



# Yuba River Development Project FERC Project No. 2246 Relicensing Project Operations Overview



Thursday, November 12, 2009

# Operations Topics Covered

- The Yuba River Watershed and YRDP
- Project Operational Objectives
- Project Operational Modes
- Power Generation
- The Yuba River Accord



# The Yuba River Watershed

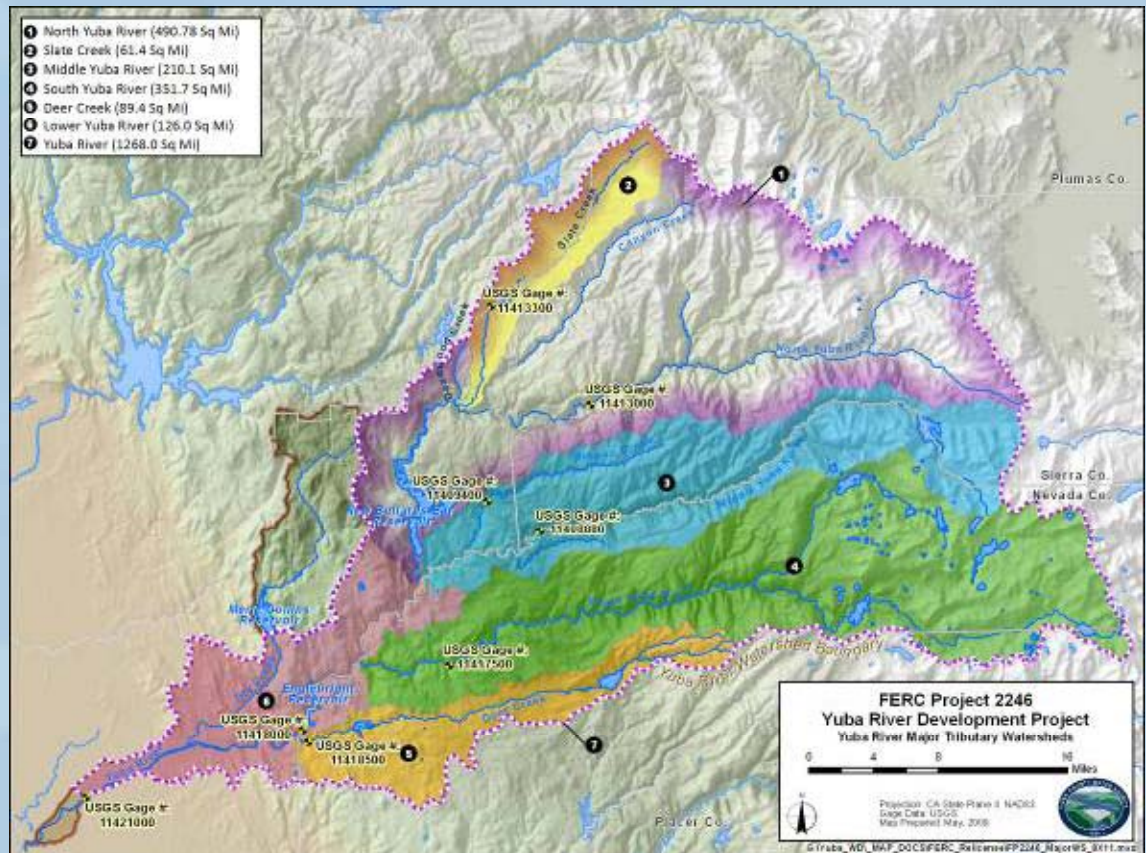
- 1,339 sq. mile watershed
- 2.37 MAF annual unimpaired flow

In comparison:

50% of the Feather River  
(4.62 MAF)

87% of the American River  
(2.72 MAF)

- Three principal tributaries
  - North Yuba River
  - Middle Yuba River
  - South Yuba River



