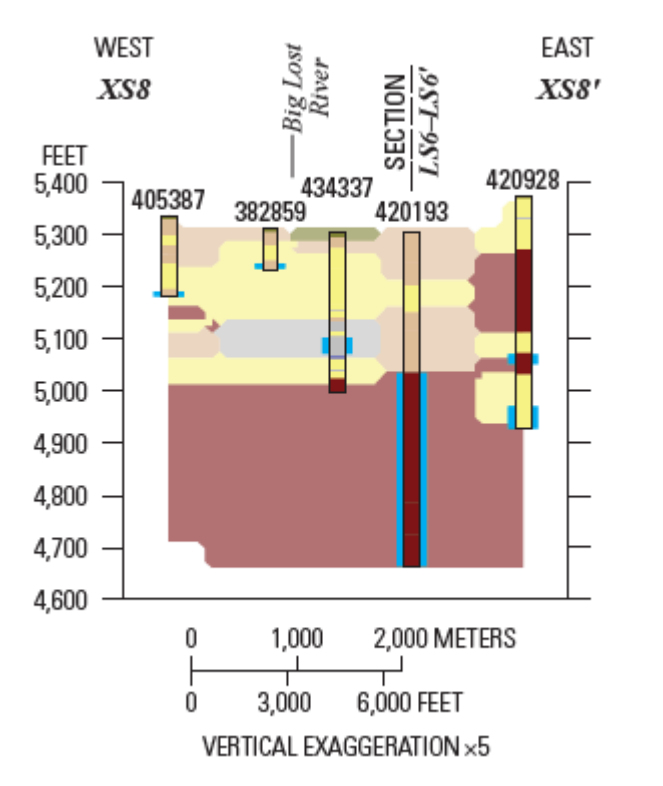
2022 Potentiometric Surfaces and Groundwater-Level Changes in the Big Lost River Valley

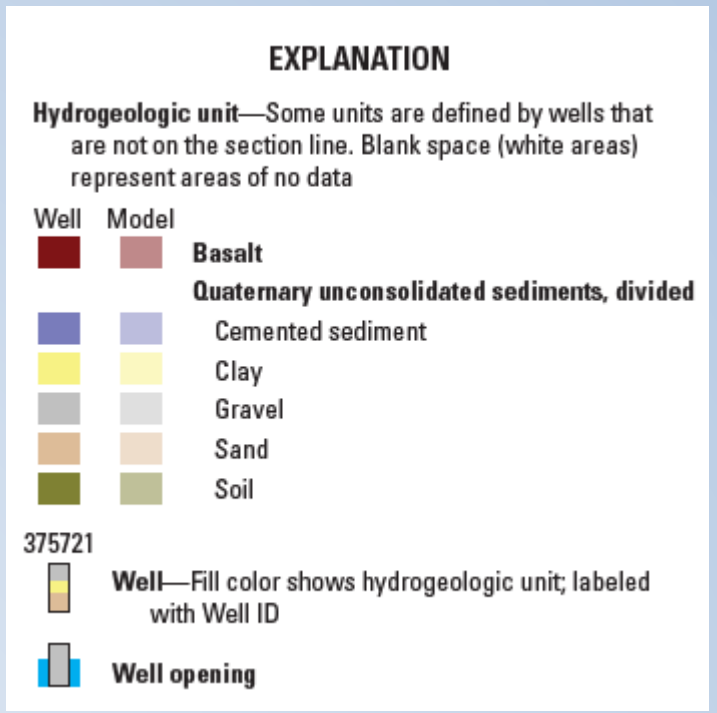
U.S. Department of the Interior
U.S. Geological Survey

In cooperation with the
Idaho Department of Water Resources

Scott Ducar
sducar@usgs.gov

Lauren Zinsser
lzinsser@usgs.gov





Motivation

- Recognized data gap
- Last detailed potentiometric surfaces developed for 1968 (whole valley) and 1991 (southern half)
- Complexity in water-bearing units in southern end of the basin

Goals

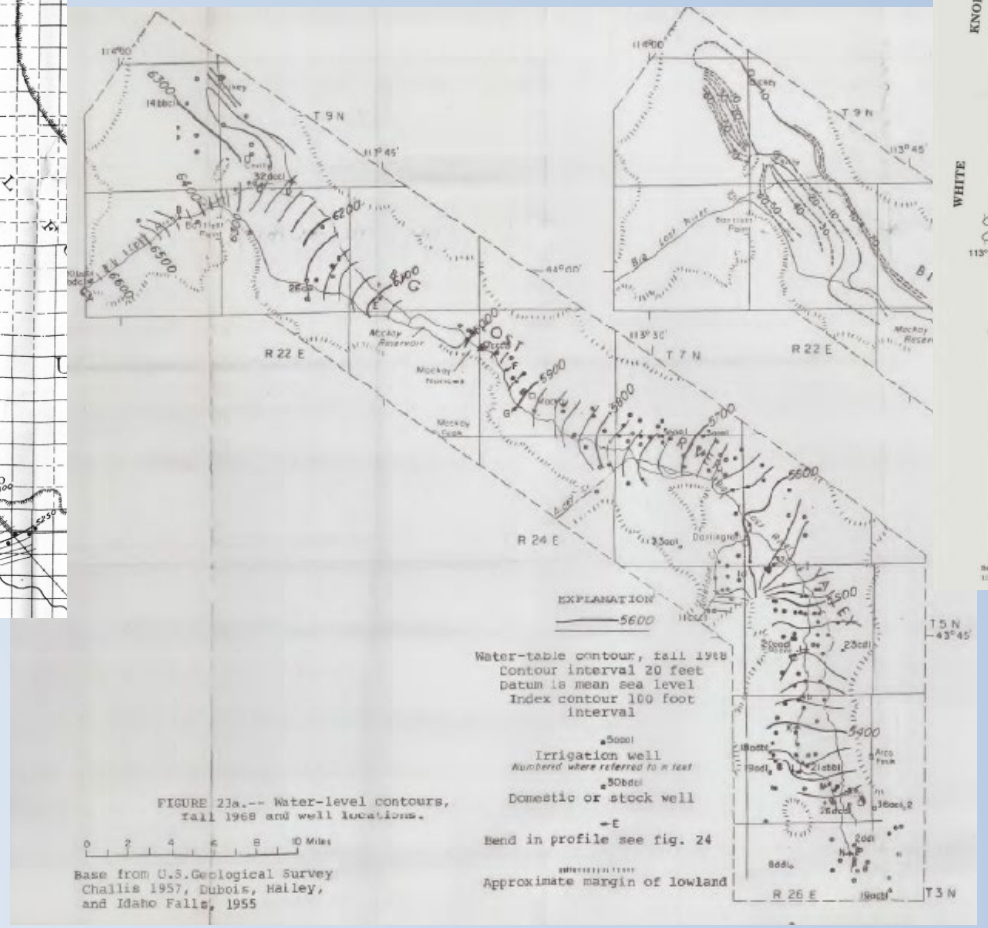
- Improve hydrogeologic understanding
- Support groundwater modeling
- Inform water rights administration

USGS

Previous Groundwater-Level Synoptics

[Stearns and others, 1938]

[Crosthwaite and others, 1970a]



[Bassick and Jones, 1992]

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Approach

- Measured water levels in 180 wells (49 IDWR/131 USGS)
  - Surveyed wellheads
  - Prioritized previously measured wells
- Two events:
  - Pre (early April 2022) and
  - Post (early November 2022) irrigation season
- Develop potentiometric surface maps
  - Kriging and then hand-modified
- Develop change maps
  - Only in paired wells (1968, 1991, 2022)

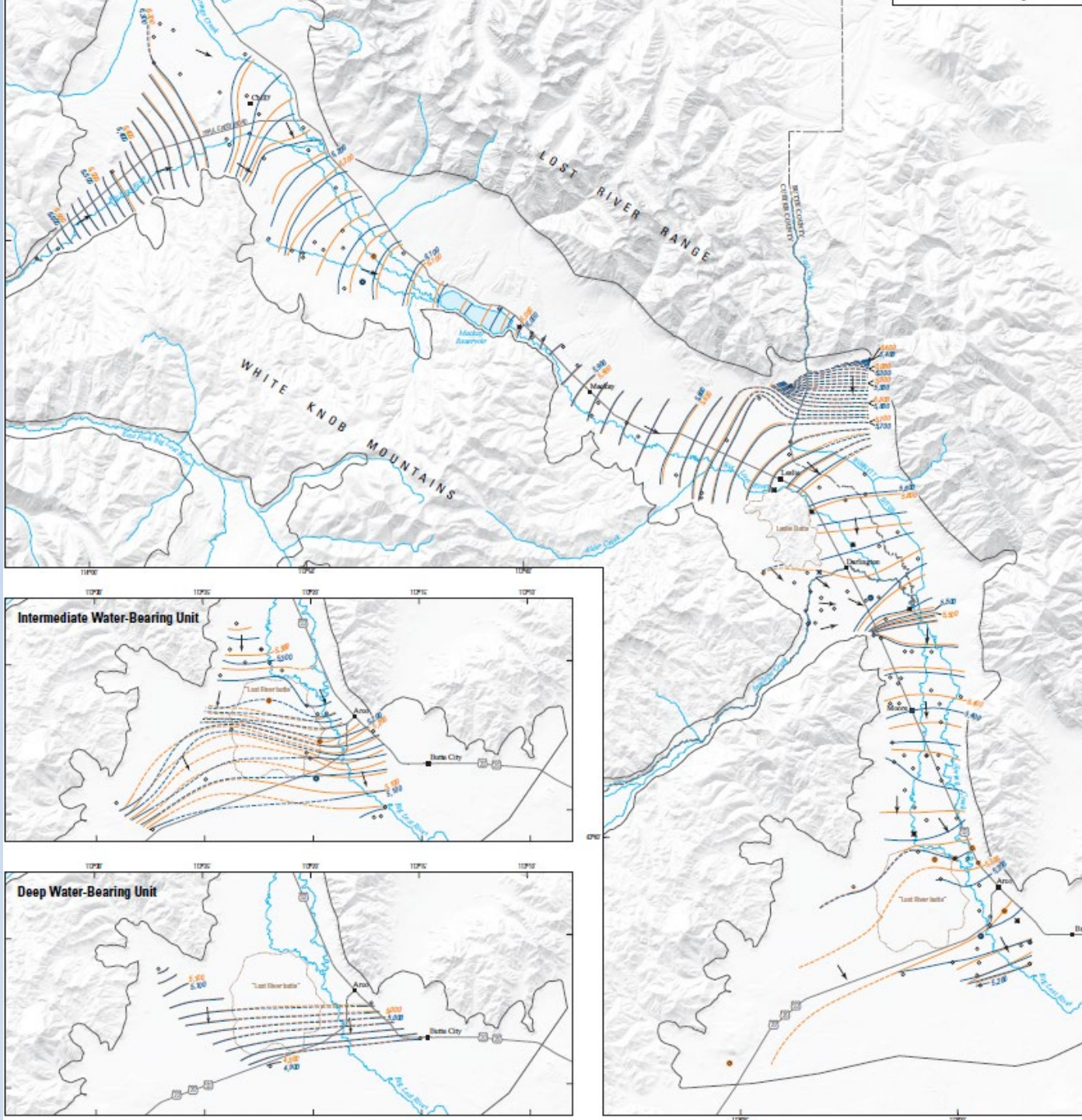
USGS

Potentiometric Surfaces

Published in Ducar and Zinsser, 2023

- Map and pamphlet: https://doi.org/10.3133/sim3509
- Data release: https://doi.org/10.5066/P93NQAP9

- Broadly similar to past surfaces
- 3 water-bearing units identified in the southern end based on:
  - Well depth
  - Water-level elevation
  - Hydrogeologic unit



