New Bullards Bar Dam

August 6, 2019

YUBA WATER AGENCY

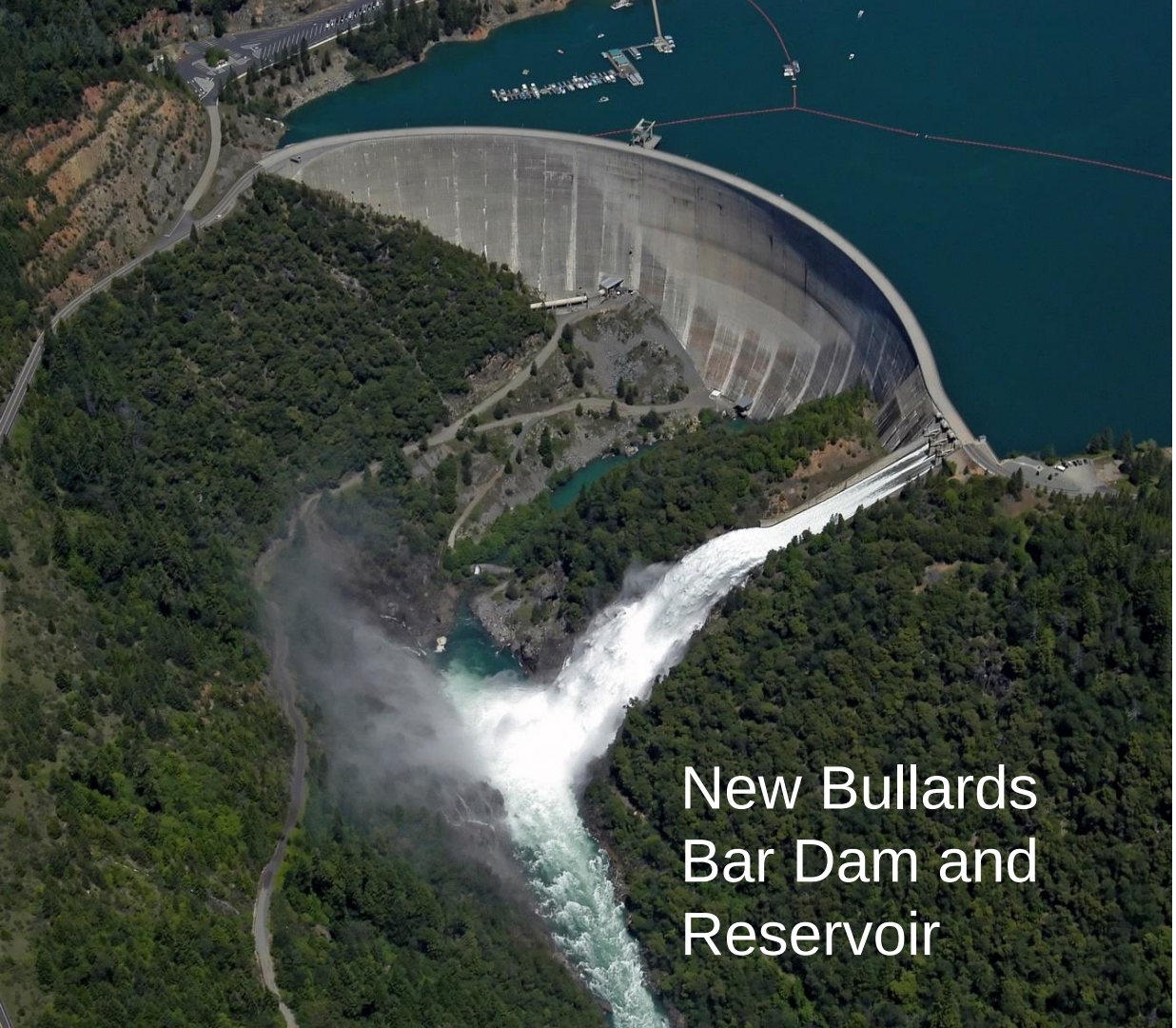
Yuba Water Agency Formation

- Created in 1959
  - Yuba County Water Agency
- Built Yuba River Development Project
- Missions:
  - Reducing flood risk
  - Ensuring a sustainable water supply
  - Hydropower generation
  - Fish habitat enhancement
  - Recreation at New Bullards Bar

Vol. 66—No. 133—100th Year Marysville-Yuba City, California Thursday, June 4, 1959 TWENT

(A.P. Photo).

