UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
SOUTHWEST REGION
777 Sonoma Avenue, Room 325
Santa Rosa, California 95404-4731

July 18, 2011

In response, refer to:
SWR/F/SWR3:LT (2246-058)

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

Subject: NOAA's National Marine Fisheries Service's Comments on the applicant's Proposed Study Plan, submitted April 19, 2011, for the Yuba River Development Project, Project No. 2246-058

Dear Secretary:

NOAA's National Marine Fisheries Service (NMFS) has reviewed the Proposed Study Plan (PSP), filed (on April 19, 2011) by the Yuba County Water Agency (Applicant), applicant for a new license for the Yuba River Development Project, P-2246-058 (Project). NMFS finds the PSP does not adequately incorporate several elements of its information or study requests filed March 7, 2011.

The attachment in Enclosure A is organized in two parts:

- Part One: NMFS Response to Applicant's Comments on NMFS Study Requests, and New or Updated Study Requests from NMFS; and

- Part Two: NMFS Comments on Applicant's Proposed Study Plan.

In each of its 8 filed requests, NMFS is seeking information or study <u>of the Project's effects</u> on the anadromous resources and habitats under its jurisdiction. In each request, the requested information or study directly pertains to whether or not Project facilities affect the anadromous fish species that are of direct concern to NMFS, as well as related factors like alteration of primary habitat constituents and overall ecosystem integrity. The resources to be studied (anadromous fishes, critical habitats, and essential fish habitats) are identified in NMFS' filing of March 7, 2011.

The results of the information collection or study of the Project's effects are intended to be used to:

- inform NMFS regarding how it may exercise its Federal Power Act (FPA) Section 18 authority, to either prescribe fishways at the Project or to reserve its prescriptive authority;
- inform NMFS' future FPA Section 10(j) and 10(a) recommendations for protection, mitigation, and enhancement measures;
- inform NMFS' recommended measures in consultation to minimize the effects of project operation on Essential Fish Habitat (EFH) for Chinook salmon identified in the upper and lower Yuba, as well as within areas downstream to the Bay/Delta; and
- inform Endangered Species Act (ESA) Section 7 consultations (informal and, potentially, formal) regarding effects on threatened species and designated critical habitats in the Yuba River.

NMFS notes that the applicant did not appear to incorporate in its PSP any elements of NMFS' Request #1 "Effects of the Project and Related Activities on Fish Passage for Anadromous Fish". The results of the requested information collection and/or study are intended to be used to assess how anadromous fish passage is affected by Project facilities and operations. This includes how fish passage is affected by the Project's influences on non-Project facilities and operations in the Yuba River, and on downstream conditions.

For all its study and information requests, NMFS submitted them according to the Integrated Licensing Process (ILP) regulations (18CFR §5.9 (a)(b)), and expects the Commission will require the Applicant's Revised Study Plan to be submitted under the ILP's content requirements (18CFR §5.11(d)). NMFS reiterates the anticipated need for consultations under section 7 of the ESA and the Magnuson-Stevens Fishery Conservation and Management Act over potential effects to anadromous species and their habitats. NMFS recommends avoiding inefficiencies and delays that might result from insufficient study or information gathering.

If you have questions about NMFS' response, please contact Mr. Larry Thompson, NMFS Regional Hydropower Program Coordinator, at 916-930-3613.

Sincerely,

Richard L. Wantuck
Hydropower Program Supervisor
Habitat Conservation Division

cc: Maria Rea, Howard Brown, Gary Sprague, Brian Ellrott, NMFS Sacramento, CA
Steve Edmondson, NMFS Santa Rosa, CA

Enclosure A

COMMENTS OF NOAA's NATIONAL MARINE FISHERIES SERVICE ON THE APPLICANT'S PROPOSED STUDY PLAN

UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Yuba County Water Agency	**)**	**FERC Project No. P-2246-058**
Yuba River Hydroelectric Project	**)**	
	)	

Introduction:

The Integrated Licensing Process should, to the extent reasonably possible, serve to establish an evidentiary record upon which the Commission and agencies with mandatory conditioning authority can carry out their responsibilities. Notice of Proposed Rule, 68 F.R. at p. 13995; IV FERC Stats. & Regs. ¶32,568 at p. 34, 705. Through its study and information requests, as emphasized in the comments below, NMFS seeks to determine whether and how the Project's facilities and operations will affect NMFS' trust resources. These are basic determinations necessary to form the foundation for the Commission's licensing order. NMFS has shown how each of the proposed studies reasonably relates to the development of potential prescriptions or protection, mitigation or enhancement measures (PM&E's) within its regulatory jurisdiction, or the fulfillment of consultation obligations between the Commission and NMFS. These results of NMFS' study requests will add appreciable evidentiary value to the record, are reasonable within the large-scale economic context of the Project, and should be ordered by the Commission to be completed.

Part One:
NMFS Response to Applicant's Comments on NMFS Study Requests,
and New or Updated Study Requests from NMFS.

NMFS Request #1 - Effects of the Project and Related Activities on Fish Passage for Anadromous Fish:

The Commission's regulations require an applicant in its PSP to "address any known resource management goals of the agencies…with jurisdiction over the resource to be studied." 18 CFR § 5.11(d)(2). NMFS' resource goals and objectives for fish passage were provided in Enclosure G, and in Request #1, as required by 18 CFR § 5.9(b)(2). In rejecting NMFS' Request #1, the Applicant does not adequately address the resource management goals of NMFS. Rather than explain how the information needed to satisfy the resource management goals NMFS has articulated in this proceeding could be obtained through alternate means, the Applicant quibbles with the relevancy of NMFS' goals to the Project and second-guesses the applicability of the goals NMFS has stated. NMFS requests that the Commission provide appropriate consideration to the statement it, as the federal resource management agency, has made regarding its own goals and the ways in which it would use the requested information in this proceeding.

Rather than "address" NMFS resource goals and objectives, the Applicant rebuts or dismisses them (PSP, pp.3-3 to 3-8). In doing so, the Applicant quotes NMFS Request #1 inaccurately, and out of context:

> *However, as NMFS concedes, it is Englebright Dam that is **the** "physical barrier to fish passage" at this location (see NMFS, Enclosure F, p. 2).* (p. 3-3). [emphasis added].

This quotation does not fairly represent a NMFS "concession" and is disingenuous because central to NMFS' need for information collection and/or study of the Project's effects on anadromous fish passage is the fact that Englebright Dam is not **the only** facility that is a barrier to fish passage, but **a** barrier. The full quote from Request #1 is:

> *NMFS does not contest that Englebright Dam, located further upstream from the Narrows hydroelectric plants, is **a** physical barrier to fish passage. We point out that the trio of the dam and its two associated hydropower facilities **altogether** are responsible for blocking fish passage.* [emphasis added].

Likewise, NMFS' 2007 "Biological Opinion, Operations of Englebright Dam/Englebright Lake and Daguerre Point Dam on the Yuba River, California" states:

> *Englebright Dam has no fish ladders making it **a** complete barrier to upstream fish passage. The majority of releases from the reservoir are made through two hydroelectric power facilities, one of which (Narrows II) is located just below the base of the dam and the other (Narrows I), is located approximately 0.2 miles downstream. (p. 3).* [emphasis added].

The Opinion as originally rendered does not somehow excuse any blockages caused by the hydropower facilities; instead, it was focused on the actions of the agency seeking consultation, the Army Corps of Engineers. Thus, the PSP dismisses Request #1 in part by misquoting NMFS, to incorrectly attribute to NMFS a view opposite to that stated in the Request at Enclosure F, pages 2-3, explaining the concept of a "trio" of passage barriers.

NMFS' concern as to the sound foundation of this licensing order is exacerbated by the fact, well-known to the parties to this proceeding, that the Biological Opinion for the Army Corps of Engineers' operations at Englebright Dam has been remanded to NMFS. The Commission's order regarding the Applicant's Study Plan should not be based on the concept that the existing Opinion is the operative one; because a new Biological Opinion is being

prepared per order of the Federal District Court. While NMFS cannot at this time provide details of decisions still to be made, it would be unreasonable to ignore the legal proceedings on this biological opinion, and the reasonably foreseeable possibility that passage could be attained as a result of the Corps' consultation with NMFS or through the third-party processes NMFS discussed in its filing of March 7, 2011.

Additional Applicant rebuttals of NMFS' Request #1 include assertions that Englebright Dam, not the Project's facilities, solely affects fish passage:

> *Although NMFS argues that PG&E's Narrows Powerhouse and YCWA's Narrows 2 Powerhouse are "hydraulic and mechanical barriers to fish passage" (see NMFS, Enclosure F, p. 3), the simple facts are:*
>
> - *YCWA's construction of the Project's Narrows 2 Powerhouse did not change the complete physical barrier to passage that Englebright Dam already had created at this location*
>
> - *Even if the Narrows 2 Powerhouse were completed removed or otherwise decommissioned, Englebright Dam would still completely block upstream fish passage at this location*
>
> - *Fish migrate past the tailrace of the Narrows 2 Powerhouse, which is located about 400 feet downstream of Englebright Dam, and on upstream to the base of Englebright Dam, where their upstream passage is completely blocked, and fish migrate downstream from the base of Englebright Dam past this tailrace.*
>
> *For these reasons, NMFS's argument that the Narrows 2 Powerhouse should have some share of a collective responsibility for the blockage of fish passage at this location should be rejected.* (p. 3-5).

These statements miss the obvious reality of the impacts of the Applicant's project facilities on anadromous fish passage by attempting to cast the sole responsibility elsewhere, to another facility located further upstream.

After Englebright Dam was completed in 1941, FERC issued original licenses to construct and operate the Narrows 1 project and the Narrows 2 Development. Thus, the present environment has changed from 1941. Englebright Dam was constructed with no low level outlets, and this configuration would pass Yuba River flows entirely over its crest if it were not for the subsequent addition of the Narrows 1 project and the Narrows 2 Development. With the addition of Narrows 1, up to roughly 700 cubic feet per second (cfs) of Yuba River flows may be diverted through its intake, and returned from its powerhouse. Narrows 2 is capable of diverting up to ~3400 cfs of the Yuba River flow – which is generally the dominant flow path and flow release of impounded Yuba River water to the downstream Narrows reach and the lower Yuba River. Thus, the additions of Narrows 1 and Narrows 2 complex has changed the way Englebright Dam affects fish passage because the hydropower complex has changed how the Yuba River flows past the Dam. Furthermore, the Narrows 1 and 2 hydropower complex introduced generation facilities and high velocity flows that created additional hydraulic and mechanical fish passage obstacles for upstream migrating fish.

