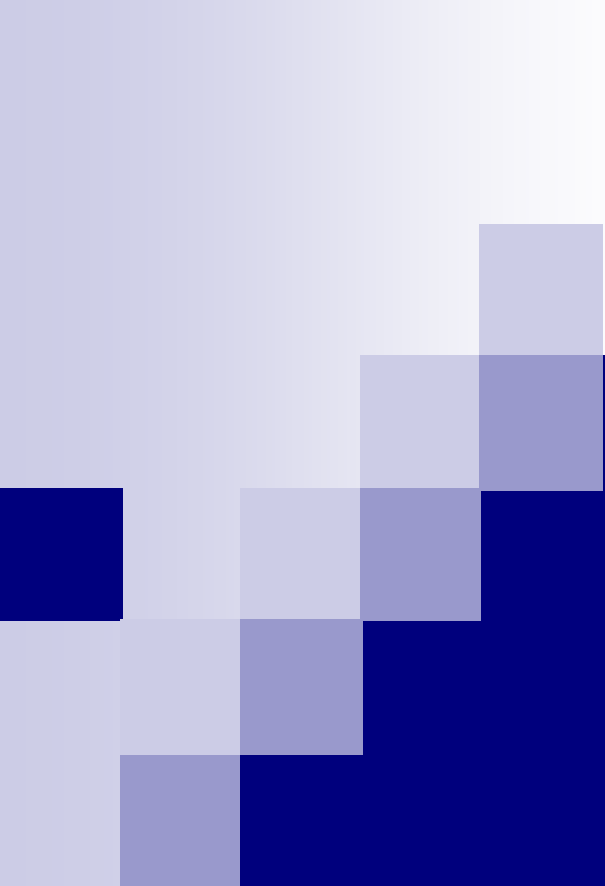




Flow, Fish, and Floodplains

May 8, 2024



Overview

- Multiple scientific studies draw **correlations** between flow and fishery benefits
- What **causes** the relationship?
- Floodplain reactivation projects

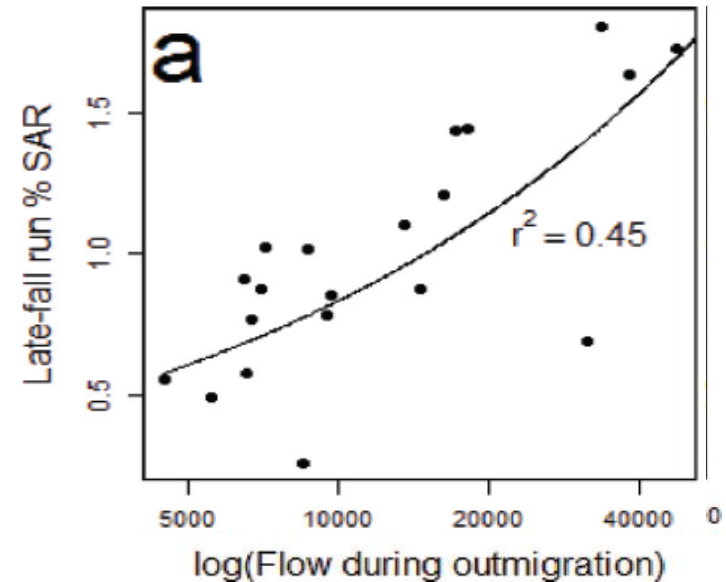
Flow-Salmon Survival

- Cyril Michel studies connect salmonid survival to Sacramento River flow
 - 2015 – Acoustic tag study (2007 – 2011)
 - 2019 – Decoupling outmigration from marine survival with smolt-to-adult survival
 - 2021 – Acoustic tag study (2013 – 2019)
 - Wilkins Slough threshold

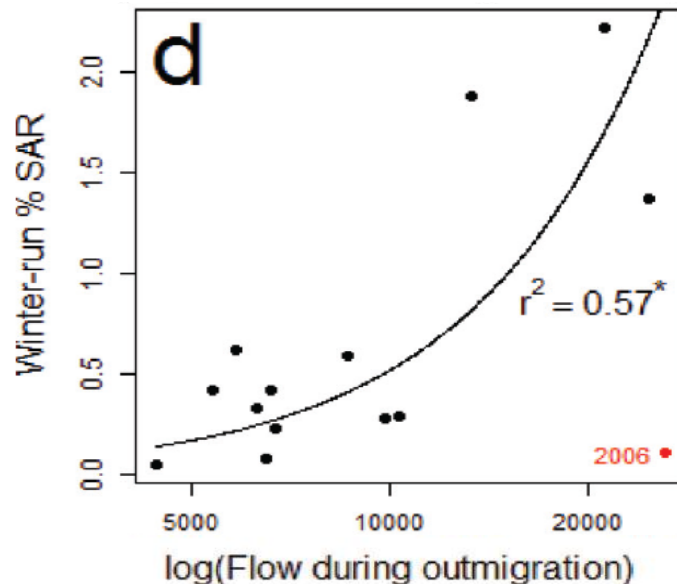
2019 Paper Findings

- Correlation between flow and smolt-to-adult survival (SAR)