GOVERNOR SIGNS YUBA WATER AGENCY BILL—A delegation from Yuba County looked on yesterday as Gov. Edmund G. Brown signed into law the Yuba County Water Agency act designed to permit Yuba to develop water resources in the Yuba River watershed. Shown (from left), standing behind Governor Brown are Ben Rose, chairman of the Marysville-Yuba County Chamber of Commerce Water Committee; Atty. Eugene E. Gray, Supervisor Charles E. Coupe, Supervisor Harold J. Sperbeck and Assemblyman Harold T. Sedgwick. Also at the signing ceremony were Supervisor John E. Furneaux of Wheatland and Engineer Colin Handforth. The agency bill does not become effective until 60 days after the Legislature adjourns.



New Bullards Bar Dam and Reservoir

Year Built: 1971

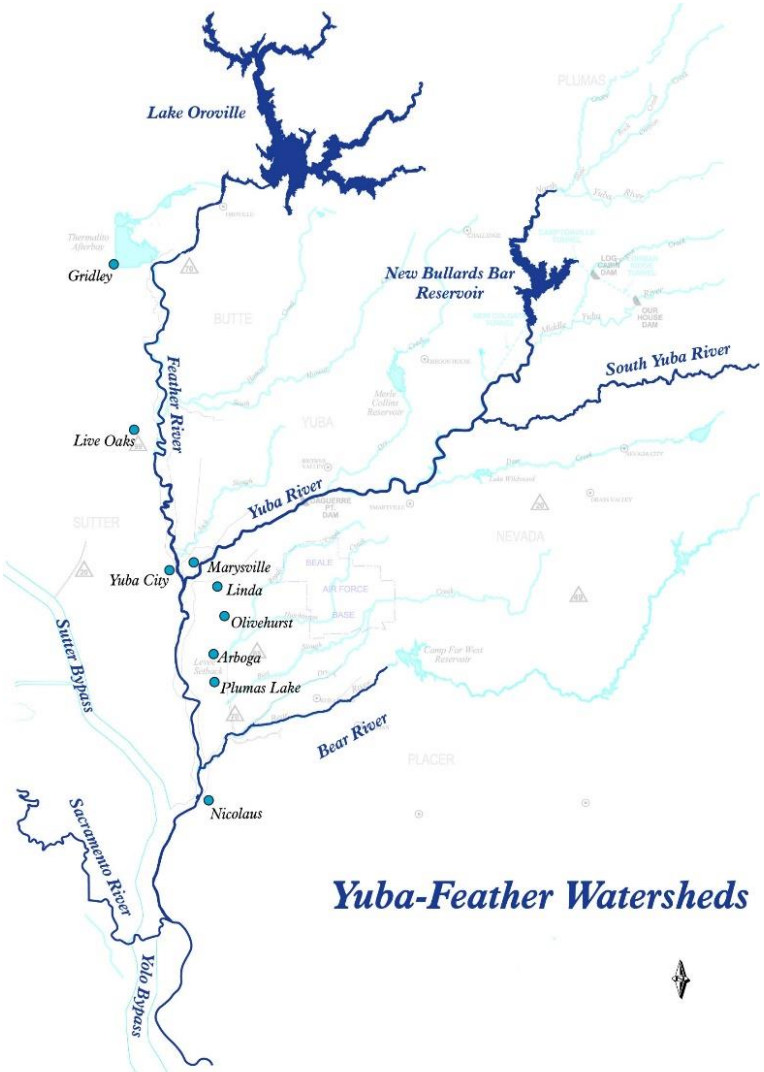
Height: 645 feet

Capacity: 966 TAF

Release capacity at the bottom flood pool: 18,000 CFS

Supplies water for 340 MW of carbon-free hydropower

YUBA WATER AGENCY



Yuba-Feather Watershed and Communities

Oroville
Gridley
Live Oak
Yuba City
Marysville
Linda
Olivehurst
Arboga
Plumas Lake
Nicolaus
And more

YUBA WATER AGENCY

Historical Flood Events and Flood Control Actions

1906
Daguerre Point Dam

1911
Congressional Authorization of Yuba, Feather, and Bear Rivers Levees

1941
Englebright Dam

1968
Oroville Dam

1969
New Bullards Bar Dam

2000
Costa-Machado Water Act of 2000

2004
Three Rivers Levee Improvement Authority Created

2006
Feather/Bear River Setback Levees

1900 1920 1940 1960 1980 2000 2020

Flood Events

1950
Yuba River Training Wall (Linda)

1955
Feather River Levee Break (Yuba City)

1959
Yuba Water Agency Created

1986
Yuba River Levee Failure (Linda/Olivehurst)

1997
Feather River Levee Failure (Arboga)

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Need for Additional Flood Protection

