



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

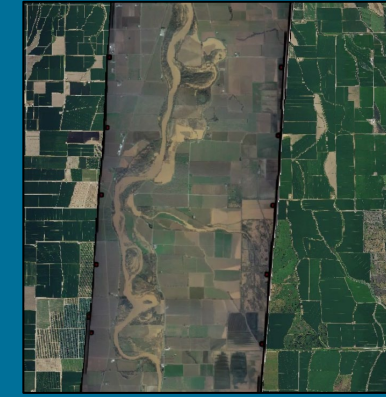
Task 2

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

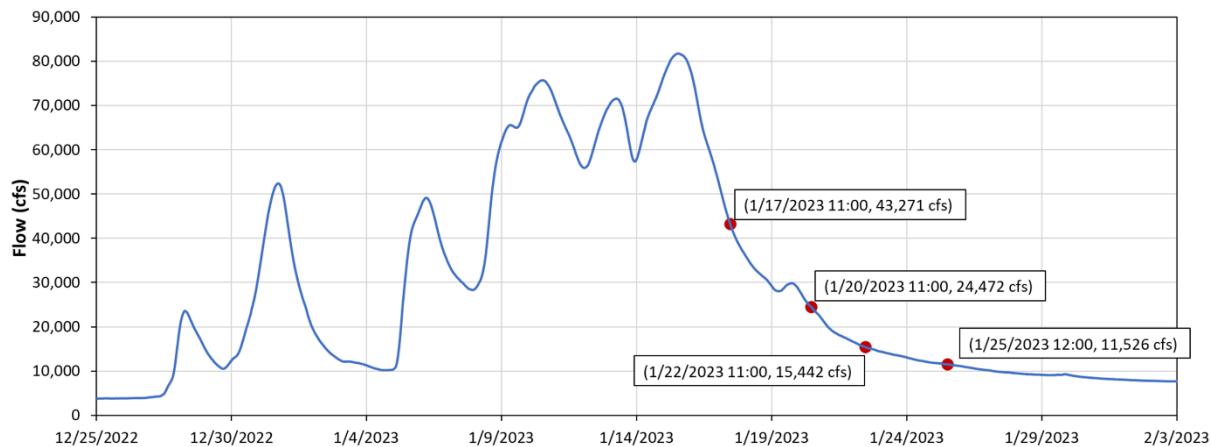
Aerial imagery collection and processing

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



Sacramento River at Ord Ferry, CDEC (ORD)



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)

