Floodplains Reimagined: Juvenile Salmon Rearing Habitat Restoration Opportunities Within the Sacramento River Corridor

River Partners Technical Assistance

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August 11, 2023

Objective and task overview

Objectives

- Identify and prioritize potential rearing habitat restoration opportunities within the Sacramento river corridor in Butte Basin

Task 1

- Aerial Imagery Data Collection and Processing
  - Collect and analyze aerial imagery

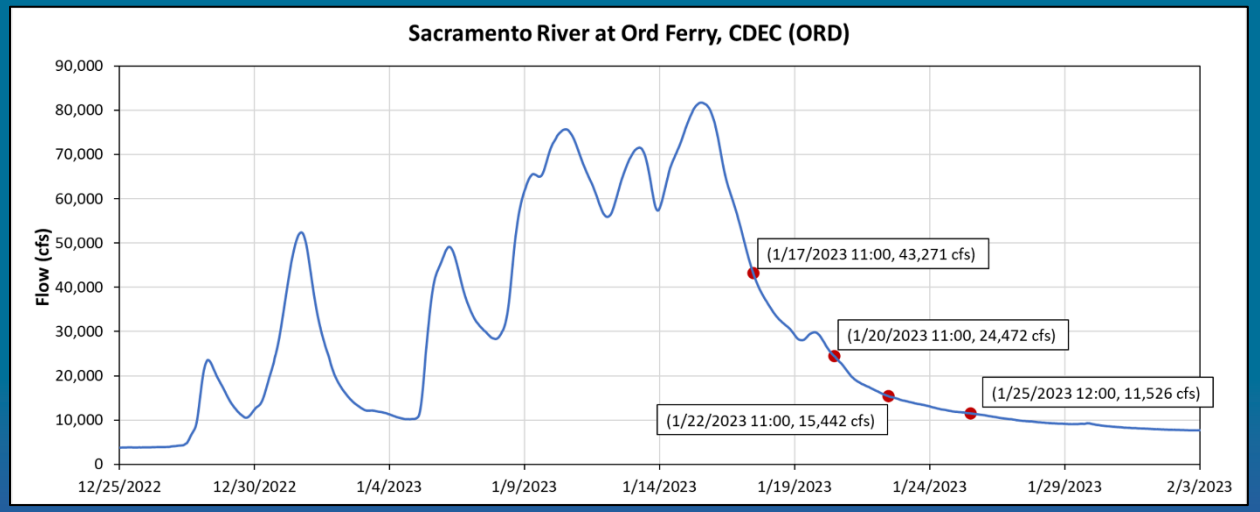
Task 2

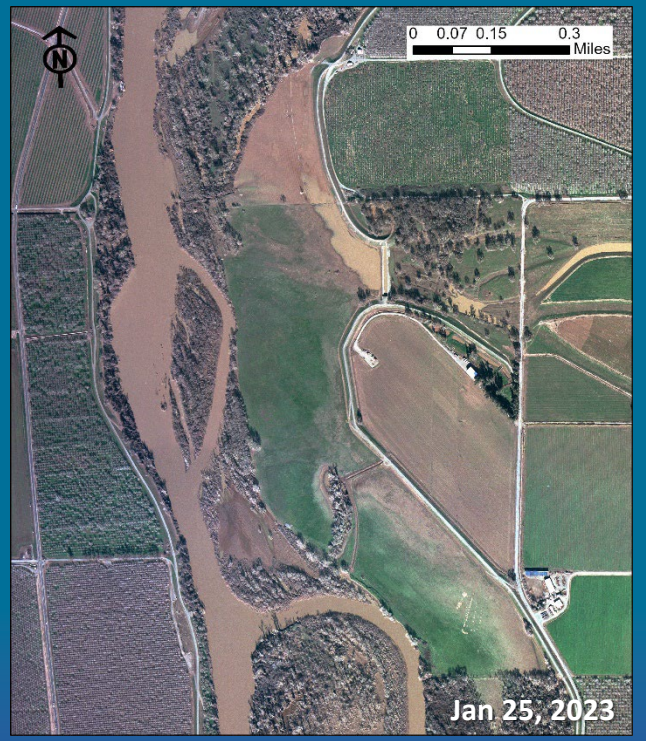
- Calibrated 1D Hydrodynamic Model Analysis
  - Floodplain inundation potential modeling to identify disconnected pools in the river corridor and verify with aerial imagery

Aerial imagery collection and processing

Task 1 - Aerial Imagery Collection and Analysis

- Flyover images taken between Hamilton City and Colusa
  - ~30 photos per day with 60% overlap
- Four dates during a flood recession, January 17-25, 2023
- Images combined and orthorectified for spatial analysis

