



Foothills Water Network

August 25, 2017

By electronic filing

Kimberly Bose, Secretary
Federal Energy Regulatory Commission
888 First Street NE
Washington, D.C. 20426

Re: Yuba River Development Project, FERC Project No. 2246
Comments on Ready for Environmental Analysis and Recommendations of the Foothills
Water Network

Dear Ms. Bose:

Attached for filing with the Federal Energy Regulatory Commission please find the response to of the Foothills Water Network to the “Notice of Application Accepted for Filing, Soliciting Motions to Intervene and Protests, Ready for Environmental Analysis, and Soliciting Comments, Recommendations, Preliminary Terms and Conditions, and Preliminary Fishway Prescriptions” of the Foothills Water Network in the above-captioned proceeding.

Please contact me with any questions.

Sincerely,

A handwritten signature in cursive script that reads "Chandra Ferrari".

Chandra Ferrari
Water Policy Advisor/Staff Attorney
Trout Unlimited

Enclosure

Cc: Service List, Project No. 2246



Foothills Water Network

COMMENTS AND RECOMMENDATIONS READY FOR ENVIRONMENTAL ANALYSIS FOR THE YUBA RIVER DEVELOPMENT PROJECT (P-2246)

August 25, 2017

Hon. Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E.
Washington, DC 20426

Via electronic filing

Dear Ms. Bose:

The Foothills Water Network (FWN or Network) and its member organizations respectfully respond to the Notice of Ready for Environmental Analysis for the relicensing of Project 2246, the Yuba River Development Project (hereinafter, the “Project”) operated by the Yuba County Water Agency (YCWA). We provide a suite of recommendations for the Project under Section 10(a) of the Federal Power Act (FPA) and comments regarding the Commission’s forthcoming Environmental Impact Statement for the Project under the National Environmental Policy Act (NEPA).

Foothills Water Network

This response was jointly developed and signed by non-governmental organizations and individuals participating in the YRDP relicensing.¹ The Foothills Water Network represents a broad group of non-governmental organizations and water resource stakeholders in the Yuba, Bear, and American Watersheds. The overall goal of the Foothills Water Network is to provide a forum that increases the effectiveness of non-profit conservation organizations to achieve river and watershed restoration and protection benefits for the Yuba, Bear, and American Rivers. This includes negotiations at the county, state, and federal levels, with an immediate focus on the FERC relicensing processes.

EXECUTIVE SUMMARY

The Foothills Water Network and its member groups have been active relicensing participants in the relicensing of the Project since before the formal commencement of the

¹ Foothills Water Network, Adventure Connection, American Rivers, American Whitewater, California Outdoors, California Sportfishing Protection Alliance, Friends of the River, Gold Country Fly Fishers, Northern California Council Federation of Fly Fishers, Sierra Club, South Yuba River Citizens League, Tributary Whitewater Tours, and Trout Unlimited

Integrated Licensing Process. The Network and its member organizations have worked collaboratively with the Licensee and the resource agencies throughout the relicensing process in an attempt to reach agreement on new license measures. In many areas, agreement was reached. The Network appreciates the fact that the Amended FLA (AFLA) includes many consensus measures. Among other things, these measures will improve recreational and whitewater boating opportunities and help ensure adequate habitat conditions below Our House and Log Cabin Diversion Dams (through maintenance of minimum flows and controlled spill). For quick reference, a table of Licensee Proposed Measures, California Department of Fish and Wildlife (CDFW) and U.S. Fish and Wildlife Service (USFWS) Preliminary 10(j) Conditions and Network Recommendations is included at the end of this executive summary.

However, despite significant effort, the relicensing participants were unable to reach agreement on several key areas. Most notably, the Licensee's proposal for protecting environmental resources in the lower Yuba River is insufficient to mitigate the effects of the Project. The Network, Licensee and agencies met for over two years to discuss and test ideas for flow and habitat mitigations for the lower Yuba River. The Network was able to reach agreement with several of the resource agencies on these measures, but not with the Licensee. Even though FWN did not reach agreement with the Licensee, the Network's lower Yuba River flow and habitat recommendations reflect an attempt to address the concerns articulated by the Licensee in those discussions. They are balanced measures to address Project impacts to ecological resources with minimal impact to Licensee's operations.

There are several other key issues that have not been adequately addressed in the AFLA. The Network recommends that Licensee and the Commission consider the following changes and additions to ensure the legal sufficiency of the Commission's NEPA analysis (*see* 18 C.F.R. § 380.3) and to ensure that the new license is in the public interest and best suited to a comprehensive plan of development for the river consistent with Section 10(a) of the FPA (*see* 16 U.S.C. § 803(a)(1)).

- 1) Implementation of the Network's lower Yuba River Flow and Habitat Recommendations as a balanced approach to restore habitat conditions and improve salmonid populations without substantial impacts to Project operations.
- 2) Implementation of the Network's Fish Passage Recommendation that requests that the Commission include Englebright Dam, including Licensee's related possessory and legal interests, as a Project work and decide the unresolved issue of the Commission's authority to require mitigation for Project impacts on fish passage.
- 3) Formation of the Yuba River Development Project Ecological Group as the primary forum to conduct post-licensing monitoring, research and consultation.
- 4) Modification or removal of the Drought Management Plan consistent with the Network's recommendation.
- 5) Minor modification of Licensee's measure related to water year types for conditions pertaining to Narrows 2 Powerhouse and Narrows 2 Full Bypass consistent with the Network's recommendation.
- 6) Adoption of Licensee's recreational measures consistent with minor modifications and clarifications recommended by the Network.

- 7) Adoption of Network’s recommendation for development of a Shot Rock Removal and Stabilization and Gravel Augmentation Plan for the Englebright Dam Reach.
- 8) Adoption of Network’s recommendation for Narrows Reach Fish Stranding Prevention Plan.
- 9) Adoption of CDFW and USFWS 10(j) conditions for aquatic and geological resources downstream of New Bullards Bar Dam, including instream minimum flows and development of a Woody Material and Sediment Enhancement Plan.
- 10) Adoption of CDFW and USFWS 10(j) condition for periodic closure of Lohman Ridge Diversion.
- 11) Modification of No-Action Alternative to include the new minimum instream flows and new spring snowmelt recession flows to be released in accordance with the final 4(e) conditions for the Yuba-Bear and Drum-Spaulding (YBDS) hydroelectric projects.
- 12) Inclusion of an alternative that examines the Network’s Lower Yuba Flow and Habitat measures.
- 13) Inclusion of a NEPA alternative that analyzes changes to Project operations and condition of aquatic resources in response to flow requirements required to meet Delta flow objectives pursuant to the State Water Resources Control Board’s ongoing update of the Bay-Delta Water Quality Control Plan and Waterfix.
- 14) An enhanced cumulative effects analysis that considers actions such as fish passage above Englebright Dam and adoption of the revised Bay-Delta Water Quality Control Plan.
- 15) Inclusion of analysis that assesses how Project effects under the new Project license will change under conditions of climate change.

Table of YCWA Proposed Measures, CDFW and USFWS Preliminary 10(j) Conditions, and FWN Recommendations

AFLA Measure	Name (may not match the titles of the corresponding 10(j) Conditions) ²	Preliminary 10(j) Condition CDFW (in <i>BOLD Italics</i> if different from AFLA Measure) ³	Preliminary 10(j) Condition USFWS (in <i>BOLD Italics</i> if different from AFLA Measure) ⁴	Notes
GEN1	<i>Organize Ecological Group and Host Meetings</i>	1.1		FWN supports AFLA measure.
GEN2	<i>Annual Review of Special-Status Species Lists</i>	1.2	6	FWN supports AFLA measure with CDFW’s modification to expand this measure to lands “immediately adjacent to” project boundary and to not limit review to National Forest lands.
GEN3	<i>Provide Environmental Training to Employees</i>	1.3		FWN supports AFLA measure.

² For conditions without a corresponding Licensee proposed measure, the name is that used by CDFW or USFWS, except when condition is proposed by FWN alone.

³ CDFW condition name may differ from AFLA or from USFWS condition.

⁴ USFWS condition name may differ from AFLA or from CDFW condition.

GEN4	<i>Develop and Implement a Coordinated Operations Plan to Assure Licensee's Compliance with the New License for the Yuba River Development Project</i>	2.8	Included in 1	FWN supports AFLA measure.
GS1	<i>Implement Erosion and Sediment Control Plan</i>	2.16		FWN supports AFLA measure.
GS2*	<i>Implement Our House and Log Cabin Diversion Dams Sediment Management Plan</i>	2.17		FWN supports AFLA measure.
GS3*	<i>Implement Our House and Log Cabin Diversion Dams and NBB Reservoir Woody Material Management Plan</i>	2.18	7	FWN supports USFWS Condition which revises the plan for NBB Reservoir to make wood available for habitat projects.
WR1	<i>Implement Hazardous Materials Management Plan</i>	1.4		FWN supports AFLA measure.
WR2	<i>Determine Water Year Types for Conditions Pertaining to Our House Diversion Dam, Log Cabin Diversion Dam and New Bullards Bar Dam</i>	2.1		FWN supports AFLA measure.
WR3	<i>Determine Water Year Types for Conditions Pertaining to Narrows 2 Powerhouse and Narrows 2 Full Bypass</i>	2.2	17	FWN supports CDFW and USFWS 10(j) Conditions to limit application of AFLA proposal that Licensee not revise water year schedule in February of Schedule 5 and 6 years and Conference years
WR4	<i>Implement Streamflow and Reservoir Level Compliance</i>	2.14		FWN supports AFLA measure.
WR5	<i>Maintain New Bullards Bar Reservoir Minimum Pool</i>			FWN supports AFLA measure.
WR6	<i>Operate New Bullards Bar Reservoir for Flood Control</i>			FWN supports AFLA measure.
WR7*	<i>Implement Water Temperature Monitoring Plan</i>	2.24		FWN supports AFLA measure.
WR8*	<i>Implement Water Quality Monitoring Plan</i>	2.25		FWN supports AFLA measure.
WR9*	<i>Implement Drought Management Plan</i>	2.16	14	FWN supports CDFW and USFWS 10(j) Conditions for a revised plan produced with the Ecological Group for extreme droughts only.
AR1	<i>Maintain Minimum Streamflows Below Our House Diversion Dam and Log Cabin Diversion Dam</i>	2.3		FWN supports AFLA measure.
AR2	<i>Control Project Spills at Our House Diversion Dam</i>	2.9 and 2.13		FWN supports AFLA measure, but recommends the increased frequency of tunnel closures stated in CDFW Condition 2.13. See also AR11.
AR3	<i>Maintain Minimum Streamflows at Narrows 2 Powerhouse and Narrows 2 Full Bypass</i>	2.5	1	FWN supports CDFW and USFWS 10(j) Conditions.
AR4	<i>Control Project Spills at New Bullards Bar Dam</i>	2.11	13	FWN supports AFLA measure.
AR5*	<i>Implement Aquatic Invasive Species Management Plan</i>	2.20	8	FWN supports AFLA measure.

AR6*	<i>Implement New Bullards Bar Reservoir Fish Stocking Plan</i>	2.21		FWN supports AFLA measure.
AR7*	<i>Implement Upper Yuba River Aquatic Monitoring Plan</i>	2.23		FWN supports AFLA measure.
AR8*	<i>Implement Lower Yuba River Aquatic Monitoring Plan</i>	2.26		FWN supports AFLA measure.
AR9	<i>Control Project Ramping and Flow Fluctuations Downstream of Englebright Dam</i>	2.12	16	FWN supports CDFW and USFWS 10(j) Conditions which extends the applicable time period through September 30. FWN's rationale for this measure is included as part of FWN's overall rationale for recommended flows in the lower Yuba River.
AR10	<i>Maintain Minimum Streamflow Below New Bullards Bar Dam</i>	2.4	11	FWN supports the CDFW and USFWS 10(j) Conditions
AR11	<i>Periodically Close (Reduce Fish Entrainment into) Lohman Ridge Diversion Tunnel</i>	2.13	10	FWN supports CDFW and USFWS 10(j) Conditions including fall tunnel closures. CDFW and USFWS Conditions increase the frequency of tunnel closures of Lohman Ridge Tunnel compared to AFLA measure.
AR12	<i>Control Project Spills at Log Cabin Diversion Dam</i>	2.10		FWN supports AFLA measure.
RR1	<i>Implement Recreation Facilities Plan</i>			FWN supports AFLA measure.
RR2	<i>Provide Recreation Flow Information</i>			FWN supports AFLA measure.
RR3	<i>Provide Whitewater Boating Below Our House Diversion Dam</i>			FWN supports AFLA measure.
	<i>Maintain Summer Water Temperatures in the Lower Yuba River in Schedule 6 Years</i>	2.6	2	FWN supports CDFW and USFWS 10(j) Conditions. FWN's rationale for this measure is included as part of FWN's overall rationale for recommended flows in the lower Yuba River.
	<i>Reservation of Authority to Recommend Fish Passage</i>	2.30	FPA Section 18 Reservation	FWN supports these reservations of authority.
*	<i>Develop and Implement Lower Yuba River Habitat Restoration and Large Woody Material Management Plan</i>	2.29	3	FWN supports CDFW and USFWS 10(j) Conditions and a plan for mitigating project effects with surface lowering, planting and wood. These measures are explicitly designed to work in combination with CDFW and USFWS 10(j) lower Yuba River flow Conditions.
*	<i>Develop and Implement North Yuba River Below New Bullards Bar Dam Large Woody Material and Sediment Enhancement and Management Plan</i>	2.20	9	FWN supports CDFW and USFWS 10(j) Conditions which mitigate for project impacts to habitat by providing wood and gravel placement.
	<i>Use of Upper New Colgate Power Tunnel Intake</i>	2.7	12	FWN supports CDFW and USFWS 10(j) Conditions
	<i>Maintain Summer Water Temperatures in the Lower Yuba River in Schedule 6 Water Years</i>	2.6	2	FWN supports CDFW and USFWS 10(j) Conditions. FWN rationale is included with overall rationale for lower Yuba River flows.
*	<i>Develop and Implement Narrows Reach Fish Stranding and Prevention Plan</i>	2.27	4	FWN supports CDFW and USFWS 10(j) Conditions

*	<i>Develop a Shot Rock Removal and Stabilization and Gravel Augmentation Plan for the Englebright Dam Reach</i>			FWN recommends a plan for mitigating project impacts related to shot rock in the Englebright Dam Reach.
	<i>Provide Recreational Access Below New Bullards Bar Dam</i>	2.22		FWN recommends that a condition require Licensee to provide public access for recreation downstream of New Bullards Bar Dam. FWN supports CDFW 10(j) Condition 2.22 to require public access for angling. FWN believes that the condition should also require access for whitewater boating and other recreational activities, which may have different seasons of use than angling. Forest Service 10(a) Recommendation 17 and the National Park Service also support recreational access below New Bullards Bar Dam.
	<i>Forecasted Target Flow and Flow Ramping Information Condition</i>			FWN recommends that a condition require Licensee to post forecasted flow information for the lower Yuba River and the Middle Yuba River downstream of Our House Dam.

Asterisk denotes the Licensee has provided or must provide a detailed implementation plan.

BACKGROUND

The initial license for the Yuba River Development Project (Project) was issued to YCWA by the Federal Power Commission, the predecessor to the Federal Energy Regulatory Commission (FERC or Commission), on May 16, 1963, effective as of May 1, 1963.⁵ The Federal Power Commission’s May 6, 1966 Order Amending License changed the license’s effective beginning date to May 1, 1966 and set the expiration date as April 30, 2016.⁶ On November 5, 2010, YCWA filed with FERC a Notice of Intent to File an Application for a New License for the Project on or before April 30, 2014.⁷ On April 28, 2014, YCWA filed its Final License Application. On June 5, 2017, YCWA filed its Amended Final License Application (AFLA) for the Project with the Commission. The Commission issued the “Notice of Application Accepted for Filing, Soliciting Motions to Intervene and Protests, Ready for Environmental Analysis, and Soliciting Comments, Recommendations, Preliminary Terms and Conditions, and Preliminary Fishway Prescriptions” for the Project on June 26, 2017.

A history of major relicensing filings for the Project is included below.

Filings by Licensees

Licensee YCWA has made the following major filings in the Integrated Licensing Process for the Yuba River Development Project:

On November 10, 2011, YCWA filed its Notice of Intent⁸ and Pre-Application Document.⁹

⁵ AFLA, p. E1-1.

⁶ Id.

⁷ Id.

⁸ See eLibrary 20101105-5187.

⁹ See eLibrary 20101105-5207.

On February 2, 2011, YCWA submitted Study Proposals.¹⁰

On March 7, 2011, YCWA filed Comments on Scoping Document 1.¹¹

On April 12, 2011, YCWA submitted a Response to Comments on SD1.¹²

On April 19, 2011, YCWA filed its Proposed Study Plan.¹³

On August 17, 2011, YCWA submitted its Revised Study Plan.¹⁴

On September 8, 2011, YCWA filed its Reply to Comments on the Revised Study Plan.¹⁵

On October 28, 2011, YCWA submitted its Implementation of Study Determination Based on Filing of Disputes.¹⁶

On October 31, 2011, YCWA filed a Motion to Partially Dismiss Notice of Study Dispute.¹⁷

On November 14, 2011, YCWA filed Comments and Information Regarding Study Dispute.¹⁸

On December 16, 2011, YCWA filed its Revised Study Plan to modify studies 2.1, 7.10 and 7.11.¹⁹

On December 29, 2011, YCWA submitted its Modified Study Plan for 3.11 Entrainment.²⁰

On February 14, 2012, YCWA filed a Modified Study 6.1, Riparian Habitat Upstream of Englebright Reservoir.²¹

On March 8, 2012, YCWA submitted modified studies for the following: 1.2, Channel Morphology Downstream of Englebright Dam²², Modified Study 3.12, New Colgate

¹⁰ See eLibrary 20110211-5105.

¹¹ See eLibrary 20110307-5099

¹² See eLibrary 20110412-5206.

¹³ See eLibrary 20110419-5179.

¹⁴ See eLibrary 20110817-5114.

¹⁵ See eLibrary 20110908-5135.

¹⁶ See eLibrary 20111028-5136.

¹⁷ See eLibrary 20111031-5342.

¹⁸ See eLibrary 20111114-5352.

¹⁹ See eLibrary 20111216-5212.

²⁰ See eLibrary 20111229-5105.

²¹ See eLibrary 20120214-5110.

²² See eLibrary 20120308-5007.

Powerhouse Ramping²³, 6.2, Riparian Habitat Downstream of Englebright²⁴ and 7.12, Project Effects on Fish Facilities Associated with Daguerre Point Dam.²⁵

On June 1, 2012, YCWA submitted its Modified Study 7.11, Fish Behavior and Hydraulics Near Narrows 2 Powerhouse.²⁶

On December 3, 2012, YCWA filed its Initial Study Report.²⁷

On February 27, 2013, YCWA filed its Response to Comments on the Initial Study Report.²⁸

On May 15, 2013, YCWA submitted plan for Study 7.13, Fish Stranding Associated with Shutdown of Narrows 2 Powerhouse Partial Bypass.²⁹

On December 2, 2013, YCWA filed the Draft License Application (DLA)³⁰ and Updated Study Report.³¹

On March 3, 2014, YCWA submitted Response to Comments on its Updated Study Report.³²

On April 28, 2014, YCWA filed its Final License Application.³³

On October 27, 2016, YCWA filed its Understanding of Agreed-Upon Forest Service Potential 4(e) Conditions.³⁴

On November 4, 2016, YCWA filed Status of Discussions Regarding 10(j) Potential Recommendations.³⁵

On December 1, 2016, YCWA submitted its Understanding of Agreed-Upon 10(j) Potential Recommendations.³⁶

On June 5, 2017, YCWA filed its Amended Final License Application (AFLA).³⁷

²³ See eLibrary 20120308-5006.

²⁴ See eLibrary 20120308-5005.

²⁵ See eLibrary 20120308-5004.

²⁶ See eLibrary 20120601-5272.

²⁷ See eLibrary 20121203-5147.

²⁸ See eLibrary 20130227-5186.

²⁹ See eLibrary 20130515-5005.

³⁰ See eLibrary 20131202-5098.

³¹ See eLibrary 20131202-5044.

³² See eLibrary 20140303-5141.

³³ See eLibrary 20140428-5073.

³⁴ See eLibrary 20161027-5175.

³⁵ See eLibrary 20161104-5114.

³⁶ See eLibrary 20161201-5304.

³⁷ See eLibrary 20170605-5050.

Issuances by the Commission

The Commission has made the following issuances in the Integrated Licensing Process for the Yuba River Development Project:

On January 4, 2011, FERC issued Notice of Intent to File License Application, Filing of Pre-Application Document (PAD), Commencement of Pre-Filing Process, and Scoping; Request for Comments on the PAD and Scoping Document, and Identification of Issues and Associated Study Requests.³⁸

On March 7, 2011, FERC issued Comments on the PAD and Preliminary Proposed Study Plans.³⁹

On April 18, 2011, FERC issued Scoping Document 2.⁴⁰

On September 30, 2011, FERC approved YCWA's Study Plan Determination.⁴¹

On November 9, 2011, FERC issued a notice of dispute resolution process schedule, panel meeting and technical conference.⁴²

On December 8, 2011, FERC issued a letter informing YCWA of the need to modify the Approved Study Plan.⁴³

On December 28, 2011, FERC issued a letter to YCWA addressing study dispute determination and requiring modification of five studies.⁴⁴

On June 26, 2017, FERC issued its Notice of Ready for Environmental Analysis.⁴⁵

Filings by Foothills Water Network

The Foothills Water Network has made the following major filings in the Integrated Licensing Process for the Yuba River Development Project:

On March 7, 2011, the Foothills Water Network filed comments on the Pre-Application Document and Scoping Document 1.⁴⁶

On July 18, 2011, the Foothills Water Network filed comments on YCWA's Proposed Study Plan.⁴⁷

³⁸ See eLibrary 20110104-3010.

³⁹ See eLibrary 20110307-4001.

⁴⁰ See eLibrary 20110503-0157.

⁴¹ See eLibrary 20110930-3051.

⁴² See eLibrary 20111109-3025.

⁴³ See eLibrary 20111208-3028.

⁴⁴ See eLibrary 20111228-3031.

⁴⁵ See eLibrary 20120119-3065.

⁴⁶ See eLibrary 20110307-5009.

On September 1, 2011, the Foothills Water Network filed comments on YCWA's Revised Study Plans.⁴⁸

On November 15, 2011, the Foothills Water Network filed Comments in Opposition to YCWA's Motion to Partially Dismiss Notice of Study Dispute.⁴⁹

On January 28, 2013, the Foothills Water Network filed comments on YCWA's Initial Study Report.⁵⁰

On January 30, 2014, the Foothills Water Network filed comments on the Updated Study Report.⁵¹

On March 4, 2014, the Foothills Water Network filed comments on the Draft License Application.⁵²

On December 2, 2014, the Foothills Water Network submitted Supplemental Information regarding Shot Rock Below Englebright Dam.⁵³

SUBSTANTIVE COMMENTS AND RECOMMENDATIONS

I. Lower Yuba River Flows

A. FWN Recommendation: Include the CDFW and USFWS 10(j) Flow Conditions that Recommend Specific Improvements to Minimum Instream Flows for the Lower Yuba River.

The Network recommends that the Commission include the CDFW and USFWS 10(j) flow conditions that recommend improvements to the instream flows for the lower Yuba River as a license measure necessary to mitigate for impacts of the Project and to improve conditions for aquatic resources. The components of this recommendation can be found in several different 10(j) recommendations, but for clarity the Network references them collectively going forward as the "CDFW and USFWS 10(j) flow Condition" for the lower Yuba River. The CDFW and USFWS 10(j) flow Condition for the lower Yuba River is the outcome of the multi-year process described in more detail below.

The recommended Condition consists of six components of improvement in comparison with the Licensee's proposed condition (AR3) and Yuba Accord flows:

⁴⁷ See eLibrary 20110718-5013.

⁴⁸ See eLibrary 20110901-5009.

⁴⁹ See eLibrary 20111115-5121.

⁵⁰ See eLibrary 20130128-5022.

⁵¹ See eLibrary 20140130-5353.

⁵² See eLibrary 20140303-5059.

⁵³ See eLibrary 20141202-5170.

- 1) Increased minimum flows during March and April of Schedule 1 and 2 years (spring floodplain inundation);
- 2) A pulse flow during February of Schedule 5 and 6 years and Conference Years when flows in excess of 3000 cfs have not previously occurred (winter pulse for steelhead attraction);
- 3) Increased minimum flows during early May of Schedule 5, 6 and Conference Years (spring pulse for salmon attraction);
- 4) Slightly increased minimum flows during early May in Schedule 2 and 3 years (smolt emigration);
- 5) Increase minimum flows in late April and May of Conference Years (water temperature protection); and
- 6) Ramping rate for riparian recruitment from April 1 through September 30.

The specific details of each component are discussed in more detail in the rationale below.

B. Lower Yuba Flow Proposal Rationale

FWN's rationale for the recommended Condition for lower Yuba flow begins with background information that helps lay the foundation and provide the context for the recommendation. The rationale then recounts the discussions of flow in the lower Yuba River that took place during relicensing, including flow proposals by FWN, by CDFW and USFWS, and some of the response of Licensee. Following this background and history, the rationale provides technical and scientific support for the CDFW and USFWS 10(j) flow Condition for the lower Yuba River.⁵⁴

1. Background on Lower Yuba River Flows

a. Yuba Accord and Relicensing

The present required flow regime in the Lower Yuba River is governed by the "Yuba Accord" Fisheries Agreement. YCWA negotiated these flows with three fisheries agencies and several non-governmental organizations in 2002-2005, in order to settle a contested water rights proceeding before California's State Water Resources Control Board.

The Yuba Accord includes a "Fisheries Agreement" that specifies rules and procedures for managing flows in the lower Yuba River, including:

- Water year scheduling using the North Yuba Index
- Minimum stream flow requirements by schedule and month
- Maximum ramping rates
- Carryover storage targets for New Bullards Bar Reservoir

⁵⁴ Throughout this document, we refer to a "10(j) condition" or "10(j) conditions." In fact, these conditions to which we refer are *preliminary* 10(j) conditions submitted by CDFW and USFWS in response to the REA Notice for this proceeding. For simplicity, we do not repeat the term "preliminary" each time we discuss or refer to these conditions.

- A River Management Team (RMT) for conducting an evaluation program and making decisions concerning certain operational scenarios, including an amount of discretionary water under certain conditions.

YCWA first officially implemented the Yuba Accord flows in Water Year 2008, with voluntary implementation in 2006 and 2007. The Yuba Accord flows became a regulatory requirement with the State Water Board's adoption of Corrected Order WR 2008-0024.

In its Pre-Application Document (November, 2010) Licensee YCWA described how the Fisheries Agreement envisioned its use in the upcoming licensing proceeding:

Section 5.4.9 of the Yuba Accord's Lower Yuba River Fisheries Agreement provides that all parties to the agreement will work together and in good faith, using the Yuba Accord minimum flow schedules as a starting point, and using all of the data that is being and will be collected on the Lower Yuba River during the term of that agreement, to try to develop a consensus proposal for the Lower Yuba River instream-flow requirements for Licensee's new Federal Power Act license. Licensee intends to take these actions during the re-licensing process.⁵⁵

Neither the RMT nor relicensing participants have developed a "consensus proposal" for instream flow requirements in the Lower Yuba River.

In its Draft License Application (DLA) on December 2, 2013, licensee Yuba County Water Agency quotes the Yuba Accord Fisheries Agreement verbatim:

The Parties intend that their monitoring and data-collection actions will produce a useful database for the proceedings of the Federal Energy Regulatory Commission regarding the relicensing of YCWA's FERC License for the Yuba Project, which expires in 2016. The Parties also intend that this monitoring and data-collection be used to evaluate the biological provisions of this Agreement.⁵⁶

The RMT has not achieved consensus on the significance of data it has collected. In response to the RMT's Draft Monitoring and Evaluation Program Interim Report (2013), the U.S. Fish and Wildlife Service wrote to the RMT:

Although we know that flows during the Chinook salmon spawning period have improved under the Yuba Accord, the link between fish population and behavioral data trends and the effect of the Yuba Accord flows remains unclear.

The Service is concerned that improvements to spawning flows may be counteracted by adverse effects to juvenile salmonids and steelhead, for which information continues to be very limited. For example, Yuba River-origin juvenile Chinook salmon outmigrants had extremely poor return rates prior to implementation of the Accord, and the effect of Accord flows on juvenile growth, survival, and outmigration remains incomplete.

⁵⁵ YRDP Pre-Application Document (PAD), p. 9-9.

⁵⁶ DLA, p. App. E2-56.

We regret that monitoring data collected during the current drought year [2014] will neither be extensive nor assessed in time to inform the new FERC license. However, we strongly encourage the RMT to further develop new studies, analyses, and comparisons to meet the objectives of the M&E Program and truly assess the effects of the Yuba Accord on anadromous salmonids and their habitat.⁵⁷

The RMT has not conducted further studies to evaluate juvenile salmonid productivity or to assess flow alternatives that might improve it. As we discuss below, existing evidence suggests that wild juvenile salmon born in the lower Yuba River do not return at rates sufficient to support a self-sustaining population.

Beginning with the filing of its Draft License Application (DLA) on December 2, 2013, licensee Yuba County Water Agency has proposed that the new project license require flows in the Lower Yuba River that are virtually identical to the Accord flows. In its Amended Final License Application (AFLA, June, 2017), YCWA proposes three adjustments to Yuba Accord flows. First, YCWA proposes (on its own motion) to extend the applicability of its “flow fluctuation criteria” to May 15 of each year. Second, YCWA proposes, as the result of negotiated agreement with relicensing participants, to add to the existing Yuba Accord flow schedule a rampdown rate in late spring in order to improve riparian recruitment and to improve conditions for juvenile salmonids. Finally, YCWA proposes to alter the flow regime in “Conference Years,” slightly reducing required flows in October through December and slightly increasing required flows in January through mid-April and in July through September, with a net overall increase of the volume of required flows of just over 23,000 af.⁵⁸

This is a substantial part of the general context in which the California Department of Fish and Wildlife and the U.S Fish and Wildlife Service, as well as the Foothills Water Network (FWN) relicensing participants, developed their flow proposals for the lower Yuba River in the YRDP relicensing.

b. Delta Flow Criteria Report

In August, 2010, the State Water Board issued its Delta Flow Criteria Report, whose development and publication was mandated in California’s Delta Reform Act of 2009.⁵⁹ The Delta Flow Criteria Report found:

In order to preserve the attributes of a natural variable system to which native fish species are adapted, many of the criteria developed by the State Water Board are crafted as percentages of natural or unimpaired flows. These criteria include:

- 75% of unimpaired Delta outflow from January through June;

⁵⁷ U.S. Fish and Wildlife Service Comments on River Management Team Draft Interim Report, June 9, 2014

⁵⁸ AFLA, p. App. E2-43.

⁵⁹ *Development of Flow Criteria for the Sacramento-San Joaquin Delta Ecosystem* (“Delta Flow Criteria Report”) is available at:

http://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/deltaflow/docs/final_rpt080310.pdf

- 75% of unimpaired Sacramento River inflow from November through June; and
- 60% of unimpaired San Joaquin River inflow from February through June.⁶⁰

In addition to the Yuba Accord and the Yuba-specific rates of return of salmon spawned in the river, this report is also an essential part of the context of the development of flow proposals for the lower Yuba River in the YRDP relicensing.

c. YCWA Proactive Response to Delta Flow Criteria Report

In February, 2011, YCWA made presentations to various water users and non-governmental organization in which YCWA representatives discussed the potential ramifications to the Yuba River of implementations of the State Water Board's Delta flow criteria. In support of these presentations, YCWA's modelers used the water balance model developed for the Yuba Accord and refined for the YRDP relicensing to model an interpretation of the Delta Flow Criteria. YCWA's modelers assumed a flow requirement in which YCWA would be required to release past the Marysville gage 75% of November-June unimpaired flow in the Yuba River watershed. This modeling assumed that upstream water users would also be required to pass 75% of the unimpaired flow past their diversions. This modeling exercise showed greatly depleted storage in New Bullards Bar Reservoir in most critically dry years, reduced irrigation deliveries in every year, increased frequency of higher-numbered flow schedules (with lower flow requirements), reduced upper basin diversions by other water and power purveyors to the Bear and American rivers, decreased cold water pool in New Bullards Bar Reservoir and increased water temperatures in the lower Yuba River in dry and critically dry years, and insufficient recharge to maintain groundwater balance in the lower Yuba basin.

On April 25, 2012, YCWA filed a letter with the State Water Board in response to the Board's Notice of Preparation of a Substitute Environmental Document for Phase II of the update of the Bay-Delta Water Quality Control Plan (Bay-Delta Plan or WQCP).⁶¹ In support of this letter, YCWA's modelers produced model results based on different, less extreme modeling assumptions for an application of modified Delta Flow Criteria, and presented these results in a technical memo that YCWA appended to its letter. YCWA's April, 2012 modeling modeled flow scenarios based on assumed requirements that YCWA release past Marysville 40% and 50% of the January-June unimpaired flow on a daily basis, or the existing Yuba Accord flow, whichever was greater. This modeling assumed that upstream water users would not bypass flows in order to contribute to Delta inflow and outflow. YCWA modelers also modeled, for comparison, the Yuba Accord flow requirements as a base case. The 2012 modeling showed the same type of impacts as the 2011 modeling had shown, but at less extreme magnitudes.

⁶⁰ *Id.*, p. 5.

⁶¹

http://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/bay_delta_plan/comments_042512/alan_lilly.pdf

In both the 2011 and 2012 modeling efforts described above, there was a notable modeling artifact. YCWA's modelers assumed that when the release capacity of YCWA's infrastructure did not allow YCWA to meet flow requirements at Marysville, YCWA would prioritize available capacity to meeting Marysville flow requirements. Effectively, whenever flow requirements were greater than about 3200-3600 cfs during the irrigation season, but when Englebright Dam was not spilling, the model shorted irrigation deliveries to Browns Valley and Daguerre Point Dam customers, often to the point of completely eliminating these deliveries. Thus, shortage of water to irrigators appeared even during very wet periods. While this application was plausible, it assumed a choice that was not presented clearly as a choice, and appeared to present irrigation reductions as a function of lack of water rather than as a function of infrastructure limitations.

2. Development of Flow Proposals for the Lower Yuba River by Relicensing Participants in the YRDP Relicensing

a. Water Balance Model

As suggested above, YCWA developed sophisticated water balance modeling capacity for the Yuba River watershed (downstream of the developments of other entities upstream) in the epoch of the negotiation of the Yuba Accord. YCWA has updated and refined the model that it initially developed for use in the Yuba Accord, and has made that model available for use in the YRDP relicensing. YCWA and its consultants have made multiple revisions and updates of its user-friendly, Excel-based daily operations model over the course of relicensing, and have been very transparent in informing relicensing participants of these updates.

b. CSPA Lower Yuba River Flow Construct, November 2013 – November 2014: Development

In an effort to kick-start discussions of flow requirements for the lower Yuba River and to have sufficient time for analysis and iteration of various flow scenarios, the California Sportfishing Protection Alliance (CSPA) formally requested in a September 20, 2013 e-mail to YCWA's lead consultant that YCWA model several flow scenarios and make the model results available to relicensing participants. CSPA referred to the model runs on which YCWA modelers reported in an Appendix to the April 25, 2012 letter from YCWA's attorney Alan Lilly to the State Water Board (described above). CSPA asked that YCWA "make effectively similar model runs available for use in relicensing." CSPA continued: "The goal here is to understand how the percent-of-spring-unimpaired approach would change project operations and performance, and to allow relicensing participants to work with the model to evaluate variations on the approach."

At a subsequent relicensing meeting later in the fall of 2013, YCWA and its consultants declined to make the model runs CSPA had requested.

As a result, with indispensable technical support from CDFW, CSPA developed a series of model run scenarios based on February-June percent of unimpaired inflow to the Yuba River's Marysville gage. While CDFW ran these scenarios, CDFW technical support implied no policy

support. Over time, YCWA's modeling consultants also provided advice and technical support. Again, this support was in the interest of accuracy, not a policy endorsement of the exercise. CSPA developed these scenarios over the time period November, 2013 through July, 2014.

On September 24, 2014, CSPA made a presentation to relicensing participants that provided modeling assumptions, model output and preliminary conclusions. CSPA described its work as a "conceptual flow construct," not a flow proposal. In that presentation, CSPA described its beginning approach as follows:

- Start with 30% & 40% of Jan-June unimpaired or Yuba Accord flows, whichever is higher
- Assume no added contribution from upstream projects
- Primary metrics: Bullards storage, Marysville flow, irrigation shortages
- Other metric: generation impacts post-processor, especially shift in timing, using Smartsville water year type index from YBDS [Slide 16]

After describing initial results and observations, CSPA then described refinements it made in modeling scenarios:

- Eliminate January from percent of unimpaired requirement so that water year type can be adjusted monthly with Bulletin 120
- Use Yuba Accord schedule for water year type
- Adjust model so that Yuba Accord schedule adjusts each month starting February
- Evaluate different percentages of unimpaired for different Yuba Accord schedules (WY type) [Slide 18]

CSPA next described some decisions it reached based on review of model output:

- 40% of Feb-Jun unimpaired appears sustainable for Schedules 2 and 3 (25%/12% total 37% of all years in period of record)
- Schedules 4-6 and conference years (13% of all years) cannot absorb higher flow requirements than Yuba Accord
- Evaluate 40%, 50%, 60% and 75% in Schedule 1 years (50% of all years)
- Cap percent-of-unimpaired flow requirement at 10,000 cfs [Slide 20]

CSPA described how project infrastructure made it very difficult to achieve flows in the range of 4000-6000 cfs, because maximum combined release capacity of Narrows 1 and Narrows 2 powerhouses is approximately 4120 cfs, and there is no low level outlet on Englebright Dam. As noted above in regard to the 2012 model runs YCWA presented to the State Water Board, this lack of capacity also means that the model must choose to either meet instream flow requirements to the limit of outlet capacity or to make irrigation deliveries when flows are in the ~3200-4120 cfs range once irrigation season starts in late March or April.

