Western Snake Plain Aquifer Model (WeSPAM) Introduction and Background

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Modeling Technical Advisory Committee Meeting

August 26, 2025

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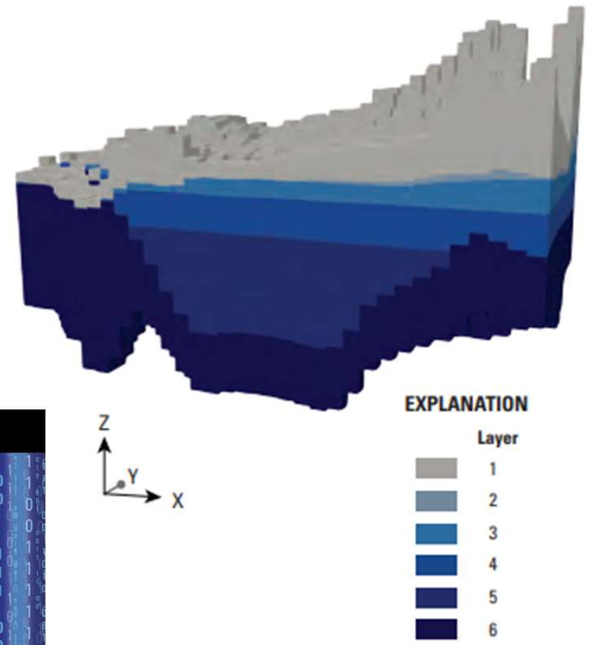
Overview

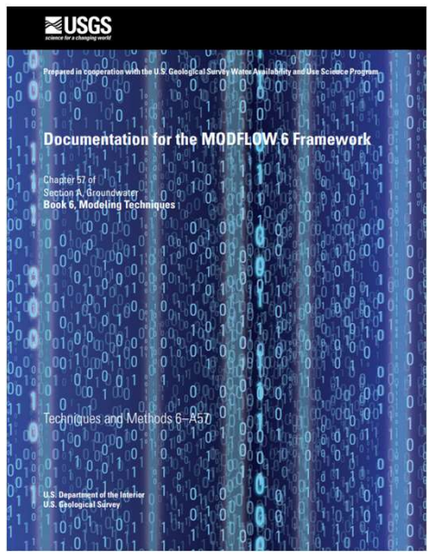
- General Background:
  - What is a groundwater flow model?
  - Conceptual model development
- WeSPAM Background:
  - Why develop WeSPAM?
    - Timeline leading up to WeSPAM development
  - Scope of work
  - Projected project timeline
  - Project budget
  - Roles and responsibilities
  - Transparency

What is a groundwater flow model?

- Mathematical representation of a groundwater system
- Computer program that solves the groundwater flow equation to simulate the processes of a real aquifer
- Simulations are run to assess effects the effects of hydrologic stresses on an aquifer
- IDWR uses MODFLOW
  - Developed by USGS
  - Publicly available
  - Widely recognized and utilized
  - Used for other IDWR/USGS models: ESPAM, Wood River, Big Lost, Treasure Valley, Spokane Valley-Rathdrum Prairie
- WeSPAM will use MODFLOW 6



Model cross-section (Hundt, 2023)



MODFLOW 6 documentation (Hughes et al., 2017)

Conceptual Model Development

Climate:

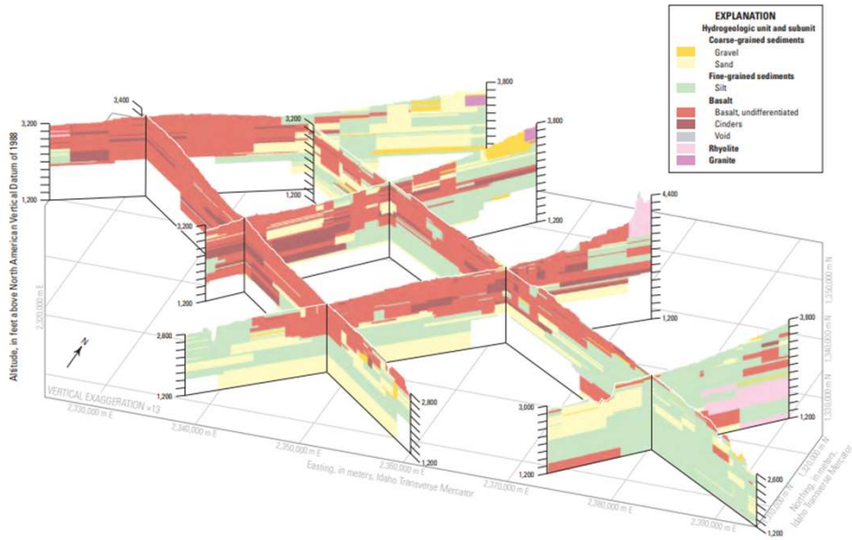
- Precipitation
- Temperature

Hydrogeology:

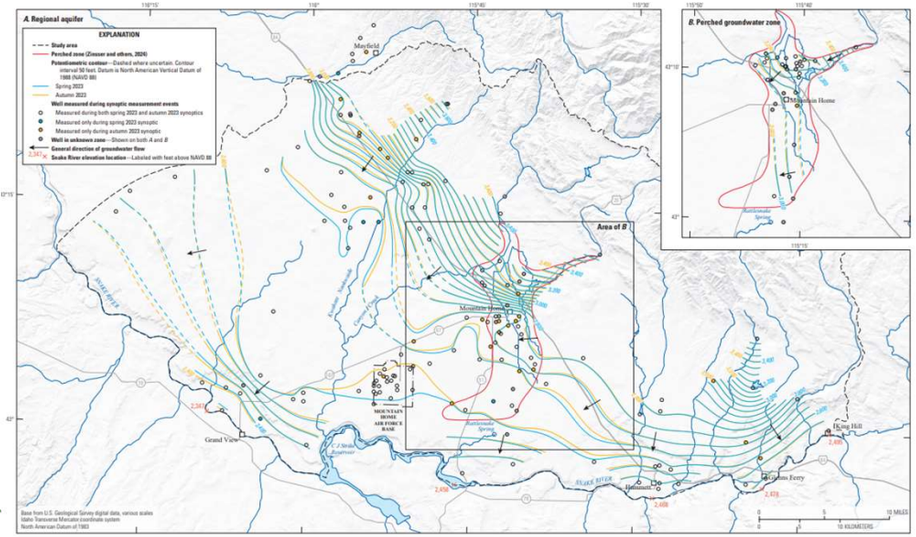
- Hydrogeologic units and properties
- Surface water and GW-SW interactions
- Groundwater levels and flow direction
- Stream gage data
- Recharge and discharge mechanisms