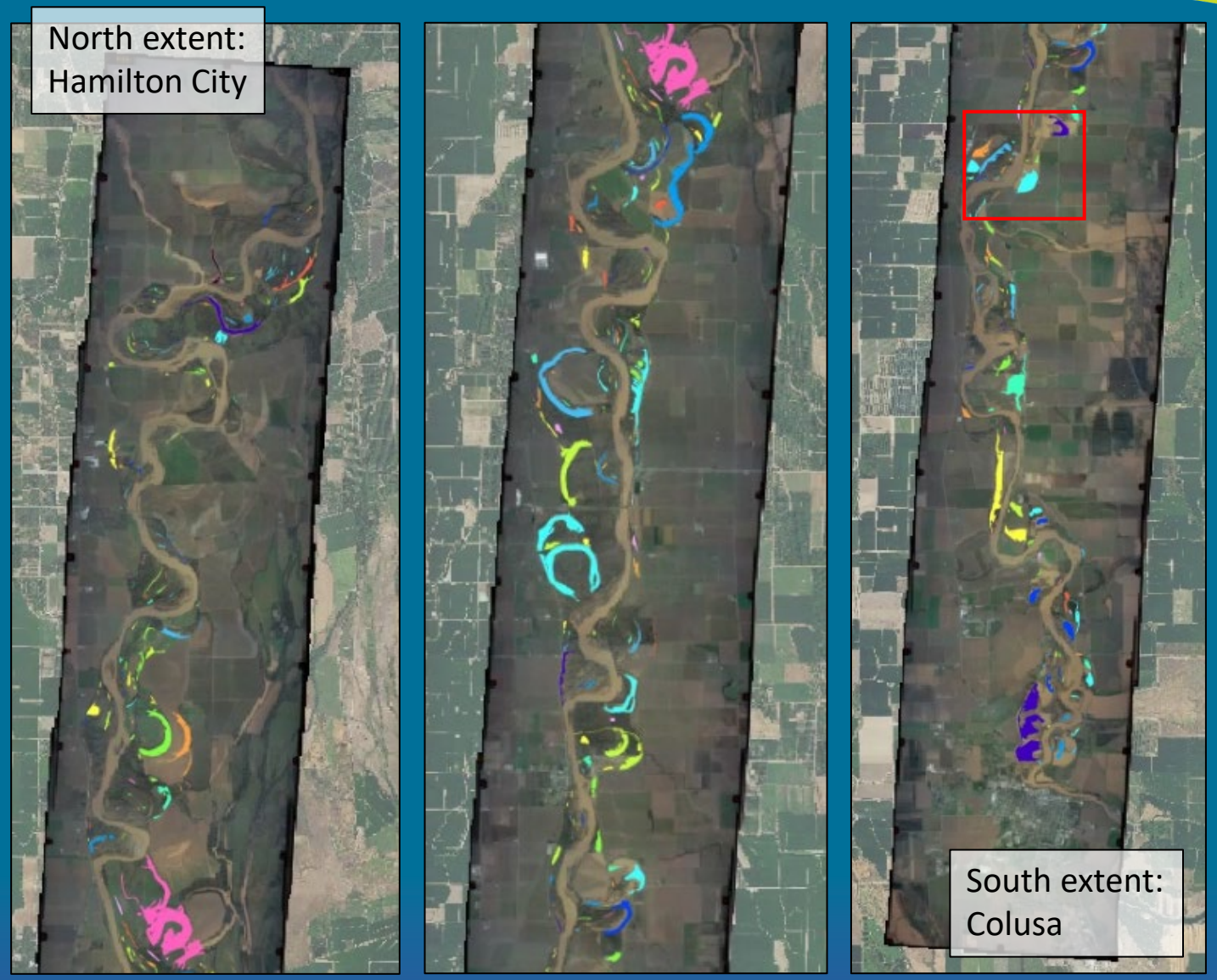




In-corridor pools identification approach

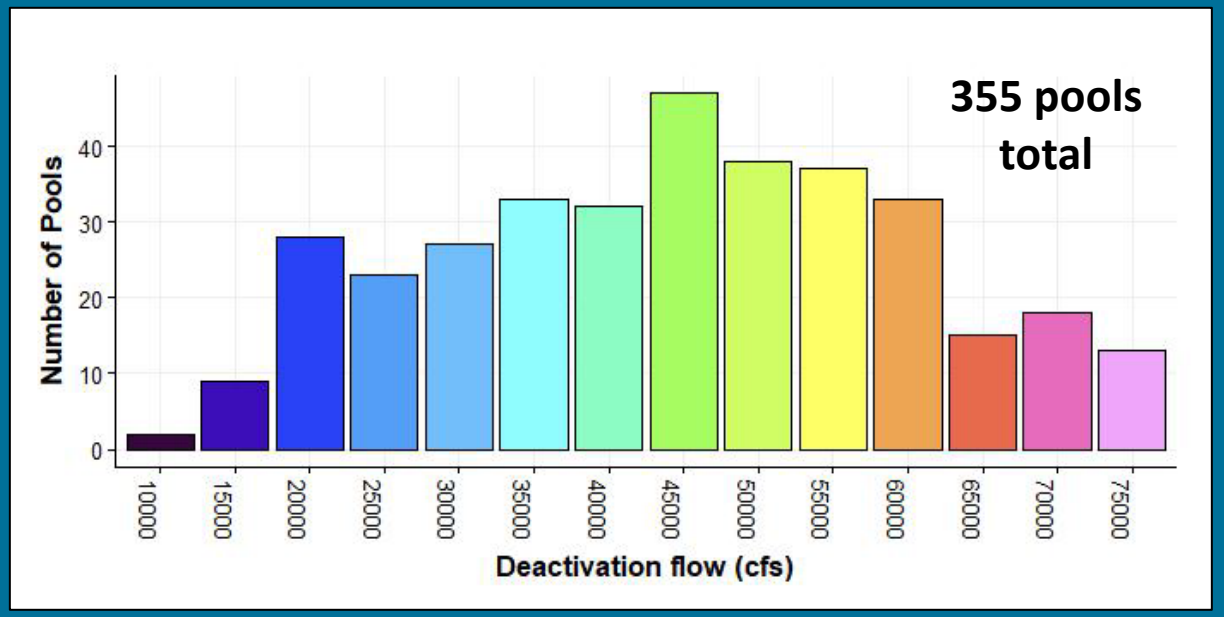
- Pools identified as **disconnected areas of inundation**
- Grouped by deactivation flow (between 10,000 – 75,000cfs, 5,000cfs intervals)
- Quantified by:
  - Surface area (acres)
  - Volume (acre-ft)
  - Proximity to the main channel (ft)
  - Limiting infiltration rate (in/hr)

