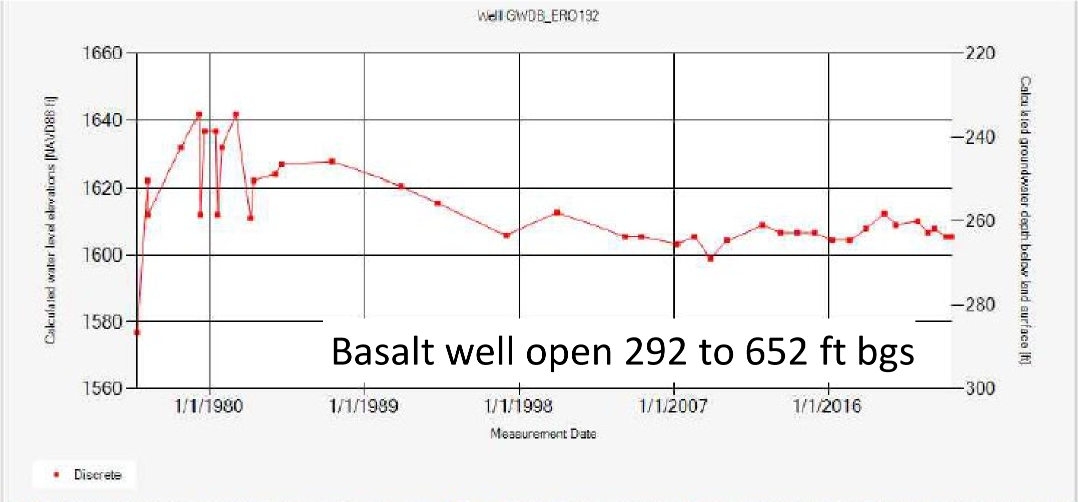
~Steady

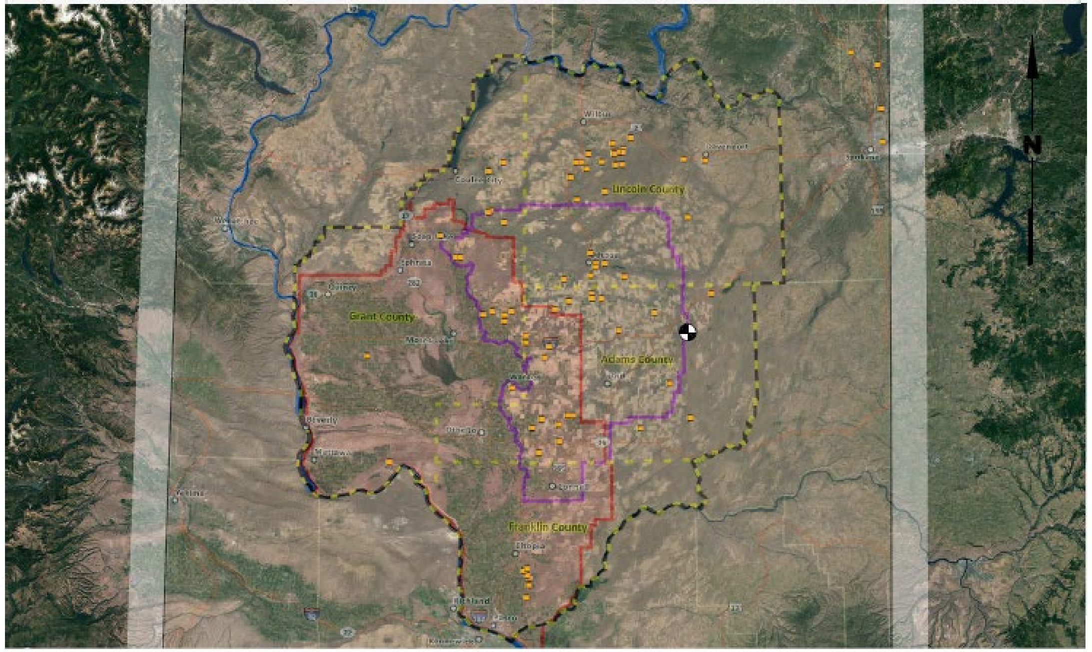
// Groundwater Level Monitoring and Trends – Ecology ERO Data