Water Use:

- Irrigated lands
- Surface water and groundwater diversions
- Evapotranspiration and irrigation requirements
- Municipal water use



Three-dimensional hydrogeologic framework model of the Mountain Home area (Zinsser and Ducar, 2025)



2023 groundwater contours for the Mountain Home area (Zinsser and Ducar, 2025)

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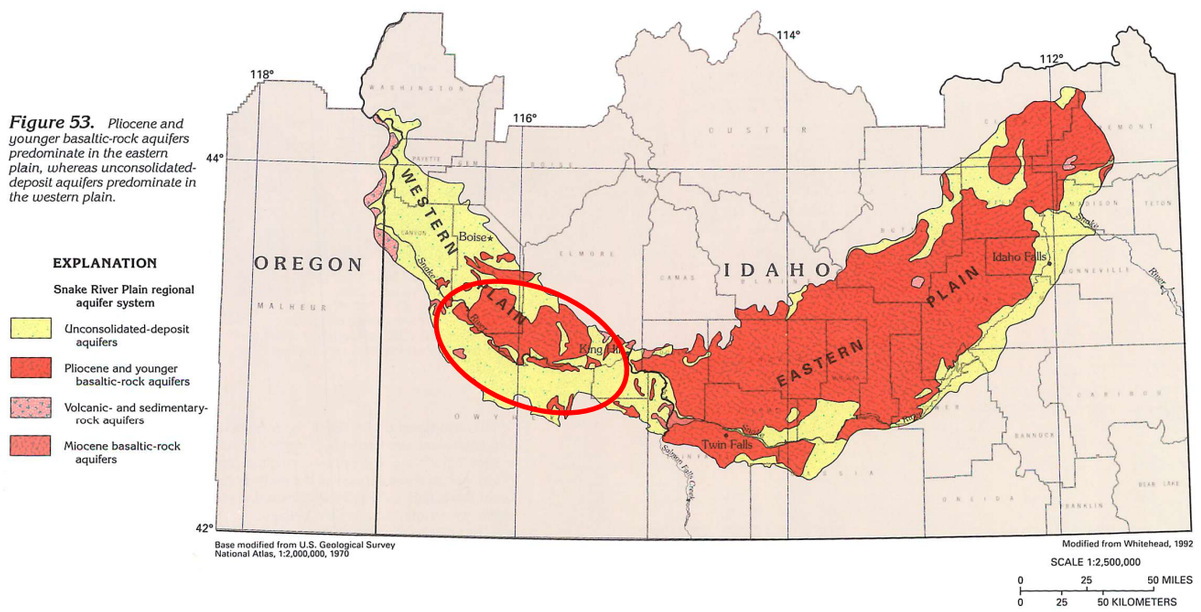
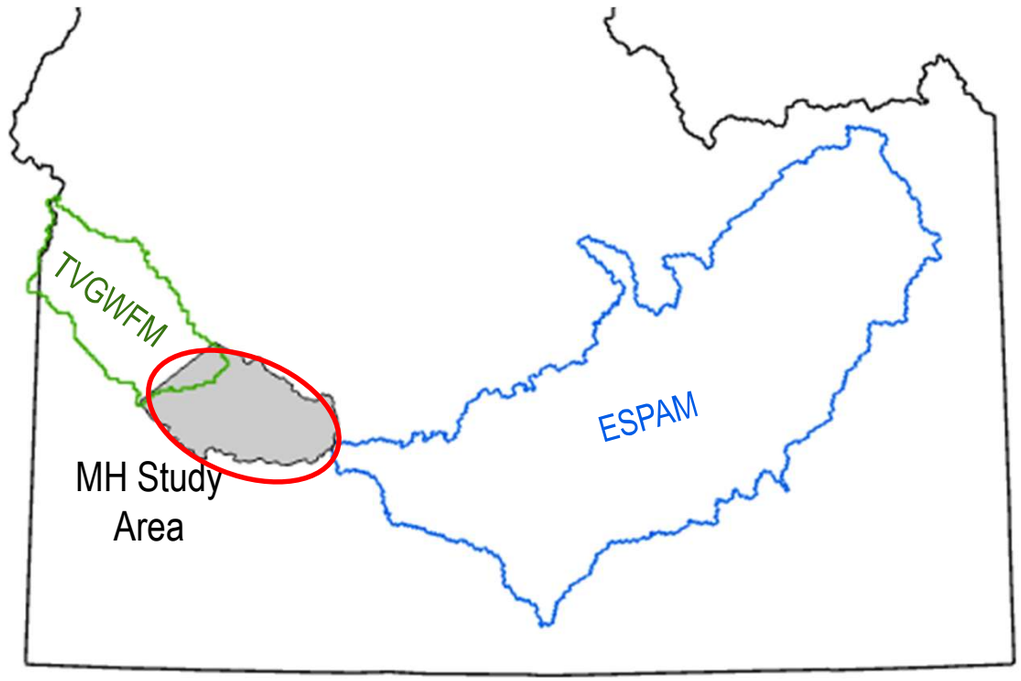
Why Develop WeSPAM?

- No hydrogeologic basis for considering the Mountain Home area separate from the Treasure Valley





Regional geology of the Snake River Plain (Whitehead, 1994)

