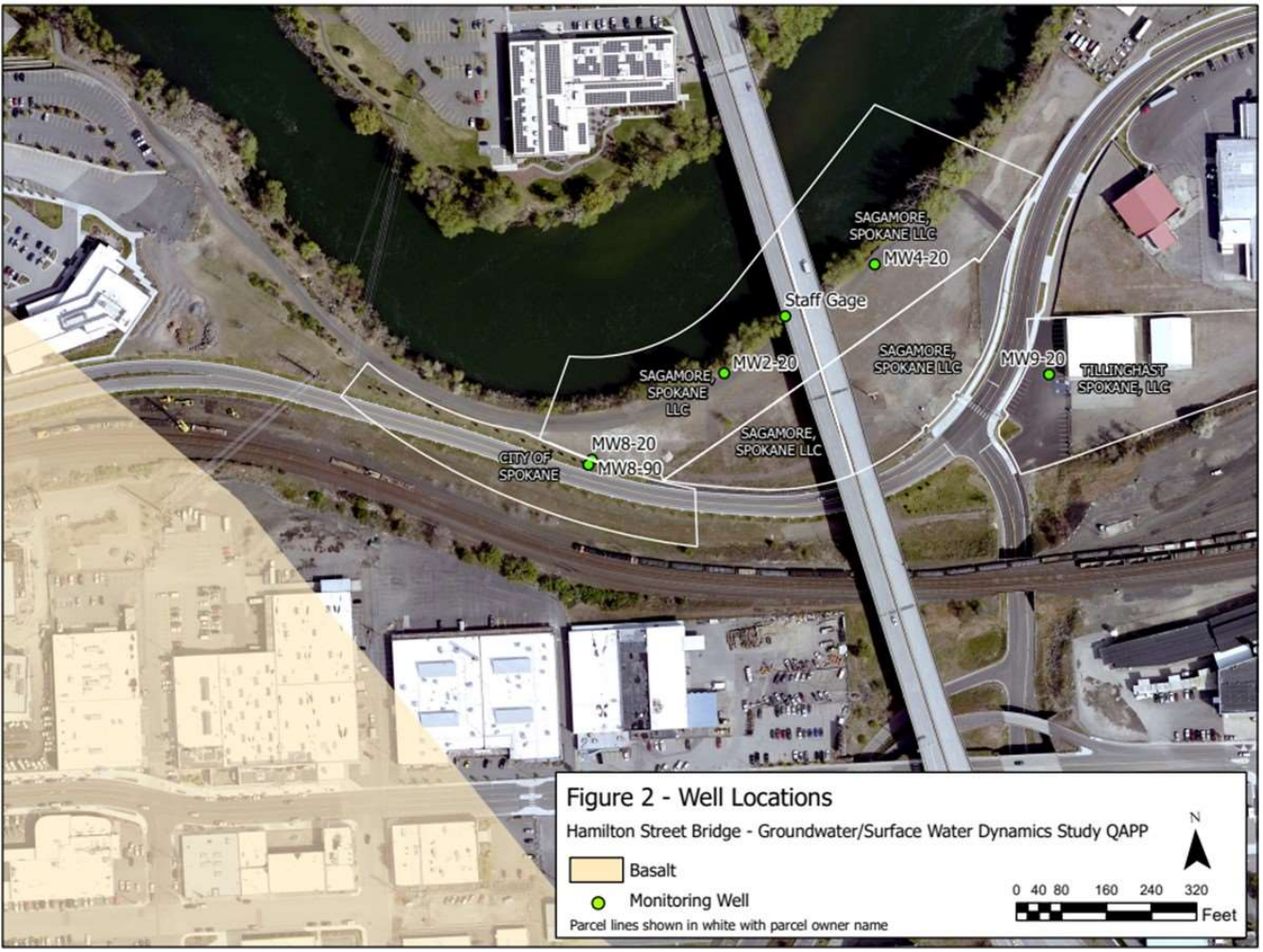
Mission Reach Groundwater Data Evaluations

- Purpose of the Task
  - Collect & examine well information in Mission Reach Area
  - Prepare interactive map
  - Draw whatever conclusions the available data allow about groundwater (GW) flow direction
- Results of first two steps
  - Maps & data tables of well information collected
- Analysis
  - Information on local geology/hydrogeology & general GW flow direction(s)
  - Hamilton Street Bridge continuous monitoring data
- Current Observations & Conclusions

Purpose of Task: Excerpts from Quality Assurance Project Plan for Hamilton Street Bridge Groundwater – Surface Water Dynamics Study, September 2021

