



**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

March 7, 2011

In response refer to:
SWR/F/SWR3:LT/WF

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

Subject: NOAA's National Marine Fisheries Service's requests for information or study, comments on the applicant's Preliminary Application Document, and comments on the Commission's public scoping meeting and Scoping Document 1, Yuba River Development Project, Project No. 2246-058

Dear Secretary:

NOAA's National Marine Fisheries Service (NMFS) has reviewed the Preliminary Application Document (PAD) filed by the Yuba County Water Agency, applicant for a new license for the Yuba River Development Project, P-2246-058 (Project). NMFS preliminarily finds the PAD does not adequately identify, discuss, and summarize all the readily available information relevant to the existing environment, including for anadromous fishes or their habitats in the Yuba River; this information is required by regulation (18CFR §5.6) for the purpose of identifying issues of potential adverse Project effects to these resources.

A principal PAD deficiency occurs with respect to information about the upper Yuba River (upstream of the applicant's Narrows II facilities and Englebright dam). NMFS expected the PAD to contain thorough discussion of the Upper Yuba River Watershed Chinook Salmon and Steelhead Habitat Assessment (Assessment), prepared for the California Department of Water Resources, a comprehensive evaluation of potential salmon and steelhead habitat in the upper Yuba River. The Assessment presents the results of data collection, field studies, and modeling to characterize current upper Yuba habitat conditions, and assesses whether they are capable of supporting Chinook salmon and steelhead. The factors studied in the Assessment included the effects of hydropower, water supply, sediment, and flood management. Furthermore, NMFS expected the PAD to acknowledge the work done to date to develop a comprehensive plan for the reintroduction of anadromous salmonids to the upper Yuba River. Instead the PAD focuses on the situation in the lower Yuba River, thus excluding hundreds of miles of potential anadromous fish habitat from thoughtful consideration. The failure of the PAD to adequately identify, summarize, and discuss this information does not reflect the exercise of due diligence on the part of the applicant.



With respect to lower Yuba River information, NMFS expected the PAD to contain thorough discussion of existing information related to the Lower Yuba River Accord, and its Environmental Impact Statement- a seminal document that evaluated the environmental effects of this action downstream to the Sacramento-San Joaquin Delta. The Accord's "Fisheries Agreement" requires the applicant to maintain instream flows in the lower Yuba River to benefit Chinook salmon, steelhead and other resources. Since provision of such flows are strongly related to the applicant's Project's facilities and operations, this information should have been more thoroughly discussed in the PAD for the purpose of identifying issues of potential Project and Project related effects.

NMFS also requests that the Commission direct the applicant to place (file) all information *referenced and cited* in the PAD into the record for this proceeding. This includes, but is not limited to, all information related to the Upper Yuba River Studies Program, the Lower Yuba River Accord (including State Board Hearing), the Environmental Impact Statement for the Lower Yuba River Accord (the NEPA/CEQA document), and the Lower Yuba River Accord Monitoring and Evaluation Program of the River Management Team, and all results of their preliminary or completed studies. This is necessary because, in a recent 10(j) meeting, Commission staff have held that all documents to be considered by the Commission must be filed on the docket in each particular proceeding. We ask the Commission to clarify this point as a matter of procedure, but in the mean time we believe it is prudent to ask the applicant to file all documents that bear on ILP decisions for the Yuba River Development Project.

NMFS also files herein its comments on Scoping Document 1 (SD1), issued by the Commission on January 4, 2011, and the public scoping meeting attended by NMFS on February 2, 2010. Of particular concern to NMFS is the geographic scope necessary in both the upstream and downstream directions to adequately evaluate and synthesize the anadromous ecosystem effects of the Project and related activities. NMFS' comments should be reviewed concerning the need for the geographic scoping to extend into the upstream reaches of the upper Yuba River, as well as downstream through the lower Yuba, the lower Feather, the Sacramento River, the Sacramento-San Joaquin River Delta, and to the San Francisco Bay.

NMFS comments address the anticipated need for consultations under section 7 of the Endangered Species Act 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 Commission scoping.

Lastly, NMFS files herein its requests for information or study of the effects of the Project and related activities on anadromous fishes and their habitats. NMFS urges the applicant to consider the requests in the context of adequate scoping, and propose a Study Plan capable of determining the Project's ecosystem effects on the resources to be studied – anadromous fishes and habitats in the Yuba River watershed and downstream.

At this time, NMFS withholds comment on the applicant's proposed study plan elements (PAD, Section 10) because it intends to follow the Integrated Licensing Process (ILP) schedule in SD 1, and file when comments on the applicant's Proposed Study Plan are due. The ILP (18 CFR Part 5) is designed to allow time for interested party involvement through (in chronological order):

1) PAD review; 2) Project site visit; 3) SD1 review; 4) input and discussion at public scoping meeting(s); 5) comment on PAD and scoping; and 6) submission of information or study requests. NMFS' understanding is the ILP is designed for input prior to development of a Proposed Study Plan by the applicant – to allow multiple views regarding identification of issues and concerns related to the Project. Possible circumvention of this ILP is a concern to NMFS.

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

Sincerely,

A handwritten signature in black ink, appearing to read "R. Wantuck", with a stylized flourish at the end.

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

**COMMENTS OF NOAA's NATIONAL MARINE FISHERIES SERVICE
ON ITS STATUTORY AUTHORITIES AND RESPONSIBILITIES,
AND THE STATUS OF ANADROMOUS FISHES IN CALIFORNIA
AND THE YUBA RIVER**

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

Yuba County Water Agency)
Yuba River Hydroelectric Project)
_____)

FERC Project No. P-2246-058

1.0 Introduction

The U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NMFS) has reviewed the Preliminary Application Document (PAD) filed by the Yuba County Water Agency (YCWA or Applicant) for the Yuba River Development Project, FERC No. 2246 (Project). NMFS also reviewed the Scoping Document (SD1) issued by the Federal Energy Regulatory Commission (Commission or FERC) on January 4, 2011. NMFS attended the FERC-arranged Project site visit on February 1, 2011, and the Commission's public scoping meeting held February 2, 2011, where oral comments were provided for the licensing record. Under the timelines established in this Integrated Licensing Process (ILP), NMFS provides herein its comments on the PAD, comments on the Commission's public scoping meeting and SD1, and its requests for information or study.

The Project is located within the North and Middle Yuba Rivers, the main stem Yuba River upstream of Englebright Dam, and on the lower Yuba River downstream of Englebright Dam. Hereafter, use of “upper Yuba” refers to the Yuba River watershed upstream of Englebright Dam, and use of “lower Yuba” refers to the watershed downstream of Englebright Dam. The lower Yuba is an anadromous fish bearing stream and the upper Yuba contains potential anadromous habitats identified as “essential” for Chinook salmon.

On July 15, 2009, NMFS attended an “initial” meeting (prior to commencement of the ILP) with the Applicant, resource agencies, and other interested parties in Marysville, California. At the meeting, NMFS identified the following anadromous resources present in the lower Yuba River, and protected under the Endangered Species Act (ESA) (hereafter collectively referred to as ESA resources):

- 1) Central Valley (CV) spring-run Chinook salmon evolutionarily significant unit (ESU) (*Oncorhynchus tshawytscha*), threatened (June 28, 2005, 70 FR 37160);
- 2) CV spring-run Chinook salmon designated critical habitat (September 2, 2005, 70 FR 52488);
- 3) CV steelhead distinct population segment (DPS) (*O. mykiss*), threatened (January 5, 2006, 71 FR 834);
- 4) CV steelhead designated critical habitat (September 2, 2005, 70 FR 52488);
- 5) Southern DPS of North American green sturgeon (*Acipenser medirostris*), threatened (April 7, 2006, 71 FR 17757);
- 6) Southern DPS of North American green sturgeon designated critical habitat (October 9, 2009, 74 FR 52300);

NMFS also identified the following anadromous resources present in the lower and upper Yuba, and protected under the Magnuson-Stevens Fisheries Conservation and Management Act (MSA)

(hereafter collectively referred to as MSA resources):

- CV spring-run and CV fall/late fall-run Chinook salmon identified “essential fish habitat” (EFH), (October 15, 2008 73 FR 60987).

NMFS identified the presence of an anadromous resource in the lower Yuba that is not listed under the ESA, but is a Federal Species of Concern (those species about which NMFS has concerns regarding status and threats, but for which insufficient information is available to indicate a need to list the species under the ESA):

- CV fall/late fall-run Chinook salmon ESU, Species of Concern (April 15, 2004, 69 FR 19975; October 17, 2006, 71 FR 61022).

Based on NMFS’ review of information in the Applicant’s PAD, it now also identifies the anadromous Pacific lamprey (*Lampetra tridentata*) as present in the lower Yuba.

Additional ESA resources, MSA resources, and other anadromous fishes and habitats that occur downstream in the Feather River, Sacramento River, Sacramento-San Joaquin Delta, and San Francisco Bay may also be affected by the Project.

2.0 NMFS’ Statutory Authorities and Responsibilities

NMFS has statutory responsibility for the protection and enhancement of living marine resources, including anadromous fishes and their supporting habitats, under the Endangered Species Act (ESA), 16 U.S.C. §1531 et seq., Magnuson-Stevens Fisheries Conservation and Management Act (MSA), 16 U.S.C. §1801 et seq., Fish and Wildlife Coordination Act, 16 U.S.C. §661 et seq., and

Reorganization Plan No. 4 of 1970, 84 Stat. 2090. NMFS has the authority to prescribe fish passage at licensed projects under the Federal Power Act (FPA) §18, and the duty to provide recommendations for the protection, mitigation of damage to, and enhancement of fish and their habitats under FPA § 10(j). NMFS submits these comments pursuant to its authorities under these statutes.

In NMFS' *Public Draft Recovery Plan for Sacramento River Winter-run Chinook Salmon, Central Valley Spring-run Chinook Salmon, and Central Valley Steelhead* (Draft Recovery Plan) (NMFS 2009), both the upper and lower Yuba River are identified as locations important for the recovery of CV spring-run Chinook salmon and CV steelhead. The Draft Recovery Plan's conceptual recovery scenarios include potential reintroductions of these species to the upper Yuba, into Primary candidate watersheds of the North Yuba, Middle Yuba, and South Yuba rivers. Recovery actions have been categorized into eleven geographic scales or regions. In the Yuba River (which lies within the Northern Sierra Diversity Group), the development and implementation of the following recovery actions are identified to re-colonize historic habitats above the Project's facilities and Englebright Dam:

- 1) Enhance habitat conditions, including providing flows and suitable water temperatures for successful upstream and downstream passage, holding, spawning and rearing; and
- 2) Improve access within the area above Englebright Dam, including increasing minimum flows, providing passage at Our House, New Bullards Bar, and Log Cabin dams, and assessing feasibility of passage improvement at natural barriers.

ESA and MSA consultation between NMFS and the Commission will be required regarding the potential effects of the Project licensing. As recovery planning proceeds, additional consultation will be necessary regarding the reintroduction of spring-run Chinook and steelhead to areas of the upper Yuba.

3.0 Current State of Anadromous Fishes

NMFS has found that impacts from dams and hydropower development have contributed substantially to the decline of ESA-listed anadromous fishes NMFS has found that impacts from hydropower development have contributed substantially to the decline of ESA-listed anadromous fishes (March 9, 1998, 63 FR 11482; March 19, 1998, 63 FR 13347; September 16, 1999, 64 FR 50394; June 14, 2004, 69 FR 33102; June 28, 2005, 70 FR 37160; January 5, 2006, 71 FR 834; April 6, 2005, 70 FR 17386; April 7, 2006, 71 FR 17757; and October 9, 2009, 74 FR 52300). Dams and hydropower development have also contributed to the decline of CV fall and late fall-run Chinook salmon (April 15, 2004, 69 FR 19975). The effects of dams on passage, flow conditions, habitat, water quality, and other effects on anadromous resources directly concern NMFS under the statutory authorities listed above.

The California Advisory Committee on Salmon and Steelhead Trout was created in 1983 to develop a strategy for the conservation and restoration of salmon and CV steelhead resources in California. The Salmon, Steelhead Trout, and Anadromous Fisheries Program Act of 1988 was signed by the Governor of California to implement the advisory committee's recommendations, which included doubling the natural production of salmon and CV steelhead as of 1988. The Steelhead Restoration and Management Plan for California (CDFG 1996) summarized this Act as follows:

Proper salmon and steelhead resource management requires maintaining adequate levels of natural, as compared to hatchery, spawning and rearing. Reliance upon hatchery production of salmon and steelhead is at or near the maximum percentage that it should occupy in the mix of natural and artificial hatchery production in the State. If both hatchery production and natural production are feasible alternatives for increasing salmon and steelhead numbers in specific situations, preference shall be given to natural production.

CV spring-run Chinook salmon and CV steelhead have been eliminated or nearly eliminated on several CV rivers. The lack of fish passage has altered the genotype of CV spring-run Chinook salmon due to hybridization with CV fall-run Chinook salmon, and has likely caused alterations in CV steelhead.

Meyer Resources Inc. (1988), together with the Steelhead Restoration and Management Plan for California (CDFG 1996), conducted an analysis of the economic benefits that would result from doubling California's salmon and steelhead stocks. These works estimate that the net annual economic benefit for the Sacramento and San Joaquin rivers would be \$101.4 million, and state that the restoration of access to historic habitat should receive the highest priority for funding. NMFS concurs with the findings of the California Advisory Committee on Salmon and Steelhead Trout, the Salmon, Steelhead Trout, and Anadromous Fisheries Program Act, and the Steelhead Restoration and Management Plan for California, that natural production should be given preference over hatchery production.

These anadromous fishes are now limited to relatively few miles of valley main stem rivers, though they were historically dispersed over many miles of upper main stems and tributaries (Yoshiyama, et al. 2001). Temperatures on the valley floor are also significantly warmer in the late fall and winter, so that fishes likely hatch and rear earlier than in their natural habitats (CDWR 2005). Valley floor habitats contain fewer features that anadromous fish require, e.g., overhanging vegetation, woody debris, and hydraulic complexity. Juvenile rearing habitat is more open and interconnected, so that available forage is competed for by many conspecifics, as well as the greater numbers of CV fall-run

Chinook salmon juveniles. Due to competition for forage, juveniles may migrate downstream at a smaller size, potentially increasing the risk of predation (CDWR 2005).

The U.S. Fish and Wildlife Service's Anadromous Fish Restoration Program (AFRP) established the following "doubling goal" for CV Chinook salmon (USFWS 2001):

"...develop within three years of enactment and implement a program which makes all reasonable efforts to ensure that, by the year 2002, natural production of anadromous fish in Central Valley rivers and streams will be sustainable, on a long-term basis, at levels not less than twice the average levels attained during the period of 1967-1991."

To estimate achievement of this goal, the AFRP established a baseline (1967-1991), the doubling target, estimated average recent (1992-2009) production, and computed the percent difference from baseline. Only 9 of the 35 areas (25%) evaluated showed positive gains compared to baseline, let alone a doubling. For the Yuba River, a preliminary production target of 66,000 CV fall-run Chinook was established, but the recent (1992-2009) average is 33,658 fish, a negligible 1% increase over the 1967-1991 baseline of 33,267 (AFRP web site: <http://www.fws.gov/stockton/afrp/>). In addition, Yuba River escapement data indicate steep declines in 2007, 2008, and 2009, consistent with the valley-wide declines in Sacramento Central Valley Chinook (Lindley et al. 2009).

NMFS' goal is to promote a viable population of spring-run Chinook in the Yuba River.

Information in the PAD did not adequately estimate the viability (extinction risk) of the existing population. Lindley et al. (2007) provide criteria to assess CV Chinook salmon population status based on population size, recent population decline, occurrences of catastrophes within the last 10 years that could cause sudden shifts from a low risk state to a higher one, and the impacts of hatchery influence. Populations with a low risk of extinction (less than 5% chance of extinction in

100 years) are those with a minimum total escapement of 2,500 spawners in 3 consecutive years (mean of 833 fish per year), no apparent decline in escapement, no catastrophic declines within the last 10 years, and a low hatchery influence. The overall estimated risk of extinction for the population is determined by the highest risk score for any category. Lindley et al. (2007). While more detailed population viability assessment (PVA) models could be constructed to assess Chinook salmon populations, Lindley et al. (2007) suggest any PVA results should be compared with the results of applying their simpler criteria to estimate status.

Considering the 4 criteria of Lindley et al. (2007), the lower Yuba spring-run Chinook salmon population may not be viable:

- 1) Escapement numbers over the past 3 consecutive years were low in 2 of the 3 years (2,604, 3,508, and 4,6353, in 2007, 2008, and 2009, respectively);
- 2) Recent declines have occurred, as the numbers in #1 above are well below the 10-year (2000-2009) average of 14,252;
- 3) Recent, anomalous conditions in the coastal ocean, along with consecutive dry years affecting inland freshwater conditions, have contributed to statewide escapement declines, and these factors likely affected the Yuba watershed;
- 4) Otolith analyses (Barnett-Johnson 2007) indicate the relative contribution of hatchery supplementation to the CV Chinook populations as a whole may be as high as 90%. Yuba-specific studies are underway to further determine the relative abundances of hatchery and natural origin fish in early returning (spring-run) Chinook ((Barnett-Johnson 2010). Unpublished reports suggest that, in 2009, approximately 70% of the spring-run observed in the Daguerre Point Dam ladder (with the Vaki Riverwatcher system) had clipped adipose fins, indicating hatchery rearing. Combined, this information suggests appreciable hatchery influence of the Yuba River population.

NMFS notes that applying even the simpler criteria of Lindley et al. (2007) presents difficulties.

NMFS' understanding is the escapement estimates for the Yuba (from carcass surveys since 1953)

do not distinguish between spring-run and fall-run Chinook. Beginning in June 2003, Vaki

Riverwatchers have been used to count adult salmon migrating upstream in the fish ladders at

Daguerre Point Dam, and therefore could indicate the abundance of phenotypic spring-run Chinook. However, gaps in the counts have occurred during spring-run immigration due to outages in the Vaki system (Greathouse 2010). NMFS noted above the likely hatchery influence. Otolith microstructure analyses may be very useful in estimating the relative abundances of hatchery and natural origin fish in early returning (spring-run) Chinook (Barnett-Johnson 2010). NMFS' understanding is that limited, preliminary genetic analyses suggests that appreciable proportions of the sampled early returning Chinook may be hybrids between spring-run and fall/late fall-run Chinook (personal communications, Brian Ellrott, NMFS); this may be due to both hatchery influences and the overlap in spawning habitats due to the confinement of spring-run Chinook to the lower Yuba habitat below passage barriers and impediments. Considered as a whole, the weight of evidence suggests the risk of extinction in the Yuba spring-run Chinook population is greater than "low risk", and therefore the population is probably not currently viable. However, more data collection and analyses are necessary to more fully evaluate the population's status.

4.0 The Need for ESA and MSA consultation

Consultation will be necessary under the ESA and MSA regarding the Project licensing action. Please see Enclosure B for NMFS' comments regarding ESA consultation and Enclosure C for its comments regarding MSA consultation.

5.0 Literature Cited

- Barnett-Johnson R., Grimes C., Royer C., and Donohoe C. 2007. Identifying the contribution of wild and hatchery Chinook salmon (*Oncorhynchus tshawytscha*) to the ocean fishery using otolith microstructure as natural tags. *Can J Fish Aquat Sci* 64:1683-1692.
- Barnett-Johnson, C. 2010. Contribution of hatchery and natural origin Chinook salmon on the lower Yuba River. Presentation at the June 29, 2010, Lower Yuba River Accord River Management Team, Sacramento, CA.
- California Advisory Committee on Salmon and Steelhead Trout (CACSSST). 1988. Restoring the Balance: 1988 Annual Report. 84 pp.
- California Department of Fish and game (CDFG). 1996. Steelhead restoration and management plan for California. Written by D. McEwan and T.A. Jackson. Inland Fisheries Division, Sacramento. 234 pp.
- California Department of Water Resources (CDWR). 2005. Letter from Henry "Rick" Ramirez including Reference Documents in Support of the Application for New License for the Oroville Facilities (FERC Project No. 2100), on eight compact disks. April 25, 2005. Available at www.ferc.gov.
- Greathouse, R. 2010. Vaki Riverwatchery monitoring at Daguerre Point Dam. Presentation at the June 29, 2010 Lower Yuba River Accord River Management Team, Sacramento, CA.
- Lindley, S.T., R.S. Schick, E. Mora, P.B. Adams, J.J. Anderson, S. Greene, C. Hanson, B.P. May, D.R. McEwan, R.B. MacFarlane, C. Swanson, and J.G. Williams. 2007. Framework for assessing viability of threatened and endangered salmon and steelhead in the Sacramento-San Joaquin Basin. *San Francisco Estuary and Watershed Science* Volume 5, Issue 1 [February 2007], article 4. Available at: <http://repositories.cdlib.org/jmie/sfew/vol5/iss1/art4>
- Lindley, S. T., C. B. Grimes, M. S. Mohr, W. T. Peterson, J. Stein, J. J. Anderson, L. W. Botsford, D. L. Bottom, C. A. Busack, T. K. Collier, J. Ferguson, J. C. Garza, A. M. Grover, D. G. Hankin, R. G. Kope, P. W. Lawson, A. Low, R. B. MacFarlane, K. Moore, M. Palmer-Zwahlen, F. B. Schwing, J. Smith, C. Tracy, R. S. Webb, B. K. Wells, and T. H. Williams. 2009. What caused the Sacramento River fall Chinook stock collapse? NOAA Tech. Memo. NMFS-SWFSC 447, U.S. Dept. of Commerce, La Jolla, CA.
- Meyer Resources, Inc. 1988. Benefits from present and future salmon and steelhead production in California. Report to the California Advisory Conunittee on Salmon and Steelhead. 78 pp.
- NMFS. 2009. Public Draft Recovery Plan for the Evolutionarily Significant Units of Sacramento River Winter-run Chinook Salmon and Central Valley Spring-run Chinook Salmon and the Distinct Population Segment of Central Valley Steelhead. NMFS, Southwest Region, Sacramento Protected Resources Division. October 2009.

United States Fish and Wildlife Service (USFWS). 2001. Final restoration plan for the anadromous fish restoration program. A plan to increase natural production of anadromous fish in the Central Valley of California. Prepared for the Secretary of Interior by the United States Fish and Wildlife Service with the assistance of Anadromous Fish Restoration Core Group under authority of the Central Valley Project Improvement Act. Sacramento. January 9, 2001. 106 pp. + 7 appendices.

Yoshiyama, R.M., E.R. Gerstung, F.W. Fisher, and P.B. Moyle. 2001. Historical and Present Distribution of Chinook Salmon in the Central Valley Drainage of California *in* Contributions to the Biology of Central Valley Salmonids. Vol. 1. California Department of Fish and Game, Fish Bulletin 179, R.L. Brown, ed.

Federal Register Notices:

Federal Register Notice, 63 Fed. Reg. 13347, March 19, 1998. Endangered and Threatened Species: Threatened Status for Two Evolutionarily Significant Units of Steelhead in Washington, Oregon, and California. Final Rule.

Federal Register Notice, 64 Fed. Reg. 50394, September 16, 1999. Endangered and Threatened Species: Threatened Status for Two Chinook Salmon Evolutionarily Significant Units in California. Final Rule.

Federal Register Notice, 69 Fed. Reg. 19975, April 15, 2004. Endangered and Threatened Species; Establishment of Species of Concern List, Addition of Species to Species of Concern List, Description of Factors for Identifying Species of Concern, and Revision of Candidate Species List Under the Endangered Species Act. Final Rule.

Federal Register Notice, 70 Fed. Reg. 37160, June 28, 2005. Endangered and Threatened Species: Final Listing Determinations for 16 Evolutionarily Significant Units (ESUs) of West Coast Salmon, and Final 4(d) Protective Regulations for Threatened Salmonid ESUs. Final Rule.

Federal Register Notice, 70 Fed. Reg. 52488, September 2, 2005. Endangered and Threatened Species: Designation of Critical Habitat for Seven Evolutionarily Significant Units of Pacific Salmon and Steelhead in California. Final Rule.

Federal Register Notice, 71 Fed. Reg. 834, January 5, 2006. Endangered and Threatened Species: Final Listing Determinations for 10 Distinct Population Segments of West Coast Steelhead. Final Rule.

Federal Register Notice, 71 Fed. Reg. 17757, April 7, 2006. Endangered and Threatened Wildlife and Plants: Threatened Status for Southern Distinct Population Segment of North American Green Sturgeon. Final Rule.

Federal Register Notice, 71 Fed. Reg. 61022, October 17, 2006. Endangered and Threatened Species: Revision of Species of Concern List, Candidate Species Definition, and Candidate Species List.

**ENDANGERED SPECIES ACT CONSULTATION
DURING THIS INTEGRATED LICENSING PROCESS**

COMMENTS OF NOAA’S NATIONAL MARINE FISHERIES SERVICE

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

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

1.0 Introduction

Pursuant to Section 7(a)(2) of the Endangered Species Act, as amended (16 U.S.C. §1531 et sq.) (ESA), Federal agencies are required to, in consultation with and with the assistance of the Secretary of the appropriate resource agency, ensure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of critical habitat. If the Commission determines that issuance of a hydroelectric license for the Yuba River Hydroelectric Project (Project) may affect a listed anadromous species or its critical habitat, then formal consultation with NMFS is required. The formal consultation process culminates with NMFS issuing its biological opinion (BO) detailing how the agency action affects the species or its critical habitat. In formulating a BO, NMFS must use the best scientific and commercial data available. Procedural guidance for implementing section 7 consultations is provided in the ESA,

and the regulations for implementing the ESA (50 CFR §402) (see last section this Enclosure).

NMFS has identified the following ESA-protected anadromous fishes and habitats in the Yuba River (ESA resources) that could be affected by the Project:

- 1) Central Valley (CV) spring-run Chinook salmon Evolutionarily Significant Unit (ESU) (*Oncorhynchus tshawytscha*), threatened (June 28, 2005, 70 FR 37160);
- 2) CV spring-run Chinook salmon designated critical habitat (September 2, 2005, 70 FR 52488);
- 3) CV steelhead Distinct Population Segment (DPS) (*O. mykiss*), threatened (January 5, 2006, 71 FR 834);
- 4) CV steelhead designated critical habitat (September 2, 2005, 70 FR 52488);
- 5) Southern DPS of North American green sturgeon (*Acipenser medirostris*), threatened (April 7, 2006, 71 FR 17757);
- 6) Southern DPS of North American green sturgeon designated critical habitat (October 9, 2009, 74 FR 52300);

Additional ESA resources downstream in the Feather River, Sacramento River, Sacramento-San Joaquin Delta, and San Francisco Bay may also be affected by the Project.

Based on NMFS' review of the preliminary description of the licensing action contemplated in the PAD, the Commission's Scoping Document 1, site visits to view the Project, and other information, it finds that consultation will be necessary under the ESA

in order for the Commission to issue a new license for the Project. NMFS also finds the following potential geographic extent of the Project's effects on ESA resources:

A. Upstream extent

- the potential action area for the Project extends throughout the upper Yuba watershed, including the North, Middle, and South Yuba watersheds. The extent of the action area may change as new information (particularly on cumulative impacts) is collected or results from study performed in this ILP.

B. Downstream extent

- the potential action area for the Project extends through the lower Yuba River watershed to the confluence with the Feather River, the lower Feather River, the lower Sacramento River, and through the Sacramento-San Joaquin Delta to the San Francisco Bay. The extent of the action area may change as new information (particularly on cumulative impacts) is collected or results from study performed in this ILP.

2.0 Interagency Task Force Guidance

Relevant guidance for improving coordination of ESA section 7 consultation and Federal Power Act (FPA) licensing is contained in the Interagency Task Force report (ITF), which describes procedures to integrate ESA consultation with the FPA licensing process. These procedures serve as general guidance for applicants, Commission staff, and resource agency staff. This report addresses issues related to coordination of the

ESA and the FPA licensing, with regard to adequacy of information and scope of effects of the proposed action. Appendix I of the ITF report outlines a means of streamlining the FPA licensing process with the ESA consultation process. This streamlining involves early coordination that should include:

1. A description of the project, including maps and project drawings.
2. A description of the species that may be affected in the project's action area.
3. A list of existing scientific information/studies
4. Identification of needed scientific information/studies
5. Identification of activities that may be interrelated or interdependent with the proposed action.
6. Identification of effects of the project on listed and proposed species, including direct and indirect effects of the project, any interrelated and interdependent actions, as well as cumulative effects.
7. Potential conservation actions and operational criteria that can be incorporated into the project to avoid or minimize effects on listed and proposed species.
8. Information on the legal, economic, and technical feasibility of such actions and criteria.

NMFS wishes to call the Commission's attention to streamlining actions #5 and #6 above, as these are highly relevant to its future scoping decisions for the Project, which in turn influence the scope of information collection and study required of the Applicant.

3.0 ESA consultation

In its Notice of Commencement, the Commission states its intent to initiate informal consultation with NMFS under the ESA and the joint agency regulations thereunder at 50 CFR, Part 402. In response, NMFS plans to meet with Commission staff and the Applicant in March of 2011, to discuss the Project and informal ESA consultation.

NMFS would like to address the following questions at the meeting:

- 1) Which discussions, meetings, correspondences, etc., between NMFS, Commission staff, and the Applicant constitute informal ESA consultation?

NMFS notes that ESA consultation communications must be designed to assist the Federal agency in determining whether formal consultation or a conference is required (50 CFR § 402.13). (Emphasis added, to note that not every meeting constitutes a portion of the informal ESA consultation).
- 2) How will the Integrated Licensing Process (ILP) and processes external to it (e.g. outside meetings) relate to informal ESA consultation?
- 3) What are the roles and responsibilities of the Commission and the Applicant during informal ESA consultation?
- 4) What are the obligations of the signatories to the ITF agreements, developed to integrate ESA issues into the Commission's scoping process?

For this Project, to initiate formal ESA consultation, the Commission should submit a written request to the Director of the NMFS Southwest Region. NMFS recommends the Commission's request include:

1. A complete description of the action being proposed and to be covered by this consultation.
 - a. The project description should contain sufficient detail to identify all aspects of the action that have potential environmental consequences, and the potential to result in adverse impacts to Federally listed anadromous fish and their habitat (including riparian and shaded riverine aquatic habitat).
 - b. The description should include the location and footprint of the action; the component elements of the action; and when different elements of the action will occur, and how long they will last. The description should break the action into a detailed description of its constituent parts that may affect listed species or critical habitat.
 - c. The project description also should include interrelated and interdependent actions that may affect Federally listed species or their critical habitat.
2. A description of the area that may be affected by the action.
 - a. The action area is defined as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR §402.02). To identify the action area, the physical, chemical, and biotic stressors of the action should be traced across direct and indirect pathways over time. NMFS presumes that if the action affects river flows and temperatures, gravel recruitment, wood transport and recruitment downstream of the project boundary, the action area may be more extensive than the project boundary.
3. The description of the action area should include the status of the listed species and designated and proposed critical habitat, and a description of any listed species or critical habitat that may be affected by the action.
4. A description or analysis of the manner in which the action may affect any listed species or critical habitat, and an analysis of any direct, indirect, or cumulative effects. NMFS has adopted a risk assessment framework for analyzing effects to listed species and their habitat based on exposure and response to an action, which would be useful in the evaluation of this Project. This framework follows a series of steps that can be consistently applied to different types of actions and used to develop replicable assessments with logical, well-reasoned, and supportable conclusions. The

two principal steps of this framework (*i.e.*, exposure and response assessments) should be addressed in the biological assessment and are described below:

- a. Assess the exposure of listed species and critical habitat to elements of the action that have potential environmental consequences and the potential to result in adverse impacts to listed anadromous fish and their habitat. Species are exposed to the physical, chemical, and biotic stressors of an action when their spatial and temporal distributions overlap. The Commission should describe the spatial and temporal co-occurrence between action-related stressors and listed species, as well as any direct or indirect exposure pathways. Assessment steps should consider:
 - i) The specific physical, biotic, and chemical stressors to which individual members of listed species are exposed.
 - ii) The pathway of exposure (*i.e.*, is exposure direct or indirect).
 - iii) The location that exposure is expected to occur.
 - iv) The species and life-history stages that will be exposed.
 - v) The number of individuals that will be exposed.
 - vi) The timing, magnitude, duration, and frequency of exposure.
 - vii) How exposure might vary depending upon the characteristics of the environment, stressor intensity, and individual behavior.
 - b. Assess the response of exposed individuals. After determining that individual members of listed species will be exposed to one or more physical, chemical, and biotic stressors produced by an action, this step is used to evaluate the available evidence to determine:
 - i) How individuals will respond to the exposure.
 - ii) Whether the probable exposure would be sufficient to evoke particular responses.
 - iii) The particular response expected for each exposed species and life stage.
5. Relevant reports, including any environmental impact statements, environmental assessments, biological assessments, or other analysis prepared on the proposal.
 6. Any other relevant studies or other information available on the action, the affected listed species, or critical habitat.

The elements above describe a biological assessment of the Project. NMFS notes that while biological assessment procedures under ESA section 7 may be consolidated with

interagency cooperation procedures required by other statutes, such as the National Environmental Policy Act, the Commission must comply with the procedures or the substantive requirements of ESA's section 7 (50 CFR § 402.06).

4.0 ESA Consultation Procedures

NMFS provides below the Federal regulations pertaining to ESA consultation.

Title 50: Wildlife and Fisheries

PART 402—INTERAGENCY COOPERATION—ENDANGERED SPECIES ACT OF 1973, AS AMENDED

Section Contents

Subpart A—General

- § 402.01 Scope.**
- § 402.02 Definitions.**
- § 402.03 Applicability.**
- § 402.04 Counterpart regulations.**
- § 402.05 Emergencies.**
- § 402.06 Coordination with other environmental reviews.**
- § 402.07 Designation of lead agency.**
- § 402.08 Designation of non-Federal representative.**
- § 402.09 Irreversible or irretrievable commitment of resources.**

Subpart B—Consultation Procedures

- § 402.10 Conference on proposed species or proposed critical habitat.**
- § 402.11 Early consultation.**
- § 402.12 Biological assessments.**
- § 402.13 Informal consultation.**
- § 402.14 Formal consultation.**
- § 402.15 Responsibilities of Federal agency following issuance of a biological opinion.**
- § 402.16 Reinitiation of formal consultation.**

Subpart A—General

§ 402.01 Scope.

(a) This part interprets and implements sections 7(a)–(d) [16 U.S.C. 1536(a)–(d)] of the Endangered Species Act of 1973, as amended (“Act”). Section 7(a) grants authority to and imposes requirements upon Federal agencies regarding endangered or threatened species of fish,

wildlife, or plants (“listed species”) and habitat of such species that has been designated as critical (“critical habitat”). Section 7(a)(1) of the Act directs Federal agencies, in consultation with and with the assistance of the Secretary of the Interior or of Commerce, as appropriate, to utilize their authorities to further the purposes of the Act by carrying out conservation programs for listed species. Such affirmative conservation programs must comply with applicable permit requirements (50 CFR parts 17, 220, 222, and 227) for listed species and should be coordinated with the appropriate Secretary. Section 7(a)(2) of the Act requires every Federal agency, in consultation with and with the assistance of the Secretary, to insure that any action it authorizes, funds, or carries out, in the United States or upon the high seas, is not likely to jeopardize the continued existence of any listed species or results in the destruction or adverse modification of critical habitat. Section 7(a)(3) of the Act authorizes a prospective permit or license applicant to request the issuing Federal agency to enter into early consultation with the Service on a proposed action to determine whether such action is likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of critical habitat. Section 7(a)(4) of the Act requires Federal agencies to confer with the Secretary on any action that is likely to jeopardize the continued existence of proposed species or result in the destruction or adverse modification of proposed critical habitat. Section 7(b) of the Act requires the Secretary, after the conclusion of early or formal consultation, to issue a written statement setting forth the Secretary's opinion detailing how the agency action affects listed species or critical habitat. Biological assessments are required under section 7(c) of the Act if listed species or critical habitat may be present in the area affected by any major construction activity as defined in §404.02. Section 7(d) of the Act prohibits Federal agencies and applicants from making any irreversible or irretrievable commitment of resources which has the effect of foreclosing the formulation or implementation of reasonable and prudent alternatives which would avoid jeopardizing the continued existence of listed species or resulting in the destruction or adverse modification of critical habitat. Section 7(e)–(o)(1) of the Act provide procedures for granting exemptions from the requirements of section 7(a)(2). Regulations governing the submission of exemption applications are found at 50 CFR part 451, and regulations governing the exemption process are found at 50 CFR parts 450, 452, and 453.

(b) The U.S. Fish and Wildlife Service (FWS) and the National Marine Fisheries Service (NMFS) share responsibilities for administering the Act. The Lists of Endangered and Threatened Wildlife and Plants are found in 50 CFR 17.11 and 17.12 and the designated critical habitats are found in 50 CFR 17.95 and 17.96 and 50 CFR part 226. Endangered or threatened species under the jurisdiction of the NMFS are located in 50 CFR 222.23(a) and 227.4. If the subject species is cited in 50 CFR 222.23(a) or 227.4, the Federal agency shall contact the NMFS. For all other listed species the Federal Agency shall contact the FWS.

§ 402.02 Definitions.

Act means the Endangered Species Act of 1973, as amended, 16 U.S.C. 1531 et seq.

Action means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies in the United States or upon the high seas. Examples include, but are not limited to:

- (a) actions intended to conserve listed species or their habitat;
 - (b) the promulgation of regulations;
 - (c) the granting of licenses, contracts, leases, easements, rights-of-way, permits, or grants-in-aid;
- or

(d) actions directly or indirectly causing modifications to the land, water, or air.

Action area means all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action.

Applicant refers to any person, as defined in section 3(13) of the Act, who requires formal approval or authorization from a Federal agency as a prerequisite to conducting the action.

Biological assessment refers to the information prepared by or under the direction of the Federal agency concerning listed and proposed species and designated and proposed critical habitat that may be present in the action area and the evaluation potential effects of the action on such species and habitat.

Biological opinion is the document that states the opinion of the Service as to whether or not the Federal action is likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of critical habitat.

Conference is a process which involves informal discussions between a Federal agency and the Service under section 7(a)(4) of the Act regarding the impact of an action on proposed species or proposed critical habitat and recommendations to minimize or avoid the adverse effects.

Conservation recommendations are suggestions of the Service regarding discretionary measures to minimize or avoid adverse effects of a proposed action on listed species or critical habitat or regarding the development of information.

Critical habitat refers to an area designated as critical habitat listed in 50 CFR parts 17 or 226.

Cumulative effects are those effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation.

Designated non-Federal representative refers to a person designated by the Federal agency as its representative to conduct informal consultation and/or to prepare any biological assessment.

Destruction or adverse modification means a direct or indirect alteration that appreciably diminishes the value of critical habitat for both the survival and recovery of a listed species. Such alterations include, but are not limited to, alterations adversely modifying any of those physical or biological features that were the basis for determining the habitat to be critical.

Director refers to the Assistant Administrator for Fisheries for the National Oceanic and Atmospheric Administration, or his authorized representative; or the Fish and Wildlife Service regional director, or his authorized representative, for the region where the action would be carried out.

Early consultation is a process requested by a Federal agency on behalf of a prospective applicant under section 7(a)(3) of the Act.

Effects of the action refers to the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action, that will be added to the environmental baseline. The environmental baseline includes the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of State or private

actions which are contemporaneous with the consultation in process. Indirect effects are those that are caused by the proposed action and are later in time, but still are reasonably certain to occur. Interrelated actions are those that are part of a larger action and depend on the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration.

Formal consultation is a process between the Service and the Federal agency that commences with the Federal agency's written request for consultation under section 7(a)(2) of the Act and concludes with the Service's issuance of the biological opinion under section 7(b)(3) of the Act.

Incidental take refers to takings that result from, but are not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or applicant.

Informal consultation is an optional process that includes all discussions, correspondence, etc., between the Service and the Federal agency or the designated non-Federal representative prior to formal consultation, if required.

Jeopardize the continued existence of means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species.

Listed species means any species of fish, wildlife, or plant which has been determined to be endangered or threatened under section 4 of the Act. Listed species are found in 50 CFR 17.11–17.12.

Major construction activity is a construction project (or other undertaking having similar physical impacts) which is a major Federal action significantly affecting the quality of the human environment as referred to in the National Environmental Policy Act [NEPA, 42 U.S.C. 4332(2)(C)].

Preliminary biological opinion refers to an opinion issued as a result of early consultation.

Proposed critical habitat means habitat proposed in the Federal Register to be designated or revised as critical habitat under section 4 of the Act for any listed or proposed species.

Proposed species means any species of fish, wildlife, or plant that is proposed in the Federal Register to be listed under section 4 of the Act.

Reasonable and prudent alternatives refer to alternative actions identified during formal consultation that can be implemented in a manner consistent with the intended purpose of the action, that can be implemented consistent with the scope of the Federal agency's legal authority and jurisdiction, that is economically and technologically feasible, and that the Director believes would avoid the likelihood of jeopardizing the continued existence of listed species or resulting in the destruction or adverse modification of critical habitat.

Reasonable and prudent measures refer to those actions the Director believes necessary or appropriate to minimize the impacts, i.e., amount or extent, of incidental take.

Recovery means improvement in the status of listed species to the point at which listing is no longer appropriate under the criteria set out in section 4(a)(1) of the Act.

Service means the U.S. Fish and Wildlife Service or the National Marine Fisheries Service, as appropriate.

[51 FR 19957, June 3, 1986, as amended at 73 FR 76286, Dec 16, 2008; 74 FR 20422, May 4, 2009]

§ 402.03 Applicability.

Section 7 and the requirements of this part apply to all actions in which there is discretionary Federal involvement or control.

[74 FR 20423, May 4, 2009]

§ 402.04 Counterpart regulations.

The consultation procedures set forth in this part may be superseded for a particular Federal agency by joint counterpart regulations among that agency, the Fish and Wildlife Service, and the National Marine Fisheries Service. Such counterpart regulations shall be published in the Federal Register in proposed form and shall be subject to public comment for at least 60 days before final rules are published.

§ 402.05 Emergencies.

(a) Where emergency circumstances mandate the need to consult in an expedited manner, consultation may be conducted informally through alternative procedures that the Director determines to be consistent with the requirements of sections 7(a)–(d) of the Act. This provision applies to situations involving acts of God, disasters, casualties, national defense or security emergencies, etc.

(b) Formal consultation shall be initiated as soon as practicable after the emergency is under control. The Federal agency shall submit information on the nature of the emergency action(s), the justification for the expedited consultation, and the impacts to endangered or threatened species and their habitats. The Service will evaluate such information and issue a biological opinion including the information and recommendations given during the emergency consultation.

§ 402.06 Coordination with other environmental reviews.

(a) Consultation, conference, and biological assessment procedures under section 7 may be consolidated with interagency cooperation procedures required by other statutes, such as the National Environmental Policy Act (NEPA) (42 U.S.C. 4321 *et seq.*, implemented at 40 CFR Parts 1500–1508) or the Fish and Wildlife Coordination Act (FWCA) (16 U.S.C. 661 *et seq.*). Satisfying the requirements of these other statutes, however, does not in itself relieve a Federal agency of its obligations to comply with the procedures set forth in this part or the substantive requirements of section 7. The Service will attempt to provide a coordinated review and analysis of all environmental requirements.

(b) Where the consultation or conference has been consolidated with the interagency cooperation procedures required by other statutes such as NEPA or FWCA, the results should be included in the documents required by those statutes.

§ 402.07 Designation of lead agency.

When a particular action involves more than one Federal agency, the consultation and conference responsibilities may be fulfilled through a lead agency. Factors relevant in determining an appropriate lead agency include the time sequence in which the agencies would become involved, the magnitude of their respective involvement, and their relative expertise with respect to the environmental effects of the action. The Director shall be notified of the designation in writing by the lead agency.

§ 402.08 Designation of non-Federal representative.

A Federal agency may designate a non-Federal representative to conduct informal consultation or prepare a biological assessment by giving written notice to the Director of such designation. If a permit or license applicant is involved and is not the designated non-Federal representative, then the applicant and Federal agency must agree on the choice of the designated non-Federal representative. If a biological assessment is prepared by the designated non-Federal representative, the Federal agency shall furnish guidance and supervision and shall independently review and evaluate the scope and contents of the biological assessment. The ultimate responsibility for compliance with section 7 remains with the Federal agency.

§ 402.09 Irreversible or irretrievable commitment of resources.

After initiation or reinitiation of consultation required under section 7(a)(2) of the Act, the Federal agency and any applicant shall make no irreversible or irretrievable commitment of resources with respect to the agency action which has the effect of foreclosing the formulation or implementation of any reasonable and prudent alternatives which would avoid violating section 7(a)(2). This prohibition is in force during the consultation process and continues until the requirements of section 7(a)(2) are satisfied. This provision does not apply to the conference requirement for proposed species or proposed critical habitat under section 7(a)(4) of the Act.

Subpart B—Consultation Procedures

§ 402.10 Conference on proposed species or proposed critical habitat.

(a) Each Federal agency shall confer with the Service on any action which is likely to jeopardize the continued existence of any proposed species or result in the destruction or adverse modification of proposed critical habitat. The conference is designed to assist the Federal agency and any applicant in identifying and resolving potential conflicts at an early stage in the planning process.

(b) The Federal agency shall initiate the conference with the Director. The Service may request a conference if, after a review of available information, it determines that a conference is required for a particular action.

(c) A conference between a Federal agency and the Service shall consist of informal discussions concerning an action that is likely to jeopardize the continued existence of the proposed species or result in the destruction or adverse modification of the proposed critical habitat at issue. Applicants may be involved in these informal discussions to the greatest extent practicable. During the conference, the Service will make advisory recommendations, if any, on ways to minimize or avoid adverse effects. If the proposed species is subsequently listed or the proposed critical habitat is designated prior to completion of the action, the Federal agency must review the action to determine whether formal consultation is required.

(d) If requested by the Federal agency and deemed appropriate by the Service, the conference may be conducted in accordance with the procedures for formal consultation in §402.14. An

opinion issued at the conclusion of the conference may be adopted as the biological opinion when the species is listed or critical habitat is designated, but only if no significant new information is developed (including that developed during the rulemaking process on the proposed listing or critical habitat designation) and no significant changes to the Federal action are made that would alter the content of the opinion. An incidental take statement provided with a conference opinion does not become effective unless the Service adopts the opinion once the listing is final.

(e) The conclusions reached during a conference and any recommendations shall be documented by the Service and provided to the Federal agency and to any applicant. The style and magnitude of this document will vary with the complexity of the conference. If formal consultation also is required for a particular action, then the Service will provide the results of the conference with the biological opinion.

§ 402.11 Early consultation.

(a) *Purpose.* Early consultation is designed to reduce the likelihood of conflicts between listed species or critical habitat and proposed actions and occurs prior to the filing of an application for a Federal permit or license. Although early consultation is conducted between the Service and the Federal agency, the prospective applicant should be involved throughout the consultation process.

(b) *Request by prospective applicant.* If a prospective applicant has reason to believe that the prospective action may affect listed species or critical habitat, it may request the Federal agency to enter into early consultation with the Service. The prospective applicant must certify in writing to the Federal agency that (1) it has a definitive proposal outlining the action and its effects and (2) it intends to implement its proposal, if authorized.

(c) *Initiation of early consultation.* If the Federal agency receives the prospective applicant's certification in paragraph (b) of this section, then the Federal agency shall initiate early consultation with the Service. This request shall be in writing and contain the information outlined in §402.14(c) and, if the action is a major construction activity, the biological assessment as outlined in §402.12.

(d) *Procedures and responsibilities.* The procedures and responsibilities for early consultation are the same as outlined in §402.14(c)–(j) for formal consultation, except that all references to the “applicant” shall be treated as the “prospective applicant” and all references to the “biological opinion” or the “opinion” shall be treated as the “preliminary biological opinion” for the purpose of this section.

(e) *Preliminary biological opinion.* The contents and conclusions of a preliminary biological opinion are the same as for a biological opinion issued after formal consultation except that the incidental take statement provided with a preliminary biological opinion does not constitute authority to take listed species.

(f) *Confirmation of preliminary biological opinion as final biological opinion.* A preliminary biological opinion may be confirmed as a biological opinion issued after formal consultation if the Service reviews the proposed action and finds that there have been no significant changes in the action as planned or in the information used during the early consultation. A written request for confirmation of the preliminary biological opinion should be submitted after the prospective applicant applies to the Federal agency for a permit or license but prior to the issuance of such permit or license. Within 45 days of receipt of the Federal agency's request, the Service shall either:

(1) Confirm that the preliminary biological opinion stands as a final biological opinion; or

(2) If the findings noted above cannot be made, request that the Federal agency initiate formal consultation.

§ 402.12 Biological assessments.

(a) *Purpose.* A biological assessment shall evaluate the potential effects of the action on listed and proposed species and designated and proposed critical habitat and determine whether any such species or habitat are likely to be adversely affected by the action and is used in determining whether formal consultation or a conference is necessary.

(b) *Preparation requirement.* (1) The procedures of this section are required for Federal actions that are “major construction activities”; provided that a contract for construction was not entered into or actual construction was not begun on or before November 10, 1978. Any person, including those who may wish to apply for an exemption from section 7(a)(2) of the Act, may prepare a biological assessment under the supervision of the Federal agency and in cooperation with the Service consistent with the procedures and requirements of this section. An exemption from the requirements of section 7(a)(2) is not permanent unless a biological assessment has been prepared.

(2) The biological assessment shall be completed before any contract for construction is entered into and before construction is begun.

(c) *Request for information.* The Federal agency or the designated non-Federal representative shall convey to the Director either (1) a written request for a list of any listed or proposed species or designated or proposed critical habitat that may be present in the action area; or (2) a written notification of the species and critical habitat that are being included in the biological assessment.

(d) *Director's response.* Within 30 days of receipt of the notification of, or the request for, a species list, the Director shall either concur with or revise the list or, in those cases where no list has been provided, advise the Federal agency or the designated non-Federal representative in writing whether, based on the best scientific and commercial data available, any listed or proposed species or designated or proposed critical habitat may be present in the action area. In addition to listed and proposed species, the Director will provide a list of candidate species that may be present in the action area. Candidate species refers to any species being considered by the Service for listing as endangered or threatened species but not yet the subject of a proposed rule. Although candidate species have no legal status and are accorded no protection under the Act, their inclusion will alert the Federal agency of potential proposals or listings.