Site illustrated in further detail

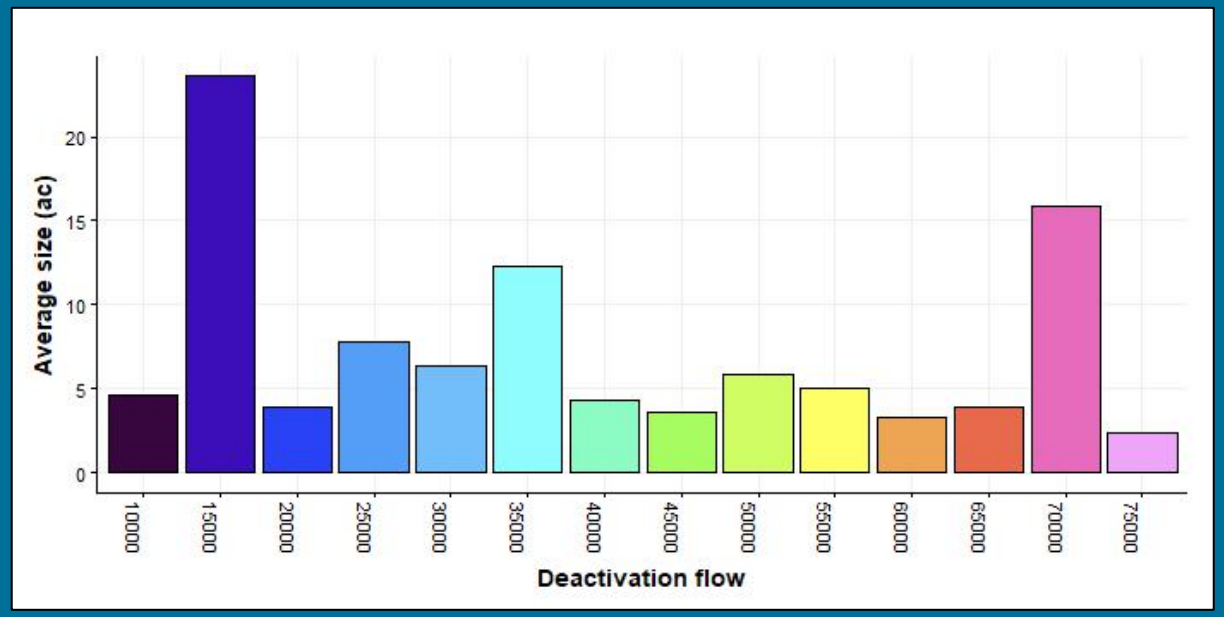


In-corridor pools statistics

Number of Pools

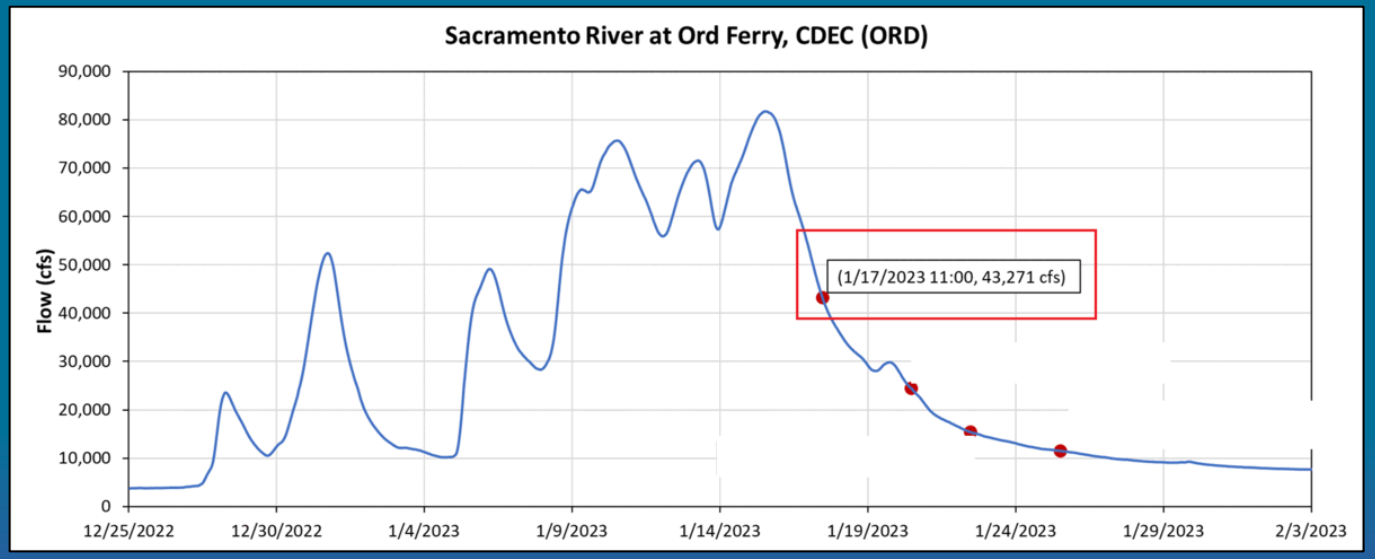


Average Size



Results at key floodplain locations

Willow Bend



Willow Bend

Colored areas, no outline = modeled channel inundation

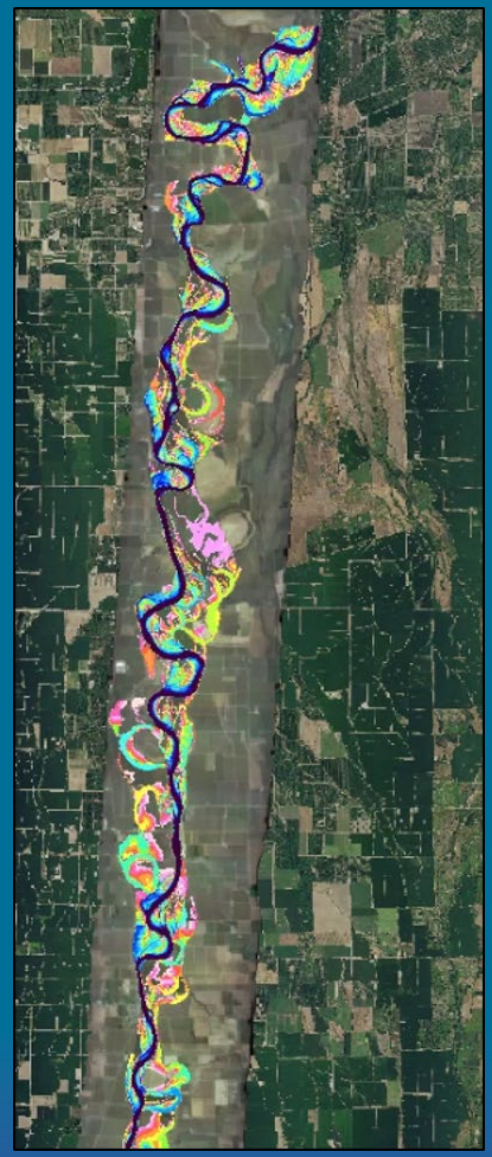
Outlined colored areas = identified standing pool locations

Large ponds disconnect from the main channel at 35,000 and 15,000 cfs

Next Steps

Use ranking of off-channel pools (by size, inundation frequency, etc.) to:

- Prioritize sites for fish presence/stranding monitoring
- Prioritize areas suitable for restoration/reconnection efforts



