Western Snake Plain Aquifer Model (WeSPAM) Scope and Objectives

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Modeling Technical Advisory Committee Meeting

August 26, 2025

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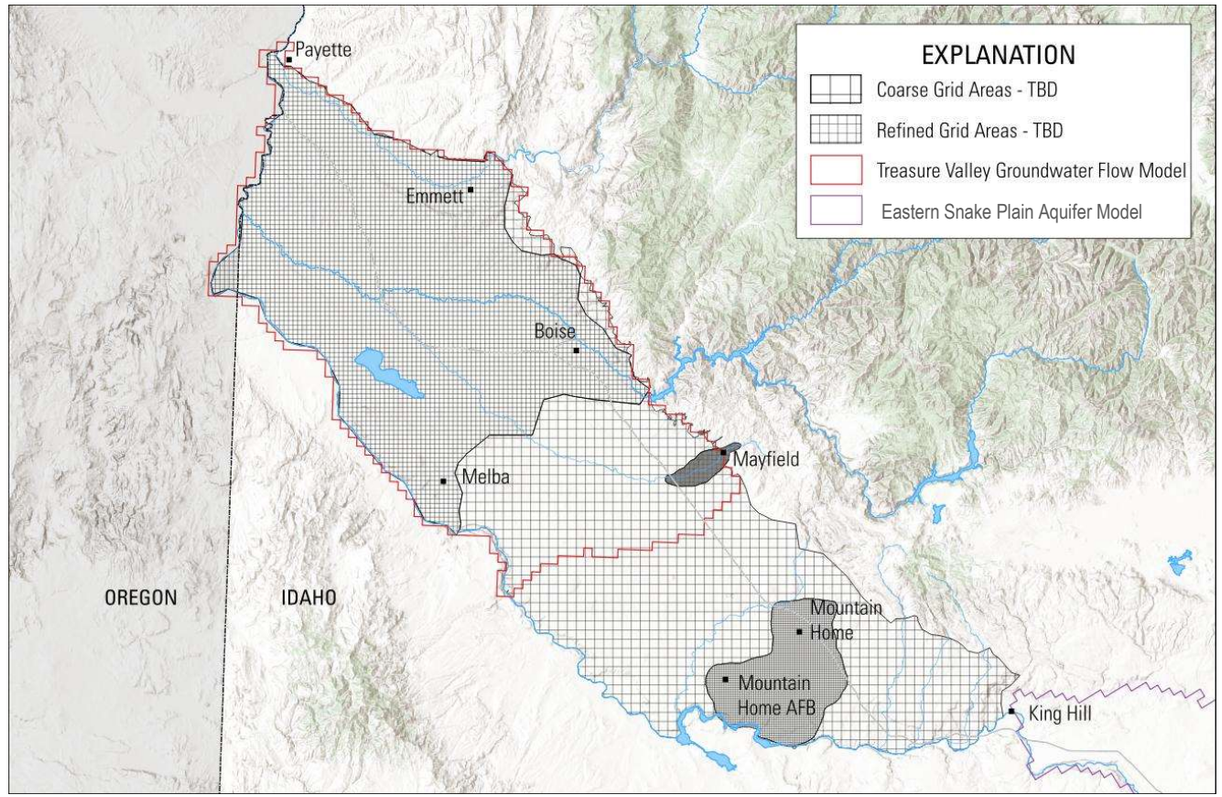
Overview

- Scope of Work
- Objectives
  - Project objectives
  - Data needs
  - Guidelines for developing model objectives
  - Model scenarios
    - Examples
    - Ideas
    - Discussion

Scope of Work

- Develop a transient numerical groundwater-flow model of the western Snake Plain
- Model consists of four refinement areas with varying cell sizes (Mayfield, Mountain Home, Treasure Valley, and the undeveloped land between them) to be solved as one model
- TVGWFM will be refined and superseded
- Historic model period will be established
- Two scenarios will be evaluated
- Model and processing scripts will be made publicly available, along with a report documenting the model