(1) If the Director advises that no listed species or critical habitat may be present, the Federal agency need not prepare a biological assessment and further consultation is not required. If only proposed species or proposed critical habitat may be present in the action area, then the Federal agency must confer with the Service if required under §402.10, but preparation of a biological assessment is not required unless the proposed listing and/or designation becomes final.

(2) If a listed species or critical habitat may be present in the action area, the Director will provide a species list or concur with the species list provided. The Director also will provide available information (or references thereto) regarding these species and critical habitat, and may recommend discretionary studies or surveys that may provide a better information base for the preparation of an assessment. Any recommendation for studies or surveys is not to be construed as the Service's opinion that the Federal agency has failed to satisfy the information standard of section 7(a)(2) of the Act.

(e) *Verification of current accuracy of species list.* If the Federal agency or the designated non-Federal representative does not begin preparation of the biological assessment within 90 days of receipt of (or concurrence with) the species list, the Federal agency or the designated non-Federal representative must verify (formally or informally) with the Service the current accuracy of the species list at the time the preparation of the assessment is begun.

(f) *Contents.* The contents of a biological assessment are at the discretion of the Federal agency and will depend on the nature of the Federal action. The following may be considered for inclusion:

(1) The results of an on-site inspection of the area affected by the action to determine if listed or proposed species are present or occur seasonally.

(2) The views of recognized experts on the species at issue.

(3) A review of the literature and other information.

(4) An analysis of the effects of the action on the species and habitat, including consideration of cumulative effects, and the results of any related studies.

(5) An analysis of alternate actions considered by the Federal agency for the proposed action.

(g) *Incorporation by reference.* If a proposed action requiring the preparation of a biological assessment is identical, or very similar, to a previous action for which a biological assessment was prepared, the Federal agency may fulfill the biological assessment requirement for the proposed action by incorporating by reference the earlier biological assessment, plus any supporting data from other documents that are pertinent to the consultation, into a written certification that:

(1) The proposed action involves similar impacts to the same species in the same geographic area;

(2) No new species have been listed or proposed or no new critical habitat designated or proposed for the action area; and

(3) The biological assessment has been supplemented with any relevant changes in information.

(h) *Permit requirements.* If conducting a biological assessment will involve the taking of a listed species, a permit under section 10 of the Act (16 U.S.C. 1539) and part 17 of this title (with respect to species under the jurisdiction of the FWS) or parts 220, 222, and 227 of this title (with respect to species under the jurisdiction of the NMFS) is required.

(i) *Completion time.* The Federal agency or the designated non-Federal representative shall complete the biological assessment within 180 days after its initiation (receipt of or concurrence with the species list) unless a different period of time is agreed to by the Director and the Federal agency. If a permit or license applicant is involved, the 180-day period may not be extended unless the agency provides the applicant, before the close of the 180-day period, with a written statement setting forth the estimated length of the proposed extension and the reasons why such an extension is necessary.

(j) *Submission of biological assessment.* The Federal agency shall submit the completed biological assessment to the Director for review. The Director will respond in writing within 30 days as to whether or not he concurs with the findings of the biological assessment. At the option

of the Federal agency, formal consultation may be initiated under §402.14(c) concurrently with the submission of the assessment.

(k) Use of the biological assessment. (1) The Federal agency shall use the biological assessment in determining whether formal consultation or a conference is required under §402.14 or §402.10, respectively. If the biological assessment indicates that there are no listed species or critical habitat present that are likely to be adversely affected by the action and the Director concurs as specified in paragraph (j) of this section, then formal consultation is not required. If the biological assessment indicates that the action is not likely to jeopardize the continued existence of proposed species or result in the destruction or adverse modification of proposed critical habitat, and the Director concurs, then a conference is not required.

(2) The Director may use the results of the biological assessment in (i) determining whether to request the Federal agency to initiate formal consultation or a conference, (ii) formulating a biological opinion, or (iii) formulating a preliminary biological opinion.

§ 402.13 Informal consultation.

(a) Informal consultation is an optional process that includes all discussions, correspondence, etc., between the Service and the Federal agency or the designated non-Federal representative, designed to assist the Federal agency in determining whether formal consultation or a conference is required. If during informal consultation it is determined by the Federal agency, with the written concurrence of the Service, that the action is not likely to adversely affect listed species or critical habitat, the consultation process is terminated, and no further action is necessary.

(b) During informal consultation, the Service may suggest modifications to the action that the Federal agency and any applicant could implement to avoid the likelihood of adverse effects to listed species or critical habitat.

[74 FR 20423, May 4, 2009]

§ 402.14 Formal consultation.

(a) Requirement for formal consultation. Each Federal agency shall review its actions at the earliest possible time to determine whether any action may affect listed species or critical habitat. If such a determination is made, formal consultation is required, except as noted in paragraph (b) of this section. The Director may request a Federal agency to enter into consultation if he identifies any action of that agency that may affect listed species or critical habitat and for which there has been no consultation. When such a request is made, the Director shall forward to the Federal agency a written explanation of the basis for the request.

(b) Exceptions. (1) A Federal agency need not initiate formal consultation if, as a result of the preparation of a biological assessment under §402.12 or as a result of informal consultation with the Service under §402.13, the Federal agency determines, with the written concurrence of the Director, that the proposed action is not likely to adversely affect any listed species or critical habitat.

(2) A Federal agency need not initiate formal consultation if a preliminary biological opinion, issued after early consultation under §402.11, is confirmed as the final biological opinion.

(c) Initiation of formal consultation. A written request to initiate formal consultation shall be submitted to the Director and shall include:

- (1) A description of the action to be considered;
- (2) A description of the specific area that may be affected by the action;
- (3) A description of any listed species or critical habitat that may be affected by the action;
- (4) A description of the manner in which the action may affect any listed species or critical habitat and an analysis of any cumulative effects;
- (5) Relevant reports, including any environmental impact statement, environmental assessment, or biological assessment prepared; and
- (6) Any other relevant available information on the action, the affected listed species, or critical habitat.

Formal consultation shall not be initiated by the Federal agency until any required biological assessment has been completed and submitted to the Director in accordance with §402.12. Any request for formal consultation may encompass, subject to the approval of the Director, a number of similar individual actions within a given geographical area or a segment of a comprehensive plan. This does not relieve the Federal agency of the requirements for considering the effects of the action as a whole.

(d) *Responsibility to provide best scientific and commercial data available.* The Federal agency requesting formal consultation shall provide the Service with the best scientific and commercial data available or which can be obtained during the consultation for an adequate review of the effects that an action may have upon listed species or critical habitat. This information may include the results of studies or surveys conducted by the Federal agency or the designated non-Federal representative. The Federal agency shall provide any applicant with the opportunity to submit information for consideration during the consultation.

(e) *Duration and extension of formal consultation.* Formal consultation concludes within 90 days after its initiation unless extended as provided below. If an applicant is not involved, the Service and the Federal agency may mutually agree to extend the consultation for a specific time period. If an applicant is involved, the Service and the Federal agency may mutually agree to extend the consultation provided that the Service submits to the applicant, before the close of the 90 days, a written statement setting forth:

- (1) The reasons why a longer period is required,
- (2) The information that is required to complete the consultation, and
- (3) The estimated date on which the consultation will be completed.

A consultation involving an applicant cannot be extended for more than 60 days without the consent of the applicant. Within 45 days after concluding formal consultation, the Service shall deliver a biological opinion to the Federal agency and any applicant.

(f) *Additional data.* When the Service determines that additional data would provide a better information base from which to formulate a biological opinion, the Director may request an extension of formal consultation and request that the Federal agency obtain additional data to determine how or to what extent the action may affect listed species or critical habitat. If formal consultation is extended by mutual agreement according to §402.14(e), the Federal agency shall obtain, to the extent practicable, that data which can be developed within the scope of the

extension. The responsibility for conducting and funding any studies belongs to the Federal agency and the applicant, not the Service. The Service's request for additional data is not to be construed as the Service's opinion that the Federal agency has failed to satisfy the information standard of section 7(a)(2) of the Act. If no extension of formal consultation is agreed to, the Director will issue a biological opinion using the best scientific and commercial data available.

(g) *Service responsibilities.* Service responsibilities during formal consultation are as follows:

(1) Review all relevant information provided by the Federal agency or otherwise available. Such review may include an on-site inspection of the action area with representatives of the Federal agency and the applicant.

(2) Evaluate the current status of the listed species or critical habitat.

(3) Evaluate the effects of the action and cumulative effects on the listed species or critical habitat.

(4) Formulate its biological opinion as to whether the action, taken together with cumulative effects, is likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of critical habitat.

(5) Discuss with the Federal agency and any applicant the Service's review and evaluation conducted under paragraphs (g)(1) through (3) of this section, the basis for any finding in the biological opinion, and the availability of reasonable and prudent alternatives (if a jeopardy opinion is to be issued) that the agency and the applicant can take to avoid violation of section 7(a)(2). The Service will utilize the expertise of the Federal agency and any applicant in identifying these alternatives. If requested, the Service shall make available to the Federal agency the draft biological opinion for the purpose of analyzing the reasonable and prudent alternatives. The 45-day period in which the biological opinion must be delivered will not be suspended unless the Federal agency secures the written consent of the applicant to an extension to a specific date. The applicant may request a copy of the draft opinion from the Federal agency. All comments on the draft biological opinion must be submitted to the Service through the Federal agency, although the applicant may send a copy of its comments directly to the Service. The Service will not issue its biological opinion prior to the 45-day or extended deadline while the draft is under review by the Federal agency. However, if the Federal agency submits comments to the Service regarding the draft biological opinion within 10 days of the deadline for issuing the opinion, the Service is entitled to an automatic 10-day extension on the deadline.

(6) Formulate discretionary conservation recommendations, if any, which will assist the Federal agency in reducing or eliminating the impacts that its proposed action may have on listed species or critical habitat.

(7) Formulate a statement concerning incidental take, if such take may occur.

(8) In formulating its biological opinion, any reasonable and prudent alternatives, and any reasonable and prudent measures, the Service will use the best scientific and commercial data available and will give appropriate consideration to any beneficial actions taken by the Federal agency or applicant, including any actions taken prior to the initiation of consultation.

(h) *Biological opinions.* The biological opinion shall include:

(1) A summary of the information on which the opinion is based;

(2) A detailed discussion of the effects of the action on listed species or critical habitat; and

(3) The Service's opinion on whether the action is likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of critical habitat (a "jeopardy biological opinion"); or, the action is not likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of critical habitat (a "no jeopardy" biological opinion). A "jeopardy" biological opinion shall include reasonable and prudent alternatives, if any. If the Service is unable to develop such alternatives, it will indicate that to the best of its knowledge there are no reasonable and prudent alternatives.

(i) *Incidental take.* (1) In those cases where the Service concludes that an action (or the implementation of any reasonable and prudent alternatives) and the resultant incidental take of listed species will not violate section 7(a)(2), and, in the case of marine mammals, where the taking is authorized pursuant to section 101(a)(5) of the Marine Mammal Protection Act of 1972, the Service will provide with the biological opinion a statement concerning incidental take that:

(i) Specifies the impact, i.e., the amount or extent, of such incidental taking on the species;

(ii) Specifies those reasonable and prudent measures that the Director considers necessary or appropriate to minimize such impact;

(iii) In the case of marine mammals, specifies those measures that are necessary to comply with section 101(a)(5) of the Marine Mammal Protection Act of 1972 and applicable regulations with regard to such taking;

(iv) Sets forth the terms and conditions (including, but not limited to, reporting requirements) that must be complied with by the Federal agency or any applicant to implement the measures specified under paragraphs (i)(1)(ii) and (i)(1)(iii) of this section; and

(v) Specifies the procedures to be used to handle or dispose of any individuals of a species actually taken.

(2) Reasonable and prudent measures, along with the terms and conditions that implement them, cannot alter the basic design, location, scope, duration, or timing of the action and may involve only minor changes.

(3) In order to monitor the impacts of incidental take, the Federal agency or any applicant must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement. The reporting requirements will be established in accordance with 50 CFR 13.45 and 18.27 for FWS and 50 CFR 220.45 and 228.5 for NMFS.

(4) If during the course of the action the amount or extent of incidental taking, as specified under paragraph (i)(1)(i) of this Section, is exceeded, the Federal agency must reinstate consultation immediately.

(5) Any taking which is subject to a statement as specified in paragraph (i)(1) of this section and which is in compliance with the terms and conditions of that statement is not a prohibited taking under the Act, and no other authorization or permit under the Act is required.

(j) *Conservation recommendations.* The Service may provide with the biological opinion a statement containing discretionary conservation recommendations. Conservation recommendations are advisory and are not intended to carry any binding legal force.

(k) *Incremental steps.* When the action is authorized by a statute that allows the agency to take incremental steps toward the completion of the action, the Service shall, if requested by the Federal agency, issue a biological opinion on the incremental step being considered, including its views on the entire action. Upon the issuance of such a biological opinion, the Federal agency may proceed with or authorize the incremental steps of the action if:

(1) The biological opinion does not conclude that the incremental step would violate section 7(a)(2);

(2) The Federal agency continues consultation with respect to the entire action and obtains biological opinions, as required, for each incremental step;

(3) The Federal agency fulfills its continuing obligation to obtain sufficient data upon which to base the final biological opinion on the entire action;

(4) The incremental step does not violate section 7(d) of the Act concerning irreversible or irretrievable commitment of resources; and

(5) There is a reasonable likelihood that the entire action will not violate section 7(a)(2) of the Act.

(1) *Termination of consultation.* (1) Formal consultation is terminated with the issuance of the biological opinion.

(2) If during any stage of consultation a Federal agency determines that its proposed action is not likely to occur, the consultation may be terminated by written notice to the Service.

(3) If during any stage of consultation a Federal agency determines, with the concurrence of the Director, that its proposed action is not likely to adversely affect any listed species or critical habitat, the consultation is terminated.

[51 FR 19957, June 3, 1986, as amended at 54 FR 40350, Sept. 29, 1989; 73 FR 76287, Dec 16, 2008; 74 FR 20423, May 4, 2009]

§ 402.15 Responsibilities of Federal agency following issuance of a biological opinion.

(a) Following the issuance of a biological opinion, the Federal agency shall determine whether and in what manner to proceed with the action in light of its section 7 obligations and the Service's biological opinion.

(b) If a jeopardy biological opinion is issued, the Federal agency shall notify the Service of its final decision on the action.

(c) If the Federal agency determines that it cannot comply with the requirements of section 7(a)(2) after consultation with the Service, it may apply for an exemption. Procedures for exemption applications by Federal agencies and others are found in 50 CFR part 451.

§ 402.16 Reinitiation of formal consultation.

Reinitiation of formal consultation is required and shall be requested by the Federal agency or by the Service, where discretionary Federal involvement or control over the action has been retained or is authorized by law and:

(a) If the amount or extent of taking specified in the incidental take statement is exceeded;

(b) If new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered;

(c) If the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the biological opinion; or

(d) If a new species is listed or critical habitat designated that may be affected by the identified action.

5.0 Literature Cited

Federal Energy Regulatory Commission (FERC). 2001. On-line Guidance: Hydropower Licensing and Endangered Species and Interagency Task Force (ITF) as Appendix A to FERC 2001. Web at: http://www.ferc.gov/industries/hydropower/gen-info/guidelines/esa_guide.pdf.

Federal Register Notices:

Federal Register Notice, 70 Fed. Reg. 37160, June 28, 2005. Endangered and Threatened Species: Final Listing Determinations for 16 Evolutionarily Significant Units (ESUs) of West Coast Salmon, and Final 4(d) Protective Regulations for Threatened Salmonid ESUs. Final Rule.

Federal Register Notice, 70 Fed. Reg. 52488, September 2, 2005. Endangered and Threatened Species: Designation of Critical Habitat for Seven Evolutionarily Significant Units of Pacific Salmon and Steelhead in California. Final Rule.

Federal Register Notice, 71 Fed. Reg. 834, January 5, 2006. Endangered and Threatened Species: Final Listing Determinations for 10 Distinct Population Segments of West Coast Steelhead. Final Rule.

Federal Register Notice, 71 Fed. Reg. 17757, April 7, 2006. Endangered and Threatened Wildlife and Plants: Threatened Status for Southern Distinct Population Segment of North American Green Sturgeon. Final Rule.

Federal Register Notice, 74, No. 195, FR 52300, October 9, 2009. Endangered and Threatened Wildlife and Plants: Final Rulemaking to Designate Critical Habitat for the Threatened Southern Distinct Population Segment of North American Green Sturgeon. Final Rule.

Federal Register Notice, 75 Fed. Reg. 30714, June 2, 2010. Endangered and Threatened Wildlife and Plants: Final Rulemaking To Establish Take Prohibitions for the Threatened Southern Distinct Population Segment of North American Green Sturgeon. Final Rule. June 2, 2010.

**NOAA’s NATIONAL MARINE FISHERIES SERVICE’S
COMMENTS ON THE PRELIMINARY APPLICATION DOCUMENT**

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

**Yuba County Water Agency)
Yuba River Hydroelectric Project)
_____)**

FERC Project No. 2246-058

1.0 Introduction

NOAA’s National Marine Fisheries Service (NMFS) has reviewed the Pre-Application Document (PAD) for the Yuba River Development Project, P-2246 (Project) filed by the Yuba County Water Agency (Applicant). NMFS explains below how the filing could better comport with the hydropower licensing regulations at 18 CFR § 5.6.

2.0 Issues and Comments on PAD

The regulations at 18 CFR § 5.6(d)(3)(i), subsections (A) through (C) provide that a potential applicant must, based on the existing, relevant, and reasonably available information, include a discussion with respect to each resource that includes:

- a) A description of the existing environment as required by paragraphs (d)(3)(ii)-(xiii) of this section;
- b) Summaries (with references to sources of information or studies) of existing data or studies regarding the resource;

- c) A description of any known or potential adverse impacts and issues associated with the construction, operation or maintenance of the proposed project, including continuing and cumulative impacts.

The regulations at 18 CFR § 5.6(d)(3)(iv) require:

*A description of the fish and other aquatic resources, including invasive species, in the project vicinity. This section must discuss the existing fish and macroinvertebrate communities, including the presence **or absence** or anadromous, catadromous, or migratory fish, and any known or potential upstream or downstream impacts of the project on the aquatic community. (Emphasis added).*

The PAD should include a summary of the Technical Report, *Upper Yuba River Watershed Chinook Salmon and Steelhead Habitat Assessment*, (Report) prepared for the California Department of Water Resources by the Upper Yuba River Studies Program Study Team (CDWR 2007); this document contains the results of comprehensive data collection, field studies, and modeling undertaken to characterize current upper Yuba habitat conditions and assess whether they are capable of supporting Chinook salmon and steelhead. The effects of hydropower and water supply were among the primary factors studied, and were determined by a 55-member stakeholder work group which represented local water, business and environmental interests, and resource agencies. The PAD fails to adequately discuss this existing information, which is relevant to the absence of anadromous fishes upstream of the Project. The PAD should have discussed the Project's potential upstream impacts on habitat preliminarily evaluated for its suitability or potential for anadromous fishes. Instead, the PAD dismisses this issue by stating repeatedly:

Anadromous fish do not occur in the North Yuba River or the Yuba River upstream of USACE's Englebright Dam. (PAD, section 8).

The PAD cannot ignore future potential adverse impacts by assuming that present conditions at Englebright Dam will never change.

NMFS provides key findings set forth in the Executive Summary of the Report:

- With respect to spring-run Chinook, in the Middle Yuba “thermally suitable...habitat would extend approximately 5.6 miles downstream of the natural barrier under current (2004) operations”. However, “...if, as observed in Butte Creek, spring-run Chinook salmon in the upper Yuba River watershed were able to hold at higher water temperatures, the range of thermally suitable habitat would be extended downstream”.
- If Middle Yuba flows were increased 50 cfs, thermally suitable habitat for spring-run Chinook “would extend approximately 11.7 miles downstream of the upstream most natural barrier with increased flow”.
- With respect to spring-run Chinook in the South Yuba, “no suitable habitat exists” due to high water temperatures; however alterations in releases from Lake Spaulding could change this conclusion.
- With respect to steelhead, in the Middle Yuba “habitat would extend 8.8 miles downstream of the natural barrier to below Wolf Creek under current (2004) operations”.
- If Middle Yuba flows were increased 50 cfs, thermally suitable habitat “would extend approximately 14 miles downstream of the upstream-most barrier to a location between Wolf and Kanaka creeks”.
- With respect to steelhead habitat in the South Yuba, no suitable habitat exists due to high water temperatures, but this conclusion may not hold if releases from Lake Spaulding are changed.
- With respect to fall-run Chinook, current flow conditions provide “suitable water temperatures for fall-run Chinook salmon”, “throughout the upper Yuba River watershed” (pp. ES-1-3).

The Report includes several upper Yuba study areas (excluding the North Yuba upstream of New Bullards Dam) investigated by a team of technical consultants. The report assesses the capability of the habitat on the Middle and South Yuba Rivers to support salmon and steelhead by identifying the amount of potential habitat and predicting the number of Chinook salmon or

steelhead those areas could support. These predictions were compared to other streams that currently support Chinook salmon and steelhead populations. These conclusions were based largely on assessment of the relationship between water flow and temperature, with the results compared to the water temperature tolerances of the various Chinook salmon and steelhead life stages, to identify the extent of thermally suitable habitat. The failure of the PAD to adequately identify, summarize, and discuss this Report's information does not reflect the exercise of due diligence on the part of the applicant.

The regulations at 18 CFR §5.6(d)(3)(vii) provide that the PAD should include various categories of information for "any listed rare, threatened and endangered, candidate, or special status species that may be present in the project vicinity". NMFS found the Applicant's list of special status species incomplete, as Section 7.7.2.1 should add as a Federal Species of Concern the Central Valley fall/late fall run Chinook salmon. The PAD defines "Project Vicinity" as "the area surrounding the Project on the order of a United States Geological Survey (USGS) 1:24000 topographic quadrangle. NMFS' comments on appropriate geographic scope are found in Enclosure E.

The regulations at 18 CFR §5.6(d)(3)(vii)(D) require that a description be provided for not only the extent and location of any federally-designated critical habitat, but also other habitat for listed species in the project area. As a result, EFH, as defined under the MSA should be more fully identified in this section of the PAD. NMFS found the PAD's description and citation (PAD p. 7.7-22, Section 7.3.2.2.1, p. 7.3-3, and footnote on p. 7.7-2) are incorrect with regard to

“essential fish habitat” (EFH). See Enclosure C for discussion of EFH in the Yuba River and downstream.

NMFS finds the PAD should disclose that the NMFS *Draft Recovery Plan for the ESUs of Central Valley Chinook salmon and Central Valley steelhead* (Draft Recovery Plan) may consider reintroduction of listed species above dams in the Yuba River which have blocked their migration in the past, and that this topic is being discussed by various groups. The PAD does not adequately consider the potential for reintroduction of ESA-listed species in the upper Yuba, as described in the Draft Recovery Plan. The PAD does mention the NMFS Draft Recovery Plan, but this aspect is an important factor in assessing potential future impacts of the Project, and should be disclosed and discussed. No final decisions have been made, but the upper Yuba River has been identified as one of the areas with the highest potential for success of reintroduction.

The regulations at 18 CFR § 5.6 (d)(i) require that the PAD include, with respect to each resource area, a list of issues pertaining to the identified resources. In Section 8 of the PAD, Applicant describes the process by which it identified issues. This process included replies to Applicant’s PAD Information Questionnaire, and comments made at a Relicensing Participants meeting held on January 13, 2010. In Section 8 of the PAD, several issues which, in the opinion of Applicant, were outside the scope of the licensing or were not caused by the Project were discarded. The inventory of issues must include all issues, not just those that Applicant finds it agreeable to address. Many of the issues below were rejected by Applicant on the grounds that “Anadromous fish do not occur in ... the Yuba River upstream of USACE’s Englebright Dam”. This is not the relevant criterion, since it considers only the status quo. Instead, the licensing

process mandates that the Project consider any “potential adverse impact.” As a result, some of the issues identified by the Applicant via its own issue identification process were subsequently amended or discarded. These Issues are discussed below.

Issue WR-10:

Effects of the Project on water temperature, specifically with regards to fish and yield for rice and other agricultural crops in the pre-1970, 1970-1993, and post-1993 period. The effect of the project on fish due to temperature changes was rejected as an issue because it was “addressed in other issues/effects”. The manner in which it was “addressed” by Applicant is not acceptable.

Issue WR-11:

Effects of predictive climate change over the next 50 years on resources in connection with existing forecasted effects of the Project, including water temperatures. This issue was deleted by Applicant. The United States District Court for the Eastern District of California recently considered the question as to whether global warming must be discussed as part of a Biological Opinion issued by NMFS which related to the Englebright and Daguerre Dams on the Yuba River. In an Order issued by the Court in South Yuba River Citizens League and Friends of the River v. National Marine Fisheries Service et al, No. Civ. S-06-28455, it ruled that the Biological Opinion was deficient for several reasons, including the fact that it failed to consider the impact of global warming on the project. The Project has an effect on water temperatures, and the future environmental conditions play a part in determining the overall impact of the Project. A failure to consider the Project’s impact in a warming environment during the 50 year span of the license seems inconsistent with the Commission’s temporal scoping established in its Scoping Document 1.

Issue AR-21:

Effect of the Project on fish due to restricted passage at Englebright Dam, New Bullards Bar Dam and Our House and Log Cabin diversion dams. This issue was amended to include only New Bullards Bar Dam and Our House and Log Cabin diversion dams. This amendment ignores the fact that potential future impacts of the Project must be evaluated, and this necessarily must incorporate possible changes in the operation of Englebright Dam. Contrary to Applicant's statements, New Englebright Dam and Reservoir are integral to the Project's Narrows 2 Development facilities; the facilities could not operate without the Dam and Reservoir.

Issue AR-22:

Effect of the Project on anadromous fish from New Bullards Bar Dam and downstream due to changes in the timing and amount of attraction and migration flows. This issue was amended to include only the area downstream from New Englebright Dam, on the grounds that "anadromous fish do not occur in the North Yuba River or the Yuba River upstream of USACE's New Englebright Dam". This justification is wrong for the reasons detailed previously; the PAD must consider potential adverse impacts independently of the current status of Englebright Dam, and must consider possible impacts of a revised Englebright Dam facility or operation in the future.

Issue AR-23:

Effects of the Project on anadromous fish out migration from New Bullards Bar Reservoir downstream due to changes in the timing and amount of flows. Applicant amended this issue in the same manner as it did AR-22, and NMFS objects for the same reasons explained above.

Issue AR-26:

Effect of the Project on fish passage, and potential enhancements for fall-run Chinook salmon. This issue was removed by Applicant on the grounds that "anadromous fish do not

occur in the North Yuba River or the Yuba River upstream of USACE’s New Englebright Dam”. This justification is wrong for the reasons detailed previously; this PAD must consider potential adverse impacts independently of the current status of Englebright Dam, and must consider possible impacts of a revised Englebright Dam facility or operation in the future.

Issue T&E-6:

Effect of the Project on anadromous fish attraction and migration flows due to releases from New Bullards Bar Dam. This issue was amended to include only releases from Narrows 2 Powerhouse and bypass. This justification is wrong for the reasons detailed previously; the PAD must consider potential adverse impacts independently of the current status of Englebright Dam, and must consider possible impacts of a revised Englebright Dam facility or operation. This would necessarily include the examination of the impact of flows from New Bullards Bar Dam.

Issue T&E-7:

Effect of the Project on anadromous fish outmigration flow and timing due to releases from New Bullards Bar Dam. This issue was amended by Applicant in the same manner that T&E-6 was amended, and the same objections apply.

Issue T&E-8:

Effect of the Project on spring-run Chinook salmon and steelhead due to migration barriers.

This issue was removed on the grounds that anadromous fish do not occur in the North Yuba River or the Yuba River upstream of USACE’s Englebright Dam, and that dam is not a Project facility. This justification is wrong for the reasons detailed previously; this PAD must consider potential adverse impacts independently of the current status of Englebright Dam, and must consider possible impacts of a revised Englebright Dam facility or operation in the future.

Issue T&E-9:

Effect of the Project on spring-run Chinook salmon, steelhead, and North American green sturgeon due to migration barriers at USACE's Englebright Dam, New Bullards Bar Dam, Our House Diversion Dam and Log Cabin Diversion Dam. This issue was removed on the grounds that anadromous fish do not occur in the North Yuba River or the Yuba River upstream of USACE's Englebright Dam, and that dam is not a Project facility. This justification is wrong for the reasons detailed previously; this PAD must consider potential adverse impacts independently of the current status of Englebright Dam, and must consider possible impacts of a revised Englebright Dam facility or operation in the future.

Section 7.1 of the PAD does not contain summaries of records regarding quantity and fate of large woody debris removed from New Bullards Bar Reservoir, from Our House Dam, and from Log Cabin Dam. The existence of Englebright Dam is insufficient justification for the PAD's failure to consider potential or existing Project impacts on anadromous species managed by NMFS.

Within section 7.3.4.2.1 of the PAD is a listing and summary of documents which apply to areas "Downstream of USACE's Englebright Dam". This area affected by the Project has been defined in the PAD as "Daguerre Point Dam to the confluence with the lower Feather River". The area affected by the Project and the Yuba River watershed is much greater than that due to the characteristics of the anadromous fish whose habitat is within the vicinity of the Project. See Enclosure E regarding scoping. The Lower Yuba Accord, cited in the PAD, generated a large volume of data and information which should be made part of this ILP record. The Lower Yuba River Accord EIR/EIS specifically included the Delta as a region of study, and this proceeding

should apply the same scope, for the same reasons. The importance of the data generated by the work done in connection with the Lower Yuba Accord, and its relevance to this present effort, was recognized by the parties (including Applicant) to the Lower Yuba River Fisheries Agreement, dated October 11, 2007. Section 1.2.1 of that Agreement states:

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

Section 2 of the PAD would benefit if it were limited to meeting the requirements for PAD content (18CFR§5.6(d)(1)) with regard to ILP process and schedule (ILP timelines), and if it did not include the applicant's proposal for a parallel "Relicensing Process" that may or may not be attended by interested parties – as it occurs outside of the ILP. NMFS' interest is to not confuse the Integrated Licensing Process (ILP) conducted under the regulations (18 CFR part 5) with a second procedure (named "relicensing") proposed by the applicant in the PAD (section 2). NMFS is concerned the proposed relicensing may be misinterpreted to mean its Relicensing Participants agree the decision to issue a new license is affirmed, leaving only the task of conditioning a new license. The regulations for the ILP (18CFR part 5) pertain to the licensing process, which is the same procedure in cases where an applicant is seeking an original license, or has an existing license and is seeking another. Confusion occurs when this latter case is called "relicensing", a word that does not appear in the regulations governing the ILP. FERC is clear in Scoping Document (SD) 1 for the Project that a licensing evaluation must determine whether to issue a new license for a project, then under what conditions:

Pursuant to the National Environmental Policy Act (NEPA) of 1969, as amended, Commission staff intends to prepare an environmental impact statement (EIS), which will be used by the Commission to determine whether, and under what conditions, to issue a new license for the project. (SD1, p. 1).

To be clear, at this time NMFS is not assuming a new license should be issued for the Project or any individual development of the Project, and it expects the Commission to assess whether a license should be issued in its NEPA review document.

Confusion between the ILP and the applicant's proposed procedure could also occur if their proposed relicensing process is mistakenly considered the same as the ILP. NMFS reviewed the applicant's "Info Sheet-Relicensing Process" (enclosed) distributed prior to the filing of the Notice of Intent, and noted its misuse of the ILP acronym (which is not an abbreviation for the "Integrated Relicensing Process"). This confusion appears to have extended to section 2 of the PAD. NMFS' understanding is the single process for licensing the Project is the ILP, the licensing option chosen by the applicant in their Notice of Intent to File.

At the Commission's ILP Effectiveness Evaluation Technical Conference on November 3, 2010, in Washington, D. C., NMFS warned of movements away from the ILP that are "creating processes", and "making it up as we go along" (FERC 2010 transcript (tr.), p. 79). NMFS explained it is now seeing (in California) the creation of "work arounds" due to the shortcomings of the ILP (tr., p. 150). NMFS warned these "parallel processes" that are outside the ILP are inefficient and time-consuming, and have resulted in a breakdown in the chronological order of the ILP (tr., p. 150). In sum, NMFS participated in the panels to assist the Commission in its improvement of the ILP, and not to report it intends to abandon the ILP in favor of replacement procedures proposed by the applicants or others.

Section 2 of the Applicant's PAD appears to be a case example of deviation from the ILP regulations in favor of a proposed alternative, its Relicensing Process. The PAD proposes procedures and protocols for meetings, consultation, communications, confidentiality, consensus decision-making, and other activities that pertain to the Relicensing Process, not the ILP. Section 2 creates confusion by providing a schedule of the timelines for this ILP (as required by the regulations pertaining to PAD content) alongside and within the context of the proposed procedures and protocols for its Relicensing Process. Additional confusion occurs when section 2 co-mingles terms such as "licensing" "ILP", "relicensing" "Relicensing Process" "participants" and "Relicensing Participants" throughout its text, as was also done in the applicants "Info Sheet". Section 2 would benefit if it were limited to meeting the requirements for PAD content (18CFR§5.6(d)(1)) with regard to process (ILP) and schedule (ILP timelines), and if it did not include a proposal for a parallel Relicensing Process.

NMFS emphasizes that its participation will follow the regulations implementing the ILP and its schedule, and NMFS' decisions will be communicated by filings in the ILP record, not in Relicensing Process meetings or others conducted outside of the ILP. NMFS expects to meet and communicate with the applicant, agencies, and other participants during the ILP; most importantly, NMFS expects to consult with the Commission and the applicant as required under the Endangered Species Act (ESA) and Magnuson-Stevens Fishery Conservation and Management Act (MSA). However, NMFS is not bound by a Relicensing Process to accomplish its FPA or ESA/MSA responsibilities. NMFS plans to meet with the applicant and Commission staff this March to further discuss the ILP and the consultations required under the ESA and MSA.

3.0 NMFS Comments on Section 10 of PAD:

Section 10.2 of the PAD describes the Licensee's **preliminary** proposed studies and Attachment 10A contains the specific detailed preliminary study plans. Ten of these detailed study plans were further modified with "red-line" versions by Licensee, which were filed with FERC on February 11, 2011. NMFS submits comments on two of these preliminary study plans below, but this should not be construed and does not imply that NMFS will not have comments on the remaining preliminary study plans as the plans move forward in the ILP process. NMFS reserves its ability to make additional comments on the study plans discussed below as well as the remaining preliminary study plans.

In Table 10.2.2-1 of the PAD, the following geologic and soil issues were identified:

1. Effect of the Project on channel morphology form and function, including effects from Project diversions and flow into and out of Project reservoirs.
2. Effect of the Project on connectivity to floodplains, including effects from Project diversions and flow into and out of Project reservoirs.
3. Effect of the Project on channel conditions, including effects from Project diversions and flow into and out of Project reservoirs.
4. Effects of the Project on sediment transport, especially through Project reservoirs and diversions.
5. Effect of the Project on bedload including effects from Project diversions and flow into and out of Project reservoirs.
6. Effects of the Project on particle size and sediment composition, especially at dam outlets, due to flow releases from Project powerhouses and uncontrolled spills from Project dams, especially at New Bullards Bar Dam.
7. Effects of tailrace discharge from New Colgate Powerhouse on channel morphology and sediment distribution.
8. Effects of the Project on large woody debris distribution, including how the Project manages large woody debris.
9. Effects of the Project on fish spawning gravel.

All nine of these issues were classified as needing additional information to address, and all issues are proposed to be addressed by the following Licensee's preliminary studies, Study 1.1

Channel Morphology Above Englebright Dam and Study 1.2 Channel Morphology Below Englebright Dam (note, issue #9 is proposed to be addressed with instream flow studies in tandem with Study 1.1 and 1.2). NMFS believes that Study 1.1 Channel Morphology Above Englebright Dam and Study 1.2 Channel Morphology Below Englebright Dam in large part will be unable to adequately address issues 1-9 above, in large part because the studies do not propose to quantify sediment supply and sediment transport (note, a bed mobility analysis does not constitute a sediment transport capacity or rate analysis), additional detail is provided below. Fundamentally, any sediment transport analysis designed to evaluate a Project's effect to channel morphology due to impacts to from sediment entrapment in Project Reservoirs or hydrologic alterations that affect the ability to transport sediment needs to answer the following questions:

- 1) How **much** (volume or mass) sediment can the channel transport with the available water?
- 2) Is this transport rate greater or smaller than the rate at which sediment is being supplied to the reach?

Preliminary Studies 1.1 and 1.2 do not propose to address either of these questions. The answers to these two, fundamental questions would roughly form the basis for a sediment budget, and Study 1.1 explicitly states that a sediment budget will not be completed: *pg. 9 "There will be no quantitative sediment budget done, however."* Neither Study 1.1 nor 1.2 propose to quantify sediment supply under current or unimpaired conditions. Neither Study 1.1 nor 1.2 propose to quantify sediment transport, which implies a rate at which a volume or mass of sediment moves. Although the Licensee does propose to assess bed mobility, which when calculated properly can determine what discharge threshold would begin to move sediment, this does not provide information as to how much sediment is moved and at what rate sediment is transported downstream. In simple terms, sediment transport is not just a function of the bed

mobility discharge threshold, but rather a function of the magnitude of discharge exceedance over this threshold and the duration of time the threshold is exceeded.

Without quantifying sediment supply and sediment transport capacity, one cannot adequately assess the Project's impacts to bedload, spawning gravel size distribution and volume, potential loss in-channel sediment storage, and thus by default channel morphology as a whole (essentially the basis of issues #1-9 identified above). Qualitative surveys related to current channel form and function as proposed in Studies 1.1 and 1.2, which do not have a baseline survey of pre-Project conditions to compare against, can only be of use to assess Project effects if one has a quantitative understanding of the mass balance of sediment supply and transport that is driving the responses being recorded in the channel surveys.

Bed Mobility Analysis:

An existing information summary for Study 1.2 was provided as Attachment 1 to the study and page 24 states:

“A common metric used to understand the link between channel dynamism and fish habitat is the discharge associated with “incipient motion”, the condition under which sediment transport is just beginning. However, the idea of a single discharge of incipient motion has always been controversial and may not be useful for a dynamic river like the LYR (Lower Yuba River).”

A particular problem for identifying a single discharge for incipient motion in high gradient, mountainous streams like the Yuba is character of the bedload sediment, which typically is very mixed and ranges in size from small boulders to sand fractions. Thus, it is imperative to use a transport function that is designed for mixed-sediments, because in a mixed-bed smaller grains will be harder to move (hiding effects) and larger grains are easier to move (exposure of larger

grains with sediment mixing). The Licensee is proposing to use a uni-sized transport relation, commonly referred to as the Shield's diagram or curve, and then inserting different grain size classes (e.g. D_{50} , D_{84} , D_{16} , spawning gravel sizes) into this function. This in effect treats each grain size completely independently of the other (as if the entire bed was composed of the one grain size) and completely ignores the interdependent grain size interactions that occurring within a mixed-bed and influencing the mobility of each parameter. Further limiting the Licensee's ability to properly predict incipient motion, the Licensee is not proposing to partition the total boundary shear stress into the portion that is available for mobilizing the sediment and the portion that is expended on immobile boundary elements such as large boulders and bedrock, LWD, channel banks, and planform curvature. The Licensee is also not proposing to validate any of their bed mobility calculations through the use of methods such as tracer rocks for Study 1.1, which is absolutely necessary given their own premise that the idea of a single discharge for incipient motion may not be useful for a dynamic river like the Yuba.

Although determining the discharge(s) that mobilize the bed can have useful applications for the ILP proceedings, it is not a substitute for sediment transport calculations and in order for the analysis to have utility a mixed-sized sediment transport function must be used, a drag-partition that calculates the shear stress available for mobilizing the sediment needs to be calculated, and field observations with tracer rocks or similar method need to be conducted in order to validate results.

Literature Cited

California Department of Water Resources (CDWR). 2005. Letter from Henry "Rick" Ramirez including Reference Documents in Support of the Application for New License for the Oroville Facilities (FERC Project No. 2100), on eight compact disks. April 25, 2005. Available at www.ferc.gov.

CDWR. 2007. Upper Yuba River Watershed Chinook Salmon and Steelhead Habitat Assessment. Technical Report. Prepared for the California Department of Water Resources by the Upper Yuba River Studies Program Study Team.

FERC. 2010. Transcripts of the Federal Energy Regulatory Commission's Integrated Licensing Process Effectiveness Evaluation Technical Conference. FERC, Washington, D. C. November 3, 2010.

Lindley, S.T., R.S. Schick, E. Mora, P.B. Adams, J.J. Anderson, S. Greene, C. Hanson, B.P. May, D.R. McEwan, R.B. MacFarlane, C. Swanson, and J.G. Williams. 2007. Framework for assessing viability of threatened and endangered salmon and steelhead in the Sacramento-San Joaquin Basin. *San Francisco Estuary and Watershed Science* Volume 5, Issue 1 [February 2007], article 4. Available at: <http://repositories.cdlib.org/jmie/sfews/vol5/iss1/art4>

Lindley, S. T., C. B. Grimes, M. S. Mohr, W. T. Peterson, J. Stein, J. J. Anderson, L. W. Botsford, D. L. Bottom, C. A. Busack, T. K. Collier, J. Ferguson, J. C. Garza, A. M. Grover, D. G. Hankin, R. G. Kope, P. W. Lawson, A. Low, R. B. MacFarlane, K. Moore, M. Palmer-Zwahlen, F. B. Schwing, J. Smith, C. Tracy, R. S. Webb, B. K. Wells, and T. H. Williams. 2009. What caused the Sacramento River fall Chinook stock collapse? NOAA Tech. Memo. NMFS-SWFSC 447, U.S. Dept. of Commerce, La Jolla, CA.

National Marine Fisheries Service (NMFS). 2007. NMFS *Biological Opinion for Operation of Englebright and Daguerre Point Dams on the Yuba River, California*. NMFS, Southwest Region, Long Beach, California. November 21, 2007.

NMFS. 2009. *Public Draft Recovery Plan for the Evolutionarily Significant Units of Sacramento River Winter-run Chinook Salmon and Central Valley Spring-run Chinook Salmon and the Distinct Population Segment of Central Valley Steelhead*. NMFS, Southwest Region, Protected Resources Division, Sacramento, California. October 2009.

Pacific Fisheries Management Council (PFMC). 1999. Pacific Fishery Management Council. Description and identification of essential fish habitat, adverse impacts and recommended conservation measures for salmon. *Amendment 14 to the Pacific Coast Salmon Plan, Appendix A*. Pacific Fisheries Management Council, Portland, Oregon.

PFMC. 2003. Pacific Fishery Management Council. Fishery Management Plan for Commercial and Recreational Salmon Fisheries off the Coasts of Washington, Oregon and California as Revised Through Amendment 14 (Adopted 1999).

Yoshiyama, R.M., E.R. Gerstung, F.W. Fisher, and P.B. Moyle. 2001. Historical and Present Distribution of Chinook Salmon in the Central Valley Drainage of California *in* Contributions to the Biology of Central Valley Salmonids. Vol. 1. California Department of Fish and Game, Fish Bulletin 179, R.L. Brown, ed.

Yuba County Water Agency (YWCA). 2011. Pre-Application Document for the Yuba River Development Hydroelectric Preoject, FERC No. P-2246, Marysville, California. 2011.

Federal Register Notices:

Federal Register Notice, 63 Fed. Reg. 13347, March 19, 1998. Endangered and Threatened Species: Threatened Status for Two Evolutionarily Significant Units of Steelhead in Washington, Oregon, and California. Final Rule.

Federal Register Notice, 64 Fed. Reg. 50394, September 16, 1999. Endangered and Threatened Species: Threatened Status for Two Chinook Salmon Evolutionarily Significant Units in California. Final Rule.

Federal Register Notice, 69 Fed. Reg. 19975, April 15, 2004. Endangered and Threatened Species; Establishment of Species of Concern List, Addition of Species to Species of Concern List, Description of Factors for Identifying Species of Concern, and Revision of Candidate Species List Under the Endangered Species Act. Final Rule.

Federal Register Notice, 70 Fed. Reg. 37160, June 28, 2005. Endangered and Threatened Species: Final Listing Determinations for 16 Evolutionarily Significant Units (ESUs) of West Coast Salmon, and Final 4(d) Protective Regulations for Threatened Salmonid ESUs. Final Rule.

Federal Register Notice, 70 Fed. Reg. 52488, September 2, 2005. Endangered and Threatened Species: Designation of Critical Habitat for Seven Evolutionarily Significant Units of Pacific Salmon and Steelhead in California. Final Rule.

Federal Register Notice, 71 Fed. Reg. 834, January 5, 2006. Endangered and Threatened Species: Final Listing Determinations for 10 Distinct Population Segments of West Coast Steelhead. Final Rule.

Federal Register Notice, 71 Fed. Reg. 17757, April 7, 2006. Endangered and Threatened Wildlife and Plants: Threatened Status for Southern Distinct Population Segment of North American Green Sturgeon. Final Rule.

Federal Register Notice, 71 Fed. Reg. 61022, October 17, 2006. Endangered and Threatened Species: Revision of Species of Concern List, Candidate Species Definition, and Candidate Species List.

Federal Register Notice, 73 FR 60987, October 15, 2008. Fisheries Off West Coast States; West Coast Salmon Fisheries; Amendment 14; Essential Fish Habitat Descriptions for Pacific Salmon. Final Rule.

Federal Register Notice, 74, FR 52300, October 9, 2009. Endangered and Threatened Wildlife and Plants: Final Rulemaking to Designate Critical Habitat for the Threatened Southern Distinct Population Segment of North American Green Sturgeon. Final Rule.

Federal Register Notice, 75 Fed. Reg. 30714, June 2, 2010. Endangered and Threatened Wildlife and Plants: Final Rulemaking To Establish Take Prohibitions for the Threatened Southern Distinct Population Segment of North American Green Sturgeon. Final Rule. June 2, 2010.

**MAGNUSON-STEVENSON FISHERIES ACT CONSULTATION
IN THIS INTEGRATED LICENSING PROCESS**

COMMENTS OF NOAA'S NATIONAL MARINE FISHERIES SERVICE

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

Yuba County Water Agency)
Yuba River Hydroelectric Project)
_____)

FERC Project No. P-2246-058

1.0 Introduction

The MSA, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), establishes procedures designed to identify, conserve, and enhance Essential Fish Habitat (EFH) for those species regulated under a Federal fisheries management plan (FMP). Pacific coast salmon stocks, highly prized by commercial, sport, and subsistence fishers, are managed by the Pacific Fishery Management Council (Council) under the Pacific Coast Salmon FMP adopted in 1999 (PFMC 2003); the managed stocks include the Sacramento River winter-run Chinook salmon (*O. tshawytscha*) Central Valley spring-run Chinook salmon (*O. tshawytscha*) and Central Valley fall- and late fall-run Chinook salmon (*O. tshawytscha*).

The MSA requires that EFH be identified and described in Federal FMP's. In amendment 14 to the Pacific Salmon FMP, the Council identified and described EFH for Pacific salmon (including for waters in the California Central Valley), identified adverse impacts to EFH, and recommended

conservation measures. NMFS' 2008 Essential Fish Habitat Final Rule codified the EFH identifications and descriptions for Pacific salmon in amendment 14, and identified the upper and lower Yuba as EFH for Chinook salmon. Freshwater EFH for Pacific salmon includes all those streams, lakes, ponds, wetlands, and other water bodies currently, or historically accessible to salmon in Washington, Oregon, Idaho, and California, except areas upstream of certain impassable man-made barriers (as identified by the Council), and longstanding, naturally-impassable barriers (i.e., natural waterfalls in existence for several hundred years).

EFH is defined as those waters and substrates necessary to fish for spawning, breeding, feeding, or growth to maturity. For the purposes of interpreting the definition of EFH, "waters" includes aquatic areas and their associated physical, chemical, and biological properties that are used by fish, and may include areas historically used by fish where appropriate; "substrate" includes sediment, hard bottom, structures underlying the waters, and associated biological communities; "necessary" means habitat required to support a sustainable fishery and a healthy ecosystem; and, "spawning, breeding, feeding, or growth to maturity" covers all habitat types used by a species throughout its life cycle (50 CFR 600.10). Freshwater EFH for Chinook salmon consists of four major habitat functions: (1) spawning and incubation; (2) juvenile rearing; (3) juvenile migration corridors; and 4) adult migration corridors and adult holding habitat (NMFS 2008). Adverse effect means any impact which reduces quality and/or quantity of EFH, and may include direct (*e.g.*, contamination or physical disruption), indirect (*e.g.*, loss of prey or reduction in species fecundity), site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810).

2.0 EFH in the Yuba River

EFH is identified in both the upper and lower Yuba River (we define the upper Yuba as the watershed upstream of Englebright Dam and its associated hydroelectric facilities). Based on considerations discussed in Amendment 14 of the Plan (PFMC 2003), the PFMC excluded certain man-made barriers (dams) from the list of those representing the upstream extent of EFH; the exclusion list names Englebright Dam on the Yuba River. Therefore, EFH in the Yuba River extends from its confluence with the Feather River upstream to the habitat historically accessible to Chinook below natural, impassable waterfalls in the North, Middle, and South Yuba rivers, and their tributaries. Since river channels change over time (e.g., due to bed load movement, rock slides, etc.), determining the exact historical limit to upstream Chinook migrations in a watershed is problematic. Historical accounts of Yuba river Chinook migrations (reviewed in Yoshiyama et al. 2001) provide useful information, but a paucity or lack of historical information cannot be taken to mean that no Chinook migrations occurred to a watershed location.

NMFS found information relevant to the existence of natural, impassable waterfalls in the upper Yuba within the *Upper Yuba River Watershed Chinook Salmon and Steelhead Habitat Assessment* (Upper Yuba Studies Report) (CDWR 2007), a report prepared by the Upper Yuba River Studies Program Study Team for the California Department of Water Resources. The Report provides results of recent evaluations that used aerial videography and field surveys to identify potential upstream migration barriers in the Middle and South Yuba rivers. The evaluations considered that a combination of a potential barrier's site geometry and hydraulic conditions, along with the leaping abilities of the fish, determine how a site may affect fish passage (Powers and Orsborn 1985).

