MAY ADVISORY COMMITTEE MEETINGS

Butte Valley Groundwater Advisory Committee Meeting

LARRY WALKER ASSOCIATES
science | policy | solutions

Stantec

Agenda

- GSP determination and possible direction on next steps
- Implementation Project Updates
  - Data collection and sensor installation
- Irrigation Workshop Recap

GSP Determination and Next Steps

- **Corrective Action 1 -** Reconduct the assessment of overdraft conditions and describe management actions to mitigate overdraft.
  - Refine the water budget, and better understand overdraft/no overdraft
  - Provide “reasonable means” to mitigate overdraft (describe feasible management actions)
- **Corrective Action 2 -** Further justify the SMCs set for water levels, and quantitatively describe the effects of the criteria on users of groundwater.
  - Describe the specific, quantitative undesirable results that are planned to be avoided
  - MTs should be set at a level where depletion of supply across the Basin may lead to undesirable results

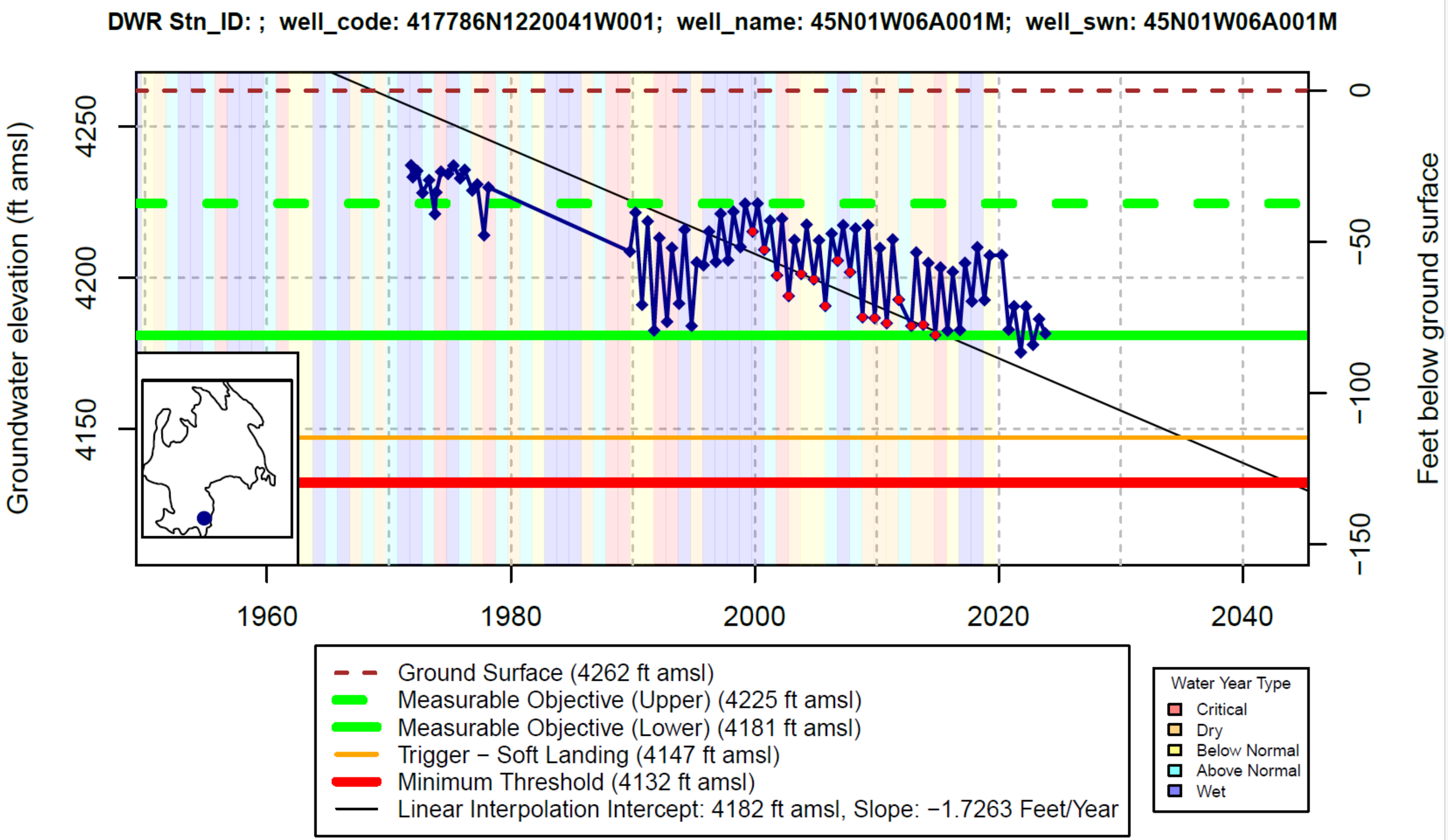
GSP Determination and Next Steps

- Monthly meetings with DWR
- Refinement of water budget
- Review of model results and boundary conditions
- Quantitative description of undesirable results for users of groundwater

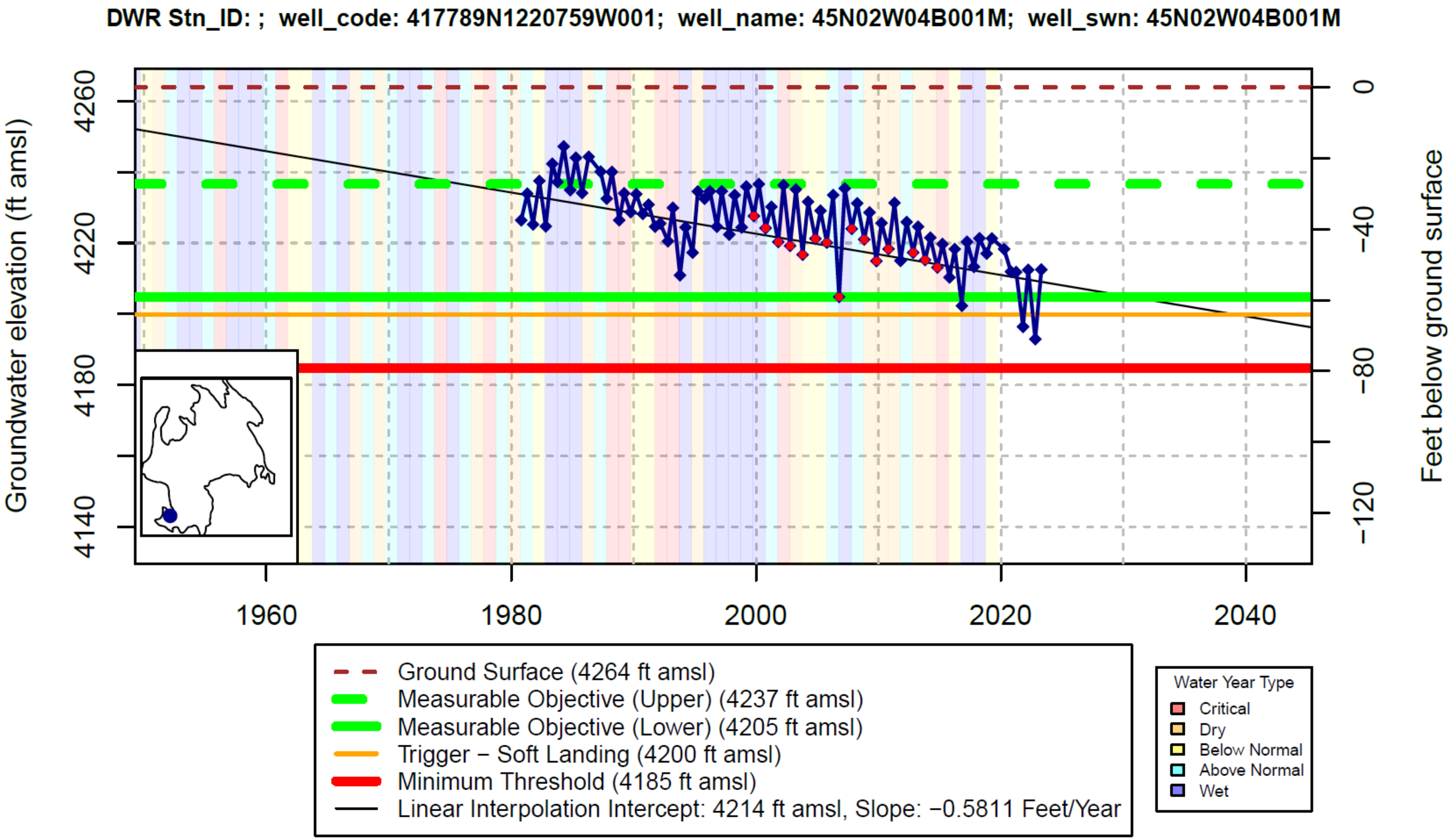
Finding 1: There is no immediate threat of water levels reaching MTs, but further long-term steady decline is not desirable nor acceptable.

Evidence: RMP Network Hydrographs

Monitoring Network



Monitoring Network



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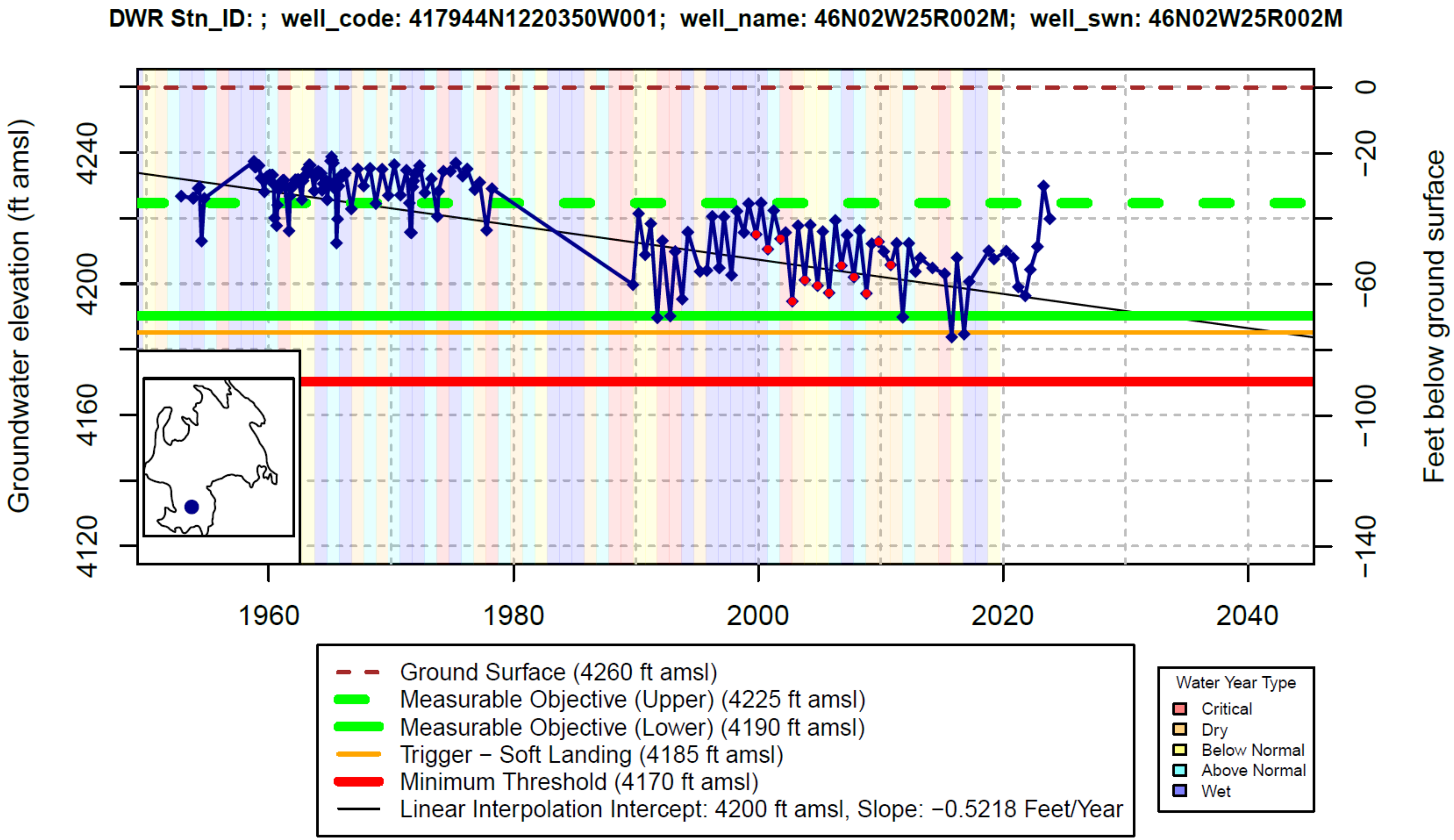

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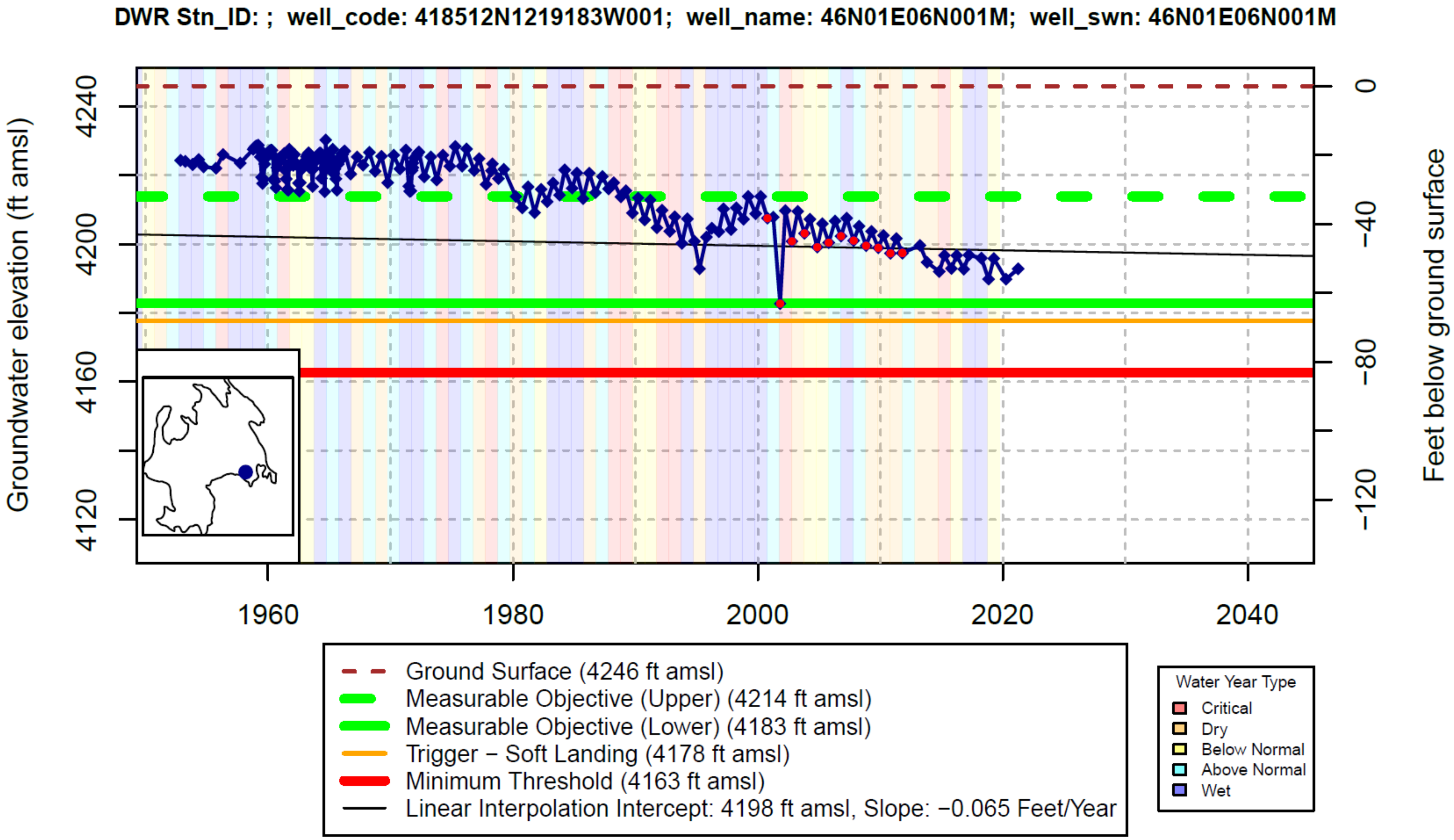