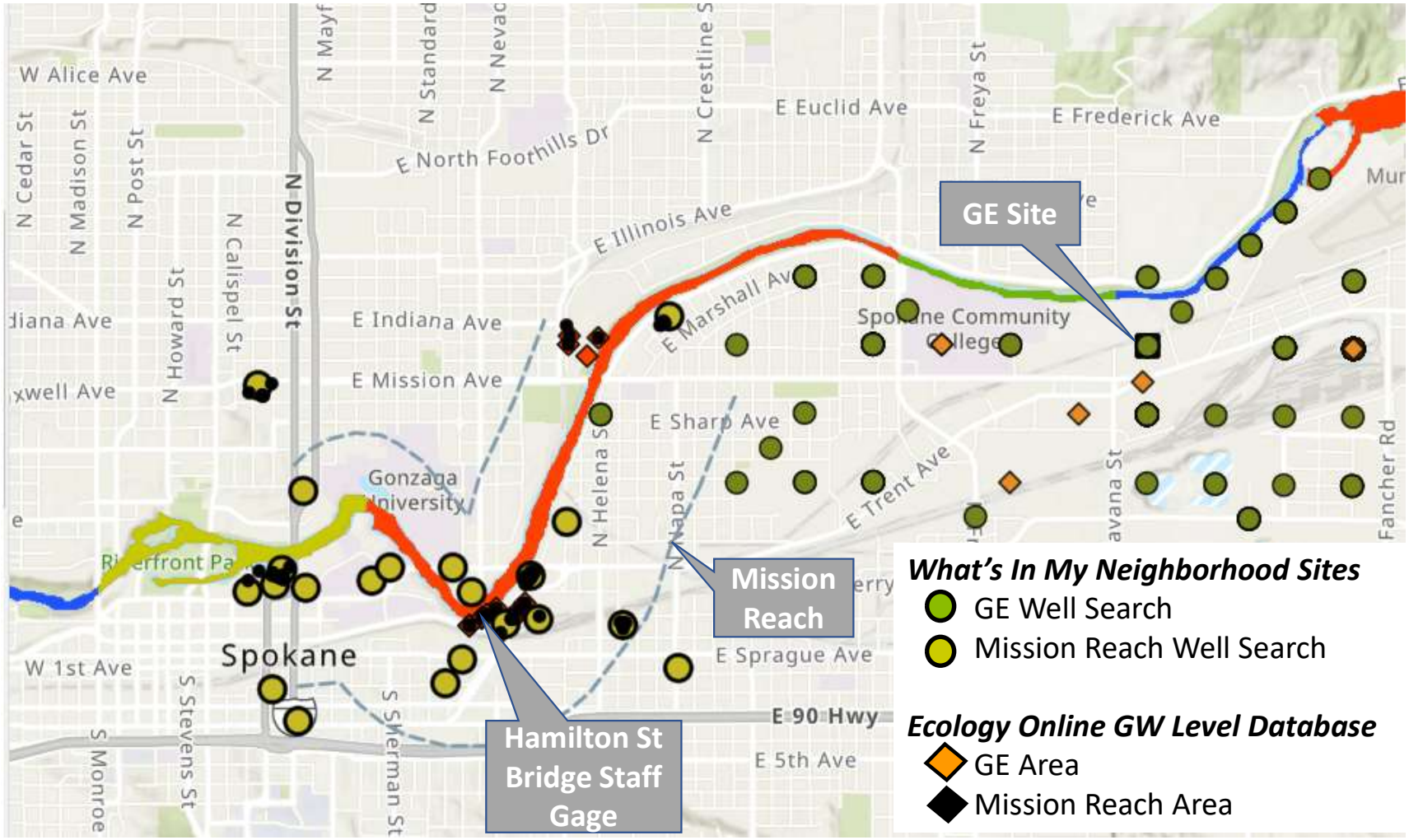


- *"…along the southern extent of the reach is the southern edge of the Spokane Valley Rathdrum Prairie (SVRP) aquifer where it meets **basalt** bedrock (Figure 2). The extent of groundwater inflow from the **basalt** aquifers that underlie a historically industrialized area, and a potential source of PCBs, is unknown."*
- *"The purpose of this project is to improve understanding of groundwater and surface water interaction within the Mission Reach and to improve understanding of the interaction of the **basalt** aquifer and SVRP aquifer along the southern portion of the reach."*
- *"If results of this study indicate a potential groundwater pathway for upland PCB sources to enter the river in the Mission reach additional study will be necessary to evaluate portions of the Mission Reach that extend north of the site, on the opposite side of the river, and downstream of the site where the river and **basalt** aquifer are in direct continuity."*
- *"[Hamilton Street] well logs show that **basalt** bedrock was encountered at approximately 89.5 ft below ground surface (bgs). **Basalt** is at surface south of the site indicating a sloped interface of the **basalt** aquifer and SVRP aquifer. The [MW8-20 and MW8-90] well pair can be utilized to show the direction of the groundwater gradient."*
- *"Data collected from the wells along the southern edge of the site will allow evaluation of potential inflow from **basalt** aquifers to the south of the site."*

