



# **Floodplains Reimagined: Advisory Committee Meeting**

# Agenda / Presentation Overview

- **Project Schedule / Timeline**
  - Where we are now and where we are going
- **Scenario Development Process**
- **Baseline Model Results**
  - Colusa and Butte Basins
- **Scenario Development**
  - Suite of potential actions
  - Preliminary inundation results
  - Preliminary habitat suitability results

# Scenario Development Needs

- 3/30 Ad Hoc Outcomes Needed: feedback on pre-screening of key actions
- 4/18 AC & 4/26 SC Outcomes Needed: feedback on refined key actions and habitat suitability results
- 5/19 AC & 5/24 SC Outcomes Needed: feedback and approval of action groupings

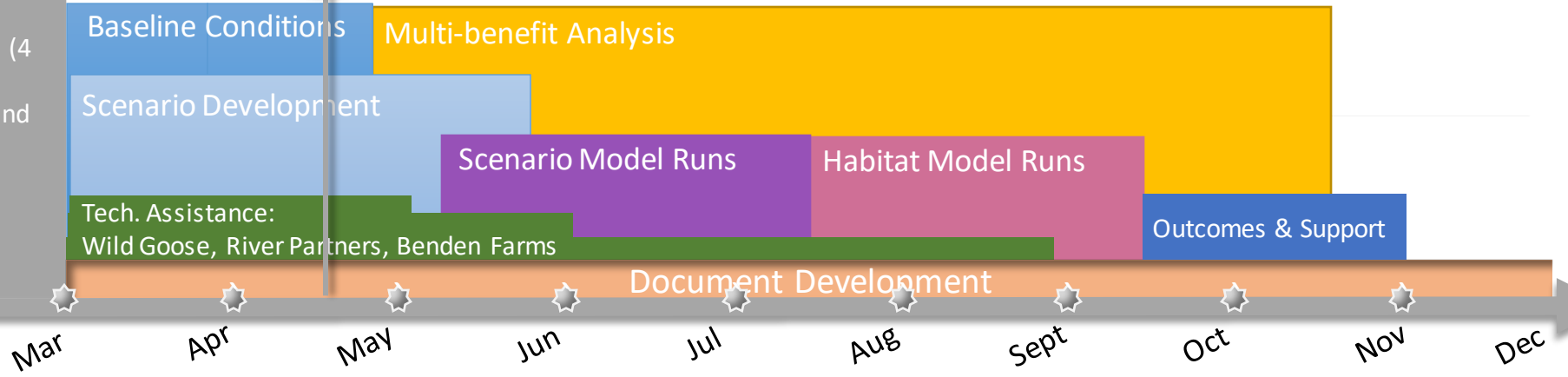
Steering Committee								
3/22	4/26	5/24	6/28	7/26	8/23	9/27	10/25	11/22
• Opp & Constraints Break Out Groups	• Scenario Dev Update	• Scenario Dev Update	• Multi-Benefit Analysis					
• Salmon Suitability	• Habitat Suitability Outcomes	• Managed Lands Metrics	• Approach					
• DU Scope of Work	• DU Scope of Work		• Salmon Productivity					

Advisory Committee					
3/22	4/18	5/19	6/9 (change to 6/2 or 16)	8/11	10/13
	• Scenario Dev Update	• Scenario Dev Update	• Multi-Benefit Analysis		
	• Habitat Suitability Outcomes	• Managed Lands Metrics	• Approach		
			• Salmon Productivity		

We are Here

- Scenario Development Ad Hoc, 3/30
- Managed Lands Ad Hoc, 4/28
- Salmon Productivity Coordination, May

- ### Discussed To-Date
- Priorities & Objectives
  - Preliminary Scenario Development (4 types of actions)
  - Implementation Strategies: Risks and Solutions
  - Habitat Suitability Criteria Development (Birds/Salmon)
  - Baseline Conditions



Feasibility: Is there potential for species benefit but more information is needed?

Next Phase of Development

# Scenario Development Process

## Develop Potential Actions

- Stakeholder/Landowner input (...4<sup>th</sup> action type added)
- Technical team input

## Pre-Screen Potential Actions (we are here)

- Test the hydrologic feasibility of key actions (...where is the water and for how long)

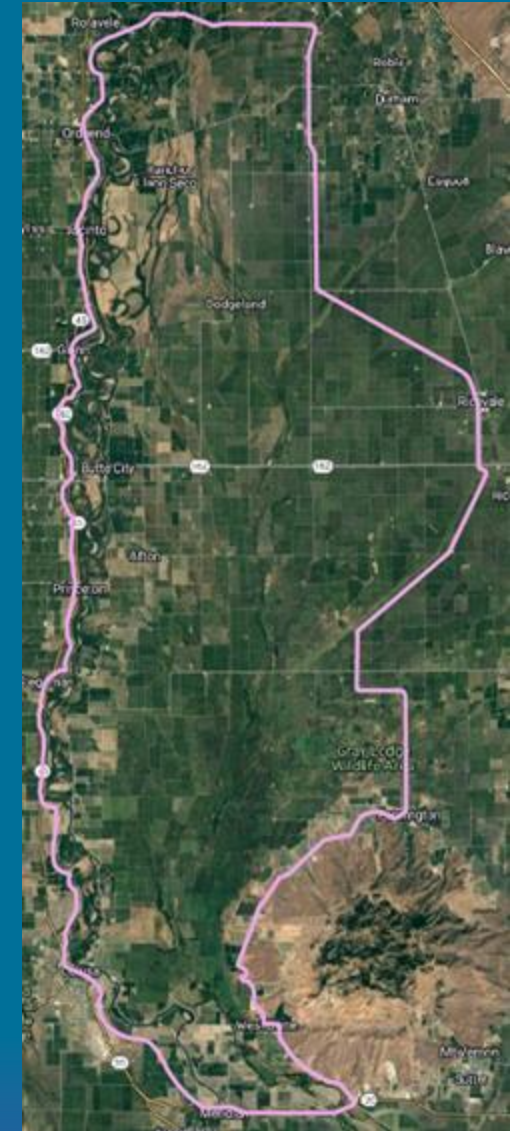
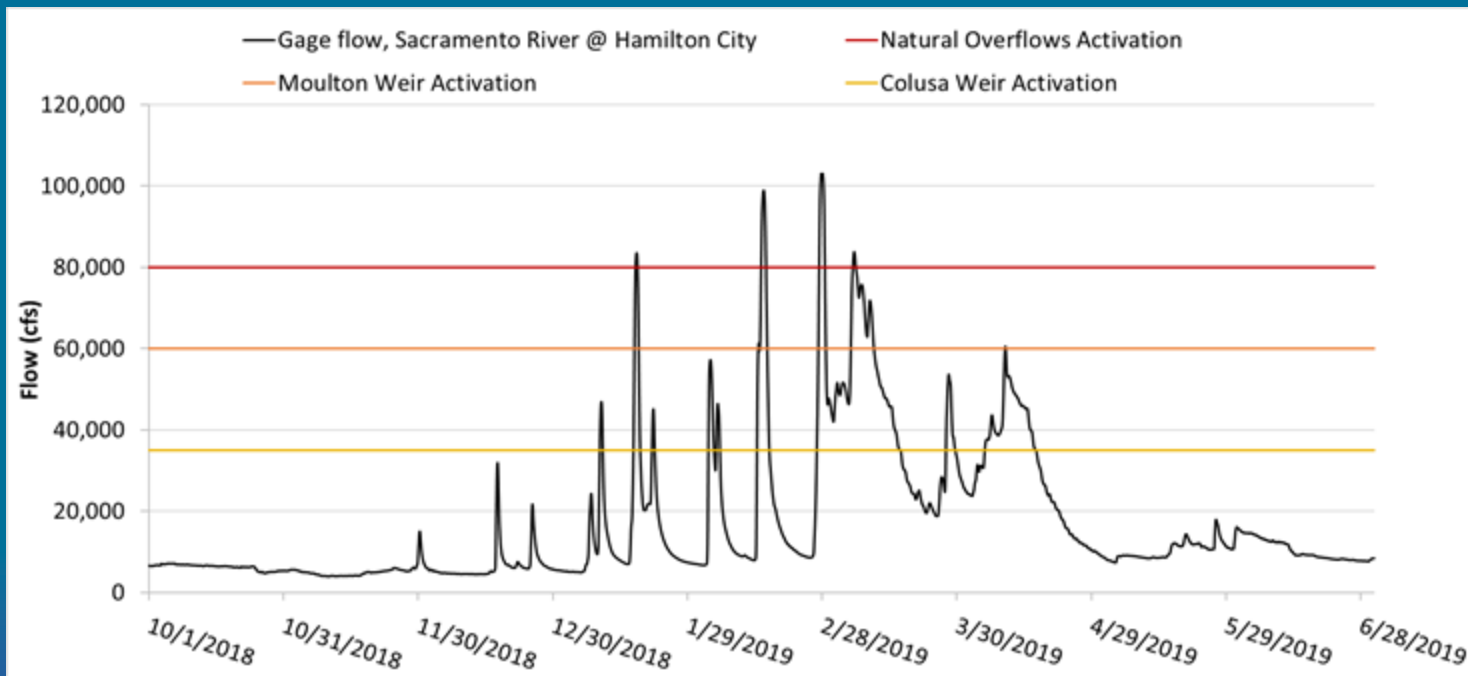
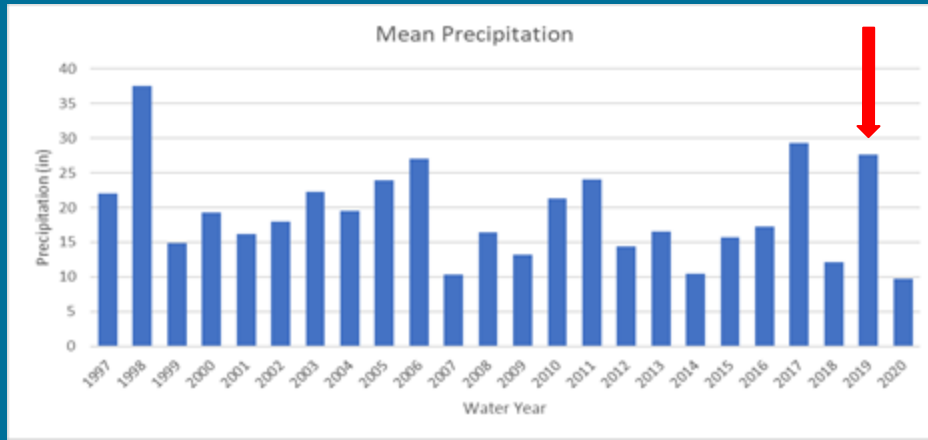
## Develop Potential Grouping of Actions

- Combine actions (...and share out at upcoming AC meetings)
- Test scenarios globally (...and identify hydrologic opportunities and constraints)
- Refine scenarios

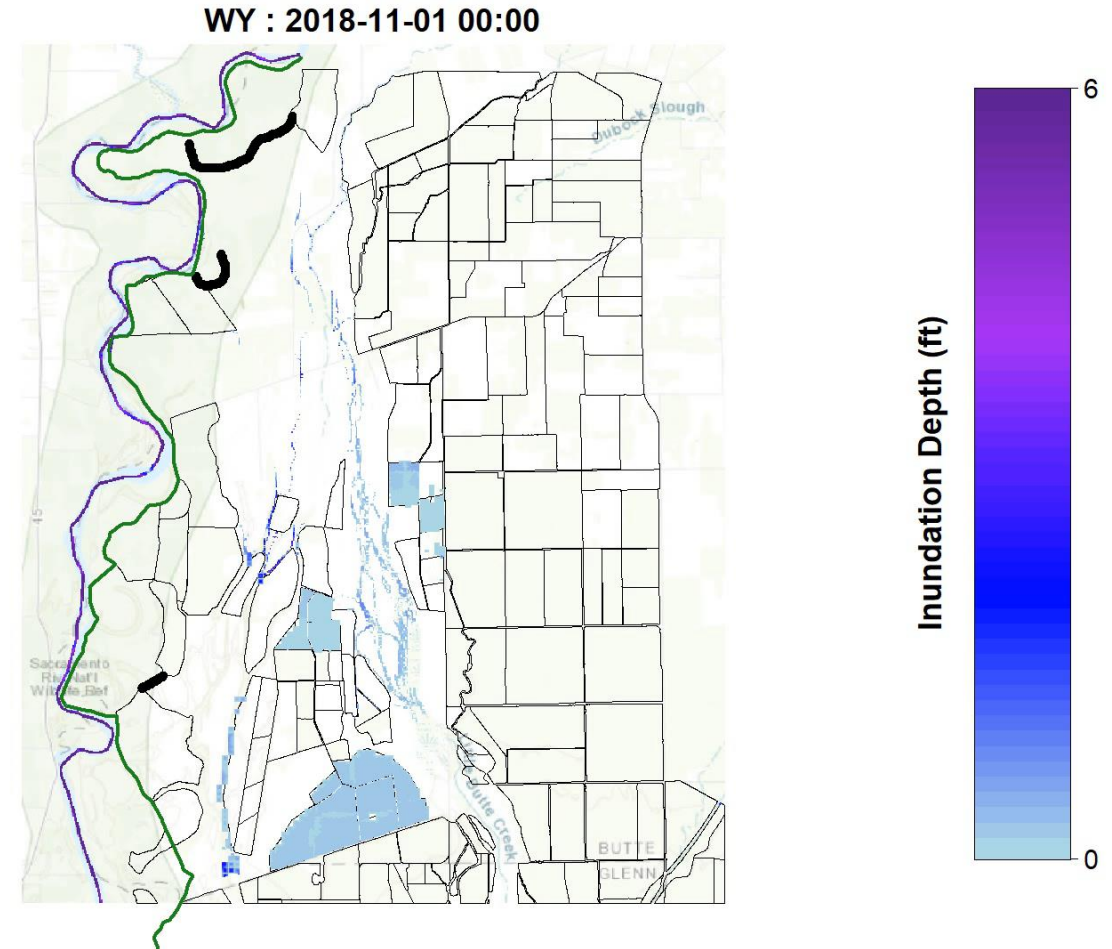
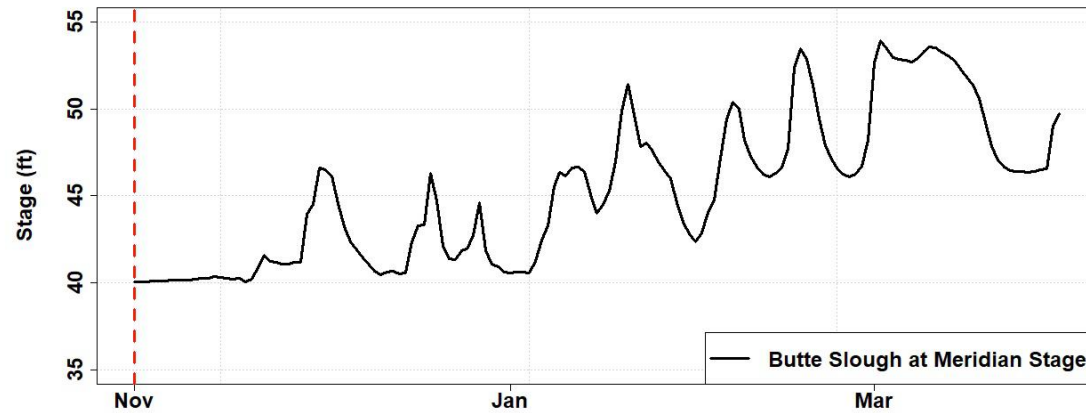
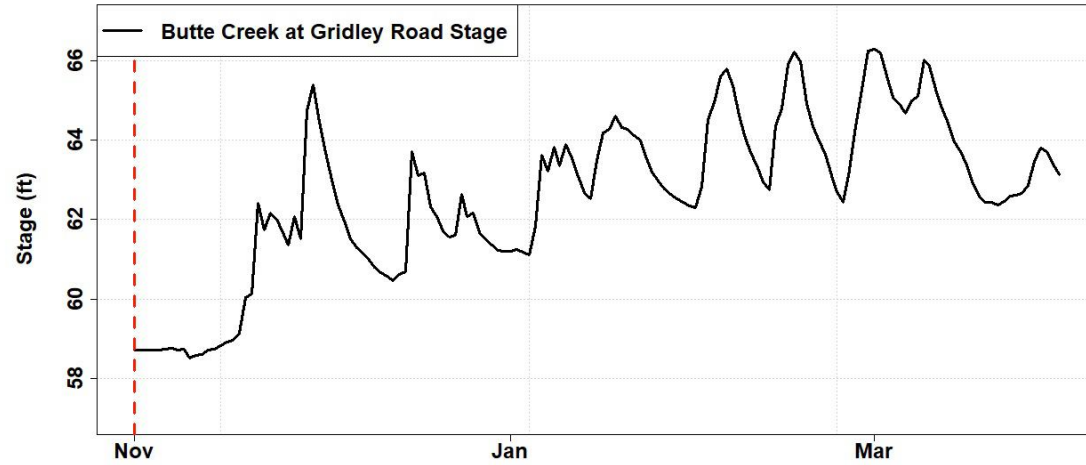
## Evaluate Scenarios

- Evaluate relative changes (scenario vs baseline)
- Perform multi-benefit analysis
- Assess landowner willingness

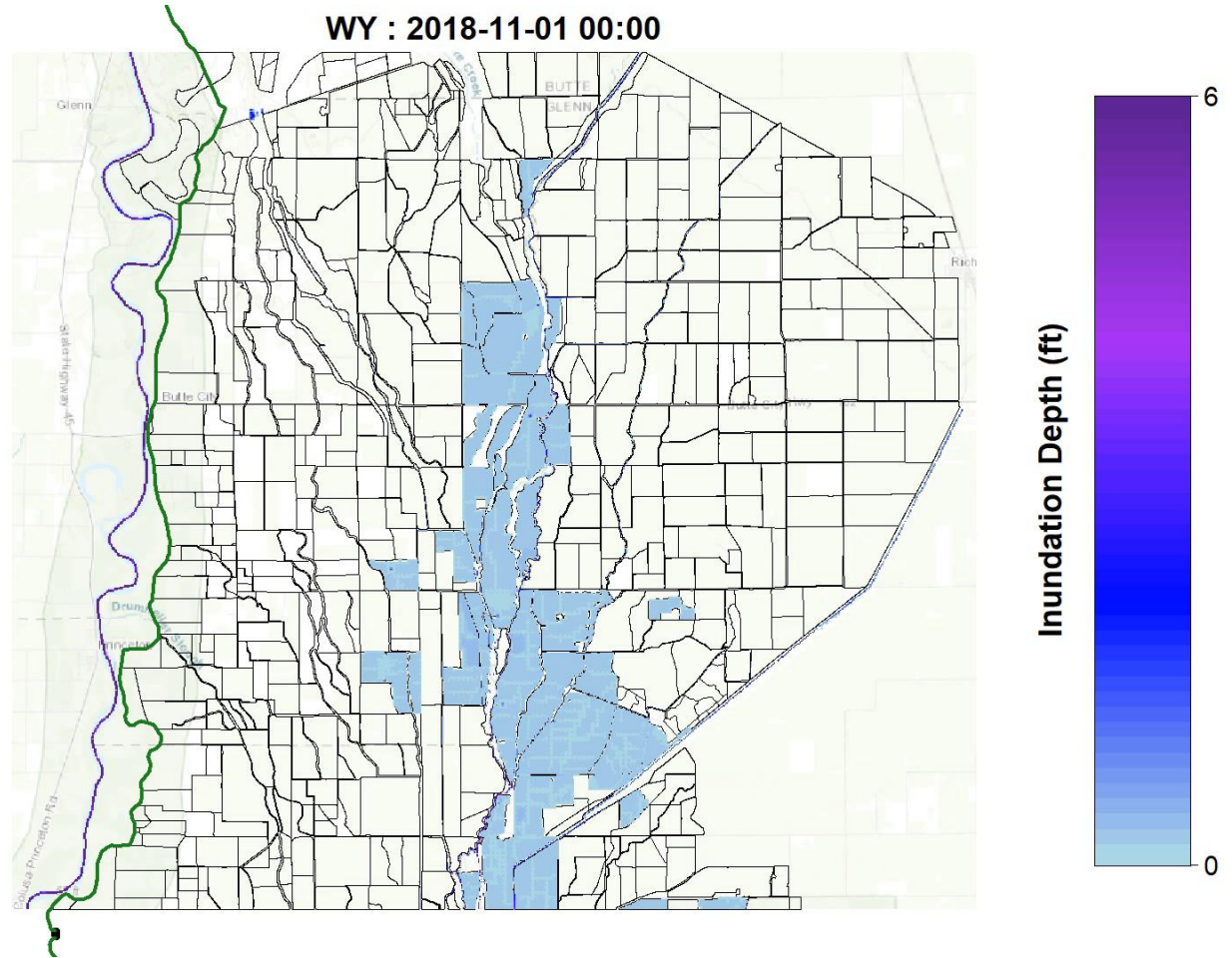
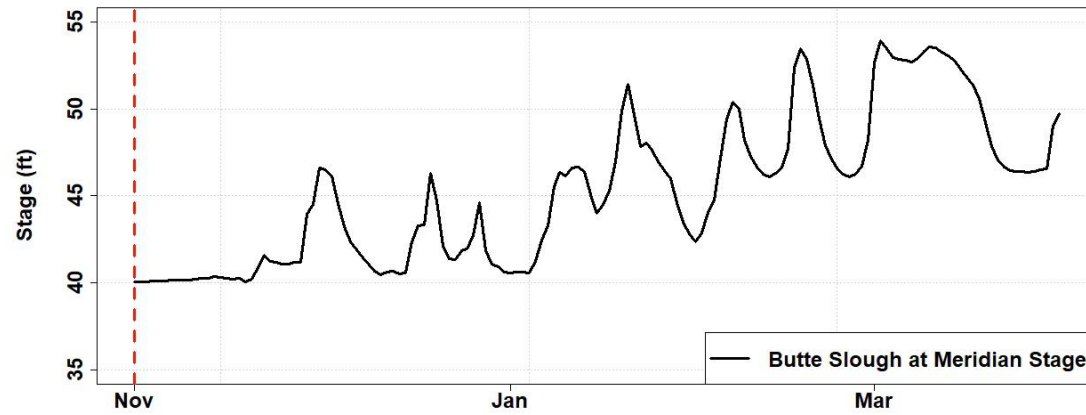
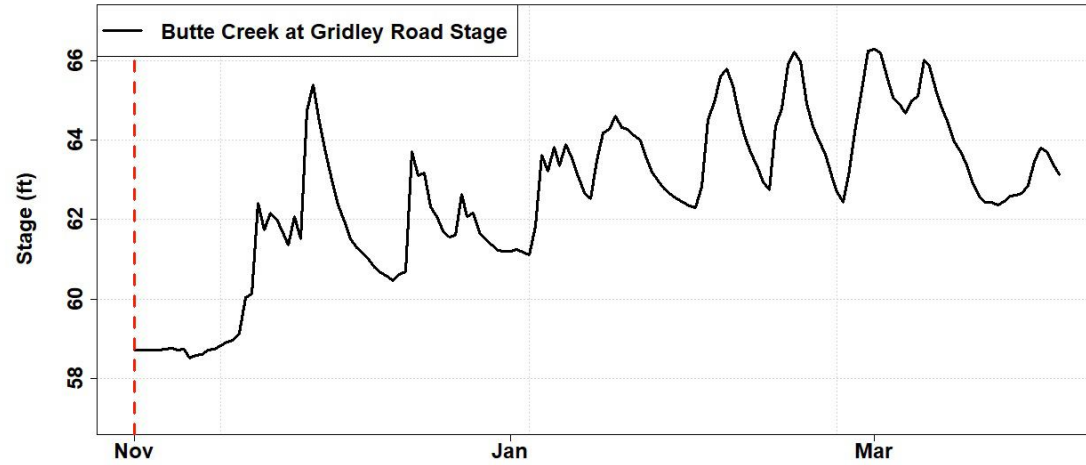
# Baseline Model Results – Butte Basin 2019