CSPA described some of the modeled impacts of the flow construct; these impacts generally increased as the required value of the Schedule 1 percent-of-unimpaired flow increased. There was a shift in power generation from summer into April and to lesser degrees

March and February; some limitation on opportunities for water sales; and some impacts to carryover storage in New Bullards Bar Reservoir.

After proposing several follow-up steps, CSPA summarized the benefits of the “Yuba Accord Plus Modified Delta Flow Criteria” construct:

- Minimum flow benefits plus high flow benefits
- Preserves Yuba Accord benefits, especially in drier years
- Reduces water and power impacts of Delta Flow Criteria in dry years
- Allows greater Delta Flow benefits in wetter years
- Provides structure to high flows, management for fisheries & riparian recruitment
- Manages for Yuba River and for downstream
- Offers unified solution for multiple proceedings [Slide 42]

In November, 2014, CSPA followed up with a sensitivity analysis that eliminated the percent-of-unimpaired flow requirement in Schedule 3 years, observing:

- Eliminating Schedule 3 years from percent of unimpaired requirement improves end of September storage in both 60% and 75% runs
- Storage improvement eliminating Schedule 3 is greater in drier years than reducing percent of unimpaired requirement from 75% to 60%
- Eliminating Schedule 3 years from percent of unimpaired requirement eliminates almost all local irrigation shortages [Slide 29]

c. CSPA Lower Yuba River Flow Construct, November 2013 – November 2014: Rationale and Analysis

CSPA built on the fact that in 2011, YCWA (working with Placer County Water Agency) took the Delta Flow Criteria Report seriously enough to model possible applications of a November-June percent-of-unimpaired flow requirement for the Yuba River. CSPA also built on the fact that YCWA refined its 2012 modeling to base its analysis on assumptions that were less extreme than the assumptions YCWA utilized in 2011.

CSPA’s goal in presenting its flow “construct” in 2013-2014 was to draw YCWA and other relicensing participants into a collaborative discussion of how the Delta Flow Criteria could be modified to: 1) preserve and reinvest the work that went into the Yuba Accord; 2) preserve and reinvest the benefits of the Yuba Accord, both instream and to YCWA; 3) more regularly achieve the benefits of high flows in the Yuba River and downstream that unregulated flow in the Yuba River now meets irregularly and in a mostly unmanaged way; and 4) achieve these added benefits at an affordable water, power and monetary cost to YCWA.

YCWA declined to have any conversation about how one could make the Delta Flow Criteria’s percent-of-unimpaired construct work in the Yuba River watershed. YCWA declined to collaboratively develop or evaluate model runs that included flow requirements tied to a percent-of-unimpaired flow. YCWA did not engage technically on any of CSPA’s flow

proposals, except to help verify modeling accuracy. YCWA went only so far as to help modify its water balance model to fairly evaluate CSPA's scenarios.

In these circumstances, CSPA was left in its modeling of percent-of-unimpaired flow scenarios to try to define YCWA's interests based on CSPA's best analysis. This is an unenviable task. From the perspective of ones colleagues, it tends to elicit accusations that one is "negotiating against oneself." From a water and power purveyor and its customers, it tends to elicit accusations of presumption. For CSPA, it required a commitment to a lot of work whose specifics other entities for the most part ignored.

CSPA presented YCWA with a conceptual flow construct in September, 2014 because YCWA explicitly solicited conceptual approaches (rather than proposals) from relicensing participants and because the agencies were silent. For over a year, CSPA sought a substantive response from YCWA to its conceptual construct. At first, YCWA deferred because the agencies did not embrace the CSPA proposal (though they also did not specifically reject it). Later, after CDFW and the U.S. Fish and Wildlife Service (USFWS) generated their own flow proposal specific to the Yuba watershed on October 9, 2015, YCWA chose to formally respond to those agencies.

d. Foothills Water Network Flow Proposal, March 2016

After over a year during which CSPA and other relicensing participants continued to press YCWA for a response to CSPA's construct, YCWA requested from CSPA an actual, formal flow proposal. On March 23, 2016, CSPA, on behalf of the Foothills Water Network (FWN) coalition of NGO's, presented a formal flow proposal and supporting plots. The FWN Proposal had less water and power costs than the October 9, 2015 CDFW and USFWS proposal.

FWN's March 23, 2016 flow proposal was simple:

- Require release of 75% of Feb-June unimpaired in Schedule 1 years (~50% of all years in period of record) or Yuba Accord requirement, whichever is greater
- Require release of 40% of Feb-June unimpaired in Schedule 2 years (~25% of all years) or Yuba Accord requirement, whichever is greater
- Retain Yuba Accord flow requirements in schedule 3-6 years and conference years (~25% of all years)
- Retain Yuba Accord flow requirements July-January
- Cap percent-of-unimpaired flow requirement at 10,000 cfs [Slide 3]
- Initiate percent-of-unimpaired requirement February through June starting on the 10th of each month so that water year type can be adjusted monthly with Bulletin 120 (adjust model so that flow schedule adjusts on the tenth of each month starting February)
- Use Yuba Accord flows as a floor when a percent of unimpaired is applied
- Use Yuba Accord schedule for water year type [Slide 4]

FWN based its March 23, 2016 flow proposal on the following assumptions:

- Do not change flow requirements of upstream diverters from recent relicensing flow schedules (no additional Delta flow requirements upstream).
- Do not reduce local irrigation deliveries in order to compensate when release capacity of YRDP facilities cannot meet required percent of unimpaired.
- Establish coordinated operating agreement with PG&E to allow use of full capacity of Narrows I PH
- Attempt to meet percent-of-unimpaired requirement on daily basis to degree possible. Consider compliance as a 3 day running average with a 14 day true-up. [Slide 5]

FWN noted that the project “has limited control of flows in the ~4120-6000 cfs range to control recession or sustain floodplain inundation.” FWN proposed the following solution:

- Induce spill at Englebright to meet downstream flow requirements (and do not reduce Englebright elevation in anticipation of spill); but do not induce spill at NBB, change NBB outlet works or increase OHD release into Middle Yuba.
- Develop explicit language that specifies measures required to achieve flows to the degree reasonably possible given system constraints; define these measures as flow compliance. [Slide 6]

In spite of this additional, explicit effort to make clear to YCWA exactly what CSPA and FWN were seeking a response to, YCWA never formally responded to CSPA and FWN.

e. The CDFW and USFWS October 9, 2015 Flow Proposal

On October 9, 2015, the California Department of Fish and Wildlife and the U.S. Fish and Wildlife Service presented a joint flow proposal to relicensing participants at a relicensing meeting. Slide 2 of their October 9, 2015 flow proposal, CDFW and USFWS described their methodology:

To develop the following flow proposal for the lower Yuba River downstream of Englebright Dam, the Fish and Wildlife agencies used the Yuba Accord and YCWA’s FLA Proposal as a baseline and added specific elements, which would otherwise be provided in a natural hydrograph, that are needed to improve the river’s ecological function and habitat for salmonids.

CDFW and USFWS identified target species, lifestages and specific functions they believed that flows need to provide for, and recommended flows to achieve those functions. Generally, CDFW and USFWS’s proposed flow requirements applied to a compliance point at the Marysville gage, unless otherwise specified.

The largest component of CDFW and USFWS’s October, 2015 flow proposal was a piece that required higher spring flows to inundate floodplains in order to improve rearing conditions for juvenile salmonids in Schedule 1, 2 and 3 years (8 out of 10 years). In about half of Schedule 1 years, such flows are in large measure achieved by unregulated flows that overwhelm the ability of Englebright and New Bullards Bar reservoirs to capture water. However, in about half of Schedule 1 years and most Schedule 2 and 3 years, there are few days during which flows

exceed levels needed to move the lower Yuba River out of its thalweg. CDFW and USFWS proposed increased flows in March through May of Schedule 1, 2 and 3 years to help achieve this function, with flows in Schedule 1 years sometimes as high as 5000 cfs at Marysville.

CDFW and USFWS's October, 2015 proposal also included a "winter pulse," seeking to assure that in drier years when unregulated events do not otherwise provide disturbance to a baseflow regime, YCWA would release water to achieve certain short duration pulse flows in early February. This proposed measure would be limited to Schedule 5, Schedule 6 and Conference years. Target species, lifestages and functions for these winter pulses were spring-run Chinook juvenile outmigration and adult steelhead upstream migration.

CDFW and USFWS recognized that in Schedule 5 and 6 years and Conference years, there is little likelihood of an early May pulse to attract adult spring-run salmon into the Yuba River. Based in part on observations of spring-run Chinook in the Feather and Yuba rivers in 2014 and 2015, CDFW and USFWS proposed a spring migration flow for early May in Schedule 5 and 6 years, and a somewhat smaller spring migration in Conference years, to maintain flow levels and water temperatures suitable for spring migration of adult spring-run Chinook salmon.

CDFW and USFWS recognized the severe lack of appropriate riparian vegetation along the lower Yuba River. They therefore proposed a flow recession schedule so that, starting April 1 of each year, YCWA would be limited in the rate it could reduce average daily flows under its control, as measured at the Smartsville (not Marysville) gage.

Finally, CDFW and USFWS proposed an augmentation of summer flows in Schedule 6 and Conference years, as compared to the Yuba Accord. The purpose of this augmentation would be to provide more suitable summer water temperatures for steelhead emergence and juvenile rearing and for holding spring-run Chinook.

By far the largest water cost of CDFW and USFWS's proposal was contained in the proposed spring floodplain inundation flows; however, CDFW and USFWS proposed these flows for years in which water was relatively plentiful. The recession measure had a relatively low water cost. The water cost of the measures CDFW and USFWS proposed for Schedule 5, 6 and Conference years had relatively low water costs in absolute terms but were proposed for water years when water would be in relatively short supply.

f. YCWA response to CDFW and USFWS flow proposal, January, 2016

On January 12, 2016, YCWA produced a 156-slide presentation providing its "feedback" on the CDFW and USFWS October, 2015 flow proposal. YCWA concluded:

- If USFWS/CDFW's Proposal were in YCWA's new license, in most cases, USFWS/CDFW's Proposal would not achieve USFWS/CDFW's stated goals
- If USFWS/CDFW's Proposal were in YCWA's new license, there would be non-compliance events about 20% of the time
- If USFWS/CDFW's Proposal were in YCWA's new license, there would be substantial water delivery deficits

- If USFWS/CDFW’s Proposal were in YCWA’s new license, USFWS/CDFW’s Proposal would significantly undermine the Yuba Accord purposes, which were to maintain water supply reliability and environmentally-beneficial flows throughout a multi-year drought. [Slide 32/pdf 138]

YCWA later agreed that some of the issues it identified in this presentation in which YCWA suggested that CDFW and USFWS’s proposal would not achieve their stated goals were based on a misunderstanding of the application of the proposed recession rate.

YCWA argued that FERC could not require flows below Englebright Reservoir greater than 3400 cfs, the outlet capacity of Narrows II powerhouse, because FERC could not order PG&E, owner of Narrows 1 powerhouse, to use Narrow 1 powerhouse capacity to meet YCWA’s Project 2246 instream flow requirements downstream of Englebright Dam.⁶² YCWA also argued that it would be difficult to maintain Englebright Reservoir full and to induce spill to meet downstream flow requirements, that this would limit YCWA’s ability to provide ancillary services, and that YCWA had no storage rights in Englebright. YCWA argued that it would need to over-release water to meet Marysville requirements under Englebright spill conditions. YCWA stated that it did not control diversions between Englebright Reservoir and Daguerre Point Dam, and that diversions by downstream diverters would be likely to cause non-compliance with some flow requirements at Marysville, downstream of those diversions.

g. YCWA’s June, 2016 “Sideboards” and Six Months of Negotiations

After YCWA’s response to the CDFW and USFWS flow proposal in January, 2016, agency and NGO relicensing participants responded in turn to YCWA on March 23. Part of this response was FWN’s flow proposal and presentation, as described above. After a break in meetings so that YCWA could produce its Final License Application on April 25, relicensing participants turned once again to lower Yuba River flows.

What may superficially appear as a relatively slow pace in addressing lower Yuba flows in the first half of 2016 is attributable to several factors. Throughout this period, relicensing participants were concerned with the imminent potential that FERC might issue its Notice of Ready for Environmental Analysis (REA Notice). To address this issue, relicensing participants joined in asking FERC staff for additional time to complete negotiations. Relicensing participants also devoted extensive time and effort to resolving upstream issues, in order to have closure on as much as possible once the REA Notice was issued. Finally, each step of the process for developing and negotiating flows for the lower Yuba River had become large and difficult, with relicensing participants spending long hours developing responses to long documents and developing new proposals and approaches.

⁶² Pacific Gas & Electric Company, owner of Narrows 1 Powerhouse, filed a “Narrows 1 and Narrows 2 Coordinated Operations Plan” in the Narrows 1 docket (P-1403) on April 25, 2016. See FERC eLibrary 20160425-5156. The Plan delegated to YCWA operational decision-making authority over both powerhouses. This filing largely mooted YCWA’s argument about its inability to assure PG&E’s cooperation in meeting instream flow requirements in the Lower Yuba River. In the AFLA, YCWA proposes a measure to develop a coordinated operations plan for Narrows 1 and Narrows 2 powerhouses (GEN4).

At a relicensing participants meeting on June 2, 2016, YCWA reported to relicensing participants that the CDFW and USFWS flow proposal and associated objectives required flows of too great a magnitude for YCWA to consider. YCWA asked if non-flow measures such as riparian planting could help meet the fish agencies' interests. YCWA also offered to make specific the limits of flow changes to the Yuba Accord flow regime that YCWA was willing to consider.

On June 29, 2016, YCWA made a presentation to relicensing participants proposing a set of what it termed "sideboards": YCWA's view of decision space for a negotiated agreement on lower Yuba River flows. YCWA described the sideboards as "criteria or limitations for potential adjustments to the FLA flow proposal." YCWA stated that the sideboards were "not absolute," but that there was "more flexibility if fewer sideboards [are] 'touched'."

The sideboards were:

- At most, only a minimal increase in total annual release volume requirement ("Annual Release Volume")
- At most, only minimal decreases in carryover storage volumes ("Carryover Storage")
- Must be able to comply with new or changed permit or license conditions ("Compliance")
- YCWA will resist using NBB/Colgate to mitigate effects on lower Yuba River of uncontrolled inflows from MY or SY ("Flexibility")
- No significant additional reduction in water supply reliability and water deliveries ("Water Supply Reliability")
- No significant change in flow schedule probability of occurrence ("Flow Schedule Occurrence")
- No overall reduction in water temperature benefits achieved with the Accord ("Water Temperature Benefits")

At the conclusion of the June 29, 2016 meeting, YCWA proposed to establish a small "modeling group" to review opportunities and limitations for flow enhancements, and to better understand YCWA's actual operations and operational decision making. Separately, YCWA also proposed that relicensing participants evaluate opportunities for non-flow measures that might allow some achievement of the ecological functions that CDFW and USFWS otherwise sought to achieve in their flow proposal.

The small modeling group, consisting of representatives of CDFW, CSPA and YCWA, met several times. This group analyzed model output from various model runs and candidly discussed how YCWA makes operational decisions. Discussions particularly emphasized distinctions between what modeling showed and actual operations, including variable timing of irrigation deliveries, the difficulty of inducing and controlling spill at Englebright Reservoir, and how lower Yuba River hydrographs could be different from model output in the spring of wetter water years. The group also discussed flow schedule changes from month to month and YCWA's proposed January-May flow fluctuation measure. The group discussed the importance of unregulated flows from the South Yuba River and Middle Yuba River, as well as spill at New

Bullards Bar. YCWA described the modeling it had performed and the development of thinking when it negotiated the Yuba Accord.

As a result of small modeling group discussions, YCWA agreed that it could meet a spring recession flow requirement, later adopted in the AFLA as Table 3 of Measure AR9. CSPA and CDFW agreed to recommend to their colleagues a compromise on summer flow requirements in Schedule 6 years, so that an otherwise required water transfer would partially meet the water temperature interest of CDFW and USFWS's proposed "summer flow measure." Otherwise, CDFW, CSPA and YCWA did not reach consensus on flow measures.

Parallel to the efforts of the modelling group, agency and NGO staff developed a suite of potential non-flow habitat improvement actions for the lower Yuba River, including sites and types of actions ("benching," side channel creation, riparian planting, etc.). The goal of these potential measures would be to allow achievement of certain ecological functions at flows less than those proposed by CDFW and USFWS, thus linking the "non-flow" discussion to the flow discussion consistent with YCWA's request on June 2. YCWA was unwilling to commit to any of the non-flow measures in the absence of agreement on flows, but did express appreciation for the level of detail and effort, including cost estimates, that agency and NGO staff displayed.

The agencies and NGO's refined their suite of potential non-flow measures for the lower Yuba River from late August through October, 2016, and met several times with YCWA to discuss them. However, neither on flow or non-flow measures did the relicensing participants reach resolution.

Finally, in recognition of long-term collaboration, the Director of CDFW convened two meetings with the General Manager of YCWA and other relicensing participants to evaluate the opportunity to reach a negotiated agreement. At the end of the second meeting in December, 2016, the attendees agreed that they were at an impasse on measures for the lower Yuba River.

3. Two-Plus Years Refining Flow Proposals to Meet YCWA's Interests

It is fair to say that in the YRDP relicensing neither YCWA nor the resource agencies approached negotiations about lower Yuba River flows with enthusiasm. Relicensing participants delayed discussion of lower Yuba River flows for several reasons, not least of which was the fact that the U.S. Forest Service owns land in the upstream portion of the project but does not own land on the lower Yuba River.

Once flow negotiations for the lower Yuba River got underway, relicensing participants universally used the Yuba Accord as a starting point. It is fair to say that for YCWA, the Yuba Accord was also the ending point, with the exception of adding a flow recession measure and YCWA's three small changes to the Yuba Accord noted above. The dynamic was for other entities, first CSPA, then CDFW and USFWS, to advance proposals that YCWA rejected almost in their entirety. YCWA responded why proposed flows or measures did not work for YCWA; YCWA did not respond by describing how it could change flows or measures that others proposed so that with changes the flows or measures could work for YCWA.

Nonetheless, CSPA and FWN, as well as CDFW and USFWS, persevered in active listening and in subsequently recasting measures that affirmatively responded to YCWA's explanations of how various proposals did not work for YCWA. The movement of CSPA and FWN, and CDFW and USFWS, is impressive, not only because of the concerted effort at moving toward consensus, but also because most of the decisions the NGO's and agencies arrived at were grounded in substantial technical effort and site-specific analysis.

CSPA's initial flow proposals quickly ran up against the fact that required flows in the February-June time period would exceed the release capacity of infrastructure at Englebright Dam. CSPA identified what it called a "doughnut hole" in which YCWA could not meet flow requirements greater than the combined 4120 cfs outlet capacity of Narrows 1 and Narrows 2 powerhouses and less than about 6000 cfs. Modeling showed that when a percent-of-unimpaired requirement exceeded 6000 cfs, Englebright would generally be spilling, and the combination of powerhouse capacity and spill would often be sufficient to meet the required flow.

In other relicensings, licensees have agreed to increase outlet capacity. For example, PG&E agreed to install a larger outlet on Spaulding Dam in the Drum – Spaulding Project upstream of Englebright Dam. Additionally, the Sacramento Municipal Utility District is currently enlarging its outlet capacity at Slab Creek Reservoir on the South Fork American River. However, though YCWA operates Englebright Dam, it does not own it. In addition, there is no low-level outlet on Englebright Dam, and there are substantial questions about whether installation of a low-level outlet would be feasible. So CSPA (and later, CDFW and USFWS) passed on the concept of requiring an increase in outlet capacity from Englebright Dam.

The next step was to consider whether YCWA could induce and/or maintain spills at Englebright Dam to supplement the combined release capacity of ~4120 cfs of Narrows 1 and Narrows 2 powerhouses. Theoretically, YCWA could induce and maintain spill at Englebright Reservoir in several ways, singly or in combination. YCWA could release additional water down the Middle Yuba River past Our House Dam (i.e., divert less water or no water into the Lohman Tunnel). YCWA could release water through the low level outlet works at New Bullards Bar Dam or, when the water surface elevation at New Bullards Bar Reservoir was high enough, induce spill at New Bullards Bar Dam, and cascade that spill down to Englebright Reservoir. Finally, YCWA could use the 3500 cfs capacity of the New Colgate Powerhouse penstock to increase spill at Englebright Dam, when the full capacity of the New Colgate penstock was not already being used.

For multiple reasons, including the expense of new infrastructure combined, potential damage to upstream reaches used for conveyance, and operational difficulty, CSPA, FWN, CDFW and USFWS all elected to not require any of the potential options for inducing spill at Englebright Dam except the use of the New Colgate penstock. In its January 12, 2016 response to the CDFW and USFWS October 9, 2015 flow proposal, YCWA opposed a requirement to induce spill at Englebright. In June, 2016, YCWA included not inducing spill at Englebright as one of its "sideboards."

Careful examination of model results of both the FWN and the CDFW and USFWS October, 2015 flow proposals showed that even if YCWA induced spill at Englebright Dam, there would still be numerous instances in which YCWA could not meet a flow requirement greater than 4120 cfs. This led CDFW and USFWS to focus on reliably generating flows that were within the capacity of the project to produce, in preference to requiring higher flows that YCWA could often simply not achieve.

Similarly, CSPA and FWN elected to change the percent-of-unimpaired flow to a flow metric rather than a requirement, for two reasons. First, the limit of the outlet capacity of Englebright Dam makes a percent-of-unimpaired flow requirement an impressive number on paper but illusive in actual operations. Second, flow requirements in Schedule 1 years are often overwhelmed by unregulated flow. Pre-spill shortages in the desired percent of unimpaired flow are often made up during spill events. The net result is that Yuba River outflow past Marysville often achieves the desired percent of unimpaired flow over a month even though on some days it is short during times when release capacity at Englebright limits releases.

The CDFW and USFWS 10(j) flow Condition for the lower Yuba River that FWN supports thus would thus not require flows greater than the 4120 cfs combined release capacity of Narrows 1 and Narrows 2 powerhouses. While the Condition would require flows of 3500 cfs in some time periods during Schedule 1 years, there is a qualifier that states the licensee will be in compliance when the combined release from the Narrows 1 Powerhouse (FERC Project No. 1403) and Narrows 2 Facilities, as measured at the Smartsville - USGS Streamflows Gage 11421000 is at or above 4120 cfs (the combined capacity of Narrows 1 Powerhouse and Narrows 2 Facilities) and Englebright Dam is not spilling.⁶³

The limitation of flow requirements to the combined release capacity of Narrows 1 and Narrows 2 powerhouses is a major decision in meeting YCWA's interests. The river needs flows greater than 4120 cfs. Part of the need for "benching," described in lower Yuba River habitat measures, CDFW Condition 2.29 ("Develop and Implement Lower Yuba River Habitat Restoration and Large Woody Material Management Plan") and USFWS Condition 3 ("Restore and Enhance Juvenile Rearing Habitat in the Lower Yuba River"), stems from the effort to achieve floodplain benefits at the flows that are reliably achievable by the project. The 10(j) spring flow requirements in Schedule 1 years, from March 24 through April 30, seek to require such flow reliability to work together with enhanced physical conditions in the lower Yuba River to achieve floodplain benefits at flows lower than those currently needed to generally reach the lower Yuba River floodplain.

When all is said and done, there is a certain circularity that CDFW and USFWS's 10(j) lower Yuba River floodplain inundation flows and habitat improvements are designed to break

⁶³ See CDFW 10(j) Condition "Maintain Minimum Streamflows Downstream of Narrows 2 Powerhouse and Narrows 2 Full Bypass," Table 2.5.1, footnote 2:

Because diversions at Daguerre Point Dam are not controlled by Licensee, Licensee will be considered to be in compliance with the specified minimum instream flows when the combined release from the Narrows 1 Powerhouse (FERC Project No. 1403) and Narrows 2 Facilities, as measured at the Smartsville - USGS Streamflows Gage 11421000 is at or above 4120 cfs (the combined capacity of Narrows 1 Powerhouse and Narrows 2 Facilities) and Englebright Dam is not spilling.

through. The release capacity through the powerhouses at Englebright Dam limits inundation of the floodplain until there is spill at Englebright. Benching and side channel creation is designed to allow floodplain benefits at flows lower than those now required, within the release capacity of the powerhouses. If one is going to make an investment in lowering the floodplain, there also need to be flows that reliably activate the benefits.

It was productive, in June, 2016, for YCWA to express its lower Yuba River flow interests in “sideboards.” However, as these sideboards worked out in practice, they became more an expression of position than of interest. For example, CDFW and USFWS’s proposed “Winter Pulse” in Schedule 5, 6 and Conference year was an effort to provide a single pulse over what could be an entire season to move juvenile salmonids out of the Yuba River and attract steelhead adults into the river. The measure would be waived if a natural equivalent flow occurred by February 1. The water cost would be from 2745 af in Conference years to 3000 af in Schedule 5 years. YCWA rejected the measure because it violated the “Water Supply Reliability” sideboard, which stated: “No significant additional reduction in water supply reliability and water deliveries.” Apparently *any* reduction in water deliveries in dry water years is “significant.” Alternatively, YCWA could reduce end of September storage by the amount of the Winter Pulse, but this would apparently violate the “Carryover Storage” sideboard: “Only minimal decreases in carryover storage volumes.” “Minimal” is apparently less than 3000 af. While YCWA described the sideboards as “not absolute,” the effect in this case was binary: YCWA rejected the measure.

As YCWA applied it, YCWA’s interpretation of “No overall reduction in water temperature benefits achieved with the Accord” was apparently that any temperature increase created a reduction in temperature benefits. CDFW, USFWS and FWN clearly understand that releasing additional water in the spring would reduce the amount of water in the reservoir in the summer, and thus incrementally increase water temperatures. In Schedule 1 water years, the wettest 50% of all years, there does not appear to be a loss of “benefits” associated with this change, and the agencies and NGO’s called for the change knowing this. Similarly, YCWA pointed out that in one Schedule 1 year out of 20, CDFW and USFWS’s October, 2015 proposed spring floodplain flows would push end-of-September storage in New Bullards Bar Reservoir just under YCWA’s end-of-September storage target. This one-in-twenty occurrence, with another year said to be “close,” was held up as an example that the other nineteen (or arguably eighteen) years were infeasible.

Finally, it is true that in negotiations, CDFW, USFWS, FWN, or some combination of these, made offers or suggested measures that might have had less water or monetary cost than the current 10(j) conditions. Those offers were made in good faith, but were not accepted. The agencies and NGO’s worked very hard to reach consensus, but did not feel they got much back to work with. One of the consequences of impasse is that negotiating parties revisit and reanalyze ecosystem needs, and the CDFW, USFWS and FWN have done that.

While CDFW and USFWS developed their 10(j) flow Condition based on aquatic needs in the lower Yuba River, FWN believes it is also important to evaluate the impact of any flow schedule in meeting aquatic needs downstream of the lower Yuba River. Using percent of unimpaired flow as a metric, the CDFW, USFWS and FWN flow Condition achieves on average

close to a 75% of unimpaired flow at Marysville in Schedule 1 years in all months except May. Schedule 2 years provide on average range from 40% of unimpaired in May to 71% in June, with February through April falling in between. Schedules 3 through 7 (Conference) show a more inverted hydrograph; any February-May water that might be supplemented with the partial goal of benefitting aquatic resources downstream of the Yuba River watershed would more directly conflict with the Yuba Accord summer and fall flow schedule whose aquatic function in the lower Yuba River is to maintain suitable water temperatures and physical habitat for holding and spawning spring-run salmon and for various lifestages of *O. mykiss*. It would also conflict with

Average of CDFW, USFWS and FWN percent unimpaired	North Yuba Index Schedule						
Month	1	2	3	4	5	6	7
1	99%	74%	110%	94%	46%		37%
2	90%	65%	70%	98%	100%		71%
3	84%	43%	32%	41%	37%	45%	100%
4	72%	57%	28%	30%	25%	22%	39%
5	52%	40%	55%	35%	27%	35%	26%
6	91%	71%	91%	81%	61%		47%
7	146%	144%	169%	156%	156%		110%
8	219%	208%	259%	188%	238%		141%
9	178%	220%	292%	223%	267%		192%
10	140%	168%	220%	202%	255%		260%
11	105%	113%	163%	185%	118%		162%
12	83%	84%	112%	110%	61%		76%

Figure 1: Average monthly percent of unimpaired flow at Marysville by North Yuba Index Schedule over period of record under CDFW and USFWS 10(j) flow Condition for the lower Yuba River

developmental uses such as local irrigation, hydropower generation, and summer water sales, the latter of which generally provide at current magnitudes the aquatic benefit of maintaining cold water temperatures in the lower Yuba River. FWN believes that the Condition for lower Yuba River flows appropriately meets downstream flow needs while maintaining protective flows within the lower Yuba River itself.

FWN worked hard to stay within YCWA’s “sideboards.” The proposed flow regime has virtually no impact on local irrigation deliveries, and YCWA can elect to mitigate any impact by slightly modifying or stretching its carryover storage targets for New Bullards Bar Reservoir. The Condition leaves hydropower, YCWA’s main source of revenue from the project, largely intact. The flow requirements meet an important element of YCWA’s sideboards: YCWA can comply with the flow requirements using existing infrastructure without modification or special operational actions. Please see the rationale of CDFW for supporting graphical demonstration of the effects of the CDFW and USFWS 10(j) flow Condition for the lower Yuba River ; CDFW’s analysis uses various metrics including flow, storage in New Bullards Bar Reservoir, irrigation deliveries, and power generation.

Managing reservoirs and carryover storage is fundamentally managing risk. FWN does not, overall, disagree with the relatively conservative operation of New Bullards Bar Reservoir that YCWA agreed to in the Yuba Accord. But it is precisely this conservatism that should allow the benefits of reliable higher spring flows in relatively wet water years and modest pulse flows to triage an otherwise very flat hydrograph in very dry years. For these reasons, FWN believes that the CDFW and USFWS 10(j) flow Condition is reasonable and strikes the appropriate balance between instream benefits and protection against future dry years.

4. Technical Rationale for Proposed Measure

Table 1 Recommended Minimum Streamflows in cubic feet per second (cfs) for the Yuba River Development Project by date and Water Year Type. Water Types are explained in CDFW 10(j) Condition 2.1. Alternative values in red represent Licensee’s recommended minimum flows where Licensee’s proposed minimum flows differ.

Date	Schedule 1	Schedule 2	Schedule 3	Schedule 4	Schedule 5	Schedule 6	Conference Year
YUBA RIVER – BELOWS NARROWS 2 POWERHOUSE/NARROWS 2 FULL BYPASS (COMPLIANCE POINT: SMARTSVILLE - USGS STREAMFLOW GAGE 11418000)							
October 1-31	700	700	700	700	600	600	500
November 1-30	700	700	700	700	600	600	500
December 1-31	700	700	700	700	550	550	500
January 1-31	700	700	700	700	550	550	500
February 1-29	700	700	700	700	550 ¹	550 ¹	500 ¹
March 1-31	700	700	700	700	550	550	500
April 1-15	700	700	700	700	600	600	500
April 16-30	--	--	--	--	--	--	--
May 1-31	--	--	--	--	--	--	--
June 1-30	--	--	--	--	--	--	--
July 1-31	--	--	--	--	--	--	--
August 1-31	--	--	--	--	--	--	--
September 1-30	700	700	700	700	500	500	500
YUBA RIVER – BELOWS NARROWS 2 POWERHOUSE/NARROWS 2 FULL BYPASS (COMPLIANCE POINT: MARYSVILLE - USGS STREAMFLOW GAGE 11421000)							
October 1-31	500	500	500	400	400	350	350
November 1-30	500	500	500	500	500	350	350
December 1-31	500	500	500	500	500	350	350
January 1-31	500	500	500	500	500	350	350
February 1-29	500	500	500	500	500 ¹	350 ¹	350 ¹
March 1-22	700	700	500	500	500	350	350
March 23-31	3,500 ² 700	700	500	500	500	350	350
April 1-15	3,500 ² 1000	2,500 700	900	600	500	350	300
April 16-30	3,500 ² 1000	2,500 800	900	900	600	500	300 245
May 1-15	2,000	1,400 1000	1,150 900	900	850 600	750 500	395 245
May 16-31	2,000	1,000	900	600	400	400	300 245
June 1-15	1,500	800	500	400	400	300	245
June 16-30	1,500	500	500	400	400	150	150
July 1-31	700	500	500	400	400	150	150
August 1-31	600	500	500	400	400	150	150
September 1-30	500	500	500	400	400	350	150

¹ See Winter Pulse Flows

² Because diversions at Daguerre Point Dam are not controlled by Licensee, Licensee will be considered to be in compliance with the specified minimum instream flows when the combined release from the Narrows 1 Powerhouse (FERC Project No. 1403) and Narrows 2 Facilities, as measured at the Smartsville - USGS Streamflows Gage 11421000 is at or above 4120 cfs (the combined capacity of Narrows 1 Powerhouse and Narrows 2 Facilities) and Englebright Dam is not spilling.

CDFW and/or USFWS have presented specific rationale statements in support of each of the six flow improvement components. Below, FWN summarizes and augments those agencies' rationales for these components.

a. Spring Floodplain Inundation

The CDFW and USFWS 10(j) flow Condition's flows during March and April of Schedule 1 and 2 years (Table 1) are necessary to ensure a minimum inundation of habitats that will provide critically needed improvements in the productivity of native salmonid populations in the lower Yuba River. These salmonids include Central Valley spring-run Chinook salmon and steelhead trout, both of which listed as Threatened under the federal Endangered Species Act.

An increasing number of studies demonstrate the importance of seasonally or ephemerally inundated floodplain and off-channel areas for salmonid rearing and growth (e.g. Sommers et al. 2001, Jeffres et al. 2008, Grosholtz and Gallo 2006, and Merz et al. 2016). Areas whose inundation creates hydraulic interaction with riparian vegetation and floodplain-associated geomorphology provide abundant and high-quality salmonid rearing habitat. Such areas increase food availability and growth opportunities as well as overall salmonid productivity. In these inundated areas, the territory size of fish decreases, thus increasing the carrying capacity per unit area (Grant and Kramer 1990). The important result is a greater number of emigrating juvenile salmonids that can successfully migrate to the ocean and later return as adults.

Geomorphic classifications typically identify the floodplain as areas that inundate above bankfull flow (e.g. Harrelson et al. 1994). However, it is important to recognize that the biological and physical features of "the floodplain" can occur at lower elevations as well. Bankfull flow on the lower Yuba River (5000 cfs) is exceeded at durations and frequencies less useful to fish than lower flows (e.g. 2500 cfs) that inundate areas with riparian stands and other physical features that support habitat productivity. The area between base flow and bankfull flow is called the in-channel bar zone (Wyrick and Pasternack 2012), or the bank zone (Reedy 2017). It comprises approximately one-fifth of the floodway area from base flow up to 21,000 cfs (Wyrick and Pasternack (2012). The bank zone of the Yuba River has a more gradual slope away from the main channel than the floodplain zone (Pasternack 2017). The bank zone has the unique combination of inundation at ecologically significant frequency and duration, structural complexity associated with riparian and geomorphic features (e.g. backwaters, swales and side-channels), and beneficial cover and food resources associated with near-channel riparian communities. In the current geomorphological setting of the lower Yuba River, the bank zone may be more representative of the biological benefits of the floodplain (referenced studies above) than the formally-defined floodplain.

CDFW, USFWS and FWN designed the spring floodplain inundation component of the CDFW and USFWS 10(j) flow Condition for the lower Yuba River to achieve the biological benefits of floodplain inundation by targeting bank zone inundation. Reference to floodplain inundation within these comments and those of USFWS and CDFW uses a definition of floodplain that includes the bank zone, or at least the upper portions of the bank zone.

The Project has substantially reduced the extent and frequency of floodplain inundation that is useful to salmonid rearing, and the CDFW and USFWS 10(j) flow Condition provides necessary mitigation. Two analyses in particular provide quantification of both these project impacts to floodplain inundation for salmonid rearing and the opportunity for improvement by the flow Condition. Both analyses – HEC-EFM and Cumulative Acre-Days – use hydrologic datasets for the Lower Yuba River generated by using the Licensee’s Operations Model (YCWA 2012) applied over a 41-year data record (1969-2010).

HEC-EFM is a tool for determining flow levels that correspond with specified minimum frequencies and durations of occurrence. (Hickey et al. 2015). Two analyses (cbec 2013, Reedy 2017) used HEC-EFM results to evaluate reduction in potential floodplain rearing habitat by the Project. Both analyses consider a minimum frequency of 67% of years as important to salmonid populations, because more infrequent occurrences may not benefit the majority of year-classes of Chinook salmon and steelhead trout. For durations, the analyses examined minimum periods of 3-days, 21-days and 60-days, representing increasing levels of opportunity for growth and productivity. The more recent effort (Reedy 2017) included the hydrology for the 10(j) flow Condition in the comparison, along with prior flow proposals, Project Base Case and Without Project. The first study evaluated a seasonal period of March 1 through June 15. The later study evaluated the period from February 1 through June.