Consider the case of downstream fish passage. The spill level in Englebright Reservoir is over 265 feet, so downstream migrating fish passing over its crest would experience a fatal plunge. Even if downstream passage measures were undertaken to address the Englebright Dam spillway (e.g., screening, spillway modification, etc.), safe and effective downstream passage facilities would still require additional measures to enact safe downstream fish passage at the intake to the Narrows 2 Powerhouse, such as screening the intake (MWH 2011, p. 7-4). The fact that Englebright Dam was constructed in 1941 without safe and effective downstream fish passage facilities does not change the fact that Narrows 2 was licensed later without its own downstream passage facilities, and the current environment situation requires evaluation of all

effects in the vicinity of river mile 24 to assure that any fish passage measures would be effective. Thus, NMFS' Request #1 has been submitted to evaluate the Project's effects on the safety and effectiveness of downstream fish passage at Narrows 2, and in the immediate vicinity, and it should not be rejected. Resident aquatic species in the upper Yuba River presently encounter the Narrows 2 intake and are subject to its Project effects (entrainment and mortality) on downstream passage; anadromous fishes could experience these Project effects when reintroduced to the upper Yuba River in the foreseeable future, and therefore such effects should be evaluated in the Applicant's Study Plan.

Consider the case of upstream fish passage. The Englebright facility is uniquely different from most dams of its size in that it was designed with no low level outlets, locks, upstream channels, water diversion bypass structures, or fishways. The original configuration meant that flow could only pass downstream over the spillway crest. A fish ladder, tramway, or other upstream passage facility built at Englebright Dam prior to the existence of Narrows 1 or Narrows 2 would likely have sited its entrance at the base of Englebright Dam, to make use of the attraction flows spilling over its crest. But the original configuration of 1941 has now changed with the addition of the Narrows 1 and Narrows 2 hydropower facilities, which were licensed without any upstream fish passage facilities or operations requirements for migratory fish. Under the current conditions, the existing conceptual engineering options (MWH 2011) do not recommend a fishway entrance in the pool at the base of Englebright Dam. Rather, the fishway engineers suggest siting an upstream passageway entrance directly adjacent to (below) the Narrows 2 Powerhouse (MWH 2011, p. 6-2, 6-3, 6-5, Plates 3, 4, 6), and modifying its draft tube (p. 6-3). This information reflects a likely Project effect on upstream fish passage, namely the attraction of upstream migrating fish to the base of Narrows 2 Powerhouse, where flows

diverted from the Yuba River at the Narrows 2 intake are returned to the channel. NMFS notes that the Narrows 2 return volume is nearly five times that of Narrows 1, and there is no flow past Englebright Dam (save for leakage) during non-spill intervals, further suggesting that upstream migrants would be expected to be attracted to the base of Narrows 2 Powerhouse. FERC's 2005 Environmental Assessment also noted this "documented holding site":

> *Congregations of adult Chinook salmon (approximately 30 to 100 fish) have been observed in the outlet pool at the base of Narrows 2 powerhouse, generally in late August or September when the powerhouse is shut down for maintenance and the pool becomes clear enough to see the fish.* (p. 15).

This is a Project effect on anadromous fish passage that occurs at the present time, and should be fully evaluated by incorporating NMFS' Request #1 into the Applicant's PSP.

The Applicant did not adopt Request #1, but does not adequately describe why, as required by ILP regulations. 18 CFR § 5.11(b)(4). Instead, the PSP states:

> *With respect to criterion 5, project nexus and how the information would inform license requirements, NMFS has included in its request dams and diversions (e.g., Daguerre Point Dam, Hallwood-Cordua and South Yuba-Brophy, to name a few) and powerhouses (e.g., PG&E's Narrows Powerhouse) that are not Project facilities and located downstream of Project facilities. NMFS's has provided no evidence concerning Project nexus or how information from the requested study would be used to inform license requirements, because FERC does not have jurisdiction over these non-Project and federal facilities.* (p. 3-53).

Thus, the Applicant asserts NMFS has inadequately explained nexus (PSP, p. 3-4), and presented no evidence that FERC is planning to direct the Applicant to include, as part of licensing, fish passage at Englebright Dam (p. 3-5). However, it would be circular reasoning to expect full understanding of the relationships between Project effects on anadromous fish passage and their effects prior to investigating them, particularly since this information was not included in the

Applicant's PAD. NMFS' Request #1 is submitted in part to more fully understand the connections (nexus) and the inter-relationships between the Project and its effects on non-Project facilities or operations that affect anadromous fish passage. It is correct that NMFS' Request #1 involves dams and diversions that are not FERC Project facilities. However, this does not necessarily mean such facilities have no nexus to Project facilities or operations. To the contrary, it seems reasonable that water stored in New Bullards Reservoir (a Project facility), impounded by New Bullards Dam (a Project facility), and released through the New Colgate Powerhouse (a Project facility) and Narrows 2 Powerhouse (a Project facility) could be diverted downstream through the (non-Project) Hallwood-Cordua and/or South Yuba-Brophy facilities, operating in concert with (non-Project) Daguerre Point Dam. Upstream and downstream passage of anadromous fishes are a concern at these non-Project facilities, and NMFS' Request #1 seeks information about how the Project's effects (for example, its influences on flow volumes, release timing, etc.) could influence the effectiveness of fish screens at the diversions and the functionality of the fish ladders at Daguerre Point Dam. In NMFS' view, it is unreasonable to deny any nexus (connection between) these Project and non-Project facilities and operations prior to information collection or study. It is also unreasonable to presume that no future license requirements could be informed by adopting NMFS' Request #1, as it seems reasonable that Project flow releases (e.g., their magnitude, timing, duration, rate-of-change, etc.) that affect downstream fish screens and ladders could be the subject of license conditions. NMFS' Request #1 is reasonably proposed to gain additional information about the Project's effects on anadromous fish passage, and to inform future PM&E's.

NMFS also notes Request #1 was prepared, in part, to seek information or study of how the Project could affect ESA-listed salmonids or sturgeon, and/or their ESA-designated critical

habitats, in the Yuba River and in locations downstream. The ILP regulations (at 18 CFR § 5.9(a)) direct NMFS to request information or study that would inform future ESA consultation between NMFS and the Commission. There is no indication within this regulation that this request must be limited to already-existing information. While the facilities are not all considered part of the Project facilities by the Commission, NMFS noted in its Request (p. 15) that the action, the action area, and the effects of an action are defined broadly for consultation under section 7 of the Endangered Species Act. NMFS also made reference to ESA-related definitions in the Code of Federal Regulations, and to its Enclosure B – "Endangered Species Act Consultation During This Integrated Licensing Process." Lastly, NMFS does not understand the Applicant's point about FERC jurisdiction. The Commission need not have jurisdiction over non-Project facilities to order the Applicant to investigate Project effects that have a nexus with non-Project facilities; understanding the impacts of the Project on trust resources is a key step to crafting protective measures through the factors which are within FERC's discretion to control, and to understanding cumulative impacts to resources, which will in turn inform ESA consultation.

In PSP section 3.1.2.4, the Applicant contends it is not reasonably foreseeable that anadromous fish will be reintroduced upstream of Englebright Dam in the near future. The Applicant asserts this is because NMFS has not provided a schedule for reintroduction, and the Public Draft Recovery Plan for Sacramento River Winter-Run Chinook Salmon, Central Valley Spring-Run Chinook Salmon and Central Valley Steelhead (Draft Plan) is not final. The Applicant asserts that even when the Draft Plan is final, it will not provide concrete measures for the introduction of anadromous fish above Englebright Dam. In addition, the Applicant ignores developments of the Yuba Salmon Forum, in which the Applicant has been actively

participating, wherein multiple stakeholder parties are investigating potential alternatives for reintroducing anadromous salmonids to the upper Yuba watershed. Finally, NMFS reminds Commission staff that it is undertaking certain independent studies related to anadromous fish reintroduction, and is developing an anadromous fish reintroduction plan that should be available in early 2012.

NMFS' filing of March 7, 2011 (especially Enclosure E – Scoping Comments) provides additional discussion about actions in the Yuba River watershed that are reasonably foreseeable, and would be informed by evaluations of the effects of Project facilities on anadromous fish passage.

NMFS Request #2: Effects of the Project and Related Activities on Hydrology for Anadromous Fish:

NMFS Request #2 "*Effect of the Project and Related Activities on Hydrology for Anadromous Fish*" was "not adopted" by Applicant in their PSP. The majority of the study elements in NMFS Request #2 are unfilled by the Applicant's PAD and PSP, and remain submitted as filed previously by NMFS on March 7, 2011. In addition, **a new element to NMFS' Request #2 is being filed at this time, and is detailed below as Element #8.**

Element #1 in this request is not fulfilled by the Applicant's PSP. The additional data set requested in NMFS study element #1 is not identical to the Applicant's dataset, nor is it a modeling run request as suggested by the Applicant. The "YRDP scenario" requested in element 1 is a data set that directly compares Project effects with the unimpaired condition. In the PSP and available PAD hydrology, there is no way to directly compare the YRDP effects to the unimpaired scenario. Direct comparison between the "unimpaired" and "current" scenario

includes the effects of upstream projects on hydrology of the basin. The Applicant's PSP looks at Project effects to hydrology in the proposed Indicators of Hydrologic Alteration (IHA) Study 2.1; however, this study is inconclusive as to what data sets will be used in the analysis and how the effects of the Project will be separated from the effects of upstream projects, which substantially influence the hydrology of the basin. For example on page 6 of Study 2.1 in section 5.3.3 IHA Analysis, the plan first states that *"flow characteristics will be computed and comparison tables prepared for the regulated and unimpaired flow condition on the stream locations listed in Section 4.1,"* but then the following paragraph in the same section states that *"the inflow hydrology data (developed for Water Years 1970-2000) will be used to analyze without-Project conditions"* – which is not unimpaired flow, but flow affected by regulation from other projects further upstream. The Applicant should be calculating IHA statistics comparing the existing conditions to the fully unimpaired flow (for assessing cumulative effects) ***and*** relative to project inflow (for assessing YRD Project specific effects). Also, the Applicant's study 2.1 does not include many of the hydrology nodes of interest listed in NMFS in request element #1, which are essential for understanding the Project's hydrological effects throughout the basin.