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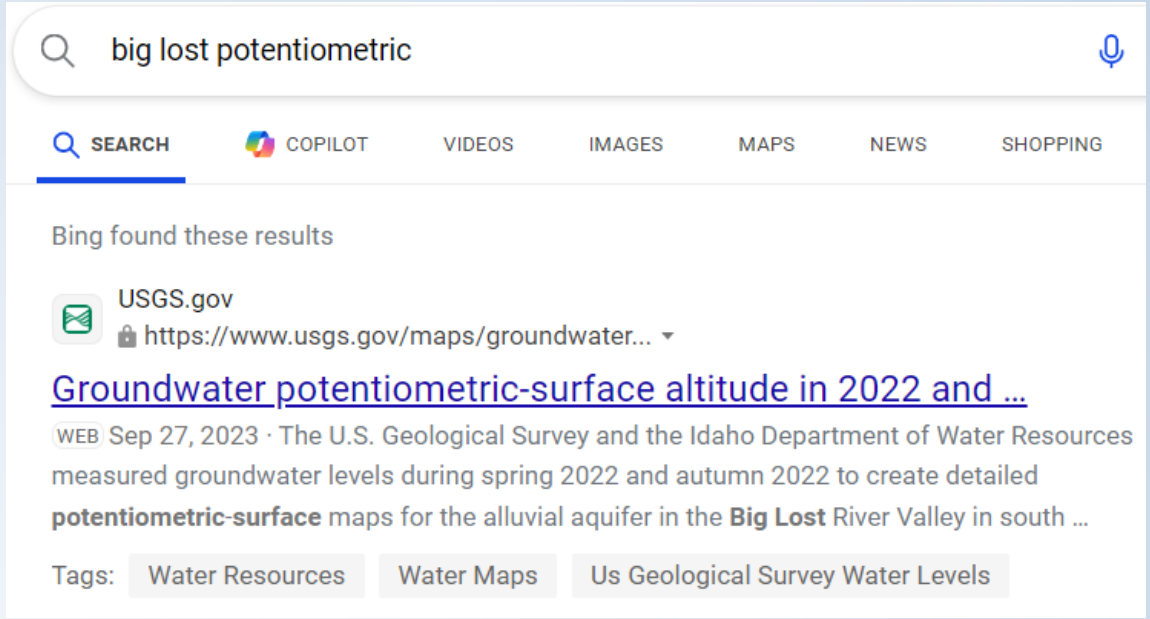

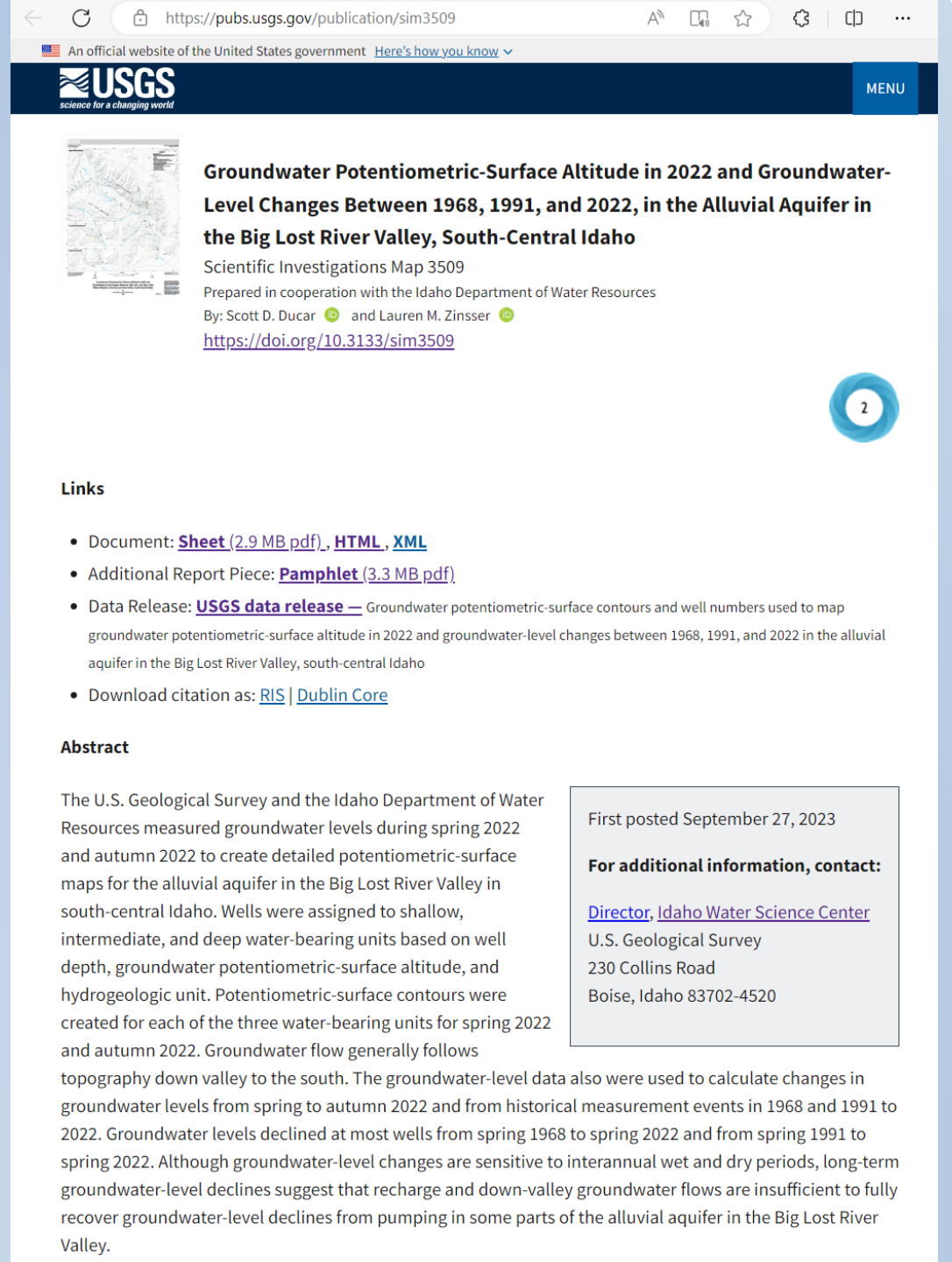

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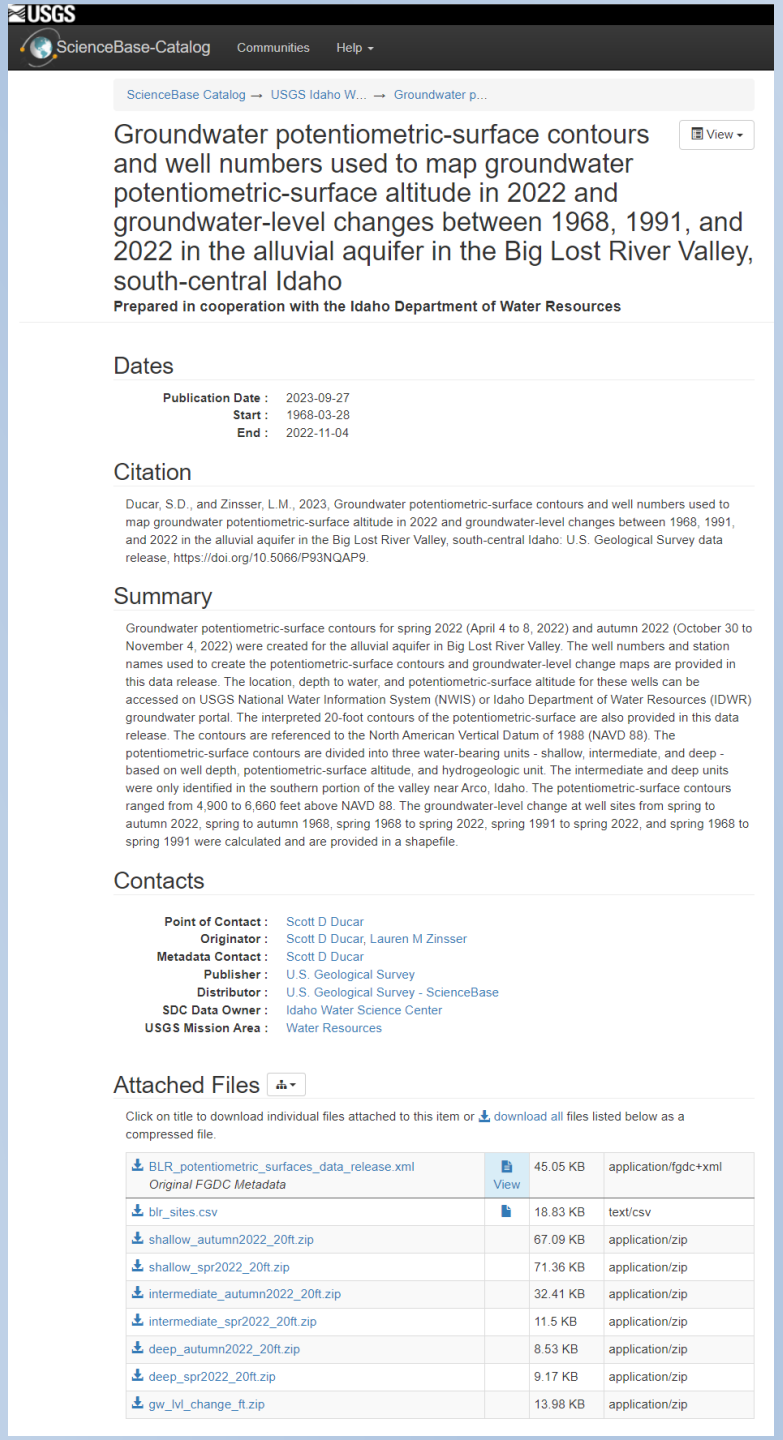

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View

Groundwater potentiometric-surface contours and well numbers used to map groundwater potentiometric-surface altitude in 2022 and groundwater-level changes between 1968, 1991, and 2022 in the alluvial aquifer in the Big Lost River Valley, south-central Idaho

Prepared in cooperation with the Idaho Department of Water Resources

Dates

Publication Date : 2023-09-27
Start : 1968-03-28
End : 2022-11-04

Citation

Ducar, S.D., and Zinsser, L.M., 2023, Groundwater potentiometric-surface contours and well numbers used to map groundwater potentiometric-surface altitude in 2022 and groundwater-level changes between 1968, 1991, and 2022 in the alluvial aquifer in the Big Lost River Valley, south-central Idaho: U.S. Geological Survey data release, https://doi.org/10.5066/P93NQAP9.

Summary

Groundwater potentiometric-surface contours for spring 2022 (April 4 to 8, 2022) and autumn 2022 (October 30 to November 4, 2022) were created for the alluvial aquifer in Big Lost River Valley. The well numbers and station names used to create the potentiometric-surface contours and groundwater-level change maps are provided in this data release. The location, depth to water, and potentiometric-surface altitude for these wells can be accessed on USGS National Water Information System (NWIS) or Idaho Department of Water Resources (IDWR) groundwater portal. The interpreted 20-foot contours of the potentiometric-surface are also provided in this data release. The contours are referenced to the North American Vertical Datum of 1988 (NAVD 88). The potentiometric-surface contours are divided into three water-bearing units - shallow, intermediate, and deep - based on well depth, potentiometric-surface altitude, and hydrogeologic unit. The intermediate and deep units were only identified in the southern portion of the valley near Arco, Idaho. The potentiometric-surface contours ranged from 4,900 to 6,660 feet above NAVD 88. The groundwater-level change at well sites from spring to autumn 2022, spring to autumn 1968, spring 1968 to spring 2022, spring 1991 to spring 2022, and spring 1968 to spring 1991 were calculated and are provided in a shapefile.

Contacts

Point of Contact : Scott D Ducar
Originator : Scott D Ducar, Lauren M Zinsser
Metadata Contact : Scott D Ducar
Publisher : U.S. Geological Survey
Distributor : U.S. Geological Survey - ScienceBase
SDC Data Owner : Idaho Water Science Center
USGS Mission Area : Water Resources

Attached Files

Click on title to download individual files attached to this item or download all files listed below as a compressed file.