Results of Data Compilation Activities

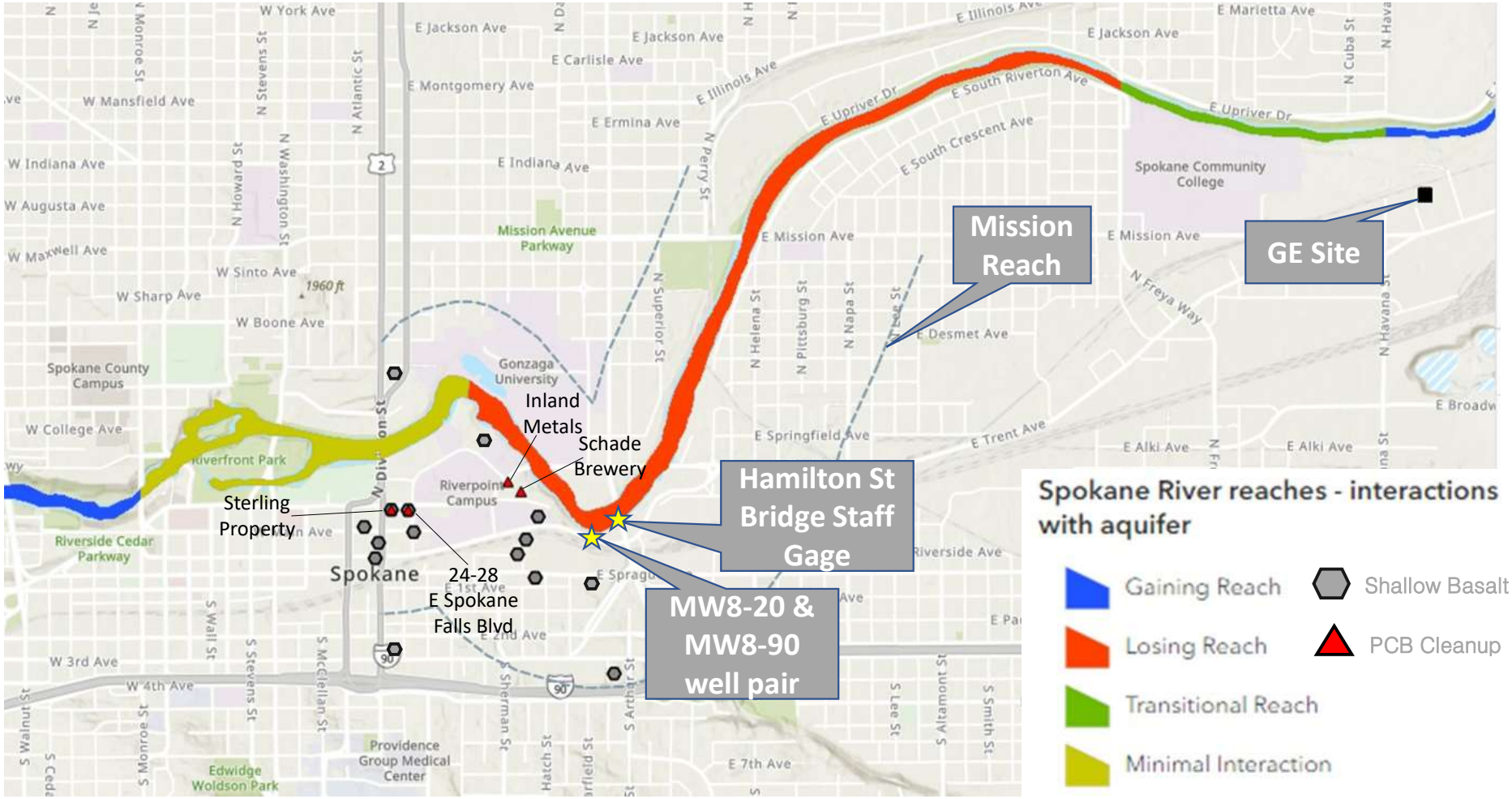
Spokane River Reach Interactions With Groundwater