The cbec 2013 HEC-EFM analysis concluded that Project Base Case flows reduce the amount of habitat available to rearing salmonids by approximately 40% compared to unimpaired flows, when habitat is defined as area inundated for at least 3 days or 21 (cbec 2013). The more recent study (Reedy 2017) concluded that Base Case flows reduce the amount of rearing habitat area 40-50% (depending on minimum durations of 3, 21 or 60 days) when measured as inundated acreage above base flow. Considering the importance of floodplain habitat to salmonid populations, these are very significant project impacts.

The CDFW and USFWS 10(j) flow Condition would significantly increase floodplain rearing habitat area, especially for longer periods of inundation. For example, the inundation levels achieved for 21 consecutive days in 67% of years would increase from 1989 cfs to 2500 cfs (below Daguerre Point Dam), compared to 2957 cfs Without Project. Inundation levels achieved for 60 consecutive days in 67% of years would increase from 971 cfs to 1496 cfs (1680 cfs Without Project). (Reedy 2017)

The analysis used discharge-area relationships from 2D mapping data to quantify increases in acreage. For a minimum 21-day inundation, the 10(j) flow Condition would provide 45 additional acres of habitat inundated for a minimum of 21 days, and 52 acres of additional inundated area inundated for a minimum of 60 days. For a minimum 3-day inundation, however, the flow Condition provides a negligible increase in habitat area concentrated in the vicinity of a 3800 cfs flow level above Daguerre and a 4100 cfs flow level below Daguerre.

The second type of analysis FWN draws on for comparison of floodplain habitat availability is USFWS’s analysis of cumulative acre-days, or the total of inundated floodplain area for each day of an annual period. The USFWS used an acre-day analysis to measure the

impact of the Project on winter and early spring high flows and on floodplain inundation, duration, and timing (USFWS 2017).

USFWS (2017) described the basis for its approach as follows:

The amount of time that the riparian floodplain is inundated and the duration of the inundation are two important metrics for determining habitat available for juvenile salmonids, because both of these conditions contribute to food and cover availability. The longer the floodplain is inundated the more time juvenile salmonids are able to forage on it and the more the invertebrate food-web becomes activated. The more acres of habitat that are inundated, the more area is available to juvenile salmonids for foraging. Because both area and time are important considerations in estimating juvenile salmonid rearing habitat during the springtime high-flow period, the USFWS uses the metric of acres * days, or “acre-days.”

For the lower Yuba River, USFWS defined the season of interest as February 1 through June 15. Based on Pasternack (2012) and USFWS (2014), USFWS defined floodplain for purposes of its analysis as area inundated above 880 cfs in the Timbuctoo Bend Reach and above 1300 cfs in the other reaches. Compared to Without Project hydrology, the Project reduced median cumulative acre-day by 25% overall (6,089 acre-days). The level of Project impact varied by water year type. Schedule 1 showed a reduction of 9%, while the driest years (Schedule 3-7) showed a reduction of 80%. The USFWS focused on Schedule 2 years for mitigation: the Project reduced acre-days in Schedule 2 years by 39%.

The CDFW and USFWS 10(j) flow Condition would increase median cumulative acre-days during the years when it is flow requirements, as opposed to unregulated inflow, that primarily controls river flows (8 of 20 Schedule 1 years and 9 of 11 Schedule 2 years in the 41-year period of record). The 10(j) flow Condition did not, however, increase median cumulative acre-days to Without Project levels.

The spring floodplain inundation flows apply only in Schedule 1 and 2 years, even though the Project impacts bank and floodplain inundation in drier years (USFWS 2017). This component of the CDFW and USFWS 10(j) flow Condition involves more additionally assigned water than any other component, but is carefully constructed to use available water and provide necessary improvement to available rearing habitat.

b. Winter Pulse Flows

The winter pulse component of the Condition provides for a regulated pulse flow event during the first week of February if average daily flow has not exceeded 3000 cfs for two consecutive days during the period from December 1 through February 1. This component of the Condition would apply in Schedule 5 and 6 years and in Conference Years. Required flow values are shown in Table 2, below.

Table 2. Conditional Winter Pulse Flows in cfs for the Yuba River Development Project to be implemented in Schedule 5, 6, and Conference Years if no flows greater than 3,000 cfs are measured for two consecutive days as measured at Smartsville (USGS Streamflow Gage 11418000).

Date	Schedule 5	Schedule 6	Conference Year
February 1 – February 2	3,000	2,850	2,745
February 3	1,850	1,700	1,595
February 4	1,000	850	745
February 5	750	600	495
February 6	600	450	345

Winter pulse flows mitigate for Project impacts to salmonid distribution resulting from reduction in flow variability during a time of year critical to steelhead migration. New Bullards Bar Reservoir and regulation of flows from Englebright Reservoir through Narrows 2 Powerhouse reduce variability of flow in the Lower Yuba River within certain ranges at certain times. One conspicuous impact of the Project on flow variability is the elimination in the passage of some freshets from the upper watershed. The eliminated freshets tend to be small or moderate in magnitude but of sufficient size to represent a natural “pulse event” that can cue upstream migration of anadromous salmonids (Banks 1969). Unless Englebright Dam has spilled due to a storm event, the elimination of this type of freshet throughout early winter removes a natural mechanism for movement of steelhead into the upper reaches of the lower Yuba River.

Diminished access to the best habitat by both spawners and progeny is likely having population-level impacts on steelhead. Steelhead redd surveys completed by the Yuba RMT in 2010 and 2011 (Yuba RMT 2013) found that the majority of steelhead redds occurred in the upper third (Timbuctoo Bend and Parks Bar reaches) of the lower Yuba River. Snorkel surveys by the RMT found that juvenile steelhead rearing persisted year-round only in these upper reaches. These upper habitats are not fully seeded, and the extremely low current population levels for Yuba River steelhead (see section V.A.2) strongly suggest a need to improve access to the best available habitat.

Winter pulse flows and spring floodplain inundation are related measures in that both mitigate for impacts of the Project on aquatic resources in the form of reduced flood pulse variability and duration. The winter pulse flow focuses on mitigating impacts to steelhead migration during dry winters when the Project can have the greatest impact. The spring floodplain flows focus on a specific period and flow level, within a broader period and range of impact, when higher inundation levels can most effectively provide for improvements to juvenile salmonid rearing habitat and aquatic productivity.

c. Spring Pulse for Attraction of Spring-Run Chinook Salmon in Dry Years

The Spring Pulse component of the CDFW and USFWS 10(j) flow Condition provides an increase of 250 cfs (compared to AFLA) from May 1-15 in Schedule 5 and 6 years to attract spring-run Chinook salmon to enter and migrate up the Yuba River.

Differentials in flow and water temperature between the Yuba River and the Feather River can be a strong determining factor in the proportion of spring-run Chinook counted at Daguerre Point Dam compared to the number estimated for the Feather River (YRMT 2013). Relatively high flows and low water temperatures in the lower Yuba River increase the

likelihood that spring-run salmon will enter the lower Yuba River. The Spring Pulse component seeks to assure that during the first half of May in Schedule 5 and 6 years, there is at least a modest pulse to attract spring-run salmon into the lower Yuba River. This flow increase over flows in April during Schedule 5 and 6 years will also help to stimulate outmigration of salmonid smolts from the lower Yuba River. Please see CDFW 10(j) Conditions for additional discussion.

d. Smolt Emigration Assistance

The Smolt Emigration component of the CDFW and USFWS 10(j) flow Condition provides a 400 cfs to 250 cfs increase in minimum flow for May 1-15 in Schedule 2 and 3 years, as compared to the AFLA and Yuba Accord flows. The component measure is not needed in Schedule 1 years when the 10(j) flow Condition would provide flow to support the objective of successful downstream migration out of the Yuba River (emigration).

Information on water temperature and juvenile salmonid migration timing in the Feather River suggests extremely high to total mortality for Yuba River emigrants past mid-May in all but the wettest years (YRMT 2013). The higher flows provided by the component of the Condition is intended to improve the survival of Yuba River emigrants by supporting timely egress, good fish condition, and salmonid productivity in Schedule 2 and 3 years. Please see CDFW 10(j) Conditions for additional discussion.

e. Water Temperature Protection

FWN recommends and supports the Water Temperature Protection component of the CDFW and USFWS 10(j) flow Condition for Schedule 6 and Conference years. In the CDFW 10(j) conditions, this element is stated as Condition 2.6. In the USFWS 10(j) conditions, this element is stated as Condition 2.

In Schedule 6 years, the component augments by 2050 acre-feet an existing requirement to initiate a 30,000 acre-foot groundwater substitution transfer. This component also seeks to assure the protective distribution of this 32,050 acre-foot quantity of water so that its thermal benefits are spread out over the summer. This component of the 10(j) flow Condition is designed to protect temperature conditions for spring-run Chinook salmon holding in Schedule 6 years.

In Conference Years, this component increases minimum streamflows from April 15 through May 31.

Drought conditions in 2014-2016 revealed that large extents of the lower Yuba River can exceed suitable temperature for salmonids. The water temperature protection component of the CDFW and USFWS 10(j) flow Condition focuses on the driest of years and provides modest flow improvement to support adequate survival of salmon and steelhead and the production of other cold water fishes. Please see CDFW 10(j) Conditions for additional discussion.

f. Riparian Recruitment

The Licensee's proposed measure AR9 provides a commendable proposal to maintain daily recession rates within limits that protect riparian seedling establishment, when such rates are controllable. Agencies and NGOs presented this type of measure during relicensing meetings. However, the Licensee's proposal as stated does not apply past July 15th, thereby putting seedlings at risk of desiccation if there is a recession rate greater than 2.5 cm/day after that date (SYRCL 2016b). In many years, the Licensee decreases flows at the end of August or at the conclusion of a water transfer period, and the demonstrated rate of flow decrease is far in excess of what seedlings such as Fremont cottonwood can survive. CDFW Condition 2.12 and USFWS Condition 16, require application of the recession condition from April 1 through September 30. This extended period during which the condition applies is necessary for protection and improvement of riparian vegetation and aquatic habitat.

Fremont cottonwood (*Populus fremontii*) is the species of primary concern in managing riparian vegetation along the lower Yuba River. Under natural conditions, it would dominate the riparian over-story, include large individual trees, and provide significant local sources of large wood and other features of aquatic habitat. Other native riparian species (e.g. Goodings willow, *Salix gooddingii*) also disperse seeds in spring and can contribute to a riparian community with more structure than currently exists on the lower Yuba River (SYRCL 2013a). Following the period of seed dispersal, flow recession greater than 2.5 cm/day is considered lethal to cottonwood seedlings because the roots can't grow fast enough to keep up with the declining water table (Mahoney and Rood 1998, Stillwater Sciences 2006, Stella et al. 2010). Seed dispersal periods and structural characteristics of riparian communities on the lower Yuba River suggest that gradual recession rates beginning April 1 would restore and enhance riparian communities (SYRCL 2013a). CDFW Condition 2.12 and USFWS Condition 16 are founded on site-specific daily recession rates that limit a drop in stage height to levels less than seedling growth rates (SYRCL 2016b).

5. Conclusion

The CDFW and USFWS 10(j) flow Condition is a balanced measure to restore habitat conditions and improve salmonid populations without substantial impacts to Project operations. The 10(j) flow Condition is the result of several years of collaboration among diverse agency and NGO staff. Although CDFW, USFWS and FWN did not reach consensus with the Licensee on lower Yuba River flow conditions, the CDFW and USFWS 10(j) flow Condition is also in many respects the product of several years of collaboration and discussion with Licensee staff and consultants. The Condition requires conservative flow increases at biologically important times to support targeted aquatic species.

The CDFW and USFWS 10(j) flow Condition carefully considers Project effects on aquatic resources along with the costs to the Licensee and the feasibility of implementation. The 10(j) flow Condition has negligible impact on the Project's hydropower operations, and no impact on flood management. The Condition presents limited and manageable risk to water storage capacity and water deliveries. The Condition will protect and improve populations of anadromous fish in the lower Yuba River. Its components will more reliably inundate the bank

zone and the floodplain zone, manage flow recession rates for riparian restoration, improve migration at key times of the year, and improve water temperatures during the driest years.

II. Lower Yuba River Habitat Restoration

A. FWN Recommendation

FWN recommends the development and implementation of a Lower Yuba River Habitat Enhancement Plan (the Plan), as recommended by the CDFW in 10(j) Condition 2.29 and USFWS in 10(j) Condition 3. Licensee should develop the Plan within one-year of license issuance in consultation with resource agencies and restoration experts. The Plan should focus on the restoration of functioning juvenile salmonid rearing habitat through implementation of specific habitat enhancement measures. Implementation of the actions should begin within 3 years of license issuance and should be substantially completed within 10 years. The Plan should include implementation and effectiveness monitoring and a provision for review, discussion and evaluation in the Ecological Group (AFLA Measure GEN1).

1. Elements of the Plan

The Licensee should implement the Plan with the elements and procedures described below.

Restoration of Floodplain Habitat

- Lower 340 acres of surfaces in the lower Yuba River from existing elevations that are inundated at flows greater than 5,000 cfs to elevations that are inundated at flows of 1,500 to 3,000 cfs. Lowering actions shall include grading of floodplain surfaces, benching of bank areas, expansion of backwaters, and/or creation of side channels and swales.
- Plant lowered surfaces with a cottonwood/willow dominated riparian plant mix derived from local cuttings and seeds at an appropriate density and distribution as determined by a professional restoration ecologist and in consultation with agencies and the Ecological Group.

Enhancement of Existing Floodplain Habitat

- Plant 251 acres of existing sparsely vegetated floodplain surfaces ranging in elevations that are inundated at flows of 3,000 cfs to 21,100 cfs with a cottonwood/willow dominated riparian plant mix derived from local cuttings and seeds at an appropriate density and distribution as determined by a restoration ecologist and in consultation with agencies and the Ecological Group.
- Prioritize planting floodplain surfaces adjacent to the lowered and planted surfaces.

Enhancement of Large Woody Material Resources

- Place a total of 492 pieces of LWM from Englebright Dam through RM 3.3.
- Place LWM at an appropriate distribution, density, and configuration as approved by agencies in consultation with the Ecological Group.
- Place LWM pieces within or adjacent to floodplain lowering and planting sites where feasible.
- Secure a minimum of 10% of LWM pieces (49 pieces) in the bank at elevations that will allow for at least partial inundation at 880 cfs upstream of Daguerre Point Dam and 530 cfs in areas downstream of Daguerre Point Dam.
- Size all LWM at a minimum of 24 inches in diameter and 18 feet in length, with attached crowns or rootwads on a minimum of 50% of LWM pieces.

LWM Replenishment

- Replenish LWM downstream of Englebright Dam through RM 3.3 within three years after completion of each LWM census, beginning with the LWM census that occurs in License Year 10 and every 10 years thereafter, until a subsequent new license is issued, as described in the Lower Yuba River Aquatic Monitoring Plan.
- Replenish the LWM up to 492 stable pieces that meet the minimum size criteria.
- Replace any of the 49 LWM pieces secured in the bank that are no longer in place.

Site Selection

- Select sites for habitat restoration actions on multiple reaches of the lower Yuba River from Englebright Dam through the Hallwood Reach ending at RM 3.3
- Combine different types of restoration action at no less than six sites.
- Select reaches and sites to maximize benefits for salmonid rearing.

Performance Metrics

- Meet the following performance metrics for all areas planted with riparian vegetation:
 - Minimum of 50% survivorship of each riparian plant species 5 years following implementation.
 - Minimum of 15% canopy cover after 5 years and 65% canopy cover after 10 years of native riparian plant species.

- Less than 5% nonnative tree and shrub species and 10% nonnative grass species after 10 years.
- Meet additional performance metrics focused on criteria for successful implementation of floodplain lowering and LWM placement. For example:
 - Elevations of lowered surfaces will fall within specified proportions with less than 10% error.
 - LWM placement will meet distribution and density parameters to be agreed upon by the agencies in consultation with the Ecological Group.

Implementation and Effectiveness Monitoring

- Provide annual written progress reports to the agencies and Ecological Group during the implementation phase of the Plan. These reports should describe restoration and enhancement activities, including surface lowering, riparian planting, and LWM placement.
- Begin implementation (i.e., “as-built”) monitoring for each restoration/enhancement and LWM site within 60 days of full implementation of restoration/enhancement sites and placement of LWM, and summarize the results of implementation monitoring in periodic reports to the agencies and the Ecological Group.
- Conduct effectiveness monitoring to assess: (1) floodplain inundation and geomorphic processes at the restored/enhanced floodplain sites; (2) survivorship of planted riparian species, riparian canopy cover, and riparian species recruitment at the restored/enhanced floodplain sites; (3) presence and function of LWM from Englebright Dam through the Hallwood Reach (RM 3.3) within and outside of the restored/enhanced floodplain sites; (4) terrestrial subsidies inputs from the restored/enhanced floodplain sites; and (5) juvenile salmonid use of restored/enhanced floodplain habitats and LWM placement sites.
- Begin effectiveness monitoring of restoration and enhancement sites one year following implementation at each site, and continue for a period of ten years or until riparian habitat performance metrics have been achieved.
- Begin effectiveness monitoring for LWM placement sites and subsequent LWM replenishment sites one year following placement, for a period of 3 years.
- Present the results of effectiveness monitoring to the Agencies annually at the Ecological Group meeting and provide a summary of effectiveness monitoring in a periodic report.

Ecological Group Consultation and Plan Revisions

- Provide a draft of any Plan revisions to the Ecological Group for review 30 days prior to a meeting.
- Provide report on implementation and effectiveness monitoring to the Ecological Group for review 30 days prior to a meeting.
- Present any proposed changes to the Plan at the annual Ecological Group meeting, including, but not limited to: performance metrics, the amount of LWM replenished, monitoring triggers and frequency, monitoring methods, and/or discontinuing the replenishment of LWM.
- File any revisions to the Plan with the Commission after approval by USFWS, CDFW, and SWRCB.

B. Rationale

FWN's rationale for the recommended Condition for lower Yuba habitat restoration begins with background information that helps lay the foundation and provide the context for the recommendation including a discussion on the status of lower Yuba River habitat and fisheries. Following this background and history, the rationale provides technical and scientific support for the recommendation.

1. Lower Yuba River Habitat Conditions and Needs

a. Background on the Lower Yuba River Habitat

Impaired habitat conditions in the lower Yuba River result from historic mining, Englebright Dam, constructed features that limit the width of the river corridor, and the Project's effects on flow and flow-related physical and biological processes. Recommended conditions and enhancement actions for the Project are designed to mitigate for impacts from the Project within the context of other legacy and ongoing impacts. Knowledge of historic and ongoing impacts from non-Project sources is necessary to fully understand synergistic impacts and determine appropriate and effective mitigation actions for the Project. However, legacy or non-project impacts are not a reason for the Licensee to deny responsibility for mitigating Project impacts, both direct and indirect, to aquatic habitats in the lower Yuba River.

The legacy impacts from historic hydraulic mining and dredging activities have dramatically altered the geomorphological condition of the lower Yuba River (James 2005, YCWA 2012). Currently, the Project alters water flow, which has a pervasive influence on the geomorphic, aquatic and riparian conditions within the river and impedes the recovery of habitat conditions from both legacy and current impacts to aquatic and riparian ecosystems (Figure 2). While Englebright Dam reduces the amount of fine sediment delivered to the lower Yuba River, the deposition of available fine sediment within the system is a function of flow characteristics and hydraulic roughness, both of which are affected by the YRDP. Altered flows and

geomorphology have directly impacted riparian and aquatic habitat. Altered flows and geomorphology have reduced the development of rearing habitat within the riparian and floodplain zones, in particular (cbec 2013, SYRCL 2016b; WSI and Fremier 2012).

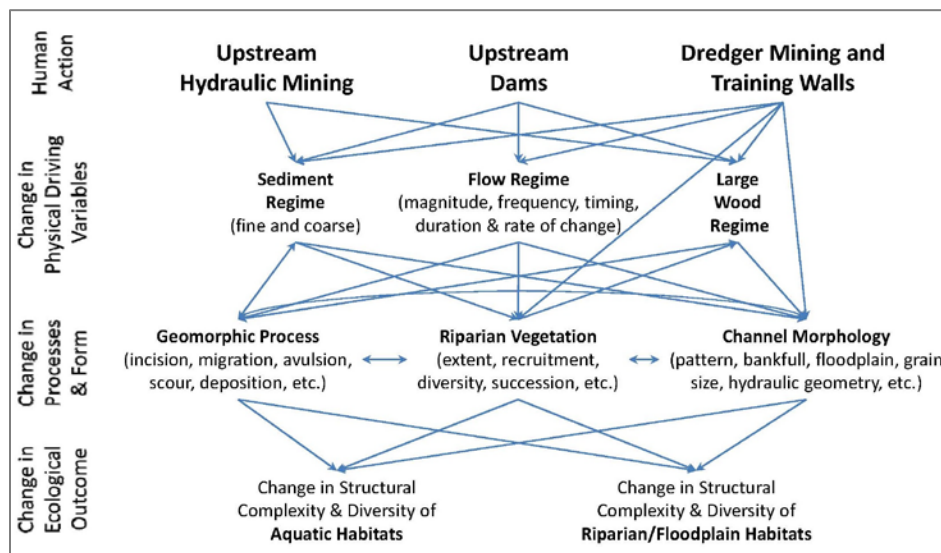


Figure 2: Conceptual diagram of relationship between human actions and lower Yuba River conditions through change in driving variables of flow, sediment and wood. From cbec et al. 2010.

Project construction and Project effects on flows have resulted in direct and indirect impacts to the lower Yuba River that will have accrued for more than 50 years before the new license conditions go into effect. Industrial dredger mining in the lower Yuba River began in the 1920s and directly impacted channel conditions up to the late 1960s (cbec 2013). By the 1970s, environmental regulations and other factors eliminated dredging in the channel and riparian areas, setting up new opportunities for natural recovery. The new license can mitigate for some of the impacts of the Project by addressing the degree to which the YRDP has limited the recovery of habitat conditions in the lower Yuba River over a sustained period of time, a time that coincides with a significant decline in salmon populations in the Central Valley.

b. Status of the Fisheries

The lower Yuba River has not naturally recovered from the combined impacts over two centuries of historic mining, reduced floodplain area, Englebright Dam, and hydrologic modifications from the YRDP. Enhancement of flows and habitat in the lower Yuba River will provide ecosystem-level benefits that will support entire biological communities. However, for a number of reasons, the benefits of these actions will focus on specific species. For example, Chinook salmon and steelhead are uniquely important to the ecology, culture and economy of areas surrounding the lower Yuba River. Central Valley spring-run Chinook salmon (*Oncorhynchus tshawytscha*) and steelhead trout (*Oncorhynchus mykiss*) are both listed as threatened under the federal Endangered Species Act, and their populations in the Yuba River are in decline.

Long-term monitoring of Chinook salmon in the Yuba River consists of spawner surveys of varied levels of effort dating back to 1953⁶⁴. Interpretation of these datasets led to the determination by the USFWS of an average historic, but post-Englebright Dam, population of 33,000 Chinook salmon (CVPIA doubling goal for the Yuba River is 66,000 salmon). More recently, estimated total salmon spawning populations in the Yuba River from 2006 through 2012 ranged from 2,604 to 13,097 fish, with an average of 6,960 (data from YRMT 2013).

Consistent monitoring of Chinook salmon and steelhead populations in the lower Yuba River began in 2003 with the installation of fish counting equipment. These records also show populations in decline. The Yuba Accord River Management Team (RMT) provided monthly fish counts of Chinook and steelhead that pass through the fish ladders at Daguerre Point Dam using VAKI Riverwatchers installed on each ladder. Monitoring is contracted through the RMT and conducted by Pacific States Marine Fisheries Commission. The RMT has not provided estimates of total annual spring-run Chinook and steelhead since 2012, but monthly fish counts at Daguerre Point Dam allow examination of trends. If it is assumed that spring-run Chinook salmon pass Daguerre Point Dam between March and the end of August, total spring-run have declined to just 73 salmon in 2015 and 194 salmon in 2016, the lowest numbers in fourteen years of data collection (YRMT 2013).⁶⁵

A suspected factor in the decline of Chinook populations has been poor quality of habitat to support juvenile salmonid productivity (e.g. USFWS 2014b, cbec 2013). Chinook salmon captured in outmigrant traps in the Lower Yuba between 2003-2006 were implanted with coded wire tags and released (YRMT 2013). Of the total of 708,750 tagged juvenile salmon that were released, only three were found to return to the Yuba River as adults, an estimated return rate of 0.0004%. This study strongly suggests that Yuba River salmon are not able to replace themselves. In addition, an analysis of otoliths from 500 Yuba River spawned salmon found a very high proportion were out-of-basin strays (Sturrock and Johnson 2013, Sturrock et al. 2015). Hatchery origin Chinook make up more than 60% of the total spawning population in the Yuba (YRMT 2013). Such results indicate that while Yuba River attracts non-natal salmon, wild juveniles do not return at rates necessary to support a self-sustaining population.

Monitoring data also indicates that steelhead populations are also at historic lows. In the VAKI data tables, *O. mykiss* are not differentiated by size, but the RMT has determined that only those *O. mykiss* greater than 41 cm (16") are likely to be adult steelhead (anadromous *O. mykiss* instead of adult trout). The RMT found that less than 10% of the total *O. mykiss* count each year met this size standard (YRMT 2013). Total *O. mykiss* counts at the VAKI from 2013 to 2016 ranged from 158-444, with 2015 and 2016 having the lowest counts. Assuming that 10% of the collected *O. mykiss* were adults (a rate higher than previously found by the RMT), then only 16 to 44 adult steelhead migrated up the lower Yuba River past Daguerre Point Dam during each of the last four years, compared to an estimated 457 steelhead in 2010-11 and 132 steelhead in 2011-12 (YRMT 2013).

High mortality rates for salmonids emigrating from the lower Yuba River are a significant concern. In the lower Yuba River, the best way to improve the status of salmonid

⁶⁴ Data available at calfish.org under GrandTab program for Central Valley.

⁶⁵ Data tables from VAKI fish counting are provided at www.yubaaccordrmt.com

populations is to improve habitat that supports greater fitness and diversity of juvenile salmon leaving the lower Yuba River. Enhancing high quality habitat for rearing juvenile salmonids includes connecting floodplains and providing structurally diverse riparian and inundation zones. Such ecosystem-level enhancements to benefit juvenile salmonids also benefit many other aquatic and riparian species.

c. The Amount and Quality of Additional Habitat Needed

Appropriate habitat enhancement actions required of the Licensee must address the amount and quality of habitat needed to mitigate project effects and to maintain aquatic resources in good condition. The Emigrating Salmonid Habitat Estimation (ESHE) model, developed by Cramer Fish Sciences and Flow West and funded by The Nature Conservancy, is a model that estimates the amount of rearing habitat needed for juvenile salmonid cohorts of a target population size (San Joaquin River Restoration Program 2012; Department of Water Resources 2016).

The ESHE model is based on the theory that territory size limits the density and production of stream/river-dwelling salmonids (Chapman 1966; Allen 1969; Grant and Kramer 1990). Salmonids either defend or rely on food from an area of territory (Cramer and Ackerman 2009). As juvenile salmonids increase in size, the area they defend also increases to meet their growing food and energy requirements (Keeley and Slaney 1996). As a result, the density of juvenile salmonids decreases as the average body size within a cohort increases (Grant and Kramer 1990). The ESHE model applies a territory size curve (a function of fish size) to empirical data on fish outmigration distribution under different flow scenarios to estimate the spatially and temporally explicit habitat area needed to support a given number of juvenile fish. The model simulates stationary growth (rearing) and downstream movement (emigration) of individual daily groups (cohorts). The model tracks numbers of fish (abundance), average emigration speed, size, survival, and territory size. The ESHE model assumes that habitat is 100% suitable with sufficient food and cover for salmonids.

ESHE model parameters include:

- Initial abundance, i.e., the number of juveniles entering the model based on the target number of parent fish. The number of juveniles included in the ESHE model run whose results are discussed in the present document was calculated using the CVPIA AFRP doubling goal.
- Initial timing and size, which is the number and average size of fish that exit the spawning grounds each day, informed by rotary screw trap tagging studies within the Central Valley.
- Migration speed, which is the speed of the daily downstream movement of juvenile salmon; survival, or the number of fish that avoid death each day, calculated from tagging studies in rivers tributary to the Sacramento-San Joaquin Delta.

- Growth, which represents the daily growth and resulting size of juveniles, calculated from lab studies.
- Territory size, which is the territory size requirement of juveniles based on their size, calculated based on field and lab studies.

The output of ESHE calculates the required suitable habitat needed to support juveniles and includes estimates of fish/reach. The ESHE model run completed for Appendix H of the Central Valley Flood Protection Plan Conservation Strategy (Department of Water Resources 2016) estimated that 1230 acres of rearing habitat that is 100% suitable is needed in the lower Yuba River to support CVPIA's salmonid population doubling goal (Flow West and Cramer Fish Sciences, Unpublished Data).

However, on-the-ground suitability studies on the San Joaquin River found that actual habitat suitability per acre was between 7% and 30% (San Joaquin River Restoration Program 2012). As a result of the fact that habitat is not 100% suitable, the number of acres of juvenile rearing habitat needed on the lower Yuba River to support the CVPIA doubling goal is thus significantly larger than 1230 acres. Habitat suitability on the lower Yuba River may be better than the San Joaquin River, and restoration activities such as revegetation, soil remediation, LWM placement, and grading can improve habitat suitability. However, even if a range of habitat suitability much higher than that found in the San Joaquin River is assumed, the 1230 acre estimate based on 100% suitable habitat increases. For example, if 50-75% habitat suitability per acre is assumed, which represents very high quality habitat, a range of 1640-2460 acres of juvenile rearing habitat would be needed in the lower Yuba River.

As mentioned above, the Central Valley Flood Protection Plan based its estimate of habitat need for the lower Yuba River on CVPIA doubling goal abundance targets. The targets developed in the ongoing Yuba Goals and Objectives process, are based, instead, on adult carrying capacity. Using adult carrying capacity as the basis to generate abundance goals for the Yuba River increases the adult population target significantly. To meet the Yuba Goals and Objectives targets, still more juvenile rearing habitat would be needed.

Existing habitat availability on the lower Yuba River is less than what is estimated as required to recover listed salmonid species populations. Estimates of available juvenile rearing habitat in the lower Yuba River range from 8.5 acres (USFWS analysis reported in Comments on YRDP REA) to perhaps 414 acres (the product of a high-end 30% habitat suitability estimate for the San Joaquin River and total potential area of 1380 acres⁶⁶). The habitat deficit on the lower Yuba River is significant, and addressing this deficit requires a combination of flow improvements and channel modifications.

⁶⁶ This area corresponds with 21,100 cfs, or the total floodway, using the area-discharge curve from 2D modelling of the lower Yuba River (Pasternack 2012).

d. Technical Rationale for the Lower Yuba River Habitat Enhancement Plan

The recommended Habitat Enhancement Plan is based on analysis of Project effects, habitat needs and feasibility. Past reports developed for planning rehabilitation of the lower Yuba River explain the types of actions that would create additional high quality habitat in the lower Yuba River (cbec et al. 2010 and cbec 2013).

The goal of improving quality and diversity of rearing habitat can be achieved using a variety of rehabilitation elements, including riparian enhancements, reconnecting floodplain areas, constructing side channels and backwaters, and creating in-channel and off-channel habitat features such as those created through the addition of large wood...
-- (cbec 2013, executive summary)

Relicensing participants including FWN began developing the recommended Condition by reviewing the cbec reports and other information. They then refined actions to specifically address Project impacts. Previous restoration projects funded by the USFWS and partners (e.g. Hammon Bar, Hallwood Project) provided additional information such as proof-of-concept engineering and results. FWN provides rationales for each major component of the Plan below, supplementing the rationales and analysis of CDFW and USFWS for this same Condition.

1. Lowering surfaces

As discussed in Section I(A)(4)(a) above in relation to the CDFW and USFWS 10(j) flow Condition for the lower Yuba River, the Project impairs floodplain function and diminishes salmonid habitat by reducing inundation of the floodplain and bank zones. For restoration, the emphasis must be on providing additional high quality habitat that supports rearing juvenile salmonids during a biologically significant time period.

Even with implementation of the 10(j) flow Condition, Project operations would significantly reduce rearing habitat in the bank and floodplain zones. Two analyses – Cumulative Acre-Days and HEC-EFM – have been conducted to examine the amount of additional rearing habitat that the 10(j) flows would provide in comparison to Project Base Case hydrology and Without Project hydrology (USFWS 2017, Reedy 2017). Description of these analytic methods is provided above in Section I(A)(4)(a) (rationale for the 10(j) flow Condition).

USFWS used an acre-day analysis to measure the impact of the Project on winter and early spring high flows and floodplain inundation, duration, and timing (USFWS 2017). The duration of inundation determines the amount of time juvenile salmonids are able to forage on a floodplain, as well as the amount of invertebrate food availability that becomes activated over time (Grosholz and Gallo 2006). The more acres of habitat that are inundated, the more area is available to juvenile salmonids for foraging.

Acre-days has been used as a metric in fisheries management (Beam 1983) and in a variety of other applications. Acre-days is a metric that takes into consideration both area and time, so it can be used to measure the decrease in floodplain area and decrease in cumulative days of inundation caused by hydropower projects. In two studies that addressed the effect of

floodplain inundation on juvenile salmonid survival, the USFWS found a correlation between the number of acre-days of inundated floodplain and juvenile salmonid survival in the river (USFWS 2014; unpublished data in USFWS files). With the understanding that a high number of acre-days of inundation is likely to result in high juvenile salmonid survival, and that management of releases from hydropower projects can reduce the inundation area and frequency along the riparian edge, the USFWS, CDFW, and FWN chose this metric to analyze the effect of the Project on juvenile salmonid habitat in the lower Yuba River.

The period of February 1 through June 15 was used to calculate inundated acres and was chosen from within a broader period of life stage periodicity for Chinook salmon (YCWA 2013). This time period has been shown to be important for juvenile salmonid rearing (Sommer et al. 2001, Sturrock et al. 2015, Yoshiyama et al. 1998, Zeug et al., 2014). Snorkel surveys and outmigrant capture data for Chinook salmon in the lower Yuba River confirm the importance of this time period (YCWA 2013). Floodplain was determined to be inundated area above 880 cfs in the Timbuctoo Bend Reach and area above 1300 cfs in lower reaches (USFWS 2014).

Analyses were conducted using 41 years of data (water years 1969 – 2010) from the Licensees Operations Model (YCWA 2012). Project hydrology resulted in fewer cumulative acre-days than Without Project hydrology (USFWS 2017). Median inundation, expressed as cumulative acre-days, was less with Project hydrology than Without Project hydrology regardless if looking at all 41 years, or by specific water schedule type. Compared to Without Project hydrology, the Project reduced median cumulative acre-day by 25% (6,089 acre-days). The Project impacts were greater in drier water years. When inundation from Project flows were compared to without project hydrology, median inundation was reduced by 9%, 39%, and 80% respectively for Schedules 1, 2, and 3-7 water years (USFWS 2017).

Using the Cumulative Acre-Days analysis, the CDFW and USFWS 10j flow Condition was found to only partially mitigate Project impacts to juvenile rearing habitat. By stratifying water year types, the USFWS was able to discern increasing impacts of the Project with increasingly dry water year types, which supported results from previous studies (e.g. Cienciala and Pasternack 2017). Mitigation based on inundation reductions during Schedule 2 was chosen. Schedule 2 water years represent moderate water years with flows that are dominated neither by heavy storms nor by dry conditions. In addition, the Project exerts control for much, but likely not all, of the season in Schedule 2 years. This represents a middle ground for how Project operations affect flows and inundation in varying water year types.

Schedule 2 years were analyzed to determine the level of lowering necessary to achieve Project mitigation as measured by cumulative acre-days. By iterative use of the model, 340 acres was determined to be needed to restore acre-days in Schedule 2 water years (USFWS 2014).

Similar to the Cumulative Acre-Day analysis, analysis using HEC-EFM analyses found that reductions in floodplain inundation resulting from Project operations were significant (cbec 2013), and that the CDFW and USFWS 10(j) flow Condition only partially mitigates for Project impacts to available rearing habitat (Reedy 2017). For example, area inundated for a minimum period of 21 consecutive days in two-thirds of years would be only partially restored by the

CDFW and USFWS 10(j) flow Condition. For minimum inundations of 3 days, the 10(j) flow Condition provided a negligible improvement (Reedy 2017). HEC-EFM analyses did not stratify years by water type. By focusing on a maximum flow to meet certain parameters in a percentage of years, HEC-EFM analyses were insensitive to the greater Project impacts in drier years that has been shown by other studies (USFWS 2017, Cienciala and Pasternack 2017).

The Cumulative Acre Day and HEC-EFM analyses both concluded that the 10(j) flow Condition, when implemented, only partially mitigates for the Project's impact on availability of floodplain rearing habitat during biologically significant time periods. Both analyses concluded that additional mitigation in the form of physical manipulation is necessary to increase the acre-days of available juvenile rearing habitat. FWN recommends that 340 acres be lowered from elevations greater than 5,000 cfs to inundate at flows between 1,500 and 3,000 cfs in order to mitigate for Project effects on rearing habitat. The recommended lowering action is specific to achieving additional habitat that will be productive for juvenile salmonids. Increased primary and invertebrate productivity results from inundation for a minimum of two to three weeks in 50% of years (Grosholz and Gallo 2006). Flow levels that meet such parameters are suggested by two HEC-EFM analyses, and provide a rationale for the target ranges for lowering surfaces on the lower Yuba River. Cbec (2013) states:

[F]loodplain areas could be lowered to elevations which begin to become inundated at 3,000 cfs. This flow magnitude was selected to guide the initial design of floodplain elevations, as it would be shallowly inundated by a flow that persisted for a 21-day duration in 1 in 2 years during the March-June period. Areas graded to inundate at flow rates lower than 3,000 cfs would be inundated more frequently, and for a longer duration.