BLR_potentiometric_surfaces_data_release.xml *Original FGDC Metadata*	View	45.05 KB	application/fgdc+xml
blr_sites.csv		18.83 KB	text/csv
shallow_autumn2022_20ft.zip		67.09 KB	application/zip
shallow_spr2022_20ft.zip		71.36 KB	application/zip
intermediate_autumn2022_20ft.zip		32.41 KB	application/zip
intermediate_spr2022_20ft.zip		11.5 KB	application/zip
deep_autumn2022_20ft.zip		8.53 KB	application/zip
deep_spr2022_20ft.zip		9.17 KB	application/zip
gw_lvl_change_ft.zip		13.98 KB	application/zip

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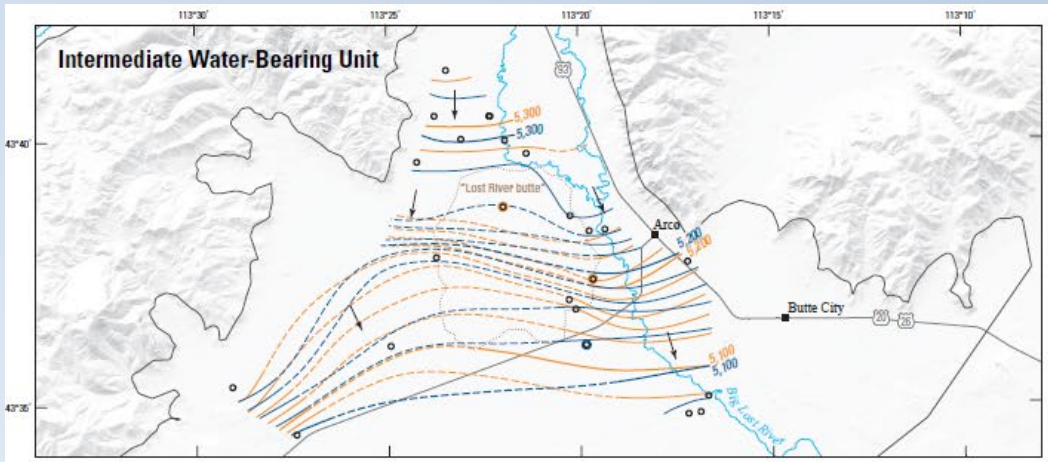
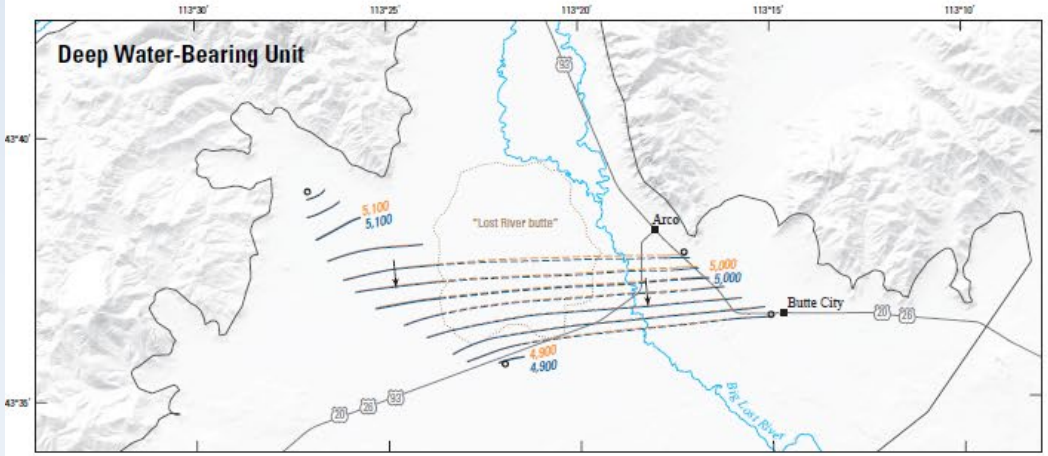
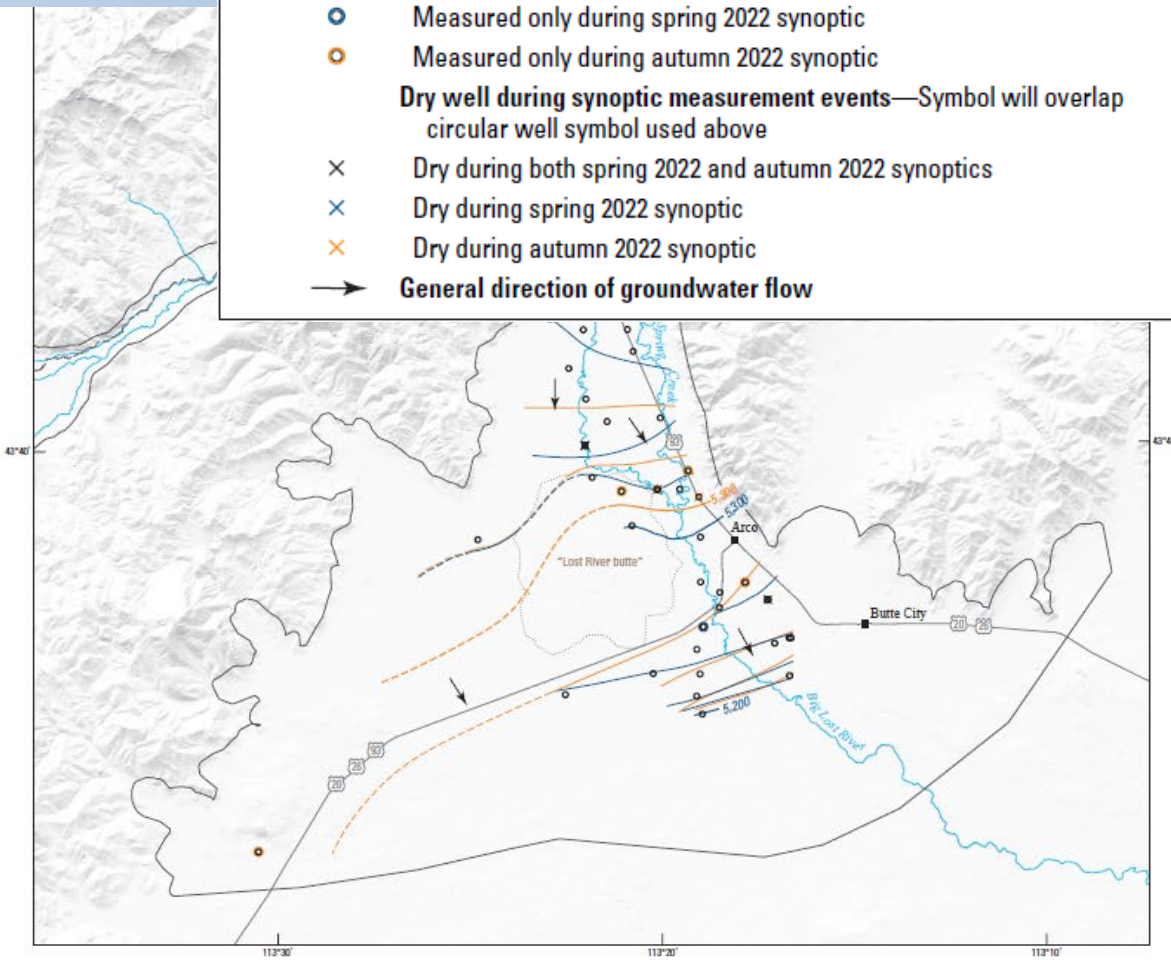
Potentiometric Surfaces – Southern End of Valley







EXPLANATION

- **Alluvial aquifer boundary**
- **Potentiometric contour**—Dashed where approximately located. Contour interval 20 feet. Datum is North American Vertical Datum of 1988
- 5,300 — Spring 2022
- 5,300 — Autumn 2022
- **Well measured during synoptic measurement events**
  - Measured during both spring 2022 and autumn 2022 synoptics
  - Measured only during spring 2022 synoptic
  - Measured only during autumn 2022 synoptic
- **Dry well during synoptic measurement events**—Symbol will overlap circular well symbol used above
  - Dry during both spring 2022 and autumn 2022 synoptics
  - Dry during spring 2022 synoptic
  - Dry during autumn 2022 synoptic
- **General direction of groundwater flow**

USGS

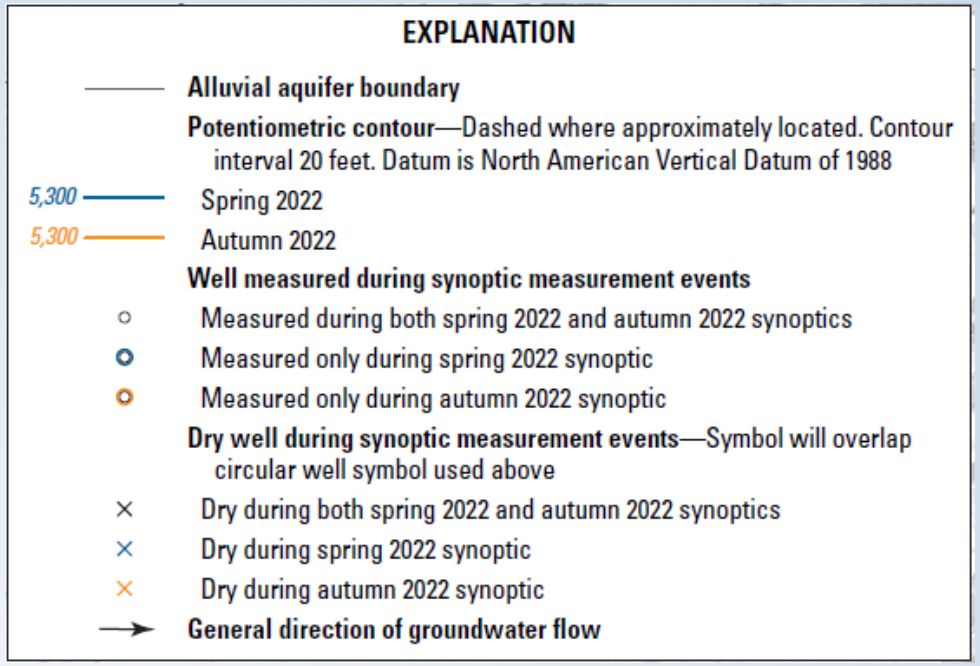
Shaded relief, roads, and boundaries from U.S. Geological Survey digital data, various scales; hydrography modified from Idaho Department of Water Resources 1:250,000-scale digital data
Idaho Transverse Mercator projected coordinate system
North American Datum of 1983