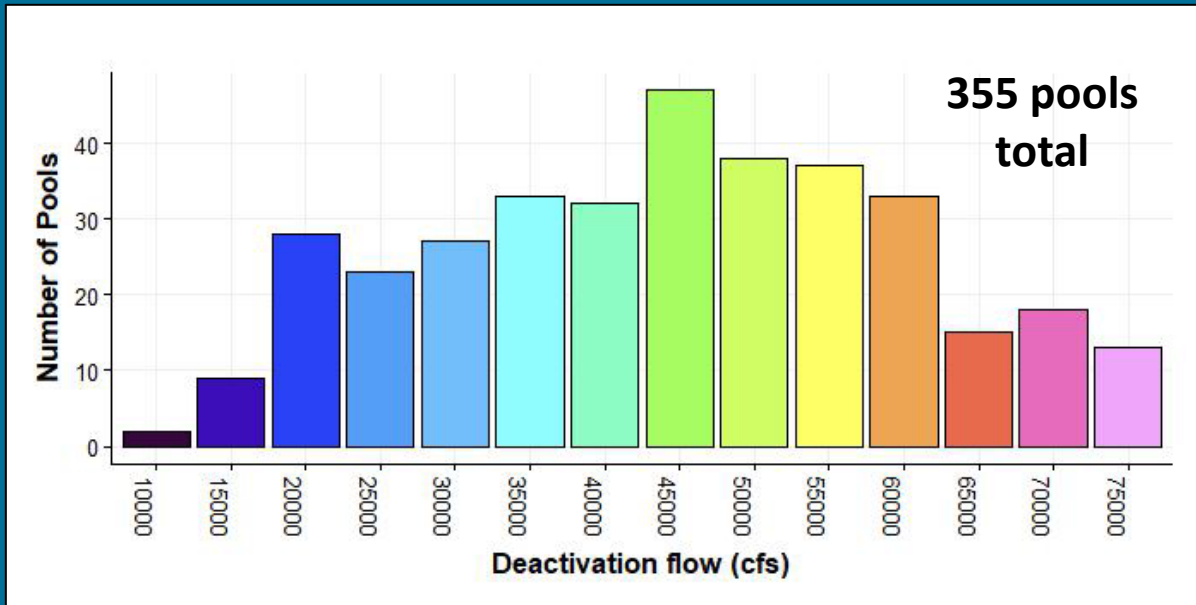


Site illustrated in further detail

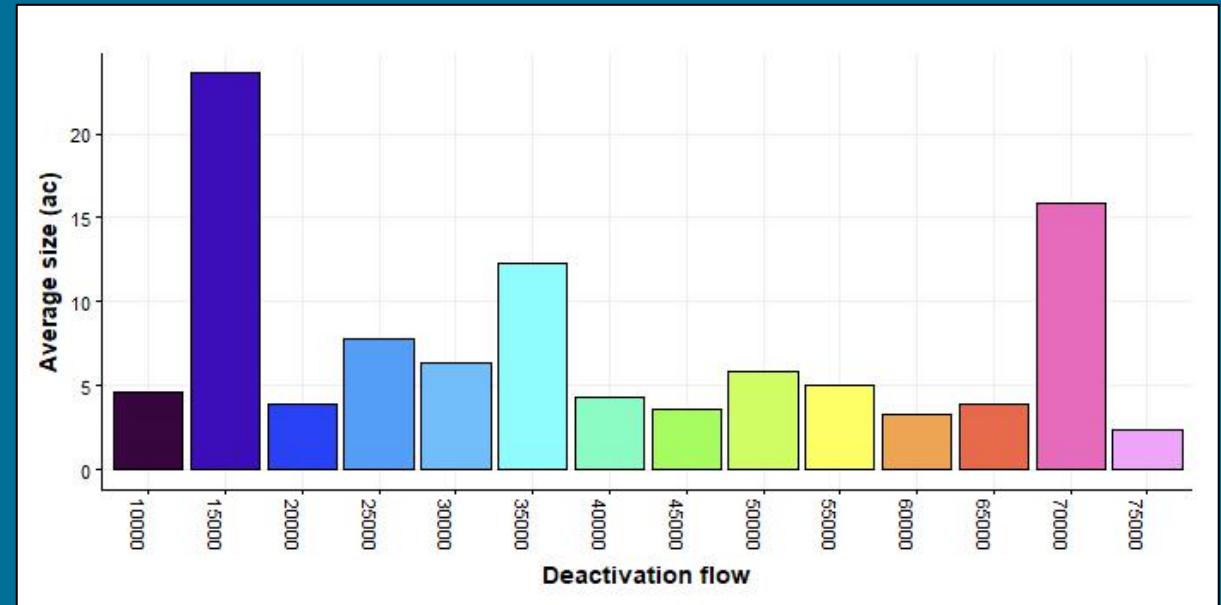


In-corridor pools statistics

Number of Pools



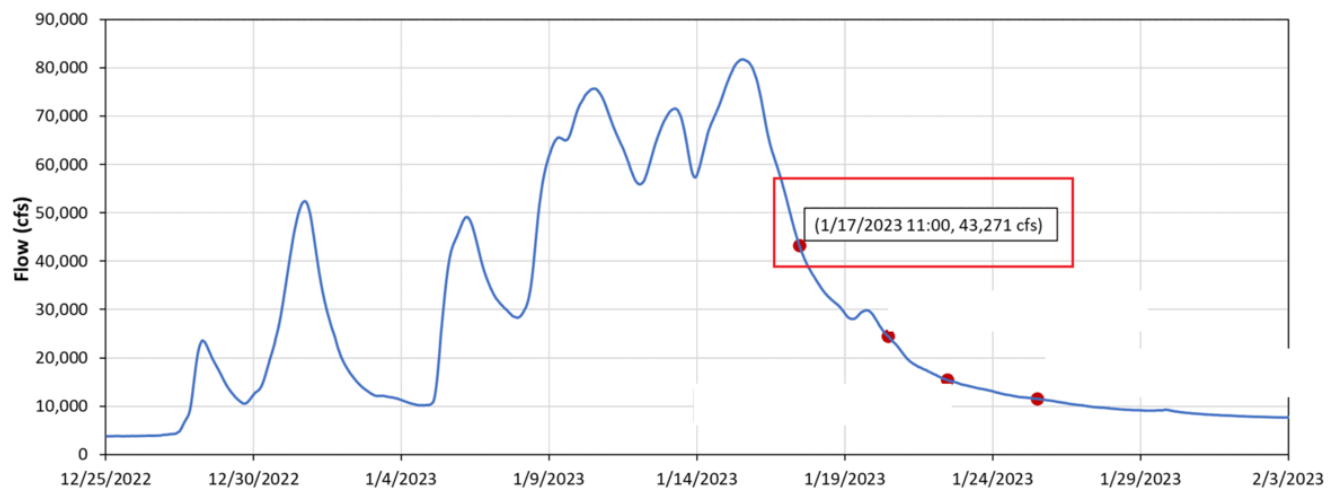
Average Size



Results at key floodplain locations

Willow Bend

Sacramento River at Ord Ferry, CDEC (ORD)



Results at key floodplain locations

Willow Bend

Colored areas, no outline = modeled channel inundation

Outlined colored areas = identified standing pool locations

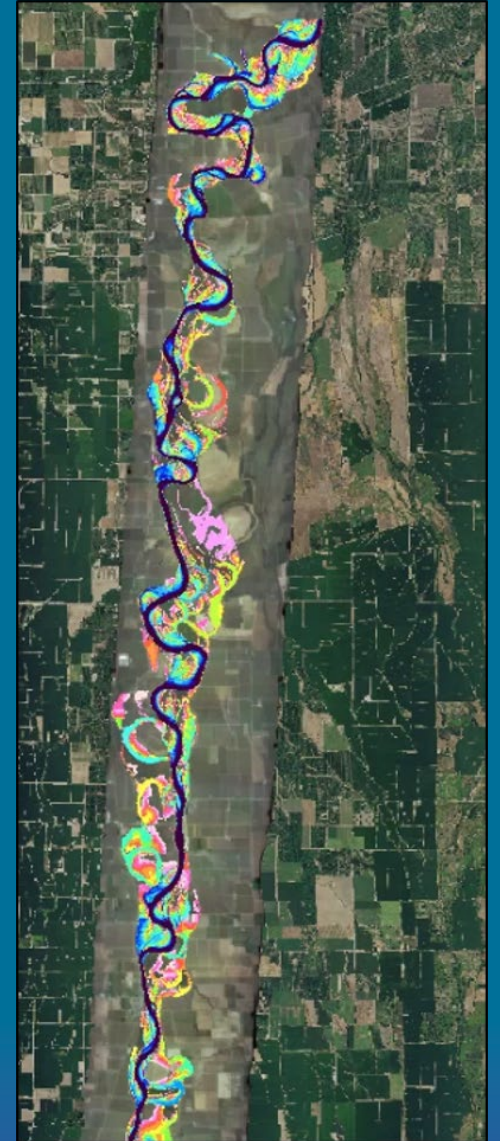
Large ponds disconnect from the main channel at 35,000 and 15,000 cfs