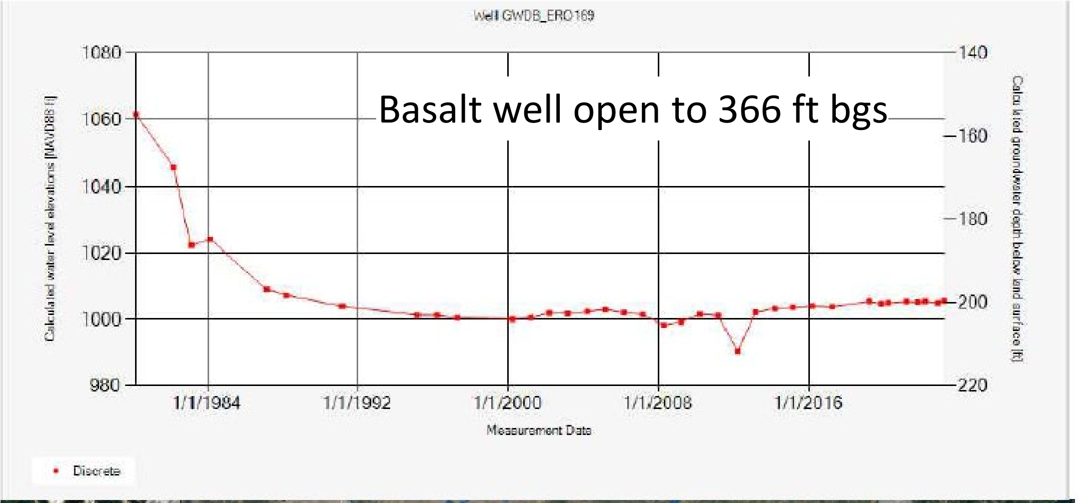
~2.0 ft per year decline

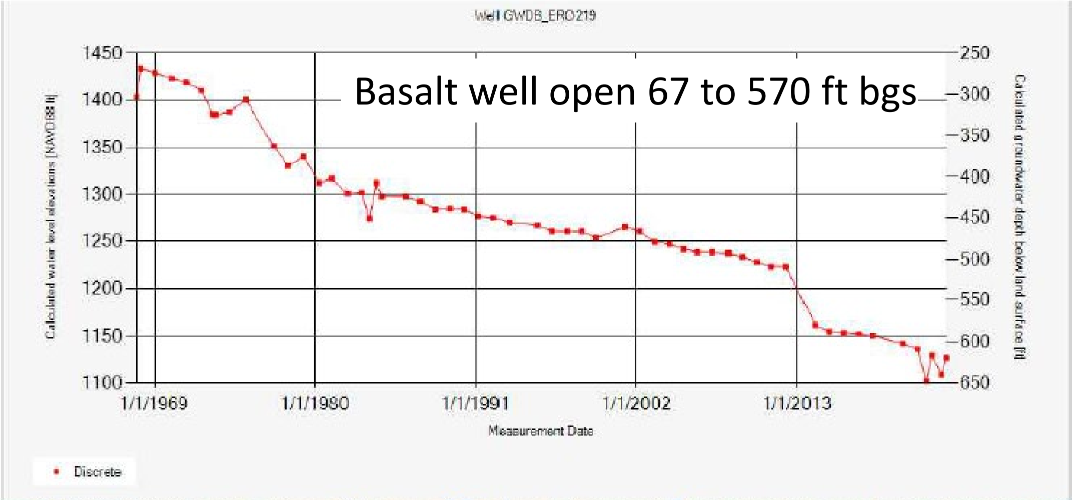


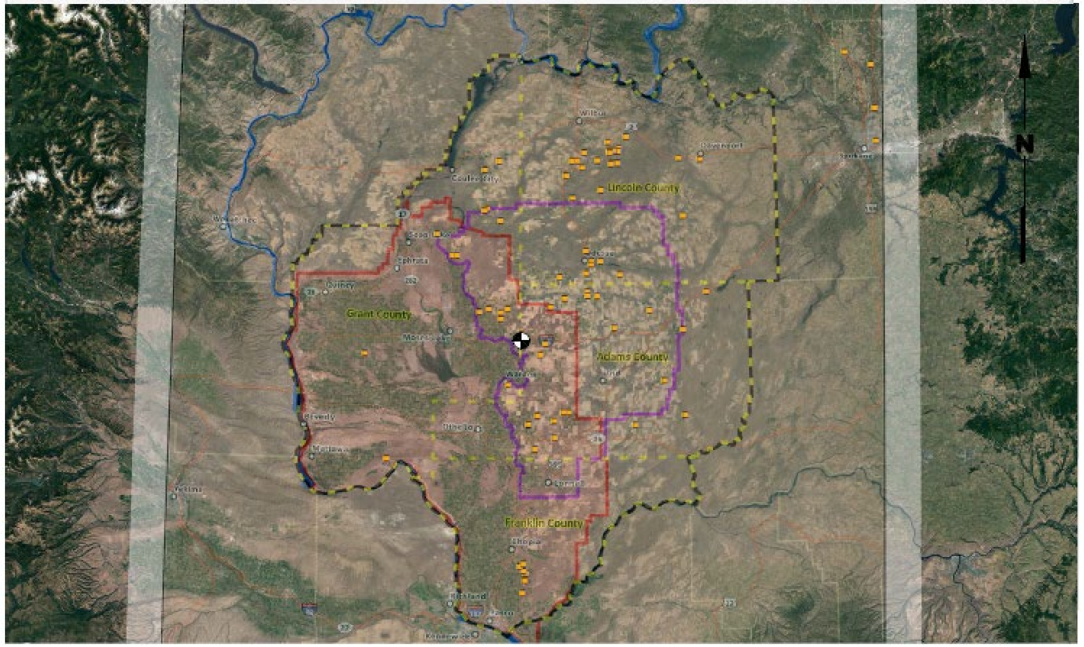


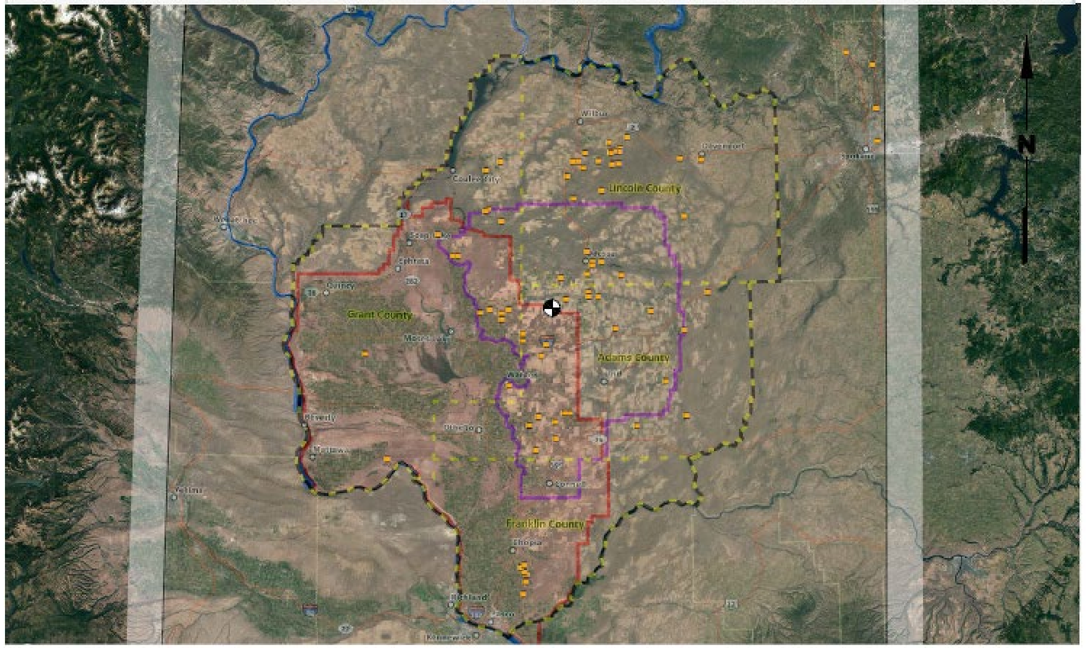
~0.6 ft per year decline

// Groundwater Level Monitoring and Trends – Ecology ERO Data





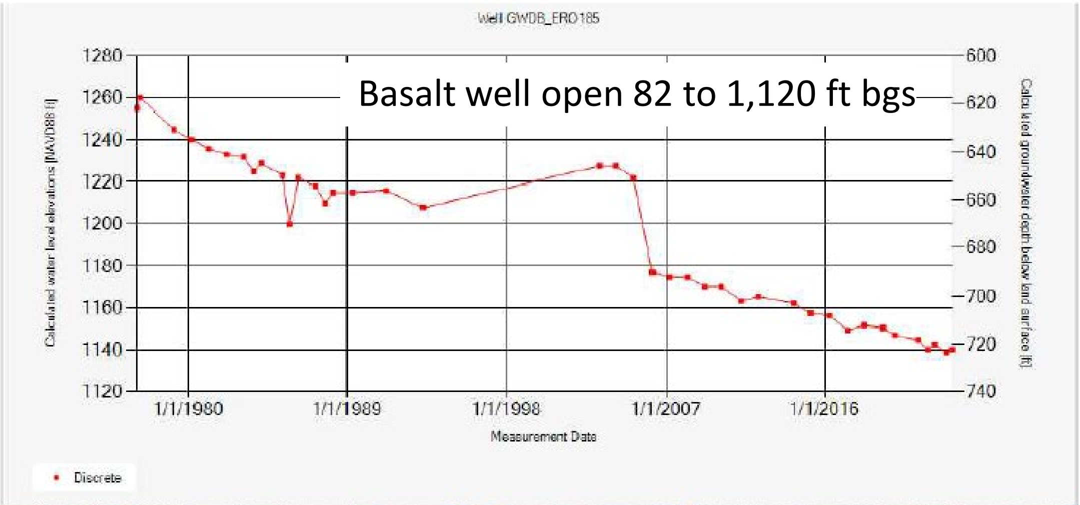


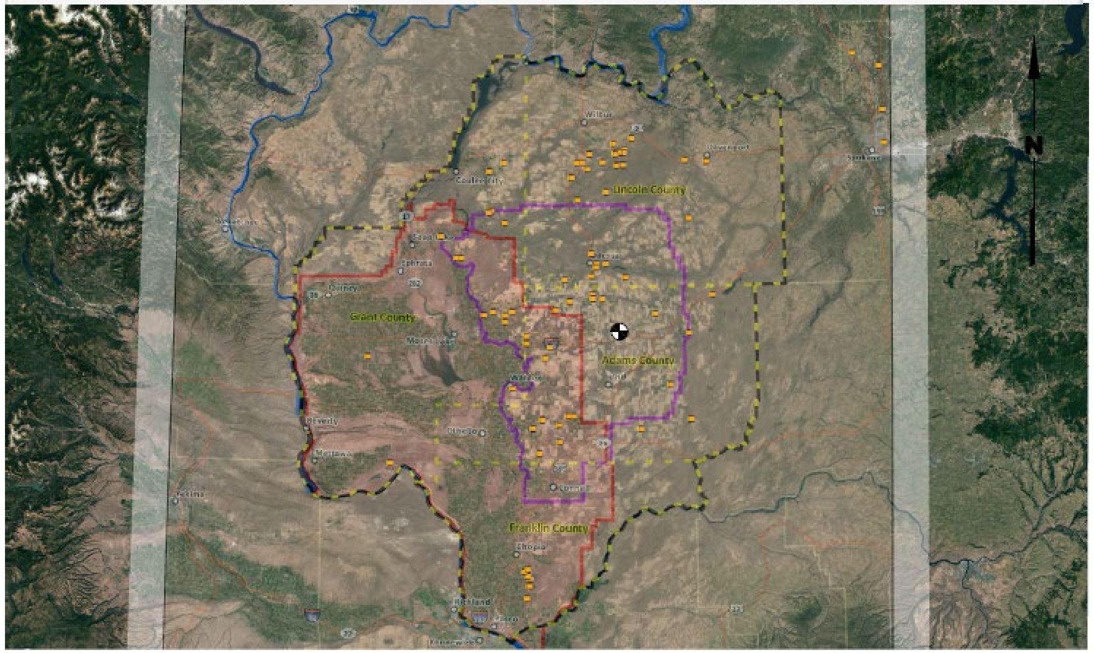


~60 ft drop in 12 years, then steady

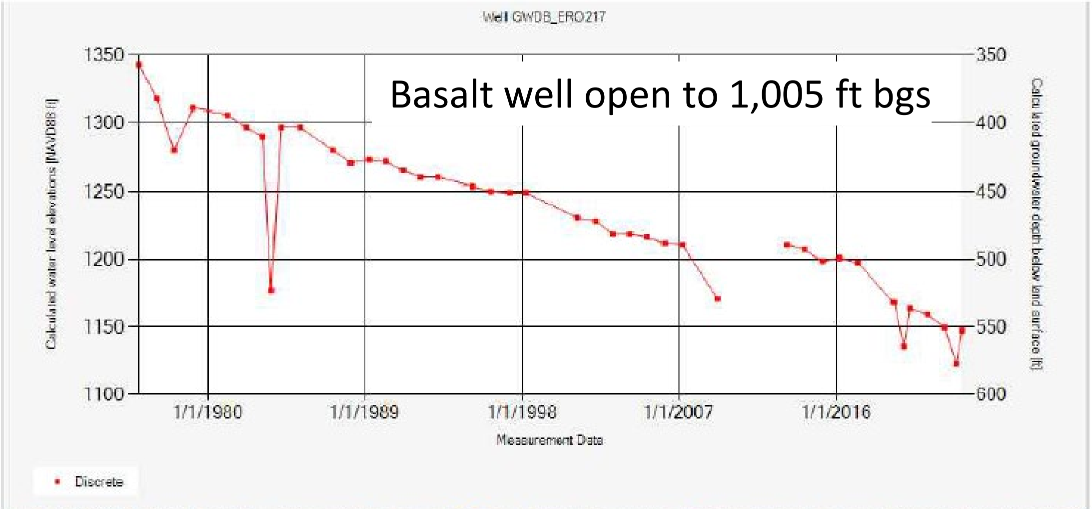
~5.7 ft per year decline (300 ft overall)

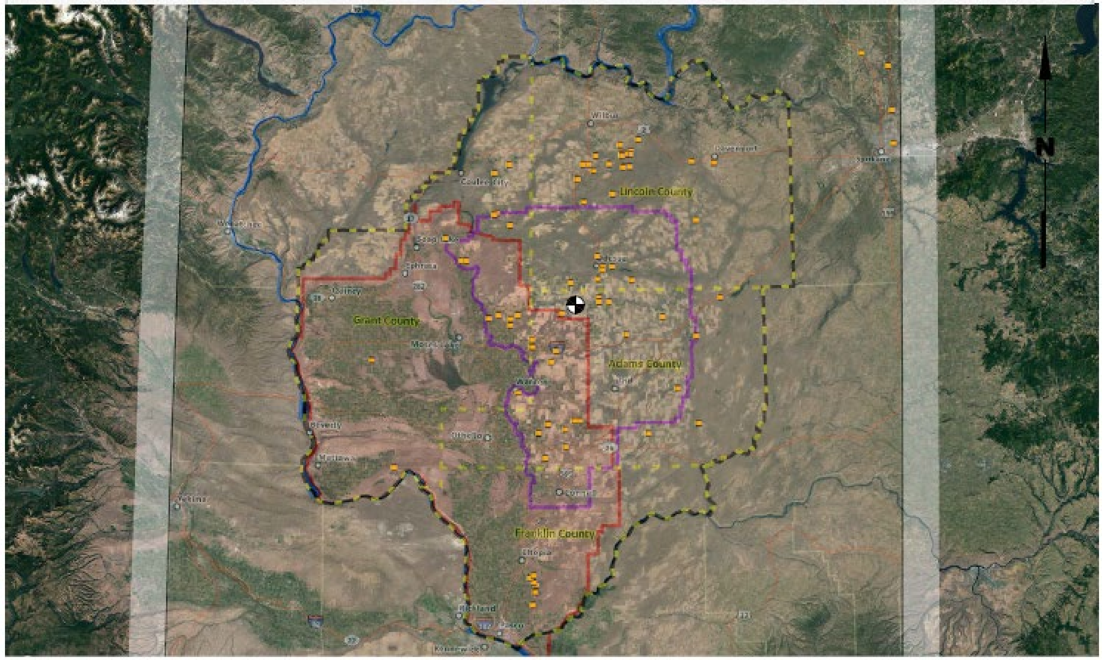
// Groundwater Level Monitoring and Trends – Ecology ERO Data





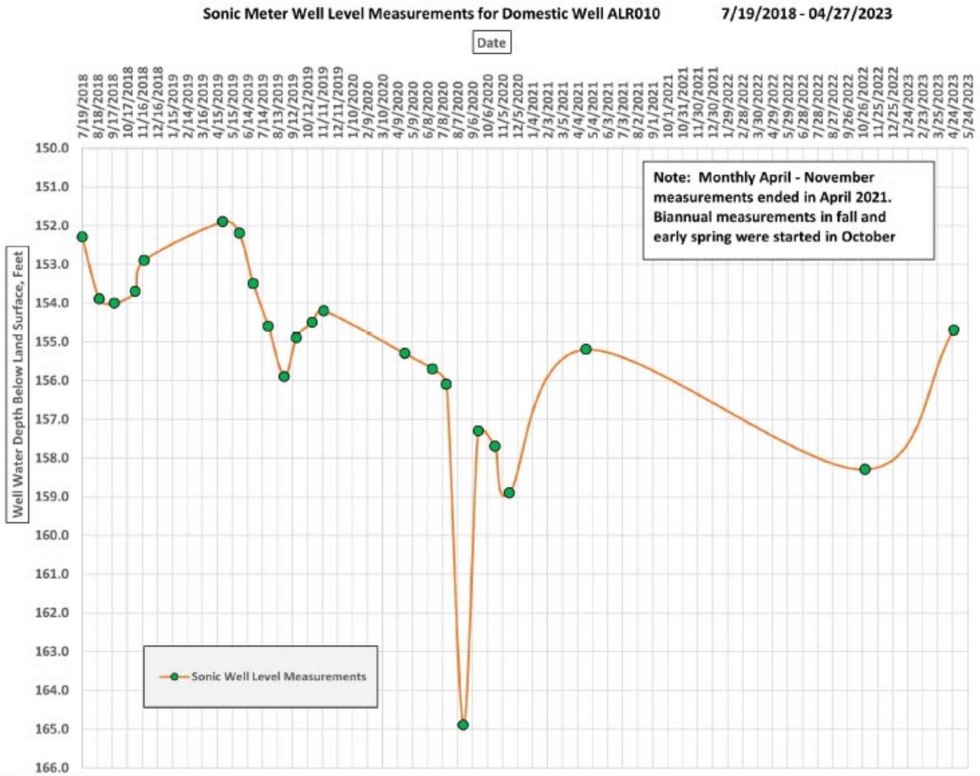
~2.6 ft per year decline (120 ft overall)