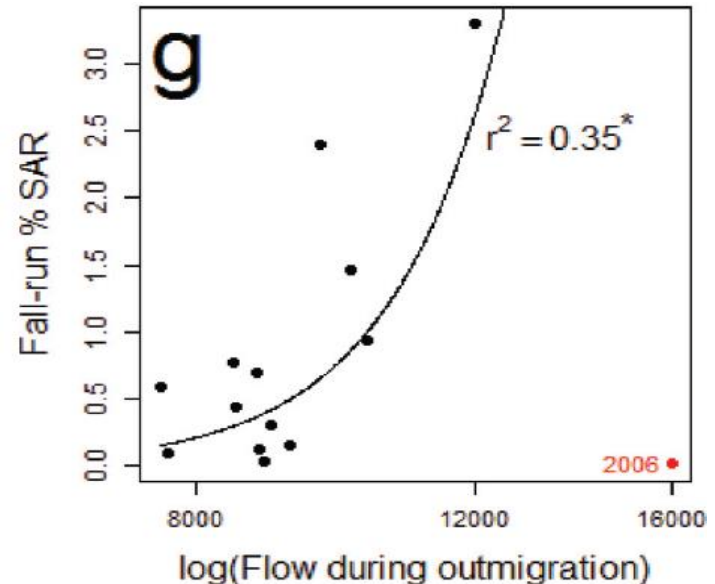
Late-fall run Chinook



Winter-run Chinook



Fall-run Chinook



Causation

- Larger Sacramento River flows spill over weirs to inundate areas in the Sutter and Yolo bypasses
- Benefits of water in the bypasses are well documented
- Is the correlation between survival and flow caused by benefits of flow in the bypasses?

Approach

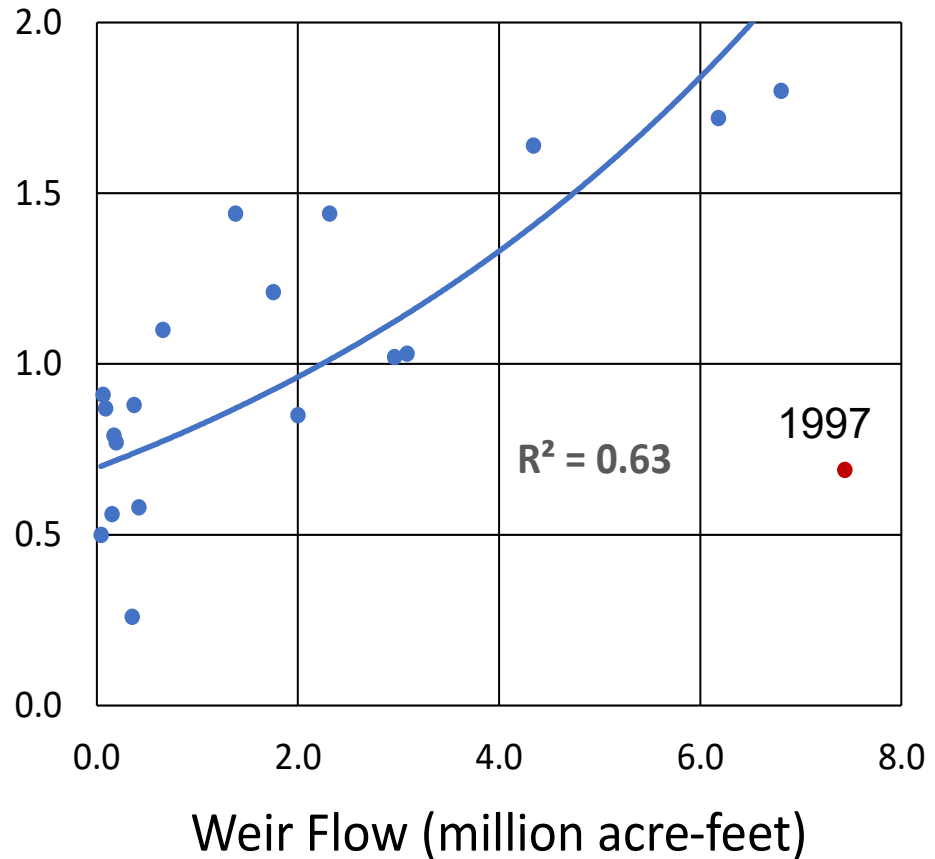
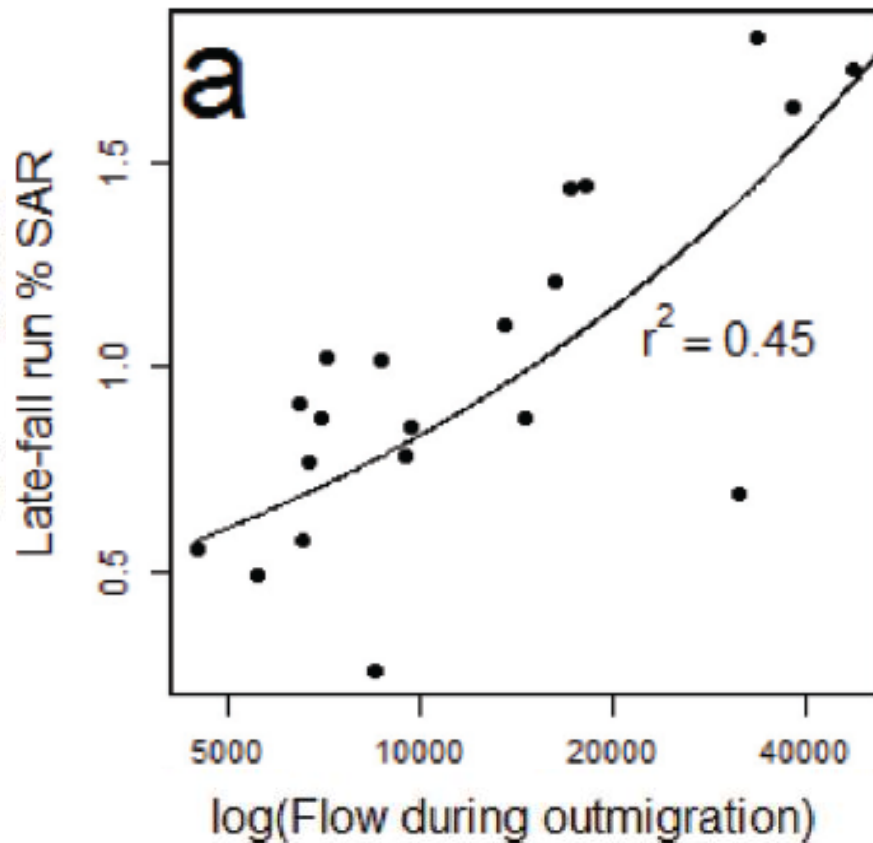
- Brood year SAR from Michel 2019
 - SAR based on released hatchery fish
 - Late-fall run: 1993 – 2012
 - Winter run and fall run: 1999 - 2012
- Daily weir spills at Moulton, Colusa, Tisdale, and Fremont weirs
- Cumulative weir spills for hatchery release months and following three months