Why? Long-term groundwater level declines in the Mountain Home Area

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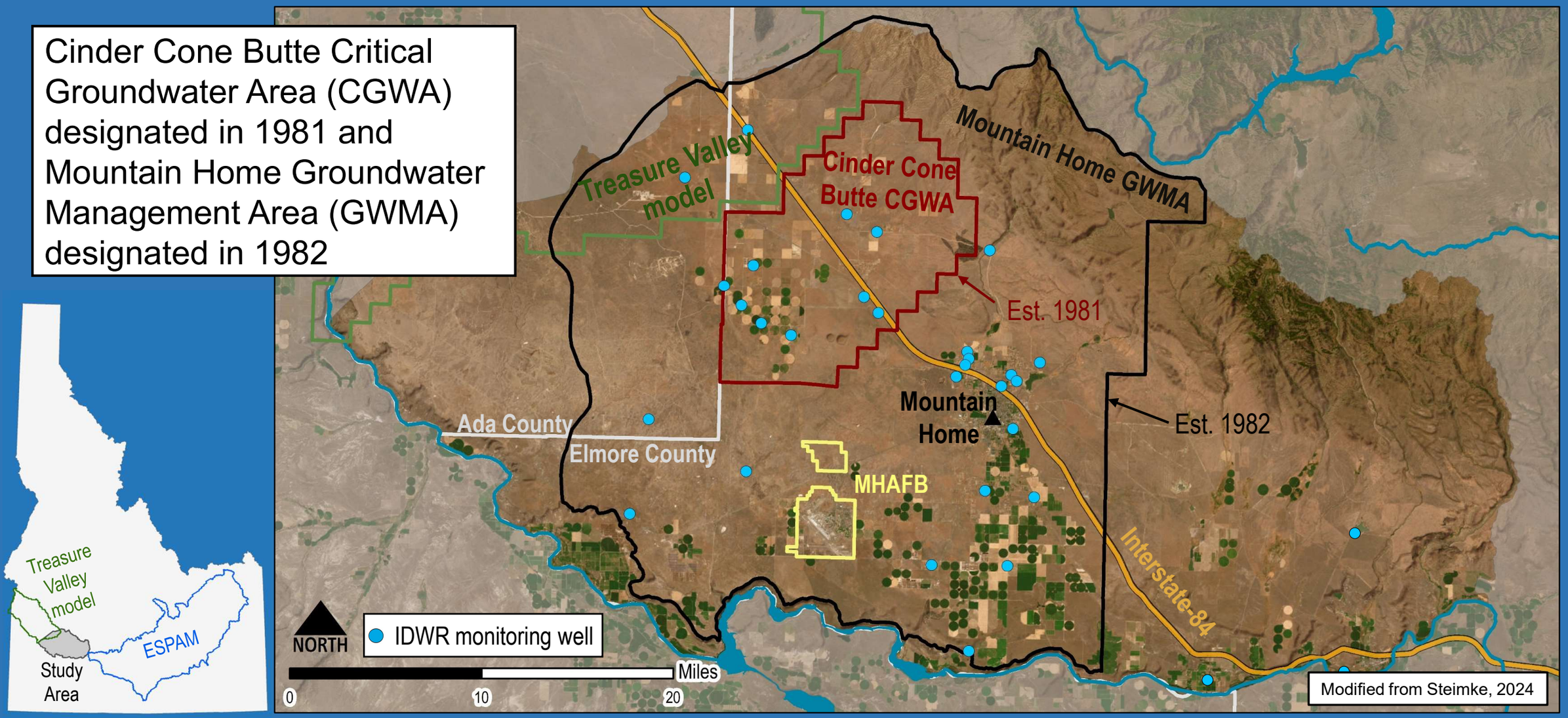
Cinder Cone Butte Critical Groundwater Area (CGWA) designated in 1981 and Mountain Home Groundwater Management Area (GWMA) designated in 1982