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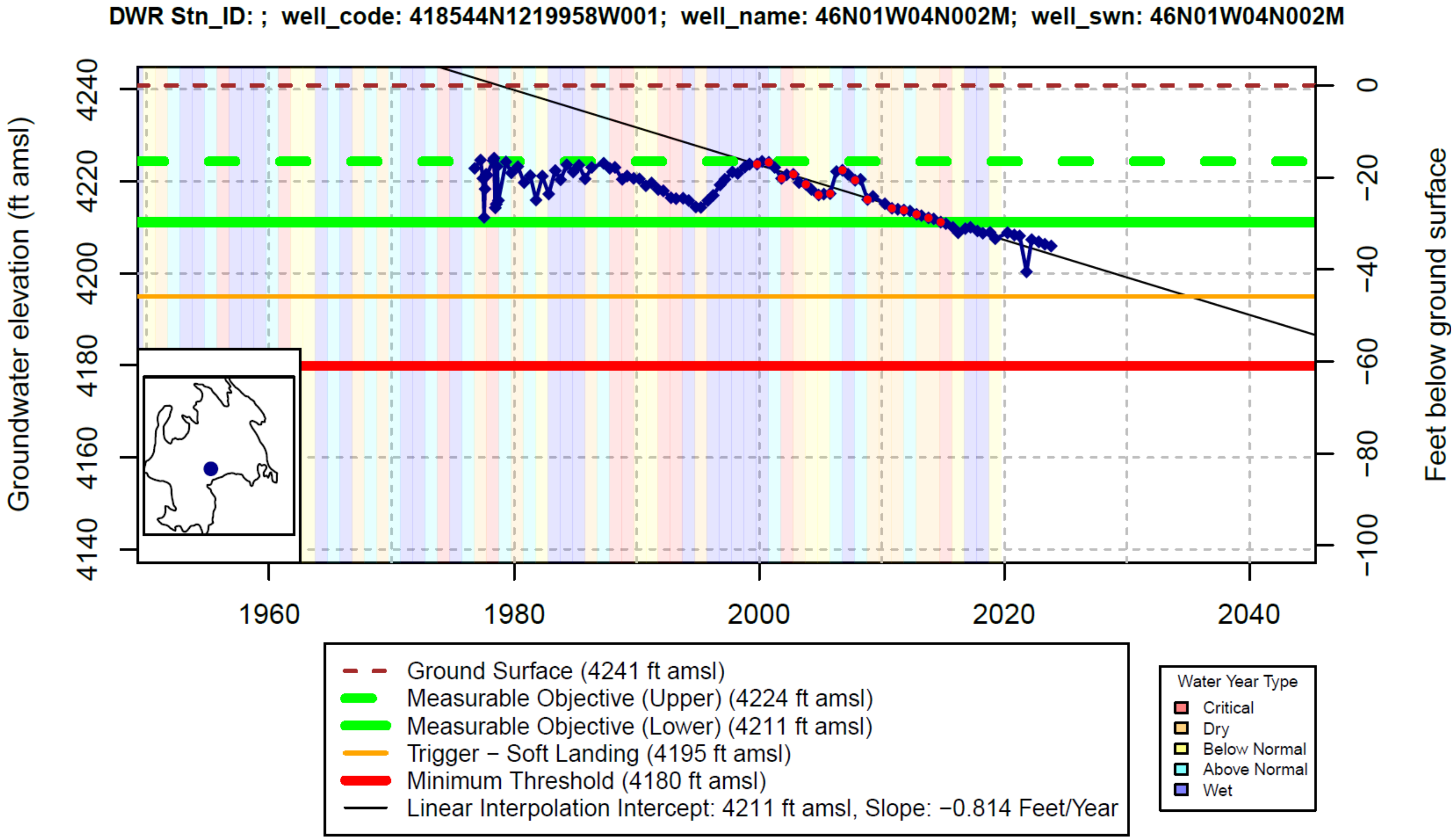

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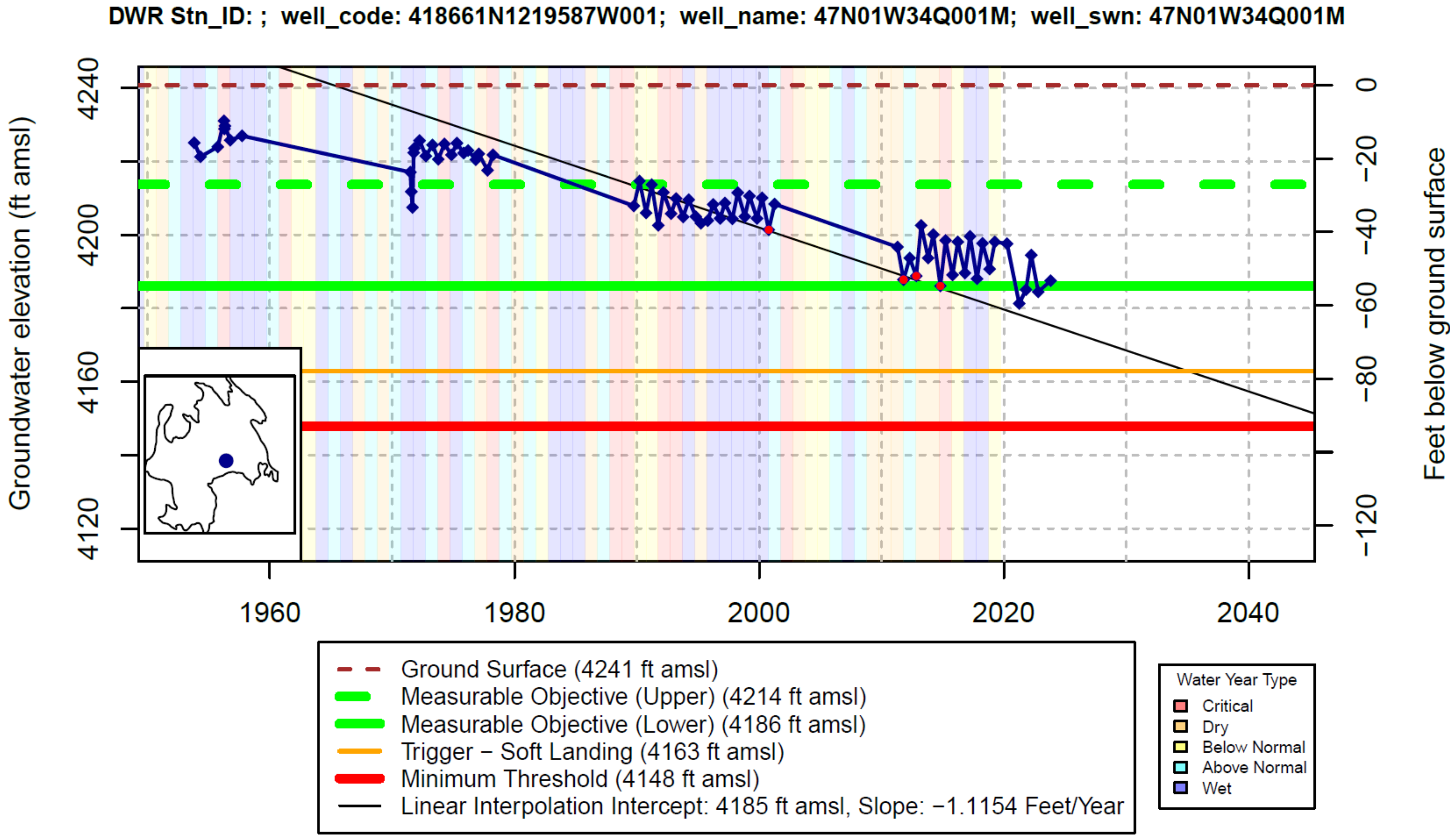

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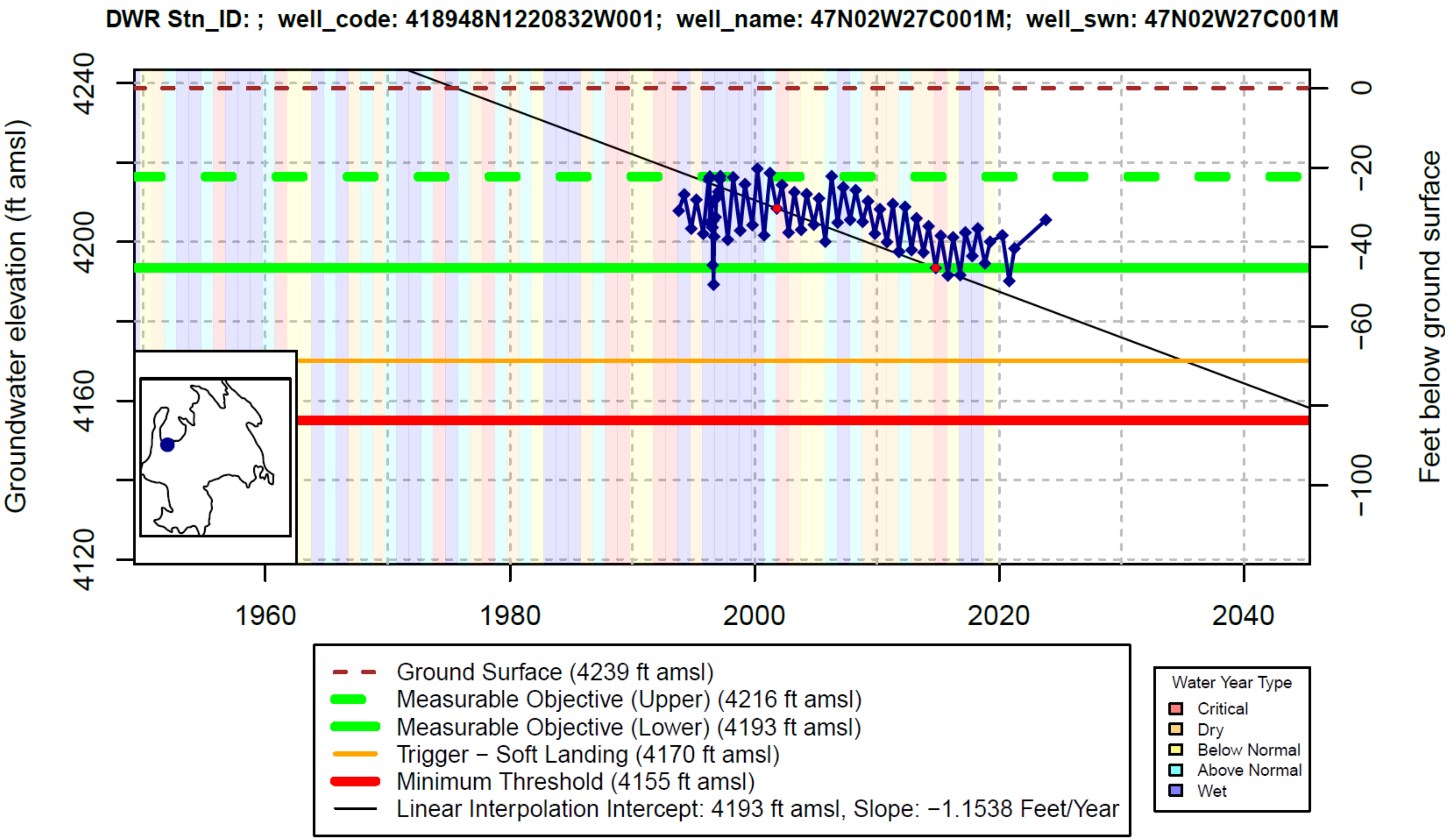

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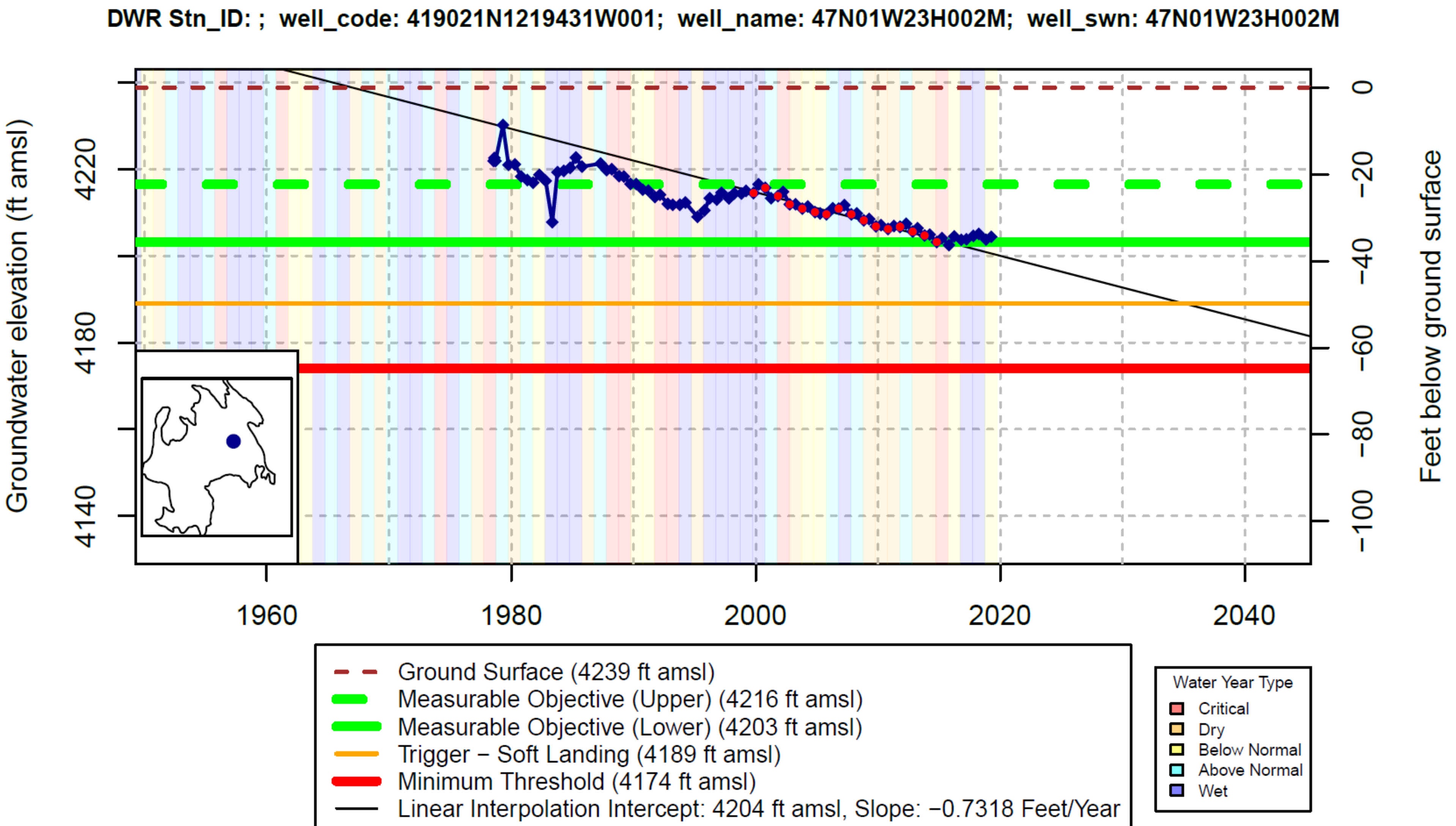

