



CALIFORNIA DEPARTMENT OF
WATER RESOURCES



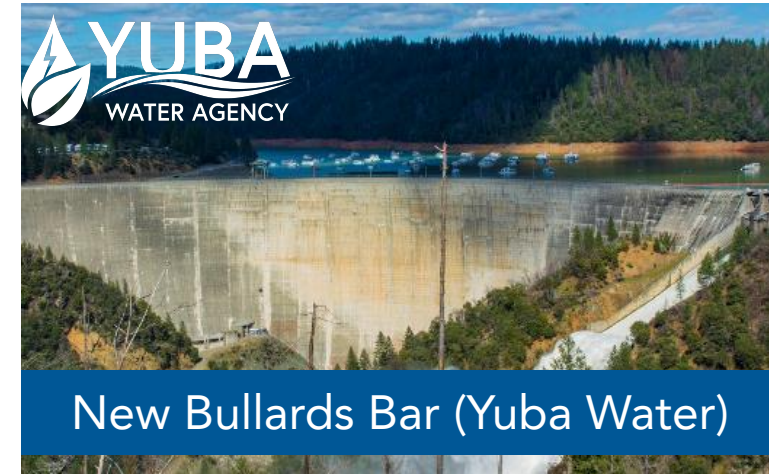
Yuba-Feather

Forecast-Informed Reservoir Operations



John Leahigh
CA Department of Water Resources, Co-Chair

John James
Yuba Water Agency, Co-Chair



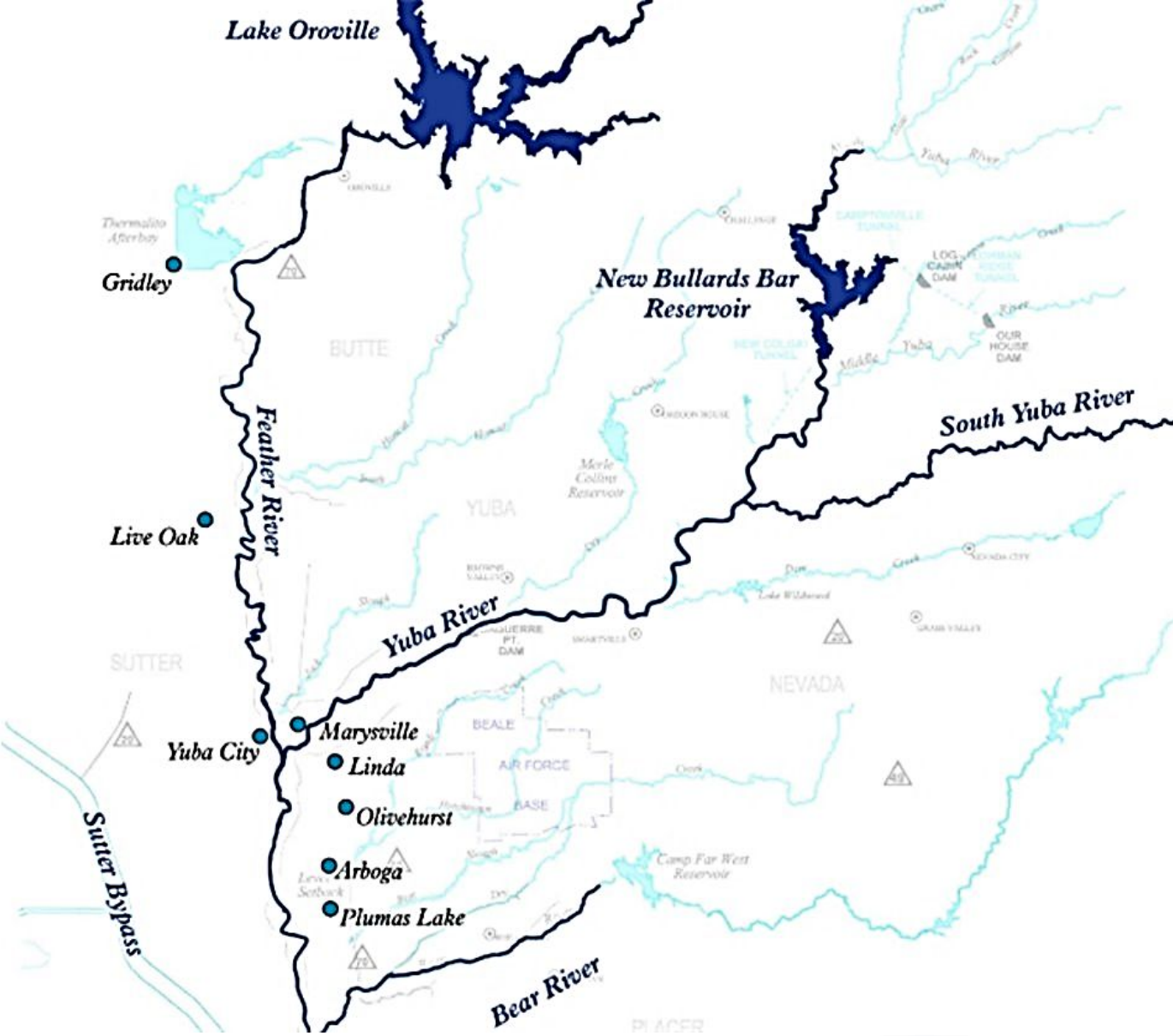
Yuba-Feather FIRO Program Partners



Center for Western Weather
and Water Extremes
SCRIPPS INSTITUTION OF OCEANOGRAPHY
AT UC SAN DIEGO