Discussion

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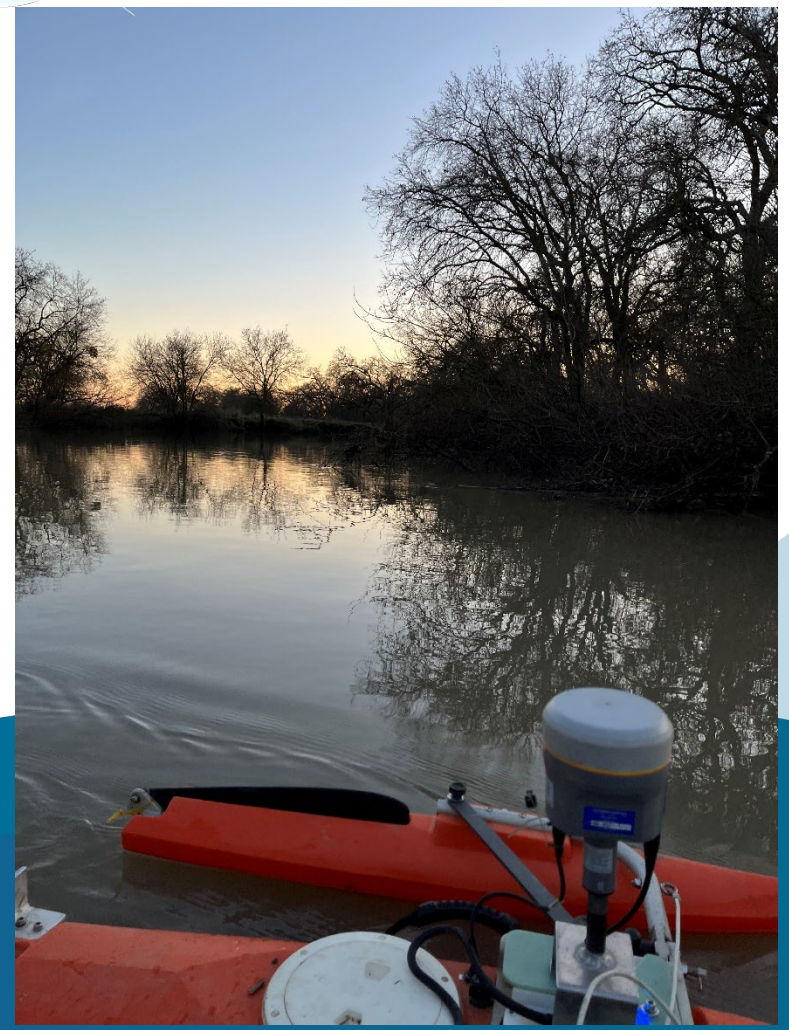
Butte Creek Flow Measurements

Near the Sanborn Slough Bifurcation Facility

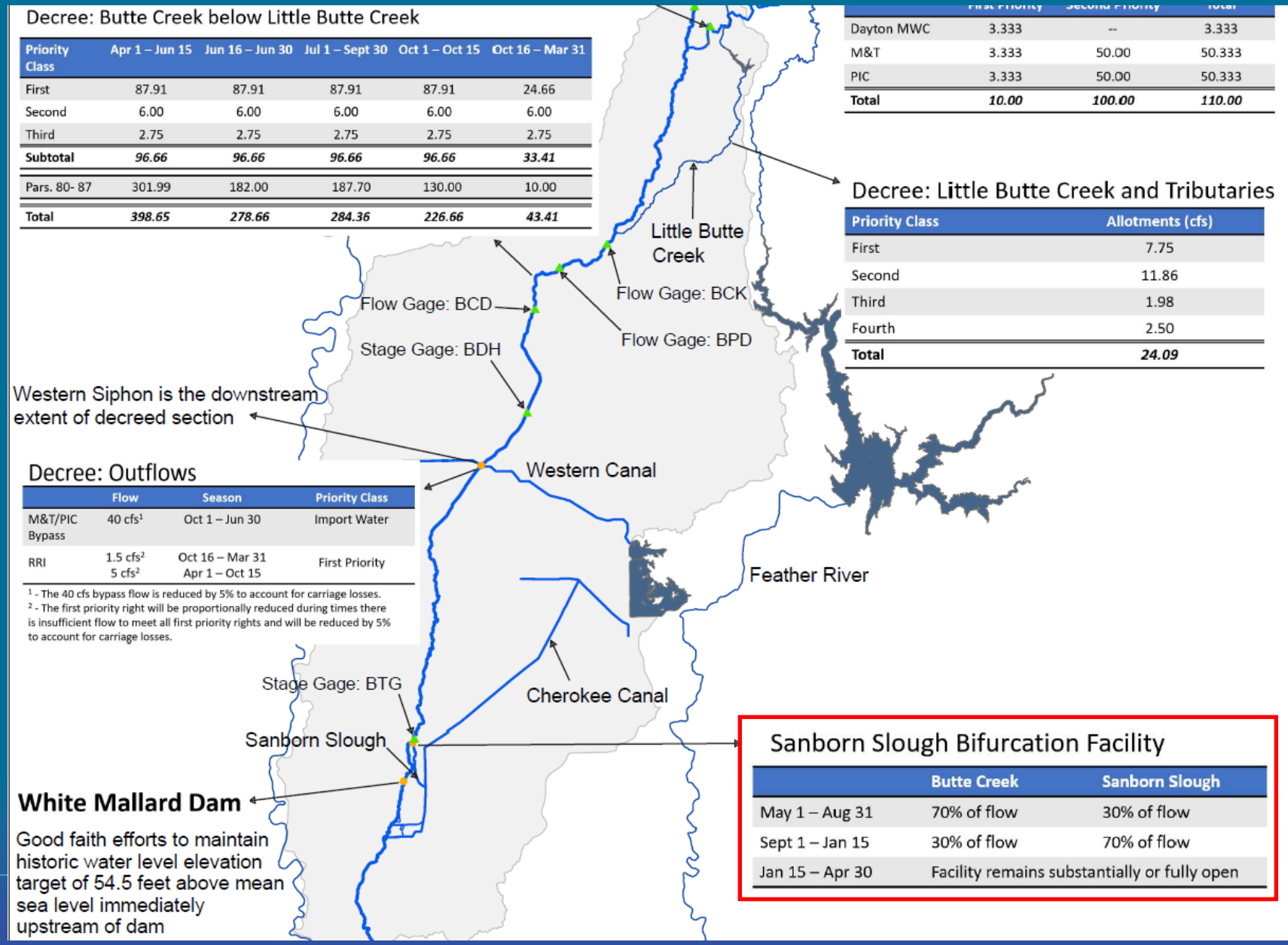
Floodplains Reimagined
Advisory Committee Meeting
August 11, 2023
Virtual