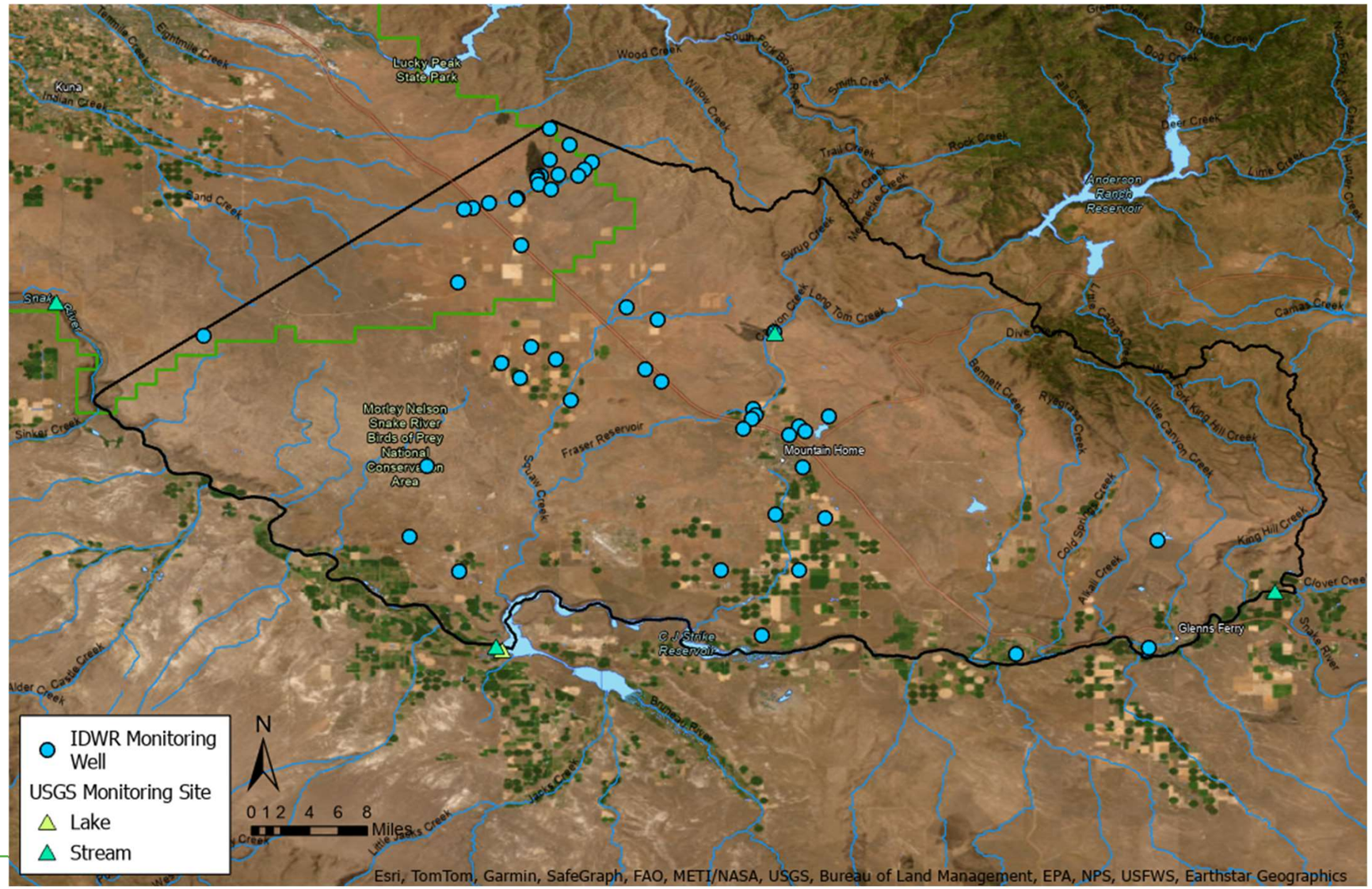
For demonstration only, final refinement areas and cell sizes are yet to be determined. Figure provided by the USGS.

General Project Objectives

- Further understanding of hydrogeology and hydrologic cycle of western Snake Plain
- Tool for IDWR to use for management of water resources
- Tool to evaluate response of groundwater system to land use, infrastructure, pumping, seasonal patterns, etc.
- Tool to evaluate impact of water use reduction/supplementation on groundwater levels
- Provide model development tools that can be adapted for generating complex scenarios
- Provide a versatile model that can be used at the appropriate scale for management questions
- Develop a tool that's accessible for groundwater modelers to learn and use
- Provide a model with sufficient run-times to perform parameter estimation and uncertainty assessment
- Lessen maintenance burden on IDWR for maintaining multiple models

Data Needs

- Reservoir info including inflow, outflow, and stage
- Diversions and field-scale water use
- Stream gage data, especially flows to the Snake River from eastern tributaries
- Recharge volumes and future plans
- Canal loss
- Groundwater levels



USGS and IDWR monitoring sites in the Mountain Home area

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Specific Model Objective Guidelines

Objectives should be identified early:

- Necessary to build the right tool for the job

Objectives should be specific:

- What questions are we trying to answer?
- What features will the model need to include to answer these questions?
- What model outputs are required to answer questions?

Objectives should guide model complexity:

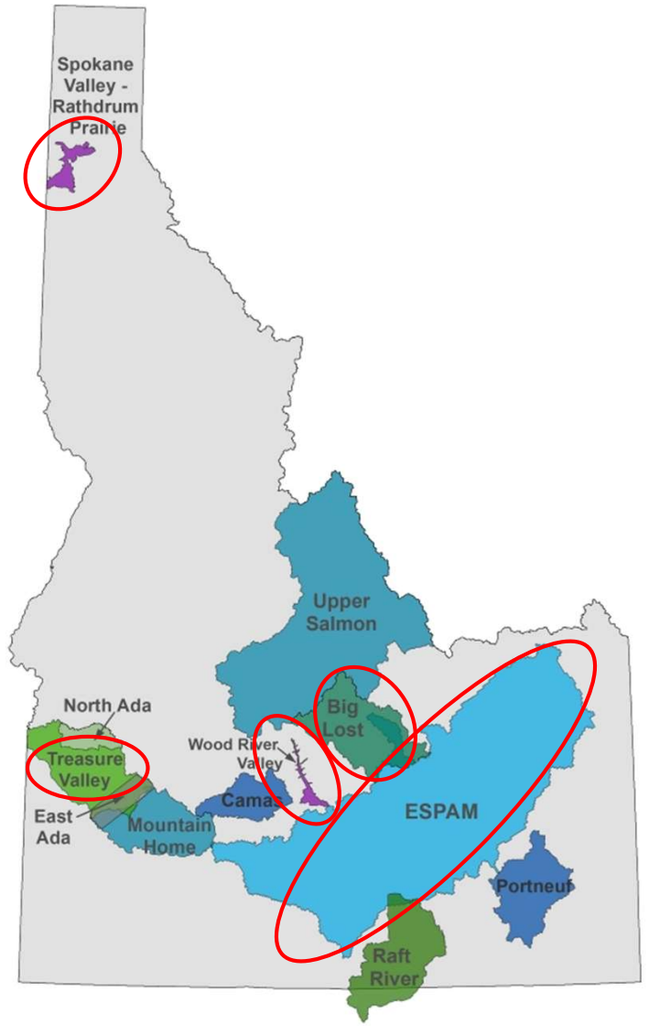
- What level of model complexity is needed to answer questions without overcomplicating, increasing runtime, decreasing accessibility, etc.