NMFS Element #2 "Peak Flows" requests a comparison of altered hydrology at tributary confluences and its effects on salmonid attraction and immigration. This request is not addressed anywhere in the PSP, and the PSP as proposed is not adequate to satisfy the request. In meetings between NMFS and YCWA, the Applicant stated this information is being developed by the Lower Yuba River Accord River Management Team (RMT) at the Feather River and Yuba River confluence. However, the PSP does not propose identifying, gathering or reporting

this specific information, nor does the Applicant propose to do any analysis for the other tributary junctions specified in the request.

NMFS Element #4 "Ramping" requests a 2-dimensional hydraulic model of the reach below New Colgate Powerhouse to determine effects of ramping on essential fish habitat. Down-ramping events can rapidly change the water surface elevation and wetted perimeter of a reach, stranding juvenile fish or dewatering redds. Up-ramping can scour redds and create increased velocities which can be barriers to upstream migration. The Applicant's PSP does not satisfy this study request and the PSP does not adequately address how the spatial and velocity components of Project ramping effects to essential fish habitat will be quantified. The Applicant does propose in Study 2-6 to calculate some statistical analyses of ramping rates of change in stage and discharge, but no metrics are provided to translate how these rates correlate with fish stranding risks, changes in flow velocities, or changes in wetted area or inundated habitats – all of which are necessary to quantify and evaluate given the level of extreme ramping observed at New Colgate Powerhouse.

NMFS Element #5 "Floodplains" was stated as "Adopted" by the Applicant in the PSP. However, the PSP does not include any language which would satisfy this request. In meetings between NMFS and YCWA, the Applicant has expressed willingness to obtain the requested information through the RMT; however, steps to obtain the specific information requested are not proposed in the PSP, nor does the PSP specify what Applicant proposed study would obtain the requested information. NMFS does not believe the requested information would be obtained in the Applicant's proposed Instream Flow Study 7.10, nor would it be appropriate for inclusion in that study.

NMFS Request Element #6: Natural Gradient Impediment/Barriers was not adopted by the Applicants because it "applies to the river upstream of Englebright Dam." However, flow releases from project Dams affect the hydraulic characteristics of the potential impediments and alter habitat connectivity and essential fish habitat. Although the Applicants have orally expressed willingness to obtain this information, they are proposing to do so in a separate process that is outside the FERC process. At this date, there is no assurance that the appropriate information will be collected and made part of the FERC Record unless FERC directs this to happen. Any information that is gathered outside the ILP - which would presumably be used to satisfy NMFS study requests - needs to be proposed in the ILP and the results made a part of the FERC record.

NMFS Request Element #7: Bay-Delta was not adopted by the Applicant because the Applicant claims it would not inform potential license conditions. The Licensee misinterprets the information request as it relates to the ILP. This element was a request for information and did not propose any specific study methodology. T he Applicant's PAD was deficient because it did not address any of the Project's effects downstream to the Delta. FERC's scoping document 2 recommends a cumulative geographic scope for anadromous fish that extends through the Sacramento-San Joaquin Delta to the San Francisco Bay. NMFS has found relevant, publicly available information that investigates the YRDP effects in the Bay-Delta. The Applicant should go back and summarize these sources (cited in request element #7) along with other available information regarding the Project's hydrologic effects in the Bay-Delta on anadromous fish and synthesize in one document. This information should then be placed on the FERC record to address the PAD deficiency.

<u>New Study Element</u> (part of Study Request #2: Hydrology)

Element #8: Quantification of Hydrograph Components

The annual hydrograph of a mixed rain-snow-dominated Mediterranean-montane basin, such as the Yuba River, can be divided into the following components: fall baseflows (typically early season rain events from approximately October 1 to December 20), fall floods, winter baseflows, winter floods (large rain events or rain on snow events from approximately December 21 to March 20), snowmelt floods (occurring approximately from March 21 to early August and heavily dependent on snowpack conditions), snowmelt recession, and summer baseflows. The Project's effects to each specific hydrograph components needs to be quantified in order to fully assess the Project's hydrology alteration and develop potential PM&E measures related to instream flow. The Applicant's proposed study 2-1 Hydrology Alteration should be adequate to assess changes to baseflow regimes through analysis of monthly average flows, but their proposed study will be insufficient to assess the Project's effects to the three types of floods (fall, winter, and snowmelt) as well as the snowmelt recession. This is in large part because annual peak flow analyses and extreme event analyses lump all three types of floods together and do not analyze each flood type independently. In addition, the snowmelt recession often spans multiple months that can change year to year, and thus the snowmelt recession is not specifically accounted for in an IHA analysis or in the Applicant's study 2-1.

Analyzing the Project's effects to the three types of floods and the snowmelt recession is a critical step in evaluating the ecological impacts of the Project because all of these hydrograph components contribute essential ecological functions, such as anadromous fish emigration and immigration cues and conduits, habitat availability for early fish life stages, and riparian species

seedling recruitment and establishment. Thus, Study Element #8 requests information that specifically quantifies the three flood flow types and the snowmelt recession under existing and unimpaired conditions in order to evaluate the Project's effects to these hydrograph components. The following information should be calculated for the three flood flow types (fall, winter, and snowmelt) for the three hydrology data sets requested under element #1 (existing conditions, unimpaired conditions, and YRDP only hydrology):

- average and median peak magnitude
- minimum and maximum peak magnitude
- frequency (number per year) of fall and winter floods (not necessary for snowmelt floods)

The following should be quantified for the snowmelt recession:

- median Julian date of peak
- seasonal duration of snowmelt runoff (number of days and Julian date of end of snowmelt runoff)
- average rate of change in flow during snowmelt recession (cfs/day)

This information, calculated for the three hydrology data sets detailed above, should be compiled for the following locations of interest, which all have hydrographs affected by the Project:

- North Yuba River below New Bullards Bar Dam (USGS Gage 11413520)
- Middle Yuba River below Our House Dam (USGS Gage 11408880)
- Middle Yuba River above North Yuba River confluence
- Oregon Creek below Log Cabin Dam (USGS Gage 11409400)
- Mainstem Upper Yuba below North/Middle Yuba confluence

- Mainstem Yuba River below Narrows II Powerhouse (USGS Gage 11418000)
- Mainstem Yuba River at Marysville (USGS Gage 11421000)

NMFS Request #3: Effects of the Project and Related Activities on Water Temperatures For Anadromous Fish Migration, Holding, Spawning, and Rearing Needs:

NMFS Request #3 "*Effects of the Project and Related Activities on Water Temperatures for Anadromous Fish Migration, Holding, Spawning, and Rearing Needs*" was not adopted by the Applicant. Request element #2 Temperature Refugia was not adopted because it applies to the river upstream of Englebright Dam. However, the Applicant's operation of the Project alters water temperatures such that temperature refugia become an important element of essential fish habitat. This element of fish habitat is not addressed in the PSP. NMFS Element #3 temperature modeling requests specific model capabilities and modeling scenarios to be carried out by the Applicant, which by in large are not addressed by the Applicant's proposed water temperature study (Study 2.6). The Applicant's Study 2.6 only proposes to model New Bullards Bar Reservoir in one dimension as a vertically segmented profile at the Colgate Powerhouse Intake and does not propose to model the longitudinal stratification along the length of New Bullards Bar Reservoir. Without modeling the longitudinal temperature profile throughout the reservoir is not possible to evaluate the Project's effects on resident fish as well as develop the necessary information for potential fish passage alternatives that include New Bullards Reservoir. Similarly, the Applicant's Study Plan 2.6 may also model Englebright Reservoir in only one-dimension (vertical stratification), which would also limit the ability to assess Project effects on fish living in the reservoir and develop potential fish passage alternatives. NMFS Request #3 outlines a number of potential future scenarios (e.g., climate change assumptions) to be run in the

temperature model which would help inform potential future license conditions and PM&E measures. The Applicant's Water Temperature Model Study 2.6 does not state what future scenarios will be run with the model. Explicitly stating what future scenarios will be run with the model assures that an appropriate model platform will be chosen and that the model, once constructed, will be able to run the requested scenarios.

NMFS Request #4 Effects of the Project and Related Activities on Coarse Substrate for Anadromous Fish: Sediment Supply, Transport and Storage:

NMFS has actively engaged with Applicant and other relicensing participants to include the necessary components of NMFS Study Request #4 that were not previously covered in the Applicant's proposed channel morphology studies 1-01 and 1-02. Substantial progress to resolve differences between NMFS and the Applicant's proposed studies has been made regarding *Study Plan 1-01 Channel Morphology Above Englebright Dam*, and based on dialogues with the Applicant and members of the RMT, NMFS anticipates that substantial progress will be forthcoming pertaining to Study Plan 1-02 Channel Morphology Below Englebright Dam. However, at this time NMFS Study Request #4 remains submitted before the Commission, and NMFS recommends the Commission order the Applicant to incorporate it within their Study Plan. Specific comments pertaining to the Applicant's proposed studies 1-01 and 1-02 are detailed in sections below specific to the Applicant's proposed studies.

NMFS Request #5: Effects of the Project and Related Activities on Large Wood and Riparian Habitat for Anadromous Fish:

NMFS' Request #5 "*Effects of the Project and Related Activities on Large Wood and Riparian Habitat for Anadromous Fish*" was stated by the Applicant as: "adopted with

modification" in the PSP. However, NMFS does not consider the studies proposed by the Applicant in the PSP to be sufficient and as a result, does not consider our study request satisfied and NMFS Request #5 remains submitted in its entirety with additional information requests that have arisen based on new knowledge of LWD processes in the basin, which are detailed below.