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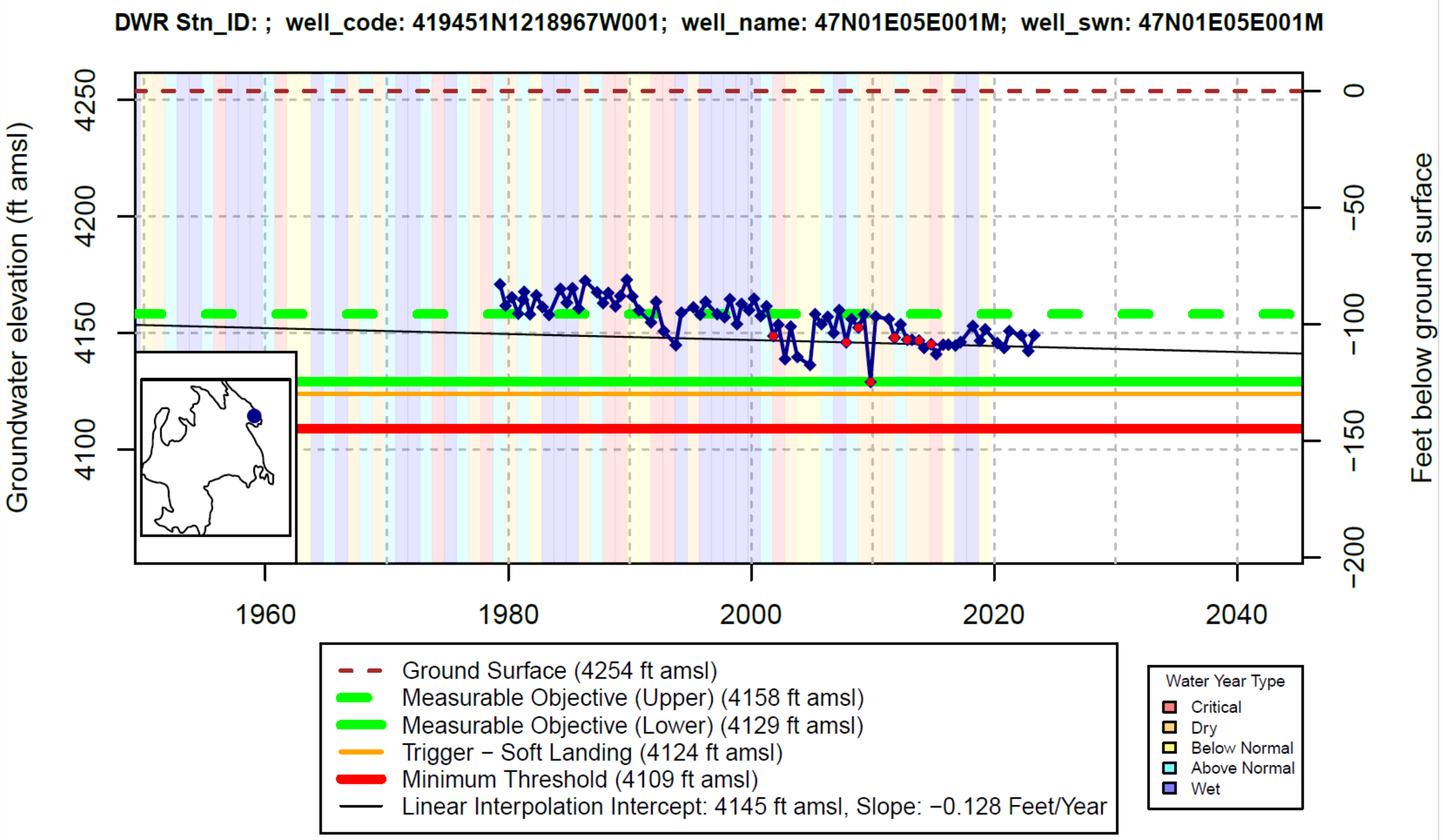

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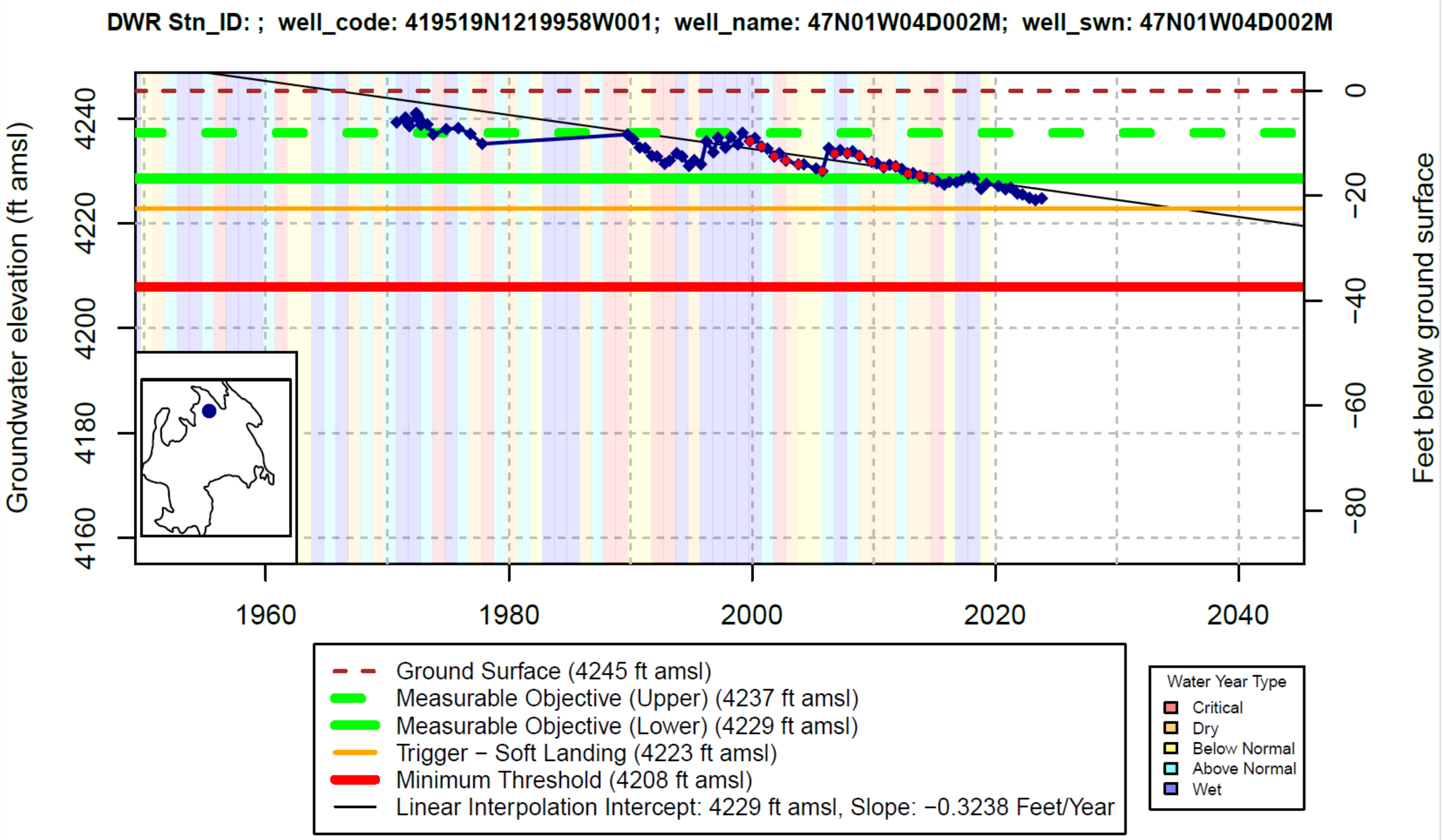

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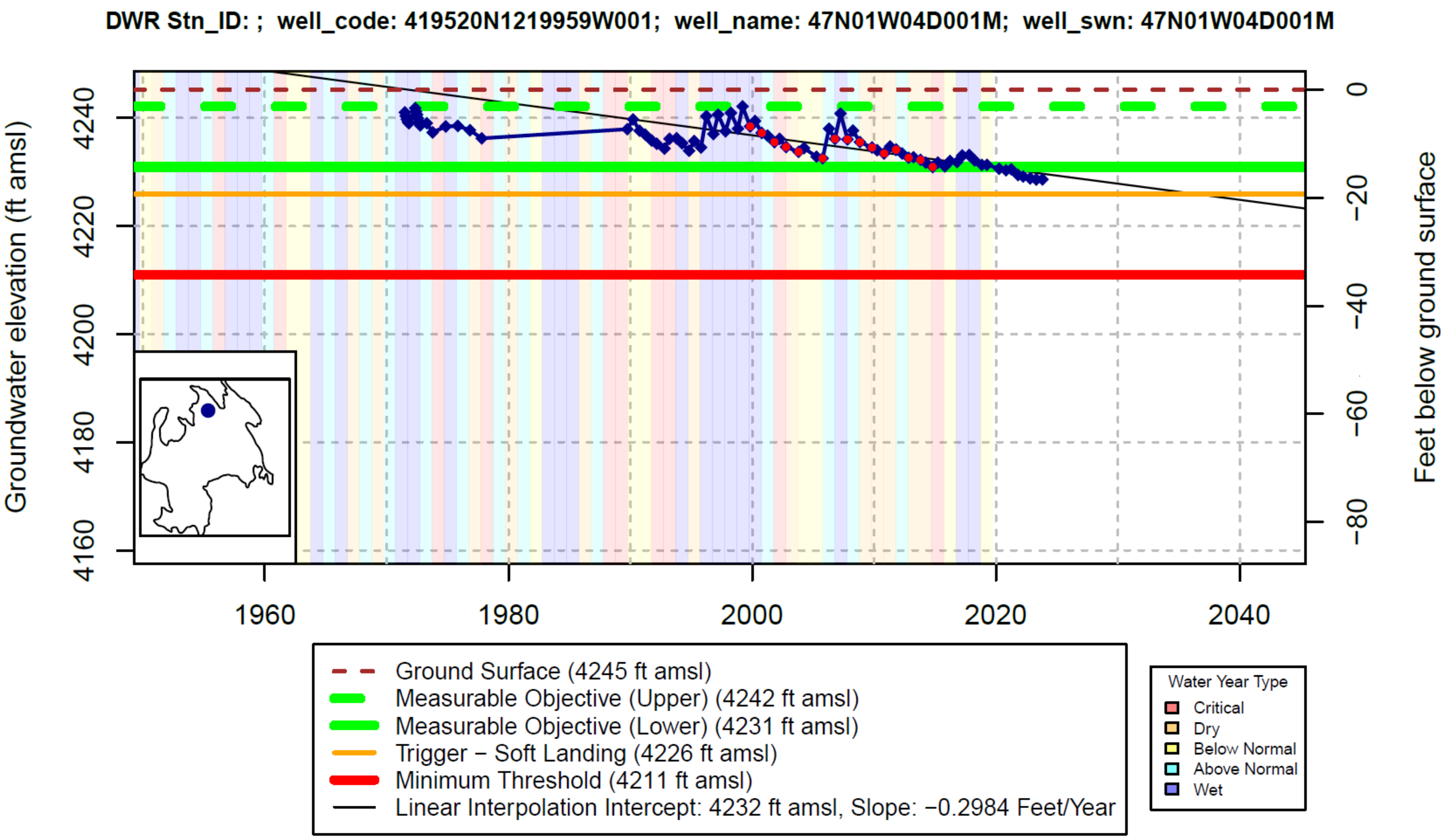

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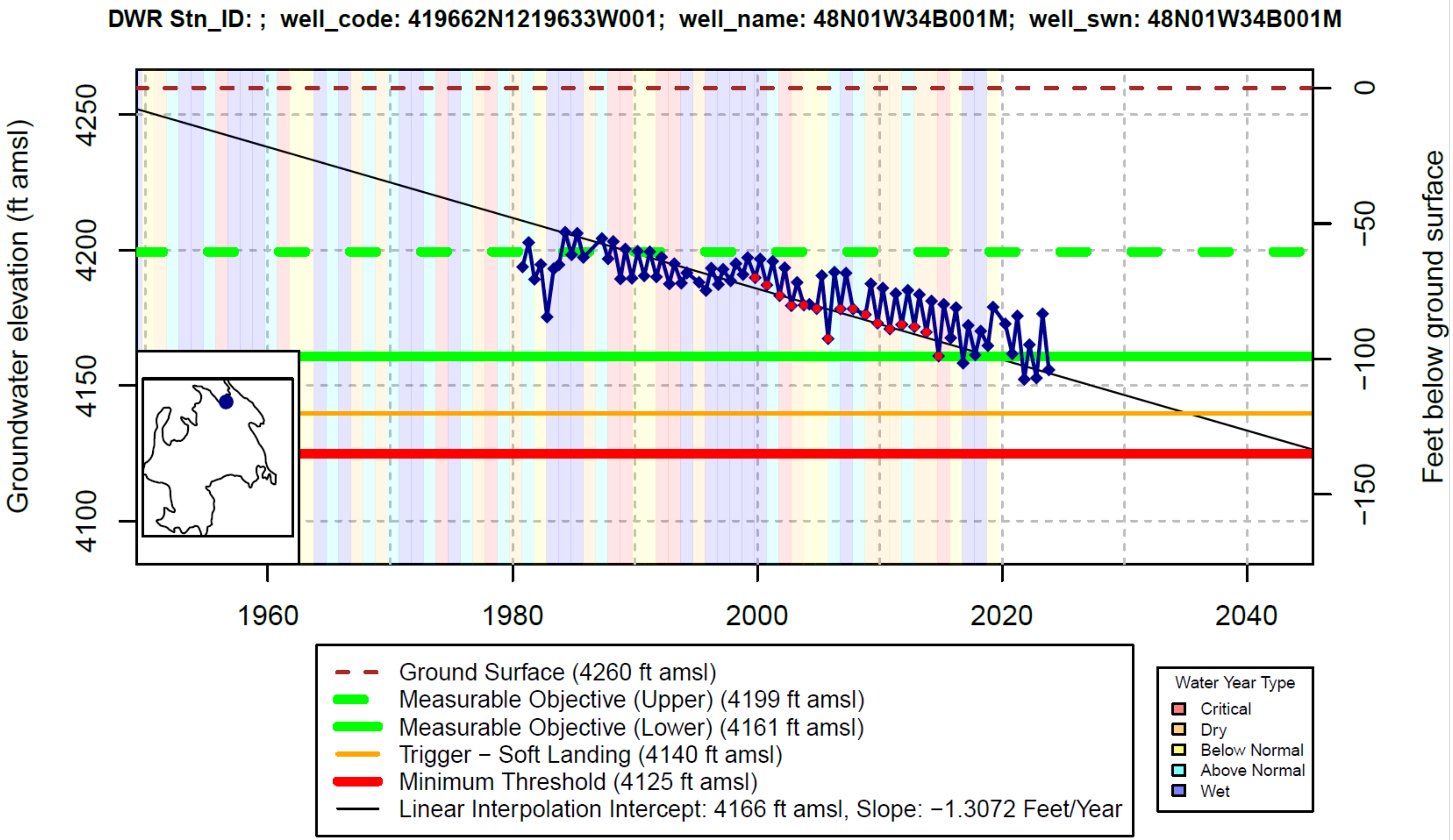