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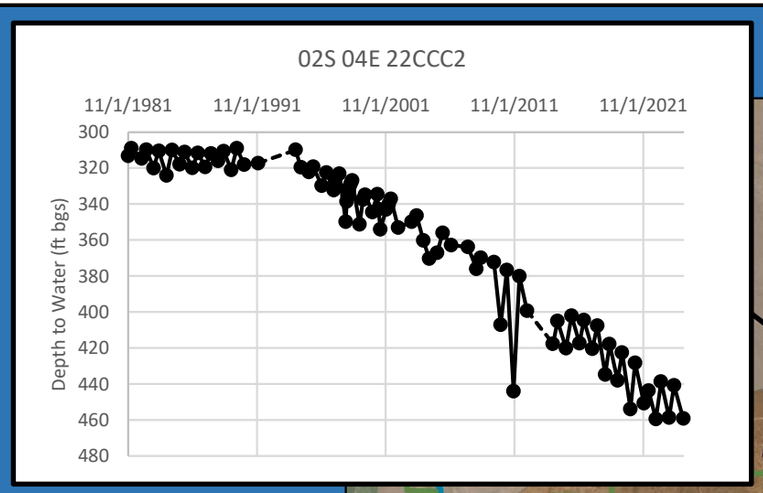
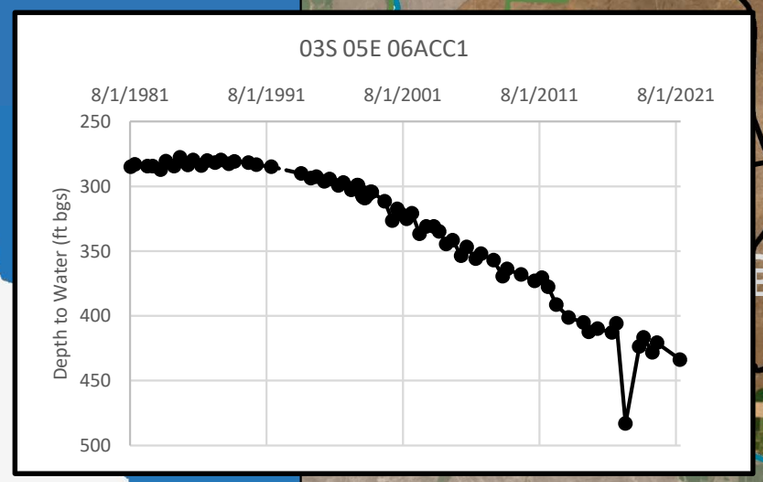
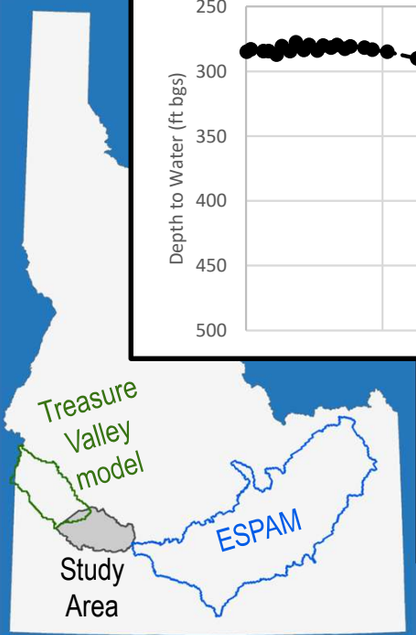
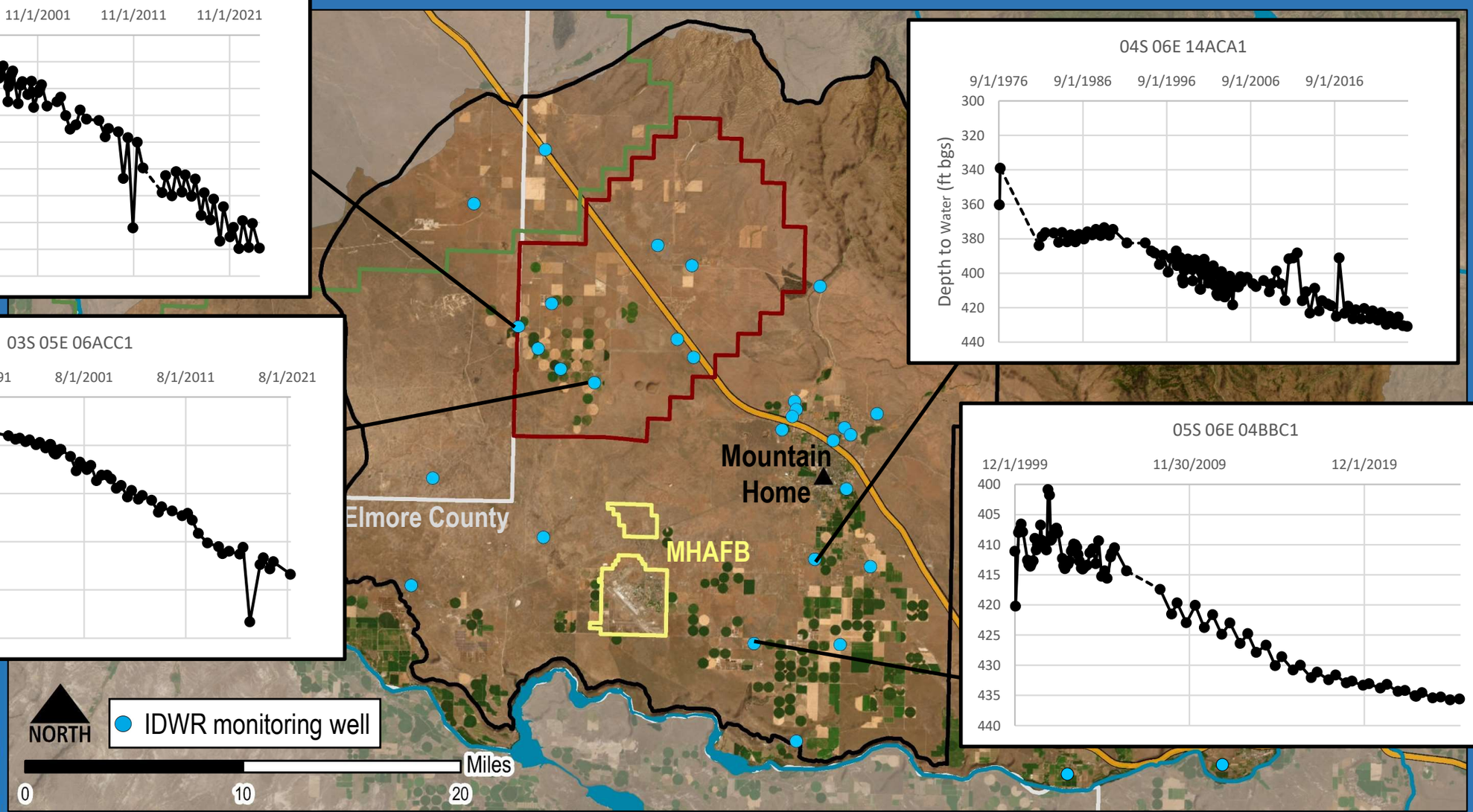