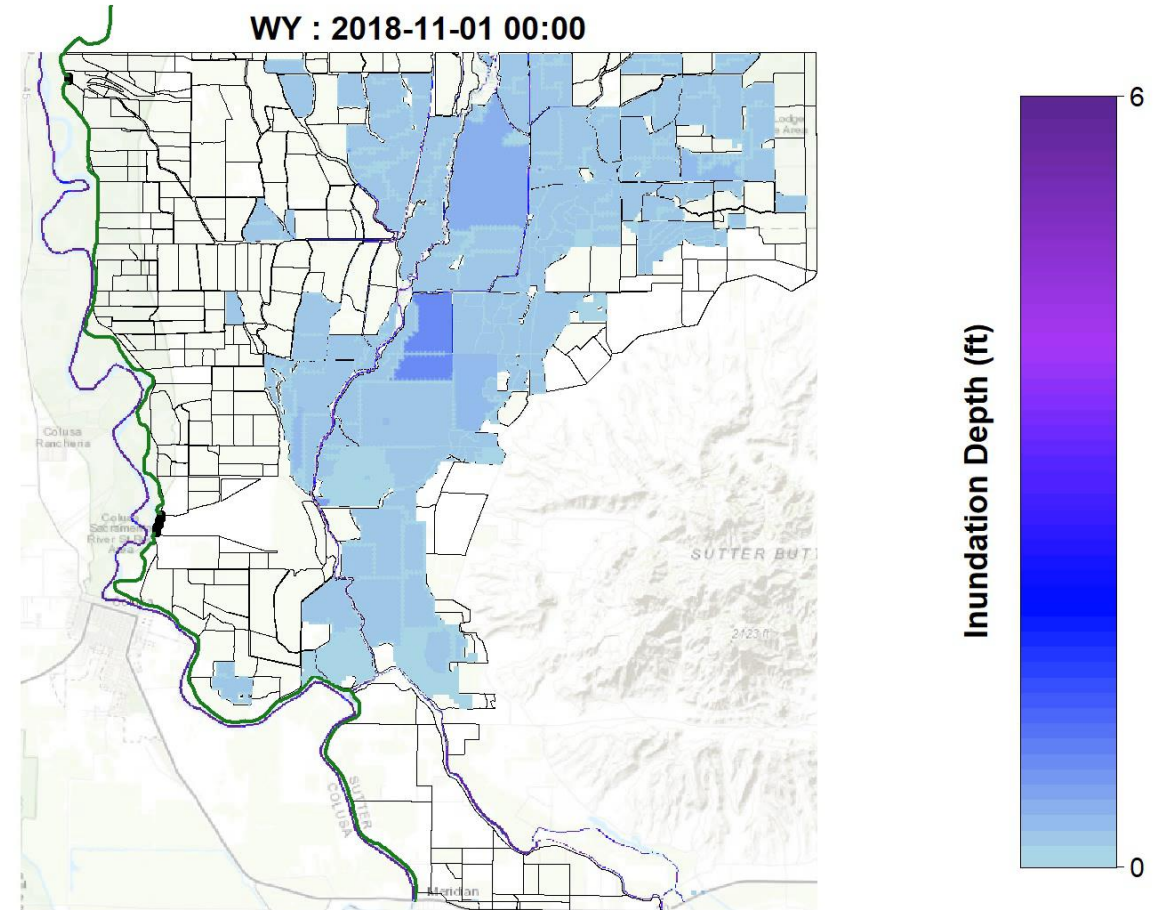
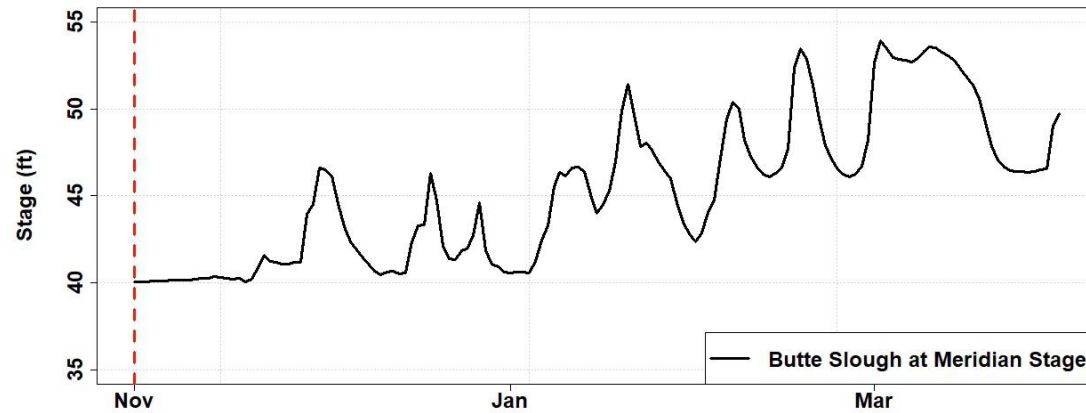
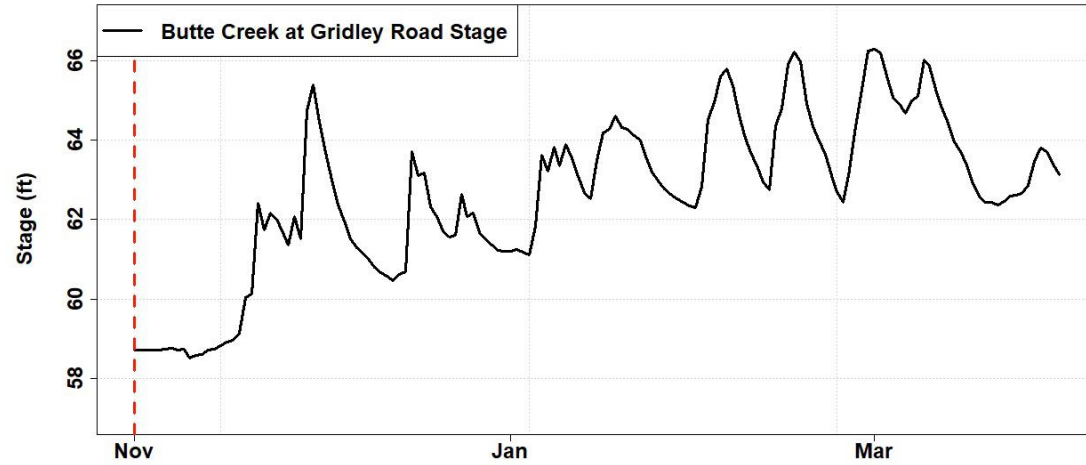
# Baseline Model Results – Butte Upper Region



# Baseline Model Results – Butte Middle Region

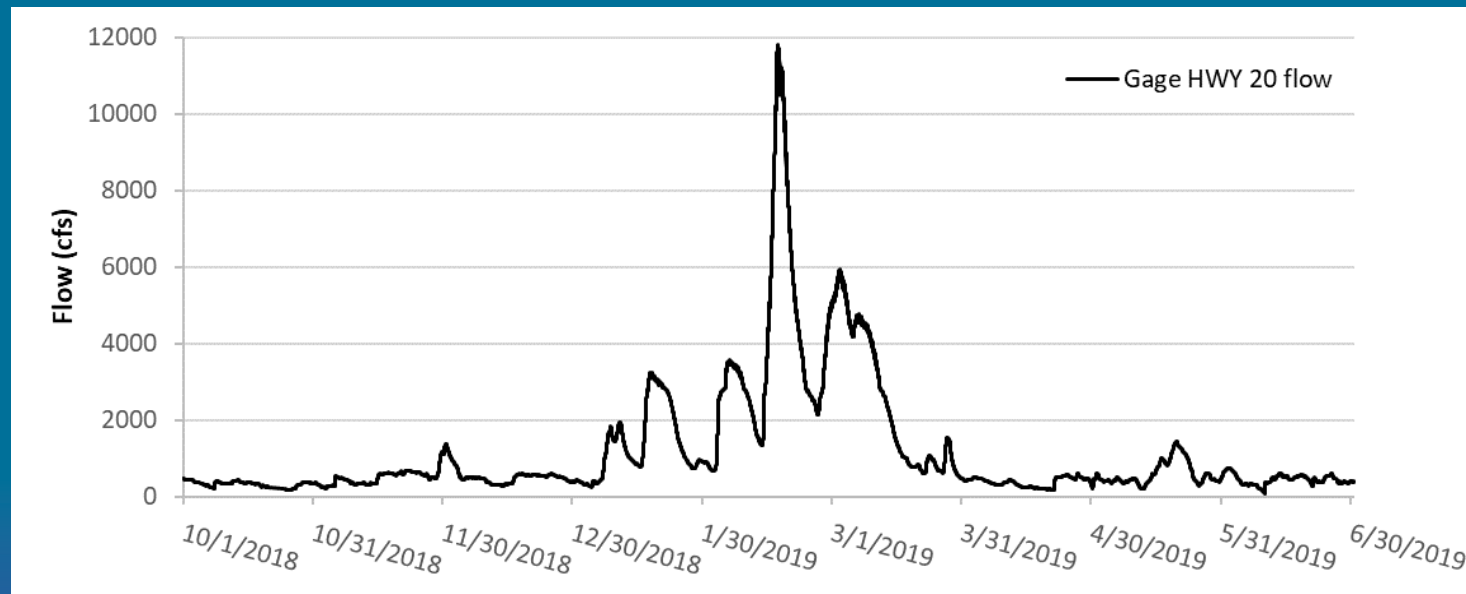
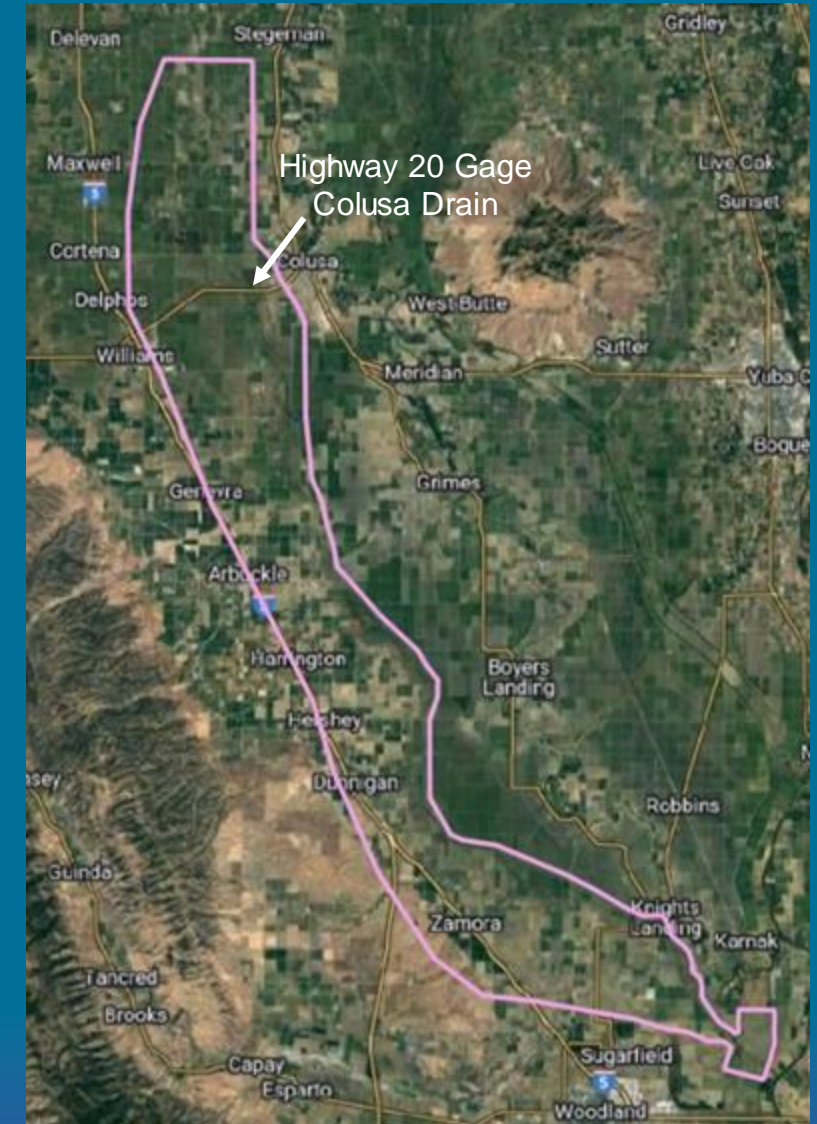
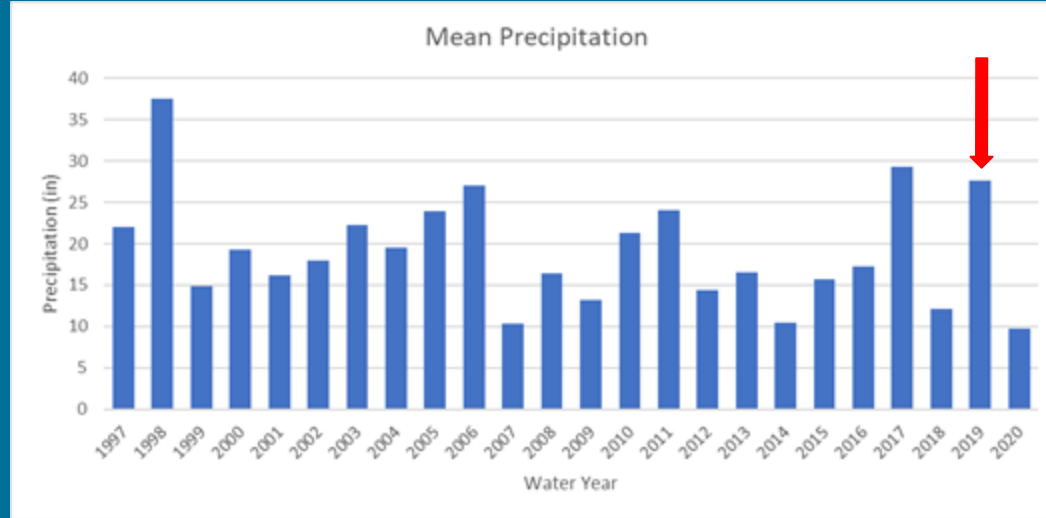


# Baseline Model Results – Butte Lower Region

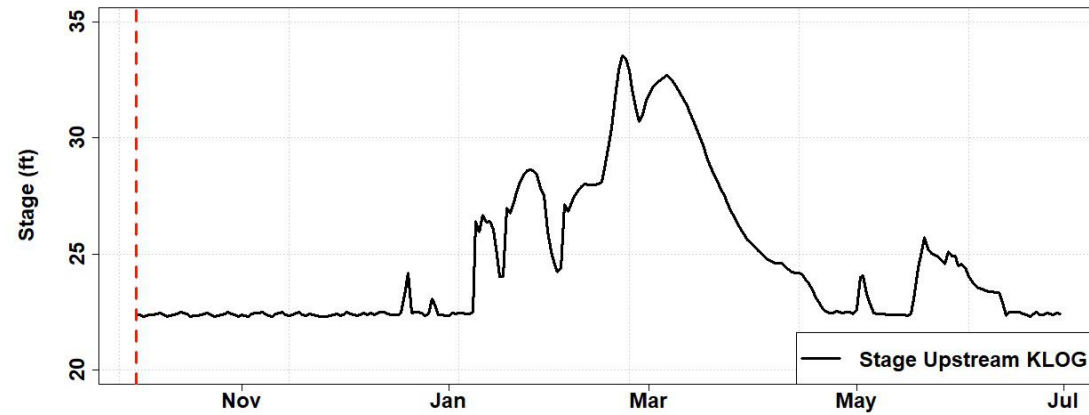
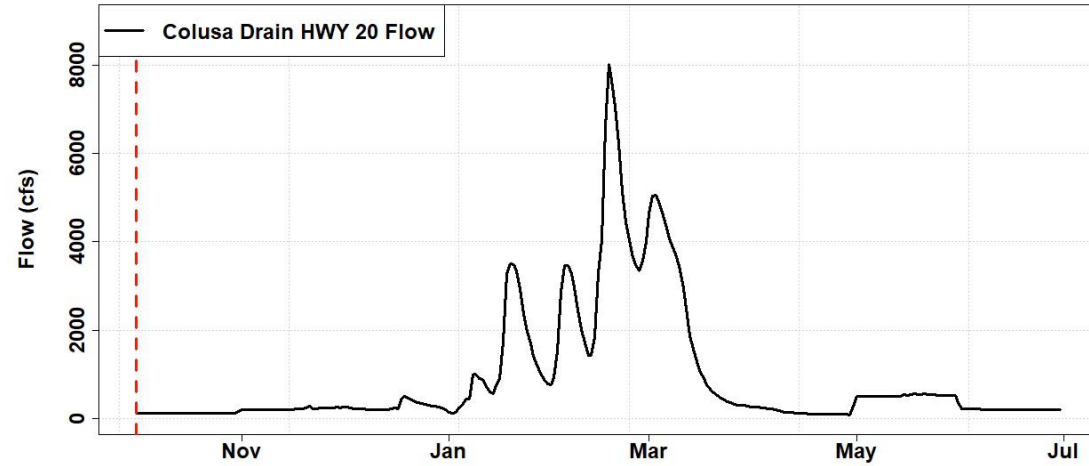




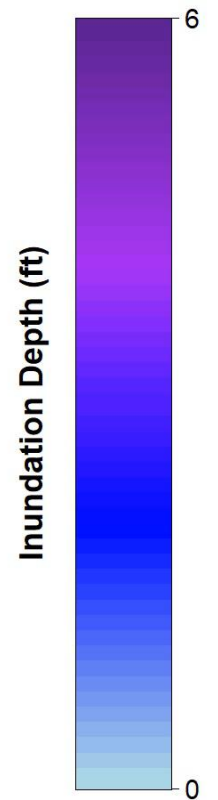
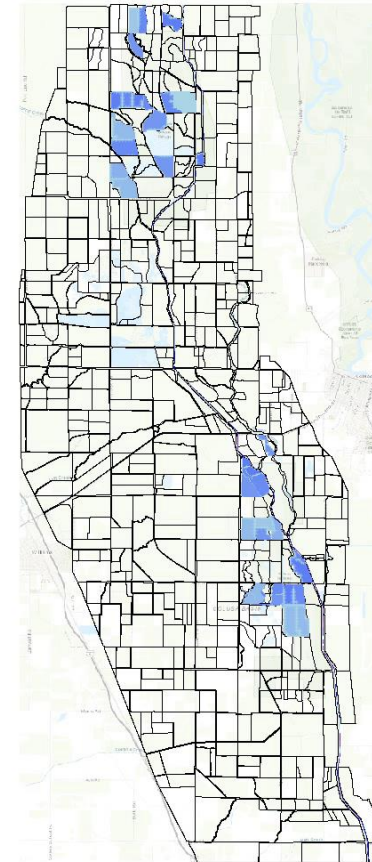
# Baseline Model Results – Colusa Basin 2019