Objectives should be relevant:

- What problems need to be solved/questions need to be answered to assist with real-life decision-making

Other IDWR and/or USGS GW Models

- Eastern Snake Plain Aquifer
- Treasure Valley
- Wood River Valley
- Spokane Valley – Rathdrum Prairie
- Big Lost River Basin (in progress)



Model Scenario Example: Treasure Valley Recharge

- Simulated ten managed aquifer recharge scenarios using TVGWFM
- Accomplished by using MODFLOW 6 to simulate application of recharge water with specific locations, flow rates, and timing
- Goal was to quantify the effect of each recharge scenario on groundwater levels, discharge to rivers, Lake Lowell, and the New York Canal, discharge to drains, changes in aquifer storage, and recharge retention in storage
- Resulted in ranking of recharge scenarios based on quantified benefits

Table 5. Criteria Rankings and Composite Scores

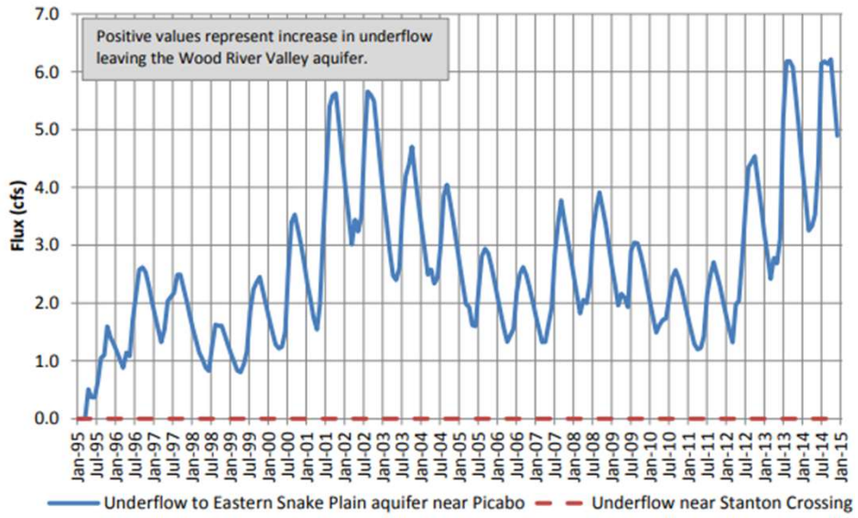
Scenario	Water Source/ Intake Location	Maximum Groundwater Mounding	Minimum Depth to Water	Maximum Monthly Discharge to Surface Water [a]	Maximum Change in Aquifer Storage	Average Annual Recharge Retention in Aquifer Storage	Sum of All Scores	Rank
B-2	Payette River (below Letha)	1	2	11	4	2	20	1
F	Boise River/ New York Canal	2	1	23	7	1	34	2
G-2	Boise River/ New York Canal	7	7	12	3	6	35	3
C	Boise River (below Diversion Dam)	3	3	27	7	3	43	4
B-1	Boise River (near Caldwell)	3	3	27	7	3	43	4
A	Snake River (below Murphy)	10	10	27	1	10	58	6
E	Boise River (below Diversion Dam)	5	5	38	6	5	59	7
G-1	Boise River/ New York Canal	8	9	30	7	7	61	8
H	Boise River/ New York Canal	9	8	40	5	8	70	9
D	Snake River (below Murphy)	6	6	56	2	9	79	10

[a] *Sum of individual scores for each surface water body.*

Scoring and ranking of recharge scenarios based on modeled aquifer impacts (Brown and Caldwell, 2024)

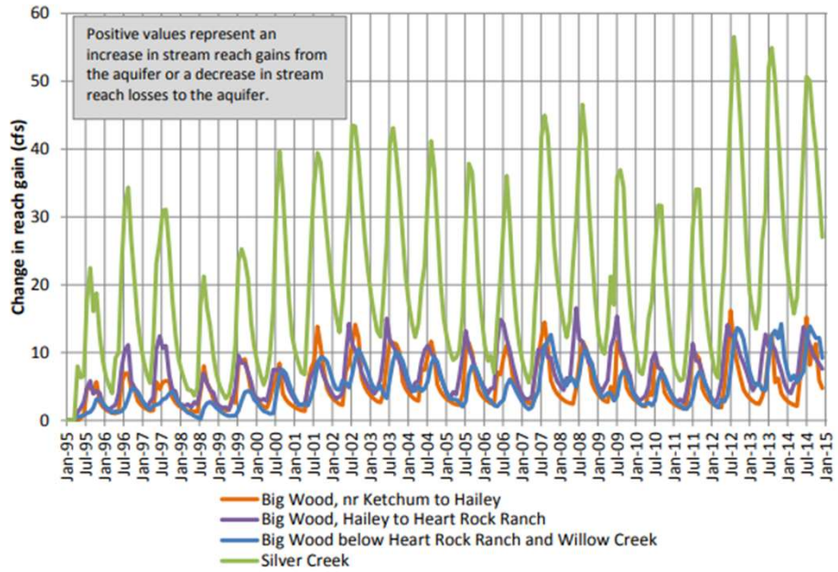
Model Scenario Example: Wood River Valley Curtailment