Yuba River Development Project  
FERC Project No. 2246 Relicensing

Project Operations Overview  
11/12/2009

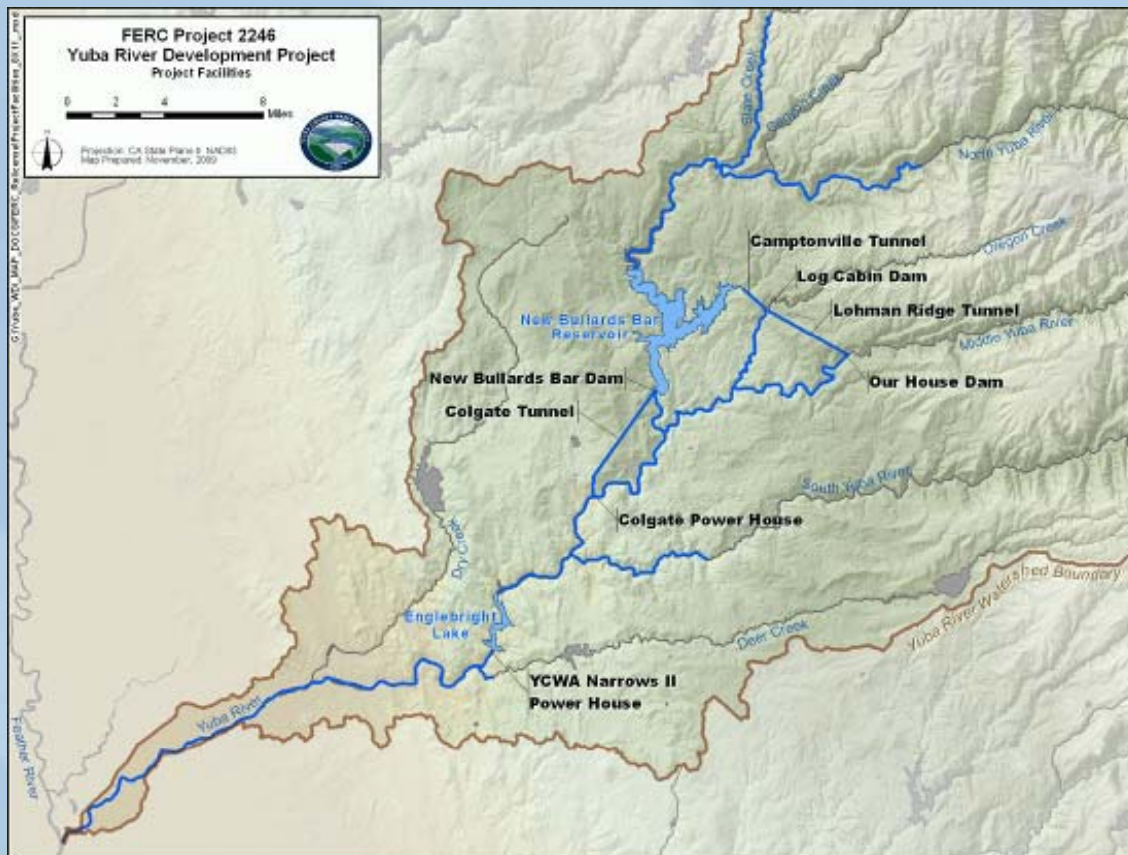
# The Yuba River Watershed

The Yuba River watershed includes a mix of YCWA and other entity facilities:

- PG&E (Drum-Spaulding Project & Narrows 1 Powerhouse)
- NID (Yuba-Bear Hydroelectric Project & misc.)
- SFWPA (South Feather Power Project)
- USACE (Englebright Dam and Reservoir & Daguerre Point Dam)



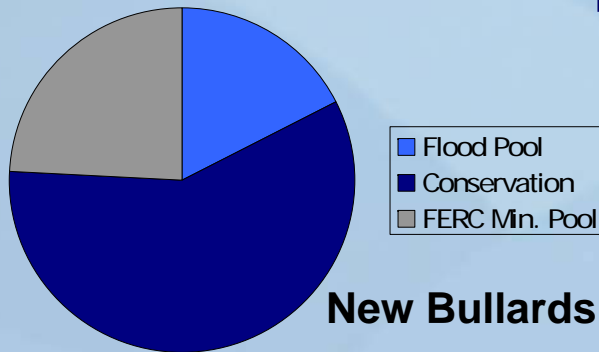
# Yuba River Development Project



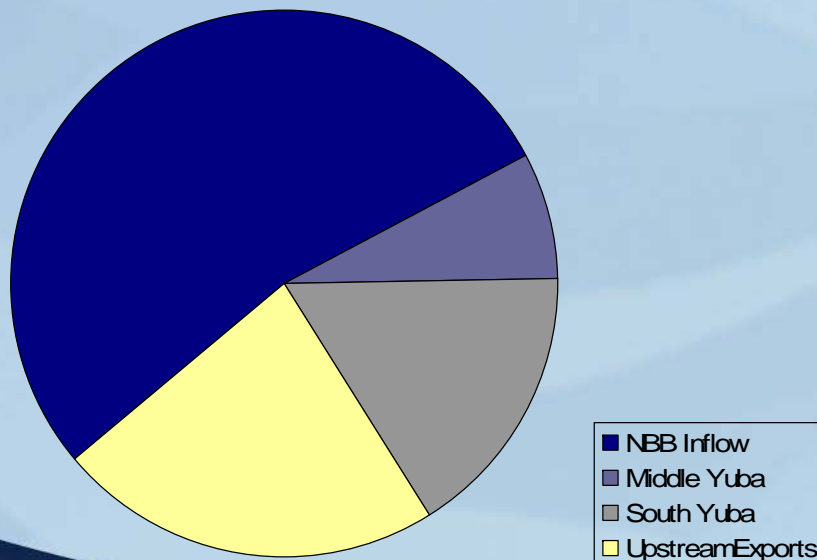
- New Bullards Bar Dam and Reservoir
  - 966,103 AF
  - 660 ft concrete dam
- Colgate Powerhouse
  - 340 MW
  - 3,430 cfs capacity
- Our House Dam and Lohman Ridge Tunnel
  - 75 ft concrete dam
  - 860 cfs tunnel capacity
- Log Cabin Dam and Camptonville Tunnel
  - 55 ft concrete dam
  - 1,100 cfs tunnel capacity
- Narrows 2 Powerhouse
  - 3,400 cfs capacity



# Yuba River Development Project Runoff & Storage



**New Bullards Bar Storage**



**Yuba River Runoff**

New Bullards Bar Dam and Reservoir  
on the North Yuba River:

- **966,103 AF Total Storage**
  - 170,000 AF Flood Pool
  - 234,000 AF Min. Reserve Pool
  - 562,103 AF Conservation Pool
- **2,370,000 AF Average Annual Unimpaired Yuba River Runoff**
  - 1,250,000 AF Inflow to NBB (includes 150,000 from Middle Yuba)
  - 171,000 AF Middle Yuba River
  - 383,000 AF South Yuba River
  - 534,000 AF Upper Basin Exports



# Yuba River Development Project Operational Objectives

YCWA operates the YRDP to meet multiple operational objectives:

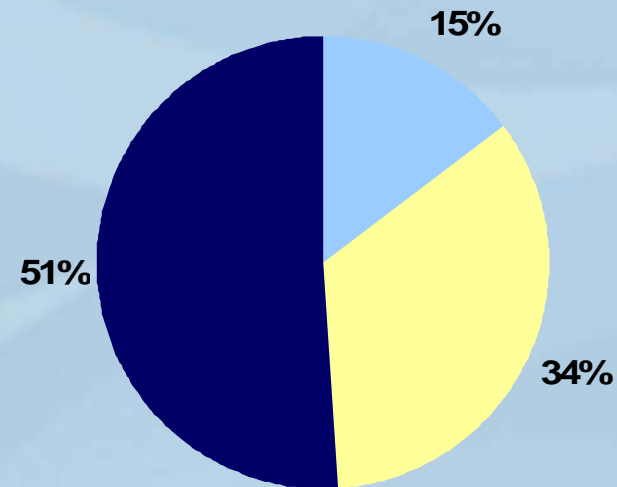
- Flood Management
- Fishery Protection
- Irrigation Deliveries
- Power Generation
- Recreation



# Yuba River Development Project Operational Modes

Yuba River Development Project is operated according to 3 primary modes:

- **Flood Management**
  - To meet prescribed flood management objectives at New Bullards Bar Dam, in the Yuba River, and in the Feather River
- **Storage Operations**
  - To meet seasonal and annual New Bullards Bar Reservoir storage target levels
- **Downstream Control Operations**
  - To meet instream flow requirements on the Yuba River and its tributaries and agricultural diversion demands



□ Flood/Storm   □ Storage   □ Downstream

*Approx. Averages (daily operation) 1999 to 2008*



# Flood Management Operations



- Required by U.S. Army Corps of Engineers
- Also operate according to Forecasted Coordinated Operations agreement with DWR
- 170 TAF flood reservation at New Bullards Bar Reservoir (Oct-May)
- 50,000 cfs below NBB Dam
- 120,000 to 180,000 cfs maximum flow at Marysville
- 300,000 maximum flow on Feather River below Yuba



# Flood Management Operations

- Required release of water from storage when encroached into flood reservation space:
  - Colgate - until flows in the Yuba River are too high (tail water)
  - Spillway – release capacity increases as flood pool encroachment increases
  - Amount of encroachment and rate of rise determines release
- Releases prior to encroachment to avoid flood reservation space:
  - Typical for larger events but not required in USACE Flood Manual
  - Based on storage and forecasted inflow for large events
  - Increased Colgate releases:
    - Some Spillway capacity above 725,000 AF storage
- Englebright Lake storage is used in coordination with PG&E to reduce storm flow impacts from Middle and South Yuba:
  - Limited to capturing small rainstorms