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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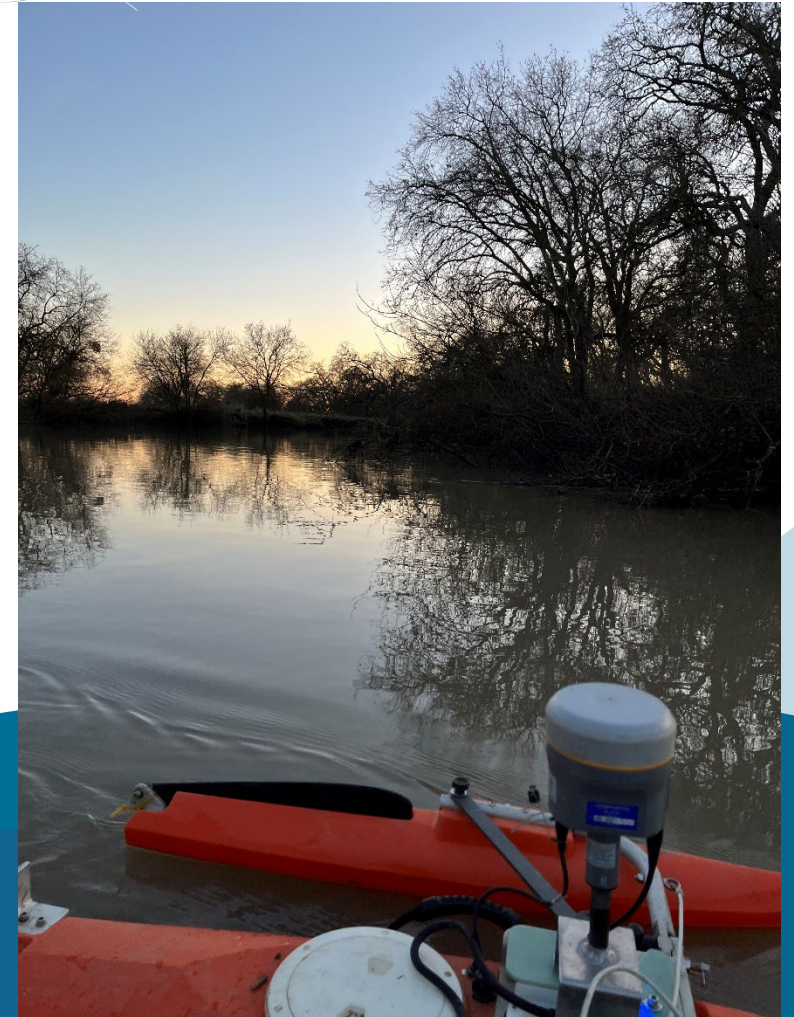
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Butte Creek Flow Measurements

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

Decree: Butte Creek below Little Butte Creek

Priority Class	Apr 1 – Jun 15	Jun 16 – Jun 30	Jul 1 – Sept 30	Oct 1 – Oct 15	Oct 16 – Mar 31
First	87.91	87.91	87.91	87.91	24.66
Second	6.00	6.00	6.00	6.00	6.00
Third	2.75	2.75	2.75	2.75	2.75
Subtotal	96.66	96.66	96.66	96.66	33.41
Pars. 80-87	301.99	182.00	187.70	130.00	10.00
Total	398.65	278.66	284.36	226.66	43.41

	First Priority	Second Priority	Total
Dayton MWC	3.333	--	3.333
M&T	3.333	50.00	50.333
PIC	3.333	50.00	50.333
Total	10.00	100.00	110.00

Decree: Little Butte Creek and Tributaries

Priority Class	Allotments (cfs)
First	7.75
Second	11.86
Third	1.98
Fourth	2.50
Total	24.09