The results suggest the limit to upstream Chinook migration in the Middle Yuba is a large landslide creating a barrier more than 10 feet high (at low flow), which is probably a high-flow barrier; this feature is located at river mile (RM) 34.5. The ability of anadromous fishes to pass upstream of natural gradients depends on several factors, and conditions at potential barriers were found to change significantly between low and high river flows. Various cascades and gradient features downstream of RM 34.4 were found to represent low-flow impediments, but not high-flow barriers. Low-flow conditions assumed discharges of less than about 200 cubic feet-per-second (cfs), and high-flow conditions assumed discharges greater than about 200 cfs (Appendix C, p. 13). This information suggests that flow management increases could greatly improve migration flow conditions within Middle Yuba, including areas downstream of Project diversions (at Our House and Log Cabin dams), during the interval when spring-run Chinook would migrate upstream.

Further physical analyses, including channel geometry surveys and hydraulic measurements, would be needed to more accurately estimate flows allowing fish passage at these barriers. Powers and Orsborn (1985) provide details on the type of site-specific analyses that should be performed to determine conditions for fish passage at migration barriers. Based on the reconnaissance survey, physical alteration of the low-flow barriers to accommodate fish passage is probably more feasible than flow augmentation (Appendix C, p. 20). However, assessment of physical factors alone would not consider the important factor of the maturity (time in the river) of the spring-run Chinook and steelhead, which in turn influence the swimming and leaping capabilities of fish (Powers and Orsborn 1985) (Appendix C, p. 1). The NMFS *Biological Opinion for Operation of Englebright and Daguerre Point Dams on the Yuba River, California* (NMFS BO on Englebright and Daguerre) (NMFS 2007) noted observations of adult Chinook salmon congregating in the plunge pool below Daguerre Point Dam (DPD), and also commented about other factors that can cause upstream migration delays in the lower Yuba (e.g. the degree DPD fish ladder operability). If such delays continue for several

days or even weeks, the salmonids consume their energy stores, and can become weakened. Since a combination of a potential barrier's site geometry and hydraulic conditions, along with the leaping abilities of the fish, determine how the site may affect fish passage (Powers and Orsborn 1985), it may be that field experiments with adult Chinook salmon and steelhead are needed to more fully assess the natural (gradient) migration impediments in the upper Yuba.

In the South Yuba, the suggested upstream limit is a feature consisting of two falls, 13 feet and 7.5 feet high, at RM 35.4. Given the distant upstream locations of these features, a substantial amount of EFH exists in both the Middle and South Yuba rivers. The Upper Yuba River Studies Program Study Team did not perform similar evaluations of natural gradient features in the mainstem upper Yuba (upstream of Englebright Reservoir to the Middle Yuba confluence) or in the North Yuba.

NMFS found the following relevant text in Yoshiyama et al. 2001:

In the North Fork Yuba River, salmon were caught by PG&E workers in the Bullards Bar area during the 1898–1911 period of operation of the Yuba Powerhouse Project; the ditch tenders at the diversion dam “would nail two or three salmon on boards, place them body down in the ice-cold ditch stream, and ten hours later the night’s dinner would come floating down” to the powerhouse on the valley floor (Coleman 1952, p 139). In later years, the salmon ascended in “considerable numbers” up to Bullards Bar Dam during its period of construction (1921–1924)—“so many salmon congregated and died below it that they had to be burned” (Sumner and Smith 1940, p 8). There are no natural barriers above the Bullards Bar Dam site, so salmon presumably had been able to ascend a considerable distance up the North Fork. There is photographic evidence of steelhead (called “salmon-trout” in early writings) occurring farther upstream at Downieville at the mouth of the Downie River (DFG file records). (p. 119-120).

Referring to the salmon runs in 1850 and 1851, the California Fish Commission (CFC 1875, p 14) stated that “large quantities were taken by the miners and by Indians... as far up as Downieville on the Yuba,” and at other points on the American and Feather rivers. There are no natural obstructions from Downieville upstream to Sierra City, where Salmon Creek enters, so spring-run salmon and steelhead most likely were able to traverse that distance.

Deep pools are present throughout the North Fork Yuba River from its mouth up to Sierra City (E.R. Gerstung, personal observation) and would have provided prime holding habitat for spring-run salmon. Spring-run salmon and steelhead probably ascended the higher-gradient reaches up to about two miles above the juncture of Salmon Creek and their absolute upstream limit on the North Fork would have been Loves Falls. (p. 120).

In the absence of additional information or study, NMFS assumes no impassable natural gradient features historically existed in the mainstem upper Yuba, and that the likely upstream limit of migration extent is near Loves Falls in the North Yuba (near RM 50). Given the distant upstream location of Loves falls, there is a substantial amount of EFH in the North Yuba. NMFS adds that the many miles of streams tributary to the upper Yuba, and historically accessible to salmon, are also considered to be EFH for MSA consultation purposes. To clarify, the historical upstream migration limits stated above do not assume that anadromous Chinook salmon, if reintroduced to the upper Yuba, could reach these locations; this is because substantial alterations in flows now occur that could hamper or prevent future migration extents. Second, establishing the limits of EFH does not mean that effects that could potentially adversely affect EFH, in areas upslope from EFH limits, do not require evaluation in an MSA consultation. This is explained in the “Consultation Procedures” section below.

EFH also exists in the lower Yuba, and in the Feather River, Sacramento River, Sacramento-San Joaquin Delta, and San Francisco Bay; these habitats will also be considered during MSA consultation.

3.0 Consultation Procedures

MSA consultation between NMFS and the Commission will be required regarding the potential effects of license actions that may adversely affect EFH.

1. Pursuant to the MSA, Federal agencies must consult with NMFS on all actions authorized, funded, or undertaken, or proposed to be authorized, funded, or undertaken, by such agency that may adversely affect any EFH identified in the MSA. MSA §305(b)(2). Therefore, the Commission must consult with NMFS on the issuance of a new license for the Project, to the extent that the actions proposed to be authorized under the license may adversely affect EFH. This includes consultation regarding activities outside EFH, such as certain upstream and upslope activities, where they may adversely affect EFH. The objectives of this EFH consultation are to determine whether the proposed action would adversely affect designated EFH and to recommend conservation measures to avoid, minimize, or otherwise offset potential adverse effects to EFH resulting from the proposed action.
2. If NMFS receives information from a Federal agency or determines from other sources that an action authorized, funded, or undertaken, or proposed to be authorized, funded, or undertaken, by a Federal agency would adversely affect any EFH, NMFS must recommend to such agency measures that can be taken by such agency to conserve such habitat. MSA §305(b)(4)(A). Therefore, NMFS' responsibility will be to provide conservation recommendations to the Commission for the new project license, if a licensed action would adversely affect EFH. Any reasonable attempt to encourage the conservation of EFH must

take into account actions that occur outside EFH, such as upstream and upslope activities, that may have an adverse effect on EFH.

3. Federal agencies must provide a detailed response in writing to NMFS within 30 days after receiving EFH conservation recommendations. The response must include a description of measures proposed by the agency for avoiding, mitigating, or offsetting the impact of the activity on EFH. MSA §305(b)(4)(B). Therefore, the Commission must provide NMFS a detailed response that must include a description of license measures proposed for avoiding, mitigating, or offsetting the impact of the license-related activity on EFH.
4. In the case of a response that is inconsistent with NMFS' EFH conservation recommendations, the Federal agency must explain its reasons for not following the recommendations. Id. Therefore, in the case of a Commission response that is inconsistent with NMFS' EFH conservation recommendations, the Commission response must explain its reasons for not following the recommendations.

4.0 Literature Cited

California Department of Water resources (DWR). 2007. Upper Yuba River Watershed Chinook Salmon and Steelhead Habitat Assessment. Technical Report. Prepared for the California Department of Water Resources by the Upper Yuba River Studies Program Study Team.

Federal Energy Regulatory Commission (FERC). 2001. On-line Guidance: Hydropower Licensing and Endangered Species and Interagency Task Force (ITF) as Appendix A to FERC 2001. Web at: http://www.ferc.gov/industries/hydropower/gen-info/guidelines/esa_guide.pdf.

National Marine Fisheries Service (NMFS). 2007. NMFS *Biological Opinion for Operation of Englebright and Daguerre Point Dams on the Yuba River, California*. NMFS, Southwest Region, November 21, 2007, Long Beach, California.

Pacific Fisheries Management Council (PFMC). 1999. Pacific Fishery Management Council. Description and identification of essential fish habitat, adverse impacts and recommended conservation measures for salmon. *Amendment 14 to the Pacific Coast Salmon Plan, Appendix A*. Pacific Fisheries Management Council, Portland, Oregon.

PFMC. 2003. Pacific Fishery Management Council. Fishery Management Plan for Commercial and Recreational Salmon Fisheries off the Coasts of Washington, Oregon and California as Revised Through Amendment 14 (Adopted 1999).

Powers, P.D. and J.F. Orsborn. 1985. Analysis of Barriers to Upstream Fish Migration: An Investigation of the Physical and Biological Conditions Affecting Fish Passage Success at Culverts and Waterfalls. Bonneville Power Administration (BPA) Report .

Yoshiyama, R.M., E.R. Gerstung, F.W. Fisher, and P.B. Moyle. 2001. Historical and Present Distribution of Chinook Salmon in the Central Valley Drainage of California *in* Contributions to the Biology of Central Valley Salmonids. Vol. 1. California Department of Fish and Game, Fish Bulletin 179, R.L. Brown, ed.

Federal Register Notices:

Federal Register Notice, 69 FR 19975, April 15, 2004. Endangered and Threatened Species; Establishment of Species of Concern List, Addition of Species to Species of Concern List, Description of Factors for Identifying Species of Concern, and Revision of Candidate Species List Under the Endangered Species Act. Final Rule.

Federal Register Notice, 70 Fed. Reg. 37160, June 28, 2005. Endangered and Threatened Species: Final Listing Determinations for 16 Evolutionarily Significant Units (ESUs) of West Coast Salmon, and Final 4(d) Protective Regulations for Threatened Salmonid ESUs. Final Rule.

Federal Register Notice, 70 Fed. Reg. 52488, September 2, 2005. Endangered and Threatened Species: Designation of Critical Habitat for Seven Evolutionarily Significant Units of Pacific Salmon and Steelhead in California. Final Rule.

Federal Register Notice, 73 FR 60987, October 15, 2008. Fisheries Off West Coast States; West Coast Salmon Fisheries; Amendment 14; Essential Fish Habitat Descriptions for Pacific Salmon. Final Rule.

COMMENTS REGARDING PROJECT SCOPING

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

Yuba County Water Agency)
Yuba River Hydroelectric Project)
_____)

FERC Project No. P-2246

1.0 Introduction

NMFS reviewed Scoping Document 1 (SD1) issued by the Commission on January 4, 2011, and provided oral comments for the Integrated Licensing Process (ILP) record at the public scoping meeting February 2, 2011. NMFS' views on scoping below are based on:

- 1) NMFS' identification of the presence and status of several anadromous resources upstream and downstream of the Project;
- 2) NMFS' review of the preliminary description of the licensing action contemplated in the PAD;
- 3) NMFS' review of the Commission's Scoping Document 1;
- 4) NMFS' attendance at multiple site visits to view the Project setting and facilities;
- 5) NMFS' consideration of comments at the Commission's public scoping meeting;
- 6) NMFS' reviews of additional, relevant information sources, including those concerning the scoping of other Yuba River actions;

- 7) NMFS' discussions within the agency and with other agencies and interested parties regarding NMFS' Federal Power Act (FPA) mandatory conditioning authority, and the mandatory conditioning authorities of other agencies.
- 8) Changes that occur in the Yuba River watershed that could restore access by anadromous fishes to upstream reaches.

2.0 Recommended Geographic Scoping

At this time, NMFS recommends the following geographic extent of scoping for the Project's effects:

A. Upstream extent

- the potential action area for the Project extends throughout the upper Yuba watershed, including the North, Middle, and South Yuba watersheds. The extent of the action area may change as new information (particularly on cumulative impacts) is collected or results from the study performed in this ILP.

B. Downstream extent

- the potential action area for the Project extends through the lower Yuba River watershed to the confluence with the Feather River, the lower Feather River, the lower Sacramento River, and through the Sacramento-San Joaquin Delta to the San Francisco Bay. The extent of the action area may change as new information (particularly on cumulative impacts) is collected or results from the study performed in this ILP.

3.0 Rationale for Recommended Geographic Scoping

1. *NMFS' identification of the presence and status of several anadromous resources upstream and downstream of the Project;*

NMFS has identified the following ESA-protected anadromous fishes and habitats (hereafter collectively referred to as ESA resources) in the Yuba River that maybe affected by the Project:

- 1) Central Valley (CV) spring-run Chinook salmon Evolutionarily Significant Unit (ESU) (*Oncorhynchus tshawytscha*), threatened (June 28, 2005, 70 FR 37160);
- 2) CV spring-run Chinook salmon designated critical habitat (September 2, 2005, 70 FR 52488);
- 3) CV steelhead Distinct Population Segment (DPS) (*O. mykiss*), threatened (January 5, 2006, 71 FR 834);
- 4) CV steelhead designated critical habitat (September 2, 2005, 70 FR 52488);
- 5) Southern DPS of North American green sturgeon (*Acipenser medirostris*), threatened (April 7, 2006, 71 FR 17757);
- 6) Southern DPS of North American green sturgeon designated critical habitat (October 9, 2009, 74 FR 52300);

Additional ESA resources occurring downstream in the Feather River, Sacramento River, Sacramento-San Joaquin Delta, and San Francisco Bay may also be affected by the Project.

NMFS also identified the following anadromous resources present in the lower and upper Yuba, and protected under the Magnuson-Stevens Fisheries Conservation and Management Act (MSA) (hereafter collectively referred to as MSA resources). NMFS lists the MSA resources below:

- CV spring-run and CV fall/late fall-run Chinook salmon identified “essential fish habitat” (EFH), (October 15, 2008 73 FR 60987).

Additional MSA resources (EFH) occurring downstream in the Feather River, Sacramento River, Sacramento-San Joaquin Delta, and San Francisco Bay may also be affected by the Project. MSA consultation between NMFS and the Commission will be required regarding the potential effects of license actions that may adversely affect EFH.

NMFS also identified the presence of an anadromous resource in the lower Yuba that is not listed under the ESA, but is a Federal Species of Concern (those species about which NMFS has concerns regarding status and threats, but for which insufficient information is available to indicate a need to list the species under the ESA):

- CV fall/late fall-run Chinook salmon ESU, Species of Concern (April 15, 2004, 69 FR 19975; October 17, 2006, 71 FR 61022).

This Federal Species of Concern also occurs downstream in the Feather River, Sacramento River, Sacramento-San Joaquin Delta, and San Francisco Bay, and may also be affected by the Project. While the fall/late-fall run Chinook ESU has no protection under the ESA, discussions with NMFS regarding effects to this species usually occurs during informal ESA consultation.

2) NMFS’ review of the preliminary description of the licensing action contemplated in the PAD;

Based on NMFS’ review of the PAD, it is clear the Project’s facilities and operations are capable of influencing conditions over a wide geographic area, both upstream and downstream. The Project’s New Bullards Bar Reservoir stores nearly 1 million acre-feet, making it clearly the most dominant

feature controlling the hydrology of the Yuba watershed. NMFS has identified nearly 30 Project facilities that could affect the upstream and/or downstream passage of fishes.

3) *NMFS' review of the Commission's Scoping Document 1;*

The descriptions in SD1 of the Project's facilities indicate its large "footprint" in the Yuba watershed. The Project's Lohman Ridge and Camptonville diversion tunnels have a combined length of nearly 5 miles, with the capacity to convey 1,100 cubic feet per second (cfs) of water to New Bullards Bar Reservoir on the North Yuba River, diverted by the Project's Our House and Log Cabin diversion dams. These diversions affect discharges downstream in the Middle Yuba for 12 miles. The Project's New Bullards dam stands 645 feet high, and its impoundment can store nearly 1 million acre-feet. The 5.2-mile-long New Colgate Power tunnel and penstock has a maximum flow capacity of 3,500 cfs, and bypasses 8 miles of natural river channel. The Project's New Bullards Minimum Flow Powerhouse releases 5 cfs to the North Yuba. The New Colgate Powerhouse operates as a "peaking" power plant, creating concerns over the fluctuations of flows returned to the upper Yuba. Clearly, these facilities dominate portions of the upper Yuba watershed and are capable of affecting flows throughout the lower Yuba, Feather River, and beyond. NMFS regrets the Commission staff did not identify threatened CV spring-run Chinook salmon, CV steelhead, or North American green sturgeon as resources with the potential to be cumulatively affected by the continued operation and maintenance of the Project, due to the extent of potential downstream flow effects. SD1 also identified the potential effects of impediments (passage barrier and flows) to fish passage and migrations, for spawning and thermal refugia, and for out migration. NMFS notes SD1 did not identify any Project facilities that exist to provide fish passage. NMFS

assumes SD1 intended that “spawning” included egg incubation and hatching, and alevin development. Assessments of fry rearing, and juvenile rearing and holding, should also be included as issues – in addition to the adult immigration, holding, and spawning, and (presumed fry or smolt) out migration mentioned. NMFS points here to a concern it has with not only the incompleteness, but the lack of synthesis of, issues identified in SD1 with respect to the 3 ESA-threatened species occurring in the lower Yuba; its entire identification of issues with respect to these species is quoted below (with **bold** emphasis added to draw attention to anadromous salmonids):

4.2.4 Threatened and Endangered Species

- Effects of project-related maintenance activities on elderberry plants and associated effects on the valley elderberry longhorn beetle
- Effects of project operation on California red-legged frog habitat and populations (and effects from warmwater fish) within a 1-mile area around project developments and project-affected reaches
- Effects of project operation and maintenance on listed plant species (Stebbins’ morning glory, Pine Hill flannelbush, Layne’s ragwort, Hartweg’s golden sunburst) and invertebrates (vernal pool fairy shrimp and vernal pool tadpole shrimp)
- **Effect of project operations on spring-run Chinook salmon and steelhead**

NMFS provides more comment on this lack of synthesis between resource issue areas and anadromous fishes and habitats (e.g. between aquatic resources and anadromous fishes, between geology/soils and anadromous habitats, etc.) in one of its requests for information or study herein.

4) *NMFS’ attendance at multiple site visits to view the Project setting and facilities;*

NMFS staff have visited Project facilities on 4 organized tours led by the Applicant over the past year or so, including the February 1, 2011, visit attended by the Commission. NMFS learned a great

deal about the Project facilities and operations by viewing them and interacting with YCWA staff, and appreciates the courtesy and commitment of resources they expended to allow the visits.

5) *NMFS' consideration of comments at the Commission's public scoping meeting;*

NMFS provided oral comments on scoping, and listened to those of others, during the Commission's public scoping meeting. NMFS requests the Commission review the oral comments delivered by NMFS during the public scoping meeting concerning the need for the scoping to extend into the upstream reaches of the upper Yuba watershed, as well as downstream through the lower Yuba, the lower Feather, the Sacramento River, the Sacramento-San Joaquin River Delta, and to the San Francisco Bay. Of particular concern to NMFS is a sufficient extent of geographic scope in both the upstream and downstream directions to adequately evaluate anadromous ecosystem effects. NMFS commented that the EIR/EIS for the Lower Yuba River Accord evaluated effects to the Delta (the water for transfers to the Delta are stored in and released through Project facilities licensed by the Commission). During the scoping meeting, NMFS also provided direction regarding future consultations under the ESA and the MSA, with regard to the adequacy of geographic scoping that should be established in this licensing proceeding. We urge the Commission to review NMFS' comments and to incorporate adequate geographic extent in its follow-on scoping documents. NMFS urges the Applicant to incorporate in its Proposed Study Plan the information/study requests submitted by NMFS, and do so in the context of the scoping comments provided herein. NMFS urges the Commission to provide a future Study Plan Determination consistent with its geographic scoping.

6) *NMFS' reviews of additional, relevant information sources, including those concerning the scoping of other Yuba River actions;*

Sale et. al. (1995), in a study for the Commission, examined the downstream extent of the impacts of the 212 existing, non-federal hydroelectric dams or diversions in the Central Valley that are components of Commission-licensed or exempted projects. The authors determined the large number of FERC licenses and exemptions in the Central Valley can be reduced to fewer than 10 that have potential for direct cumulative impacts on the Bay-Delta. According to the authors, another 27 projects may also be influencing the Bay-Delta, but their impacts were thought to be largely mediated by four large federal projects (Shasta, Folsom, New Melones, and Millerton/Friant), and one state project (Oroville). The report concluded that the Project is one of only 9 Central Valley FERC-licensed projects capable of influencing the environment (in a cumulative fashion) to downstream locations as distant as the Sacramento-San Joaquin River Delta (Delta) and San Francisco Bay, through its influences on the contributions of freshwater inflows from the Yuba River to points downstream. Based on this and other information, NMFS' view is that the New Colgate Development exerts the dominant anthropogenic control over the North Yuba flows reaching the lower Yuba (New Bullards Reservoir has a useable storage capacity of nearly 1,000,000 acre-feet). Other North Yuba flow control is exerted by the FERC-licensed South Feather Hydroelectric project (P-2088), which diverts an average of about 70,000 acre-feet per year from the North Yuba to the Feather River (HDR 2007). In the Middle and South Yuba rivers, FERC-licensed hydroelectric projects (Yuba-Bear, P- 2246, and Drum-Spaulding, P-2310) also exert appreciable anthropogenic control over the flows reaching the lower Yuba and beyond; these projects have a combined storage capacity of about 307,000 acre-feet, and the associated diversion facilities export

an average of approximately 410,000 acre-feet per year to the Bear River and American River; these are volumes that never reach the Corp's Englebright Dam or the lower Yuba (HDR 2007). The described upper Yuba FERC-licensed facilities and operations can significantly reduce the water supply available to the lower Yuba River, particularly during dry and critical water years (HDR 2007).

Consistent with the above-mentioned evaluation of Sale et al. (1995), the Environmental Impact Report / Environmental Impact Statement (EIR/EIS) for the Lower Yuba Accord (USBR 2007), which evaluated the Project's dams, diversions, water supply capabilities, and water transfer operations, scoped their evaluation to the Delta. Recently, the United States District Court for the Eastern District of California issued an Order in *South Yuba River Citizens League and Friends of the River v. National Marine Fisheries Service et al*, No. Civ. S-06-28455, ruling that the no-jeopardy conclusion of a NMFS Biological Opinion is arbitrary and capricious, in part because it did not analyze the project's potential effects downstream of the Yuba River, to San Francisco Bay. (Case 2:06-cv-02845-LKK-JFM Document 316 Filed 07/08/10). This distant downstream geographic scope has been deemed necessary despite the low (~70,000 acre-feet) storage capability of Englebright Reservoir compared with New Bullards Reservoir (~1 million acre-feet), and release operations that hold Englebright Reservoir at near full pool. NMFS recommends the Commission consider its scoping decisions in the context of the evaluations discussed above.

7) NMFS' discussions within the agency and with other agencies and interested parties regarding NMFS' Federal Power Act (FPA) mandatory conditioning authority, and the mandatory conditioning authorities of other agencies.

An upper Yuba geographic scope should be established that adequately informs NMFS' potential exercise of its FPA mandatory conditioning authorities under section 18 of the Federal Power Act (FPA). Scenarios to be contemplated by NMFS include prescription of anadromous fish passage to areas beyond the Project's Narrows II Development in the lower Yuba, and other Project facilities in the upper Yuba, to the upper Yuba watershed including the North, Middle, and South Yuba watersheds. Information about the Project facilities and habitats in these watersheds will also likely inform any exercise of the mandatory FPA section 4(e) authorities of the U.S. Forest Service or U.S. Army Corps of Engineers, or the Clean Water Act section 401 mandatory authority of the California State Water Resources Control Board.

NMFS has additional authorities under the ESA, and based on its review of information currently available, NMFS finds that ESA consultation will be necessary in order for the Commission to issue a new Project license. In NMFS' *Public Draft Recovery Plan for Sacramento River Winter-run Chinook Salmon, Central Valley Spring-run Chinook Salmon, and Central Valley Steelhead* (Draft Recovery Plan) (NMFS 2009), both the upper and lower Yuba River are identified as locations important for the recovery of CV spring-run Chinook salmon and CV steelhead. The Draft Recovery Plan's conceptual recovery scenarios include potential reintroductions of these species to the upper Yuba, into Primary candidate watersheds of the North Yuba, Middle Yuba, and South Yuba rivers. In the Yuba River, the development and implementation of the following recovery actions are identified to re-colonize historic habitats above the Project's facilities and Englebright Dam:

- 1) Enhance habitat conditions, including providing flows and suitable water temperatures for successful upstream and downstream passage, holding, spawning and rearing; and

- 2) Improve access within the area above Englebright Dam, including increasing minimum flows, providing passage at Our House, New Bullards Bar, and Log Cabin dams, and assessing feasibility of passage improvement at natural barriers.

Recovery planning actions for CV spring-run Chinook and CV steelhead are currently underway, and a completed Recovery Plan is anticipated in 2011. NMFS has stated it could revise its critical habitat designations in the future, as additional information becomes available through recovery planning processes (September 2, 2005, 70FR 52488):

The CHART [Critical Habitat Analytical Review Team] reviewed information regarding unoccupied habitat above Englebright Dam for the proposed rule and concluded that unoccupied and inaccessible areas above the dam 'may' be essential for the conservation of these ESUs. However, we have not made a final determination that these areas are essential to conservation. As noted previously for other unoccupied and inaccessible areas, we believe that it is premature to designate unoccupied areas in the Yuba River above Englebright Dam as critical habitat until ongoing recovery planning efforts identify those specific unoccupied habitat areas in the central valley that are essential to the conservation and recovery of these ESUs. The Upper Yuba River Studies Program is expected to provide relevant information for the recovery planning process of both ESUs, and we intend to await the findings of this program as well as recovery planning efforts before making a determination about whether or not the unoccupied habitat areas in question are essential to the conservation of either ESU. If such a determination is made, we will undertake the appropriate rulemaking to propose the designation of these areas as critical habitat.
(p. 52515).

As recovery planning proceeds, additional consultation will be necessary regarding the reintroduction of CV spring-run Chinook and CV steelhead to areas of the upper Yuba. Evaluations of potential anadromous habitat suitability in the Middle and South Yuba watersheds have been performed, with results compiled in the *Technical Report, Upper Yuba River Watershed Chinook Salmon and Steelhead Habitat Assessment*, prepared for the California Department of Water Resources by the Upper Yuba River Studies Program Study Team (CDWR 2007) (Upper Yuba Studies Report); this document contains the results of comprehensive data collection, field studies, and modeling undertaken to characterize current upper Yuba habitat conditions and assess whether

they are capable of supporting Chinook salmon and steelhead. The North Yuba watershed was not evaluated by the Upper Yuba River Studies Program Study Team, but NMFS is developing a salmonid habitat and population model (RIPPLE) to at least partially fill this information gap. Additional information will be necessary regarding the upper Yuba habitats, with regard to their suitability for adult immigration, holding, and spawning, and for juvenile rearing, holding, and emigration, and regarding the effects of the Project's facilities and operations. For these reasons, NMFS has suggested the upstream geographic scope stated above; the expectation is that the Commission will adopt this geographic scope, the Applicant's Study Plan will incorporate further investigations of these areas consistent with this scope, and/or the Commission will require information collection or study in these areas in its Study Plan Determination.

8) *Changes that occur in the Yuba River watershed that could restore access by anadromous fishes to upstream reaches.*

Events could occur in the foreseeable future that might open anadromous access to the upper Yuba, and require scoping of its North, Middle, and South Yuba watersheds. NMFS noted in the introductory text of SD1, the Commission establishes (p. 1) that its staff intends to prepare an EIS which will be used by the Commission to determine whether, and under what conditions, to issue a new license for the Project. This implies an initial "yes or no" licensing determination by the Commission, followed by (if the decision to license is "yes") determination of the appropriate conditions for the new license. NMFS agrees with the intent of the Commission to sequentially follow this path in its licensing decisions. However, NMFS does not agree with language later in SD1:

Decommissioning of the project could be accomplished with or without dam removal. Either alternative would require denying the relicense application and surrender or termination of the existing license with appropriate conditions. There would be significant costs involved with decommissioning the project and/or removing any project facilities. The project provides a viable, safe, and clean renewable source of power to the region. With decommissioning, the project would no longer be authorized to generate power.

No party has suggested project decommissioning would be appropriate in this case, and we have no basis for recommending it. Thus, we do not consider project decommissioning a reasonable alternative to relicensing the project with appropriate environmental measures. (p. 14-15).

Despite the Commission's earlier statement of its intent to first determine whether to issue a new license, the language above suggests the Commission has already decided there is no reasonable alternative to a "relicensing"; thus, the remaining issue is determination of the appropriate new terms or conditions of a new license. NMFS noted the Commission's misuse of the term "relicensing" in the SD1 text cited above (and noted the Applicant's misuse of the same "relicensing" term in the PAD, Section 2, Process Plan, Schedule, and Communication Guidelines).

It is unclear to NMFS how the Commission reached its decision on "relicensing" in SD1, prior to the Project site visit, before receiving and considering the scoping comments of the resource agencies and the public, before receiving and considering any comments on the Applicant's PAD, before information or study requests have been filed in the ILP, and before study of the environmental or other effects of the Project have commenced in this ILP. NMFS therefore objects to this apparent premature scoping determination of the Commission, as several events could occur in the foreseeable future that might resurrect the issue of decommissioning or removal of Project facilities. For example, a revised NMFS biological opinion (BO) for the U.S. Army Corps of Engineers' Operations of Englebright Dam and Daguerre Dam (see United States District Court for the Eastern District of California, Order in *South Yuba River Citizens League and Friends of the River v.*

National Marine Fisheries Service et al, No. Civ. S-06-28455) could potentially change the environmental setting of both the upper Yuba and the lower Yuba in the foreseeable future. That BO did not include consultation over flow releases to the lower Yuba. No ESA biological opinion was issued for the Lower Yuba River Accord that involves releases to the lower Yuba (and beyond) from the Project's New Bullards Dam; its Fishery Agreement provides six flow schedules to meet fishery needs in the lower Yuba River. In the near future, ESA and MSA consultations will be required for the licensing of the Yuba-Bear (FERC No. 2266) and Drum-Spaulding (FERC No. 2310) projects, due to their effects on upper and lower Yuba flows and flow-related conditions. If 400,000 acre-feet of water per year were not exported by these projects from the Yuba River basin, operations to meet the Fishery Agreement in the Lower Yuba River Accord may be facilitated. Clearly, several future developments, many potentially interrelated and interdependent, could cause major changes in the Yuba River watershed and affect the ability of certain Project facilities to continue operating as they now do, or to operate in their present locations. Therefore, NMFS finds that decommissioning the Project or removing some of its facilities may be a reasonable alternative that should not be ruled out by the Commission in its scoping.

NMFS recommends that the Commission's scoping also consider other potential alternatives that could place anadromous fishes in the upper Yuba in the foreseeable future. These include:

- 1) actions taken under the "Habitat Expansion Agreement for Central Valley Spring-Run Chinook Salmon and California Central Valley Steelhead (HEA) to mitigate for any presently unmitigated impacts due to the blockage of fish passage caused by FERC-licensed hydroelectric projects in the Feather River;

- 2) collaborative efforts, such as those underway in the “Yuba Salmon Forum” that have discussed the potential reintroduction of anadromous fishes to the upper Yuba;
- 3) potential future actions taken in the licensings of the Yuba-Bear Hydroelectric Project (FERC No. 2266) and the Drum-Spaulding Hydroelectric Project (FERC No. 2310), which both affect the conditions in existing and potential Yuba River anadromous habitats.

NMFS has suggested the geographic scope stated above; the expectation is that the Commission will adopt this geographic scope, the Applicant’s Study Plan will incorporate further investigations of these areas consistent with this scope, and/or the Commission will require information collection or study in these areas in its Study Plan Determination.

4.0 Literature Cited

Federal Energy Regulatory Commission (FERC). 2011a. FERC Scoping Document 1, dated January 4, 2011, for the Yuba River Development Hydroelectric Project, FERC No, P-2246, Yuba River, California.

FERC. 2011b . FERC Public Scoping Meeting Transcripts, dated February 2, 2011, for the Yuba River Development Hydroelectric Project, FERC No, P-2246, Yuba River, California.

National Marine Fisheries Service (NMFS). 2007. *NMFS Biological Opinion for Operation of Englebright and Daguerre Point Dams on the Yuba River, California*. NMFS, Southwest Region, Long Beach, California. November 21, 2007.

NMFS. 2009. Public Draft Recovery Plan for the Evolutionarily Significant Units of Sacramento River Winter-run Chinook Salmon and Central Valley Spring-run Chinook Salmon and the Distinct Population Segment of Central Valley Steelhead. NMFS, Southwest Region, Sacramento Protected Resources Division. October 2009.

Sale et. al. 1995. Potential Cumulative Effects of Hydropower Projects in the Bay-Delta, California. Oak Ridge National Laboratory for the Federal Energy Regulatory Commission.

U.S. Bureau of Reclamation (USBR). 2007. United States Department of the Interior, Bureau of Reclamation. Final Environmental Impact Report/Environmental Impact Statement for the Proposed Lower Yuba River Accord. October 2007. Available at:
http://www.usbr.gov/mp/nepa/nepa_projdetails.cfm?Project_ID=2549.

Federal Register Notices:

Federal Register Notice, 63 Fed. Reg. 13347, March 19, 1998. Endangered and Threatened Species: Threatened Status for Two Evolutionarily Significant Units of Steelhead in Washington, Oregon, and California. Final Rule.

Federal Register Notice, 64 Fed. Reg. 50394, September 16, 1999. Endangered and Threatened Species: Threatened Status for Two Chinook Salmon Evolutionarily Significant Units in California. Final Rule.

Federal Register Notice, 69 Fed. Reg. 19975, April 15, 2004. Endangered and Threatened Species; Establishment of Species of Concern List, Addition of Species to Species of Concern List, Description of Factors for Identifying Species of Concern, and Revision of Candidate Species List Under the Endangered Species Act. Final Rule.

Federal Register Notice, 70 Fed. Reg. 37160, June 28, 2005. Endangered and Threatened Species: Final Listing Determinations for 16 Evolutionarily Significant Units (ESUs) of West Coast Salmon, and Final 4(d) Protective Regulations for Threatened Salmonid ESUs. Final Rule.

Federal Register Notice, 70 Fed. Reg. 52488, September 2, 2005. Endangered and Threatened Species: Designation of Critical Habitat for Seven Evolutionarily Significant Units of Pacific Salmon and Steelhead in California. Final Rule.

Federal Register Notice, 71 Fed. Reg. 834, January 5, 2006. Endangered and Threatened Species: Final Listing Determinations for 10 Distinct Population Segments of West Coast Steelhead. Final Rule.

Federal Register Notice, 71 Fed. Reg. 17757, April 7, 2006. Endangered and Threatened Wildlife and Plants: Threatened Status for Southern Distinct Population Segment of North American Green Sturgeon. Final Rule.

Federal Register Notice, 71 Fed. Reg. 61022, October 17, 2006. Endangered and Threatened Species: Revision of Species of Concern List, Candidate Species Definition, and Candidate Species List.

Federal Register Notice, 73 FR 60987, October 15, 2008. Fisheries Off West Coast States; West Coast Salmon Fisheries; Amendment 14; Essential Fish Habitat Descriptions for Pacific Salmon. Final Rule.

**REQUESTS OF NOAA's NATIONAL MARINE FISHERIES SERVICE
FOR INFORMATION OR STUDY**

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

Yuba County Water Agency)
Yuba River Hydroelectric Project)
_____)

FERC Project No. P-2246-058

Requests for Information or Study

NMFS Request #1: Request for Information or Study; Effects of the Project and Related Activities on Fish Passage for Anadromous Fish

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

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

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

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

NMFS Request #6: Request for Information or Study; Effects of the Project and Related Activities on the Loss of Marine-derived Nutrients in the Yuba River

NMFS Request #7: Effects of the Project and Related Activities on Aquatic Benthic Macroinvertebrates for Anadromous Fish

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

NMFS Request #1
Request for Information or Study
Effects of the Project and Related Activities on Fish Passage for Anadromous Fish
March 7, 2011

The National Oceanic and Atmospheric Administration's, National Marine Fisheries Service (NMFS) hereby files this request for additional information and study with the Federal Energy Regulatory Commission (Commission or FERC) for Yuba County Water Agency's (Applicant) Yuba River Hydroelectric Project (Project), FERC Project No. 2246, Yuba River, California.

Anadromous Fish Passage:

NMFS requests that the applicant conduct studies related to fish passage for all life stages of anadromous fish inhabiting the Yuba River. This includes passage requirements for both juvenile and adult life stages. The fish species to be studied are: (1) fall-run Chinook salmon, (2) spring-run Chinook salmon, (3) steelhead (*O.mykiss*, ocean type), (4) green sturgeon. Fish passage must be analyzed throughout the river basin, including upstream and downstream of the river's major dams and reservoirs, to the extents of natural habitat accessibility.

Anadromous fish passage studies are requested to help inform decision making for NMFS' forthcoming FPA 10(j) recommendations and section 18 fishway prescriptions.

NMFS requests the Applicant apply its information collection and/or study to evaluate the safety, timeliness, and effectiveness (passage effects) of Project and related activities¹, for the purpose of informing the decision making of NMFS under:

- I. The Endangered Species Act (ESA) section 7 (consultation between the Commission and NMFS);
- II. The Magnuson-Stevens Fisheries Conservation and Management Act (MSA) (consultation between the Commission and NMFS); and
- III. The Federal Power Act (FPA) section 10(a) and 10(j) (authority to recommend license terms and conditions) and section 18 (authority to prescribe fishway prescriptions).

Of course, the results of this request will also inform the Applicant, the Commission, and other interested parties.

NMFS requests the Applicant's evaluations of passage effects be directed at the following species (hereafter collectively referred to as "target species") found in the Yuba River (Table 1.)

- A. fall-run Chinook salmon;
- B. spring-run Chinook salmon;
- C. steelhead (*O.mykiss*, ocean type);
- D. green sturgeon;
- E. Pacific lamprey.

¹ To understand NMFS' use of "related activities", see NMFS' response below to the regulations at 18 CFR § 5.9(a).

Table 1. Project facilities and related activities affecting anadromous Yuba River fish passage.

Reach	#	Facility Encountered (upstream direction)	RM	Target Species	Passage Issue	NMFS authority	Total Migration		
Lower Yuba									
	1	Daguerre Point Dam	11.4	A, B, C, D, E	a-d f g h j k l m	I, II	11.4		
	2	Hollywood-Cordua diversion	11.4	A, B, C, D, E	f h i j k l m	I, II	11.4		
	3	South Yuba-Brophy diversion	11.6	A, B, C, D, E	f h i j k l m	I, II	11.6		Species Key
	4	Brown's Valley diversion	12.2	A, B, C, D, E	f h i j k l m	I, II	12.2	A	fall-run Chinook
	5	Narrows I Powerhouse	23.6	A, B, C, D, E	a c d e f g i j l m	I, II, III	23.6	B	spring-run Chinook
	6	Narrows II Powerhouse	23.9	A, B, C, D, E	a c d e f g i j l m	I, II, III	23.9	C	CV steelhead
	7	Narrows II Flow Bypass	23.9	A, B, C, D, E	a c d e f g i j l m	I, II, III	23.9	D	green sturgeon
	8	Englebright Dam	24.0	A, B, C, D, E	a g k l m	I, II	24.0	E	Pacific lamprey
Upper Yuba									
	9	Englebright Reservoir	24.0	A, B, C, D	l m	I, II, III	24.0		
	10	Narrows I Intake	24.1	A, B, C, D	c i	I, II, III	24.1		Authority Key
	11	Narrows II Intake	24.1	A, B, C, D	c i	I, II, III	24.1	I	ESA
	12	Englebright Reservoir (end)	32.2	A, B, C, D	m	I, II, III	32.2	II	MSA
	13	New Colgate Powerhouse	33.9	A, B, C, D	b e f j k l m	I, II, III	33.9	III	FPAsec 18 and 10
Middle Yuba			0.0				40.1		
	14	Our House Measurement Weir	11.9	B, C	b g l	I, II, III	51.6		
	15	Our House Dam	12.0	B, C	a f g k l m	I, II, III	51.7		Passage Issue Key
	16	Our House Reservoir	12.0	B, C	l m	I, II, III	51.7	a	adult barrier
	17	Lohman Diversion Intake	12.1	B, C	c i	I, II, III	51.8	b	adult partial barrier
Oregon Creek			0.0				44.2	c	adult entrainment
	18	Log Cabin Diversion Dam	4.1	B, C	a f g k l m	I, II, III	48.3	d	adult stranding
	19	Log Cabin Reservoir	4.1	B, C	l m	I, II, III	48.3	e	adult tailrace attraction
	20	Camptonville Diversion Intake	4.1	B, C	c i	I, II, III	48.3	f	min.flow, flow continuation
	21	Lohman Ridge Diversion Outlet	4.3	B, C	e	I, II, III	48.5	g	juvenile barrier
North Yuba			0.0				42.0	h	juvenile partial barrier
	22	New Bullards Bar Dam Spillway	2.1	B, C	e f	I, II, III	44.1	i	juvenile entrainment
	23	Fish Release Measurement Weir	2.2	B, C	b g l	I, II, III	44.2	j	juvenile stranding
	24	New Bullards Fish Flow Powerhouse	2.3	B, C	a g f k l m	I, II, III	44.3	k	inadequate flow
	25	New Bullards Dam	2.3	B, C	a g k l m	I, II, III	44.3	l	increased predation
	26	New Bullards Reservoir	2.3	B, C	l m	I, II, III	44.3	m	water temperature modification
	27	New Colgate Power Intake	2.6	B, C	c i	I, II, III	44.6		
	28	Bullards Bar Dam (submerged)	2.7	B, C	h	I, II	44.7		
	29	Camptonville Diversion Tunnel Outlet	2.8	B, C	e	I, II, III	44.8		
	30	Recreation Facilities	3.0	B, C	?	I, II, III	45.0		
	31	New Bullards Reservoir (end)	18.1	B, C	m	I, II, III	60.1		

NMFS adds that evaluations at Project and related activities locations would also evaluate the habitats for these species, including ESA-designated critical habitats and MSA-identified essential fish habitat (EFH). Please see Enclosures B and C for additional information about these.

Rationale for section 18 authority:

1. Englebright Dam physically obstructs flow and fish passage via the natural river channel. As a result, all flow from the upper Yuba River is redirected through the hydroelectric complex- Narrows 1 and Narrows 2 facilities. These facilities were constructed without provisions for safe and effective fish passage.

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.

For its part, the dam is a physical barrier to fish passage. However, the hydropower facilities are also hydraulic and mechanical barriers to fish passage. Regardless of the mode of blockage, the result is that all facilities are fish passage barriers in their own right.

Englebright Dam is located upstream of the Narrows hydroelectric facilities and water discharge points. The Narrows 2 facility is approximately 400 feet south of Englebright Dam on the west bank of the Yuba River (FERC 2005), and Narrows 1 is a quarter of a mile downstream of Englebright Reservoir on the eastern bank of the Yuba River (FERC 1992). Thus, upstream migrating fish encounter the passage effects of the Narrows hydroelectric facilities first, before potentially reaching Englebright Dam.

The penstocks to the Narrows 1 and Narrows 2 developments are the only outlets from Englebright dam, and are the only means of discharging water downstream, except for spills over the top of the dam (FERC 1992; 2005). The construction of the FERC-licensed Narrows hydroelectric complex resulted in the full flow of the Yuba River being routed through, and confined in project facilities - from the intakes in Englebright reservoir, through a gauntlet of tunnels, pressurized pipes, rotating turbines, high velocity draft tubes, and turbulent outfalls. In effect, the natural flow of the river was transformed into a highly unnatural environment for any fish and wildlife encountering it. With the exception of rare events when excess water spills over the crest of Englebright Dam, the flow through the Narrows 1 and Narrows 2 hydroelectric complex represents the only possible route to swim upstream – a route that fish cannot negotiate successfully.

The hydroelectric complex is operated in tandem. Narrows 1 and 2 constrain the entire Yuba River flow in some combination between them. At times, when Narrows 1 is shut down for maintenance or other reasons, then all flows need to pass through Narrows 2 if the downstream river is to be kept wetted. In this case, it is the only waterway that connects upstream with downstream.

Recognizing that the original Englebright Dam facility had no provisions for flow releases other than through the FERC-licensed hydropower complex, the Commission could have conditioned the Licenses to include fish passage as part of its FPA 10(a)(2) responsibility. Instead, hundreds of miles of historic anadromous fish habitat have been inaccessible to anadromous fish over the past 50 years, causing serious reductions in these fish populations over time. The current Integrated Licensing Process for the Yuba River Development represents an opportunity to repair the damage to Yuba River anadromous fish resources over the past 50 years – by restoring access to many miles of historic habitats upstream.

2. Narrows 2 is one of the three inter-related facilities that collectively constitute a total barrier to fish migration near River Mile 24 the Yuba River.

The Narrows 2, Narrows 1, and Englebright Dam complex represents an undeniable upstream passage barrier to fish. Each facility, in its own way, prevents or impairs the biologically necessary migration behavior of [anadromous] fish. At the same time, the facilities are highly related. Englebright Dam forms the forebay for the Narrows I and Narrows II facilities, which both have intakes that take water from Englebright Reservoir. The Applicant and the Pacific Gas and Electric Company (PG&E), licensee for the Narrows I project, currently coordinate the operation of Narrows 1 and Narrows 2 for hydropower efficiency and flow stability in the lower Yuba River. The penstocks to the two developments are the only outlets from Englebright Dam, and are the only means of discharging water downstream, except for spills over the top of the

dam. Both Narrows I and Narrows II are dependent on available storage in New Bullards Bar and Englebright reservoirs. Under an existing power purchase agreement between the Applicant and PG&E, PG&E can require the release of water from New Bullards Bar Reservoir for power generation based on monthly quotas and available storage in the reservoir above an established index or “critical line.” (FERC 2005).

The facilities each create independent, unique, and often extreme hazards for many different aquatic organisms encountering them, particularly for anadromous fish species native to the waters upstream of these locations. For example, fish that pass downstream by washing over the 260 foot dam crest during rare spill events (“dam route”), are subject to high injury and mortality rates. Likewise, downstream passage through the Narrows 2 and Narrows 1 complex (“hydro route”) is often injurious or fatal to fish. Similarly, the Narrows facilities do not allow for upstream migration, and they present conditions that are hazardous for fish trying to swim upstream. In seeking an upstream swimming route, fish may be able get inside the tailrace, draft tubes, or other parts of the power plant(s). Once there, they can be killed or injured. This could happen during startup and shutdown operations, as has been experienced at hydroelectric plants elsewhere.

The question arises:

Why would fish try to swim into the draft tubes of these hydroelectric plants?

Certain anadromous fishes evolved to seek spawning habitat at higher elevations in the watershed – where conditions are more conducive for their reproduction and early life cycle. For certain anadromous fish, this instinct can be a matter of survival, so these behaviors are strongly imprinted in each individual. In the case of the Yuba River, because there are no other predominant in-stream flow releases, the hydro plant discharges can function as an environmental cue for anadromous fish - by signaling to them the most likely route upstream. Instinct drives anadromous fish to explore for possible upstream migration routes – even in the high velocity, turbulent flow caused by Narrows 2. Many years ago, experts in the field of fish passage and hydraulic engineering named this phenomenon “false attraction.”

In the narrows reach (between Yuba River Mile 23 and 24), the only possible routes to upstream habitat are through the Narrows 2 and Narrows 1 hydroelectric facilities. This is because the hydroelectric plants capture and transport the full flow of the Yuba River from upstream of Englebright Dam to downstream of Englebright Dam. The dam itself, unlike other dams of this type, has no other provisions for passing water downstream – no low level outlet, no locks or sluice gates, and no fishways. Since fish cannot fly, they are faced with the insurmountable task of swimming through high energy power plant flows, as their only hope of getting further upstream:

Since the hydraulic conditions of flows within Narrows 2 exceed the swimming ability of all anadromous fish, and because there are no other viable upstream swimming routes – Narrows 2 is a complete barrier to upstream fish passage.

Because the trio of inter-related, man-made passage barriers cause anadromous fish to ultimately fail to find a viable route upstream, they are forced to fall back to spawn in competition with a host of other fishes utilizing the lower river. Expending energy reserves at hydropower outfalls during migration can decrease fecundity. Spatial competition for limited habitat can reduce fecundity, growth, and survivability. Crowding all species into limited habitat downstream of

the Narrows complex has significant ecosystems effects. The loss of upstream anadromous habitat is serious impact to the Yuba River anadromous fish population.

Basically, the conditions inside narrows 2 hydroelectric facility cannot provide safe, timely, and effective fish passage in either direction – upstream or downstream; and the Yuba River Development Project has no other means of mitigating this deficiency at this time. The Commission can rectify this situation by establishing effective fish passage facilities as a condition in the prospective, new license.

3. Narrows 2 facilities do not provide for safe and effective passage for [anadromous] fish in either direction– upstream or downstream. It is part of the Yuba River Development Project that is the subject of this Integrated Licensing Process.

The Narrows 2 complex is the subject of this P-2246 Integrated Licensing Process; therefore a focus on its failure to provide for effective [anadromous] fish passage is central to this discussion at this time. Similar impacts are created by the Narrows 1 power plant facilities. Both facilities are operated co-dependently, and in conjunction with one another to provide the requisite instream flow to the lower Yuba River.

However, the Narrows I license contains the following:

Article 411. The Licensee shall, for the limited purpose of coordinating operations with FERC Project No. 2246 for the development of fish resources in the Yuba River downstream of Englebright dam, comply with such reasonable modifications of project operations, as may be ordered by the Commission upon the relicensing or amendment of the license for FERC Project No. 2246, after notice and opportunity for hearing.

Therefore, NMFS understands the two project licensing processes are linked by the Commission.

Narrows 1 impact will be presumably be addressed in separate licensing proceedings unless the Commission chooses to merge the two project licensing processes for reasons of expediency. Englebright Dam is located further upstream of the Narrows water discharge points, so upstream migrating fish encounter the effects of the hydropower plants first. Impacts caused further upstream by Englebright Dam are not subject to FERC jurisdiction and therefore must be addressed in other venues. The original FERC licenses did not compel the licensees to construct appropriate fish passage systems, even though it was known that there were no other fish passage facilities at Englebright Dam (nor any plan to construct them), and that there was no satisfactory mitigation for the loss of hundreds of miles of upstream habitat caused when these facilities were licensed and constructed.

4. Upstream fish passage through the Narrows 2 is made impossible by hazardous and extreme conditions created within the facility as part of its normal operation.