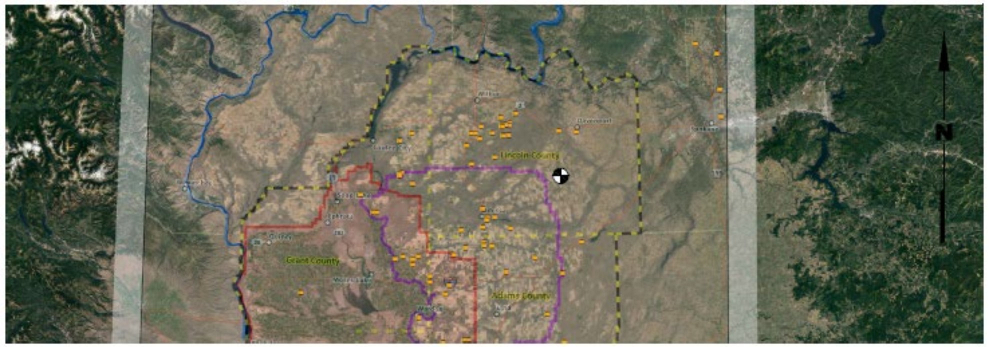




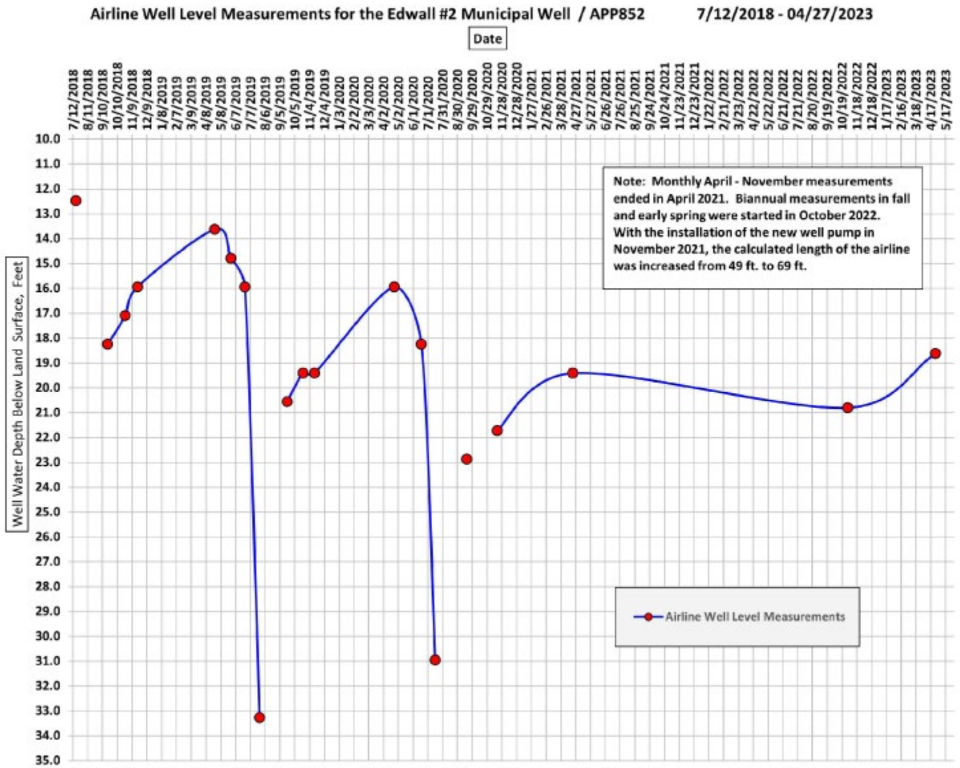
~3.9 ft per year decline (200 ft overall)

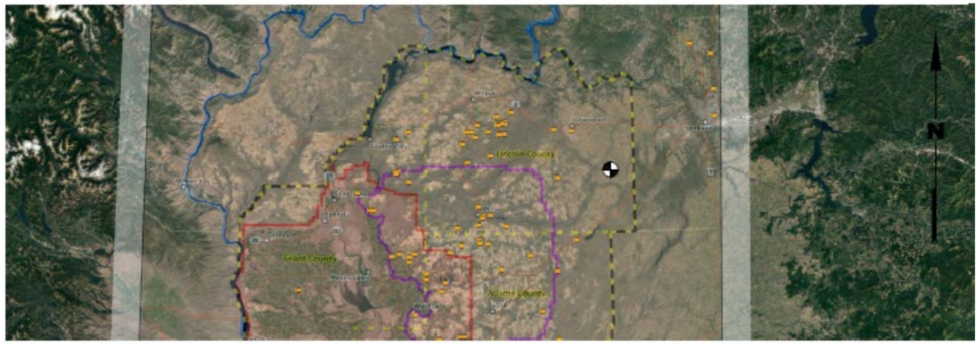
// Groundwater Level Monitoring and Trends – LCCD Data