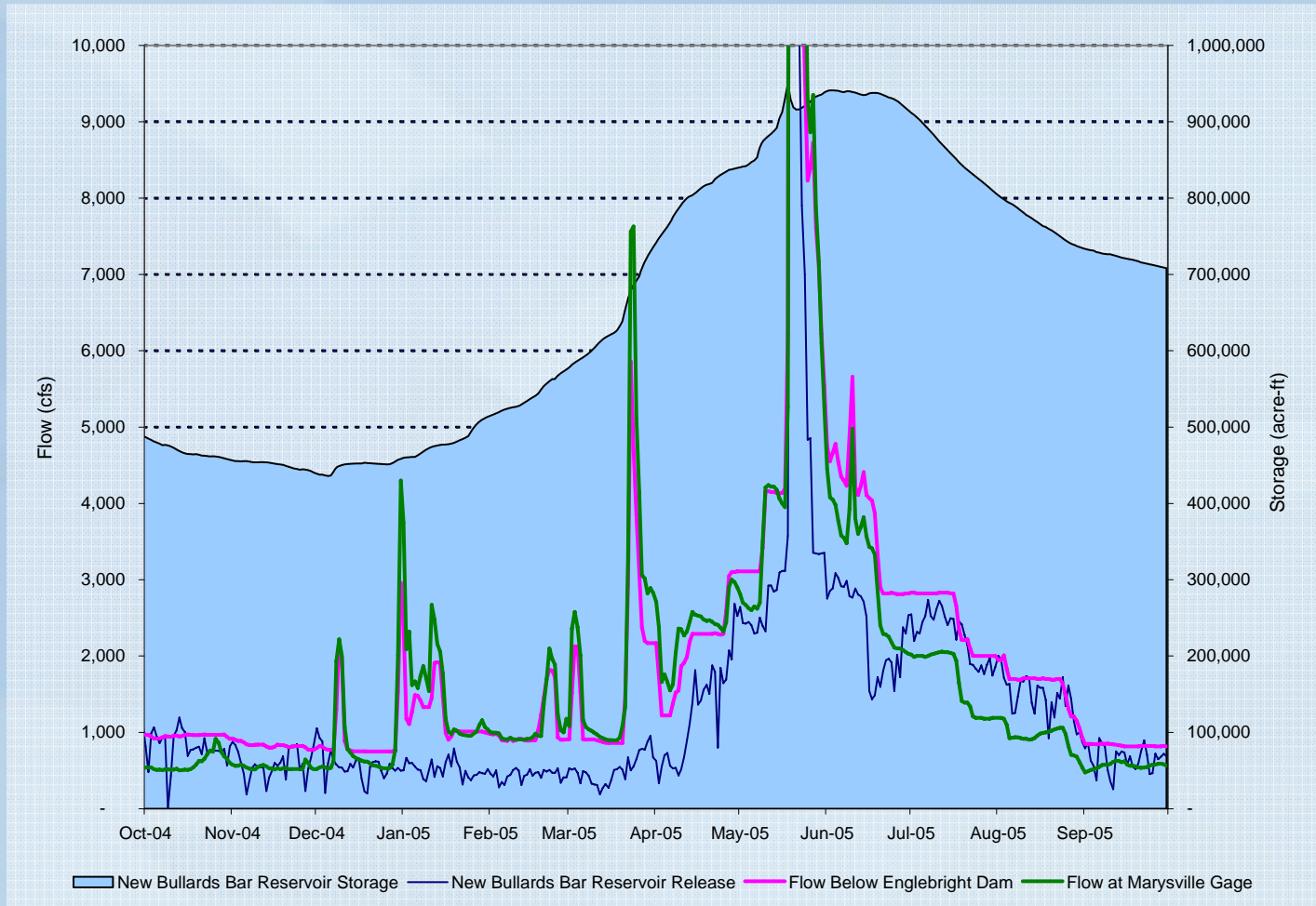


# Storm Operations at Englebright Lake

- Not flood operations; times when uncontrolled flows of the Middle and South Yuba are high, but NBB is not in flood operations
- Englebright overtopping (spill) is a normal occurrence
  - Averages about twice per year, and about 30 days per year  
*(this is with Englebright storm operations)*
- Storm management at Englebright used for smaller storms to:
  - Smooth flows on the lower Yuba River
  - Conserve water in New Bullards Bar Reservoir
  - Optimize power generation
- Lower Yuba sees a very wide range of flows even with these operations



# Project Releases and Storage in a representative Normal Water Year - 2005



# Storm Operations at Englebright Lake

## Procedural Outline:

- Reduce Colgate outflow and/or increase Narrows powerhouse flows to reduce Englebright elevation one to four days before storm
- Hold back on Colgate outflow during peak of storm flows from Middle and South Yuba Rivers
- Resume normal Colgate operations & return Narrows powerhouse to Baseline (pre-storm) flows after peak inflow to Englebright has passed
- Utilizes about 10 feet of Englebright Reservoir storage



# Storage Operations

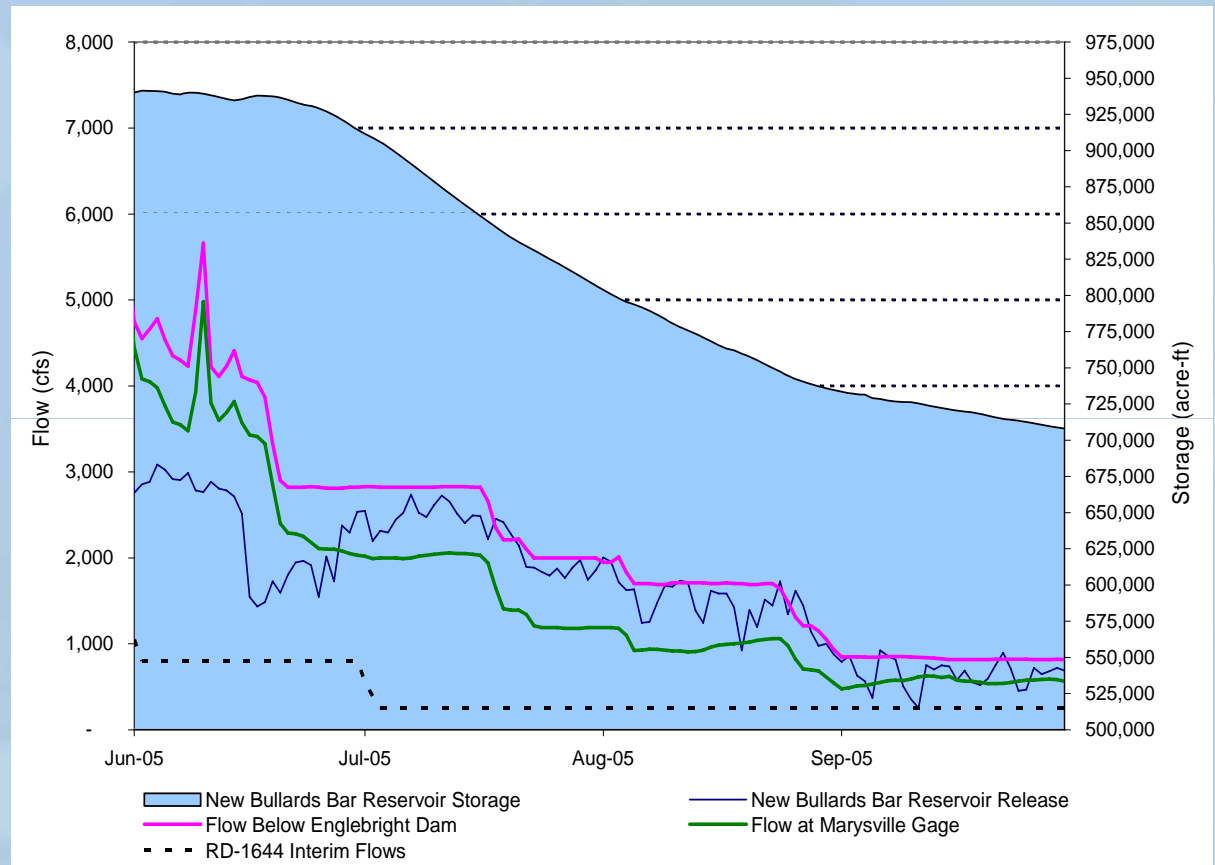


- When runoff is available in sufficient quantity to meet:
  - All downstream demands
  - NBB storage target(s)
- Operations for multiple objectives:
  - Flows above instream requirements
  - Power generation
  - Seasonal and annual storage target levels



# Storage Operations

- Decisions rely heavily on regularly-updated inflow forecasts
- Operated for relatively consistent lower Yuba River flows throughout season
- Releases made through Colgate Powerhouse
- Shape releases according to environmental and power generation considerations

