



Surface-Groundwater Interactions at a Floodplain Restoration Site – Jocko River

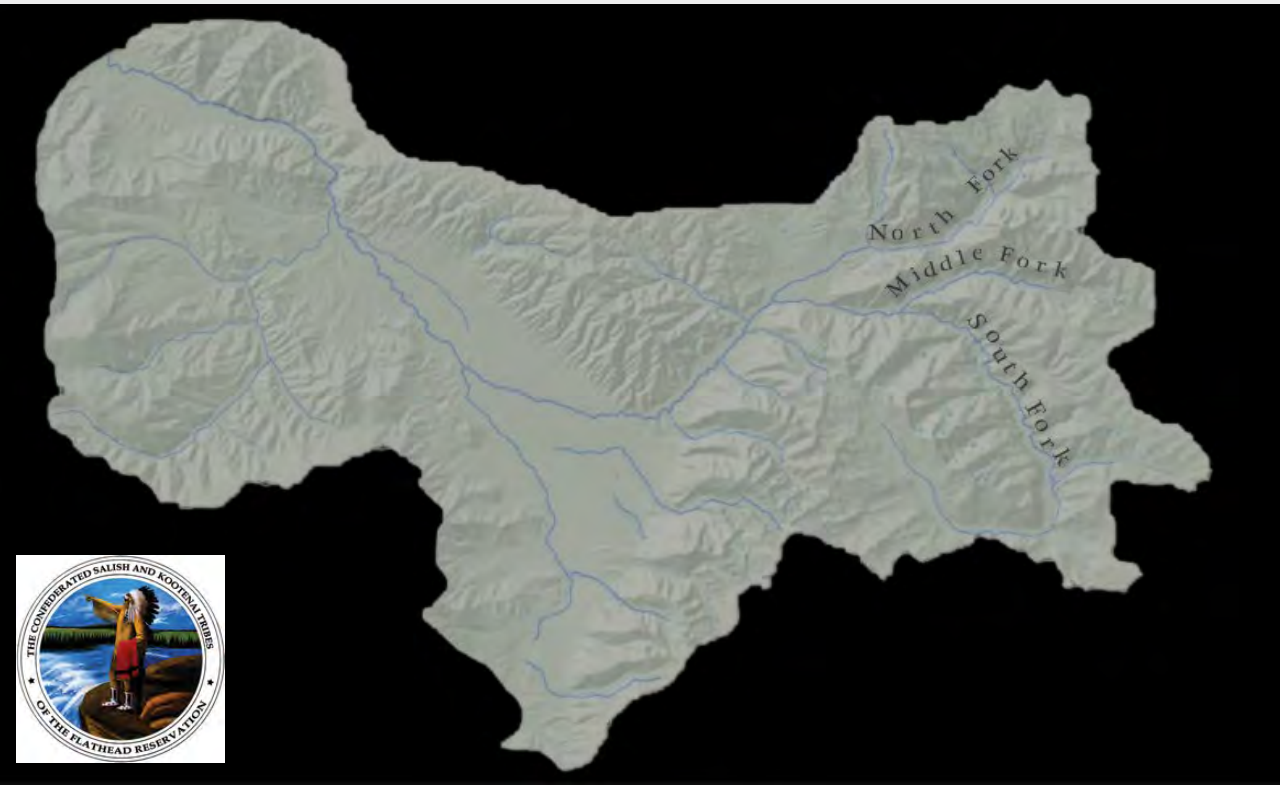
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Project Vicinity

Ntqalq^w Sewtk^ws — Jocko River

Draining an area of roughly 250,000 acres, the Jocko River is the second largest tributary watershed of the lower Flathead River and provides stream habitat connectivity for aquatic species.



JOCKO RIVER VICINITY MAP



This project is located along the lower Jocko River approximately 3 miles upstream of its confluence with the Flathead River.

Historical Alterations



"Seagoing" TD-18 dozer in action. Widening, deepening and straightening channel of Jocko River above No. 1 flood gate.



Material dozed from river bed forms a dike on both banks as protection from ice jams and to confine water during flood periods.



View from elevation showing No. 1 flood gate and boundary fence. Straight channel and diking is expected to protect flood gate and fence from ice jams and floods. This has been a bad spot.