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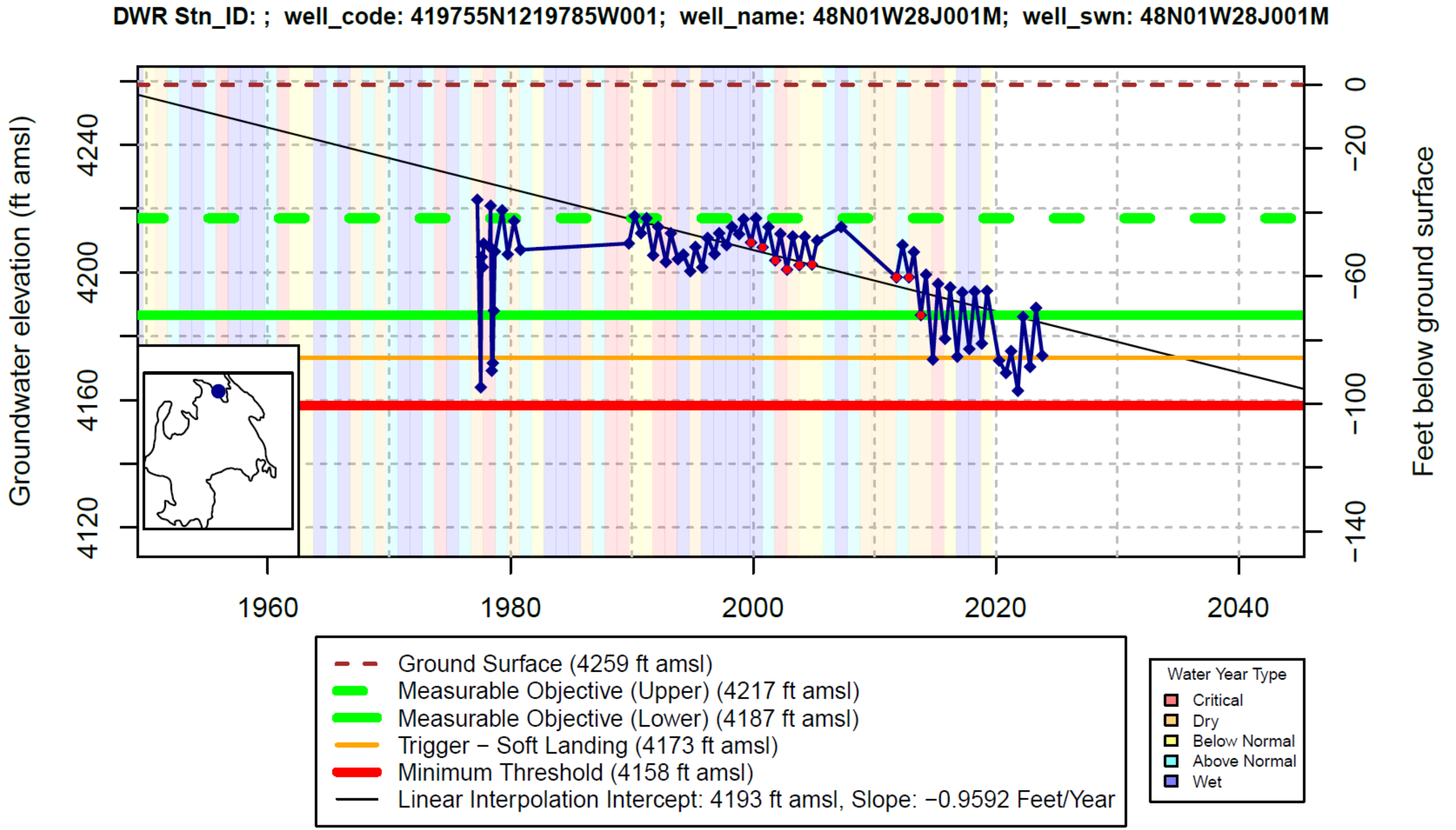
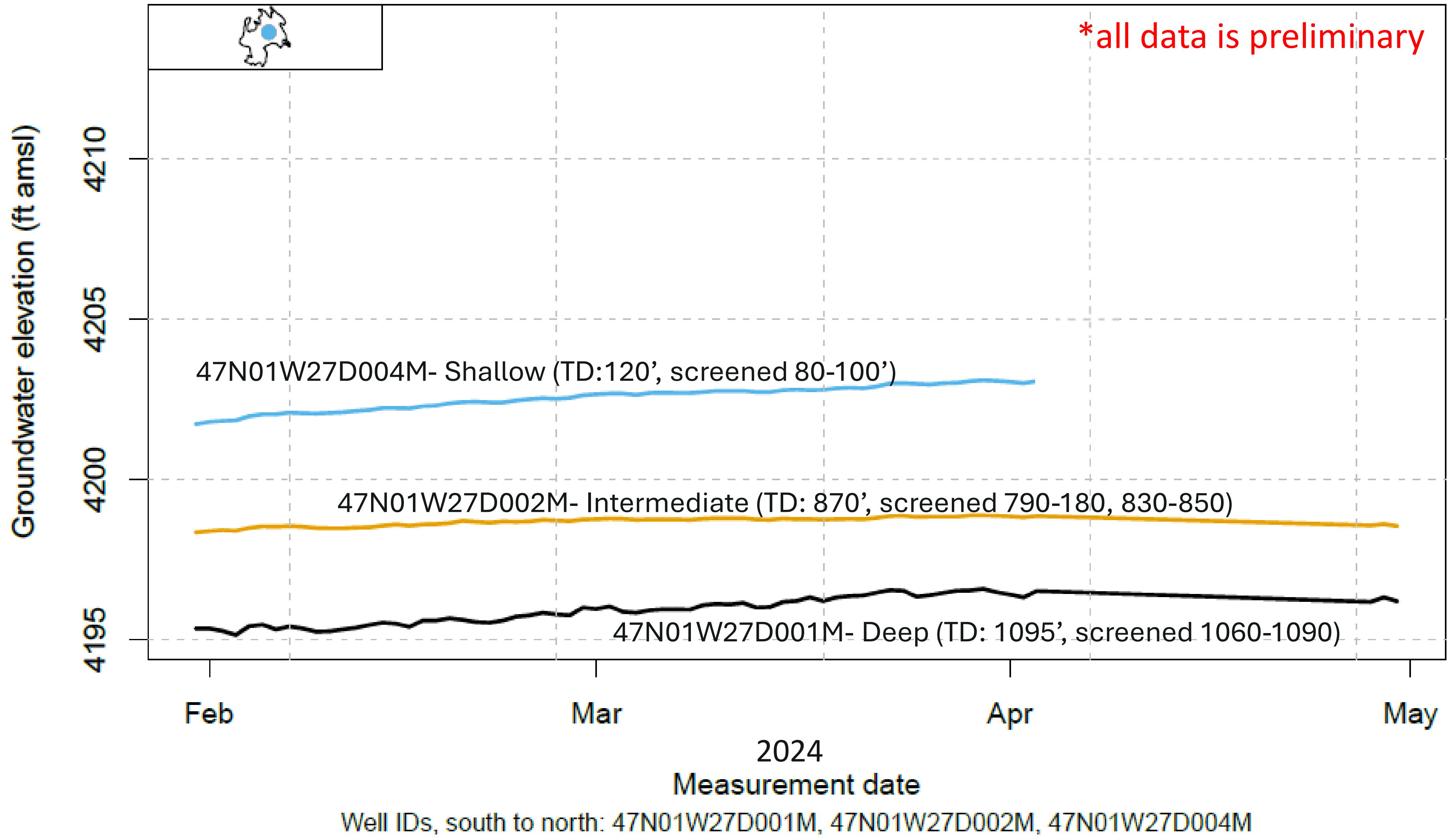


Butte Valley TSS Well (County Airport) (Jan 1 2024 – April 30 2024)

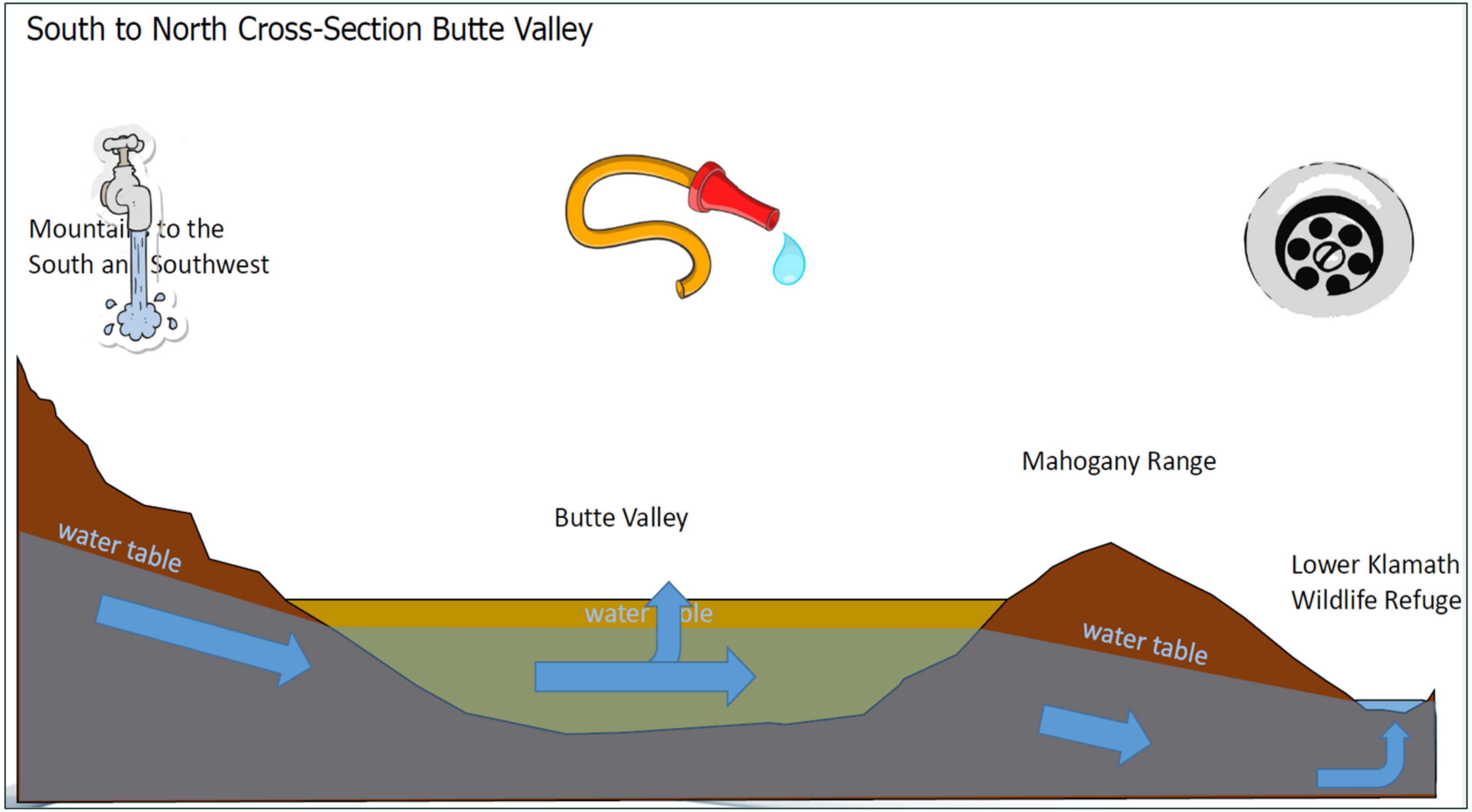


Finding 2: To support water levels in Butte Valley above the MT (in the 4100s' range), sufficient subsurface outflow toward Tulelake/Lost River is needed (water levels in the low 4000s' range) => affects sustainable yield in Butte Valley.

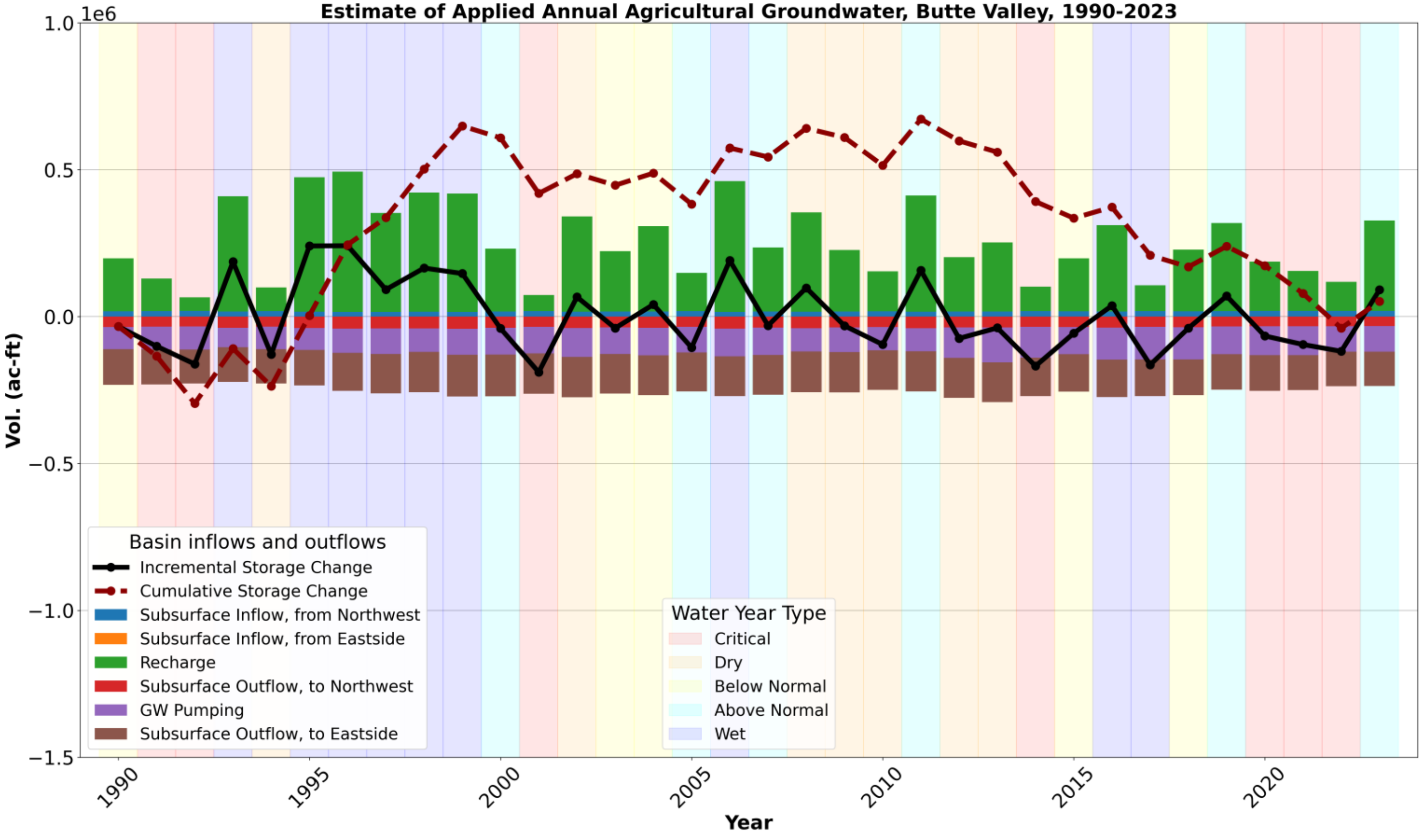
Evidence: Conceptual Model, BVIHM

Simplified Conceptual Model

sustainable yield = recharge - necessary outflow to NE (Lower Klamath Wildlife/Tulelake/Lost River)