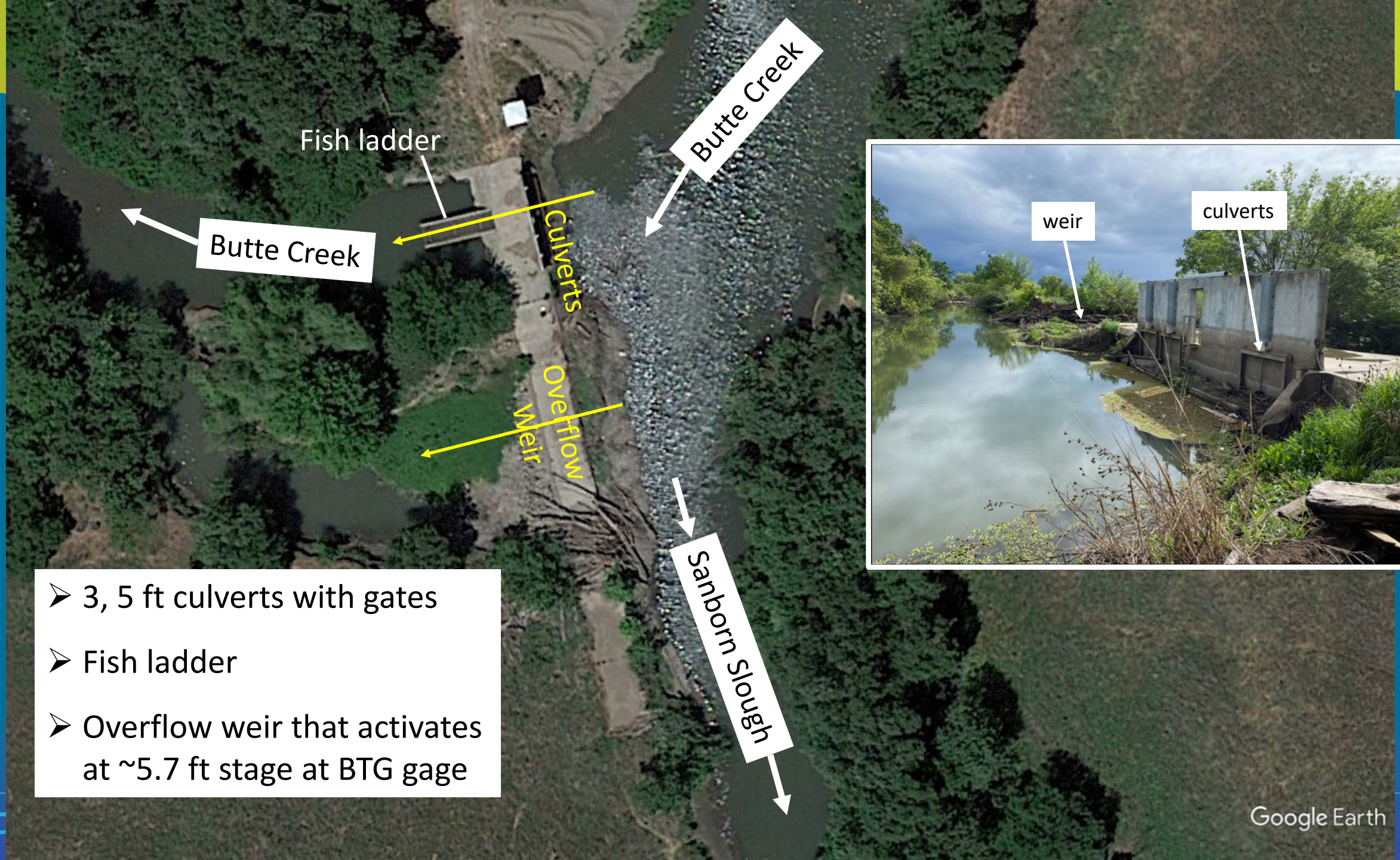


Sanborn Slough Bifurcation Facility

- Controls the flow split between Butte Creek and Sanborn Slough at the top of Butte Sink
- Operated (RD1004 and Wild Goose Club) to maintain different flow splits in different seasons:
  - Fall: 70% down Sanborn Slough
  - Winter: substantially or fully open
  - Summer: 70% down Butte Creek
- Important structure in hydrodynamic model

