Use of an Aquifer Model for Groundwater Supply Management and Planning

Spokane Valley-Rathdrum Prairie Aquifer
Eastern Washington and Northern Idaho

Prepared by
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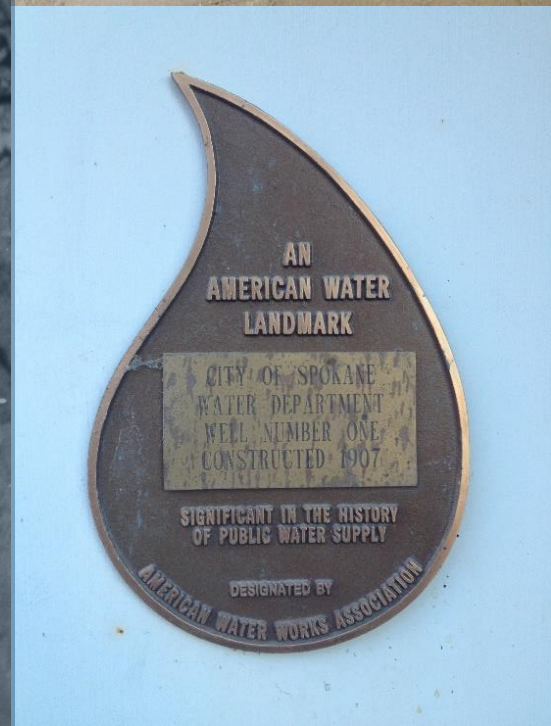
GSI Water Solutions, Inc.

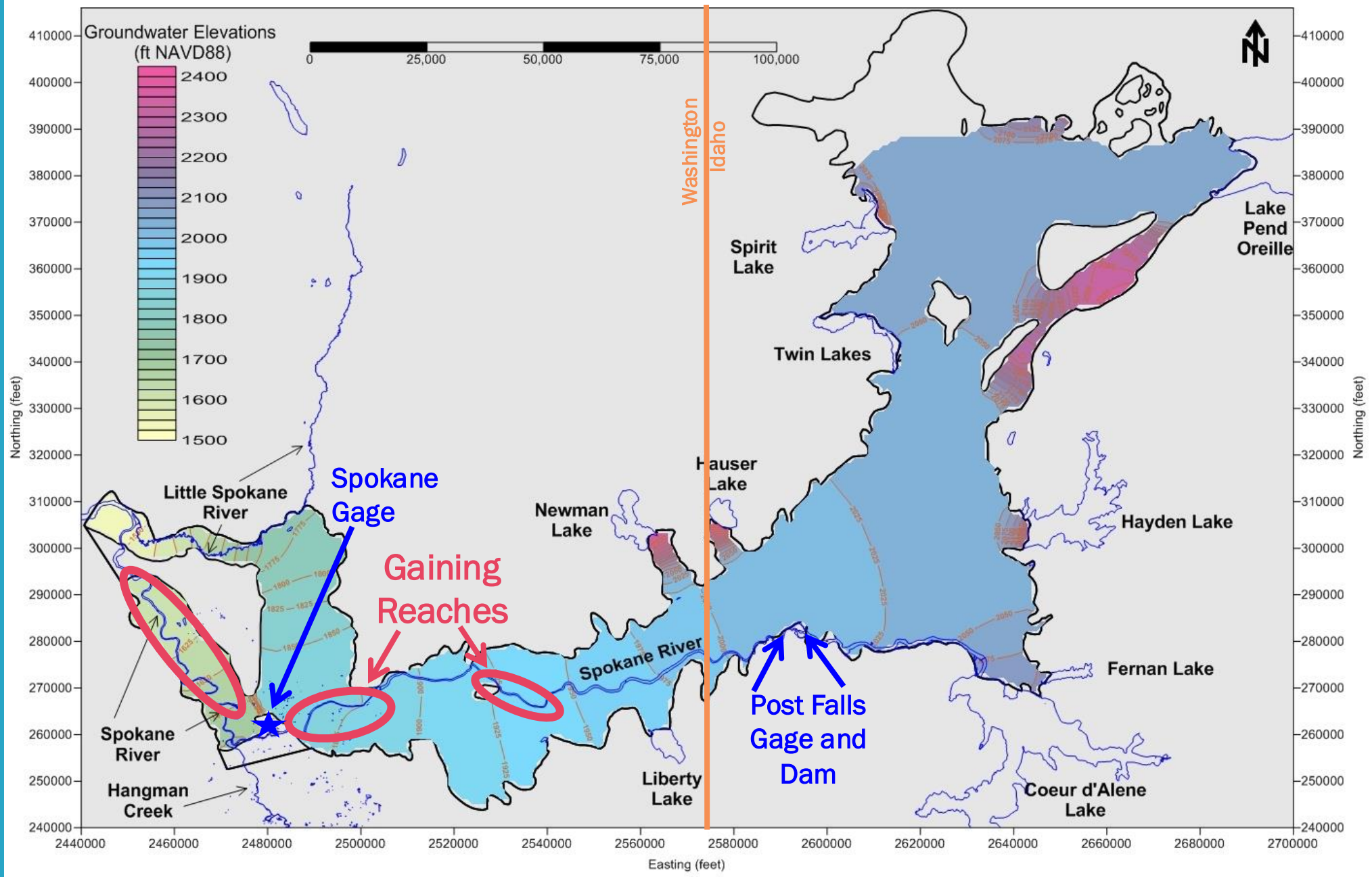
Prepared for
Spokane River Forum Conference

April 23, 2025



Location Map

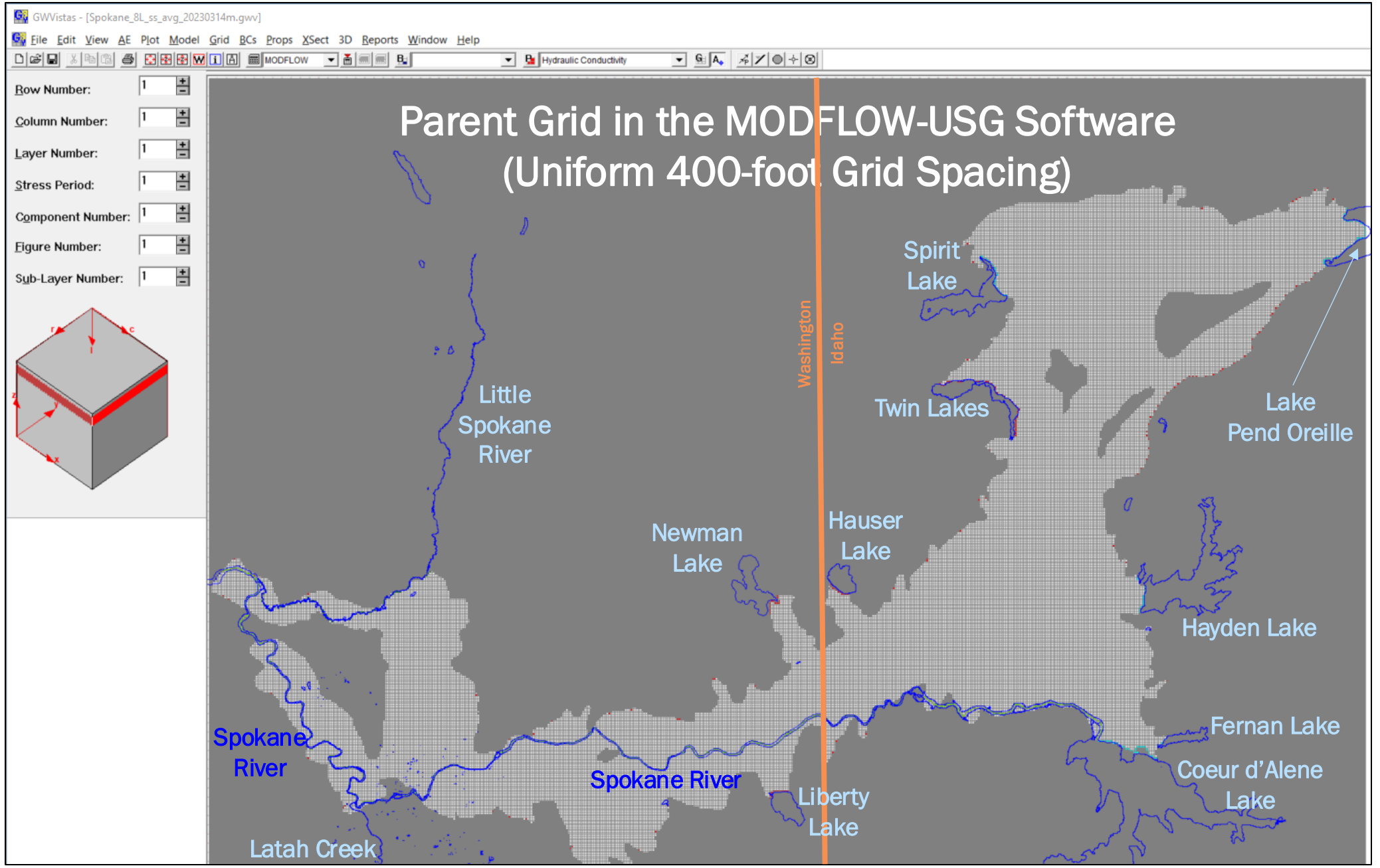
The SVRP Aquifer and the Spokane River



Source: GSI Water Solutions, City of Spokane, and Spokane Aquifer Joint Board (SAJB)