Groundwater Model Update
Butte Valley Integrated Hydrologic Model (BVIHM)



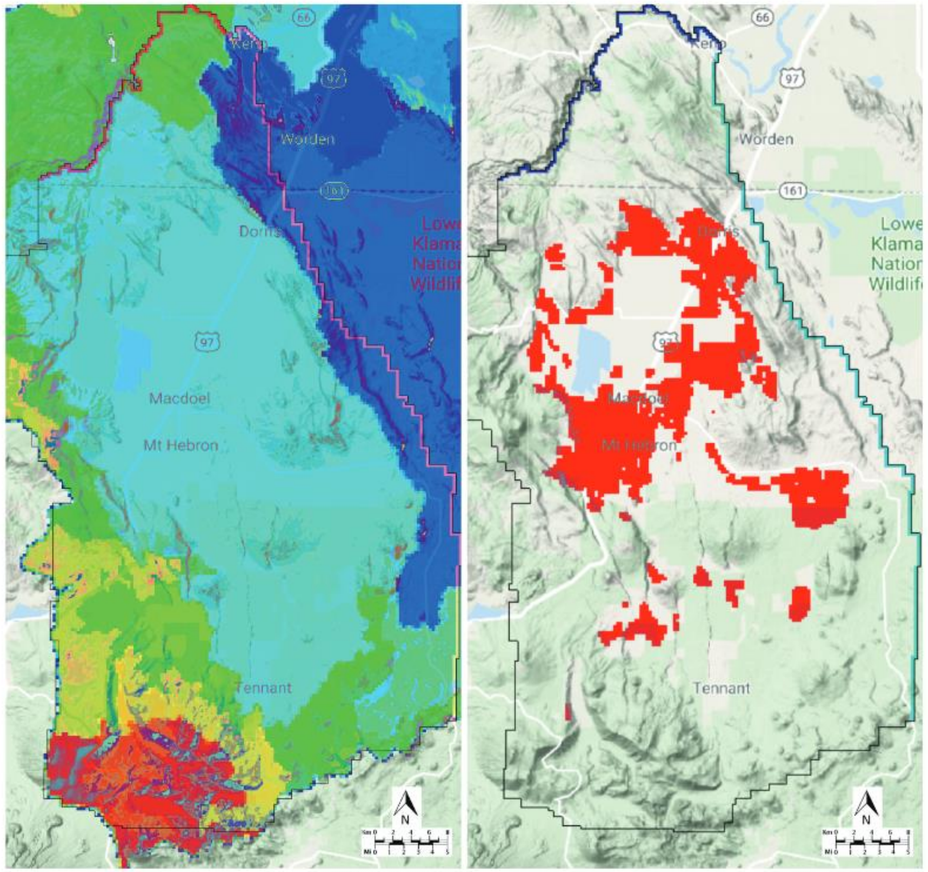
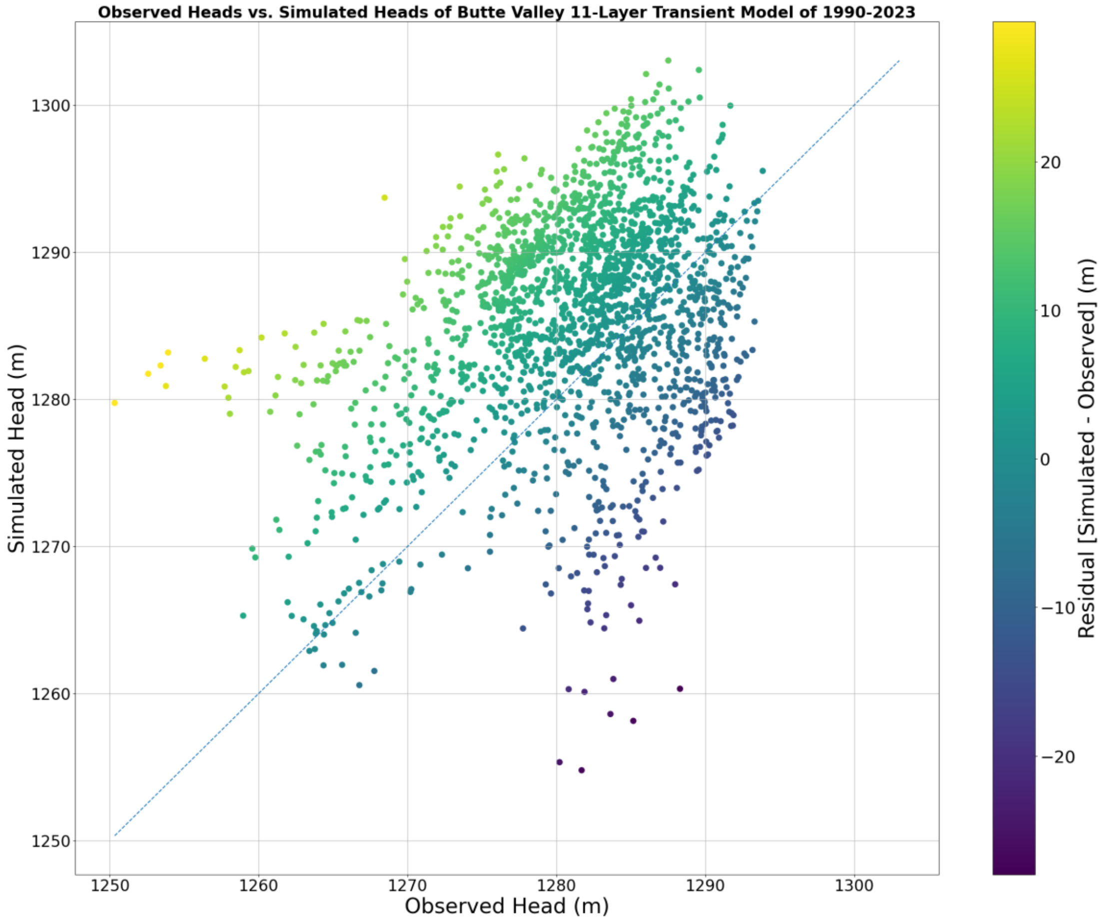
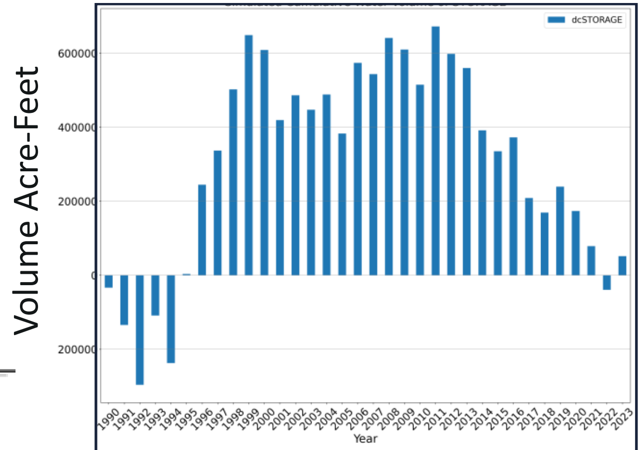


Figure 1.39: Spatial distribution of long-term average recharge (left, red: highest amounts of recharge, dark blue: lowest amounts of recharge) and location of areas with groundwater pumping (right). Black outline: BVIHM simulation domain boundary.

Groundwater Model - Accuracy



Simulated Cumulative Water Volume of Storage



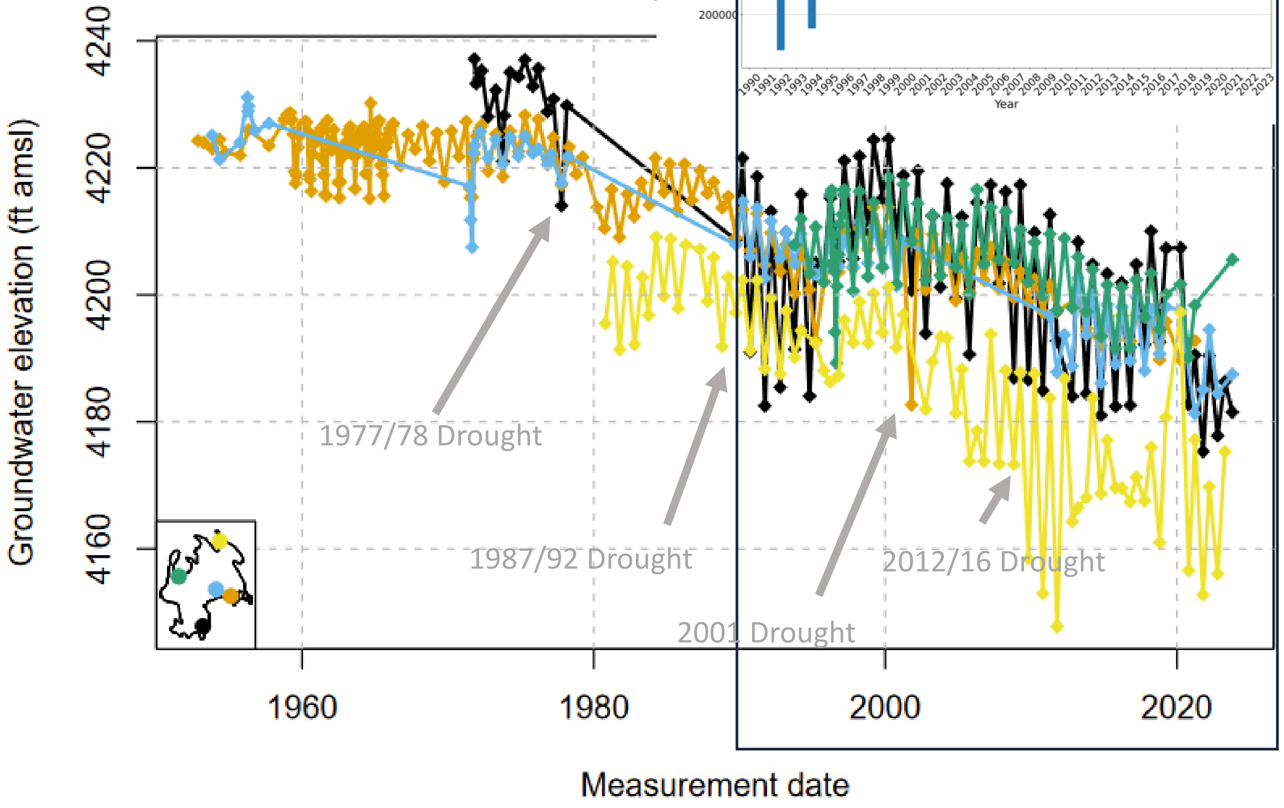
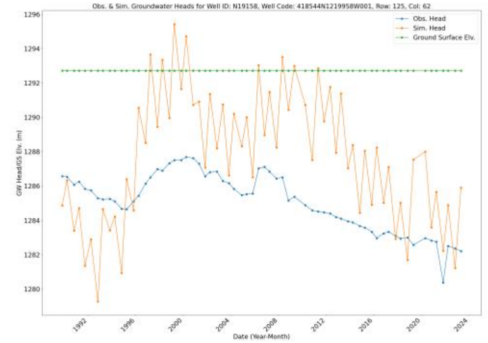
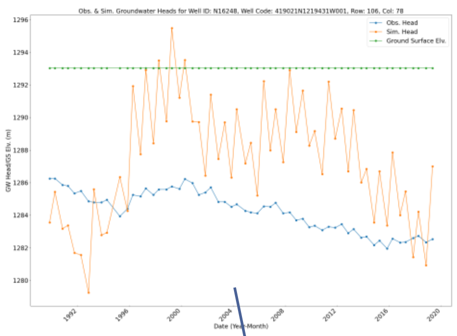
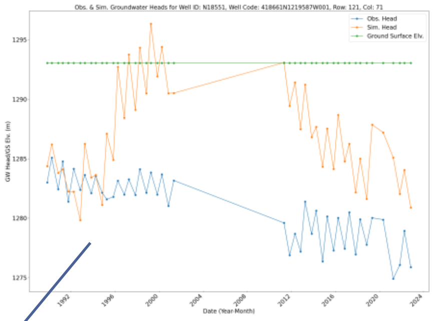


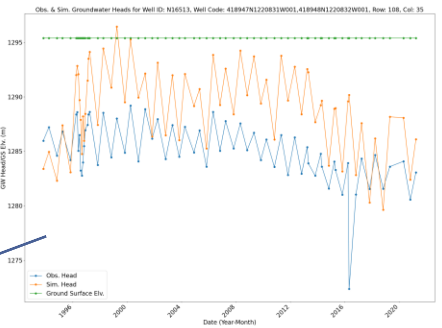
Figure 2.2: Groundwater elevation measurements over time in five wells, one located in each hydrogeologic zone.