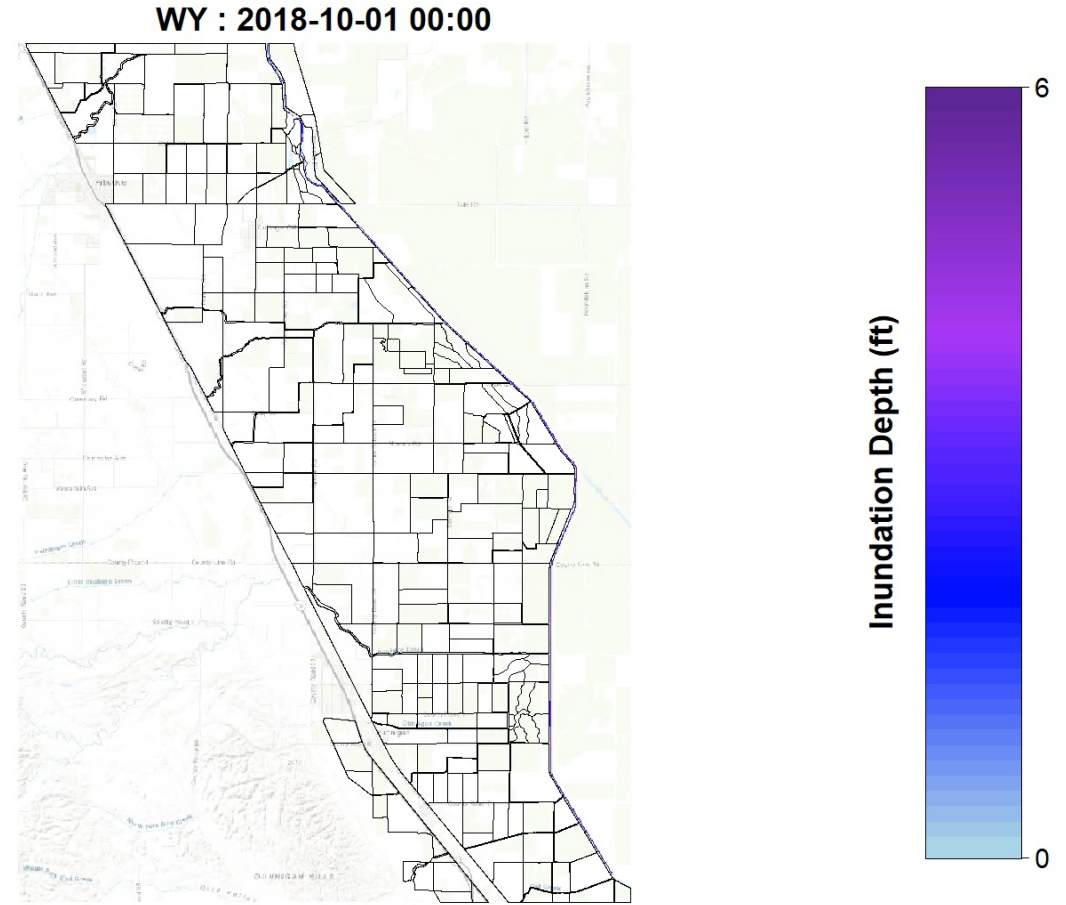
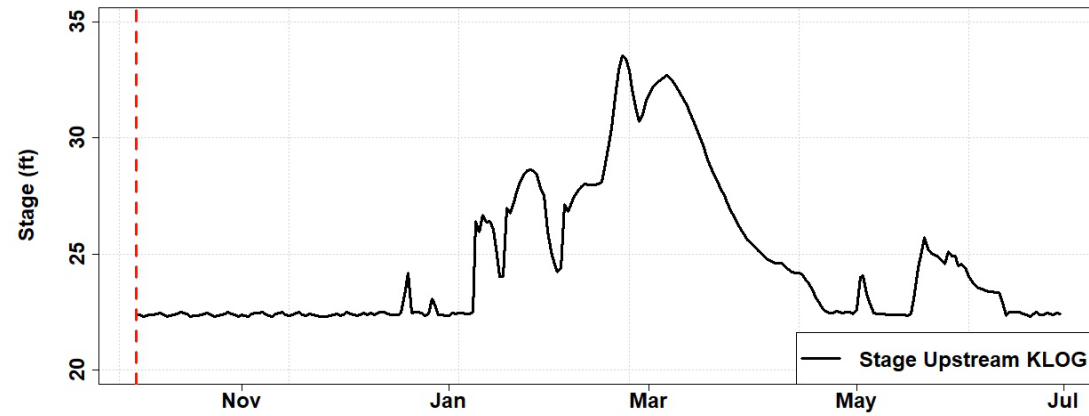
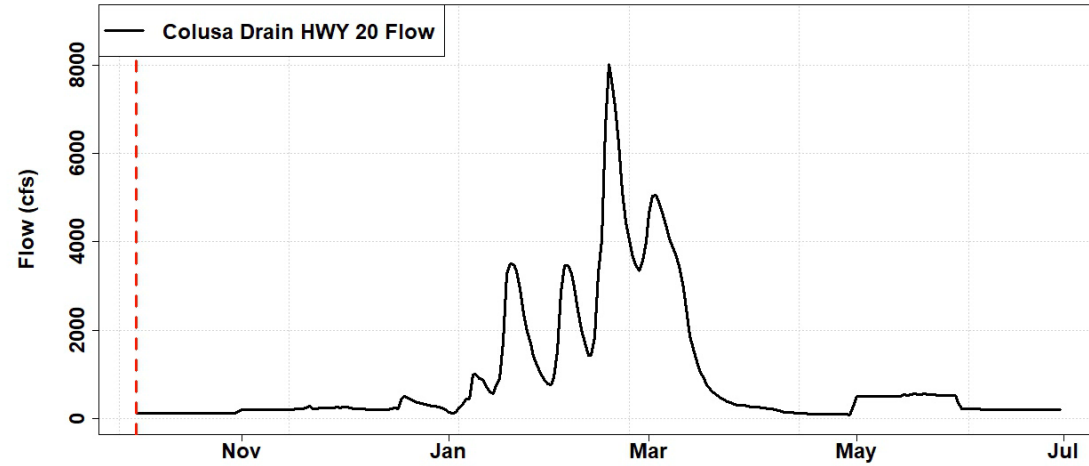
# Baseline Model Results - Colusa Upper Region



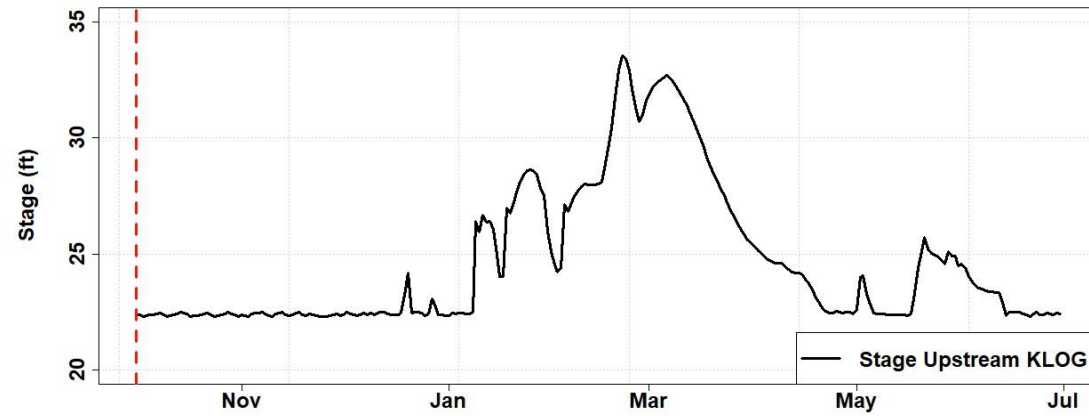
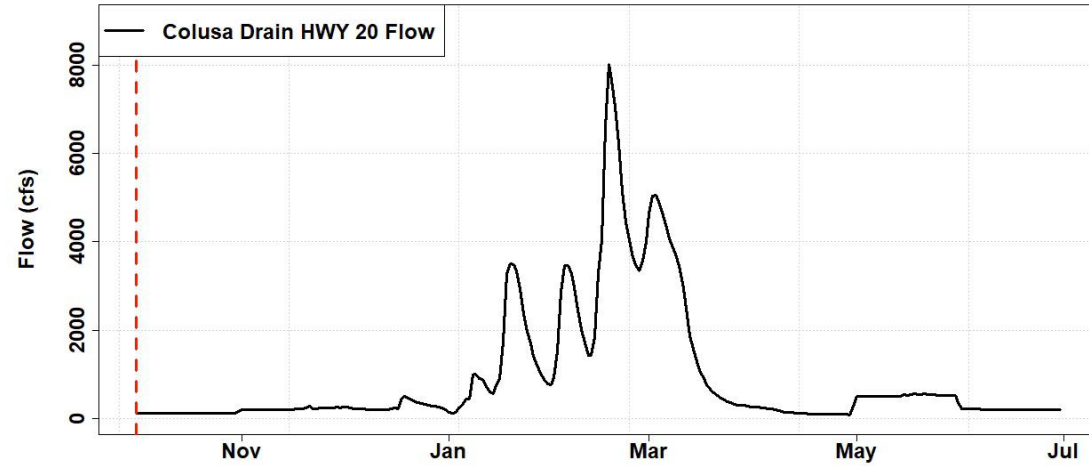
WY : 2018-10-01 00:00



# Baseline Model Results – Colusa Middle Region



# Baseline Model Results – Colusa Lower Region



WY : 2018-10-01 00:00



# Scenario Development – Suite of Possible Actions

## Types

- River Connections
  - Notch overflow and flood weirs
  - Modify outfall gates
  - Modify existing or add new diversions
  - With or without fish screens
- Floodplain Infrastructure
- Land Management
- Habitat Restoration



# Scenario Development – Suite of Possible Actions

## Types

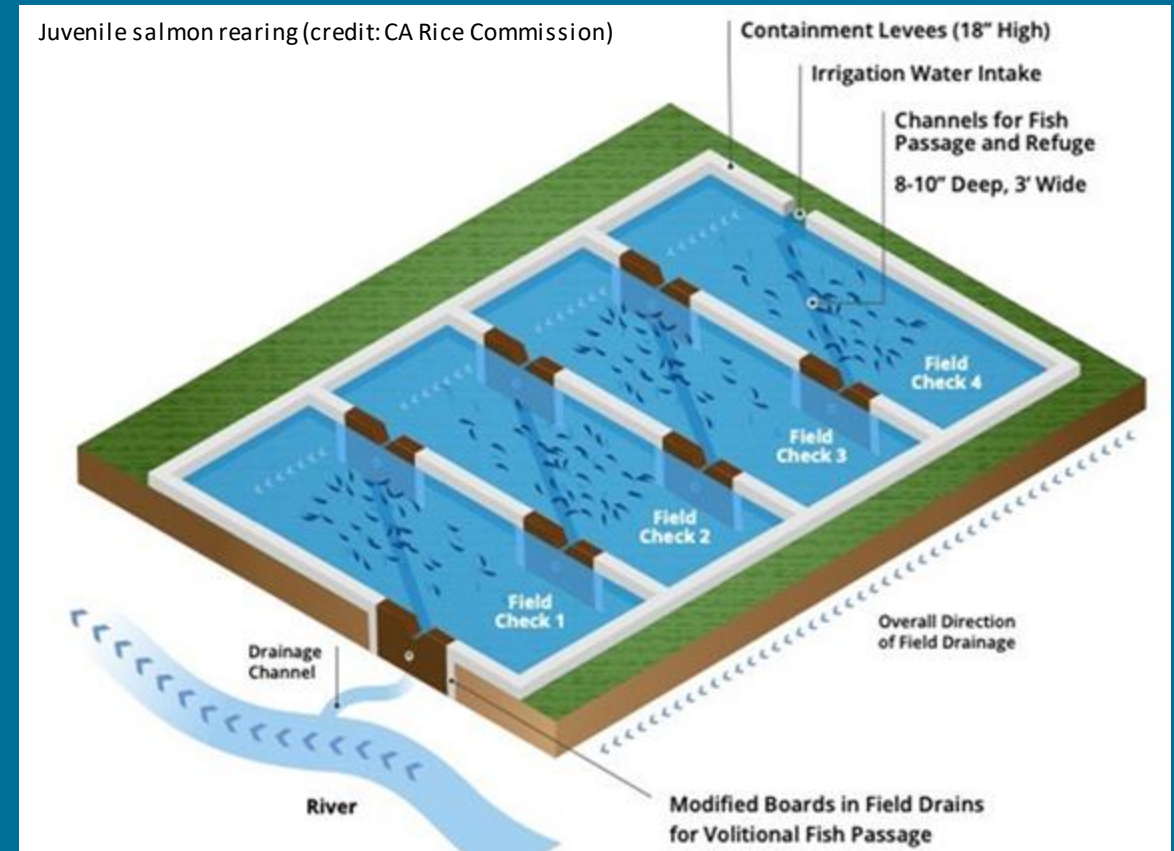
- River Connections
- Floodplain Infrastructure
  - Modify water management
  - Improve fish passage
- Land Management
- Habitat Restoration



# Scenario Development – Suite of Possible Actions

## Types

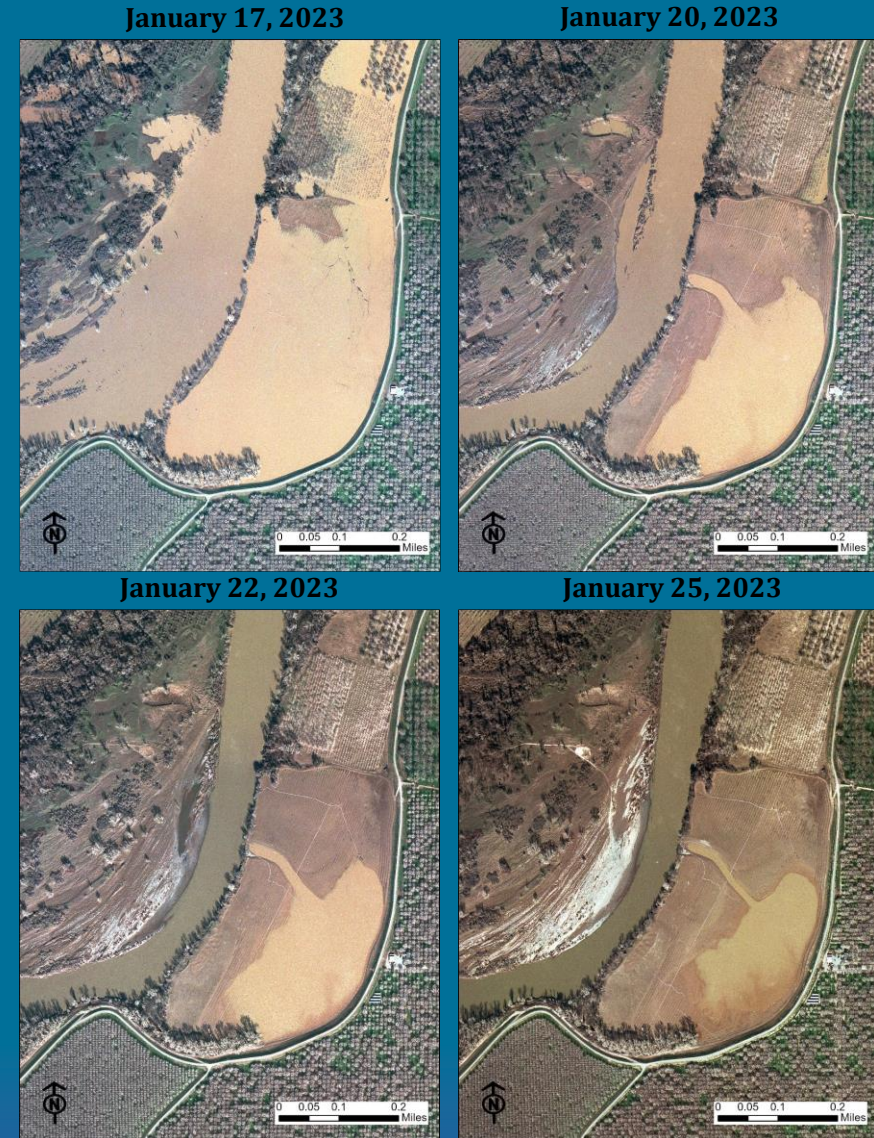
- River Connections
- Floodplain Infrastructure
- Land Management
  - Manage water on the field unit
    - Juvenile salmon rearing & fish food
    - Bird habitat
    - Groundwater recharge
  - Fish friendly passage
  - Fish screens
- Habitat Restoration



# Scenario Development – Suite of Possible Actions

## Types

- River Connections
- Floodplain Infrastructure
- Land Management
- Habitat Restoration
  - Juvenile rearing
  - Reduce stranding
  - Riparian restoration



Willow Bend Preserve (credit: this study)



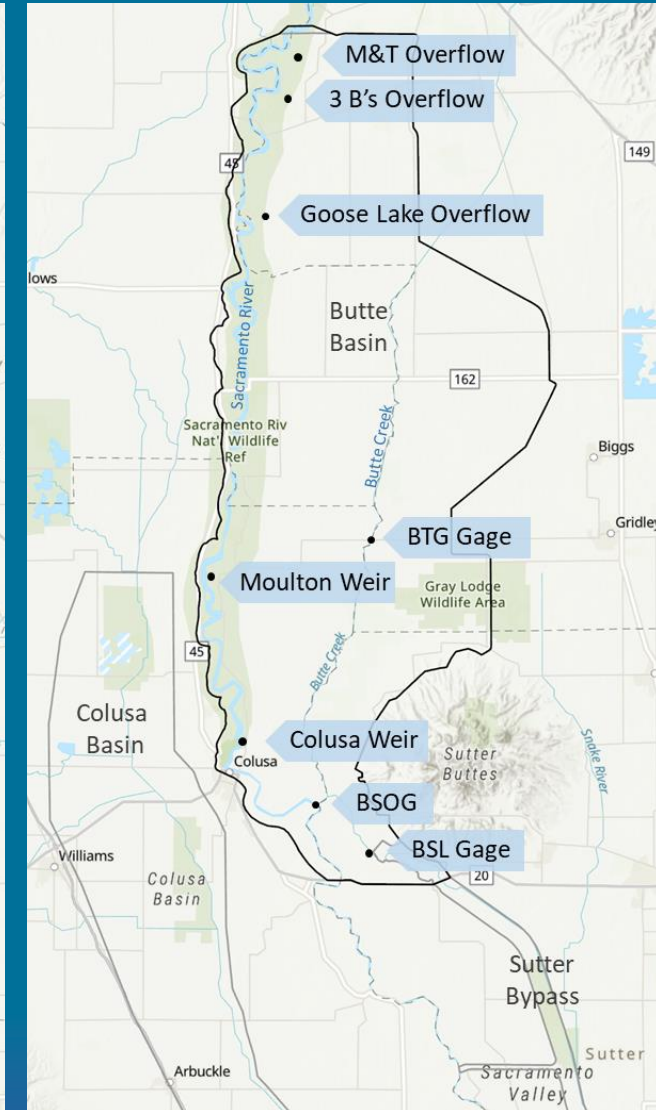
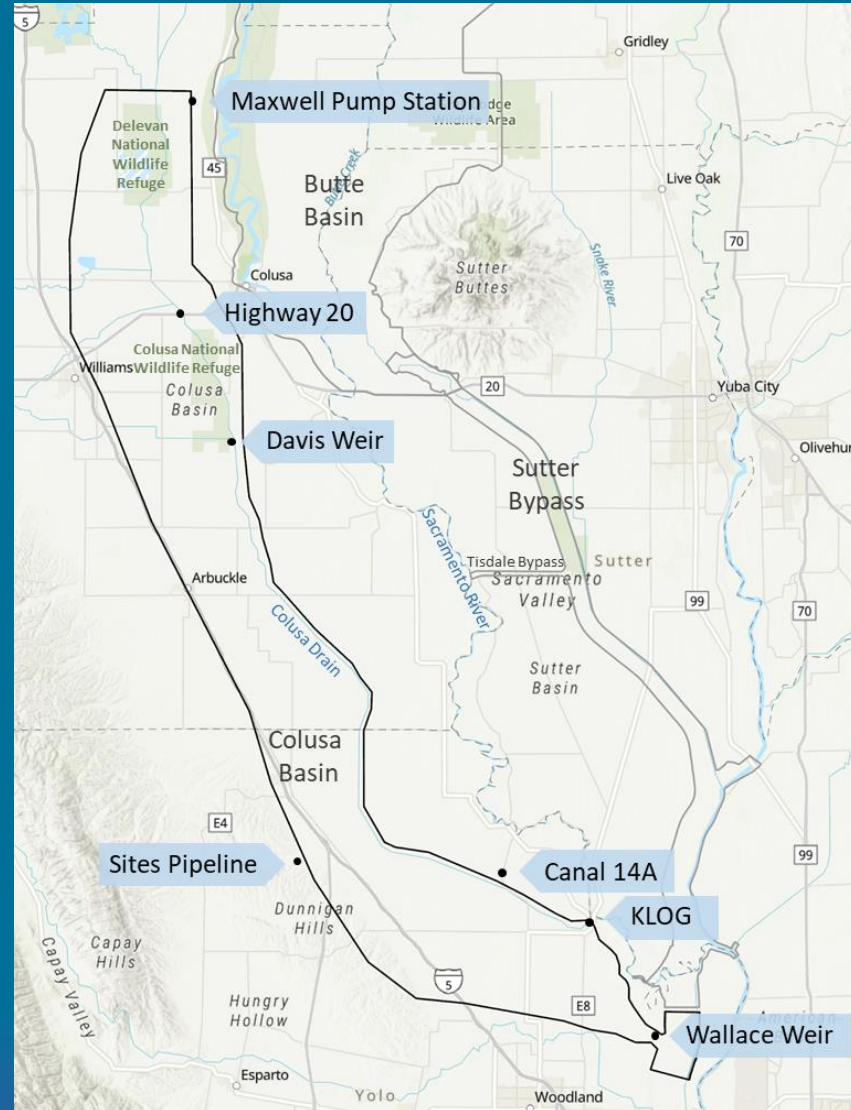
# Scenario Development – Suite of Possible Actions

## Actions are Preliminary!!!

- Actions require willingness
- Actions require evaluation
  - Are they feasible?
  - Are they beneficial?
  - Do they impact existing uses?
  - Do they impact other projects?