Candidate Sites With Existing or Potential Monitoring Well Data



Mission Reach Sites With Limited Groundwater Flow Direction Data

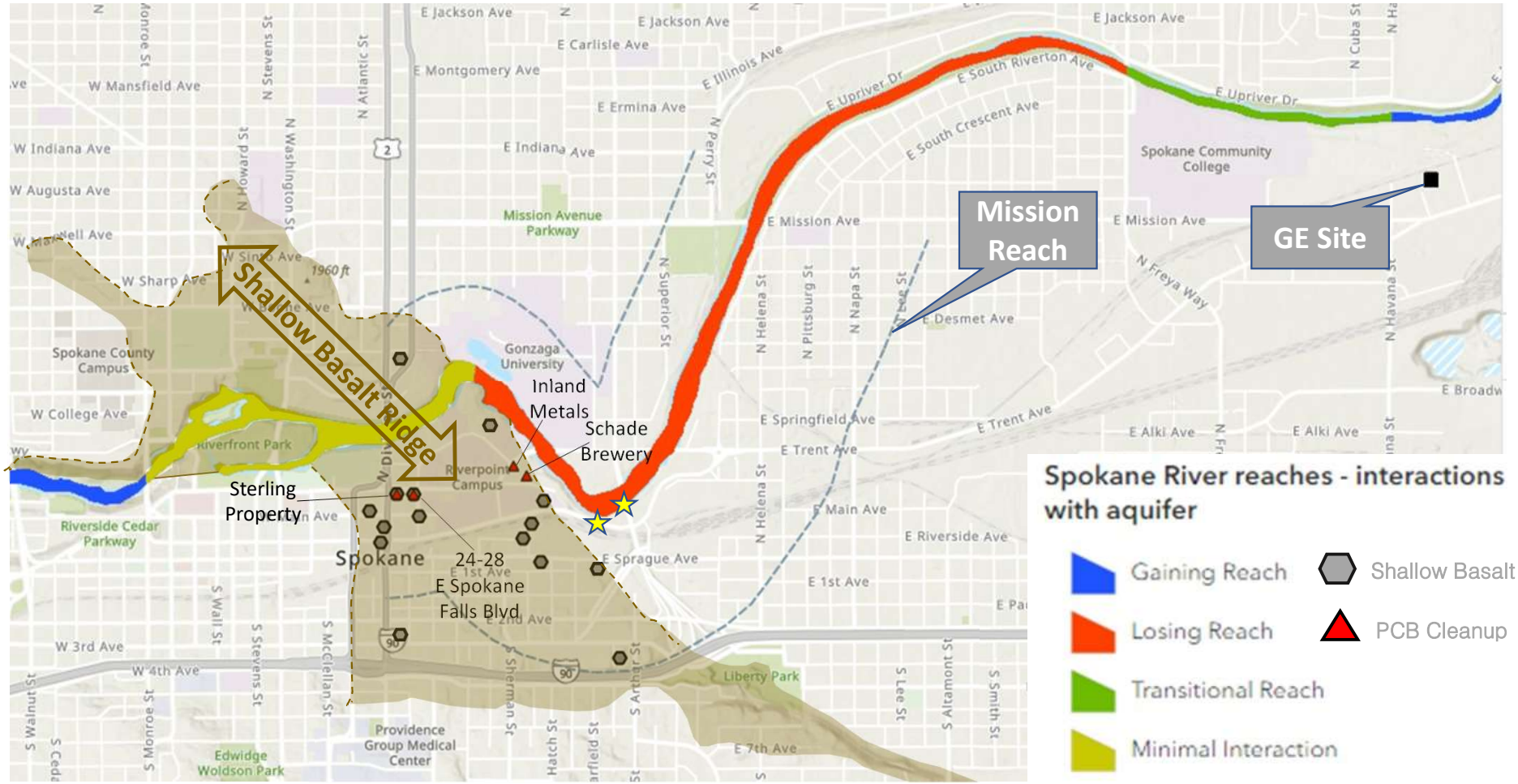
Sites With Shallow Basalt Present



Exposed/Shallow Basalt Ridge at Surface (Columbia River Group)

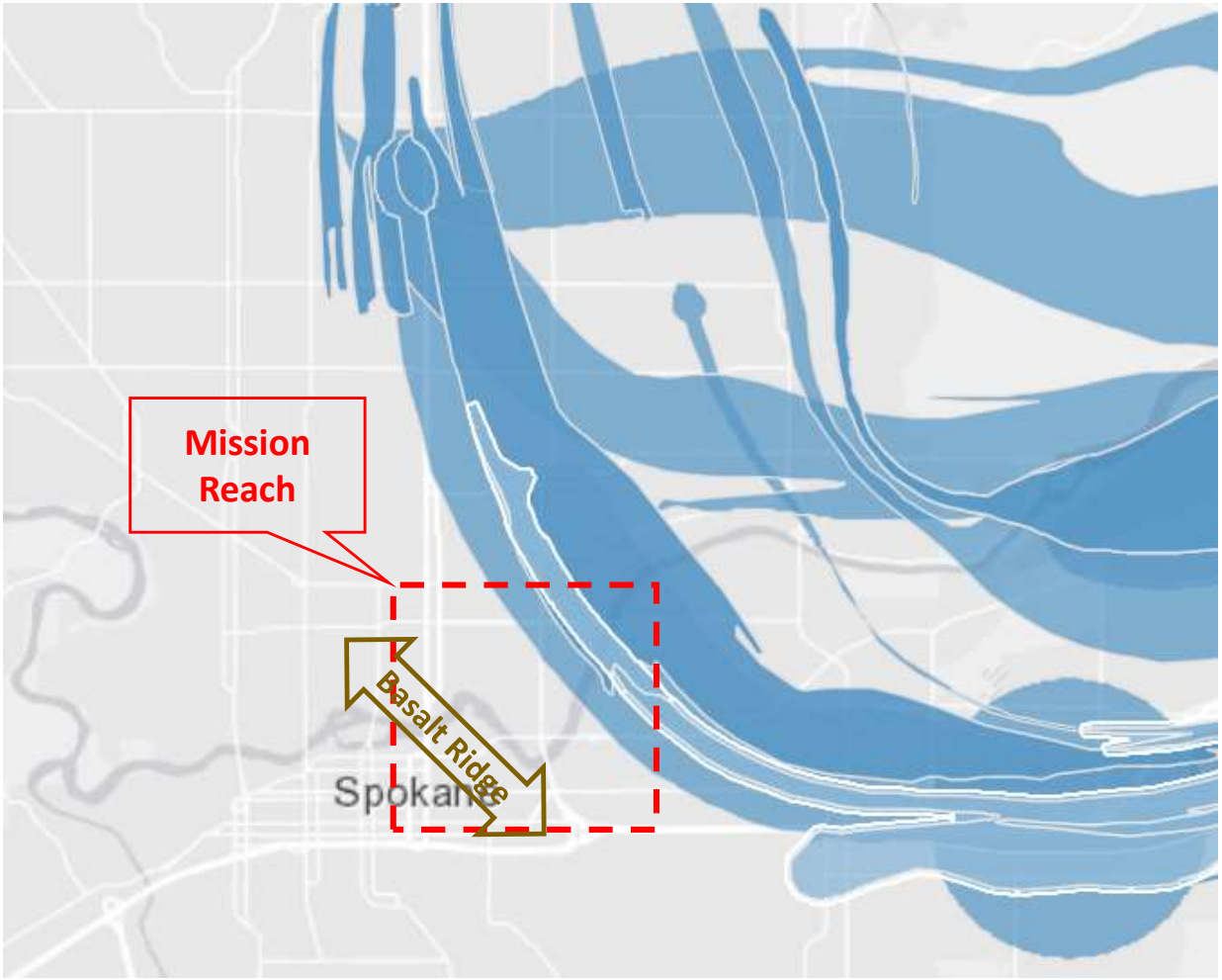
Groundwater Generally Absent or Perched in Depressions on Top of Basalt