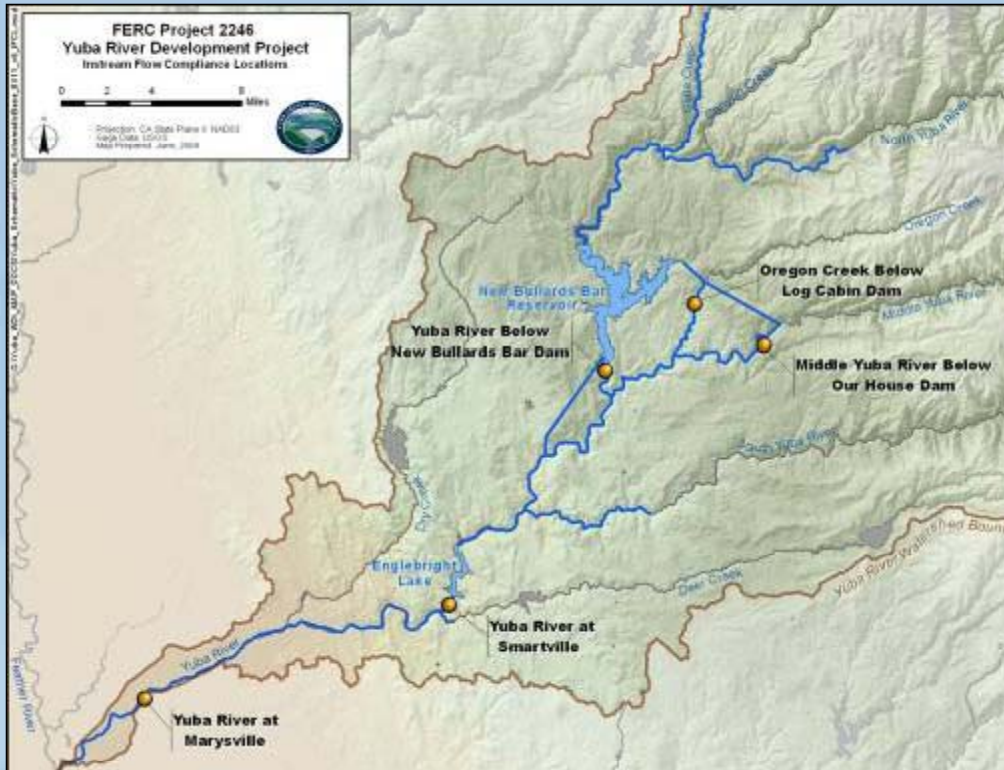


# Downstream Requirement Operations

- Operations to meet instream flow requirements and agricultural diversion demands
- Will draw reservoir storage below seasonal targets
- Instream flow requirements defined by:
  - FERC Project No. 2246 License
  - Yuba River Accord
- 8 YCWA Member Units have contracts for surface water deliveries for agricultural irrigation



# Downstream Requirement Operations

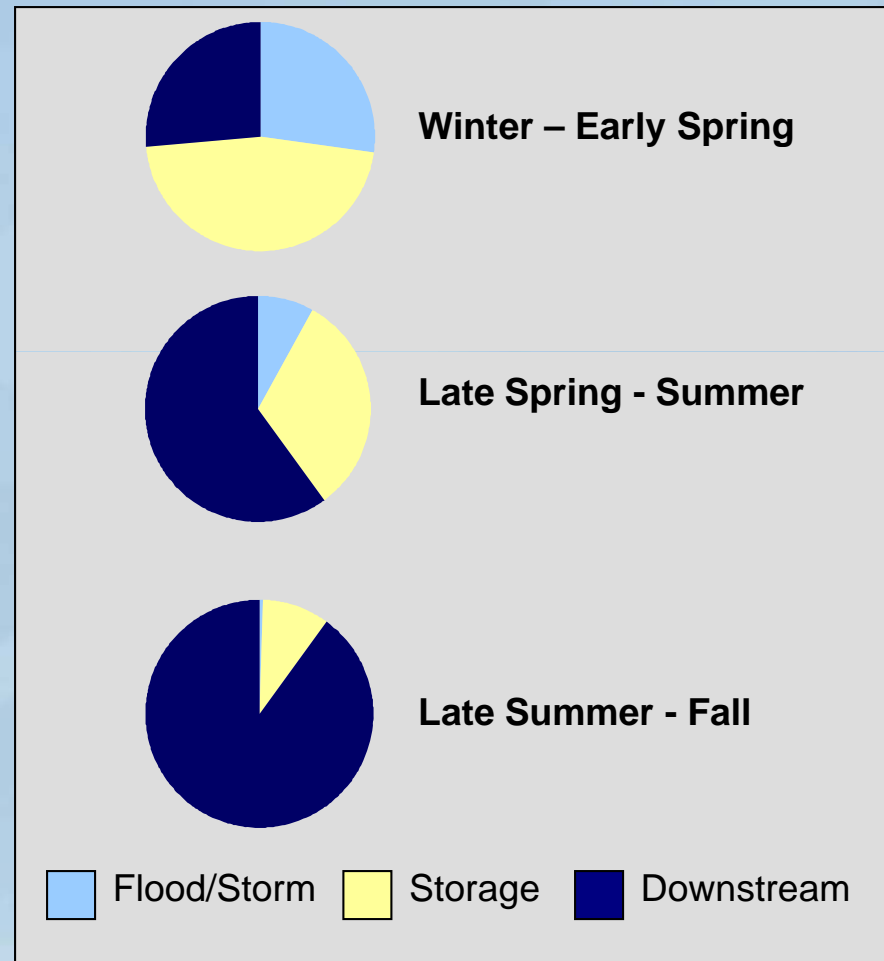


- North Yuba River requirement met by releases through Fish Hydro at New Bullards Bar Dam
- Oregon Creek and Middle Yuba River requirements met through releases from Log Cabin Dam and Our House Dam, respectively
- Lower Yuba River requirements met through releases made from New Bullards Bar Reservoir and regulated at Englebright Reservoir
  - Release to meet either Smartville requirement or Marysville requirement + agricultural diversion demands