Yuba-Feather River System



California Department of Water Resources State Water Project

- Reservoir
- Aqueduct or canal
- Hydroelectric station
- ▲ Pumping station

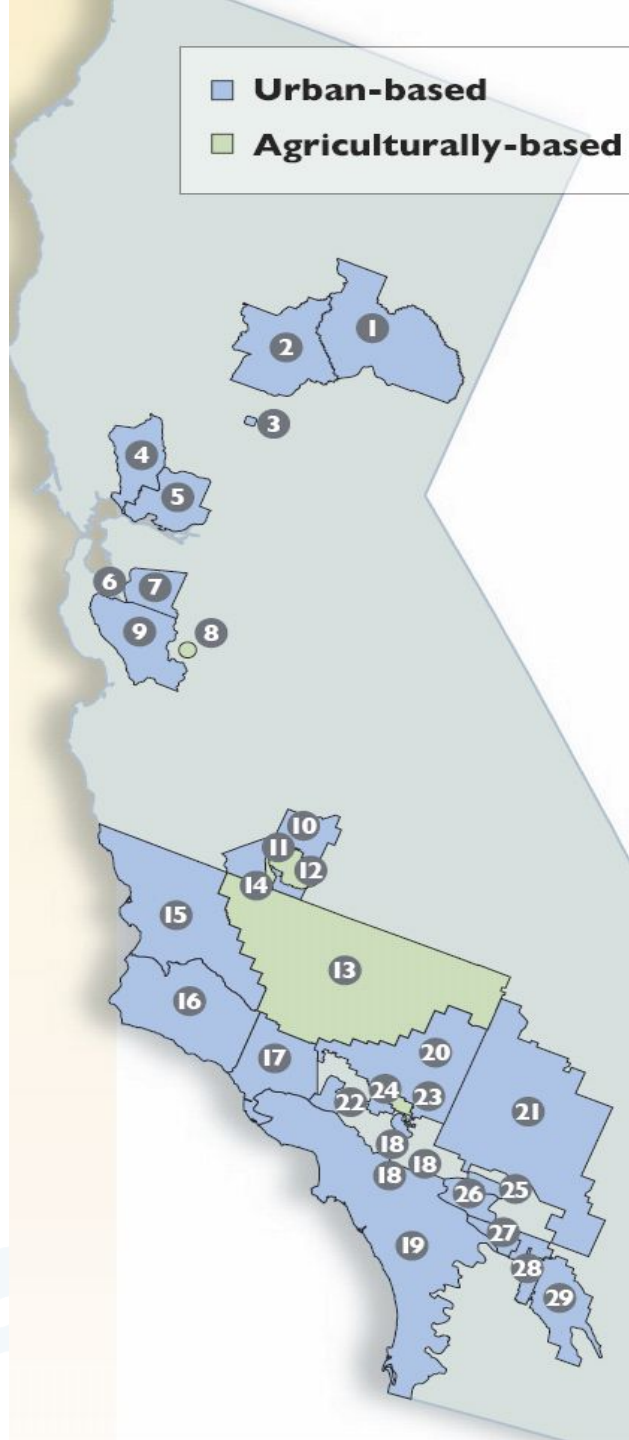
Purple indicates shared features with the federal Central Valley Project (CVP)
Light blue indicates other federal or private facilities
Only principal features are shown



State Water Project Water Supply Contractors

- 29 water contractors
- 70% urban / 30% agricultural
- 750,000 acres of crops
- 27 million people (2/3 of state's population)





- 1 Plumas County Flood Control & Water Conservation District
- 2 County of Butte
- 3 City of Yuba City
- 4 Napa County Flood Control & Water Conservation District
- 5 Solano County Water Agency
- 6 Alameda County Water District
- 7 Alameda County FCWCD: Zone 7
- 8 Oak Flat Water District
- 9 Santa Clara Valley Water District
- 10 County of Kings
- 11 Empire West Side Irrigation District
- 12 Tulare Lake Basin Water Storage District
- 13 Kern County Water Agency
- 14 Dudley Ridge Water District
- 15 San Luis Obispo County Flood Control & Water Conservation District
- 16 Santa Barbara County Flood Control & Water Conservation District
- 17 Ventura County Flood Control District
- 18 San Gabriel Valley Municipal Water District
- 19 The Metropolitan Water District of Southern California
- 20 Antelope Valley-East Kern Water Agency
- 21 Mojave Water Agency
- 22 Castaic Lake Water Agency (Devil's Den)
- 23 Littlerock Creek Irrigation District
- 24 Palmdale Water District
- 25 Crestline-Lake Arrowhead Water Agency
- 26 San Bernardino Valley Municipal Water District
- 27 San Geronimo Pass Water Agency
- 28 Desert Water Agency
- 29 Coachella Valley Water District