Basalt Ridge Coincides With Zone of "Minimal Interaction" in River



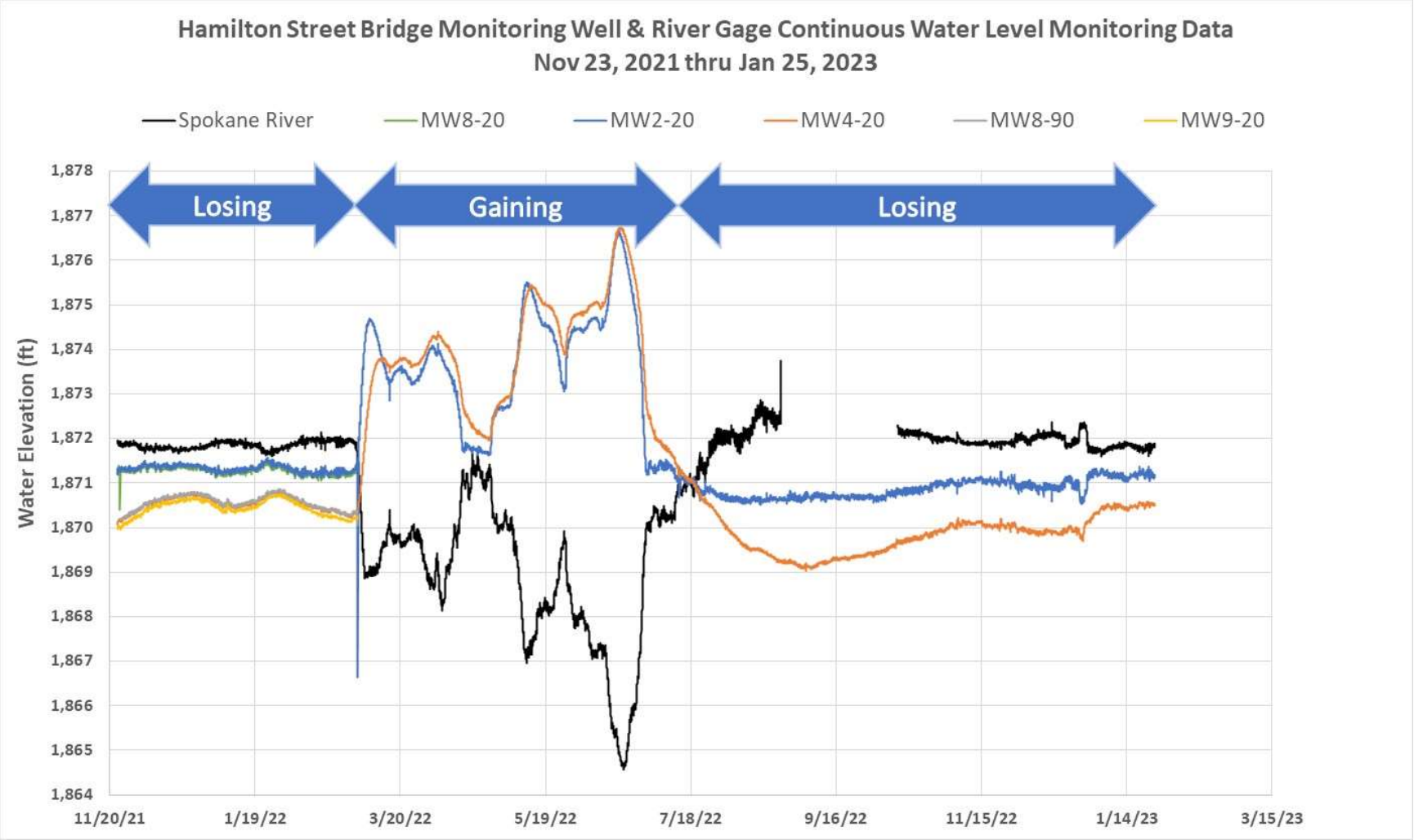
Spokane Valley GW: 10-Year Well Head Protection Areas