- Simulated curtailment of non-exempt groundwater irrigation
- Accomplished by reducing baseline groundwater pumping and incidental recharge
- Goal: Provide general information regarding the impacts of the consumptive use of groundwater in the Wood River Valley on surface water flow in the Big Wood River and Silver Creek
- Resulted in quantification of increased streamflow in Big Wood and Silver Creek and increased GW underflow



Increase in groundwater underflow in response to 1995-2014 curtailment scenario (Sukow, 2019)

Increases in streamflow in response to 1995-2014 curtailment scenario (Sukow, 2019)



Potential WeSPAM Scenarios

- These scenarios are presented as ***examples***
- Final scenarios and scenario details will be discussed extensively with the MTAC
- Scenarios presented here are meant to jumpstart brainstorming and discussion

Potential WeSPAM Scenario: Recharge near Mountain Home

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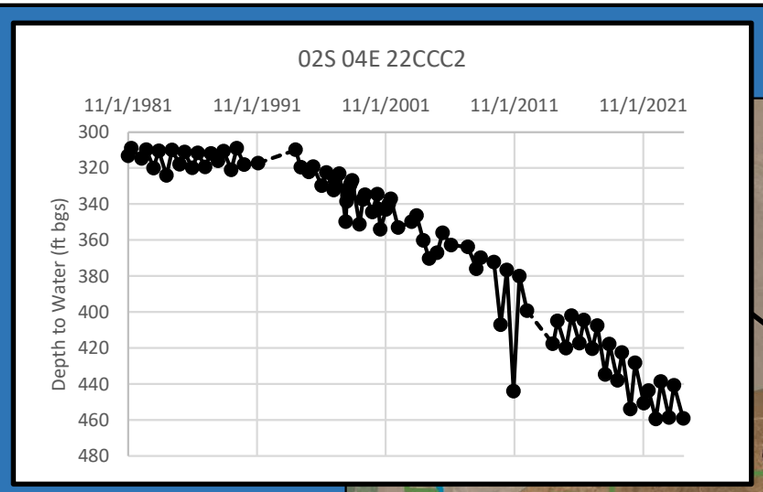
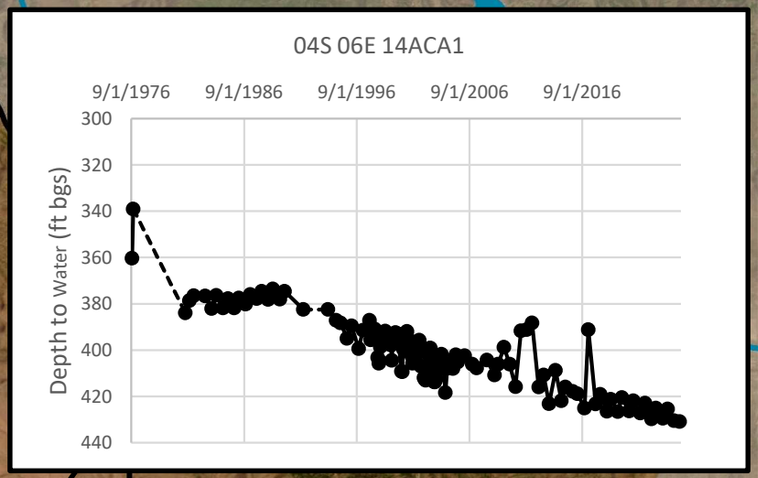
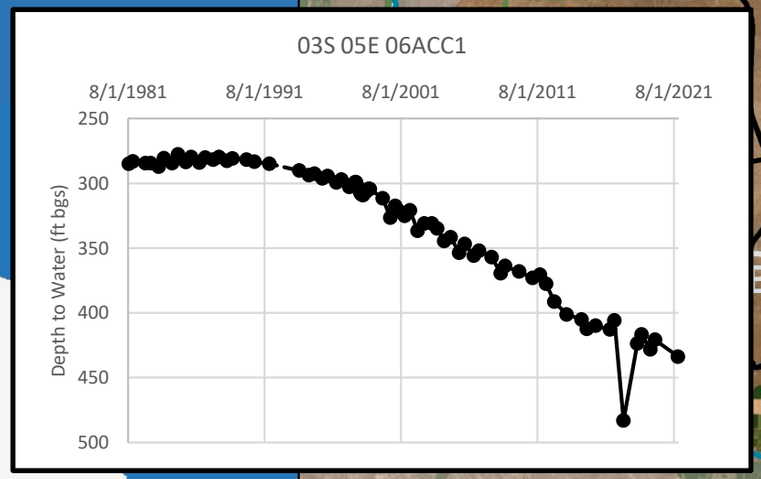
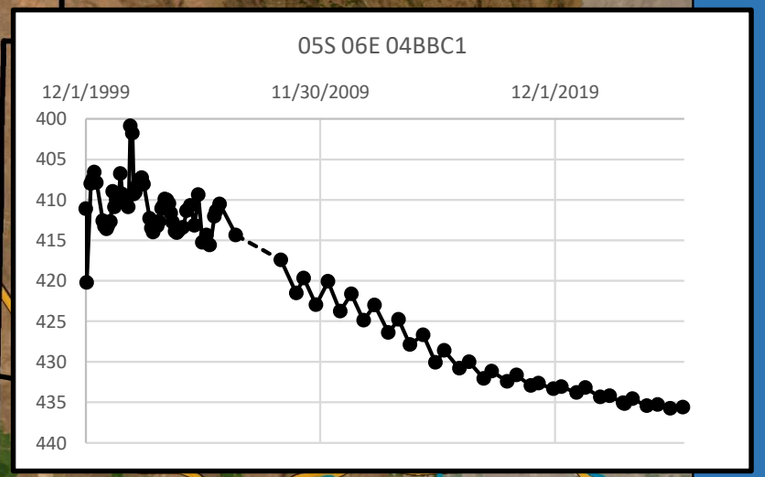
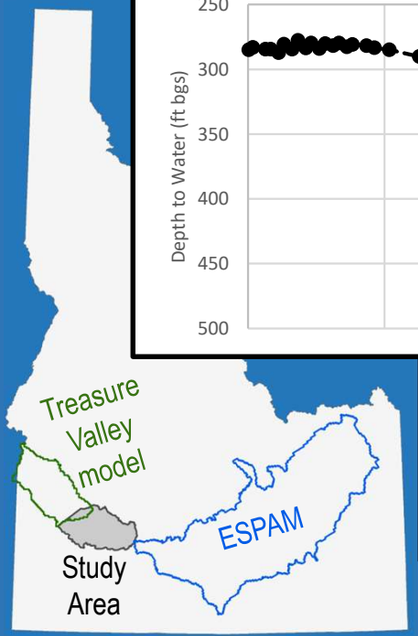
Continued water-level declines in Mountain Home area