Element #1 specifies an annual volumetric flux of large wood be developed for LWD entering and removed from Project reservoirs and Englebright Reservoir. This information is directly related to Project effects on large wood and development of PM&E measures as well as a key component for developing a LWD budget. The Applicant's PSP does not include development of annual estimates of the volume of LWD trapped in reservoirs; although, there is discussion of quantifying LWD in project reservoirs in section 5.3.2.14 of Study Plan 1-01 without specifics as to what metrics the resource will be quantified with..

Element #2 LWD Survey is not satisfied by the Applicant's proposed study plan. The Large Woody Debris (LWD) surveys done as a part of the habitat mapping exercise (Attachment 3.10A to Instream Flow Above Englebright Study Proposal) were not conducted with appropriate methods for comparison with RMT data collection and other LWD studies done in Sierran streams. The Applicant's habitat mapping exercise only measured pieces of LWD which were ½ bankfull width or longer. In some of the survey reaches this would equal only surveying pieces greater than 50 ft. in length – a very large piece of LWD and inadequate as a lower threshold for conducting LWD surveys. The smaller size thresholds proposed in NMFS request are similar or identical to other studies (Ruediger and Ward (1996) and Berg et al. (1998)) as well as the methodology for the Applicant's proposed study 6.2 Riparian Habitat Downstream of Englebright Dam. It is unclear why the Applicant has two different size thresholds for LWD

surveys above and below Englebright Dam. NMFS continues to request LWD surveys of the size thresholds and locations (including control reaches) specified in request #5. Although the PSP response to NMFS Study requests mentions potential establishment of a control reach on Oregon Creek, language does not exist in any of Applicant's proposed study plans that commits to surveying LWD in any control reaches. Comparisons solely to published literature will confound evaluation of Project impacts due to differences in Basin geology, topography, etc. It is preferable to have multiple control reaches in the same Basin as the Project to more accurately compare LWD abundance. NMFS believes that establishment of control reaches directly upstream of Our House Dam on the Middle Yuba River are feasible, because the presence of other dams further up in the watershed are more than 27 miles upstream which implies that the vast majority of LWD trapped at these dams would break, abraid, and/or be lost to floodplain of jam deposition before it would enter Our House Reservoir or any potential control reach.

Furthermore, the Applicant does not propose developing a LWD budget as NMFS requests in element #4. A LWD budget quantifies the volume of LWD inputs to Project reservoirs and to Project affected reaches downstream of Project dams. The requested LWD budget should continue through Englebright reservoir into the LYR. The LWD budget most continue past Englebright Dam because LWD passes over Englebright Dam during high flows, and thus the Project has the potential to affect LWD loading in the LYR due to LWD removal at New Bullards, Our House, and Log Cabin reservoirs.

As part of LWD budget, it will be necessary to quantify the volume of wood that passes over any Project dams and at Englebright Dam. It will also be necessary to determine what

flows are necessary to pass LWD over these dams in order to evaluate whether the Project affects the frequency of LWD passage at Project and Englebright dams. Determining these requisite flows represents a new information request relative to NMFS original Study Request #5, which arose based on new information that LWD can pass Englebright Dam and potentially Our House and/or Log Cabin dams. This information is necessary to determine whether the Project's effects on the high flow regime alters the rate at which LWD is passed over dams and to downstream reaches where it can provide essential fish habitat.

NMFS proposed LWD budget as well as LWD surveys (request element #2) that quantify in-channel LWD loading that is crucial for aquatic habitat and a properly function channel are necessary to evaluate the Project's effects on LWD and aquatic habitat upstream and downstream of Englebright Dam. This information can also potentially inform PM&E measures related to in-stream wood and/or habitat restoration.

Element #4 Riparian Habitat and Vegetation remains unfilled by the Applicant's PSP. This primarily applies to evaluating riparian habitat and associated Project effects upstream of Englebright Dam, where the Applicant's proposed study 6-01 Riparian Habitat Above Englebright Dam fails to provide metrics and data collection methods to assess Project effects. Specific comments pertaining to Applicant's proposed riparian studies are detailed in sections below.

NMFS Request #6: Effects of the Project and Related Activities on the Loss of Marine-Derived Nutrients in the Yuba River:

NMFS contends the Project has the potential to exert direct effects on anadromous fishes in the lower Yuba River, and therefore cumulatively affects the escapement levels of fall-run and spring-run Chinook salmon. NMFS' Request #6 explained that upstream migration of anadromous salmonids followed by their death is important to replenish or "fertilize" streams and rivers, and the uptake of nutrients has been found to enhance the abundances of benthic "biofilm" and benthic macro invertebrates, the condition of juvenile salmon, riparian shrub and tree growth, birds, mammals, and other "receptors". NMFS explained this salmon-borne "fertilizer" improves the quality of anadromous spawning and rearing habitat, and thus the reproductive success of subsequent generations of salmon. Thus, NMFS requested evaluation (by "desktop" estimation) of the current annual mass of marine-derived nitrogen transported by fall-run and spring-run Chinook salmon to the lower Yuba River, and comparison to historic amounts to determine the trend or severity of recent losses. In the future, if Chinook salmon escapements continue their long-term decline, resource agencies may determine the lower Yuba requires "fertilization" due to nutrient deficits. NMFS explained that use of a manufactured salmon carcass analogue (Kohler et al. 2008) is one treatment option, and the results of Request #6 could inform and assist in monitoring the success of nutrient treatments.

NMFS also requested estimations of the loss (compared with historical amounts) of marine-derived nitrogen to the upper Yuba River, due to the lack of passage of spring-run Chinook to these areas. NMFS explained that investigations in the Pacific Northwest are finding that the inland transport of nutrients by salmon, and the deposit in rivers when they die, is an

"ecosystem service" that functions at the very base of the aquatic and terrestrial food webs. Given NMFS' resource goals and objectives to reintroduce anadromous fishes to the upper Yuba watershed, resource agencies may determine the upper Yuba requires "fertilization" due to years of nutrient deficits caused by blocked anadromous access. As stated above, the use of a manufactured salmon carcass analogue is one treatment option.

During a June 17, 2011, meeting with the Applicant, the Applicant appeared to object to the lower Yuba River evaluation on the basis of the lack of Project nexus. The Applicant appeared to object to the upper Yuba evaluation based on an assertion that Project facilities do not prevent upstream passage of anadromous fishes. NMFS disagrees, and states its reasoning in its Request #1 that Project facilities at Narrows 2 do not allow anadromous salmon to reach the upper Yuba because the waterway (from outfall to intake) that connects the upper Yuba to the lower Yuba is a path that cannot be surmounted by upstream migrating fishes, as explained more fully in the Request.

At this time, NMFS' Request #6 remains submitted before the Commission, and NMFS does not find adequate explanation for how the PSP addresses the known resource management goals of NMFS. 18 CFR § 5.11(d)(2).

NMFS Request #8: Anadromous Fish Ecosystem Effects Analysis: Synthesis of the Direct, Indirect, and Cumulative Effects of the Project and Related Facilities on Anadromous Fish:

<u>NMFS Response to Applicant's Comment</u>:

NMFS #8 Request for Information or Study *"Anadromous Fish Ecosystem Effects Analysis: Synthesis of the Direct, Indirect, and Cumulative Effects of the Project and Related Facilities on*

Anadromous Fish" was not adopted by the Applicant. Instead, the Applicant has proposed to study "ESA/CESA-Listed Salmonids Downstream of Englebright Dam" (Study 7.8). This proposal by the Applicant is not sufficient to satisfy NMFS' request. The Applicant's study does not synthesize the abiotic factors studied in the ILP (water resources, soils, etc.) that together affect salmonids and their habitat in the Yuba River. NMFS' Request #8 was specifically designed to use the information developed in the other NMFS requests or other available sources to evaluate the Project's effects on these abiotic resources and their resulting effects on salmonid populations. Nowhere in the Applicant's study 7.8 does it propose to investigate the Project's effects on stream flow, temperature, sediment, riparian vegetation or woody debris, as they pertain to their effects on anadromous fish populations. Furthermore, the Applicant's study does not propose to integrate results of studies proposed in the ILP, but rather just synthesize existing RMT data. Most of the monitoring and evaluation data collected by the RMT was not specifically collected for the purpose of characterizing cumulative Project effects on anadromous populations, but rather for monitoring and evaluation of the Yuba Accord. Merely synthesizing existing data collected for another purpose will not demonstrate the Project's effects on anadromous populations.

In addition, NMFS hereby by adds the following components to NMFS Study Request #8 as a means to identify, understand, and assess conditions in the immediate vicinity of the Narrows II power plant, and how the facilities and operations impact anadromous fish.

New: Addendum to NMFS Study Request #8:

NMFS' Request #8 *"Anadromous Fish Ecosystem Effects Analysis: Synthesis of the Direct, Indirect, and Cumulative Effects of the Project and Related Facilities on Anadromous Fish"* was

submitted to FERC in NMFS' filing of March 7, 2011. It called for the Applicant to compile and synthesize information generated from each of the other NMFS study or information requests, and to integrate all information in an assessment of ecosystem functions and habitat conditions for anadromous fish.

NMFS hereby adds the following Addendum to Study Request #8 in order to identify Project effects on aquatic species and the ecosystem functions on which they depend:

Request Element #8.1: Information or Study of Hydraulic Conditions near Project facilities:

Information to identify, quantify, and qualify hydraulic conditions in the vicinity of the hydroelectric power generation facilities including: all intakes, tunnels, pipes, flumes, penstocks, turbines and turbine housings, draft tubes, surge tanks or basins, and discharge outfalls. In particular, the Narrows 2, Our House, Colgate and Bullards Bar Dam facilities should be studied for actual or potential impacts on fish and other aquatic organisms. The primary purpose of this study request is to evaluate whether or not fish of all life stages are affected by Project facilities during operations - including transient operations involving start ups or shutdowns. These effects must be assessed in both the upstream and downstream directions. Another purpose is to examine whether other organisms in the food web are affected by the Project, and if so: how are these impacts manifested from an ecosystem integrity perspective? Entrainment studies should be undertaken as part of this request to identify the level of entrainment into the project, and the subsequent impacts to fish. Studies of conditions within the plant facilities and outfalls are necessary to understand whether entrainment is occurring in the upstream direction; thus

requiring the addition of protective devices (e.g.- tailrace barriers) or operational measures to reduce or eliminate these impacts.