Arcing GW Flow Patterns Show Diversion of GW East of Shallow Basalt Ridge

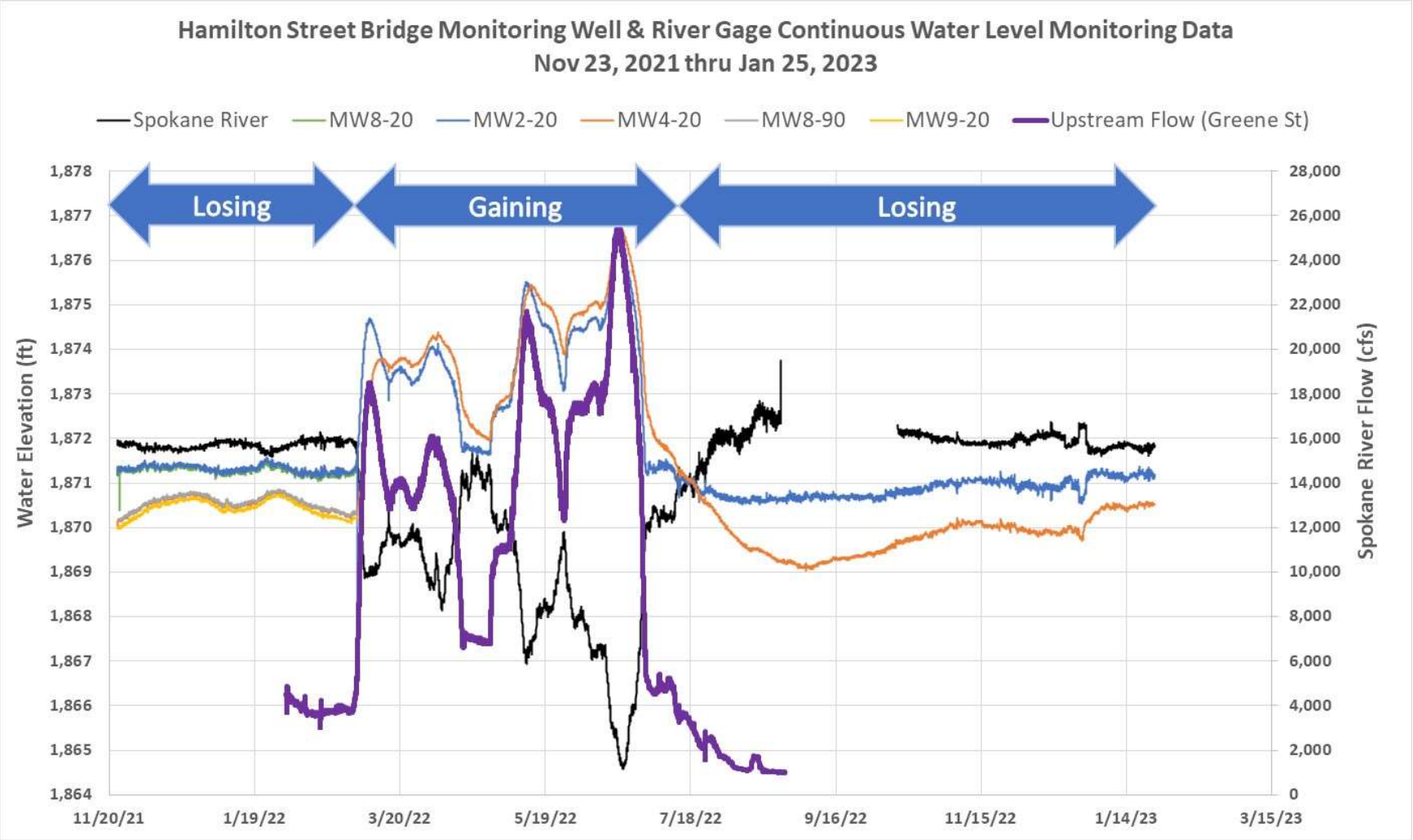


Analysis of Hamilton Street Bridge Continuous Monitoring Data

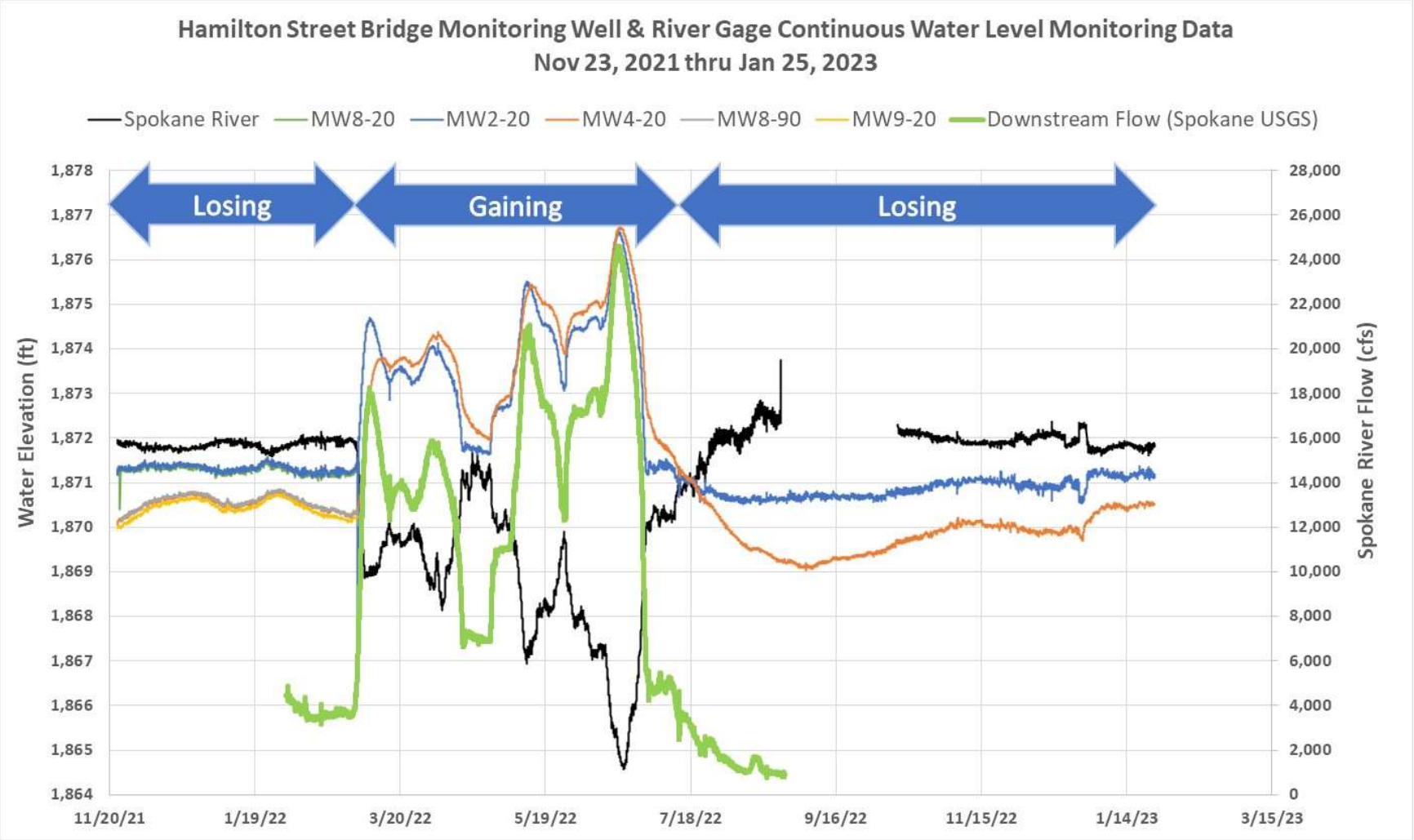
Hamilton Street Continuous Surface Water & GW Level Monitoring Data