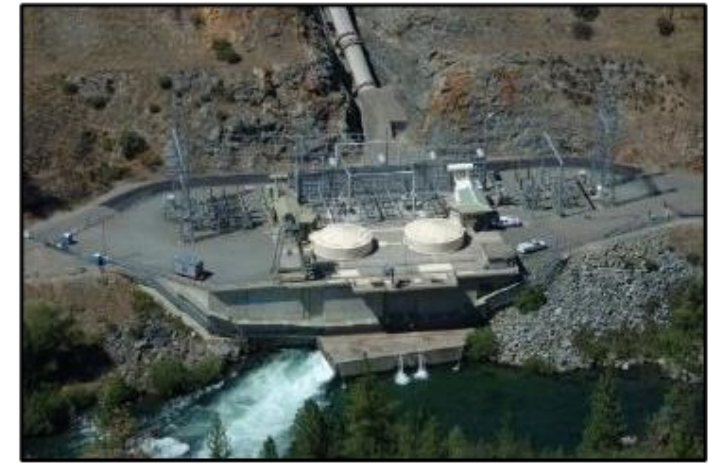
Yuba Water Agency Mission Areas



Flood Risk Reduction



Sustainable Water Supply



Hydropower Generation



Fisheries Protection and
Enhancement



Recreation at
New Bullards Bar



New Bullards Bar Dam:

- **5th tallest dam** in the United States and the **2nd tallest** in California
- Completed in **1970**
- **645 feet** tall
- Stores nearly **one million** acre-feet of water
- **170,000** acre-feet of dedicated flood storage space



🌊 New Bullards Bar Dam



⚡ New Colgate Powerhouse



🌊 Log Cabin Dam



🌊 Our House Dam

Water diversions from the Yuba River provide farm and ranch families with **260,000 acre feet** of water for **60,000 acres of crops** (rice, peaches, prunes and more), and ensure a sustainable groundwater **supply for 80%** of Yuba's residents.



YUBA WATER HYDROPOWER FACILITY FACTS:



COMBINED FACILITY CAPACITY

- 407MW (Colgate PH, Narrows 1 + Narrows 2 PH)
- Energy for 400,000 homes
- Carbon-free
- Reliable generation regardless of weather conditions