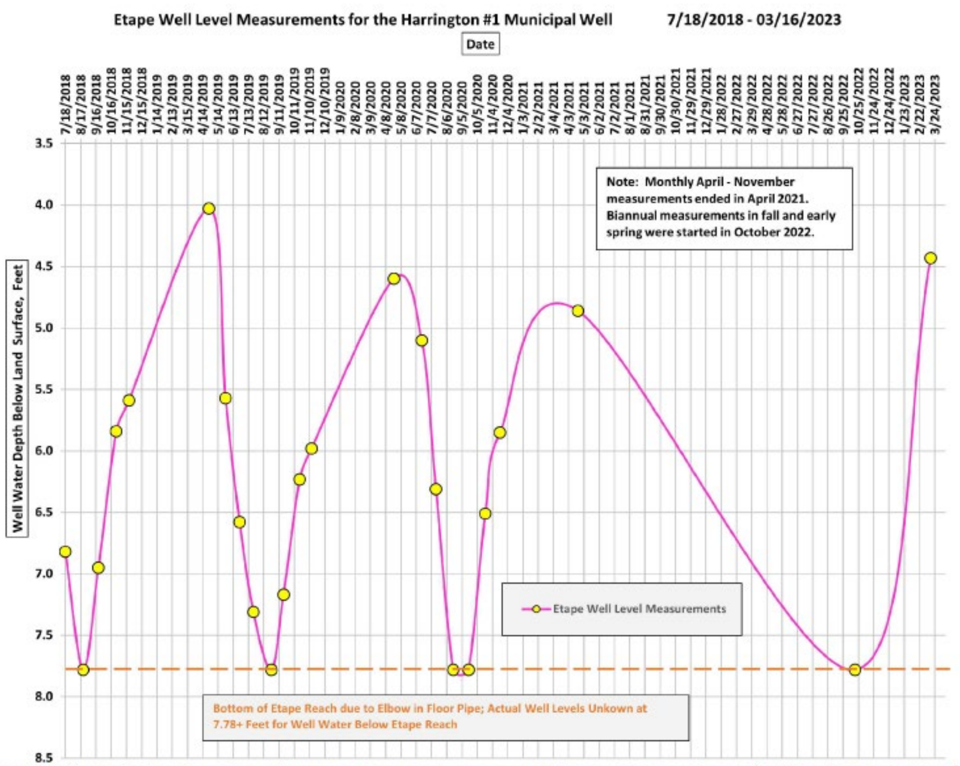
~0.9 ft per year decline

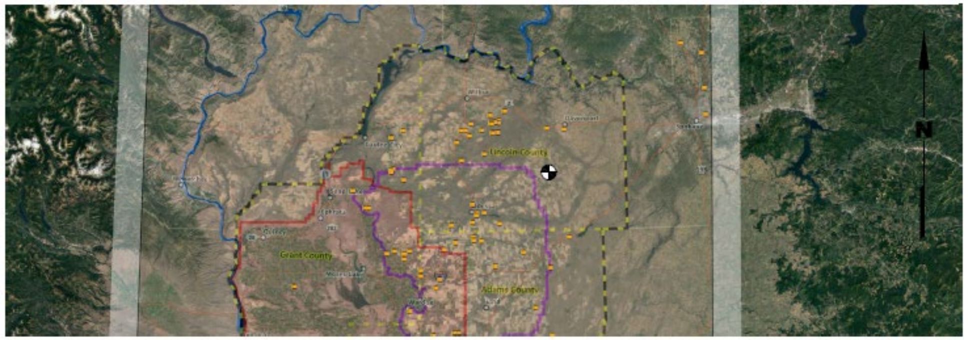




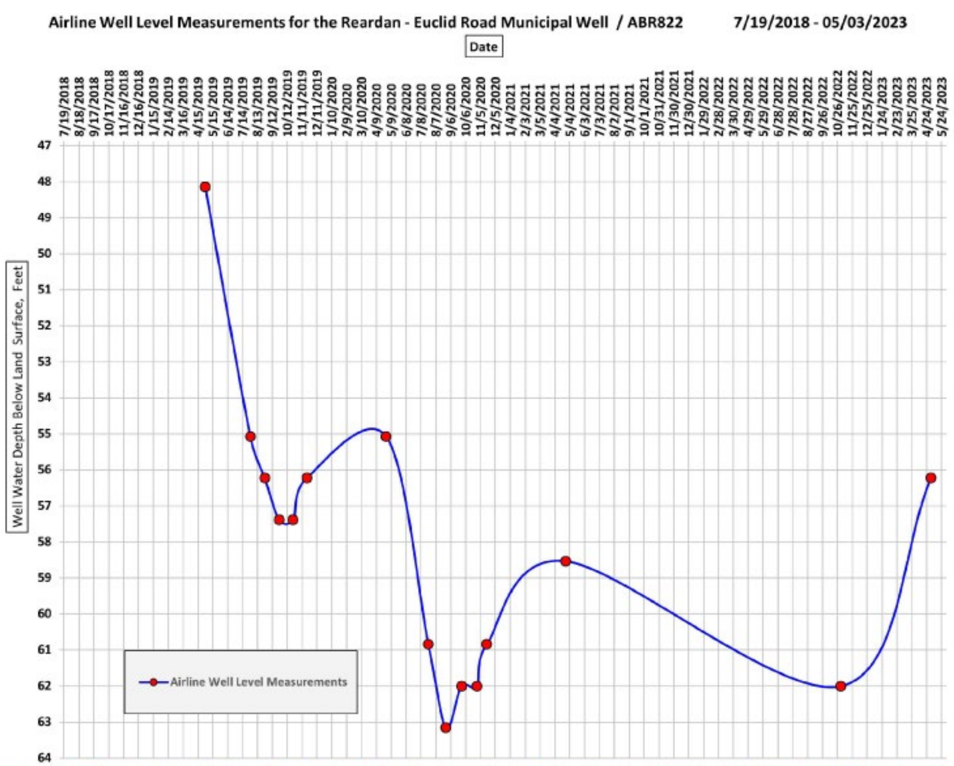
~1.3 ft per year decline

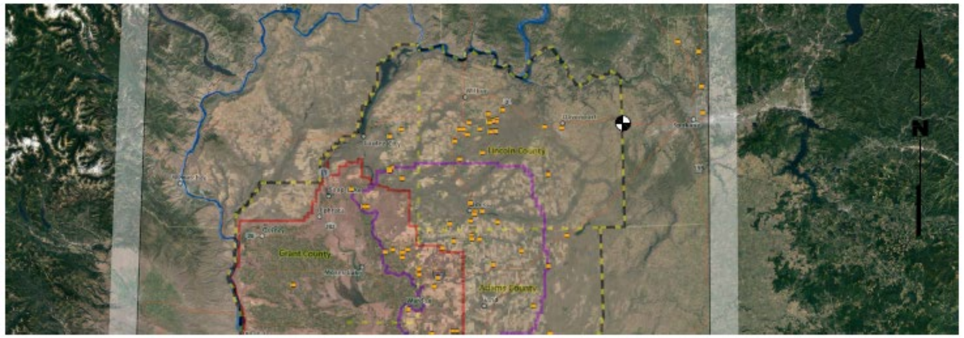
// Groundwater Level Monitoring and Trends – LCCD Data





~0.2 ft per year decline (?)





~0.9 ft per year decline (?)

// Groundwater Level Monitoring and Trends

Summary:

- Aquifers are being depleted (flow out > flow in)
- Declines are common but location-specific
- Declining water levels between 1 and 5 ft per year is common
- Some wells show declines less than 1 ft per year
- Some wells show declines greater than 5 ft per year
- Consistent data collection is important to understand trends

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// Alternatives for CBSWC Consideration

Three Types of Water Resource Management Alternatives:

- Project Alternatives (Alternative Group A)
- Tool Alternatives (Alternative Group B)
- Planning Alternatives (Alternative Group C)

// Alternatives for CBSWC Consideration – Project Alternatives

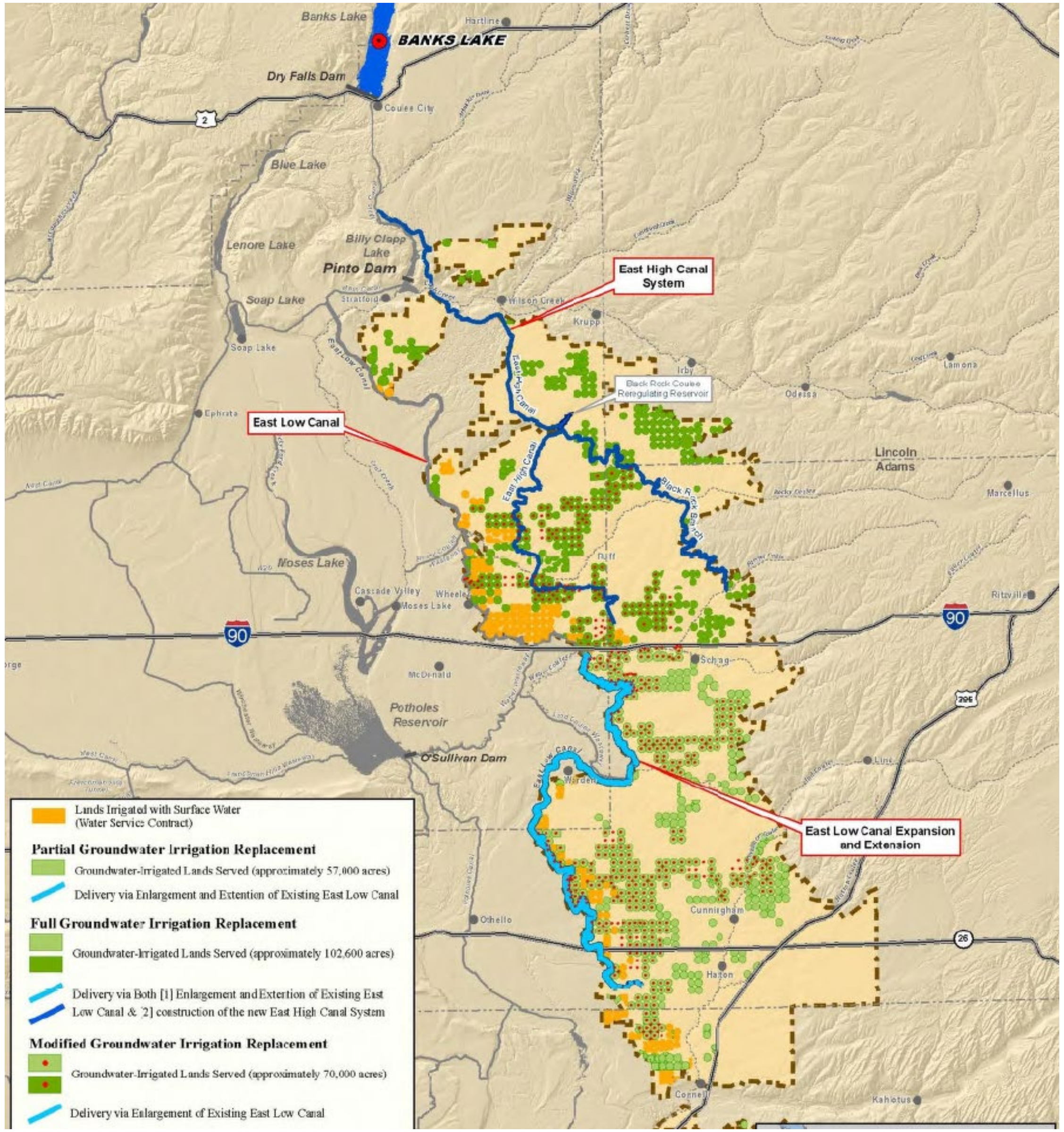
Project Alternatives:

- A1: Odessa Groundwater Replacement Program
- A2: Full Columbia Basin Project Completion
- A3: Water Conservation
- A4: Aquifer Recharge by Passive Rehydration
- A5: Aquifer Recharge by Deep Well Injection Network
- A6: New Source Treatment and Regional Distribution

// Alternatives for CBSWC Consideration – Project Alternatives

A1: Odessa Groundwater Replacement Program (OGWRP)

- Benefits:
  - Reduce groundwater pumping for irrigation of up to 80,000 acres
  - Planned and permitted, partially funded
  - Construction is in process
- Challenges:
  - Limited to Odessa Subarea Special Study Area (western Odessa subarea)
  - Requires multiple pump stations



From: USBR 2012 – Final Feasibility-Level Special Study Report

// Alternatives for CBSWC Consideration – Project Alternatives

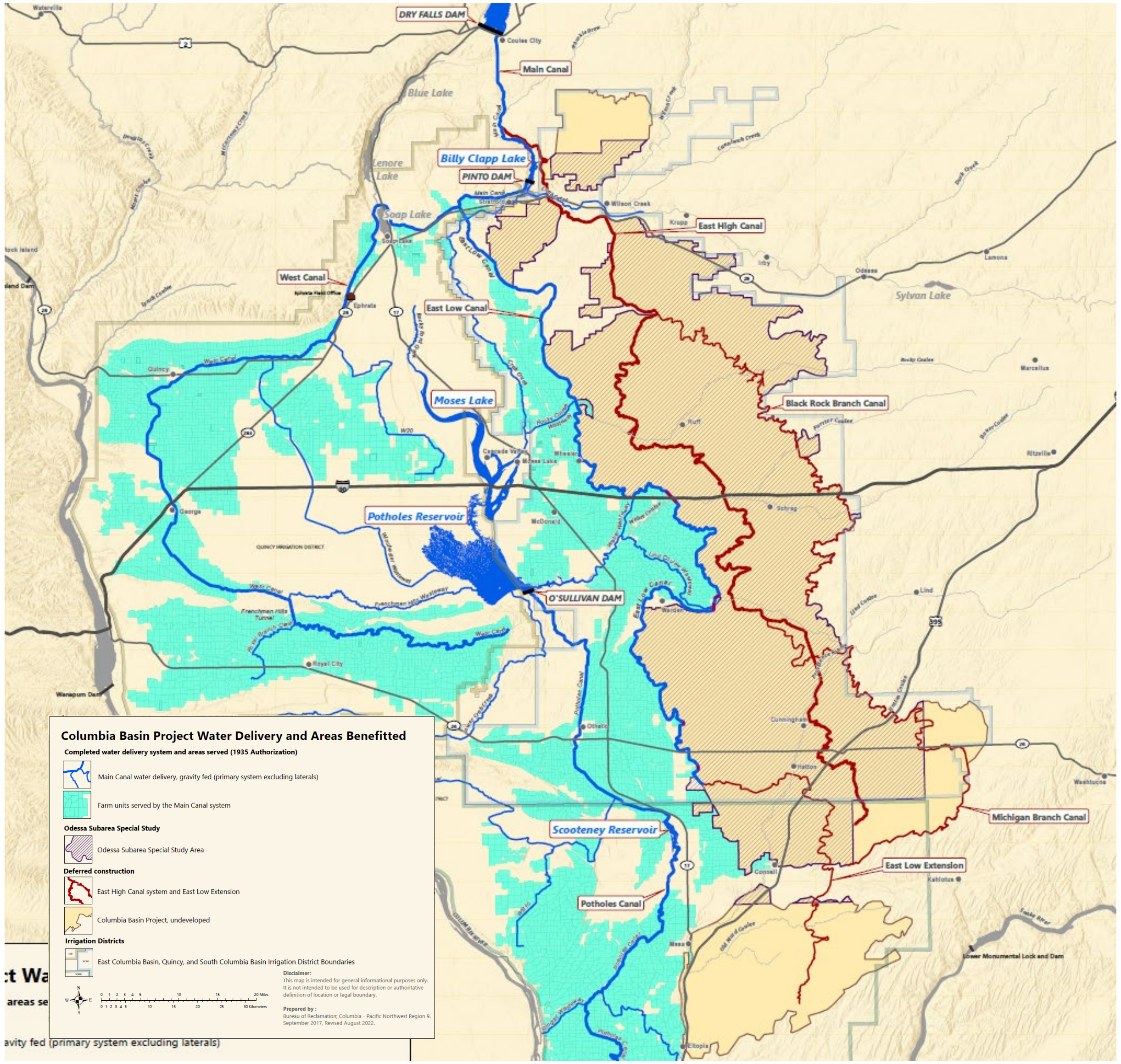
A2: Full Columbia Basin Project Completion

Benefits :

- Reduce groundwater pumping for irrigation of 100,000 acres
- Potential for serving irrigation and communities further east, compared to OGWRP
- Fewer pump stations, then gravity