## Actions to be Discussed Today

- River Connections
  - Moulton & Colusa Weir Notch
- Floodplain Infrastructure
  - Wallace Weir & KLOG



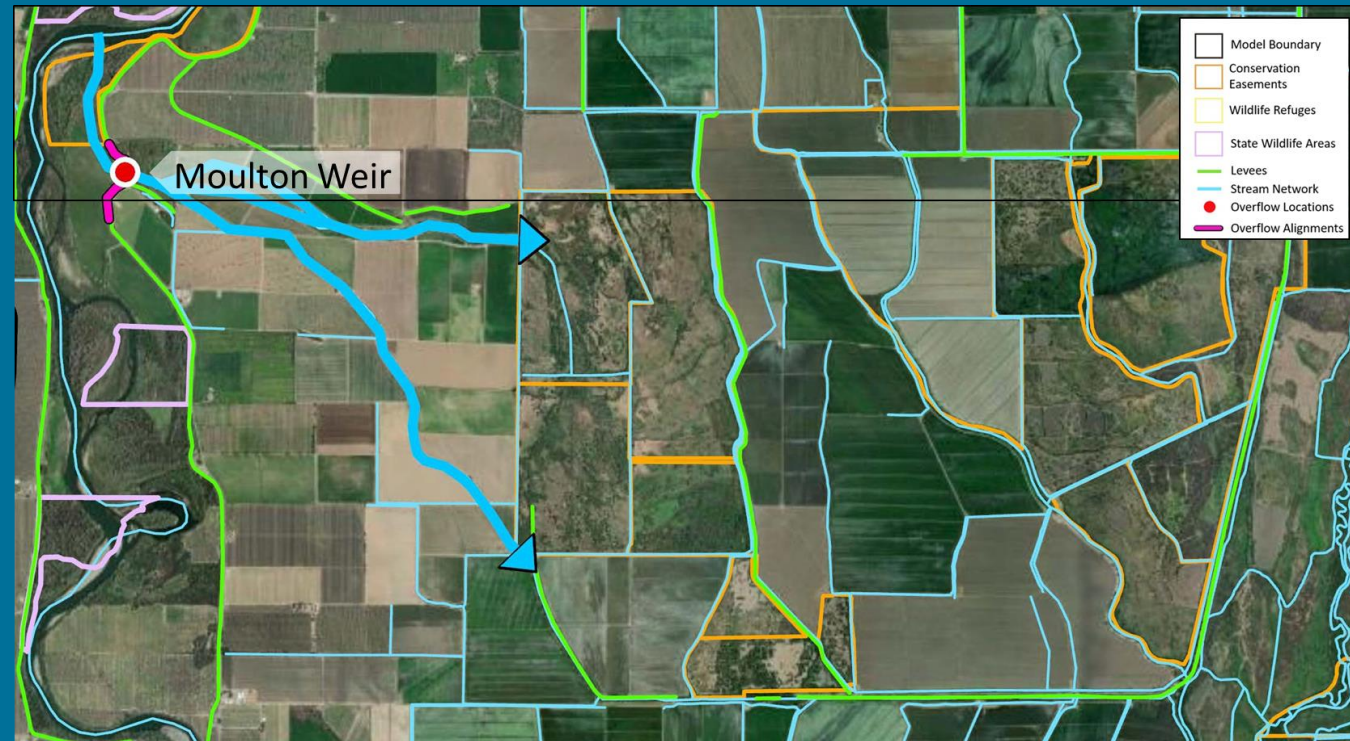
# Butte Basin – Moulton Weir Notch Action

## Description

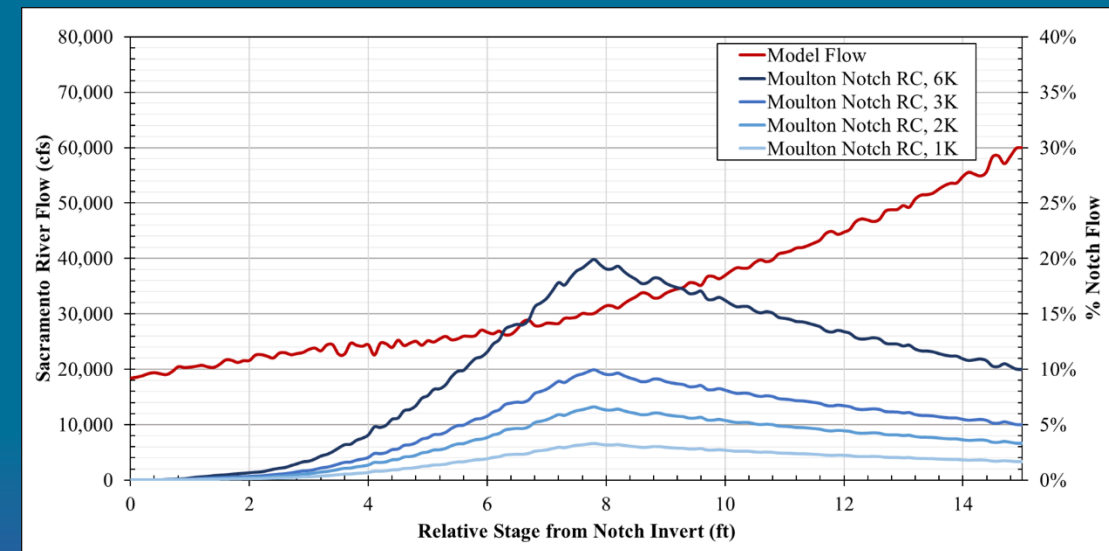
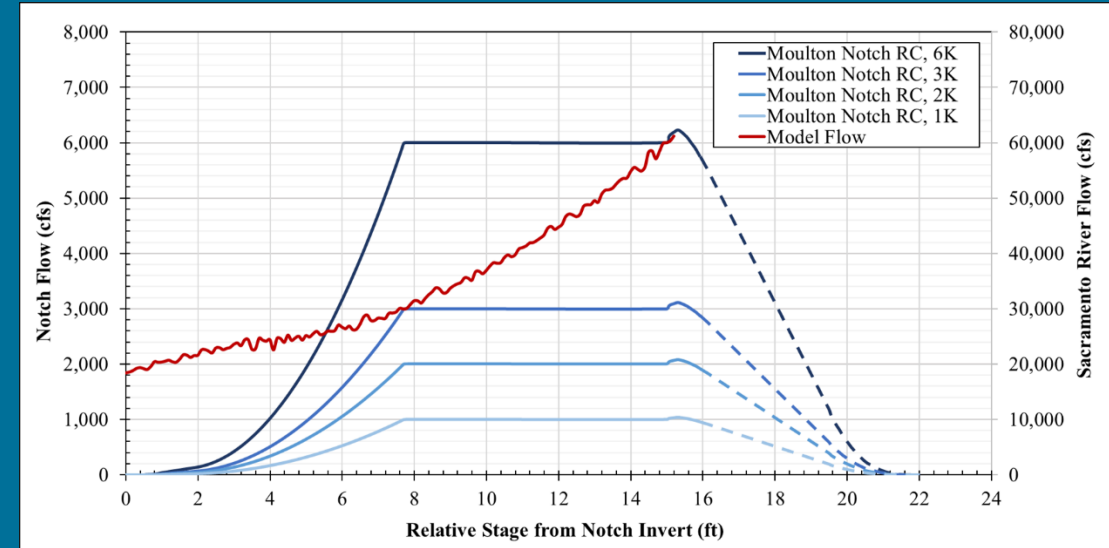
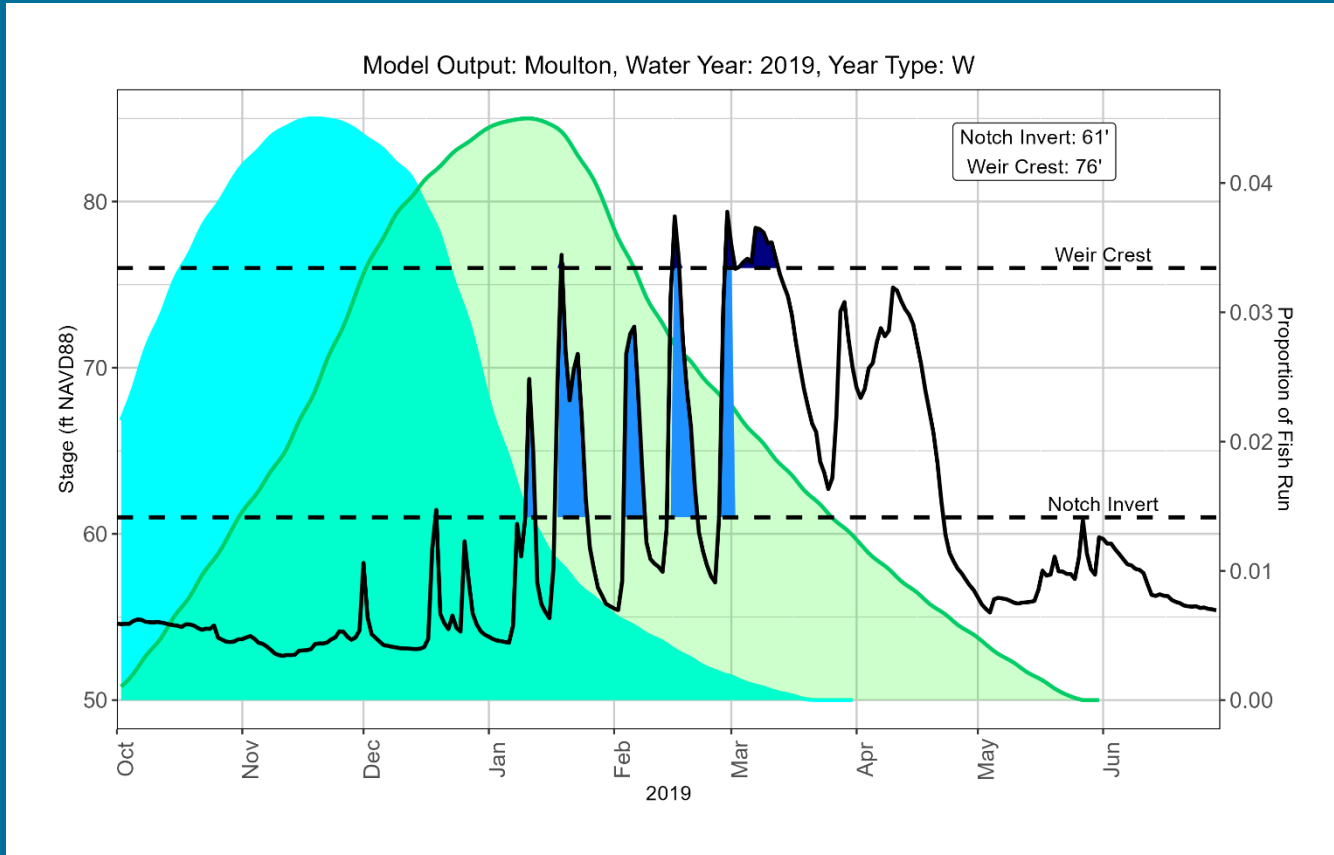
- Existing weir:
  - Overtops at 60,000 cfs and 76 ft
- Operable notch:
  - Operational window: 11/1 to 3/1
  - River stage range: 61 ft to 76 ft
  - River flow range: 18000 cfs to 60000 cfs
  - Notch flows: max rates of 1000, 2000, 3000, and 6000 cfs
- Operable notch features:
  - Inlet: grade 3800 ft channel
  - Outlet: regrade overflow channels

## Question/Discussion

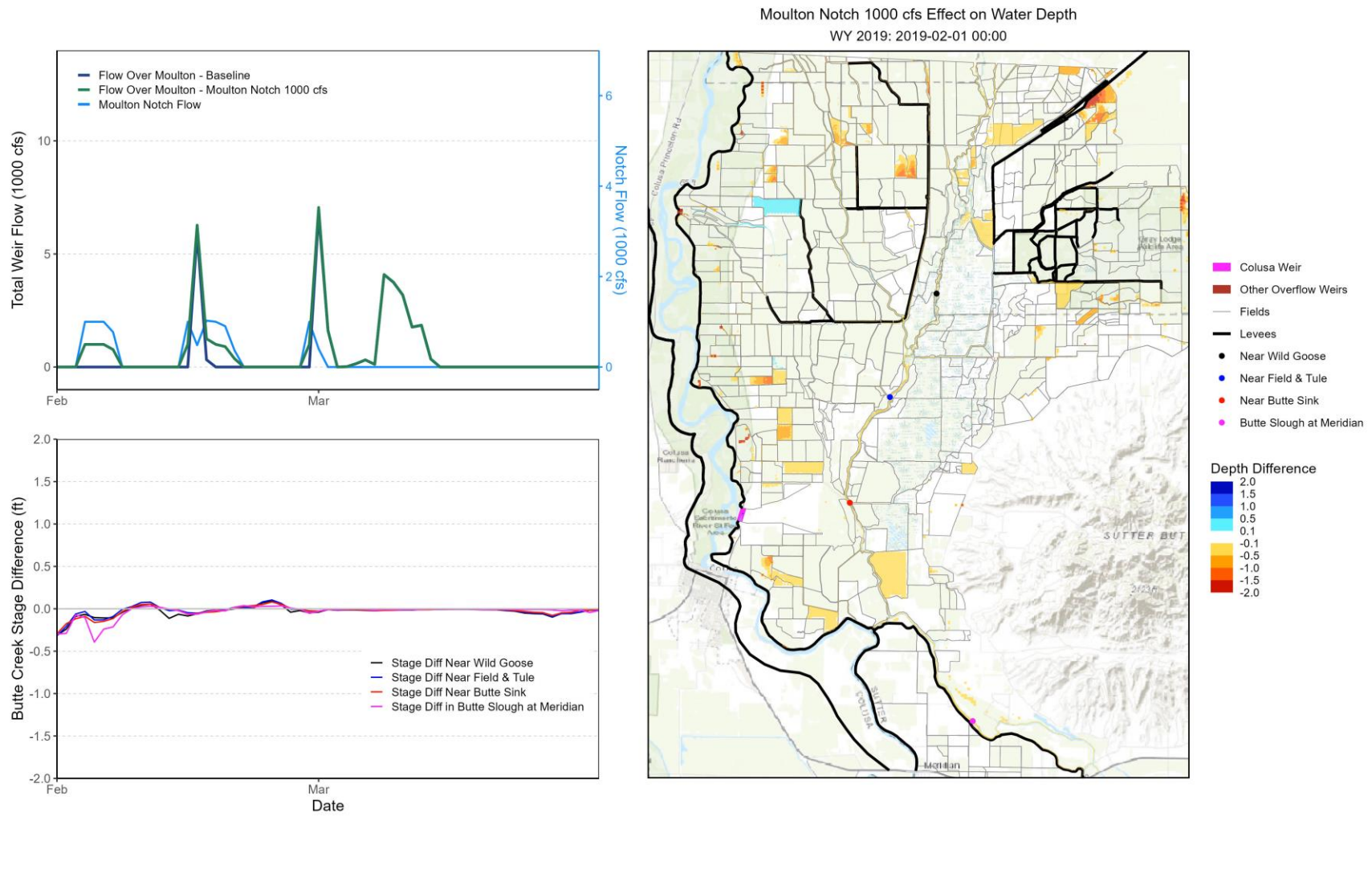
- Have we demonstrated feasibility of the notch action?



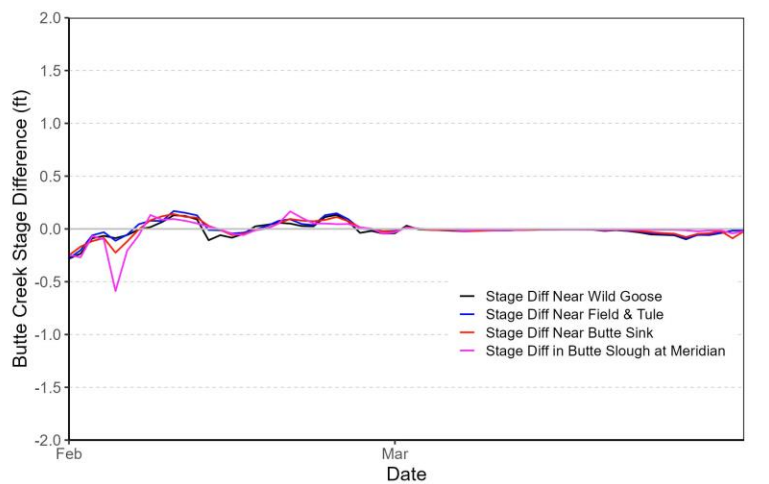
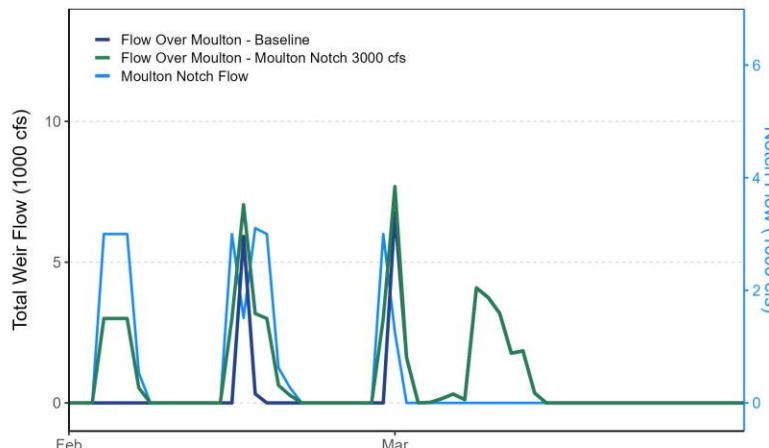
# Butte Basin – Moulton Weir Notch Action



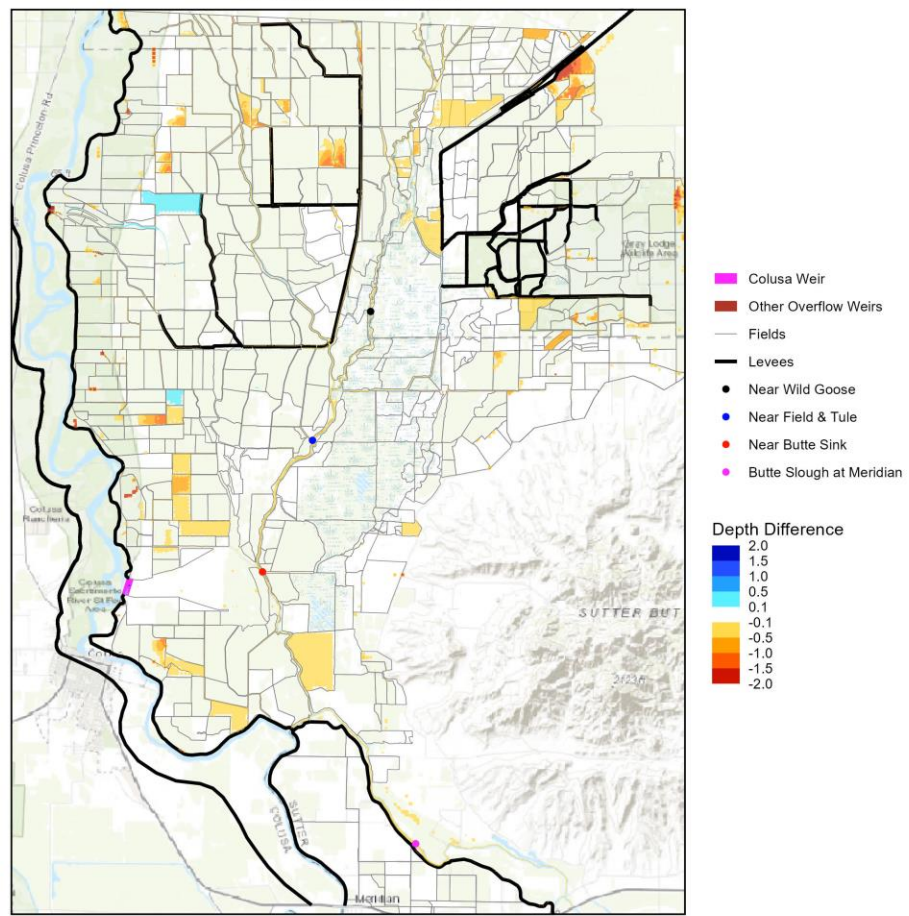
# Butte Basin – Moulton Weir Notch 1000 cfs Action