Request Element #8.2: Information about Fish Presence and Behavior from downstream of Project facilities to upstream of Project facilities.

Information about the presence, absence, timing and abundance, and migration behaviors of anadromous fish in the reaches in the vicinity of all Project facilities. For example, the study area for the Narrows 2 Powerhouse should include: (i) the immediate vicinity of the Narrows 2 draft tube and outfall structure, (2) area upstream of Narrows 2 inclusive of the full-flow bypass facility, and up to the base of Englebright Dam, (3) downstream of the Narrows 2 outfall in the Narrows reach to a selected point downstream of Sinoro Bar, inclusive of the Narrows 1 project outfall. Other Project facilities should be included in this information/study request based on a similar stream reaches to detect potential fish and ecosystem impacts in the immediate vicinity of Project outfalls, plus a representative reach in the upstream and downstream directions. For reservoir reaches located upstream of the Narrows 2 intake, information should be developed to quantitatively determine the composition and behavior of existing fish and aquatic organism species. This information should later be correlated with habitat-based information from other requests so that it is possible to perform an integrated ecological analysis.

For the Narrows 2 reach, in particular, NMFS requests a detailed investigation of anadromous and resident fish in the vicinity of the Project facility. This information is needed because it is central to the understanding of the response of anadromous and resident fish to conditions presented by Project facilities and operations, a key aspect necessary for formulating protection, mitigation, and enhancement measures.

A fish survey in the Narrows Reach, Colgate, Our House, and Bullards Bar reaches is requested by NMFS in order to understand fish presence and behavior, and to determine whether (and how) the Projects have effects on the species. The survey should employ DIDSON technology to scan for, identify, and enumerate fish and fish behaviors in the identified river reaches over periods of time that best coincide with expected presence of migratory fish. Use of conventional underwater cameras and diving or snorkeling may also be employed in addition to DIDSON, or in lieu of DIDSON where conditions warrant, e.g.- below Bullards bar dam because of the extremely low flow releases at that point. Multiple investigations (during seasons when anadromous fish are expected to be present) should be conducted in the near vicinity of the Narrows 2 outfall and upstream to the base of Englebright Dam, New Colgate outfall and upstream, "Fish Flow Powerhouse" outfall (base of Bullards Bar Dam), the confluence area of Middle Yuba with North Yuba River, and at Our House and Log Cabin Dams reservoirs and adjacent stream reaches .

Request Element #8.3: Physical Aspects at Narrows 1, Narrows 2, Englebright Dam, New Colgate Powerhouse, New Bullards Bar Dam, Our House and Log Cabin Dams that Affect Fish and Ecosystem Integrity.

8.3(a) Hydraulic Studies

The objective is to obtain hydraulic mapping of streams in the vicinity of each major Project facility so that the Project's environmental impacts on fish and the ecosystem can be assessed. This, in turn will help inform appropriate protection, mitigation, and enhancement measures. This specifically includes detailed information and/or studies of velocity, turbulence, and

temperature in the immediate vicinity (upstream and downstream) of the Narrows 1, Narrows 2, and New Colgate tailraces as compared to surrounding channel characteristics. In particular, the hydraulic conditions adjacent to the Narrows 2 tailrace and the area leading up to the base of Englebright Dam shall be carefully mapped and described in terms of hydraulic characteristics that may affect fish behavior, e.g.- velocity, turbulence, temperature gradients, seasonal flows and "flow splits" between Project discharge and natural stream flows. Narrows 1 is included because it is important to understand fish migration and behavior relative to this important downstream discharge, and whether fish are blocked from passing further upstream under all operating conditions. In addition, it is recognized that the operations at Narrows 1 are coordinated with the Project's Narrows 2 Development. One reason for hydraulic studies near Project facilities (intakes, internal conduits, and discharges) is to establish physical and temporal profiles describing the hydraulic environment that may affect the migratory ability and/or behavior of anadromous fish, e.g.- temperature and water quality variations, flow cues, turbulence-related barriers, etc.

8.3 (b) Channel Bathymetry and Stage-Discharge Relationships

This request involves a bathymetry survey and characterization in vicinity of all major Project facilities, as compared with likely stage-discharge relationships under the range of operating scenarios, and a time-frequency analysis that compares conditions to fish passage windows for adult spring-run Chinook, steelhead, or resident trout (*O.mykiss)*. The required information will provide a comparison of channel dimensions and locations relative to migration routes. Definition of channel characteristics (i.e.- widths, depths, velocities, temperatures) in key locations will enable an assessment as to whether or not the Project inhibits or maintains the continuity of upstream and downstream fish passage. For example, under what conditions and

with what frequency, if any, do fish swim past the Narrows 2 or Colgate power plant discharges? In addition to the other upstream Project facilities, channel widths and depths should be taken at multiple transects at the following locations: (1) upstream and downstream of Daguerre dam and water diversions (identified as indirect Project effects), (2) Narrows 1 &2, (3) Colgate, and (4) "Fish Flow" (Bullards) powerhouse facilities, as well as the area at the base of the Englebright, New Bullards Bar, and Our House dams. Channel widths, depths and temperatures need to be surveyed and recorded in the narrow channel and small pool immediately upstream of Narrows 2 during summer and early fall seasons. Similar surveys need to be undertaken at the other Project facilities where water is dammed and diverted from its natural course of flow. These studies are needed to assess physical /hydraulic fish habitat conditions as they are affected by the Project facilities.

8.3 (c) Tailrace Barrier Protection Requirements

This request involves an engineering study of the facility designs and review of prevailing operational conditions at the tailrace/outfall of the Narrows 2 and New Colgate powerhouses, and bypass outfalls. The objective is to understand the historical incidence, or potential future likelihood, of fish stranding, mortality or injury - resulting from "false attraction" into the power plant structures. All plant operating or maintenance records should be made available for inspection in this ILP proceeding, particularly any records that relate to the presence of fish inside Project facilities, or documentation of capture or attraction within the Project facilities. This study will inform the need for design and construction of tailrace barriers or other improvements that were not incorporated into original facility designs. Such measures have become standard upgrades at other hydroelectric facilities. The Commission should call for

analysis of the need for tailrace barriers as a protective measure for all fish and wildlife species that may be susceptible to injury or mortality by power plant structures and operations.

Request Element #8.4: Reservoir fish habitat conditions upstream of Englebright, Bullards Bar, Our House, and Log Cabin Dams:

It is important to assess conditions both upstream and downstream of Project facilities in order to understand and mitigate impacts to fish and other aquatic organisms. For example, reservoir conditions are very different from the natural riverine conditions and require a study of physical relationships of dam, reservoir and shoreline topography/ bathymetry to determine how these alterations affect the ecosystem in which the Project operates.

Information in the following categories should be collected:

- Temperature profiles – detailed profiles in the vicinity of existing New Colgate, Narrows 1 and Narrows 2 Development hydropower intakes,; and at the Our House Dam water diversion point, and throughout the Project reservoirs.
- Bathymetry profiles – detailed profiles in the vicinity of existing New Colgate, Narrows 1 and Narrows 2 Development hydropower intakes, and at the Our House Dam water diversion point, and throughout the Project reservoirs;
- Hydraulic profiles – detailed profiles in the vicinity of existing New Colgate, Narrows 1 and Narrows 2 Development hydropower intakes, and at the Our House water diversion point, and throughout the Project reservoirs.

Request Element #8.5: Fish Habitat Conditions in the Vicinity of New Colgate Powerhouse to New Bullards Bar Dam

Comprehensive study of physical, chemical, hydraulic, and ecological conditions beginning at approximately one mile downstream of the Colgate powerhouse, and continuing to the base of Bullards bar and Our House Dams (significantly dewatered reaches) . The study is to include a detailed analysis of temperature and hydraulic profiles, i.e.- velocity, turbulence, temperature gradients. It also includes a comparative analysis of the conditions at locations where flow has been significantly altered from its natural in-stream flow patterns. These studies will identify how the Project facilities and operations affect fish, fish habitat conditions, and the ecosystem functions on which fish depend.

Request Element #8.6: Fish Habitat Conditions in the Middle Yuba River

Study of anadromous fish habitat and ecosystem conditions from the confluence of the Middle Yuba River with the North Yuba River, and moving upstream to assess conditions upstream of Our House Dam. This study is needed to assess how Project facilities and operations affect fish habitat conditions, and the ecosystem functions on which fish depend.

Request Element #8.7: Fish Habitat Conditions in the Bullards Reservoir

Study of fish habitat conditions in the New Bullards Bar reservoir and upstream to the north Yuba River, including confluences any major intervening tributaries or water diversions. Fish habitat assessment and characterization is part of this information/study request. This study is needed to assess how Project facilities and operations affect fish habitat conditions, and the ecosystem functions on which fish depend.

Part Two:
NMFS Comments on Applicant's Proposed Study Plan (PSP)

Applicant Study 1-01 Channel Morphology Upstream of Englebright Dam:

NMFS and other relicensing participants have been actively engaging with the Applicant to modify the proposed Study Plan 1-01 Channel Morphology Upstream of Englebright Dam. As a result, a new redlined version of Study Plan 1-01 dated June 17, 2011 is currently available on the Project's relicensing website. NMFS assumes that the new elements of this red-lined study plan will be included in the Applicant's revised study plan, and NMFS comments below pertain to the version of the study plan dated June 17, 2011.

General Comments:

On page 6 of the Proposed Study Plan 1-01 the Applicant implies that Project has minimal capacity to affect channel morphology and geomorphic processes because of the bedrock influence of the Study Area: "*Bedrock channels are generally insensitive to short-term changes in sediment supply or discharge. Only a persistent decrease in discharge and/or an increase in sediment supply sufficient to convert the channel to an alluvial morphology would significantly alter bedrock channels (Montgomery and Buffington 1993).*" While bedrock does exert lateral and vertical controls on valley and sometimes channel geometry in the Study Area, the Study Area is not a pure bedrock channel and should be classified as a mixed bedrock-alluvial system. This classification is evidenced by a mantle of alluvial sediment (e.g., cobbles, gravels, and small boulders) covering the underlying bedrock throughout the Study Area and the persistence of point bars and other sediment depositional features throughout the Study Area. This distinction is important because in mixed bedrock-alluvial systems stream energy is generally high and any modifications to the natural sediment supply and transport capacity can dramatically alter the

quantity and caliber of alluvium transporting and depositing in the channel. The implication that the Project can only induce small, localized changes in channel morphology is inaccurate and preempts study results and should be removed from the study plan.