Historical Alterations

-Channelization and armored leveeing of Jocko River across the project area to exclude the Jocko River from its historic floodplain

-Straight channel alignment dominated by homogeneous plane-bed, riffle habitats, which do not provide diversity of aquatic habitat

-Channel downcutting disconnected the river from its floodplain and lowered the shallow groundwater elevations, resulting in loss of vegetative diversity.

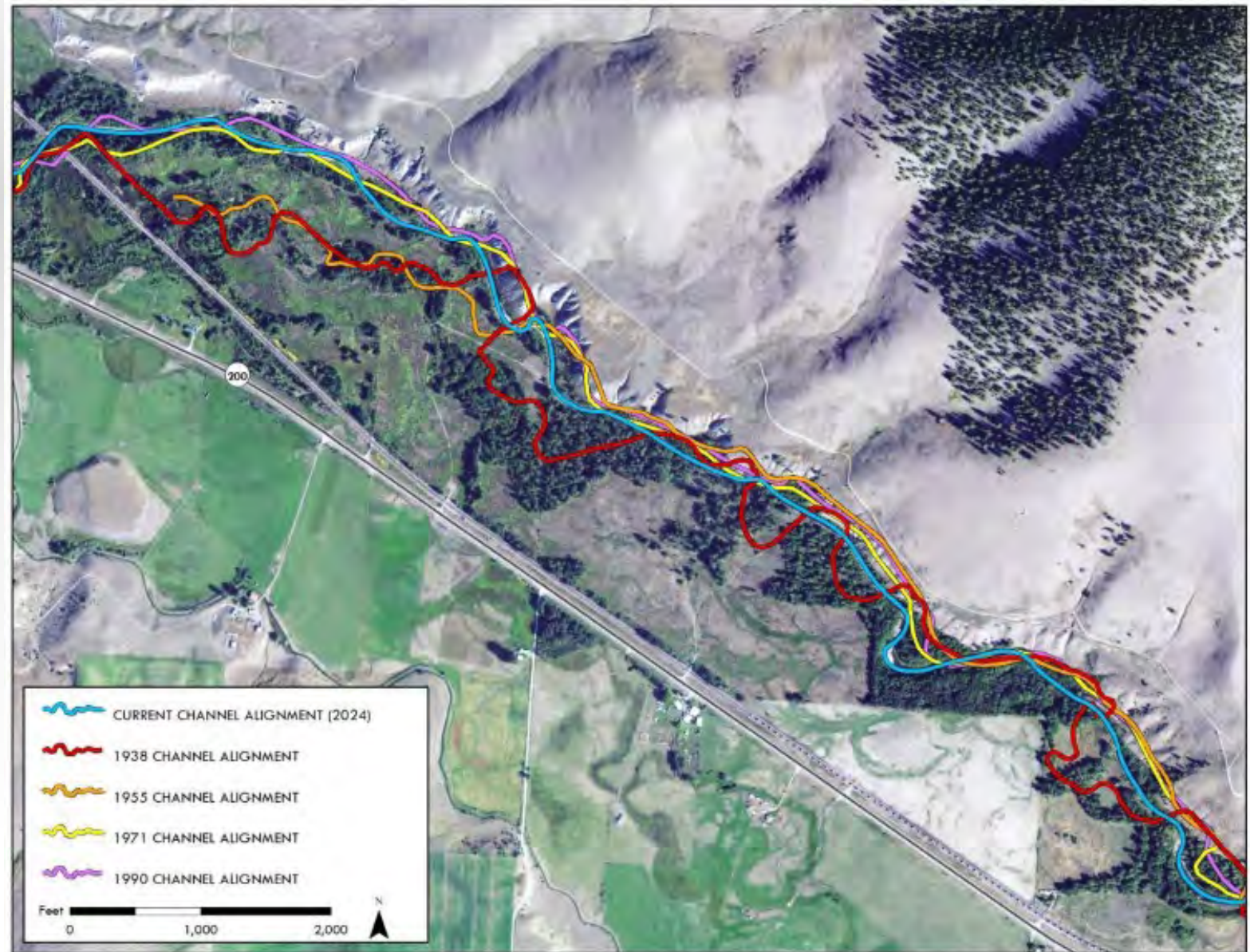


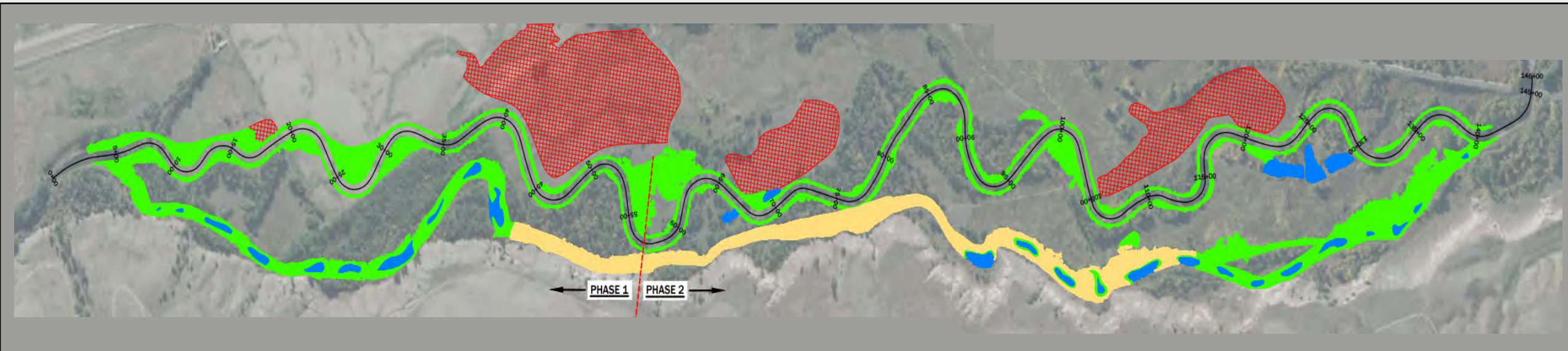
Figure 2-3. Historical channel locations of the Jocko River Bison Range Reach.

Restoration Project Objectives

CSKT is re-naturalizing a 2.8-mile portion of the Jocko River in order to:

- Re-connect Jocko River to its historical floodplain surface
- Construct a riffle-pool stream type consistent with historical morphologies of the Jocko River channel
- Improve aquatic habitat complexity
- Improve water quality by reducing sediment loading, increasing cover and shade to the channel corridor
- Creating and enhancing floodplain and off-channel wetland communities

PLANTING LEGEND	
SYMBOL	
	RIPARIAN PLANTING
	UPLAND PLANTING
	WETLAND PLANTING
	SCARIFICATION AREA



Project Status

- 2008 – Jocko River Master Plan prioritized project
- 2012 – Initial Design (50%);
 - work paused pending land acquisition
- May 2023 – Final Project Design
- March 2025 – Phase 1 Excavation & Channel Construction
- 9/18 through 9/22 – Phased Channel Activation
- 9/22 through 9/24 – Fish Rescue
- 2026 – Phase 2 Construction



Fish Rescue from old channel to new channel



Bull Trout Rescue

Groundwater Monitoring Network

Legend

- Existing Well
- Monitoring Well

CSKT Bison Range

- Objectives: characterize baseline hydrology and compare with future conditions.
- Hydrogeologic setting: alluvium of modern channels and floodplains.
- Gravel, sand, and some silt.
- Alluvial thickness ~ 25-75 feet.

- Design: wells positioned to provide down-channel and lateral representation, predominantly within inner meander belt of new channel.
- Wells instrumented with Solinst Levelogger5[®] transducers on 1-hour data recording intervals.