# Butte Basin – Moulton Weir Notch 3000 cfs Action



Moulton Notch 3000 cfs Effect on Water Depth  
WY 2019: 2019-02-01 00:00



# Butte Basin – Moulton Weir Notch Action

## 1000 cfs

## 2000 cfs

## 3000 cfs

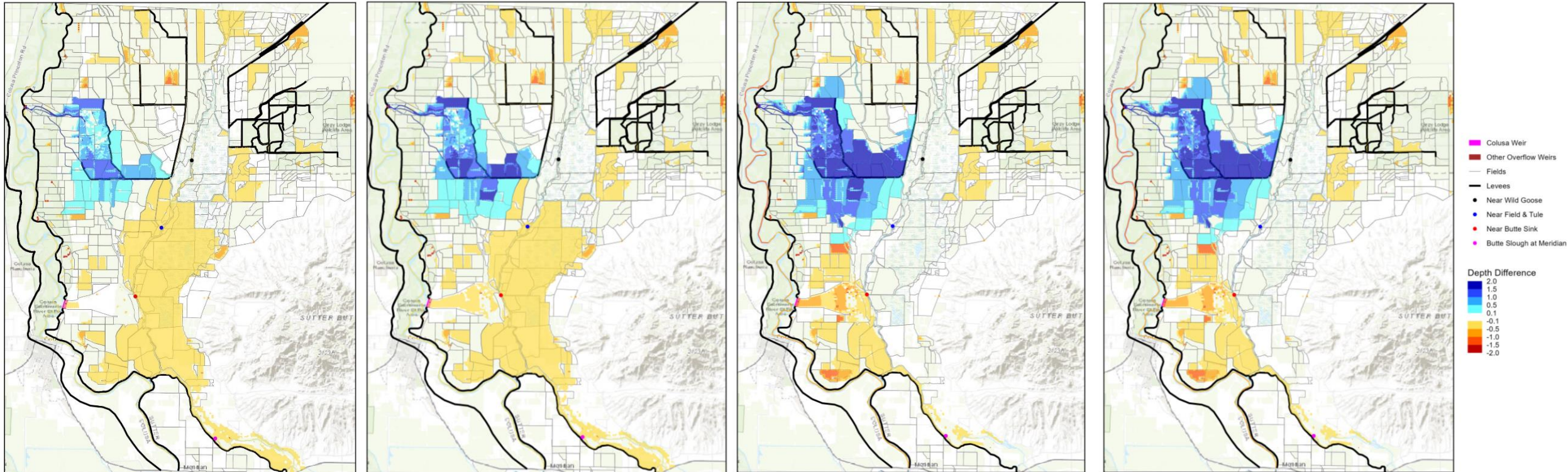
## 6000 cfs

Moulton Notch 1000 cfs Effect on Water Depth  
WY 2019: 2019-02-06 00:00

Moulton Notch 2000 cfs Effect on Water Depth  
WY 2019: 2019-02-06 00:00

Moulton Notch 3000 cfs Effect on Water Depth  
WY 2019: 2019-02-06 00:00

Moulton Notch 6000 cfs Effect on Water Depth  
WY 2019: 2019-02-06 00:00



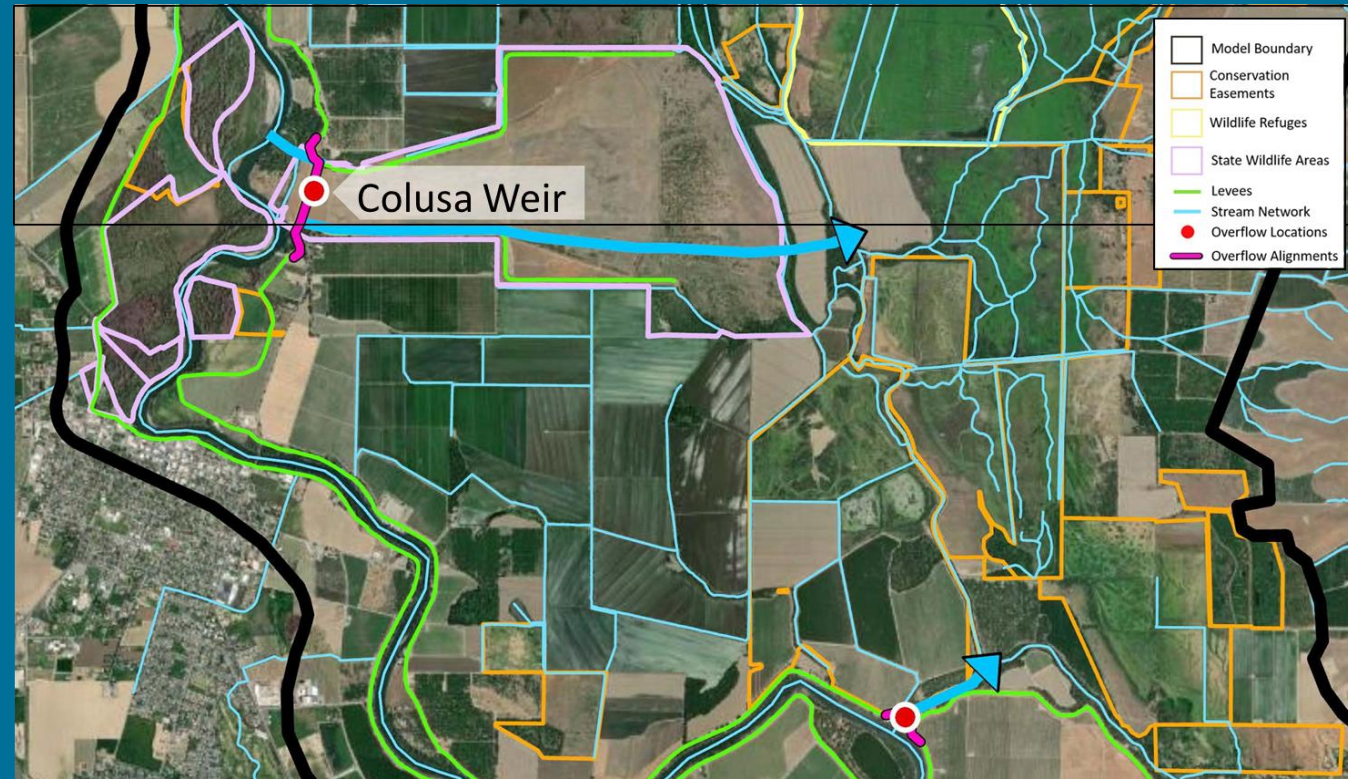
# Butte Basin – Colusa Weir Notch Action

## Description

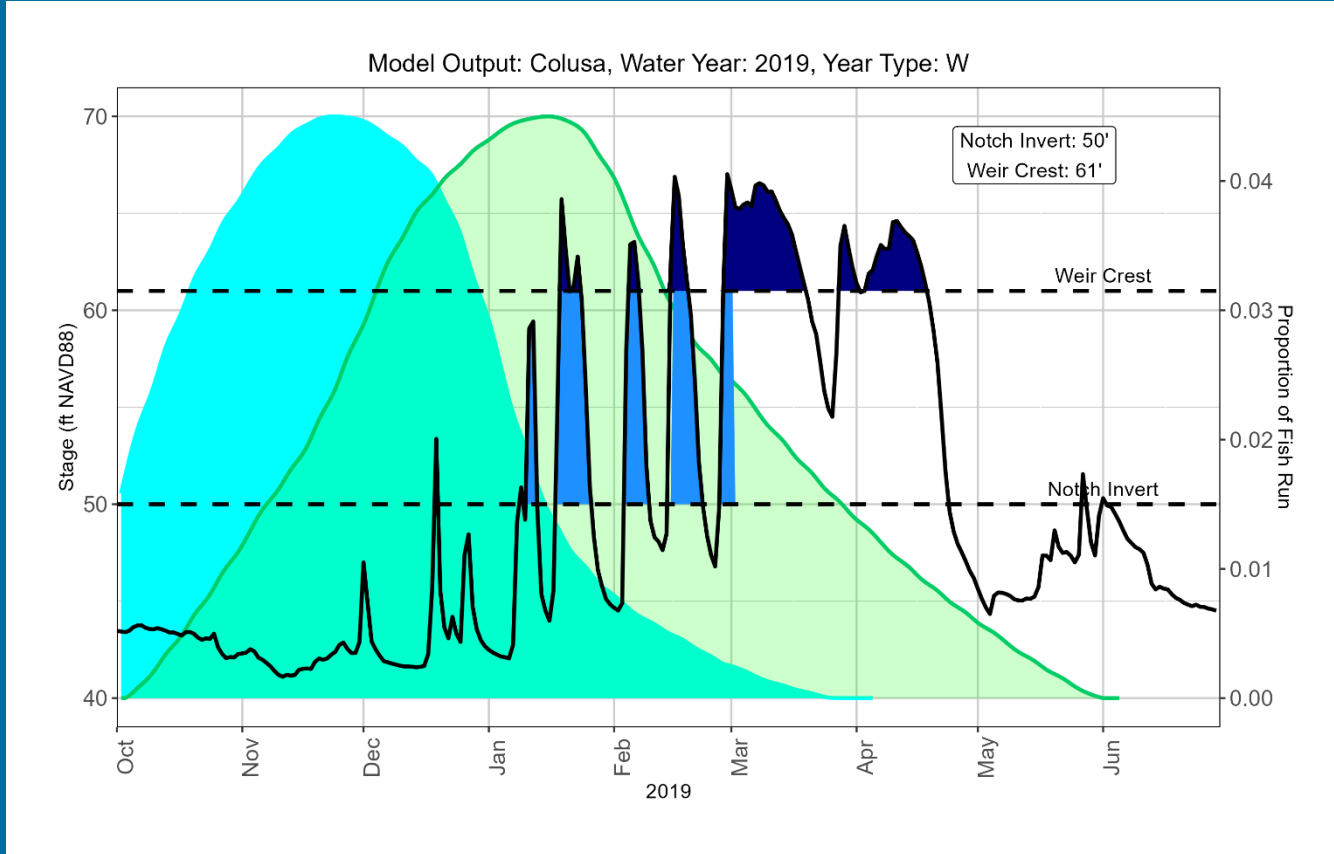
- Existing weir:
  - Overtops at 30,000 cfs and 61 ft
- Operable notch:
  - Operational window: 11/1 to 3/1
  - River stage range: 50 ft to 61 ft
  - River flow range: 16000 cfs to 30000 cfs
  - Notch flows: max rates of 1000, 2000, 3000, and 6000 cfs
- Operable notch features:
  - Inlet: regrade 1300 ft oxbows
  - Outlet: grade 15000 ft channel

## Question/Discussion

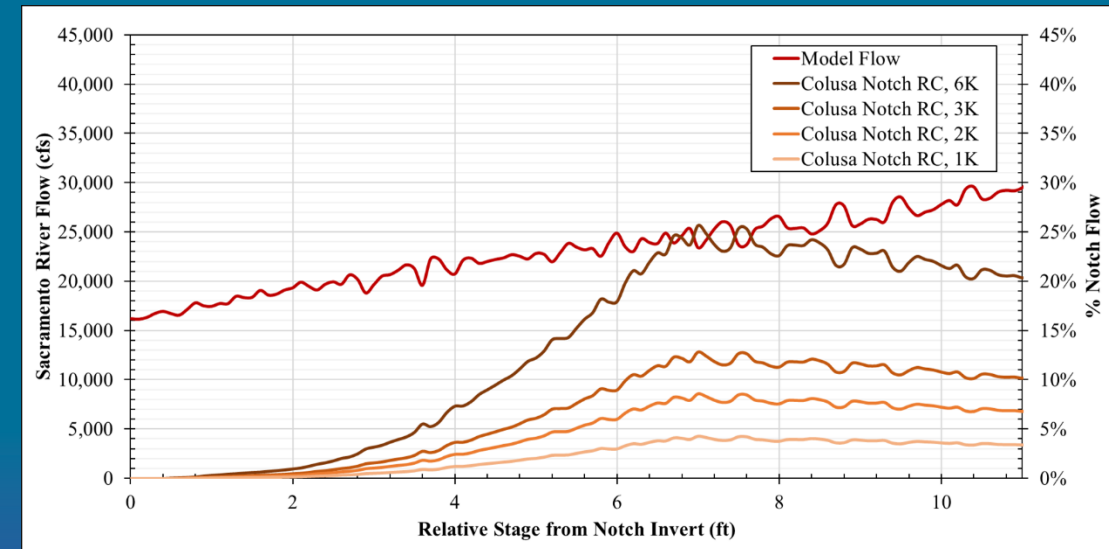
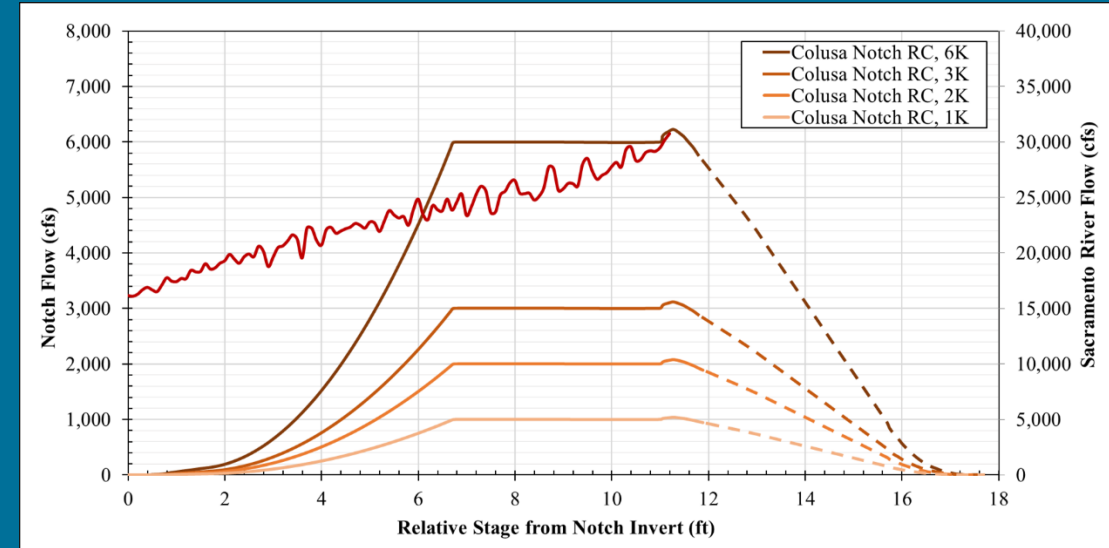
- Have we demonstrated feasibility of the notch action?



# Butte Basin – Colusa Weir Notch Action

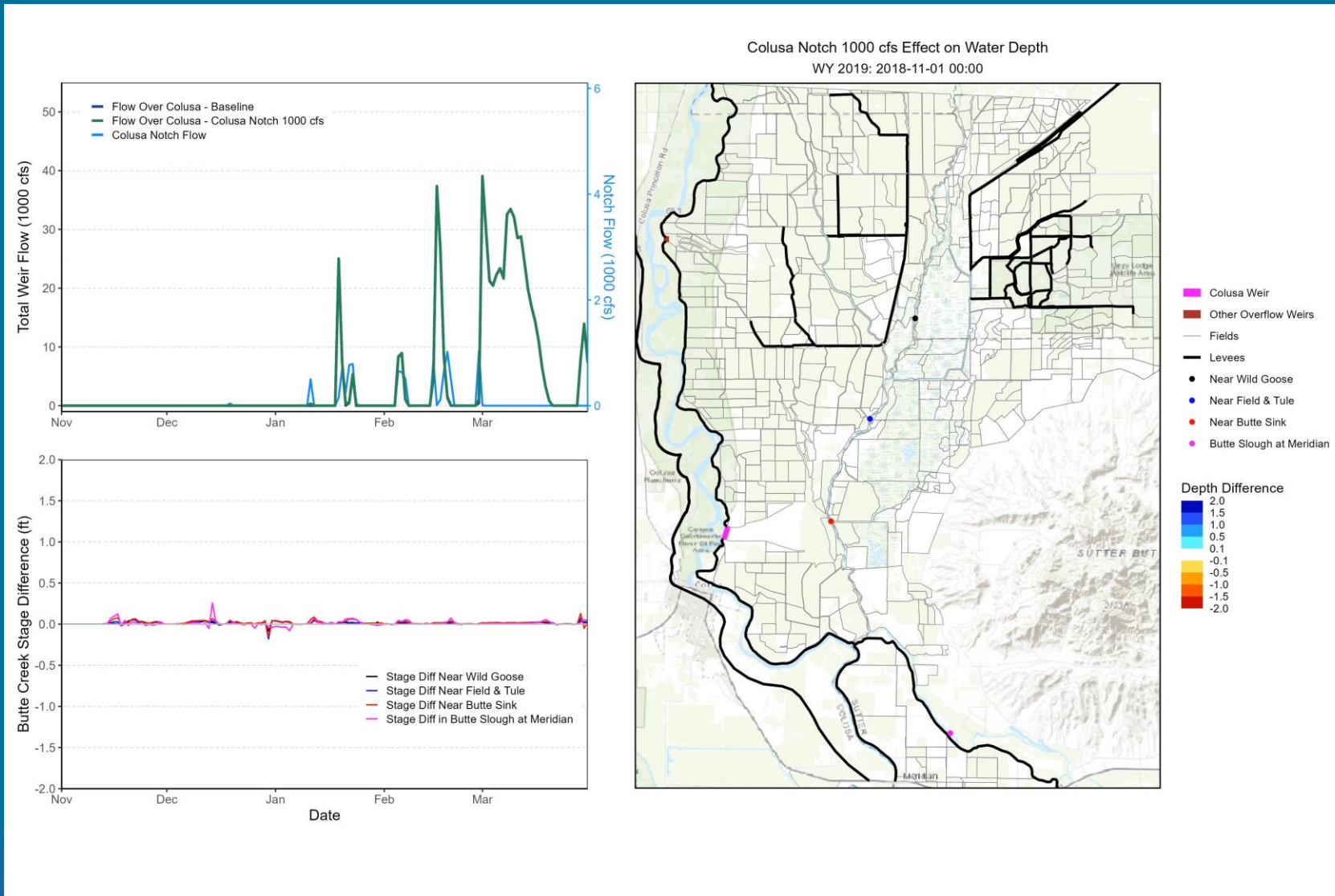


■ Notch Active: Open Nov 1 to Mar 1
 ■ Weir Overtopping
 ■ Winter Run
 ■ Fall/Spring Run

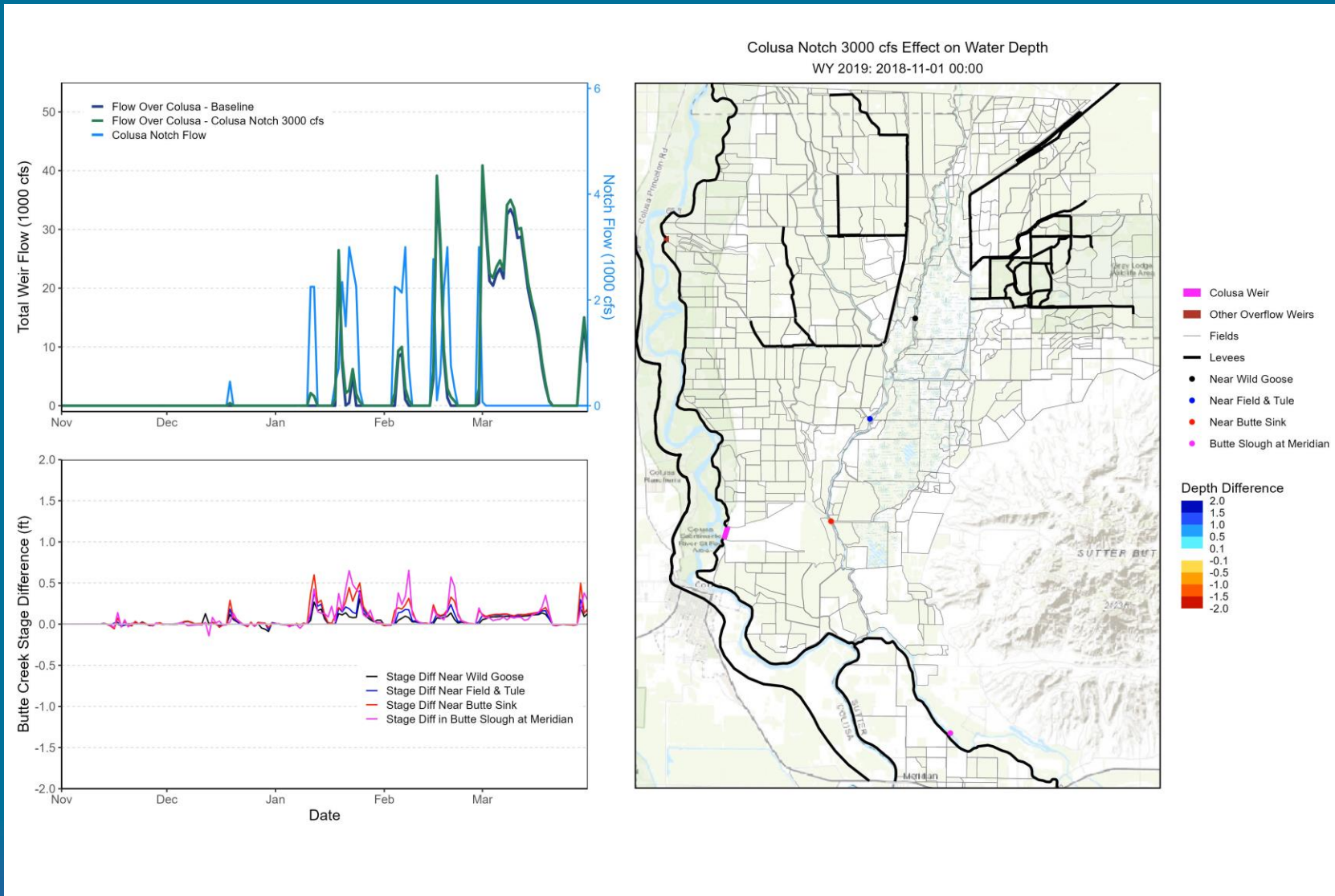




# Butte Basin – Colusa Weir Notch 1000 cfs Action



# Butte Basin – Colusa Weir Notch 3000 cfs Action



# Butte Basin – Colusa Weir Notch Action

1000 cfs

2000 cfs

3000 cfs

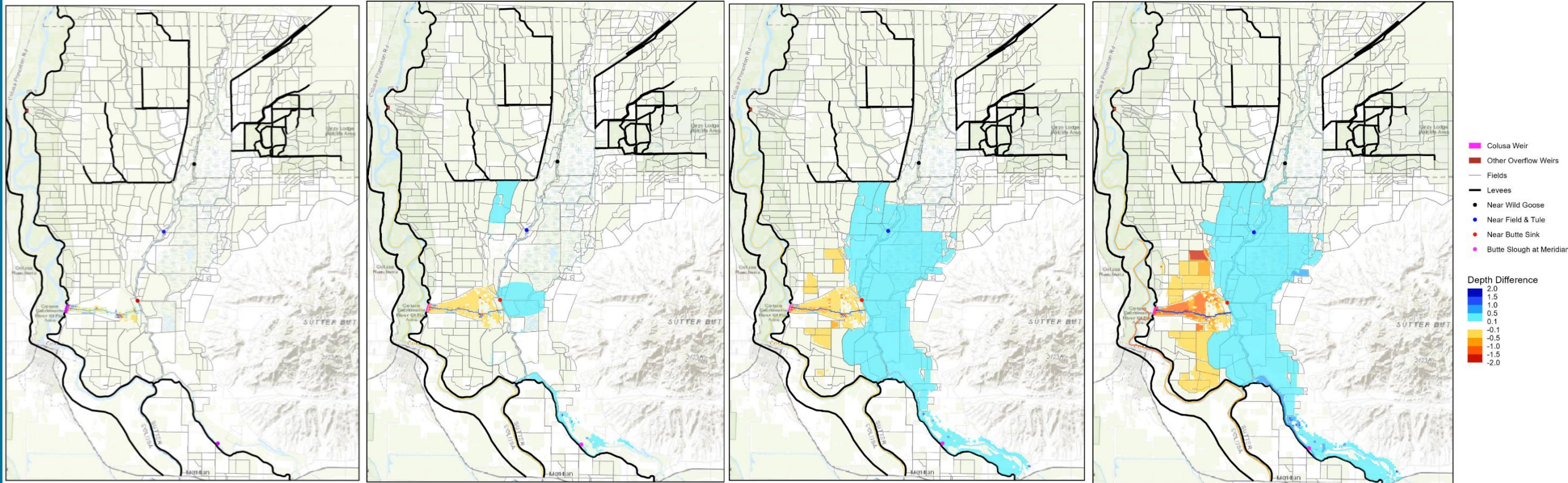
6000 cfs

Colusa Notch 1000 cfs Effect on Water Depth  
WY 2019: 2019-02-06 00:00

Colusa Notch 2000 cfs Effect on Water Depth  
WY 2019: 2019-02-06 00:00

Colusa Notch 3000 cfs Effect on Water Depth  
WY 2019: 2019-02-06 00:00

Colusa Notch 6000 cfs Effect on Water Depth  
WY 2019: 2019-02-06 00:00



# Salmon Habitat Suitability Criteria

## Juvenile Salmon Criteria

- Timing
  - November 1 – June 30 (1)
- Duration
  - $\geq 14$  days (1)
  - $< 14$  days (0.66)
- Depth
  - $> 0.9$  ft (1)
  - 0.6 - 0.9 ft (0.66)
- Velocity
  - $\leq 1.5$  ft/s (1)
- Connectivity
  - Natural areas hydraulically connected (1)
  - Managed fields connected through berm overtopping (1)
  - Managed fields connected through outlet structure (0.66)
- Landcover
  - Riparian/wetland/open water (1)
  - Rice/ Agriculture (0.66)