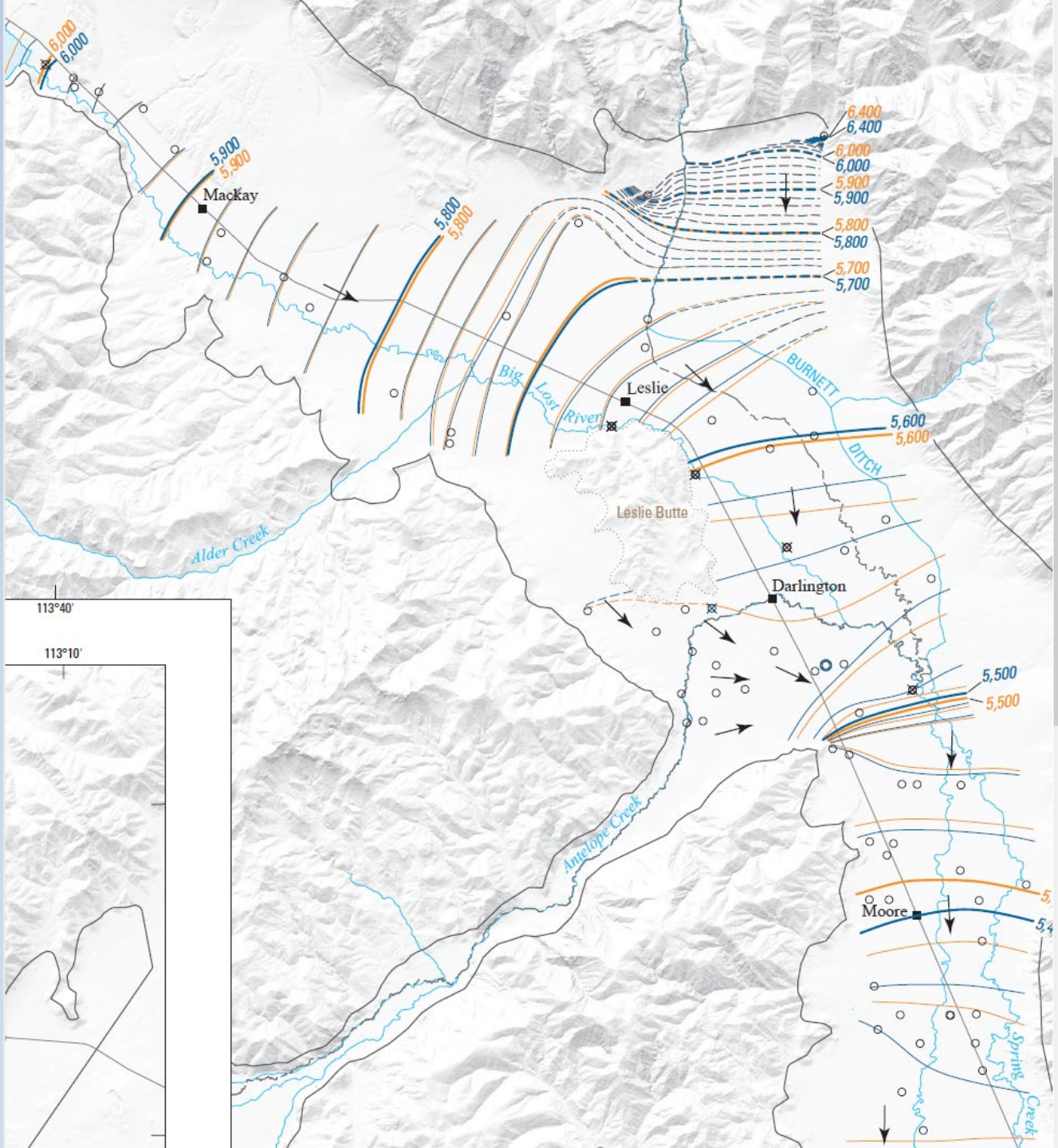
SCALE 1:150 000
10 MILES
10 KILOMETERS

IDAHO
MAP LOCATION

Digital cartographic production by Joseph F. Mangano; edited by Nathan A. Severance
Manuscript approved for publication September 3, 2023

Potentiometric Surfaces: Middle





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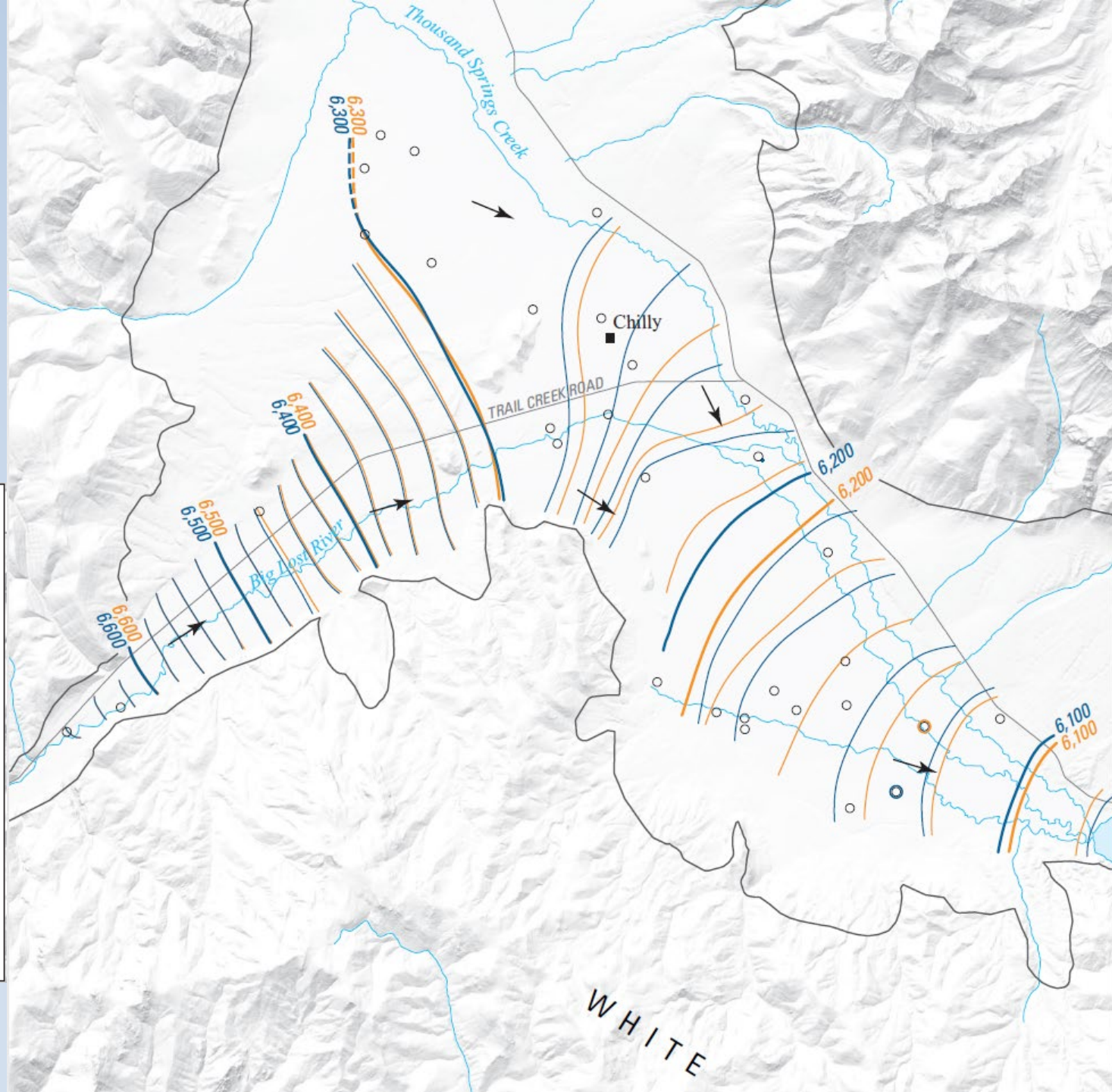
Potentiometric Surfaces: Northern



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2022 Spring to Autumn Water-Level Change

- Rise in water levels near Chilly and Darlington
- Little change in water levels near Mackay
- Declining water levels in southern third of the valley in shallow and intermediate water-bearing units

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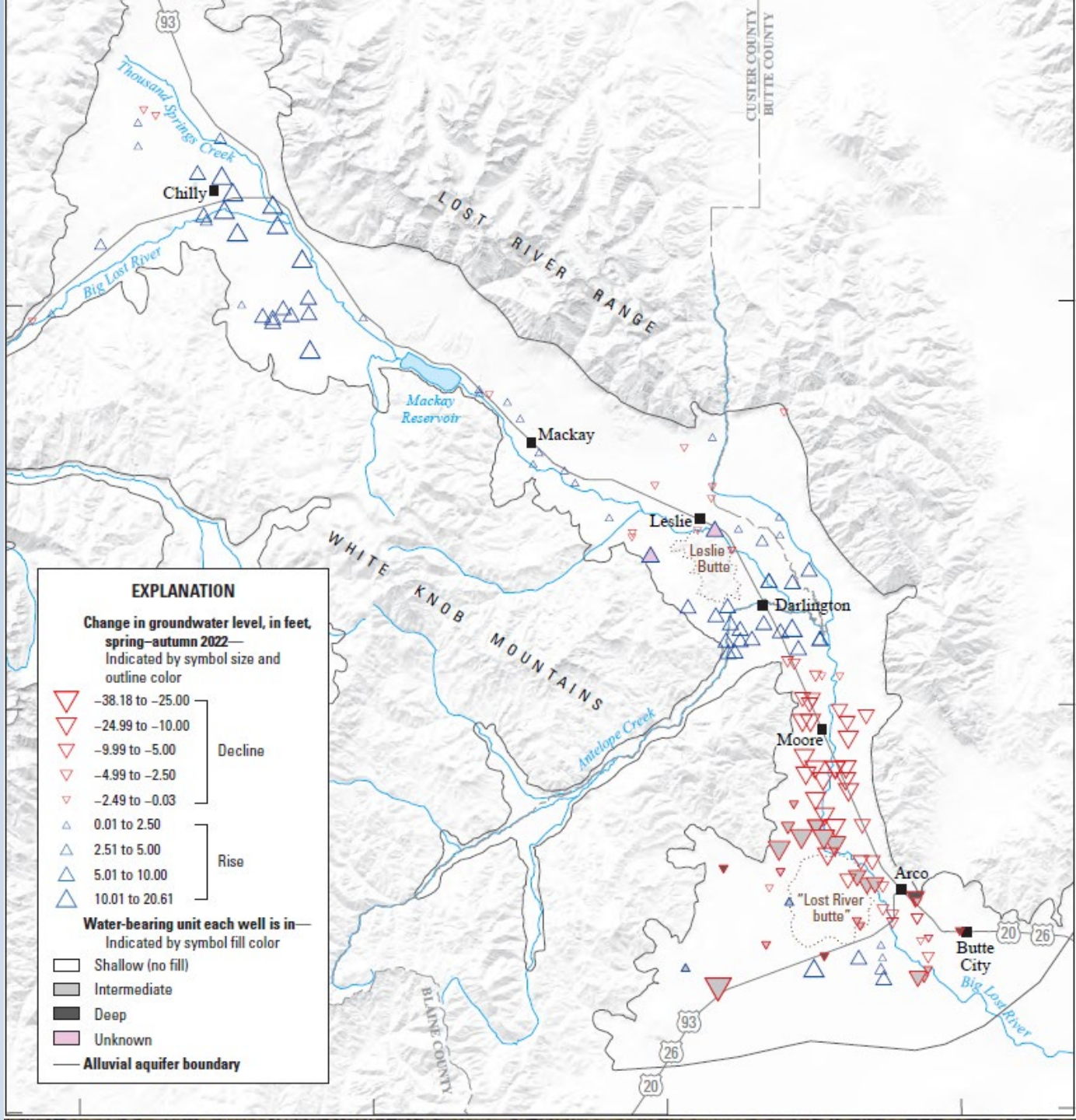
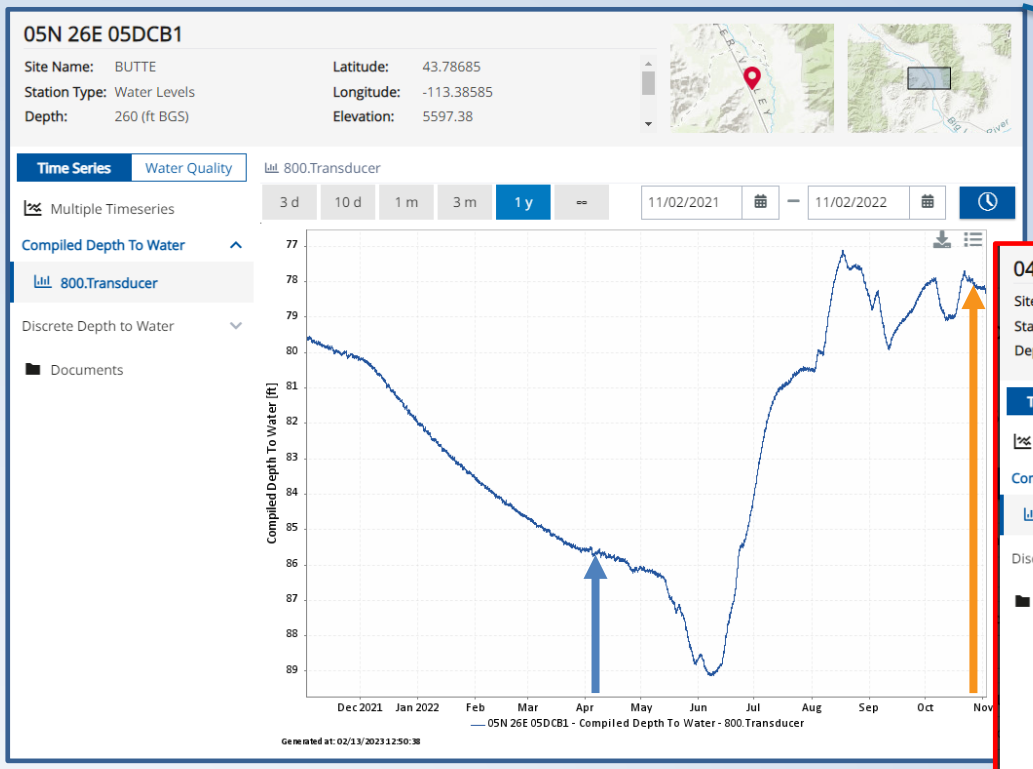