Cumulative Weir Spill Periods

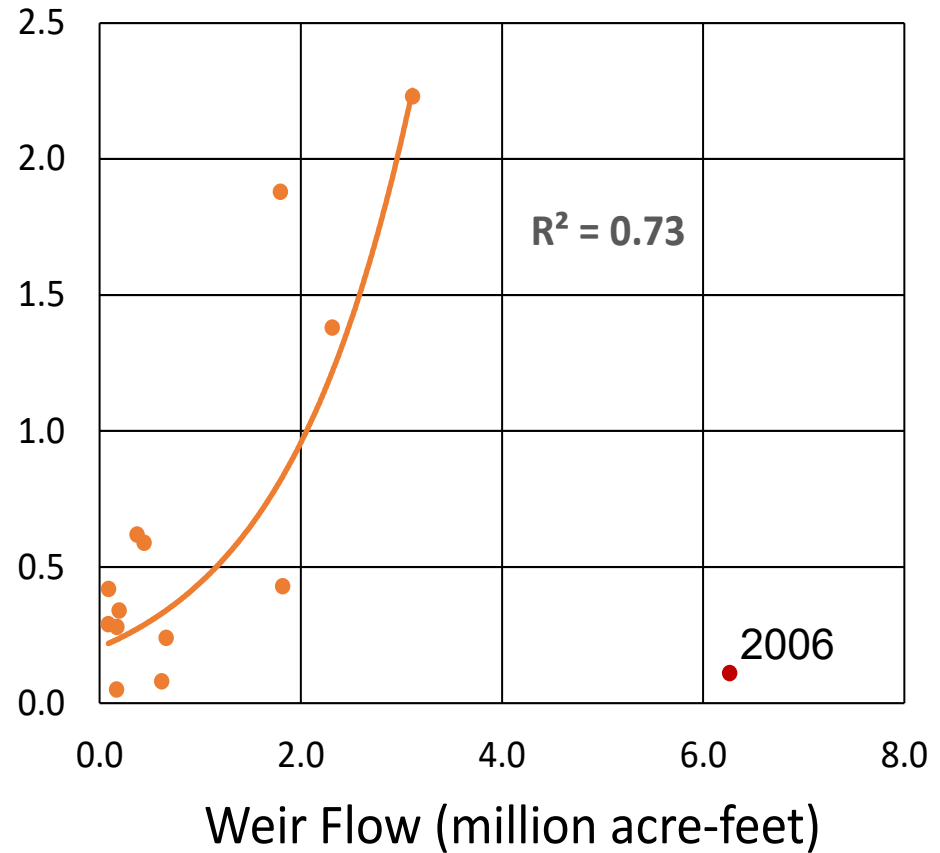
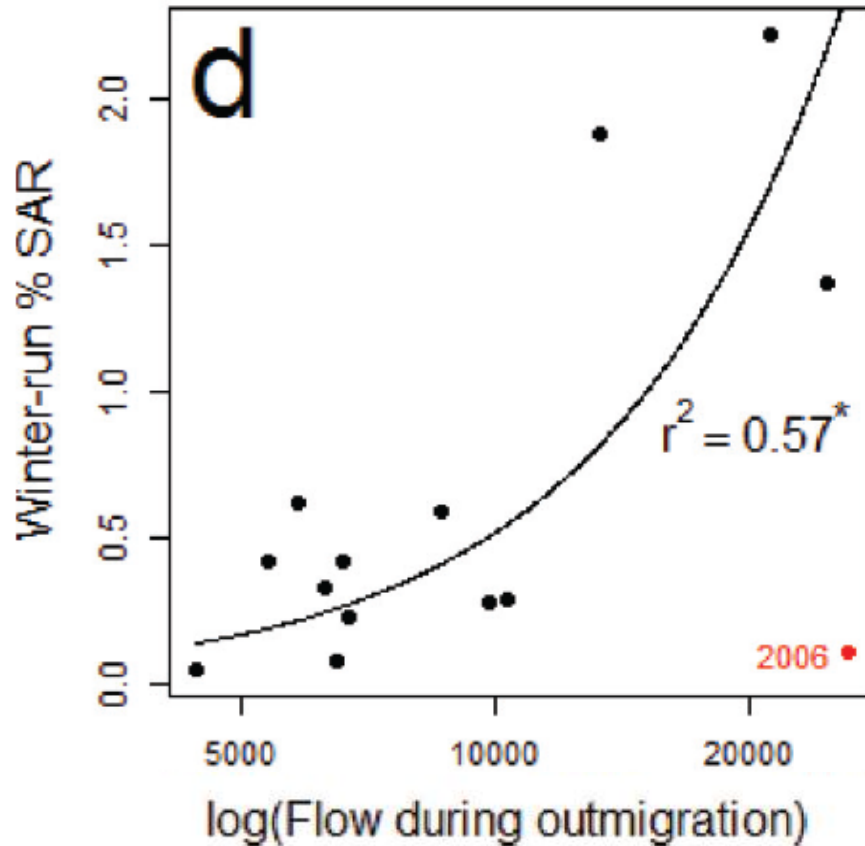
	Hatchery Release		Period for Weir Spills	
Run	Start	End	Start	End
Late-fall	December	January	December	April
Winter	December	March	December	June
Fall	March	April	March	July