Challenges :

- High Cost
- Needs permitting (secondary use water rights, EIS, etc.)
- Long timeframe for completion



From: USBR 2022

// Alternatives for CBSWC Consideration – Project Alternatives

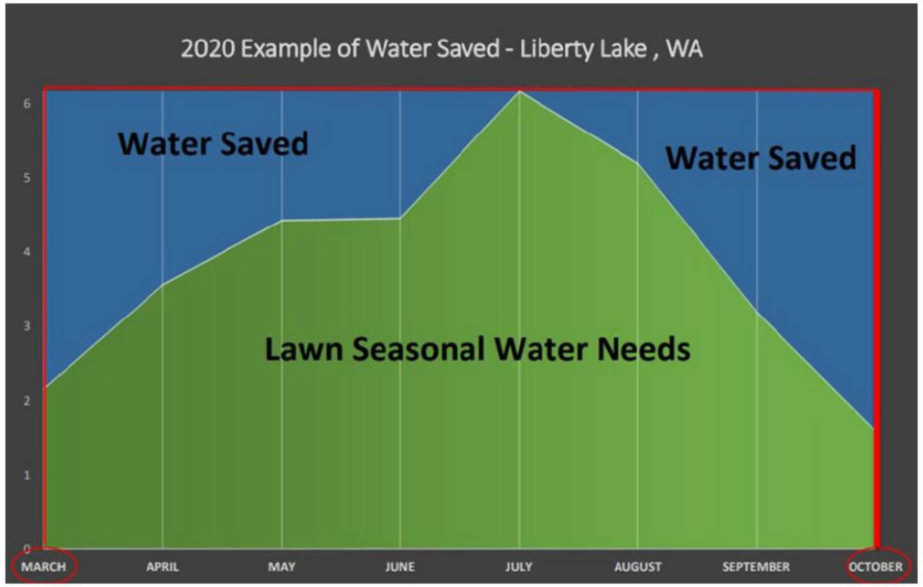
A3: Water Conservation (widespread)

Benefits :

- Can stretch existing supplies
- Can be implemented now

Challenges :

- Public perception/ unpopular
- No current regional mechanism for coordinated conservation



Before

After

From: Spokane Aquifer Joint Board

// Alternatives for CBSWC Consideration – Project Alternatives

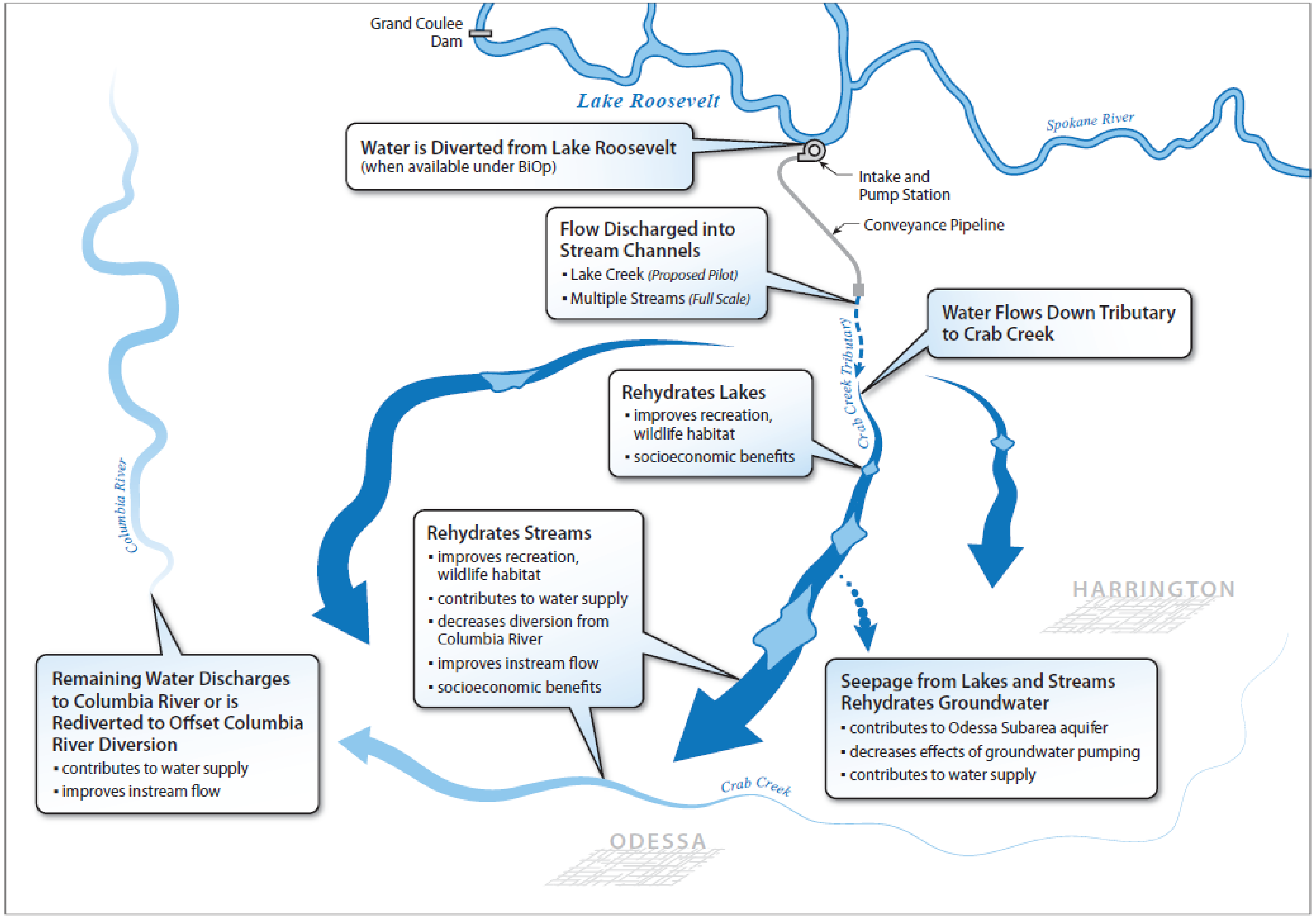
A4: Aquifer Recharge by Passive Rehydration

Benefits :

- Replenish aquifer over time
- Allow use of existing muni wells/pumps (when aquifer is recharged)
- Minimal water quality treatment

Challenges :

- Long timeframe
- Not fully efficient (could be a benefit)
- Undefined source
- Studied preliminarily but needs additional study



From: LCCD/GSI/HDR/WNR 2011 – Prefeasibility Assessment Report

Lincoln County Passive Rehydration Project Conceptual Schematic Diagram

// Alternatives for CBSWC Consideration – Project Alternatives

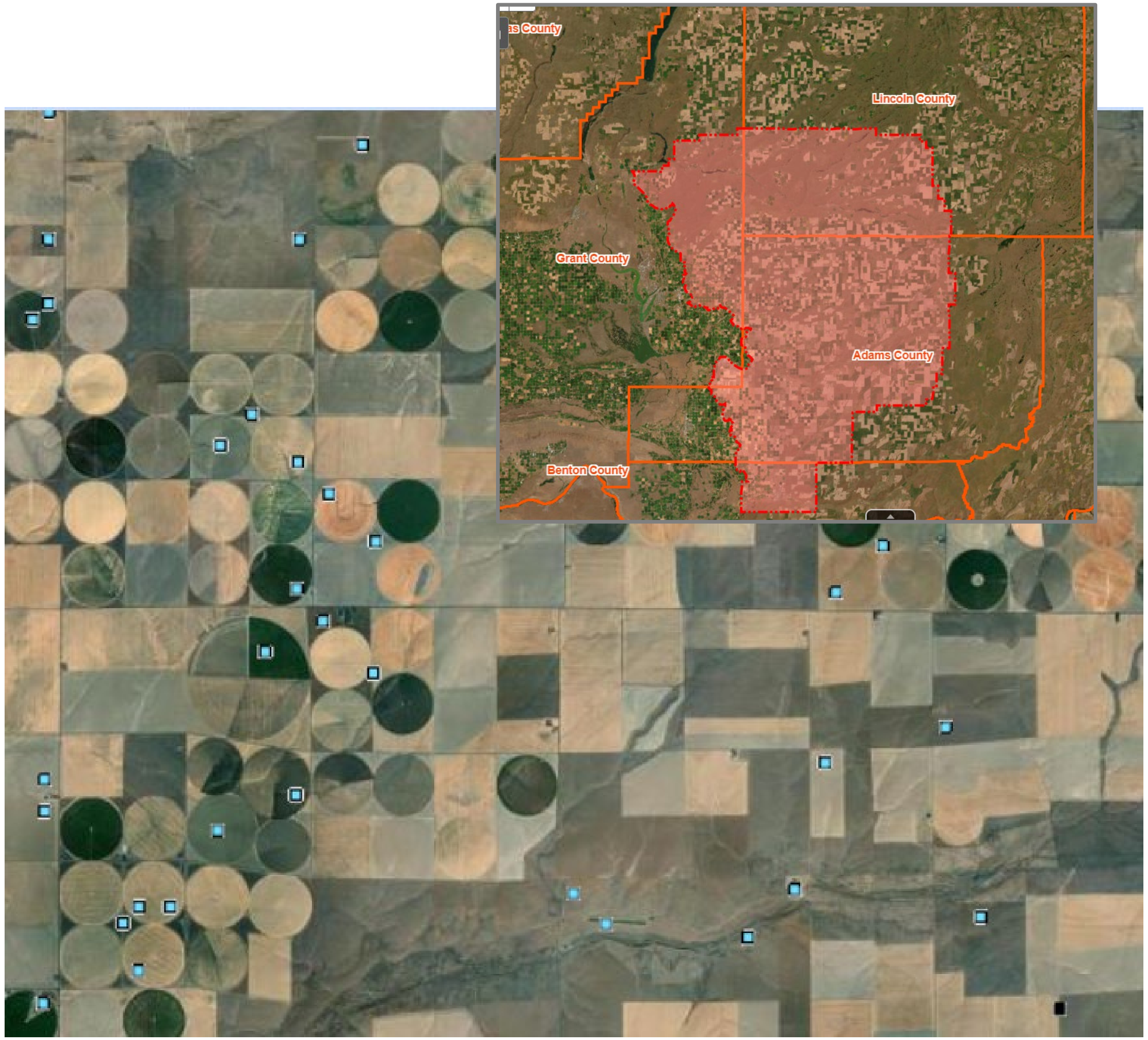
A5: Aquifer Recharge by Deep Well Injection Network

Benefits :

- Replenish aquifer over time
- Allow use of existing muni wells/pumps (when aquifer is recharged)
- Shorter timeframe (compared to passive rehydration)

Challenges :

- Not fully efficient (could be a benefit)
- Undefined source
- Needs feasibility study
- Significant water quality treatment
- Permitting not defined