To achieve inundation for 60 days or longer in two-thirds of years, surfaces should be lowered below 2000 cfs, and all lowering should be concentrated below 3800 cfs (Reedy 2017). To provide benefits at flows required in the 10(j) flow Condition, target zones for restoration should be sufficiently inundated at 3500 cfs (Schedule 1 years) and 2500 cfs (Schedule 2 years). Depth to discharge relationships for the lower Yuba River (Pasternack as referenced in SYRCL 2016 and YCWA 2014) indicate an average depth of approximately 5 cm between 3500 cfs and 3000 cfs which is near the minimum suitable for rearing salmonids. Therefore, the upper target of lowered surfaces should be 3000 cfs, and a target range of 1500 cfs to 3000 cfs is appropriate for achieving successful mitigation and productive habitats.

2. Riparian planting

In the lower Yuba River, channelization and reduced floodplain connectivity under Project conditions has limited the development of healthy riparian and floodplain ecosystems. Functioning riparian and floodplain ecosystems are important for producing healthy juvenile salmonids because they increase primary productivity (Ahearn et al. 2006) and food production (Jeffres 2008), and create cover during high flow events. Planting on floodplain surfaces at a variety of flood return intervals jumpstarts plant communities, increases roughness, recruits fine sediments, and recruits large woody material, helping these ecosystems to become self-sustaining.

The lower Yuba River is a dynamic river with intense scour and fill during floods (cbec 2013). Native riparian communities are adapted to thrive in this high disturbance regime (Lite et al. 2005). However, on the lower Yuba River, the colonization of vegetation after large flow events is limited by Project conditions that accelerate the spring flow recession and restrict natural deposition of sediments and seeds. In the lower Yuba River, species diversity is low; narrowleaf willow (*Salix exigua*) and dusky willow (*Salix melanopsis*) comprise 80% of the vegetative cover (WSI 2009). These species are adapted to spread from rhizomes and are not as dependent on seed dispersal for reproduction. As suggested in Tech Memo 6-2 (YCWA 2013), vegetation cover does increase after floods, but the Project impairs the recovery of a diverse array of species and riparian community structure (SYRCL 2013a, SYRCL 2016b).

The natural flow regime of the lower Yuba River is characterized by flood events followed by gradual flow recession. Gradual flow recession promotes the biological and physical function typical of a healthy river system (Yarnell et al. 2010). The Project accelerates flow recession by emphasizing water storage and reducing discharge from New Bullards Bar and Colgate powerhouse. Daily recession greater than 2.5 cm/day is considered lethal to seedlings because the roots can't grow fast enough to keep up with the declining water table (Stillwater Sciences 2006, Stella et al. 2010).

At the request of relicensing participants, the Licensee conducted an analysis of the daily stage change as may indicate frequency of days with recession rate less than 2.5 cm/day, Project flow compared to Without Project flows (YCWA 2014). The Licensee summarizes its interpretation of the results as follows: "With-Project hydrology provided more days with recession rates less than 2.5 cm than the Without-Project hydrology on an annual basis" (AFLA E3.3.4-18). However, those results are based in data from April 1 to July 15 that is largely comprised of flows less than 3000 cfs. SYRCL analyzed the same data filtered for days when flow was greater than 5000 cfs and found entirely different results. The Project actually increases the frequency of days with stage drops greater than 2.5 cm/day (Figure 3) when focused on floodplain conditions. Additionally, the Project decreases the duration of consecutive days with stage drops less than 2.5 cm/day (Figure 4) during the spring when seed dispersal and germination of native riparian species is critical (Stillwater Sciences 2006; Stella et al. 2010; SYRCL 2013a, SYRCL 2016a). In the lower Yuba River, the number of days per year with recession less than 2.5 cm/day has decreased by 38% under flows controlled by the Project (Figure 5). Also, the number of years with overall suitable hydrologic conditions for riparian seedling recruitment has been reduced by Project hydrology (SYRCL 2016b).

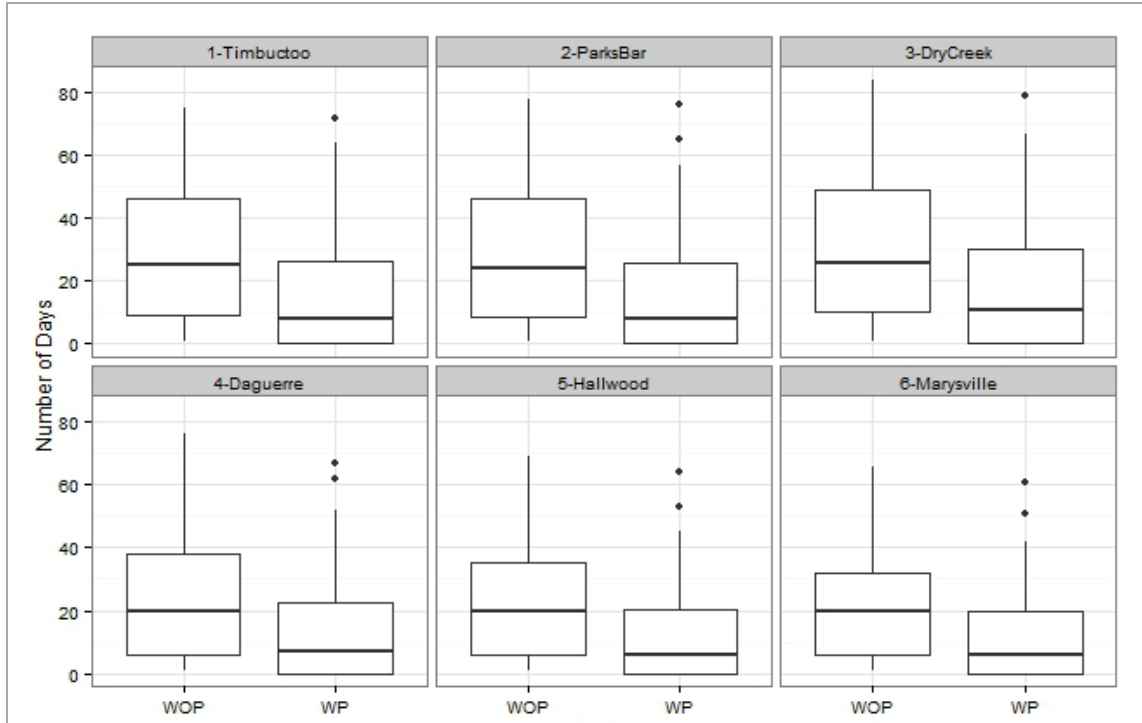


Figure 3: Box-plots (bold bar is median) of number of days with recession rates less than 2.5 cm/day in Without Project and With Project (Base Case) hydrology for April 1 to July 15 period in WYs 1969-2009. Data from TM 6-2 (YCWA 2014) and excluding flows less than 5000 cfs (unpublished SYRCL analysis).

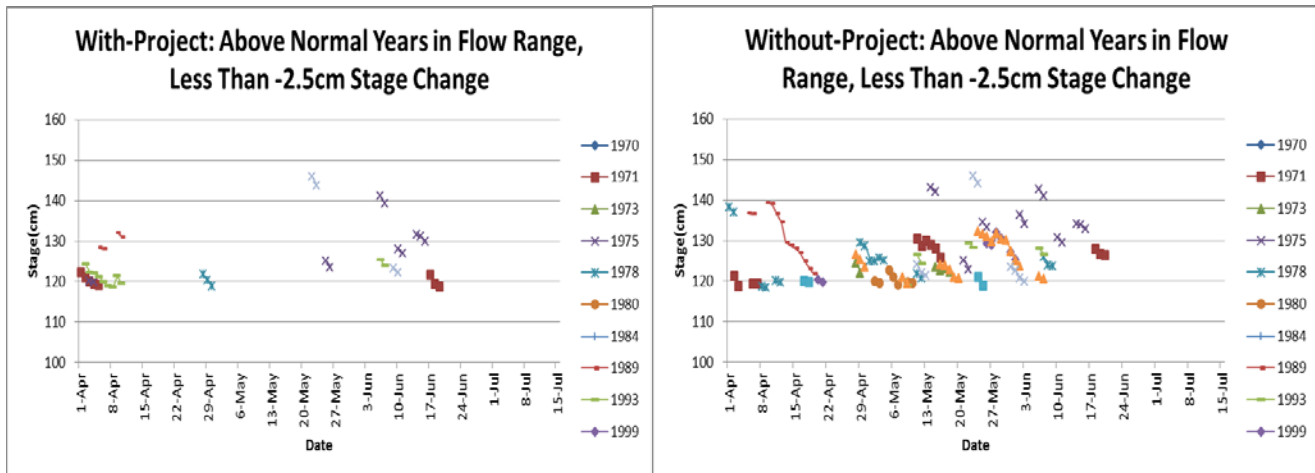


Figure 4: Sequential days with recession rates less than 2.5 cm/day in Without Project and With Project (Base Case) hydrology. Data from TM 6-2 (YCWA 2014) and excluding flows less than 5000 cfs (unpublished SYRCL analysis).

Because the Project decreases the number of days with recession rates less than 2.5 cm/day, and the number of years with suitable conditions for seedling germination (SYRCL 2016b), there are reduced opportunities for the natural recruitment of riparian trees on the lower Yuba River floodplain. Species affected include Fremont cottonwood (*Populus fremontii*), Goodings willow (*Salix gooddingii*), and other willow species, which are of particular importance in 1) producing large woody material (LWM), 2) increasing floodplain roughness to

create productive, heterogeneous floodplain habitat, and 3) promoting a diverse riparian community (Stromberg 1993, SYRCL 2013a).

The Licensee has acknowledged that “coarse substrate and lack of developed soils, combined with the flow regime, are likely to influence the distribution of riparian vegetation” (AFLA E3.3.4-17). Licensee also suggested that low levels of fine sediment in the lower Yuba River are a factor in limiting riparian recruitment (YCWA 2013a). However, the Licensee has not acknowledged the Project’s role in limiting deposition of fine sediment in the bank zone and floodplain that would naturally support riparian recruitment. Fine sediment is transported and deposited primarily during the recession of high flows. Less frequent and shorter inundation periods on the lower Yuba River (Reedy 2017, USFWS 2017) limit the processes for fine sediment deposition (Haasen et al. 2006, Yarnell et al. 2010). Concomitantly, faster recession rates (Figure Z) limit rates of sediment deposition. By these mechanisms, the Project impairs fluvial geomorphic process that supports floodplain connection and riparian succession (Florsheim and Mount 2003; Galat et al. 1998).

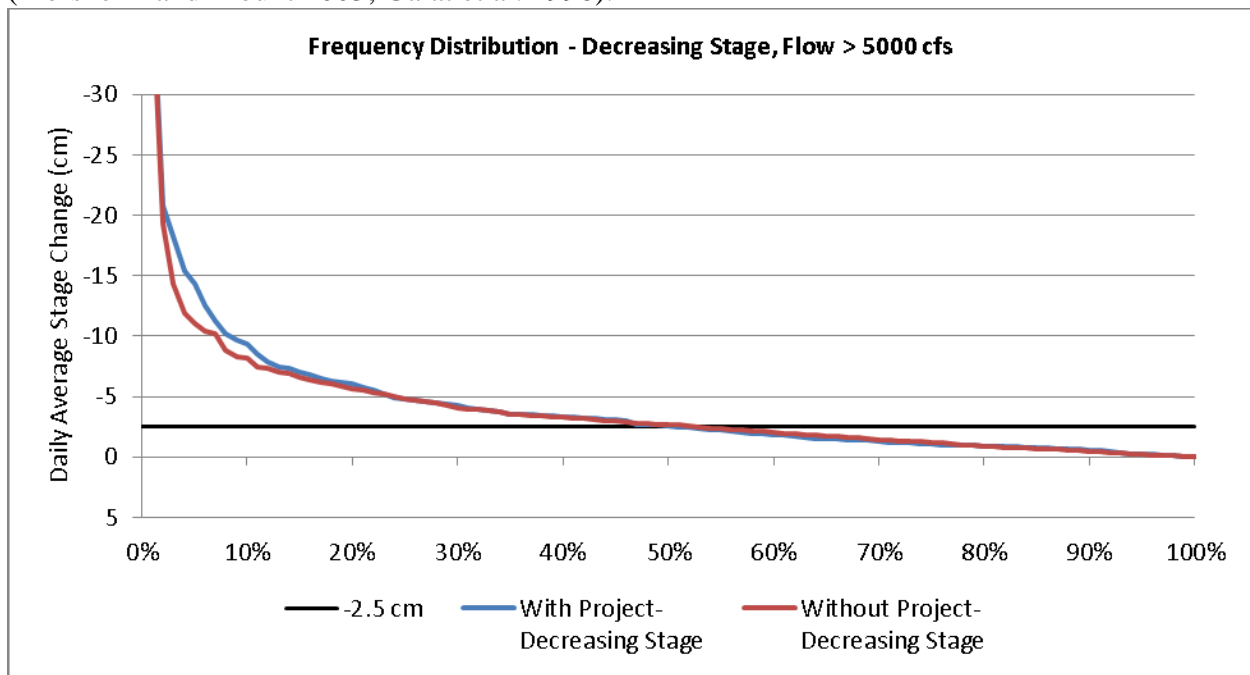


Figure 5: Frequency distributions for daily stage change in Without Project and Base Case (Project) hydrology. From TM 6-2 Excel file and excluding flows less than 5000 cfs.

Planting on the existing floodplain, including above 5000 cfs, is necessary to mitigate for project impacts, and will provide increased productivity for fish habitat during high flows years. Extensive planting on unvegetated areas of the floodplain is needed to recover habitat elements throughout the river corridor that have been impacted by project flows (Figures X, Y, and Z) and to offset impaired opportunities for riparian seedling establishment on the floodplain. Riparian planting on the floodplain is a cost-effective method of jumpstarting processes of recovering floodplain complexity and riparian communities (SYRCL 2013b). Because the lower Yuba River is a dynamic environment with significant rates of channel change (Pasternack 2009), riparian succession on the floodplain will lead to the creation of aquatic habitat elements, such as undercut banks held together by tree roots and LWM generated from local riparian forests.

Detailed planting plans should be developed based on the lack of existing vegetation (WSI and Fremier 2012), geomorphic conditions, and depth to groundwater. The planting plan for existing floodplain surfaces that do not flood regularly must account for depth to groundwater as the determinant of survivorship (Bywater-Reyes 2015). Higher floodplain surfaces have a higher likelihood of developing riparian forests with larger trees (Fremier 2003) due to the lower likelihood of high velocity flow events.

Planting of lowered surfaces is necessary to mitigate for Project impacts and provide habitat elements for rearing juvenile salmonids. The planting methods should include planting Fremont cottonwood and willow tree cuttings by methods similar to those used in the Hammon Bar Riparian Enhancement Project (SYRCL 2012), but refined for planting at lower elevations as planned for the Hallwood Restoration Project. Planting along existing and newly created perennial and seasonal side channels will encourage healthy off-channel instream rearing conditions during low flows and will provide cover for juveniles and terrestrial inputs to the stream during higher flows.

Detailed planting plans for lowered surfaces should be developed based on existing vegetation (WSI and Fremier 2012), flow velocity, groundwater depth, and the potential for natural recruitment. Review of the scientific literature indicates that small or young vegetation is likely to uproot or scour under conditions where flows are greater than 0.98 feet per second (Bywater-Reyes 2015). In addition, vegetation establishment within river corridors is highly susceptible to drought stress (Johnson 2000). As such, the size of vegetation (Pasquale et al., 2012; Stone et al., 2011; Peterson and Claassen, 2013), the water velocity, and the depth of the groundwater (Bywater-Reyes 2015) all play a significant role in determining whether an established plant can persist during a flood event or during a period of drought.

By applying the combination of extant vegetation, velocity and groundwater data to each project site, areas can be identified that will support different plant communities including elderberries, Fremont cottonwood, and willows. To increase effectiveness of riparian plantings, planting plans and palettes should also take into consideration whether target locations are considered seasonal side channels, perennial side channels, or vegetated floodplain.

3. Placement of Large Woody Material

Large woody material (LWM) is of critical importance in providing high quality habitat for salmonids. The addition of LWM is expected to enhance aquatic habitat by increasing habitat heterogeneity, providing velocity refuges for juvenile salmonids, enhancing macroinvertebrate substrata, adding structural complexity to the channel by modifying local hydraulics and sediment transport, and providing bank protection (i.e. Ruediger and Ward, 1996; Abbe and Montgomery, 1996; Dolloff 1983; Bryant et al. 2005). The addition of LWM will improve habitat in the lower Yuba River more rapidly than waiting for natural recruitment of LWM. Placement of LWM is direct mitigation for the Project because New Bullards Bar dam prevents the movement of LWM from the forested upper watershed to the lower Yuba River; the New Bullards Bar Reservoir captures large amounts of LWM transported from the North Yuba River watershed, primarily during large flood events (Senter and Pasternack 2012). In addition,

ongoing Project impacts limit riparian regeneration, which in turn limits the local production of LWM and associated habitat elements (SYRCL 2016b).

Recommended ramping rates for riparian recruitment (USFWS Condition 16 and CDFW Condition 2.12) will restore processes for natural recovery and succession of riparian stands. However, the duration required for that recovery extends many decades, or roughly the term of the new license. LWM placement is therefore a necessary action to close the mitigation gap between existing project impacts and habitat outcomes that should result from improvements in the recession rate.

Functional LWM is that of sufficient size and structure to enhance floodplain hydraulics and the processes of deposition and scour. The Plan uses size criteria for LWM that correspond with those used by the Licensee (TM-6-2; YCWA 2013a) in classifying “key pieces”, those pieces that are large enough or positioned to provide significant interaction with aquatic habitat. The Plan also locates a significant portion of the wood at stage elevations that ensure interaction with flows at frequency and durations relevant to rearing habitat for juveniles. LWM should be placed with design techniques that promote persistence and complement hydraulic and sediment processes to create high quality rearing habitat. For example, pieces should have one end buried, oriented with hydraulic consideration, and in many cases assembled into Engineered Log Jams (cbec 2013).

4. *Location of Actions*

The cbec (2013) report described 18 potential rehabilitation sites that were selected based on a list of criteria and available information. Some reaches of the lower Yuba River will be more cost-effective for rehabilitation efforts than other reaches due to geomorphic characteristics and longitudinal setting. Currently, rearing habitat restoration efforts funded by the USFWS have been focused over about 200 acres within the Parks Bar and the Daguerre Point Dam reaches. These reaches have been focal areas for restoration planning because they both have adequate site access and a low percent cover of tall trees.

To ensure that the Plan will benefit both abundance and diversity goals for lower Yuba River juvenile Chinook and steelhead, sites should be dispersed across multiple reaches of the lower Yuba River, both upstream and downstream of Daguerre Point Dam. Important factors for selecting locations include: access, position relative to spawning grounds for use by emergent fish, and cost-effectiveness as may be influenced by hydrologic and geomorphic conditions. Hydrology varies upstream and downstream of Daguerre Point Dam in ways that can influence outcomes as measured in frequency and duration of inundation (Reedy 2017). Before prescribing any particular proportion of the enhancement effort to particular reaches, FWN suggests a thorough analysis of these factors.

5. *Performance Metrics and Monitoring*

Actions from the Plan should be designed and implemented to be effective and self-sustaining in providing high quality habitat that is used by juvenile salmonids. The importance of monitoring the effectiveness of restoration projects has been highlighted on other rivers (Golet et

al. 2013; Kondolf et al. 2007). Performance metrics are simply a way to plan for how effectiveness will be measured. The Plan as described in the 10(j) Condition includes performance metrics for riparian planting areas that may be considered examples of what the final Plan will include.

The Hammon Bar project is the only project on the lower Yuba River that has been implemented to date, and demonstrates planting riparian species as a mechanism for improving juvenile rearing habitat. The Hammon Bar project inundates at flows in the range of 5000 cfs and 20,000 cfs (SYRCL 2013b). The goal of this project was to create high flow refugia and to jumpstart a riparian forest community that would eventually produce large woody material. A self-sustaining riparian forest requires adequate canopy cover and stem density to entrain fine sediment and allow for secondary successional recruitment to take place. Based on Hammon Bar project monitoring and lessons learned, the performance metric requiring 50% survivorship and 65% cover after 10 years are appropriate because they are attainable and indicative of a closed canopy forest where understory vegetation and secondary forest species can naturally recruit (Trowbridge et al. 2005).

Riparian plant communities are often plagued by non-native species and propagule pressure from invasive species can out-compete planted species,impeding the natural succession of riparian plant communities (Eschthrueth and Battles 2011). In the lower Yuba River Himalayan blackberry (*Rubus armeniacus*), tree of heaven (*Ailanthus altissima*), giant reed (*Arundo donax*), and other invasive grasses and forbs may all benefit and colonize in restoration areas where fine sediments accumulate as a result of restoration activities. Actively managing non-native species within restoration plantings will be critical to creating habitat that is functional for juvenile rearing and that produces LWM as the plantings mature.

The collaboratively agreed-upon Lower Yuba River Aquatic Monitoring Plan includes monitoring activities and objectives that could be used to evaluate how the Project effects anadromous fish populations and dependent habitat. If the new license includes significant improvements in the form of both flows and rehabilitation, as recommended in the 10(j) flow and habitat enhancement Conditions, then monitoring can be expected to demonstrate improvements in physical habitat, riparian habitat and fisheries condition.

Certain pieces of the Aquatic Monitoring Plan were initiated and drafted by Agencies and NGOs through the collaborative relicensing process. Aerial photography and LiDAR mapping, riparian surveys, sediment surveys, and steelhead spawning surveys were all introduced because of the need to evaluate whether or not the recommended flows and habitat measures are having the intended effect. Effectiveness monitoring for the overall habitat enhancement actions should include activities described in the lower Yuba River Aquatic Monitoring Plan. Outmigrant trapping and monitoring will increase understanding of important biological parameters such as juvenile salmonid production, fitness, and survivorship. Additionally, sediment monitoring, LWM monitoring and riparian monitoring described in the monitoring plan will also allow evaluation of how the habitat enhancement projects are improving physical conditions on the lower Yuba River overall.

The Habitat Enhancement Plan should provide the resource agencies with the ability to modify monitoring plans in consultation with the Ecological Group if modification is necessary to evaluate the Plan's success.

2. Summary of Project Effects and Necessary Mitigation

The Project has impaired natural recovery of habitats as well as further impaired some ecological processes in the lower Yuba River. The Project has reduced variability in flow levels, decreased the duration and area of floodplain inundation, and increased stage recession rates. By these alterations, the Project has reduced habitat available through inundation and reduced the quality of habitat available in the bank zone and floodplain zone. It has suppressed regeneration of the riparian community, limited the production and availability of large woody material, and reduced hydraulic cover and food resources for fish. The ESHE model suggests that over 1000 acres of additional high quality habitat are needed in the lower Yuba River to recover anadromous fish populations.

Flow is a master variable that drives the creation and maintenance of aquatic habitat (Poff et al., 1997). Flow provides for the area and duration of habitat, foundationally, and also drives processes (e.g. sediment deposition, riparian recruitment and survival) that determine many important physical features of habitat. Physical rehabilitation (planting, grading, placement of wood, etc.) can increase areas inundated at flows less than bankfull (5000 cfs) and improve habitat suitability. Flow enhancements can enhance habitat conditions more broadly by increasing physical habitat area and enabling natural processes that increase the quality of habitat.

The amount of high quality habitat available in the lower Yuba River under any flow regime is limited by a combination of river channel conditions. These conditions include predominantly coarse substrates, geomorphic characteristics that minimize off-channel or floodplain habitat for fish, and low levels of riparian cover and structural complexity. The CDFW and USFWS 10(j) flow Condition for the lower Yuba River will increase the available habitat associated with riparian zones and floodplain features. However, more substantial increases in the high quality habitat in the lower Yuba River depend on actions that create that habitat.

A combination of both flow and non-flow actions are necessary to mitigate Project impacts.

III. Fish Passage

A. FWN Recommendation

The Network recommends that the Commission designate Englebright Dam, including Licensee's related possessory and legal interests, as a Project work. The Network also recommends that the Commission require conditions in the new license to mitigate the impacts of the Project on fish passage. The Network recommends that the Commission decide the

unresolved issue of the Commission's authority to require such mitigation prior to issuance of its forthcoming Environmental Impact Statement in order to assure the adequacy of that document.

B. Rationale

Englebright Dam, located at river mile 24, is the terminal barrier to upstream passage of Chinook salmon and *O. mykiss*. Englebright Dam impounds the Yuba River in Englebright Reservoir, which serves as an afterbay that re-regulates New Colgate Powerhouse and as a forebay to Narrows 2 Powerhouse. In several previous filings in this proceeding, the Network has argued that Englebright Dam is appropriately a project work under FPA § 3(12) because it is “part” of the complete unit of development, “used and useful” for power generation, and “directly connected” to the Narrows 2 powerhouse, which is part of the licensed works. *See* FPA 3(11), 16 U.S.C. § 796(11). We refer the Commission to these filings (cited in the footnote below) for additional information and analysis on the points raised in this section.⁶⁷

Licensee stores and re-regulates flows in Englebright Reservoir under its water rights and contracts. Consequently, power generation at the Project is dependent on the continued existence of the dam that is the terminal barrier to upstream passage. The Commission has an obligation to license all project works that are related to, and necessary for, power generation.⁶⁸ Englebright is an integral and necessary part of Licensee's power operations at the Project and thus falls squarely within the statutory definition of project work under FPA section 3(12). Additionally, Licensee has secured possessory and other legal interests that give it the ability to exclusively operate the dam for power generation and related purposes under its control. Possession of these interests obligates the Licensee to mitigate the adverse environmental impacts caused by the existence and continued operation of Englebright Reservoir and Englebright Dam.⁶⁹ For these reasons, the Commission has regulatory authority over the Licensee's use of Englebright Reservoir for power operations of the Project and can appropriately condition the new license on provisions that mitigate the impacts of Licensee's operations and use of Englebright Dam and Reservoir.

Despite Licensee's dependence on Englebright for power generation at New Colgate Powerhouse, and at Narrows 2, the Licensee does not propose to mitigate the Project's impacts on fish passage in its Amended FLA. Licensee repeats its assertion that the presence of Englebright Dam is part of the existing condition and alleges that the Commission does not have the authority to regulate it.

“Past and present actions contribute to the current condition of the resources, and are intrinsically embedded in the base line (i.e., existing conditions), and are discussed where appropriate in the specific resource sections of this Exhibit E. [...] These activities

⁶⁷ *See* Foothills Water Network Comments on Proposed Study Plan for Yuba River Development Project, July 17, 2011. eLibrary 20110718-5013, esp. pp 3-11; Conservation Groups' Answer in Opposition to Motion to Partially Dismiss Notice of Study Dispute, November 15, 2011. eLibrary 20111115-5121; Foothills Water Network Comments on Draft License Application, corrected, March 4, 2014, eLibrary20140304-5127, esp. pp. 22-27 and 33-34.

⁶⁸ *Big Bear Area Regional Wastewater Agency*, 33 FERC ¶ 61,115 (1985).

⁶⁹ A license must mitigate adverse environmental impacts caused by a project. This responsibility may arise from ownership of a dam or interests in lands and waters. *City of Tacoma v. FERC*, 460 F.3d 53, 65-69 (D.C. Cir. 2006).

include harvesting, grazing, mining, operation of USACE’s Englebright and Daguerre Point dams and water deliveries. These activities affect the resources identified for cumulative effects analysis in SD2, and are outside the Commission’s authority to regulate.”

Amended FLA, p. E3-25.

As noted above, these arguments are without merit. The U.S. Army Corps of Engineers (Corps) conducts no independent “operation of Englebright Dam.” The Corps has not constructed any power plant at Englebright, nor does it have any recorded water right for operation of the dam for power generation or any other purpose. Instead, the Corps has entered into formal legal arrangements with Licensee (at Licensee’s request) for use of the federal facilities and storage of water in Englebright. And the Corps is compensated for the valuable service that Englebright provides. Table 5.1.2 of the AFLA notes that YCWA pays the Corps \$100,000 per year for “Storage of Water in Englebright Reservoir.”⁷⁰ Licensee pays these substantial fees because the flow re-regulating service currently provided by Englebright is fundamentally essential to Licensee’s power generating business.

In sum, it is the Licensee that operates Englebright Reservoir and Englebright Dam for power generation. Accordingly, Englebright Dam is “used and useful to” operation of the Yuba River Development Project and is appropriately part of the Project, and the Commission has the authority to condition this use by the Licensee.

The Licensee also notes that several parties are currently negotiating a settlement agreement that may include reintroduction actions.

“Parties to the YSF [Yuba Salmon Forum] have formed the Yuba Salmon Partnership Initiative (YSPI) and currently are negotiating a settlement agreement to expand the Yuba River watershed’s contribution to recovery of anadromous salmonids in the Central Valley, which may include reintroduction actions. However, those negotiations have not concluded and the cost and feasibility of any reintroduction actions still is being evaluated.”

Amended FLA, p. ES-27.

It should be clarified that not all participants in the YSF are participants in the YSPI. Additionally, as noted in the Amended FLA, these discussions have not yet produced a settlement agreement, nor is it certain that reintroduction actions above Englebright will be among the terms of any final settlement agreement. In the event a final settlement agreement is reached, it is likely that some parties to this relicensing process, including some members of the Network, will support settlement. However, it is also likely that some parties to this relicensing process, including members of the Network, will judge the actions required in such a settlement to be insufficient to mitigate the impacts of Licensee’s operations and use of Englebright Dam. Therefore, it is appropriate and necessary that the Commission evaluate conditions for inclusion in the new license to mitigate the impacts of the Project on fish passage.

⁷⁰ See AFLA, p. D-8 noting that this payment amount is likely to increase in the future.⁷⁰

The Network understands that the National Marine Fisheries Service (NMFS) plans to reserve its authority under section 18 of the FPA to prescribe fish passage at the Project, to modify its fishway prescriptions, and to recommend terms and conditions in the future based upon significant new information or failure of the YSPI parties to achieve settlement. The Network and/or its members will review and provide comments on any fish passage prescriptions and/or revised terms and conditions related to fish passage that NMFS may submit.

IV. FWN Comments and Recommendation on Proposed Measure WR9: Implement Drought Management Plan

As an Appendix to its Amended Final License Application (AFLA), Licensee includes a “Drought Management Plan.” On a July 19, 2017 conference call, YCWA’s representatives explained that FERC had requested that YCWA submit such a plan. YCWA’s representatives also stated that they expected the State Water Board to request such a plan for consideration in the Water Quality Certification for the relicensing. Generally, the Network agrees with drought planning efforts and that such efforts should occur proactively when possible. However, in this relicensing, the participants have already addressed the variation in water year (WY) through agreements on license conditions covering WY types, minimum instream flows, tunnel closures, spill management, and whitewater boating flows. Further drought planning appears unnecessary and mostly aimed at anticipating license variances.

A. FWN Recommendation

The Network does not believe that the Drought Management Plan is necessary. If it is included in the new license, it should be appropriately conditioned with the language below.

Licensee shall revise the Drought Management Plan in collaboration with the Ecological Group and with agreement from the USFWS, Forest Service, CDFW, and NMFS, that includes the following elements:

- (i) Licensee shall develop a drought definition that is specific to the Yuba Watershed and to Licensee’s operations;
- (ii) Licensee shall develop a process to notify the Ecological Group as well as specified resource agencies when Licensee has a “Drought Concern”;
- (iii) Licensee shall solicit and consider comments and recommendations from the Ecological Group on any proposed drought response, including any variance requests;
- (iv) In the event that Licensee proposes variances or temporary changes to FERC and/or the State Water Board, Licensee should request that those entities provide notice and opportunity for intervention (FERC) or formal response (Water Board) on a short turnaround.

B. Rationale

- 1. License Variances Are Not, and Should Not Be, Part of the Normal Course of Business.**

The Foothills Water Network coalition is disturbed by what appears to be the presumption of FERC and the State Water Board that license variances, or variances to conditions in a Water Quality Certification, are the appropriate responses to drought conditions. FWN believes that the presumption should be that license conditions should be appropriate for critically dry years or dry year sequences in and of themselves. License conditions for dry and critically dry water year types are already deliberately set up as triage for public trust resources, conditions whose application in the long term would substantially diminish those resources. The implied notion that it is appropriate for this or any licensee to have one foot out the door of license conditions at a sign of system stress reduces the value and weight of license conditions themselves.

There are due process issues that are not solved by creating a menu of default exceptions to the new project license. Due process in the first instance takes place during a licensing proceeding and a Water Quality Certification proceeding. These proceedings feature prescribed stakeholder participation, defined roles and authorities for resource agencies, and environmental review.

In those exceptional cases where one may argue that due process must be accelerated to respond to extraordinary or emergency conditions, the Commission made at least a credible effort during the recent drought in California to involve the public, particularly in the years 2014 and 2015. When FERC project licensees requested variances in 2014 and 2015, the Commission generally issued notices and called for interventions. Though it was on an accelerated basis, there was a defined proceeding, and any stakeholder had the ability to intervene and comment, and in the extreme case, request rehearing and eventually file suit. In general, the Commission entertained variances based on water supply or aquatic needs, but not potential loss of hydropower generation. In short, there was not great delay or difficulty in the Commission's responding to requests for drought variances in California in 2014 and 2015. In some sense, then, the Commission's apparent request to YCWA to prepare a drought management plan is a solution in search of a problem.

The State Water Board, on the contrary, did not hold formal proceedings during its consideration of many measures to respond to drought in 2014 and 2015. In the worst cases, the State Water Board issued Temporary Urgency Change Orders to the State Water Project and Central Valley Project before taking comments. The State Water Board held informal workshops but did not hold hearings. Of great concern to conservation groups such as those that the FWN represents is the fact that the State Water Board sought without public notice, and received, the approval of resource agencies prior to the opportunity for public input, and in some cases prior to issuance of notice of a proposed temporary urgency change.

YCWA does not directly deliver water to wholesalers or customers for municipal and industrial purposes. YCWA already includes in its planning reduced irrigation deliveries in such cases where YCWA's modeling shows that release of required instream flows combined with full irrigation deliveries will lead to carryover storage in New Bullards Bar Reservoir that is less than the end-of-September target. YCWA reduces irrigation deliveries up to a maximum of 50% in order to meet the carryover target. Contrary to the statement on p. 2-1 of the Drought Management Plan that "YCWA does not need to implement this Plan for drought management operations of the Project that are consistent with the license," reductions in irrigation deliveries are

YCWA's first line of action in times that water is short. It is completely appropriate for YCWA to include this operation in its Drought Management Plan. In addition, in the event that YCWA requests and receives a variance that allows reduced streamflows in the lower Yuba River, YCWA should be precluded from selling water that it would be required to release under normal license conditions.

2. The Stated Circumstances under which the Plan Suggests the Potential for Variances are Inappropriate and/or Insufficiently Clear.

The specific circumstances under which the Drought Management Plan proposes that YCWA may seek variances are also causes for concern. The Plan describes those circumstances on p. 2-1 as follows:

- The Governor of State of California declares a drought emergency for the State or areas of the Yuba River basin
- The State Water Resources Control Board (SWRCB) enacts specific regulations for the purpose of managing drought conditions in the State or the Yuba River basin
- Based on May of the previous Water Year (WY) or February of the current WY, Schedule 6 or Conference Years, as described in YCWA's Proposed Condition WR3, occur
- In the fall/early winter (November – January) following a very dry WY where end-of- September storage in New Bullards Bar Reservoir is less than 450,000 ac-ft
- In the January to March period snowpack development to date is below 60 percent of average

If any of the above conditions occur, YCWA may implement this Plan.

We address each of these circumstances below.

Governor declares emergency:

In considering these circumstances, it is important to remember that the Yuba River watershed is one of the few watersheds that drain to California's Sacramento-San Joaquin Delta that is not severely over-allocated. In 2014 and 2015, California's Governor declared statewide drought emergencies. The immediate impetus for these emergency declarations was conditions relating to the State Water Project and Central Valley Project. These State and Federal Projects contract for more water than they deliver. They allocate water to senior "settlement contractors" with limited delivery shortages even in the driest conditions. They are responsible for meeting water temperature requirements in the Sacramento, Feather, American and Stanislaus rivers, and are also responsible for meeting Delta water quality standards pursuant to the State Water Board's Water Rights Decision 1641. In substantial part because the State and Federal Projects are over-allocated, they operate their reservoirs for storage in a manner that is far less conservative than YCWA's operation of New Bullards Bar Reservoir. In two or three sequential dry years, the State and Federal Projects are tapped out, thrust into a state of "emergency" because of a combination of excessive demands, limited water resources, and default operational decisions.

Because any gubernatorial declaration of statewide drought emergency is thus likely to be based on conditions relating to the State and Federal Projects, it is completely inappropriate for Licensee YCWA to base a request for a drought variance on a statewide declaration of drought emergency by the Governor.

A declaration by the Governor of a drought emergency in “areas of the Yuba River basin” is slightly more compelling, but it is highly likely that such a declaration would apply to areas upstream of the YRDP where water is diverted for domestic and industrial water supply. Any declaration by the Governor that might serve as a reasonable justification for YCWA to seek a license variance would need to have direct effects on YCWA’s water supply and operation.