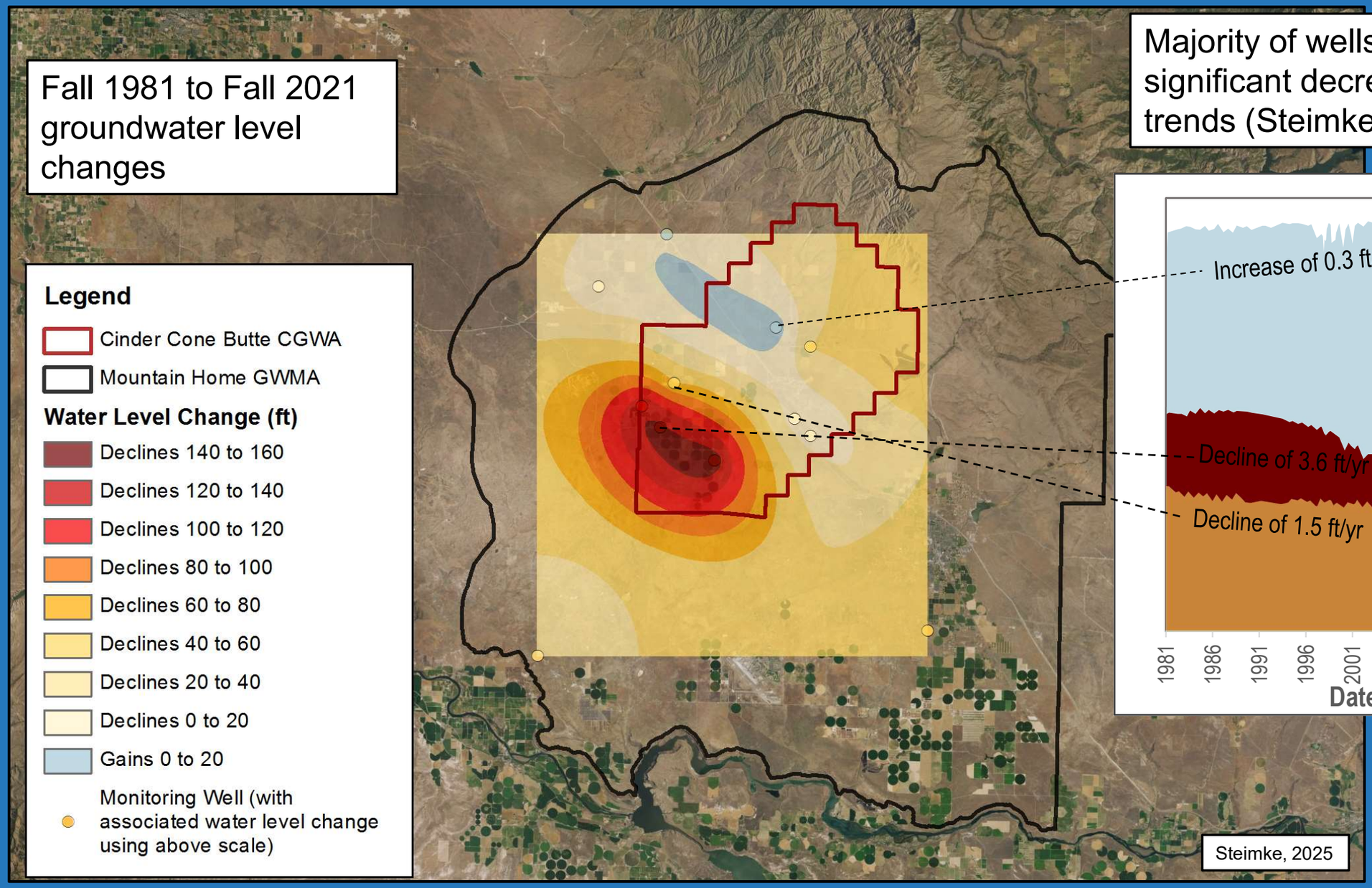


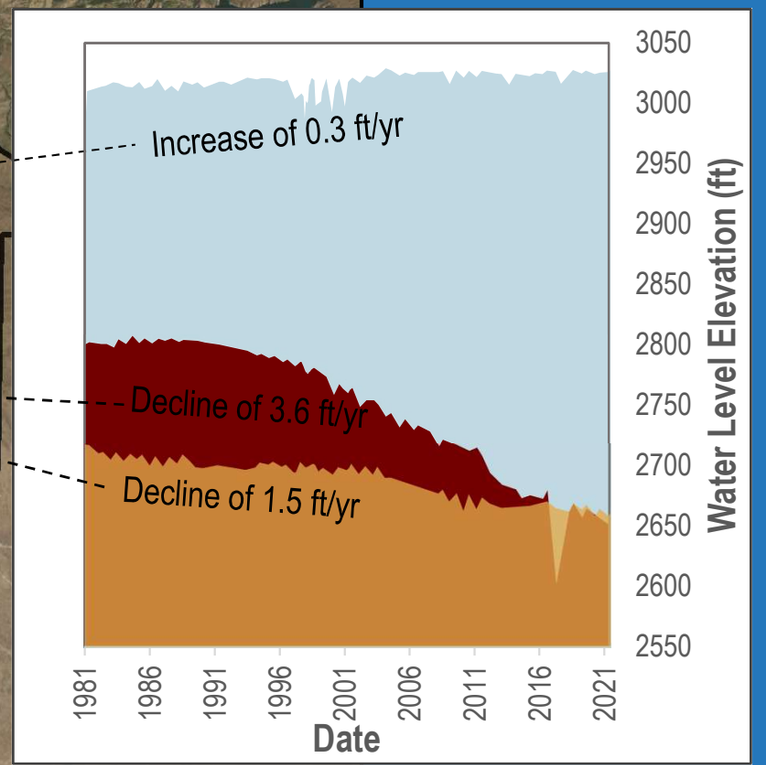


Why? Long-term groundwater level declines in the Mountain Home Area

Fall 1981 to Fall 2021 groundwater level changes

Majority of wells exhibit statistically significant decreasing water-level trends (Steimke, 2025).





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Why? Proposed groundwater development

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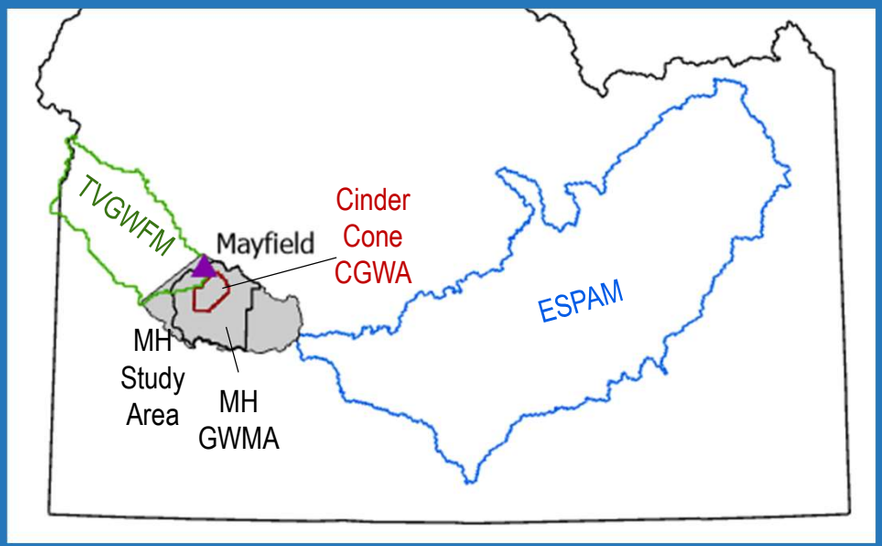
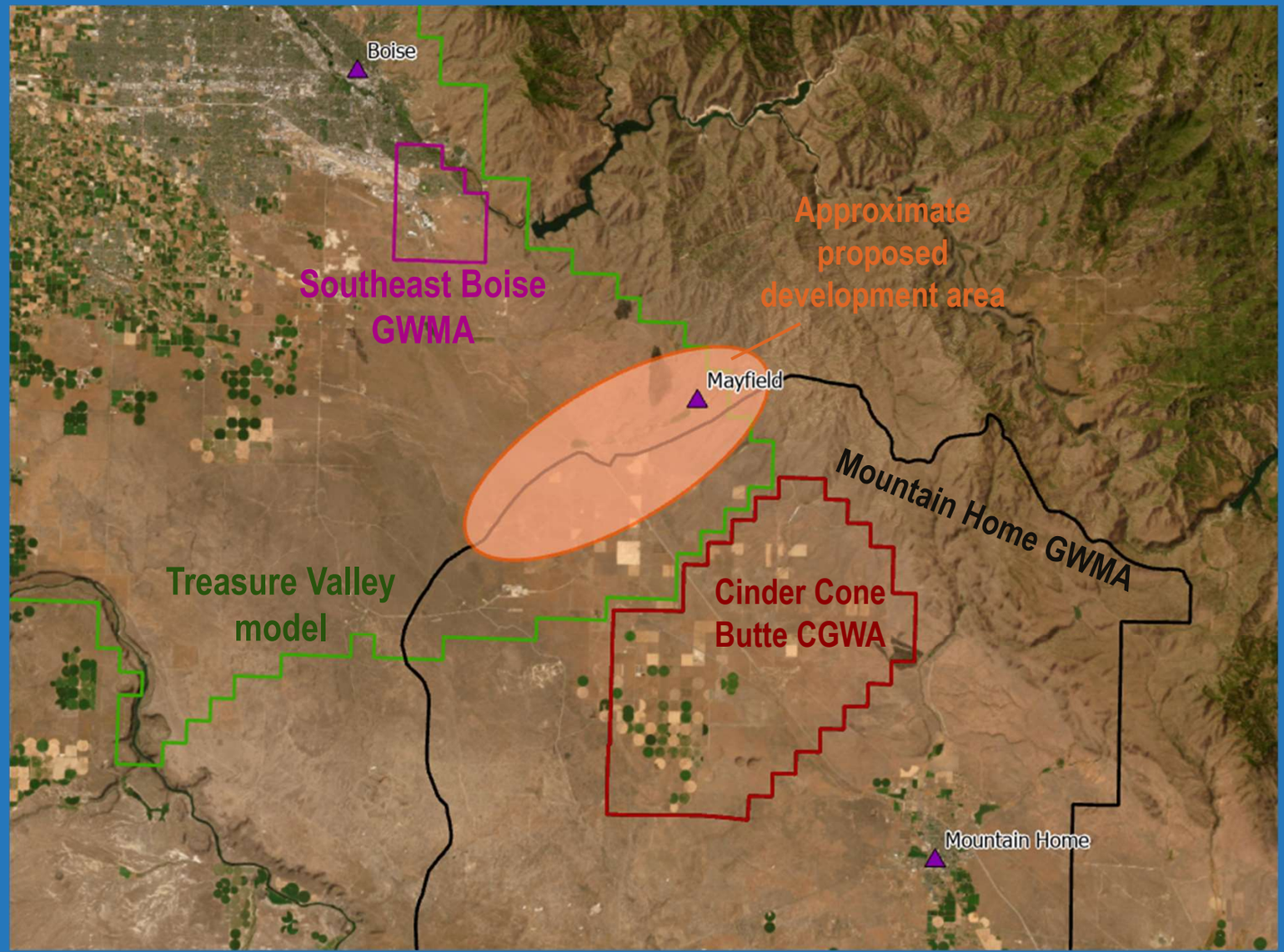
Groundwater development is proposed in the Mayfield area