From: Ecology Online Well Log Viewer

// Alternatives for CBSWC Consideration – Project Alternatives

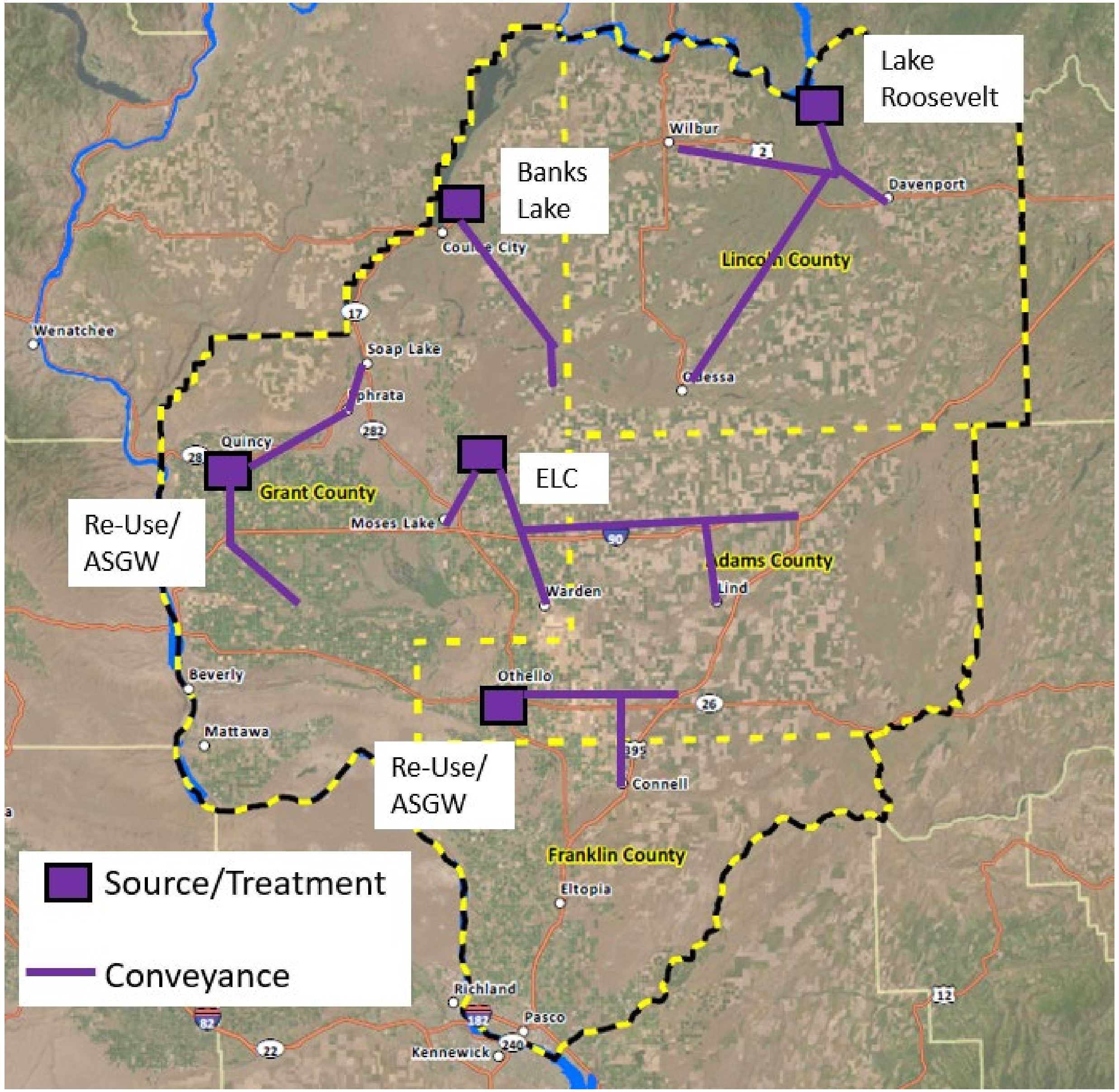
A6: New Source Treatment and Regional Distribution

Benefits :

- ~100% efficiency (piped direct)
- Some defined sources
- Technical and permitting pathways are known

Challenges :

- Cost for new infrastructure
- Challenge serving eastern communities
- Needs feasibility study



Alternatives for CBSWC Consideration – Tool Alternatives

Tool Alternatives:

- B1: Groundwater Level Monitoring
- B2: Numerical Groundwater Modeling

Alternatives for CBSWC Consideration – Tool Alternatives

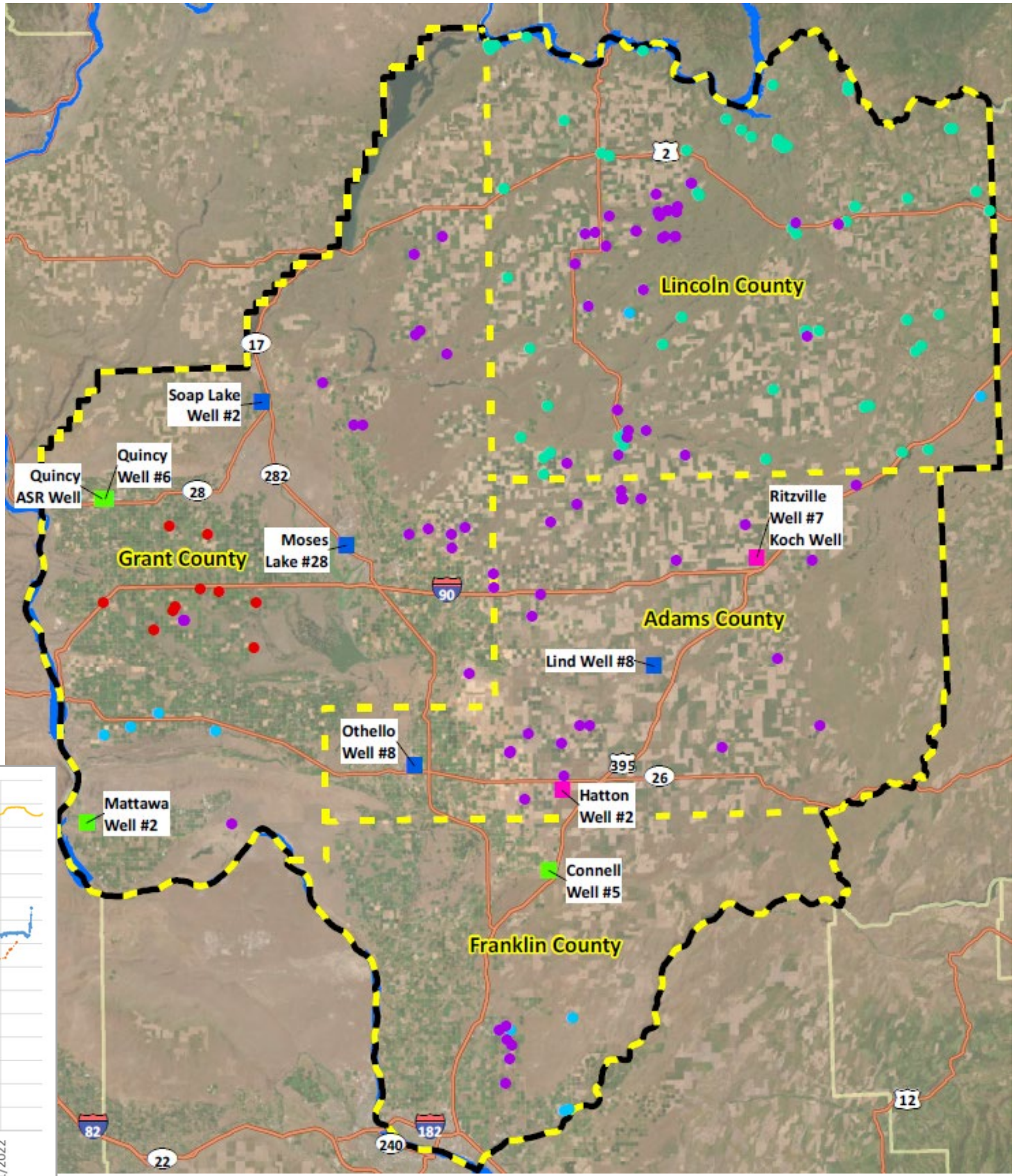
B1: Groundwater Level Monitoring

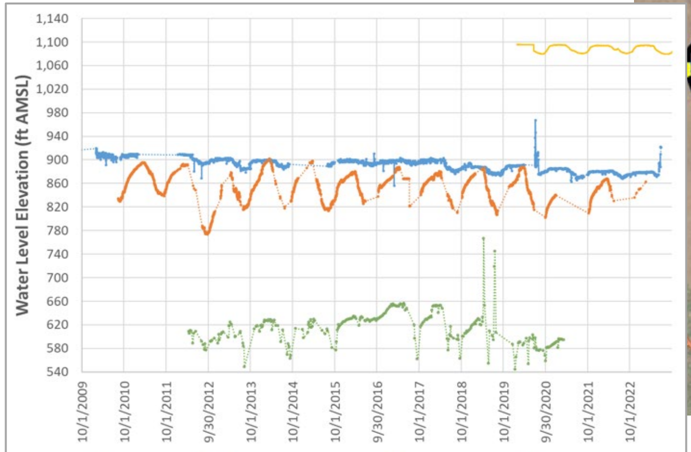
Benefits :

- Low Cost
- Direct measurements of current groundwater supplies and trends
- Helps focus resources

Challenges :