State Water Board enacts emergency regulations:

Similarly, the State Water Board is likely to issue statewide emergency regulations based on conditions outside the Yuba River. Thus, it is also inappropriate for YCWA to request variances to license conditions because of such statewide regulations. It does not even follow that emergency regulations in the Yuba River watershed should trigger YCWA to request variances. Mandatory statewide urban water conservation, for instance, such as the State Water Board implemented in 2014 and 2015 and which applied to diverters in the Yuba watershed upstream of the YRDP, had no direct effect on YCWA and its operations. Until the State Water Board enacts regulations that direct YCWA itself to manage drought conditions in specified ways, YCWA should not use regulations directed at others as a trigger to request variances to its FERC license and Water Quality Certification.

Previous year or February a Schedule 6 or Conference Year:

A Schedule 6 or Conference year, either in the preceding water year or in February of a current year, is equally not cause to implement a Drought Management Plan separate from the flow requirements and other measures that are established in the license and Water Quality Certification for such conditions. First, conditions should be evaluated in the first instance based on the current year, not based on conditions from the “previous water year,” i.e., the previous May. More importantly, for any February, flow requirements in Schedule 6 and Conference are already triage. How flow and other license requirements perform when water is in really short supply is one of the major tests of the fairness and depth of those flow and other license requirements. Proposing a Plan B without relying on Plan A to do its job undermines the cornerstone of regulatory process. It threatens to trample license requirements in a parade of supposedly one-off exceptions and anomalous conditions that provide alternatives to regulations at the very time that they matter the most.

Low carryover storage and low snowpack:

It is not entirely clear what YCWA intends in its fourth bullet as quoted above. We interpret it to mean that this describes a situation where New Bullards Bar end-of-September storage *was* (not “is”) less than 450,000 af and YCWA is not in the November through January

period without having had much inflow to New Bullards Bar Reservoir. We also interpret the 450,000 af figure to mean total storage, including the FERC minimum pool of 237,000 af.⁷¹

As previously stated regarding conditions in the previous water year, it is not so much low end-of-September storage that might be of concern as low storage moving into the winter or early spring. Of course, low storage with a good snowpack has different meaning than low storage with a poor snowpack. In addition, there are many years in which precipitation in quantity comes relatively late to the Sierras, January or even later. It is possible that there is a threshold at which low storage, low snowpack and lateness in the season might in combination motivate consideration of a request for license variance or variances. However, pegging a drought request to any of these variables individually would be difficult to justify.

3. The Plan’s Elements for “Notification of Drought Concern” and for Distribution and Review of a Specific Drought Management Plan Inappropriately Limits Public Participation.

One of the most disturbing procedural aspects of the State Water Board’s treatment of requests by the State Water Project and Central Valley Project for temporary urgency changes during 2014 and 2015 was approval by resource agencies of temporary changes prior to public review or even notice of those changes. The informality and lack of public involvement reached a level that violated due process.

The public and NGO representatives of the public interest do not have specific authorities that allow them to reject or modify proposed variances or temporary changes. However, the public has an overriding interest in compliance with FERC license and other regulatory conditions that protect public trust resources and associated values.

FWN therefore recommends that any time the Licensee notifies resource agencies of a “Drought Concern”, Licensee notify all participants in the Ecological Group (Condition GEN1) and solicit comments and recommendations from all of those participants. When Licensee proposes a “specific drought management plan” that would require variance or variances from license conditions, Licensee should convene a meeting or conference call of the Ecological Group to discuss the plan.

FWN understands and appreciates that need for quick turnaround in such potential decision-making processes, and recognizes that some participants in the Ecological Group might not be able to respond on a short, ad hoc schedule. FWN also understands that the role of FWN in such circumstances would be limited to discussion and advice, rather than formal approval. Nonetheless, circumstances in which Licensee contemplates license variances are exactly the type of situation for which the Ecological Group is ideally positioned to provide rapid and informed consultation. Such consultation may prevent avoidable conflicts or regulatory protest and is in the interest of the Licensee and the resource agencies as well as in the interest of other Ecological Group participants.

⁷¹ If the intent is that the 450,000 af figure is in addition to the FERC minimum pool, a request for a variance would clearly be unwarranted. It would mean that *any* end-of-September storage amount less than the target could be grounds to request a license variance.

FWN also recommends that in the event that Licensee proposes variances or temporary changes to FERC and/or the State Water Board, Licensee requests that those entities provide notice and opportunity for intervention (FERC) or formal response (Water Board) on a short turnaround.⁷² We urge the Commission and the Water Board to a default process that requires public notice of a formal process whenever this or any other licensee requests a variance to a FERC license or a temporary change to a Water Quality Certification.

V. FWN Comments and Recommendations on Proposed Measure GEN1: Annual Consultation and Ecological Group

A. FWN Recommendation

The new license should include proposed measure GEN1, Annual Consultation and Ecological Group.

B. Rationale

FWN appreciates and supports Licensee’s proposed license measure GEN-1, “Organize Ecological Group and Host Meetings.” The same measure is supported by CDFW, USFWS and the Forest Service. In particular, FWN appreciates the opportunity for FWN organizations, other NGO’s, and members of the public to meaningfully, efficiently and effectively participate in the implementation of the new license.

The Ecological Group will create a platform for dialogue. It will present several important opportunities to participants, in particular to NGO’s and members of the public who would not otherwise have such opportunities. First, it will provide a forum for NGO’s and others to directly hear about issues and concerns of the Licensee and resource agencies in a form that is direct and allows questions and dialogue. Second, it will allow NGO’s and other interested persons to make suggestions and express concerns on a less-than-formal basis, also in a form that allows questions and dialogue. As the Forest Service points out in its comments, it will also benefit the licensee by creating a “standing group” that “facilitates expedient review” of “any license compliance issues.”

As currently formulated, the Ecological Group will meet at least once a year for an Annual Meeting. The FWN recommends that Licensee convene Ecological Group meetings as often as needed. In particular, it may be appropriate for the Ecological Group to have designated meetings focused on habitat restoration in the lower Yuba River or other topics that require focused participation and extended time.

In addition to the standing agenda items described in the measure, FWN recommends that it would also be productive for the Ecological Group to be a forum to review and consult with the Licensee and the resource agencies on the following (non-exhaustive) topics:

⁷² An exception for emergency variances or changes is reasonable, in the sense of short-term emergencies as defined in CDFW 10(j) condition 2.16.

- Results of foothill yellow-legged frog (FYLF) monitoring to determine if adjustments to the recession rates below Our House Dam and Log Cabin Dam are necessary to adequately protect FYLF
- Proposed actions relating to the groundwater substitution requirement of WR Order 2008-0025, such as changes to the default water transfer schedule in Schedule 6 years, water temperature effects of transfer timing, and transfer opportunities, as required in CDFW Condition 2.6, “Maintain Summer Water Temperatures in the Lower Yuba River in Schedule 6 Water Years”
- Progress and proposed changes to the Lower Yuba River Habitat Restoration and Enhancement Plan, including, but not limited to:
 - Performance metrics,
 - The amount of LWM replenished
 - Site selection, lowering and planting plans
 - LWM anchoring techniques,
 - Monitoring triggers and frequency
 - Monitoring methods
 - Discontinuation of the replenishment of LWM
- Progress and proposed changes to the plan for habitat enhancement in the North Yuba River below New Bullards Bar Reservoir, including but not limited to:
 - Obtaining and selecting LWM by collection at New Bullards Bar Reservoir, or other sources
 - Results of LWM and gravel/cobble monitoring
 - Evaluation of the LWM and gravel/cobble enhancement effort and proposed changes to the plan including, but not limited to:
 - The amount of LWM and gravel replenished
 - Monitoring triggers and frequency
 - Monitoring methods
 - Discontinuation of the replenishment of LWM and/or gravel/cobble
- Determination of which New Colgate Power Tunnel Intake Licensee will utilize, as required by CDFW Condition 2.7, “Use of Upper New Colgate Power Tunnel Intake”
- Development and implementation of a revised Drought Management Plan

Please see the comments of the U.S. Forest Service on this measure in support of the general benefits of a “standing group” in implementing hydropower licenses. FWN concurs with those comments.

VI. FWN Comments and Recommendations on Proposed Measure WR3: Determine Water Year Types for Conditions Pertaining to Narrows 2 Powerhouse and Narrows 2 Full Bypass

A. FWN Recommendation

Beginning within the first 90 days of the new license term, Licensee shall, using the California Department of Water Resources (DWR)-published Bulletin 120, each year in each of the months of February, March, April and May, and then thereafter whenever DWR issues an update to the Bulletin 120, determine the applicable water year type as described in Table 1 of

this condition (below). However, when the current water year type is a Schedule 5, 6 or Conference Year and DWR’s Bulletin 120 February 1 forecast for the Yuba River near Smartsville plus Deer Creek forecast for annual unimpaired runoff is less than 50 percent of average, Licensee shall not re-evaluate the applicable water year type in February. Licensee shall use the water-year type determination to implement articles and conditions of the license that are dependent on water year type and that concern flows in the Yuba River downstream of the combined releases of Narrows 2 Powerhouse and Narrows 2 Full Bypass. Water year types for these articles and conditions shall be based on the North Yuba Index as defined in Table 1 of this condition.⁷³

Table 1. North Yuba Index.

Water Year Type	Thousands of Acre-Feet
Schedule 1	Equal to or greater than 1,400
Schedule 2	Equal to or greater than 1,040 and less than 1,400
Schedule 3	Equal to or greater than 920 and less than 1,040
Schedule 4	Equal to or greater than 820 and less than 920
Schedule 5	Equal to or greater than 693 and less than 820
Schedule 6	Equal to or greater than 500 and less than 693
Conference Year	Less than 500

The North Yuba Index shall be defined as follows:

$$\text{North Yuba Index} = Sa^{\text{NBB}} + I^{\text{NBB}}$$

where Sa^{NBB} is the actual recorded amount of water in storage in New Bullards Bar Reservoir on September 30 of the previous water year as reported for USGS gage 11413515 minus 234,000 acre-feet; and I^{NBB} is calculated as follows:

$$I^{\text{NBB}} = \text{Total Actual Inflow to New Bullards Bar Reservoir from October 1 to the end of Month}^{i-1} + \text{Forecasted Inflow from the Beginning of Month}^i \text{ to September 30 (Month}^{i-1} \text{ is the previous month and Month}^i \text{ is the current month)}$$

where Total Actual Inflow to New Bullards Bar Reservoir from October 1 to the end of Monthⁱ⁻¹ is the calculated inflow in thousands of acre-feet based on a monthly summation of inflow as follows:

$$\text{Total Actual Inflow to New Bullards Bar Reservoir from October 1 to the end of Month}^{i-1} = \text{Monthly change in stored water} + \text{Monthly outflow}$$

and where the Forecasted Inflow from the Beginning of Monthⁱ to September 30 is calculated as follows:

⁷³ Table numbers shown in this condition are quoted from the condition and are not to be confused with table numeration presented elsewhere in this document.

$$\text{Forecasted Inflow to NBB}^i = \text{February NBB Inflow} \\ + \text{March Inflow} + \text{April-July Inflow} + \text{August-September Inflow}$$

Forecasted inflow to NBB shall be determined for each month using statistically-derived linear coefficients shown in Table 2 of this condition, applied to the measured inflow to New Bullards Bar Reservoir and the DWR’s Bulletin 120 for February, March, April, and May, and subsequent updates of forecasts of unimpaired flow of the North Yuba River at Goodyears Bar (USGS Gage 11413000) and at the Yuba River at Smartsville (USGS Gage 11418000). DWR’s forecast published in February, March, and April shall apply from the 16th day of that month to the 15th day of the next month. After May 16, the index will be recalculated for each subsequent Bulletin 120 update, and the index shall apply until two days after the next update. The index determined by the final Bulletin 120 update for the water year shall remain in effect until February 14 of the following water year.

Table 2. Coefficients for the calculation of Forecasted Inflow from the beginning of “Monthⁱ” to September 30.

Forecast Month	Forecasted For	Constant (C) (ac-ft)	Total Actual Inflow to New Bullards Bar Reservoir ³ (C1) (no units)	Bulletin 120 ^{2, 4} Forecasted Smartsville (C2) (no units)	Bulletin 120 ² Forecasted Goodyear's Bar (C3) (no units)
February	February	-2,146	0.01424	0.52533	--
	March	-3,221	0.02458	0.54787	--
	April-July	-30,416	0.01413	0.62473	-0.24081
	August-September	--	0.01593	0.64037	--
March	March	-23,495	0.00596	0.55386	--
	April-July	-31,134	0.01237	0.62162	-0.23266
	August-September	--	0.01473	0.59396	--
April	April-July	-30,665	0.00547	0.61332	-0.19623
	August-September	--	0.01409	0.53241	--
May ^{1, 5}	April-July	-31,652	0.01033	0.61645	-0.22353
	August-September	--	0.01298	0.50071	--

¹ For all subsequent forecast updates, the May coefficients shall be used, with the forecasted Goodyears Bar runoff equaling 0.273 times the current forecasted Yuba River unimpaired flow at Smartsville.

² The Bulletin 120 forecasted flow for Smartsville and Goodyears Bar shall use the 50-percent exceedance forecasted flow.

³ Total actual inflow means inflow to date from October 1 of the previous year

⁴ “Forecasted Smartsville” is the DWR forecast for “Yuba River at Smartsville Plus Deer Creek”

⁵ The May calculation of Forecasted NBB Inflow and subsequent updated calculations shall be reduced by the actual NBB inflow between April 1 and the calculation date.

Formula terms are only applicable as shown in Table 2 (e.g., the March forecast does not include a term for forecasted February NBB Inflow). The following formula shall be used to calculate the terms of the formula for Forecasted Inflow to NBBⁱ using the corresponding coefficients from Table 2):

- February NBB Inflow = $C + C1 \times \text{Total Actual Inflow to NBB} + C2 \times \text{Forecasted Smartville}^{(\text{February})}$
- March NBB Inflow = $C + C1 \times \text{Total Actual Inflow to NBB} + C2 \times \text{Forecasted Smartville}^{(\text{March})}$
- April – July Inflow = $C + C1 \times \text{Total Actual Inflow to NBB} + C2 \times \text{Forecasted Smartville}^{(\text{April- July})} + C3 \times \text{Forecasted Goodyears Bar}^{(\text{April - July})}$
- August - September Inflow = $C1 \times \text{Total Actual Inflow to NBB} + C2 \times \text{Forecasted Smartville}^{(\text{August - September})}$

Terms are calculated in ac-ft and the result is converted to thousands of ac-ft for use in the calculation of the Forecasted Total Inflow to New Bullards Bar (I^{NBB} (TAF)).

B. Rationale:

FWN and resource agencies generally agree with Licensee’s water year schedules that apply the North Yuba Index downstream of Englebright Dam.

In the Amended FLA, Licensee proposes to change the application of the North Yuba Index in February of years when the previous water year had ended as a Schedule 5 or Schedule 6 year or a Conference Year. Licensee proposes in the AFLA that in such cases, Licensee will not change the applicable Schedule of the North Yuba Index in February.

FWN agrees in part and disagrees in part with Licensee’s proposed change in the application of the North Yuba Index in February. It is appropriate to delay a change in the applicable schedule in February when a Schedule 5 or 6 year or Conference Year is followed by a particularly dry fall, December and January. However, in the event that the months preceding February have not been unusually dry, it is appropriate to adjust the North Yuba Index flow schedule in February. Therefore, FWN supports the addition to Licensee’s modification that is recommended by CDFW: Licensee should forego the change of the North Yuba Index flow schedule in Februarys that follow Schedule 5 or 6 years or Conference Years only when the forecasted runoff at Smartsville and Deer Creek as shown in the February DWR Bulletin 120 (50% exceedance) is less than 50% of average.

VII. FWN Comments and Recommendations on Proposed Condition AR 10: Maintain Minimum Streamflows Below New Bullards Bar Dam

A. FWN Recommendation

The new license should include USFWS 10(j) Condition 11 and CDFW 10(j) Condition 2.4: Maintain Minimum Streamflows below New Bullards Bar Dam. A summary of the condition is below.

“Licensee shall meet the minimum streamflow requirements for the North Yuba River downstream of New Bullards Bar Dam that are shown in Table 2.4.1 of CDFW’s Condition. Minimum streamflows shall be measured in cubic feet per second (cfs) once every 15-minute at the compliance gage, and these 15-minute measurements averaged into hourly measurements that will be recorded and reported to USGS and the Commission. Except as otherwise provided, Licensee shall implement the minimum streamflows of this condition beginning in the first 90 days of the new license term. Changes between minimum streamflow values may be made with one adjustment to the controlling valve (i.e., ramping from one minimum flow to another minimum flow is not required).”⁷⁴

Table 2.4.1. Minimum streamflows in cubic feet per second (cfs) in the North Yuba River downstream of New Bullards Bar Dam by month and Water Year Type. Water Year types are defined in CDFW Recommended Condition 2.1.

Month	Wet Water Year	Above Normal Water Year	Below Normal Water Year	Dry Water Year	Critically Dry Water Year
NORTH YUBA RIVER - BELOW NEW BULLARDS BAR DAM (COMPLIANCE POINT: USGS STREAMFLOW GAGE 11413517)					
October 1 - 30	30	30	30	30	30
November 1-30	30	30	30	30	30
December 1 - 31	30	30	30	30	30
January 1 - 31	30	30	30	30	30
February 1-29	30	30	30	30	30
March 1 - 31	30	30	30	30	30
April 1 - 30	60	60	60	60	60
May 1- 31	60	60	60	60	60
June 1 - 30	60	60	60	60	60
July 1 - 31	40	40	40	40	40
August 1 - 31	40	40	40	40	40
September 1- 30	30	30	30	30	30

B. Rationale

The North Yuba River drains a 490 square-mile watershed and is the largest fork of the Yuba River. The Project facility of New Bullards Bar Dam controls flows in the lowest 2.4 miles of the North Yuba River, except during uncontrolled spill events. The North Yuba River below the Project dam contains rainbow trout (*O. mykiss*) which are dependent on suitable flows and temperature to support all life stages. Flows and water temperature in the North Yuba River also influence the mainstem Yuba River below confluence with the Middle Yuba.

The Licensee’s proposed minimum instream flows for the North Yuba River (AFLA AR10) range from 5 cfs to 13 cfs, and are only 5 cfs in April, May and June of all Water Year

⁷⁴ Table number shown in this condition is quoted from the condition and is not to be confused with table numeration presented elsewhere in this document.

Types. The Licensee proposed flows are less than 1% of the 98% exceedance probability for natural flows in most months (i.e. without the project the flows would be more than 500 cfs), and are insufficient to ensure good fisheries condition below the Project's dam. April, May and June are the primary rearing months for trout fry. The low flows and high water temperatures associated with the Licensee proposed flows would make most of the North Yuba River unsuitably warm for trout rearing and additionally suppress the trout population by supporting predatory warm-water fishes.

CDFW has done extensive temperature modelling, in collaboration with the Forest Service, USFWS, and NGOs, to develop a minimum instream flow scenario that balances the thermal needs for salmonids in the North Yuba River and downstream of the confluence of the North and Middle Yuba rivers. The 10(j) flow Condition is the result of adjustments to flows that address survivorship of young-of-year juveniles and adult *O. mykiss* in the North Yuba River. The flow Condition balances the benefit of higher releases downstream with the need to keep appropriate temperatures for *O. mykiss* in the North Yuba River. These analyses used a 20°C objective for the protection of cold water species.

VIII. FWN Comments and Recommendations on Proposed Measure GS3 NBB Reservoir Woody Material Management Plan

A. FWN Recommendation

The new license should include USFWS 10(j) Condition 9 and CDFW 10(j) Condition 2.19: Develop and Implement North Yuba River Large Woody Material and Sediment Enhancement and Management Plan.

1. Summary of Condition

Licensee shall, within the first full calendar year of the new license term, develop a North Yuba River Large Woody Material and Sediment Enhancement Plan in consultation with the Forest Service, USFWS, CDFW, and SWRCB. The Plan shall include large woody material (LWM) and sediment (gravel/cobble) placement and monitoring within the 2.4-mile reach of the North Yuba River from immediately below New Bullards Bar Dam spillway to the confluence with the Middle Yuba River (NBB Reach), as described below.

a. Large Woody Material Placement

Licensee shall, within the first five years of the new license term in the months of August and September, place below New Bullards Bar Reservoir spillway, a minimum of 143 pieces of LWM. Licensee shall implement LWM placement as follows:

- All pieces of LWM shall be a minimum of 25 feet in length (not including the rootwad in the measurement) and a minimum of 12 inches in diameter.
- Place a minimum of 129 pieces in one or more piles, without anchors or attachments in the lower water channel and floodplain surfaces, downstream of the spillway channel, as widely dispersed as feasible.

- At two sites on the North Yuba River below New Bullards Bar Dam, secure or embed a minimum of 14 pieces of LWM using the largest size class available. Site selection and securing/embedding techniques shall be determined in consultation with the Ecological Group described in Condition 1.1 of this Enclosure B, and American Whitewater.
- Provide LWM for placement and secured/embedded sites by collection at New Bullards Bar Reservoir, or other sources agreed to by the Ecological Group. Priority of LWM selected shall include the largest pieces of wood available and those with rootwads attached.
- Transport LWM to the placement area and secured/embedded sites by truck, helicopter, or other means deemed safe and feasible by Licensee. Appropriate measures shall be implemented during LWM collection, transport, and placement to prevent the potential introduction and/or spread of invasive species and to minimize impacts to special-status species, water quality, and other sensitive resources.
- Establish permanent photo points for the LWM placement area and the two secured/embedded sites and document the location with a GPS. Take photos of the LWM pile(s) and LWM at each anchored/buried site immediately after initial installation.

Licensee shall conduct baseline monitoring no more than one year prior to LWM placement and installation of secured/embedded sites. Baseline monitoring shall occur between spring runoff and November and include a count and characterization of all LWM pieces within the NBB Reach utilizing the same field methods and data analysis for LWM described in the Upper Yuba River Aquatic Monitoring Plan. All LWM pieces shall be documented with photos. Following placement and securing/embedding of LWM, monitoring shall occur up to three times in each 10-year period, of the new license, as triggered by a flow event of 8,000 cfs or more. If less than two of these events occur within the 10-year period, then monitoring would occur during year 10 regardless of the magnitude of a flow event. Licensee shall monitor LWM in the NBB Reach during each monitoring event as specified.

Following each monitoring event, Licensee shall replenish the LWM pile(s) to a total of 129 pieces, minus the number of stable LWM pieces found in the NBB Reach during monitoring. Licensee shall replace any of the 14 originally secured/embedded LWM pieces that are no longer in place every ten years.

b. Gravel/Cobble Placement

Licensee shall, within the first five years of the new license term between the months of August and September, place in a pile immediately downstream of New Bullards Bar Reservoir spillway, 5,000 tons of mixed gravel/cobble 0.25 to 6 inches in diameter. Licensee shall implement gravel/cobble placement as follows:

- Gravel/cobble shall be transported and placed in the river by truck, helicopter, or other means deemed safe and feasible by Licensee. Gravel/cobble shall be obtained from a

clean source and appropriate measures shall be implemented during collection, transport, and placement to prevent the potential introduction and/or spread of invasive species and to minimize impacts to special-status species, water quality, and other sensitive resources.

- Take photos and describe the spatial area of the gravel/cobble pile and document the location with a GPS immediately following placement.
- Establish permanent transects and photo points for gravel/cobble monitoring within the NBB Reach at the two sites where secured/embedded LWM will be installed. Document the location of transects with a GPS.

Licensee shall conduct baseline monitoring no more than one year prior to gravel/cobble placement. Baseline monitoring shall occur between spring runoff and November and include facies mapping and quantification, including determination of particle distribution and fine sediment content of rainbow trout spawning gravels within the NBB Reach at the two sites where secured/embedded LWM will be installed utilizing the same field methods and data analysis for Stream Channel Morphology described in the Upper Yuba River Aquatic Monitoring Plan. Photos shall be taken at each transect.

Following placement of gravel/cobble, monitoring shall occur up to three times in each 10-year period of the new license, as triggered by a flow event of 8,000 cfs or more. If less than two of these events occur within the 10-year period, then monitoring would occur during year 10. Licensee shall monitor the distribution of gravel/cobble in the NBB Reach during each monitoring event as specified. Following each monitoring event, Licensee shall replenish the gravel/cobble pile to approximately 5,000 tons.

c. Reporting and Consultation

Licensee shall file with the Commission, and provide to the Forest Service, USFWS, CDFW, and SWRCB, a report describing the implementation of LWM and gravel/cobble placement and the results of baseline monitoring by March 15 of the year following initial LWM and gravel/cobble placement. Licensee shall also provide reports describing the results of LWM and gravel/cobble monitoring post-placement. Licensee shall provide the results of LWM and gravel/cobble monitoring to the Ecological Group.

At the annual Ecological Group meeting of the year following completion of the each 10-year monitoring period, Licensee shall present an evaluation of the LWM and gravel/cobble enhancement effort, including a summary of the results of the 10-year monitoring period. At the meeting, Licensee and/or members of the Ecological Group shall present any proposed changes to the Plan, including, but not limited to: the amount of LWM and gravel replenished, monitoring triggers and frequency, monitoring methods, and/or discontinuing the replenishment of LWM and/or gravel/cobble. Any changes to the plan shall be collectively agreed to by Licensee, Forest Service, USFWS, CDFW, and SWRCB prior to Licensee filing a revised Plan with the Commission for approval.

B. Rationale

New Bullards Bar Dam and Reservoir impound all large wood and gravel transported downstream from the large and heavily forested North Yuba River watershed. The lower North Yuba (New Bullards Bar Reach) and downstream reaches of the Yuba River (upstream of Englebright Dam) do not receive natural inputs of LWM and sediment which are fundamental elements of aquatic habitat. This Condition provides minimal mitigation for these impacts by restoring a modest supply of large wood and sediment.

Studies of the river reaches below New Bullards Bar Dam indicate that suitable habitat is lacking for rainbow trout and other aquatic species. Fish sampling conducted by the Licensee (Study 3.8) revealed low numbers of rainbow trout in the New Bullards Bar Reach and downstream reaches of the Yuba River above Englebright Reservoir. Additionally, benthic macroinvertebrates in these reaches are in poor condition (Study 3.1). Restoring fundamental habitat elements in the form of sediment and LWM will most certainly improve conditions for macroinvertebrates and trout.

Relicensing participants from resource agencies and NGOs met with the Licensee more than five times on this topic, and exchanged many drafts of proposed measures. Despite the fact that the Licensee did not adopt an interest in habitat restoration for these reaches, the collaborative process provided a means for relicensing participants to refine a mitigation approach. As detailed in the rationales provided by USFWS and CDFW, this Condition consists of specific and reasonable terms for the placement, monitoring, and management of LWM and gravel in the New Bullards Bar Reach.

IX. FWN Comments and Recommendations on Proposed Measure GS3 Woody Material Management Plan for Our House Dam, Log Cabin Dam and New Bullards Bar Dam

A. FWN Recommendation

Licensee proposed condition GS3 provides a management plan for woody material at Our House Dam, Log Cabin Dam and New Bullards Bar Dam. FWN supports the plan for Our House and Log Cabin Dam, and supports a revision of the plan pertaining to New Bullards Bar as described in USFWS 10(j) Condition 7 and summarized as follows:

- The wood shall be removed from New Bullards Bar Reservoir using an excavator placed on dry land and loading the wood onto trucks or temporarily storing the wood in the Licensee's operations yard ramp area.
- The wood shall be hauled off-site immediately or stored no more than one day at the Licensee's operations yard ramp area.
- Following Rapid LWM and Woody Debris Removal, the Licensee shall make 200 key pieces of LWM available to entities conducting salmonid restoration actions in the lower Yuba River.
- Entities receiving the LWM for the purpose of salmonid habitat restoration shall be charged no more than the hauling cost to transport the LWM to restoration areas or stockpiling sites in the lower Yuba River.

- All key pieces of LWM with root wads still attached shall be preferentially selected to be made available for lower Yuba River salmonid habitat restoration.

B. Rationale

New Bullards Bar Dam and Reservoir impound all large wood and gravel transported downstream from the large and heavily forested North Yuba River watershed. Most of the material is captured in episodic events associated with large floods (Senter and Pasternack 2012). LWM is an important component of aquatic habitat for which natural deliver to the Yuba River downstream, including the lower Yuba River, is impeded by the Project.

During collaborative relicensing meetings, resource agency and NGO representatives consistently presented to the Licensee an interest in a specific woody material management plan for New Bullards Bar that would focus on the collection of LWM for use in habitat enhancement projects in the lower Yuba River. This interest was highlighted by the fact that during this period the Army Corps of Engineers was having difficulty finding suitable large wood with which to implement their program of wood placement on the lower Yuba River (USACE 2011). In addition, USFWS contractors were planning projects in the lower Yuba River for which LWM would be an essential component, but were uncertain about the source for such material (cbec 2012).

The wood flow event at New Bullard Bar in 2017 provided the latest opportunity for the Licensee to remove wood for their reservoir in an environmentally benign way that would also make the resource available to restoration projects in the lower Yuba River. FWN commends the USFWS and the Licensee for working together to accomplish an improved method of wood removal during that time. However, the disposal of all the material by chipping was disappointing and should not be repeated during the term of the new license. The USFWS 10(j) Condition appropriately requires the Licensee to make the most valuable pieces of LWM available for habitat enhancements.

X. Develop and Implement Narrows Reach Fish Stranding Prevention Plan

A. FWN Recommendation

The Network recommends that the Commission adopt USFWS 10(j) Condition 4 and CDFW 10(j) Condition 2.27 regarding a Narrows Reach Fish Stranding Prevention Plan. A summary of the condition is below.

The Licensee shall, within the first year of the new license term, develop a Narrows Reach Fish Stranding Prevention Plan in consultation with CDFW, NMFS, SWRCB, and USFWS. The Plan shall be focused on the reach of the lower Yuba River from immediately below Englebright Dam to the Narrows No. 1 Powerhouse (“Narrows Reach”). The plan shall include permanent or long-term measures to reduce or eliminate the stranding potential of fish during flow transitions of normal operations of the Project. Measures provided in the plan shall be developed in consideration of existing locations in the Narrows Reach where stranding has occurred or has been identified as having the potential to occur. Specific measures of the Plan

may include, but are not limited to, changes in the operations of Narrows 2 Facilities and coordinated operations with the Narrows 1 Powerhouse, construction of entrainment deterrents, maintenance of gravel bars and banks, or filling of intermittent pools. Measures shall include implementation and effectiveness monitoring.

B. Rationale

Project operations at the Narrows 2 Facilities have had a history of stranding both adult and juvenile fish, including spring-run Chinook salmon and fall-run Chinook salmon, between Englebright Dam and Narrows 1 Powerhouse.⁷⁵ These stranding events are typically associated with flow transitions of normal operations of the Project, such as transition from the Narrows 2 Powerhouse to Narrows 1 Powerhouse, transition from the Narrows 2 Powerhouse to Narrows 1 Powerhouse and Full Bypass, transition from the Full Bypass to the Narrows 1 Powerhouse, transition from the Narrows 1 Powerhouse to the Narrows 2 Powerhouse, transition from the Narrows 1 Powerhouse to the Full Bypass, and transitions using the Partial Bypass.

Minimum flow requirements for the Project under Article 33 and state water right permits refer to the combined flow of the Narrows 2 facilities and Narrows 1 Powerhouse as measured at the Smartsville and Marysville gages. Thus, operations of the Partial or Full Bypasses can lead to abrupt changes in river stage above Narrows 1, potentially stranding fishes. Subsequent to operation of the Partial Bypass, Chinook salmon carcasses have been found in the large rocks on the north bank of the river where the Partial Bypass discharge had sprayed. CDFW extracted a dead Chinook salmon from a crevice 70 feet downstream of the Narrows 2 Powerhouse on October 25, 2002, following such a stranding event. Discharge from the Full Bypass creates an isolation pool on a gravel bar on the south bank of the river below the Full Bypass Pool. Chinook salmon have been observed in the isolation pool on numerous occasions. The pool reformed in 2016 following Licensee's effort to fill the pool with gravel/cobble in December 2015. At certain flows, the Full Bypass Pool is isolated from the river channel downstream of the Narrows 2 Powerhouse by a small gravel bar. Fish have been observed stranded in the Full Bypass Pool. The spray from the Full Bypass Pool provides a connection between the pool and the river, which attracts fish into the pool. When operation of the Full Bypass ceases, water recedes and disconnects the pool from the channel.

The USFWS and CDFW 10(j) Condition is necessary to prevent additional fish stranding associated with operation of the Project. The currently depressed population of Yuba River spring-run Chinook salmon is particularly vulnerable to stranding associated with Narrows 2 facilities, due to the propensity of spring-run to migrate to far upstream. FWN recommends that the Licensee support this Condition and work collaboratively with USFWS, CDFW, NMFS and the SWRCB to develop and implement a Narrows Reach Fish Stranding Prevention Plan.

⁷⁵ This uppermost section of the lower Yuba River between Englebright Dam and Narrows 1 Powerhouse is called the "Narrows Reach" for the purposes of this Condition and of the topic of fish stranding associated with Narrows 2 facilities. It should not to be confused with a geomorphically-defined reach of the lower Yuba River downstream.

XI. FWN Recommended Measure: Develop a Shot Rock Removal and Stabilization and Gravel Augmentation Plan for the Englebright Dam Reach

A. FWN Recommendation

FWN recommends a Condition requiring the Licensee to develop and implement a Shot Rock Removal and Stabilization and Gravel Augmentation Plan to rehabilitate the Englebright Dam Reach of the Lower Yuba River. Licensee should develop the plan within one year of license issuance. The plan should be approved by USFWS, CDFW, NMFS and the SWRCB and developed in consultation with the Army Corps of Engineers and the Ecological Group (GEN 1). Licensee should implement the plan within 5 years of license issuance. Once implemented, Licensee should monitor the affected area to ensure effectiveness. Monitoring for implementation effectiveness should occur within two years following every major flood event (50,000 cfs flow or greater at Smartsville gage), and identify any mobilization of shot rock within the Englebright Dam Reach.

B. Rationale

Material from construction and operation of Project facilities is impairing habitat conditions and limiting habitat enhancement activities in the Englebright Dam Reach (EDR). As mitigation for project impacts to habitat in the EDR, the Licensee should undertake a combination of actions, to be specified in a plan, that include shot rock removal, shot rock stabilization, and gravel augmentation. Licensee should armor the bank that continues to introduce shot rock to the channel and should contribute to ongoing efforts to improve the habitat in the EDR that has been impacted by shot rock.

Shot rock is irregular-shaped angular cobbles and boulders blasted from surrounding hillsides (Pasternack et al. 2010). Shot rock in the EDR originated from the construction of Englebright Dam (c. 1940), construction of Narrows 2 penstock and powerhouse (c. 1968) and construction of the Narrows 2 bypass (c. 2005). Shot rock has been transported to multiple locations in the reach, and yet significant amounts remain on the river bank immediately downstream of Narrows 2, including as embankment supporting the Narrows 2 Access Road (Pasternack 2008). Mobilized shot rock has impaired habitat for salmonids and in for particular spring-run Chinook salmon by interfering with and limiting suitable spawning habitat.

The Habitat Expansion Plan (2010) developed by the Department of Water Resources and Pacific Gas & Electric Company states:

“...[T]he quantity and quality of salmonid spawning habitat in this [EDR] reach has been significantly reduced by the deposition of large, consolidated rock fragments (i.e., “shot-rock”)a program [gravel augmentation] would provide minimal benefits to spring-run Chinook salmon and steelhead until the channel is rehabilitated”

The flood-related inputs of shot rock to the river channel and the ongoing impacts of shot rock on salmonid habitat are of increasing concern as the Army Corps and the USFWS invest in rehabilitation actions in the EDR below Project-associated sources of shot rock (ESA 2014).

While PG&E and DWR have proposed larger scale rehabilitation, the question of responsibility for shot rock is one of several issues preventing that work from moving forward. The recommended condition mitigates for existing and future impacts while protecting enhanced habitat that may result from planned and future potential restoration efforts.

FERC staff convened a technical meeting on October 28, 2014 in response to requests by FWN and the National Marine Fisheries Service for additional or expanded studies. Information the FWN presented during that meeting⁷⁶ and additional information that FWN filed afterward⁷⁷ demonstrates that the condition of the Yuba River downstream of Englebright Dam is impaired by the shot rock that originated, at least in part, from the Project. The construction of Narrows 2 hydropower facility near the base of Englebright Dam created at least 6491 cubic yards of shot rock that was apparently placed in positions where the rock would be entrained by flows into the river channel. FWN calculated this volume using the lengths and widths of the penstock tunnel as reported in the Licensee's Project Relicensing Fact Sheet. The actual amount of shot rock created during the construction of Narrows 2 would be higher, because it would include the volume of rock created from the excavation for the powerhouse as depicted in Figure 1 of FWN's letter to FERC staff on December 2, 2014 (included as Appendix A).

A photo taken during construction of Narrows 2 (Figure 2, Appendix A), reveals that large volumes of shot rock were piled along the north wall of the river canyon while providing a grade for the Narrows 2 Access Road and another road extending downstream toward the USGS gage site. While much of the shot rock depicted in this figure may have originated from the construction of Englebright Dam, the construction of Narrows 2 clearly repositioned this material. Today, the north face of the canyon shows signs of massive erosion including scarp faces and large gullies (Figures 3 and 4, Appendix A). The river has created a flood terrace at the canyon wall composed entirely of the larger pieces of shot rock.

Following the 2014 meeting, scientists contracted by the U.S. Fish and Wildlife Service's Anadromous Fish Restoration Program produced a plan entitled "Englebright Dam and Narrows Reaches of the Lower Yuba River, Habitat Management and Rehabilitation Plan" (ESA 2015), which includes the following statements:

"[S]hot rock has overwhelmed the river corridor degrading physical habitat ...