Google Earth

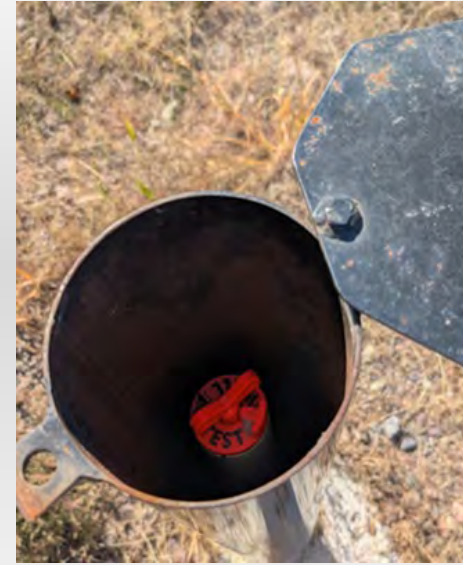
Image © 2025 Airbus



2000 ft

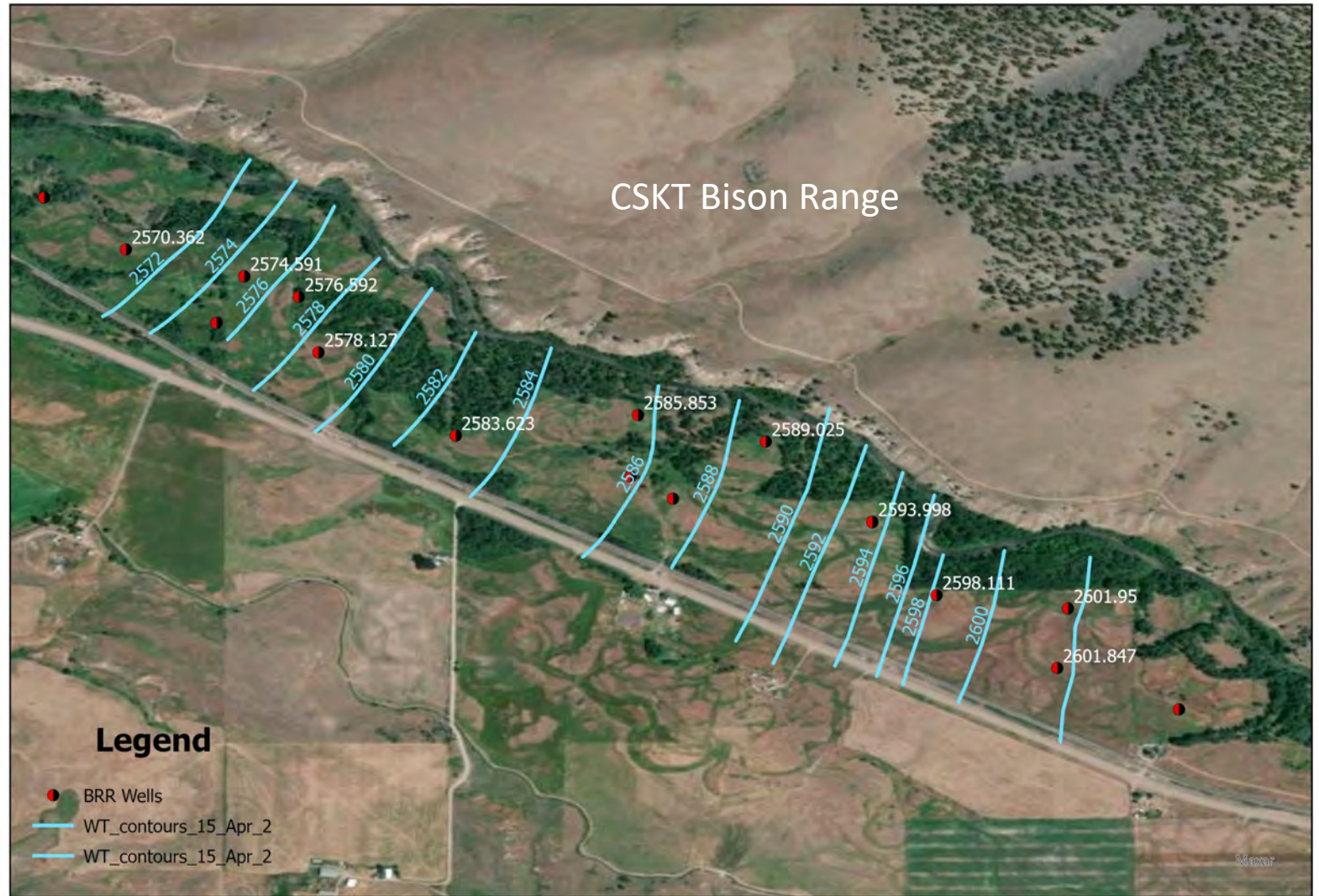
Groundwater Monitoring Results

- Monitoring period: 18 months and counting.
- Groundwater levels in shallow monitoring wells range from about 2.5 to 8.0 feet below ground surface (bgs) – unconfined.
- Monitoring well depths to water are generally shallower at the downstream end of the study reach.
- Groundwater levels in existing (domestic) wells ranged from 13 feet bgs to several feet above grade.
- Flowing well (75-100 feet) produces 40+ gpm (confined or semi-confined aquifer).



Groundwater Monitoring Results

- Shallow GW flow down-valley from SE to NW.
- Flow generally parallel to the river.
- Pattern is consistent with a losing stream in which river flow recharges the aquifer along its (former) south bank.
- Likely limited flow from bedrock highlands to the river.