2022 Spring to Autumn Water-Level Change

Increases in some areas, decreases in others



Data from IDWR, Groundwater Data Portal

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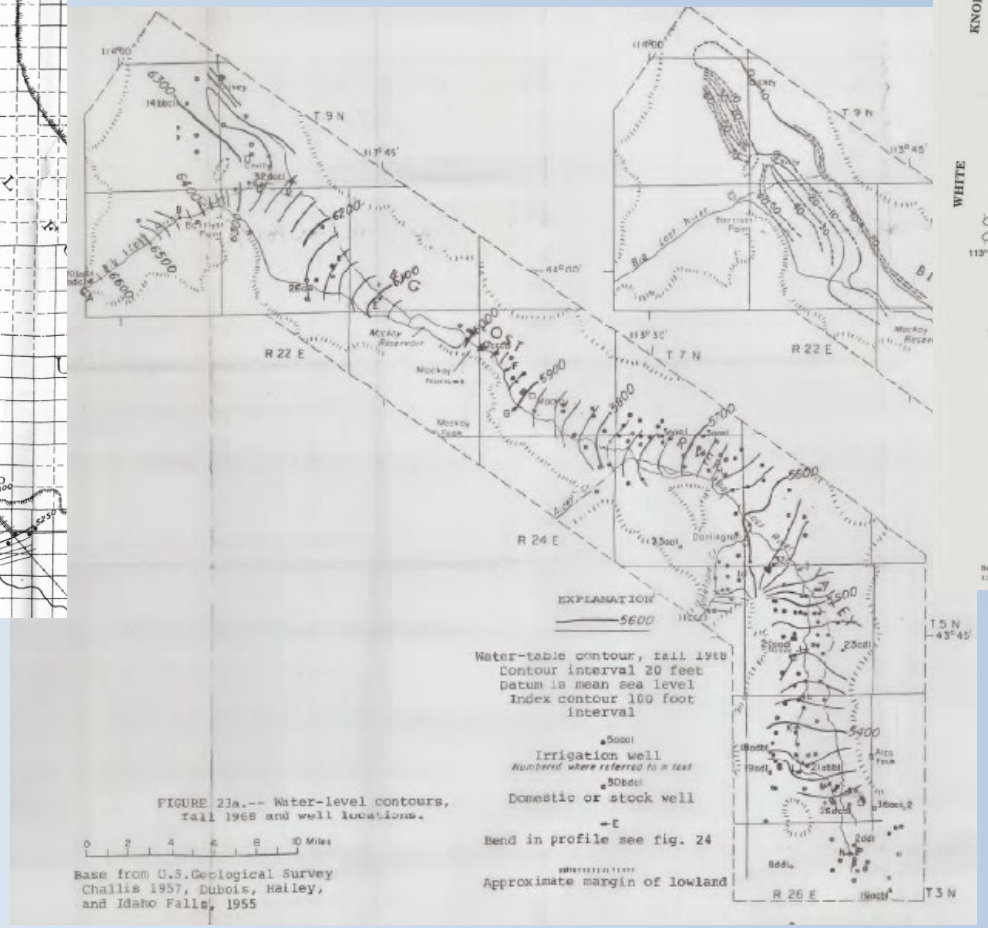

[Bassick and Jones, 1992]

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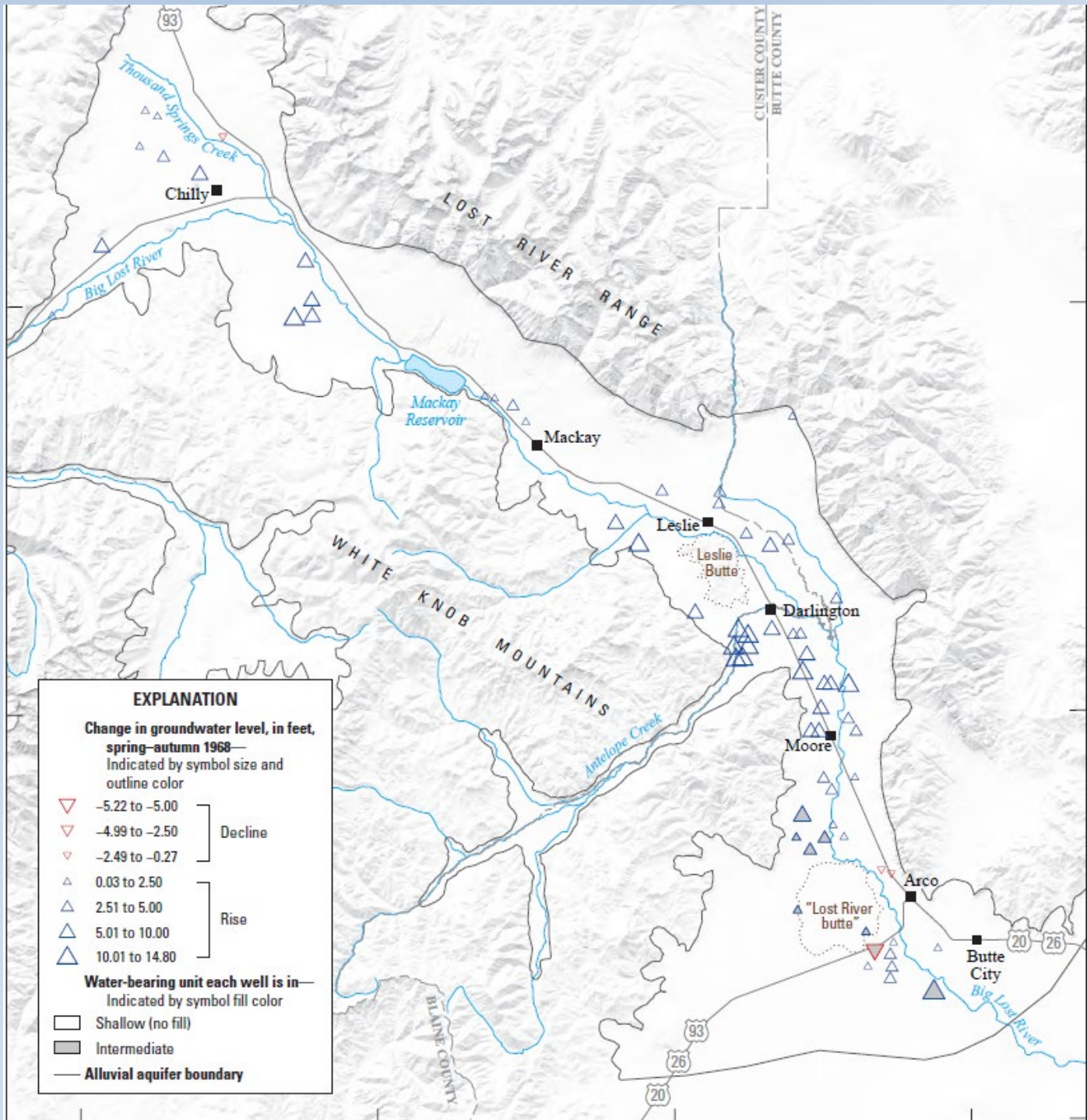
1968 Spring to Autumn Water-Level Change

- Increased water levels in most wells in the valley, in shallow and intermediate water-bearing units
- The rise in water levels suggest recharge was generally sufficient to recover groundwater-level declines from pumping in 1968.



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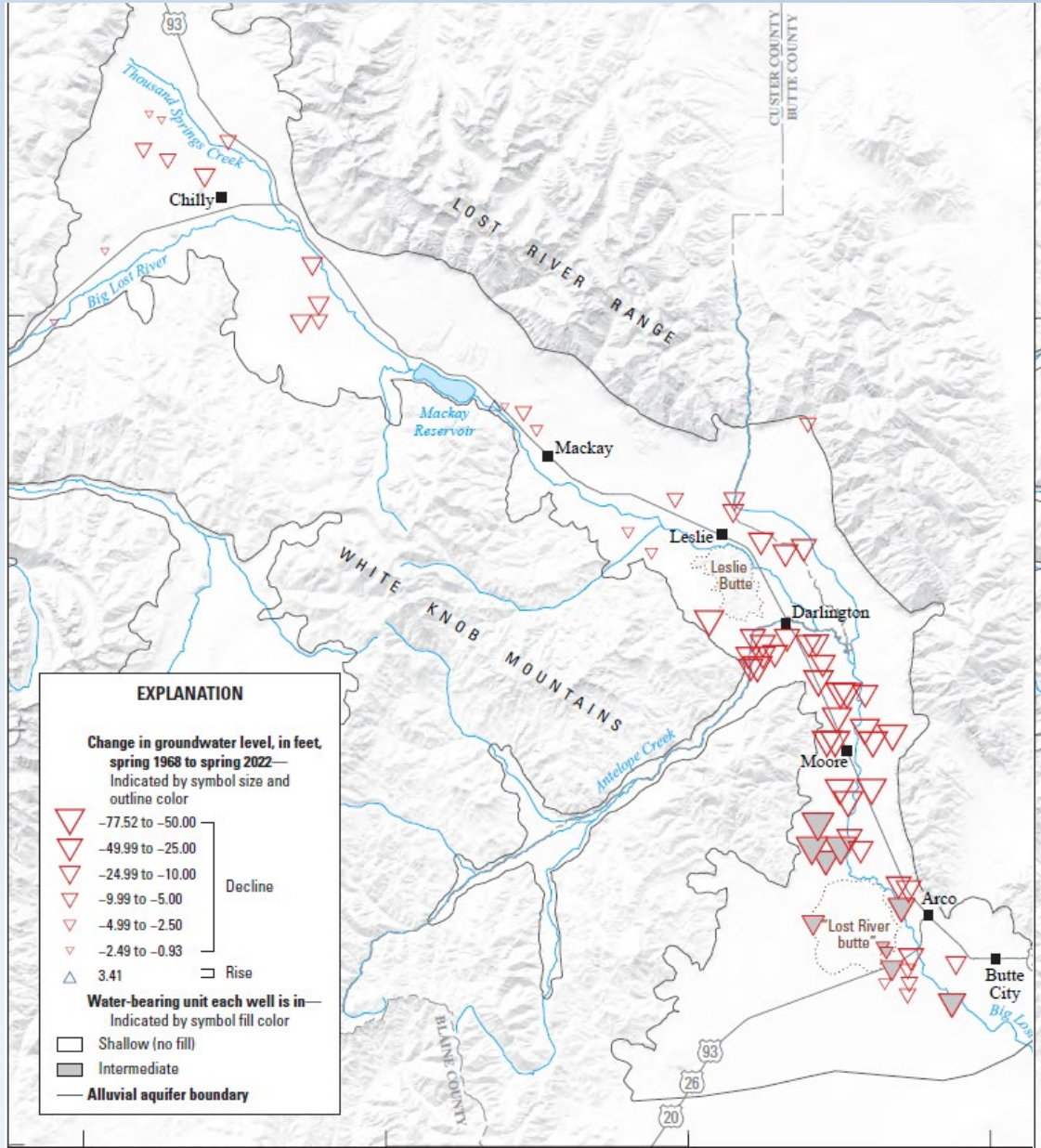
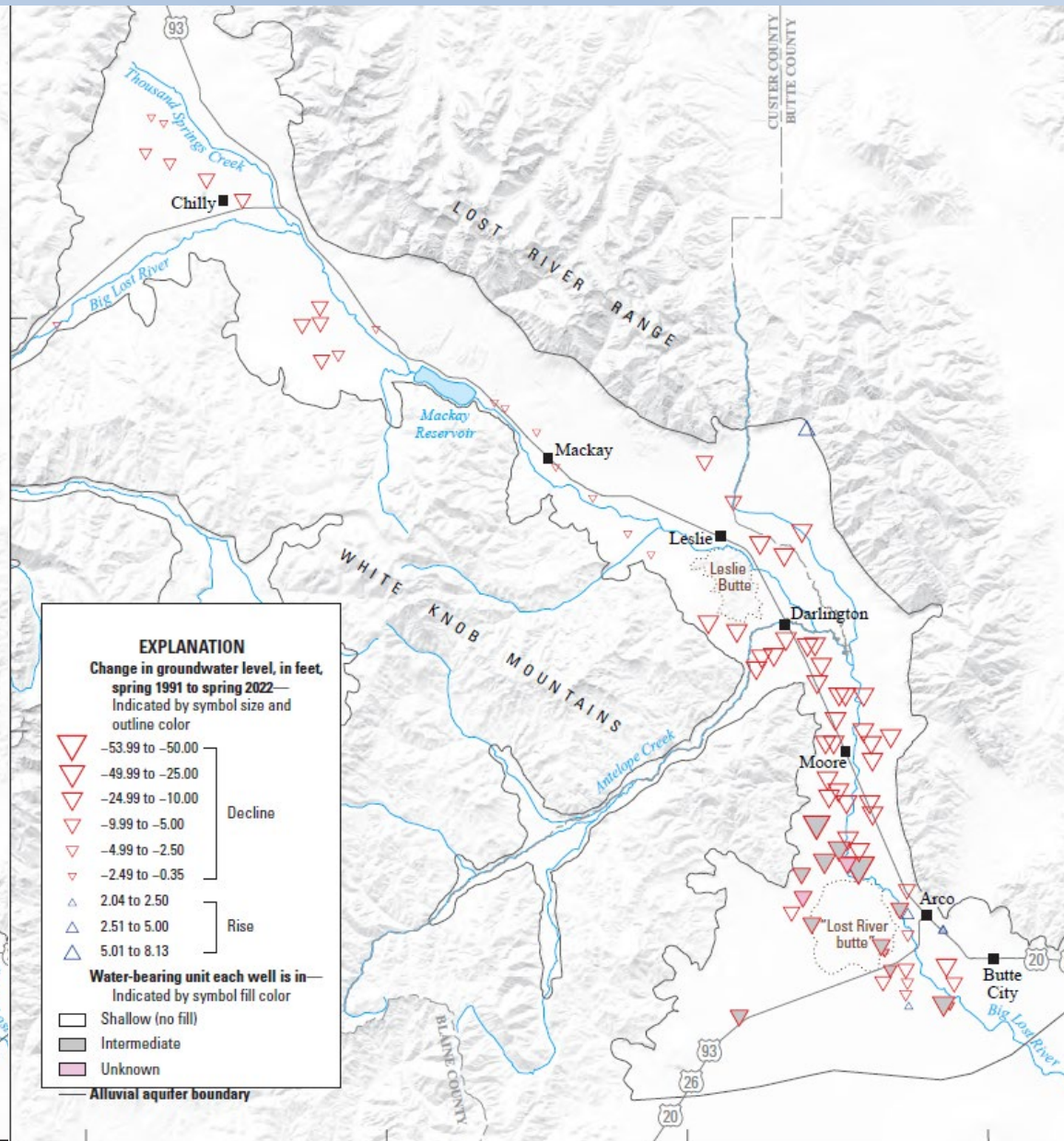
1968 to 2022 and 1991 to 2022 Water-Level Change