- Long-term funding sources

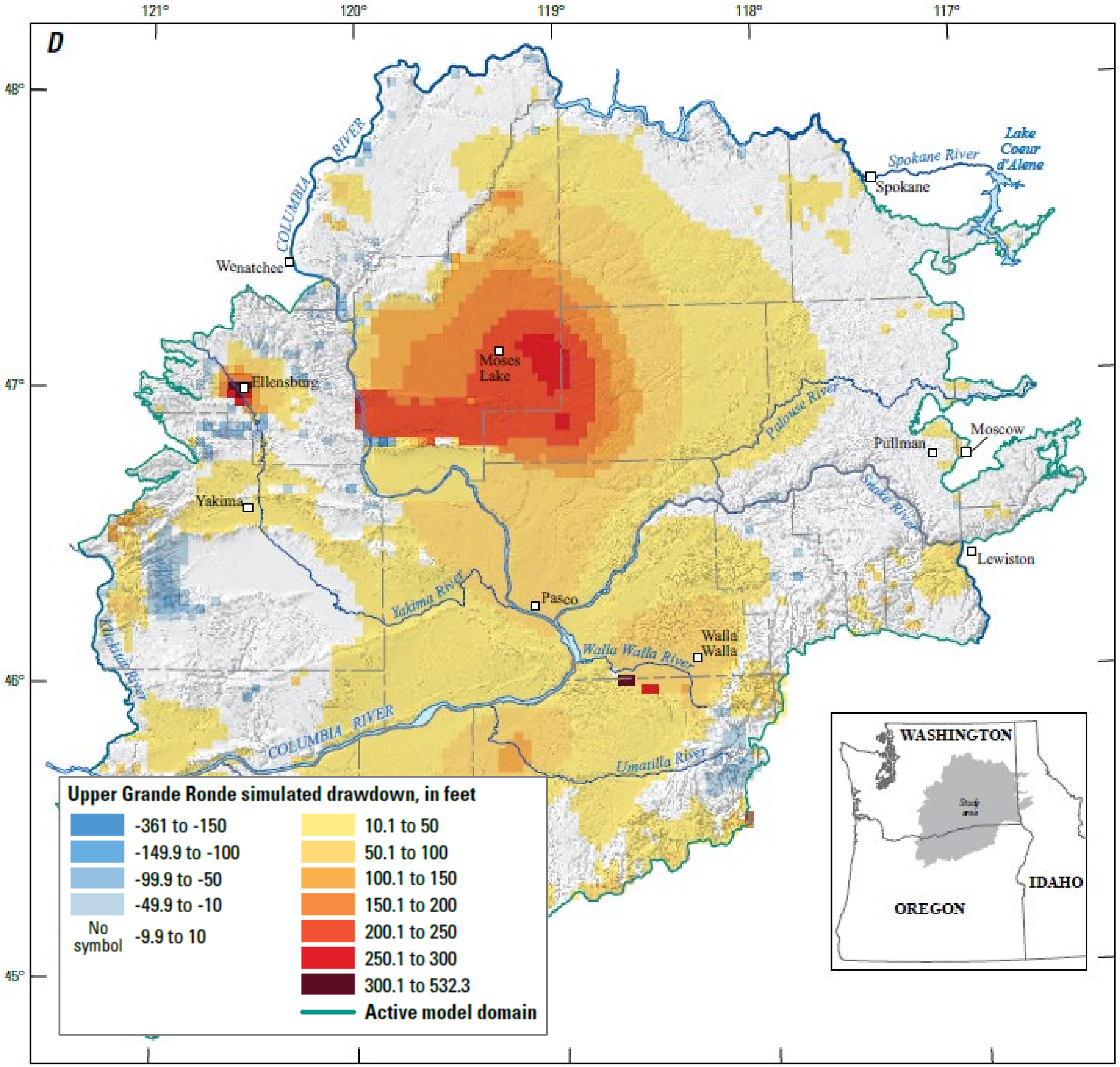




Alternatives for CBSWC Consideration – Tool Alternatives

B2: Groundwater Modeling

- Benefits :
  - Future projections of changing conditions
  - Existing models of project area
- Challenges :
  - Cost
  - Uncertainties



From: USGS SIR 2015-5127

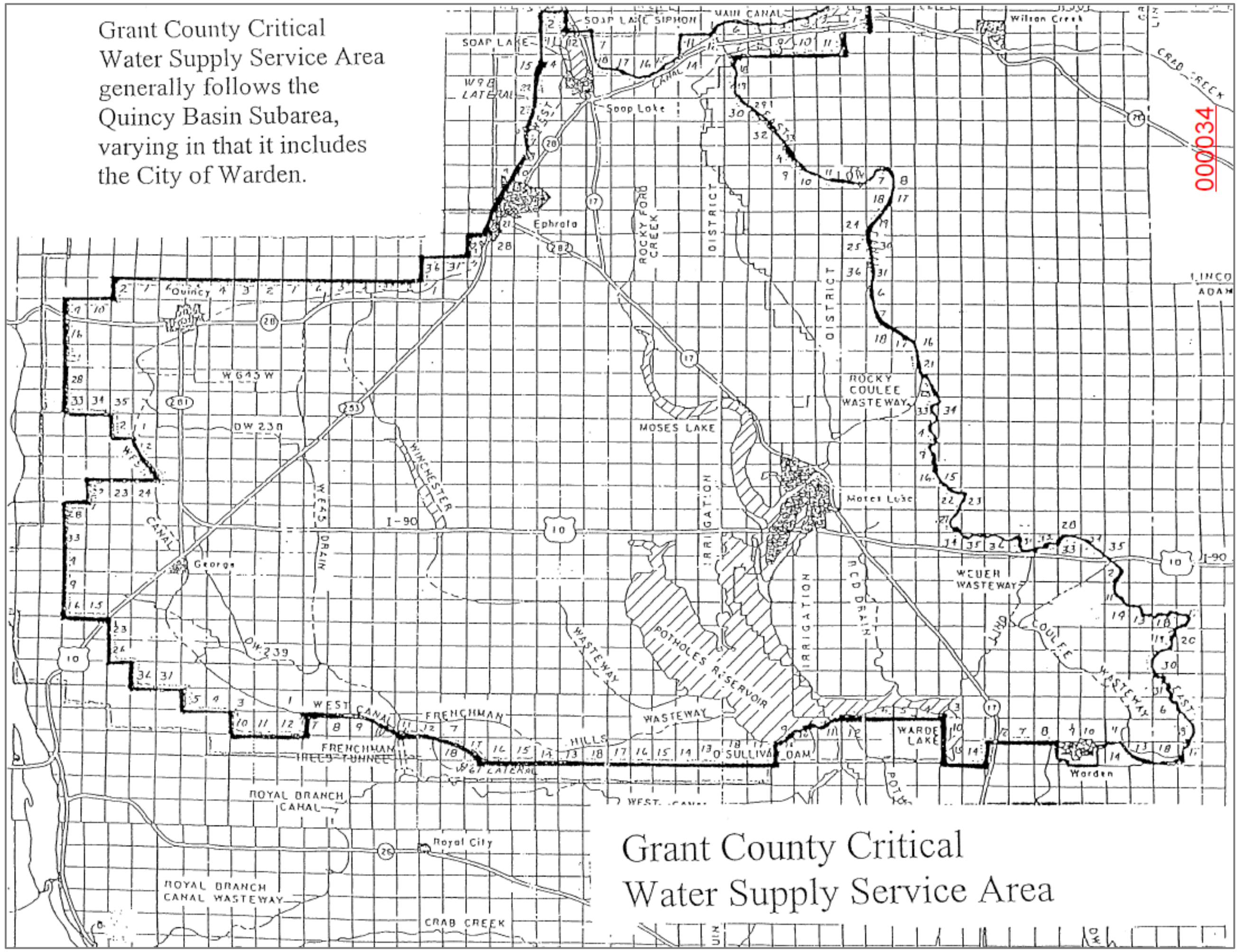
// Alternatives for CBSWC Consideration – Planning Alternatives

Planning Alternatives:

- C1: Coordinated Water System Planning
- C2: Groundwater Management Planning
- C3: Integrated Planning
- C4: US Bureau of Reclamation Basin Study

// Alternatives for CBSWC Consideration – Planning Alternatives

C1: Coordinated Water System Planning



Benefits :

- Can provide regulatory framework to limit additional groundwater withdrawals
- Opportunity for regional coordination

Challenges :

- Not intended for project implementation (more water system focused)

From: Grant County 1999

Alternatives for CBSWC Consideration – Planning Alternatives

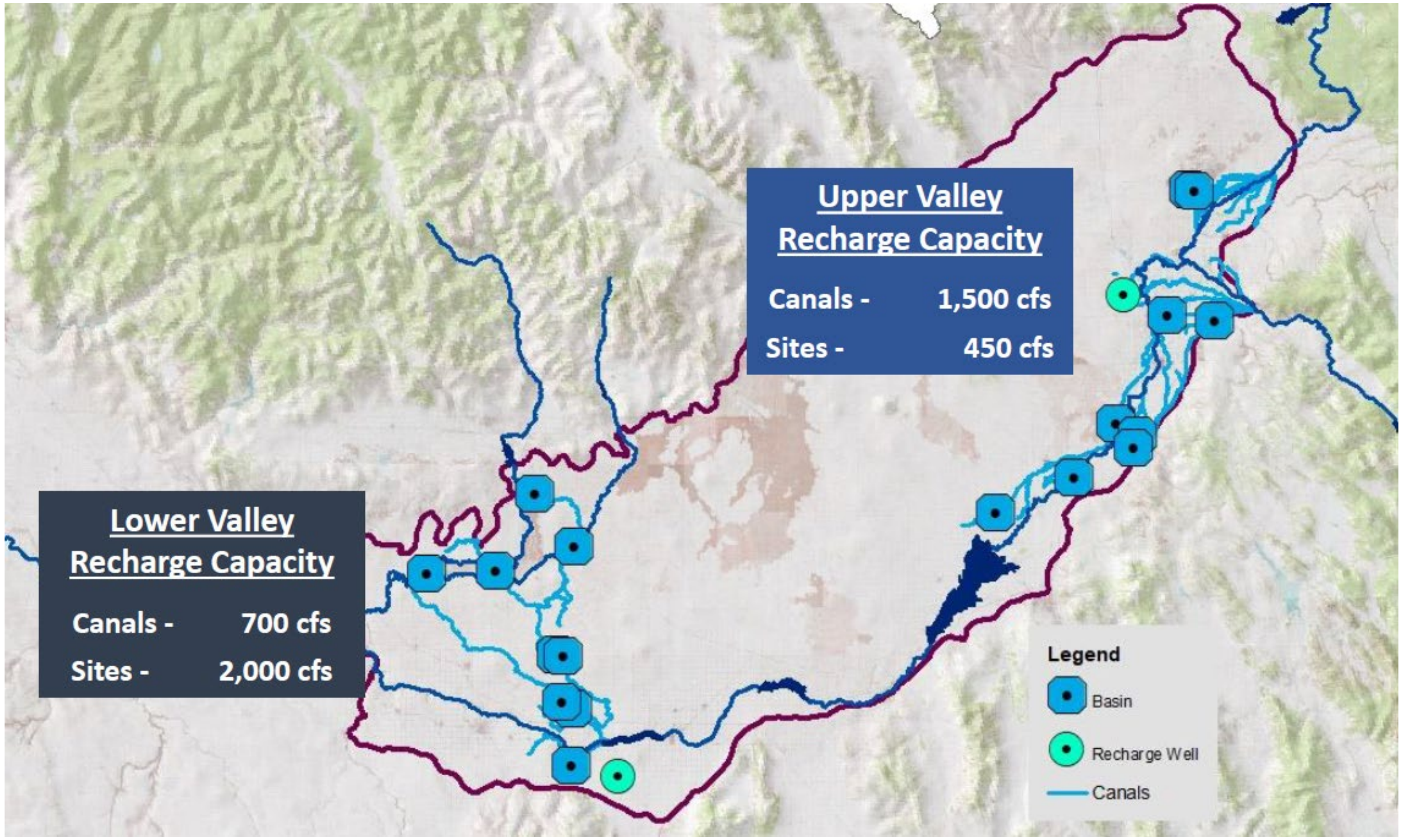
C2: Groundwater Management Planning

Benefits :

- Project-focused for groundwater supply maintenance/ augmentation
- Stakeholder-driven

Challenges :

- Stakeholder participation may be limited



From: IDWR 2023

// Alternatives for CBSWC Consideration – Planning Alternatives

C3: Integrated Planning

Benefits :

- Stakeholder-driven (and diverse stakeholders)
- Creative solutions
- Successful models exist

Challenges :

- Legislative funding required for agency participation and facilitation
- Long timeframe

"Everyone will get some of what they need, but not everything they want."
– Tom Tebb, Ecology OCR