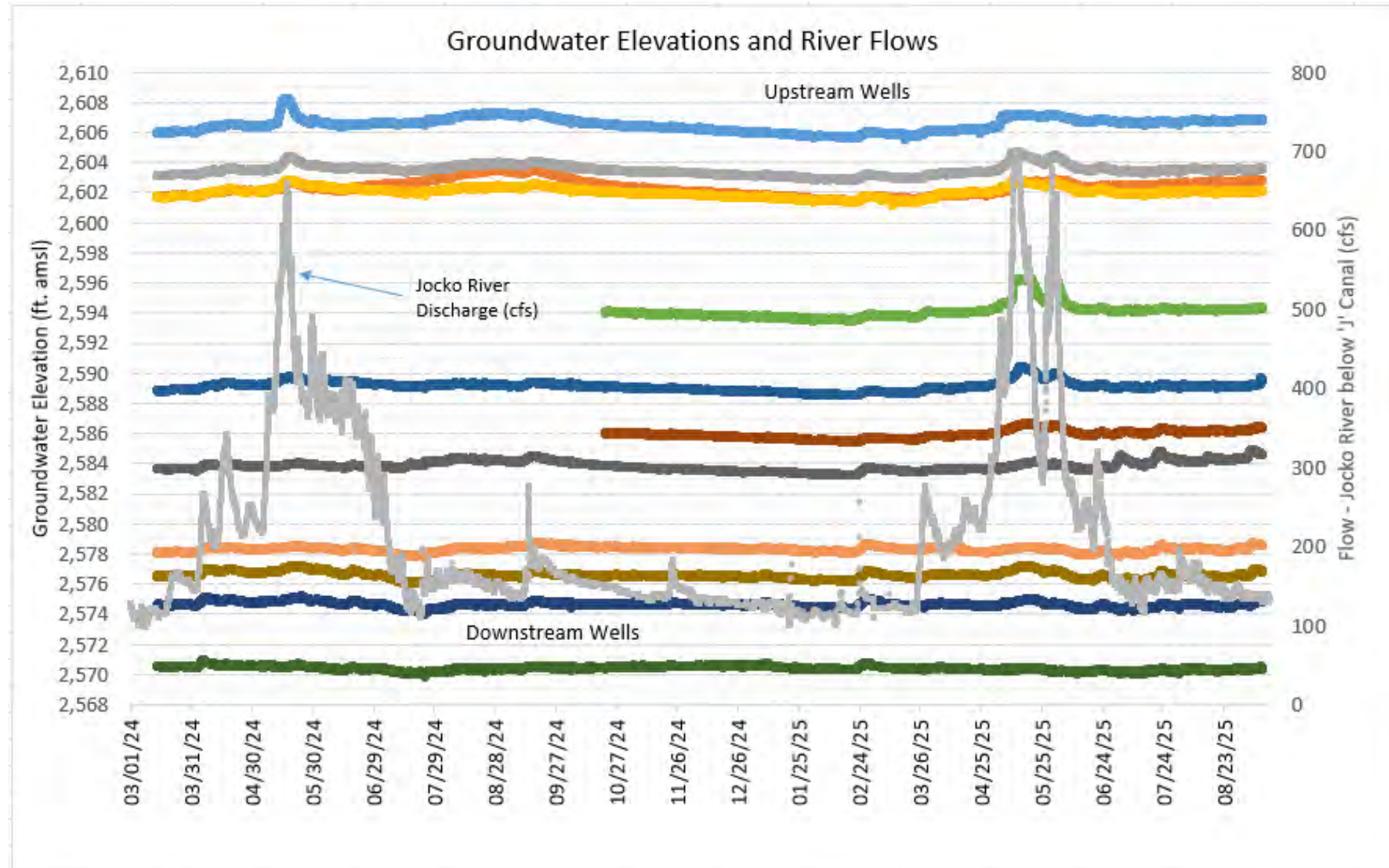
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Miles