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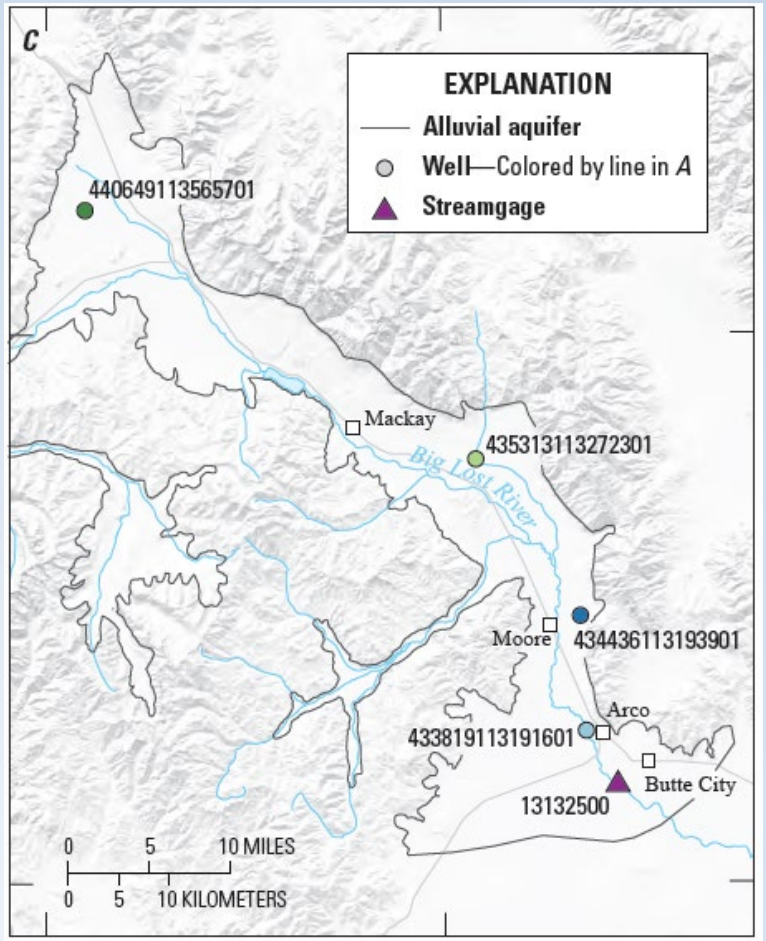
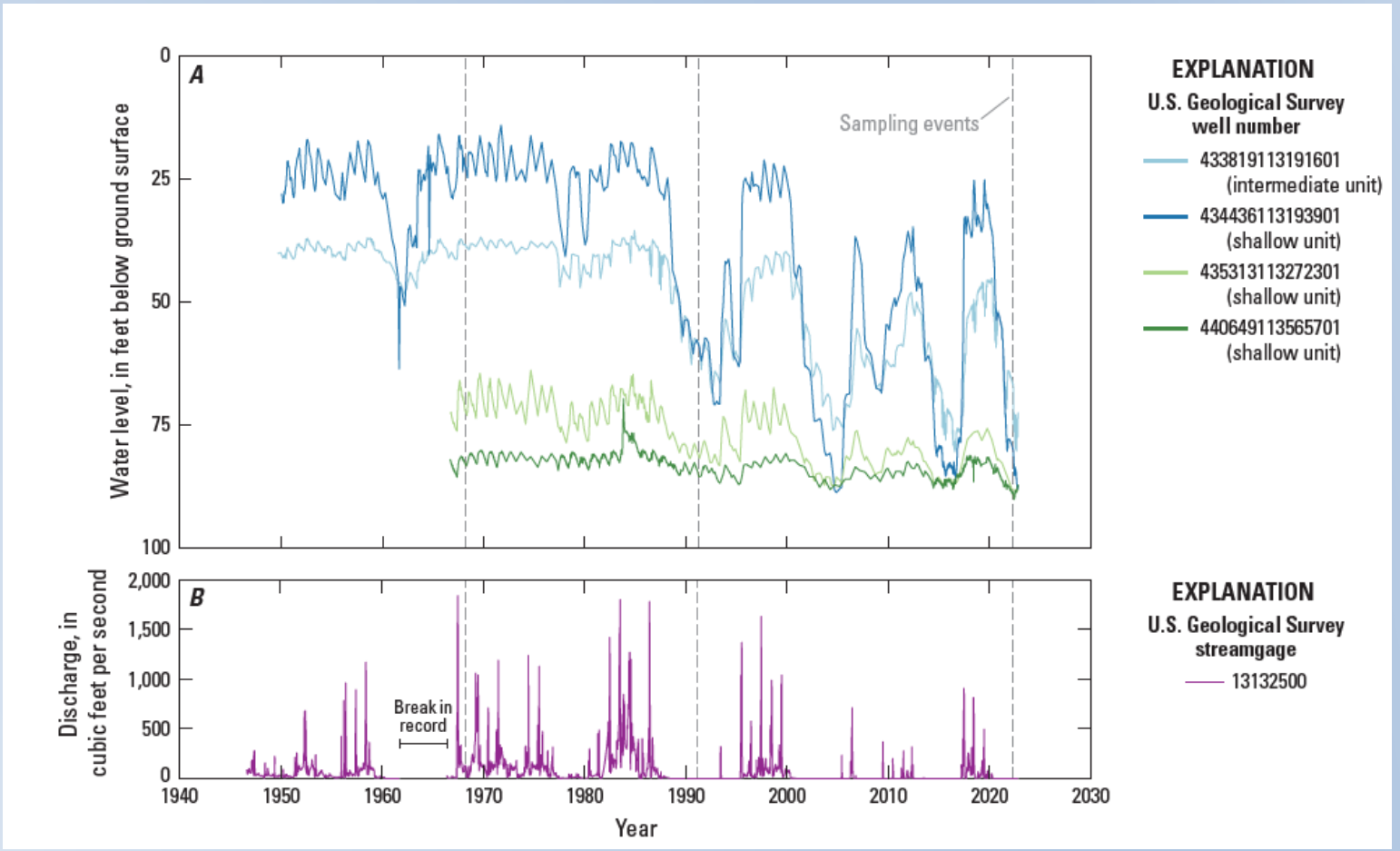
In the context of long-term groundwater-levels





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Stephen’s turn…

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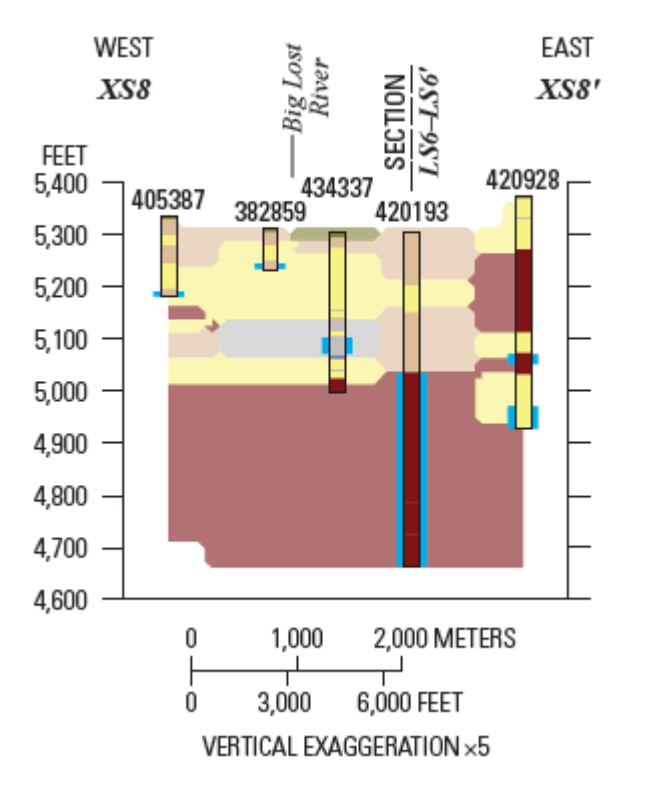