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





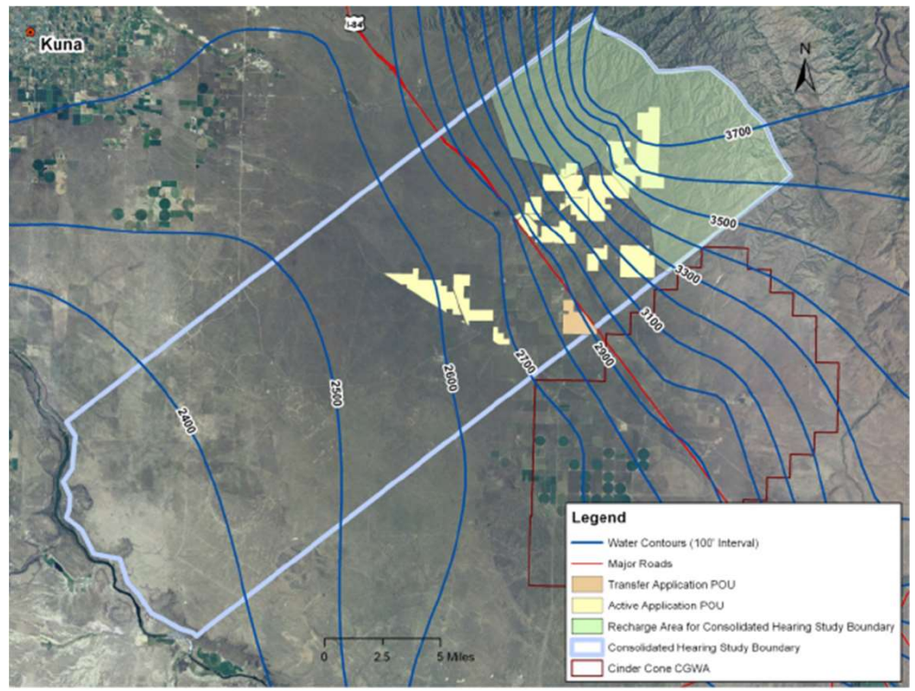
Timeline related to WeSPAM development

2008

- The Idaho legislature authorizes the IWRB to begin Comprehensive Aquifer Management Planning (CAMP) in the Treasure Valley; groundwater studies are planned in East Ada and North Ada County to collect data in areas of proposed development.

2013

- October: East Ada Comprehensive Hydrologic Investigation focused on the Mayfield Springs area is completed and final report is released (Tesch, 2013).



East Ada groundwater contours (Tesch, 2013)

2016

- September: IDWR and IWRB enter a 5-year agreement with the USGS to develop a new Treasure Valley model. The TV CAMP was not adopted, but the proposed boundary was used as the basis for the new model boundary, which included East Ada and North Ada study areas.

Timeline related to WeSPAM development

2021

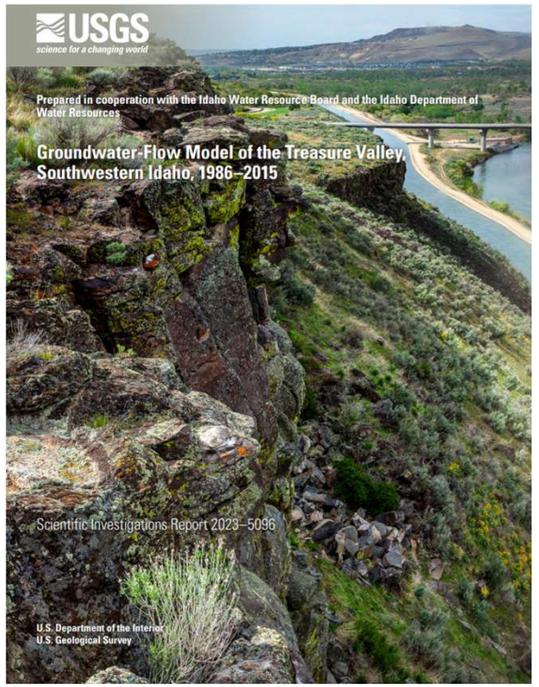
- May: Elmore County petitions the IWRB to incorporate the Mountain Home Plateau into the Treasure Valley model.