1986/1997 Floods:

- 5,000 homes damaged or destroyed
- $500M state claim payout

Not enough flood storage to capture large flows:

- Oroville flood space: 750 TAF
- New Bullards Bar flood space: 170 TAF
- Authorized Marysville Dam flood space: 240 TAF
  (Never built)

1986 – Peach Tree Mall

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Supplemental Flood Control Feasibility Study

After 1997 floods,

Yuba Water Agency initiated studies to reduce flood risk:

principal objective: 1-in-500 year protection

1997 levee break, Arboga

Supplemental Flood Control Feasibility Study

Key elements identified for implementation:

1. Controlled surcharge of Lake Oroville
2. Thermalito Afterbay emergency reoperation
3. New Colgate Powerhouse tailwater depression system
4. Feather River / Bear River levee improvements and setback levees (in Yuba County)
5. Forecast-Coordinated Operations (FCO) and Forecast-Informed Operations (FIO)
6. New Bullards Bar Reservoir low level outlet

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Yuba-Feather Forecast Coordinated Operations

- CA Department of Water Resources (DWR)
  - State-Federal Flood Operations Center
  - Oroville Operations
- NWS CA-NV River Forecast Center (CNRFC)
- US Army Corps of Engineers (USACE)
- Yuba Water Agency

FCO Program Purpose

- Improve real-time data collection and runoff forecasting
- Develop decision support system for coordinated reservoir ops
- Reduce flood risk through coordinated reservoir operations
- Provide annual FCO exercises and staff training
- Enhance reporting to downstream flood emergency personnel
- Promote multi-agency operational coordinated decision making, using FCO interface

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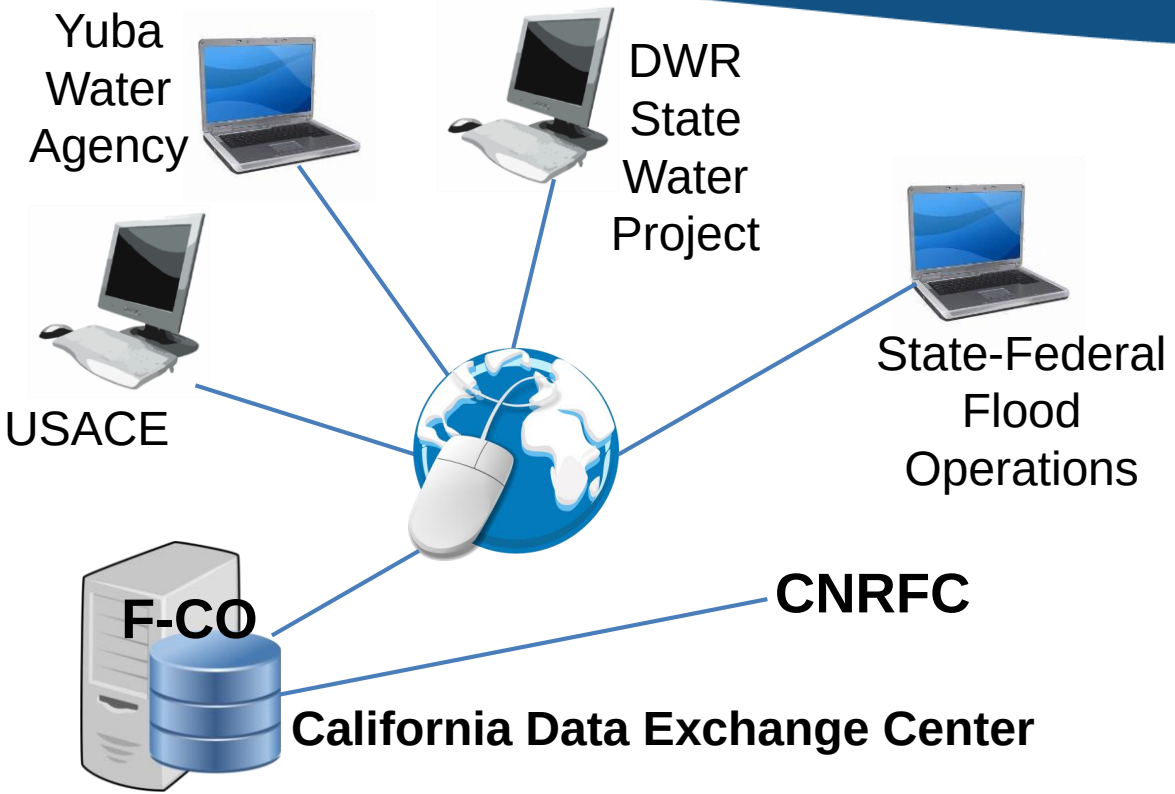
FCO – California Data Exchange Center Interface