Fish attempting to migrate upstream cannot swim through the Narrows 2 project facilities because the internal hydraulic conditions during operations are hazardous and extreme. Should fish attempt to swim through Narrows 2 facilities in the upstream direction – one of the two potential flow paths leading to upstream habitat (and sometimes the only one if Narrows 1 is taken off-line) -- they are unsuccessful. The Narrows 2 facility was licensed without any suitable, “auxiliary” waterway for fish to swim through. It is the intake tunnel and penstock that

“unnaturally compresses” the flow to transform potential energy into the kinetic energy that drives the hydropower turbines and it is this action that creates the unsuitable hydraulic conditions for anadromous fishes. Hydraulic engineers refer to this as closed conduit, pressurized pipe flow, as opposed to the “open channel” (depressurized) flow of a natural river, in which aquatic species have evolved.

5. Downstream fish passage through Narrows 2 is dangerous, resulting in injury and mortality to fish.

Fish attempting to migrate downstream would normally be entrained in the Narrows 2 or Narrows 1 intakes; thus they are then subjected to extreme forces within the project’s tunnels, penstocks, turbines, draft tubes, and outfall structures. The likelihood of successful downstream passage through Narrows 2 project facilities is low and the probability of injury and mortality is high – due to the hydraulic and mechanical conditions within these project facilities. Because Narrows 2 has no entrainment protection for fish, study of this impact is an important information requirement for this licensing process, in order to allow suitable preventive measures to be prescribed.

6. Study of the fish passage conditions in the segment where the Yuba river is captured for use by Narrows 2, along with detailed assessment of conditions in the adjacent river channel, is required to establish the full scope of fish passage concerns for the Yuba River Development Project during the Integrated Licensing Process.

The hazardous and extreme conditions imposed upon fish (by Narrows 2) will be documented in greater detail as the ILP process proceeds. Describing and illuminating the upstream and downstream swimming conditions resulting from bypassing all Yuba River flow through hydroelectric facilities - without any other provisions for safe, timely, and effective fish passage – is an important aspect of this licensing proceeding. By including this factual information on the Administrative Record, the Commission will fairly establish a basis for evaluating all impacts and characterizing potential protection, mitigation, and enhancement measures for anadromous fish resources. Furthermore, these investigations bear on NMFS’ future decision related to FPA§18 fishway prescriptions (whether or not to prescribe fishways) and form part of the basis for several of NMFS’ information and study requests.

7. The original 1963 FERC license contemplated the need, or necessity, of reasonable modifications to the project in the interest of fisheries resources.

Narrows 2 was authorized as part of the Yuba River Development Project by Commission Order on May 16, 1963 (29F.P.C. 1002). Article 31 of Commission Order states: “...The Licensee shall construct, maintain, and operate such protective devices and shall comply with such reasonable modifications of the project structures and operation in the interest of fish and wildlife resources, provided that such modifications shall be reasonably consistent with the primary purpose of the project...”

The Licensee has enjoyed a 50-year initial license term, utilizing the public resources for profit without providing reasonable measures for fish passage. The Commission’s original license endorsed this situation, but allowed for reasonable modifications to be instituted to protect fish and wildlife resources at a later time.

8. Re-establishment of safe and effective fish passage is a reasonable modification to the Narrows 2 project.

NMFS asserts that re-establishment of safe and effective anadromous fish passage is a reasonable modification to the Narrows 2 project, as contemplated in the original license. NMFS further asserts that anadromous fish passage and reintroduction upstream of Narrows 2 is a necessary conservation and recovery measure for ESA and MSA protected species. Once fish are successfully passed into the upper watershed, fish passage provisions at other project facilities will likely also be necessary. NMFS' study requests herein reflect a comprehensive inquiry about fish passage, fish habitat, and the other ecosystem-related effects of the Yuba River Development Project. The information derived from these inquiries will inform NMFS' future decisions regarding FPA§18 prescriptions.

9. NMFS respectfully requests the Commission order all studies enumerated in this official correspondence in support of developing a complete and accurate Administrative Record for these proceedings.

The requested scope of fish passage and habitat-based information and studies- upstream of the Narrows 2 facility development- is supported by the foregoing facts identifying the Narrows 2 facility as a "gateway" fish passage barrier. All requested studies in the upstream watershed are appropriate and relevant to this proceeding. Studies that are requested specifically to establish that the Narrows 2 facility is a fish migration barrier may be waived or modified if the applicant and the Commission will stipulate to the fact in this proceeding. Otherwise, the Commission should grant all studies requested by NMFS, other resource agencies, and other stakeholders that reasonably yield information to support decisions about future FPA§18 fishway prescriptions, FPA 4(e) conditions, as well as FPA§10(j) protection, mitigation, and enhancement measures for the entire Yuba River Development Project.

a. Request Element #1: Information about Hydraulic Conditions near project facilities:

Information to identify, quantify, and qualify hydraulic conditions within 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. One primary focus of this investigation is the Narrows 2 power generation facility between the intake and outfall. Other project facilities should also be studied for actual or potential impacts on fish passage. The purpose of this information request is to evaluate whether or not anadromous fish of all life stages are affected by project facilities during operations. Specifically, the request seeks to answer the question of whether or not the hydropower facilities are conducive to maintaining safe, timely, and effective fish passage from the point just downstream of all project facilities to points upstream of those facilities. For example, the Narrows 2 outfall to the upper extents of natural, anadromous fish habitat in the upper Yuba watershed – inclusive of all intervening stream reaches and facilities comprising the Yuba River Development.

If the applicant and the Commission wish to stipulate for the Record that Narrows 2, and certain other project facilities (e.g.- New Colgate powerhouse, New Bullards Bar Dam, Our House Dam, etc.), constitute upstream and downstream migration barriers that are hazardous to fish, then some elements of NMFS' information request may be retracted or modified accordingly.

Lacking any stipulations as suggested above, one approach to the question of whether or not the water velocity through the project's power plants exceeds the swimming ability of anadromous fish is to install acoustic velocity flow meters in penstocks of Narrows 2 (and Narrows 1). In this

way, the water velocity data can be collected and compared against the known swimming abilities of fish.

Request Element #2: Information about Fish Presence and Migration 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 Narrows reach, and in the reaches in the vicinity of all other project facilities. For example, the study area for the Narrows 2 facility should include: (1) 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, 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 I project outfall. Other relevant project facilities should be included in this information/study request based on a similar, appropriate stream reaches to detect potential fish passage impacts in the immediate vicinity of project outfalls, plus a representative reach in the upstream and downstream directions. For facilities located upstream of the Narrows 2 intake, information should be developed to quantitatively determine the composition and behavior of existing fish 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, as called for in the NMFS ecosystems effects information/study request.

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

Fish survey in Narrows Reach

This is specifically requested by NMFS in order to understand [anadromous] fish presence and migration behavior. The survey should employ DIDSON technology to scan for, identify, and enumerate fish and fish behaviors in the identified river reach over periods of time that best coincide with expected presence of anadromous 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 assays should be conducted in the near vicinity of the Narrows 2 outfall, New Colgate outfall, “Fish Flow Powerhouse” outfall (base of Bullards Bar Dam), the confluence area of Middle Yuba with North Yuba River, Our House and Log Cabin Dams. Any known information about fish populations and assemblages in all reaches between Narrows 2 and the upstream extents of natural accessibility for anadromous fish (excluding so-called “partial barriers” or any project facilities) should be brought forward in response to this information request.

Request Element #3: Specific fish passage information/study request at DaGuerre Point Dam

The fish passage conditions and efficacy of fish ladders and screens at DaGuerre dam and its associated water diversions should be studied.

This information/study request recognizes that DaGuerre Point Dam is a key in stream facility affecting fish passage in the Yuba River. Although the facility is owned by the USACE, the reason for its existence and function is interdependent and interrelated with the FERC P-2246.

DaGuerre provides head for gravity diversions of water at the Brophy and Hallwood - Cordua Irrigation Districts. The reason why these diversions are able to function is because of the nearly 1M acre-feet storage capacity of Bullards Bar reservoir, established by the impoundment caused by Bullards Bar Dam (a project work). Without the large upstream impoundment capability of P-2246, the Hallwood-Cordua and Brophy water diversions would be severely restricted in their capacity and seasons of diversions. The existence of project storage water therefore creates an inter-related, indirect impact to the Yuba River fish habitat and ecosystem processes.

Request Element #4: Fish Passage information/study request at Narrows I, Narrows 2, Englebright Dam, New Colgate Powerhouse, New Bullards Bar Dam, Our House and Log Cabin Dams

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 specifically includes detailed information and/or studies of velocity, turbulence, and temperature in the immediate vicinity 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 passage or 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. The 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. This includes both physical passage conditions and behavioral aquatic environment cues that affect fish passage, e.g.- temperature and water quality variations, flow cues, turbulence-related barriers, etc.

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 and steelhead. The required information will provide a comparison of channel dimensions and locations relative to fish passage and migration routes. For example, 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. 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 I & 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 the other project 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. These studies are needed to assess physical /hydraulic fish passage characteristics and habitat conditions in order to make an informed determination about physical and behavioral barriers to passage relative to the Project facilities.

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 #6: Specific information/study request about Fish Passage Upstream of the Narrows I & 2/Englebright Dam complex; and upstream of other Project facilities.

This information request should be informed by the 2010 Montgomery-Watson- Harza, Inc. (MWH) report on Yuba River fish passage options. While the MWH study contains significant engineering and biological information, the scope of the study did not cover all fish passage aspects, so the FERC-sponsored studies should build on the MWH study and fill in the gaps. For example, the applicant should analyze the MWH fish passage options as compared to other potential modes for fish passage, including the notching or complete removal of Englebright Dam. A previous CH2M Hill effort produced information about a potential “dam notch and fishway” concept. This information should be brought forward for further analysis of this fish passage alternative. A study of the complete removal of Englebright and DaGuerre dams is warranted as a potential fisheries restoration action for the Yuba watershed, but these are not within the scope of FERC-licensing.

The MWH study looked at multiple options for fish passage into the upper watershed at a conceptual level. Some of these options involved volitional passage (ladders), others involved semi-volitional (trams) or non-volitional (“collection and transport”) methods. NMFS requests additional engineering feasibility studies to continue with the process of selecting and designing effective fish passage systems. Studies of all project facilities may be involved- to the extent they are relevant in the on-going process of developing and refining alternatives, and eventually selecting a preferred alternative for an effective anadromous fish passage program. This outcome is consistent with NMFS resource goals and objectives for this project. It is also consistent with NMFS Draft Central Valley Recovery Plan for ESA listed species, which has been filed with the Commission as a Comprehensive Watershed Plan.

Request Element #7: Specific information/study request of reservoir fish passage conditions upstream of Englebright, Bullards Bar, Our House, and Log Cabin Dams:

It is important to assess both upstream and downstream fish passage facility designs in order to develop a cost-effective fish passage program. For example, a volitional upstream passage system for adult salmonids needs to be informed by reservoir conditions at the release point(s); and downstream fishway designs (screens, surface collectors will require a study of physical relationships of dam, reservoir and shoreline topography/ bathymetry.

- Temperature profiles – detailed profiles in the vicinity of existing New Colgate, Narrows 1 and Narrows 2 Development hydropower intakes, and upstream to the estimated extent of fish guide nets for a possible floating surface collection system;
- Bathymetry profiles – detailed profiles in the vicinity of existing New Colgate, Narrows 1 and Narrows 2 Development hydropower intakes, and upstream to the estimated extent of fish guide nets for a possible floating surface collection system;
- Hydraulic profiles – detailed profiles in the vicinity of existing New Colgate, Narrows 1 and Narrows 2 Development hydropower intakes, and upstream to the estimated extent of fish guide nets for a possible floating surface collection system.

In addition to study upstream of dams, similar studies should be conducted at the head of the reservoirs to evaluate the potential for juvenile fish collection at these locations.

Specific studies for prevention of entrainment (e.g. fish screens and facilities for collection and transport downstream of fry/smolts/kelts) at all power plant intakes is part of this information/study request.

Request Element #8: Specific information/study request of fish passage conditions over the length of DaGuerre Reservoir and its tail water pools, Englebright Reservoir, and New Bullards Bar reservoir and tail water pools.²

- Temperature profiles - general profiles (width and depth) through the reservoir to identify thermal profiles and potential cool water refugia or other temperature stratification phenomena that potentially affects adult and juvenile salmonid migrations.
- Bathymetry profiles – general profiles (width and depth) through the reservoir to identify thermal profiles and potential cool water refugia or other temperature stratification phenomena that potentially affects adult and juvenile salmonid migrations.
- Hydraulic profiles – general profiles to describe velocity patterns in pools below the dam and upstream near the dam at diversion intakes. This should include study of the forebay, fish ladders, and the areas near points of diversion.

This information is useful to support evaluation of anadromous fish passage conditions in any scenario where fishways may be prescribed. The information will be considered in the overall analysis of whether or not to prescribe fish passage.

² Specific , detailed study of conditions downstream of Englebright Dam is included in request element #4

Request Element #9: Fish Passage Conditions in the South Yuba River

Study of anadromous fish passage conditions from the confluence of the South Yuba River at the reservoir and moving upstream to assess conditions up to RM 35.4. For natural in stream features currently classified as potential partial barriers, conduct a site survey and produce estimates of hydraulic conditions during higher flow events that would result from additional flow releases from upstream hydroelectric projects. Also, these studies should be conducted by qualified fish passage specialists to determine potential remediation methods should enhancement of fish passage become a restoration objective.

Request Element #10: Fish Passage conditions in the vicinity and upstream of New Colgate powerhouse to New Bullards Bar Dam

Comprehensive study of physical and hydraulic conditions beginning at approximately one mile downstream of the Colgate powerhouse, and continuing to approximately one-half mile upstream of Colgate powerhouse . The study is to include a detailed analysis of temperature and hydraulic profiles, i.e.- velocity, turbulence, temperature gradients.

Tailrace barrier requirements - study of the conditions at the tailrace of the New Colgate powerhouse, and associated bypass outfalls or other discharges. All historical plant records documenting fish inside power plant facilities should be made available. Objective is to study and assess the historical incidence, or potential future incidence of fish mortality or injury - resulting from attraction and entrainment into the power plant structures. This study will inform future design and construction of tailrace barriers that were not incorporated into original facility designs.

Request Element #11: Fish Passage Conditions in the Middle Yuba River

Study of anadromous fish passage conditions from the confluence of the Middle Yuba River with the North Yuba River, and moving upstream to assess conditions up to RM 34.5. For natural in stream features currently classified as potential, partial barriers, conduct a site survey and produce estimates of hydraulic conditions during higher flow events that would result from additional flow releases from upstream hydroelectric projects. Also, these studies should be conducted by qualified fish passage specialists to determine potential remediation methods should enhancement of fish passage become a restoration objective.

Upstream and Downstream fish passage conditions at Our House Dam (and the small downstream measurement weir) are part of this request.

Request Element #12: Fish Passage Conditions in the Upper North Yuba River

Study of anadromous fish passage conditions in the New Bullards Bar reservoir and upstream to Love's Falls, including any major intervening tributaries. Habitat assessment and characterization is part of this information/study request.

Request Element #13: Pilot Field Experiments for Anadromous Fish Reintroduction

NMFS has filed a preliminary ESA S10(a)1(a) permit application necessary to conduct field pilot experiment studies using adult and juvenile Chinook salmon and steelhead for research purposes. This permit can be applied for ESA “take” coverage for a consultant hired to conduct these experiments.

Types of reintroduction pilot studies:

- Adult Tracking and Migration – gaining access to holding and suitable spawning; will adults spawn and where?
- Juveniles – smolt outmigration and reservoir transit studies; use mark re-capture or hydroacoustics techniques to track juvenile out-migrant passage through reservoirs and at facility passage obstacles
- Eggs – experiments with fertilized hatchery eggs to establish founder populations in targeted upstream watershed reaches

The scope, extent, duration, design, and oversight of these studies must be done under the oversight of NMFS, with assistance from USFWS and CDFG.

This request is formatted in accordance with:

Title 18 of the Federal regulations *Conservation of Power and Water Resources*;
Part 5 *Integrated License Application Process*; Section 5.9 *Comments and information or study requests*.

18 CFR § 5.9 (a): *Comments and study requests*. Comments on the pre-application document and the Commission staff's Scoping Document 1 must be filed with the Commission within 60 days following the Commission's notice of consultation procedures issued pursuant to §5.8. Comments, including those by Commission staff, must be accompanied by any information gathering and study requests, and should include information and studies needed for consultation under section 7 of the Endangered Species Act and water quality certification under Section 401 of the Clean Water Act. (Emphasis added for relevance to highlight NMFS' ESA concerns)

18 CFR § 5.9 (b): *Content of study request*. Any information or study request must:

- (1) Describe the goals and objectives of each study proposal and the information to be obtained;
- (2) If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied;
- (3) If the requester is not a resource agency, explain any relevant public interest considerations in regard to the proposed study;
- (4) Describe existing information concerning the subject of the study proposal, and the need for additional information;

(5) Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study results would inform the development of license requirements;

(6) 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 relevant tribal values and knowledge; and

(7) Describe considerations of level of effort and cost, as applicable, and why any proposed alternative studies would not be sufficient to meet the stated information needs.

(c) *Applicant seeking PURPA benefits; estimate of fees.* If a potential applicant has stated that it intends to seek PURPA benefits, comments on the pre-application document by a fish and wildlife agency must provide the potential applicant with a reasonable estimate of the total costs the agency anticipates it will incur in order to set mandatory terms and conditions for the proposed project. An agency may provide a potential applicant with an updated estimate as it deems necessary. If any agency believes that its most recent estimate will be exceeded by more than 25 percent, it must supply the potential applicant with a new estimate and submit a copy to the Commission.

§ 5.9 (a): The Information Gathering or Study Should Inform Consultation Under Section 7 of the Endangered Species Act

Comments, including those by Commission staff, must be accompanied by any information gathering and study requests, and should include information and studies needed for consultation under section 7 of the Endangered Species Act

The information or study resulting from this Request would inform future ESA consultation between NMFS and the Commission because the Project's effects on the resource(s) to be studied in this request affect ESA-listed salmonids or sturgeon, and/or their ESA-designated critical habitats, both in the Yuba River and in locations downstream.

NMFS has identified the following ESA-protected anadromous fishes and habitats (ESA resources) in the Yuba River that could be affected by the Project:

- 1) Central Valley (CV) spring-run Chinook salmon Evolutionarily Significant Unit (ESU) (*Oncorhynchus tshawytscha*), threatened (June 28, 2005, 70 FR 37160);
- 2) CV spring-run Chinook salmon designated critical habitat (September 2, 2005, 70 FR 52488);
- 3) CV steelhead Distinct Population Segment (DPS) (*O. mykiss*), threatened (January 5, 2006, 71 FR 834);
- 4) CV steelhead designated critical habitat (September 2, 2005, 70 FR 52488);
- 5) Southern DPS of North American green sturgeon (*Acipenser medirostris*), threatened (April 7, 2006, 71 FR 17757);

- 6) Southern DPS of North American green sturgeon designated critical habitat (October 9, 2009, 74 FR 52300);

ESA resources that occur downstream in the Feather River, Sacramento River, Sacramento-San Joaquin Delta, and San Francisco Bay may also be affected by the Project.

NMFS also identified the presence of an anadromous resource in the lower Yuba that is not listed under the ESA, but is a Federal Species of Concern (those species about which NMFS has concerns regarding status and threats, but for which insufficient information is available to indicate a need to list the species under the ESA):

- CV fall/late fall-run Chinook salmon ESU, Species of Concern (April 15, 2004, 69 FR 19975; October 17, 2006, 71 FR 61022).

This Federal Species of Concern also occurs downstream in the Feather River, Sacramento River, Sacramento-San Joaquin Delta, and San Francisco Bay, and may also be affected by the Project. While the fall/late-fall run Chinook ESU has no formal protection under the ESA, discussions with NMFS regarding effects to this species usually occurs during ESA consultation.

NMFS notes the facilities requested for review are not all considered part of the “Project” facilities by the Commission. However, for consultation under section 7 of the Endangered Species Act, the action, action area, and the effects of an action are defined more broadly. NMFS refers the Commission and Applicant to the following definitions from the Code of Federal Regulations (CFR), and to Enclosure B of this filing:

50 CFR § 402.02 Definitions.

Action means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies in the United States or upon the high seas. Examples include, but are not limited to:

- (a) actions intended to conserve listed species or their habitat;
 - (b) the promulgation of regulations;
 - (c) the granting of licenses, contracts, leases, easements, rights-of-way, permits, or grants-in-aid;
- or
- (d) actions directly or indirectly causing modifications to the land, water, or air.

Action area means all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action.

Effects of the action refers to the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action, that will be added to the environmental baseline. The environmental baseline includes the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation in process. Indirect effects are those that are caused by the proposed action and are later in time, but still are reasonably certain to occur. Interrelated actions are those that are part of a larger action and depend on the larger action for their justification. Interdependent actions are those that have no independent

utility apart from the action under consideration. (Emphasis added to highlight that evaluation of the effects of an action in the ESA sense is broader than evaluation of the action alone).

§ 5.9 (b): 1.0 Goals and Objectives of Request

Describe the goals and objectives of each study proposal and the information to be obtained;

Study goals and objectives:

- 1) To accurately identify, quantify, and qualify the effects of the Project on **fish passage** for all relevant anadromous and resident fish species at all project facilities. As well as in the vicinity of stream reaches which are affected directly or indirectly by the project facilities or operations. If this request is incorporated in the Applicant's Study Plan and implemented in a scientifically defensible manner, the results would inform NMFS' decisions with respect to this ILP (including NMFS' FPA§18 authority), consistent with NMFS' resource goals and objectives with respect to anadromous fish and their habitats.
- 2) Develop information that will be aggregated with other information requests to determine the Project's effects on anadromous fish and the ecosystems that support them.

§ 5.9 (b): 2.0 Resource Management Goals of NMFS

If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied;

NMFS' Resource Management Goal and Objectives, provided in full as Enclosure G, apply with respect to species listed under the and Magnuson-Stevens Fishery Conservation and Management Act (MSA) (16 U.S.C. §1801 *et seq.*) and the Endangered Species Act (ESA) (16 U.S.C. §1531 *et seq.*), as well as anadromous species that are not currently listed but are affected by continuing operations of the Project or may require listing in the future. Thus, our requests for information or study are linked with NMFS' Resource Management Goals and Objectives. If NMFS' requests are included in the Applicant's Study Plan and approved in the Commission's Study Plan Determination, then successfully implemented, the results would inform:

- (A) Whether and how NMFS may exercise its FPA Section 18 authority, to either prescribe fishways at the Project or to reserve its prescriptive authority;
- (B) NMFS' decisions regarding its future FPA Section 10(j) and 10(a) proposals for protection, mitigation, and enhancement measures;
- (C) NMFS' decisions regarding its future recommended measures to improve EFH for Chinook salmon in the upper and lower Yuba, as well as areas downstream to the Bay/Delta;
- (D) The ESA Section 7 consultations (informal and formal) regarding effects on threatened species and designated critical habitats in the Yuba River.

The fulfillment of NMFS' request is consistent with the following NMFS' Resource Goals and Objectives for anadromous fishes and habitats in the Yuba River (Enclosure G):

5.1 - Protect, conserve, enhance, and recover native anadromous fishes and their habitats by providing access to suitable habitats and by restoring fully functioning habitat conditions for related rearing and feeding (see 6.1-6.4), migration (see 6.5), spawning (See 6.6), and adjoining

riparian and benthic macroinvertebrate (BMI) habitats (see 6.7).

5.2 - Identify and implement measures to protect, mitigate or minimize direct, indirect, and cumulative impacts to, and enhance native anadromous fish resources, including related rearing and feeding (see 6.1-6.4), migration (see 6.5), spawning (See 6.6), riparian and BMI habitats (see 6.7), protection from adverse Fish Hatchery operations (see 6.8) and predation (see 6.9), and ensure coordination within and outside of the Project (see 6.10) to minimize risk to anadromous fishes.

6.1-Flows; 6.2-Flow Ramping; 6.3-Water Quality; 6.4-Water Availability; 6.9-Predation; and 6.10-Coordination.

§ 5.9 (b): 3.0 Relevant Public Interest Considerations

If the requester is not a resource agency, explain any relevant public interest considerations in regard to the proposed study;

This content requirement is not applicable, as NMFS is a federal resource agency.

§ 5.9 (b): 4.0 Existing Information and Need for Additional Information

Describe existing information concerning the subject of the study proposal, and the need for additional information;

The data provided in the PAD needs to be supplemented with additional information to provide the temporal and spatial resolution in order to accurately quantify the Project's effects on anadromous fishes, their habitats, and the ecosystems which support them. Specific fish passage information is required to inform FPA§18 decisions and FPA§10(j) recommendations.

§ 5.9 (b): 5.0 Nexus Between Project Operations and Effects on the Resource Studied, and How the Study Results Would Inform Development of License Conditions

Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study results would inform the development of license requirements;

Fish passage studies play an important role in the design and construction of safe and effective fishways. Under Section 18 of the Federal Power Act, 16 U.S.C. § 811, the Secretary of Commerce has the mandatory conditioning authority to prescribe fishways. Successful operation of fishways may require adults and/or juveniles to successfully navigate Project works including reservoirs and stream reaches affected by powerhouse, dam, or other releases. Understanding the nature and characteristics of target stream reaches, project facilities, and reservoirs in the context of a comprehensive fish passage assessment will assist NMFS (on behalf of the Secretary) in its decisions regarding potential fishway alternatives and designs for the purpose of safe and effective fish passage. Clearly, the effectiveness of fish ladders, fish screens, or other volitional, semi-volitional (e.g. tramway), or non-volitional (e.g. collection and transport) methods of fish passage may be affected by the magnitude, duration, frequency and timing of the water flowing through them (MWH 2010).

The Yuba River anadromous resources to be studied in this Request, all under the jurisdiction of NMFS, include:

- 1) Central Valley (CV) spring-run Chinook salmon Evolutionarily Significant Unit (ESU) (*Oncorhynchus tshawytscha*), threatened (June 28, 2005, 70 FR 37160);
- 2) CV spring-run Chinook salmon designated critical habitat (September 2, 2005, 70 FR 52488);
- 3) CV steelhead Distinct Population Segment (DPS) (*O. mykiss*), threatened (January 5, 2006, 71 FR 834);
- 4) CV steelhead designated critical habitat (September 2, 2005, 70 FR 52488);
- 5) Southern DPS of North American green sturgeon (*Acipenser medirostris*), threatened (April 7, 2006, 71 FR 17757);
- 6) Southern DPS of North American green sturgeon designated critical habitat (October 9, 2009, 74 FR 52300);
- 7) CV fall/late-fall run Chinook salmon ESU, Species of Concern (April 15, 2004, 69 FR 19975);
- 8) CV spring-run and CV fall/late fall-run Chinook salmon identified “essential fish habitat” (EFH), (October 15, 2008 73 FR 60987);
- 9) CV fall/late fall-run Chinook salmon ESU, Species of Concern (April 15, 2004, 69 FR 19975).

§ 5.9 (b): 6.0 Consistency with Generally Accepted Practice

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 relevant tribal values and knowledge;

This request for information or study is consistent with the goals and objectives outlined for recent FERC hydroelectric ILP studies in the Western U.S., and uses accepted methodologies from published scientific literature and protocols from the National Marine Fisheries Service, U.S. Fish and Wildlife Service, and California Department of Fish and Game. Specific fish passage study requests are consistent West Coast practices with regard to pre-design information collection for engineered fishway systems.

NMFS is presenting an Information Request and not necessarily specific study methodology (preferred data collection and analysis techniques, or objectively quantified information). This is because the Applicant’s responsibility under the FPA is to either provide the requested information or to develop a more detailed Study Plan to obtain such information. It is anticipated that through the reiterative study development process within the ILP that the Applicant and the Commission will work with ILP participants to develop a study that obtains

the requested information, or that adequate information, approved by the Commission, is provided by the Applicant.

§ 5.9 (b): 7.0 Considerations of Level of Effort and Cost

Describe considerations of level of effort and cost, as applicable, and why any proposed alternative studies would not be sufficient to meet the stated information needs.

The Licensees do not request PURPA benefits in their PAD. NMFS considers that the cost of these studies will be between \$470,000-\$850,000. The Project is considered vast and complex. Considering the number of dams, the amount of water diverted, the potential for environmental disturbance, the status of several species listed under the ESA, and the recent closure of Chinook fisheries on the West Coast of the United States, the level of effort and cost for the Licensees is commensurate with the magnitude and impacts of the Project, and the revenues derived from sales of generated energy.

8.0 References

- DWR 2007. Upper Yuba River Watershed Chinook Salmon and Steelhead Habitat Assessment. Technical Report. Prepared for the California Department of Water Resources by the Upper Yuba River Studies Program Study Team.
- FERC 1992. (Federal Energy Regulatory Commission). Environmental Assessment for Hydropower License for the Narrows Project. FERC Project No. 1403-004. February 21, 1992. Washington, DC.
- FERC 2005. (Federal Energy Regulatory Commission). Environmental Assessment for Hydropower License for the Yuba River Development Project. FERC No. 2246-047. November 2005. Washington, DC.
- Moyle, P.B., J.G. Williams, J.D. Kiernan, G.M. Kondolf, and J.F. Mount. 2010. In Press. Improving environmental flow methodologies used in California FERC relicensing. California Energy Commission, PIER.
- MWH. 2010. Montgomery, Watson, Harza Americas, Inc. Yuba River Fish Passage Conceptual Engineering Options. Prepared for the National Marine Fisheries Service, Southwest Region, by MWH Americas, Inc., Sacramento California.
- NMFS 2009. "Public Draft Recovery Plan for Sacramento River Winter-run Chinook Salmon, Central Valley Spring-run Chinook Salmon, and Central Valley Steelhead." NMFS, Southwest Region, Sacramento, California. 7pp. October 2009.
- Pacific Fisheries Management Council (PFMC). 1999. Pacific Fishery Management Council. Description and identification of essential fish habitat, adverse impacts and recommended conservation measures for salmon. *Amendment 14 to the Pacific Coast Salmon Plan, Appendix A*. Pacific Fisheries Management Council, Portland, Oregon.
- Pasternack, G. B. 2008. SHIRA-Based River Analysis and Field-Based Manipulative Sediment Transport Experiments to Balance Habitat and Geomorphic Goals on the Lower Yuba River. Prepared for the Cooperative Ecosystems Study Unit (CESU) 813326J002, University of California at Davis. Department of Land, Air, and Water Resources (in association with the UC Davis Center for Watershed Sciences). Final Report. August (Revised January 29, 2009).
- PFMC. 2003. Pacific Fishery Management Council. Fishery Management Plan for Commercial and Recreational Salmon Fisheries off the Coasts of Washington, Oregon and California as Revised Through Amendment 14 (Adopted 1999).
- Powers, P.D. and J.F. Orsborn. 1985. Analysis of barriers to upstream fish migration. Final Project Report (Part 4 of 4). Bonneville Power Administration, Portland, OR. 61 p.
- RMT. 2008. Proposal to Map the Lower Yuba River Corridor in High Resolution to Support Riparian and Channel Restoration. Prepared by G. Pasternack for the Lower Yuba River Accord River Management Team Planning Group.<http://www.yubaaccordrmt.com/Study%20Protocols/Mapping/LYR08map_proposal_summary.pdf>

Federal Register Notices

Federal Register Notice, 63 Fed. Reg. 13347, March 19, 1998. Endangered and Threatened Species: Threatened Status for Two Evolutionarily Significant Units of Steelhead in Washington, Oregon, and California. Final Rule.

Federal Register Notice, 64 Fed. Reg. 50394, September 16, 1999. Endangered and Threatened Species: Threatened Status for Two Chinook Salmon Evolutionarily Significant Units in California. Final Rule.

Federal Register Notice, 69 Fed. Reg. 19975, April 15, 2004. Endangered and Threatened Species; Establishment of Species of Concern List, Addition of Species to Species of Concern List, Description of Factors for Identifying Species of Concern, and Revision of Candidate Species List Under the Endangered Species Act. Final Rule.

Federal Register Notice, 70 Fed. Reg. 37160, June 28, 2005. Endangered and Threatened Species: Final Listing Determinations for 16 Evolutionarily Significant Units (ESUs) of West Coast Salmon, and Final 4(d) Protective Regulations for Threatened Salmonid ESUs. Final Rule.

Federal Register Notice, 70 Fed. Reg. 52488, September 2, 2005. Endangered and Threatened Species: Designation of Critical Habitat for Seven Evolutionarily Significant Units of Pacific Salmon and Steelhead in California. Final Rule.

Federal Register Notice, 71 Fed. Reg. 834, January 5, 2006. Endangered and Threatened Species: Final Listing Determinations for 10 Distinct Population Segments of West Coast Steelhead. Final Rule.

Federal Register Notice, 71 Fed. Reg. 17757, April 7, 2006. Endangered and Threatened Wildlife and Plants: Threatened Status for Southern Distinct Population Segment of North American Green Sturgeon. Final Rule.

Federal Register Notice, 71 Fed. Reg. 61022, October 17, 2006. Endangered and Threatened Species: Revision of Species of Concern List, Candidate Species Definition, and Candidate Species List.

Federal Register Notice, 73 FR 60987, October 15, 2008. Fisheries Off West Coast States; West Coast Salmon Fisheries; Amendment 14; Essential Fish Habitat Descriptions for Pacific Salmon. Final Rule.

Federal Register Notice, 74, FR 52300, October 9, 2009. Endangered and Threatened Wildlife and Plants: Final Rulemaking to Designate Critical Habitat for the Threatened Southern Distinct Population Segment of North American Green Sturgeon. Final Rule.

Federal Register Notice, 75 Fed. Reg. 30714, June 2, 2010. Endangered and Threatened Wildlife and Plants: Final Rulemaking To Establish Take Prohibitions for the Threatened Southern Distinct Population Segment of North American Green Sturgeon. Final Rule. June 2, 2010.

NMFS Request #2
Request for Information or Study
Effects of the Project and Related Activities on Hydrology for Anadromous Fish
March 7, 2011

The National Oceanic and Atmospheric Administration's, National Marine Fisheries Service (NMFS) hereby files this request for additional information and study with the Federal Energy Regulatory Commission (Commission or FERC) for Yuba County Water Agency's (Applicant) Yuba River Hydroelectric Project (Project), FERC Project No. 2246, Yuba River, California.

Hydrologic regimes, comprised of flow magnitude, duration, frequency, timing, and rate-of-change, substantially influence aquatic habitat and ecology (Poff and Zimmerman 2010). Threatened fishes native to the basin have evolved in and have adapted to the unique hydrologic regime of the Yuba Watershed. Stream characteristics and ecological processes affected by hydrologic regimes include stream channel width and depth, floodplain inundation, transport, storage, deposition, and recruitment of substrates and organic matter, and development, recruitment, and persistence of riparian vegetation. Changes in the timing of high flows affect anadromous species and habitats by altering timing of immigration and emigration, ability to ascend natural and artificial barriers, and ability to utilize overbank habitats that provide cover and nutrients in juvenile life-stages. Alteration of streamflow magnitudes has been shown to be the primary predictor of biological integrity for fish and macroinvertebrate communities (Carlisle et al. 2010).

Request Element #1: Data Development

NMFS requests the Applicant develop three hydrologic data sets to compare Project hydrology with unimpaired hydrology and the effects of other developments within the watershed. The three watershed hydrologic scenarios which data sets should be developed are: Unimpaired (e.g., natural flow conditions throughout the Yuba Basin), YRDP (accounting for the hydrological effects of just the Yuba River Development Project, and all other water development projects are represented in an unimpaired condition) and Current (e.g., current conditions with all water development in the Yuba Basin). These scenarios are similar to those developed in the hydrology report in Appendix F of the PAD, but the PAD's non-YRDP scenario is replaced with the YRDP scenario, allowing for easy comparisons of YRDP's hydrology effects with the unimpaired scenario without influence of other water development projects. Given the amount of FERC projects in the watershed it is important to separate out the contribution to hydrologic alteration of each project. Unimpaired hydrology should be developed in an open and transparent manner, with step-by-step, written accounting of the methods and processes used to develop the data set, as was done in Appendix F of the PAD. Unimpaired hydrology for contributing reaches upstream of the Project (e.g., Middle Yuba River above Our House Dam, South Yuba River, etc.) should be developed in the same manner as in Appendix F of the PAD, not imported from the Yuba-Bear/Drum Spaulding (FERC Nos. 2310, 2266) Project. This is to ensure continuity with the unimpaired hydrology developed for this Project and allow for adequate comparisons throughout the entire watershed. The data sets should be comprised of average daily flow for the water years 1970-2010 for each of the three scenarios.

The following parameters should be developed for all three sets of data; similar parameters for the Current scenario have already been developed in Appendix F of the PAD, and can easily be aggregated into the information requested below.

Average annual flow

Monthly averages for each month

1, 3, 7-day maximum – mean for all years

1, 3, 7-day minimum – mean for all years

Julian date and magnitude of annual maximum

Julian date and magnitude of annual minimum

The three datasets should be developed for the following locations of interest:

South Yuba River at Jones Bar (USGS Gage 11417500)

North Yuba at Goodyears Bar (USGS Gage 11413000)

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 Upper Yuba below New Colgate Powerhouse

Mainstem Upper Yuba above Englebright reservoir

Mainstem Yuba River below Narrows II Powerhouse (USGS Gage 11418000)

Mainstem Yuba River below Daguerre Point Diversion Dam

Mainstem Yuba River at Marysville (USGS Gage 11421000)

Mainstem Yuba River above Feather River confluence

Feather River below Yuba Confluence

Feather River above Yuba Confluence

Sacramento River below Feather Confluence (USGS 11425500)

Sacramento River above Sacramento-San Joaquin Delta

Request Element #2: Peak Flows

Alterations of peak flows by project operations can have a number of direct and indirect effects on threatened and endangered species in the Yuba basin. Peak flows are responsible for forming and maintaining aquatic habitats such as holding pools and spawning riffles. They can also affect migration cues and passage at partial barriers to migration. This information will illuminate how the magnitude and duration of peak flows have been altered by Project operations or operations related to the Project.

A log-Pearson type III flood frequency analysis should be performed on all three data sets, at all locations of interest. Magnitudes of the flood events with return intervals of 1.01, 1.5, 2, 5, 10, 25, 50, and 100 years should be calculated. In addition to the return intervals above, the Applicant should compute average monthly maximums for the years 1970-2010 for the all three scenarios. Any flow greater than 1.01 year return interval or greater than the unimpaired average monthly maximum flow will be considered a pulse flow. The date of the beginning and end of each occurrence of a pulse flow should be recorded, along with the magnitude and duration of

each pulse flow event. A table comparing the frequency, magnitude and duration of the pulse flows documented for each scenario should be prepared at all locations of interest listed above. Such a table would document the occurrence of pulse flows in each water year (1970-2010) as well as each water year type based on the North Yuba Index, as defined in the Yuba Accord Fisheries Agreement. Annual hydrographs should be developed for a representative year of each water year type under the North Yuba Index.

A comparison of hydrology at major confluences (Feather/Sacramento, Yuba/Feather, Yuba/South Yuba, Middle Yuba/North Yuba) under the three different watershed development scenarios should be performed for the purpose of characterizing the Projects' effects on magnitude and timing of attraction flows into each tributary. Pulse flow events along with average monthly flow should be compared and evaluated in terms of altered immigration attraction flows into one or more tributaries during times the months of January-June. In the Applicant's Anadromous Ecosystem Effects Analysis (NMFS information request #8), this information will be assessed for the capability of these attraction flows to influence the immigration of adult Chinook, steelhead, and green sturgeon in each reach to be assessed.

Request Element #3: Dam Spills

The Applicant should compute the timing, magnitude, duration, and volume of historical spill events below the following dams:

North Yuba River – New Bullards Bar Dam

Middle Yuba River – Our House Diversion Dam

Oregon Creek – Log Cabin Diversion Dam

Yuba River – Englebright Dam

The Applicant should use historical flow records from operation of the Yuba-Bear/Drum Spaulding projects (FERC Nos. 2310, 2266) along with available Englebright reservoir stage information, New Bullards Bar Dam spills and releases from New Bullards Minimum Flow Powerhouse to analyze the contribution of each Project's effect on the spill frequency at Englebright and Our House Diversion Dams.

This information should be evaluated for its capacity to affect fish passage barriers and operation of fish passage facilities. It will also shed light on riparian recruitment processes, sediment and large woody debris transport capacity, attraction and outmigration flows for salmonids, as well as amount and quality of aquatic habitat.

Request Element #4: Ramping

Applicant should analyze 15-minute data from water years 1970-2010 below the New Colgate and Narrows 2 powerhouses and 1-hour data for water years 1970-2010 below the Log Cabin and Our House diversion dams. An exceedance probability of change in flow and stage in 15 minute and 1 hour intervals for the New Colgate and Narrows 2 powerhouses and 1 hour interval for the Log Cabin and Our House diversion dams as measured at the nearest stream gage below the facility should be calculated for up-ramps and down-ramps as observed during the period of record. The greatest hourly rate of change in flow for the largest 10 rate-of-change events will

also be provided to characterize extreme change events. For the 10 largest events, 24-hour hydrographs with descriptions of event conditions should be provided.

Effects of the powerhouse discharge and ramping rate on the hydraulic characteristics of the reaches below Colgate Powerhouse should also be examined as a part of the Powerhouse element. Changes in the stage of the reach below the powerhouse due to project operations can have numerous effects on anadromous species and the physical habitats they may occupy (Hunter 1992). 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.

In order to assess these Project effects, a detailed two-dimensional hydraulic model of the reach below New Colgate powerhouse should be developed to determine depth, water surface elevations and velocities continuously along the entire reach below the powerhouse to the upstream extent of Englebright Reservoir. Two-dimensional models eliminate the problem of site selection of representative cross-sections that traditional one-dimensional models have been hampered by (Moyle et al. 2011, in press). A two-dimensional model has already been developed for the reach below Narrows II Powerhouse and is presented in Pasternack (2008) as well as ongoing mapping efforts by the Yuba River Management Team. Development of two-dimensional models such as SRH 2-D developed by the Bureau of Reclamation, enable modeling many kilometers of river at a fine resolution (<1 meter) accurately and quickly. Rapid advances in technology enable data gathering to be done in a comprehensive and cost-effective manner.

As input to the two-dimensional hydraulic model, Applicant should develop a digital elevation model (DEM) of the Colgate reach (from the outflow of New Colgate powerhouse downstream to the normal water surface elevation of Englebright Reservoir) spanning the maximum flow width. Mapping of this reach should take place when Englebright Reservoir is at or near its yearly minimum water surface level, to insure that exposed riverbed is surveyed for any migration barriers. The DEM should have a resolution of less than 1 meter both vertically and horizontally. DEM collection methods should mirror as closely as possible the Lower Yuba River Management Team's mapping efforts of the Lower River to insure data continuity. In that effort, an airborne light detection and ranging (LiDAR) topography survey was conducted and field checked with a ground based total station and GPS surveys. This data was combined with detailed stream bed bathymetry surveys by a boat mounted fathometer. A detailed data collection procedure is outlined by the Lower Yuba River Accord River Management Team Planning Group (RMT 2008).

The DEM should be used as input to the two-dimensional model to predict depths and velocities at various discharges. Applicant should model current average monthly discharges below Colgate and Narrows II powerhouses using hydraulic models. In addition, the Applicant should also model the 10 greatest rate-of-change events identified above. Because flows from the New Colgate Powerhouse combine with the discharge from the mainstem upper Yuba River, the range of flows discharged from New Colgate (maximum 3,430 cfs) can have a varying effect on depths and velocities downstream, depending on how much flow is coming down the mainstem Yuba. The 10 greatest rate-of-change events should be evaluated in terms of what time of year and how much flow was present in the mainstem Yuba. If it is determined that the 10 greatest rate-of-

change events do not accurately represent the full range of flows in the mainstem (winter storm runoff, spring snowmelt and summer low flows) then additional flow scenarios should be completed. The model should also be detailed enough to capture any hydraulic jets that occur immediately below New Colgate discharge.

The two-dimensional model should be validated using field measurements of depth, water surface elevations and velocity. An Acoustic Doppler Current Profiler (ACDP) can be used to accurately and quickly gather the necessary validation information at multiple discharges. At minimum, measurements should be taken at every significant geomorphic unit as classified by Montgomery and Buffington (1997) with more complex units such as braided channels requiring more intensive sampling.

This information should be evaluated for its capacity to affect fish passage barriers and operation of fish passage facilities. It will also shed light on riparian recruitment processes, sediment transport capacity, attraction and outmigration flows for salmonids, amount and quality of aquatic habitat, potential for stranding and dewatering of redds. The DEM and the two-dimensional model will also be used in the sediment budget analysis of project effects on physical habitat such as deposition or scour of spawning gravel.

Request Element #5 Floodplains

Floodplain functions and ecological processes depend on seasonal and periodic inundation of the floodplain. The floodplain is defined as “The floodplain is the flat area adjoining a river channel constructed by the river in the present climate and overflowed at high discharge.” (Dunne and Leopold 1978): The timing, or predictability, of flow events, is ecologically critical because the life cycles of many aquatic and riparian species depend on environmental cues provided by flow events and are timed to avoid or exploit flows of variable magnitude (Poff et al. 1997).

Using a two-dimensional hydraulic model, the Applicant shall compare the unimpaired and current frequency, magnitude and duration of floodplain inundation. Applicant shall use a two-dimensional model of the lower Yuba River from the Narrows II discharge to the confluence with the Feather River to determine how much floodplain area is currently accessible. The Applicant should then use current and unimpaired hydrology to determine the frequency, duration, and magnitude of floodplain inundation under both scenarios as well as the total area and depth of inundation during the ecologically important spring snowmelt season. The Applicant should work collaboratively with ILP participants to define additional, specific ecologically important time periods for floodplain inundation modeling.

Request Element #6: Natural Gradient Impediment/Barriers

Information from the peak flow, dam spill and powerhouse analyses should be used to analyze project effects on hydrology at partial and full natural impediments or barriers to adult salmonid migration. Applicant should analyze helicopter video, ground surveys and the results of previous studies to identify these natural gradient features within the study area. At minimum, field crews should conduct ground surveys along the North Yuba from New Bullards Bar Dam to the confluence with the Middle Yuba and the mainstem upper Yuba from the North/Middle Yuba confluence to the normal water surface elevation of Englebright Reservoir. It is assumed that

low-flow barriers occurring below New Colgate Powerhouse, including exposure of drowned riverbed when Englebright reservoir is at low water surface elevation should be identified in the powerhouse element. Ground surveys can easily be combined with ground surveys necessary to satisfy other information requests, such as Large Woody Debris (LWD) and Riparian Habitats.

The same definitions for partial and complete barriers to migration for salmonids that were used in Powers and Orsborn (1985) should be used in this analysis. Once a barrier is located, GPS coordinate points of its location should be recorded and a number of physical measurements should be taken which include: height of falls, depth of plunge pool, velocity, slope and depth of fish exit. While initial sampling should take place during annual low-flow conditions, once a barrier is located, the same physical measurements should be taken to the extent safely possible during flows greater than 200 cfs. At a minimum, the physical measurements described above should be developed for the potential barrier on the Middle Yuba approximately 0.4 miles upstream of the North Yuba confluence. The exact location of the barrier and some of its physical characteristics are identified in DWR (2007).

Alteration of the hydrograph at these barriers affects the hydraulic characteristics at the potential barrier, and therefore anadromous immigration potential. Average daily flow for all three watershed development scenarios should be developed at any potential barrier found. Analysis of the hydrology under the different watershed scenarios should be combined with the physical attributes of the barrier and species criteria, to develop a comprehensive assessment of fish passage “windows”, the dates and durations when adult Chinook salmon or CV steelhead would likely be able to ascend the barrier under different scenarios. This information should be supplied to partly fulfill NMFS’ information request #8 Anadromous Ecosystem Effects Analysis.

Request Element #7: Bay-Delta

The Yuba Watershed has a drainage area of approximately 1,344 mi², and is a significant contributor of streamflow to the larger Sacramento River watershed as well as the Sacramento-San Joaquin Delta and San Francisco Bay. Altered flow from the Project has the ability to affect water quantity and quality downstream to the Bay-Delta. The Bay-Delta is an important ecosystem from which consumptive water exports are made. The Yuba Accord EIS discusses some of the impacts that altered Project flow releases in the lower Yuba River would have on water quality and quantity in the Bay-Delta (DOI 2007). The Applicant should synthesize information and analysis already available in documents such as the Lower Yuba River Accord Final Environmental Impact Statement (DOI 2007) and any information developed in this request, to shed light on the Project’s effects on the Bay-Delta ecosystem and the various consumptive water demands in the Bay-Delta.

This request is formatted in accordance with:

Title 18 of the Federal regulations *Conservation of Power and Water Resources*;
Part 5 *Integrated License Application Process*; Section 5.9 *Comments and information or study requests*.

18 CFR § 5.9 (a): *Comments and study requests*. Comments on the pre-application document and the Commission staff's Scoping Document 1 must be filed with the Commission within 60 days following the Commission's notice of consultation procedures issued pursuant to §5.8. Comments, including those by Commission staff, must be accompanied by any information gathering and study requests, and should include information and studies needed for consultation under section 7 of the Endangered Species Act and water quality certification under Section 401 of the Clean Water Act. (Emphasis added for relevance to highlight NMFS' ESA concerns)

18 CFR § 5.9 (b): *Content of study request*. Any information or study request must:

- (1) Describe the goals and objectives of each study proposal and the information to be obtained;
 - (2) If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied;
 - (3) If the requester is not a resource agency, explain any relevant public interest considerations in regard to the proposed study;
 - (4) Describe existing information concerning the subject of the study proposal, and the need for additional information;
 - (5) Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study results would inform the development of license requirements;
 - (6) 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 relevant tribal values and knowledge; and
 - (7) Describe considerations of level of effort and cost, as applicable, and why any proposed alternative studies would not be sufficient to meet the stated information needs.
- (c) *Applicant seeking PURPA benefits; estimate of fees*. If a potential applicant has stated that it intends to seek PURPA benefits, comments on the pre-application document by a fish and wildlife agency must provide the potential applicant with a reasonable estimate of the total costs the agency anticipates it will incur in order to set mandatory terms and conditions for the proposed project. An agency may provide a potential applicant with an updated estimate as it deems necessary. If any agency believes that its most recent estimate will be exceeded by more than 25 percent, it must supply the potential applicant with a new estimate and submit a copy to the Commission.