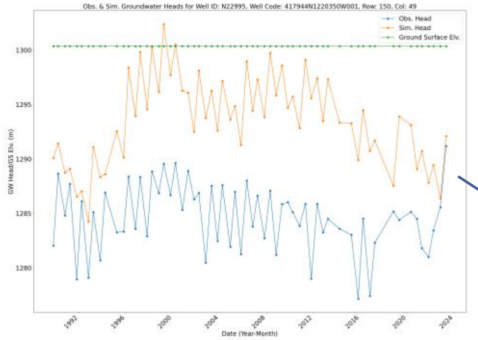
Overall Model Performance

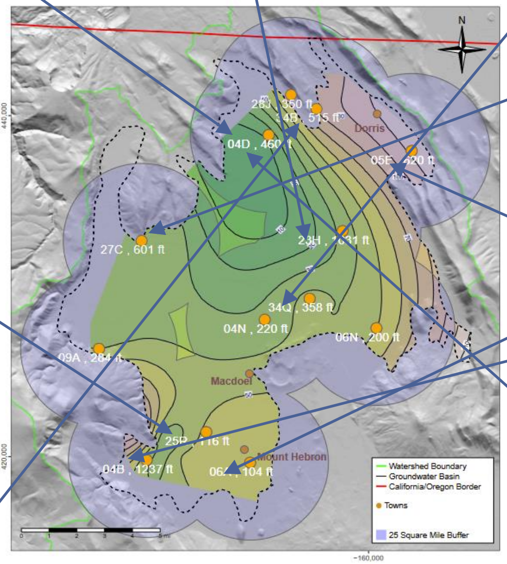


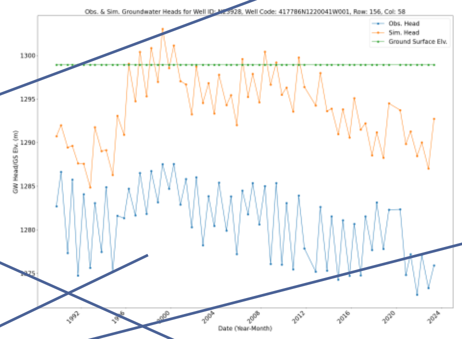


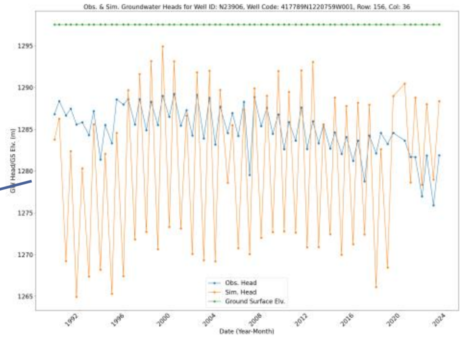


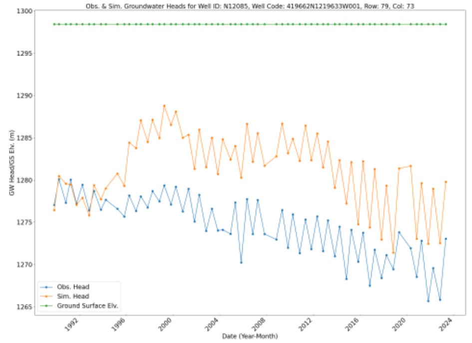


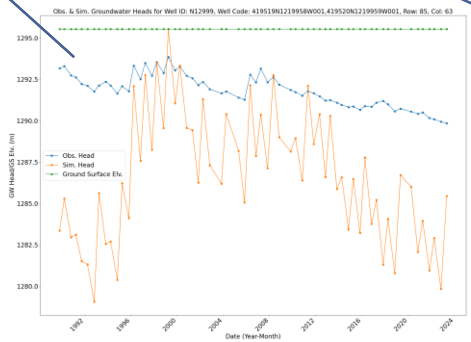


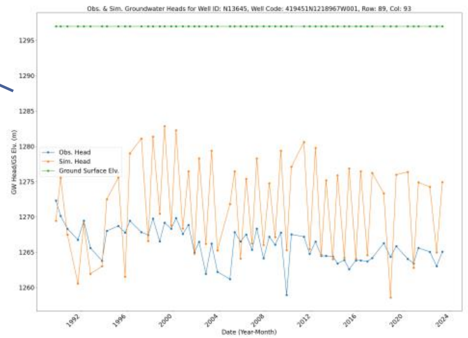








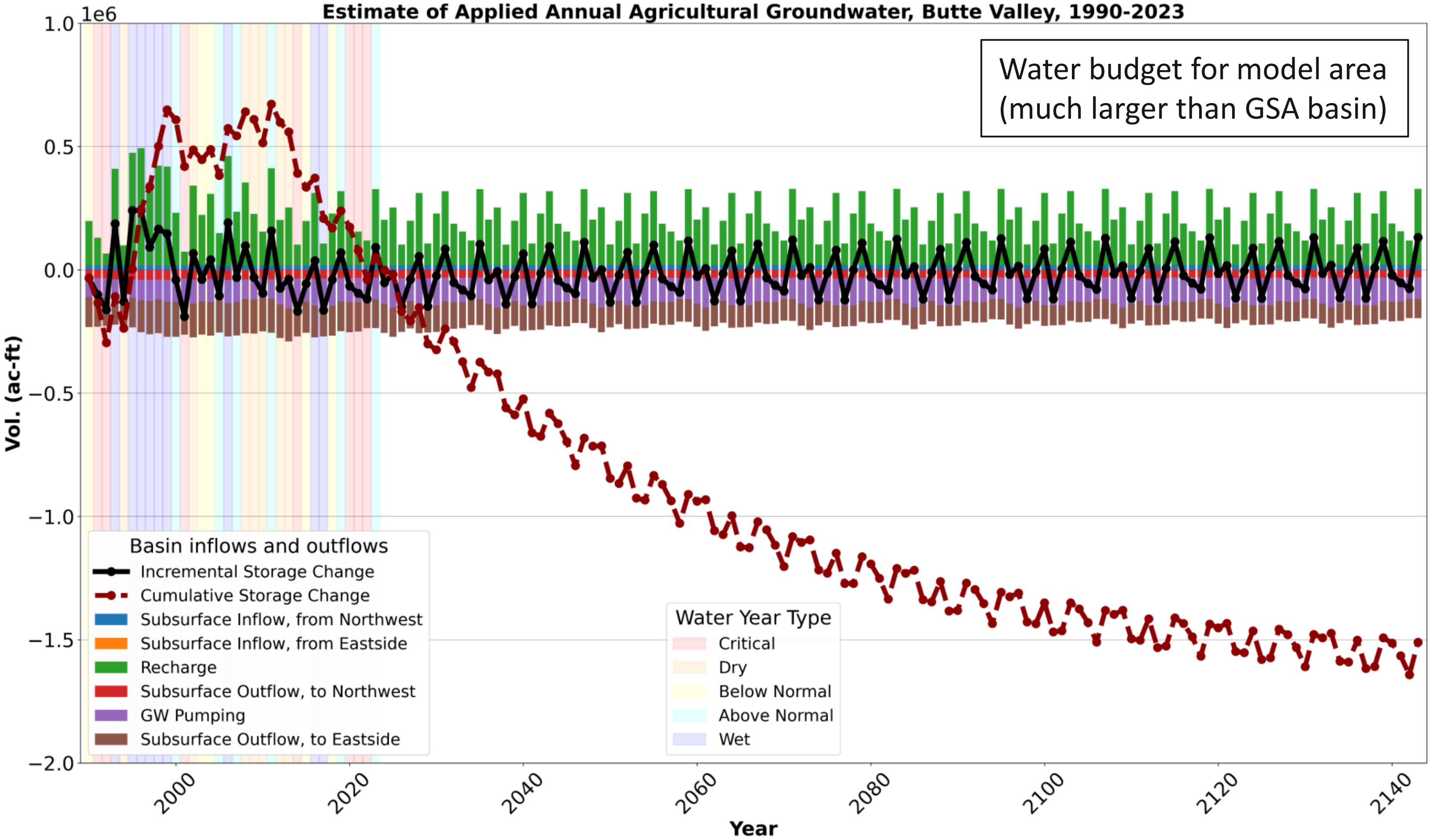




In figures, green, orange, and blue lines show ground surface elevation, simulated head, and observed head.

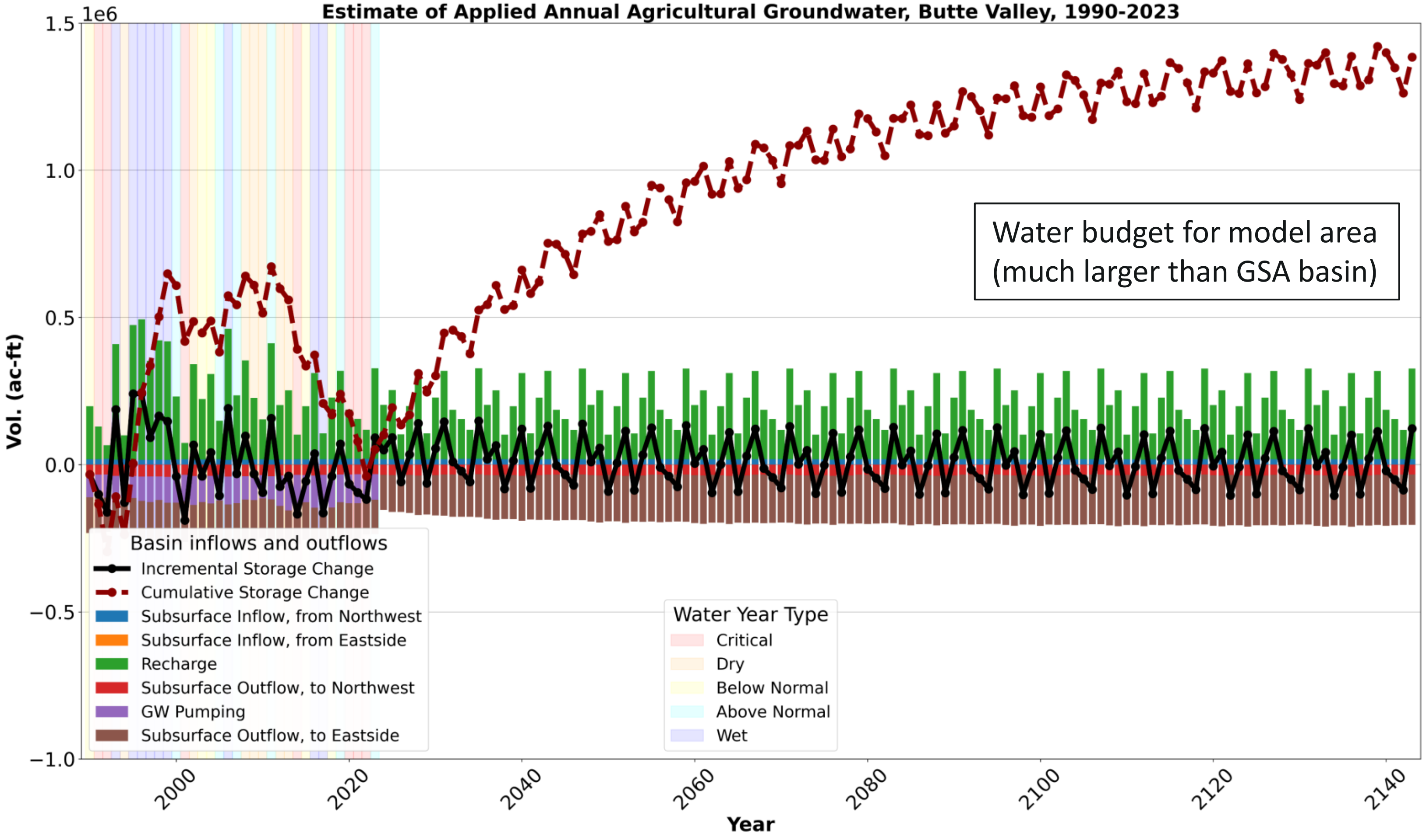
BVIHM: Where are we heading, worst case?

- **2011-2023 driest megadrought climate**, repeated through mid-21st century
- 2011-2023 pumping, repeated



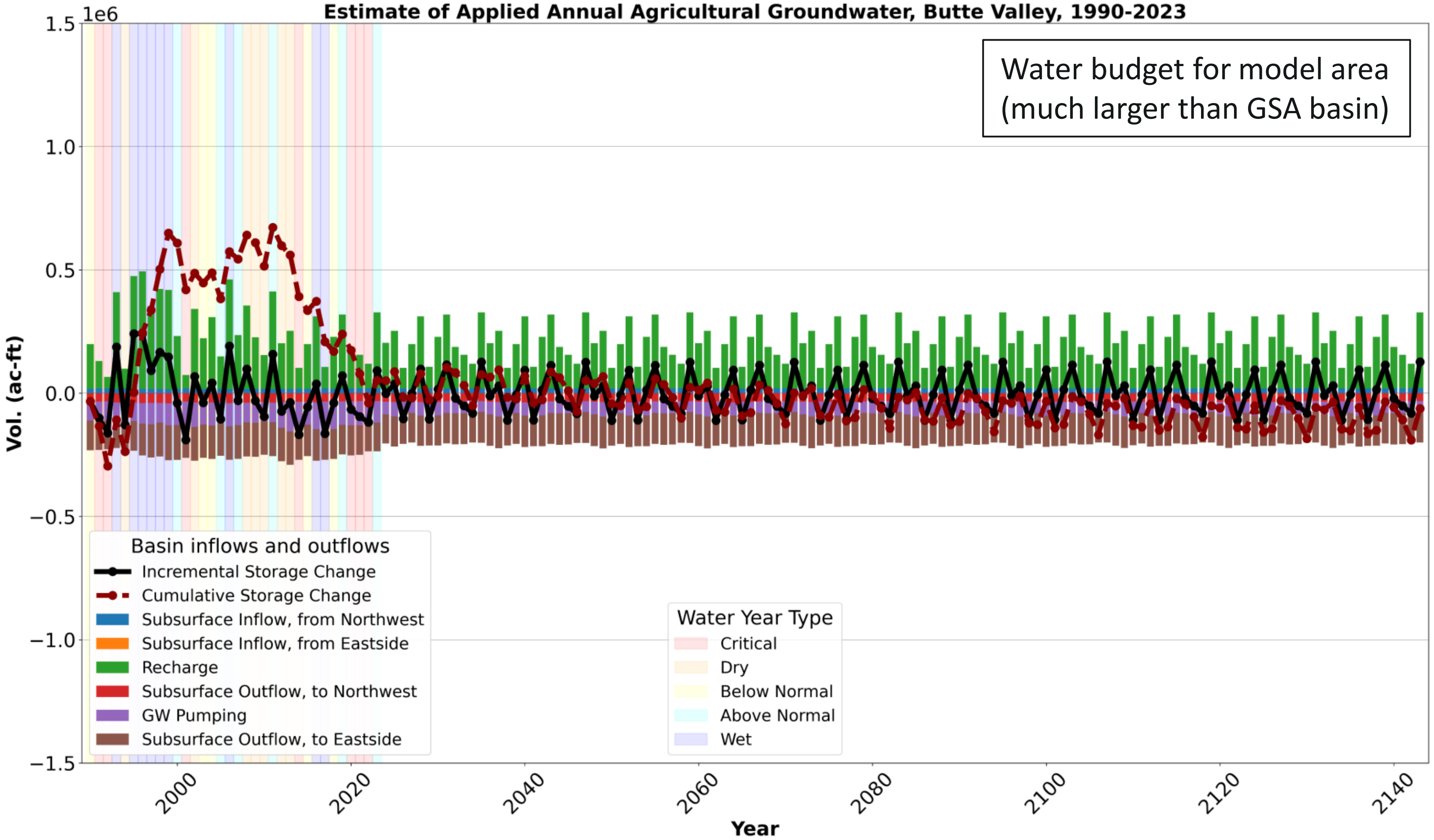
BVIHM: Unimpaired scenario (super-drought)

- 2011-2023 driest megadrought climate, repeated through mid-21st century
- no pumping after 2023