Lack of measurements to document actual flow splits

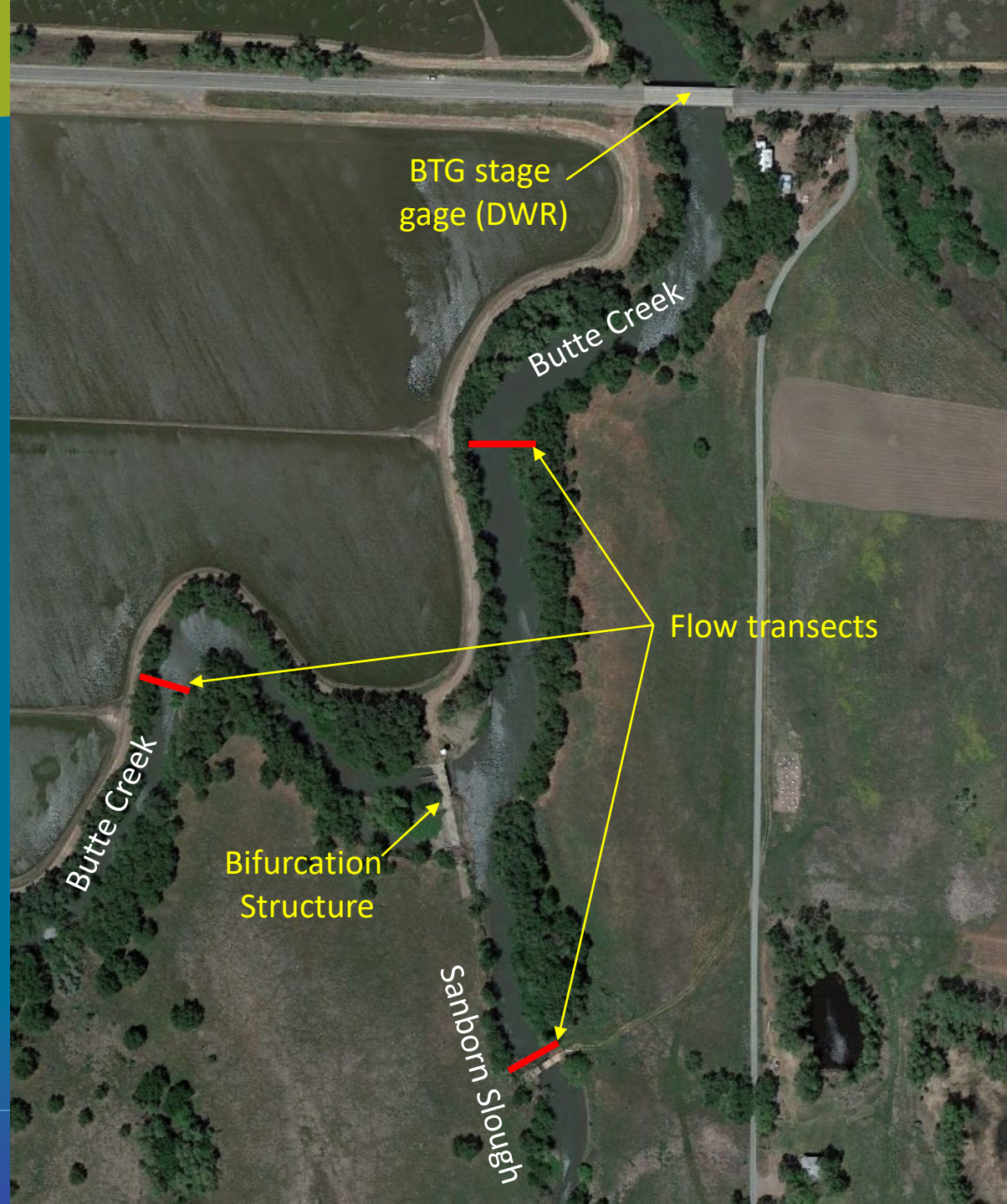




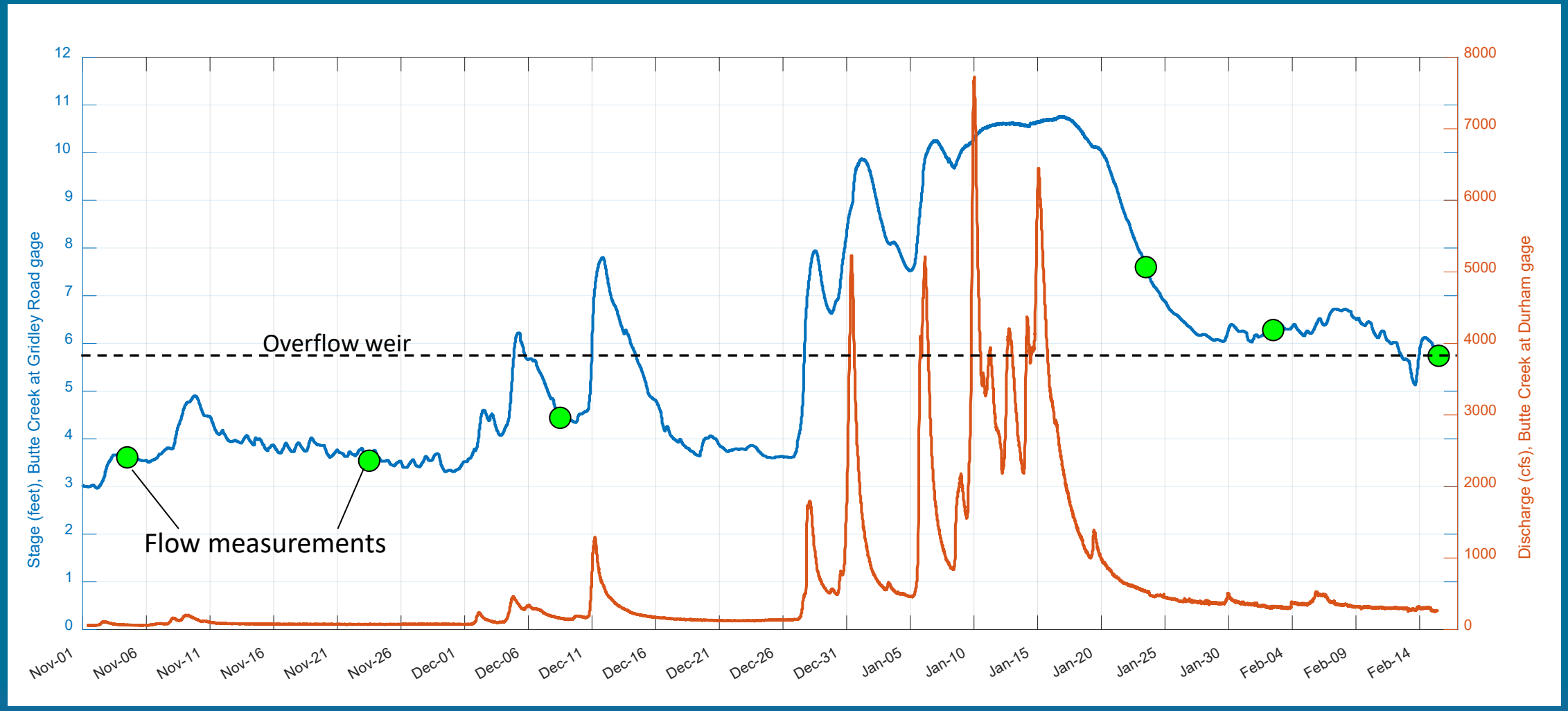
- 3, 5 ft culverts with gates
- Fish ladder
- Overflow weir that activates at ~5.7 ft stage at BTG gage