2022

- January: IWRB passes a resolution for a $700k, 3.5-year hydrologic study in Mountain Home to collect the data necessary for groundwater model development.
- February-November: IDWR and IWRB enter into agreements with the USGS for water budget, hydrogeologic framework, and groundwater level measurement work.
- September: Final Treasure Valley model calibration is completed.

2023

- January: Treasure Valley model files are available to the public.
- November: IDWR begins discussions with the USGS on developing a groundwater model for the Mountain Home area.



Timeline related to WeSPAM development

2024

- Spring-Fall: IDWR and a contractor drill 5 wells in the Mountain Home Plateau, install transducers in wells, and collect borehole geophysics data.
- November: IWRB passes a resolution for $850k over FY25-FY28 to construct the Western Snake Plain Aquifer Model (WeSPAM).

2025

- January: USGS publishes a hydrogeologic framework for the Mountain Home area; JFA is received from the USGS to develop a Western Snake Plain Model
- June: IDWR releases an update on groundwater conditions in the Mountain Home GWMA and Cinder Cone Butte CGWA.
- August: First modeling technical advisory committee (MTAC) meeting is held to facilitate technical input and feedback on WeSPAM

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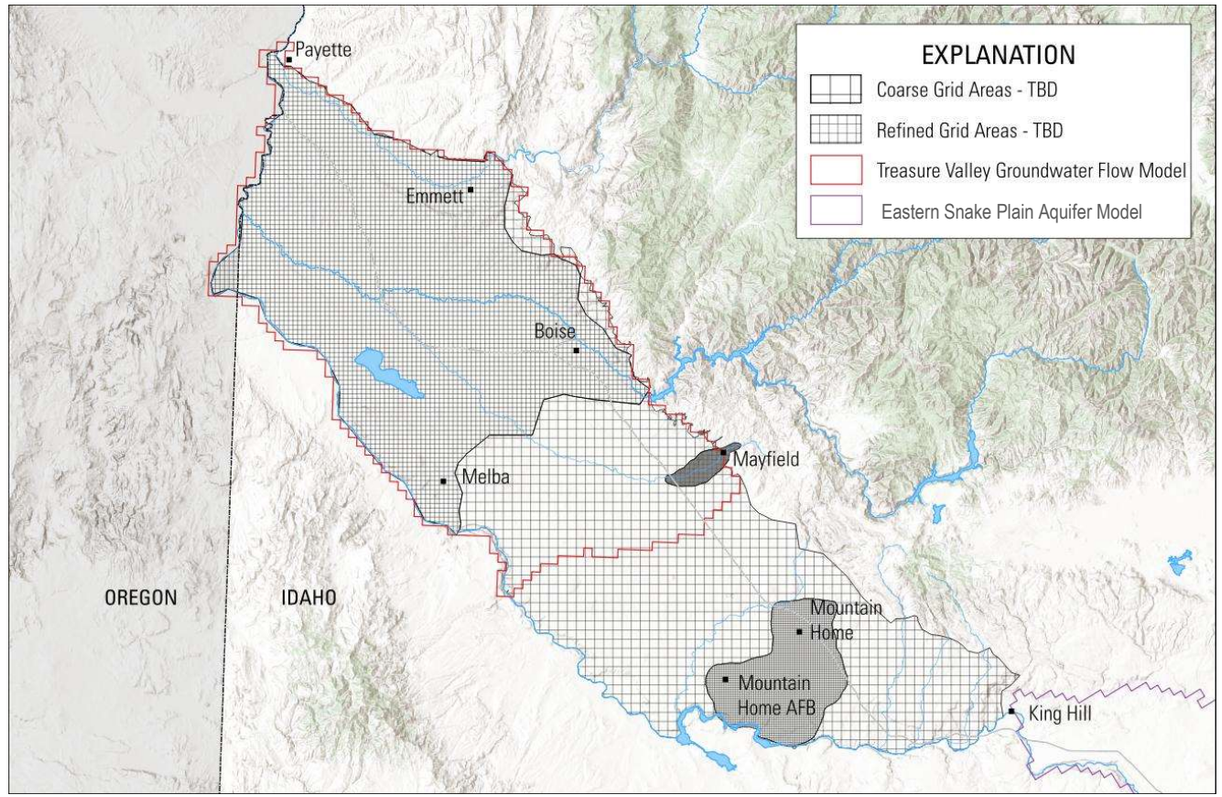
Borehole geophysics data collection