# Seasonal Perspective to Operational Modes

- Winter and early spring:
  - Could be any of the three modes
- Late spring and summer:
  - Generally storage and downstream requirement operations
- Late summer and fall:
  - Always operations for downstream requirements



*Approx. Averages 1999 to 2008*



# Power Generation Considerations



- Colgate Powerhouse is operated in close coordination with PG&E:
  - Provides valuable resource for grid regulation
  - Hourly, daily, and to a lesser extent weekly, releases determined by power generation considerations
  - Monthly and seasonal releases determined by downstream requirements and reservoir storage conditions
  - During flood management operations, power generation is a secondary consideration
- Narrows 2 Powerhouse is operated as block load or run-of-the-river:
  - Provide consistent flows on lower Yuba River
  - Ensure downstream requirements are met



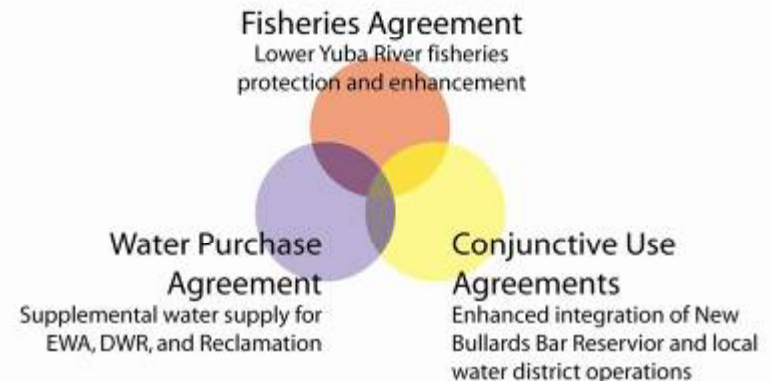
# Yuba River Accord

The Yuba River Accord consists of 3 Agreements:

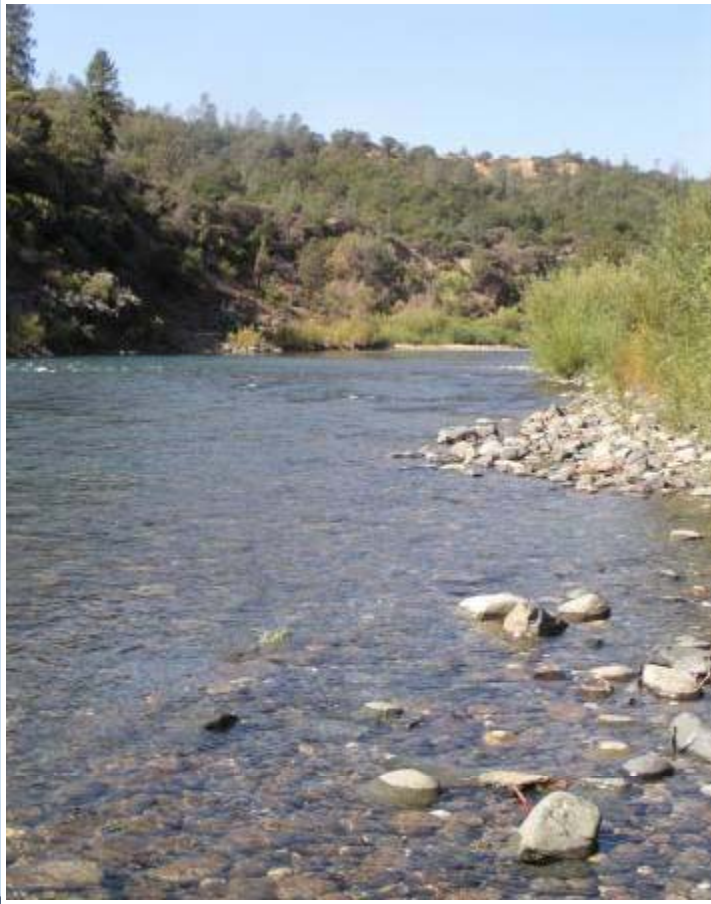
- **Fisheries Agreement:**
  - Provides flow requirements and “rules” for operations
- **Water Purchase Agreement:**
  - Provides accounting and payment provisions
- **Conjunctive Use Agreement:**
  - Provides water in dry years and back-up supply in drought years

## Yuba Accord Alternative:

Three Distinct, but Inseparable Agreements



# Yuba River Accord



Operations under the Yuba River Accord are governed by several factors:

- **Instream flow requirements:**
  - Determined based on available and forecasted water supply
- **End-of-September New Bullards Bar Reservoir storage targets:**
  - Storage target of 650,000 AF
- **Groundwater Substitution transfers:**
  - Released on a schedule mutually agreed to buyers, PG&E, and YCWA with RMT consultation
  - Specific rules on releases in Fisheries Agreement
- **River Management Team:**
  - Has both specific and informal role in shaping releases for environmental benefit



# Yuba River Accord Flow Schedules

- Flow requirements were collaboratively determined by biologists to be most environmentally-beneficial use of available water supply
- Flow schedules determined by available and forecasted water supply