COLGATE POWERHOUSE

- 340MW
- Carbon-free, flexible, dispatchable



NARROWS I POWERHOUSE

- 12 MW
- Carbon-free



NARROWS II POWERHOUSE

- 55 MW
- Carbon-free



⚡ Narrows II Powerhouse

🏠 Headquarters

MARYSVILLE



Lower Yuba River

Feather River

ENGLEBRIGHT LAKE

LAKE WILDWOOD

South Yuba River

Deer Creek

Colgate Tunnel

Middle Yuba River

Oregon Creek

Lohman Ridge Tunnel

NEW BULLARDS BAR RESERVOIR

North Yuba River



⚡ Narrows I Powerhouse



Yuba-Feather Flood History



**10,000 Flee For Lives
In Northern California**

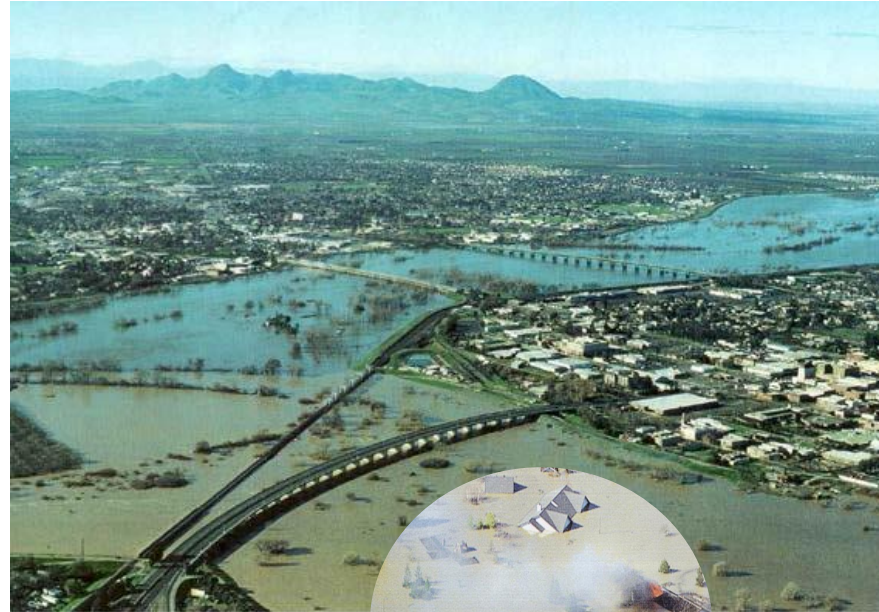
Army Takes
Over in Peru.
Revolt Ends

Fate of Whole
Race at Stake
Warns Pope

Urgent Plea
Sounded for
Aid in Flood

Levee Break
at Yuba City
Floods Town

1955



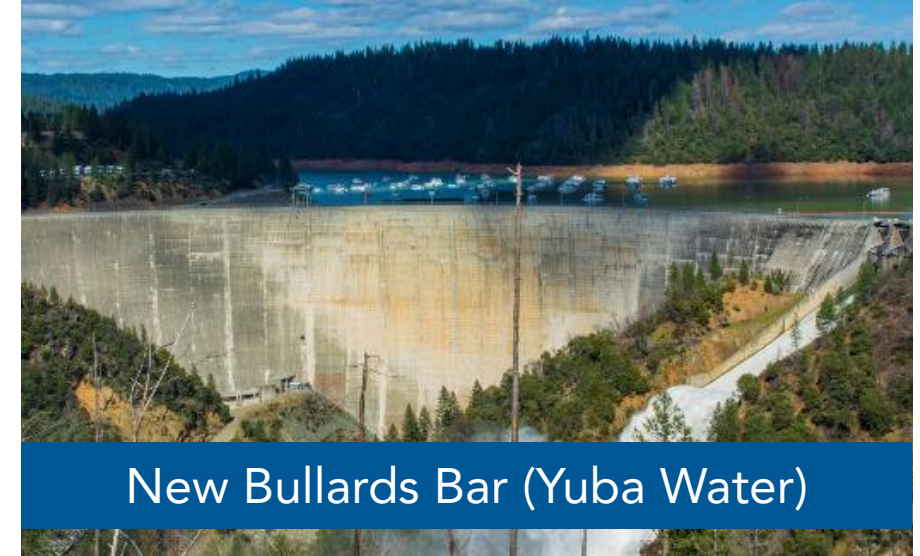
1997



1986



Yuba-Feather River Forecast-Coordinated Operations (F-CO)



- Reservoir releases regulated by U.S. Army Corps of Engineers' Water Control Manuals
- Current forecast coordinated operations program supported by a strong partnership among federal, state and local agencies



Forecast-Informed Reservoir Operations (FIRO)

- Yuba-Feather Rivers, Oroville and New Bullards Bar (2019), multi-reservoir system
- Uses improved forecasting to increase flexibility to store or release water (primarily flood risk reduction)
- Informing reservoir operational rules updates to New Bullards Bar and Lake Oroville Water Control Manual Updates (concurrently)



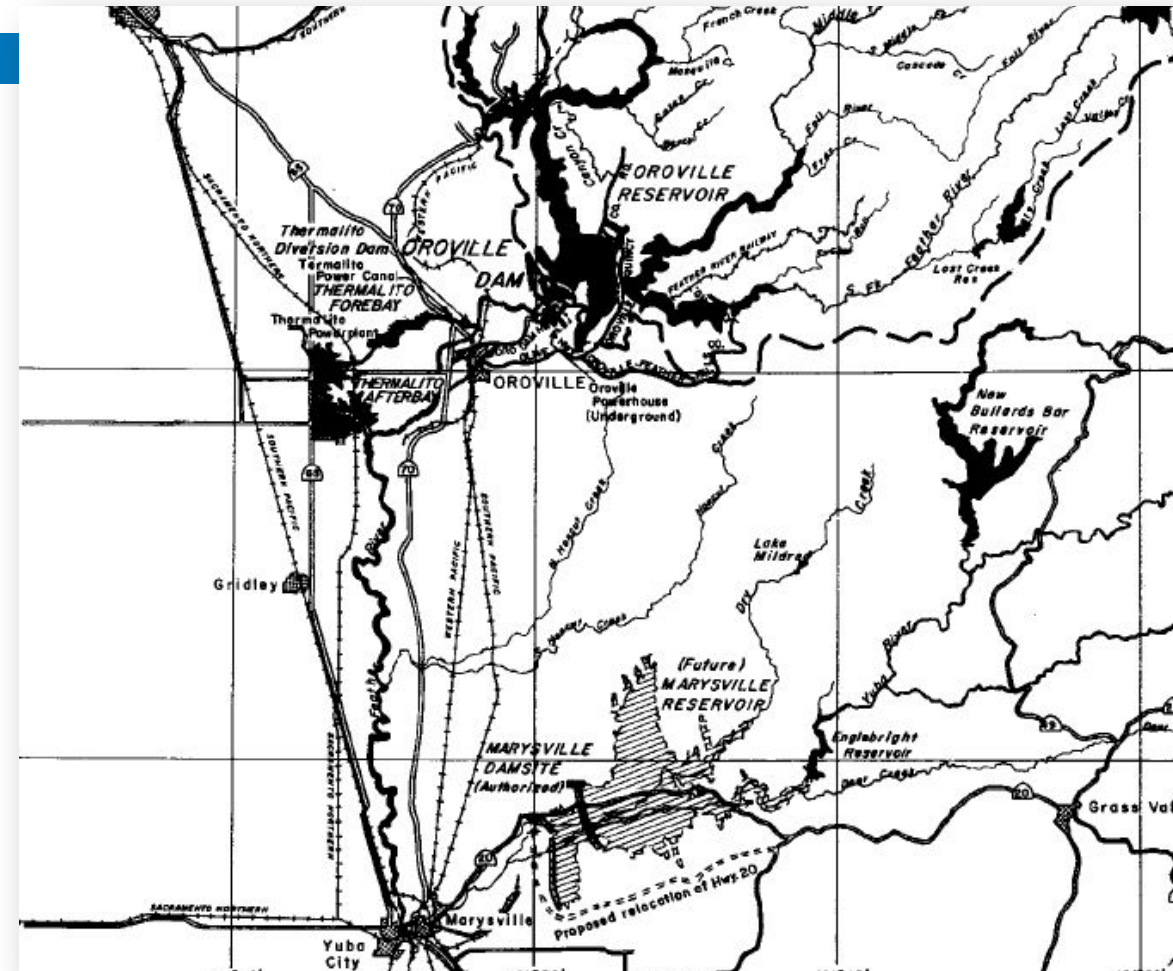
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Yuba Feather System Flood Storage