# Bird Habitat Suitability Criteria

## Waterfowl Criteria

- Timing
  - August 15 – March 31
- Depth
  - < 12 in
- Landcover
  - Managed Wetlands and Rice

## Shorebird Criteria

- Timing
  - July 1 – May 15
- Depth
  - < 4 in
- Landcover
  - Managed Wetlands, Rice, Field and Row Crops

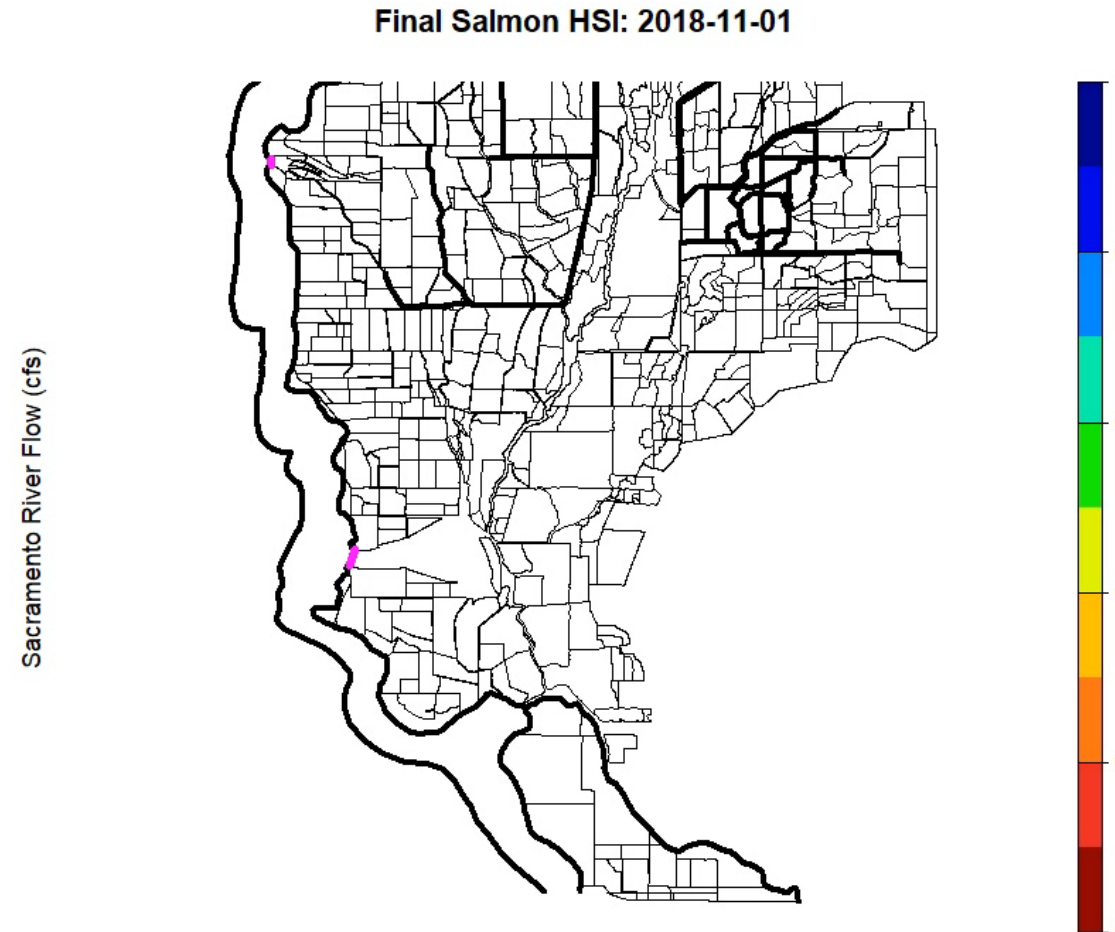
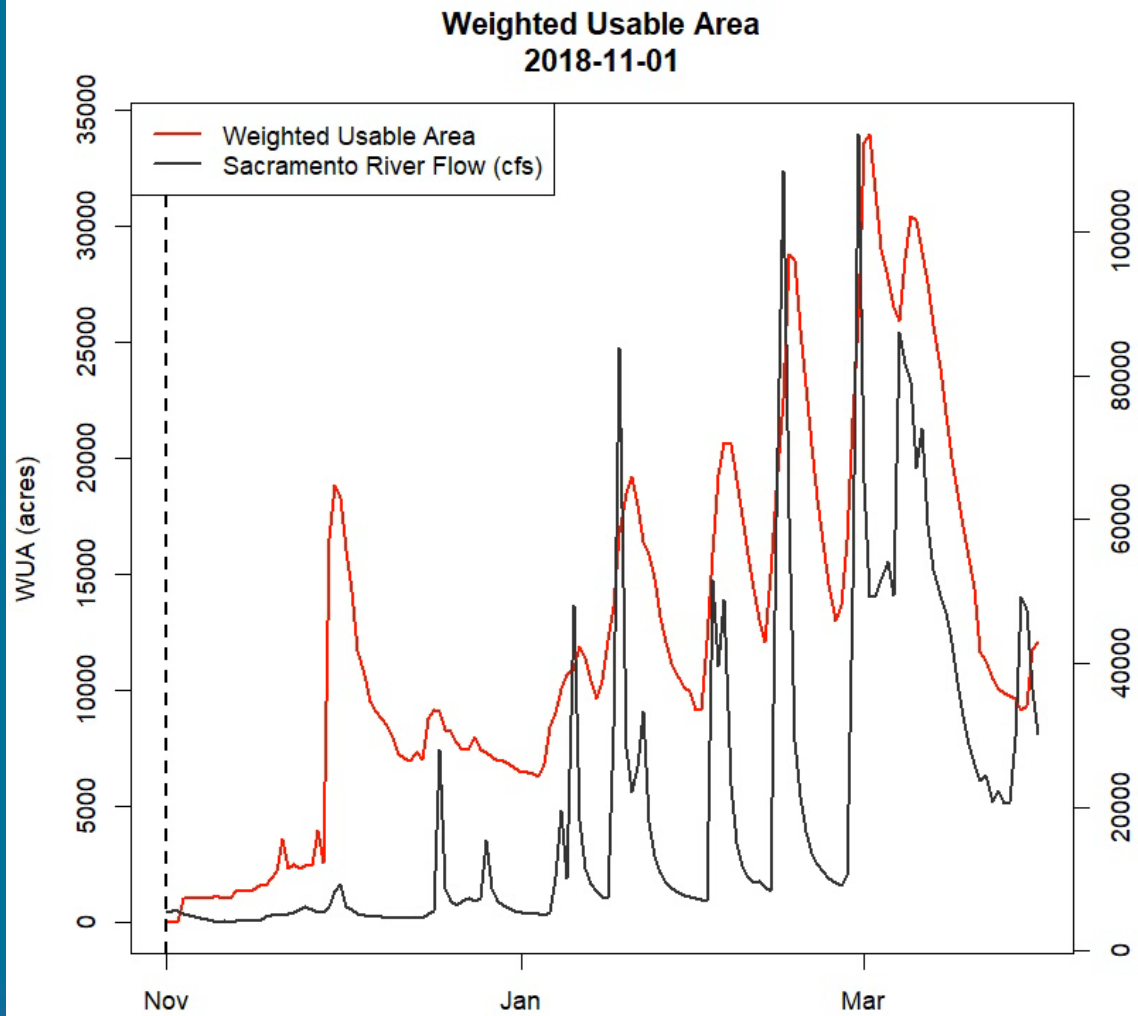
## Sandhill Crane Roosting

- Timing
  - October 1 – March 15
- Depth
  - < 8 in
- Landcover
  - Managed Wetlands, Rice, and Corn

## Sandhill Crane Foraging

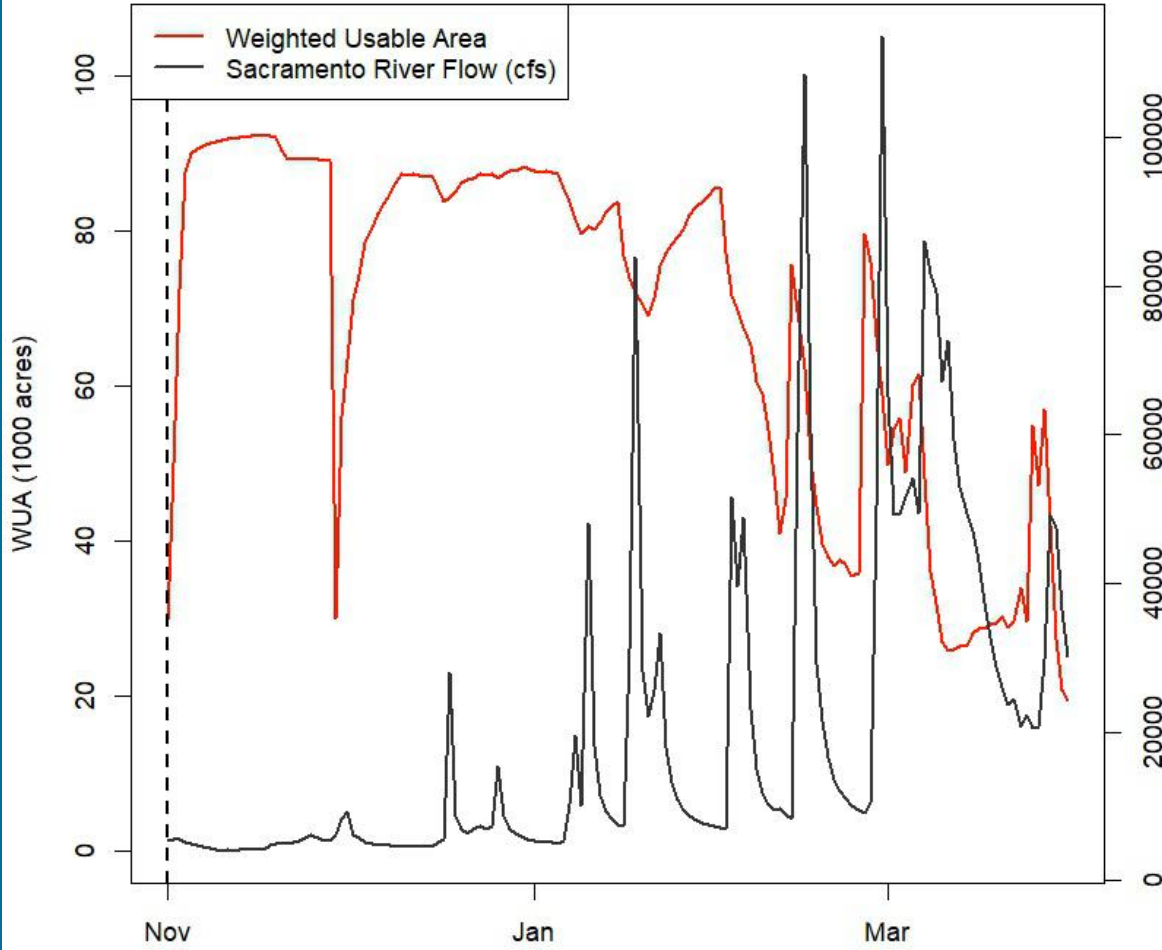
- Timing
  - October 1 – March 15
- Depth
  - < 2 in
- Landcover
  - Wetlands or annual crops within 5km of known roost

# Salmon Habitat Suitability – Baseline

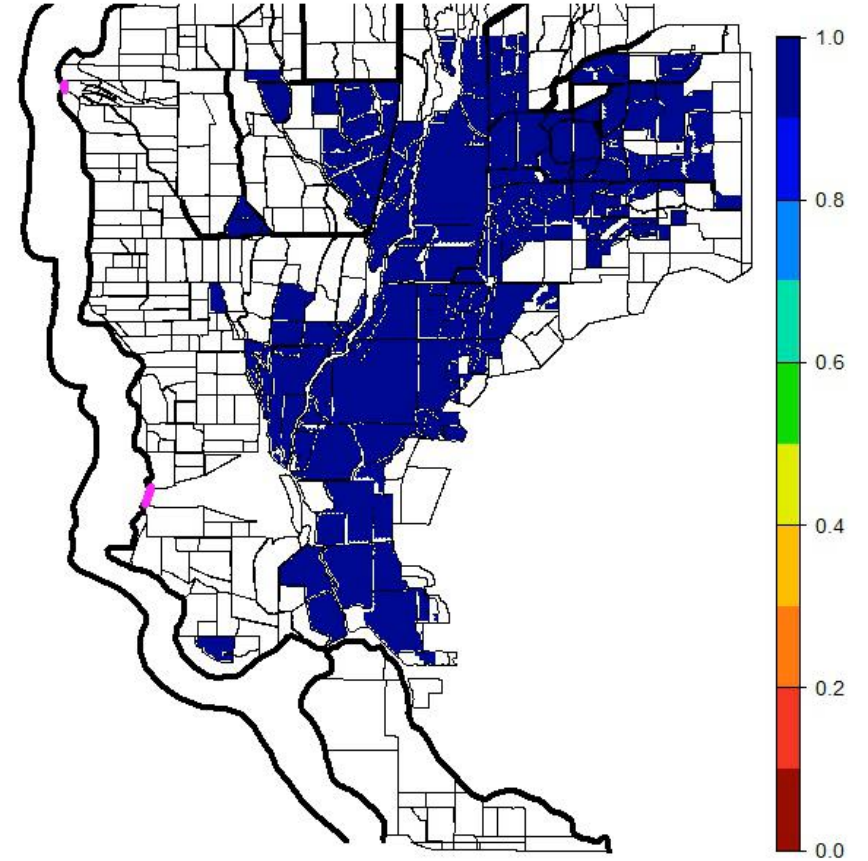


# Waterfowl Habitat Suitability – Baseline

Weighted Usable Area  
2018-11-01



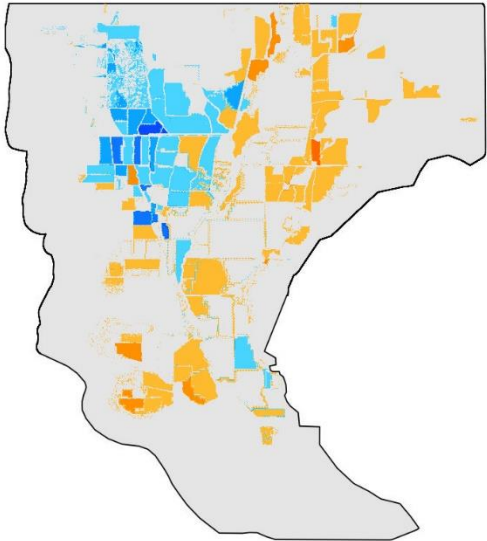
Final Salmon HSI: 2018-11-01



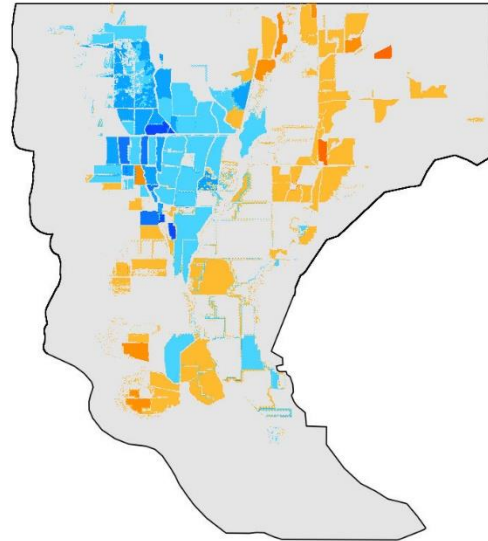
# Salmon Habitat Suitability – Difference in Total WUA

## 2019

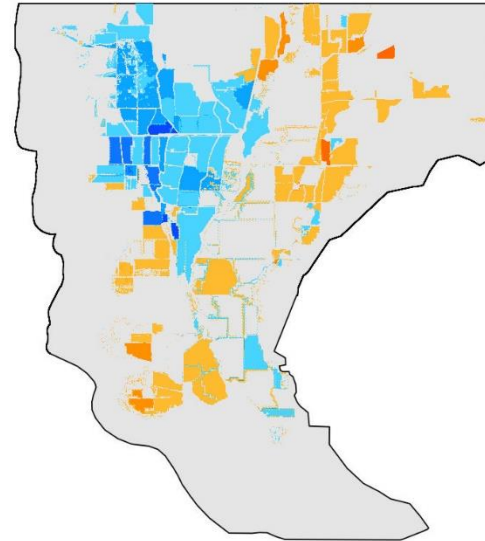
Moulton Notch  
1000 cfs Max



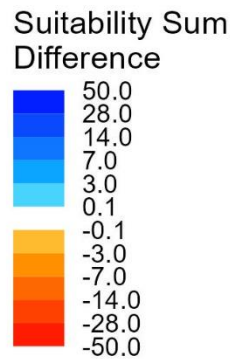
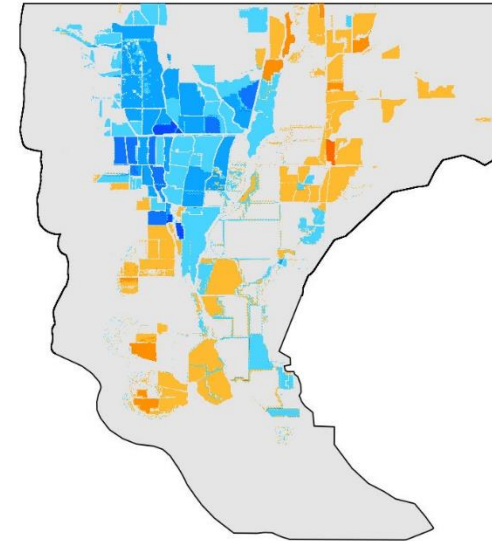
Moulton Notch  
2000 cfs Max



Moulton Notch  
3000 cfs Max



Moulton Notch  
6000 cfs Max

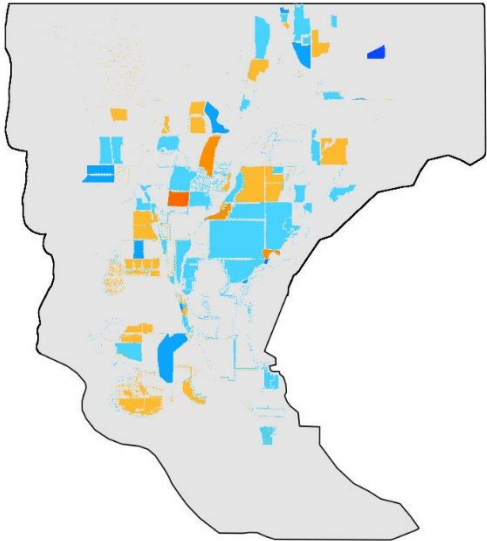




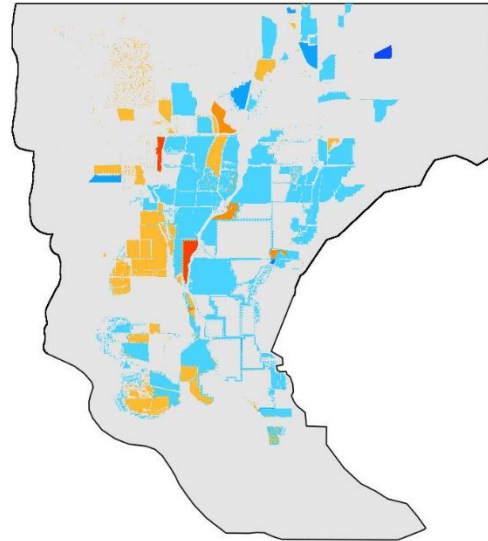
# Salmon Habitat Suitability – Difference in Total WUA