§ 5.9 (a): The Information Gathering or Study Should Inform Consultation Under Section 7 of the Endangered Species Act

Comments, including those by Commission staff, must be accompanied by any information gathering and study requests, and should include information and studies needed for consultation under section 7 of the Endangered Species Act

The information or study resulting from this Request would inform future ESA consultation between NMFS and the Commission because the Project's effects on the resource(s) to be studied in this request affect ESA-listed salmonids or sturgeon, and/or their ESA-designated critical habitats, both in the Yuba River and in locations downstream.

NMFS has identified the following ESA-protected anadromous fishes and habitats (ESA resources) in the Yuba River that could be affected by the Project:

- 1) Central Valley (CV) spring-run Chinook salmon Evolutionarily Significant Unit (ESU) (*Oncorhynchus tshawytscha*), threatened (June 28, 2005, 70 FR 37160);
- 2) CV spring-run Chinook salmon designated critical habitat (September 2, 2005, 70 FR 52488);
- 3) CV steelhead Distinct Population Segment (DPS) (*O. mykiss*), threatened (January 5, 2006, 71 FR 834);
- 4) CV steelhead designated critical habitat (September 2, 2005, 70 FR 52488);
- 5) Southern DPS of North American green sturgeon (*Acipenser medirostris*), threatened (April 7, 2006, 71 FR 17757);
- 6) Southern DPS of North American green sturgeon designated critical habitat (October 9, 2009, 74 FR 52300);

ESA resources that occur downstream in the Feather River, Sacramento River, Sacramento-San Joaquin Delta, and San Francisco Bay may also be affected by the Project.

NMFS also identified the presence of an anadromous resource in the lower Yuba that is not listed under the ESA, but is a Federal Species of Concern (those species about which NMFS has concerns regarding status and threats, but for which insufficient information is available to indicate a need to list the species under the ESA):

- CV fall/late fall-run Chinook salmon ESU, Species of Concern (April 15, 2004, 69 FR 19975; October 17, 2006, 71 FR 61022).

This Federal Species of Concern also occurs downstream in the Feather River, Sacramento River, Sacramento-San Joaquin Delta, and San Francisco Bay, and may also be affected by the Project. While the fall/late-fall run Chinook ESU has no formal protection under the ESA, discussions with NMFS regarding effects to this species usually occurs during ESA consultation.

NMFS notes the facilities requested for review are not all considered part of the “Project” facilities by the Commission. However, for consultation under section 7 of the Endangered Species Act, the action, action area, and the effects of an action are defined more broadly. NMFS refers the Commission and Applicant to the following definitions from the Code of Federal Regulations (CFR), and to Enclosure B of this filing:

50 CFR § 402.02 Definitions.

Action means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies in the United States or upon the high seas. Examples include, but are not limited to:

- (a) actions intended to conserve listed species or their habitat;
- (b) the promulgation of regulations;
- (c) the granting of licenses, contracts, leases, easements, rights-of-way, permits, or grants-in-aid;
- or
- (d) actions directly or indirectly causing modifications to the land, water, or air.

Action area means all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action.

Effects of the action refers to the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action, that will be added to the environmental baseline. The environmental baseline includes the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation in process. Indirect effects are those that are caused by the proposed action and are later in time, but still are reasonably certain to occur. Interrelated actions are those that are part of a larger action and depend on the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration. (Emphasis added to highlight that evaluation of the effects of an action in the ESA sense is broader than evaluation of the action alone).

§ 5.9 (b): 1.0 Goals and Objectives of Request

Describe the goals and objectives of each study proposal and the information to be obtained;

Study goals:

- 1) To accurately quantify the effects of the Project on hydrologic regimes at a relevant temporal and geographic scale, that in turn affect anadromous fish and their habitats, resources over which NMFS has jurisdiction. If this request is incorporated in the Applicant’s Study Plan and implemented in a scientifically defensible manner, the results would inform NMFS’ decisions with respect to this ILP, consistent with NMFS’ resource goals and objectives with respect to anadromous fish and their habitats.
- 2) Develop information that will be aggregated with other information requests to determine the Project’s effects on anadromous fish and the ecosystems that support them.

Specific information and objectives to be obtained in this information request include:

- a. Daily average stream flow at all locations of interest (described below) within the watershed under current climate and water management, an unimpaired scenario, and a Yuba River Development Project scenario.
- b. Average annual flow for all three scenarios
- c. Monthly averages for each month for all three scenarios
- d. 1, 3, 7-day maximum – mean for all years for all three scenarios
- e. 1, 3, 7-day minimum – mean for all years for all three scenarios
- f. Julian date and magnitude of annual maximum for all three scenarios
- g. Julian date and magnitude of annual minimum for all three scenarios
- h. Log-Pearson type III flood analysis for all locations of interest for multiple return intervals (described below)
- i. Monthly average flow at major confluences (Yuba/Feather, Yuba/South Yuba, Middle Yuba/North Yuba)
- j. Timing, magnitude, duration, and volume of historical spill events below Project dams including Englebright Dam
- k. Relative contribution of Project vs. upstream projects to dam spill frequency
- l. Predicted velocities and water depths for various ramping and discharge scenarios in the New Colgate reach (described below)
- m. Documentation of natural barriers to migration and alteration of passage windows at these barriers under different scenarios
- n. Physical attributes and hydraulic measurements of any barriers to migration found during field surveys
- o. Detailed hydrologic alteration information for incorporation into Anadromous Effects Ecosystem Study (NMFS Information request #8)

§ 5.9 (b): 2.0 Resource Management Goals of NMFS

If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied;

NMFS' Resource Management Goal and Objectives, provided in full as Enclosure G, apply with respect to species listed under the and Magnuson-Stevens Fishery Conservation and Management Act (MSA) (16 U.S.C. §1801 *et seq.*) and the Endangered Species Act (ESA) (16 U.S.C. §1531 *et seq.*), as well as anadromous species that are not currently listed but are affected by continuing operations of the Project or may require listing in the future. Thus, our requests for information or study are linked with NMFS' Resource Management Goals and Objectives. If NMFS' requests are included in the Applicant's Study Plan and approved in the Commission's Study Plan Determination, then successfully implemented, the results would inform:

(A) Whether and how NMFS may exercise its FPA Section 18 authority, to either prescribe fishways at the Project or to reserve its prescriptive authority;

(B) NMFS' decisions regarding its future FPA Section 10(j) and 10(a) proposals for protection, mitigation, and enhancement measures;

(C) NMFS' decisions regarding its future recommended measures to improve EFH for Chinook salmon in the upper and lower Yuba, as well as areas downstream to the Bay/Delta;

(D) The ESA Section 7 consultations (informal and formal) regarding effects on threatened species and designated critical habitats in the Yuba River.

The fulfillment of NMFS' request is consistent with the following NMFS' Resource Goals and Objectives for anadromous fishes and habitats in the Yuba River (Enclosure G):

Resource Goals:

3.1 - Protect, conserve, enhance, and recover native anadromous fishes and their habitats by providing access to suitable habitats and by restoring fully functioning habitat conditions for related rearing and feeding (see 4.1-4.4), migration (see 4.5), spawning (See 4.6), and adjoining riparian and aquatic benthic macroinvertebrate (BMI) habitats (see 4.7).

3.2 - Identify and implement measures to protect, mitigate or minimize direct, indirect, and cumulative impacts to, and enhance native anadromous fish resources, including related rearing and feeding (see 4.1-4.4), migration (see 4.5), spawning (See 4.6), riparian and BMI habitats (see 4.7), protection from adverse Fish Hatchery operations (see 4.8) and predation (see 4.9), and ensure coordination within and outside of the Project (see 4.10) to minimize risk to anadromous fishes.

Resource Objectives:

4.1-Flows; 4.2-Flow Ramping; 4.3-Water Quality; 4.4-Water Availability; 4.5-Fish Passage; 4.6-Channel Maintenance; 4.7-Riparian/LWD Habitat; 4.8-Hatchery Operations; 4.9-Predation; and 4.10-Coordination.

§ 5.9 (b): 3.0 Relevant Public Interest Considerations

If the requester is not a resource agency, explain any relevant public interest considerations in regard to the proposed study;

This content requirement is not applicable, as NMFS is a resource agency.

§ 5.9 (b): 4.0 Existing Information and Need for Additional Information

Describe existing information concerning the subject of the study proposal, and the need for additional information;

Section 7.2 and Appendix F of the PAD provides hydrology information which will be incorporated with the information generated by this request, to provide a more accurate representation of the Project's effects on anadromous fishes and their habitats. The existing information includes flow information from:

- Middle Yuba River below Our House Diversion Dam (USGS Gage 11408880 available from October 1, 1968 through October 1, 2008)

- Oregon Creek Below Log Cabin Diversion Dam (USGS Gage 11409400 available from September 1, 1968 through September 1, 2008)
- Middle Yuba River near North San Juan (USGS Gage 11410000 available from July 1, 1900 through March 17, 2005)
- North Yuba River below New Bullards Bar Dam (USGS Gage 11413520 available from August 13, 1966 through September 30, 2004)
- Yuba River at Smartville (USGS Gage 11418000 available from October 1, 1941 through September 30, 2008)
- Yuba River near Smartville (USGS Gage 11419600 available from October 3, 1960 through December 11, 2002)
- Yuba River near Marysville (USGS Gage 11421000 available from October 1, 1943 through September 30, 2008)

In addition, synthesized regulated streamflow data have been developed by YCWA at several other locations:

- Upper Yuba below confluence with Middle Yuba River (from October 1, 1969 through September 30, 2008)
- Upper Yuba below New Colgate Powerhouse (from October 1, 1969 through September 30, 2008)
- Yuba River below confluence with Deer Creek (from October 1, 1969 through September 30, 2008)
- Middle Yuba River below Our House Diversion Dam (USGS Gage 11408880 from water years (WY) 1969 through 2008)
- Oregon Creek Below Log Cabin Diversion Dam (USGS Gage 11409400 from WY 1969 through 2008)
- North Yuba River below Goodyears Bar (USGS Gage 11413000 from WY 1931 through 2008)
- North Yuba River below New Bullards Bar Dam (USGS Gage 11413520 from WY 1967 through 2004)
- Yuba River at Smartville (USGS Gage 11418000 from WY 1942 through 2008)
- Yuba River at Marysville (USGS Gage 11421000 from WY 1944 through 2008)

The data provided in the PAD needs to be supplemented with additional information to provide the temporal and spatial resolution in order to more accurately quantify the Project's effects on anadromous fishes, their habitats, and the ecosystems which support them.

§ 5.9 (b): 5.0 Nexus Between Project Operations and Effects on the Resource Studied, and How the Study Results Would Inform Development of License Conditions

Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study results would inform the development of license requirements;

YCWA's continued operation and maintenance (O&M) of the Project affects stream flows upstream of its facilities (through impoundment) and downstream of its facilities (through impoundment, release operations, and diversion). Hydrologic regimes, comprised of flow magnitude, duration, frequency, timing, and rate-of-change, substantially influence aquatic habitat and ecology (Poff and Zimmerman 2010). Threatened fishes native to the basin have evolved in and have adapted to the unique hydrologic regime of the Yuba Watershed. Stream characteristics and ecological processes affected by hydrologic regimes include stream channel width and depth; floodplain inundation; transport, storage, deposition, and recruitment of substrates and organic matter (such as woody materials); and development, recruitment, and persistence of riparian vegetation. Changes in the timing of high flows affect anadromous species and habitats by altering timing of immigration and ability to ascend natural and artificial barriers. Alteration of streamflow magnitudes has been shown to be the primary predictor of biological integrity for fish and macroinvertebrate communities (Carlisle et al. 2010). Altered hydrologic regimes also affect timing and success of reproduction as well as outmigration. Information developed in this request will be used in analyses of Project alterations on fish passage, stream temperatures, coarse sediment and large woody debris transport, the suitability and availability of mesohabitats (e.g. holding pools, spawning grounds, juvenile rearing habitats, etc.) and "ecosystem services" and then used to recommend protection, mitigation, enhancement, and other measures.

Hydrologic regimes also play an important role in the design and construction of safe and effective fishways. Under Section 18 of the Federal Power Act, 16 U.S.C. § 811, the Secretary of Commerce has the mandatory conditioning authority to prescribe fishways. Successful operation of fishways may require adults and/or juveniles to successfully navigate Project works including reservoirs and stream reaches affected by powerhouse, dam, or other releases. Understanding the hydrologic alteration of stream reaches and reservoirs will assist NMFS (on behalf of the Secretary) in its decisions regarding potential fishway alternatives and designs for the purpose of safe and effective fish passage. Clearly, the effectiveness of fish ladders or other volitional, semi-volitional (e.g. tramway), or non-volitional (e.g. collection and transport) methods of fish passage may be affected by the magnitude, duration, frequency and timing of the water flowing through them (MWH 2010).

The Yuba River anadromous resources to be studied in this Request, all under the jurisdiction of NMFS, include:

- 1) Central Valley (CV) spring-run Chinook salmon Evolutionarily Significant Unit (ESU) (*Oncorhynchus tshawytscha*), threatened (June 28, 2005, 70 FR 37160);

- 2) CV spring-run Chinook salmon designated critical habitat (September 2, 2005, 70 FR 52488);
- 3) CV steelhead Distinct Population Segment (DPS) (*O. mykiss*), threatened (January 5, 2006, 71 FR 834);
- 4) CV steelhead designated critical habitat (September 2, 2005, 70 FR 52488);
- 5) Southern DPS of North American green sturgeon (*Acipenser medirostris*), threatened (April 7, 2006, 71 FR 17757);
- 6) Southern DPS of North American green sturgeon designated critical habitat (October 9, 2009, 74 FR 52300);
- 7) CV fall/late fall-run Chinook salmon ESU, Species of Concern (April 15, 2004, 69 FR 19975);
- 8) CV spring-run and CV fall/late-fall run Chinook salmon identified “essential fish habitat” (EFH), (October 15, 2008 73 FR 60987);
- 9) CV fall/late fall-run Chinook salmon ESU, Species of Concern (April 15, 2004, 69 FR 19975).

§ 5.9 (b): 6.0 Consistency with Generally Accepted Practice

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 relevant tribal values and knowledge;

This request for information or study is consistent with the goals and objectives outlined for recent FERC hydroelectric ILP studies in the Western U.S., and uses accepted methodologies from published scientific literature and protocols from the National Marine Fisheries Service, U.S. Fish and Wildlife Service, and California Department of Fish and Game.

NMFS is presenting an Information Request and not necessarily specific study methodology (preferred data collection and analysis techniques, or objectively quantified information). This is because the Applicant’s responsibility under the FPA is to either provide the requested information or to develop a more detailed Study Plan to obtain such information. It is anticipated that through the reiterative study development process within the ILP that the Applicant and the Commission will work with ILP participants to develop a study that obtains the requested information, or that adequate information, approved by the Commission, is provided by the Applicant.

§ 5.9 (b): 7.0 Considerations of Level of Effort and Cost

Describe considerations of level of effort and cost, as applicable, and why any proposed alternative studies would not be sufficient to meet the stated information needs.

The Licensees do not request PURPA benefits in their PAD. NMFS considers that the cost of these studies will be between \$100,000-\$250,000. The Project is considered vast and complex. Considering the number of dams, the amount of water diverted, the potential for environmental disturbance, the status of several species listed under the ESA, and the recent closure of Chinook fisheries on the West Coast of the United States, the level of effort and cost for the Licensees is commensurate with the magnitude and impacts of the Project, and the revenues derived from sales of generated energy.

8.0 References

- Carlisle D.M., Wolock D.M., and Meador M.R. 2010. Alteration of Streamflow Magnitudes and Potential Ecological Consequences: A Multiregion Assessment. *Front Ecol Environ* 2010; doi:10.1890/100053
- DOI. 2007. Final environmental impact report/environmental impact statement for the lower Yuba River accord. Prepared for the US Department of Interior/Bureau of Reclamation by HDR/Surface Water Resources, Inc.
- Dunne, T. and Leopold, L.B. 1978. Water in Environmental Planning. W.H. Freeman and Company.
- DWR 2007. Upper Yuba River Watershed Chinook Salmon and Steelhead Habitat Assessment. Technical Report. Prepared for the California Department of Water Resources by the Upper Yuba River Studies Program Study Team.
- Hunter, M.A. 1992. Hydropower flow fluctuations and salmonids: a review of the biological effects, mechanical causes, and options for mitigation. Technical Report Number 119. Department of Fisheries. State of Washington.
- Montgomery, D. R., Buffington, J. M. 1997. Channel Reach Morphology in Mountain Drainage Basins. *GSA Bulletin*. 5. p. 596-611.
- Moyle, P.B., J.G. Williams, J.D. Kiernan, G.M. Kondolf, and J.F. Mount. 2010. In Press. Improving environmental flow methodologies used in California FERC relicensing. California Energy Commission, PIER.
- MWH. 2010. Montgomery, Watson, Harza Americas, Inc. Yuba River Fish Passage Conceptual Engineering Options. Prepared for the National Marine Fisheries Service, Southwest Region, by MWH Americas, Inc., Sacramento California.
- NMFS 2009. "Public Draft Recovery Plan for Sacramento River Winter-run Chinook Salmon, Central Valley Spring-run Chinook Salmon, and Central Valley Steelhead." NMFS, Southwest Region, Sacramento, California. 7pp. October 2009.

- Pasternack, G. B. 2008. SHIRA-Based River Analysis and Field-Based Manipulative Sediment Transport Experiments to Balance Habitat and Geomorphic Goals on the Lower Yuba River. Prepared for the Cooperative Ecosystems Study Unit (CESU) 813326J002, University of California at Davis. Department of Land, Air, and Water Resources (in association with the UC Davis Center for Watershed Sciences). Final Report. August (Revised January 29, 2009).
- PFMC. 2003. Pacific Fishery Management Council. Fishery Management Plan for Commercial and Recreational Salmon Fisheries off the Coasts of Washington, Oregon and California as Revised Through Amendment 14 (Adopted 1999).
- Poff, N.L., J.D. Allan, M.B. Bain, J.R. Karr, K.L. Pretegaard, B.D. Richter, R.E. Sparks and J.C. Stromberg, 1997. The natural flow regime: a paradigm for river conservation and restoration. *BioScience* 47(11):769-784.
- Poff, NL and Zimmerman JKH. 2010. Ecological responses to altered flow regimes: a literature review to inform the science and management of environmental flows. *Freshwater Biol* 55:194–205.
- Powers, P.D. and J.F. Orsborn. 1985. Analysis of barriers to upstream fish migration. Final Project Report (Part 4 of 4). Bonneville Power Administration, Portland, OR. 61 p.
- RMT. 2008. Proposal to Map the Lower Yuba River Corridor in High Resolution to Support Riparian and Channel Restoration. Prepared by G. Pasternack for the Lower Yuba River Accord River Management Team Planning Group.<http://www.yubaaccordrmt.com/Study%20Protocols/Mapping/LYR08map_proposal_summary.pdf>

Federal Register Notices

- Federal Register Notice, 63 Fed. Reg. 13347, March 19, 1998. Endangered and Threatened Species: Threatened Status for Two Evolutionarily Significant Units of Steelhead in Washington, Oregon, and California. Final Rule.
- Federal Register Notice, 64 Fed. Reg. 50394, September 16, 1999. Endangered and Threatened Species: Threatened Status for Two Chinook Salmon Evolutionarily Significant Units in California. Final Rule.
- Federal Register Notice, 69 Fed. Reg. 19975, April 15, 2004. Endangered and Threatened Species; Establishment of Species of Concern List, Addition of Species to Species of Concern List, Description of Factors for Identifying Species of Concern, and Revision of Candidate Species List Under the Endangered Species Act. Final Rule.
- Federal Register Notice, 70 Fed. Reg. 37160, June 28, 2005. Endangered and Threatened Species: Final Listing Determinations for 16 Evolutionarily Significant Units (ESUs) of West Coast Salmon, and Final 4(d) Protective Regulations for Threatened Salmonid ESUs. Final Rule.

Federal Register Notice, 70 Fed. Reg. 52488, September 2, 2005. Endangered and Threatened Species: Designation of Critical Habitat for Seven Evolutionarily Significant Units of Pacific Salmon and Steelhead in California. Final Rule.

Federal Register Notice, 71 Fed. Reg. 834, January 5, 2006. Endangered and Threatened Species: Final Listing Determinations for 10 Distinct Population Segments of West Coast Steelhead. Final Rule.

Federal Register Notice, 71 Fed. Reg. 17757, April 7, 2006. Endangered and Threatened Wildlife and Plants: Threatened Status for Southern Distinct Population Segment of North American Green Sturgeon. Final Rule.

Federal Register Notice, 71 Fed. Reg. 61022, October 17, 2006. Endangered and Threatened Species: Revision of Species of Concern List, Candidate Species Definition, and Candidate Species List.

Federal Register Notice, 73 FR 60987, October 15, 2008. Fisheries Off West Coast States; West Coast Salmon Fisheries; Amendment 14; Essential Fish Habitat Descriptions for Pacific Salmon. Final Rule.

Federal Register Notice, 74, FR 52300, October 9, 2009. Endangered and Threatened Wildlife and Plants: Final Rulemaking to Designate Critical Habitat for the Threatened Southern Distinct Population Segment of North American Green Sturgeon. Final Rule.

Federal Register Notice, 75 Fed. Reg. 30714, June 2, 2010. Endangered and Threatened Wildlife and Plants: Final Rulemaking To Establish Take Prohibitions for the Threatened Southern Distinct Population Segment of North American Green Sturgeon. Final Rule. June 2, 2010.

NMFS Request #3
Request for Information or Study
Effects of the Project and Related Activities on Water Temperatures
For Anadromous Fish Migration, Holding, Spawning, and Rearing Needs
March 7, 2011

The National Oceanic and Atmospheric Administration's, National Marine Fisheries Service (NMFS) hereby files this request for additional information and study with the Federal Energy Regulatory Commission (Commission or FERC) for Yuba County Water Agency's (Applicant) Yuba River Hydroelectric Project (Project), FERC Project No. 2246, Yuba River, California.

Aquatic species native to the Yuba Basin have evolved in and adapted to the unique thermal regime of the Yuba Basin. Altered thermal regimes can have a variety of adverse effects on the physiology and physical performance and life history expressions of anadromous fish (McCullough 1999). Temperature can affect growth, behavior, competitive interactions, habitat requirements, and susceptibility to disease. Most fish maintain body temperatures that closely match their environment and as a result, water temperature has a strong influence on every life history stage including: metabolism and growth, timing of life history events such as adult migration and spawning, emergence from the redd, and outmigration (Groot et al. 1995).

Request Element #1: Temperature Monitoring

Applicant has implemented a network of temperature monitoring stations listed in section 7.2.9.1 of the PAD. In addition to these locations, Applicant should install water temperature loggers that record water temperature at 15-minute intervals at the following locations: Oregon Creek above the confluence with the Middle Yuba and the mainstem Yuba River above Englebright Reservoir. It is NMFS understanding that in addition to these locations, the Applicants also have multiple temperature monitoring locations in the Upper North Yuba above New Bullards Bar reservoir, which should be included as a part of this study. All of the gage locations listed in table 7.2.9-1 of the PAD, in addition to the ones requested here should record stream temperature data at 15-minute intervals until at least the end of 2012, consulting yearly with ILP participants after that. Data should be downloaded at least twice per year and checked for quality assurance purposes. The raw gage data should then be made available in excel format to ILP participants through a public website.

Applicants are also collecting reservoir temperature data at Englebright and New Bullards Bar reservoirs twice per month at locations near the powerhouse intakes. In addition the Applicants should collect reservoir profile temperatures at two additional points in each reservoir. These points should be located in order to assess the spatial variability and cold water pools in each reservoir. Exact locations will be determined in a collaborative fashion but should be in the spaced in a manner to assess temperature profiles in the middle and upstream end of each reservoir. Temperatures should be measured at 10 foot intervals twice monthly. Data collection should continue bi-weekly at all locations until at least the end of 2012, consulting yearly with ILP participants after that. Data should be checked for quality assurance purposes and made available to ILP participants in excel format through a public website.

Request Element #2: Temperature Refugia

The applicant should investigate for presence and persistence of temperature refugia. Tributary inputs, hyporheic flows, and stratified pools can create thermal refugia in streams with temperatures otherwise inhospitable for salmonids (Matthews and Berg 1997, Nielsen et al 1994). The Upper Yuba River Studies Report conducted an analysis of temperature refugia for the Middle and South Yuba Rivers above Project facilities (DWR 2007). The Applicant should conduct a similar analysis for riverine reaches of the mainstem Yuba from the Middle/North Yuba Confluence to the confluence with the Feather River, riverine reaches of the North Yuba from its headwaters to the confluence with the Middle Yuba, the Middle Yuba below Our House Dam to the confluence with the North Yuba.

Applicant should locate possible thermal refuge areas, and measure water temperatures wherever any clustering of trout are observed, in deep pools (> 10 feet) where stratification is possible, and above/below all flowing tributary mouths. Analysis should be conducted during annual minimum flow conditions. Thermal stratification of pools should be measured at maximum pool depth and compared to surface temperatures at the same location. In addition, a documentation of the physical characteristics of potential holding pools such as depth, width, length, presence of cover (riparian shade, overhanging rocks, bubble curtains) and presence of spawning gravel. If a significant temperature difference exists (>1 ° C) between bottom and surface pool temperatures, then additional temperature measurements will be made including: temperature profiles of the pool at 1 ft. intervals and at locations at the head and tail of the pool to quantify the spatial extent of the colder water.

The applicant should also investigate cold water inputs from tributaries or cold water seeps. Study area will include mainstem Yuba from the Middle/North Yuba Confluence to the confluence with the Feather River, riverine reaches of the North Yuba from its headwaters to the confluence with the Middle Yuba, the Middle Yuba below Our House Dam to the confluence with the North Yuba and Oregon Creek. Where ever a tributary enters the reaches listed above, temperature measurements should be made above and below tributary inputs as well as in the tributary itself. Wherever congregations of trout are observed temperatures both above and below this point will be measured in order to identify potential cold-water seeps. Field surveys should be conducted as closely as possible to annual flow minimums and tributary flows should be measured and recorded.

Request Element #3: Temperature Modeling

The Applicant should develop a tool comprised of one or more models to predict water temperature in project affected streams, reservoirs, and related facilities. The tool should seamlessly incorporate upstream projects and inflows, project reservoirs and diversions with downstream flows and diversions in order to model the entire Yuba basin as well as the Feather River downstream to the Sacramento River confluence under different watershed development and climatic scenarios.

There are a number of water temperature modeling platforms that can accomplish the objectives of the study. It is expected that the Applicant will choose an appropriate platform in an open and

transparent manner in collaboration with ILP participants. It is expected that the model(s) will be calibrated and verified using accepted scientific methodology and the best available data.

All model runs should be for the water years 1970-2012 unless otherwise noted. Outputs for the tool should include water temperature predictions at 1hour intervals during water years 1970-2012 at the stream nodes specified in the Temperature Monitoring Element. These nodes include all temperature monitoring locations listed in table 7.2.9-1 of the PAD, along with the additional nodes requested, including North Yuba locations above New Bullards Bar. In addition, if any two nodes are greater than 2 river miles apart then an additional “reach” node should be located as close as possible to the geographic mean between the two nodes and the data made available to ILP participants upon request.

Water temperature models have been developed for the Middle Yuba River above Our House Dam and for the South Yuba River above Englebright Lake for the Yuba-Bear/Drum Spaulding Project. While temperature outputs are not requested for these locations, the Applicant will have to utilize these or comparable models to simulate water temperatures from these projects. Applicant should also provide daily minimums, means, maximums, as well as the 7 day average of daily means (MWAT) for all stream locations and make these results available to the public in excel format through a public website.

For water temperatures in New Bullards Bar and Englebright Reservoirs, accurate temperature predictions are desired in a both longitudinal and vertical direction, necessitating the need for a 2-dimensional representation of the reservoir. Vertical intervals and cross-section spacing should be as small as feasible to run the model in a timely fashion. At minimum the model should predict water temperatures on a daily time step for all cross-sections and depths for the water years 1970-2012 for all scenarios. Graphical representations of water temperatures and depths should be provided at areas where temperature profile data was collected (head, middle, tail of reservoir) for the entire period of record for each scenario listed below. The Applicant should use the tool to predict water temperatures for the following scenarios:

Historical Operations: water years 1970-2012. This scenario will mirror as closely as possible measured and observed values for streamflow, water temperature and climate during this period.

Alteration of Project diversions and releases: water years 1970-2012. The water temperature tool should be able to predict water temperatures resulting from any individual or collective alterations in project flows including:

- 1) Increased/decreased diversion at Log Cabin and Our House Diversion Dams
- 2) Increased/decreased flow release schedules for New Bullards minimum flow release, New Colgate, and Narrows I and II powerhouses.

Alteration of Project facilities: water years 1970-2012. The water temperature tool should be able to predict water temperature resulting from any combination of the following:

- 1) Alteration of either of the release pipes on Our House Diversion Dam to increase/decrease capacity or control flow
- 2) Alteration of either of the release pipes on Log Cabin Diversion Dam to increase/decrease capacity or control flow

- 3) Alteration of Camptonville and Lohman Ridge diversion tunnels to control flow at any desired level up to their maximum capacities
- 4) Alteration of the New Bullards Bar minimum flow powerhouse to increase maximum capacity
- 5) Alteration of New Bullards Bar Dam low-level outlet to increase maximum capacity
- 6) Alteration of intake structure for New Colgate tunnel and penstock to selectively draw from different depths or a combination of depths of New Bullard Bar reservoir
- 7) Alteration of the intake structures for Narrows I and II powerhouses to selectively draw from different depths or a combination of depths of Englebright reservoir.

The water temperature tool should be able to combine any of the scenarios above with any of the alteration of project diversions and releases scenarios.

Alterations of interrelated facilities: water years 1970-2012. The water temperature tool should be able to predict water temperatures resulting from any combination of the following:

- 1) Alteration of instream releases from the Yuba-Bear/Drum Spaulding project (FERC Nos. 2310, 2266)
- 2) Alteration of instream releases from the South Feather Power Project (FERC No. 2088) in Slate Creek
- 3) Alteration of diversion amounts/timing at Daguerre Point Diversion Dam

The water temperature tool should be able to combine any of the scenarios above with any of the alteration of project facilities, diversions and releases scenarios.

Unimpaired temperature regime scenario: water years 1970-2012. This scenario will examine water temperatures under various levels of watershed development. The Applicant should use unimpaired hydrology data developed in NMFS information request #2 combined with the historical climate data. The tool will predict water temperatures in an “unimpaired” state free of any human development including all of the Project facilities, upstream projects and land use changes. The Applicant should also model a “YRDP” scenario where the tool uses YRDP hydrology information, which represents the watershed in an otherwise unimpaired state except for YRDP (i.e. no upstream or downstream projects or land use change); this scenario will model Englebright reservoir as it is an interrelated and integral part of the YRDP. This scenario will also allow for comparison of effects of individual elements of the YRDP (i.e. what is the water temperature effect of the New Colgate development without the Narrows I and II developments and vice versa?) The water temperature tool should be able to combine any of the scenarios above with any of the alteration of project facilities, diversions and releases scenarios.

Climate change scenario: The water temperature tool should be able to assess the effects of a warmer future climate on water temperatures. Using hydrology and operations data from the water years 1970-2012 combined with average air temperature increases of 2, 5 and 8 degrees Celsius for adequate comparison to the analysis conducted in Lindley (2007). For each of the warming scenarios, reasonable assumptions will have to be made about other climatological inputs such as rain/snow proportion, snowmelt timing, rain/snow intensity and amounts. It is intended for the Applicant to develop reasonable estimates of these variables from scientific literature reviews and input from ILP participants.

.This request is formatted in accordance with:

Title 18 of the Federal regulations *Conservation of Power and Water Resources*;
Part 5 *Integrated License Application Process*; Section 5.9 *Comments and information or study requests*.

18 CFR § 5.9 (a): *Comments and study requests*. Comments on the pre-application document and the Commission staff's Scoping Document 1 must be filed with the Commission within 60 days following the Commission's notice of consultation procedures issued pursuant to §5.8. Comments, including those by Commission staff, must be accompanied by any information gathering and study requests, and should include information and studies needed for consultation under section 7 of the Endangered Species Act and water quality certification under Section 401 of the Clean Water Act. (Emphasis added for relevance to highlight NMFS' ESA concerns)

18 CFR § 5.9 (b): *Content of study request*. Any information or study request must:

- (1) Describe the goals and objectives of each study proposal and the information to be obtained;
 - (2) If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied;
 - (3) If the requester is not a resource agency, explain any relevant public interest considerations in regard to the proposed study;
 - (4) Describe existing information concerning the subject of the study proposal, and the need for additional information;
 - (5) Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study results would inform the development of license requirements;
 - (6) 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 relevant tribal values and knowledge; and
 - (7) Describe considerations of level of effort and cost, as applicable, and why any proposed alternative studies would not be sufficient to meet the stated information needs.
- (c) *Applicant seeking PURPA benefits; estimate of fees*. If a potential applicant has stated that it intends to seek PURPA benefits, comments on the pre-application document by a fish and wildlife agency must provide the potential applicant with a reasonable estimate of the total costs the agency anticipates it will incur in order to set mandatory terms and conditions for the proposed project. An agency may provide a potential applicant with an updated estimate as it deems necessary. If any agency believes that its most recent estimate will be exceeded by more

than 25 percent, it must supply the potential applicant with a new estimate and submit a copy to the Commission.

§ 5.9 (a): The Information Gathering or Study Should Inform Consultation Under Section 7 of the Endangered Species Act

Comments, including those by Commission staff, must be accompanied by any information gathering and study requests, and should include information and studies needed for consultation under section 7 of the Endangered Species Act

The information or study resulting from this Request would inform future ESA consultation between NMFS and the Commission because the Project's effects on the resource(s) to be studied in this request affect ESA-listed salmonids or sturgeon, and/or their ESA-designated critical habitats, both in the Yuba River and in locations downstream.

NMFS has identified the following ESA-protected anadromous fishes and habitats (ESA resources) in the Yuba River that could be affected by the Project:

- 1) Central Valley (CV) spring-run Chinook salmon Evolutionarily Significant Unit (ESU) (*Oncorhynchus tshawytscha*), threatened (June 28, 2005, 70 FR 37160);
- 2) CV spring-run Chinook salmon designated critical habitat (September 2, 2005, 70 FR 52488);
- 3) CV steelhead Distinct Population Segment (DPS) (*O. mykiss*), threatened (January 5, 2006, 71 FR 834);
- 4) CV steelhead designated critical habitat (September 2, 2005, 70 FR 52488);
- 5) Southern DPS of North American green sturgeon (*Acipenser medirostris*), threatened (April 7, 2006, 71 FR 17757);
- 6) Southern DPS of North American green sturgeon designated critical habitat (October 9, 2009, 74 FR 52300);

ESA resources that occur downstream in the Feather River, Sacramento River, Sacramento-San Joaquin Delta, and San Francisco Bay may also be affected by the Project.

NMFS also identified the presence of an anadromous resource in the lower Yuba that is not listed under the ESA, but is a Federal Species of Concern (those species about which NMFS has concerns regarding status and threats, but for which insufficient information is available to indicate a need to list the species under the ESA):

- CV fall/late fall-run Chinook salmon ESU, Species of Concern (April 15, 2004, 69 FR 19975; October 17, 2006, 71 FR 61022).

This Federal Species of Concern also occurs downstream in the Feather River, Sacramento River, Sacramento-San Joaquin Delta, and San Francisco Bay, and may also be affected by the Project. While the fall/late-fall run Chinook ESU has no formal protection under the ESA, discussions with NMFS regarding effects to this species usually occurs during ESA consultation.

NMFS notes the facilities requested for review are not all considered part of the “Project” facilities by the Commission. However, for consultation under section 7 of the Endangered Species Act, the action, action area, and the effects of an action are defined more broadly. NMFS refers the Commission and Applicant to the following definitions from the Code of Federal Regulations (CFR), and to Enclosure B of this filing:

50 CFR § 402.02 Definitions.

Action means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies in the United States or upon the high seas. Examples include, but are not limited to:

- (a) actions intended to conserve listed species or their habitat;
- (b) the promulgation of regulations;
- (c) the granting of licenses, contracts, leases, easements, rights-of-way, permits, or grants-in-aid; or
- (d) actions directly or indirectly causing modifications to the land, water, or air.

Action area means all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action.

Effects of the action refers to the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action, that will be added to the environmental baseline. The environmental baseline includes the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation in process. Indirect effects are those that are caused by the proposed action and are later in time, but still are reasonably certain to occur. Interrelated actions are those that are part of a larger action and depend on the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration. (Emphasis added to highlight that evaluation of the effects of an action in the ESA sense is broader than evaluation of the action alone).

§ 5.9 (b): 1.0 Goals and Objectives of Request

Describe the goals and objectives of each study proposal and the information to be obtained;

Study Goals:

- 1) To accurately quantify the effects of the Project on water temperature at relevant temporal and geographic scales necessary to help inform license conditions and accomplish NMFS’ resource goals and objectives.

Specific information and objectives to be obtained in this information and study request include:

- a. 15-minute stream temperature collected at all relevant nodes (described above) within the watershed under current climate and water management regimes, from the installation of the data-loggers through at least water year 2012.
- b. Daily minimum, mean and maximum water temperature; along with 7-day average of the daily mean (MWAT) at all monitoring locations for the entire period of record.
- c. Water temperature measurements taken bi-weekly at 10-foot intervals at 3 sampling locations at Englebright and New Bullards Bar reservoirs.
- d. Detailed water temperature profiles of Englebright and New Bullards Bar reservoirs under current climate and water management regimes
- e. Simulated daily minimum, mean and maximum along with 7-day average of the daily mean (MWAT) temperature at all monitoring locations under multiple water management and climatic scenarios.
- f. Identification of any pool determined to be greater than 10 feet in depth that could provide holding habitat for salmonids.
- g. Identification of cold water seeps and tributary inputs that could provide cold-water refugia.
- h. Temperature profiles and physical characteristics of any such holding pools identified, measured during summer low-flow conditions at 1-foot intervals at the pools maximum depth.
- i. Simulated water temperature profiles of Englebright and New Bullards Bar reservoirs under multiple water management and climatic scenarios.
- j. Integration of stream and reservoir temperature models to predict multiple operational scenarios, including effects of different management of upstream and downstream projects (including but not limited to Daguerre Point Dam and the Yuba/Bear-Drum/Spalding Project, South Feather Power Project)
- k. Provide detailed stream and reservoir temperature information and analysis for incorporation into Anadromous Effects Ecosystem Study (NMFS #8).

§ 5.9 (b): 2.0 Resource Management Goals of NMFS

If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied;

NMFS' Resource Management Goal and Objectives, provided in full as Enclosure G, apply with respect to species listed under the and Magnuson-Stevens Fishery Conservation and Management Act (MSA) (16 U.S.C. §1801 *et seq.*) and the Endangered Species Act (ESA) (16 U.S.C. §1531 *et seq.*), as well as anadromous species that are not currently listed but are affected by continuing operations of the Project or may require listing in the future. Thus, our requests for information or study are linked with NMFS' Resource Management Goals and Objectives. If NMFS' requests are included in the Applicant's Study Plan and approved in the Commission's Study Plan Determination, then successfully implemented, the results would inform:

(A) Whether and how NMFS may exercise its FPA Section 18 authority, to either prescribe fishways at the Project or to reserve its prescriptive authority;

(B) NMFS' decisions regarding its future FPA Section 10(j) and 10(a) proposals for protection, mitigation, and enhancement measures;

(C) NMFS' decisions regarding its future recommended measures to improve EFH for Chinook salmon in the upper and lower Yuba, as well as areas downstream to the Bay/Delta;

(D) The ESA Section 7 consultations (informal and formal) regarding effects on threatened species and designated critical habitats in the Yuba River.

The fulfillment of NMFS' request is consistent with the following NMFS' Resources Goals and Objectives for anadromous fishes and habitats in the Yuba River (Enclosure G):

Resource Goals:

3.1 - Protect, conserve, enhance, and recover native anadromous fishes and their habitats by providing access to suitable habitats and by restoring fully functioning habitat conditions for related rearing and feeding (see 4.1-4.4), migration (see 4.5), spawning (See 4.6), and adjoining riparian and aquatic benthic macroinvertebrate (BMI) habitats (see 4.7).

3.2 - Identify and implement measures to protect, mitigate or minimize direct, indirect, and cumulative impacts to, and enhance native anadromous fish resources, including related rearing and feeding (see 4.1-4.4), migration (see 4.5), spawning (See 4.6), riparian and BMI habitats (see 4.7), protection from adverse Fish Hatchery operations (see 4.8) and predation (see 4.9), and ensure coordination within and outside of the Project (see 4.10) to minimize risk to anadromous fishes.

Resource Objectives:

4.1-Flows; 4.2-Flow Ramping; 4.3-Water Quality; 4.4-Water Availability; 4.5-Fish Passage; 4.6-Channel Maintenance; 4.7-Riparian/LWD Habitat; 4.8-Hatchery Operations; 4.9-Predation; and 4.10-Coordination.

§ 5.9 (b): 3.0 Relevant Public Interest Considerations

If the requester is not a resource agency, explain any relevant public interest considerations in regard to the proposed study;

This content requirement is not applicable, as NMFS is a resource agency.

§ 5.9 (b): 4.0 Existing Information and Need for Additional Information

Describe existing information concerning the subject of the study proposal, and the need for additional information;

Available water temperature data are described in Section 7.2.9.1 of the PAD and summarized below:

Applicant is actively collecting stream water temperature data upstream, within and downstream of the Project, and is also collecting reservoir water temperature data in New Bullards Bar Reservoir and in the United States Army Corps of Engineers (USACE) Englebright Reservoir. Table 7.2.9-1 lists Applicant's stream temperature data collection network and the period of

record for each site as of July 2009. Data have been collected at several locations in the Yuba River below USACE's Englebright Dam since 2003; at other locations, data collection began in summer 2008. Reservoir temperature data have been recorded twice per month by Applicant since 1990 at a single point near the upstream face of New Bullards Bar Dam and at a single point near the upstream face of USACE's Englebright Dam. Normally, reservoir data have been collected at 10-foot intervals, along with *in situ* air temperature.

The data provided in the PAD needs to be supplemented with increased water temperature monitoring to provide the temporal and spatial resolution of measurements in order to accurately quantify its effects on anadromous fish and the ecosystems which support them.

The Upper Yuba River Studies Report (DWR 2007) collected temperature data along the Middle and South Yuba Rivers during parts of 2003-2007. A temperature model was also constructed for the report that simulated water temperatures for the summer of 2004. Model runs were made with increased flow releases from upstream reservoirs and the potential effects to salmonid suitability were discussed.

Temperature data was also collected as a part of the ILP process for the Yuba-Bear/Drum-Spaulding Project (FERC Nos. 2310, 2266). Multiple temperature models were constructed to simulate water temperatures in reservoirs and streams affected by the project. The stream models are able to predict water temperatures downstream to Our House Dam on the Middle Yuba and to Jones Bar on the South Yuba River. Multiple runs of the water model are being made for various water release scenarios for that project and the models are made available for public use.

The U.S. Fish and Wildlife Service also collected water temperature data in the lower Yuba, Middle and South Yuba Rivers during 1998 and 1999 (Deas 1999).

NMFS is currently collecting water temperature data in the upper North Yuba River at multiple locations above New Bullards Bar Reservoir upstream to the confluence with Haypress Creek, including tributaries such as the Downie River and Canyon Creek started during the summer of 2010.

Previous water temperature modeling efforts have resulted in several different modeling approaches, as described below:

- In 1991, a water temperature model, the Yuba River Temperature Model (YRTM) (YCWA 1992), was developed by YCWA in response to California Department of Fish and Game (DFG) proposed flow requirements on the lower Yuba River. This model consisted of the following:
 1. A CE-QUAL-R1 1-dimensional model of New Bullards Bar Reservoir.
 2. A series of linear regressions to simulate water temperatures in the Colgate Penstock as a function of water temperature from New Bullards Bar Reservoir, flow through the penstock, and Marysville air temperature.
 3. A series of linear regressions to simulate water temperatures in Englebright Reservoir as functions of Colgate Penstock temperatures, flows through the Colgate penstock, and Marysville air temperatures.

4. A HEC-5Q 1-dimensional model of the lower Yuba River.

This model operated on a daily basis, and was calibrated for water years 1974, 1976, and 1977, and a portion of June 1991. The model was verified by simulating water temperatures in 1975 and 1978.

While the regression coefficients for the Colgate Penstock and Englebright Reservoir components and the HEC-5Q model for the lower Yuba River are available, the CE-QUAL-R1 model of New Bullards Bar Reservoir is not available.

- In 2001, a water temperature model of the lower Yuba River was developed by YCWA to support testimony before the California State Water Resources Control Board (SWRCB) (YCWA 2001). This water temperature model consisted of three linear regressions for the following:
 1. Narrows 2 Powerhouse temperatures as a function of Colgate Powerhouse release temperature and Marysville air temperature.
 2. Yuba River flow temperature at the Marysville gage as a function of Narrows 2 Powerhouse release temperature, Yuba River flow at Marysville, and Marysville air temperature.
 3. Yuba River flow temperature at Daguerre Point Dam as a function of Marysville flow temperature, Yuba River flow at Marysville, and Marysville air temperature.

The model relied on historical average monthly release temperatures from Colgate Powerhouse rather than simulating New Bullards Bar Reservoir water temperatures. The model operated on a monthly basis, and the regressions were computed based on historical water temperatures from 1989 through 2001.

- In 2006, an expanded regression-based water temperature model was developed by YCWA to support the Yuba River Accord Environmental Impact Report/Environmental Impact Statement (EIR/EIS) (YCWA 2007). This water temperature model included regressions for the following:
 1. Colgate Powerhouse release temperature as a function of month and New Bullards Bar Reservoir storage.
 2. Narrows 2 Powerhouse release temperature as a function of Colgate Powerhouse release temperature, inflow to Englebright Reservoir, and Marysville air temperature.
 3. Daguerre Point Dam flow temperature as a function of Narrows 2 Powerhouse release temperature, Yuba River flow at Smartville, and Marysville air temperature.
 4. Marysville flow temperature as a function of Narrows 2 Powerhouse release temperature, Yuba River flow at Smartville, Yuba River flow at Marysville, and Marysville air temperature.

These regressions were developed using historical data from 2000 through 2006, and were validated against historical data from 1990 through 2000. The model operated on a monthly time step.

None of these previously developed models adequately addresses the range of operations and geography required to assess water management decisions throughout the entire basin over a range of climatic conditions, necessitating the development of a new tool.

§ 5.9 (b): 5.0 Nexus Between Project Operations and Effects on the Resource Studied, and How the Study Results Would Inform Development of License Conditions

Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study results would inform the development of license requirements;

YCWA's continued operation and maintenance (O&M) of the Yuba River Development Project (Project) affects water temperature. Temperature regimes in the Lower Yuba River are controlled by the complex interaction between releases from New Colgate powerhouse, flow from the North, Middle and South Yuba Rivers, and the thermal stratification of Englebright reservoir. Bypassed reaches of the North and Middle Yuba as well as Oregon Creek have altered thermal regimes as a result of flow alterations and diversions. The complex nature of water development in the Yuba Basin necessitates the need for a comprehensive, integrated understanding of water temperature effects on anadromous fish and their habitats.

Aquatic species native to the Yuba Basin have evolved in and adapted to the unique thermal regime of the Yuba Basin. Altered thermal regimes can have a variety of adverse effects on the physiology and physical performance and life history expressions of anadromous fish (McCullough 1999). Temperature can affect growth, behavior, competitive interactions, habitat requirements, and susceptibility to disease. Most fish maintain body temperatures that closely match their environment and as a result, water temperature has a strong influence on every life history stage including: metabolism and growth, timing of life history events such as adult migration and spawning, emergence from the redd, and outmigration (Groot et al. 1995).

Temperature also plays an important role in the design and construction of successful fishways. Under Section 18 of the Federal Power Act, 16 U.S.C. § 811, the Secretary of Commerce has the mandatory conditioning authority to prescribe fishways. Successful operation of fishways may require adults and/or juveniles to successfully navigate project reservoirs. The thermal profile of the reservoir combined with inflow temperatures and currents may provide cues to migration and help design more effective fish passage alternatives. The effectiveness of fish ladders or other volitional, semi-volitional (e.g. tramway), or non-volitional (e.g. collection and transport) of fish passage may be affected by the temperature of water that flows through them.

The Yuba River anadromous resources to be studied in this Request, all under the jurisdiction of NMFS, include:

- 1) Central Valley (CV) spring-run Chinook salmon Evolutionarily Significant Unit (ESU) (*Oncorhynchus tshawytscha*), threatened (June 28, 2005, 70 FR 37160);

- 2) CV spring-run Chinook salmon designated critical habitat (September 2, 2005, 70 FR 52488);
- 3) CV steelhead Distinct Population Segment (DPS) (*O. mykiss*), threatened (January 5, 2006, 71 FR 834);
- 4) CV steelhead designated critical habitat (September 2, 2005, 70 FR 52488);
- 5) Southern DPS of North American green sturgeon (*Acipenser medirostris*), threatened (April 7, 2006, 71 FR 17757);
- 6) Southern DPS of North American green sturgeon designated critical habitat (October 9, 2009, 74 FR 52300);
- 7) CV fall/late fall-run Chinook salmon ESU, Species of Concern (April 15, 2004, 69 FR 19975);
- 8) CV spring-run and CV fall/late-fall run Chinook salmon identified “essential fish habitat” (EFH), (October 15, 2008 73 FR 60987);
- 9) CV fall/late fall-run Chinook salmon ESU, Species of Concern (April 15, 2004, 69 FR 19975).

§ 5.9 (b): 6.0 Consistency with Generally Accepted Practice

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 relevant tribal values and knowledge;

Any proposed methodology is consistent with the goals and objectives outlined for recent FERC hydroelectric ILP studies in the Western U.S., and uses accepted methodologies from published scientific literature and protocols from the National Marine Fisheries Service, U.S. Fish and Wildlife Service, and California Department of Fish and Game.

NMFS is presenting an Information Request and not necessarily specific study methodology (preferred data collection and analysis techniques, or objectively quantified information). This is because the Applicant’s responsibility under the FPA is to either provide the requested information or to develop a more detailed Study Plan to obtain such information. It is anticipated that through the reiterative study development process within the ILP that the Applicant and the Commission will work with ILP participants to develop a study that obtains the requested information, or that adequate information, approved by the Commission, is provided by the Applicant.

§ 5.9 (b): 7.0 Considerations of Level of Effort and Cost

Describe considerations of level of effort and cost, as applicable, and why any proposed alternative studies would not be sufficient to meet the stated information needs.