Flow Measurements

- RDI River Pro ADCP with RTK-GPS
- Pressure transducers on Sanborn Slough and Butte Creek downstream from the Bifurcation Structure (BTG gage upstream on Butte Creek); recording depth every 15 minutes
- Water-surface elevation measurements with RTK-GPS to convert to NAVD88
- 6 sets of measurements (all 3 transects) from November 2022 through February 2023



Flow Measurement Times



Measured Flow Values

Butte Cr upstream

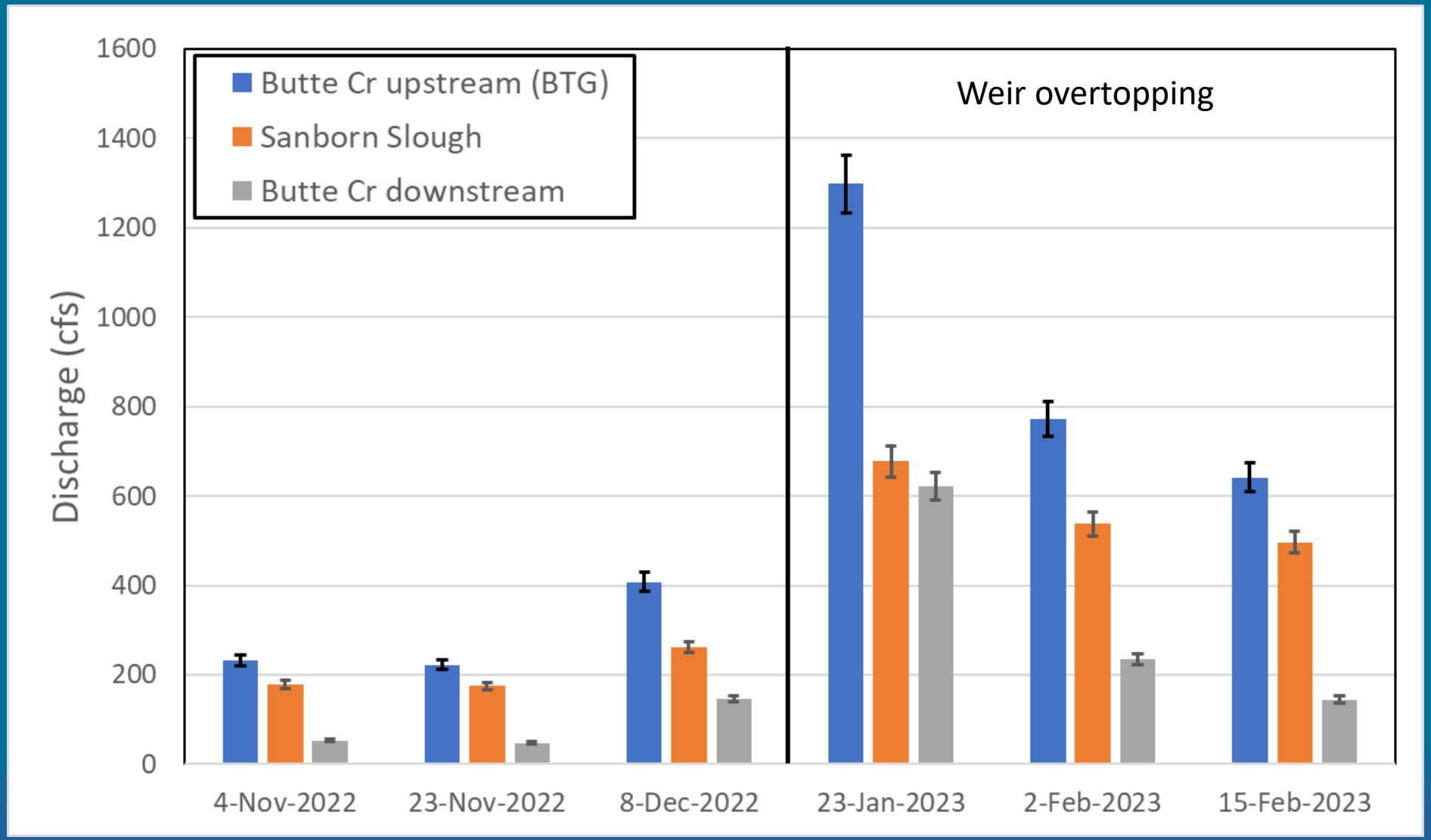
220 – 1,300 cfs
3.9 ft stage range

Sanborn Slough

180 – 680 cfs
2.8 ft stage range

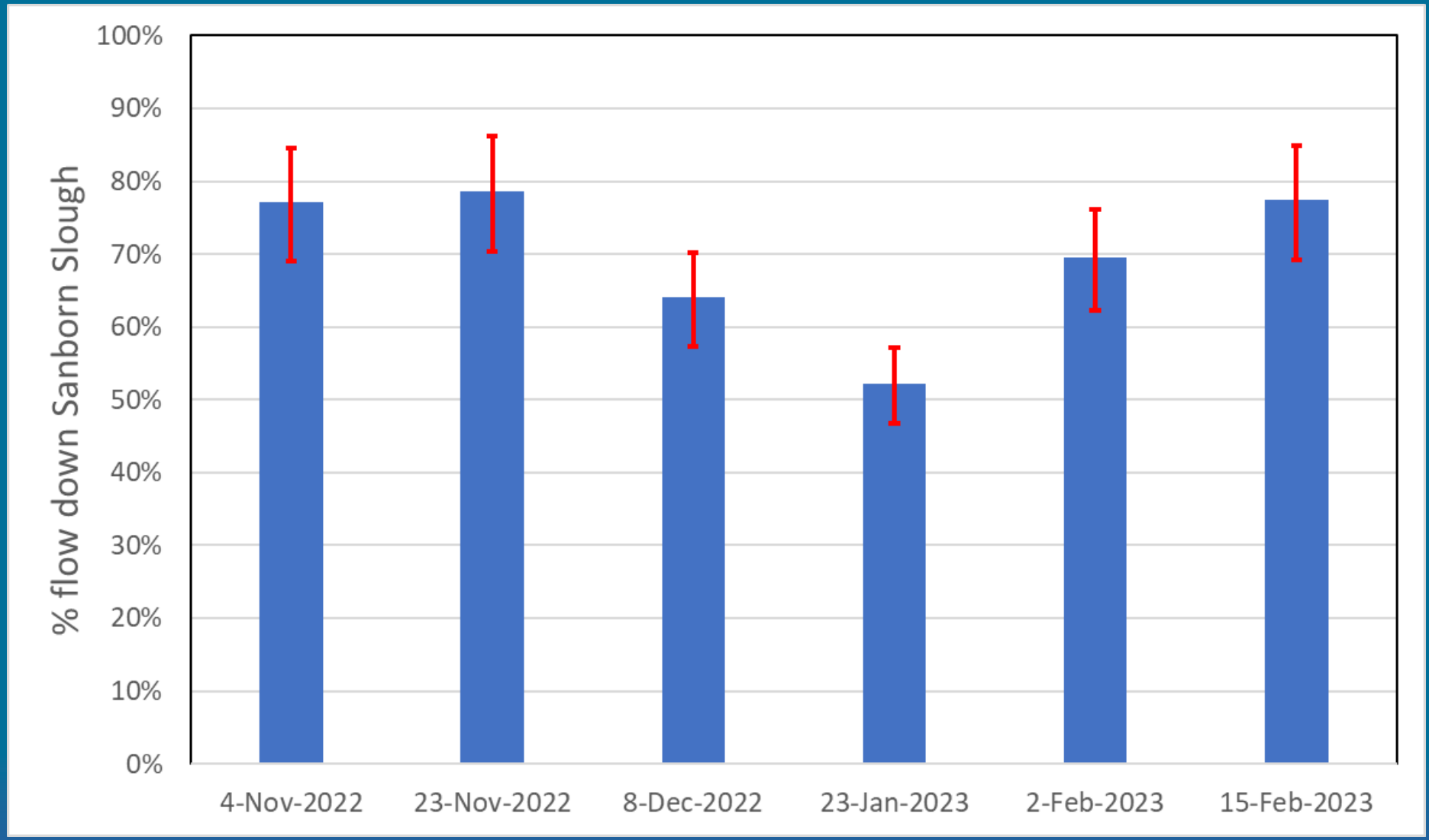