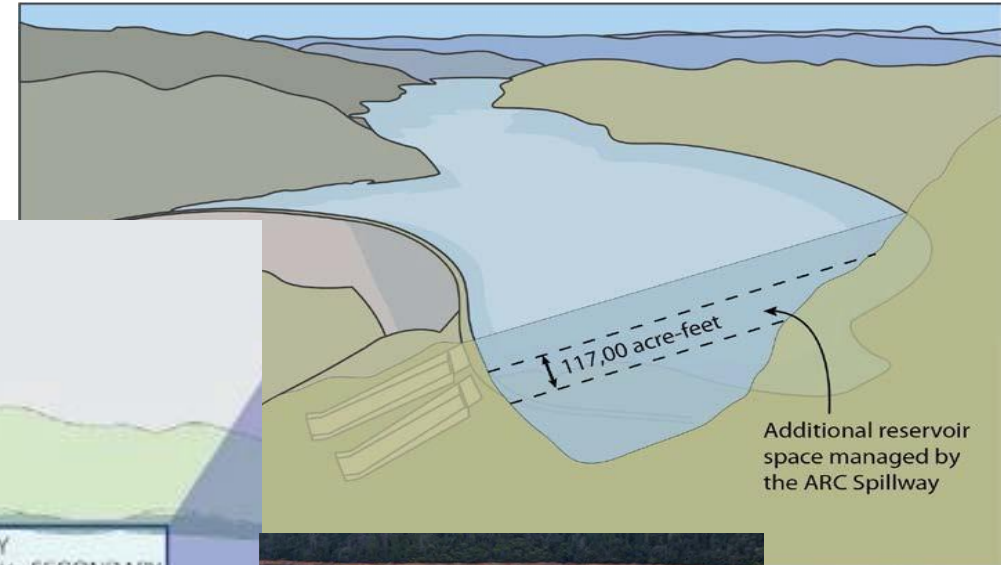
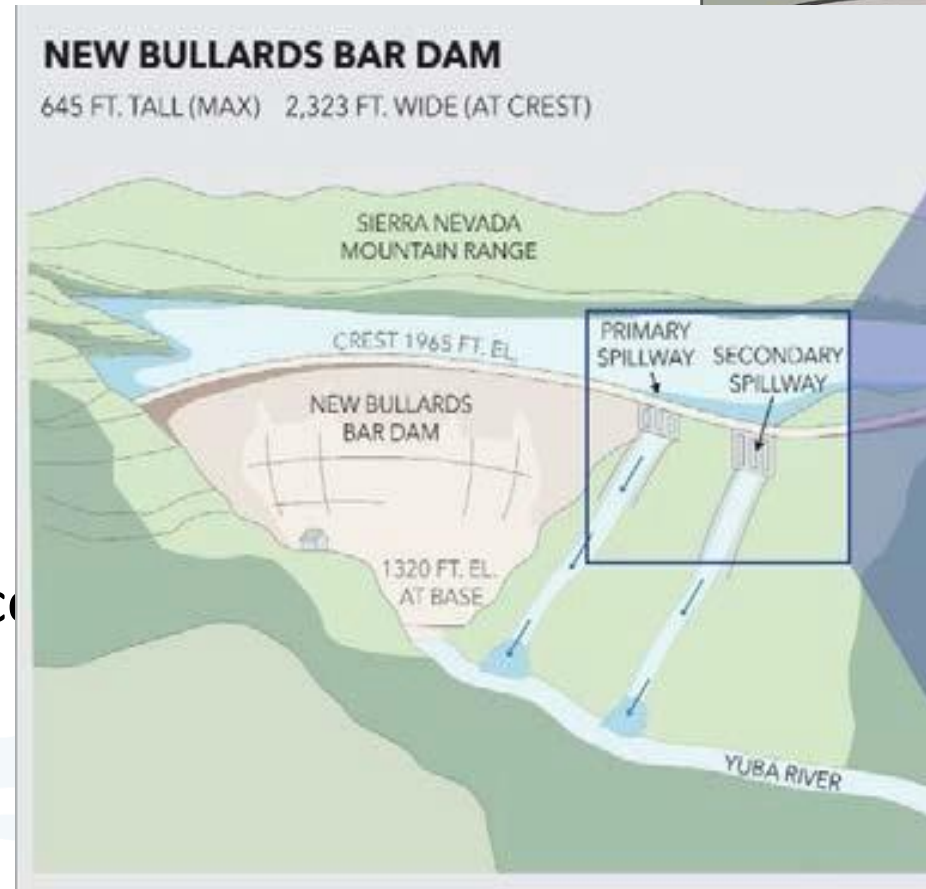
Multi-Reservoir Flood Control System

- Oroville: 750,000 acre-feet
- New Bullards Bar: 170,000 acre-feet
- *Marysville (never built): 260,000 acre-feet*