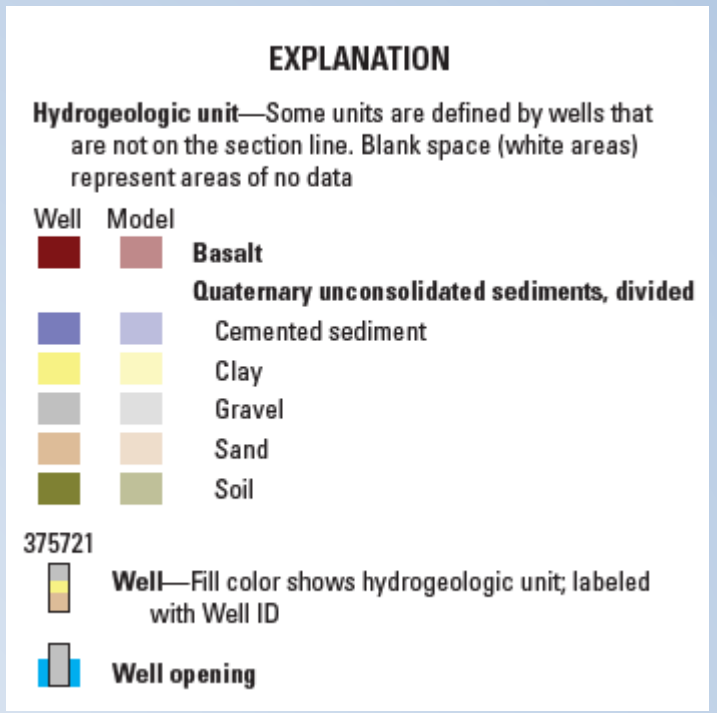

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- Support groundwater modeling
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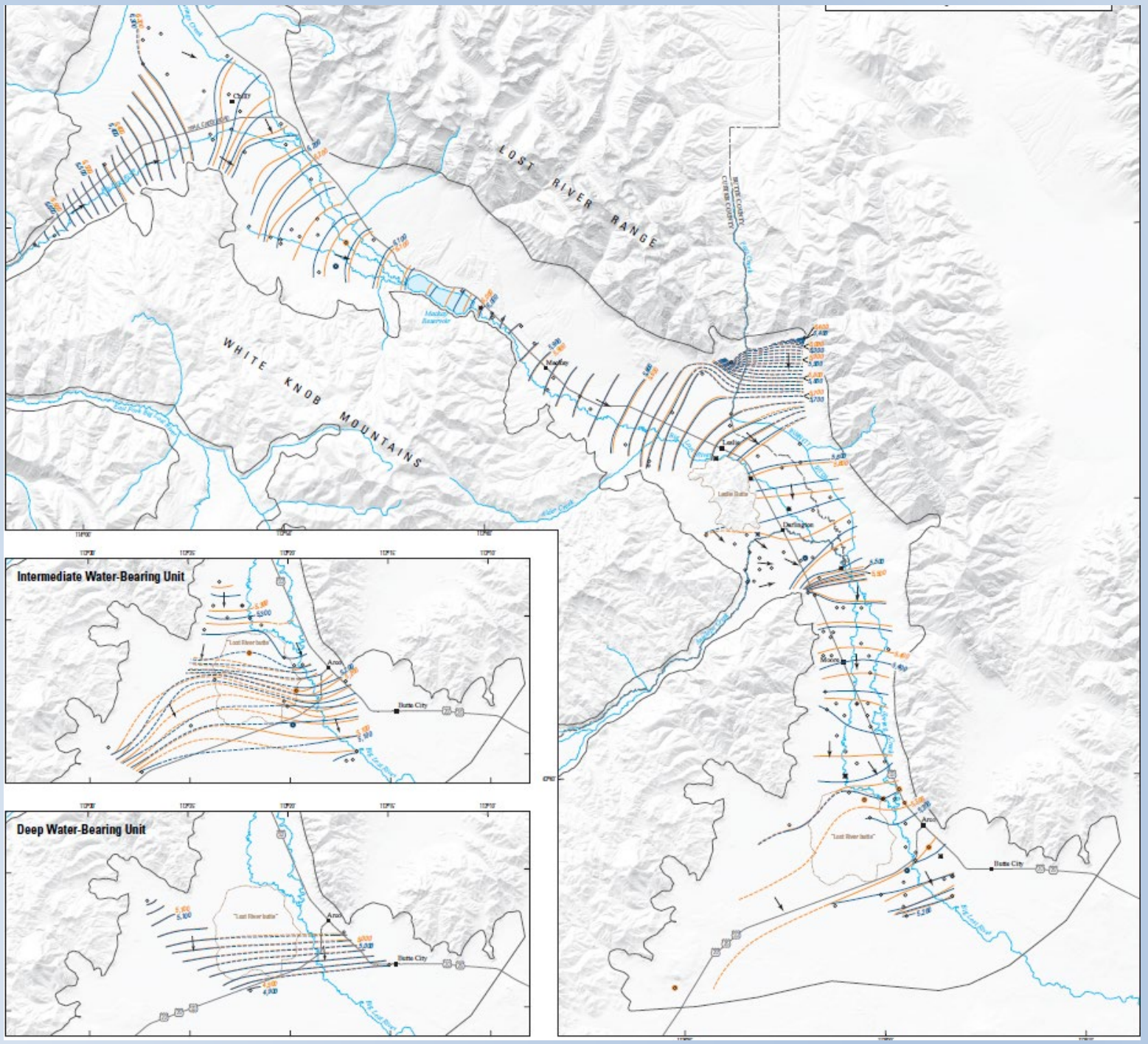
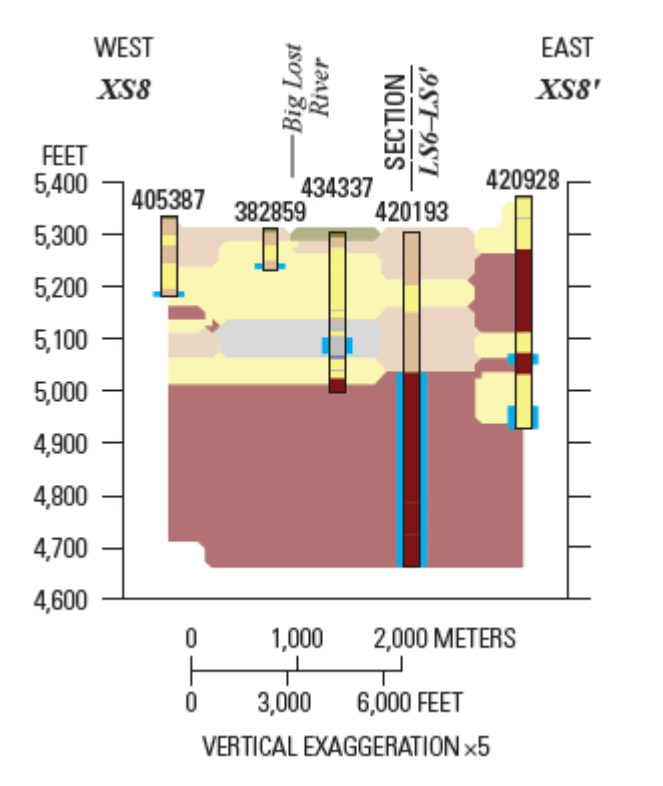
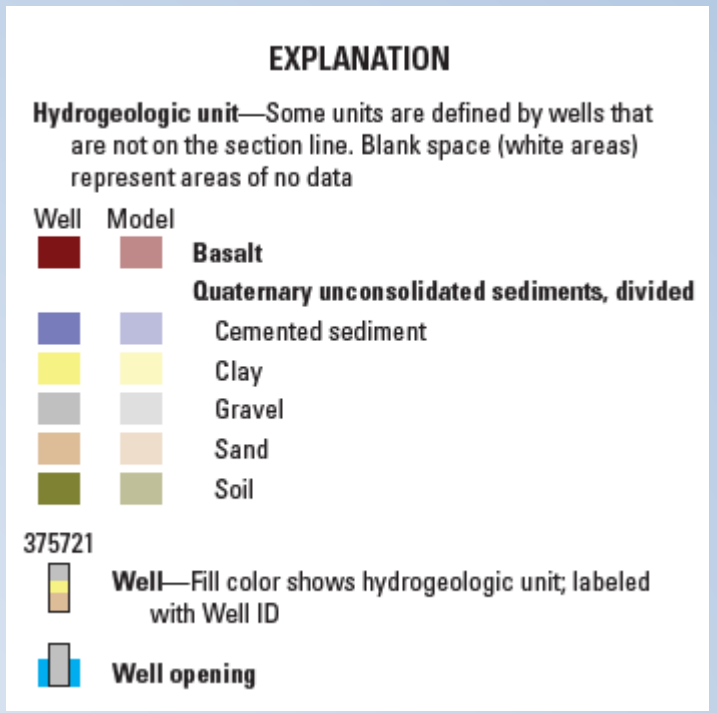
Improve Hydrogeologic Understanding







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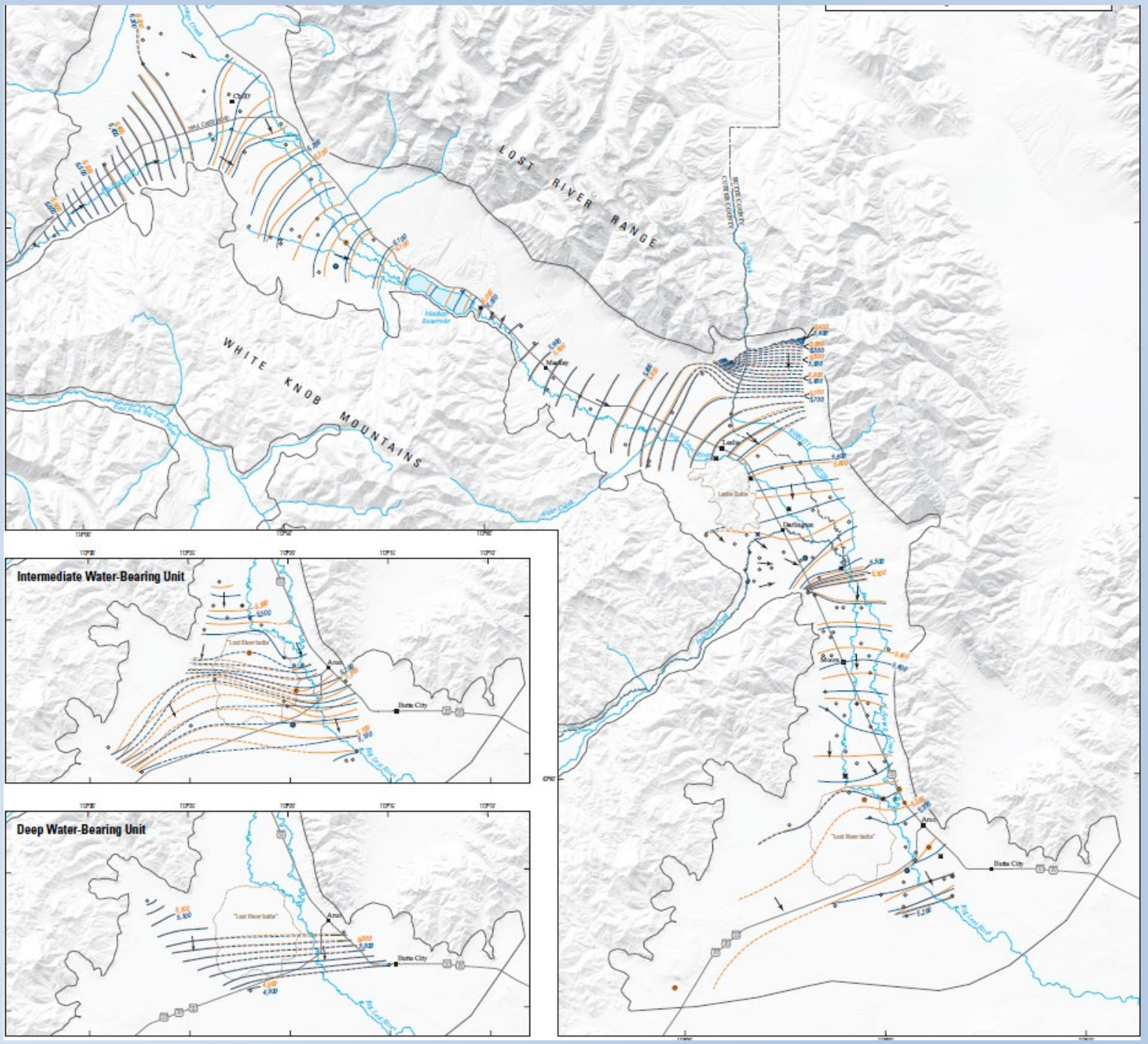