- Total weir spills from start of hatchery release to three months after end of hatchery release

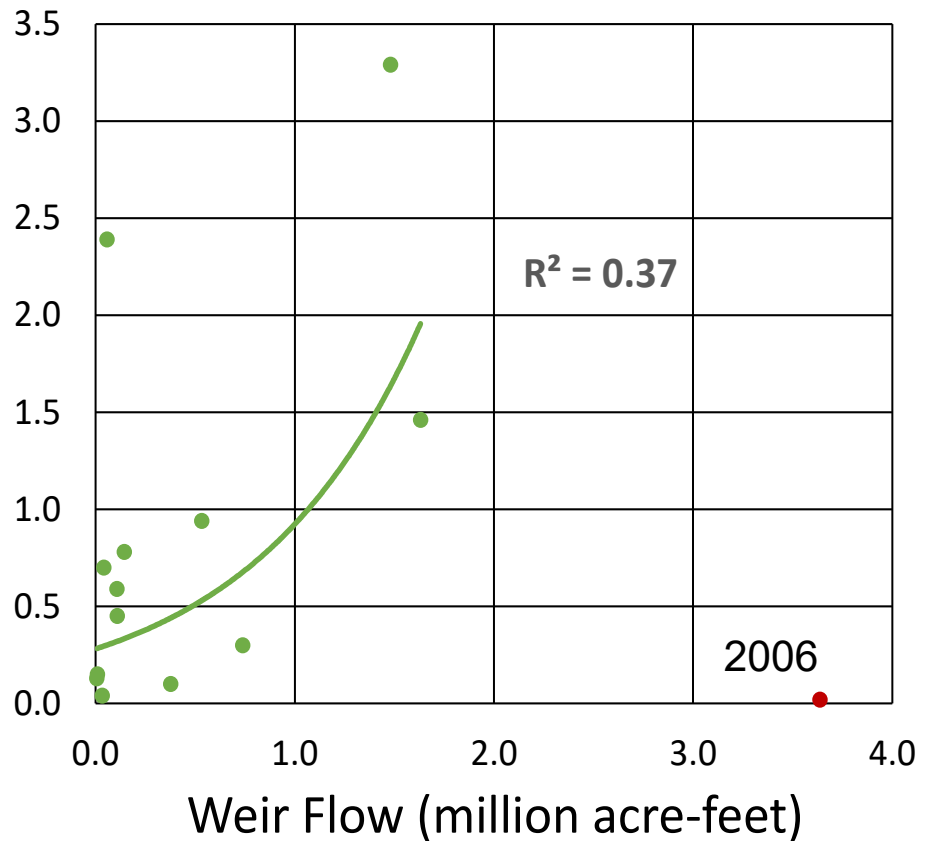
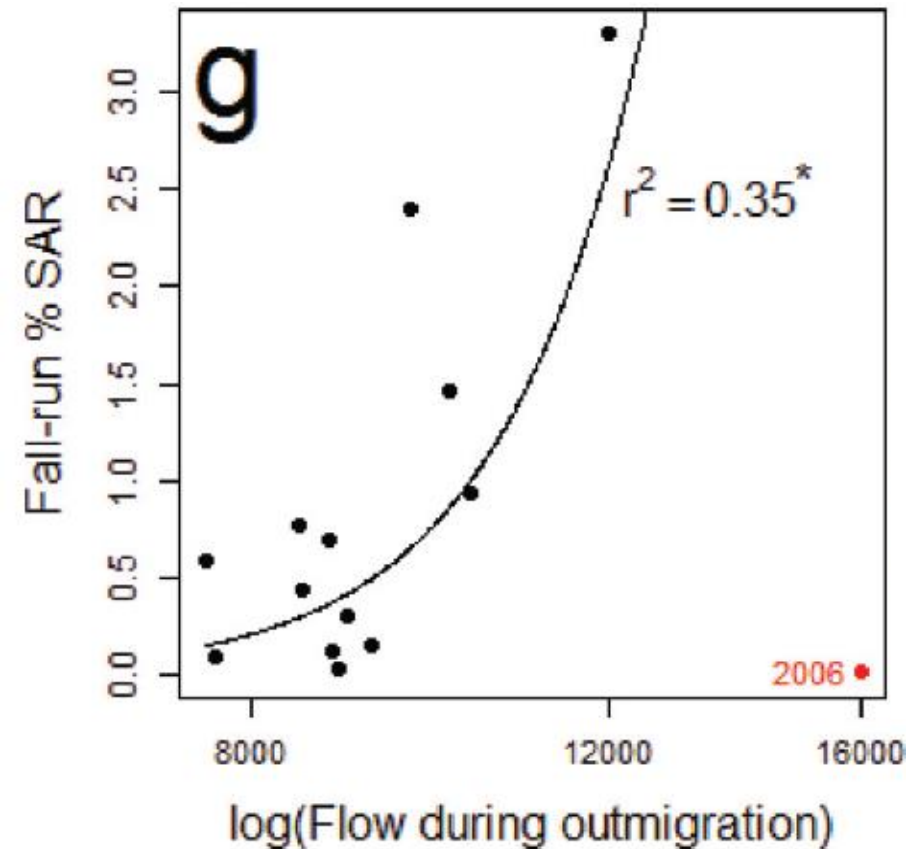
Late-fall Run Comparison