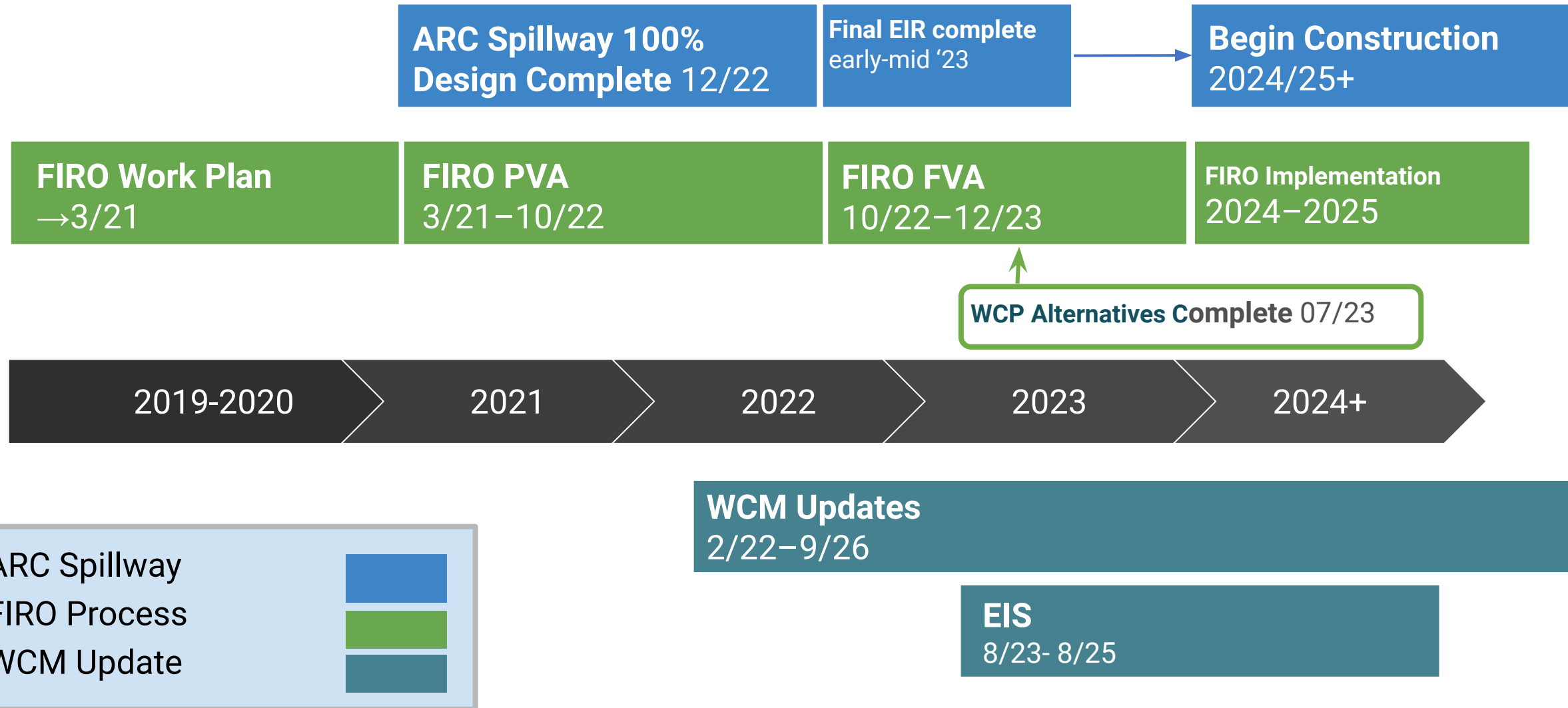


New Bullards Bar Atmospheric River Control Spillway

- Construction of second spillway facility at a lower reservoir water elevation (**31.5 feet** lower than current spillway)
- Discharge capacity of **35,000** cubic-feet-per second (cfs)
- Ability to manage an additional **117,000 acre-feet** of reservoir space