Specific Section Comments:

Section 5.3.2.4 Particle Size

This section describes methods for sampling the surface and subsurface material. This section defines the depth of the subsurface sample as equal to the depth of the surface sample, which is defined by the depth of the largest particle on the surface. Because the size of the largest particle on the surface is unknown and the desired sample locations are in mobile, smaller sediment patches, this definition for the depth of the subsurface sample is inadequate to always ensure a representative sample. Thus the subsurface sample depth should always have a minimum sample depth, such as 150 mm (6 inches), in case the largest surface particle is less than 150 mm. This definition should not represent a significant burden to the Applicant since they are proposing to sub-sample the subsurface material necessary to pack out for additional lab analysis.

Section 5.3.2.14 Large Woody Debris

This section states that the Applicant has previously collected LWD data as part of the habitat mapping in their Attachment 3.10A to Instream Flow Above Englebright Study Proposal, and no further LWD data will be collected upstream of Englebright. As discussed above in responses to NMFS Study Request #5, NMFS views the LWD data previously collected as insufficient to characterize the LWD resource within the Project affected area, or potentially to characterize the Project's effects on Essential Fish Habitat. A primary reason for the inadequacy of the previously collected LWD data is the minimum length threshold used to define whether a

specific LWD piece was counted in the survey, i.e. a piece of LWD had to be greater than ½ times the bankfull width to be counted in the survey. Thus in some reaches of their survey a piece of LWD had to be greater than 50 ft. long to be included in the survey, which is typical of the longest of pieces found in an alluvial system. NMFS outlined in its Study Request #5 "Effects of the Project and Related Activities on Large Wood and Riparian Habitat for Anadromous Fish" an appropriate study plan and methodology to quantify LWD and assess the Project's effects to this vital resource component of river channels ecosystems and essential fish habitat. NMFS continues to request that its Study Request #5 pertaining to LWD and riparian habitats be implemented in full.

Section 5.3.3.3 Estimate Changes in Mobility Bedload Transport under Regulated and Unimpaired Conditions

This section continues to use Log-Pearson III analyses of hydrology data to assess regulated and unimpaired bedload transport. Log-Pearson Type III analyses and statistics are inappropriate for assessing sediment transport frequency because these analyses are only based on the one largest flow event per year (regardless as to whether the largest flow is an instantaneous peak flow or based on the annual daily max flow) rather than documenting the number of days per year or frequency of time that sediment transport is occurring. In order to assess the frequency of sediment transport, hydrology statistics generated from the continuous daily flow series should be used, such as an annual flow duration curve. This is important for understanding the frequency and duration of sediment transport as well as annual sediment transport capacity.

Section 5.3.5 Data Analysis

The data analysis should include a comparison of sediment supply to sediment transport capacity (data parameters proposed to be collected) under unimpaired and existing conditions in order to assess the Project's effects on the mass balance of sediment supply and transport. This comparison should also be juxtaposed with results from the coarse sediment storage analysis. These final steps in the data analysis are necessary to synthesize study results, evaluate Project effects, and inform potential PM&E measures related to instream flow and gravel augmentation.

Applicant Study 1-02 Channel Morphology Downstream of Englebright Dam:

NMFS and other relicensing participants attended a meeting with the Applicant and members of the RMT on July 5, 2011 to discuss available data and ongoing studies within the Lower Yuba River that could be used in a study evaluating channel morphology and its relation to Project O&M downstream of Englebright Dam. Based on this meeting and previous feedback NMFS provided the Applicant regarding Study 1-02 Channel Morphology Downstream of Englebright, NFMS is expecting that a revised study plan will be forthcoming from the Applicant that contains substantially more detail pertaining to the data sources that will be used, the proposed methodologies for data analysis, and linkages for how data/analyses will be used to evaluate potential project effects. However, at this time a revised study plan (e.g., redline version) for channel morphology downstream of Englebright Dam is not available, and NMFS comments pertain to Study 1-02 in the PSP.

In broad terms, Study Plan 1-02 basically lists a suite of available or ongoing data sources from the RMT and previous studies which will be used to satisfy the data needs for Study 1-02 without further data collection. Table 5.3-1 provides a generalized list of the types of analyses

that will be performed; however, no detail is provided as to how these analyses will be conducted, which reaches will be analyzed, and in some cases which existing data sources will drive the analyses. For example there is discussion of a sediment transport model being applied to determine bed mobility and as part of the deliverables sediment transport input and output model files will be provided as an attachment. However, no description of the sediment transport model is provided as to what model will be used, which data will be used as input, nor where and in how many reaches will the model be applied. Without this information it is not possible to evaluate as to whether the proposed sediment transport model and analyses are sufficient to assess bed mobility and the Project's effects on the mass balance of sediment supply and transport and substrate grain size distributions. Another example of a resource area with insufficient detail in Table 5.3-1 is "Project Effects on Bedload Distribution", where the data listed to be used are "Channel Armoring" and the analysis consists of comparing LYR armoring ratios with published values to bracket the existing condition. However, no information is provided as to where and how the grain size samples will be or were collected, how many samples or sites will be analyzed, or how it will be quantified what the Project effects are to the grain size distribution (note, merely quantifying whether a sample site is armored or not does not address what the Project effects are to the grain size distribution). Because the Project effects high flows within the study area which in turn is a significant control on the bedload and substrate grain size distribution that provides crucial spawning habitat for anadromous fish, NMFS agrees that this a key issue to investigate but the Applicant provides insufficient detail in Study Plan 1-02 to evaluate whether their proposed methods will achieve the goal of determining "Project Effects on Bedload Distribution." Thus Study Plan 1-02 Channel Morphology Downstream of Englebright Dam does not comply with the criteria in CFR 18 § 5.11 (d)(5) and

explain how, or in some cases even what, their methodology follows accepted scientific practices.

NMFS and other relicensing participants have communicated several issues to the Applicant within Study Plan 1-02 that require additional detail, clarification, or inclusion into the study plan. The primary issues include:

- Description of the sediment transport model / analyses to be used for the bed mobility analysis, the input data used to drive the analysis, and description of where the analyses will be applied. Based on conversation in the July 5, 2011 meeting, NMFS believes the Applicant will propose to assess bed mobility over the entire Lower Yuba River using the available 2-D hydrodynamic model using a Shield's stress approach derived from an existing grain size distribution map. The approach is also anticipated to be applied to spawning gravel sized material. This information is necessary to Project effect's on bed mobility and develop potential PM&E measures related to instream flow regimes.
- In addition to the bed mobility analysis, the Applicant should assess at what flows geomorphic processes such as bar erosion and deposition occur and what discharges induce bank erosion and channel migration. Often, these are components of a properly functioning alluvial river system, and assessing whether the Project affects the frequency of these events is essential for determining if there are Project related impacts to channel morphology.
- An analysis of the rate at which sediment is exported or eroded from the LYR in relation to high flow regimes. Typically this can be thought of as sediment transport capacity, but in the LYR existing data is likely sufficient to actually analyze measured sediment erosion volumes. This information should be compared with existing sediment supply,

unimpaired sediment supply, and existing in-channel sediment storage volumes. As expected due to the termination of sediment supply at dams and the large volumes of stored mining sediment, the LYR is currently degrading and eroding into the stored sediment. This proposed analysis will assess the rate at which the LYR is exhausting the available in-channel sediment storage and the Project's effects on this rate due to flow alterations. This information is necessary for assessing potential Project effects and possible PM&E measures that could relate to instream flow regimes and/or gravel augmentation.

- An analysis of how the channel morphology is evolving as the LYR degrades into the existing sediment storage. For example, are bar surfaces becoming isolated from the active channel and functioning as terraces not inundated under typical high flows as the LYR degrades? How is the distribution of side channel habitats changing as the LYR degrades into the stored sediment?
- Additional description of how the Applicant will characterize the existing substrate grain size distribution in the LYR, with particular focus to grain sizes on potential spawning riffles. Additional description and analyses of how the Applicant will evaluate the Project's effects on grain size distributions due to high flow alteration.
- Additional descriptions and analyses of studies proposed to quantify LWD frequency and how LWD functions as a geomorphic control and forcing mechanism in the LYR. The Project affects the rate of LWD is supplied to the LYR due to entrapment at Project dams (note, LWD transports over Englebright Dam into the LYR) as well as alteration of high flows that could potentially transport LWD to and within the LYR.

Applicant Study 3-10 Instream Flow Above Englebright Reservoir:

In its requests for information or study, NMFS did not request an instream flow assessment upstream of Englebright Dam of the type in PSP 3.10 to assess anadromous fishes. PSP 3.10 plans to link depth and velocity-based models of physical habitat "suitabilities" for life stages of fish with a hydraulic model that simulates the availability of physical habitat across discharge (referred to hereafter as a "hydraulic-based habitat model"). Before a final 3.10 plan is established, NMFS recommends review of "Improving Environmental Flow Methods Used in California FERC Licensing" (Moyle et al. 2011), a report developed by the Center for Watershed Sciences at the University of California, Davis, under contract to the California Energy Commission. Both its Chapter 1.0, "Environmental Flow Assessments: A Critical Review and Commentary" and its Appendix A, "A Critique of PHABSIM" are especially relevant. NMFS is also suggesting the Applicant and FERC staff consider the key supporting literature referenced in the report, to examine the extent to which the Applicant's proposed study methodology is consistent with generally accepted practice in the scientific community. 18 CFR 5.11(d)(5).