Elmore County

Mountain Home

MHAFB

NORTH

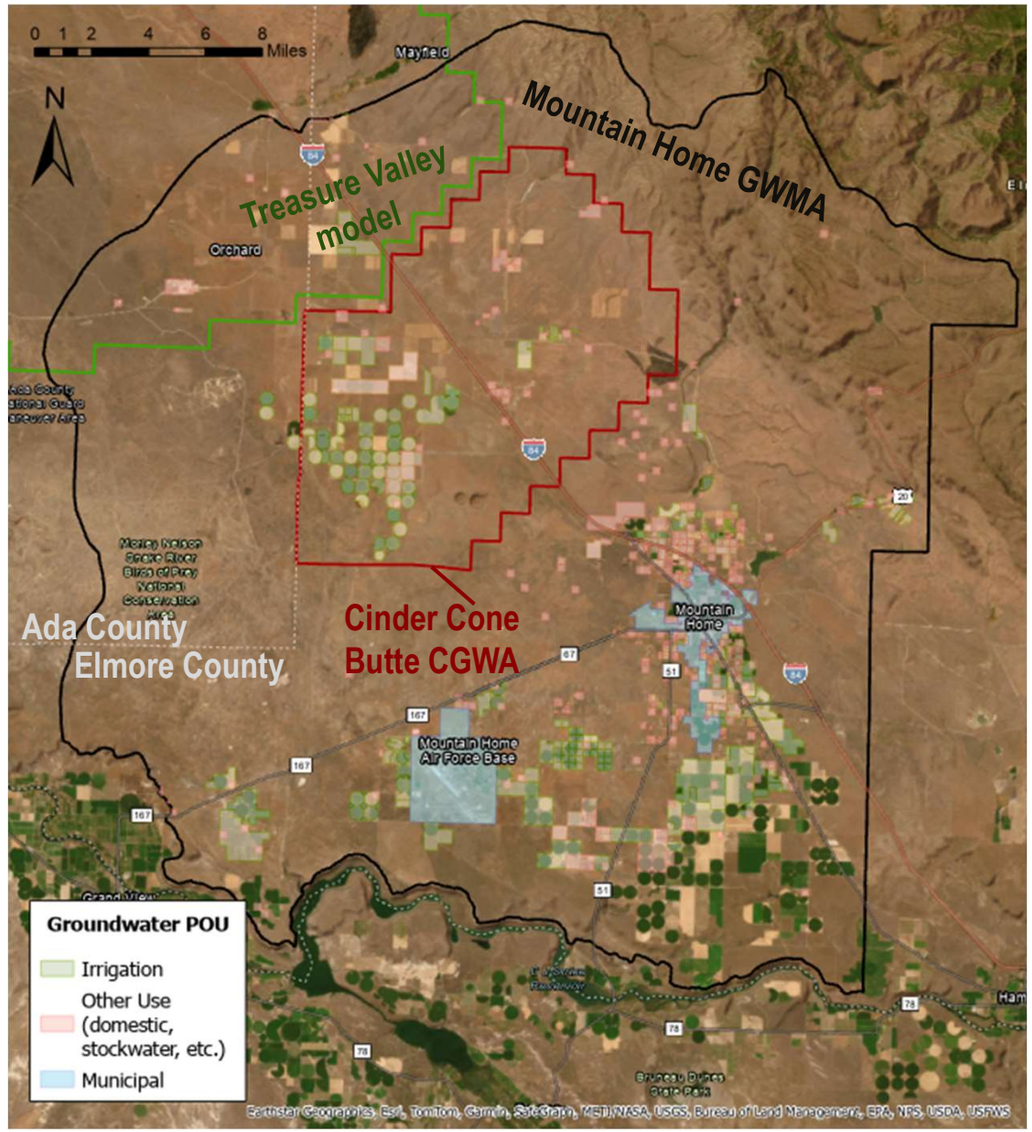
IDWR monitoring well

Miles

0 10 20

Potential WeSPAM Model Scenario: Recharge near Mountain Home

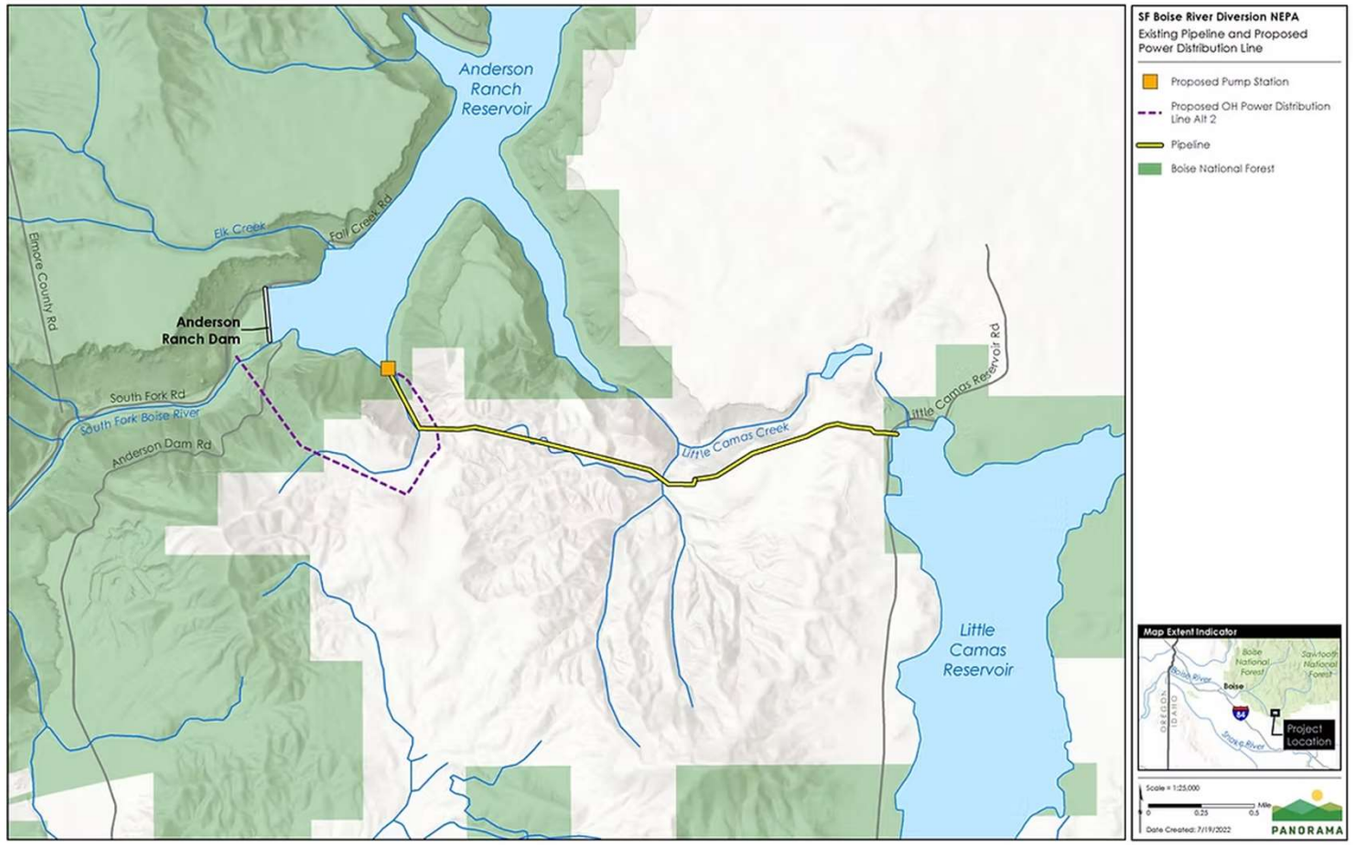
- Groundwater is vital for the economy and the livelihood of the Mountain Home Community
- Mountain Home area relies on groundwater to meet some irrigation and all municipal needs for the City of Mountain Home and Mountain Home Air Force Base
- Significant uncertainty related to potential population growth, activities at MHAFB, and continued groundwater declines shed light on the need to focus on aquifer health



Groundwater places of use in Mountain Home GWMA and Cinder Cone Butte CGWA

Potential WeSPAM Model Scenario: Recharge near Mountain Home

- Elmore County is currently evaluating managed aquifer recharge (MAR) projects to raise groundwater levels
- South Fork Boise River Diversion Project would involve delivery of water from Anderson Ranch Reservoir to the Mountain Home area to be used as recharge water in gravel pits and be used as supplemental irrigation water