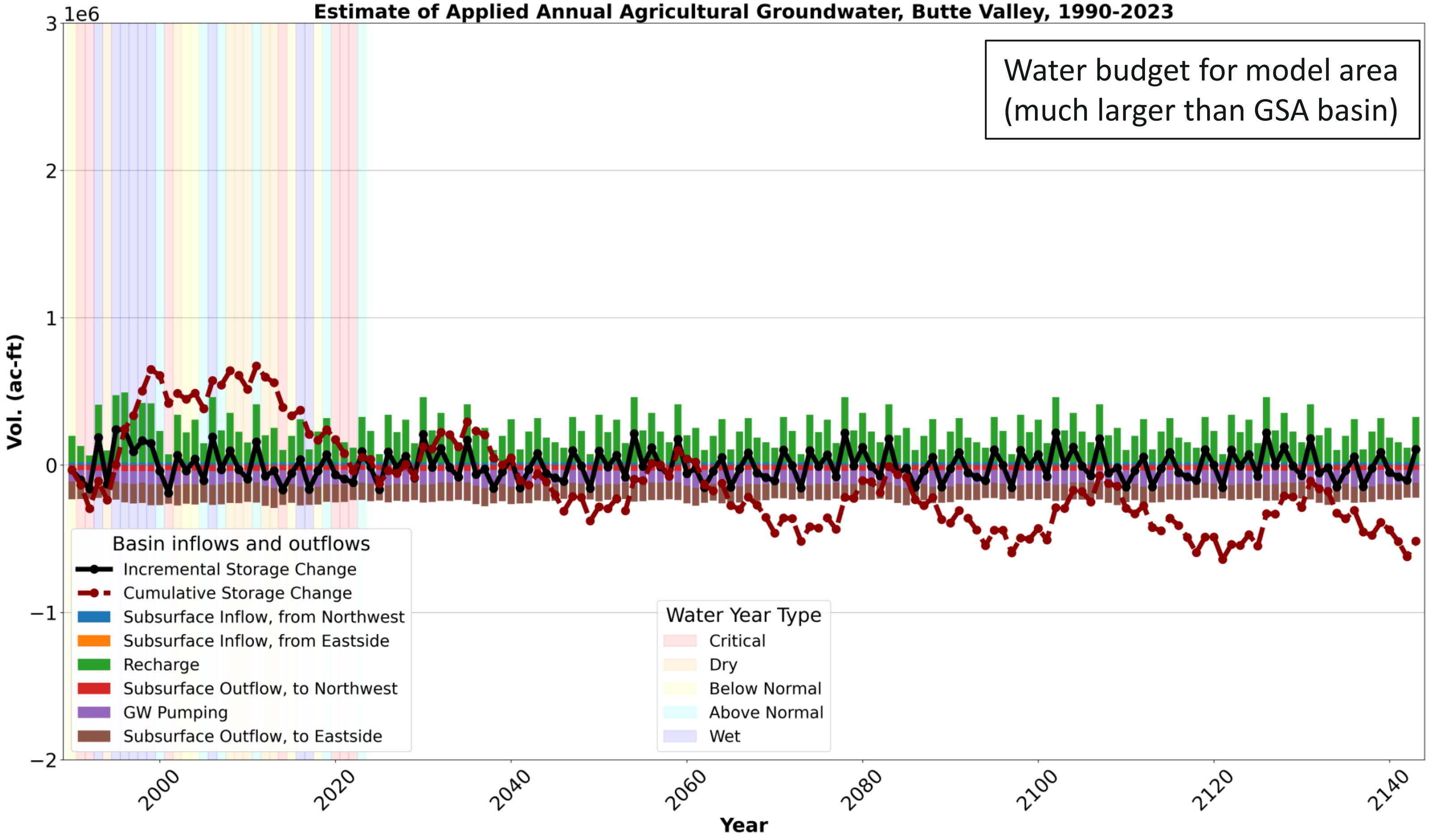
BVIHM: Sustainable Yield Future Scenario

- 2011-2023 driest megadrought climate, repeated through mid-21st century
- 50% of 2011-2023 pumping, repeated



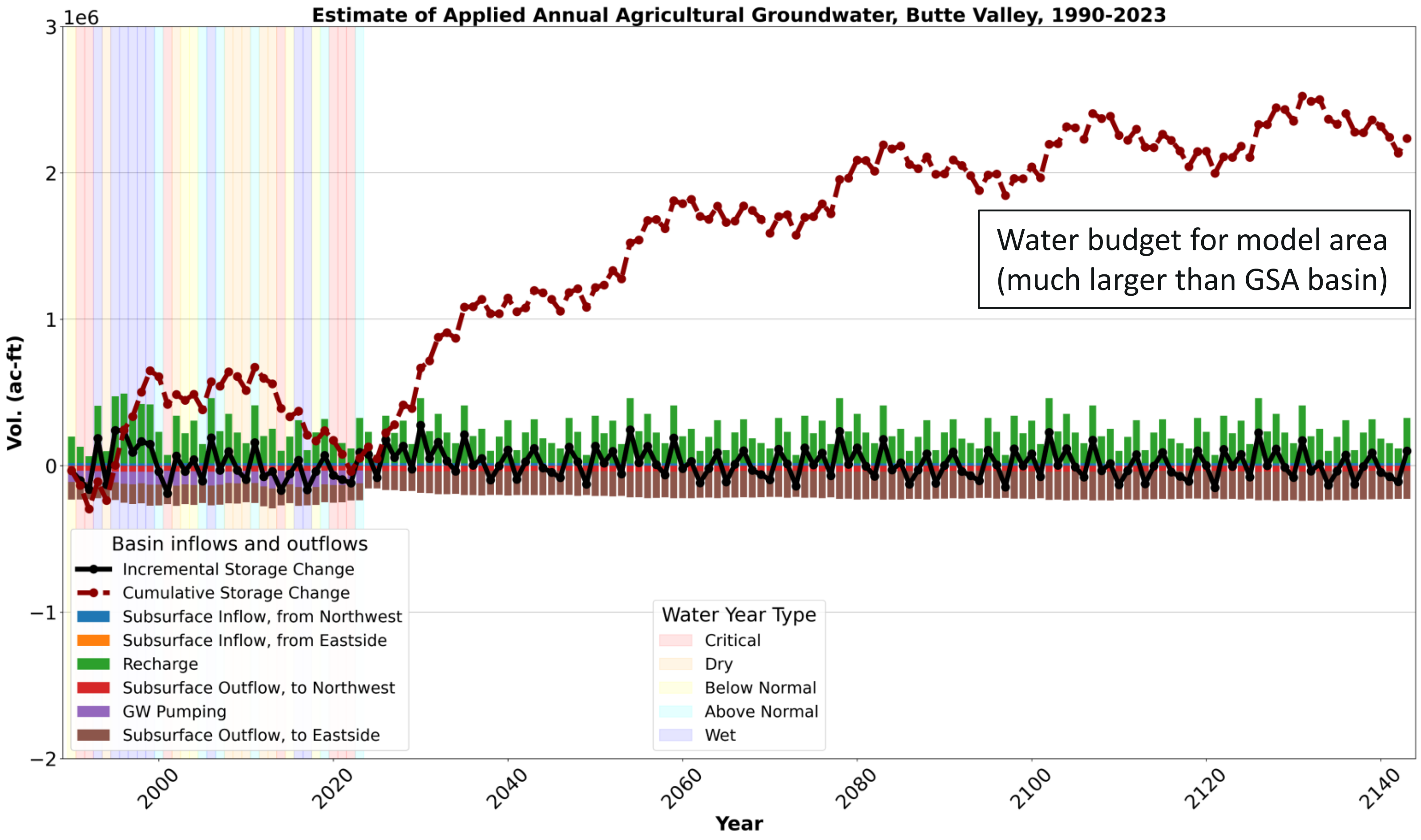
BVIHM: Where are we heading, not so worst case?

- **2000-2023 megadrought climate**, repeated through mid-21st century
- 2000-2023 pumping repeated



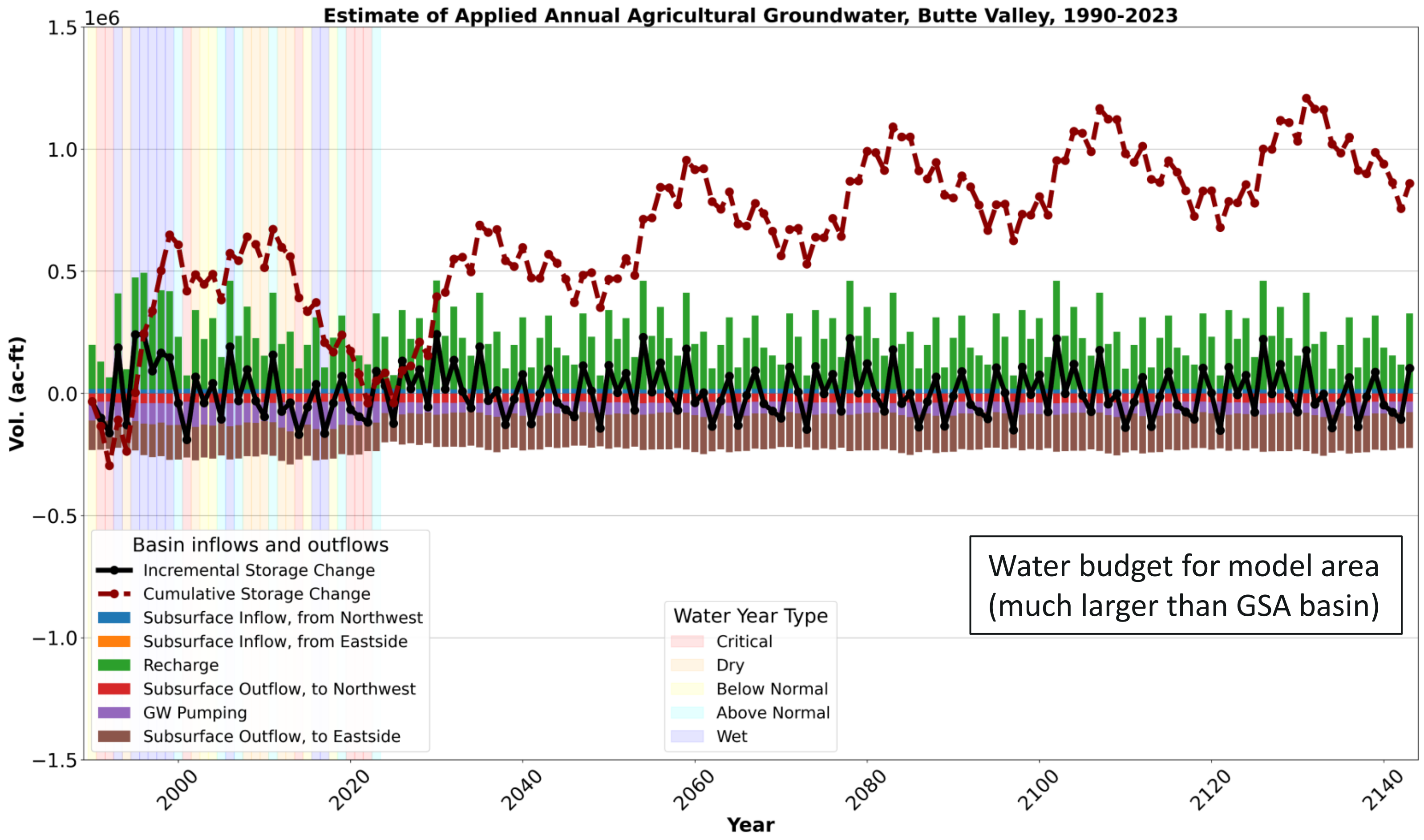
BVIHM: Unimpaired scenario (mega-drought)

- 2000-2023 megadrought climate, repeated through mid-21st century
- No pumping after 2023



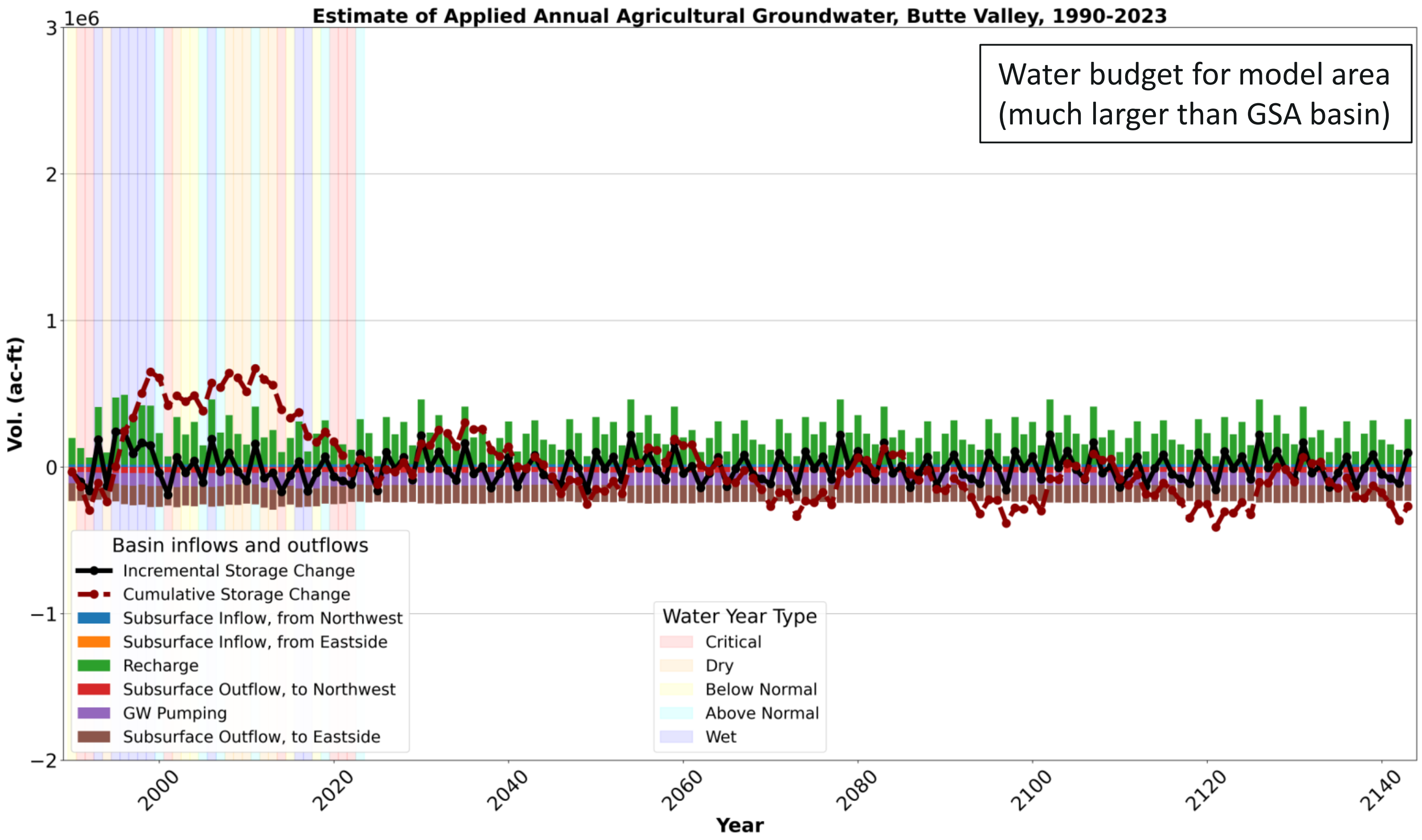
BVIHM: 50% pump reduction (mega-drought)