"[I]f gravel augmentation in the dam zone is implemented in ways that can simultaneously stabilize the shot rock source areas, the risk of re-entraining shot rock would be reduced. If such an action is pursued it is recommended that a maintenance and engineering plan be developed to assess its long term performance."

"[T]he entire hillslope of the Narrows II access road is still eroding and ... there is the potential that more shot rock could be entrained and deposited in the downstream riverbed."

⁷⁶ See "Information for FERC on Shot Rock and Habitat on the Yuba River below Englebright Dam," eLibrary no. 20141030-5027. See also

⁷⁷ "Comments Supplemental to October 28th Meeting on Shot Rock below Englebright Dam, Yuba River Development Project, FERC Project No. 2246," eLibrary no.20141208-4007.

The Narrows 2 Access Road was constructed for the purpose of construction and operation of the Narrows 2 facility. The lower section of the road bisects the steep and eroding slope of shot rock, and has been maintained, in part, by supply of shot rock over the edge of the road (Figures 5-7, Appendix A). Licensee has not provided details of how this road is being maintained or repaired, but has proposed removing a 100-ft right-of-way for the road from the Project boundary. The lands proposed for removal (Amended FLA, Exhibit A-77, Exhibit G) include embankment composed of shot rock as illustrated in Figures 2 and 5-8 (Appendix A).

XII. FWN Comments and Recommendations on Proposed Measure AR 11 Periodically Close Lohman Ridge Diversion Tunnel

A. FWN Recommendation

The Network recommends that the Commission include the California Department of Fish and Wildlife (CDFW) and U.S. Fish and Wildlife Service (USFWS) 10(j) Tunnel Closure condition in lieu of AR 11. The recommended language is provided below.

Licensee shall, beginning in the first full calendar year after license issuance, fully close the Lohman Ridge Diversion Tunnel as described in this condition.

Spring and Summer Tunnel Closures: If the end-of-March New Bullards Bar Reservoir storage is 775,000 acre-feet (ac-ft) or greater and the California Department of Water Resources (DWR) March median water year forecast is greater than 2,191 thousand ac-ft, the Licensee shall, on April 1, close the Lohman Ridge Diversion Tunnel and it shall remain fully closed through September 30 of that calendar year. If the subsequent DWR April median water year forecast is less than 2,191 thousand ac-ft., Licensee shall begin to open the Lohman Ridge Diversion Tunnel within 2 business days of when the DWR publishes that April Bulletin 120 and provide a ramp down consistent with CDFW Recommended Condition 2.9. Concurrent with the Lohman Ridge Diversion Tunnel closure, Licensee shall open the low-level outlet and fish release valve at Log Cabin Diversion Dam, but Licensee may leave the Camptonville Diversion Tunnel fully open.

California Department of Fish and Wildlife (CDFW) recommendation 2.13 and U.S. Fish and Wildlife Service (USFWS) recommendation 11.

B. Rationale

There are two different proposed conditions related to closing the Lohman Ridge Diversion Tunnel. This rationale begins with a summary of both proposed conditions and background information that provides important context to this recommendation. Following the background information, the rationale includes an economic analysis to help provide an understanding of how closing the tunnel would impact specific components of generation (ancillary services and standard generation) for both sets of recommendations.

1. Summary of Proposed Conditions

The Licensee and the USFS have proposed a condition that requires the Licensee to close the Lohman Tunnel in wet water years. The condition (“Licensee/USFS condition”) states:

If the end-of-March New Bullards Bar Reservoir storage is 775,000 acre-feet or greater and the subsequent April is a Wet Water Year, as defined in Licensee’s proposed Condition WR2, Licensee shall close the Lohman Ridge Diversion Tunnel within 2 business days of when the California Department of Water Resources publishes that April Bulletin 120. The Lohman Ridge Diversion Tunnel shall remain fully closed through September 30 of that calendar year. Concurrent with the Lohman Ridge Diversion Tunnel closure, Licensee shall open the low-level outlet and fish release valve at Log Cabin Diversion Dam, but Licensee may leave the Camptonville Diversion Tunnel fully open.

Licensee FLA Condition AR 11 and identical U.S. Forest Service Condition

In order to protect aquatic resources, the California Department of Fish and Wildlife (“CDFW”), U.S. Fish and Wildlife Service (“USFWS”) and the FWN propose that the Licensee close Lohman Tunnel in wet and above normal water years. The recommendation (“CDFW/USFWS recommendation”) states:

Licensee shall, beginning in the first full calendar year after license issuance, fully close the Lohman Ridge Diversion Tunnel as described in this condition.

Spring and Summer Tunnel Closures: If the end-of-March New Bullards Bar Reservoir storage is 775,000 acre-feet (ac-ft) or greater and the California Department of Water Resources (DWR) March median water year forecast is greater than 2,191 thousand ac-ft, the Licensee shall, on April 1, close the Lohman Ridge Diversion Tunnel and it shall remain fully closed through September 30 of that calendar year. If the subsequent DWR April median water year forecast is less than 2,191 thousand ac-ft., Licensee shall begin to open the Lohman Ridge Diversion Tunnel within 2 business days of when the DWR publishes that April Bulletin 120 and provide a ramp down consistent with CDFW Recommended Condition 2.9. Concurrent with the Lohman Ridge Diversion Tunnel closure, Licensee shall open the low-level outlet and fish release valve at Log Cabin Diversion Dam, but Licensee may leave the Camptonville Diversion Tunnel fully open.

California Department of Fish and Wildlife (CDFW) recommendation 2.13 and identical U.S. Fish and Wildlife Service (USFWS) recommendation 11.

2. Background

This section provides the background on how relicensing participants developed the concept of tunnel closure in this proceeding. This background is necessary to help the Commission understand the differences between the two conditions.

At the beginning of relicensing discussions, resource agencies and FWN sought flow conditions relating to spill cessation, pulsed flows for geomorphic and riparian processes, and ramping rates that would be protective of the river. As stakeholders began to explore the options for meeting these goals, it became clear that the Our House Dam (“OHD”) facility was significantly constrained in its ability to provide these flow conditions. With just 280 acre-feet of storage, OHD has a relatively small impoundment. Inflows into the reservoir dictate flow conditions below the dam. As a result, it would be infeasible for the Project to meet specific requirements for the timing, duration, magnitude and rate of change for pulse flows, spill cessation and ramping rates. Given these constraints, stakeholders began to discuss the practicality of simply closing the diversion tunnel during critical times of the year and allowing the entire flow of the Middle Yuba River to flow through the reservoir and pass downstream of Our House Dam.

This approach had significant advantages in terms of simplicity and of meeting the objective of replicating the natural hydrograph. Instead of using the less-than-nimble Project works to attempt to meet flow conditions in a very dynamic system, the Licensee would simply be required to close the tunnels and allow the unaltered flows to continue downstream. This meant that the resource agencies no longer needed to determine specific ramp rate steps, the duration and magnitude of flows, and the triggering event for each type of flow condition. Additionally, the Licensee would not be faced with myriad challenges in order to be in compliance with conditions related to pulse flows or ramping rates. The only requirement would be for the Licensee, on a certain date, to close the tunnel to their diversion. In 2015 stakeholders agreed that this was a path worth pursuing and turned to the question of when to close the tunnels: i.e., on what dates, and during what water year types.

Through investigation, FWN representatives found that in wet and above normal water years, closing the diversion would have no impact to water supply. This was largely due to the fact that in these years water diverted from the Middle Yuba is then spilled at New Bullards Bar Dam when large inflows from the North Yuba exceed the storage capacity of the reservoir. FWN recognized that there was a loss to power generation, and the Licensee’s analysis showed that closing the tunnels in wet years would result in an annual average generation loss of 2.3%. However, the trade-off for this lost generation was that an additional 128,000 acre-feet of water could be returned to the Middle Yuba on average in years when the tunnel would be closed.⁷⁸

The question before the relicensing group was to determine the appropriate threshold for when to close the tunnels and not divert water from the Middle Yuba. Initially, relicensing participants evaluated the possibility of only closing the tunnels when New Bullards Bar Dam was spilling. This option was sub-optimal because the Project would not be able to easily provide ramping rates at OHD that would be biologically protective. If the tunnels were to be closed and re-opened during the high flow season, all of the issues associated with determining ramping rates as the tunnel was being closed would come into play. Additionally, the biological benefits of the natural flow returning to the Middle Yuba would be lost. Most importantly,

⁷⁸ Based upon run name RP072616_5b as compared to the RP072716_0, No Tunnel Closure model run. All model runs are available to FERC upon request.

benefits to the Project in terms of water supply were nonexistent, and the impacts to power generation were minimal.

Resource agencies and the FWN had extensive discussions with YCWA on the percentage of years that the tunnel should be closed. FWN and the resource agencies stated from the outset that tunnel closures should not impact water supply. This limited potential tunnel closure years to 24% of years, based upon the historical record. The group then had to determine the level of reduction in power generation that was appropriate to achieve the biological benefit desired.

In the fall of 2016, YCWA was considering filing a trial-type hearing request with the USFS over concerns about the cost associated with potential 4(e) conditions for the Project. After several meetings that only included agency managers, a one-on-one discussion between YCWA and USFS led those two parties to agree that the Lohman Ridge Tunnel should be closed in Wet water years. It is important to note that these final negotiations did not include any of the other resource agencies or FWN.

CDFW, USFWS and the FWN, were not convinced that this measure provided the appropriate balance between resource protection and power generation, and decided to perform additional analysis to evaluate alternative triggers for closing the tunnel. The Licensee/USFS condition closes the tunnel in “Wet” years when the reservoir is already full (775,000 ac-ft is the top of the reservoir “rule curve” on April 1). However, CDFW, USFWS and the FWN noted that the New Bullards Bar Reservoir often spills in Above Normal water years in addition to Wet water years.

FERC has recognized the benefits of returning the natural flow to other rivers. For example, the DEIS on the Yuba Bear/Drum Spaulding Project (P-2310), states:

Rapid changes in streamflow associated with management of spill conditions at dams can have a significant effect on aquatic habitat and the organisms that depend on that habitat. Frequently, dams are operated to sharply curtail flow when inflow decreases to a level when the dam stops spilling at the end of an uncontrolled spill event; the resulting quick decrease in discharge can rapidly dewater habitat and strand aquatic organisms below the dam. Less mobile early life stages such as eggs and tadpoles of foothill yellow-legged frog are particularly vulnerable to stranding and desiccation at these times.⁷⁹

Additionally, CDFW has provided an extensive explanation of the biological benefits associated with closing the tunnel in the 10(j) recommendations it filed with FERC for the YRDP Project. See the CDFW 10(j) filing for more information. While the biological benefits of returning the natural flow to the Middle Yuba were clear, FWN realized that a better economic analysis was also needed in order to justify closing the tunnel in Above Normal water years.

⁷⁹ YBDS DEIS, pp. 226-227. (FERC eLibrary Accession No. 20130517-4001).

3. Economic Analysis

The Licensee analyzed the economics of closing the tunnels (during Wet water years, as included in its amended FLA) in terms of lost generation on an aggregate scale. However, FWN, CDFW and USFWS were interested in understanding how closing the tunnel would impact specific components of generation (ancillary services and standard generation) for both sets of recommendations (Licensee/USFS and CDFW/USFWS). They also realized that understanding the amount of revenue generated by these different types of generation was a more accurate measure of the impact to the Licensee than simply looking at gross change in the KWh of generation. Ultimately, stakeholders needed a better understanding of the value to the Licensee of each acre-foot of water diverted compared to the value of leaving this water in the river for instream benefits.

During relicensing, the Licensee provided relicensing participants with a generation post-processor tool that FWN, DFW and USFWS used to determine the amount of revenue that each type of generation produces. For more information on the methodology behind this tool, please see CDFW’s rationale for the tunnel closure recommendation 2.13.

Overall, the prices for base load and ancillary services are rapidly changing as the energy markets adapt as solar and wind increasingly come online. As a leader in developing renewable portfolio standards, California has been on the forefront of this new reality. Many predicted that very low or negative power pricing wouldn’t become common until 2020,⁸⁰ but with an abundance of hydropower on the grid after a particularly wet year, it’s already happening in 2017.⁸¹

The post-processing tool used for this model is the same one that the Licensee used to perform the developmental analysis in Section 4.0 of Exhibit E in the Final License Application (YCWA, 2014). In that analysis, the Licensee used 2012 pricing data, which was certainly appropriate for the FLA filed with FERC in 2014. However, in light of the fact that the prices for base load and ancillary services are rapidly changing (as represented in Table 1 below), FWN, CDFW and USFWS used energy values from 2016 for this analysis.

Base Case: 2016 prices, compared to 2012 prices					
	generation	reg down	reg up	spin	total revenue
Revenue	-11.6%	53.7%	31.0%	-11.8%	-7.7%

*Table 3. Base Case Project Revenue with 2016 vs. 2012 Power Prices*⁸²

⁸⁰ Scott Madden Management Consultants. Revisiting the Duck Curve: An Exploration of its Existence, Impact, and Migration Potential. October 2016, p. 3. Available at: http://www.scottmadden.com/wp-content/uploads/2016/10/Revisiting-the-Duck-Curve_Article.pdf

⁸¹ <http://www.utilitydive.com/news/prognosis-negative-how-california-is-dealing-with-below-zero-power-market/442130/>

⁸² Data from the California ISO Open Access Same-time Information System (OASIS), available at: <http://oasis.caiso.com/mrioasis/logon.do>

Table 3 shows the dramatic changes in power revenue from 2012 to 2016. While total revenue was down 7.7%, ancillary services for Reg Up and Reg Down were up 53% and 37%, respectively. This demonstrates the increasing importance of ancillary services to the Licensee. Also, because this analysis is only comparing the base case with different pricing data, it is important to note that changing market conditions are having a far more dramatic impact on Project revenue than the impact from updated flow conditions.

Overall, the CDFW/USFWS tunnel closure recommendation⁸³ reduces total energy generation by 1.78%, while increasing total potential ancillary service provision by 0.29% compared to the Licensee/USFS condition.⁸⁴ In terms of revenue, this results in a 1.41% reduction in revenue from energy sales and a 0.63% increase in potential ancillary services revenue, for an overall reduction of 1.08% in total revenue. These impacts are summarized in Tables 4 and 5 below.

Table 4: Impact to Ancillary Service Capacity (MW) and Generation (MWh)

<i>Generation / Capacity</i>	Reg Up (MW)	Reg Down (MW)	Spin (MW)	Total AS (MW)	Total Energy (MWh)
CDFW/USFWS	12,440,399.8	9,151,852.2	50,760,103.8	72,352,355.7	47,760,159.4
Licensee/USFS	12,518,601.4	9,000,876.9	51,044,316.2	72,563,794.6	46,909,134.6
% Δ	0.63%	1.65%	0.56%	0.29%	-1.78%

Table 5: Impact to Revenue (\$ Million)

<i>Revenue Impacts (\$ Million)</i>	Reg Up (\$)	Reg Down (\$)	Spin (\$)	Total AS (\$)	Total Energy (\$)	Total Revenue
CDFW/USFWS	\$77.768	\$59.780	\$140.856	\$278.405	\$1,448.558	\$1,726.962
Licensee/USFS	\$79.103	\$58.390	\$142.674	\$280.167	\$1,428.184	\$1,708.351
% Δ	1.72%	2.33%	1.29%	0.63%	1.41%	1.08%

⁸³ Modeling run name RP072616_5b.

⁸⁴ Modeling run name L081816_plus AG NY. All of the modeling runs are available to FERC upon request.

For both 2012 and 2016, the model revealed several relationships between power revenue, generation and the different types of generation that are important not only for the discussion of closing the tunnels, but for all of the flow conditions for the Project.

The first relationship is that between the different model runs, the percentage of change in the amount of generation did not correspond with the changes in revenue. In this case, the impact of the CDFW/USFWS tunnel closure condition on revenue from the Project is distinct from, and in terms of percent, less than, the impact on electricity generation. When comparing the CDFW/USFWS tunnel closure condition to the Licensee’s Final Amended License Application, main generation was reduced by 1.78 %, while Project revenue reduced by only 1.08%. Therefore “generation impact” and “revenue impact” should not be used interchangeably.

The second relationship that the model revealed was that the CDFW/USFWS tunnel closure condition increases the value of ancillary services at the Project. The primary reason for this result is the fact that, while the tunnel closures do impact overall generation, they actually increase ancillary service capabilities of the Project. The explanation for this is fairly simple. The operations model will always allocate the maximum amount of water available towards generation. When the tunnel is open and the maximum amount of water is diverted from the Middle Yuba River, the model will operate the powerhouse at full capacity. As a result, there will not be any capacity for regulation up, or spinning reserves.

Using total revenue outputs from the operations model post processor, FWN, CDFW and USFWS were able to more accurately estimate the power revenue for the Project from the different power generation products that the Licensee is capable of supplying to the CAISO. This provided an accurate picture of the value of water diverted from the Middle Yuba under different operation scenarios and water year types. To analyze the amount of generation value gained/lost for additional water diversions, the Licensee/USFS 4(e) condition operations model run was compared to the CDFW/USFWS Section 10(j) recommendation that recommends the tunnels be closed in additional years. All energy products (total generation and ancillary services) were combined together to look at the difference in total value (in dollars) of the generation between the two scenarios for each water year type.

The additional generation per acre-foot of water diverted was calculated for each water year by:

$$\frac{\text{Total Generation Value}_{USFS} - \text{Total Generation Value}_{CDFW}}{\text{Total Diversions at OHD}_{USFS} - \text{Total Diversions at OHD}_{CDFW}}$$

The results of this analysis are presented below (Figure 6) on the Y-axis, compared to DWR’s April B120 median forecast value on the X-axis. This graph compares the value of each acre-foot diverted in different years.

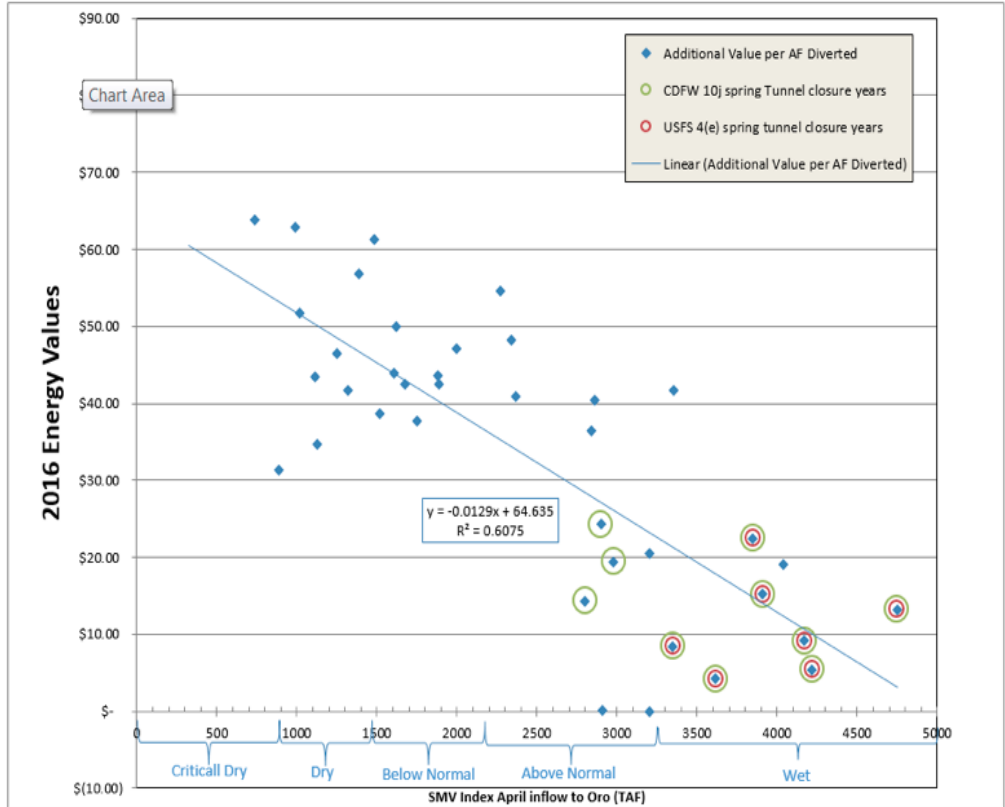


Figure 6. Total additional generation per acre-foot of water additional water diverted.

The graph above illustrates that diverted water becomes more valuable to the Licensee during drier water years and less valuable in wetter water years, and uses the historical water record to assess how often the tunnel would have been closed under the Licensee/USFS vs. CDFW/USFWS scenarios. There is a logical break point for values that are above vs. below \$30/acre-ft, and all values below \$30/acre-ft occur in Above Normal and Wet water years. As the graph illustrates, implementing the CDFW/USFWS tunnel closure scenario would have resulted in closing the tunnels in three additional years when compared to the Licensee/USFS scenario. In terms of the power generation value of each acre-foot of water diverted, there is no good rationale for excluding the Above Normal years in the CDFW/USFWS recommendation.

Where the Licensee/USFS condition simply caps spring tunnel closures in Wet years (and when DWR’s Bulletin 120 forecasted unimpaired inflow at Smartville is greater than 3,240,000 ac-ft), the CDFW/USFWS recommended condition additionally calls for spring closures in above normal water year types (Bulletin 120 above 2,191,000 ac-ft). However, as is represented on the graph, the tunnels would not be closed in all Above Normal water years because of the additional trigger that the reservoir must be “full” (or at 775,000 ac-ft) on April 1.

4. Conclusion

FWN strongly supports the CDFW/USFWS Tunnel Closure Proposal. The analysis provided shows that including Above Normal water years in the tunnel closures can occur at a minimal cost. The Commission, more than most, should recognize the fact that ancillary

services are becoming more valuable with the rapidly changing structure of the resources that power the grid. To accept modeling results that suggest that YCWA will not maximize ancillary services in the future ignores the economic signals given to utilities each and every second. YCWA will not generate with this additional water during the middle of the day when prices are typically at their lowest. Rather, YCWA will save this generation capacity for the late afternoon/evening, when prices are higher. Under YCWA's proposed measure that excludes all Above Normal years from spring tunnel closure, most of this water will be diverted from the Middle Yuba only to be spilled over the top of New Bullards Bar Reservoir, generating no power and providing no additional water supply. Clearly, this is not what is intended in the Federal Power Act that the project shall be "best adapted to a comprehensive plan for improving or developing a waterway...."⁸⁵

The economic analysis by FWN/CDFW/USFWS is far more detailed than what FWN has seen in other FERC relicensings. FWN feels confident in its conclusions and recommendations. FWN notes that this analysis was not available to the USFS or YCWA when they reached their agreement. FWN welcomes FERC staff's analysis of this measure and its response to FWN, CDFW and USFWS's economic analysis, and requests the same level of detail in staff's analysis as the economic analysis that FWN has presented in these comments.

XIII. FWN Comments and Recommendations on Proposed Recreation Measures

A. FWN Recommendation

The Licensee, the USFS and the FWN, with American Whitewater as the lead, reached agreement on the recreation measures below, which will substantially improve whitewater recreation opportunities on the Project. Specifically, these measures will improve access, flows and flow information on each of the impacted reaches. FWN recommends that the Commission include Licensee proposed conditions RR1, RR2 and RR3 in the new license with the clarification discussed below. Additionally, FWN requests that the Commission include a new recreation measure to address access at North Fork Yuba New Bullards Bar Dam.

FWN recommends that the following measures be included in the new license:

- Condition RR2: *Recreation Flow Information*
- Condition RR3: *Whitewater Boating Below Our House Diversion Dam*
- Condition RR1: *Recreation Facilities Plan*
 - Our House Diversion Dam
 - New Colgate Powerhouse River Access
 - New Bullards Bar Reservoir Whitewater Boating Shuttle

While FWN supports the recreation conditions noted above, we recommend that they include the following clarification:

⁸⁵ 16 U.S.C. § 803(a)(1)

- It is our understanding that USFS and YCWA have developed an agreement that YCWA will provide the USFS adequate funding to operate and maintain the Oregon Creek Day Use Area year round. The Commission should require YCWA to demonstrate that this funding will enable the USFS to operate the Oregon Creek Day Use Area during the boating season from October 1st through June 30th.

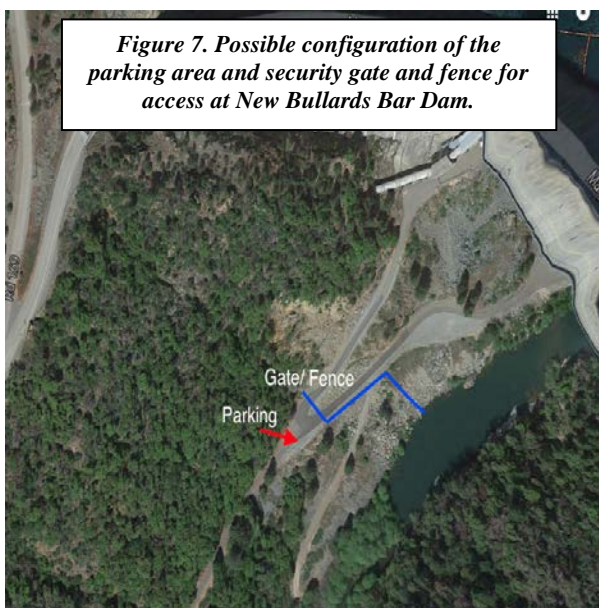
Additionally, FWN recommends that FERC include the following recreation condition in the new license:

North Fork Yuba Bullards Bar Dam Access Condition

The Licensee shall provide public access to the North Fork Yuba River downstream of New Bullards Bar Dam. This can be provided one of two ways.

- 1) The Licensee shall allow vehicle access on the existing access road to the gauging station below New Bullards Bar Dam, and provide an area sufficient to stage, unload and park up to five vehicles in that location. In order to provide security and keep the public away from Project features, the Licensee may build a gate to restrict vehicular access on the road from the parking area to the base of the dam, and construct a fence from the parking area to the river. The Licensee shall construct a trail that is suitable for pedestrian access from the parking area down to the road leading to the gauging station below New Bullards Bar Dam.
- 2) In the event that the Licensee determines that it is unacceptable to provide public access at the base of New Bullards Bar Dam using the existing access road, the Licensee shall build an alternative access point that provides security for Project facilities and parking and access for whitewater boaters at the top of the run.

See Figures 7 and 8 for reference.



B. Rationale

Project operations impact several important whitewater resources on the Middle and North Yuba rivers. These include the Middle Yuba below Our House Dam, the North Yuba below New Bullards Bar Dam, and the North Yuba above New Bullards Bar Reservoir. However, the measures discussed in section (A) above will help ensure that whitewater recreation opportunities on the Project are significantly improved.

1. Recreational flow information

One of the primary measures on which relicensing participants came to agreement is Proposed Condition RR2: *Provide Recreation Flow Information*. The Licensee's Environmental Report of the Amended Application states:

“Relicensing study results also identified that existing flow-related recreation opportunities downstream of Project dam's may currently be under utilized because real time flow information for some reaches is not available for the public to schedule their visits during periods when flows are within an acceptable range for their recreation activity (e.g., whitewater boating and angling).”⁸⁶

We agree. The Licensee's proposed measure to provide public flow information will improve recreationist's ability to utilize the river reaches and reservoir on this Project. We also applaud the Licensee's willingness to make this information available as soon as reasonably feasible. Many of these gauges have been available for some time and we hope to see the others available in the near future.

2. Specific whitewater boating reaches

We present the majority of our comments below by whitewater boating reach. However there is one note that applies to all reaches. The Licensee's description of access points on the reaches impacted by the Project needs clarification. The *Environmental Report Amended Application for New License* states: “[a]ll of the reaches have multiple access points, including for whitewater boating put-in and take-out needs; however some access points on the higher demand reaches have minimal river access facilities.”⁸⁷ American Whitewater notes that each impacted reach has exactly two access points for each run (a put-in and a take-out), which is the minimum number of required access points for a whitewater run. It appears that the document could be referring to the number of river access locations for a variety of recreational uses. However, framing this statement this way in the middle of the whitewater recreation section leads the reader to conclude that there are multiple access locations for whitewater boating when in fact there is only one option for put-in and take-out for each of the runs. We recommend that this section in the final document focus only on access for whitewater recreation and be amended to read, “All of the reaches have a put-in and a take-out location for whitewater boating needs. However some access points....”

⁸⁶ Yuba County Water Agency, Amended Application for New License (June 2017). Exh. E – Environmental Report. Page E3.3.6-54

⁸⁷ YCWA, Amended Application for New License (June 2017). Exh. E – Environmental Report Page E3.3.6-53.

a. Middle Yuba Below Our House Dam

The Middle Yuba below Our House Dam is considered to be a high-quality Class IV run. This fact was confirmed when hundreds of paddlers came out to enjoy this whitewater run during the winter and spring of 2017. This run is popular for several reasons, including its high quality whitewater, easy shuttle and relatively low elevation (below the normal snow level). The biggest impediment to the ability of paddlers to enjoy this reach has been the lack of consistent flow opportunities. YCWA's Proposed Condition RR3, *Provide Whitewater Boating Below Our House Diversion Dam*, will help to mitigate some of the boating opportunities impacted by the Project by providing eight days of boating opportunities in a Wet year and up to two days of boating opportunities in Critically Dry years. Because the Licensee's ability to provide these flows is completely dependent on the inflow into Our House Reservoir, scheduling these opportunities will present a challenge for both the Licensee and American Whitewater. However, clear and open channels of communication will help us meet the intent of this condition.

Additionally, YCWA's proposed condition AR11, *Periodically Close Lohman Ridge Diversion Tunnel*, will require the Licensee to close the Lohman Ridge Diversion Tunnel during Wet water years. As discussed above, FWN also recommends closing the tunnel in Above Normal water years, provided certain reservoir target elevations are met. Either measure will, however, provide several months of boating opportunities in Wet water years on the Middle Yuba.

In order to fulfill this additional whitewater boating opportunity, the Licensee must provide access to the river. American Whitewater worked with YCWA and the USFS to develop recreational facilities at Our House Dam that include a trail that will make it easier to access the river below the dam, restroom facilities, and a cart to carry rafts. The cart was a compromise solution that allows the Licensee to meet its security objectives while making it feasible for boaters to transport rafts from the parking area to the put-in. Specifically, YCWA was uncomfortable allowing vehicular access to the area near the Dam, and the cart allows the Licensee to keep its gate locked while giving boaters a feasible way to carry heavy rafts ¼ mile down the road to the river.

Improved access is also desperately needed at the USFS's Oregon Creek Day Use Area. This location is the take-out for the boaters putting in at Our House Dam and also provides a put-in for boaters who are paddling the lower run from Highway 49 and taking out near Colgate Powerhouse. When open, the day use area facilities are more than sufficient to accommodate whitewater paddlers, with 32 parking spaces and two restrooms. However, the day use area is open only during the summer months, making it unavailable to paddlers when sufficient flows are available in the winter and spring. When the day use area is closed, there are only three parking spaces available outside of the locked gate. This is completely inadequate to meet current or future demand. It is our understanding that USFS and YCWA have developed an agreement that YCWA will provide the USFS adequate funding to operate and maintain the Oregon Creek Day Use Area year round. As noted in FWN's recommendation above, the Commission should require YCWA to demonstrate that this funding will enable the USFS to

operate the Oregon Creek Day Use Area during the boating season from October 1st through June 30th.

b. North Fork Yuba above New Bullards Bar Reservoir

The whitewater reach from Highway 49 to New Bullards Bar reservoir is a Class III/IV run that flows during the winter and spring, and in Wet years well into the summer. Although the Project does not impact flows in the North Yuba River above New Bullards Bar, the elevation of the reservoir significantly impacts the length of this run because there are no take-out options in the upper section of the reservoir. When the reservoir is at full pool, the whitewater run is approximately 6 miles long, and necessitates that paddlers either paddle, or be shuttled, approximately 12 miles on the reservoir to reach to the nearest boat ramp (Emerald Cove Boat Ramp). As the reservoir drops, the whitewater run becomes longer and the amount of flat water on the reservoir becomes shorter. However, it still requires a lengthy paddle to the take-out. Historically, some commercial outfitters and a few private boaters have hired someone at the marina to pick them up in a powerboat at the top of the reservoir and shuttle them to the take out. However, this has not been an ideal solution, as the marina concessionaire has not consistently offered this service. Clearly, changing reservoir elevations have a large impact on paddlers' ability to utilize this reach.

FWN, through its member organization American Whitewater, worked with YCWA and the USFS to reach agreement on the development of a shuttle service that will allow paddlers to access this portion of the North Fork Yuba. The shuttle service described in Condition RR1, *Implement Recreation Facilities Plan*, will be developed in consultation with American Whitewater and USFS. Specific elements of the shuttle service, including specific logistical elements and cost, will be determined in this consultation process.

c. North Fork Yuba below New Bullards Bar Reservoir

Paddlers, anglers and other river recreationists have a strong interest in access below New Bullards Bar Dam. Improved flows and habitat measures, whether proposed by the Licensee, agencies or the Foothills Water Network, will improve the river reach for recreational angling and boating. Specifically, as recommended by USFS, CDFW and the FWN, higher base flows will increase habitat. Even the Licensee's proposed flows under Condition AR10, *Maintain Minimum Streamflow Below New Bullards Bar Dam*, will give a small improvement to this fishery. Additionally, the resource agencies have recommended measures (gravel augmentation and large woody debris for e.g.) in addition to higher base flows than those proposed by the Licensee; these measures will further improve habitat. Collectively, these measures will improve this coldwater fishery and opportunities for recreational angling.

Opportunities for whitewater boating will also improve. Condition AR4, *Control Project Spills at New Bullards Bar Dam*, will require the Licensee to reduce flows from each spill event at a rate of approximately 250 cfs per day, beginning when flows reach 2,000 cfs and ending when they reach base flows. This will provide a minimum of two days of flows within the boatable range each time spills are brought down to base flows. Flows in the boatable range will

be far more predictable as they follow a series of days of flow recession, and thus more easily used by boaters.

The location for putting in on this run is immediately downstream of New Bullards Bar Dam. During the 2008 whitewater boating flow study, paddlers reached this location via a 0.75 mile access road that is typically gated and locked.⁸⁸ This location is the only possible access point to the upper part of this reach of the North Yuba River. During the whitewater boating flow study in 2008, one kayaker accessed the river down the steep canyon slope downstream of the gated road; he stated that he would not attempt to do so again because of the steep terrain, thick vegetation and the amount of time it took to reach the river.⁸⁹

Unfortunately, the Licensee's proposal denies vehicular access below New Bullards Bar Dam, rendering the opportunity for whitewater recreation on this reach nonexistent. The Licensee states:

[n]otably, the public does not have vehicular access due to a gate at the top of Bullards Bar Dam Road at Marysville Road. YCWA does not propose to provide vehicular access to the public along this road due to safety and security concerns and the critical role this major dam plays in controlling flows in the Yuba River system."⁹⁰

The public's ability to enjoy this section of the North Fork Yuba River will be severely restricted if the Licensee prohibits vehicular access to this location. More importantly, the Licensee has stated in relicensing meetings that it does not intend to allow the public to access this road at all. While the AFLA clearly states that the Licensee does not wish to allow vehicular access below the dam, it is silent on the matter of allowing foot traffic. At a minimum, FWN requests that FERC require the Licensee to provide clarity on this point.

More troubling is that the Licensee has been unwilling to discuss any alternatives for allowing access to the river. This is perplexing in light of the Licensee's proposal to construct and maintain a trail at the take-out for this run (New Colgate Powerhouse), specifically to provide boaters with improved access at the takeout for this reach. This trail will be of little use if paddlers are unable to access the top of the reach. We certainly understand the Licensee's desire for security at this location; however, the Licensee is required to provide public access to reaches affected by the Project under the equal consideration clause of Section 4(e) of the Federal Power Act. Given the success at finding the balance between security and access on hydropower projects across the country, we strongly believe that we can reach a solution in this instance that provides security for Project facilities and access to the river.⁹¹ Ultimately, if the Licensee believes that it cannot address its security concerns by offering access via the existing

⁸⁸ Yuba County Water Agency, New Bullards Bar Dam Whitewater Boating Study (December 19, 2008). FERC Project No. P-2246. At page 2.

⁸⁹ Yuba County Water Agency, New Bullards Bar Dam Whitewater Boating Study (December 19, 2008). FERC Project No. P-2246. At page 16.

⁹⁰ Yuba County Water Agency, Amended Application for New License (June 2017). Exh. E – Environmental Report Page E3.3.6-53.

⁹¹ See Heather Campbell and Frank Calgano, *Offering Public Access While Maintaining Security*, Hydro Review, October 2005, pp. 16ff.

access road, it is obligated to build an alternative access to the river. The Network's recommendation to address this issue is included in section (A) of this section.

XIV. FWN Proposed Measure: Forecasted Target Flow and Flow Ramping Information Condition

A. FWN Recommendation

FWN recommends that the Commission include a Condition in the Project license requiring Licensee to publicly report short-term and long-term forecasted flows and flow ramping rates on three Project-affected reaches.

The first reach is the reach of the lower Yuba River below Englebright Dam based on the flow of the lower Yuba River at Parks Bar.⁹² Licensee should provide year round forecasted flows at this site using best efforts.

The second reach is the reach the lower Yuba River downstream of Daguerre Point Dam, as shown at the Marysville (11421000/MRY) gage. Licensee should provide year round forecasted flows at this site using best efforts.

The third reach is the Middle Yuba River downstream of Our House Dam. Licensee should provide forecasted flows at this location whenever either spring tunnel closures per AFLA proposed condition AR11 or recession rates per AFLA proposed condition AR2 are in effect.