From: www.yakimabasinintegratedplan.org

// Alternatives for CBSWC Consideration – Planning Alternatives

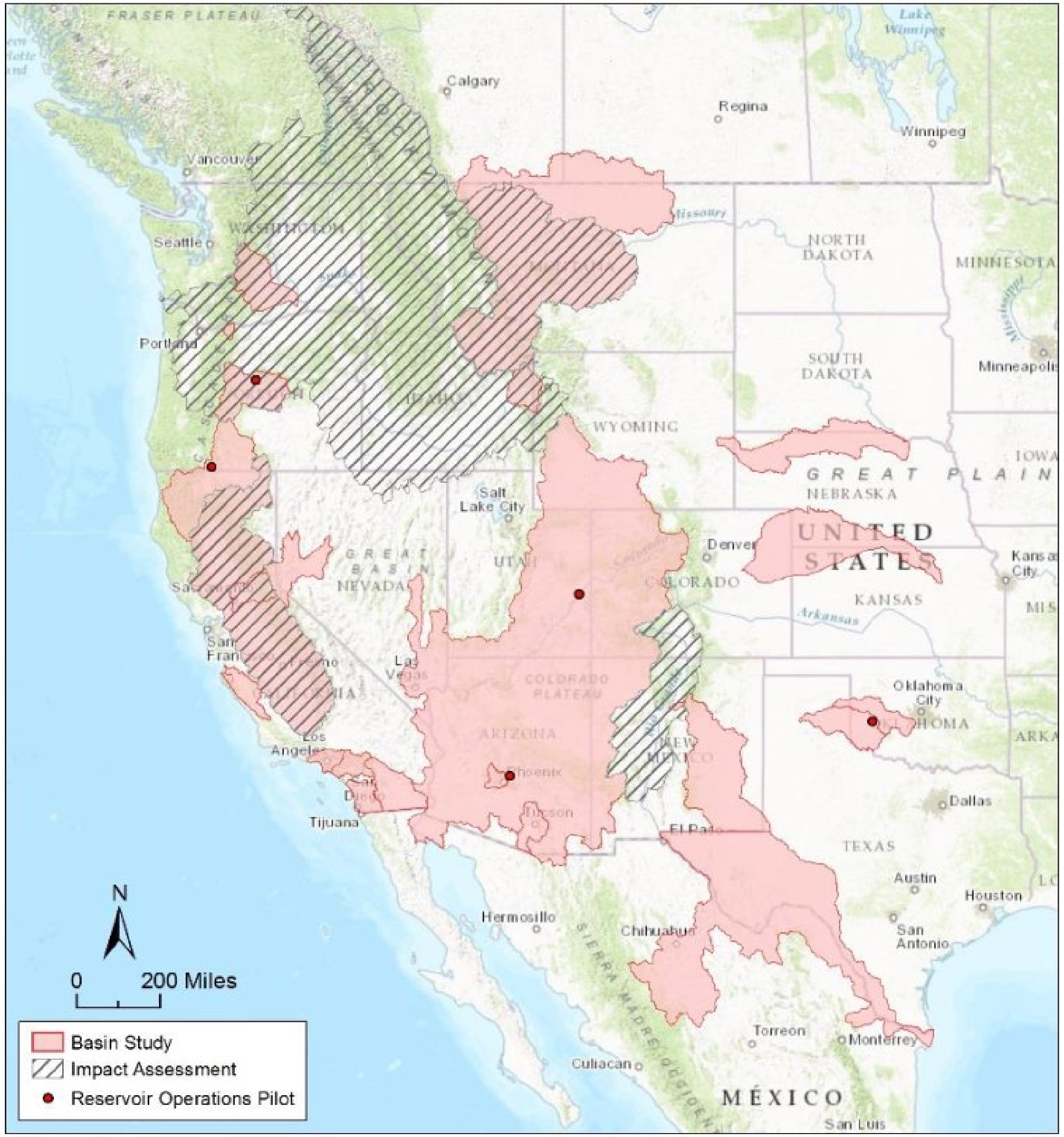
C4: USBR Basin Study

Benefits :

- Process for finding basin-wide solutions
- Stakeholder participation

Challenges :

- Non-federal entity 50% matching funds required
- USBR-driven – stakeholder control in outcomes is uncertain



From: US Bureau of Reclamation 2023

Preliminary Watershed Management Plan

Agenda:

- CBSWC Background and Project Area
- Hydrogeologic Setting
- Groundwater Level Monitoring and Trends
- Alternatives for CBSWC Consideration
  - Projects
  - Tools
  - Planning
- **Preferred Alternatives**

Preferred Alternatives

Preferred Alternative Selection Process:

- CBSWC Board and Working Group
- Criteria Categories
- Numerical Scoring of Each Alternative within Each Criteria Category
- Weighting Factor of Each Criteria Category

// Preferred Alternatives

Criteria Categories:

- Extent of Benefit (regional scores higher than local)
- Type of Benefit (tangible/physical scores higher than conceptual)
- Timing of Benefit (near-term realization scores higher than delayed)
- Certainty of Benefit (studied benefit scores higher than unstudied)
- Sustainability of Benefit (self-sustaining scores higher than short-term)
- Technical Implementability (technical feasible scores higher)
- Regulatory Implementability (known regulatory pathway scores higher)
- Cost (lower cost scores higher than greater cost)

// Preferred Alternatives

Numerical Alternative Scoring (within each Criteria Category):

- Used to designate CBSWC's level of preference for each Alternative within each Criteria Category
- Scale:
  - 1: Poor; Does not achieve CBSWC's objectives
  - 2: Fair; Only achieves a small part of CBSWC's objectives
  - 3: Good; Achieves some of the CBSWC's objectives
  - 4: Very Good; Achieves most of CBSWC's objectives
  - 5: Excellent; Achieves all of CBSWC's objectives

// Preferred Alternatives

Weighting Factors:

- Used to designated CBSWC's perspective on relative importance of each Criteria Category to emphasize or de-emphasize certain criteria
- Scale:
  - 1: Lower Importance
  - 2: Moderate Importance
  - 3: Higher Importance

	Extent of Benefit			**Type of Benefit**			**Timing of Benefit**			**Certainty of Benefit**		
Notes and Range of Scores/Descriptions:	**Regional benefit is preferred over local benefit**			**Physical/tangible benefit is preferred over conceptual benefit**			**Near-term benefit is preferred over delayed benefit**			**Currently known/expected benefit is preferred over need for additional study to determine benefit**		
Alternatives - Projects	Scoring Criteria (1 to 5)	Multiplier (1 to 3)	Project Score (criteria X multiplier)	Scoring Criteria (1 to 5)	Multiplier (1 to 3)	Project Score (criteria X multiplier)	Scoring Criteria (1 to 5)	Multiplier (1 to 3)	Project Score (criteria X multiplier)	Scoring Criteria (1 to 5)	Multiplier (1 to 3)	Project Score (criteria X multiplier)
1. OGWRP			0			0			0			0
2. Full CBP Build-Out			0			0			0			0
3. Conservation			0			0			0			0
4a. Aquifer Recharge: Passive Rehydration			0			0			0			0
4b. Aquifer Recharge: Deep Well Injection Network			0			0			0			0
5. Centralized Treatment and Distribution (M&I; Col. River; Re-use; Shallow GW)			0			0			0			0
Alternatives - Tools	Scoring Criteria (1 to 5)	1	Tool Score (criteria X multiplier)	Scoring Criteria (1 to 5)	1	Tool Score (criteria X multiplier)	Scoring Criteria (1 to 5)	1	Tool Score (criteria X multiplier)	Scoring Criteria (1 to 5)	1	Tool Score (criteria X multiplier)
1. Groundwater Monitoring			0			0			0			0
2. Numerical Modeling			0			0			0			0
Alternatives - Planning	Scoring Criteria (1 to 5)		Planning Score (criteria X	Scoring Criteria (1 to 5)		Planning Score (criteria X	Scoring Criteria (1 to 5)		Planning Score (criteria X	Scoring Criteria (1 to 5)		Planning Score (criteria X
1. Coordinated Water System Planning			0			0			0			0
2. Groundwater Management Planning			0			0			0			0
3. Integrated Planning			0			0			0			0
4. USBR Basin Study			0			0			0			0

	Sustainability of Benefit			**Technical Implementability**			**Regulatory Implementability**			**Cost**			
	Benefit that is sustainable over the long-term is preferred over benefit that is only short-term			**Benefit that is easy to implement, from a construction and/or contracting perspective, is preferred over benefit that is difficult to implement**			**Benefit that is easy to permit or has a known permitting pathway is preferred over benefit that is difficult to permit or would require a novel permitting pathway**			**Lower cost is preferred over higher cost**			
Alternatives - Projects	Scoring Criteria (1 to 5)	Multiplier (1 to 3)	Project Score (criteria X multiplier)	Scoring Criteria (1 to 5)	Multiplier (1 to 3)	Project Score (criteria X multiplier)	Scoring Criteria (1 to 5)	Multiplier (1 to 3)	Project Score (criteria X multiplier)	Scoring Criteria (1 to 5)	Multiplier (1 to 3)	Project Score (criteria X multiplier)	**Total Project Score**
1. OGWRP			0			0			0			0	**0**
2. Full CBP Build-Out			0			0			0			0	**0**
3. Conservation			0			0			0			0	**0**
4a. Aquifer Recharge: Passive Rehydration			0			0			0			0	**0**
4b. Aquifer Recharge: Deep Well Injection Network			0			0			0			0	**0**
5. Centralized Treatment and Distribution (M&I; Col. River; Re-use; Shallow GW)			0			0			0			0	**0**
Alternatives - Tools	Scoring Criteria (1 to 5)	1	Tool Score (criteria X multiplier)	Scoring Criteria (1 to 5)	1	Tool Score (criteria X multiplier)	Scoring Criteria (1 to 5)	1	Tool Score (criteria X multiplier)	Scoring Criteria (1 to 5)	1	Tool Score (criteria X multiplier)	**Total Tool Score**
1. Groundwater Monitoring			0			0			0			0	**0**
2. Numerical Modeling			0			0			0			0	**0**
Alternatives - Planning	Scoring Criteria (1 to 5)		Planning Score (criteria X	Scoring Criteria (1 to 5)		Planning Score (criteria X	Scoring Criteria (1 to 5)		Planning Score (criteria X	Scoring Criteria (1 to 5)		Planning Score (criteria X	**Total Planning Score**
1. Coordinated Water System Planning			0			0			0			0	**0**
2. Groundwater Management Planning			0			0			0			0	**0**
3. Integrated Planning			0			0			0			0	**0**
4. USBR Basin Study			0			0			0			0	**0**

Preferred Alternatives

Preferred Project Alternatives Ranking:

1. Odessa Groundwater Replacement Program (A1)
2. New Source Treatment and Regional Distribution (A6)
3. Water Conservation (A3)
4. Columbia Basin Project Completion (A2)
5. Aquifer Recharge by Deep Well Injection (A5)
6. Aquifer Recharge by Passive Rehydration (A4)

// Preferred Alternatives

Preferred Tool Alternatives Ranking:

1. Groundwater Level Monitoring (B1)
2. Numerical Groundwater Modeling (B2)

// Preferred Alternatives

Preferred Planning Alternatives Ranking:

1. Integrated Planning (C3)
2. Groundwater Management Planning (C2)
3. US Bureau of Reclamation Basin Study (C4)
4. Coordinated Water System Planning (C1)

Preliminary Watershed Management Plan

Next Steps:

- Finalize the Preliminary Watershed Management Plan
- Pursue Implementation of Preferred Project, Tool, and Planning Alternatives

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