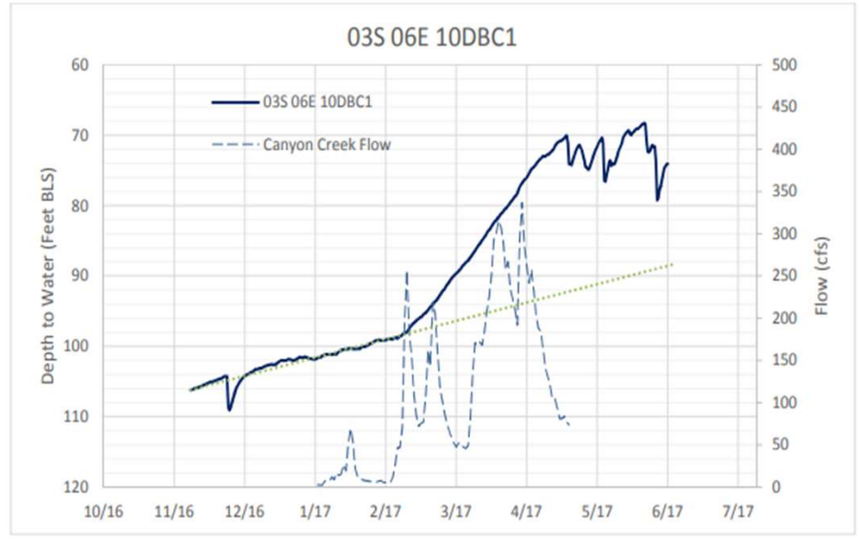
SFBR proposed pipeline from Anderson Ranch Reservoir to Little Camas Reservoir, from which it will be diverted to the Mountain Home area for aquifer recharge and supplemental irrigation (https://www.sfbrdiversion.com/copy-of-background, 2025)

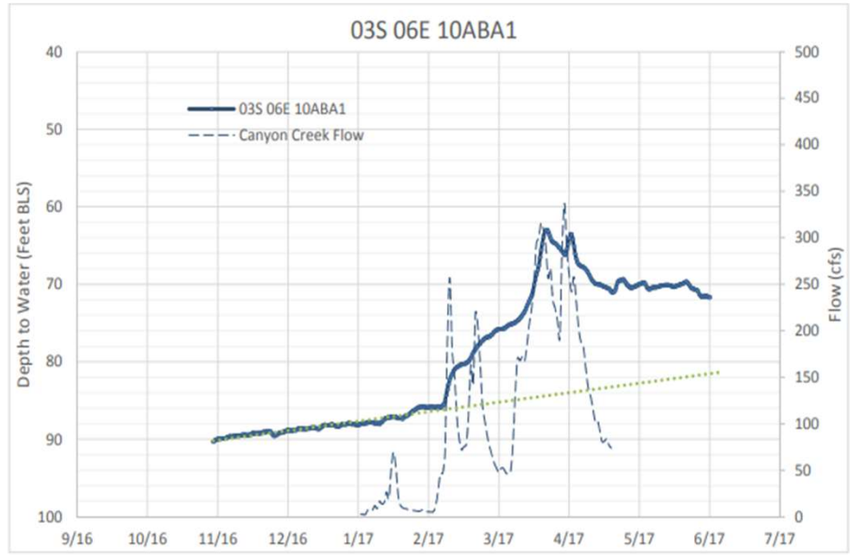
Potential WeSPAM Model Scenario: Recharge near Mountain Home

- History of successful aquifer recharge in the area
  - In Spring 2017, Canyon Creek water was diverted into two gravel pits

Canyon Creek recharge area (Owsley, 2017)

- Two monitored wells indicated positive water-level response to recharge water, with water level rises of ~22 ft





Hydrographs for wells near Canyon Creek recharge area (Owsley, 2017)

Potential WeSPAM Model Scenario: Recharge near Mountain Home

- A Mountain Home recharge scenario run in WeSPAM would allow for quantification of aquifer storage impacts for different recharge locations, volumes, and timings, to maximize recharge benefits
- This could follow a similar modeling process as the previously described Treasure Valley recharge modeling.