Upstream Flow (Green Street Gage) Data Parallel Hamilton Street Bridge GW Levels & Mirror Surface Water Levels

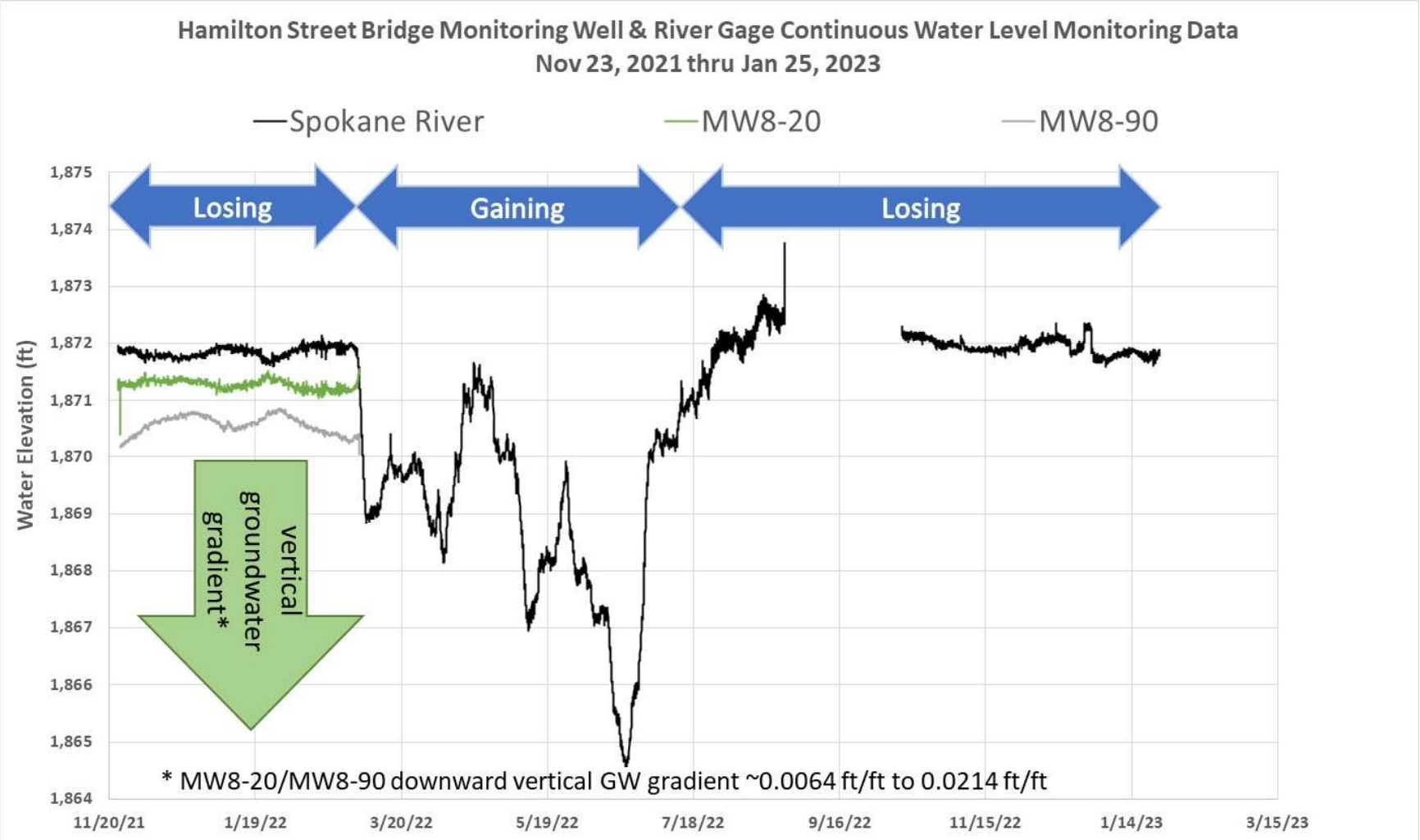


Downstream Flow (Spokane-USGS Gage) Data Parallel Hamilton Street Bridge GW Levels & Mirror Surface Water Levels