## 2019

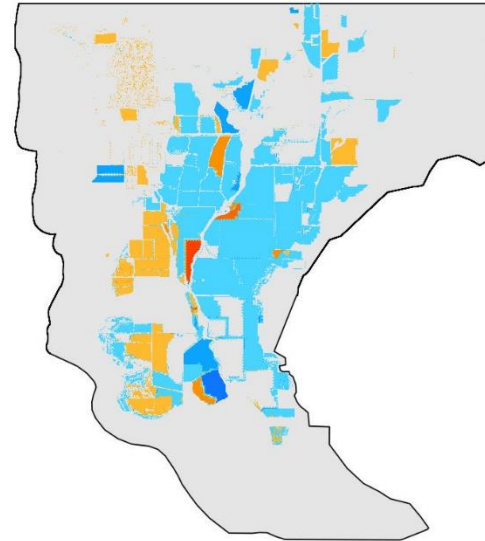
Colusa Notch  
1000 cfs Max



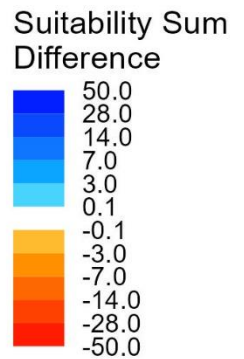
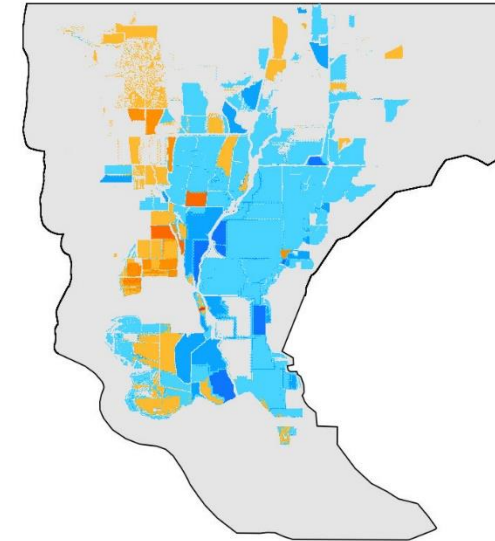
Colusa Notch  
2000 cfs Max



Colusa Notch  
3000 cfs Max



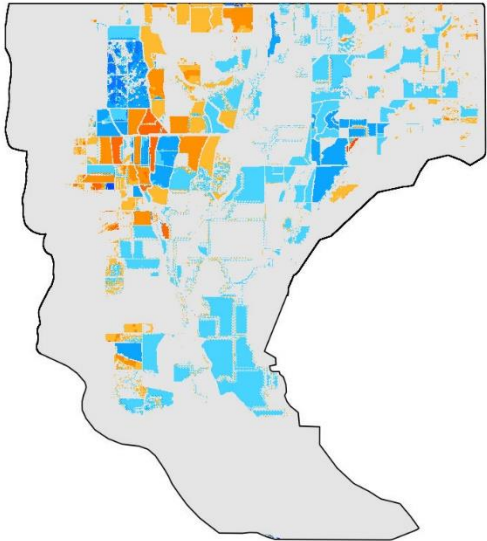
Colusa Notch  
6000 cfs Max



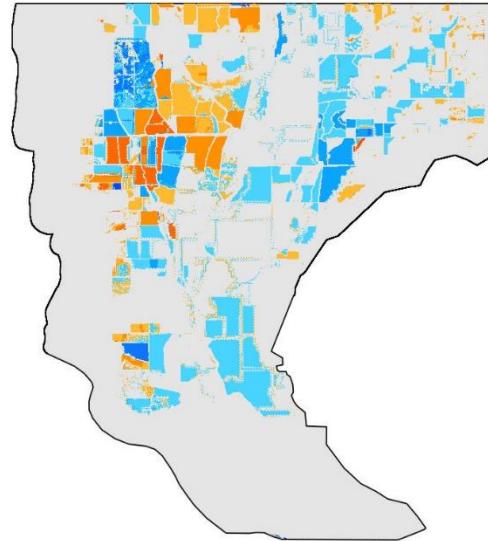
# Waterfowl Habitat Suitability – Difference in Total WUA

## 2019

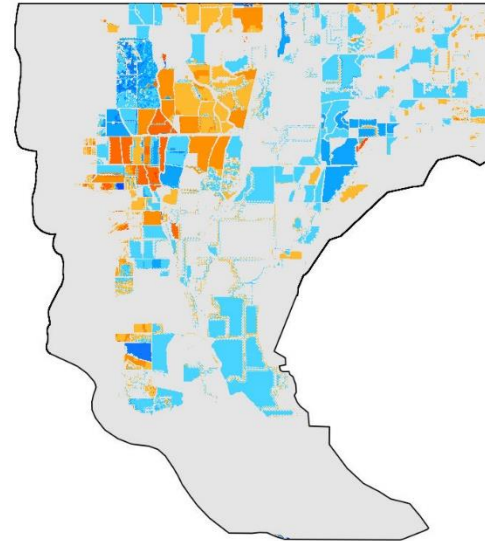
Moulton Notch  
1000 cfs Max



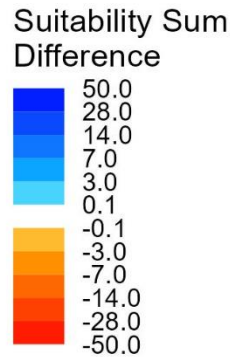
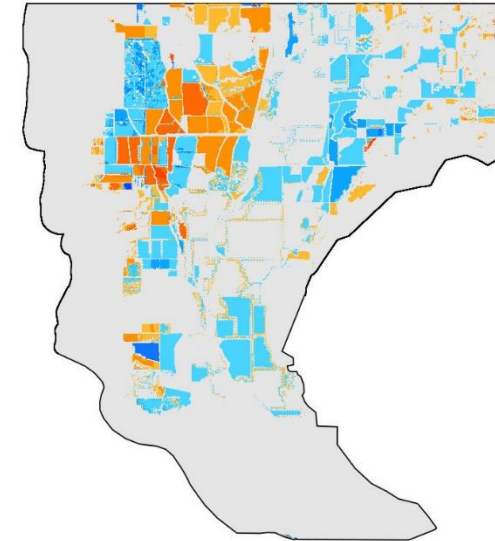
Moulton Notch  
2000 cfs Max



Moulton Notch  
3000 cfs Max



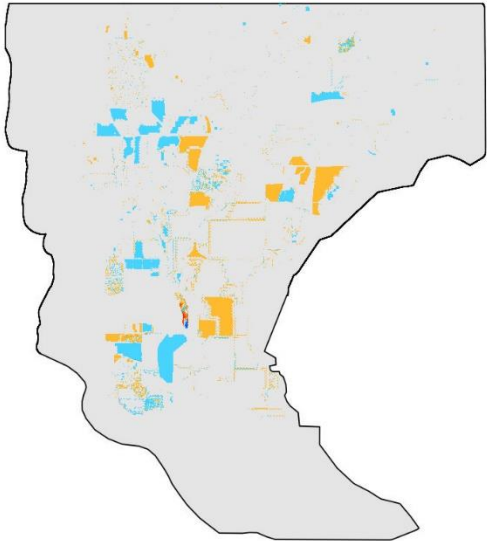
Moulton Notch  
6000 cfs Max



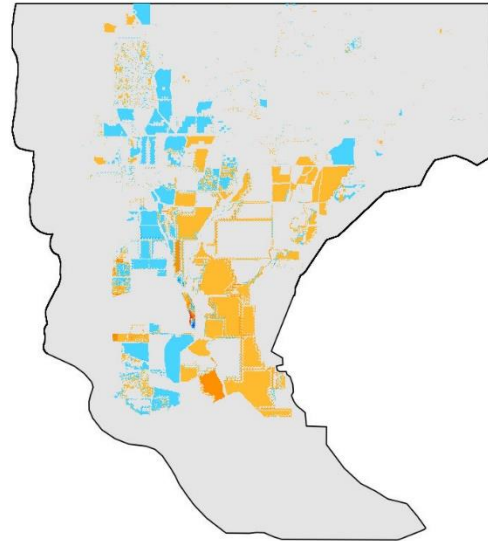
# Waterfowl Habitat Suitability – Difference in Total WUA

## 2019

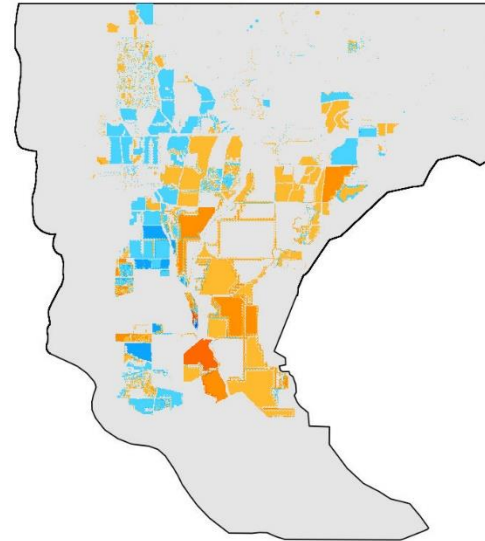
Colusa Notch  
1000 cfs Max



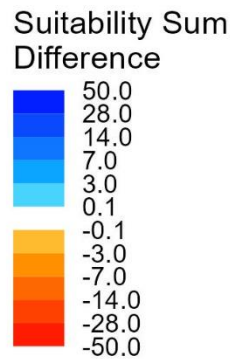
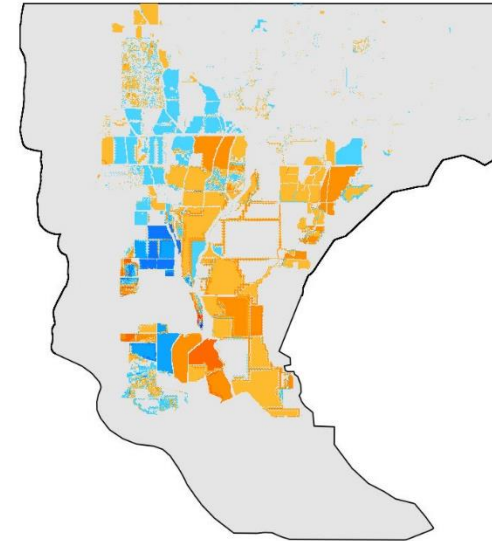
Colusa Notch  
2000 cfs Max



Colusa Notch  
3000 cfs Max



Colusa Notch  
6000 cfs Max

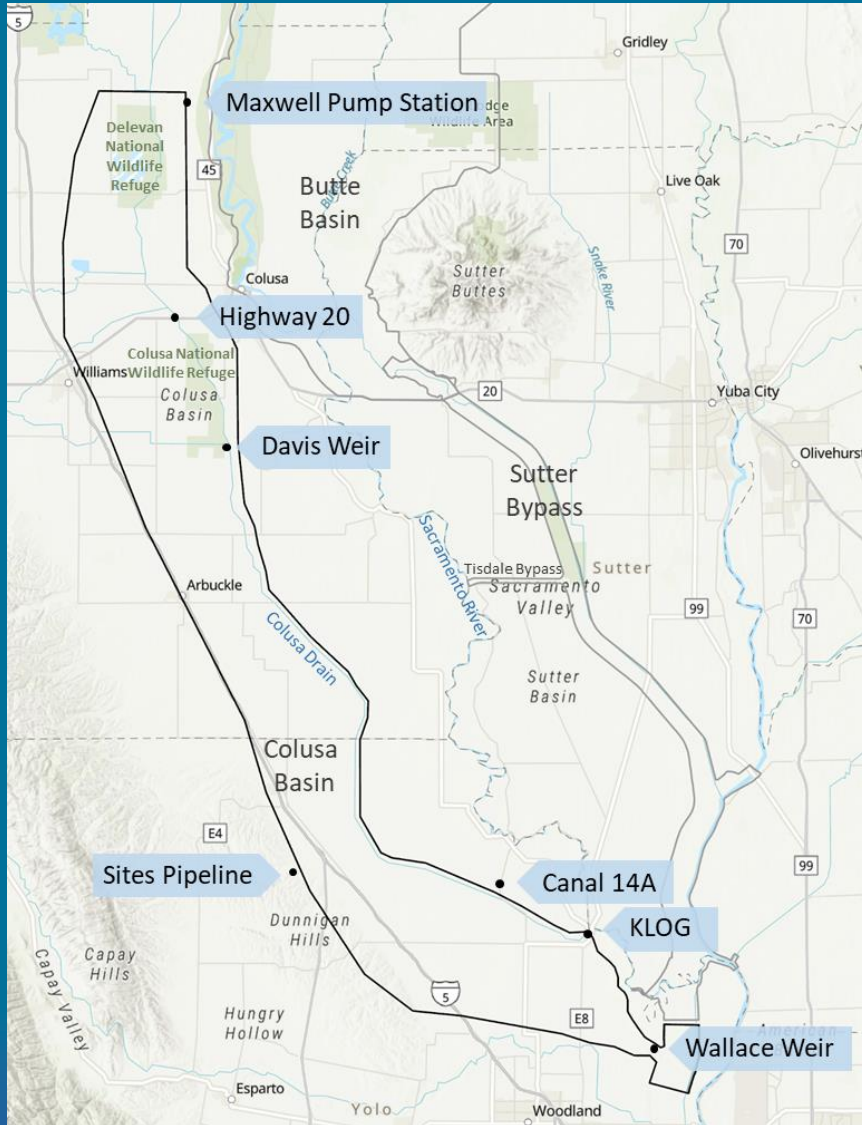


# WUA Summary – 2019

Feb 1 – Mar 31	Baseline WUA (acres)	Moulton 1k cfs Notch	Moulton 2k cfs Notch	Moulton 3k cfs Notch	Moulton 6k cfs Notch
<b>Salmon Floodplain</b>	873,808	0.2%	1.0%	1.6%	2.5%
<b>Waterfowl</b>	759,848	1.4%	0.9%	0.7%	-0.4%

Nov 1 – Mar 31	Baseline WUA (acres)	Colusa 1k cfs Notch	Colusa 2k cfs Notch	Colusa 3k cfs Notch	Colusa 6k cfs Notch
<b>Salmon Floodplain</b>	1,416,327	0.3%	0.1%	0.5%	1.6%
<b>Waterfowl</b>	2,977,001	0.0%	-0.1%	-0.3%	-0.3%

# Colusa Basin – Wallace Weir Water Level Management Action



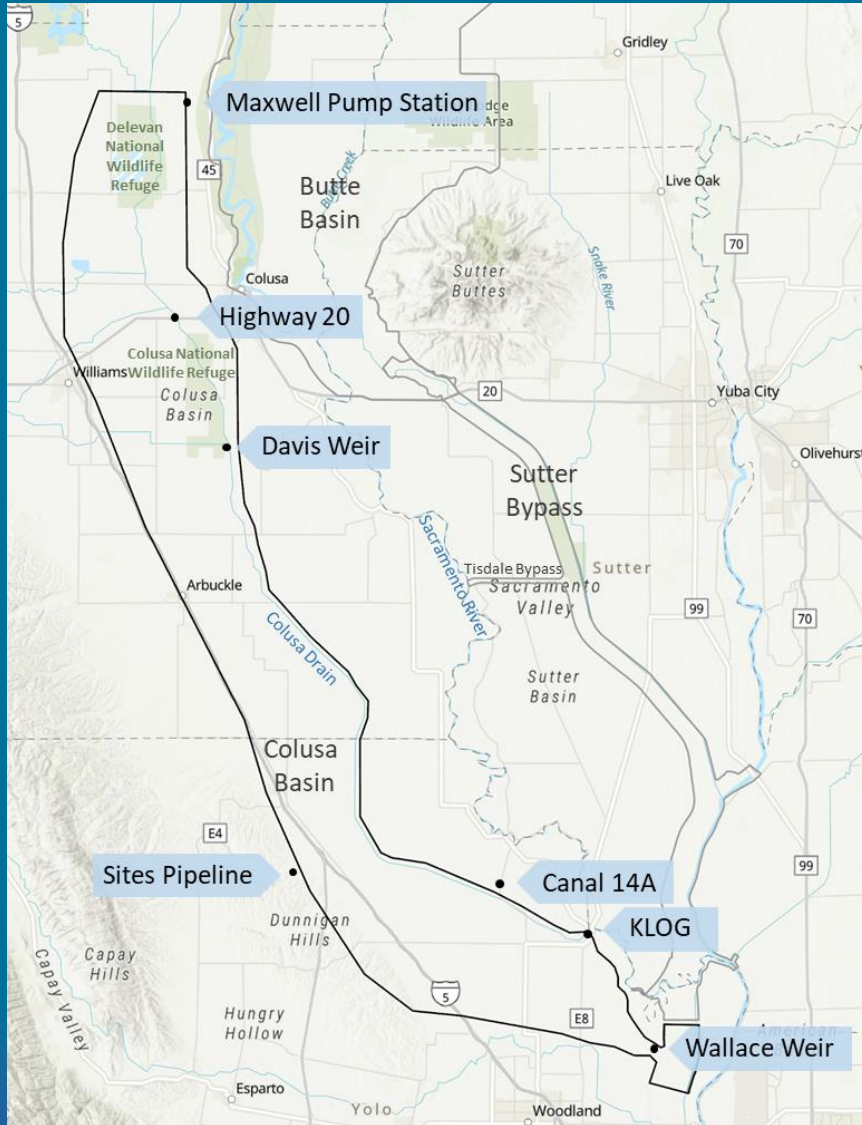
## Description

- Reoperate Wallace Weir and KLOG to maintain a higher management level in the Colusa Drain
- Potential to increase in flow in Colusa Drain through multiple potential locations for water additions or Sacramento River connections

## Questions

- Is it physically possible to accommodate volitional ingress/egress on the adjoining floodplain if juvenile salmon were introduced to the basin?
- Should juvenile salmon access into Colusa Basin be considered?

# Colusa Basin – Wallace Weir Water Level Management Action

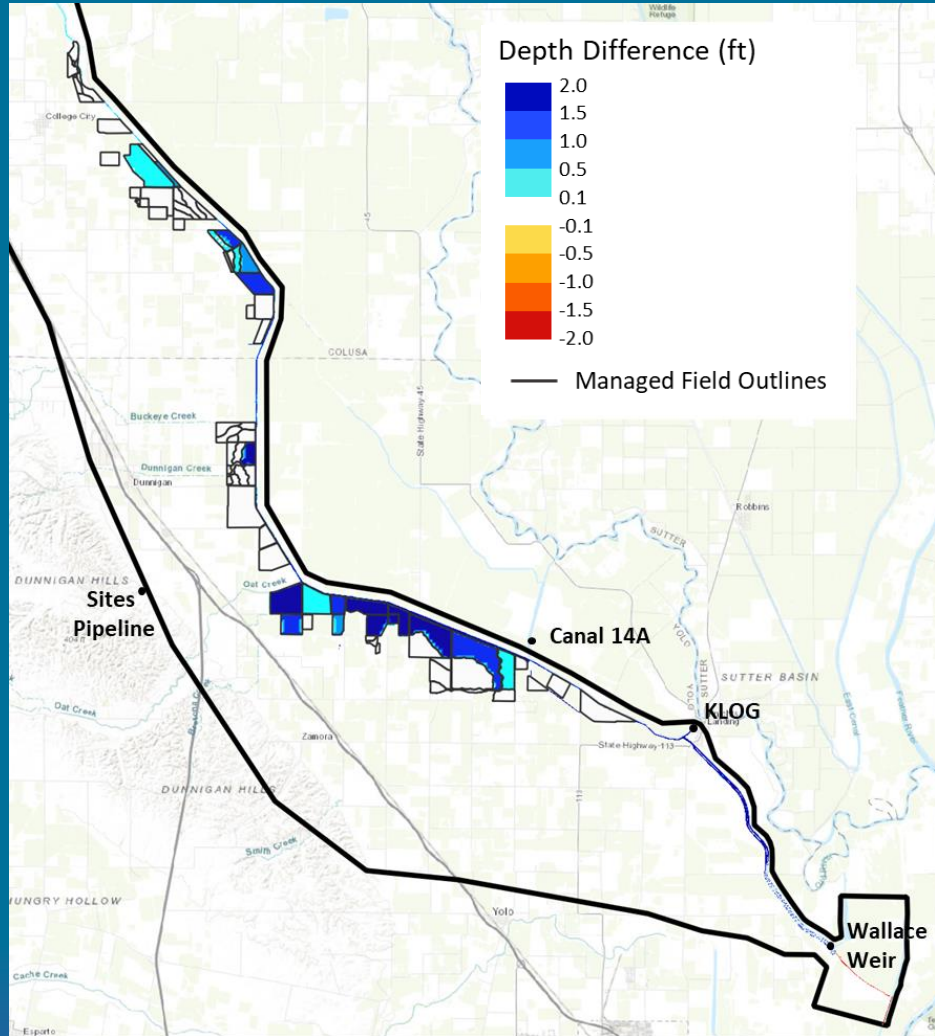


## Description

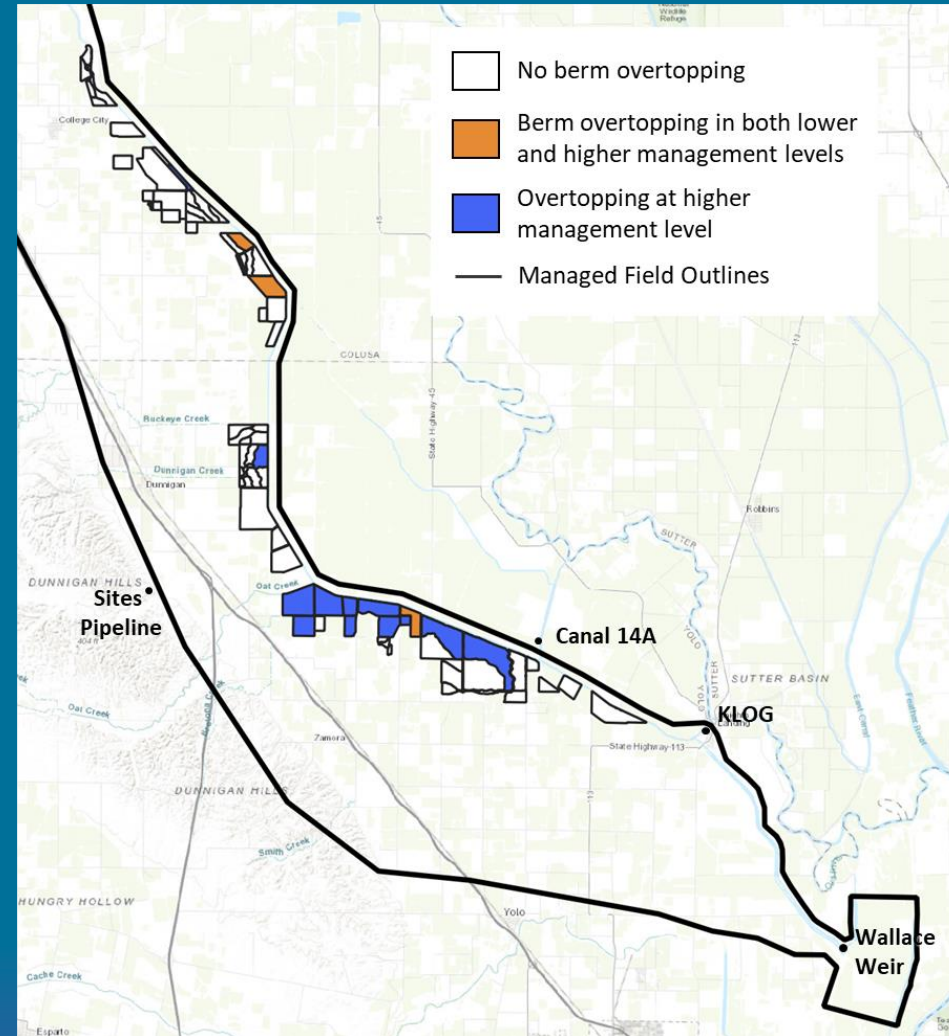
- Wallace Weir Baseline:
  - Operate Wallace Weir to maintain a **current management level of 22.4 ft** at KLOG
- Wallace Weir Action:
  - Operate Wallace Weir to maintain a **higher management level of 27.75 ft** upstream of Wallace Weir
- Analysis:
  - Compare the depths in the inundation area along the drain between the two management levels
    - Four constant flows: 1000, 2000, 3000, and 4000 cfs
  - Identify when managed wetlands would experience berm overtopping events to allow for juvenile salmon access
  - Note: there is subsidence in the lower half of the basin with subsidence of 1-1.5 ft in the last 15 years