Why? Proposed groundwater development

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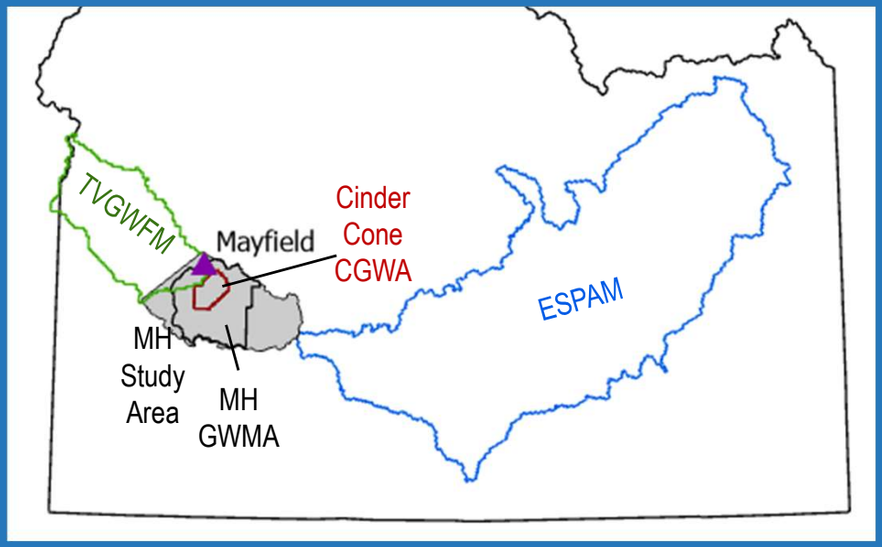
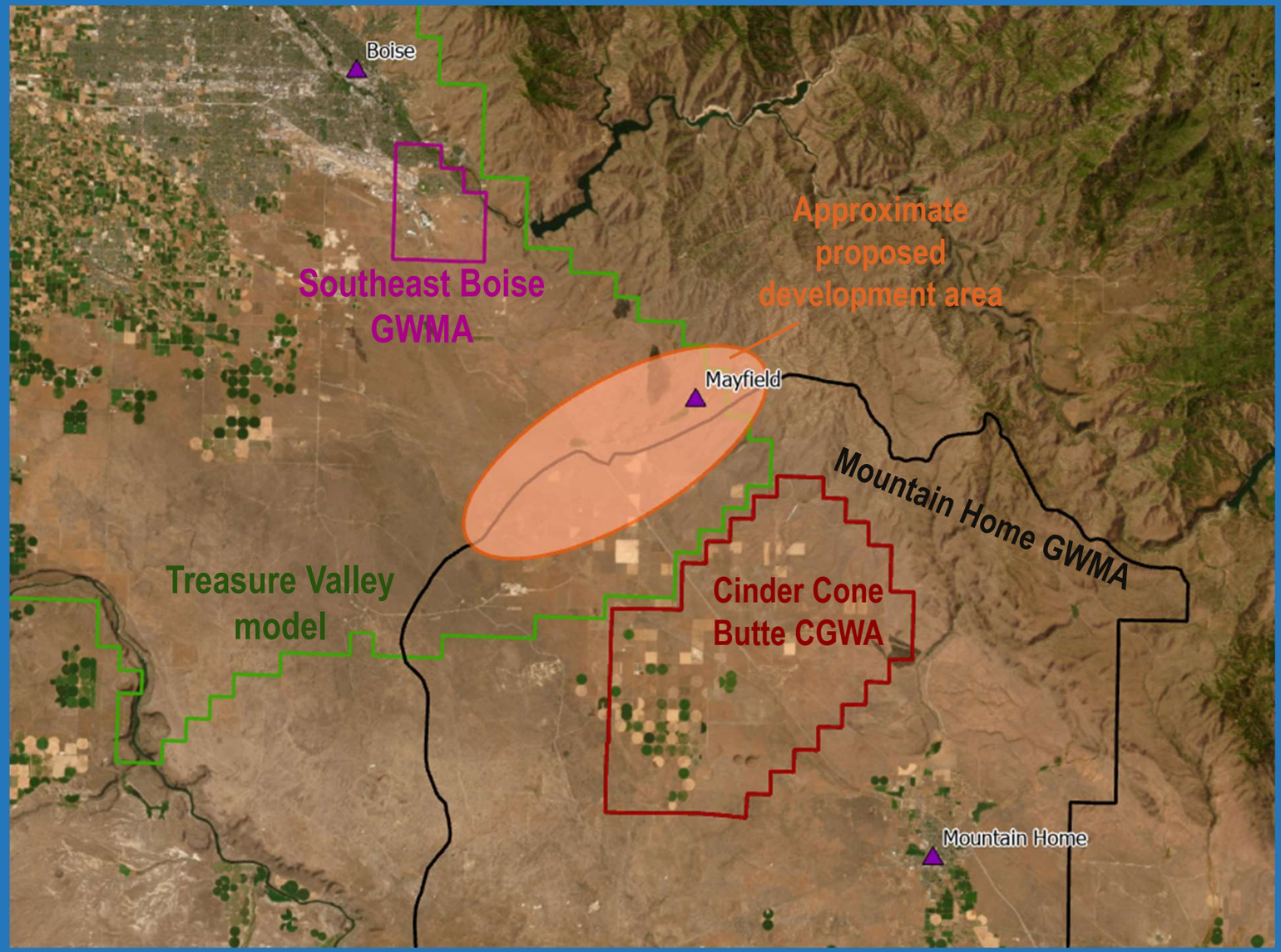
Groundwater development is proposed in the Mayfield area

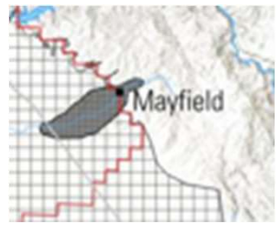
Located near the TVGWFM boundary and adjacent to the Mountain Home GWMA

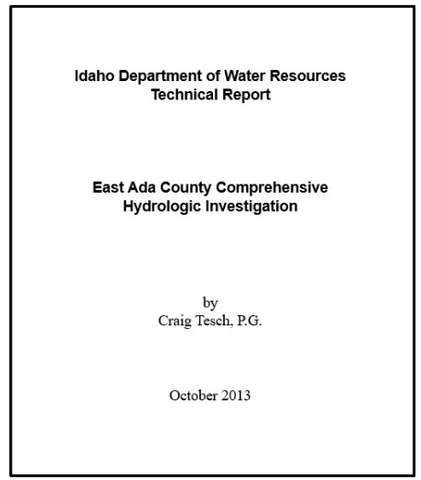




Potential WeSPAM Model Scenario: Pumping Impacts near Mayfield

- Previous reports have established a water budget in the area to estimate water available for appropriation
- Model design will allow for assessment of this area via a refinement area with appropriate boundary and grid size
- Groundwater modeling scenario could allow for assessment of groundwater levels and aquifer storage changes resulting from additional pumping
- Could be achieved by simulating additional groundwater pumping





Idaho Department of Water Resources
Technical Report

East Ada County Comprehensive
Hydrologic Investigation

by
Craig Tesch, P.G.

October 2013

What do you think?

- Feedback on these scenarios?
- Ideas for additional scenarios?
- Additional information that you need to consider potential scenarios?
- Conversations will be ongoing

Broad Objectives

- Further understanding of hydrogeology and hydrologic cycle of western Snake Plain
- Tool for IDWR to use for management of water resources
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As a reminder…

- Even if your scenario does not advance, your input is still valuable so that the model can suit your needs
- The model and scripts will be made publicly available to allow for use by the public
- While no model is one size fits all, it can be designed in a way that it can be used for multiple scenarios or adapted to meet additional needs

Questions?

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