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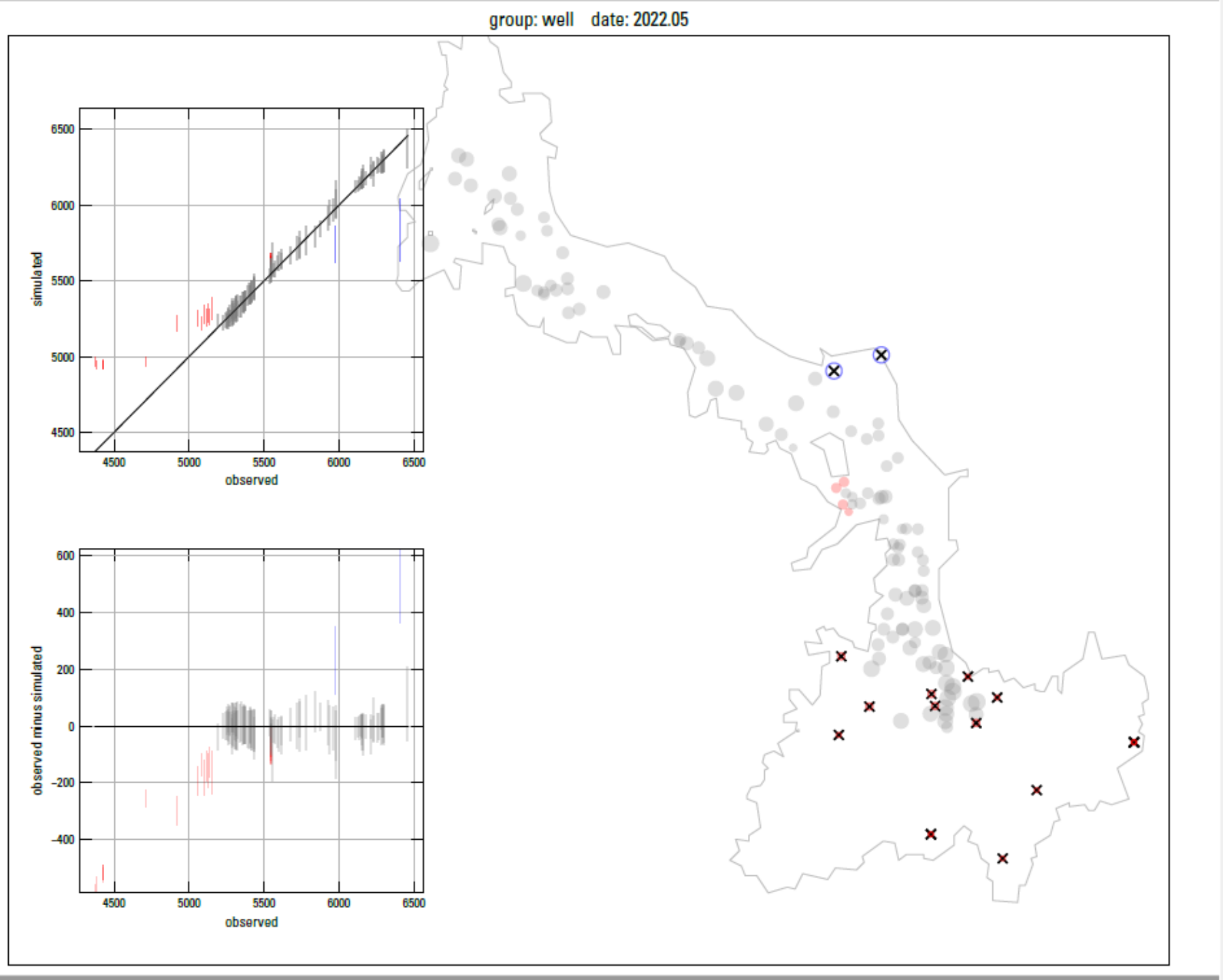

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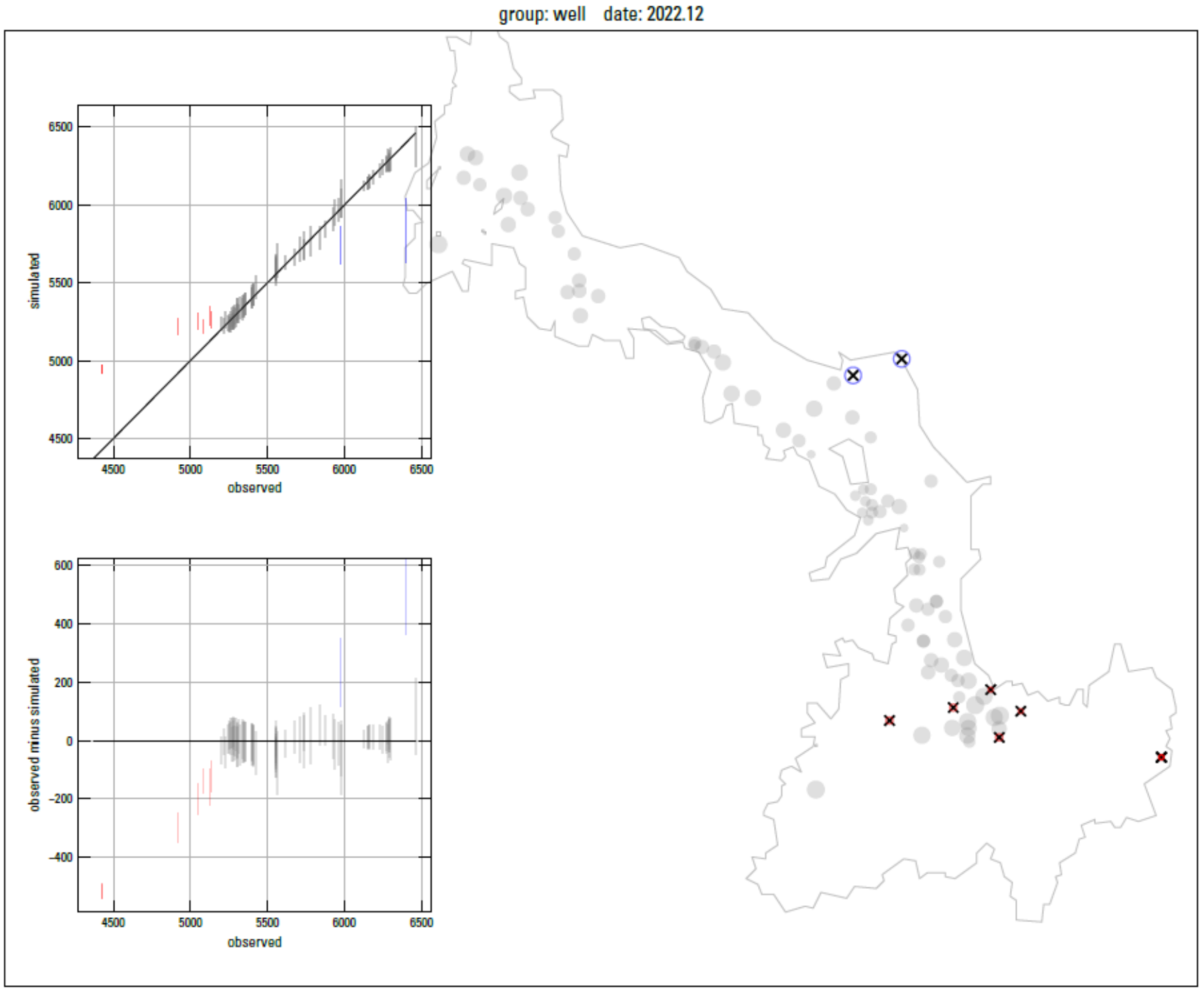

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Summary

- Groundwater levels declined in most wells in southern end of valley between spring 2022 and autumn 2022

- Suggests recharge and down-valley groundwater flows were insufficient to fully recover groundwater levels across the 2022 irrigation season

- Long-term groundwater hydrographs are sensitive to interannual wet and dry periods but indicate declining groundwater levels overall

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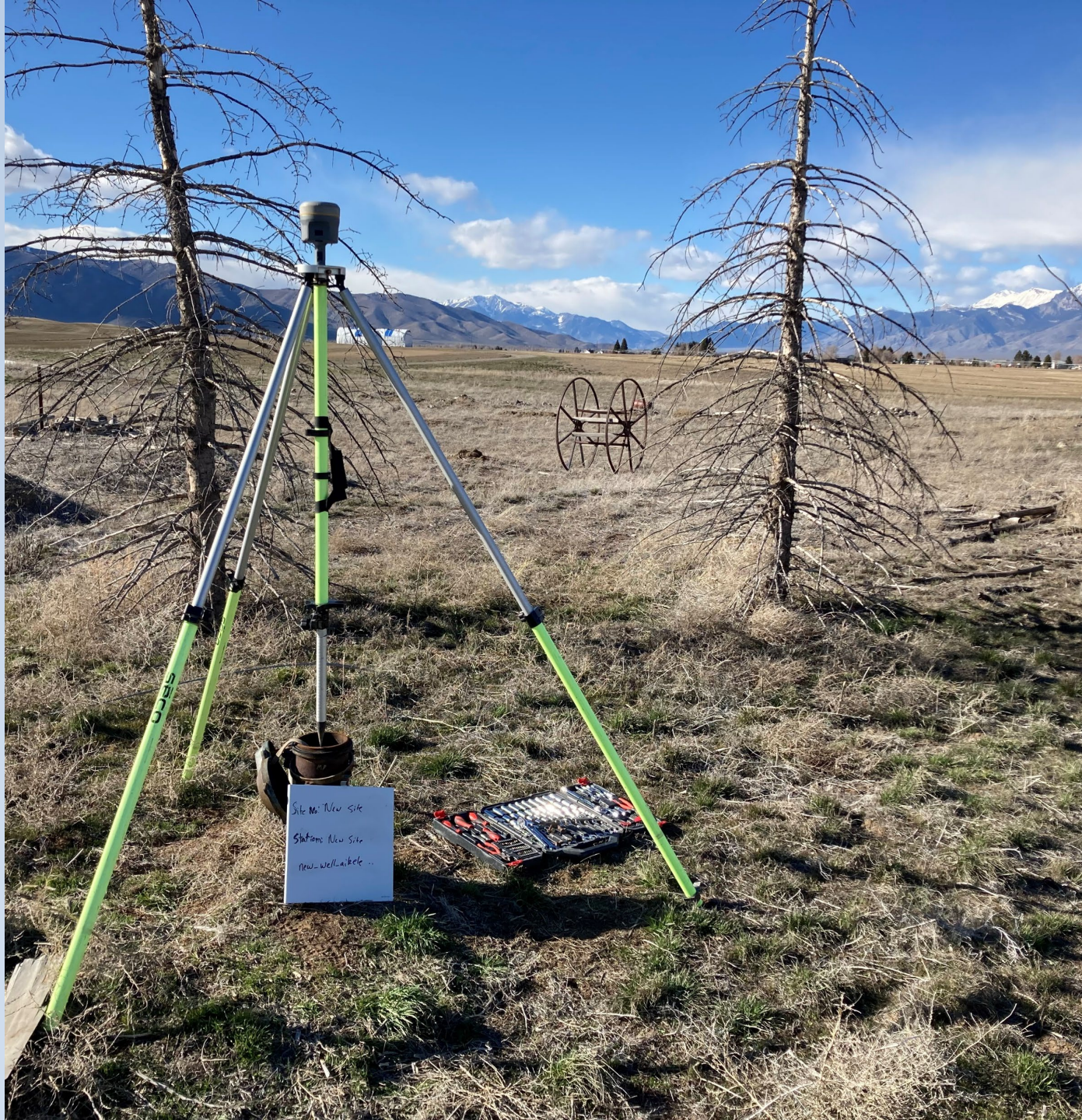

Questions?

Check out the details!

Ducar and Zinsser, 2023

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