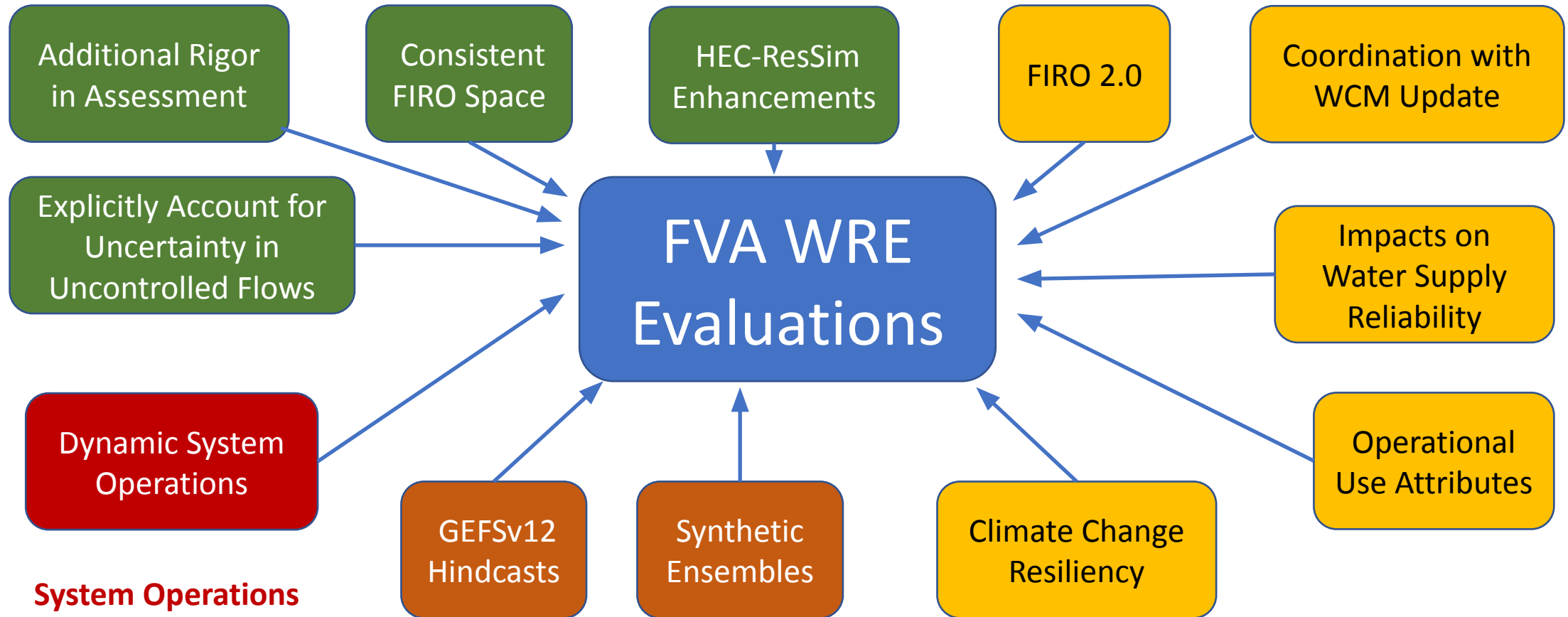
Yuba-Feather FIRO, ARC Spillway, & WCM Timeline