The Licensees do not request PURPA benefits in their PAD. NMFS considers that the cost of these studies will be between \$100,000-\$250,000. The Project is considered vast and complex. Considering the number of dams, the amount of water diverted, the potential for environmental disturbance, the status of several species listed under the ESA, and the recent closure of Chinook fisheries on the West Coast of the United States, the level of effort and cost for the Licensees is commensurate with the magnitude and impacts of the Project, and the revenues derived from sales of generated energy.

8.0 References

- Deas, M. L. 1999. Yuba River Temperature Monitoring Program. Prepared for the United States Fish and Wildlife Service Sacramento/San Joaquin River Fishery Restoration Office
- DWR 2007. Upper Yuba River Watershed Chinook Salmon and Steelhead Habitat Assessment. Technical Report. Prepared for the California Department of Water Resources by the Upper Yuba River Studies Program Study Team.
- Groot, C., L. Margolis, and W. C. Clarke, editors. 1995. Physiological ecology of Pacific Salmon. University of British Columbia Press, Vancouver.
- Lindley, S. T., et al. 2007. Framework for Assessing Viability of Threatened and Endangered Chinook Salmon and Steelhead in the Sacramento-San Joaquin Basin San Francisco Estuary and Watershed Science 5, Issue 1, Article 4.
- Matthews, K.R., and N.H. Berg. 1997. Rainbow trout responses to water temperature and dissolved oxygen stress in two southern California stream pools. Journal of Fish Biology 50:50-67.
- McCullough, D.A. 1999. A review and synthesis of effects of alterations to the water temperature regime on freshwater life stages of salmonids with special reference to Chinook salmon. U.S. EPA Report #EPA 910-R-010. 279 pp.
- Nielsen, J.L., T.E. Lisle, and V. Ozaki. 1994. Thermally stratified pools and their use by steelhead in northern California streams. Transactions of the American Fisheries Society 123:613-626.
- NMFS 2009. "Public Draft Recovery Plan for Sacramento River Winter-run Chinook Salmon, Central Valley Spring-run Chinook Salmon, and Central Valley Steelhead." NMFS, Southwest Region, Sacramento, California. 7pp. October 2009.

Pacific Fisheries Management Council (PFMC). 1999. Pacific Fishery Management Council. Description and identification of essential fish habitat, adverse impacts and recommended conservation measures for salmon. *Amendment 14 to the Pacific Coast Salmon Plan, Appendix A*. Pacific Fisheries Management Council, Portland, Oregon.

PFMC. 2003. Pacific Fishery Management Council. Fishery Management Plan for Commercial and Recreational Salmon Fisheries off the Coasts of Washington, Oregon and California as Revised Through Amendment 14 (Adopted 1999).

Federal Register Notices

Federal Register Notice, 63 Fed. Reg. 13347, March 19, 1998. Endangered and Threatened Species: Threatened Status for Two Evolutionarily Significant Units of Steelhead in Washington, Oregon, and California. Final Rule.

Federal Register Notice, 64 Fed. Reg. 50394, September 16, 1999. Endangered and Threatened Species: Threatened Status for Two Chinook Salmon Evolutionarily Significant Units in California. Final Rule.

Federal Register Notice, 69 Fed. Reg. 19975, April 15, 2004. Endangered and Threatened Species; Establishment of Species of Concern List, Addition of Species to Species of Concern List, Description of Factors for Identifying Species of Concern, and Revision of Candidate Species List Under the Endangered Species Act. Final Rule.

Federal Register Notice, 70 Fed. Reg. 37160, June 28, 2005. Endangered and Threatened Species: Final Listing Determinations for 16 Evolutionarily Significant Units (ESUs) of West Coast Salmon, and Final 4(d) Protective Regulations for Threatened Salmonid ESUs. Final Rule.

Federal Register Notice, 70 Fed. Reg. 52488, September 2, 2005. Endangered and Threatened Species: Designation of Critical Habitat for Seven Evolutionarily Significant Units of Pacific Salmon and Steelhead in California. Final Rule.

Federal Register Notice, 71 Fed. Reg. 834, January 5, 2006. Endangered and Threatened Species: Final Listing Determinations for 10 Distinct Population Segments of West Coast Steelhead. Final Rule.

Federal Register Notice, 71 Fed. Reg. 17757, April 7, 2006. Endangered and Threatened Wildlife and Plants: Threatened Status for Southern Distinct Population Segment of North American Green Sturgeon. Final Rule.

Federal Register Notice, 71 Fed. Reg. 61022, October 17, 2006. Endangered and Threatened Species: Revision of Species of Concern List, Candidate Species Definition, and Candidate Species List.

Federal Register Notice, 73 FR 60987, October 15, 2008. Fisheries Off West Coast States; West Coast Salmon Fisheries; Amendment 14; Essential Fish Habitat Descriptions for Pacific Salmon. Final Rule.

Federal Register Notice, 74, FR 52300, October 9, 2009. Endangered and Threatened Wildlife and Plants: Final Rulemaking to Designate Critical Habitat for the Threatened Southern Distinct Population Segment of North American Green Sturgeon. Final Rule.

Federal Register Notice, 75 Fed. Reg. 30714, June 2, 2010. Endangered and Threatened Wildlife and Plants: Final Rulemaking To Establish Take Prohibitions for the Threatened Southern Distinct Population Segment of North American Green Sturgeon. Final Rule. June 2, 2010.

NMFS Request #4
Request for Information or Study
Effects of the Project and Related Activities on Coarse Substrate
for Anadromous Fish: Sediment Supply, Transport and Storage
March 7, 2011

The National Oceanic and Atmospheric Administration's, National Marine Fisheries Service (NMFS) hereby files this request for additional information and study with the Federal Energy Regulatory Commission (Commission or FERC) for Yuba County Water Agency's (Applicant) Yuba River Hydroelectric Project (Project), FERC Project No. 2246, Yuba River watershed, California.

The purpose of this study is to evaluate the effects of the Yuba River Development Project on fluvial processes and channel morphology, which includes the amount and size of coarse substrate material that life stages of anadromous and resident fishes use and rely upon in freshwaters. A river's character and morphologic function are strongly influenced by the amount and timing of sediment and water provided to them, and any change to this continuum provokes a change in the river and its associated physical and biological processes it supports (Reid and Dunne 2003). Dams can affect channel morphology by trapping sediment, altering the frequency, timing and magnitude of peak flows, and by intercepting large woody debris (LWD) (Grant et al. 2003). New Bullards Bar, Log Cabin, and Our House Diversion dams all interrupt the downstream continuum of sediment supply and transport. Operation and maintenance of the Project therefore has the potential to effect fluvial processes and channel form and associated anadromous and resident fish habitat, and this study seeks to quantify the Project's impacts to the mass balance of sediment supply and transport.

1.1 Study Area

The study area includes: 1) the Middle Yuba River from Our House Diversion Dam to the confluence with the North Yuba River; 2) Oregon Creek from the Log Cabin Diversion Dam to the confluence with the Middle Yuba River; 3) the North Yuba River from New Bullards Bar Dam to the confluence with the Middle Yuba River; 4) the portion of the Yuba River from the confluence of the North and Middle Yuba rivers downstream to Englebright Dam; 5) the lower Yuba river from Englebright Dam to the Feather River confluence; and 6) the portion of the North Yuba, Middle Yuba, Oregon Creek affected by base-level control exerted by either the diversion dam (Our House, Log Cabin) or reservoir water level (New Bullards Bar).

1.2 Study Methods

1.2.1 Request Element #1: Develop Sediment Supply Estimates to Project Affected Reaches

1.2.1.1 Reservoir Sedimentation Rates to Project and Nearby Reservoirs

Sediment accumulation in New Bullards Bar, Our House, and Log Cabin reservoirs since Project construction reflects sediment yield from reservoir source areas under current conditions and

should be used to estimate current average annual sediment yield. Additional reservoir sedimentation rates are available for Englebright Reservoir and several reservoirs in the nearby South Feather drainage (Childs et al. 2003, Snyder et al. 2004a and 2006 and SFWPA 2007). Calculating reservoir sediment yield requires measuring or estimating (1) the volume of sediment accumulated in each impoundment; (2) bulk sediment properties (i.e., density, percent organic matter, and coarse sediment : total sediment ratio); (3) reservoir trap efficiency; and (4) source area to the impoundment.

Information pertaining to sediment accumulation rates (volumetric) and subsequent dredging for Our House Diversion Dam is provided in the Project's PAD. Also within the PAD, there is mention of developing a sediment pass-through program at Log Cabin Diversion Dam, which presumes some information pertaining to the accumulation and/or dredging at the dam exists. For the purposes of this study request, it is assumed that sufficient data exists at the Log Cabin Reservoir to calculate an accumulation rate for Oregon Creek. Sediment accumulation rates for Englebright Dam are available for pre- and post-1970 (Childs et al. 2003, Snyder et al. 2004a and 2006).

The volume of sediment accumulated in New Bullards Bar Reservoir since construction should be determined by differencing two digital grids of reservoir floor elevations, one based on topography prior to sediment filling and the other based on modern bathymetry. Grids of reservoir topography prior to sediment filling should be derived from as-built construction drawings of Bullards Bar (built in 1924 and inundated by New Bullards Bar) and New Bullards Bar, as well as any bathymetric data pertaining to Bullards Bar sedimentation prior to construction of New Bullards Bar. Modern bathymetry should be surveyed using a combination of boat and ground-based techniques. The majority of the surveying should be conducted from a boat using a survey-grade echosounder and a real-time kinematic (RTK) global positioning system (GPS). Ground-based RTK GPS and total station surveys should supplement bathymetric data where shallow water depths and dense vegetation limit boat access, and where satellite coverage is inadequate. The combined bathymetric data should be used to construct a triangulated irregular network surface that should then be rasterized into a grid. The coincident grids of post-construction and modern reservoir floor elevations should be subtracted to determine sediment thickness and calculate accumulated sediment volume (Morris and Fan 1998, Childs et al. 2003, Snyder et al. 2004). Isopach maps will be used to evaluate the distribution of sediment accumulated in the reservoir.

Estimates of unit area sediment yields area derived from reservoir sedimentation are available for Bullards Bar Reservoir are available from 1919 to 1939 prior to the construction of New Bullards Bar Dam (Miner and Kondolf 2009, Dendy and Champion 1978). It is unknown precisely what data sources were used to derive these estimates, but presumable an as-built drawing of Bullards Bar Dam was used in conjunction with a bathymetric surveyed collected in 1939. These data sources will be pivotal in calculating the present day reservoir sedimentation in New Bullards Bar Reservoir. However, the reservoir sedimentation rate from 1919 to 1939 will not serve to replace a reservoir sedimentation survey for the modern day New Bullards Bar Reservoir for the following reason: 1) it covers a short time window (20 years) that does not likely cover sufficient hydrologic conditions to capture the long-term average rate; 2) the survey period is know more than 70 years old and likely does not reflect the modern day sediment yield;

3) uncertainty involving the 1939 bathymetric survey; and 4) potential differences in reservoir trap efficiency between Bullards Bar Dam and New Bullards Bar Dam.

Average annual, unit-area sediment yields to New Bullards Bar, Our House, and Log Cabin reservoirs should be calculated using the following procedure:

- 1 Accumulated sediment volume should be converted to accumulated mass using published values (e.g., Snyder 2004a,b) for reservoir sediment density.
- 2 Total mass yield should be calculated from accumulated mass using trap efficiency estimates derived from accepted empirical equations (e.g., Brown 1943, Churchill 1948, Brune 1953; Heinemann 1981).
- 3 Average annual, unit-area total sediment yield should be calculated by dividing the total mass sediment yield by the bedload (regulated) source area and the duration of accumulation.
- 4 Average annual coarse sediment yield should be estimated by multiplying the accumulated sediment mass by a coarse:total sediment ratio, and then dividing the total coarse mass by the bedload (regulated) source area and the duration of accumulation.

Note that due to the significant research surrounding the reservoir sediment deposited in Englebright Lake (Childs et al. 2003, Snyder et al. 2004a,b and 2006), several of the key uncertainties regarding extrapolation of reservoir sedimentation volumes into unit-area sediment yields, such as sediment density and coarse to total load ratios, are well constrained for Englebright Lake and are likely applicable for extrapolation to sediments deposited in Project reservoirs. Thus additional, detailed studies of the sediment properties deposited in Project reservoirs is likely not necessary.

1.2.1.2 Extrapolation of Sediment Yields to Project Affected Reaches

Unit-area sediment yields from the reservoir sedimentation calculations should be applied to key locations affected by Project operations and other significant locations in the Yuba watershed to determine average annual coarse and total sediment yields for current and unimpaired conditions. Several of the key locations are listed in Table 1 and Figure 1, these locations focus on quantifying sediment supply upstream and downstream of Project Dams and Englebright Dam, at tributary and river confluences, and at Colgate Powerhouse. Average annual coarse and total sediment yield under reference and current conditions should be calculated by multiplying the apportioned average annual unit-area yield for each drainage basin by the upstream regulated drainage area (for regulated sediment supply) or upstream unimpaired drainage area (for unimpaired sediment supply) to each site. For example an unimpaired sediment supply node located downstream of the North and Middle Yuba confluence would use the New Bullards Bar unit area yield for the North Yuba drainage area, the Our House unit-area yield for the Middle Yuba drainage except for the Oregon Creek drainage area that would use the Log Cabin unit-area yield. Extrapolating this scenario to a current conditions value would use the same unit-area yields for each stream but would eliminate supply upstream of the dams by subtracting all of the source areas upstream of the New Bullards Bar, Our House, and Log Cabin Diversion Dams. Sedimentation rates in Englebright Reservoir (Childs et al. 2003 and Snyder et al. 2004a) can be

used for representing South and Middle Yuba supply rates downstream of the South Yuba confluence with the Yuba River.

Table 1: Sediment supply nodes for sediment budget for Yuba River Development Project.

Sediment Supply Node ID	Description
1	North Yuba input to New Bullards Bar Dam
2	North Yuba downstream of New Bullards Bar Dam
3	Oregon Cr upstream of Log Cabin Diversion Dam
4	Oregon Cr downstream Log Cabin Diversion Dam
5	Middle Yuba upstream of Our House Diversion Dam
6	Middle Yuba downstream of Our House Diversion Dam
7	Middle Yuba downstream of Oregon Cr confluence
8	Middle Yuba at confluence with North Yuba
9	Yuba River at confluence of North and Middle
10	Yuba River downstream of Colgate Powerhouse
11	Yuba River input to Englebright
12	Yuba River downstream of Englebright Dam
13	Yuba River downstream of Deer Creek
14	Yuba River downstream of Dry Creek
15	Yuba River at Daguerre Point Dam
16	Yuba River at confluence with Feather River

In all likelihood stratification of sediment supply rates by contributing drainage basin (e.g. New Bullards Bar unit-area yield represents all North Yuba drainage areas) will be sufficient to characterize sediment supply to the nodes downstream of Project dams listed in Table 1. However, in the event that substantial differences exist between unit-area yields at the different reservoirs, additional analysis may be necessary to decide which rate to use for contributing drainage areas potentially of mixed drainage area types. For example, if the unit-area yield is substantially different at Log Cabin Reservoir as compared to Our House Reservoir, the question will arise as to which rate to use (or potentially a weighted average of the two) for areas on the Middle Yuba downstream of the Oregon Creek confluence. In this case, additional stratification calculated in GIS by geologic type, hillslope gradient, soil erodibility, percent coverage by roads, and/or the TNF GIS geomorphic data layer differentiating colluvial hillslopes and eroding hillslopes (USFS 2010) may be necessary to determine which sediment yield is most appropriate to use.

1.2.2 Request Element #2: Coarse Level Stratification and Study Site Selection

The objectives of the coarse-level characterization of channel morphology in Project affected reaches are to classify and organize stream reaches in the Study Area based on valley and channel morphology and stratify the relative responsiveness (i.e. “sensitivity”) of river reaches to alterations in the flow and sediment regimes. This element will involve assessing information

gathered from previous studies, data from topographic maps and USGS 10-m DEM as well as aerial photographs, and a helicopter overflight. Based on a coarse-level analysis of the study area, detailed study sites will be selected to examine channel morphology and bed composition more closely and calculate sediment transport capacity. A detailed study site should be selected for in the nearby vicinity of sediment supply study nodes #1 through 10 identified listed in Table 1 and in Figure 1. Detailed study sites downstream of Englebright Dam are likely not necessary due to pre-existing information and studies already underway from the RMT (Pasternack 2010). An additional study site is not needed at node #11 because a site near node #10 should apply to both nodes. Study sites at nodes #1, 3, and 5 (upstream of New Bullards Bar, Log Cabin, and Our House reservoirs, respectively) are in part needed to characterize channel morphology, substrate conditions, and in-channel sediment storage in quasi-reference reaches (i.e., conditions upstream of Project facilities).

Coarse level channel stratification and selection of responsive study sites will involve the following steps:

1. **Review existing information and assemble aerial photographic sets.** Relevant existing data, reports, maps, and aerial photography will be collected and reviewed. These data are expected to include source documentation on geology, topography, soils, land-use (i.e., timber management history, fires, mining, grazing, road development, and water diversions), and the TNF GIS geomorphic data layer (USFS 2010) as well as the mass wasting map “Geology and Slope Instability map of a Portion of the Tahoe National Forest, California” by Don Lewis, TNF Geologist.
2. **Historical aerial photograph analysis.** Historical aerial photographs will be analyzed (where possible) for channel planform position and sinuosity, channel and valley width, coarse sediment deposits, bed morphology (pool-riffle, plane-bed, cascade, bedrock, etc), evidence of hillslope mass-wasting and relative presence of riparian vegetation. Aerial photography will also be used to assist with classifying channel morphology as described below. These photographs should also be used to assess any land use (e.g., mining or timber harvesting activities).
3. **Derive channel slope and create longitudinal profile.** Channel slope and longitudinal profile should be derived from 10-m USGS digital elevation data, or higher resolution data if available. A DEM and GIS coverage of channel slope will be generated for the Study Area. Planform maps of channel slope will be plotted as well as longitudinal profiles of the North , Middle , and mainstem Yuba Rivers as well as Oregon Creek.
4. **Helicopter overflight.** A low altitude aerial video of all Project-affected reaches and facilities was collected by the Licensee (PAD, Appendix E - Project Helicopter Video. This video should be further used to identify potential response reaches based on alluvial sediment storage and identification of pool-riffle reaches.
5. **Identify response reaches and select study sites.** Stream reaches within the Study Area will be grouped according to the channel classification scheme of Montgomery and Buffington (1997 and 1998), which utilizes a process-based framework of sediment supply, sediment transport, links to hillslope processes, and external forcing by valley

confinement, riparian vegetation, and LWD. Channel morphology classifications will be based on aerial photographs, channel slope generated from the DEM, and observations from the helicopter overflight.

Subsequent to designating a Montgomery-Buffington classification, response reaches within the Study Area will be delineated. Response reaches are those most likely to show an impact from altered hydrology or sediment loading, and typically have the following attributes: (1) are unconfined, (2) have a plane-bed or pool-riffle morphology, (3) are predominantly alluvial, and (4) have slopes of less than 4% (Montgomery and Buffington 1998). Channel confinement, alluvial sediment, and morphology will be assessed using aerial photographs and observations made during the helicopter overflight.

Detailed study sites will be selected from the response reaches where possible as identified during the coarse level analyses, which will promote investigation of sites most likely to show a response to any Project alterations in hydrology and sediment supply, are suitable for the sediment transport analysis described below, and will illuminate changes in the downstream trajectory of the balance between coarse sediment supply and transport. Where response reaches do not exist in the vicinity of the sediment supply nodes #1-10, sites with the lowest gradient, least confinement, and greatest alluvial sediment storage should be selected. Other criteria used to evaluate the suitability of the potential detailed study sites will include: minimal direct sediment input from streamside mass wasting (i.e., from bank collapse or shallow landsliding) that may cause localized changes in the channel morphology or bed texture, and minimal localized land use impacts such as riparian timber harvest, channel constrictions due to road construction or crossings, and artificial channel hardening from rip-rapping bank material.

1.2.3 Request Element #3: Assessment of Channel Morphology and Fluvial Processes

Each detailed study site should be classified according to the scheme of Montgomery and Buffington (1997). All detailed study sites should be 20 bankfull channel width long. Data collected at each site should include:

- sediment facies mapped onto hard copy aerial photographs following the conventions of Buffington and Montgomery (1999);
- pebble counts (Wolman 1954) to verify facies mapping and provide roughness parameters at cross-sections used in the sediment transport analysis;
- 3 bulk samples at each site in alluvial sediment deposits using a McNeil or similar sampler in order to characterize the size distribution of the surface and subsurface material;
- 3 representative cross sections extended onto the floodplain (or to the hillslope toe if floodplains are not present), noting bankfull width and floodprone width at each cross-section using standard field indicators (Harrelson et al. 1994);
- Stage-discharge relationships observed at three discharges, with observations at 2 cross-sections within each site
- a long profile of the bed and water surface elevation, with elevations points surveyed at

- the habitat unit scale (i.e., at the top of each pool, riffle, run);
- mapping of all alluvial coarse sediment storage (see section 1.2.5 below); and
- notation of other characteristics of the channel bank and bed, including indicators of channel stability (e.g., bank erosion, aggradation, or degradation).
- LWD counts of all pieces within the floodprone width (also requested as part of study NMFS #5).

1.2.4 Request Element #4: Calculation of Bed Mobility and Sediment Transport Capacity

The rate that bed material is transported downstream of the Project can be used to assess how quickly bed material is leaving the reach and compare how the mass balance of sediment supply and transport capacity has been affected by Project operations. The faster bed material leaves the reach, the greater the effect of reduced sediment supply on channel form and aquatic habitat. This study will assess how often sediment is transported under current and unimpaired conditions and how the Project has affected the frequency, magnitude, and volume of sediment transport. The objectives are to evaluate sediment transport thresholds and their recurrence interval in Project-affected reaches to predict how often bed material is transported and to derive the average annual sediment transport capacity. It is vital to note that the study of bed mobility thresholds (or incipient motion) does not substitute or quantify the average annual sediment transport capacity, which is necessary to calculate the annual sediment load, determine sediment budgets, estimate quantities of gravel augmentation, and to assess stream response to changes in water and sediment supply (Wilcock *et al.* 2009).

1.2.4.1 Deploy Tracer Rocks and Monitor Following High Flow Events

Tracer gravel studies involve marking rocks or placing rocks of a foreign lithology (e.g., quartz rocks) on the river channel bed at low flows and monitoring whether they move after high flow events. Tracer rocks with grain size approximately equal to the local surface D_{50} and D_{84} , or if low flows permit rocks painted in-situ (e.g., paint the tops of rocks without removing them from the bed, which creates less disturbance to the natural particle arrangement), should be deployed at as many detailed study sites as logistically feasible. NMFS recognizes that due to access constraints and/or high flow velocities and depths that deployment of tracer rocks may not be feasible at all detailed study sites. Tracer rocks should be placed along the two cross-sections that represent the most uniform flow conditions conducive to sediment transport modeling at each study site. Tracer rock deployment is not necessary downstream of Englebright Dam due to previously collected data (Pasternack 2010).

Tracer gravel experiments are performed so that observations of particle movement and distances traveled are recorded after various high flow events. Tracer rocks should be resurveyed opportunistically following peak flow events, the lowest being flows that generally occur several times per year. If no movement is observed during these flows, the threshold for observations should increase. If the marked rocks do move, they should be replaced. The percent tracers mobilized at each flow are then used to produce a chart of discharge vs. percent moved for each size class. This gives the observer a better understanding of the flows at which bed material is under incipient and total mobility, which is then used to calibrate τ_r^* for the sediment transport

model. Having some level of calibration for incipient motion in a sediment transport model is necessary in order to account for variations that may occur due to particle embeddedness, development of pavement layers, and/or effects of large, immobile roughness that can absorb a significant portion of the boundary shear stress. This information also can be used to refine future volumes and size distribution of gravel augmentation (where warranted) as well as instream flow regimes in order to maximize the benefits and residence times of any augmentation measures.

1.2.4.2 Calculation of Bed Mobility and Coarse Sediment Transport Capacity

A hydraulic model should be used to estimate boundary shear stresses for the most uniform, representative cross-section at each detailed study site. Input data for the hydraulic model should include cross-section geometry, water surface slopes, and substrate grain size distributions. The total boundary shear stress from the hydraulic model must then be partitioned into the part that only acts on the grains and produces sediment transport (commonly referred to as the grain stress or skin friction). This is a necessary step because in steeper mountain streams a significant portion of the total shear stress is absorbed by relatively immobile roughness elements such as LWD, boulders, channel banks and bends. An example of how to calculate the grain shear stress can be found in Wilcock et al. (2009). The drag partitioned results from the hydraulic model should be used to develop a rating curve of grain shear stress compared to discharge at each detailed study site.

Incipient motion thresholds of the substrate distributions (both surface and sub-surface material) should then be calculated using a transport function designed for mixed-sized sediments. For a system such as the Yuba River where a large range of sediment sizes are present in the bed (small boulders to sand), it is important to not use a transport function designed for uni-sized sediment distributions such as the Shields curve coupled, because in a mixed-bed smaller grains will be harder to move (hiding effects) and larger grains are easier to move (exposure of larger grains with sediment mixing) (Wilcock et al. 2009). Examples of sediment transport relationships that are for mixed sized sediments that incorporate functions that incorporate these hiding effects include: the substrate –based equation of Parker-Klingeman-McLean (1982), the surface-based equation of Parker (1990a,b), and the surface-based equation of Wilcock and Crowe (2003). Equations such as these should be used to predict the discharge that different size classes of the grain size distributions are mobilized and the discharge which the entire bed is mobilized at. Initial results of sediment mobilization can then be calibrated based on observations of tracer gravels (see section 1.2.4.1). Following any calibration of incipient motion calculations, an analysis should be performed that calculates the frequency of bedload mobilization events (e.g., # of events per year) and determine the annual peak flow return interval (calculated according to USGS Bulletin 17B guidelines[(USGS 1982)]) of bedload transporting events for current and unimpaired conditions, using the unimpaired and current hydrology data sets developed in NMFS information request #4 at each study site.

Sediment transport equations as described above, should then be used to calculate transport capacity (e.g. tons/day) as a function of discharge. Flow duration curves of the mean daily flow series for current and unimpaired conditions should then be integrated under the transport capacity vs. discharge functions to produce an average annual sediment transport capacity There

are several “off-the-shelf” models available that can perform this calculation, such as the Bedload Assessment in Gravel-bedded Streams (BAGS) model (Wilcock et al. 2009).

For reaches downstream of Englebright, existing data (or data scheduled to be collected as part of other studies) pertaining to bed mobility thresholds, their associated frequency and return-intervals for current and unimpaired conditions, and average annual sediment transport capacity should be summarized. If bed mobility calculations and/or sediment transport capacities are not available for nodes 12 through 16 in Table 1, these values should be calculated with the methods described above using existing morphologic data as input parameters.

1.2.5 Request Element #5: Evaluate Coarse Sediment Storage in Project Affected Reaches

The quantity and time that coarse alluvial sediment (e.g., gravel and cobble) is stored in a channel reflects the mass balance between coarse sediment supply and bedload transport. A reduction in coarse sediment supply with little change in the frequency and duration of effective discharges that transport bedload can force a coarse sediment deficit in responsive reaches, potentially resulting in reduced sediment storage, coarsening of the bed surface, and/or incision. Reduced in-channel sediment storage can lead to a loss in the frequency and size of smaller mobile sediment deposits often used for spawning that are typically formed by large roughness elements, local backwater effects, and local flow expansion.

In order to evaluate alluvial sediment storage in a quantitative manner, channel sediment storage should be quantified in the Project affected reaches and in response reaches upstream of the Project reservoirs in order to provide reference reaches. Reference reaches will compare in-channel sediment storage upstream and downstream of Project dams and provide a metric for assessing potential Project induced changes. Reference reaches are necessary for comparing in-channel sediment storage because an unimpaired calculation or extrapolation is not feasible – unlike sediment supply and transport capacity. Potential reference reaches should exhibit similar morphologic characteristics (such as channel slope, width to depth ratios, and morphologic classification as defined by Montgomery and Buffington (1997) [see section 1.2.2]) as Project affected reaches.

Channel sediment storage should be sampled along the entire length of the 10 detailed study sites outline in section 1.2.2, which includes three reference reaches upstream of Project Dams. An additional sediment storage sample site should be added to the following reaches: North Yuba upstream of New Bullards Bar Reservoir, North Yuba between New Bullards Bar Dam and Middle Yuba confluence, Middle Yuba upstream of Our House Diversion Dam, Middle Yuba between Our House Diversion Dam and Oregon Creek confluence, Middle Yuba downstream of Oregon Creek, and Oregon Creek downstream of Log Cabin Diversion Dam, which will bring the total population of channel sediment storage sample reaches to 16. Channel sediment storage downstream of Englebright Dam is not necessary due to existing information, ongoing gravel augmentation projects, and the large quantities of hydraulic mining related sediment stored throughout the lower Yuba (Pasternack 2010).

Channel sediment storage should be mapped in the field using methods similar to Kelsey et al. (1987) and Curtis et al. (2005). Stored sediment should be defined as the fraction of the bed material that is mobile during frequent flood events (e.g., 1.5–5-year recurrence interval floods). This will require defining a size distribution for what constitutes “mobile sediment”, which is often characterized by small or medium cobbles and finer (e.g., < 128 mm). However, results from the sediment transport modeling as well grain size data collected in Element 2 (see section 1.2.4.2) can be used to further refine what is “active, mobile sediment” for the Study Area.

Boundaries of each sediment storage patch should be mapped in the field on color aerial photo tiles printed at a relatively high resolution (e.g., less than or equal to 1:2,000). Each sediment storage patch should be described in geomorphic terms, assigned an activity class (e.g., active or semi active) based on relative position and indicators of residence time, and characterized with a textural facies and an estimated D_{50} and D_{84} grain size. Depth of each patch should be measured with a probing rod (see Hilton and Lisle 1993 for an example) or estimated relative to the depth to bedrock controls or the thalweg elevation if the patch is inaccessible by wading. For reaches where the following parameters have not been quantified as part of the detailed study sites the following need to be collected: bankfull width, wetted channel width, water surface slope, and length were measured in each sample reach.

Sediment storage areas mapped in the field on air photo tiles should be digitized in GIS, and the area of each patch calculated. Unit storage area (*i.e.*, area of sediment storage per unit area of bankfull channel in m^2/m^2) and unit storage volume (*i.e.*, volume of sediment storage per unit area of bankfull channel in m^3/m^2) should be calculated for each sample reach from field measurements of channel width, reach length, and depth of storage. Normalizing sediment storage values by channel area will likely be necessary to account for differences in the length and width of sample reaches.

Results from the channel sediment storage inventory should identify the following:

1. Compare sediment storage in Project effected reaches with reference reaches.
2. Will identify how far downstream the Project’s effects from sediment entrapment extend. For example, at some unknown distance, in-channel sediment storage below Our House Diversion Dam may approach values similar to unimpaired reaches.
3. Results will identify reaches that may warrant gravel augmentation, and quantify what volume of material would be needed to maintain a properly functioning channel morphology (this would be determined in concert with the sediment transport modeling results).

1.2.6 Request Element #6: Synthesize Study Results to Evaluate Ecological and Geomorphic Impacts

In order to assess channel sediment dynamics and associated ecological effects on the Yuba River in the Study Area, data collected during this study and relevant hydrogeomorphic data from the proposed *Effects of the Project and Related Facilities on Hydrology for Anadromous Fish* and *Effects of the Project and Related Facilities on Large Wood and Riparian Habitat for Anadromous Fish* studies will be synthesized. The objectives of the synthesis are to (1) describe

the downstream trajectory of the mass balance between coarse sediment supply and transport capacity, (2) determine the extent and magnitude of the coarse sediment deficit on the Yuba downstream of Project Dams based on channel bed storage and morphology, (3) provide information required for future efforts aimed at quantifying the ecological significance of any geomorphic effects of the Project, and (4) provide information necessary to determine if and what management measures may be necessary to mitigate any sediment imbalance.

The synthesis should include a sediment budget (Reid and Dunne 1996 and 2003) comparing sediment supply and transport capacity from Project Dams downstream to the Feather River confluence, for both regulated and unimpaired conditions. The sediment budget should have nodes (stations on a longitudinal plot) for sediment supply as listed in Table 1 and sediment transport capacity calculated at detailed study sites. The sediment budget should also include a comparison with in-channel sediment storage results upstream of Englebright Dam in order to assess how the sediment supply and transport balance is affecting volumes of sediment stored within the channel.

The synthesis should summarize and tabulate the results from the sediment transport modeling at detailed study sites, including discharges necessary to mobilize individual grain size fractions as well as complete bed mobilization, the frequency of which bed mobilization discharges occur under the regulated and unimpaired flow regimes, and develop bedload and total sediment load rating curves (e.g., transport capacity as a function of discharge). In addition, simple conceptual models of channel sediment dynamics under current and reference conditions will be developed. These conceptual models should include analyzing Project effects with the framework proposed by Grant et al. (2003), often referred to as a T^* and S^* analysis, as well as calculating the metrics for assessing the downstream effects of dams proposed by Schmidt and Wilcock (2008).

The synthesis will enable an assessment of the Project's effects on channel morphology and substrate as well as the direct impacts on gravels used for spawning by anadromous fish and resident salmonids. This information can further be used to develop PM&E measures related to augment gravel, adjust instream flow regimes, and thereby improve salmonid spawning habitat affected by the Project. The need for this assessment results from the entrapment of likely 100% of the North Yuba sediment load at New Bullards Bar Reservoir and a substantial, but unknown percentage of the coarse sediment load for the Middle Yuba and Oregon Creek at Our House and Log Cabin diversion dams. In addition sediment transport capacity is affected due to changes to the hydrologic regime caused by the large storage created at New Bullards Bar Dam and flow diversions at Our House and Log Cabin diversion dams. These Project facilities and their operations have unknown effects on the volume and size distribution of alluvial sediment stored in the channel in Project affected reaches; these effects in turn are factors that strongly influence biologically-relevant conditions and ecological functions, including salmonid spawning habitat, BMI production and associated food supplies, and riparian conditions that provide shading and cover for salmonids, and food for BMI prey. This study will quantify the geomorphic processes influencing channel morphology and associated alluvial sediment available to maintain a properly functioning aquatic and riparian ecosystem, and these results will further be integrated into their effects on anadromous salmon in NMFS Proposed Study #8, *Anadromous Fish Ecosystem Effects Analysis: Synthesis of the Direct, Indirect, and Cumulative Effects of the Project and Related Activities on Anadromous Fish Resources*.

This request is formatted in accordance with:

Title 18 of the Federal regulations *Conservation of Power and Water Resources*;
Part 5 *Integrated License Application Process*; Section 5.9 *Comments and information or study requests*.

18 CFR § 5.9 (a): *Comments and study requests*. Comments on the pre-application document and the Commission staff's Scoping Document 1 must be filed with the Commission within 60 days following the Commission's notice of consultation procedures issued pursuant to §5.8. Comments, including those by Commission staff, must be accompanied by any information gathering and study requests, and should include information and studies needed for consultation under section 7 of the Endangered Species Act and water quality certification under Section 401 of the Clean Water Act. (Emphasis added for relevance to highlight NMFS' ESA concerns)

18 CFR § 5.9 (b): *Content of study request*. Any information or study request must:

- (1) Describe the goals and objectives of each study proposal and the information to be obtained;
 - (2) If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied;
 - (3) If the requester is not a resource agency, explain any relevant public interest considerations in regard to the proposed study;
 - (4) Describe existing information concerning the subject of the study proposal, and the need for additional information;
 - (5) Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study results would inform the development of license requirements;
 - (6) 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 relevant tribal values and knowledge; and
 - (7) Describe considerations of level of effort and cost, as applicable, and why any proposed alternative studies would not be sufficient to meet the stated information needs.
- (c) *Applicant seeking PURPA benefits; estimate of fees*. If a potential applicant has stated that it intends to seek PURPA benefits, comments on the pre-application document by a fish and wildlife agency must provide the potential applicant with a reasonable estimate of the total costs the agency anticipates it will incur in order to set mandatory terms and conditions for the proposed project. An agency may provide a potential applicant with an updated estimate as it deems necessary. If any agency believes that its most recent estimate will be exceeded by more

than 25 percent, it must supply the potential applicant with a new estimate and submit a copy to the Commission.

§ 5.9 (a): The Information Gathering or Study Should Inform Consultation Under Section 7 of the Endangered Species Act

Comments, including those by Commission staff, must be accompanied by any information gathering and study requests, and should include information and studies needed for consultation under section 7 of the Endangered Species Act

The information or study resulting from this Request would inform future ESA consultation between NMFS and the Commission because the Project's effects on the resource(s) to be studied in this request affect ESA-listed salmonids or sturgeon, and/or their ESA-designated critical habitats, both in the Yuba River and in locations downstream.

NMFS has identified the following ESA-protected anadromous fishes and habitats (ESA resources) in the Yuba River that could be affected by the Project:

- 1) Central Valley (CV) spring-run Chinook salmon Evolutionarily Significant Unit (ESU) (*Oncorhynchus tshawytscha*), threatened (June 28, 2005, 70 FR 37160);
- 2) CV spring-run Chinook salmon designated critical habitat (September 2, 2005, 70 FR 52488);
- 3) CV steelhead Distinct Population Segment (DPS) (*O. mykiss*), threatened (January 5, 2006, 71 FR 834);
- 4) CV steelhead designated critical habitat (September 2, 2005, 70 FR 52488);
- 5) Southern DPS of North American green sturgeon (*Acipenser medirostris*), threatened (April 7, 2006, 71 FR 17757);
- 6) Southern DPS of North American green sturgeon designated critical habitat (October 9, 2009, 74 FR 52300);

ESA resources that occur downstream in the Feather River, Sacramento River, Sacramento-San Joaquin Delta, and San Francisco Bay may also be affected by the Project.

NMFS also identified the presence of an anadromous resource in the lower Yuba that is not listed under the ESA, but is a Federal Species of Concern (those species about which NMFS has concerns regarding status and threats, but for which insufficient information is available to indicate a need to list the species under the ESA):

- CV fall/late fall-run Chinook salmon ESU, Species of Concern (April 15, 2004, 69 FR 19975; October 17, 2006, 71 FR 61022).

This Federal Species of Concern also occurs downstream in the Feather River, Sacramento River, Sacramento-San Joaquin Delta, and San Francisco Bay, and may also be affected by the Project. While the fall/late-fall run Chinook ESU has no formal protection under the ESA, discussions with NMFS regarding effects to this species usually occurs during ESA consultation.

NMFS notes the facilities requested for review are not all considered part of the “Project” facilities by the Commission. However, for consultation under section 7 of the Endangered Species Act, the action, action area, and the effects of an action are defined more broadly. NMFS refers the Commission and Applicant to the following definitions from the Code of Federal Regulations (CFR), and to Enclosure B of this filing:

50 CFR § 402.02 Definitions.

Action means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies in the United States or upon the high seas. Examples include, but are not limited to:

- (a) actions intended to conserve listed species or their habitat;
- (b) the promulgation of regulations;
- (c) the granting of licenses, contracts, leases, easements, rights-of-way, permits, or grants-in-aid;
- or
- (d) actions directly or indirectly causing modifications to the land, water, or air.

Action area means all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action.

Effects of the action refers to the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action, that will be added to the environmental baseline. The environmental baseline includes the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation in process. Indirect effects are those that are caused by the proposed action and are later in time, but still are reasonably certain to occur. Interrelated actions are those that are part of a larger action and depend on the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration. (Emphasis added to highlight that evaluation of the effects of an action in the ESA sense is broader than evaluation of the action alone).

§ 5.9 (b): 1.0 Goals and Objectives of Request

Describe the goals and objectives of each study proposal and the information to be obtained;

The purpose of this study is to evaluate the effects of the Yuba River Development on fluvial processes and channel morphology, which includes the amount and size of coarse substrate material that life stages of anadromous and resident fishes use and rely upon in freshwaters. A river’s character and morphologic function are strongly influenced by the amount and timing of sediment and water provided to them, and any change to this continuum provokes a change in

the river and its associated physical and biological processes it supports (Reid and Dunne 2003). Dams can affect channel morphology by trapping sediment, altering the frequency, timing and magnitude of peak flows, and by intercepting large woody debris (LWD) (Grant et al. 2003). New Bullards Bar, Log Cabin, and Our House Diversion dams all interrupt the downstream continuum of sediment supply and transport.

This study has two primary goals: (1) to assess the potential geomorphic effect of reducing coarse sediment supply to, and altering coarse sediment transport capacity within, Oregon Creek, the Middle Yuba, the North Yuba, and the Yuba rivers downstream of Log Cabin, Our House, and New Bullards Bar dams (hereafter referred to as the Project affected reaches); and (2) to provide information required to assess the potential ecological impacts of any geomorphic changes in the Yuba River resulting from Project facilities or operations.

These goals will primarily be achieved by compiling a sediment budget beginning at the upstream end of the Project reservoirs and continuing through the Project affected reaches (e.g., downstream of the dams) to the Yuba River's confluence with the Feather River. A sediment budget describes the input, transport, storage, and export of sediment from a geomorphic system (Reid and Dunne 1996 and 2003). A sediment budget for both current conditions and unimpaired conditions will be developed in order to compare and quantify Project effects. The specific objectives of the sediment budget and this study include:

1. Characterize coarse sediment supply rates upstream and downstream of New Bullards Bar, Our House, Log Cabin, and Englebright dams, at tributary and river confluences (e.g., Oregon Creek with the Middle Yuba, Middle Yuba and North Yuba, South Yuba and mainstem Yuba River), and at Colgate Powerhouse.
2. Classify transport and response reaches within the Project affected reaches.
3. Characterize channel morphology, fluvial processes, substrate particle size, and coarse sediment transport at selected study sites (where possible in response reaches) in the Project affected reaches.
4. Evaluate the mass balance between coarse sediment supply and transport at study sites and other significant locations within the Project affected reaches to assess current and unimpaired conditions.
5. Determine coarse sediment storage within the Project affected reaches, including anadromous and resident fish spawning gravel.
6. Complete a current conditions and unimpaired sediment budget using data from objectives 1 through 6 above that will include evaluations of coarse sediment deficits and how they relate to in-channel sediment storage.
7. Synthesize results developed in this study with results from the following submitted study requests: *Effects of the Project on Hydrology for Anadromous Fish: Magnitude, Timing, Duration, and Rate of Change* and *Effects of the Project on LWD and Riparian Habitat for Anadromous Fish: Cover, Rearing, and Migration Habitats* in order to evaluate the geomorphic and associated ecological effects of trapping sediment and LWD and altering the hydrologic and associated sediment and LWD transport regimes due to Project operations and maintenance.

§ 5.9 (b): 2.0 Resource Management Goals of NMFS

If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied;

NMFS' Resource Management Goal and Objectives, provided in full as Enclosure G, apply with respect to species listed under the and Magnuson-Stevens Fishery Conservation and Management Act (MSA) (16 U.S.C. §1801 *et seq.*) and the Endangered Species Act (ESA) (16 U.S.C. §1531 *et seq.*), as well as anadromous species that are not currently listed but are affected by continuing operations of the Project or may require listing in the future. Thus, our requests for information or study are linked with NMFS' Resource Management Goals and Objectives. If NMFS' requests are included in the Applicant's Study Plan and approved in the Commission's Study Plan Determination, then successfully implemented, the results would inform:

- (A) Whether and how NMFS may exercise its FPA Section 18 authority, to either prescribe fishways at the Project or to reserve its prescriptive authority;
- (B) NMFS' decisions regarding its future FPA Section 10(j) and 10(a) proposals for protection, mitigation, and enhancement measures;
- (C) NMFS' decisions regarding its future recommended measures to improve EFH for Chinook salmon in the upper and lower Yuba, as well as areas downstream to the Bay/Delta;
- (D) The ESA Section 7 consultations (informal and formal) regarding effects on threatened species and designated critical habitats in the Yuba River, as well as areas downstream to the Bay/Delta;

The fulfillment of NMFS' request is consistent with the following NMFS' Resource Goals and Objectives for anadromous fishes and habitats in the Yuba River (Enclosure G):

Resource Goals:

3.1 - Protect, conserve, enhance, and recover native anadromous fishes and their habitats by providing access to suitable habitats and by restoring fully functioning habitat conditions for related rearing and feeding (see 4.1-4.4), migration (see 4.5), spawning (See 4.6), and adjoining riparian and aquatic benthic macroinvertebrate (BMI) habitats (see 4.7).

3.2 - Identify and implement measures to protect, mitigate or minimize direct, indirect, and cumulative impacts to, and enhance native anadromous fish resources, including related rearing and feeding (see 4.1-4.4), migration (see 4.5), spawning (See 4.6), riparian and BMI habitats (see 4.7), protection from adverse Fish Hatchery operations (see 4.8) and predation (see 4.9), and ensure coordination within and outside of the Project (see 4.10) to minimize risk to anadromous fishes.

Resource Objectives:

4.1-Flows; 4.2-Flow Ramping; 4.3-Water Quality; 4.4-Water Availability; 4.5-Fish Passage; 4.6-Channel Maintenance; 4.7-Riparian/LWD Habitat; 4.8-Hatchery Operations; 4.9-Predation; and 4.10-Coordination.

§ 5.9 (b): 3.0 Relevant Public Interest Considerations

If the requester is not a resource agency, explain any relevant public interest considerations in regard to the proposed study;

This content requirement is not applicable, as NMFS is a resource agency.

§ 5.9 (b): 4.0 Existing Information and Need for Additional Information

Describe existing information concerning the subject of the study proposal, and the need for additional information;

- Upper Yuba River Studies Program (UYRSP). NMFS found existing information relevant to the geomorphology of the upper Yuba river in the *Upper Yuba River Watershed Chinook Salmon and Steelhead Habitat Assessment (Report) (CDWR 2007)*, prepared for the California Department of Water Resources. Approximately 415 potential Chinook salmon and steelhead spawning sites were identified in the upper Yuba, most located in the South Yuba and Middle Yuba rivers. On the Middle Yuba River, most of the potential spawning sites are located upstream of Our House Dam and downstream of Oregon Creek; few sites exist upstream of Tehama Ravine. No potential spawning sites were identified in the North Yuba River below New Bullards Bar Dam, to its confluence with the Middle Yuba. Only 13 potential spawning sites were identified in the upper Yuba River, all of which are located downstream of the confluence with the Middle Yuba. Most of the sites in the Yuba River below the mouth of the Middle Yuba contained relatively large gravel (d50 = 45 to 60 mm [1.8 to 2.4 inches]) and would potentially be used by only a few Chinook salmon and steelhead.
- Tahoe National Forest (TNF) has compiled a geomorphic data layer primarily differentiating colluvial hillslopes and eroding hillslopes (USFS 2010), which includes a significant portion of the Project Area, particularly in the Middle Yuba and Oregon Creek.
- Sediment management and volumes removed from Our House Diversion Dam (PAD, Section 7.1.8.2.2. Geology and Soils)
- Reservoir sedimentation rates at Englebright Reservoir (Childs et al. 2003 and Snyder et al. 2004a), Bullards Bar Reservoir (pre-New Bullards Bar Reservoir, Minear and Kondolf 2009, Dendy and Champion 1978), and nearby reservoirs for the South Feather River (SFWPA 2007)
- Hydrologic information, modeling and statistics for Project-affected reaches (PAD, Section 7.2 Water Resources and Appendix F - Hydrology)
- Low altitude aerial video of all Project-affected reaches and facilities (PAD, Appendix E - Project Helicopter Video)
- Habitat Mapping Report of the Yuba River Development Project completed by the Licensee in 2009 (Attachment 3.10A to Licensee's Instream Flow Study Proposal, Study 3.10)

Downstream of Englebright Dam substantial existing information exists pertaining to geomorphic processes and additional information is scheduled to be collected by the River Management Team (RMT) by mid-2012 (Pasternack 2010). The existing information downstream of Englebright Dam is summarized by Pasternack (2010). No additional field data

is requested in this study proposal downstream of Englebright Dam; however, further analysis, including continuation of the sediment budget from Englebright Dam to the Feather River confluence, of the data below Englebright Dam is requested.

To achieve the study goals, additional information is needed, which includes:

- Reservoir bathymetry of New Bullards Bar Reservoir in order to calculate sedimentation rates
- Calculation of average annual sediment yields for New Bullards Bar, Our House, and Log Cabin reservoirs
- Field measurement of cross-sections profiles and longitudinal profiles of water surface and bed elevations, at detailed study sites upstream of Englebright Reservoir
- Stage-discharge relationships, based on field measurement of calibration flows, to use in a sediment transport model for sediment transport capacity estimates and, in conjunction with flow frequency analysis, frequency of floodplain inundation
- Field measurement of grain size distribution of surface and subsurface material, at detailed study sites upstream of Englebright Reservoir
- Quantification of in-channel sediment storage through field measurement of Project affected reaches upstream of Englebright Reservoir as well as reaches upstream of Project reservoirs (as reference reaches)
- Modeling of annual sediment transport **capacity** for current and unimpaired conditions
- Development of a sediment budget for current and unimpaired conditions for Project affected reaches that compares the mass balance of sediment supply and transport capacity on an average annual basis

§ 5.9 (b): 5.0 Nexus Between Project Operations and Effects on the Resource Studied, and How the Study Results Would Inform Development of License Conditions

Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study results would inform the development of license requirements;

A river's character and morphologic function are strongly influenced by the amount and timing of sediment and water provided to it, and any change to this continuum provokes a change in the river and its associated physical and biological processes it supports (Reid and Dunne 2003). New Bullards Bar Dam/Reservoir traps all coarse sediment supplied by the upstream watershed and reduces peak flows due to its large storage capacity and creates a "bypass reach" between the dam and Colgate Powerhouse. Our House Diversion Dam on the Middle Yuba and Log Cabin Diversion Dam on Oregon Creek divert flow and trap a significant portion of the upstream coarse sediment. Operation and maintenance of the Project therefore alters the frequency, magnitude, and duration of flow events that mobilize coarse sediment deposits, and impose a coarse sediment deficit in several reaches of the Yuba watershed upstream of Englebright Dam. Downstream of Englebright Dam, the Project has the potential to affect channel morphology due to changes in the hydrologic regime caused by operation of the Project's large storage reservoir.

These Project effects may have initiated and/or lead to future downstream changes in channel morphology (e.g., channel incision, reduced coarse sediment storage, and bed surface coarsening) with associated ecological effects on aquatic and riparian habitat. In particular for anadromous and resident fisheries, the potential loss of coarse sediment storage and bed surface coarsening can lead to reduced spawning habitat availability and suitability, and decreased food availability due to impaired benthic macroinvertebrate (BMI) production or loss of prey diversity. Thus, this study seeks to evaluate the Project's effects to channel morphology by quantifying the coarse sediment supply and transport regimes.