# Colusa Basin Action Evaluation – 1000 cfs

## Action – Baseline

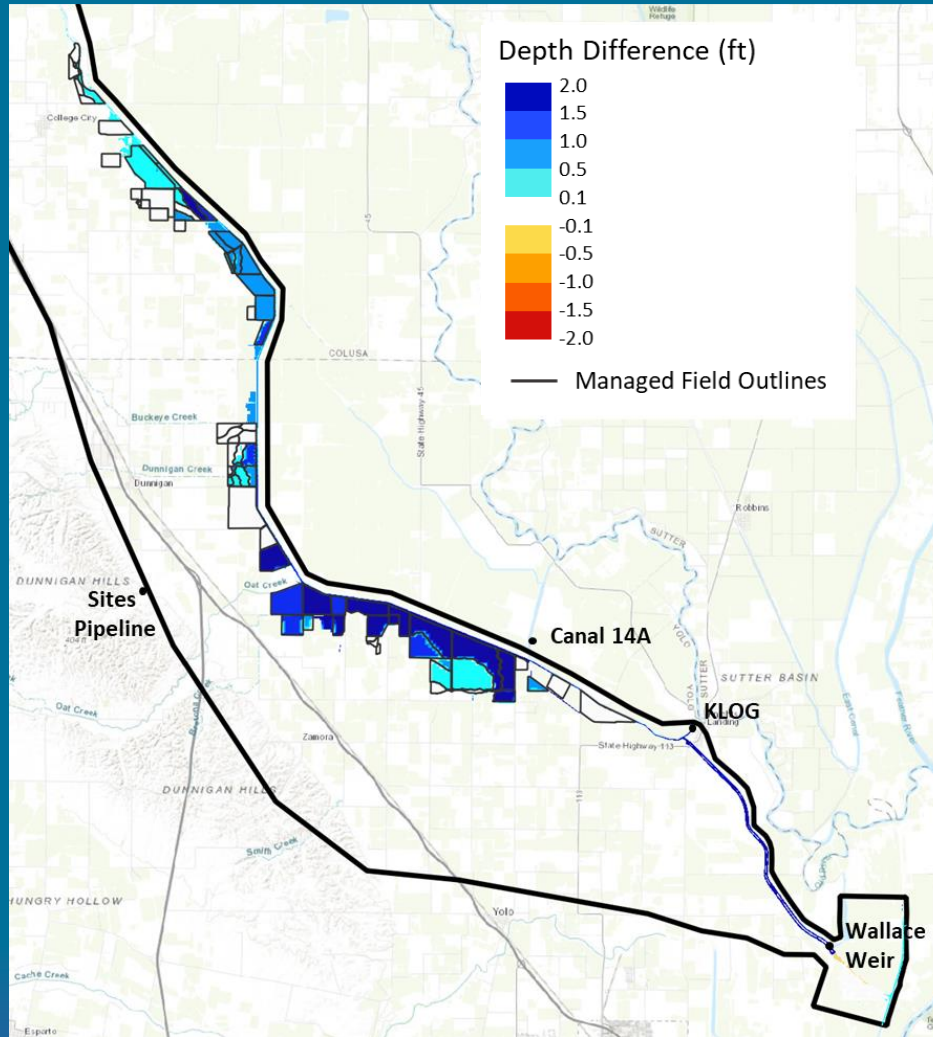


## Managed Wetland Berm Overtopping

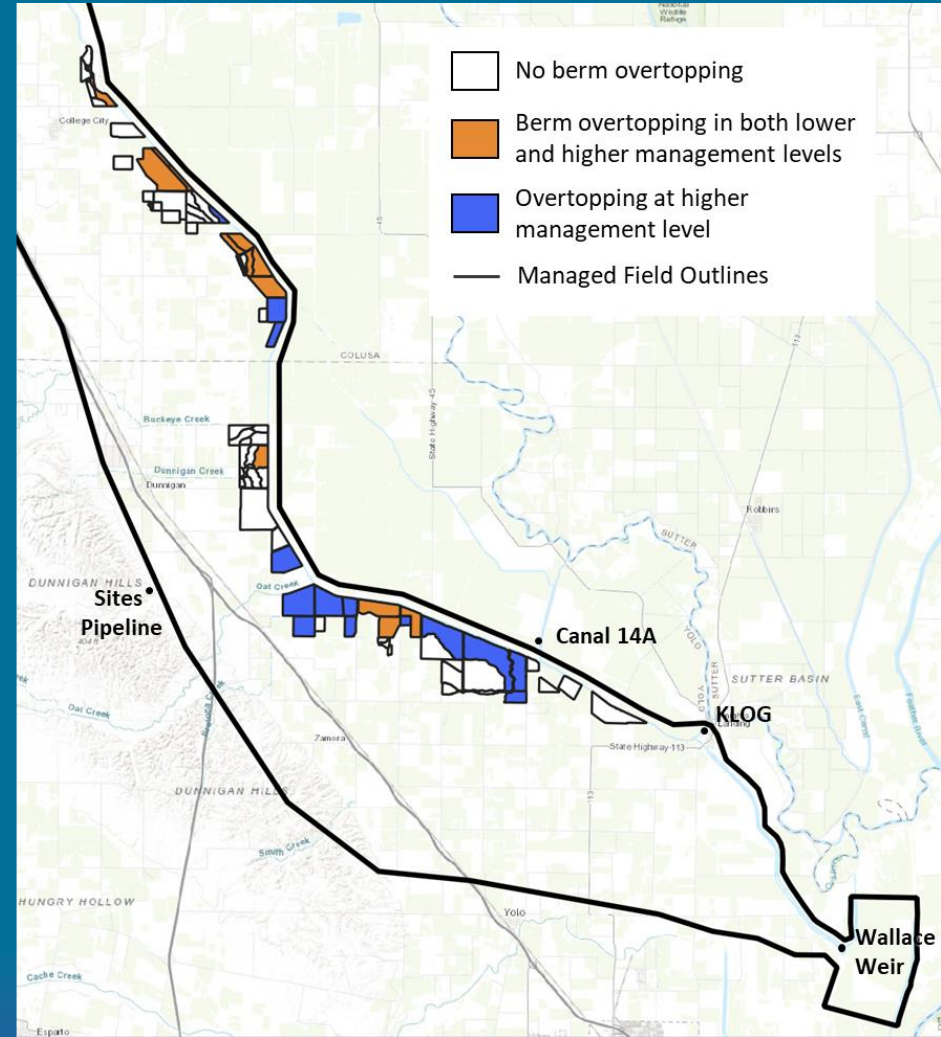


# Colusa Basin Action Evaluation – 2000 cfs

## Action – Baseline



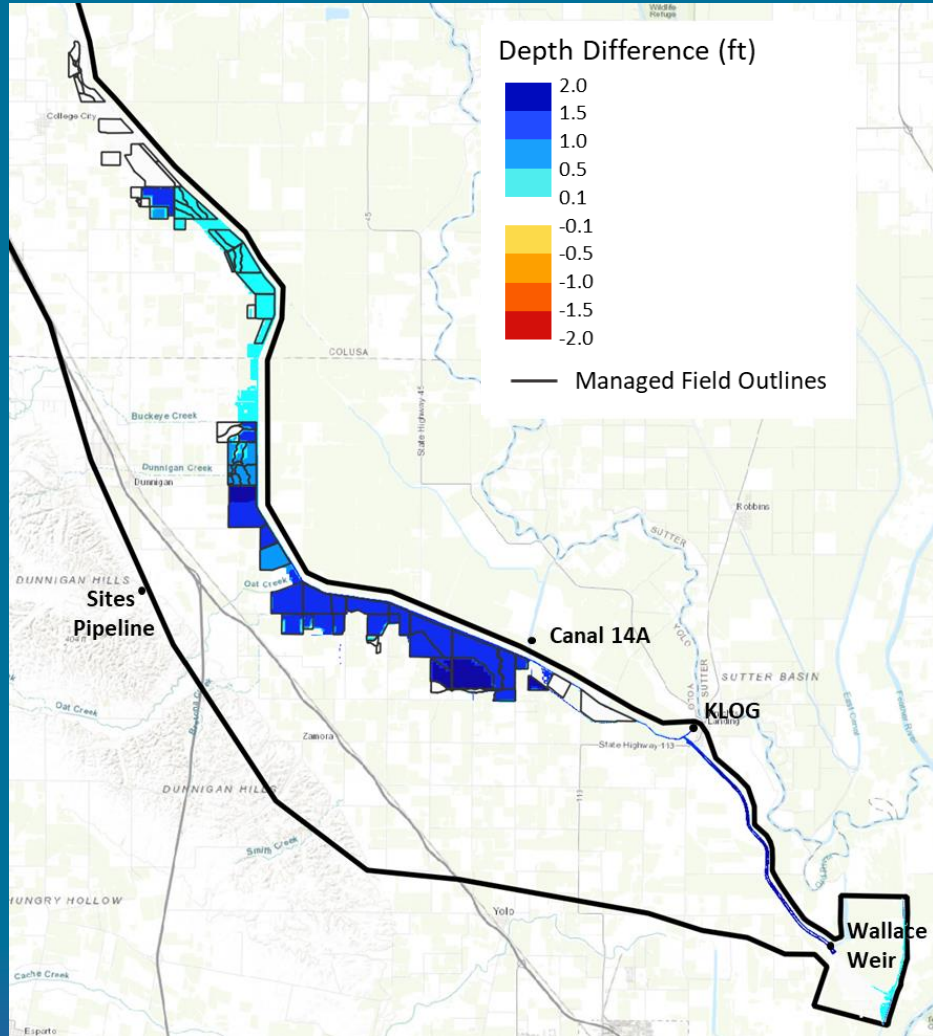
## Managed Wetland Berm Overtopping



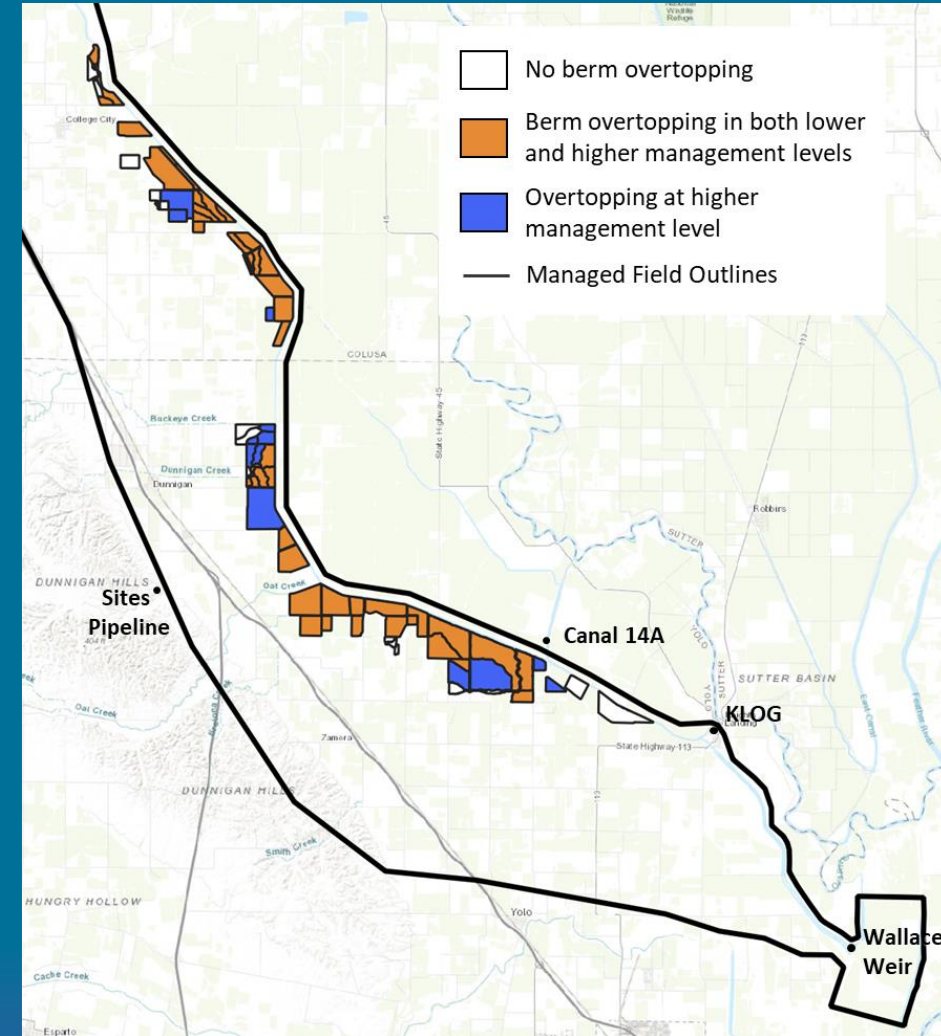


# Colusa Basin Action Evaluation – 3000 cfs

## Action – Baseline

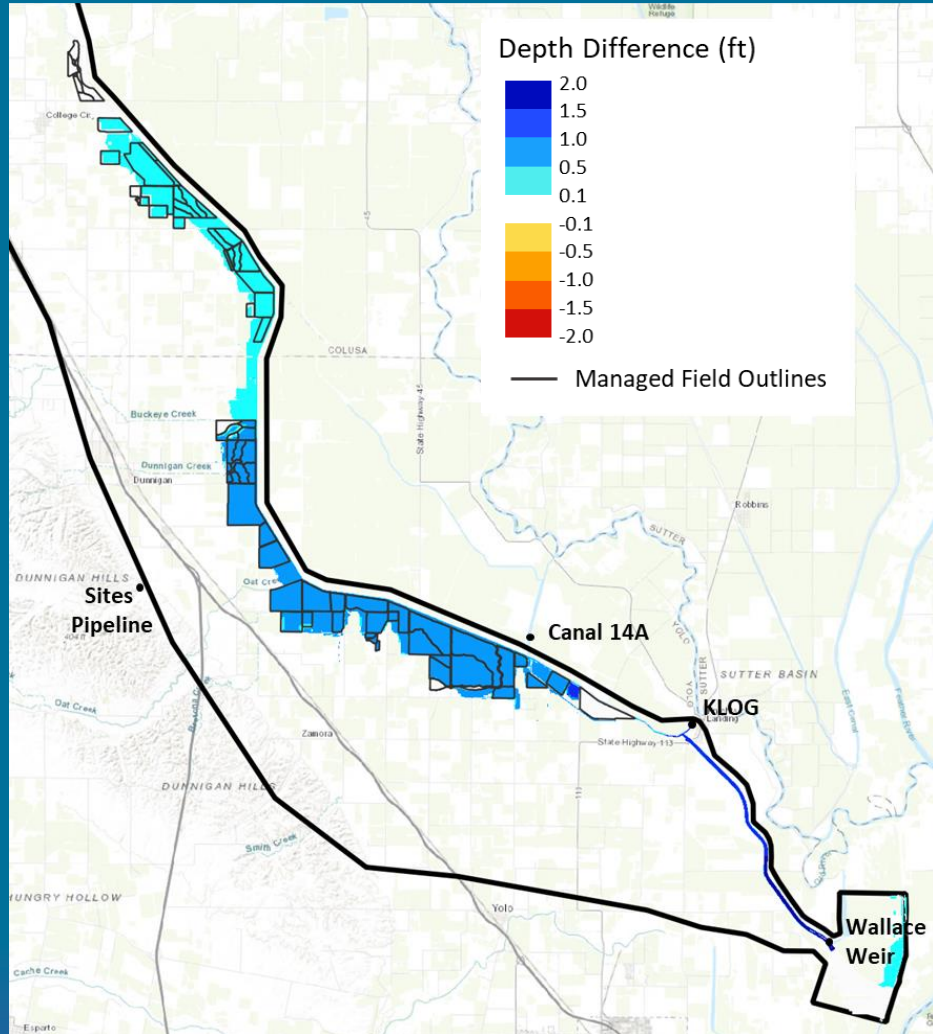


## Managed Wetland Berm Overtopping

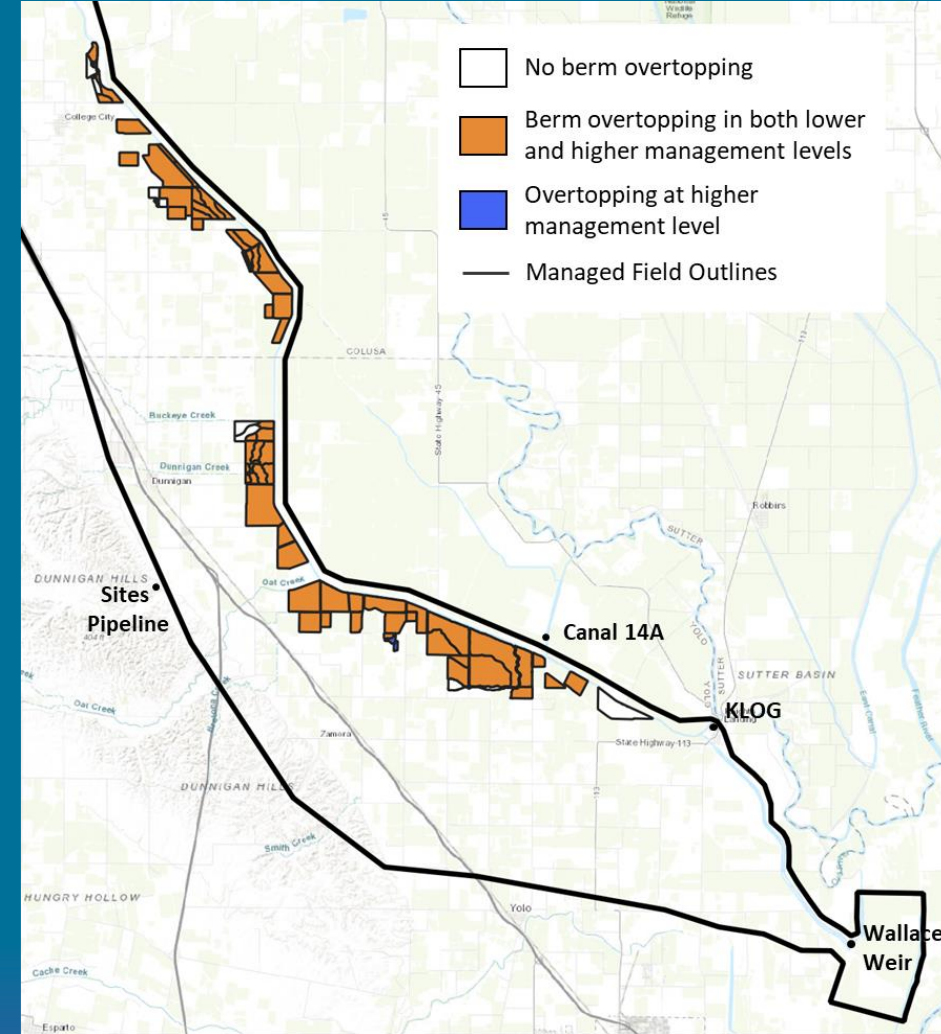


# Colusa Basin Action Evaluation – 4000 cfs

## Action – Baseline



## Managed Wetland Berm Overtopping



**Questions?**