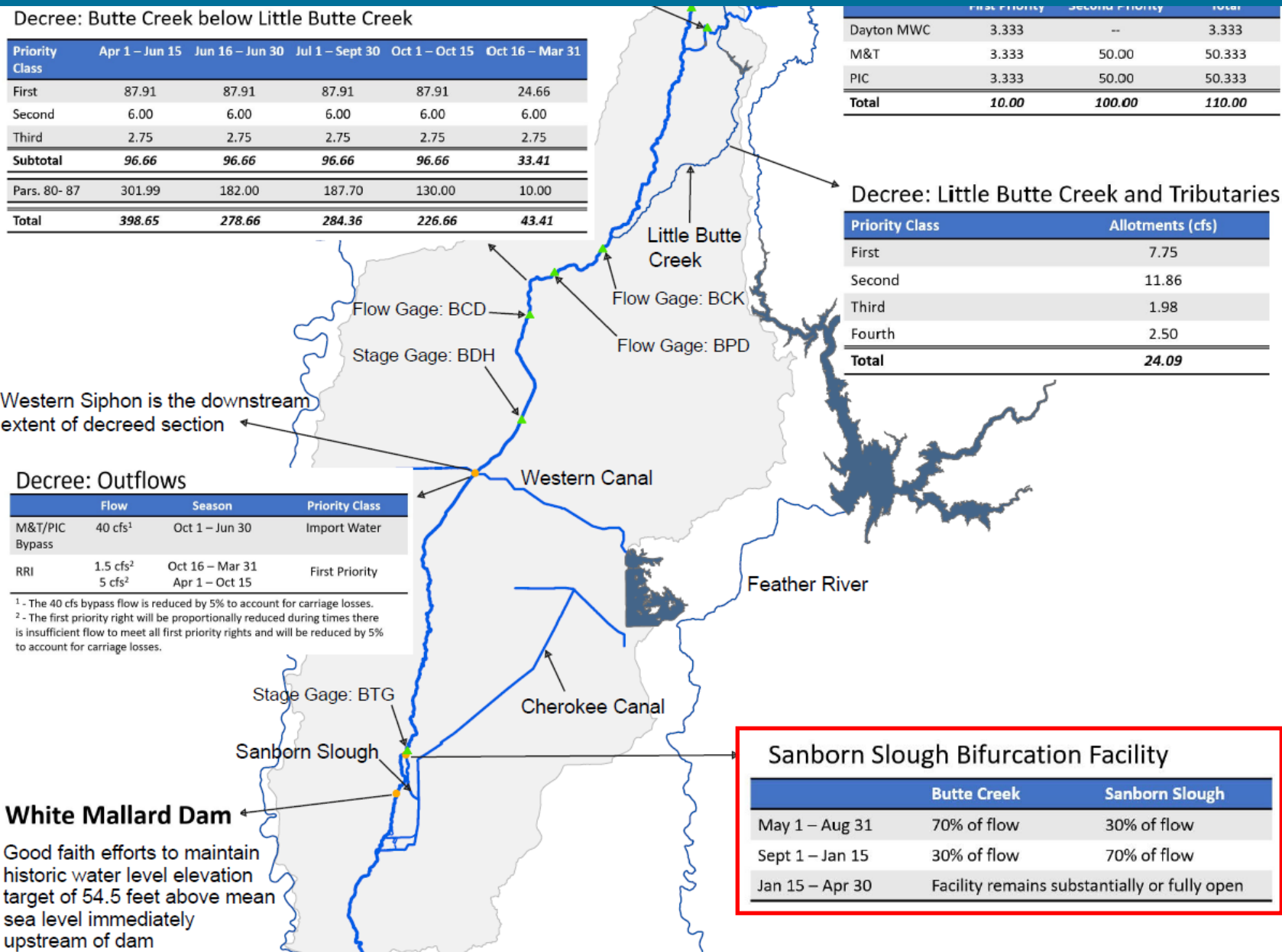
Decree: Outflows

	Flow	Season	Priority Class
M&T/PIC Bypass	40 cfs ¹	Oct 1 – Jun 30	Import Water
RRI	1.5 cfs ²	Oct 16 – Mar 31	First Priority
	5 cfs ²	Apr 1 – Oct 15	

¹ - The 40 cfs bypass flow is reduced by 5% to account for carriage losses.
² - The first priority right will be proportionally reduced during times there is insufficient flow to meet all first priority rights and will be reduced by 5% to account for carriage losses.

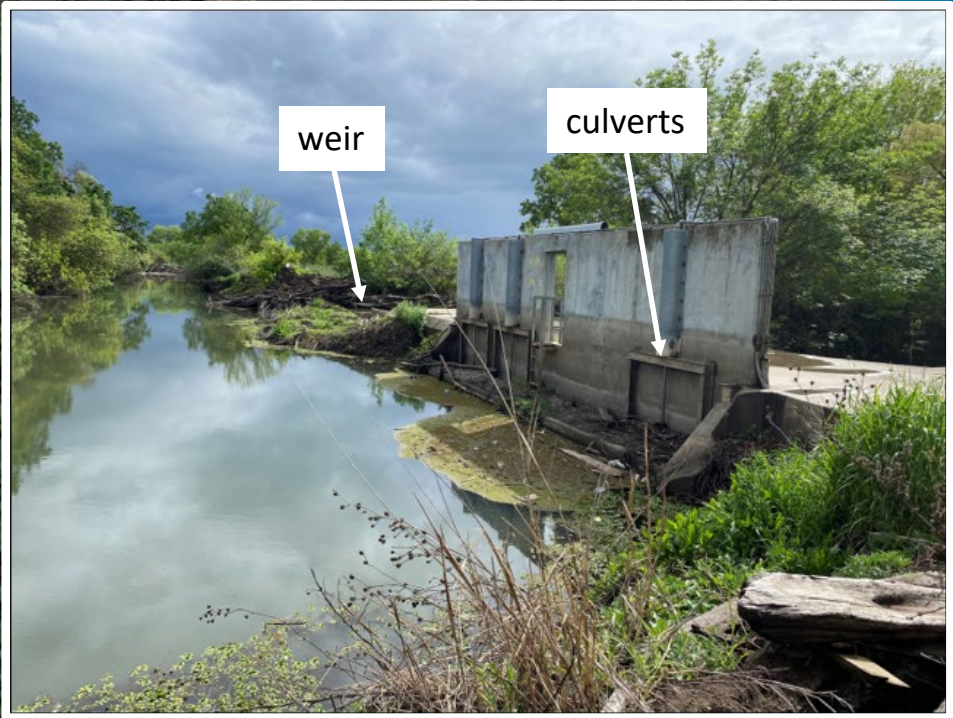
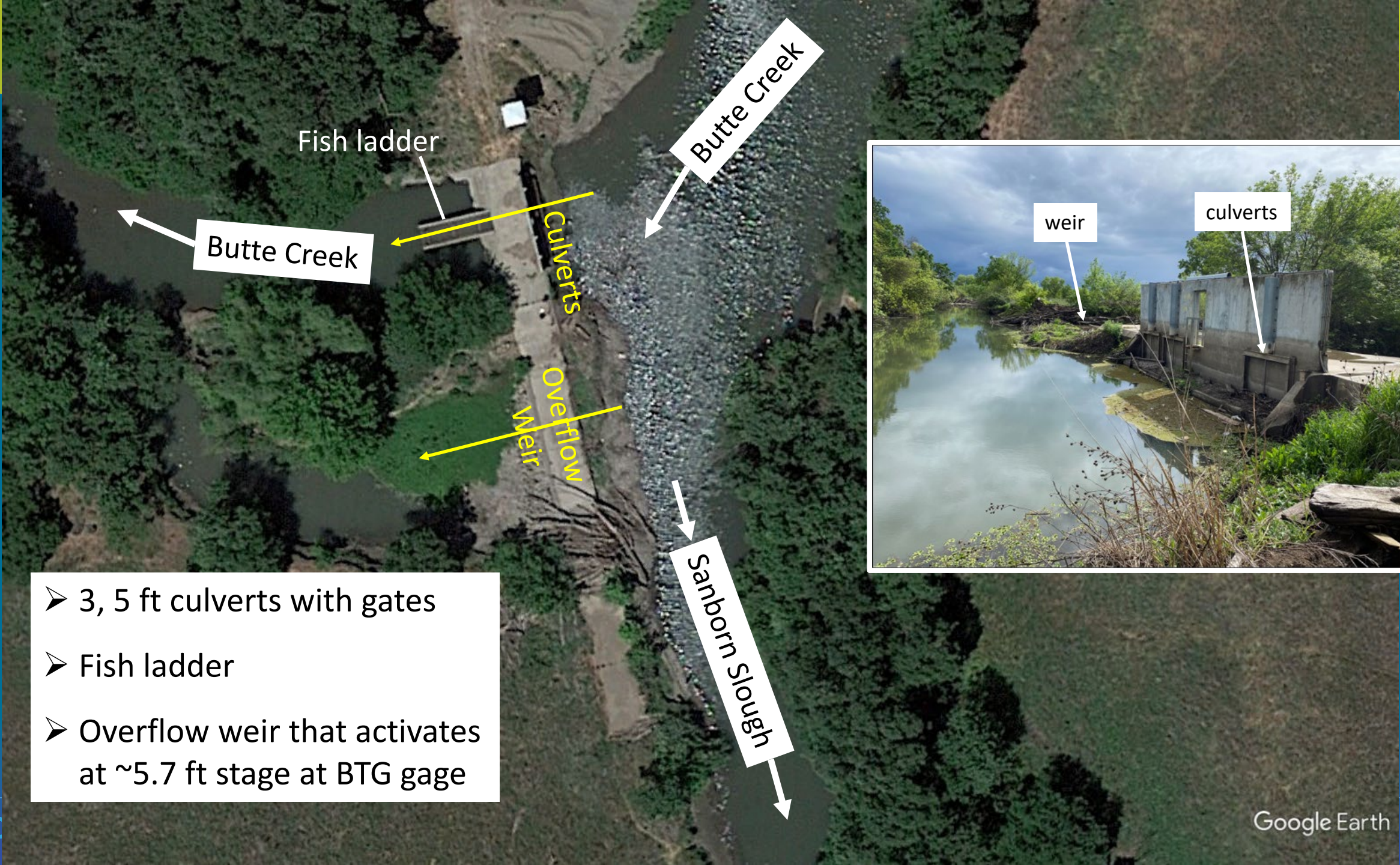
White Mallard Dam