FWN recommends that this Condition require that target flow information be made available to the public via the Internet, on Licensee's website or another internet location through a third party. It is understood that this information will be provisional and subject to change, and that Licensee shall so state. It is also understood that the forecasted flows and flow ramping rates may be shown as a range of anticipated flows and as estimated dates or as periods of forecasted flows and target ramping steps or rates.

In complying with such a condition, it is appropriate that Licensee be allowed to provide any additional information or disclaimers that it may deem useful or necessary to sufficiently qualify the uses and reliability of the information.

Licensee shall demonstrate compliance with this Condition by posting the required information in the stated manner in a timely way.

B. Rationale

There is existing and virtually certain future demand for recreational opportunities in the lower Yuba River and in the Middle Yuba River downstream of Our House Dam. There is high economic and safety value to the Licensee providing the public forecasted flow information to

⁹² Yuba River at Parks Bar is calculated flow based on the sum of the Yuba River at Smartsville gage (YRS/11418000) and the Deer Creek near Smartsville gage (DCS/11418500).

the extent it is known. Forecasted flows will augment the value of the real-time flow information Licensee provides pursuant to proposed Condition RR2.

Licensee has been providing forecasted flow information for the lower Yuba River on the internet for some time (see: <http://www.ycwa.com/the-ycwa/currently-on-the-river/>). This information has been extremely helpful to regular users of the lower Yuba River in planning their activities.

Forecasting of project operations in California hydroelectric projects is not unique to this Licensee. The licensee of the El Dorado Project (P-184) provides monthly operations plans that describe forecasted project operations on the El Dorado Irrigation District website at: <http://www.eid.org/our-services/hydroelectric/project-184/water-operations-plans-and-forecasts>

For many of the members of the organizations that FWN represents, the lower Yuba River is a destination fishery that they travel many hours to enjoy. It is likely that whitewater boaters will equally, in the future, travel on a more frequent basis to kayak the Middle Yuba River. The ability to make informed predictions about flows in these reaches, over both the short-term and the long-term, will increase the recreational value of these resources. This predictability will also increase the level of safety for boaters and waders alike.

NEPA ANALYSIS AND ALTERNATIVES

Pursuant to its obligations under NEPA and FPA, the Commission must assess the Project's direct and cumulative effects on the environment, develop and adopt appropriate protection, mitigation or enhancement measures to mitigate the adverse effects of the Project, and develop and analyze reasonable alternatives to the proposed Project. The Commission must assure that the information contained in the license application is adequate to inform its NEPA analysis.

I. Alternatives

A NEPA document must include a reasonable range of alternatives to the proposed action which would achieve a given purpose. *See* 42 U.S.C. § 4332(2)(E); 40 C.F.R. § 1508.9(b). Consideration of alternatives is “the heart” of an EIS because it compels agencies to “present the environmental impacts of the proposal and the alternatives in comparative form, thus sharply defining the issues and providing a clear basis for choice among options by the decisionmaker and the public.” *Id.*; see also 40 C.F.R. § 1508.9(b). An EIS must include those reasonable alternatives that “are practical or feasible from the technical and economic standpoint and using common sense, rather than simply desirable from the standpoint of the applicant.” *See* CEQ, “Forty Most Asked Questions Concerning CEQ’s National Environmental Policy Act Regulations,” 46 Fed. Reg. 18026 (Mar. 23, 1981), Question 2a. FERC is required to “[i]nclude reasonable alternatives not within [its] jurisdiction.” *See* 18 CFR § 1502.14. Importantly, under NEPA section 102(2)(D) all agencies are required to:

“study, develop, and describe appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources.” This requirement ... seeks to ensure that each agency decision maker has before him and takes into proper account all possible approaches to a particular project ... which would alter the environmental impact and the cost-benefit balance.⁹³

In its comments on the DLA, the Network proposed that Licensee analyze several different alternatives in its FLA to ensure that the Commission has sufficient information to make an informed decision on the new Project license.⁹⁴ The Licensee declined to do so. The Commission should not repeat this error. The DEIS should include the following alternatives: 1) a No-Action Alternative representing existing conditions and including final 4(e) conditions filed for the relicensing of the Yuba-Bear (FERC no. 2266) and Drum-Spaulding (FERC no. 2310) projects located upstream of some Yuba River Development facilities; 2) a Lower Yuba River Flow and Habitat Alternative that evaluates the consequences of implementing the Network’s proposed flow and habitat measures for the lower Yuba River; and 3) a Bay-Delta Water Quality Control Plan Alternative that analyzes flow operations to meet 40%, 50%, and 75% of January through June unimpaired flow as measured at Marysville, with off-ramps for multiple dry year sequences and assuming similar contributions from other major Sacramento River tributaries. These alternatives are reasonable and warrant analysis.

A. No-Action Alternative

NEPA regulations specify that the no-action alternative may be used as a “benchmark, enabling decision makers to compare the magnitude of environmental effects of the action alternatives.”⁹⁵ The FLA follows this model noting that its no-action alternative constitutes “the baseline from which to compare all action alternatives.”⁹⁶ The Network recognizes a reasonable and foreseeable change in baseline conditions: final 4(e) conditions have been filed for the relicensing of the Yuba-Bear (FERC no. 2266) and Drum-Spaulding (FERC no. 2310) (together “YBDS”) projects located upstream of some Yuba River Development facilities. It is therefore reasonable to expect changed instream flows entering into the Yuba River Development Project from the Middle Yuba and South Yuba rivers. The No-Action Alternative conditions should

⁹³ *Calvert Cliffs' Coordinating Committee, Inc. v. U. S. Atomic Energy Commission*, 449 F.2d 1109, 1114 (D.C. Cir. 1971). Further, NEPA section 102(2)(E) requires that the federal lead agency “study, develop, and describe appropriate alternatives to recommended course of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources...” 42 U.S.C. § 4332(2)(E). The duty to consider alternatives under NEPA 102(2)(E) is “at least as broad” as the duty under NEPA section 102(2)(C)(iii). The purpose is “to insist that no major federal project should be undertaken without intense consideration of other more ecologically sound courses of action, including shelving the entire project or of accomplishing the same result by entirely different means.” *Environmental Defense Fund v. U.S. Army Corps of Engineers*, 492 F.2d 1123 (5th Cir. 1974); see Mandelker, *supra* § 9:22, p. 9-53.

⁹⁴ See Foothills Water Network Comments on the Draft License Application of Yuba County Water Agency for the Yuba River Development Project. eLibrary 20140303-5059.

⁹⁵ CEQ’s Forty Most Asked Questions Concerning CEQ’s NEPA Regulations.

⁹⁶ Amended FLA, p. E1-43.

include the new minimum instream flows and new spring snowmelt recession flows to be released in accordance with the final 4(e) conditions for the YBDS projects.⁹⁷

The Licensee declines to do this in the FLA noting that:

“[i]f the commission issues new licenses for NID’s Yuba-Bear Hydroelectric Project and PG&E’s Drum-Spaulding project that include the Forest Service’s and BLM’s final 4(e) conditions before FERC completes its EIS for the Yuba River Development Project relicensing, then the Commission can include these conditions in the environmental baseline in that Yuba River Development Project EIS. This will not require the development of any new alternatives.”

Amended FLA, p. E2-82.

The Network’s concern with the Licensee’s approach is that the Commission may not issue new licenses for the YBDS projects prior to the development of the YRDP DEIS. There is no compelling reason, legal or otherwise, to not include these conditions in the no-action alternative “baseline” now to ensure that the DEIS analysis is as informative and useful as possible. The new operations of the Yuba-Bear and Drum-Spaulding (YBDS) projects pursuant to the final 4(e) conditions will occur regardless of the outcome of this proceeding and are sufficiently well-defined to allow for meaningful review. As NEPA does not preclude lead agencies from including anticipated future conditions in the impact assessment, the DEIS can include as part of the no-action alternative relevant projects that are likely to occur in the future irrespective of the Project. This will facilitate the assessment of Project effects and development of measures tailored to the conditions that will be present over the term of the License.

As noted above, Licensee considers the No-Action Alternative to constitute “the baseline from which to compare all action alternatives.”⁹⁸ The AFLA specifies that the No-Action Alternative baseline flows for the lower Yuba River are the Yuba Accord flow requirements.

Under the No-Action Alternative, the Project would continue to operate into the future as it has historically operated (i.e., for the past 5 years), and no new environmental PM&E measures would be implemented.

Amended FLA, p. E1-43.

Since 2008, YCWA has been operating the Project to implement the Yuba Accord according to the authorizations and requirements in SWRCB Corrected Order WR 2008-0014.

⁹⁷ This approach is also allowed under CEQA. The CEQA baseline for assessing significance of impacts is normally the environmental setting, or existing conditions, at the time a Notice of Preparation (NOP) is issued; however, the word *normally* in this context indicates that CEQA lead agencies have the discretion, where justified, to fully or partially update baseline conditions beyond the time of issuance of the NOP. *Smart Rail v. Exposition Metro Line Construction Authority*, 57 Cal.4th 439 (2013).

⁹⁸ AFLA, p. E1-43.

Amended FLA, p. B-21.

In many instances, however, actual flows observed in the lower Yuba River are significantly different than the flows prescribed by the Yuba Accord. For instance, flows observed during the summer in the Yuba River are considerably higher than the minimum flows required by the Yuba Accord. This is due to Licensee’s releases for hydropower purposes and/or water transfers. “Stored water transfers have typically occurred from July through September. Under the Yuba Accord, transfer releases can occur throughout the year..., but through reoperation of the state and federal projects only delivered across the Delta in the summer months.” Amended FLA, p. B-28. This phenomenon is represented in the graphs below that depict flows required by the SWRCB Revised Decision (RD)-1644 instream flow requirements and Yuba Accord flow requirements, as well as mean daily flows actually observed at the Marysville Gage from 2006 - 2012.⁹⁹ The green shaded area represents actual flows at Marysville.

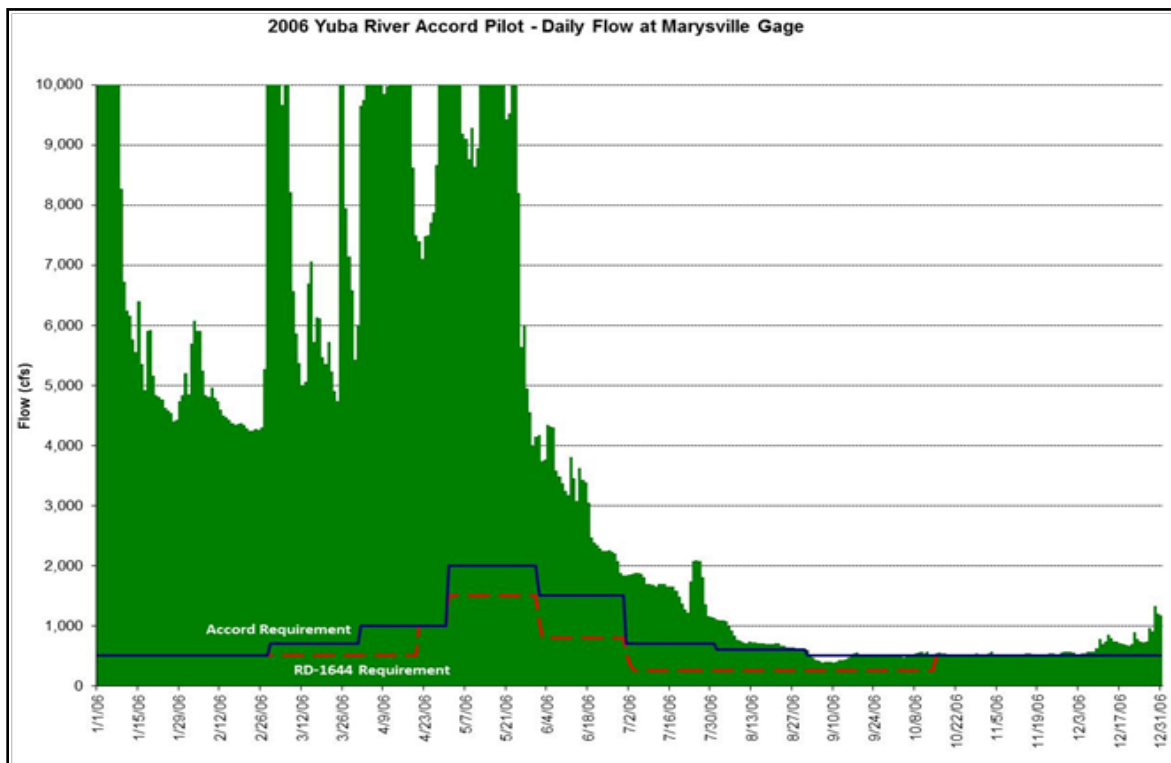


Figure 9a: Graph of required and actual flow in lower Yuba River at Marysville, 2006 (YRMT 2013)

⁹⁹ Yuba Accord River Management Team’s (RMT) 2013 Draft Interim Monitoring and Evaluation Program Report, Figure 7-1.

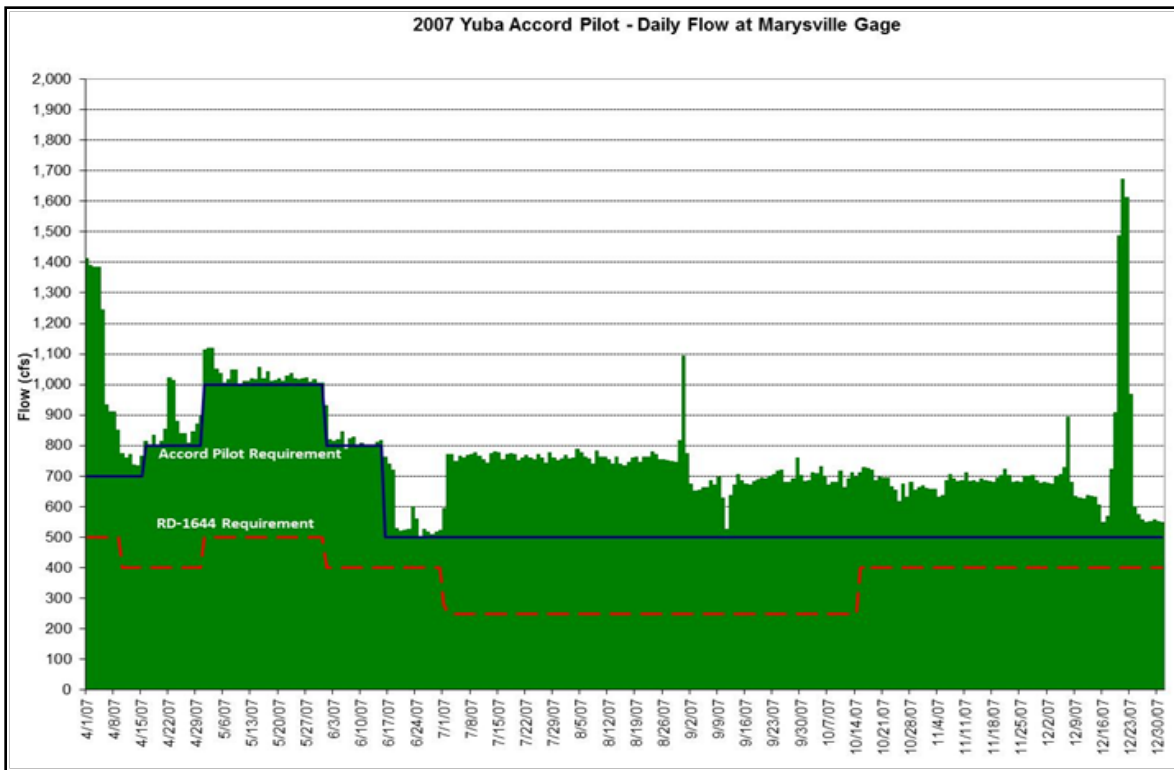


Figure 9b: Graph of required and actual flow in lower Yuba River at Marysville, 2007 (YRMT 2013)

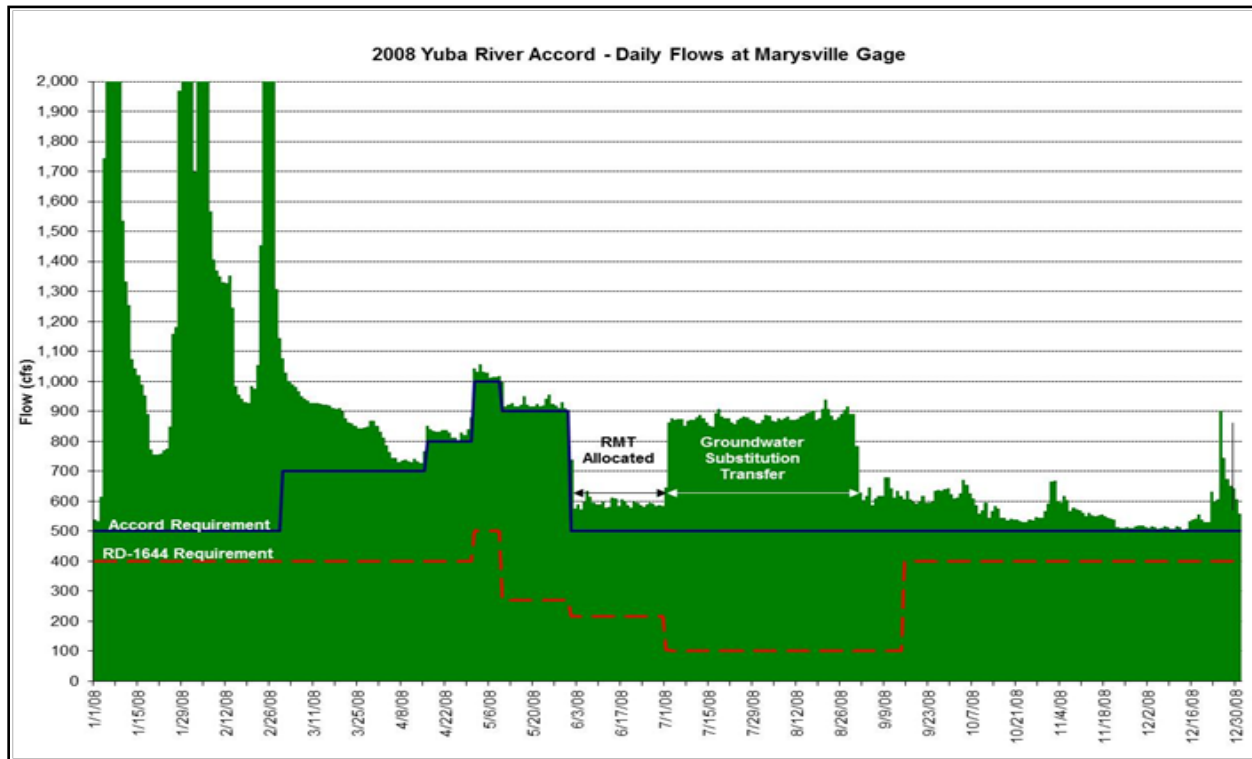


Figure 9c: Graph of required and actual flow in lower Yuba River at Marysville, 2008 (YRMT 2013)

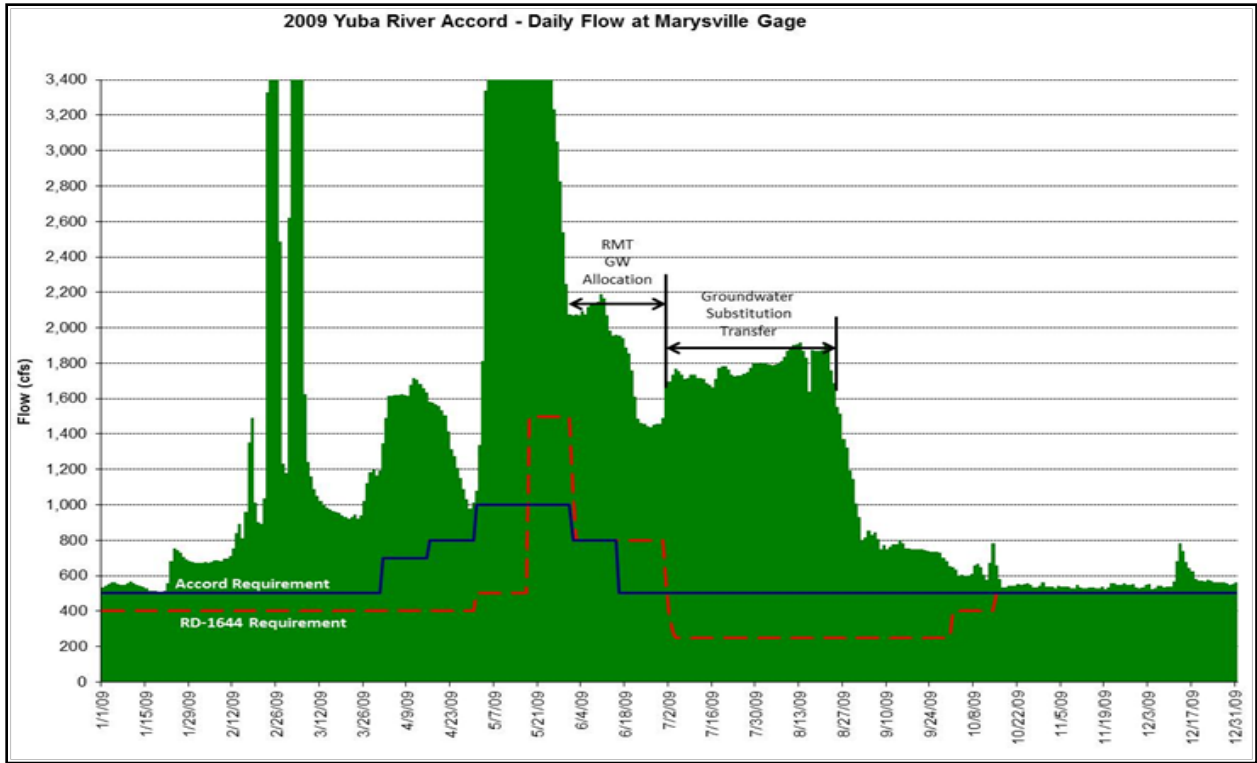


Figure 9d: Graph of required and actual flow in lower Yuba River at Marysville, 2009 (YRMT 2013)

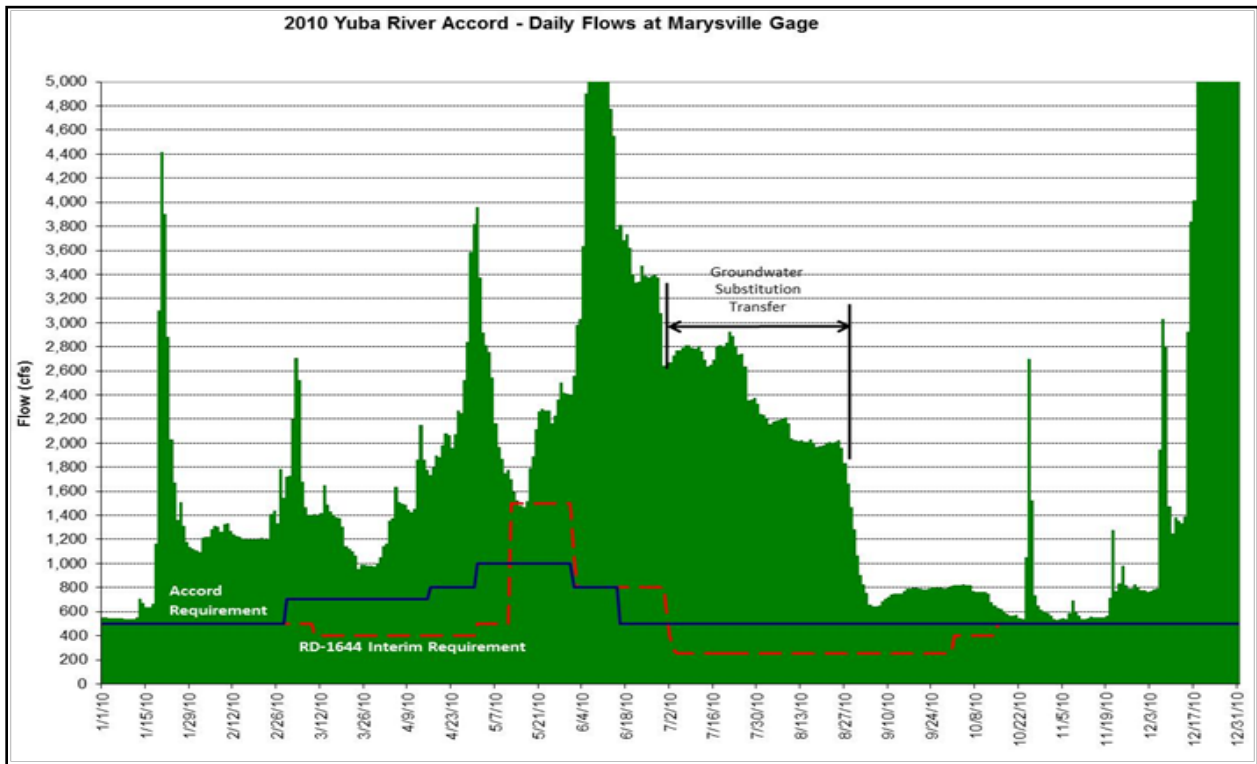


Figure 9e: Graph of required and actual flow in lower Yuba River at Marysville, 2010 (YRMT 2013)

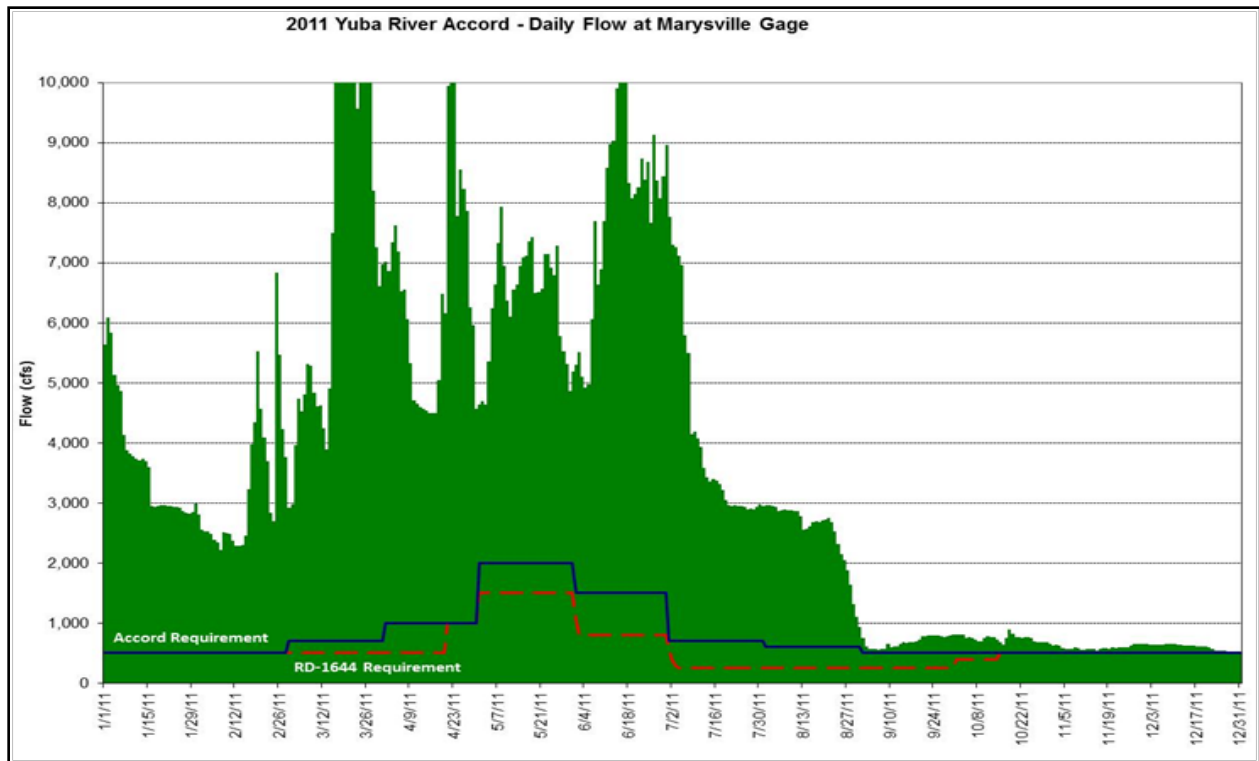


Figure 9f: Graph of required and actual flow in lower Yuba River at Marysville, 2011 (YRMT 2013)

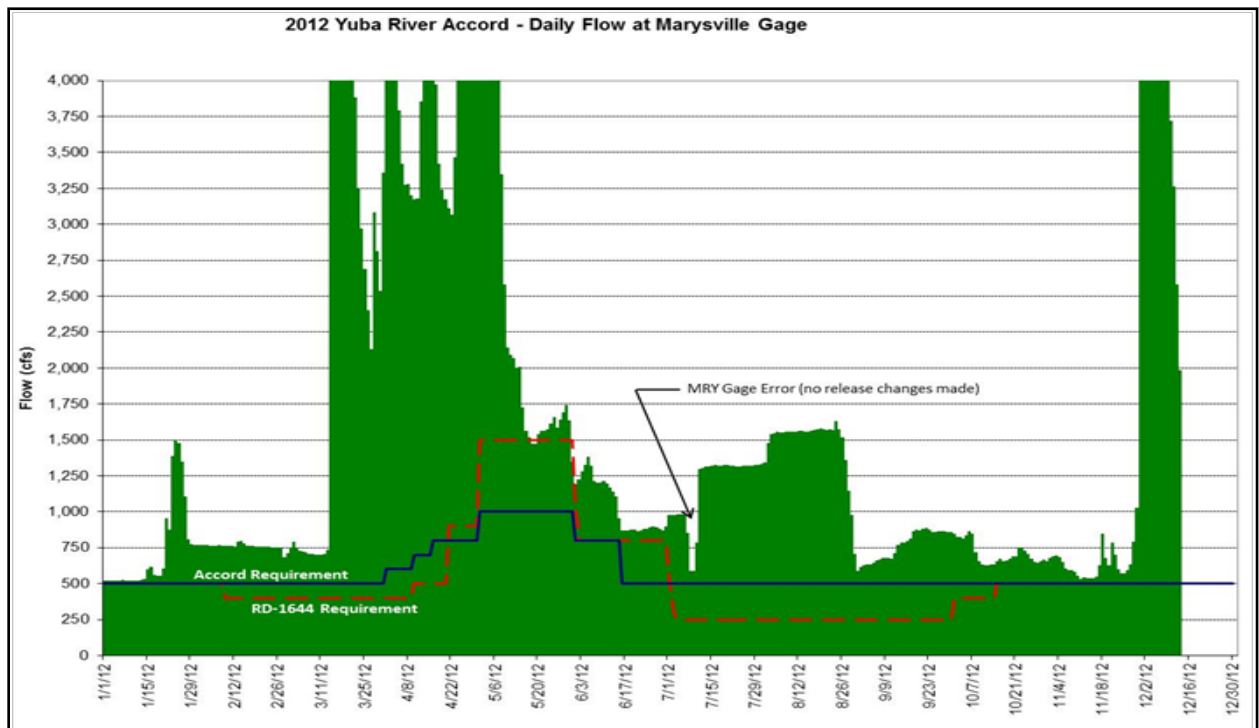


Figure 9g: Graph of required and actual flow in lower Yuba River at Marysville, 2012 (YRMT 2013)

To allow the Commission and relicensing participants to understand the real effects of the Project and develop appropriate protective measures, the DEIS should explain how the No-Action Alternative baseline flow requirements differ from flow conditions actually observed since the Yuba Accord took effect and disclose any resulting impacts to biological resources. For instance, the DEIS should analyze the Project effects of high flows presenting in the summer instead of during the springtime. In addition, the DEIS should consider the cumulative effects of high summer flows and low spring flows occurring on the lower Yuba River down to the Bay-Delta estuary.

B. Lower Yuba Flow and Habitat Alternative

The DEIS should evaluate the Network's Lower Yuba River Flow and Habitat Recommendations as an alternative (see FWN's proposed conditions in Sections I and II.). This alternative will facilitate an understanding of how Project operations will be modified in order to implement these conditions and how Project effects will change with implementation.

The Network's Lower Yuba River Flow and Habitat recommendations are necessary to mitigate for impacts from the Project and improve conditions for aquatic resources. Both sets of recommendations represent the product of several years of collaboration among diverse agency and NGO staff. The collaborations included the Licensee, but a final agreement with Licensee was not reached. However, the Network, CDFW and USFWS designed the recommendations such that they would address the concerns articulated by Licensee in those discussions and mitigate for impacts from the Project within the context of a river that has other impacts. Accordingly, the recommendations represent balanced measures to restore habitat conditions and improve salmonid populations without substantial impacts to Project operations. They constitute a reasonable alternative to the measures proposed by Licensee and should be analyzed as a NEPA alternative in the DEIS.

C. Bay-Delta Water Quality Control Plan Alternative

The Commission should include an alternative that evaluates Project operations that release 40%, 50% or 75% of January through June unimpaired flow into the Yuba River as measured at the Marysville gage. Including this alternative in the DEIS is reasonable given that the State Water Resources Control Board (State Board) is in the process of updating the Bay-Delta Water Quality Control Plan (Plan) "to protect beneficial uses in the Bay-Delta..."¹⁰⁰ The AFLA mentions this process only to decline further analysis alleging that the process is not far enough along. The AFLA fails to acknowledge the significant steps that have been taken to move this Plan update forward since the DLA was issued including independent scientific review of the technical document that is the foundation for the update to the Plan.¹⁰¹ It also fails to

¹⁰⁰ See SWRCB, "Revised Notice of Preparation and Notice of Scoping Meeting for Environmental Documentation for the Update and Implementation of the Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary: Comprehensive Review" available at www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta_bay_delta_plan/environmental_review/docs

¹⁰¹ See Letter to Edmund G. Brown Jr., Governor of the State of California from Felicia Marcus, Chair of the State Water Resources Control Board (December 22, 2016) noting that the "State Water Board has just completed receiving comments on a scientific basis report that will serve as a foundation for action in the Sacramento River

acknowledge the significant effect the Plan may have on the Yuba watershed and Project storage and operations once it is finalized.

Phase II of the update includes considering “potential modifications to current objectives included in the 2006 Bay-Delta Plan, the potential establishment of new objectives and modifications to the program of implementation for those objectives.”¹⁰² The State Board has suggested that it may establish new Delta outflow and Sacramento River flow requirements that are based on specified percentages of unimpaired flows and has supported this suggestion with a scientific report.¹⁰³ The Working Draft Scientific Basis Report (Report)¹⁰⁴ released in October 2016 and intended to “support the update of the Bay-Delta Plan’s protection of fish and wildlife beneficial uses in the Sacramento River watershed...” proposes the “use of unimpaired flows and adaptive management...to protect fish and wildlife.”¹⁰⁵ Specifically,

[t]he Report includes recommendations for year-round Sacramento River mainstem and tributary and Delta eastside tributary inflow requirements to protect native fish and wildlife species rearing in and migrating through tributaries....The Report recommends that inflow requirements be established as a percent of unimpaired flow from the mainstem Sacramento River and Sacramento and Delta eastside tributaries that could be adaptively managed within established parameters....Similar to the proposed 1 changes to the Bay-Delta Plan...the Report recommends use of a range of unimpaired flows.

Report, p. 1-11.

Additionally the Report notes that:

“[t]he numeric alternatives currently under development fall within the range of 35 to 75 percent of unimpaired flow....”

Report, p. 1-12.

This unimpaired flow range encompasses the suggestion contained in the State Board’s August 2010 Delta Flow Criteria Report that 75% of unimpaired Delta outflow would be

Basin....The State Water Board has also committed additional staff and resources to be ready to propose and begin public review on a draft plan amendment and supporting environmental documentation by next summer.” *See also* Review of SWRCB’s “Working Draft Scientific Basis Report for New and Revised Flow Requirements on the Sacramento River and Tributaries, Eastside Tributaries to the Delta, Delta Outflow, and Interior Delta Operations. Delta Independent Science Board. February 23, 2017, noting that the overall impressions of the Draft Scientific Basis Report include “[i]nsightful, informative, well-illustrated, clearly written.”

¹⁰² See SWRCB, “Revised Notice of Preparation and Notice of Scoping Meeting for Environmental Documentation for the Update and Implementation of the Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary: Comprehensive Review” *available at* www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta_bay_delta_plan/environmental_review/docs

¹⁰³ Id.

¹⁰⁴ Working Draft Scientific Basis Report for New and Revised Flow Requirements on the Sacramento River and Tributaries, Eastside Tributaries to the Delta, Delta Outflow, and Interior Delta Operations, State Water Resources Control Board. October 2016. Available at:

http://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/docs/20161014_ph2_scireport.pdf

¹⁰⁵ Id at 1-1 and 1-9.

necessary to protect aquatic public trust resources from January through June, and that 75% of unimpaired Sacramento River flow would be needed for these months, as well as for November and December.¹⁰⁶ Similarly, the SWRCB has analyzed various unimpaired flow requirement scenarios for the tributaries to the San Joaquin River as part of Phase 1 of its update to the Bay-Delta Plan.

Hence, the contours of the Plan update are sufficiently developed to permit analysis of this alternative. This alternative will facilitate an understanding of how Project operations may be modified in response to a State Board requirement that the Yuba River release 40%, 50% or 75% unimpaired flow from January through June; as noted above, all scenarios within the realm of possibilities being considered by the State Board. The Commission may also wish to evaluate modifications to these flow requirements in critically dry years or dry year sequences, using the type of analysis CSPA and FWN used in developing flow proposals for this relicensing, as described in Section I above.

As part of this analysis, the Commission should include information related to the effects to aquatic resources, cold-water pool levels, frequency of flood events, magnitude and frequency of water transfers and timing and quantity of water available for diversion to Licensee's customers as a result of modifying operations to meet the State Board requirements.