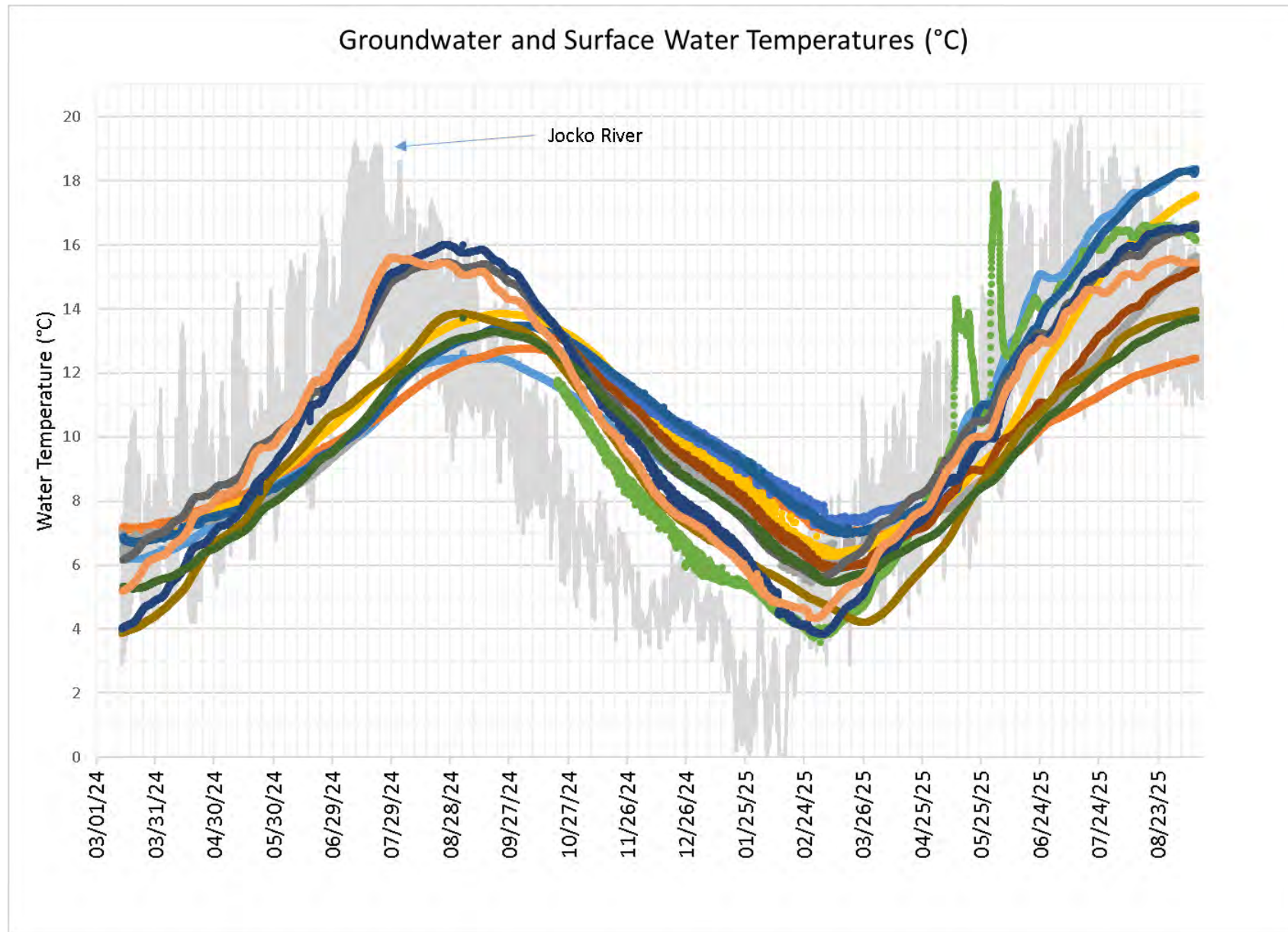
Groundwater Elevations

- Water table responds to seasonal changes in river stage and streamflow (e.g., May 2024/2025).
- Consistent with a losing stream reach (aquifer recharge).
- Patterns and magnitudes of water level response vary by well location.