Good faith efforts to maintain historic water level elevation target of 54.5 feet above mean sea level immediately upstream of dam



	Butte Creek	Sanborn Slough
May 1 – Aug 31	70% of flow	30% of flow
Sept 1 – Jan 15	30% of flow	70% of flow
Jan 15 – Apr 30	Facility remains substantially or fully open	

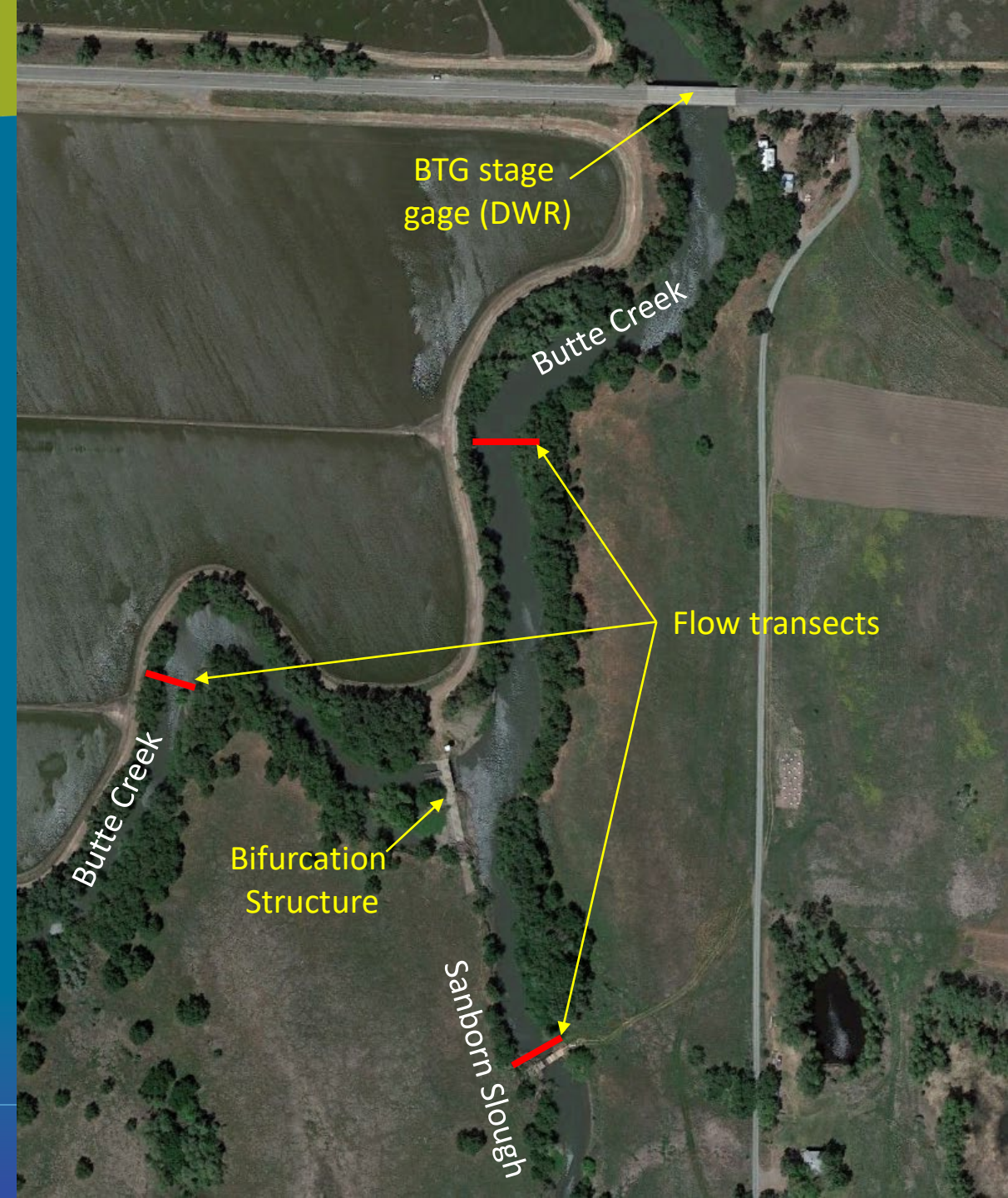
Lack of measurements to document actual flow splits