The Local Water Purveyors' Groundwater Flow Model

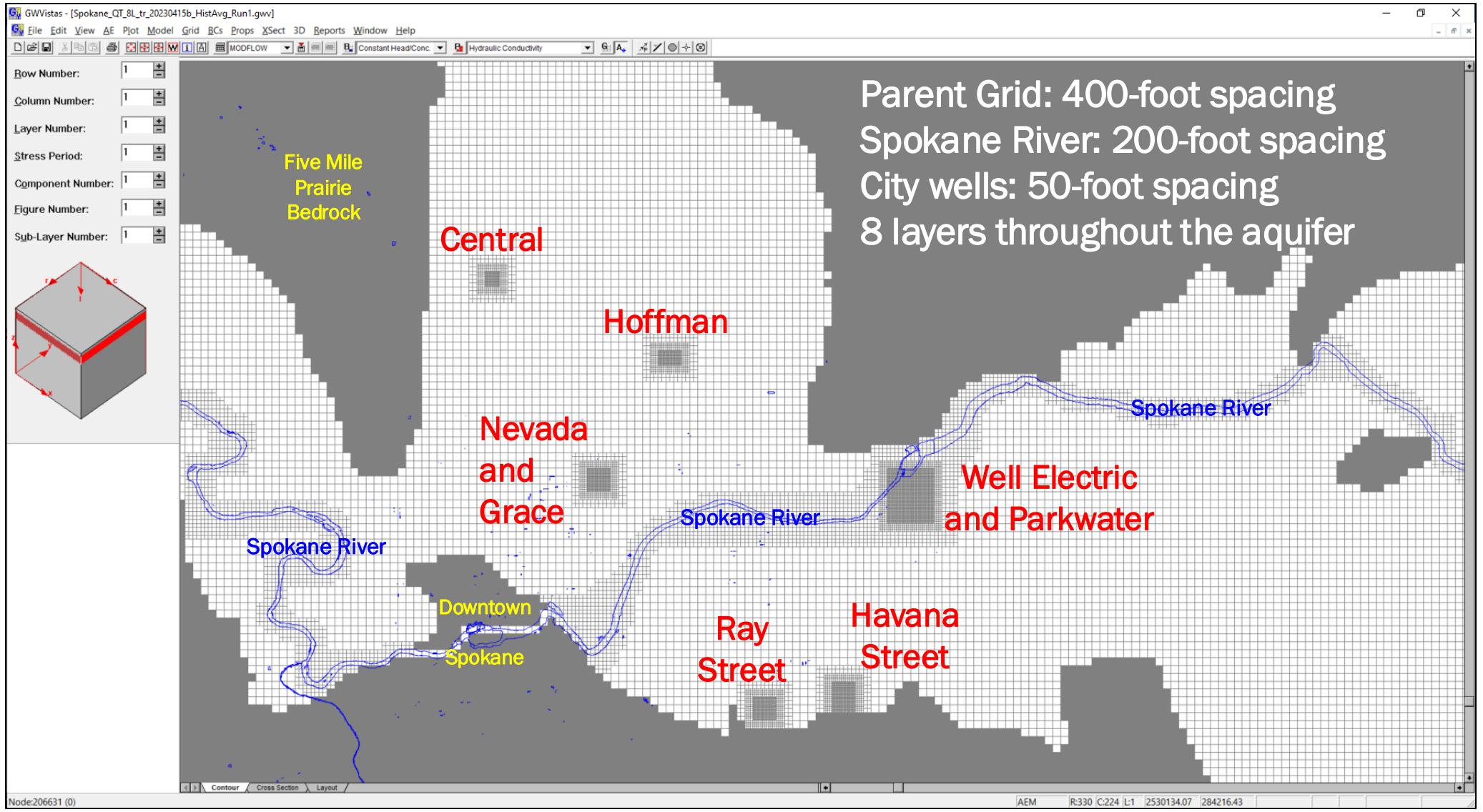
Parent Grid



Source: GSI Water Solutions and City of Spokane

The Local Water Purveyors' Groundwater Flow Model

Refined Grid for City of Spokane Studies



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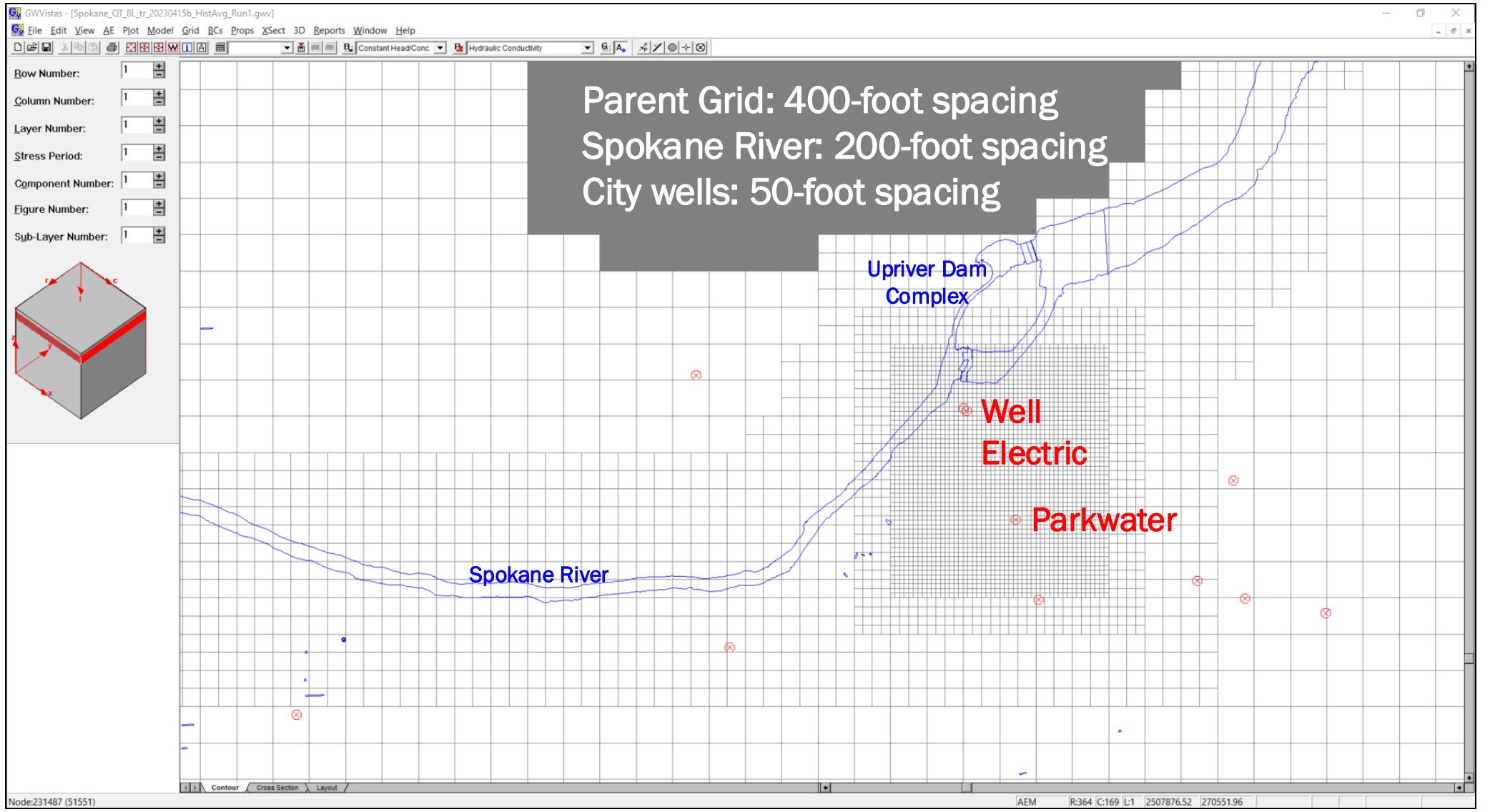
The Local Water Purveyors' Groundwater Flow Model

Refined Grid for City of Spokane Studies



Source: GSI Water Solutions and City of Spokane

Water Agency Collaboration

Many Entities Are Doing Groundwater Supply Planning and Management in the SVRP Aquifer

Too Many Cities and Other Municipal Water Providers to List Here!