The Yuba River anadromous resources to be studied in this Request, all under the jurisdiction of NMFS, include:

- 1) Central Valley (CV) spring-run Chinook salmon Evolutionarily Significant Unit (ESU) (*Oncorhynchus tshawytscha*), threatened (June 28, 2005, 70 FR 37160);
- 2) CV spring-run Chinook salmon designated critical habitat (September 2, 2005, 70 FR 52488);
- 3) CV steelhead Distinct Population Segment (DPS) (*O. mykiss*), threatened (January 5, 2006, 71 FR 834);
- 4) CV steelhead designated critical habitat (September 2, 2005, 70 FR 52488);
- 5) Southern DPS of North American green sturgeon (*Acipenser medirostris*), threatened (April 7, 2006, 71 FR 17757);
- 6) Southern DPS of North American green sturgeon designated critical habitat (October 9, 2009, 74 FR 52300);
- 7) CV fall/late-fall run Chinook salmon ESU, Species of Concern (April 15, 2004, 69 FR 19975);
- 8) CV spring-run and CV fall/late fall-run Chinook salmon identified "essential fish habitat" (EFH), (October 15, 2008 73 FR 60987);
- 9) CV fall/late fall-run Chinook salmon ESU, Species of Concern (April 15, 2004, 69 FR 19975).

§ 5.9 (b): 6.0 Consistency with Generally Accepted Practice

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 relevant tribal values and knowledge;

This study is consistent with the goals, objectives, and methods outlined for recent FERC hydroelectric relicensing studies in California (e.g. McCloud-Pit Project FERC No. 2106 and

South Feather Power Project FERC No. 2088 where a sediment budget framework was used to assess Project effects to geomorphic processes by analyzing the mass balance between sediment supply and transport), and uses well recognized scientific methodologies (e.g., Wilcock et al. 2009, Reid and Dunne 2003, Kondolf et al. 2003, Grant et al. 2003, Harrelson et al. 1994) and protocols from the National Marine Fisheries Service, U.S. Fish and Wildlife Service, and California Department of Fish and Game.

NMFS is presenting an Information Request and not necessarily specific study methodology (preferred data collection and analysis techniques, or objectively quantified information). This is because the Applicant's responsibility under the FPA is to either provide the requested information or to develop a more detailed Study Plan to obtain such information. It is anticipated that through the reiterative study development process within the ILP that the Applicant and the Commission will work with ILP participants to develop a study that obtains the requested information, or that adequate information, approved by the Commission, is provided by the Applicant.

§ 5.9 (b): 7.0 Considerations of Level of Effort and Cost

Describe considerations of level of effort and cost, as applicable, and why any proposed alternative studies would not be sufficient to meet the stated information needs.

In this request, NMFS is not aware that the Applicant is seeking PURPA benefits. NMFS considers that the cost of these studies will total approximately \$125,000 to \$225,000. The Project is considered vast and complex. Considering the number of dams, the amount of water diverted, the potential for environmental disturbance, the status of several species listed under the ESA, and the recent closure of Chinook fisheries on the West Coast of the United States, the level of effort and cost for the Licensees is commensurate with the magnitude and impacts of the Project, and the revenues derived from sales of generated energy.

8.0 References

- Brown, C. B. 1943. Discussion of sedimentation in reservoirs. Proceedings of the American Society of Civil Engineers 69: 1493-1500.
- Buffington, J. M., and D. R. Montgomery. 1999. A procedure for classifying textural facies in gravel-bed rivers. Water Resources Research 35: 1903-1914.
- Brune, G. M. 1953. Trap efficiency of reservoirs. Transactions of the American Geophysical Union 34: 407-418
- Childs, J. R., N. P. Snyder, and M. A. Hampton. 2003. Bathymetric and geophysical surveys of Englebright Lake, Yuba-Nevada Counties, California. Open-File Report 03-383. U. S. Geological Survey, Santa Cruz, California.
- Churchill, M. A. 1948. Discussion of Analyses and use of reservoir sedimentation data, by L. C. Gottschalk. In Proceedings of the federal interagency sedimentation conference, Denver; Colorado. Washington D. C.: US Geological Survey, 139-40.

- Curtis, J.A., L.E. Flint, C.N. Alpers, and S.M. Yarnell. 2005. Conceptual model of sediment processes in the upper Yuba River watershed, Sierra Nevada, California. *Geomorphology* 68:149–166.
- Dendy, F. E., and W. A. Champion. 1978. Sediment deposition in U.S. reservoirs: Summary of data reported through 1975, Misc. Publ. 1362, 68 pp., U.S. Dep. of Agric., Washington, D. C.
- Grant, G. E., J. C. Schmidt, and S. L. Lewis. 2003. A geological framework for interpreting downstream effects of dams on rivers. Pages 209-225 in J. E. O'Connor and G. E. Grant, editors. *A peculiar river: geology, geomorphology, and hydrology of the Deschutes River, Oregon*. Water Science and Application Series No. 7. American Geophysical Union, Washington, D. C.
- Harrelson, C., C.L. Rawlins, And J.P. Potyondy. 1994. Stream channel reference sites: An illustrated guide to field technique. United States Department of Agriculture. Forest Service General Technical Report RM-245.
- Heinemann, H. G. .1981. A new sediment trap efficiency curve for small reservoirs, *Water Resources Bulletin*, 17, 825– 830.
- Hilton, S., and T. E. Lisle. 1993. Measuring the fraction of pool volume filled with fine sediment. Research Note PSW-RN-414. USDA Forest Service, Pacific Southwest Research Station, Berkeley, California.
- Kelsey, H.M., R. Lamberson, and M.A. Madej. 1987. Stochastic model for the long-term transport of stored sediment in a river channel. *Water Resource Research* 23:1,738–1,750.
- Kondolf, GM, Lisle TE, Wolman, GM. 2003. *Bed Sediment Measurement in: Tools in fluvial geomorphology*. Edited by: GM Kondolf and H Piegay, Wiley, Chichester
- Minear, J. T., and G. M. Kondolf (2009), Estimating reservoir sedimentation rates at large spatial and temporal scales: A case study of California, *Water Resour. Res.*, 45, W12502, doi:10.1029/2007WR006703.
- Montgomery, D. R., and J. M. Buffington. 1997. Channel-reach morphology in mountain drainage basins. *Geological Society of America Bulletin* 109: 596-611.
- Montgomery, D. R., and J. M. Buffington. 1998. Channel processes, classification, and response. Pages 13-42 in R. J. Naiman and R. E. Bilby, editors. *River ecology and management*. Springer-Verlag, New York.
- Morris, G. L., and J. Fan. 1998. *Reservoir sedimentation handbook: design and management of dams, reservoirs, and watersheds for sustainable use*. McGraw-Hill, New York.
- Parker, G. 1990a. Surface-based bedload transport relation for gravel rivers. *Journal of Hydraulic Research* 28: 417-436.
- Parker, G. 1990b. The Acronym Series of PASCAL program for computing bedload transport in gravel rivers. External Memorandum M-220. St. Anthony Falls Laboratory, University of Minnesota.

- Parker, G.; Klingeman, P. C.; McLean, D. G. 1982. Bedload and size distribution in paved gravel bed streams. *Journal of Hydraulic Engineering*. 108(4): 544-571.
- Pasternack, G. 2010. Existing Information Summary: Attachment 1 to Channel Morphology Study Downstream of Englebright Dam Study Proposal. Prepared for: Yuba County Water Agency. Yuba River Development Project. FERC Project No. 2246.
- Reid, L. M.; Dunne, T. 2003. Sediment budgets as an organizing framework in fluvial geomorphology. Ch. 16. In: Kondolf, G. M.; Piegay, H. (eds.). *Tools in fluvial geomorphology*. John Wiley & Sons.
- Reid, L. M.; Dunne, T. 1996. Rapid evaluation of sediment budgets. Catena Verlag. Reiskirchen, Germany. 164 p.
- Schmidt, J. C., and P. R. Wilcock (2008), Metrics for assessing the downstream effects of dams, *Water Resources Research*, 44, W04404, doi:10.1029/2006WR005092.
- South Feather Water and Power Agency (SFWPA). 2007. Application for a new license. Exhibit E. Geological Resources Chapter E11. South Feather Power Project. FERC Project No. 2088. March 2007.
- Snyder, N. P., D. M. Rubin, C. N. Alpers, J. R. Childs, J. A. Curtis, L. E. Flint, and S. A. Wright. 2004a. Estimating accumulation rates and physical properties of sediment behind a dam: Englebright Lake, Yuba River, northern California. *Water Resources Research* 40: doi 10.1029/2004WR003279.
- Snyder, N. P., J. R. Allen, C. Dare, M. A. Hampton, G. Schneider, R. J. Wooley, C. N. Alpers, and M. C. Marvin-DiPasquale. 2004b. Sediment grain-size and loss-on-ignition analyses from 2002 Englebright Lake coring and sampling campaigns, U.S. Geol. Surv. Open File Rep., 2004-1080, 46 pp.
- Snyder, N. P., S. A. Wright, C. N. Alpers, L. E. Flint, C. W. Holmes, and D. M. Rubin. 2006. Reconstructing depositional processes and history from reservoir stratigraphy: Englebright Lake, Yuba River, northern California, *J. Geophys. Res.*, 111, F04003, doi:10.1029/2005JF000451.
- United States Department of Agriculture, Forest Service (USFS). 2010. Tahoe National Forest Geomorphology. Adaptive Management Services En, USFS, Unpublished Material.
- United States Geological Survey (USGS). 1982. Guidelines for Determining Flood Flow Frequency. Bulletin #17B of the Hydrology Subcommittee, Interagency Advisory Committee on Water Data. Office of Water Data Coordination. Reston, VA. Revised 1981, 1982.
- Wilcock, P. R.; Crowe, J. C. 2003. Surface-based transport model for mixed-size sediment. *Journal of Hydraulic Engineering*. 129(2): 120-128.
- Wilcock, P.R.; Pitlick, J.; Cui, Y. 2009. Sediment transport primer, BAGS Model: estimating bed-material transport in gravel-bed rivers. Gen. Tech. Rep. RMRS-GTR-226. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 78 p.
- Wolman, G. M. 1954. A method of sampling coarse river-bed material. *Transactions of the American Geophysical Union* 35: 951-956.

Federal Register Notices

Federal Register Notice, 63 Fed. Reg. 13347, March 19, 1998. Endangered and Threatened Species: Threatened Status for Two Evolutionarily Significant Units of Steelhead in Washington, Oregon, and California. Final Rule.

Federal Register Notice, 64 Fed. Reg. 50394, September 16, 1999. Endangered and Threatened Species: Threatened Status for Two Chinook Salmon Evolutionarily Significant Units in California. Final Rule.

Federal Register Notice, 69 Fed. Reg. 19975, April 15, 2004. Endangered and Threatened Species; Establishment of Species of Concern List, Addition of Species to Species of Concern List, Description of Factors for Identifying Species of Concern, and Revision of Candidate Species List Under the Endangered Species Act. Final Rule.

Federal Register Notice, 70 Fed. Reg. 37160, June 28, 2005. Endangered and Threatened Species: Final Listing Determinations for 16 Evolutionarily Significant Units (ESUs) of West Coast Salmon, and Final 4(d) Protective Regulations for Threatened Salmonid ESUs. Final Rule.

Federal Register Notice, 70 Fed. Reg. 52488, September 2, 2005. Endangered and Threatened Species: Designation of Critical Habitat for Seven Evolutionarily Significant Units of Pacific Salmon and Steelhead in California. Final Rule.

Federal Register Notice, 71 Fed. Reg. 834, January 5, 2006. Endangered and Threatened Species: Final Listing Determinations for 10 Distinct Population Segments of West Coast Steelhead. Final Rule.

Federal Register Notice, 71 Fed. Reg. 17757, April 7, 2006. Endangered and Threatened Wildlife and Plants: Threatened Status for Southern Distinct Population Segment of North American Green Sturgeon. Final Rule.

Federal Register Notice, 71 Fed. Reg. 61022, October 17, 2006. Endangered and Threatened Species: Revision of Species of Concern List, Candidate Species Definition, and Candidate Species List.

Federal Register Notice, 73 FR 60987, October 15, 2008. Fisheries Off West Coast States; West Coast Salmon Fisheries; Amendment 14; Essential Fish Habitat Descriptions for Pacific Salmon. Final Rule.

Federal Register Notice, 74, FR 52300, October 9, 2009. Endangered and Threatened Wildlife and Plants: Final Rulemaking to Designate Critical Habitat for the Threatened Southern Distinct Population Segment of North American Green Sturgeon. Final Rule.

Federal Register Notice, 75 Fed. Reg. 30714, June 2, 2010. Endangered and Threatened Wildlife and Plants: Final Rulemaking To Establish Take Prohibitions for the Threatened Southern Distinct Population Segment of North American Green Sturgeon. Final Rule. June 2, 2010.

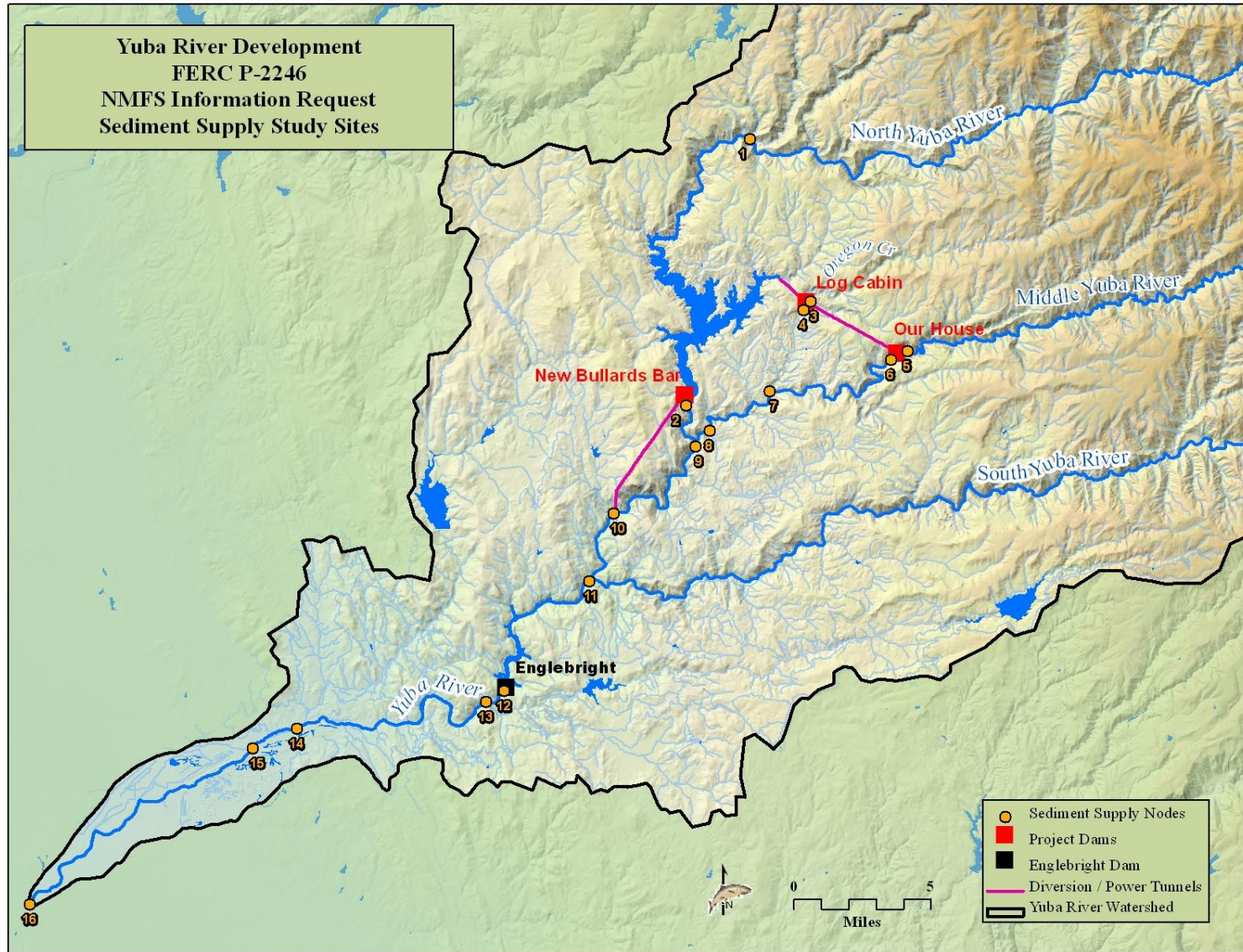


Figure 1: Location of sediment supply nodes for the proposed sediment budget for the Yuba River Development Project.

NMFS Request #5
Request for Information or Study
Effects of the Project and Related Activities on Large Wood
and Riparian Habitat for Anadromous Fish
March 7, 2011

The National Oceanic and Atmospheric Administration's, National Marine Fisheries Service (NMFS) hereby files this request for additional information and study with the Federal Energy Regulatory Commission (Commission or FERC) for Yuba County Water Agency's (Applicant) Yuba River Hydroelectric Project (Project), FERC Project No. 2246, Yuba River, California.

Large woody debris (LWD) plays an important role in streams by shaping channel morphology, storing sediment and organic matter, and providing habitat for all life-stages of anadromous fish. The three Project dams (New Bullards Bar, Our House Diversion, and Log Cabin Diversion) along with Englebright Dam trap LWD, which is periodically removed from the reservoirs by the Applicant and not returned to the river ecosystem. These actions have reduced LWD supplied to reaches downstream of Project dams, which could have negative effects on downstream habitat for anadromous fish. The magnitude of Project effects on LWD is a function of the amount of LWD trapped in project reservoirs, the potential mobility of that wood, and the distribution of potential depositional zones downstream. Information regarding the historical LWD budget along with the LWD volumes removed by the Applicant will help inform potential protection, mitigation and enhancement measures.

Request Element #1: LWD Removal from Project Works

Quantitative and anecdotal information on LWD removal from Project reservoirs and diversions including New Bullards Bar and Englebright reservoirs, and Our House and Log Cabin Dams, will be assembled. Information developed for the licensing of the South Feather Power Project (FERC No. 2088) which affects LWD supply on Slate Creek and the Yuba-Bear/Drum Spaulding project (FERC No. 2310, 2266) which affects LWD supply on the Middle Yuba shall be analyzed to determine their effect on LWD delivery to Project diversions and reservoirs. Potential impacts of other land use activities, such as timber harvest, salvage logging, road construction, and channel modification that can alter LWD loading should also be assessed. From this information, estimates of annual volumetric flux of wood volume entering project reservoirs and diversions will be calculated.

Request Element #2: LWD Survey

During the geomorphic field surveys conducted for NMFS information request #4 "Effects of Project on Coarse Substrates for Anadromous Fish", LWD greater than 1 meter long within the active channel will be recorded within four diameter classes: small (10-30 cm [4-12 inches]), medium (31-60 cm [12-24 inches]), large (61-90 cm [24-36 inches]), and very large (>90 cm [>36 inches]); and four length classes (1.0-7.3 m [3-25 ft.], 7.3-14.6 m [25-50 ft.], 14.6-21.9 m [50-75 ft.], and >21.9 m [75 ft.]). These size classes will enable like comparisons with other LWD studies in the Sierra Nevada such as Ruediger and Ward (1996) and Berg et al. (1998). Additional LWD field surveys should be conducted in areas identified as response reaches in the coarse level analysis outlined in NMFS Study #4, Effects of the Project and Related Facilities on

Coarse Substrate for Anadromous Fish: Sediment Supply, Transport and Storage, including reaches in the lower Yuba River below Narrows II Powerhouse. The length of additional sample reaches in response reaches should be at least 30 times the bankfull width.

More detailed measurements should be taken for key pieces, which are defined as pieces either longer than 1/2 times the bankfull width, or of sufficient size and/or are deposited in a manner that alters channel morphology and aquatic habitat (e.g., trapping sediment or altering flow patterns). Key piece characteristics to be recorded will include:

- a. piece location, either mapped onto aerial photos or documented with GPS
- b. piece length
- c. piece diameter
- d. piece orientation
- e. position relative to the channel
- f. whether the piece has a rootwad
- g. tree species or type (e.g., conifer or hardwood)
- h. whether the piece is associated with a jam or not
- i. the number of large pieces in the jam
- j. recruitment mechanism
- k. function in the channel

Control reaches without significant watershed development upstream of project facilities should be surveyed for LWD using the protocols above. The length of control reaches should be at least 30 times the bankfull width. Since wood input mechanisms can be strongly influenced by hill slope processes and LWD dynamics can be strongly influenced by channel morphology, the geology and geomorphology of the control reaches and Project reaches should be as similar as possible. As many control reaches must be selected in order to compare similar channel geometry and geology. Selection of control reaches will ultimately need to be made in collaborative fashion with ILP participants after coarse level stratification of potential reaches is made based on geology, geomorphology, drainage area, and channel slope derived from USGS 10-m DEM. Preliminary potential control reaches include Canyon Creek (tributary to the North Yuba upstream of New Bullards Bar reservoir, drainage area of 158 km²), Oregon Creek upstream of Log Cabin Dam, and the Middle Yuba upstream of Our House Dam. Although the Middle Yuba upstream of Our House Dam is impacted by dams further upstream in the watershed (e.g., Milton Dam), because these dams are more than 22 miles upstream their impact on LWD loading in potential control reaches just upstream of Our House Dam is likely minimal. Significant watershed development and infrastructure influences LWD recruitment in the North Yuba above New Bullards Bar reservoir. For example, Highway 49 parallels the majority of the North Yuba in close proximity to the channel and likely interrupts the hillslope delivery of LWD on one side of the channel for a significant portion of its length. Therefore these reaches do not represent “natural” LWD abundance and would not be viable control reaches. Control reaches outside of the Yuba basin can be chosen but must be representative of the climate, hydrology and geomorphology and geology of the study reaches and adequate justification provided.

Request Element #3: Evaluation of Project effects on LWD and LWD Budget

The objective of this task is to evaluate and summarize Project and other land-use effects on LWD dynamics in the Project area which extends from the upstream extent of project reservoirs to the Yuba River's confluence with the Feather River. This task will evaluate the effects of the Project and other land uses on LWD storage, recruitment, and transport in the lower and upper Yuba, North Yuba, Middle Yuba Rivers and Oregon Creek using information collected as part of the elements outlined above. In particular, the amount of wood trapped in Project reservoirs will be compared with current and historical loading levels in the study area. The size of wood, which affects its stability and influence on channel morphology and creation of aquatic habitat for salmonids, should be compared through time. The role of other land uses will also be assessed in terms of their effect on LWD loading and size.

Part of the evaluation of Project effects on LWD should include the development of a LWD budget that extends from the upstream extent of Project Reservoirs past Englebright Dam to the confluence with the Feather River. Conceptually, a wood budget uses a mass balance approach to analyze the input, output, depletion, and changes in storage of LWD in a channel network. A simplified mass balance relationship for LWD for a given channel segment is presented in Equation 1 (Martin and Benda 2001):

$$dS = (I_H dx - Ldx + (Q_I - Q_O) - D)dt \quad \text{(Equation 1)}$$

Where:

dS = the change in wood storage within a given reach length (dx) over time (dt)

I_H = the volume (V) of wood recruited from the hillslopes and channel margins per unit channel (x) length over time (V/x)

L = the loss of wood due to overbank deposition during high flow events, abandonment of jams, or burial per unit channel length over time (V/x)

Q_I and Q_O = the volumes of wood fluvially transported into and out of a reach, respectively, over time (V/t)

$(Q_I - Q_O)$ = the fluvial LWD flux

D = the volume lost from decay over time (V/t)

In order to quantify many of these parameters, values derived from peer reviewed publications will need to be used. Published values should be used in concert with field surveys and estimates of LWD trapped and removed at Project reservoirs should be used to complete the LWD budget. An additional element that will need to be quantified is the volume of LWD delivered to Project reservoirs from the hillslopes surrounding the impoundment. The LWD budget should be quantified for both current and unimpaired conditions. This will allow for a quantification of the Project impacts to LWD loading in Project affected reaches downstream of Project Dams.

Request Element #4: Riparian Habitat and Vegetation

Riparian zones are a critical component of the landscape that connect and sustain river and terrestrial ecosystems. Riparian trees stabilize stream banks, filter nutrients and pollutants, provide shade that cools nearby air and waters, contribute nutritious organic matter and large

woody debris to the aquatic ecosystem, and their root masses can provide velocity and predator refugia for anadromous fishes. The Project's alteration of the hydrologic regime has the potential to affect riparian vegetation composition and distribution by decreasing seedling dispersal and recruitment flows and processes. The loss of in-channel sediment storage downstream of Project Dams due to sediment entrapment at Project Reservoirs may also reduce the surfaces available for riparian vegetation establishment. In addition, the frequency of riparian vegetation resetting processes (e.g., when a surface becomes scoured and then recolonized) may also be affected by Project operations that may reduce the frequency of vegetation and sediment scouring events. Due to the Project's potential to impact riparian processes and the vital contribution the riparian ecosystem provides several anadromous fishes' life stages, NMFS requests information pertaining to the following components of the riparian ecosystem:

1. Assess the current composition and distribution of riparian vegetation within all Project affected reaches.
2. Assess the composition and distribution of riparian vegetation within control upstream of Project influences (see LWD Survey Element above for potential control reaches). Compare results of control reaches with Project affected reaches.
3. Quantify the amount and type of riparian habitat lost under Project Reservoirs, including: New Bullards Bar, Our House, and Log Cabin reservoirs. The most appropriate method will likely be extrapolating riparian composition, distributions, and frequency from control reaches with similar geomorphic characteristics as the channels now under the reservoirs along the length of the now submerged channels.
4. Using cross-sections, stage-discharge, and hydraulic models developed as part NMFS Study Request #2 or #4, quantify the frequency of overbank flows that can facilitate riparian seedling establishment under current and unimpaired conditions. This should be calculated for all Project affected and control study sites where the necessary hydraulic input parameters are collected as part of other studies (see NMFS Study Request #2 or #4 for additional detail on study sites where such parameters should be collected).
5. Assess whether riparian vegetation encroachment has occurred in any of the reaches that have altered hydrology due to Project operations. In particular the following reaches need to be assessed: Oregon Creek from Log Cabin Diversion Dam downstream to the Middle Yuba confluence; and the North Yuba from New Bullards Bar Dam to the Middle Yuba confluence.
6. Using the in-channel sediment storage results from NMFS Study Request #4, 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 and transport capacity balance downstream of Project Dams. For example, the loss of coarse sediment supply may decrease the frequency and extent of point-bar surfaces that allow for various successional stages of riparian vegetation to establish.

This request is formatted in accordance with:

Title 18 of the Federal regulations *Conservation of Power and Water Resources*;
Part 5 *Integrated License Application Process*; Section 5.9 *Comments and information or study requests*.

18 CFR § 5.9 (a): *Comments and study requests*. Comments on the pre-application document and the Commission staff's Scoping Document 1 must be filed with the Commission within 60 days following the Commission's notice of consultation procedures issued pursuant to §5.8. Comments, including those by Commission staff, must be accompanied by any information gathering and study requests, and should include information and studies needed for consultation under section 7 of the Endangered Species Act and water quality certification under Section 401 of the Clean Water Act. (Emphasis added for relevance to highlight NMFS' ESA concerns)

18 CFR § 5.9 (b): *Content of study request*. Any information or study request must:

- (1) Describe the goals and objectives of each study proposal and the information to be obtained;
 - (2) If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied;
 - (3) If the requester is not a resource agency, explain any relevant public interest considerations in regard to the proposed study;
 - (4) Describe existing information concerning the subject of the study proposal, and the need for additional information;
 - (5) Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study results would inform the development of license requirements;
 - (6) 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 relevant tribal values and knowledge; and
 - (7) Describe considerations of level of effort and cost, as applicable, and why any proposed alternative studies would not be sufficient to meet the stated information needs.
- (c) *Applicant seeking PURPA benefits; estimate of fees*. If a potential applicant has stated that it intends to seek PURPA benefits, comments on the pre-application document by a fish and wildlife agency must provide the potential applicant with a reasonable estimate of the total costs the agency anticipates it will incur in order to set mandatory terms and conditions for the proposed project. An agency may provide a potential applicant with an updated estimate as it deems necessary. If any agency believes that its most recent estimate will be exceeded by more

than 25 percent, it must supply the potential applicant with a new estimate and submit a copy to the Commission.

§ 5.9 (a): The Information Gathering or Study Should Inform Consultation Under Section 7 of the Endangered Species Act

Comments, including those by Commission staff, must be accompanied by any information gathering and study requests, and should include information and studies needed for consultation under section 7 of the Endangered Species Act

The information or study resulting from this Request would inform future ESA consultation between NMFS and the Commission because the Project's effects on the resource(s) to be studied in this request affect ESA-listed salmonids or sturgeon, and/or their ESA-designated critical habitats, both in the Yuba River and in locations downstream.

NMFS has identified the following ESA-protected anadromous fishes and habitats (ESA resources) in the Yuba River that could be affected by the Project:

- 1) Central Valley (CV) spring-run Chinook salmon Evolutionarily Significant Unit (ESU) (*Oncorhynchus tshawytscha*), threatened (June 28, 2005, 70 FR 37160);
- 2) CV spring-run Chinook salmon designated critical habitat (September 2, 2005, 70 FR 52488);
- 3) CV steelhead Distinct Population Segment (DPS) (*O. mykiss*), threatened (January 5, 2006, 71 FR 834);
- 4) CV steelhead designated critical habitat (September 2, 2005, 70 FR 52488);
- 5) Southern DPS of North American green sturgeon (*Acipenser medirostris*), threatened (April 7, 2006, 71 FR 17757);
- 6) Southern DPS of North American green sturgeon designated critical habitat (October 9, 2009, 74 FR 52300);

ESA resources that occur downstream in the Feather River, Sacramento River, Sacramento-San Joaquin Delta, and San Francisco Bay may also be affected by the Project.

NMFS also identified the presence of an anadromous resource in the lower Yuba that is not listed under the ESA, but is a Federal Species of Concern (those species about which NMFS has concerns regarding status and threats, but for which insufficient information is available to indicate a need to list the species under the ESA):

- CV fall/late fall-run Chinook salmon ESU, Species of Concern (April 15, 2004, 69 FR 19975; October 17, 2006, 71 FR 61022).

This Federal Species of Concern also occurs downstream in the Feather River, Sacramento River, Sacramento-San Joaquin Delta, and San Francisco Bay, and may also be affected by the Project. While the fall/late-fall run Chinook ESU has no formal protection under the ESA, discussions with NMFS regarding effects to this species usually occurs during ESA consultation.

NMFS notes the facilities requested for review are not all considered part of the “Project” facilities by the Commission. However, for consultation under section 7 of the Endangered Species Act, the action, action area, and the effects of an action are defined more broadly. NMFS refers the Commission and Applicant to the following definitions from the Code of Federal Regulations (CFR), and to Enclosure B of this filing:

50 CFR § 402.02 Definitions.

Action means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies in the United States or upon the high seas. Examples include, but are not limited to:

- (a) actions intended to conserve listed species or their habitat;
- (b) the promulgation of regulations;
- (c) the granting of licenses, contracts, leases, easements, rights-of-way, permits, or grants-in-aid; or
- (d) actions directly or indirectly causing modifications to the land, water, or air.

Action area means all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action.

Effects of the action refers to the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action, that will be added to the environmental baseline. The environmental baseline includes the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation in process. Indirect effects are those that are caused by the proposed action and are later in time, but still are reasonably certain to occur. Interrelated actions are those that are part of a larger action and depend on the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration. (Emphasis added to highlight that evaluation of the effects of an action in the ESA sense is broader than evaluation of the action alone).

§ 5.9 (b): 1.0 Goals and Objectives of Request

Describe the goals and objectives of each study proposal and the information to be obtained;

The goals of this information request are: (1) Describe historical and current LWD characteristics and loading in the Study Area (2) Identify the ongoing effects of the Yuba River Development Project (Project) and other land uses (forest management, roads, etc.) on LWD characteristics, recruitment, storage, and transport.

The objectives of the Information request are:

- a. Calculate annual volumetric flux of wood into project reservoirs (New Bullards and Englebright)
- b. Calculate annual volumetric flux of wood into project diversions (Our House and Log Cabin Dams)
- c. Calculate effects of upstream projects and land-use to LWD delivery into Project works
- d. Conduct ground surveys of LWD below Project works
- e. Description and measurements of all wood > 1m in length in the active stream channel in study reaches
- f. Conduct ground surveys of LWD in control reaches
- g. Description and measurements of all wood > 1m in length in the active stream channel in control reaches
- h. Evaluation of historical and current LWD recruitment, transport and storage through development of LWD budget.
- i. Evaluation of Project's effects on LWD budget

§ 5.9 (b): 2.0 Resource Management Goals of NMFS

If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied;

NMFS' Resource Management Goal and Objectives, provided in full as Enclosure G, apply with respect to species listed under the and Magnuson-Stevens Fishery Conservation and Management Act (MSA) (16 U.S.C. §1801 *et seq.*) and the Endangered Species Act (ESA) (16 U.S.C. §1531 *et seq.*), as well as anadromous species that are not currently listed but are affected by continuing operations of the Project or may require listing in the future. Thus, our requests for information or study are linked with NMFS' Resource Management Goals and Objectives. If NMFS' requests are included in the Applicant's Study Plan and approved in the Commission's Study Plan Determination, then successfully implemented, the results would inform:

- (A) Whether and how NMFS may exercise its FPA Section 18 authority, to either prescribe fishways at the Project or to reserve its prescriptive authority;
- (B) NMFS' decisions regarding its future FPA Section 10(j) and 10(a) proposals for protection, mitigation, and enhancement measures;
- (C) NMFS' decisions regarding its future recommended measures to improve EFH for Chinook salmon in the upper and lower Yuba, as well as areas downstream to the Bay/Delta;
- (D) The ESA Section 7 consultations (informal and formal) regarding effects on threatened species and designated critical habitats in the Yuba River.

The fulfillment of NMFS' request is consistent with the following NMFS' Resource Goals and Objectives for anadromous fishes and habitats in the Yuba River (Enclosure G):

5.1 - Protect, conserve, enhance, and recover native anadromous fishes and their habitats by providing access to suitable habitats and by restoring fully functioning habitat conditions for

related rearing and feeding (see 6.1-6.4), migration (see 6.5), spawning (See 6.6), and adjoining riparian and benthic macroinvertebrate (BMI) habitats (see 6.7).

5.2 - Identify and implement measures to protect, mitigate or minimize direct, indirect, and cumulative impacts to, and enhance native anadromous fish resources, including related rearing and feeding (see 6.1-6.4), migration (see 6.5), spawning (See 6.6), riparian and BMI habitats (see 6.7), protection from adverse Fish Hatchery operations (see 6.8) and predation (see 6.9), and ensure coordination within and outside of the Project (see 6.10) to minimize risk to anadromous fishes.

6.1-Flows; 6.2-Flow Ramping; 6.3-Water Quality; 6.4-Water Availability; 6.9-Predation; and 6.10-Coordination.

§ 5.9 (b): 3.0 Relevant Public Interest Considerations

If the requester is not a resource agency, explain any relevant public interest considerations in regard to the proposed study;

This content requirement is not applicable, as NMFS is a resource agency.

§ 5.9 (b): 4.0 Existing Information and Need for Additional Information

Describe existing information concerning the subject of the study proposal, and the need for additional information;

The Applicant has conducted a habitat mapping exercise included in the PAD as “Study 3-10a Attachment –Habitat Mapping Report”. This report includes documentation of large woody debris occurrence during habitat mapping surveys. Habitat was mapped using low-altitude helicopter aerial video combined with ground-based surveys of selected reaches.

Habitat mapping occurred in the following reaches:

Middle Yuba River – Oregon Creek and Our House Diversion Dam Reaches: 12.0 miles from the confluence with the North Yuba River to Our House Diversion Dam

Oregon Creek Reach – Log Cabin Diversion Dam Reach: 4.1 miles from the confluence with the Middle Yuba River to the Log Cabin Diversion Dam

North Yuba River – New Bullards Bar Dam Reach: 2.3 miles from the confluence with the Middle Yuba River to the New Bullards Bar Dam

Yuba River – New Colgate Powerhouse and Middle/North Yuba River Reaches: 7.5 miles. Normal maximum water surface elevation of USACE’s Englebright Reservoir (RM 32.2) to Middle Yuba/North Yuba river confluence at RM 39.7

During the Applicant’s habitat mapping effort, LWD was defined as: “All pieces of wood lying within the bankfull width of the channel that measure 1/2 bankfull width or longer. Wood must

be both downed, and with a portion lying within the bankfull channel, and dead or dying to be considered LWD. Divide into average size classes, and tally the total number of LWD pieces in each size class. Size classes we will use are maximum diameters of 6-12 inches, 12-24, 24-36, or >36 inches. Lengths are <3 feet, 3-10, 10-25, 25-75, >75 feet. These are total lengths, not just length in the channel. Note: LWD has to measure in length at least 1/2 bankfull width or longer to be counted, so which length classes you might use are dependent on stream width (e.g., a 30ft wide stream would only use classes from 10-25ft on up, because the log would have to be at least 15ft to be counted).”

Section 7.1.8.1.6 of the PAD entitled “Large Woody Debris in Slate Creek and Slate Creek Reservoir” summarizes LWD occurrence in Slate Creek above and below South Feather Power Project’s diversion dam on Slate Creek.

The Applicant’s proposed “Study 01-01 Channel Morphology Above Englebright” states:

“Applicant records regarding quantity and fate of large woody debris removed from New Bullards Bar Reservoir, from Our House Dam, and from Log Cabin Dam will be summarized in Applicant’s Pre-Application Document Section 7.1.”

This information is not provided in Section 7.1 of the PAD, but it is assumed that the information would be available to complete this information request.

The Applicant’s classification of LWD does not use similar methodology to comparable studies. Ruediger and Ward (1996) use 1 meter as the minimum length to count LWD, whereas the Applicant used a higher standard for minimum piece length (1/2 bank full width) in order to qualify for inclusion in its survey, which underestimates the amount of LWD relative to Ruediger and Ward (1996) and cannot be compared to results found in that study. In addition, the Applicant did not provide any removal history of LWD from project reservoirs or historical estimates of volumetric flux of LWD in project affected reaches, necessitating this information request.

§ 5.9 (b): 5.0 Nexus Between Project Operations and Effects on the Resource Studied, and How the Study Results Would Inform Development of License Conditions

Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study results would inform the development of license requirements;

Large woody debris (LWD) plays an important role in streams by shaping channel morphology, storing sediment and organic matter, and providing habitat for all life-stages of anadromous fish. The three Project dams (New Bullards Bar, Our House, and Log Cabin) along with Englebright Dam trap LWD, which is periodically removed by the Applicant. In addition, the inundation of 4,790 acres by New Bullards Bar reservoir has eliminated the ability for these areas to contribute LWD to the active stream channel. These actions have reduced LWD supplied to downstream reaches, which could have negative effects on downstream habitat for anadromous fish. Information regarding the historical LWD budget along with the LWD volumes removed by the Applicant will help inform potential protection, mitigation and enhancement measures.

The recruitment, transportation and deposition of LWD may also play an important role in the design and construction of successful fishways. Under Section 18 of the Federal Power Act, 16 U.S.C. § 811, the secretary of Commerce has the mandatory conditioning authority to prescribe fishways. Successful operation of fishways may require adults and/or juveniles to successfully navigate project works including reservoirs and stream reaches affected by powerhouse releases. The safety and effectiveness of fish ladders and other methods of fish passage may be affected by the amount of LWD contributed to project reservoirs and stream reaches.

The Yuba River anadromous resources to be studied in this Request, all under the jurisdiction of NMFS, include:

- 1) Central Valley (CV) spring-run Chinook salmon Evolutionarily Significant Unit (ESU) (*Oncorhynchus tshawytscha*), threatened (June 28, 2005, 70 FR 37160);
- 2) CV spring-run Chinook salmon designated critical habitat (September 2, 2005, 70 FR 52488);
- 3) CV steelhead Distinct Population Segment (DPS) (*O. mykiss*), threatened (January 5, 2006, 71 FR 834);
- 4) CV steelhead designated critical habitat (September 2, 2005, 70 FR 52488);
- 5) Southern DPS of North American green sturgeon (*Acipenser medirostris*), threatened (April 7, 2006, 71 FR 17757);
- 6) Southern DPS of North American green sturgeon designated critical habitat (October 9, 2009, 74 FR 52300);
- 7) CV fall/late-fall run Chinook salmon ESU, Species of Concern (April 15, 2004, 69 FR 19975);
- 8) CV spring-run and CV fall/late fall-run Chinook salmon identified “essential fish habitat” (EFH), (October 15, 2008 73 FR 60987);
- 9) CV fall/late fall-run Chinook salmon ESU, Species of Concern (April 15, 2004, 69 FR 19975).

§ 5.9 (b): 6.0 Consistency with Generally Accepted Practice

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 relevant tribal values and knowledge;

This study is consistent with the goals and objectives outlined for recent FERC hydroelectric ILP studies in the Western U.S., and uses accepted methodologies from published scientific literature and protocols from the National Marine Fisheries Service, U.S. Fish and Wildlife Service, and California Department of Fish and Game.

NMFS is presenting an Information Request and not necessarily specific study methodology (preferred data collection and analysis techniques, or objectively quantified information). This is because the Applicant's responsibility under the FPA is to either provide the requested information or to develop a more detailed Study Plan to obtain such information. It is anticipated that through the reiterative study development process within the ILP that the Applicant and the Commission will work with ILP participants to develop a study that obtains the requested information, or that adequate information, approved by the Commission, is provided by the Applicant.

§ 5.9 (b): 7.0 Considerations of Level of Effort and Cost

Describe considerations of level of effort and cost, as applicable, and why any proposed alternative studies would not be sufficient to meet the stated information needs.

The Licensees do not request PURPA benefits in their PAD. NMFS considers that the cost of these studies will to be between \$50,000-\$100,000. The Project is considered vast and complex. Considering the number of dams, the amount of water diverted, the potential for environmental disturbance, the status of several species listed under the ESA, and the recent closure of Chinook fisheries on the West Coast of the United States, the level of effort and cost for the Licensees is commensurate with the magnitude and impacts of the Project, and the revenues derived from sales of generated energy.

8.0 References

Berg, N., A. Carlson, and D. Azuma. 1998. Function and dynamics of woody debris in stream reaches in the central Sierra Nevada, California. *Canadian Journal of Fisheries and Aquatic Sciences* 55: 1807-1820.

Martin, D. J., and L. E. Benda. 2001. Patterns of instream wood recruitment and transport at the watershed scale. *Transactions of the American Fisheries Society* 130: 940-958.

NMFS 2009a. "Public Draft Recovery Plan for Sacramento River Winter-run Chinook Salmon, Central Valley Spring-run Chinook Salmon, and Central Valley Steelhead." NMFS, Southwest Region, Sacramento, California. 7pp. October 2009.

Pacific Fisheries Management Council (PFMC). 1999. Pacific Fishery Management Council. Description and identification of essential fish habitat, adverse impacts and recommended conservation measures for salmon. *Amendment 14 to the Pacific Coast Salmon Plan, Appendix A*. Pacific Fisheries Management Council, Portland, Oregon.

PFMC. 2003. Pacific Fishery Management Council. Fishery Management Plan for Commercial and Recreational Salmon Fisheries off the Coasts of Washington, Oregon and California as Revised Through Amendment 14 (Adopted 1999).

Ruediger R., and J.Ward. 1996. Abundance and function of large woody debris in central Sierra Nevada Streams. Fish Habitat Relationships Technical Bulletin No. 20, May 1996.

Federal Register Notices

Federal Register Notice, 63 Fed. Reg. 13347, March 19, 1998. Endangered and Threatened Species: Threatened Status for Two Evolutionarily Significant Units of Steelhead in Washington, Oregon, and California. Final Rule.

Federal Register Notice, 64 Fed. Reg. 50394, September 16, 1999. Endangered and Threatened Species: Threatened Status for Two Chinook Salmon Evolutionarily Significant Units in California. Final Rule.

Federal Register Notice, 69 Fed. Reg. 19975, April 15, 2004. Endangered and Threatened Species; Establishment of Species of Concern List, Addition of Species to Species of Concern List, Description of Factors for Identifying Species of Concern, and Revision of Candidate Species List Under the Endangered Species Act. Final Rule.

Federal Register Notice, 70 Fed. Reg. 37160, June 28, 2005. Endangered and Threatened Species: Final Listing Determinations for 16 Evolutionarily Significant Units (ESUs) of West Coast Salmon, and Final 4(d) Protective Regulations for Threatened Salmonid ESUs. Final Rule.

Federal Register Notice, 70 Fed. Reg. 52488, September 2, 2005. Endangered and Threatened Species: Designation of Critical Habitat for Seven Evolutionarily Significant Units of Pacific Salmon and Steelhead in California. Final Rule.

Federal Register Notice, 71 Fed. Reg. 834, January 5, 2006. Endangered and Threatened Species: Final Listing Determinations for 10 Distinct Population Segments of West Coast Steelhead. Final Rule.

Federal Register Notice, 71 Fed. Reg. 17757, April 7, 2006. Endangered and Threatened Wildlife and Plants: Threatened Status for Southern Distinct Population Segment of North American Green Sturgeon. Final Rule.

Federal Register Notice, 71 Fed. Reg. 61022, October 17, 2006. Endangered and Threatened Species: Revision of Species of Concern List, Candidate Species Definition, and Candidate Species List.

Federal Register Notice, 73 FR 60987, October 15, 2008. Fisheries Off West Coast States; West Coast Salmon Fisheries; Amendment 14; Essential Fish Habitat Descriptions for Pacific Salmon. Final Rule.

Federal Register Notice, 74, FR 52300, October 9, 2009. Endangered and Threatened Wildlife and Plants: Final Rulemaking to Designate Critical Habitat for the Threatened Southern Distinct Population Segment of North American Green Sturgeon. Final Rule.

Federal Register Notice, 75 Fed. Reg. 30714, June 2, 2010. Endangered and Threatened Wildlife and Plants: Final Rulemaking To Establish Take Prohibitions for the Threatened Southern Distinct Population Segment of North American Green Sturgeon. Final Rule. June 2, 2010.

NMFS Request #6
Request for Information or Study
Effects of the Project and Related Activities on the Loss
of Marine-Derived Nutrients in the Yuba River
March 7, 2011

The National Oceanic and Atmospheric Administration's, National Marine Fisheries Service (NMFS) hereby files this request for information or study with the Federal Energy Regulatory Commission (Commission or FERC) for Yuba County Water Agency's (Applicant) Yuba River Hydroelectric Project (Project), FERC No. 2246, Yuba River, California.

Background:

Streams in temperate and northern latitudes are generally unproductive, limited by phosphorous (P) or nitrogen (N) as a result of the geology and the inevitable downstream flow of nutrients to the ocean. Therefore, the upstream migration of anadromous salmonids followed by their death is important to replenish or "fertilize" streams and rivers (Quinn 2005). This fertilization has been studied in several streams, where the uptake of nutrients has been found to enhance the abundances of benthic "biofilm and benthic macro invertebrates (Wiplfi et al. 1998), the condition of juvenile salmon (Bilby et al. 1998), riparian shrub and tree growth (Helfield and Naiman 2001), birds, mammals, and other "receptors". Direct and indirect "feedbacks" occur whereby this salmon-borne "fertilizer" improves the quality of spawning and rearing habitat, and thus the reproductive success of subsequent generations of salmon (Quinn 2005). For example, Wiplfi et al. (1998) found reaches of a creek accessible to salmon had 25 times higher densities of benthic macro invertebrates than reaches of the creek not accessible to salmon. This would benefit juvenile salmon, which eat primarily insects during much of their lives in streams (Quinn 2005). Bilby et al. (1998) demonstrated additional benefits when they examined gut contents of young salmon and learned they eat not only insects but salmon eggs and the flesh from salmon carcasses. The "ecosystem services" provided by dead salmon remain important and economically significant, and have been demonstrated even in the impaired watersheds of the California Central Valley (Merz and Moyle 2006).

Due primarily to the construction of dams, other barriers, and the dewatering of stream reaches, an estimated 1,057 miles (or 48%) of the stream lengths historically available to Chinook salmon have been lost from the original total of 2,183 miles in the Central Valley; if only spawning and holding habitat (excluding migration corridors in the lower elevations) are considered, the reduction in historical range probably exceeds 72% (this is because most of the former spawning and holding habitat is in upstream reaches now inaccessible to Chinook salmon) (Yoshiyama et al. 2001). Other estimates of habitat loss are as high as 95% (

Gresh et al. (2000) used estimates of the historic (high and low ranges) and current escapement sizes and average fish weights to compute biomass, then used information about the nutrient content of salmon carcasses to quantify the historic and current N and P loads transported to the Pacific Northwest (including to California rivers). The authors' estimates for California are collected in Table 1 below. The California (statewide) estimated loss of salmon biomass is 23 to 27 metric tons annually (52 to 60 million pounds). The estimated annual loss of marine-derived N (fertilizer) from historic levels is 713 to 826 metric tons (1.6 million to 1.8 million pounds). Proportionate losses of N, P, and salmon biomass are similar at 94-95% deficits from historic levels.

The estimates of Gresh et al. (2000) were based on statewide losses for all Pacific salmon, and applied an average N content for all salmon species. Merz and Moyle (2006) restricted their estimates to Central Valley Chinook salmon, using a peak escapement (in 2001) of 600,000 fish and a higher average carcass N content, based on analysis of Chinook tissue samples (collected from the Mokelumne River). Using these refinements, the authors calculated that Chinook salmon runs may contribute 337 metric tons of N to the Central Valley annually, much greater than the 43 metric tons estimated by Gresh et al. (2000). They also estimated annual losses of 13 to 22 metric tons of marine-derived N due to California’s state hatchery system, which disposes their salmon carcasses outside the watersheds (Merz and Moyle 2006).

Table 1. Estimates and comparisons of marine-derived nitrogen (N) and phosphorus (P) transported by Pacific salmon to California rivers in historic and current times. Data are extracted and compiled from Gresh et al. (2000) (Table 7, p. 19).