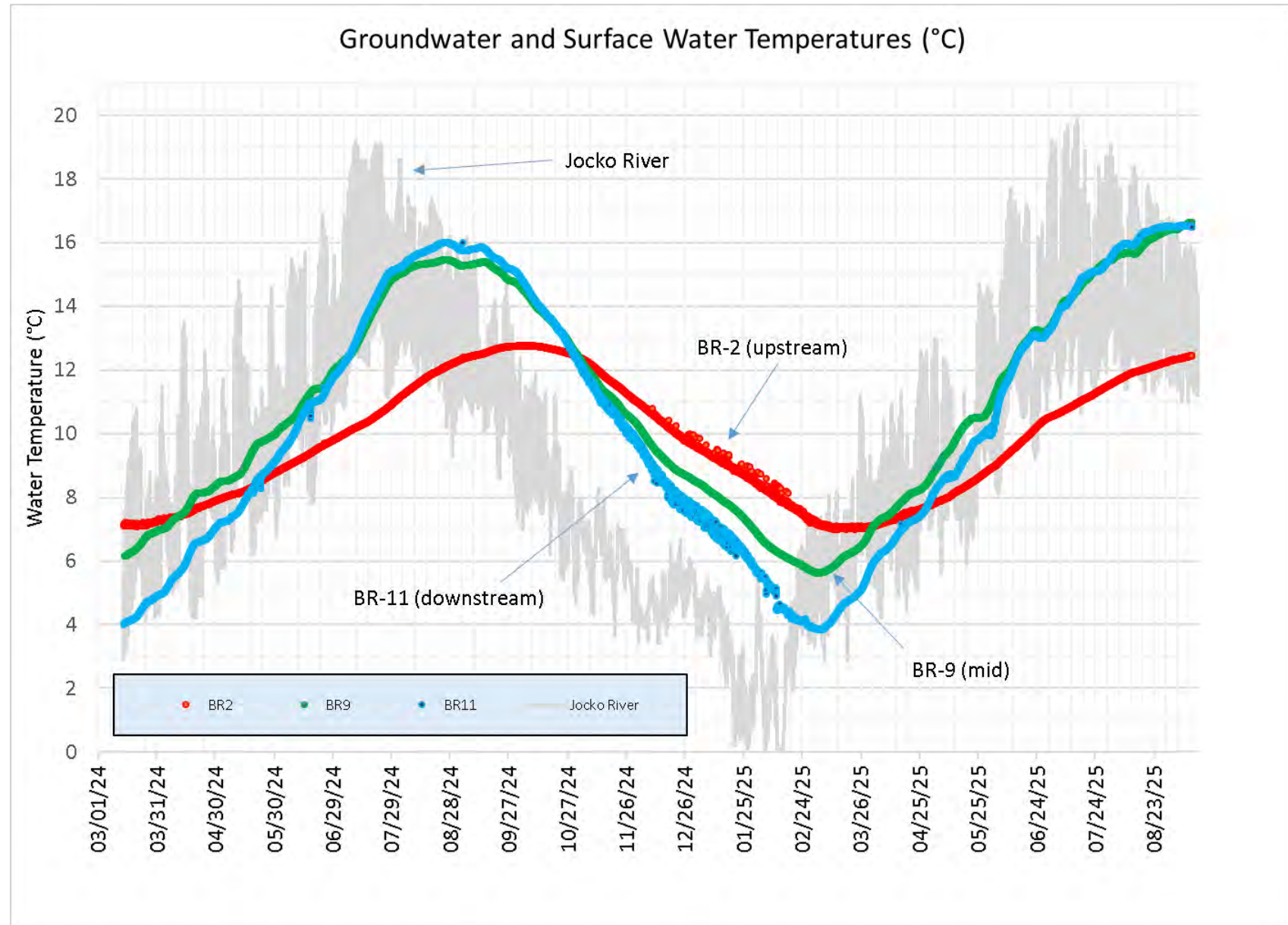
Groundwater Temperatures

- Without stream influences, groundwater temperatures should be fairly constant.
- At the study reach, temperatures vary on a seasonal basis (mimic river temperatures).
- Magnitude and timing of temperature fluctuations diverge from stream patterns and vary based on location.
- Magnitude: groundwater temperatures at a given location range from about 5 to 14 °C; river range > 20 °C.



Groundwater Temperatures

- Variable timing: groundwater temperatures mimic, but lag behind, river temperatures.
- Degree of GW-SW connection varies based on location.
- Patterns suggest variable groundwater flow path lengths and/or multiple flow paths at a given location.
- Temperature patterns point toward streamflow losses.
- Results are consistent with water table map (aquifer recharge)



Findings and Future Work

- Moderate to high degree of hydraulic communication between the Jocko River and associated floodplain aquifer.
- River influences groundwater elevations and temperatures (losing stream).
- CSKT will continue to monitoring groundwater elevations, river discharge, and water temperatures.
- Post-restoration changes may include increased floodplain groundwater storage and modified groundwater flow paths, among others.



Former and new channels (9/18/25)



Residual flow - former channel (9/23/25)



Flow in new channel (9/23/25)