Winter Run Comparison



Fall Run Comparison





Floodplain Reactivation Projects

- Floodplain benefits
- Provide floodplain benefits more often
 - Tisdale Weir Rehabilitation and Fish Passage
 - Fremont Weir Big Notch
 - Fish Food

Floodplain Benefits



Fish Comparison

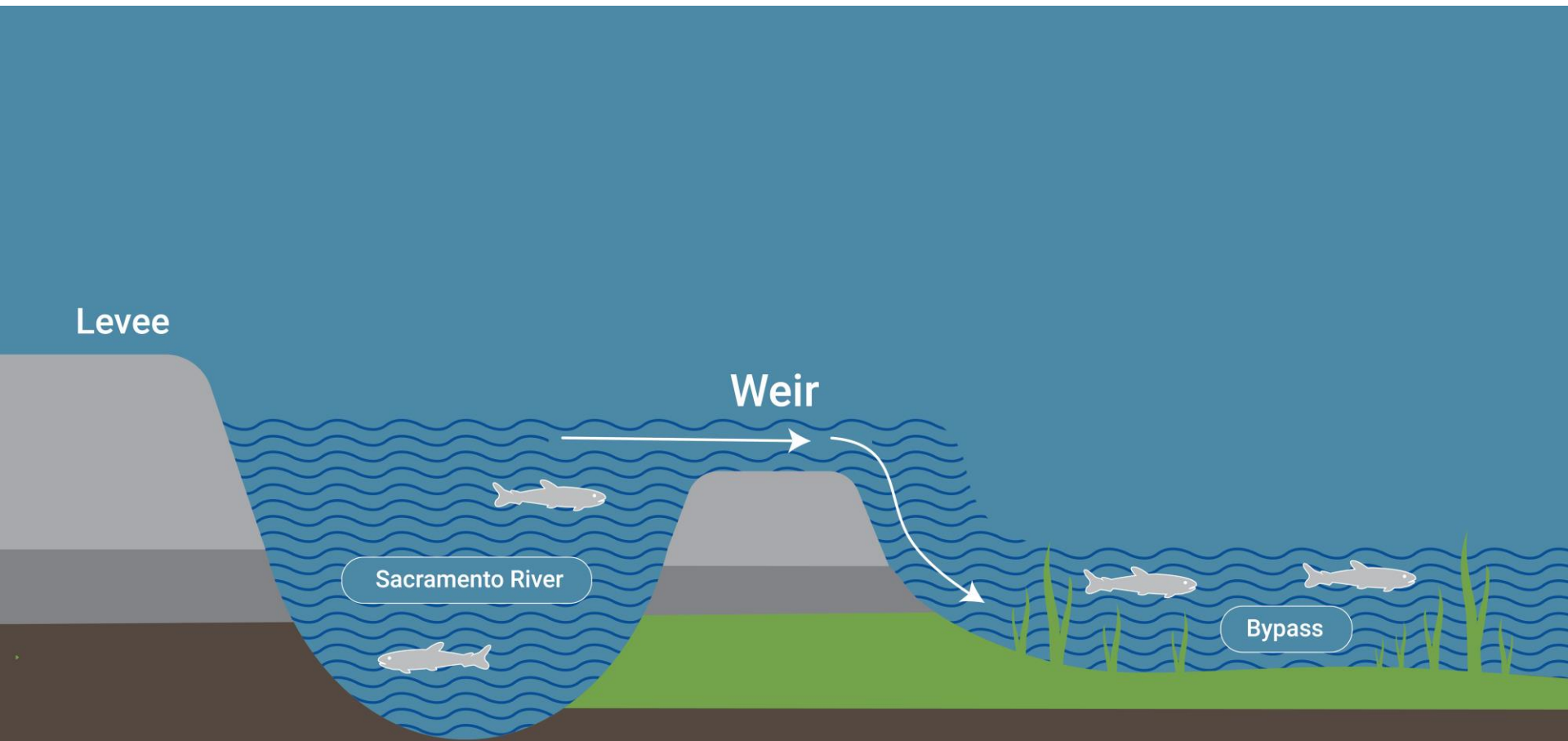
Same age salmon after 2 weeks in separate habitats