In analyzing this alternative, the DEIS should evaluate the effects of the different flow requirements assuming an equal contribution of flow from all major Sacramento tributaries, notably the Feather River (utilize the same percent of unimpaired flow standard in the same months). Accordingly, this alternative should consider how releases from the Project will be coordinated with releases from the Department of Water Resources' Oroville Facilities to meet State Board requirements, assuming there are compliance locations on the Yuba River above the confluence of the Feather, and on the Feather above the confluence with the Sacramento River.

The Yuba River is a tributary to the Feather River, and both systems support runs of spring-run Chinook salmon and steelhead. The Yuba and Feather River spring-run and steelhead stock are part of the same meta-population that relies on both systems to provide adequate flow and habitat conditions. (BA, pp. 5-52, 119.) The RMT has documented late seasonal upstream migration of spring-run Chinook into both the Feather and the Yuba, and in 2010 documented over 60% straying of spring –run from the Feather River Fish Hatchery into the Yuba.¹⁰⁷ Population improvements will require higher spring releases from both systems to the Bay-Delta. The analysis should consider that higher carry-over storage requirements will be needed at Oroville Reservoir to facilitate the release of higher spring flows into the Feather River.

Inclusion of this alternative will also help ensure more efficient consideration and issuance of the 401 certification for the Project by the State Board. The State Board must comply with the California Environmental Quality Act (CEQA) prior to issuing the necessary 401 certification for the Project. The State Board's CEQA analysis should include discussion on

¹⁰⁶ Development of Flow Criteria for the Sacramento-San Joaquin Delta Ecosystem, State Water Resources Control Board Staff Technical Report, August 2010.

¹⁰⁷ Draft Interim Monitoring and Evaluation Program Report, Chapter 4, Yuba Accord River Management Team. (2013).

the ability of the Project to meet water quality objectives including those contained in the Bay-Delta Water Quality Control Plan update. The public and decision-makers will be better served if this information is included within the DEIS and compared with the other NEPA alternatives.

Finally, the geographic scope of the analysis should extend to the Bay-Delta estuary consistent with Commission direction.

Downstream--the potential action area for the project extend through the lower Yuba River watershed to the confluence of the Feather River, the lower Feather River, the lower Sacramento River, and through the Sacramento-San Joaquin Delta to the San Francisco Bay.”

Scoping Document 2, p. 15.¹⁰⁸

II. Cumulative Effects

The Commission’s NEPA document must address cumulative effects, which are defined as: “[t]he impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions.”

40 C.F.R. § 1508.7.

The Commission’s policy is to:

address and consider cumulative impact issues at original licensing and relicensing *to the fullest extent possible* consistent with the Commission's statutory responsibility to avoid undue delay in the relicensing process and to avoid undue delay in the amelioration of individual project impacts at relicensing.

18 C.F.R. § 2.23 (emphasis added).

The new Project license will cumulatively affect fish and wildlife and recreation resources. Yet, the Amended FLA does not include sufficient information regarding other present and/or reasonably foreseeable future actions to facilitate the Commission’s evaluation of the Project’s cumulative effects. For instance, the Amended FLA does not include sufficient information on efforts to restore fish access above Englebright Dam, information regarding the update to the State Water Resources Control Board Water Quality Control Plan, foreseeable changed operations at Oroville Dam or the Water Fix process. Where these actions have been identified, it is for the exclusive purpose of discounting any substantive analysis of them under the rationale that they lack detail. For instance, the Licensee declines to analyze fish passage or introduction actions because it is “uncertain if or when any such actions may occur and it is very uncertain what components... would be included in any such project.” Amended FLA at E3-27. Similarly, Licensee declines to include any analysis of the SWRCB Bay Delta Water Quality Control Plan or modified Feather operations given that “SWRCB’s process to update this plan

¹⁰⁸ eLibrary no: 20110418-3027.

has not proceeded far enough for YCWA or the Commission to know what amendments to this plan may be adopted in the future.” Amended FLA at E3-28.

As noted above, Licensee suggests that an action is reasonably foreseeable only if specific details of the action are known and only if the action will actually be implemented. Licensee’s interpretation of the reasonable foreseeability standard is not supported by CEQ’s regulations or applicable case law, which expressly reject efforts to impose a higher threshold of certainty in a cumulative effects analysis. The duty to analyze cumulative impacts is not limited to actual proposals.¹⁰⁹ The cumulative impacts of a proposal must be analyzed even if certain details of the proposal remain unknown. The duty remains even if there is no guarantee that the proposal will ever be implemented. In other words, a defined timeline for implementation is not required for a proposal to be deemed reasonably foreseeable.¹¹⁰

There is sufficient information in the record and publicly available regarding the actions below to necessitate their inclusion in the cumulative effects analysis. We request that the Commission utilize all available sources to inform its cumulative effects discussion in the DEIS consistent with the comments below.

A. Update of Bay-Delta Water Quality Control Plan

The FLA does not address the ongoing process to update the State Water Resources Control Board’s Bay-Delta Water Quality Control Plan (Phase 2 WQCP) (*see* Bay-Delta Water Quality Control Plan Alternative, NEPA section I(C), above). It is reasonably foreseeable that the State Board will adopt new flow objectives that will affect the Yuba River during the term of the new license. However, Licensee declines to address it because the process is currently in progress.

YCWA has not included any potential SWRCB update of the Bay-Delta Water Quality Control Plan or any related changes in Feather River flows in the cumulative impacts discussions of this Amended FLA because the SWRCB’s process to update this plan has not proceeded far enough for YCWA or the Commission to know what amendments to this plan may be adopted in the future.

FLA, p. E3-28.

Again, the law on this point is clear. The Phase 2 WQCP need not be finalized to warrant consideration in the cumulative effects analysis. On the contrary, the direction and progress of the Phase 2 WQCP update effort is sufficiently developed such that the Commission must consider it in the cumulative effects analysis of the DEIS. The recent SWRCB Phase II Draft

¹⁰⁹ *See Texas Committee on Natural Resources Van Winkle*, 197 F. Supp.2d 586, 617 (2002)(citing *Oregon Natural Res. Council v. Marsh*, 832 F.2d 1498 (9th Cir. 1987), *rev’d on other grounds*, 490 U.S. 360 (1989).

¹¹⁰ *See Sierra Club v. U.S. Dept. of Energy*, 255 F.Supp.2d 1177 (D. CO 2002) – the court considered whether a mine should have been analyzed as a cumulative impact of an easement grant because it was a “reasonably foreseeable future action.” In its analysis the court noted that it is not pertinent when the mining company will begin operations, as long as action is “still reasonably foreseeable.”¹¹⁰ In other words, the uncertain timeline for implementation of the proposal did not preclude the possibility that it was a reasonably foreseeable action.

Scientific Basis Report (Report) notes that the best available scientific information indicates that current requirements “are insufficient to protect fish and wildlife.”¹¹¹ Additionally, it notes that the current WQCP “only specifies minimal flows for the Sacramento River mainstem and does not address the very specific needs of native fish in individual tributaries critical to their lifecycle.”¹¹² The Report includes a recommendation for year-round Sacramento tributary inflow requirements to protect aquatic resources, the Yuba River included.¹¹³ The Report also includes flow targets “within the range of 35 to 75 percent of unimpaired flow” similar to those required as part of the SWRCB’s Draft Revised Phase 1 WQCP for the San Joaquin and its tributaries.

In sum, it is reasonably foreseeable that the State Board will adopt new flow objectives that will affect the Yuba River during the term of the new license. The Commission should utilize publicly available information, including the Report, to consider this action in the cumulative effects analysis of the DEIS.

B. Feather River Operations

The Licensee’s Biological Assessment (BA) explains how flow releases from the Feather River can affect resources in the Yuba River. For instance, high spring releases and low temperatures from the Yuba River, particularly when combined with low flow releases from the Feather River, can attract Feather River fish to the Yuba.

[T]he higher the Yuba River flows relative to Feather River flows, combined with the lower the Yuba River water temperatures relative to Feather River water temperatures, the higher the percentage of fin-clipped Chinook salmon passing upstream of Daguerre Point Dam 6 weeks later.

Biological Assessment, p. 5-54. Despite the acknowledgment of the connection between the Feather River and Yuba River and their respective resources, the FLA does not discuss any reasonably foreseeable changes at Oroville Dam.

As discussed above, the State Board is updating its Bay-Delta Water Quality Control Plan and the details of that update are sufficiently developed to warrant consideration in the cumulative effects analysis of the DEIS. Specifically, the DEIS should consider how project operations at Oroville would be modified in response to a State Board requirement that the Yuba River and/or Feather River release 40%, 50% or 75% of unimpaired flow in January through June and November and December.

In addition, the DEIS should analyze the effects of Feather River operations on the Yuba River/Feather River salmon and steelhead populations and associated mitigation measures.

¹¹¹ State Water Resources Control Board. Phase II Update of the 2006 Bay-Delta Plan Draft Scientific Basis Report (Report). October 2016. p. 1-3.

¹¹² See State Water Resources Control Board Fact Sheet on the 2006 Bay-Delta Plan Working Draft Scientific Basis Report for Flow Requirements on the Sacramento River, its Tributaries, Eastside Tributaries to the Delta, Delta Outflow, and Interior Delta Flows available at http://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/docs/fs101916_phase2_factsheet.pdf.

¹¹³ Report at 1-11.

Spring flow and temperature conditions combined with physical and volitional upstream migration problems in Feather downstream of confluence with Yuba (especially at Shanghai Bend) negatively impact the fitness of anadromous fish populations. The DEIS should analyze how flow releases from Oroville affect anadromous fish populations and should consider potential measures that would increase the fitness and resiliency of Yuba River salmon and steelhead from increased Feather River flows. For instance, measures that will decrease the straying of Feather River hatchery fish into the lower Yuba River should be considered.

The BA notes that it is questionable whether the Yuba River spring-run stock represents an independent population. However,

...[I]t may be possible to preserve some additional component of the ancestral Central Valley spring-run Chinook salmon genomic variation through careful management of this stock that can contribute to the recovery of the ESA-listed Central Valley spring-run Chinook salmon ESU....

Biological Assessment, E5-52. To date, requirements for addressing limiting factors in the Yuba River have been developed and implemented without consideration of or coordination with Feather River operations. Such coordination is necessary to provide the careful management that will facilitate the preservation of spring-run genetic variety and minimize the straying of Feather River hatchery fish into the lower Yuba River.

C. California WaterFix Project

The FLA declines to include the California WaterFix Project in the cumulative effects analysis because it argues its implementation is uncertain.

YCWA has not included any potential changes in Project operations that may occur because of the California WaterFix Project because it is not possible at this time to know whether or not the California WaterFix Project will be implemented, or, if it is implemented, how its implementation might affect Project operations.

Amended FLA, p. E3-28.

As discussed above, this is a misread of the legal standard governing cumulative effects analyses. The duty to analyze the cumulative impacts of a proposal is present even if there is no guarantee that the proposal will be implemented or certain details of the proposal remain unknown. The Waterfix proposal contains sufficient structure to permit analysis and therefore should be included in the cumulative effects analysis of the DEIS.

If implemented, the WaterFix would increase the amount of water that could be reliably conveyed through the Delta each year by the construction of three North Delta diversion intakes with a capacity of 3000 cfs each. This would likely create a greater demand for Yuba River water for export south of Delta. It might also increase the value of export water in the spring, during which time current pumping restrictions in the South Delta restrict export capacity. WaterFix might create additional rearing habitat in the Delta or engineered floodplains or access

to floodplains. On the other hand, WaterFix might increase entrainment or otherwise reduce success of Yuba River and other Sacramento River watershed salmon and steelhead endeavoring to outmigrate past North Delta pumps.

D. Fish Passage

The FLA acknowledges that Englebright Dam is a complete barrier to fish migration: “However, the USACE’s Englebright Dam at River Mile (RM) 24.3 on the Yuba River is currently a complete physical barrier to anadromous fish upstream migration....” FLA, p. E1-28.

However, the FLA does not propose to mitigate the Project’s cumulative effects on fish passage because the presence of Englebright Dam is part of the existing condition and allegedly the Commission does not have the authority to regulate it.

Past and present actions contribute to the current condition of the resources, and are intrinsically embedded in the base line (i.e., existing conditions), and are discussed where appropriate in the specific resource sections of this Exhibit E. [...] These activities include harvesting, grazing, mining, operation of USACE’s Englebright and Daguerre Point dams and water deliveries. These activities affect the resources identified for cumulative effects analysis in SD2, and are outside the Commission’s authority to regulate.

Amended FLA, p. E3-25.

Additionally, as noted above, the FLA does not include fish passage above Englebright Dam in the cumulative effects analysis because it claims the action is too uncertain.

Parties to the YSF have formed the Yuba Salmon Partnership Initiative (YSPI) and currently are negotiating a settlement agreement to expand the Yuba River watershed’s contribution to recovery of anadromous salmonids in the Central Valley, which may include reintroduction actions. However, those negotiations have not concluded and the cost and feasibility of any reintroduction actions still is being evaluated. Moreover, neither the 2009 Draft Recovery Plan, nor the 2014 Final Recovery Plan, contains any specific proposed actions for fish passage or introductions of anadromous fish into these streams.

Amended FLA, p. E3-27.

As previously addressed, Englebright Dam is appropriately part of Licensee’s Project and the Commission has the authority to condition its use. Additionally, the Licensee has an obligation to include information sufficient to inform an impacts analysis of the continuing and incremental impacts of the Project and to develop appropriate mitigation measures that reduce the impacts attributable to the existence and use of Englebright Dam. The Network understands that there is not a specific proposal for fish passage above Englebright Dam at this time. However, over the past decade, there have been several different initiatives to develop engineering alternatives to allow passage upstream of Englebright Dam, develop reintroduction

plans, and collaborate with watershed stakeholders to develop a reintroduction strategy.¹¹⁴ The level of legal, political, regulatory, and technical engagement demonstrates that reintroduction of salmon and steelhead to the upper Yuba River is a priority for a wide range of stakeholders who have been working on this for more than a decade. Additionally, the National Marine Fisheries Service Final Recovery Plan for Salmon and Steelhead directs NMFS to “[d]evelop and implement a program to reintroduce spring-run Chinook salmon and steelhead to historic habitats upstream of Englebright Dam” and includes the action as a top tier priority.¹¹⁵

The Commission should consider the totality of information suggesting that reintroduction of salmon and/or steelhead above Englebright Dam is a strong possibility over the term of the new license. Including such an action in the cumulative effects analysis of the DEIS would help inform discussions surrounding appropriate mitigation for the Project’s impact on fish passage. Uncertainty regarding the mechanics of passage should not deter the Commission from its obligation under the NEPA to consider this action in the cumulative effects analysis.

III. Climate Change

The Commission must conduct a thorough climate change effects analysis in the DEIS to ensure adequate analysis of Project effects on resources under changing climate conditions and to evaluate protective measures.^{116,117} Such conditions include potential changes in precipitation, hydrology, stream flows, and potential water yield, as well as potential effects on energy production and fisheries.^{118,119,120,121,122,123} The AFLA fails to include sufficient information to

¹¹⁴ For instance, the Yuba Salmon Forum found that suitable habitat for anadromous fish exists in Middle Yuba River.

¹¹⁵ Recovery Plan for the Evolutionarily Significant Units of Sacramento River Winter-run Chinook Salmon and Central Valley Spring-run Chinook Salmon and the Distinct Population Segment of California Central Valley Steelhead. National Marine Fisheries Service. July 2014. p. 253.

¹¹⁶ See Draft NEPA Guidance on Consideration of the Effects of Climate Change and Greenhouse Gas Emissions, CEQ, at 6 (February 18, 2010) (“Draft Guidance”). The Draft Guidance states: “Climate change effects should be considered in the analysis of projects that are designed for long-term utility and located in areas that are considered vulnerable to specific effects of climate change (such as increasing sea level or ecological change) within the project’s timeframe.” Draft Guidance at 7.

¹¹⁷ Runting, R. K., Bryan, B. A., Dee, L. E., Maseyk, F. J., Mandle, L., Hamel, P., K.A. Wilson, K. Yetka, H.P. Possingham, and J.R. Rhodes. (2017). Incorporating climate change into ecosystem service assessments and decisions: a review. *Global change biology*, 23(1), 28-41.

¹¹⁸ He, M., Russo, M., & Anderson, M. (2016). Predictability of Seasonal Streamflow in a Changing Climate in the Sierra Nevada. *Climate*, 4(4), 57.

¹¹⁹ Belmecheri, S., Babst, F., Wahl, E. R., Stahle, D. W., & Trouet, V. (2016). Multi-century evaluation of Sierra Nevada snowpack. *Nature Climate Change*, 6(1), 2-3.

¹²⁰ Null SE, Viers JH, Mount JF (2010) Hydrologic response and watershed sensitivity to climate warming in California’s Sierra Nevada. PLoS ONE 5(4):e9932. doi:10.1371/journal.pone.0009932.

¹²¹ Ficklin, D. L., Stewart, I. T., & Maurer, E. P. (2013). Effects of climate change on stream temperature, dissolved oxygen, and sediment concentration in the Sierra Nevada in California. *Water Resources Research*, 49(5), 2765-2782.

¹²² Jepsen, S. M., Harmon, T. C., Meadows, M. W., & Hunsaker, C. T. (2016). Hydrogeologic influence on changes in snowmelt runoff with climate warming: Numerical experiments on a mid-elevation catchment in the Sierra Nevada, USA. *Journal of Hydrology*, 533, 332-342.

permit this analysis. The AFLA describes the two different climate terrains encompassed within the Project, including the higher elevation areas characterized by significant winter snowfall accumulation at elevations over 4,000 to 5,000 feet, but does not reference the significant publicly available information that demonstrates that the conditions in these climate terrains are expected to change in California as a result of climate change.¹²⁴

Changes in precipitation, hydrology, and temperatures have already been documented in the region over the last century.⁴ More than 200 peer-reviewed scientific articles on climate and water in California have now been published, with more in preparation.¹²⁵ Studies consistently indicate that in California, global climate warming will likely result in substantial increases in air temperature by the end of the century and that precipitation will likely decrease.¹²⁶ Models show an end-of-century warming of approximately 1.5 degree C to 6 degree C above the 1961–1990 mean for summer months in California, assuming that business-as-usual greenhouse gas emissions continue, with warming in the Sierra Nevada expected to be among the highest in the state.¹²⁷ Warming is expected to result in a greater fraction of total precipitation as winter rain and earlier snowmelt. These changes are anticipated to result in more precipitation-driven runoff in winter and reduced snowmelt runoff in spring, leading to a general shift in runoff timing to earlier in the year and reduced annual runoff. Several studies show that these changes have already been observed over the past half-century or so, including greater warming, less precipitation as snow, earlier snowmelt and onset of spring and a shift in runoff to earlier in the year.¹²⁸

The numerous regional and watershed-scale studies referenced above provide a valuable scientific foundation to understand how climate change will affect precipitation, streamflows, air temperature and other climate variables. However, they alone do not provide the information necessary to understand how Project effects on the resources of the Yuba watershed will change

¹²³ Thompson, L. C., Escobar, M. I., Mosser, C. M., Purkey, D. R., Yates, D., & Moyle, P. B. (2011). Water management adaptations to prevent loss of spring-run Chinook salmon in California under climate change. *Journal of Water Resources Planning and Management*, 138(5), 465-478.

¹²⁴ AFLA, p. E3-21.

¹²⁵ *See for example*, Cayan et. al., 2006; Kiparsky and Gleick, 2005; Knowles et. al., 2007; Lund et. al., 2003; Medellin et. al., 2006.

¹²⁶ *See for example*, Vicuña S, Dracup JA, Dale L. 2011. Climate change impacts on two high-elevation hydropower systems in California. *Climatic Change* 109: 151–169. DOI: 10.1007/s10584-011-0301-8; Franco G, Cayan DR, Moser S, Hanemann M, Jones M-A. 2011. Second California assessment: integrated climate change impacts assessment of natural and managed systems. Guest editorial. *Climatic Change* 109: 1–19. DOI: 10.1007/s10584-011-0318-z.

¹²⁷ Hayhoe K, Cayan D, Field CB, Frumhoff PC, Maurer EP, Miller NL, Moser SC, Schneider SH, Cahill KN, Cleland EE, Dale L, Drapek R, Hanemann RM, Kalkstein LS, Lenihan J, Lunch CK, Neilson RP, Sheridan SC, Verville JH. 2004. Emissions pathways, climate change, and impacts on California.

¹²⁸ Vicuna S, Dracup J. 2007. The evolution of climate change impact studies on hydrology and water resources in California. *Climatic Change* 82:327–350. DOI: 10.1007/s10584-006-9207-2; Cayan DR, Maurer EP, Dettinger MD, Tyree M, Hayhoe K. 2008. Climate change scenarios for the California region. *Climatic Change* 87: 21–42. DOI: 10.1007/s10584-007-9377-6. Barnett TP, Pierce DW, Hidalgo HG, Bonfils C, Santer BD, Das T, Bala G, Wood AW, Nozawa T, Mirin AA, Cayan DR, Dettinger MD. 2008. Human-induced changes in the hydrology of the western United States. *Science* 319: 1080–1083. DOI: 10.1126/science.1152538; Bonfils C, Santer BD, Pierce DW, Hidalgo HG, Bala G, Das T, Barnett TP, Cayan DR, Doutriaux C, Wood AW, Mirin A, Nozawa T. 2008. Detection and attribution of temperature changes in the mountainous western United States. *Journal of Climate* 21: 6404–6424. DOI: 10.1175/2008JCLI2397.1.

under climate change, and what measures might be necessary to respond to these changes in Project effects. Therefore, the Network requests that the DEIS analyze a meaningful suite of scenarios, reflecting the best available scientific data and analyses, which project potential changes in precipitation, temperature, and climate across the region in order to provide a meaningful analysis of potential effects on Project operations. This should include power production and water diversions, as well as the contributions of Project operations and the Project environment to cumulative effects. The Commission must also consider the effects of climate change on various alternatives considered under NEPA, and how the Project will affect instream and other resources under changing climate conditions. To do so, the DEIS must use a technically credible and substantiated hydrologic baseline that is developed for changed climate conditions and that is not simply based on past hydrology.

CONCLUSION

Thank you for the opportunity to provide comments and recommendations in response to the Notice of Ready for Environmental Analysis for the relicensing of the Yuba River Development Project

Sincerely,



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A small, rectangular box containing a handwritten signature in dark ink. The signature appears to be 'TJV'.

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**BEFORE THE
UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION**

Yuba County Water Agency)

**Yuba River Development Project
Project No. 2246**

Certificate of Service

I hereby certify that the foregoing Comments on Ready for Environmental Analysis and Recommendations of the Foothills Water Network, Adventure Connection, American Rivers, American Whitewater, California Outdoors, California Sportfishing Protection Alliance, Friends of the River, Gold Country Fly Fishers, Northern California Council Federation of Fly Fishers, Sierra Club, South Yuba River Citizens League, Tributary Whitewater Tours and Trout Unlimited in the above-captioned proceedings has this day been filed online with the Federal Energy Regulatory Commission and served via email or surface mail upon each person designated on the Service List compiled by the Commission Secretary for these Projects.

Dated at Sacramento, California this 25th day of August, 2017.



Traci Sheehan
Coordinator
Foothills Water Network

APPENDIX A



FOOTHILLS WATER NETWORK

Via Electronic Submittal

Hon. Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First St., NE
Washington, DC 20426

December 2, 2014

COMMENTS SUPPLEMENTAL TO OCTOBER 28TH MEETING ON SHOT ROCK BELOW ENGLEBRIGHT DAM, YUBA RIVER DEVELOPMENT PROJECT, FERC PROJECT NO. 2246

The Foothills Water Network (FWN) appreciates that FERC staff recently convened a technical meeting on shot rock below Englebright Dam as a means to determining whether or not additional study is necessary to assess project impacts to the river. This letter provides supplemental information for that determination.

In comments on the Updated Study Report for the Yuba River Development Project, FWN requested additional study of shot rock below Englebright Dam as a modification of Study 1-2 (Channel Morphology) and the National Marine Fisheries Service requested a new study focused on shot rock below Englebright Dam. As described in those comments, and discussed at that October 28th meeting, the condition of the Yuba River downstream of Englebright Dam is impaired by the shot rock and there is a need to advance opportunities to rehabilitate the river for the benefit of salmonid species, including populations listed as Threatened under the Endangered Species Act. The transcript from the October 28th meeting and the presentation by FWN (filed to the project by FERC staff) provide important information, including document citations, which are not reiterated here and document the problem of shot rock. The transcript from the October 28th meeting and the presentation by FWN also provide a definition of shot rock as irregular-shaped, angular cobbles and boulders blasted from bedrock.

The FWN sees a nexus between the operations of the Yuba River Development Project and the existence and recruitment of shot rock to the river below Englebright Dam, and FWN requests that the Commission make a determination of additional study to satisfy unanswered questions (see FWN comments and 10/28 presentation) regarding the potential impact of the project from ongoing operation.

The Construction and Operation of Narrows 2

The construction of Narrows 2 hydropower facility near the base of Englebright Dam created at least 6491 cubic yards of shot rock that was apparently placed in positions where the rock would be entrained

by flows into the river channel. This volume was calculated using the lengths and widths of the penstock tunnel¹, as reported in YCWA's Project Relicensing Fact Sheet. The actual amount of shot rock created during the construction of Narrows 2 would be higher as it would include the volume of rock created from the excavation for the powerhouse as depicted in Figure 1.

A photo taken during construction of Narrows 2 reveals that large volumes of shot rock were piled along the north wall of the river canyon while providing a grade for the Narrows 2 Access Road and another road extending downstream toward the USGS gage site (Figure 2). While much of the shot rock depicted in Figure 2 may have been remains from the construction of Englebright Dam, it appears that the entire volume was subject to relocation or placement during the construction of Narrows 2.

While the final positioning of shot rock upon the first operation of Narrows 2 is unknown to us at this time, it seems a reasonable possibility that a large amount of the shot rock was left in position to be eroded and mobilized into the river channel by the hydraulics of Narrows 2. Entrainment of shot rock may have peaked immediately upon initial operation of Narrows 2 and continued as erosion by hydraulic forces undercut the piles of material to create new angles of repose. Today, the north face of the canyon shows signs of massive erosion including scarp faces and large gullies (Figure 3 and 4). The river has created a flood terrace at the canyon wall composed of the larger pieces of shot rock.

While much shot rock currently impacting fish habitat in the Englebright Dam reach would have originated from the construction of the dam and prior to Narrows 2, it seems that the construction and operation of Narrows 2 contributed additional material to the river channel. A more thorough review of historic photographs and records would provide a more complete picture of how Narrows 2 has contributed to the shot rock problem.

The Narrows 2 Access Road

The Narrows 2 Access Road was constructed solely for the purpose of construction and operation of the Narrows 2 facility. The road crosses, with a switchback, a steep slope and the lower section of the road has apparently been rebuilt within the last ten years. Site photos (Figures 5-7) indicate that shot rock has been poured over the edge of the road in this location. YCWA has not provided details of how this road is being maintained or repaired, and whether such activities contribute additional shot rock that may be subject to entrainment into the river channel.

In their Final License Application (Exhibit A, page 65), YCWA proposes changes to the project boundary that have relevance to the location of shot rock. This includes, as excerpted:

- The addition of the area that encompasses a 20-ft right-of-way (i.e., 10 ft on either side of centerline) around the Primary Project Trail that is used to access USGS Gage 11418000 located downstream of the Narrows 2 Powerhouse and the gage building itself.
- removal of the area that extends south beyond a 100-ft right-of-way (i.e., 50 ft on either side of centerline) along the Narrows 2 Access Road.

¹ Data for calculation includes lengths and diameters for the two parts of tunnel (20' diameter for 376'; 14' diameter for 371.5') and was found on the 2012 Fact Sheet by YCWA (<http://www.ycwa-relicensing.com/Project%20Maps%20Schematics%20and%20Fact%20Sheets/YCWA%20Relicensing%20Fact%20Sheet%20and%20Flow%20Schematic.pdf>).

The lands proposed for removal (FLA, Exhibit G Figure 2.0-2) include embankment composed of shot rock as illustrated below in Figures 2 and 5-8. The Primary Project Trail accessing the USGS Gage utilizes the lower road pictured in Figure 1. While the project boundary line along the lowest stretch of the Narrows 2 Access Road is not proposed for change, it is worth noting that this boundary bisects the steep and eroding slope of shot rock.

Conclusions and Study Criteria

In summary, FWN submits this additional information to support the Commission in determining what additional study or measures are required to address the ongoing impacts of shot rock below Englebright Dam. FWN humbly requests, as in comments submitted on the Updated Study Report, that YCWA be required to conduct a study, either as modification of Study 1-2 or as a new study, to provide information concerning the project's effect on aquatic habitat through the location, supply, modification, and mobilization of shot rock.

In recognition of the Commission's Study Criteria (CFR 18, § 5.9b), a description of the study request is provided, as follows, in order of specific criteria.

1. The objective of the study would be to provide all information useful for assessing the potential impacts of the project on the river through the supply, modification, mobilization of shot rock. The study area would be Narrows 2 and the river channel from Englebright Dam to the Narrows gorge approximately 1.5 miles downstream. Information should include historic photographs of the project area, data on the time series distribution of shot rock, and information on the shot rock as it affects aquatic habitat. In presentation to the 10/28 meeting, FWN proposed that the study attempt to provide all information useful to the following questions:
 - a. What is the distribution and volume of shot rock in the Englebright Dam reach?
 - b. What is the history of shot rock introduction or entrainment to the river bed?
 - c. How are project operations contributing to the shot rock deposition or mobility?
 - d. What is the likelihood of additional shot-rock entrainment?
 - e. What are the impacts of the shot rock on fisheries habitat?
 - f. What limitations (or benefit reductions) does shot rock impose on spawning gravel augmentations by the Army Corps of Engineers?
2. See resource management goals of the National Marine Fisheries Service
3. The condition of aquatic habitat below Englebright Dam is of great public interest due to the importance of the Yuba River in providing habitat for native aquatic species, including the recovery of Central Valley Spring-run Chinook Salmon and Central Valley Steelhead Trout which are threatened with extinction.
4. While some information documenting and describing the cause and conditions associated with shot rock below Englebright Dam (see FWN presentation for 10/28 meeting), there has been no study devoted to this proposed study objective, no information provided by YCWA specific to shot rock, no available map of the amount and extent of shot rock in the river below Englebright Dam. Further investigation and compilation of information in one source is necessary to assess potential project impacts on the river through supply or mobilization of shot rock.

5. There is a nexus between project operations and effects of shot rock on aquatic habitat. As described in more detail above, the construction and operation of Narrows 2 has caused shot rock to enter the river channel, and maintenance of the Narrows 2 Access Road appears to involve shot rock at risk of entering the river channel.
6. The proposed study could entirely involve collection and synthesis of information existing in various locations, including photographs, project records and channel surveys. Possibly, additional channel surveys and mapping are necessary to determine accurate current extent and distribution of shot rock in the channel.
7. As explained in original comments by FWN on the Updated Study Report, neither Tech Memo for Study 1-2 (Channel Morphology) or any other document provided by YCWA contains sufficient information to assess potential project impacts involving shot rock. With the possible exception of one additional survey of the river channel (up to 2 miles), the proposed study could be conducted through gathering of existing information. The cost of the proposed study is expected to be less than \$10,000, and the duration required to complete the study no more than 6 months.

Finally, FWN appreciates the Commission's effort to provide complete study of potential project impacts to the Yuba River. Please contact Traci Sheehan, FWN Coordinator, for any correspondence regarding the request for study.

Respectfully submitted,



Foothills Water Network

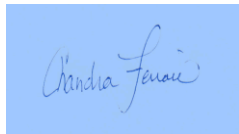
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A handwritten signature in black ink, appearing to read "Gary Reedy".

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FIGURES

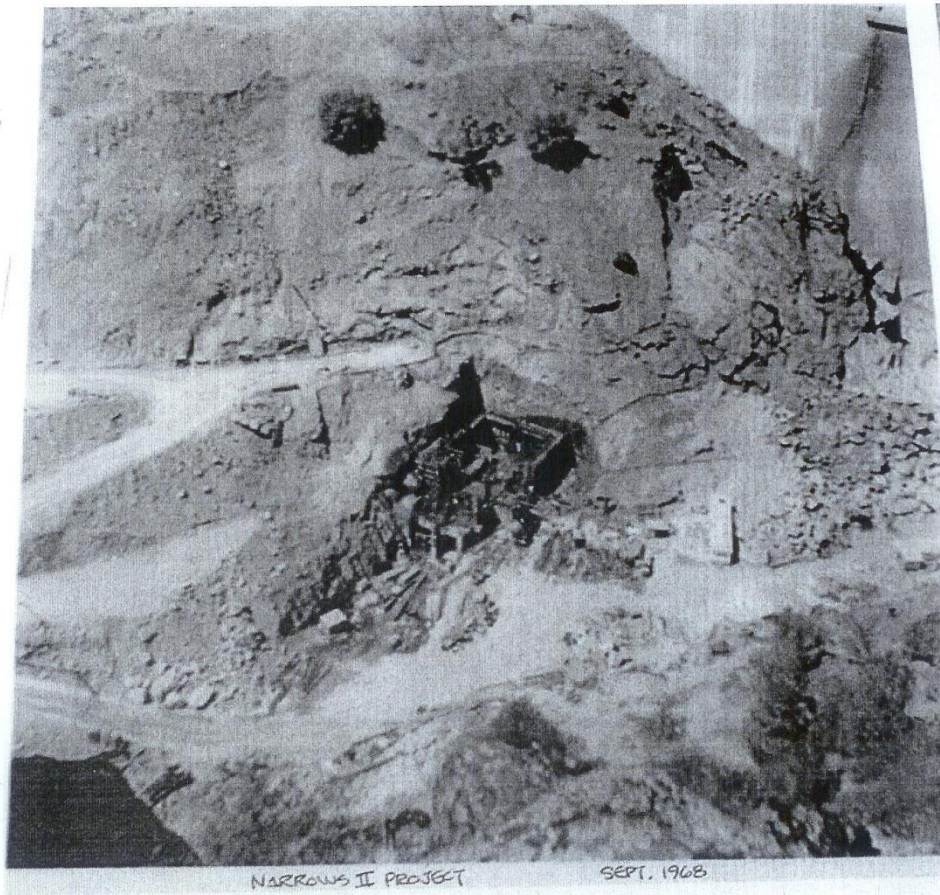
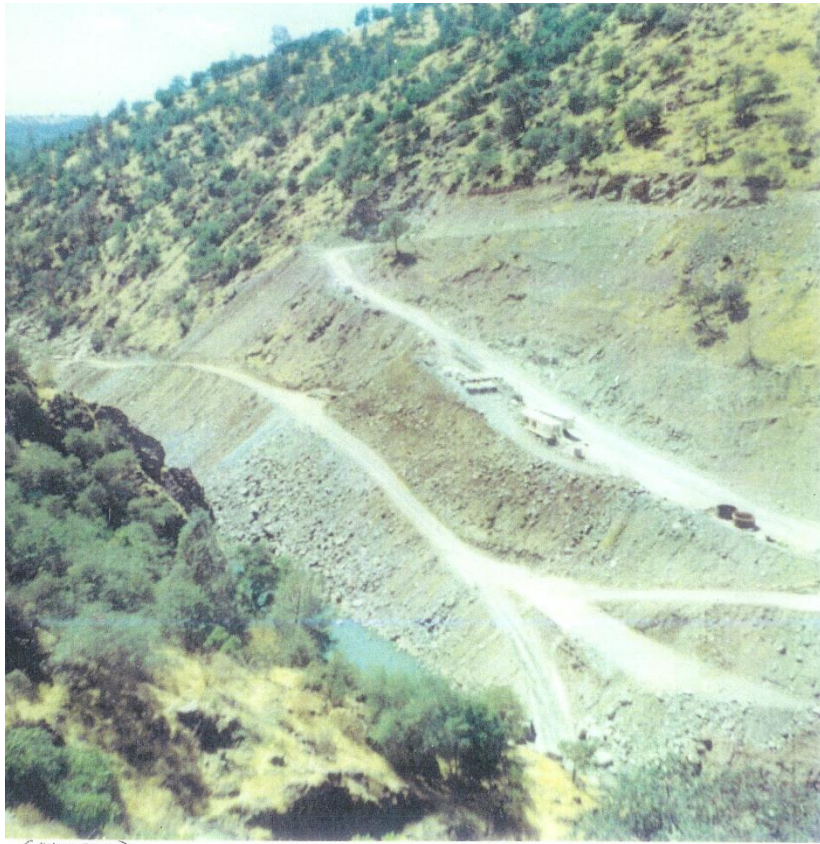


Figure 1: Photo of Narrows 2 powerhouse under construction in September, 1968. Photo by James Butler.



(SHOT ROCK)
SPILL DUMP NARROWS II PROJECT SEPT. 1968 YUBA RIVER

Figure 2: Photo of Narrows 2 access road and north bank of Yuba River on in September, 1968. Photo by James Butler.



Figure 2: Photo of Narrows 2 access road and north bank of Yuba River in 2014. Photo by Gary Reedy (Oct. 30 2014).



Figure 4: Photo of Narrows 2 access road and erosion scars (Oct. 30, 2014).



Figure 5: Photo of Narrows 2 access road and erosion scars looking downstream (Oct. 30, 2014).



Figure 6: Photo of Narrows 2 access road and Narrows 2 (Oct. 30, 2014).



Figure 7: Photo of Narrows 2 and shot rock supporting Narrows 2 access road (Oct. 30, 2014).