Butte Cr downstream

50 – 620 cfs
5.6 ft stage range



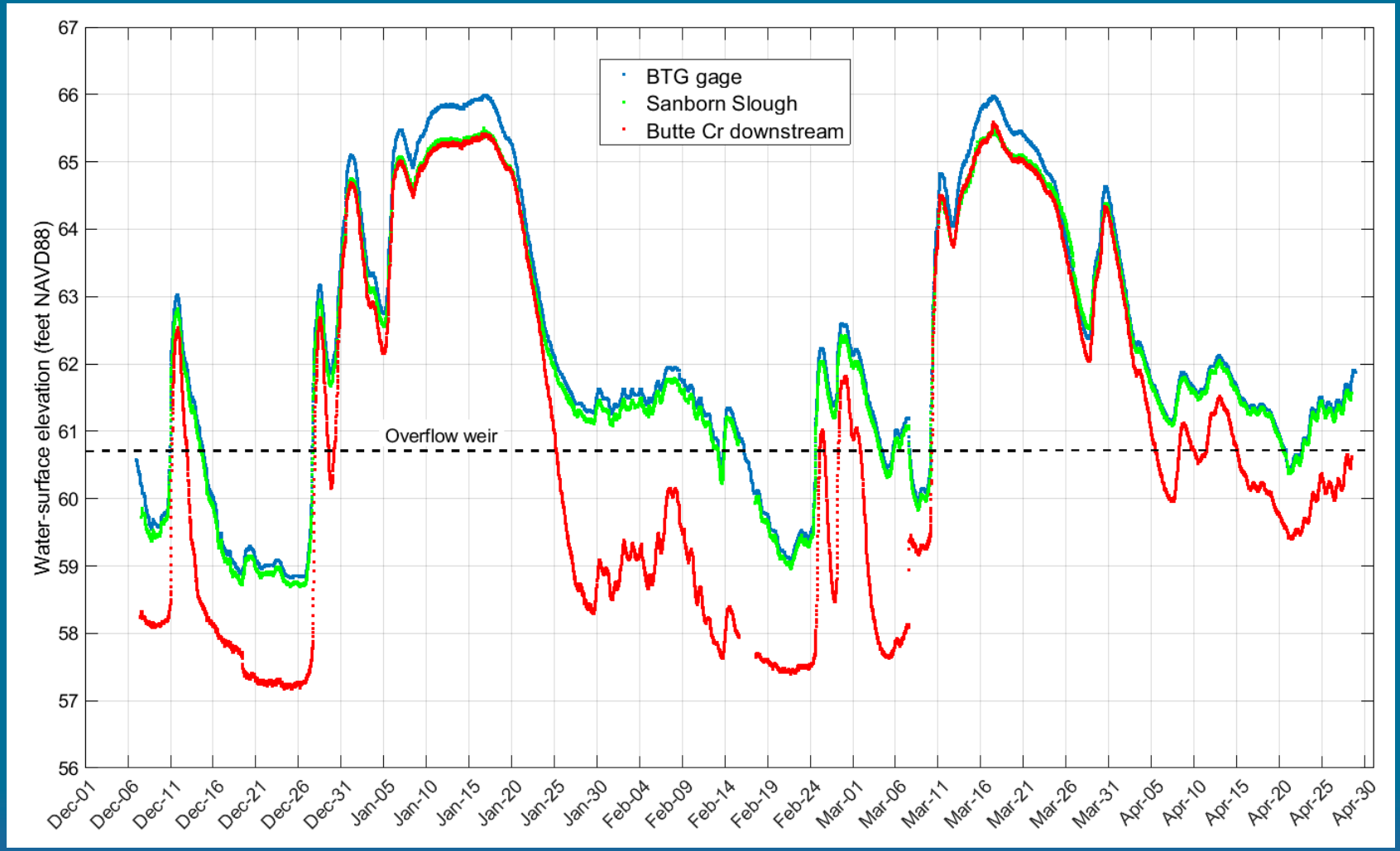
Measured Flow Splits

- Flow split about 70-80% Sanborn prior to runoff events
- Flow split dipped to about 50% during runoff when overflow weir activated
- Flow split returned to about 70% after runoff



Water-Surface Elevations

- Sanborn tracks BTG closely, with elevation drop increasing at high stage
- Substantial head drop (2 – 3 feet) over the bifurcation structure at low stage



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Questions?

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