Floodplain

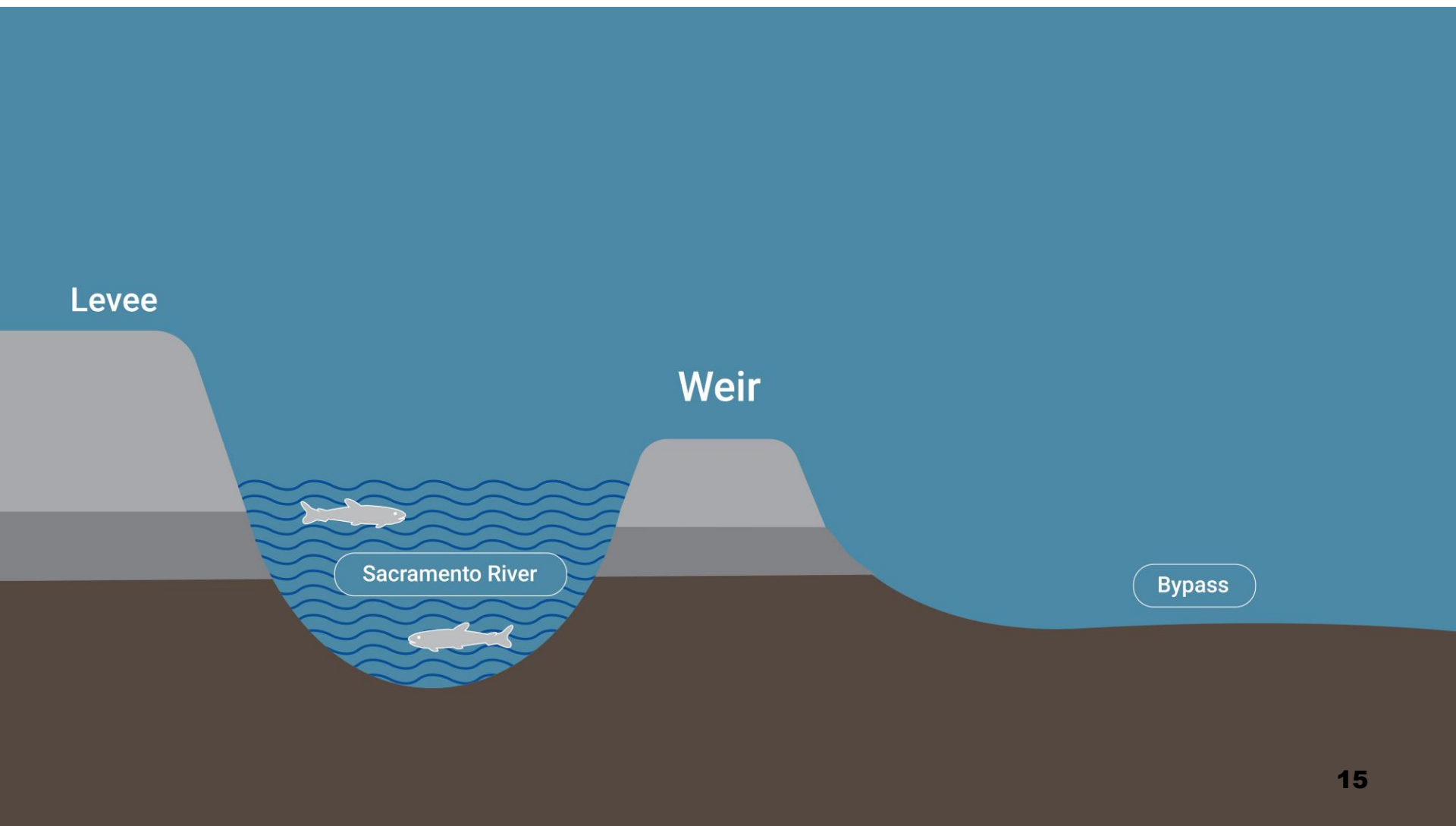
River



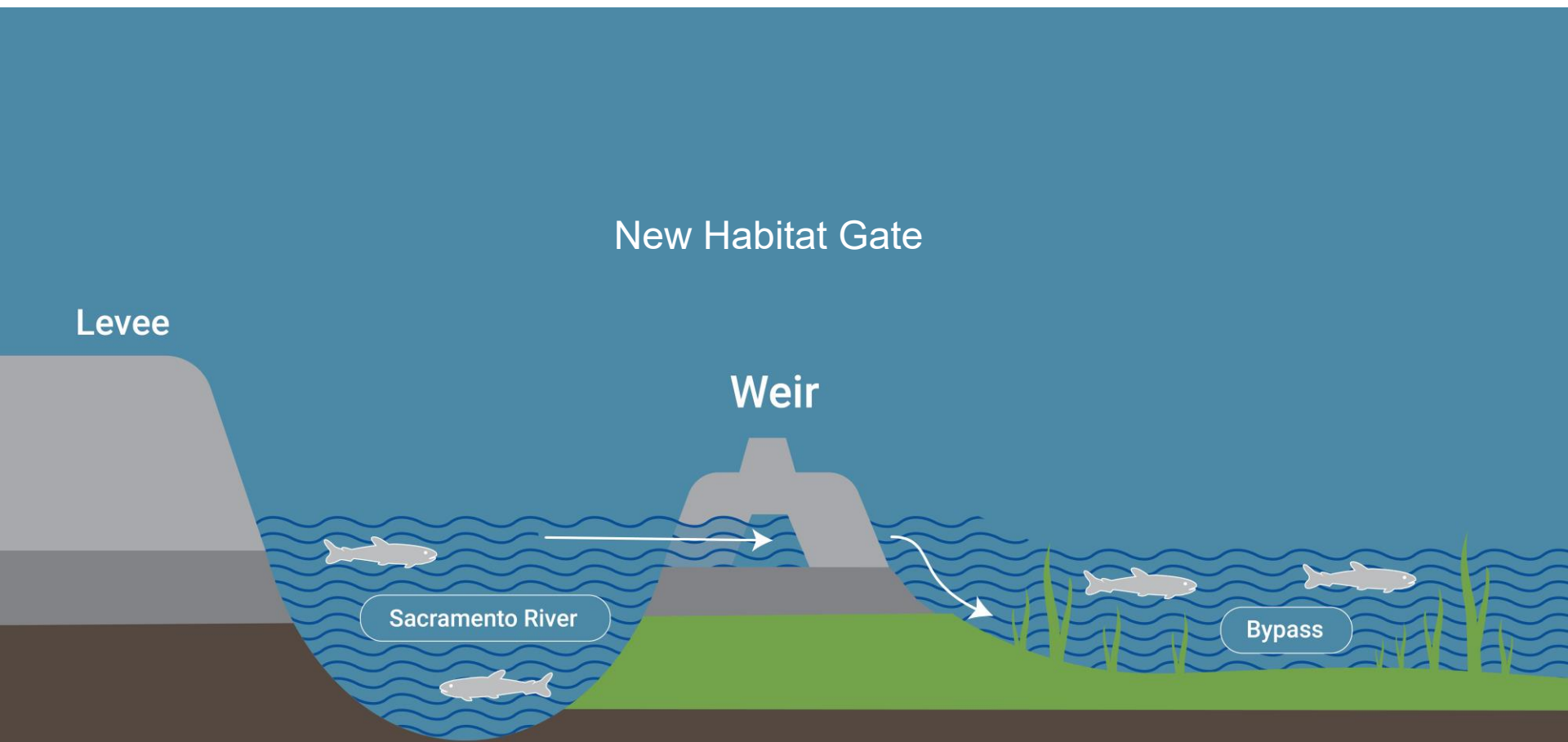
Existing Tisdale Weir – Wet Year



Existing Tisdale Weir – Dry Year

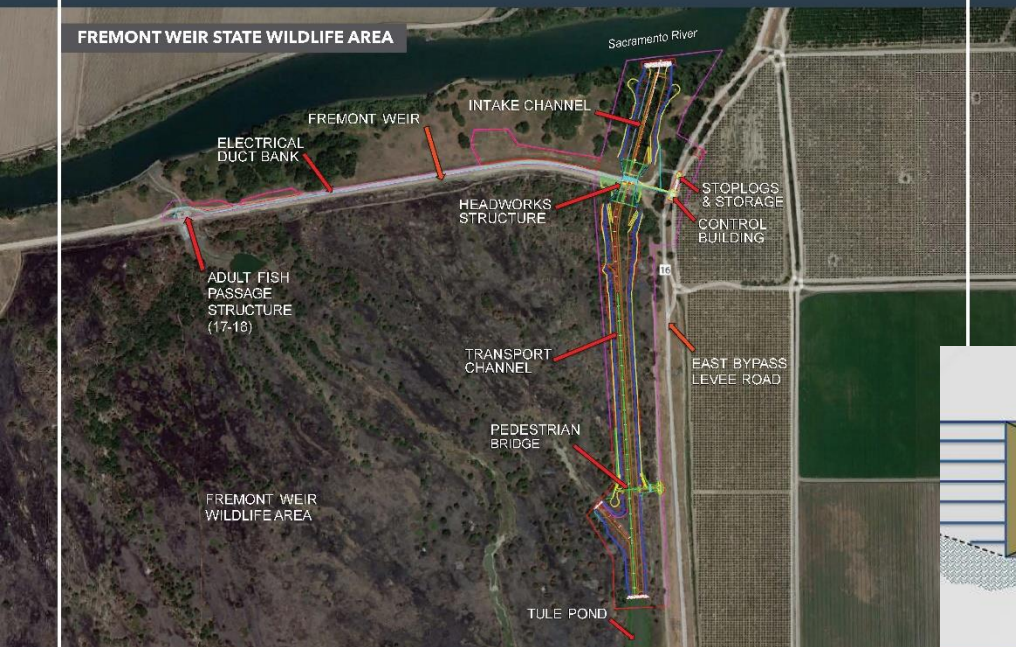


Tisdale Weir Rehabilitation