Local Water Purveyor Groups Leading Modeling Efforts in Idaho and Washington

IWAC
IDAHO WASHINGTON AQUIFER COLLABORATIVE

SAJB
Spokane Aquifer Joint Board

CITY OF SPOKANE

Local Agencies

Spokane County
WASHINGTON

KOOTENAI COUNTY
IDAHO
Kootenai County Aquifer Protection Board

Public Health
Prevent. Promote. Protect.
Panhandle Health District

Panhandle Health District I
Serving Benewah, Bonner, Boundary, Kootenai, and Shoshone counties of Idaho

Other Entities

State Agencies
Idaho Department of Environmental Quality
Idaho Department of Water Resources
Washington State Department of Health
Washington State Department of Ecology

Research Community
U.S. Geological Survey
USDA Natural Resources Conservation Service
Idaho Water Resources Research Institute
University of California, Merced

Water Purveyor-Led Modeling History

Mid-1990s

Develop and Apply Model in Washington

Late 1990s

Apply Model in Washington After Forming SAJB

Build on City Model

2012

Expand Model into Idaho

Build on City, SAJB, and USGS Models

2013-2016

Apply Model to Study Aquifer Exchanges with Spokane River

Build on 2012 City Model

2023-2024

Upgrade Model and Evaluate Climate Change Influences on City Wells

Build on All Prior Models

2024-2025

Update WHP Areas and Evaluate Climate Change Influences on SAJB Wells

Build on Newest City Model

2024-2026

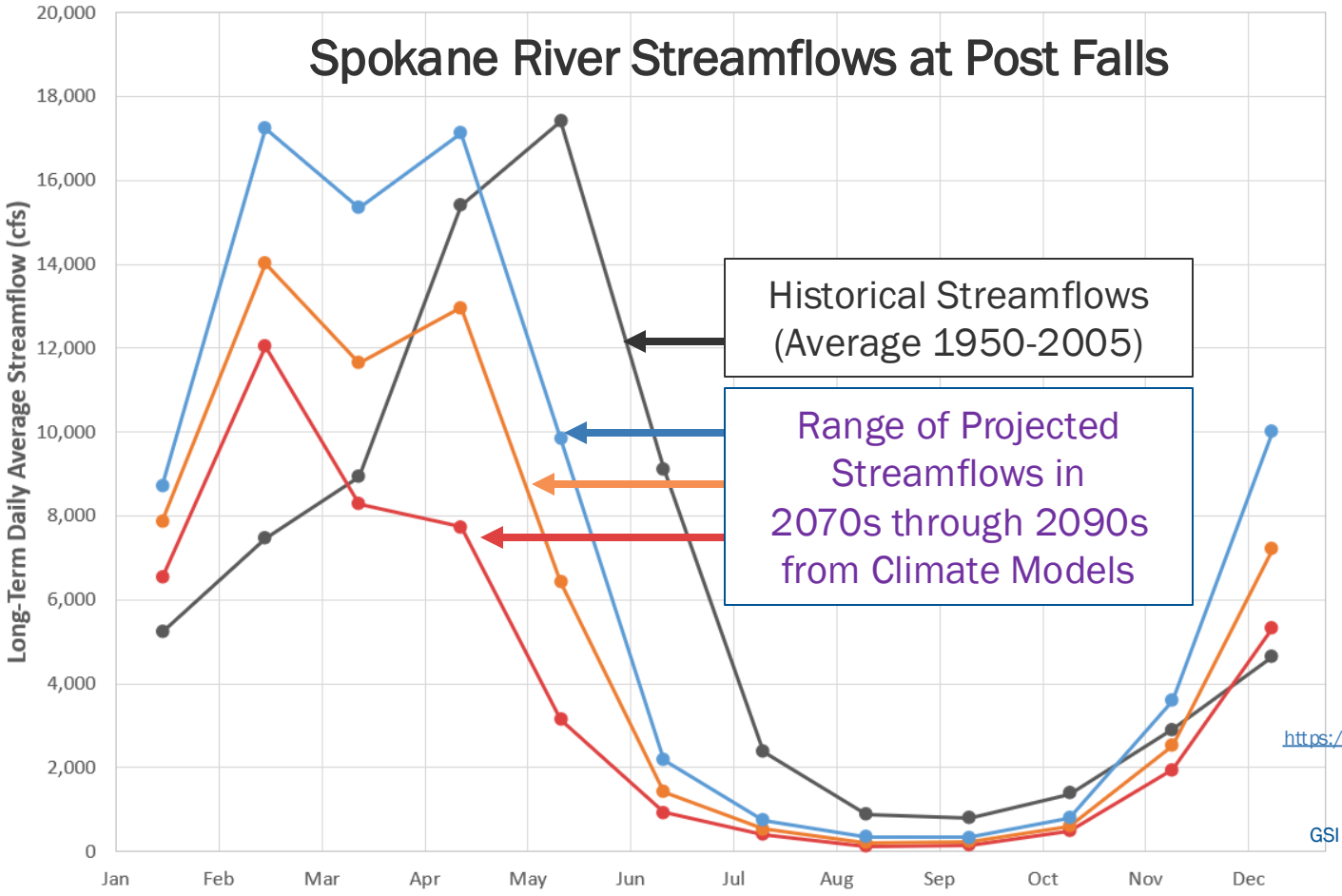
Upgrade Model in Idaho to Provide New Up-to-Date Planning Tool

Build on Newest City/SAJB Model

How Does a Regional Aquifer Model Help with Water Supply Planning?

We can vary the natural hydrologic inputs affected by a changing climate

- Inflows in Spokane River (Post Falls)
- Inflows from tributary valleys
- Precipitation recharge



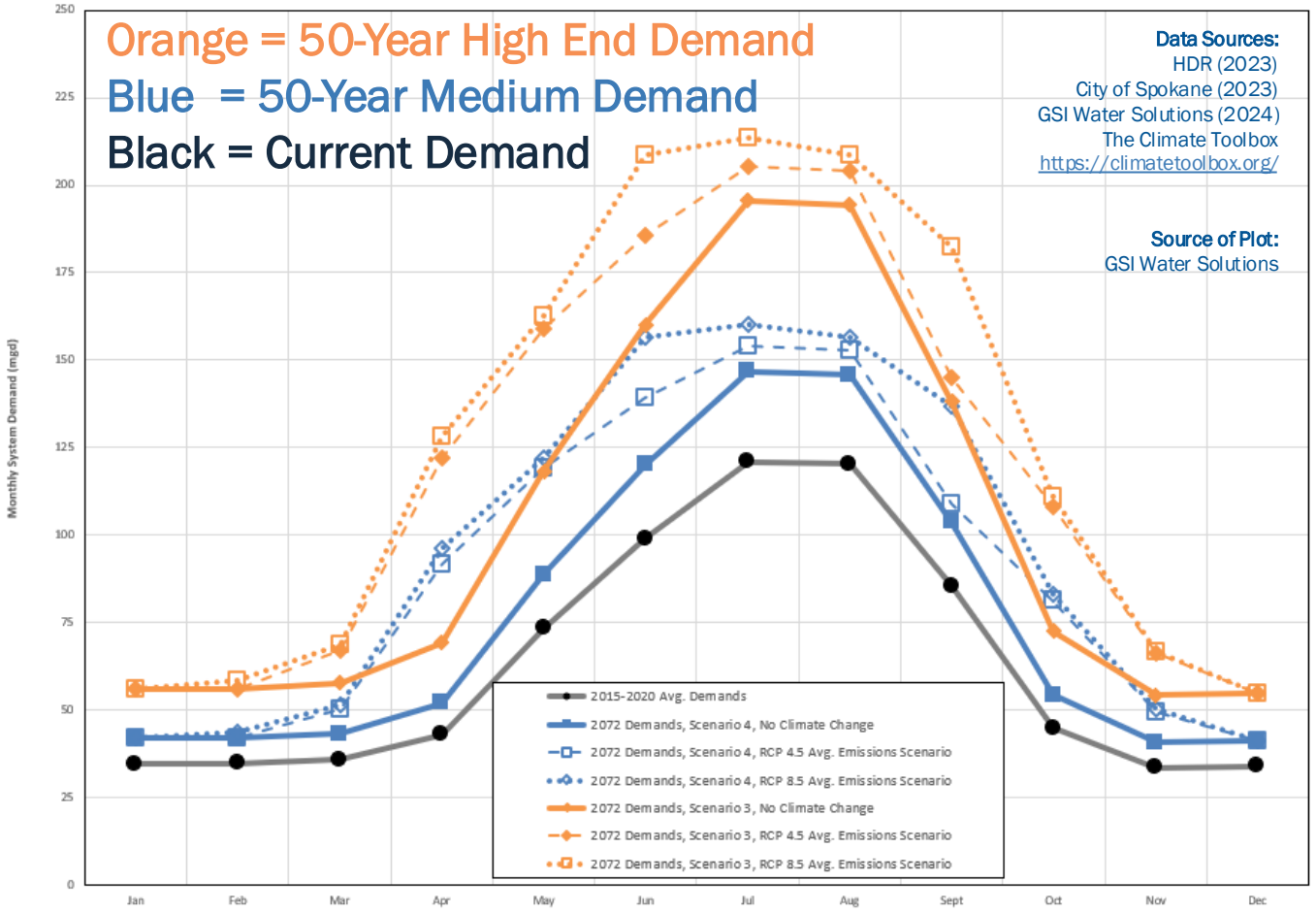
Data Source:
The Climate Toolbox
https://climatetoolbox.org/

Source of Plot:
GSI Water Solutions and City of Spokane

How Does a Regional Aquifer Model Help with Water Supply Planning?