Drill cuttings

Monitoring well and e-tape

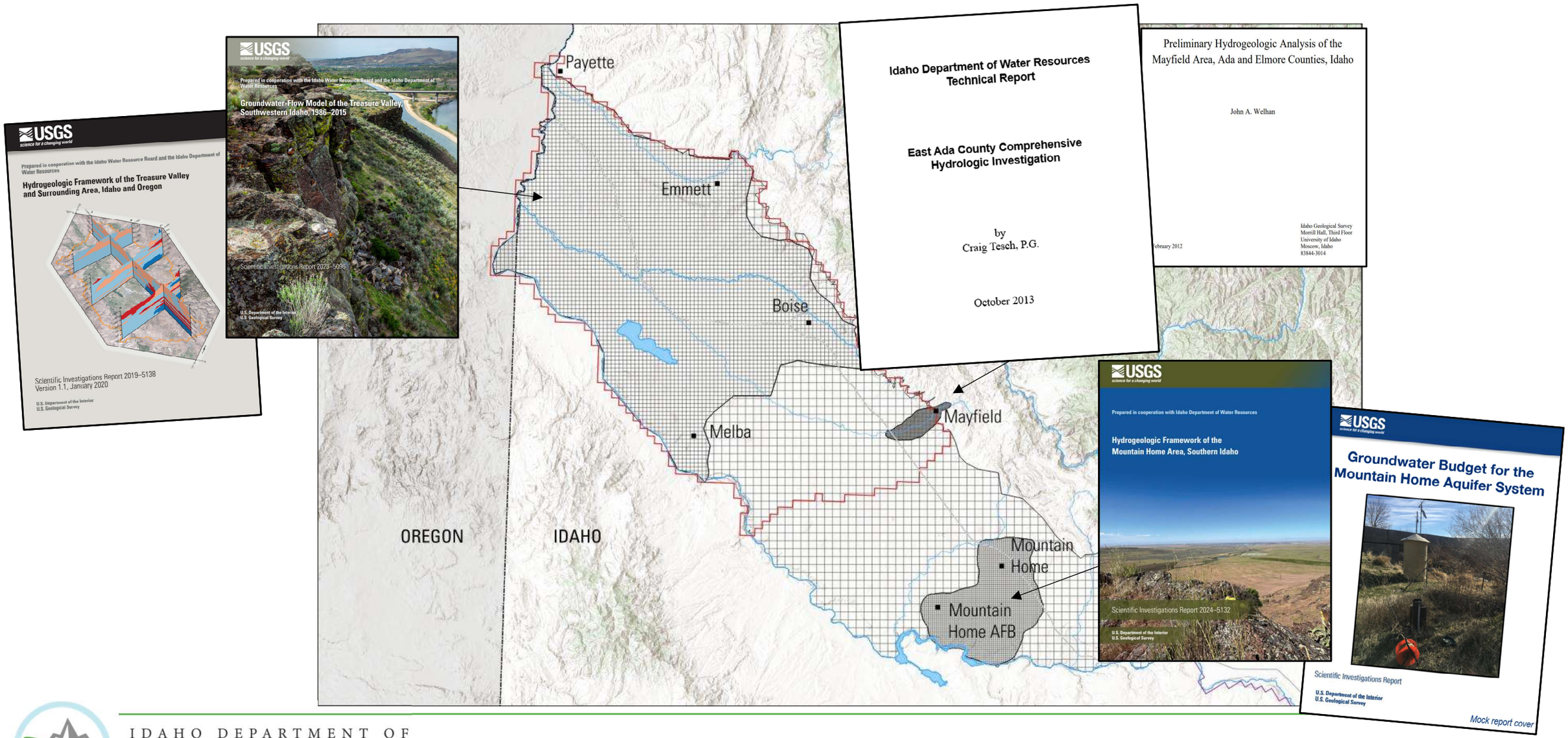
Scope of Work

- 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.

USGS, IDWR, and IGS studies lay the groundwork for model development



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Project Timeline

	2025	2026	2027	2028
Phase A: Initial Tasks				
Phase B: Core Development				
Phase C: Final Tasks				
Ongoing Tasks				

Phase A: Initial Tasks

- Make limited adjustments to the Treasure Valley Groundwater Flow Model
- Literature and data review of the Mayfield area
- Choose a historic model period
- Attempt to fill known data gaps for the Mountain Home Plateau

Project Timeline

	2025	2026	2027	2028
Phase A: Initial Tasks				
Phase B: Core Development				
Phase C: Final Tasks				
Ongoing Tasks				

Phase B: Core Development

- Reuse and edit scripts written for previous groundwater flow models
- Retrieve and prepare data
- Refine and connect model areas
- Define boundaries and parameterization
- Conduct parameter estimation and uncertainty analysis
- Assess results

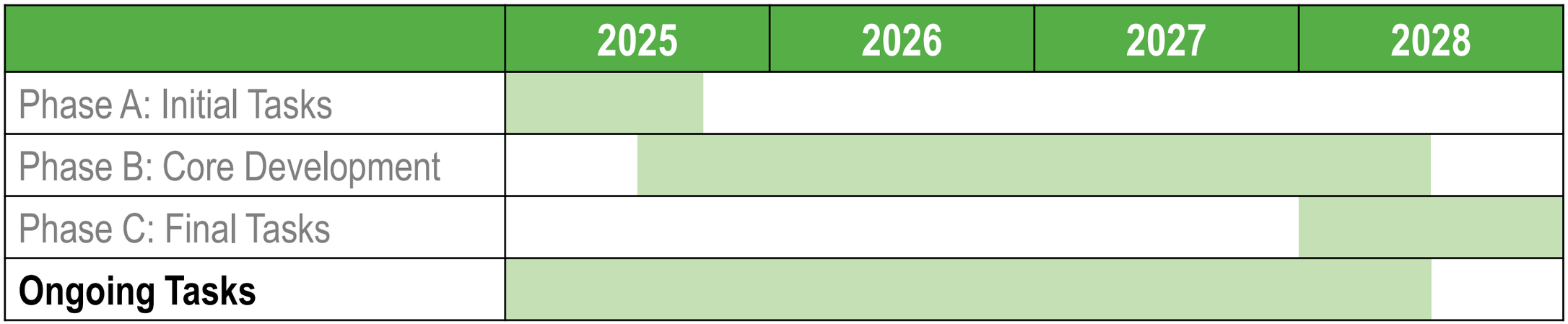
Project Timeline

	2025	2026	2027	2028
Phase A: Initial Tasks				
Phase B: Core Development				
Phase C: Final Tasks				
Ongoing Tasks				

Phase C: Final Tasks

- Run two scenarios
- Publish model documentation, report, and data release
- Teach class

Project Timeline



Ongoing Tasks

- MTAC meetings
- Meetings with USGS and IDWR staff

WeSPAM Budget

- In November 2024, IWRB authorized a total of $850k over Fiscal Years 2025-2028, for a total of $850k to fund construction of WeSPAM
- IWRB funding through the Secondary Aquifer Planning, Management, and Implementation Fund (Secondary Aquifer Fund)
- USGS funding $300k

IWRB: $850k
+ USGS: $300k
Total: $1.15M

Roles and Responsibilities

USGS: Model construction, calibration, and report preparation

- Jacob Knight – Lead modeler
- Paul Thomas – Project management and modeling support
- Scott Ducar – Data analysis and modeling support

IDWR: End user, MTAC facilitation, modeling support

IWRB: End user, providing funding through the Secondary Aquifer Fund

MTAC: Stakeholder technical input

- Data sharing
- Input on model scenarios, refinement areas, conceptual models, etc.
- Peer review
- Provides for transparency

Transparency

Promoted through:

- MTAC meetings
- Public domain software (MODFLOW 6)
- Model documentation
  - Fact sheet, design documents, USGS scientific report, etc.
- Dissemination of data, documents, model files, meeting materials, etc. on IDWR's project webpage: https://idwr.idaho.gov/water-data/projects/western-snake-plain-aquifer-model/

Questions?

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