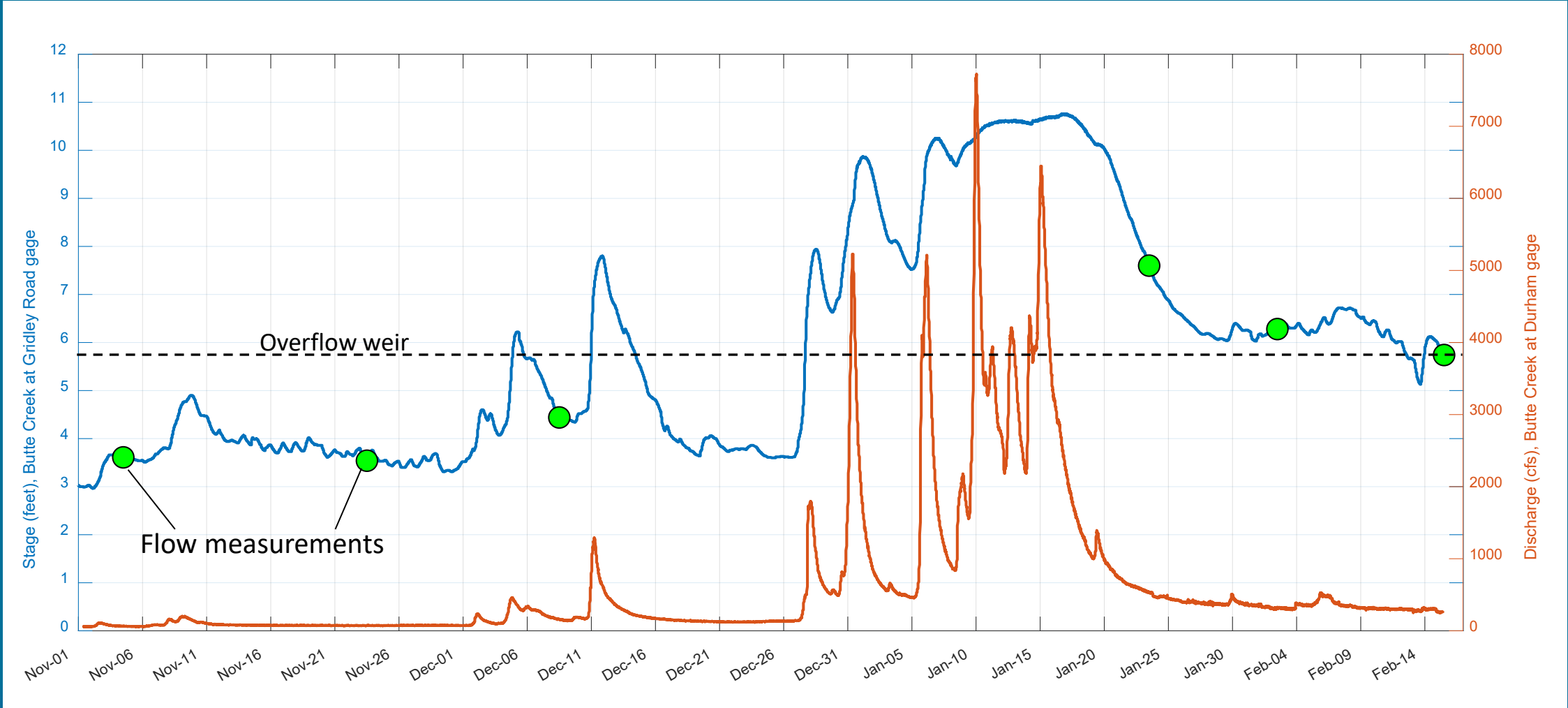
- 3, 5 ft culverts with gates
- Fish ladder
- Overflow weir that activates at ~5.7 ft stage at BTG gage