We can change pumping demands

- Locations
- Volumes
- Monthly/seasonal variations
- Climate effects on demands

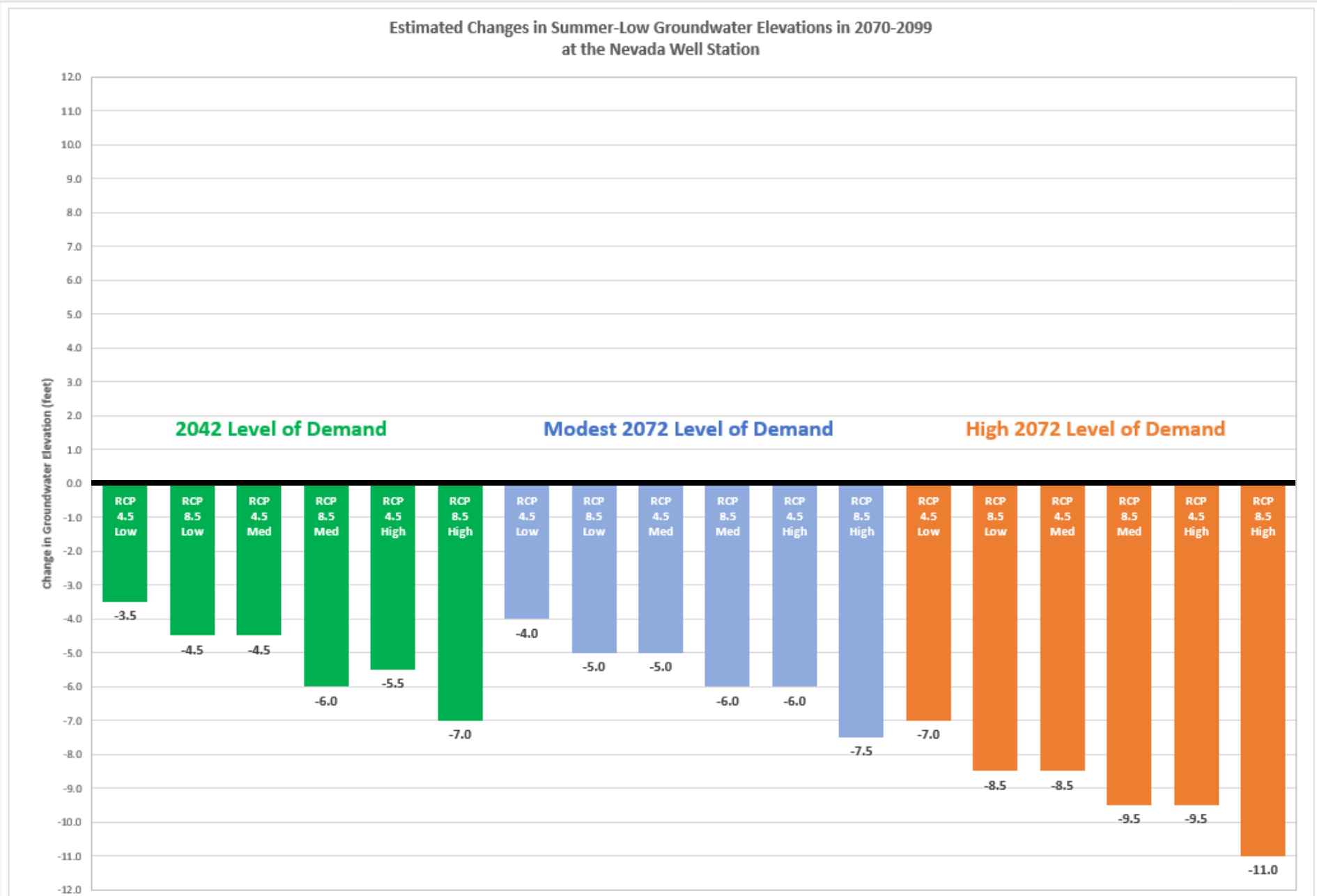


City of Spokane Well Station Locations

Source: GSI Water Solutions

Range of Potential Climate Influences on Late Spring/Early Summer Water Levels

Nevada Well Station

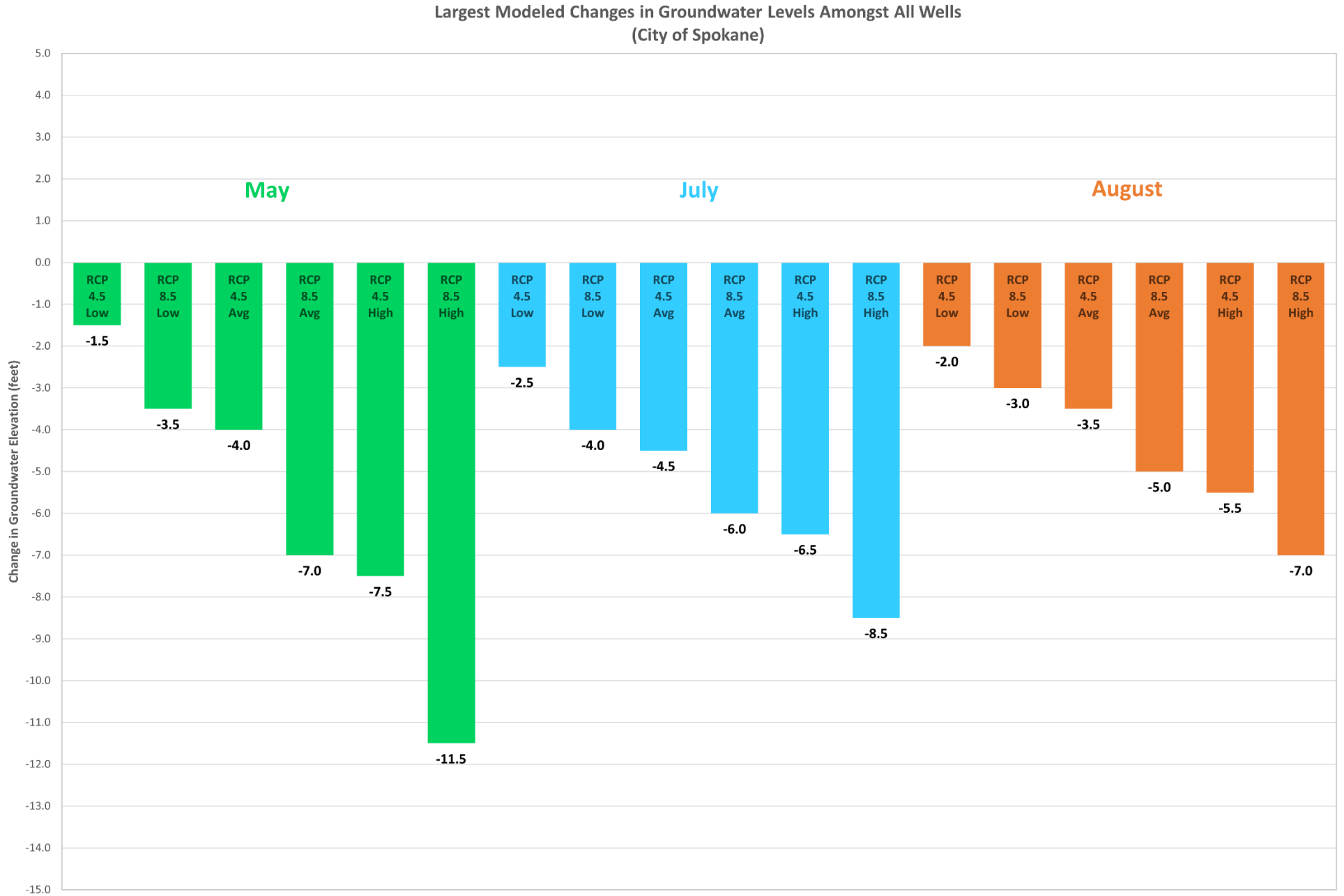


GSI Water Solutions, Inc.

Note: RCP = Representative Concentration Pathway for future greenhouse gas emissions

Range of Potential Climate Influences on Spring and Summer Water Levels

City of Spokane Largest Change



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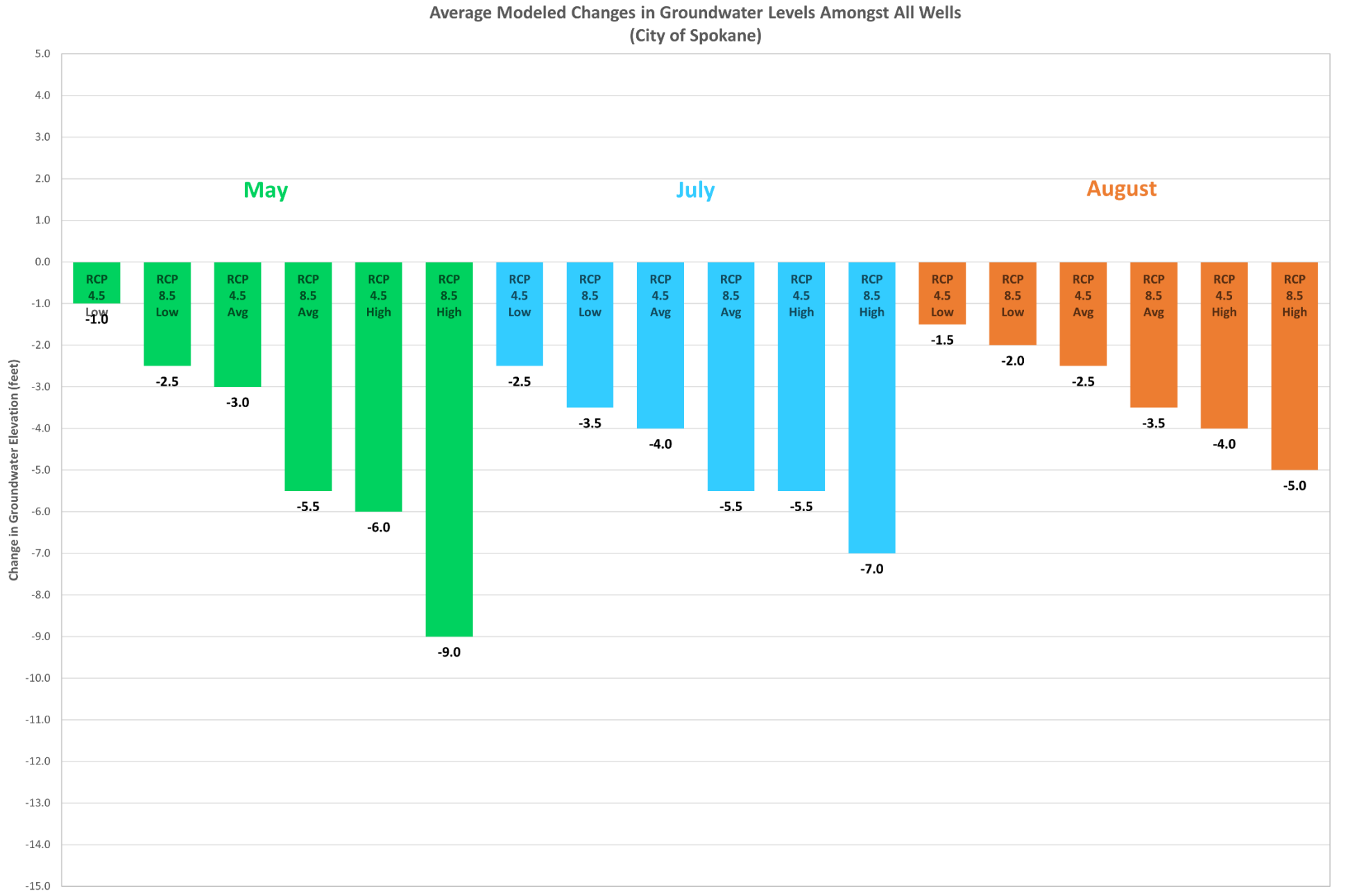
Range of Potential Climate Influences on Spring and Summer Water Levels