- 2000-2023 megadrought climate, repeated through mid-21st century
- 50% of 2000-2023 pumping, repeated



BVIHM: Sustainable Yield (mega-drought)

- 2000-2023 megadrought climate, repeated through mid-21st century
- 2023 pumping fixed all years thereafter (65,000 acft, which is the average for 1990-2014)

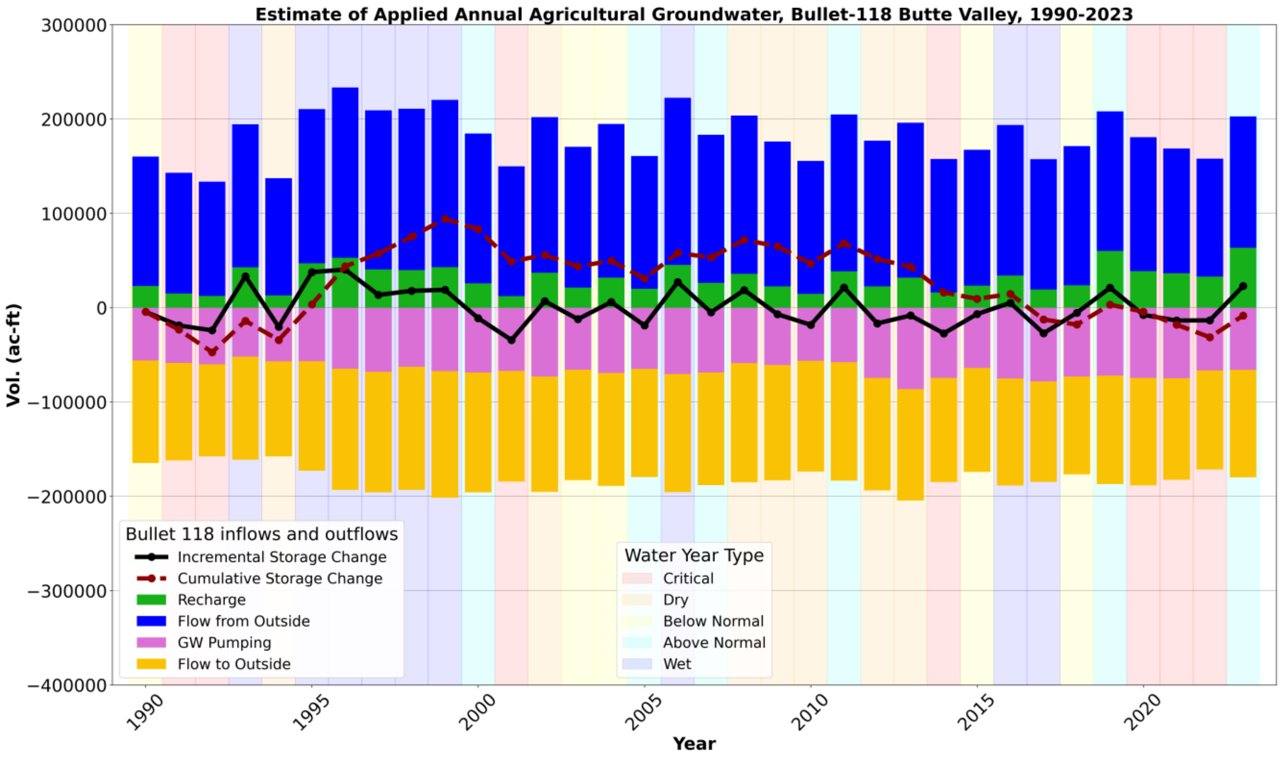


Finding 3: Revised sustainable yield of 65,000 acft is a reasonable target (same as 1990-2014 average, similar to reported pumping of the 1970s)

Evidence: BVIHM

Model Update: Simulate Applied Groundwater in Bullet-118 Butte Valley, CA, 1990-2023

Simulate Applied Groundwater in the Bullet-118 Butte Valley, CA, 1990-2023					
Water Year	**Pumping (ac-ft)**	**Water Year**	**Pumping (ac-ft)**	**Water Year**	**Pumping (ac-ft)**
1990	55,990	**2001**	67,059	**2012**	74,464
1991	58,563	**2002**	72,904	**2013**	86,338
1992	60,079	**2003**	65,689	**2014**	74,332
1993	51,851	**2004**	69,236	**2015**	63,969
1994	56,836	**2005**	64,810	**2016**	74,991
1995	56,676	**2006**	70,371	**2017**	78,074
1996	64,641	**2007**	68,753	**2018**	73,007
1997	67,982	**2008**	58,657	**2019**	71,977
1998	62,548	**2009**	60,781	**2020**	74,496
1999	67,218	**2010**	56,341	**2021**	74,729
2000	68,704	**2011**	57,689	**2022**	66,468
				2023	65,982



Finding 4: Water level will stabilize before 2042, unless climate remains ultra-dry (would require revision of sustainable yield)

Evidence: future water level monitoring

Core Action - Option 1

- Revise minimum thresholds to be at lowest historic levels during baseline reference period 1990-2014 (similar to many approved GSPs)
- Eliminates need to provide additional details on a well mitigation program (water levels will stay above baseline period levels)
- Will require stepwise lowering of everyone's pumping output, in 10% increments until water levels are above MT (back to 1990-2014 levels) => **may eventually require 50%+ pumping reduction**, pending climate and given uncertainty about recent watershed recharge
- Low likelihood of approval by advisory committee, GSA board due to impact on economic livelihood of the basin

Core Action Option 2

- Keep minimum thresholds and extended minimum thresholds as defined in 2022 GSP
- Requires a **strong well mitigation program** to avoid significant undesirable results
    - Create public water supply system in Macdoel with a supply well that has a top of the screen at depths of 400’ or more (replacing domestic wells)
    - Create public water supply system in Mt Hebron with a supply well that has a top of the screen at depths of 400’ or more (replacing domestic wells)
    - Expand public water supply system in Dorris (replacing domestic wells on the border of the city).
    - Provide emergency well deepening program for domestic well outages outside these public water supply systems
- Sustainable yield of 65,000 acft (about 10% less than 2011-2023)
    - Improve irrigation efficiency
    - Improve metering of groundwater pumping, implement assessment of ET, update BVIHM and evaluation of sustainable yield

Core Action Option 3

- No or very limited well mitigation program
- No or very limited monitoring and management of groundwater use
- Fail GSP revision
- Proceed into Chapter 11
- Management under SWRCB:
  - **Costly fee schedule for all water supply wells** except domestic wells
  - **Public metering** of all water supply wells
  - Focus on reduction of pumping to bring water levels to pre-2015 elevation, avoid well outages
  - **Pumping reductions may be in the range of 10% to 50%+ pending climate & future water level trends**

Tech-Team Assessment of Most Likely to Succeed: Core Action 2

- Follows the intent of the original GSP
- Keeps basin in no-overdraft conditions
- Avoids significant undesirable results through strengthened well mitigation program
- Provides GSA operational flexibility for managing groundwater pumping, adjusting sustainable yield in response to climate variation, at 5 year-increments
- Will likely allow groundwater use at 65,000 acft (5% above reported groundwater use of the 1970s; equal to 1990-2014 and to 2022-2023; 10% less than the average 2011-2023)
    - Can be achieved through irrigation efficiency improvements at reasonable economic cost to agricultural sector
    - Improve metering of groundwater pumping, implement assessment of ET, update BVIHM and evaluation of sustainable yield
- Cost of providing well mitigation program is fraction of economic impact if agricultural production were reduced by one-quarter, one-third, one-half, or more

Five-Year Action Plan under Option 2

- Plan for public supply systems to replace most shallow domestic wells (well depth at least 400 ft bgs, top of screen) => build future resiliency
- Plan for well deepening outside public supply systems to depths of at least 200 ft bgs (top of screen) => build future resiliency
- Set sustainable yield at 65,000 acft for the next 5 years:
  - Monitor baseline and improvements

  → should lead to some foreseeable stabilization of water levels, soft landing prior to 2042
- Plan for
  - 10% improvements on efficiency,
  - or 10% demand reduction
  - Or combination of both

Implementation Project Update

Timeline – Implementation Projects

2023 Q3

- Formation of work groups in August AC Meetings
- Work groups approve draft project scope and schedule
- Final grant awards expected in September

2023 Q4

- October AC Meetings- review of final funding awards
- Detailed scope and schedule for funded projects provided to Advisory Committee

2024 Q1

- February AC Meetings- updates from project work groups, updates depend on individual project schedules
- SGMA Compliance- Annual Report for WY 2023

2024 Q2

- May AC Meetings- Update on implementation projects

Timeline through Fall 2024

2024 Q3

- GSP determination/corrective actions, submission due July 16 2024
- Summer sample collection
- Continue expansion of the monitoring network and monitoring design plan
- Installation of 4 new domestic wells through the City of Dorris Project (Drought Emergency)
- Continue development of well inventory and approach to the fee study
- August AC Meetings

2024 Q4

- Preliminary Database Management System (DMS)
- Model scenario results with different management actions
- October AC Meetings
- Continued data collection

Jan 1 | Feb 1 | Mar 1 | Apr 1 | May 1 | Jun 1 | Jul 1 | Aug 1 | Sept 1 | Oct 1 | Nov 1 | Dec 1 | Dec 31

In Progress | Added to Backlog | Complete | Blocked

Implementation Grant Progress *Through May 2024*

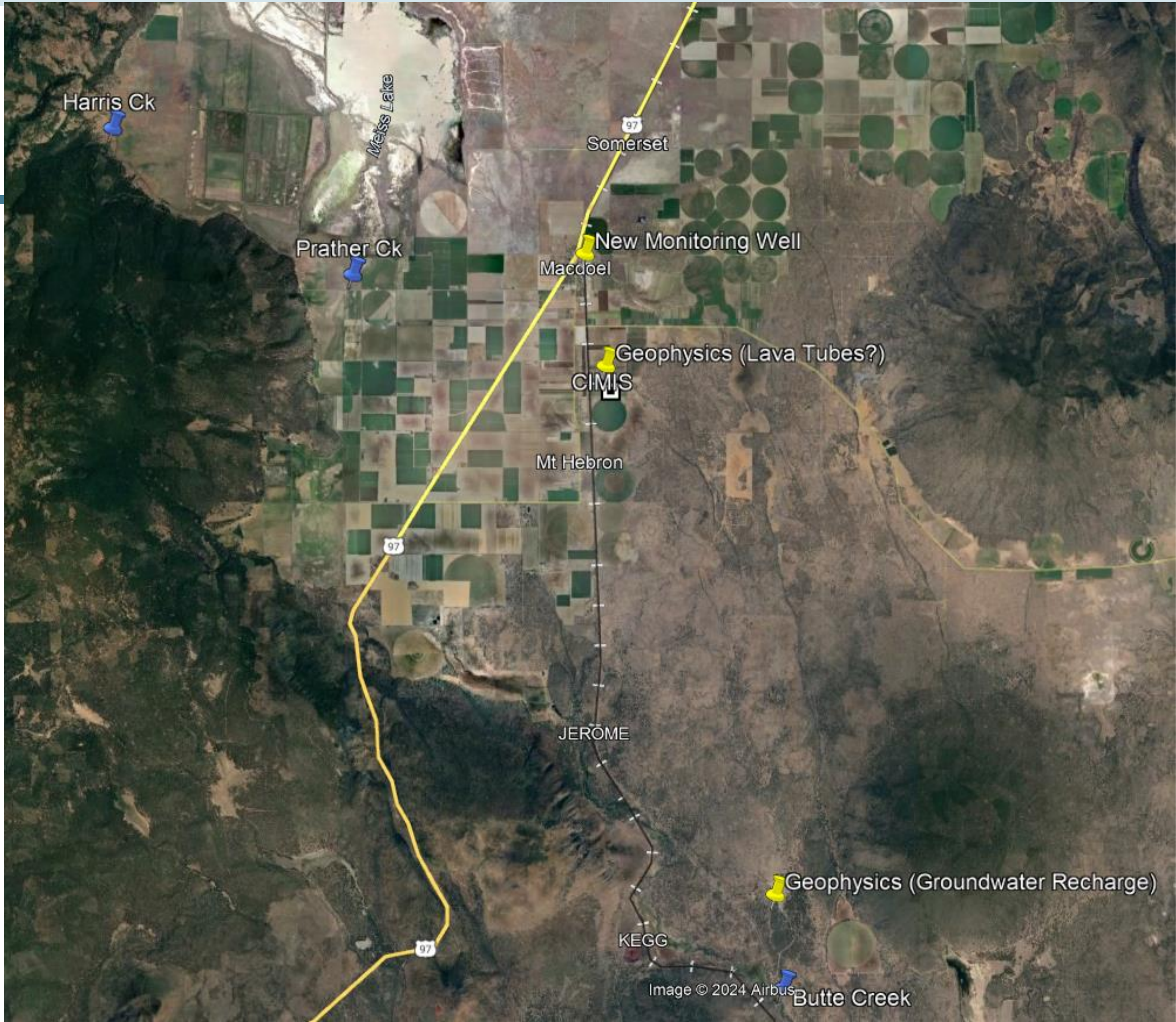
#	Component	Notes	Status
1	**SGMA Compliance and GSP Updates**		
1.1	GSP Revisions	Due January 2027	In Progress
1.2	Reporting (Data and Annual Report)	Annual Reports due April 1 of each year (submitted AR 2023)	In Progress
1.3	Model Updates and Scenario Evaluation		In Progress
1.4	Data Gaps and Monitoring Expansion and DMS		In Progress
2	**Fee Study and Economic Analysis**		
2.1	Evaluation of Fee/Rate Options and Schedule Development		Not Started
2.2	Parcel scale groundwater use estimate		In Progress
2.3	Economic Analysis and Water Market Analysis		Not Started
3	**Well Inventory**		
3.1	Database Development and Well Risk Assessment		In Progress
3.2	Monitoring Well Construction or Well Instrumentation		Not Started
4	**Monitoring Network**		
4.1	Upper watershed monitoring	Locate snow monitoring stations, secure permissions	In Progress
4.2	Voluntary well metering	ID wells to instrument, goal of 40 wells.	Not Started
4.3	Monitoring network expansion	Water quality wells, install two stream gauges	In Progress
4.4	Improve GDE Analysis	Review GDEs identified in GSP. Collect monitoring data	Not Started

Sensor Installation and Data Collection

- Installed flow station near Meiss Lake on Prather Creek
- Installed shallow groundwater monitoring well telemetry in Macdoel
- Conducted a geophysics study in SE Butte Valley looking at lava tubes
- Conducted a geophysics study around the Butte Valley groundwater recharge sink
- Surveyed potential locations of future groundwater model calibration sites along Butte Creek
- Continued stage/flow measurements of new flow stations
- Beginning monthly depth to water measurements at key groundwater wells

Sensor Installation Data Collection

- Geophysics to study groundwater movement through fractured basalt (lava tube?) and a major groundwater recharge site near Butte Creek.
- Installed new sensors in Macdoel to monitor shallow wells in the Macdoel area.



Irrigation Efficiency Workshop - Recap

- “Workshop on Efficient Water Management for Forage Crops”
- Conducted Thursday March 14th
- Field visits with irrigation specialist May 21, 22, 23
- Link to survey: https://us11.list-manage.com/survey?u=2516c89941f49355f514cefb8&id=3435a2de67&attribution=false

Thank You