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

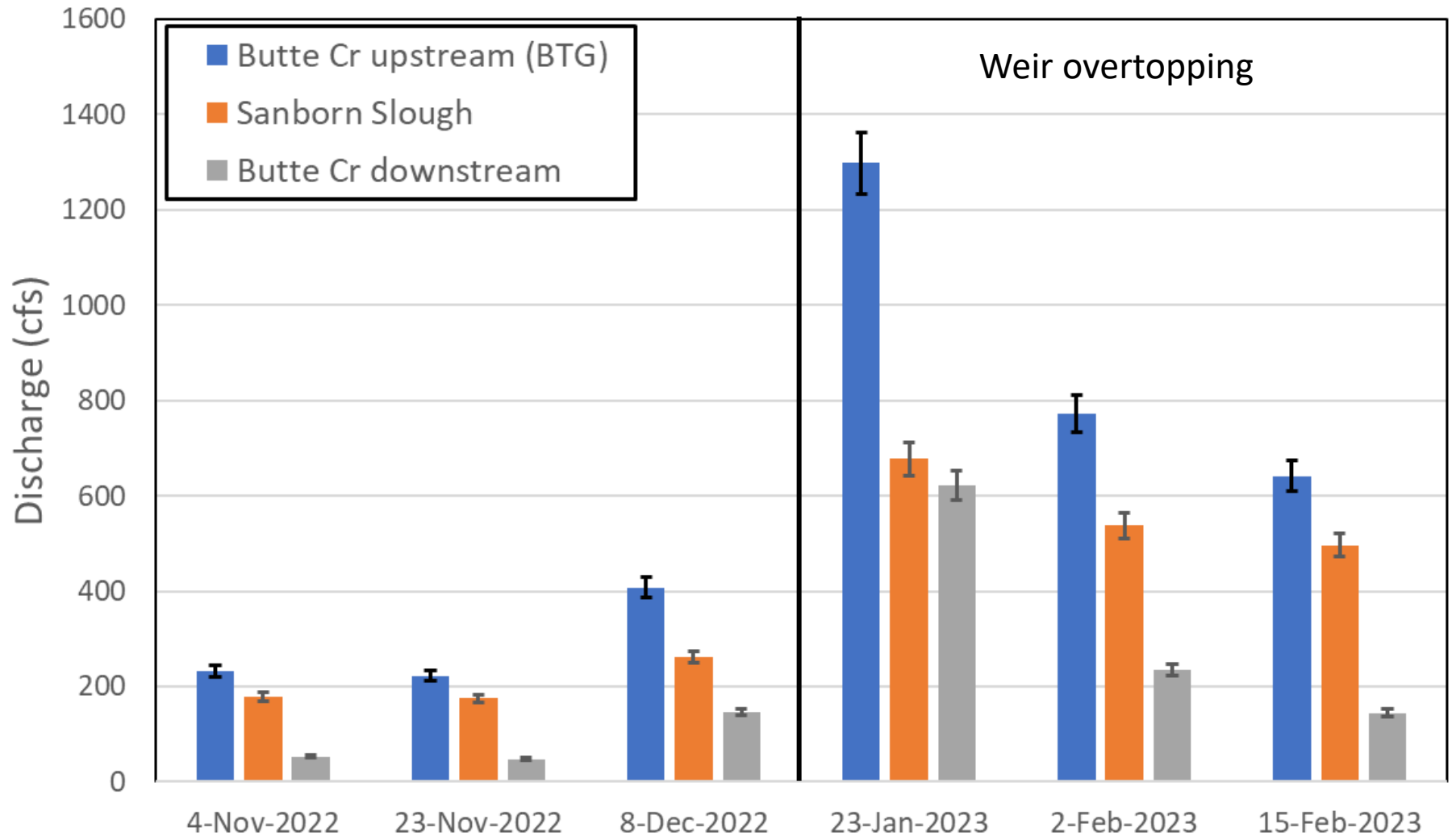
220 – 1,300 cfs
3.9 ft stage range

Sanborn Slough

180 – 680 cfs
2.8 ft stage range

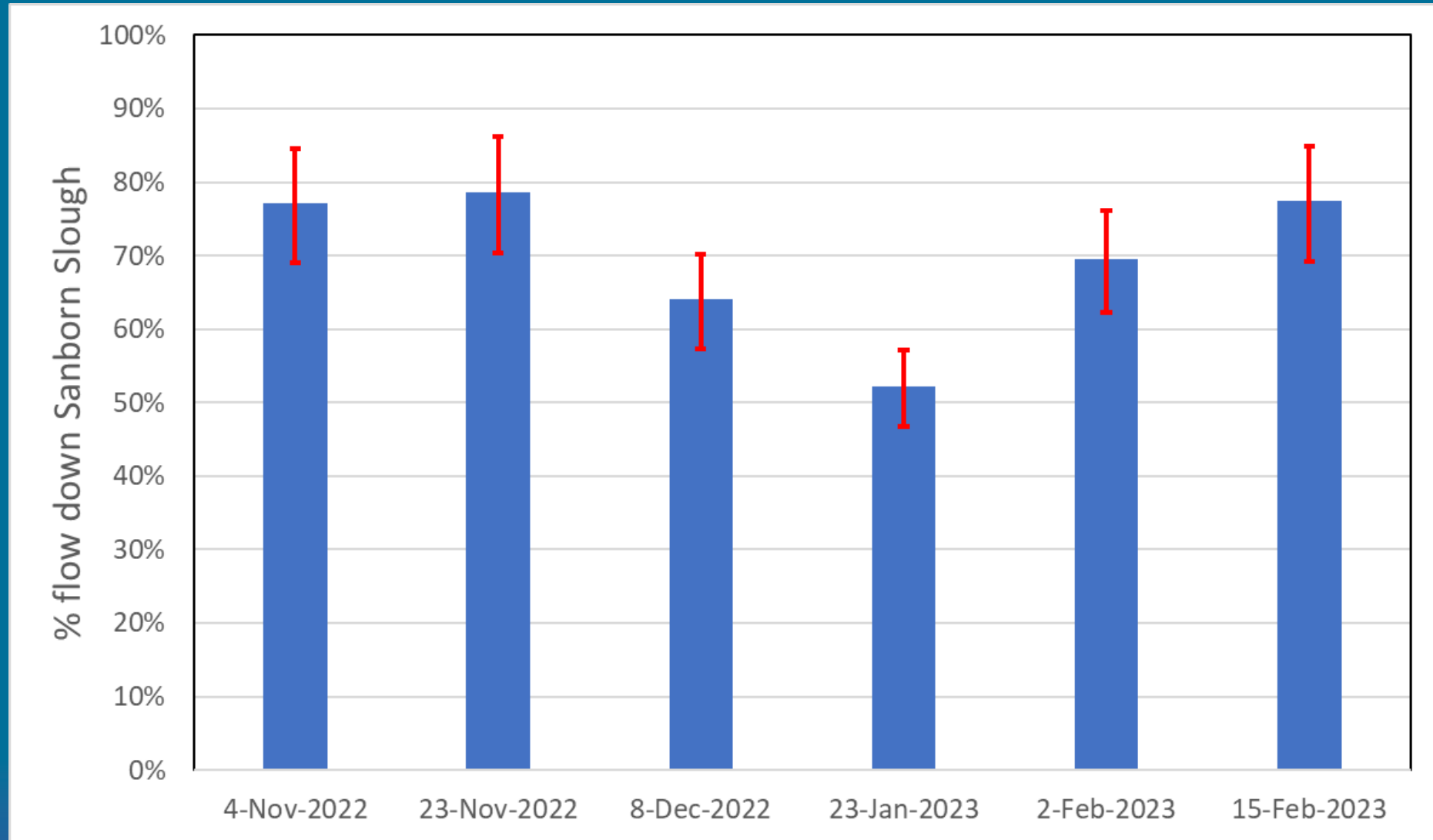