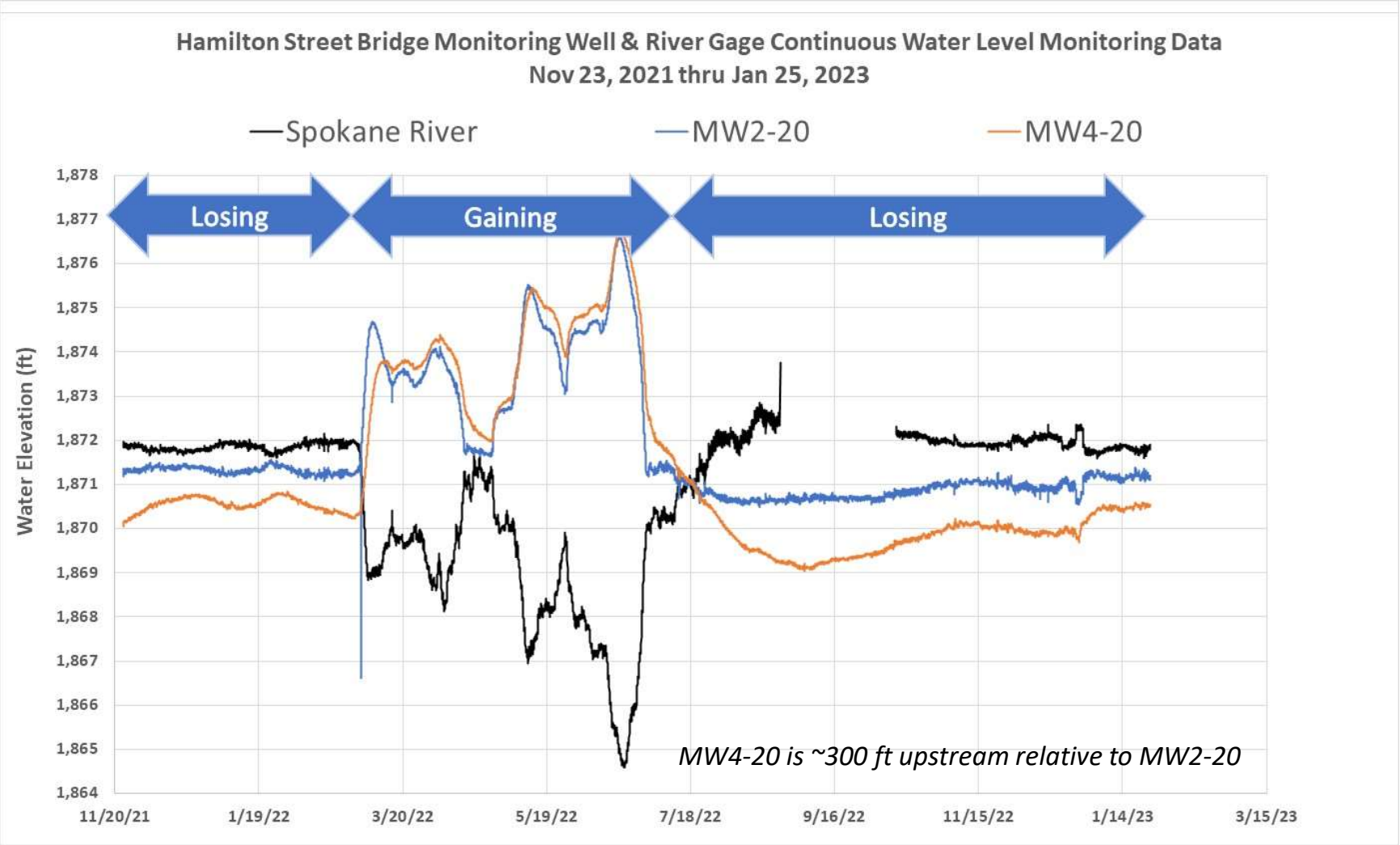
Hamilton Street Bridge MW8-20/MW8-90 Clustered Monitoring Well Data

GW Recharge Shown by Consistent Downward Vertical GW Gradient During 1st Losing Reach Period



Only Shallow Wells MW2-20 & MW4-20 Have Data Past 3/2/22

No Vertical GW Gradients Data Available After 3/2/22 & Before 1/25/23 Data Download



Mission Reach: General Observations & Conclusions

- Limited groundwater flow direction data from sources other than Hamilton Street
  - Consistent with river reach GW interaction map
  - Seasonal data important
- Basalt ridge to west appears to be a groundwater boundary
  - Basalt crosses river in "*minimal interaction*" reach zone
  - Suggests limited/no interaction with shallow sand/gravel aquifer ***– need to confirm***

Hamilton Street Bridge Continuous Monitoring Data
Current Observations & Conclusions

- Data believable – trends consistent with river flow data
- Groundwater trends parallel upstream & downstream flow curves (i.e., direct relationship)
- Hamilton Street bridge surface water levels mirror upstream & downstream flow curves (i.e., inverse relationship)
- Abrupt drop in Hamilton Street bridge surface water levels start when Spokane River Flow >5,200 cfs
  - Suspect dam control influences ***but need confirmation from Avista***
- Available vertical groundwater gradient consistently downward during 1st losing period
  - Vertical groundwater gradient data not available during gaining period nor 2nd losing period

Discussion