Transition to Forecast Informed Reservoir Operations

Benefits:

- Use inflow forecasts to help make decisions about releasing water in advance of flood event
- Creating additional space in reservoir to capture peak flood flows
- Lower downstream peak flood stages
- Opportunity for earlier spring refill

Feasibility Study:

- Various alternatives considered
- Implementation requires secondary spillway at New Bullards Bar – early estimates at $160 million

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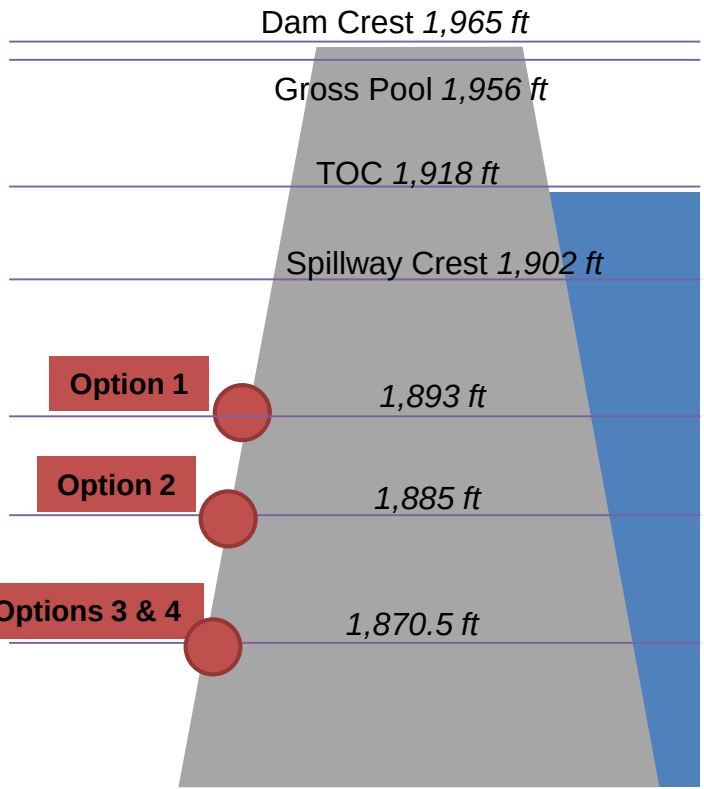
Secondary Spillway Alternatives

Option	Description
Option 1	Intake Elevation 1,893 ft
	Tunnel Size: 26’ w x 25’ h
	19,000 cfs*
Option 2	Intake Elevation 1,885 ft
	Tunnel Size: 38’ w x 28’ h
	31,000 cfs*
Option 3	Intake Elevation 1,870.5 ft
	Tunnel Size: 26’ w x 25’ h
	27,000 cfs*
Option 4 (Preferred)	Intake Elevation 1,870.5 ft
	Tunnel Size: 38’ w x 28’ h
	45,000 cfs*