Water Resources Engineering PVA Recommendations for FVA

Evaluation Controls

Evaluation Features



Simulation/Testing Plan

Combining At-Site Alternatives into System Operations



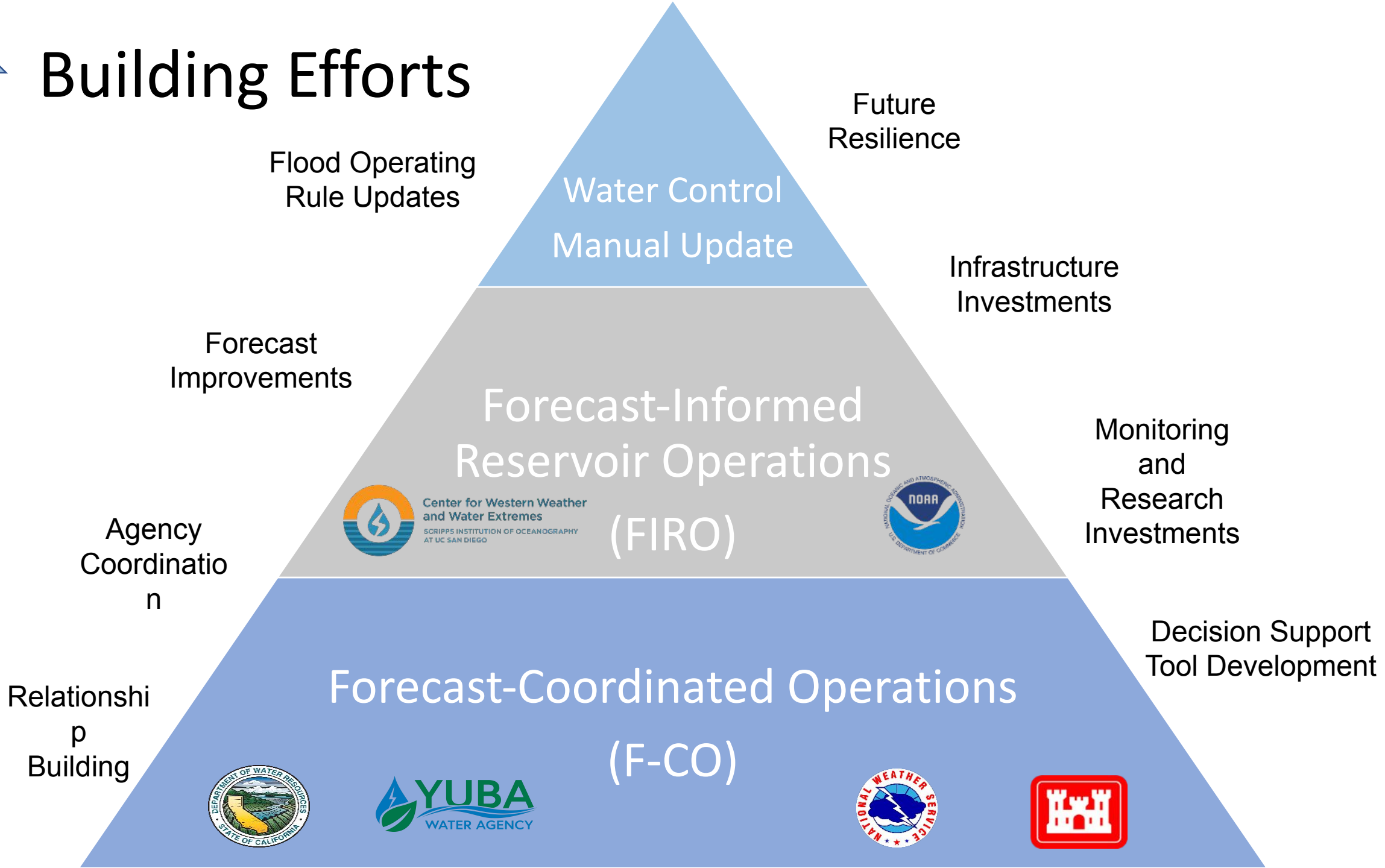


System Operations – Flow Constraints

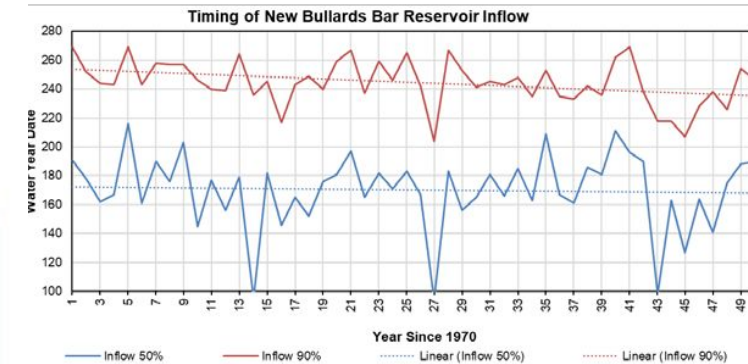
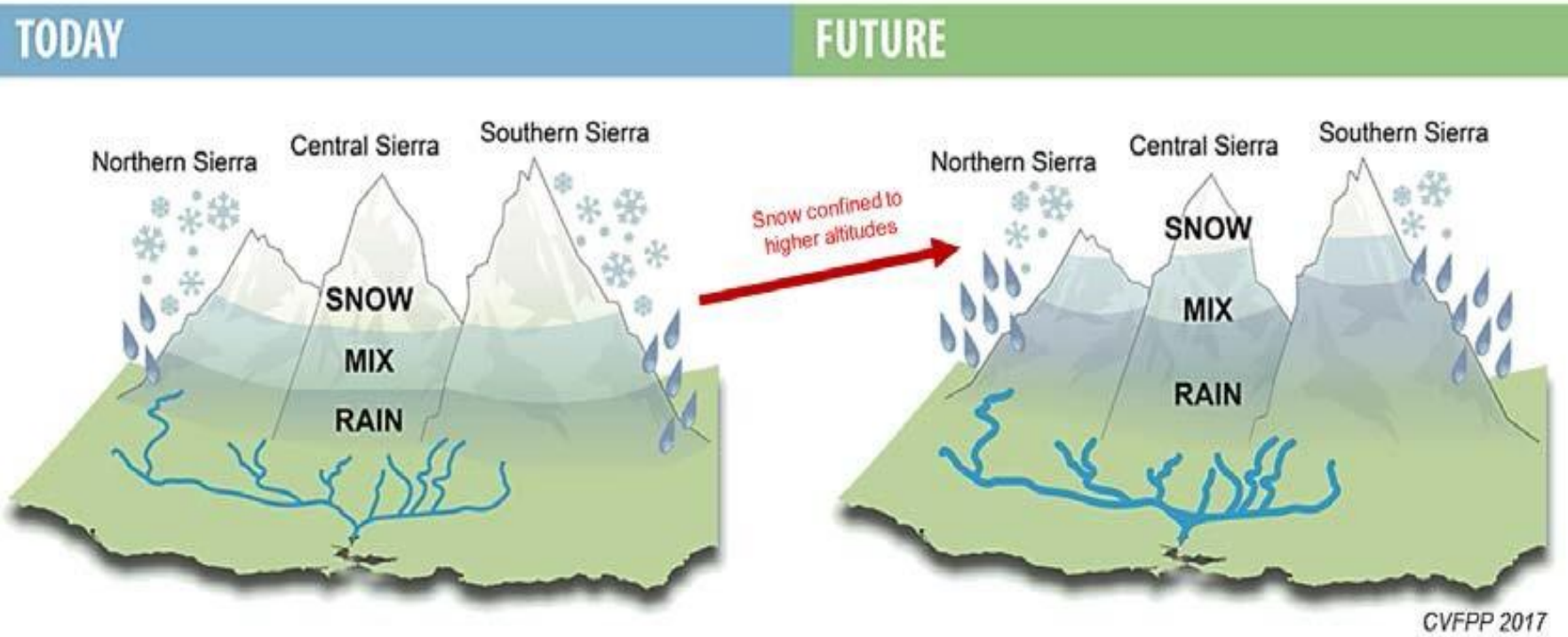
	Location	Flow Constraint (kcfs)	NBB	ORO
1	Feather River below Yuba River	300	x	x
2	Feather River below Bear River	320	x	x
3	Yuba River near Marysville	120 when Feather is “high”	x	
		180 when Feather is “low”	x	
4	Feather River at Yuba City	180		x
5	Feather River downstream of ORO	150		x

Building Efforts

Progressive Program Development



Yuba-Feather FIRO and Climate Change Resilience





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Thank you

Questions?