	OCT		NOV	DEC	JAN	FEB	MAR	APR		MAY		JUN		JUL	AUG	SEP	Annual Vol. (TAF)
	1-15	16-31	1-30	1-31	1-31	1-29	1-31	1-15	16-30	1-15	16-31	1-15	16-30	1-31	1-31	1-30	
1	500	500	500	500	500	500	700	1000	1000	2000	2000	1500	1500	700	600	500	574
2	500	500	500	500	500	500	700	700	800	1000	1000	800	500	500	500	500	429
3	500	500	500	500	500	500	500	700	700	900	900	500	500	500	500	500	399
4	400	400	500	500	500	500	500	600	900	900	600	400	400	400	400	400	362
5	400	400	500	500	500	500	500	500	600	600	400	400	400	400	400	400	335
6	350	350	350	350	350	350	350	350	500	500	400	300	150	150	150	350	232

## Flows at Marysville Gage

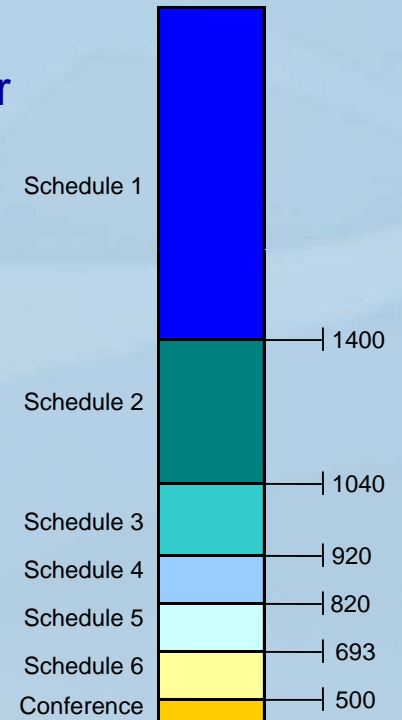
Current license ranges from 173 to 122 TAF



# Flow Schedule Determination

## Flow Schedules – Marysville and Smartville Gages

- North Yuba Index – Available Water at New Bullards Bar Reservoir
  - Storage in New Bullards Bar Reservoir September 30<sup>th</sup>
  - + Inflow to New Bullards Bar Reservoir for the Water Year
    - Measured inflow to date
    - Plus forecasted inflow (based on DWR Bulletin 120)
- Index ranges define Flow Schedule
- Start new index calculation in February
- Subsequent re-calculation in March, April May and any subsequent B-120 updates

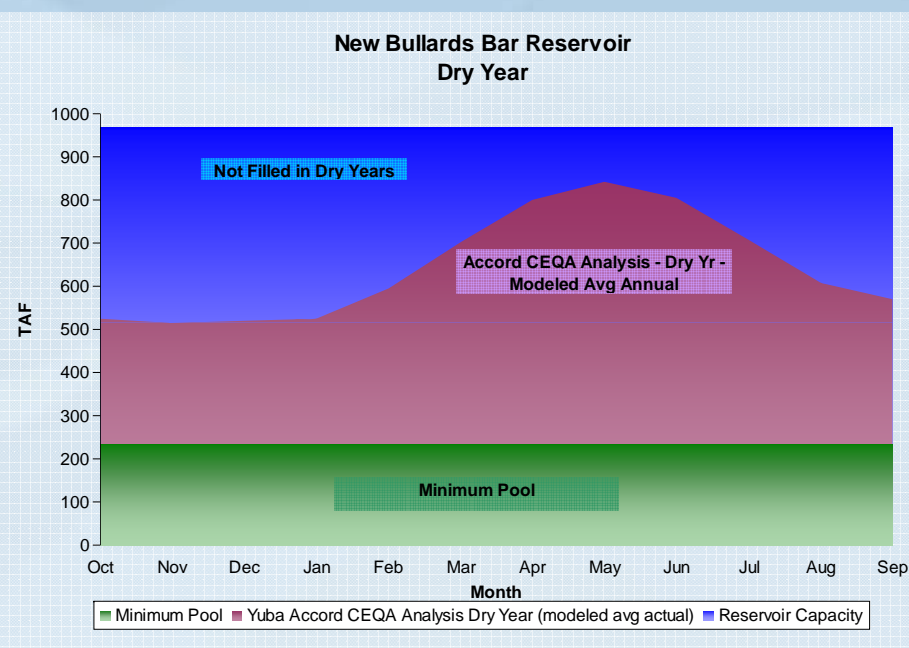


# Flow Schedule Application

- Flow Schedules track inflow and storage conditions
- Incentive to balance current year needs with future year needs
- Dry years results in lower carryover, more risk of shortages

Schedule	NBBAW Index	Percent	
		Occurrence	Cumulative
1	> 1,400	56%	56%
2	1400 to 1051	22%	78%
3	1050 to 931	7%	85%
4	930 to 826	5%	90%
5	825 to 691	5%	95%
6	<690	4%	99%