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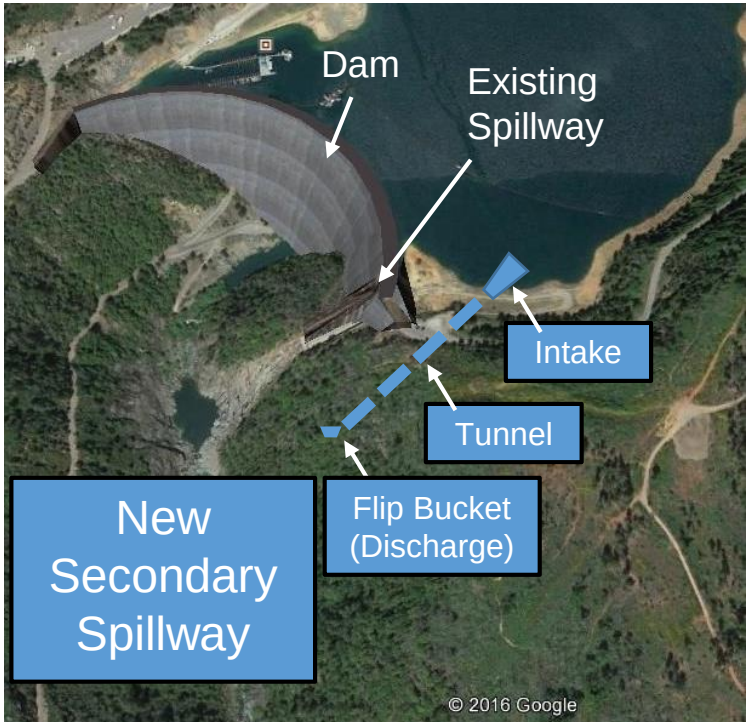
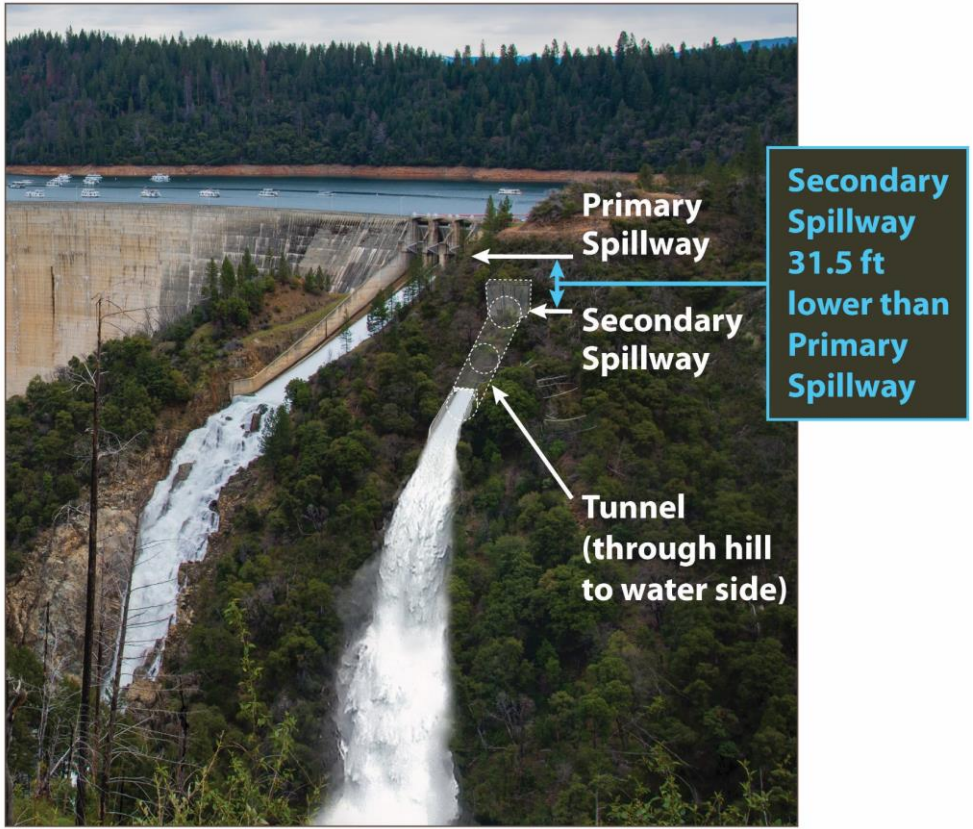
Secondary Spillway Features





FIO Operation with Secondary Spillway

Reduction in Peak Flood Flow/Stage

Location	Existing Conditions[1] Base Case (BC)	F-IO and Option 4 Alternative	Stage Reduction (Alternative vs. BC) ft
	Flow cfs	Flow cfs	
1986 Event, Scaled 100%			
Yuba River Near Marysville	132,178	116,701	-1.3
Yuba + Feather Confluence	284,021	241,911	-2.0
Feather River Near Nicolaus	321,588	282,755	-1.2
1986 Event, Scaled 130%			
Yuba River Near Marysville	180,369	156,911	-1.8
Yuba + Feather Confluence	287,766	257,711	-1.5
Feather River Near Nicolaus	345,287	318,527	-0.9
1997 Event, Scaled 100%			
Yuba River Near Marysville	176,727	153,015	-2.0
Yuba + Feather Confluence	300,235	252,236	-2.3
Feather River Near Nicolaus	340,546	296,392	-1.4
1997 Event, Scaled 110%			
Yuba River Near Marysville	180,817	141,935	-3.1
Yuba + Feather Confluence	300,878	253,252	-2.3
Feather River Near Nicolaus	348,835	301,674	-1.5

[1] Based on CVHS Inflows
Note: Stages and Stage Reductions Based on Rating Curves and in Some Cases Extension of Rating Curves.