Butte Cr downstream

50 – 620 cfs
5.6 ft stage range



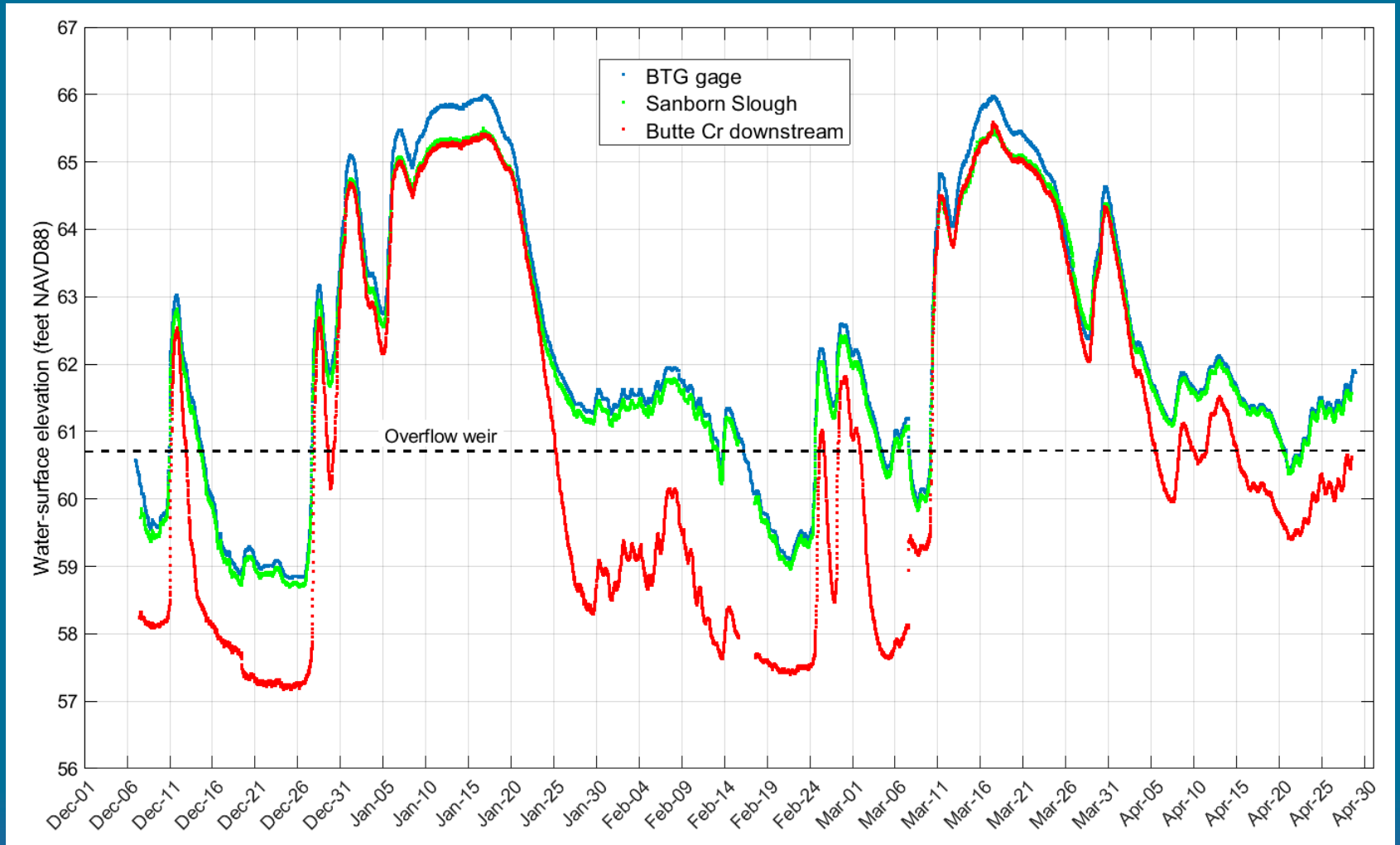
Measured Flow Splits

- 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



Questions?

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