In its Request #8, "Anadromous Fish Ecosystem Effects Analysis: Synthesis of the Direct, Indirect, and Cumulative Effects of the Project and Related Facilities on Anadromous Fish", NMFS recommends survival estimates and capacity estimates for each life-stage in habitats above Englebright Reservoir, to be incorporated into a population dynamics model. NMFS recommended the use of available population dynamics-based models such as RIPPLE (developed by Stillwater Sciences, Inc.) or SHIRAZ (developed at the University of Washington). To assess the upper Yuba River watershed potential to support Chinook salmon and steelhead populations, NMFS has contracted with Stillwater Sciences to develop a RIPPLE

model. NMFS anticipates the first model version will be available in the summer of 2011, and thus its early version cannot incorporate information developed from study in this Project ILP. Thus far, NMFS has worked with Stillwater Sciences to obtain all existing information the modelers deem would inform their model (from other licensing proceedings, the Upper Yuba River Studies Program, and other sources). In 2010, at the request of Stillwater Sciences, NMFS obtained field measurements of stream temperatures and hydraulic geometries in the North Yuba River to inform the model. NMFS encourages the Applicant to work with Stillwater Sciences to collect any additional information in the upper Yuba River upstream of Englebright Dam that would improve any future model versions that might be undertaken.

Applicant Study 6-01 Riparian Habitat Upstream of Englebright Dam:

The primary intent of the Applicant's Study 6-01 appears to primarily inventory existing riparian plants without any quantifiable metrics to assess the Project's effects on riparian habitat due to alteration of flow and sediment supply. The Study Goals and Objectives (Section 3.0) of the Applicant's Riparian Habitat Upstream of Englebright Dam are quoted in full below:

> *"The goal of this study is to assess the condition of riparian habitats within river reaches upstream of the United States Army Corps of Engineer's (USACE) Englebright Reservoir potentially affected by continued Project O&M.*
>
> *The objective of this study is to gather the data and information necessary to meet the study goals."*

The quantitative portion of the Applicant's proposal to study riparian habitats upstream of Englebright Dam primarily consists of compiling transects and cover plots of herbaceous and woody vegetation at five sites that are co-located with channel morphology study sites. There are a suite of proposed qualitative metrics on general riparian conditions that are listed to be

collected (e.g., evidence of riparian vegetative connectivity (or lack of) and hydrologic connectivity (or lack of)), but none of them contain any specific methodologies, metrics, or data parameters, and thus they fail to comply with CFR 18 § 5.11 (d)(5) and appear to be subjective evaluations without data collection or analyses that would allow for evaluation of project effects and development of potential PM&E conditions. There are no proposed quantifiable metrics to evaluate potential Project effects on riparian habitat and structure, despite that there is a clear nexus between the Project's O&M that impacts the hydrology and sediment supply (both quantity and size) to reach's downstream of Our House, Log Cabin, and New Bullards dams, which in turn has the potential to impact riparian habitat and the surfaces that riparian vegetation establish on. The Applicant's Proposed Study 6-01 does not explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on riparian vegetation and associated physical processes, and thus the study plan does not comply with CFR 18 § 5.11 (d)(4).

There are several key components to evaluating potential riparian effects that the Applicant's Study Plan 6-01 does not address; however, NMFS notes that the Applicant for the most part does address these components for reaches downstream of Englebright in Study Plan 6-02. Specifically, Study Plan 6-01 does not quantify the following: 1) the frequency of overbank flows that can facilitate riparian seedling establishment under current and unimpaired conditions; 2) assessment of altered hydrology due to Project operations and its relation to riparian stand condition, structure, and composition; 3) assess whether the quantity (both frequency and areal extent) of surfaces available for riparian vegetation establishment has been affected by Project operations that impact the coarse sediment supply; 4) does not describe how riparian vegetation has changed through time (often done through aerial photograph comparisons); and 5) nor does the plan evaluate regeneration and germination processes and how

they relate to altered Project hydrology. The Applicant asked NMFS in a meeting on June 17, 2011 to evaluate whether their plan satisfied NMFS riparian information requests put forth in NMFS Study Request #5 *Effects of the Project and Related Activities on Large Wood and Riparian Habitat for Anadromous Fish*, and because the Applicant's proposed study plan does not address the information requests outlined above nor provide metrics for assessing Project effects, the Applicant's proposed study plan ***does not*** satisfy NMFS information request for riparian habitat. The Applicant's study plan for riparian habitat upstream of Englebright Dam would need to be modified to include these study components in order to satisfy the riparian component of NMFS Study Request #5.

As previously described, the Applicant's Study 6-02 designed to evaluate riparian habitat downstream of Englebright Dam contains many proposed metrics, data collection procedures, and analyses that are **not** included in their evaluation of riparian habitat upstream of Englebright Dam. The Applicant should be collecting comparable information to evaluate riparian habitat and potential Project effects to the resource both upstream and downstream of Englebright Dam. Riparian habitat is a critical component of essential fish habitat and the aquatic ecosystem upstream of Englebright Dam and the Project has the potential to alter riparian habitat upstream of Englebright Dam due to sediment supply and hydrology alteration. When comparing just the study objectives and goals of proposed studies 6-01 (upstream of Englebright) and 6-02 (downstream of Englebright), one can see that the riparian resource upstream of Englebright is not receiving the same level of evaluation as downstream.

While NMFS recognizes that riparian studies downstream of Englebright Dam have the advantage of utilizing data and tools (e.g., 2-D hydrodynamic model, extensive topographic

survey [DEM], and LiDAR data) developed by the RMT, this does not imply that similar parameters do not to be evaluated upstream of Englebright Dam. To evaluate similar riparian parameters upstream of Englebright Dam, the Applicant does not need to develop the same tools as are available for reaches downstream. For example, simpler, more cost-effective 1-D hydraulic models can be developed for site specific applications that can be used to assess the flows necessary for riparian habitat inundation and the frequency these habitats are inundated in existing and unimpaired conditions, as opposed to developing a comprehensive 2-D hydrodynamic model. Using a 1-D hydraulic model to assess riparian habitat inundation discharges are common approaches in other FERC licensing proceedings in California, for example the McCloud-Pit FERC No 2106 and Big Creek No. 3 and No. 4 Projects FERC No 120 and 2017.

On page 4 of the Proposed Study Plan 6-01 the Applicant seems to imply that Project has minimal capacity to affect the riparian resource because of the bedrock influence of the Study Area: "*Bedrock channels are generally insensitive to short-term changes in sediment supply or discharge. Only a persistent decrease in discharge and/or an increase in sediment supply sufficient to convert the channel to an alluvial morphology would significantly alter bedrock channels (Montgomery and Buffington 1993).*" While bedrock does exert lateral and vertical controls on valley and sometimes channel geometry in the Study Area, the Study Area is not a pure bedrock channel and should be classified as a mixed bedrock-alluvial system. This classification is evidenced by a mantle of alluvial sediment (e.g., cobbles, gravels, and small boulders) covering the underlying bedrock throughout the Study Area and the persistence of point bars and other sediment depositional features (that often have riparian vegetation established on them) throughout the Study Area. This distinction is important because in mixed

bedrock-alluvial systems stream energy is generally high and any modifications to the natural sediment supply and transport capacity can dramatically alter the quantity and caliber of alluvium transporting and depositing in the channel. The implication that the Project can only induce small, localized changes in channel morphology and associated riparian habitats is inaccurate and preempts study results and should be removed from the study plan.

Applicant Study 6-02 Riparian Habitat Below Englebright:

The Applicant's proposed study 6-02 Riparian Habitat Below Englebright provided in the PSP describes several methodologies and data collections necessary for adequately assessing the riparian condition and potential Project effects on the resource. Several of the study attributes that are included in the proposed study plan and are necessary for evaluating riparian habitat include: Greenline surveys, quantifying inundation frequency and duration, aerial photograph analyses of riparian vegetation changes through time, and understanding how erosion, deposition, or other substrate movement may effect riparian vegetation. NMFS primary concern with Study Plan 6-02 is the number of study sites specified in the proposed study plan. A key component of a riparian study should be collecting data from all representative geomorphic and riparian reach type as well as collecting sufficient data for replication and analysis.

The current 6-02 study plan calls for four study sites total, two sites in each of the two reaches in the LYR downstream of the Narrows as identified by Beak Consultants (1989): 1) from the Narrows to Daguerre Point Dam; and 2) from Daguerre Point Dam to the Feather River confluence. However, more recently the RMT has divided the LYR downstream of the Narrows into six distinct geomorphic reaches (three reaches upstream of Daguerre Dam and three reaches

downstream) based in part on channel gradient and valley width . Thus, at best the current proposed four study sites would only sample four of the six geomorphic reaches without any replication within a given reach. NMFS believes this is an insufficient number of study sites, and requests that the study plan be expanded to include 8 to 10 riparian study sites, with the total number and distribution within each geomorphic reach type selected in collaboration with relicensing participants.

Applicant Study 7.8 ESA/CESA-listed Salmonids Downstream of Englebright Dam

(For comparison see also: New Addendum to NMFS Study Request #8: discussion at p.22-29 above)

NMFS found the Proposed Study Plan (PSP) 7.8 deficient in meeting the content regulations (18 CFR 5.11(d)). 18 CFR 5.11(d)(1) requires the Applicant to describe the goals and objectives of each study proposal and the information to be obtained. This explanation is found in section 3.0, which states: "The overall goal of this study plan is to evaluate Project-related effects on salmonid populations in the Yuba River downstream of Englebright Dam." However, the specific objectives that follow do not explain how the Project effects are to be evaluated. For example, consider the first few objectives followed by NMFS' questions about how Project effects will be evaluated.

- Document the number, size and distribution of mesohabitats available for immigrating, holding and spawning adult salmonids and rearing juvenile salmonids.
    - What is the potential link between the Project (such as flow releases) and the size and distribution of mesohabitats? Is this to be assessed?

- Estimate annual run-sizes of spring-run and fall-run Chinook salmon, and steelhead/rainbow trout

    - The PSP explains no potential Project effect on the annual run sizes. How far downstream does the Project effect extend?

- Characterize the temporal and spatial distributions of immigrating spring-run and fall-run Chinook salmon, and steelhead/rainbow trout

    - How does the Project potentially affect the temporal and spatial distributions of immigrating spring-run and fall-run Chinook salmon, and steelhead/rainbow trout? For example, what does the available tracking information say about the Project's potential effects on immigrating spring-run Chinook, such as holding delays below Daguerre Dam or upstream and downstream movements during the summer holding period?