City of Spokane Average Change



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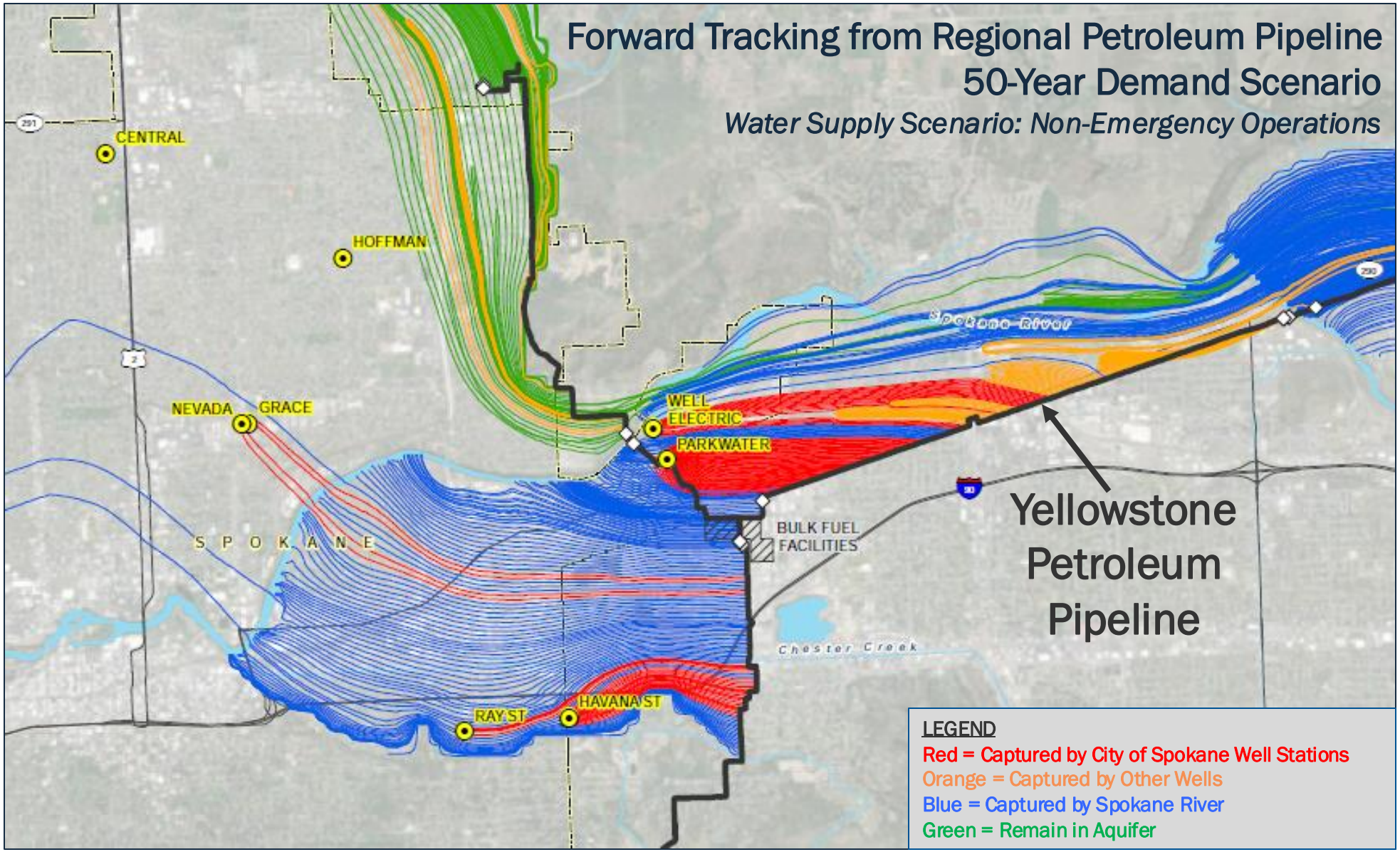
Case Study:

Groundwater Quality Protection

Emergency Planning



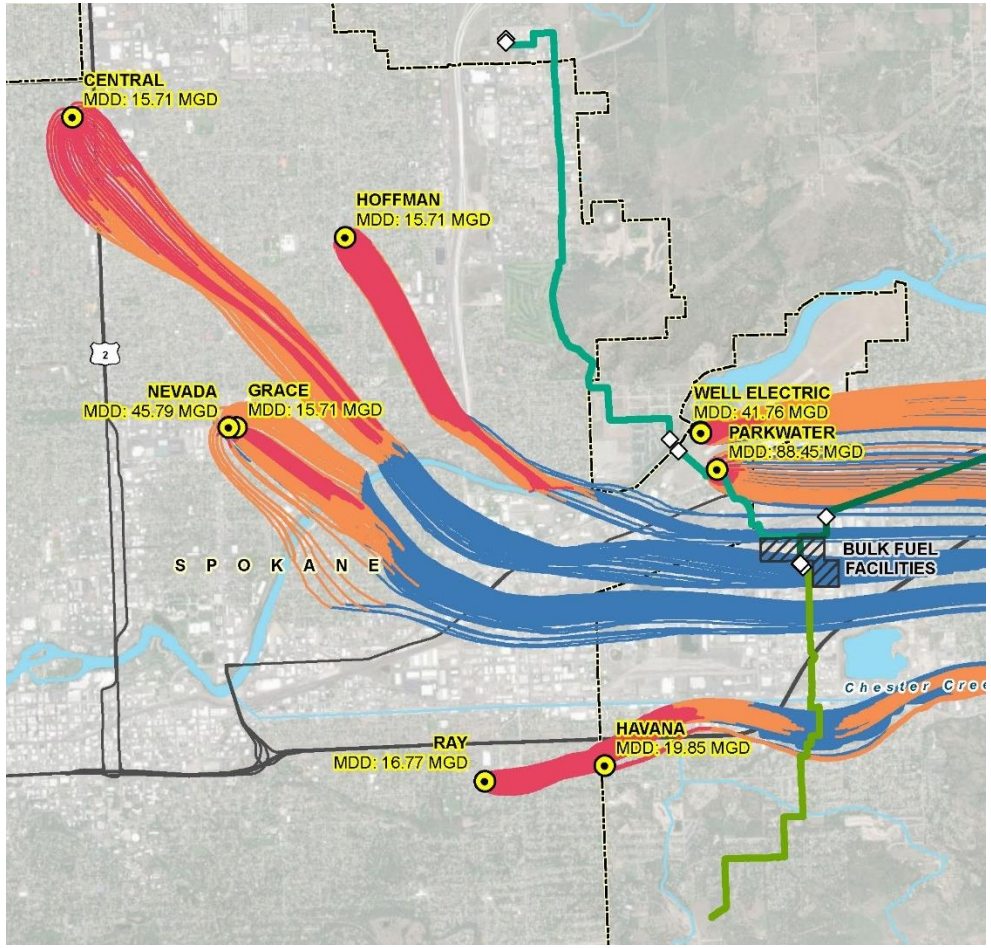
Source: GSI Water Solutions

Case Study:

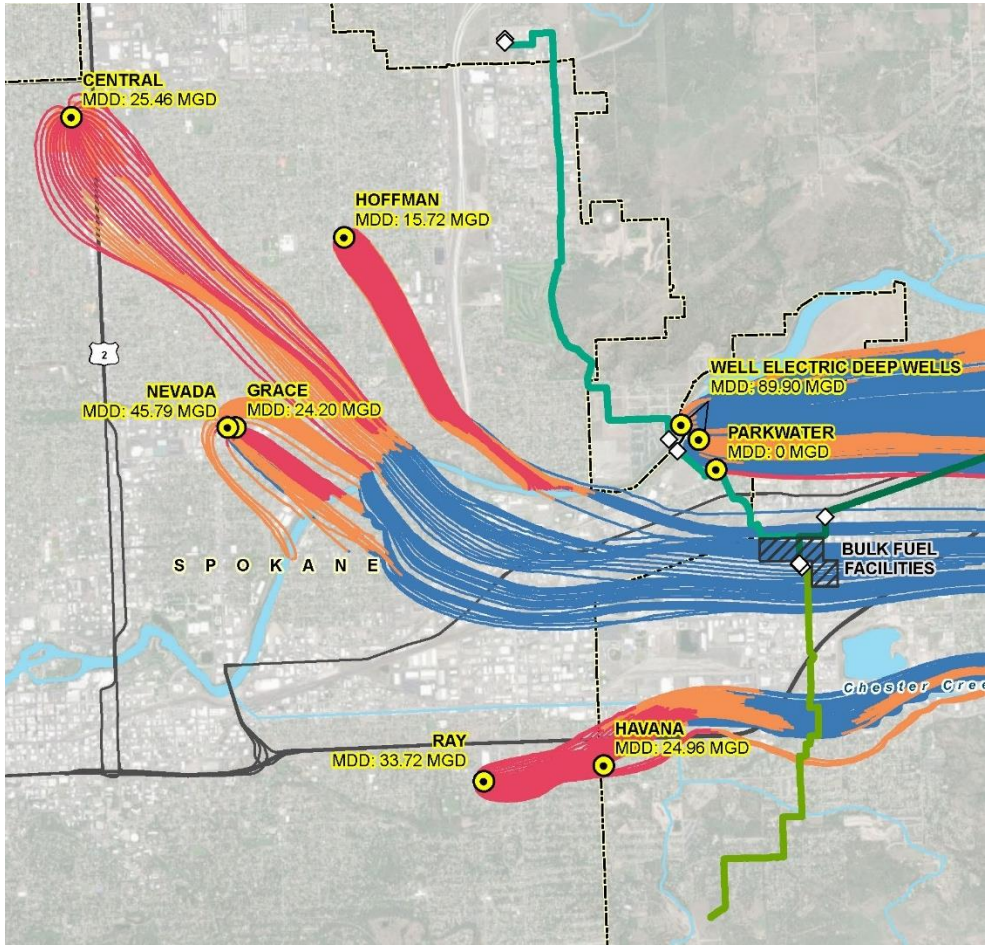
Groundwater Quality Protection

Emergency Planning

Non-Emergency Operations (50-Year Demand)



Parkwater Offline (50-Year Demand)



LEGEND
Red = Model Layer 1 (Uppermost Model Layer)
Orange = Model Layer 2
Blue = Below Model Layer 2 (model has 8 layers)

Source: GSI Water Solutions

Feedback Loop
(From Modeling to Decision-Making)

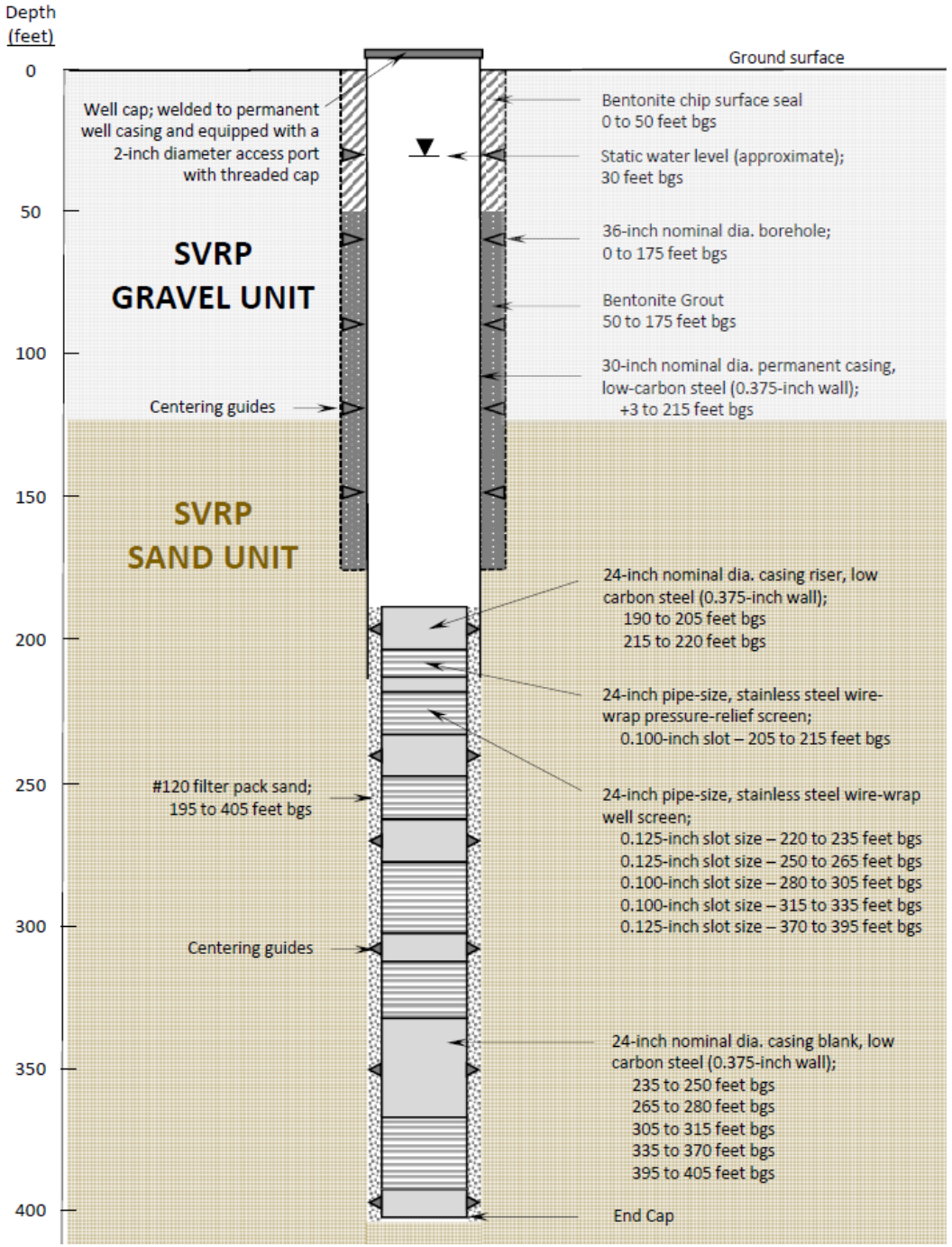
Need to Get More Data at Well Electric

Feedback Loop
(From Modeling to Decision-Making)