1% Dry Year Occurrence = Conference Years



# Elements of the Fisheries Agreement that Affect Operations

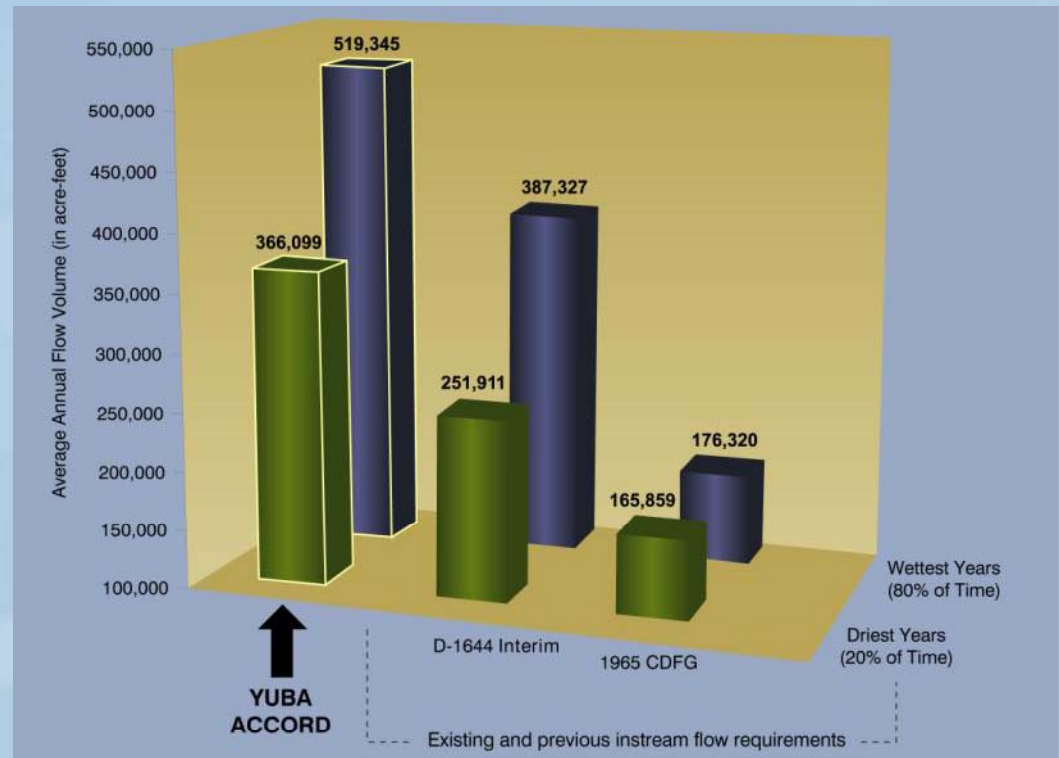
- Flow Schedules – Marysville and Smartville Gages
  - Drives planning decisions
- Schedule 6 year provisions
  - 30,000 AF Groundwater to augment flows – RMT to schedule water
- Conference Years (1% driest years)
  - Current FERC License Flows as minimum - no dry year reduction
  - Plus any additional flows agreed to by RMT
  - Total diversions at Daguerre Point Dam not to exceed 250,000 AF



# Yuba River Accord – Increased Flows

The Yuba River Accord increases annual use of available water supply:

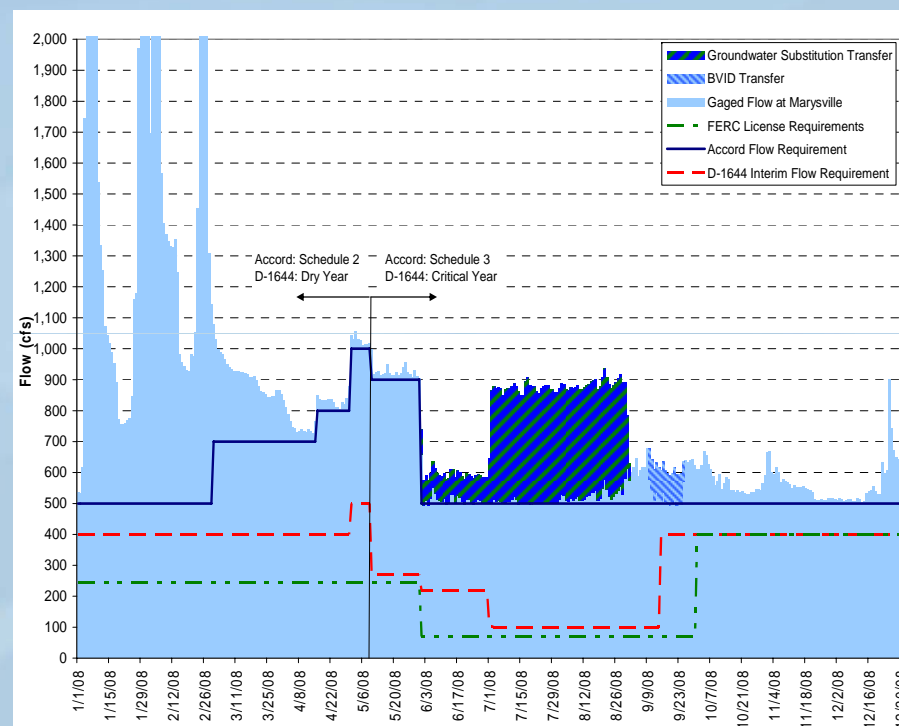
- Greater flow requirements
  - Ties minimum streamflow to available water
- Lower End-of-September Storage Target
  - Forces increased releases from storage in relatively wet years
- Groundwater supply available as backup
  - Local agricultural irrigators agree to pump groundwater to make surface water available to Yuba River



# Elements of the Fisheries Agreement that Affect Operations

## Groundwater Substitution Transfers

- Schedule 1 – flows to start on or after July 1
  - Total of GW substitution flows and Accord flows not to exceed 1,500 cfs or the flow on June 30<sup>th</sup> whichever is greater
- Schedule 2 & 3 – up to 10% of flow scheduled by RMT
- Schedule 4 & 5 – up to 20% of flow scheduled by RMT YCWA must submit a preliminary schedule by April 10<sup>th</sup> and final schedule by May 15<sup>th</sup>



Minimum Instream Flow Requirements and actual flows, Marysville Gauge, 2008



# Wrap-Up

- Yuba River Development Project operational objectives result in minimal discretionary operations
- Tightly controlled throughout year in virtually all year-types
- YRDP is operated collaboratively:
  - YCWA and its Member Units
  - River Management Team
  - PG&E
  - DWR and Reclamation





# Questions?



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