These are but a few brief examples of how the PSP is unclear about the use of the information to be collected.

18 CFR 5.11(d)(2) requires the Applicant to address any known resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied. The PSP treats this in its section 2.0, where the Applicant acknowledges NMFS' jurisdiction over the ESA-listed salmonids (and ESA-designated critical habitats) downstream of Englebright Dam (p. 1-2). However, simply stating which agency has jurisdiction over a resource does not explain how PSP 7.8 intends to address the resource goals and objectives of NMFS.

18 CFR 5.11(d)(3) requires the Applicant to describe the existing information concerning the subject of the study proposal, and the need for additional information. The Applicant asserts the Yuba River is highly studied, and provides Attachment 7.8A that lists available studies and reports. In most cases, it is not clear how the information will be used by the Applicant to evaluate the effects of the Project. There are several references to the Yuba Accord Monitoring and Evaluation Program's ongoing data collection, monitoring, and evaluation activities, but the PSP does not explain how this existing information will be used to determine Project effects and license conditions, or why new information under development is or is not required.

18 CFR 5.11(d)(4) requires the Applicant to explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied. As discussed above, PSP 7.8 does not explain how the Project potentially affects the resources to be studied. In section 1.0, the Applicant acknowledges that continued operation and maintenance of the Project has the potential to affect salmonid species. This explanation of nexus is insufficient. PSP 7.8 does not acknowledge or discuss the Project's obvious direct effects on stream flows, temperatures, substrate conditions, large instream wood or other abiotic conditions that affect habitat quality and availability for anadromous fishes. The Applicant's description of nexus does not explain <u>any</u> nexus between the Project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied. NMFS directs the Applicant and FERC to its Request #8, which was submitted in part to encourage the Applicant to devise a study plan that synthesizes the Project's many and disparate effects on abiotic elements (e.g., flows, temperatures, substrates, instream wood, etc.) in terms of their biological effects on anadromous fishes.

18 CFR 5.11(d)(5) requires the Applicant to explain how any proposed study methodology (including any preferred data collection and analysis techniques, or objectively quantified information, and a schedule including appropriate field season(s) and the duration) is consistent with generally accepted practice in the scientific community or, as appropriate, considers any known tribal interests. It is not clear in the PSP what data analysis techniques are to be applied to the large body of existing information listed in Attachment 7.8A.

Applicant Study 7.9 Green Sturgeon Downstream of Englebright Dam

NMFS understands that results of recent investigations of green sturgeon presence in the Yuba River (funded by the Anadromous Fish Restoration Program) are now available and the reports will be filed in this licensing proceeding. The U.S. Fish and Wildlife Service (Beth Campbell) recently communicated orally the preliminary results of 2011 videography that detected the presence of 4 to 5 adult green sturgeon in the pool directly downstream of Daguerre Dam. The behavior of some observed sturgeon suggests that spawning may be occurring at the location.

NMFS recommends investigations of additional life stages of green sturgeon in the lower Yuba River. At present, PSP 7.9 expends a great deal of effort to explain the paucity of evidence of green sturgeon in the Yuba River (and to some extent the Feather), and the lack of spawning activity outside of the mainstem Sacramento River. NMFS instead finds there is ample evidence of Yuba River use by green sturgeon, and recommends:

1) Continuation of video-based study to detect adults in the Daguerre Dam pool and in additional lower Yuba locations;
2) New study to detect juveniles, larvae or eggs;

3) Determination of the number and approximate area of deep (~ 10 feet) pools upstream of Daguerre Dam (to the base of the Narrows 2 powerhouse) that represent potential use by adult green sturgeon.

NMFS understands that ESA-related permits may be required for some additional study.

Applicant Study 7.10 Instream Flow Downstream of Englebright Dam

In its requests for information or study, NMFS has not requested an instream flow assessment downstream of Englebright Dam of the type in PSP 7.10. PSP 7.10 plans to link depth and velocity-based models of physical habitat "suitabilities" for salmonid life stages with a hydraulic model that simulates the availability of physical habitat across discharge (referred to hereafter as a "hydraulic-based habitat model"). Section 3.0 of the PSP briefly describes the existing information, and the Applicant's intent to improve upon currently completed hydraulic-based habitat models by using a SRH-2 hydraulic model under development by the RMT, and new habitat suitability criteria (HSC). Before a final 7.10 plan is established, NMFS recommends review of "Improving Environmental Flow Methods Used in California FERC Licensing" (Moyle et al. 2011), a report developed by the Center for Watershed Sciences at the University of California, Davis, under contract to the California Energy Commission. Both its Chapter 1.0, "Environmental Flow Assessments: A Critical Review and Commentary" and its Appendix A, "A Critique of PHABSIM" are especially relevant (NMFS understands the Applicant is not proposing in PSP 7.10 a PHABSIM model, but many of the comments in Appendix A about the development and use of HSC may apply). NMFS is also suggesting the Applicant and FERC staff consider the key supporting literature referenced in the report, to

examine the extent to which the Applicant's proposed study methodology is consistent with generally accepted practice in the scientific community. 18 CFR 5.11(d)(5).

One clear limitation of the approach of PSP 7.10 is the lack of detail about how its results will be linked with information proposed to be collected in PSP 7.8 "ESA/CESA-Listed Salmonids Downstream of Englebright Dam". Specifically, PSP 7.10 methods do not link flow versus habitat availability relationships with population dynamics, or with assessments of population viability. This deficiency reflects common criticisms of hydraulic-based habitat models, that they exclusively emphasize physical habitat (mostly depth and velocity conditions), do not address the other factors that determine fish abundances, and do not relate habitat to population numbers of target species. Identifying the main factors limiting a population involves considerations of population dynamics, and the relative effects of many influences in addition to hydraulic habitat conditions, (e.g., water temperatures, water quality, competition, predation, hatchery influences, harvest management, fish passage restrictions, etc.) on the population sizes. Model outputs of weighted usable habitat area versus discharge will yield information that could inform an integrated life-cycle model that incorporates population dynamics (see NMFS' Request #8, Element #7), but on its own yields only habitat area information. Put another way, it is recognized that habitat affects fish populations through its effects on births, deaths, and migration; not directly (Moyle et al. 2011; Anderson et al. 2006; Lancaster and Downes 2010). This suggests that increasing the detail of a 2-D hydraulic model and developing additional HSC relationships, as proposed in PSP 7.10, won't greatly improve the information in the recent existing models, which itself is not incorporated in a way that determines Project effects on anadromous fish populations.

The construction of full life-cycle salmonid models is difficult, and NMFS acknowledges this point. Probably for this reason, freshwater ecologists are advocating shifting the focus of flow management in regulated rivers away from habitat provisions for target species and towards preserving viability of the larger river environment (Anderson et al. 2006). This is discussed in Moyle et al. (2011) (p. 42) as a "top-down" approach – that focuses on how much flow regime change from a natural state can occur without causing without undue change or harm. In other words, the approach recognizes that only a flow regime that remains unimpaired can preserve the native condition, so start from "the top" and determine how much modification can occur without loss of system viability (including the viability of anadromous salmonid populations). Based on recent literature reviews and analyses of regulated rivers in the U.S., a top down approach may be warranted. For example, Poff and Zimmerman (2010 reviewed 165 published papers and characterized flow alteration in terms of magnitude, frequency, duration, timing and rate of change, while fish responses were characterized according to type of response (abundance, diversity, etc.). Of the 165 papers, 152 (92%) reported decreased values for recorded ecological metrics in response to a variety of types of flow alteration. Fifty-five of the 165 papers had information suitable for quantitative analysis of ecological response to flow alteration. Fish abundance, diversity and demographic rates consistently declined in response to both elevated and reduced flow magnitude. The analyses support the inference that flow alteration is strongly associated with ecological change, and that the risk of ecological change increases with increasing magnitude of flow alteration. The review highlights the importance of natural streamflow regimes to the maintenance of aquatic communities and ecosystems, and supports a "top down" approach where deviations from natural regimes are tested. Similarly, a recent multiregional investigation (Carlisle et al. 2011) assessed streamflow alteration at 2888

sites across the U.S., and found diminished flow magnitudes were the primary predictors of biological integrity for fish and macroinvertebrate communities. The review provides a multiregional-scale perspective on the importance of natural streamflow regimes to the maintenance of aquatic communities and ecosystems, which also supports the idea that a "top down" approach is prudent.

In contrast, a "bottom up" approach seeks to define what needs to remain in the river, a common approach in California (Moyle et al. (2011). This approach would (conceptually) start with no flows (the bottom), or an existing impaired state, and revise the flow regime upward as abiotic and biotic needs can be demonstrated. In the case of PSP 7.10, the depth and velocity requirements of the various salmonid life stages (to be determined through HSC development) are to be met (in part) by discharge amounts estimated through hydraulic modeling (with SRH-2). The result is an estimate of how much water the fish are determined to need to meet their habitat needs. In this approach, there is an implied confidence that meaningful HSC can be developed (for multiple species and life stages), a hydraulic model can be developed to accurately assess how much area (deemed hydraulically suitable) is available as a function of discharge, and the results can be used to determine the flow regime that should be constructed. Moyle et al. (2011) note bottom-up methods logically require high confidence in understanding what matters about the flow regime for the stream in question (p. 43). Regardless of their uncertainties, the results of hydraulic-based habitat models often dominate the decision-making regarding flow regime needs later in the licensing.

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Enclosure B

CERTIFICATE OF SERVICE

UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Yuba County Water Agency	)	**Project No. P-2246-058**
Yuba River Hydroelectric Project	)	
	)	

I hereby certify that I have this day served, by first class mail or electronic mail, a letter to Secretary Bose, Federal Energy Regulatory Commission, containing the National Marine Fisheries Service's comments on the Applicant's Proposed Study Plan pertaining to the Yuba River Hydroelectric Project. This Certificate of Service is served upon each person designated on the official P-2246 Service List compiled by the Commission in the above-captioned proceeding.

Dated this 18th day of July, 2011

Larry Thompson
National Marine Fisheries Service