Need to Get More Data at Well Electric


Source:
City of Spokane

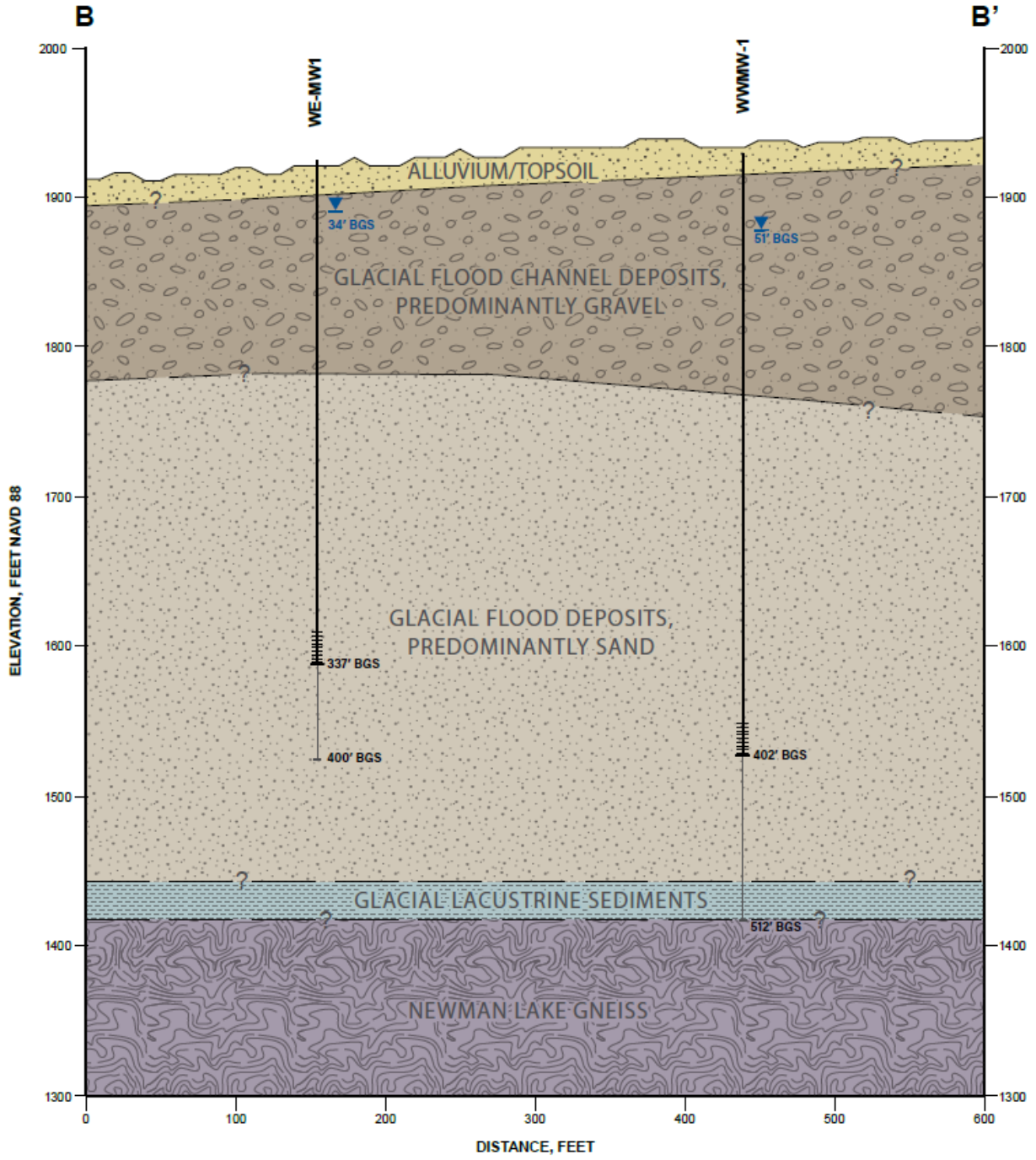
Source:
Landau Associates



Source: GSI Water Solutions

Extent and Thickness of Gravel Unit and Sand Unit from Exploratory Drilling

Well Electric Well Station

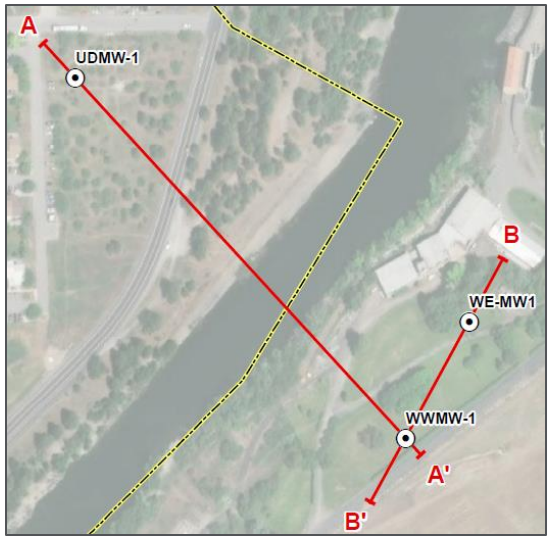


LEGEND

- Qal - Alluvium
- Qfcg - Glacial Flood Channel Deposits, Predominantly Gravel
- Qfs - Glacial Flood Deposits, Predominantly Sand
- Qgl - Glacial Lacustrine Sediments
- Kog - Newman Lake Gneiss

WELL LEGEND

- Static Water Level
- Screen
- Explored Depth
- Well
- Cross Section Line



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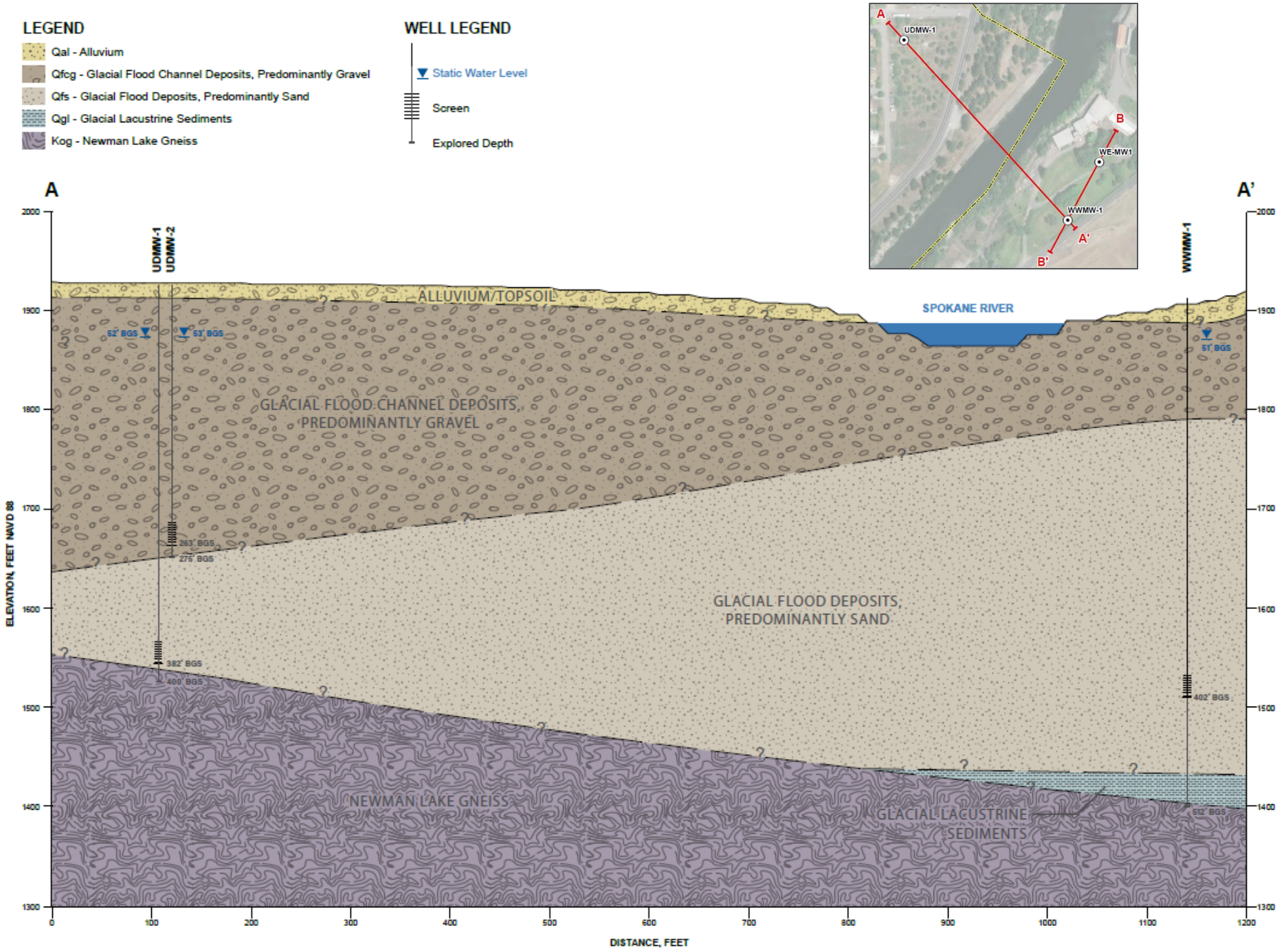
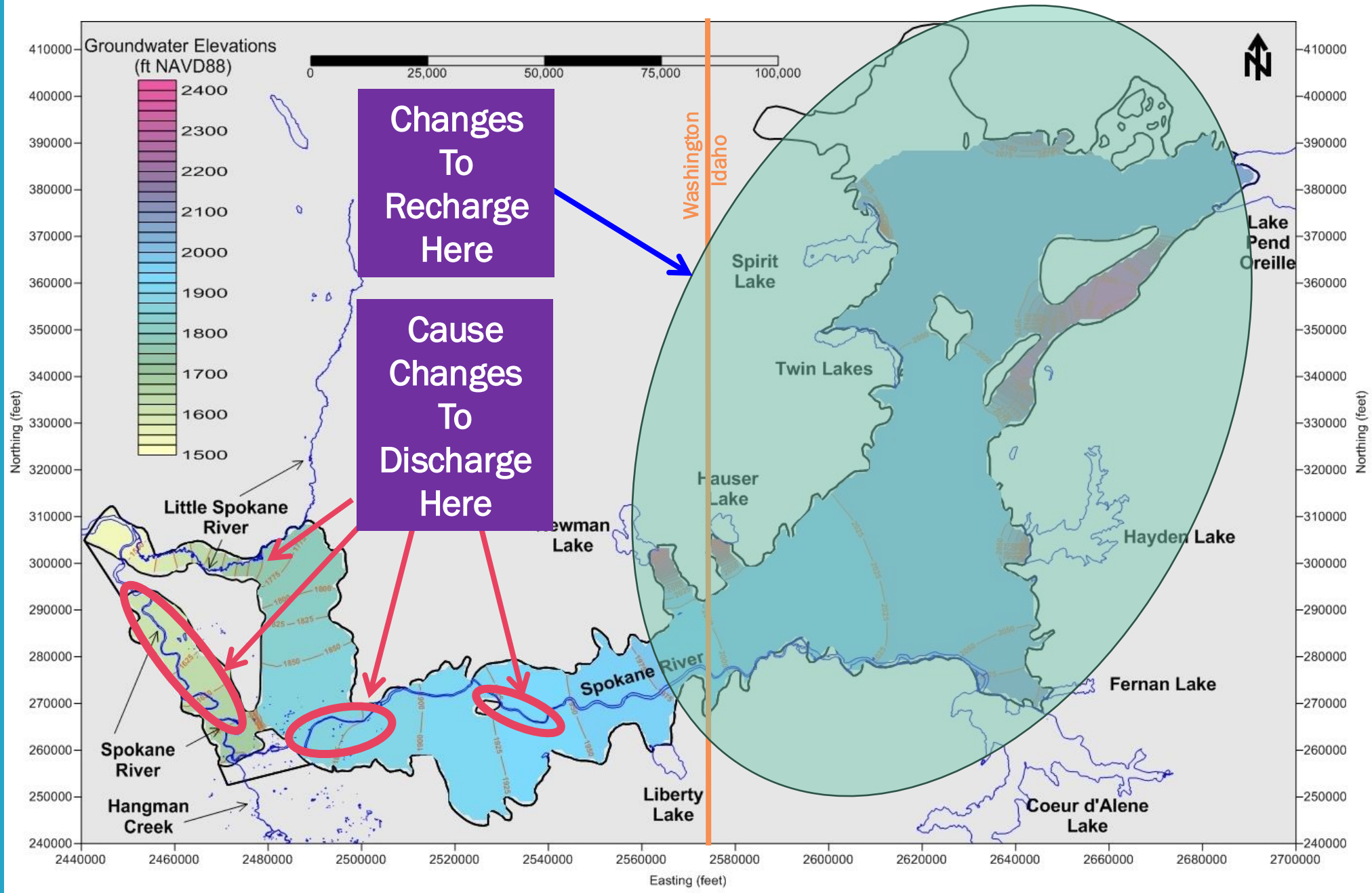