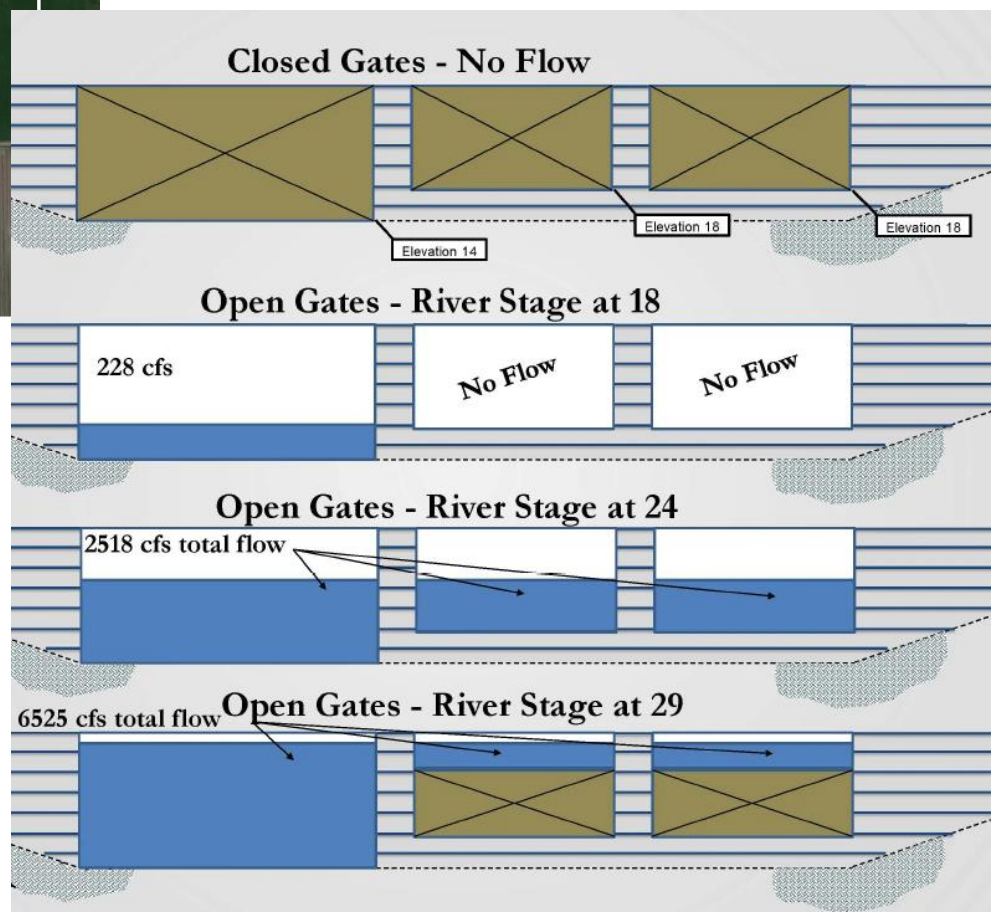


BIG NOTCH PROJECT



- Allows water into Yolo Bypass at lower Sacramento River stage

- Construction complete
- Not yet operational





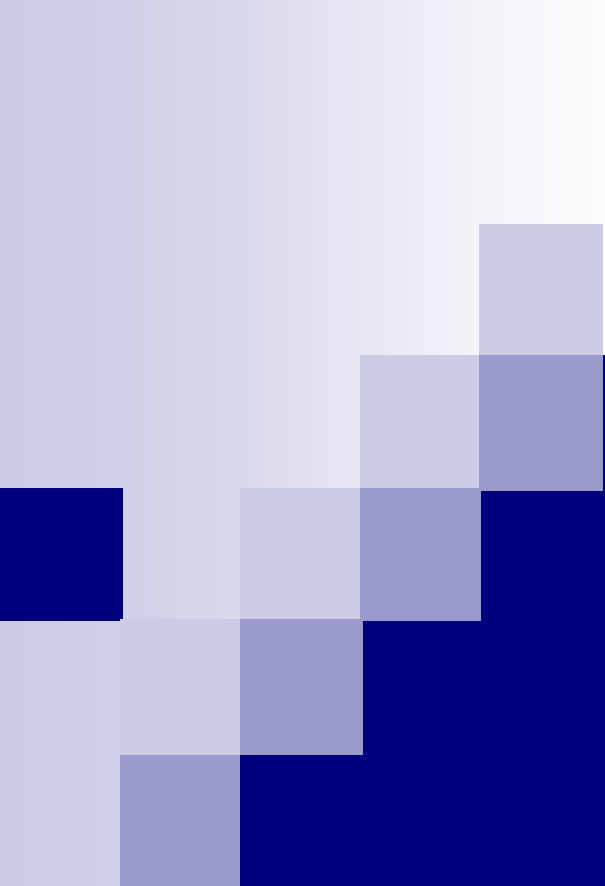
Fish Food on Flooded Farms

- Possible to create food by diverting flows and returning water back to the river
- Started in 2017
- 35,000 acres activated in 2023/24 season

Natural Infrastructure



- ~5% of historical habitat remains
- Delta outflow is ~50% of unimpaired flow



Questions & Discussion

May 8, 2024