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FIO and Climate Resiliency

In addition to lowering flood stage downstream, FIO operation provides system resiliency.

The system will be able to accommodate for larger storms resulting from future climate change.

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Secondary Spillway Redundancy and Dam Safety

Secondary spillway:

- Provides needed low-level flood release capacity
- Can handle 1997 flood of record independently
- Accommodate a 1-in-260-year flood event
- Enhance New Bullards Bar dam safety

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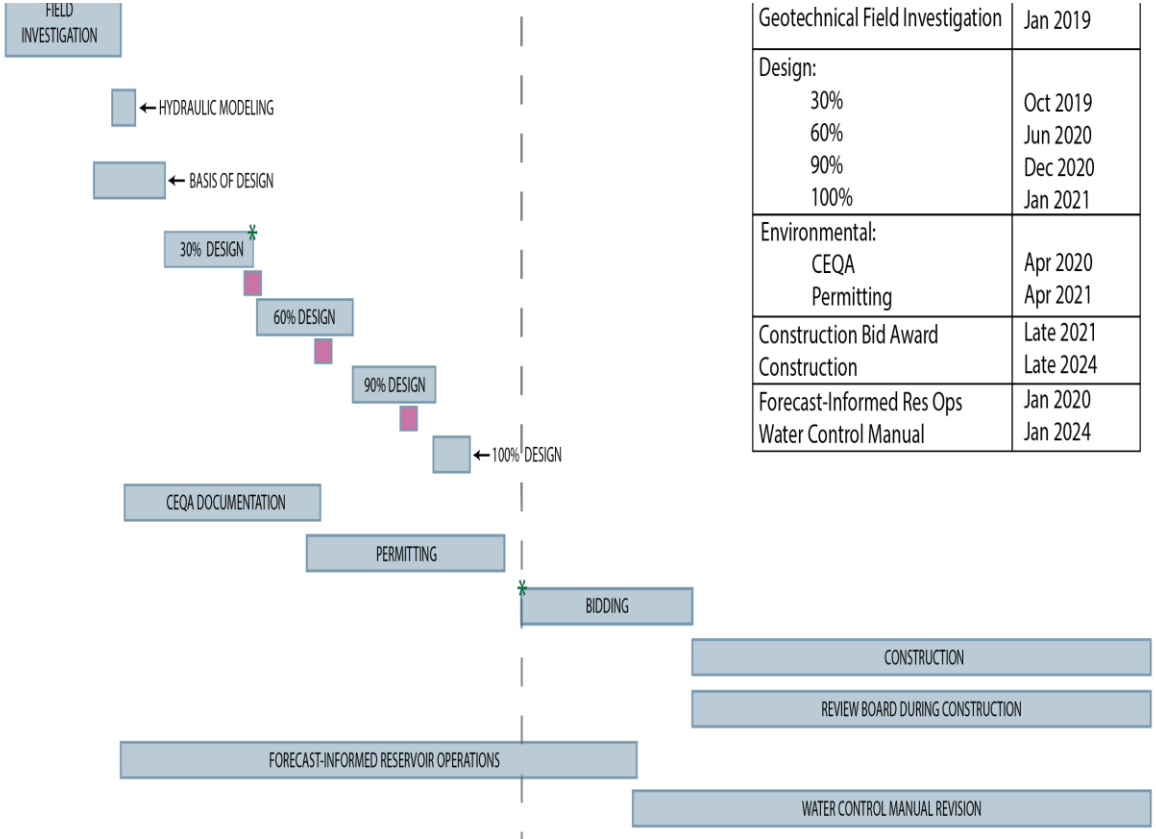
Secondary Spillway Schedule

Feasibility, Design, Permitting, and Construction



Geotechnical Field Investigation	Jan 2019
Design:	
30%	Oct 2019
60%	Jun 2020
90%	Dec 2020
100%	Jan 2021
Environmental:	
CEQA	Apr 2020
Permitting	Apr 2021
Construction Bid Award	Late 2021
Construction	Late 2024
Forecast-Informed Res Ops	Jan 2020
Water Control Manual	Jan 2024

Other Related Projects

Water Control Manual Update:

- To include FCO/FIO
- Incorporate secondary spillway
- Allow for late winter/early spring refill of New Bullards Bar in dry years

FERC Relicensing:

- Working with FERC for relicensing at Bullards
- FERC application includes Secondary Spillway

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Thank you!

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