The Aquifer Is Like A Balloon



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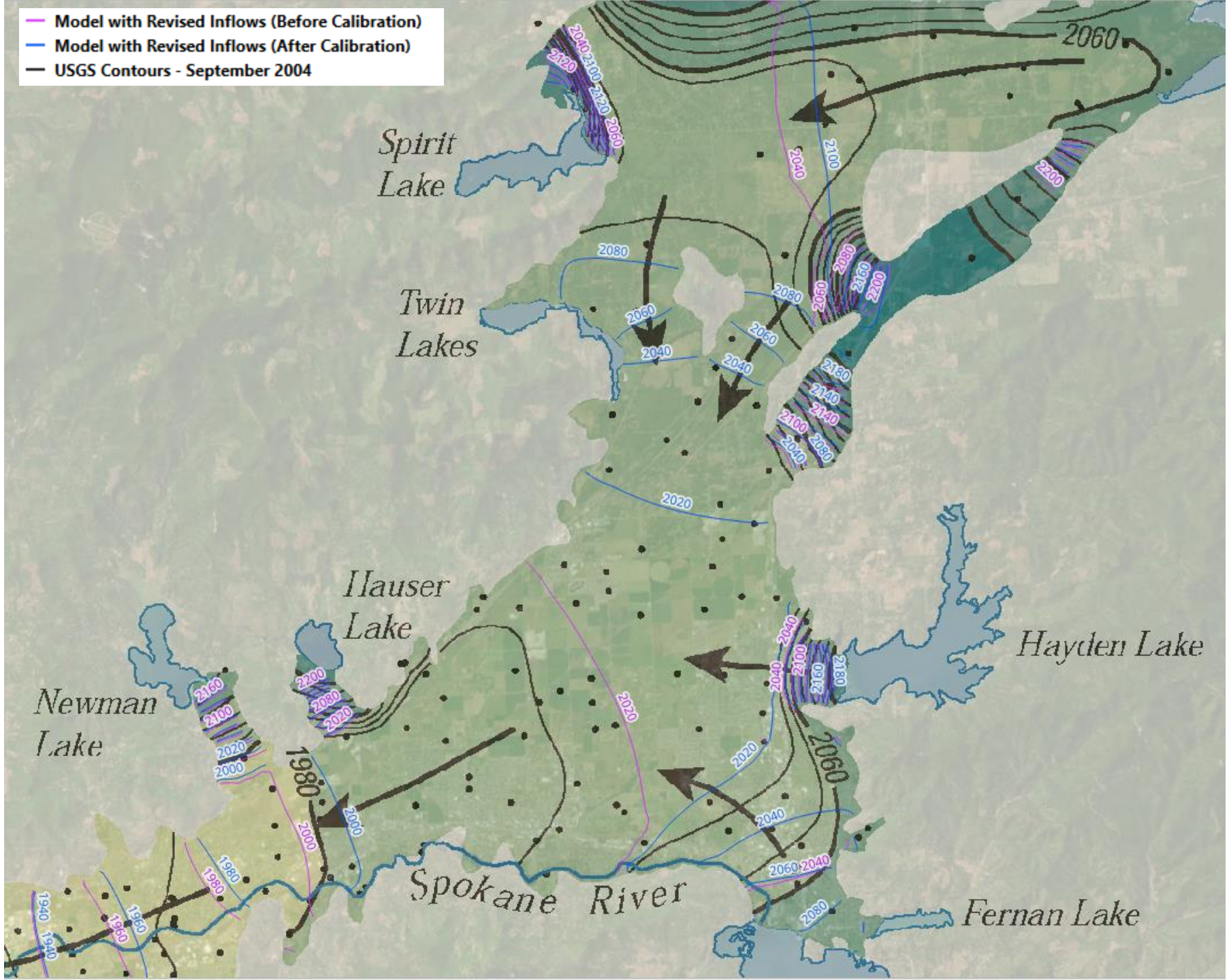
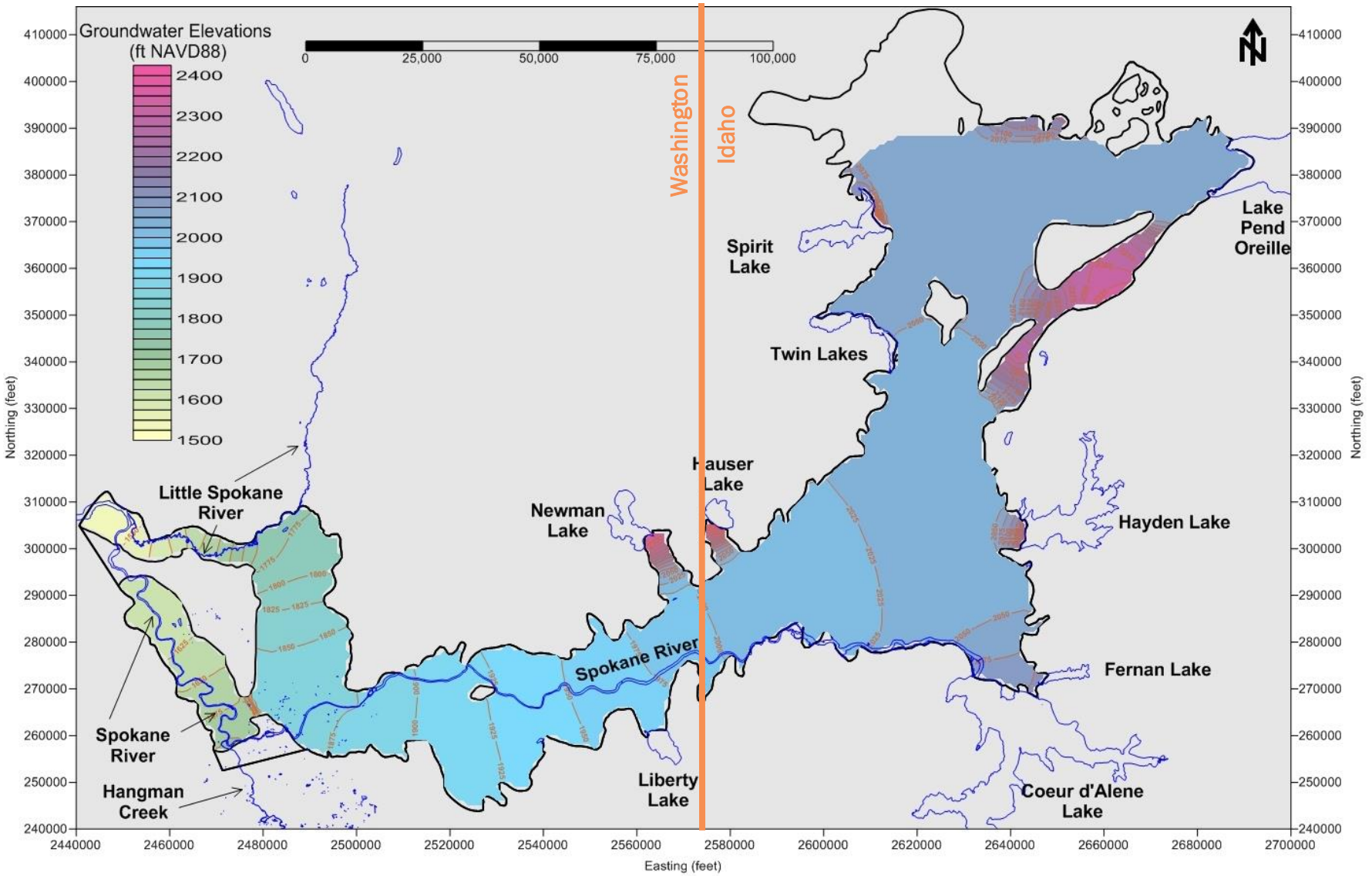
Recent Adjustments to Simulated Lake Inflows Creates the Need to Adjust the Model's Calibration





Source: GSI Water Solutions, City of Spokane, and Spokane Aquifer Joint Board (SAJB)

THANK YOU!

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