Biomass		Historic	Historic	Current	Loss	Loss	Percent loss	Percent loss
		high range	low range		low range	high range		
Salmon	Metric tons	28,623	24,882	1,404	23,478	27,219		
	U.S. tons	31,551	27,428	1,548	25,880	30,004	94.4%	95.1%
	Pounds	63,102,913	54,855,420	3,095,290	51,760,130	60,007,623		
N	Metric tons	869	756	43	713	826		
	U.S. tons	958	833	47	786	911	94.3%	95.1%
	Pounds	1,915,817	1,666,695	94,799	1,571,896	1,821,018		
P	Metric tons	103	89	5	84	98		
	U.S. tons	114	98	6	93	108	94.4%	95.1%
	Pounds	227,076	196,211	11,023	185,188	216,053		

Request Element #1: Estimate a range of the historic mass of marine-derived N transported annually by Chinook salmon (all runs) to the Yuba River.

NMFS’ understanding is information may be limited regarding the historical escapement ranges for the Yuba River. In the estimates of Merz and Moyle (2006), they used a 2001 peak escapement of 600,000 Chinook (presumably all ESUs) to the Central Valley. It may be possible to find estimates of the historical Sacramento Valley run size, or estimate its proportional contribution from total Central Valley escapement numbers. The California Department of Fish and Game (CDFG 1993, in Yoshiyama et al. 2006, p.25) estimates the Yuba River “historically supported up to 15% of the annual run of fall-run Chinook salmon in the Sacramento River system”, thereby providing an approximate proportion of the Yuba River contribution to the Sacramento Valley. An estimate calculated in this fashion would be “rough”, and would likely be a low estimate (because it would not include the spring-run escapement to the Yuba).

Yoshiyama et al. (2006) describe and summarize historical accounts indicating salmon originally migrated into the Yuba River in large numbers to spawn. They include discussion of reports of the California Fish Commission that in 1850 “the salmon resorted in vast numbers to the Feather, Yuba, American, Mokelumne, and Tuolumne Rivers”. Many of these were very likely spring-run Chinook because the California Fish Commission further stated that in 1850 and 1851, “large quantities [of salmon] were taken by the miners and by Indians ... as far up as Downieville on the Yuba”. In later years, the salmon ascended in “considerable numbers” up to Bullards Bar Dam during its period of construction (1921-1924)— “so many salmon congregated and died below it that they had to be burned” (Sumner and Smith 1940, in Yoshiyama et al. 2006). Therefore,

while the estimates requested here would be approximate, NMFS requests this information to provide a “baseline” regarding the historic levels of marine-derived N transported annually to the Yuba River.

Using the escapement estimates discussed above, NMFS requests the Applicant use a 10-kilogram (kg) average mass for adult Chinook, and a 5.62% average N content. The annual mass of marine-derived N would follow the calculation method of Merz and Moyle (2006),

transport = nut% x SW x SP, where
nut% is the average percentage of N
SW is the average mass of an adult Chinook, and
SP is Chinook salmon escapement. (p. 1002).

Request Element #2: Estimate the historic mass of marine-derived N transported annually by spring-run Chinook salmon to the Yuba River.

If the proportion of the spring-run Chinook to the total historic run to the Yuba can be estimated, NMFS requests the Applicant follow the method above to estimate the historic mass of marine-derived N transported annually by spring-run Chinook salmon to the Yuba River.

Request Element #3: Estimate the current annual mass of marine-derived N transported by Chinook salmon to the Yuba River.

NMFS requests the Applicant use the use the recent peak and 10-year (2001-2010) average Yuba River Chinook escapements, a 10 kilogram (kg) average mass for adult Chinook, and a 5.62% average N content to compute an estimated range of the current mass of marine-derived N transported annually to the Yuba River. These estimates would follow the calculation method of Merz and Moyle (2006), given above.

Request Element #4: Estimate the current annual mass of marine-derived N transported by phenotypic “spring-run” Chinook salmon to the Yuba River.

NMFS’ understanding is the escapement estimates for the Yuba River (from carcass surveys) do not distinguish between spring-run and fall-run Chinook. However, since 2003, Vaki Riverwatchers have been used to count adult salmon migrating upstream in the fish ladders at Daguerre Point Dam (Greathouse 2010). This information could inform an estimate of the proportion of phenotypic spring-run Chinook escapement to the total escapement. Future improvements in VAKI operations could close some of the gaps in the count record that have occurred due to system outages (Greathouse 2010). It may also be that information from the (outer edges of) otoliths extracted from sampled Yuba River Chinook carcasses could further inform the estimate of the proportion of spring-run Chinook to the total run; tagging of at least a portion of the early-returning salmon passing the Daguerre Dam fish ladders might be necessary to validate the analysis. Using the results of Element #3 above, and the ratio of phenotypic spring-run to the total run, NMFS’ requests the Applicant estimate the annual N contribution of Chinook that return early (prior to September) to the Yuba River.

NMFS notes these results would also provide an estimate the current annual loss of marine-derived N to the upper Yuba River, if anadromous fish passage were possible at Englebright Dam and the associated hydroelectric facilities. This is because it can be assumed that nearly all early-returning Chinook would pass beyond the elevations of the lower Yuba. Spring-run Chinook historically used the higher spring flows to migrate to elevations of at least 1,500 feet to hold and mature during the summer, before spawning in the early fall at elevations of at least

1,000 feet. If they spawned in early fall, they needed to ascend even higher, at least to ~ 2,500-3,000 ft. in the Sacramento drainage (Yoshiyama et al. 2006). Fall-run historically immigrated in the fall (September or later) under lower flow conditions and spawned shortly after arrival at valley floor (up to 500 feet) and lower foothill (up to 1000 feet) elevations (Yoshiyama et al. 2006). Since lower Yuba elevations are well below the lower (1000-foot) limit historically used by spring-run Chinook (the base of Englebright Dam is ~ 247 feet), NMFS suggests the Applicant assume that all early-returning (spring-run) Chinook entering the Yuba would, if upstream passage were possible, migrate to the upper Yuba to hold, spawn, and die.

From the time Englebright Dam was closed and all upper Yuba flows have been passed to the lower Yuba either over its (247-foot) spillway and/or through Englebright's associated hydroelectric facilities (via the intakes, tunnels, penstocks, powerhouses, and outfalls of PG&E's Narrows I and the Project's Narrows II Development), the upper Yuba has been inaccessible to anadromous fishes. This is because neither Englebright Dam, nor the associated hydroelectric facilities or operations themselves, provide waterways that allow anadromous salmon to reach the upper Yuba. The only current waterways connecting the upper Yuba to the lower Yuba are paths that cannot be surmounted by upstream migrating fishes.

Request Element #5: Estimate the annual loss, from historic to current levels, of marine-derived N to the Yuba River.

This estimate can be obtained by subtraction from estimates computed above (Element#1 – Element #3).

Request Element #6: Estimate the annual loss, from historic to current levels, of marine-derived N to the upper Yuba

This estimate can be obtained by subtraction from estimates computed above (Element#2 – Element #4).

Request Element #7: Compare the differences of marine-derived N incorporated into periphyton and aquatic benthic macroinvertebrates collected in the upper and lower Yuba.

Nitrogen normally has a molecular weight of 14 but some atoms contain an extra neutron, increasing the molecular weight to 15; the proportion of the heavier isotope is greater in marine ecosystems than in freshwater ecosystems (Quinn 2005). NMFS requests the Applicant examine the ratio of (heavy) marine-derived N isotopes to the (lighter) atmospheric isotopes in periphyton and benthic macroinvertebrates collected in upper and lower Yuba locations. NMFS suggests the Applicant apply the methods in Kohler et al. (2008) and others cited therein.

Passage of anadromous salmonids into the upper Yuba would begin to replenish the nutrient levels in habitats which have likely experienced a deficit since Englebright Dam and associated facilities blocked anadromous immigrations. If implemented in the Applicant's Study Plan, the results would indicate whether uptake of marine-derived N is occurring in aquatic biota in the lower Yuba, upper Yuba, and the degree of uptake in these locations. The data would allow relative comparisons with upper Yuba locations.

In the future, resource agencies may determine the upper Yuba requires "fertilization" due to nutrient deficits caused by blocked anadromous access. Use of a manufactured salmon carcass analogue (Kohler et al. 2008) is one treatment option, and the data requested here could be used, and the techniques repeated, to monitor the success of nutrient restorations.

This request is formatted in accordance with:

Title 18 of the Federal regulations *Conservation of Power and Water Resources*; Part 5 *Integrated License Application Process*; Section 5.9 *Comments and information or study requests*.

18 CFR § 5.9 (a): *Comments and study requests*. Comments on the pre-application document and the Commission staff's Scoping Document 1 must be filed with the Commission within 60 days following the Commission's notice of consultation procedures issued pursuant to §5.8. Comments, including those by Commission staff, must be accompanied by any information gathering and study requests, and should include information and studies needed for consultation under section 7 of the Endangered Species Act and water quality certification under Section 401 of the Clean Water Act. (Emphasis added for relevance to highlight NMFS' ESA concerns)

18 CFR § 5.9 (b): *Content of study request*. Any information or study request must:

- (1) Describe the goals and objectives of each study proposal and the information to be obtained;
 - (2) If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied;
 - (3) If the requester is not a resource agency, explain any relevant public interest considerations in regard to the proposed study;
 - (4) Describe existing information concerning the subject of the study proposal, and the need for additional information;
 - (5) Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study results would inform the development of license requirements;
 - (6) 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 relevant tribal values and knowledge; and
 - (7) Describe considerations of level of effort and cost, as applicable, and why any proposed alternative studies would not be sufficient to meet the stated information needs.
- (c) *Applicant seeking PURPA benefits; estimate of fees*. If a potential applicant has stated that it intends to seek PURPA benefits, comments on the pre-application document by a fish and wildlife agency must provide the potential applicant with a reasonable estimate of the total costs the agency anticipates it will incur in order to set mandatory terms and conditions for the proposed project. An agency may provide a potential applicant with an updated estimate as it deems necessary. If any agency believes that its most recent estimate will be exceeded by more than 25 percent, it must supply the potential applicant with a new estimate and submit a copy to the Commission.

§ 5.9 (a): The Information Gathering or Study Should Inform Consultation Under Section 7 of the Endangered Species Act

Comments, including those by Commission staff, must be accompanied by any information gathering and study requests, and should include information and studies needed for consultation under section 7 of the Endangered Species Act

The information or study resulting from this Request would inform future ESA consultation between NMFS and the Commission because the Project's effects on the resource(s) to be studied in this request affect ESA-listed salmonids or sturgeon, and/or their ESA-designated critical habitats, both in the Yuba River and in locations downstream.

NMFS has identified the following ESA-protected anadromous fishes and habitats (ESA resources) in the Yuba River that could be affected by the Project:

- 1) Central Valley (CV) spring-run Chinook salmon Evolutionarily Significant Unit (ESU) (*Oncorhynchus tshawytscha*), threatened (June 28, 2005, 70 FR 37160);
- 2) CV spring-run Chinook salmon designated critical habitat (September 2, 2005, 70 FR 52488);
- 3) CV steelhead Distinct Population Segment (DPS) (*O. mykiss*), threatened (January 5, 2006, 71 FR 834);
- 4) CV steelhead designated critical habitat (September 2, 2005, 70 FR 52488);
- 5) Southern DPS of North American green sturgeon (*Acipenser medirostris*), threatened (April 7, 2006, 71 FR 17757);
- 6) Southern DPS of North American green sturgeon designated critical habitat (October 9, 2009, 74 FR 52300);

ESA resources that occur downstream in the Feather River, Sacramento River, Sacramento-San Joaquin Delta, and San Francisco Bay may also be affected by the Project.

NMFS also identified the presence of an anadromous resource in the lower Yuba that is not listed under the ESA, but is a Federal Species of Concern (those species about which NMFS has concerns regarding status and threats, but for which insufficient information is available to indicate a need to list the species under the ESA):

- CV fall/late fall-run Chinook salmon ESU, Species of Concern (April 15, 2004, 69 FR 19975; October 17, 2006, 71 FR 61022).

This Federal Species of Concern also occurs downstream in the Feather River, Sacramento River, Sacramento-San Joaquin Delta, and San Francisco Bay, and may also be affected by the Project. While the fall/late-fall run Chinook ESU has no formal protection under the ESA, discussions with NMFS regarding effects to this species usually occurs during ESA consultation.

NMFS notes the facilities requested for review are not all considered part of the "Project" facilities by the Commission. However, for consultation under section 7 of the Endangered Species Act, the action, action area, and the effects of an action are defined more broadly. NMFS refers the Commission and Applicant to the following definitions from the Code of Federal Regulations (CFR), and to Enclosure B of this filing:

50 CFR § 402.02 Definitions.

Action means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies in the United States or upon the high seas. Examples include, but are not limited to:

- (a) actions intended to conserve listed species or their habitat;
- (b) the promulgation of regulations;
- (c) the granting of licenses, contracts, leases, easements, rights-of-way, permits, or grants-in-aid; or
- (d) actions directly or indirectly causing modifications to the land, water, or air.

Action area means all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action.

Effects of the action refers to the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action, that will be added to the environmental baseline. The environmental baseline includes the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation in process. Indirect effects are those that are caused by the proposed action and are later in time, but still are reasonably certain to occur. Interrelated actions are those that are part of a larger action and depend on the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration. (Emphasis added to highlight that evaluation of the effects of an action in the ESA sense is broader than evaluation of the action alone).

§ 5.9 (b): 1.0 Goals and Objectives of Request

Describe the goals and objectives of each study proposal and the information to be obtained;

The goal or purpose of this study is to evaluate the effects of the Project and Project-related activities on the degree of reduction or loss in nutrient replenishment to the upper and lower Yuba River. The nutrients in question are those that are marine-derived, and then transported and deposited in freshwaters by migrating anadromous fishes. The mass of nitrogen (N) will be measured here for simplicity, although carbon and phosphorus are also transported and deposited by returning anadromous salmon. In the final element, NMFS requests information about current uptake of marine-derived N, which can be “traced” in terrestrial systems because the proportion of the heavier isotope is greater in marine than freshwater ecosystems. NMFS requests the Applicant examine the ratio of (heavy) marine-derived N isotopes to the (lighter) atmospheric isotopes in periphyton and benthic macroinvertebrates collected in upper and lower Yuba locations, to compare and determine if differences in uptake in nutrients has occurred since salmon have lost access to the upper Yuba.

The information to be obtained is:

- 1) An estimate a range of the historic mass of marine-derived N that was transported annually by Chinook salmon (all runs) to the Yuba River. This is baseline information.
- 2) An estimate of the historic mass of marine-derived N that was transported annually by spring-run Chinook salmon to the upper Yuba River. This is baseline information.

- 3) An estimate of the current annual mass of marine-derived N transported by Chinook salmon to the lower Yuba River. This is current information, for comparison with baseline.
- 4) An estimate of the current annual mass of marine-derived N transported by phenotypic “spring-run” Chinook salmon to the Yuba River. This is current information, for comparison with baseline.
- 5) An estimate of the annual loss, from historic to current levels, of marine-derived N to the Yuba. This compares historic (baseline) conditions with current conditions.
- 6) An estimate of the annual loss, from historic to current levels, of marine-derived N to the upper Yuba. This compares historic (baseline) conditions with current conditions.
- 7) Compare the differences of marine-derived N incorporated into periphyton and aquatic benthic macroinvertebrates collected in the upper and lower Yuba. This will determine if uptake is occurring, and to what degree in the upper and lower Yuba.

The resulting information will be interpreted in the context of information or results yielded in other submitted requests, including *Effects of the Project and Related Facilities on Fish Passage for Anadromous Fish*, *Effects of the Project on Hydrology for Anadromous Fish: Magnitude, Timing, Duration, and Rate of Change*, and others.

§ 5.9 (b): 2.0 Resource Management Goals of NMFS

If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied;

NMFS’ Resource Management Goal and Objectives, provided in full as Enclosure G, apply with respect to species listed under the and Magnuson-Stevens Fishery Conservation and Management Act (MSA) (16 U.S.C. §1801 *et seq.*) and the Endangered Species Act (ESA) (16 U.S.C. §1531 *et seq.*), as well as anadromous species that are not currently listed but are affected by continuing operations of the Project or may require listing in the future. Thus, our requests for information or study are linked with NMFS’ Resource Management Goals and Objectives. If NMFS’ requests are included in the Applicant’s Study Plan and approved in the Commission’s Study Plan Determination, then successfully implemented, the results would inform:

- (A) Whether and how NMFS may exercise its FPA Section 18 authority, to either prescribe fishways at the Project or to reserve its prescriptive authority;
- (B) NMFS’ decisions regarding its future FPA Section 10(j) and 10(a) proposals for protection, mitigation, and enhancement measures;
- (C) NMFS’ decisions regarding its future recommended measures to improve EFH for Chinook salmon in the upper and lower Yuba, as well as areas downstream to the Bay/Delta;
- (D) The ESA Section 7 consultations (informal and formal) regarding effects on threatened species and designated critical habitats in the Yuba River, as well as areas downstream to the Bay/Delta;

The fulfillment of NMFS’ request is consistent with the following NMFS’ Resource Goals and Objectives for anadromous fishes and habitats in the Yuba River (Enclosure G):

Resource Goals:

3.1 - Protect, conserve, enhance, and recover native anadromous fishes and their habitats by providing access to suitable habitats and by restoring fully functioning habitat conditions for related rearing and feeding (see 4.1-4.4), migration (see 4.5), spawning (See 4.6), and adjoining riparian and aquatic benthic macroinvertebrate (BMI) habitats (see 4.7).

3.2 - Identify and implement measures to protect, mitigate or minimize direct, indirect, and cumulative impacts to, and enhance native anadromous fish resources, including related rearing and feeding (see 4.1-4.4), migration (see 4.5), spawning (See 4.6), riparian and BMI habitats (see 4.7), protection from adverse Fish Hatchery operations (see 4.8) and predation (see 4.9), and ensure coordination within and outside of the Project (see 4.10) to minimize risk to anadromous fishes.

Resource Objectives:

4.1-Flows; 4.2-Flow Ramping; 4.3-Water Quality; 4.4-Water Availability; 4.5-Fish Passage; 4.6-Channel Maintenance; 4.7-Riparian/LWD Habitat; 4.8-Hatchery Operations; 4.9-Predation; and 4.10-Coordination.

§ 5.9 (b): 3.0 Relevant Public Interest Considerations

If the requester is not a resource agency, explain any relevant public interest considerations in regard to the proposed study;

This content requirement is not applicable, as NMFS is a resource agency.

§ 5.9 (b): 4.0 Existing Information and Need for Additional Information

Describe existing information concerning the subject of the study proposal, and the need for additional information;

NMFS could find no existing information regarding the nutrient status of the Yuba River, with respect to the loss of marine-derived nutrients due to reduced escapement of anadromous Chinook or their blocked access to historic habitats. NMFS understanding is a nutrient study may have been planned by the Upper Yuba River Studies Program, but not carried out.

§ 5.9 (b): 5.0 Nexus Between Project Operations and Effects on the Resource Studied, and How the Study Results Would Inform Development of License Conditions

Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study results would inform the development of license requirements;

In NMFS' *Request for Information or Study: Effects of the Project and Related Facilities on Fish Passage for Anadromous Fish*, the Applicant is asked to conduct studies related to fish passage for all life stages of anadromous fish inhabiting the Yuba River; this includes passage requirements for Chinook salmon adults. In the "Background" section above, NMFS explains that the upstream migration of anadromous salmonids followed by their death is important to replenish or "fertilize" streams and rivers. This fertilization has been studied in several streams, where the uptake of nutrients has been found to enhance the abundances of periphyton, benthic macro invertebrates, the condition of juvenile salmon, the riparian shrub and tree growth, birds, mammals, and other wildlife and plants. Studies 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.

The Yuba River anadromous resources to be studied in this Request, all under the jurisdiction of NMFS, include:

- 1) Central Valley (CV) spring-run Chinook salmon Evolutionarily Significant Unit (ESU) (*Oncorhynchus tshawytscha*), threatened (June 28, 2005, 70 FR 37160);
- 2) CV spring-run Chinook salmon designated critical habitat (September 2, 2005, 70 FR 52488);
- 3) CV steelhead Distinct Population Segment (DPS) (*O. mykiss*), threatened (January 5, 2006, 71 FR 834);
- 4) CV steelhead designated critical habitat (September 2, 2005, 70 FR 52488);
- 5) CV fall/late-fall run Chinook salmon ESU, Species of Concern (April 15, 2004, 69 FR 19975);
- 6) CV spring-run and CV fall/late fall-run Chinook salmon identified “essential fish habitat” (EFH), (October 15, 2008 73 FR 60987);
- 7) CV fall/late fall-run Chinook salmon ESU, Species of Concern (April 15, 2004, 69 FR 19975).

The major nexus to this Project is that its facilities and operations may act to both reduce the abundances of returning Chinook salmon and/or impede or block their passage to upstream habitats. Since direct and indirect “feedbacks” occur whereby this salmon-borne “fertilizer” improves the quality of spawning and rearing habitat, and thus the reproductive success of subsequent generations of salmon, losses could beget more losses if this trend is not reversed. The consequences are vastly reduced stream and riparian productivity. The Project’s facilities and operations, and related activities, could impede or block anadromous fish passage at multiple locations in the watershed. NMFS constructed Table 2 (below) to note all these facilities locations where passage of adult Chinook could be impaired or blocked, and note it contains some 20 Project facilities. Due to relationship of Project operations with other facilities listed in

Table 2. Project and Project-related facilities encountered by anadromous fishes migrating in the Yuba River.

Reach	#	Facility Encountered (upstream direction)	RM	Total Migration Distance (mi.)
Lower Yuba				
	1	Daguerre Point Dam	11.4	11.4
	2	Hallwood-Cordua diversion	11.4	11.4
	3	South Yuba-Brophy diversion	11.6	11.6
	4	Brown's Valley diversion	12.2	12.2
	5	Narrows I Powerhouse	23.6	23.6
	6	Narrows II Powerhouse	23.9	23.9
	7	Narrows II Flow Bypass	23.9	23.9
	8	Englebright Dam	24.0	24.0
Upper Yuba				
	9	Englebright Reservoir	24.0	24.0
	10	Narrows I Intake	24.1	24.1
	11	Narrows II Intake	24.1	24.1
	12	Englebright Reservoir (end)	32.2	32.2
	13	New Colgate Powerhouse	33.9	33.9
Middle Yuba			0.0	40.1
	14	Our House Measurement Weir	11.9	51.6
	15	Our House Dam	12.0	51.7
	16	Our House Reservoir	12.0	51.7
	17	Lohman Diversion Intake	12.1	51.8
Oregon Creek			0.0	44.2
	18	Log Cabin Diversion Dam	4.1	48.3
	19	Log Cabin Reservoir	4.1	48.3
	20	Camptonville Diversion Intake	4.1	48.3
	21	Lohman Ridge Diversion Outlet	4.3	48.5
North Yuba			0.0	42.0
	22	New Bullards Bar Dam Spillway	2.1	44.1
	23	Fish Release Measurement Weir	2.2	44.2
	24	New Bullards Fish Flow Powerhouse	2.3	44.3
	25	New Bullards Dam	2.3	44.3
	26	New Bullards Reservoir	2.3	44.3
	27	New Colgate Power Intake	2.6	44.6
	28	Bullards Bar Dam (submerged)	2.7	44.7
	29	Camptonville Diversion Tunnel Outlet	2.8	44.8
	30	Recreation Facilities	3.0	45.0
	31	New Bullards Reservoir (end)	18.1	60.1

Table 2, there is a nexus to additional facilities that could block or impair upstream salmon migrations. Lastly, due to the effects of Project diversions, potential anadromous passage at additional areas of steep natural gradient within natural stream channels could be impaired or blocked.

§ 5.9 (b): 6.0 Consistency with Generally Accepted Practice

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 relevant tribal values and knowledge;

This request is consistent with evaluations of marine-derived nutrient status performed in California and the Pacific Northwest by Gresh et al. (2000). The request is also consistent with the methods applied by Merz and Moyle (2006) for the Central Valley Chinook salmon of the Central Valley of California. Ecological studies that rely on isotopes are widely performed and the results are available in the publicly available scientific journals.

NMFS is presenting an Information Request and not necessarily specific study methodology (preferred data collection and analysis techniques, or objectively quantified information). This is because the Applicant's responsibility under the FPA is to either provide the requested information or to develop a more detailed Study Plan to obtain such information. It is anticipated that through the reiterative study development process within the ILP that the Applicant and the Commission will work with ILP participants to develop a study that obtains the requested information, or that adequate information, approved by the Commission, is provided by the Applicant.

§ 5.9 (b): 7.0 Considerations of Level of Effort and Cost

Describe considerations of level of effort and cost, as applicable, and why any proposed alternative studies would not be sufficient to meet the stated information needs.

The Licensees do not request PURPA benefits in their PAD. NMFS considers that the cost of these studies will to be between \$10,000-\$20,000. The Project is considered vast and complex. Considering the number of dams, the amount of water diverted, the potential for environmental disturbance, the status of several species listed under the ESA, and the recent closure of Chinook fisheries on the West Coast of the United States, the level of effort and cost for the Applicant is commensurate with the magnitude and impacts of the Project, and the revenues derived from sales of generated energy.

8.0 References

- Bilby, R. E., B. R. Fransen, P. A. Bisson, and J. K. Walter. 1998. Response of juvenile coho salmon (*Oncorhynchus kisutch*) and steelhead (*Oncorhynchus mykiss*) to the addition of salmon carcasses to two streams in southwestern Washington, USA. *Canadian Journal of Fisheries and Aquatic Sciences* 55:1909-1918.
- Greathouse, R. 2010. Vaki Riverwatcher monitoring at Daguerre Point Dam. Presentation at the June 29, 2010 Lower Yuba River Accord River Management Team, Sacramento, CA.
- Gresh, T., Lichatowich, J., and P. Schoonmaker. 2000. An estimation of historic and current levels of salmon production in the Northeast Pacific ecosystem: evidence of a nutrient deficit in the freshwater systems of the Pacific Northwest. *Fisheries*: 25(1):15-21.
- Helfield, J.M. and R.J. Naiman. 2001. Effects of salmon-derived nitrogen on riparian forest growth and implications for stream productivity. *Ecology* 82(9): 2403-2409.
- Kohler, A. E., Rugenski, A., and D. Taki. 2008. Stream food web response to a salmon carcass analogue addition in two central Idaho, U.S.A. streams. *Freshwater Biology* 53: 446-460.
- Merz, J.E. and P.B. Moyle. 2006. Salmon, wildlife, and wine: marine-derived nutrients in human-dominated ecosystems of central California. *Ecological Applications* 16(3):999-1009.
- Quinn, T.P. 2005. The Ecology of Dead Salmon, Chapter 7 in *The Behavior and Ecology of Pacific Salmon and Trout*. University of Washington Press. Seattle.
- Wipfli, M. S., Hudson, J. P., and J. P. Caouette. 1998. Influence of salmon carcasses on stream productivity: response of biofilm and benthic macroinvertebrates in southeastern Alaska, USA. *Canadian Journal of Fisheries and Aquatic Sciences* 55:1503-1511.
- Yoshiyama, R.M., E.R. Gerstung, F.W. Fisher, and P.B. Moyle. 2001. Historical and Present Distribution of Chinook Salmon in the Central Valley Drainage of California in *Contributions to the Biology of Central Valley Salmonids*. Vol. 1. California Department of Fish and Game, Fish Bulletin 179, R.L. Brown, ed.

Federal Register Notices

- Federal Register Notice, 63 Fed. Reg. 13347, March 19, 1998. Endangered and Threatened Species: Threatened Status for Two Evolutionarily Significant Units of Steelhead in Washington, Oregon, and California. Final Rule.
- Federal Register Notice, 64 Fed. Reg. 50394, September 16, 1999. Endangered and Threatened Species: Threatened Status for Two Chinook Salmon Evolutionarily Significant Units in California. Final Rule.
- Federal Register Notice, 69 Fed. Reg. 19975, April 15, 2004. Endangered and Threatened Species; Establishment of Species of Concern List, Addition of Species to Species of Concern List, Description of Factors for Identifying Species of Concern, and Revision of Candidate Species List Under the Endangered Species Act. Final Rule.

Federal Register Notice, 70 Fed. Reg. 37160, June 28, 2005. Endangered and Threatened Species: Final Listing Determinations for 16 Evolutionarily Significant Units (ESUs) of West Coast Salmon, and Final 4(d) Protective Regulations for Threatened Salmonid ESUs. Final Rule.

Federal Register Notice, 70 Fed. Reg. 52488, September 2, 2005. Endangered and Threatened Species: Designation of Critical Habitat for Seven Evolutionarily Significant Units of Pacific Salmon and Steelhead in California. Final Rule.

Federal Register Notice, 71 Fed. Reg. 834, January 5, 2006. Endangered and Threatened Species: Final Listing Determinations for 10 Distinct Population Segments of West Coast Steelhead. Final Rule.

Federal Register Notice, 71 Fed. Reg. 17757, April 7, 2006. Endangered and Threatened Wildlife and Plants: Threatened Status for Southern Distinct Population Segment of North American Green Sturgeon. Final Rule.

Federal Register Notice, 71 Fed. Reg. 61022, October 17, 2006. Endangered and Threatened Species: Revision of Species of Concern List, Candidate Species Definition, and Candidate Species List.

Federal Register Notice, 73 FR 60987, October 15, 2008. Fisheries Off West Coast States; West Coast Salmon Fisheries; Amendment 14; Essential Fish Habitat Descriptions for Pacific Salmon. Final Rule.

Federal Register Notice, 74, FR 52300, October 9, 2009. Endangered and Threatened Wildlife and Plants: Final Rulemaking to Designate Critical Habitat for the Threatened Southern Distinct Population Segment of North American Green Sturgeon. Final Rule.

Federal Register Notice, 75 Fed. Reg. 30714, June 2, 2010. Endangered and Threatened Wildlife and Plants: Final Rulemaking To Establish Take Prohibitions for the Threatened Southern Distinct Population Segment of North American Green Sturgeon. Final Rule. June 2, 2010.

NMFS Request #6
Request for Information or Study
Effects of the Project and Related Activities on the Loss
of Marine-Derived Nutrients in the Yuba River
March 7, 2011

The National Oceanic and Atmospheric Administration's, National Marine Fisheries Service (NMFS) hereby files this request for information or study with the Federal Energy Regulatory Commission (Commission or FERC) for Yuba County Water Agency's (Applicant) Yuba River Hydroelectric Project (Project), FERC No. 2246, Yuba River, California.

Background:

Streams in temperate and northern latitudes are generally unproductive, limited by phosphorous (P) or nitrogen (N) as a result of the geology and the inevitable downstream flow of nutrients to the ocean. Therefore, the upstream migration of anadromous salmonids followed by their death is important to replenish or "fertilize" streams and rivers (Quinn 2005). This fertilization has been studied in several streams, where the uptake of nutrients has been found to enhance the abundances of benthic "biofilm and benthic macro invertebrates (Wiplfi et al. 1998), the condition of juvenile salmon (Bilby et al. 1998), riparian shrub and tree growth (Helfield and Naiman 2001), birds, mammals, and other "receptors". Direct and indirect "feedbacks" occur whereby this salmon-borne "fertilizer" improves the quality of spawning and rearing habitat, and thus the reproductive success of subsequent generations of salmon (Quinn 2005). For example, Wiplfi et al. (1998) found reaches of a creek accessible to salmon had 25 times higher densities of benthic macro invertebrates than reaches of the creek not accessible to salmon. This would benefit juvenile salmon, which eat primarily insects during much of their lives in streams (Quinn 2005). Bilby et al. (1998) demonstrated additional benefits when they examined gut contents of young salmon and learned they eat not only insects but salmon eggs and the flesh from salmon carcasses. The "ecosystem services" provided by dead salmon remain important and economically significant, and have been demonstrated even in the impaired watersheds of the California Central Valley (Merz and Moyle 2006).

Due primarily to the construction of dams, other barriers, and the dewatering of stream reaches, an estimated 1,057 miles (or 48%) of the stream lengths historically available to Chinook salmon have been lost from the original total of 2,183 miles in the Central Valley; if only spawning and holding habitat (excluding migration corridors in the lower elevations) are considered, the reduction in historical range probably exceeds 72% (this is because most of the former spawning and holding habitat is in upstream reaches now inaccessible to Chinook salmon) (Yoshiyama et al. 2001). Other estimates of habitat loss are as high as 95% (

Gresh et al. (2000) used estimates of the historic (high and low ranges) and current escapement sizes and average fish weights to compute biomass, then used information about the nutrient content of salmon carcasses to quantify the historic and current N and P loads transported to the Pacific Northwest (including to California rivers). The authors' estimates for California are collected in Table 1 below. The California (statewide) estimated loss of salmon biomass is 23 to 27 metric tons annually (52 to 60 million pounds). The estimated annual loss of marine-derived N (fertilizer) from historic levels is 713 to 826 metric tons (1.6 million to 1.8 million pounds). Proportionate losses of N, P, and salmon biomass are similar at 94-95% deficits from historic levels.

The estimates of Gresh et al. (2000) were based on statewide losses for all Pacific salmon, and applied an average N content for all salmon species. Merz and Moyle (2006) restricted their estimates to Central Valley Chinook salmon, using a peak escapement (in 2001) of 600,000 fish and a higher average carcass N content, based on analysis of Chinook tissue samples (collected from the Mokelumne River). Using these refinements, the authors calculated that Chinook salmon runs may contribute 337 metric tons of N to the Central Valley annually, much greater than the 43 metric tons estimated by Gresh et al. (2000). They also estimated annual losses of 13 to 22 metric tons of marine-derived N due to California’s state hatchery system, which disposes their salmon carcasses outside the watersheds (Merz and Moyle 2006).

Table 1. Estimates and comparisons of marine-derived nitrogen (N) and phosphorus (P) transported by Pacific salmon to California rivers in historic and current times. Data are extracted and compiled from Gresh et al. (2000) (Table 7, p. 19).

Biomass		Historic	Historic	Current	Loss	Loss	Percent loss	Percent loss
		high range	low range		low range	high range		
Salmon	Metric tons	28,623	24,882	1,404	23,478	27,219		
	U.S. tons	31,551	27,428	1,548	25,880	30,004	94.4%	95.1%
	Pounds	63,102,913	54,855,420	3,095,290	51,760,130	60,007,623		
N	Metric tons	869	756	43	713	826		
	U.S. tons	958	833	47	786	911	94.3%	95.1%
	Pounds	1,915,817	1,666,695	94,799	1,571,896	1,821,018		
P	Metric tons	103	89	5	84	98		
	U.S. tons	114	98	6	93	108	94.4%	95.1%
	Pounds	227,076	196,211	11,023	185,188	216,053		

Request Element #1: Estimate a range of the historic mass of marine-derived N transported annually by Chinook salmon (all runs) to the Yuba River.

NMFS’ understanding is information may be limited regarding the historical escapement ranges for the Yuba River. In the estimates of Merz and Moyle (2006), they used a 2001 peak escapement of 600,000 Chinook (presumably all ESUs) to the Central Valley. It may be possible to find estimates of the historical Sacramento Valley run size, or estimate its proportional contribution from total Central Valley escapement numbers. The California Department of Fish and Game (CDFG 1993, in Yoshiyama et al. 2006, p.25) estimates the Yuba River “historically supported up to 15% of the annual run of fall-run Chinook salmon in the Sacramento River system”, thereby providing an approximate proportion of the Yuba River contribution to the Sacramento Valley. An estimate calculated in this fashion would be “rough”, and would likely be a low estimate (because it would not include the spring-run escapement to the Yuba).

Yoshiyama et al. (2006) describe and summarize historical accounts indicating salmon originally migrated into the Yuba River in large numbers to spawn. They include discussion of reports of the California Fish Commission that in 1850 “the salmon resorted in vast numbers to the Feather, Yuba, American, Mokelumne, and Tuolumne Rivers”. Many of these were very likely spring-run Chinook because the California Fish Commission further stated that in 1850 and 1851, “large quantities [of salmon] were taken by the miners and by Indians ... as far up as Downieville on the Yuba”. In later years, the salmon ascended in “considerable numbers” up to Bullards Bar Dam during its period of construction (1921-1924)— “so many salmon congregated and died below it that they had to be burned” (Sumner and Smith 1940, in Yoshiyama et al. 2006). Therefore,

while the estimates requested here would be approximate, NMFS requests this information to provide a “baseline” regarding the historic levels of marine-derived N transported annually to the Yuba River.

Using the escapement estimates discussed above, NMFS requests the Applicant use a 10-kilogram (kg) average mass for adult Chinook, and a 5.62% average N content. The annual mass of marine-derived N would follow the calculation method of Merz and Moyle (2006),

transport = nut% x SW x SP, where
nut% is the average percentage of N
SW is the average mass of an adult Chinook, and
SP is Chinook salmon escapement. (p. 1002).

Request Element #2: Estimate the historic mass of marine-derived N transported annually by spring-run Chinook salmon to the Yuba River.

If the proportion of the spring-run Chinook to the total historic run to the Yuba can be estimated, NMFS requests the Applicant follow the method above to estimate the historic mass of marine-derived N transported annually by spring-run Chinook salmon to the Yuba River.

Request Element #3: Estimate the current annual mass of marine-derived N transported by Chinook salmon to the Yuba River.

NMFS requests the Applicant use the use the recent peak and 10-year (2001-2010) average Yuba River Chinook escapements, a 10 kilogram (kg) average mass for adult Chinook, and a 5.62% average N content to compute an estimated range of the current mass of marine-derived N transported annually to the Yuba River. These estimates would follow the calculation method of Merz and Moyle (2006), given above.

Request Element #4: Estimate the current annual mass of marine-derived N transported by phenotypic “spring-run” Chinook salmon to the Yuba River.

NMFS’ understanding is the escapement estimates for the Yuba River (from carcass surveys) do not distinguish between spring-run and fall-run Chinook. However, since 2003, Vaki Riverwatchers have been used to count adult salmon migrating upstream in the fish ladders at Daguerre Point Dam (Greathouse 2010). This information could inform an estimate of the proportion of phenotypic spring-run Chinook escapement to the total escapement. Future improvements in VAKI operations could close some of the gaps in the count record that have occurred due to system outages (Greathouse 2010). It may also be that information from the (outer edges of) otoliths extracted from sampled Yuba River Chinook carcasses could further inform the estimate of the proportion of spring-run Chinook to the total run; tagging of at least a portion of the early-returning salmon passing the Daguerre Dam fish ladders might be necessary to validate the analysis. Using the results of Element #3 above, and the ratio of phenotypic spring-run to the total run, NMFS’ requests the Applicant estimate the annual N contribution of Chinook that return early (prior to September) to the Yuba River.

NMFS notes these results would also provide an estimate the current annual loss of marine-derived N to the upper Yuba River, if anadromous fish passage were possible at Englebright Dam and the associated hydroelectric facilities. This is because it can be assumed that nearly all early-returning Chinook would pass beyond the elevations of the lower Yuba. Spring-run Chinook historically used the higher spring flows to migrate to elevations of at least 1,500 feet to hold and mature during the summer, before spawning in the early fall at elevations of at least

1,000 feet. If they spawned in early fall, they needed to ascend even higher, at least to ~ 2,500-3,000 ft. in the Sacramento drainage (Yoshiyama et al. 2006). Fall-run historically immigrated in the fall (September or later) under lower flow conditions and spawned shortly after arrival at valley floor (up to 500 feet) and lower foothill (up to 1000 feet) elevations (Yoshiyama et al. 2006). Since lower Yuba elevations are well below the lower (1000-foot) limit historically used by spring-run Chinook (the base of Englebright Dam is ~ 247 feet), NMFS suggests the Applicant assume that all early-returning (spring-run) Chinook entering the Yuba would, if upstream passage were possible, migrate to the upper Yuba to hold, spawn, and die.

From the time Englebright Dam was closed and all upper Yuba flows have been passed to the lower Yuba either over its (247-foot) spillway and/or through Englebright's associated hydroelectric facilities (via the intakes, tunnels, penstocks, powerhouses, and outfalls of PG&E's Narrows I and the Project's Narrows II Development), the upper Yuba has been inaccessible to anadromous fishes. This is because neither Englebright Dam, nor the associated hydroelectric facilities or operations themselves, provide waterways that allow anadromous salmon to reach the upper Yuba. The only current waterways connecting the upper Yuba to the lower Yuba are paths that cannot be surmounted by upstream migrating fishes.

Request Element #5: Estimate the annual loss, from historic to current levels, of marine-derived N to the Yuba River.

This estimate can be obtained by subtraction from estimates computed above (Element#1 – Element #3).

Request Element #6: Estimate the annual loss, from historic to current levels, of marine-derived N to the upper Yuba

This estimate can be obtained by subtraction from estimates computed above (Element#2 – Element #4).

Request Element #7: Compare the differences of marine-derived N incorporated into periphyton and aquatic benthic macroinvertebrates collected in the upper and lower Yuba.

Nitrogen normally has a molecular weight of 14 but some atoms contain an extra neutron, increasing the molecular weight to 15; the proportion of the heavier isotope is greater in marine ecosystems than in freshwater ecosystems (Quinn 2005). NMFS requests the Applicant examine the ratio of (heavy) marine-derived N isotopes to the (lighter) atmospheric isotopes in periphyton and benthic macroinvertebrates collected in upper and lower Yuba locations. NMFS suggests the Applicant apply the methods in Kohler et al. (2008) and others cited therein.

Passage of anadromous salmonids into the upper Yuba would begin to replenish the nutrient levels in habitats which have likely experienced a deficit since Englebright Dam and associated facilities blocked anadromous immigrations. If implemented in the Applicant's Study Plan, the results would indicate whether uptake of marine-derived N is occurring in aquatic biota in the lower Yuba, upper Yuba, and the degree of uptake in these locations. The data would allow relative comparisons with upper Yuba locations.

In the future, resource agencies may determine the upper Yuba requires "fertilization" due to nutrient deficits caused by blocked anadromous access. Use of a manufactured salmon carcass analogue (Kohler et al. 2008) is one treatment option, and the data requested here could be used, and the techniques repeated, to monitor the success of nutrient restorations.

This request is formatted in accordance with:

Title 18 of the Federal regulations *Conservation of Power and Water Resources*; Part 5 *Integrated License Application Process*; Section 5.9 *Comments and information or study requests*.

18 CFR § 5.9 (a): *Comments and study requests*. Comments on the pre-application document and the Commission staff's Scoping Document 1 must be filed with the Commission within 60 days following the Commission's notice of consultation procedures issued pursuant to §5.8. Comments, including those by Commission staff, must be accompanied by any information gathering and study requests, and should include information and studies needed for consultation under section 7 of the Endangered Species Act and water quality certification under Section 401 of the Clean Water Act. (Emphasis added for relevance to highlight NMFS' ESA concerns)

18 CFR § 5.9 (b): *Content of study request*. Any information or study request must:

- (1) Describe the goals and objectives of each study proposal and the information to be obtained;
 - (2) If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied;
 - (3) If the requester is not a resource agency, explain any relevant public interest considerations in regard to the proposed study;
 - (4) Describe existing information concerning the subject of the study proposal, and the need for additional information;
 - (5) Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study results would inform the development of license requirements;
 - (6) 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 relevant tribal values and knowledge; and
 - (7) Describe considerations of level of effort and cost, as applicable, and why any proposed alternative studies would not be sufficient to meet the stated information needs.
- (c) *Applicant seeking PURPA benefits; estimate of fees*. If a potential applicant has stated that it intends to seek PURPA benefits, comments on the pre-application document by a fish and wildlife agency must provide the potential applicant with a reasonable estimate of the total costs the agency anticipates it will incur in order to set mandatory terms and conditions for the proposed project. An agency may provide a potential applicant with an updated estimate as it deems necessary. If any agency believes that its most recent estimate will be exceeded by more than 25 percent, it must supply the potential applicant with a new estimate and submit a copy to the Commission.

§ 5.9 (a): The Information Gathering or Study Should Inform Consultation Under Section 7 of the Endangered Species Act

Comments, including those by Commission staff, must be accompanied by any information gathering and study requests, and should include information and studies needed for consultation under section 7 of the Endangered Species Act

The information or study resulting from this Request would inform future ESA consultation between NMFS and the Commission because the Project's effects on the resource(s) to be studied in this request affect ESA-listed salmonids or sturgeon, and/or their ESA-designated critical habitats, both in the Yuba River and in locations downstream.

NMFS has identified the following ESA-protected anadromous fishes and habitats (ESA resources) in the Yuba River that could be affected by the Project:

- 1) Central Valley (CV) spring-run Chinook salmon Evolutionarily Significant Unit (ESU) (*Oncorhynchus tshawytscha*), threatened (June 28, 2005, 70 FR 37160);
- 2) CV spring-run Chinook salmon designated critical habitat (September 2, 2005, 70 FR 52488);
- 3) CV steelhead Distinct Population Segment (DPS) (*O. mykiss*), threatened (January 5, 2006, 71 FR 834);
- 4) CV steelhead designated critical habitat (September 2, 2005, 70 FR 52488);
- 5) Southern DPS of North American green sturgeon (*Acipenser medirostris*), threatened (April 7, 2006, 71 FR 17757);
- 6) Southern DPS of North American green sturgeon designated critical habitat (October 9, 2009, 74 FR 52300);

ESA resources that occur downstream in the Feather River, Sacramento River, Sacramento-San Joaquin Delta, and San Francisco Bay may also be affected by the Project.

NMFS also identified the presence of an anadromous resource in the lower Yuba that is not listed under the ESA, but is a Federal Species of Concern (those species about which NMFS has concerns regarding status and threats, but for which insufficient information is available to indicate a need to list the species under the ESA):

- CV fall/late fall-run Chinook salmon ESU, Species of Concern (April 15, 2004, 69 FR 19975; October 17, 2006, 71 FR 61022).

This Federal Species of Concern also occurs downstream in the Feather River, Sacramento River, Sacramento-San Joaquin Delta, and San Francisco Bay, and may also be affected by the Project. While the fall/late-fall run Chinook ESU has no formal protection under the ESA, discussions with NMFS regarding effects to this species usually occurs during ESA consultation.

NMFS notes the facilities requested for review are not all considered part of the "Project" facilities by the Commission. However, for consultation under section 7 of the Endangered Species Act, the action, action area, and the effects of an action are defined more broadly. NMFS refers the Commission and Applicant to the following definitions from the Code of Federal Regulations (CFR), and to Enclosure B of this filing:

50 CFR § 402.02 Definitions.

Action means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies in the United States or upon the high seas. Examples include, but are not limited to:

- (a) actions intended to conserve listed species or their habitat;
- (b) the promulgation of regulations;
- (c) the granting of licenses, contracts, leases, easements, rights-of-way, permits, or grants-in-aid; or
- (d) actions directly or indirectly causing modifications to the land, water, or air.

Action area means all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action.

Effects of the action refers to the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action, that will be added to the environmental baseline. The environmental baseline includes the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation in process. Indirect effects are those that are caused by the proposed action and are later in time, but still are reasonably certain to occur. Interrelated actions are those that are part of a larger action and depend on the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration. (Emphasis added to highlight that evaluation of the effects of an action in the ESA sense is broader than evaluation of the action alone).

§ 5.9 (b): 1.0 Goals and Objectives of Request

Describe the goals and objectives of each study proposal and the information to be obtained;

The goal or purpose of this study is to evaluate the effects of the Project and Project-related activities on the degree of reduction or loss in nutrient replenishment to the upper and lower Yuba River. The nutrients in question are those that are marine-derived, and then transported and deposited in freshwaters by migrating anadromous fishes. The mass of nitrogen (N) will be measured here for simplicity, although carbon and phosphorus are also transported and deposited by returning anadromous salmon. In the final element, NMFS requests information about current uptake of marine-derived N, which can be “traced” in terrestrial systems because the proportion of the heavier isotope is greater in marine than freshwater ecosystems. NMFS requests the Applicant examine the ratio of (heavy) marine-derived N isotopes to the (lighter) atmospheric isotopes in periphyton and benthic macroinvertebrates collected in upper and lower Yuba locations, to compare and determine if differences in uptake in nutrients has occurred since salmon have lost access to the upper Yuba.

The information to be obtained is:

- 1) An estimate a range of the historic mass of marine-derived N that was transported annually by Chinook salmon (all runs) to the Yuba River. This is baseline information.
- 2) An estimate of the historic mass of marine-derived N that was transported annually by spring-run Chinook salmon to the upper Yuba River. This is baseline information.

- 3) An estimate of the current annual mass of marine-derived N transported by Chinook salmon to the lower Yuba River. This is current information, for comparison with baseline.
- 4) An estimate of the current annual mass of marine-derived N transported by phenotypic “spring-run” Chinook salmon to the Yuba River. This is current information, for comparison with baseline.
- 5) An estimate of the annual loss, from historic to current levels, of marine-derived N to the Yuba. This compares historic (baseline) conditions with current conditions.
- 6) An estimate of the annual loss, from historic to current levels, of marine-derived N to the upper Yuba. This compares historic (baseline) conditions with current conditions.
- 7) Compare the differences of marine-derived N incorporated into periphyton and aquatic benthic macroinvertebrates collected in the upper and lower Yuba. This will determine if uptake is occurring, and to what degree in the upper and lower Yuba.

The resulting information will be interpreted in the context of information or results yielded in other submitted requests, including *Effects of the Project and Related Facilities on Fish Passage for Anadromous Fish*, *Effects of the Project on Hydrology for Anadromous Fish: Magnitude, Timing, Duration, and Rate of Change*, and others.

§ 5.9 (b): 2.0 Resource Management Goals of NMFS

If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied;

NMFS’ Resource Management Goal and Objectives, provided in full as Enclosure G, apply with respect to species listed under the and Magnuson-Stevens Fishery Conservation and Management Act (MSA) (16 U.S.C. §1801 *et seq.*) and the Endangered Species Act (ESA) (16 U.S.C. §1531 *et seq.*), as well as anadromous species that are not currently listed but are affected by continuing operations of the Project or may require listing in the future. Thus, our requests for information or study are linked with NMFS’ Resource Management Goals and Objectives. If NMFS’ requests are included in the Applicant’s Study Plan and approved in the Commission’s Study Plan Determination, then successfully implemented, the results would inform:

- (A) Whether and how NMFS may exercise its FPA Section 18 authority, to either prescribe fishways at the Project or to reserve its prescriptive authority;
- (B) NMFS’ decisions regarding its future FPA Section 10(j) and 10(a) proposals for protection, mitigation, and enhancement measures;
- (C) NMFS’ decisions regarding its future recommended measures to improve EFH for Chinook salmon in the upper and lower Yuba, as well as areas downstream to the Bay/Delta;
- (D) The ESA Section 7 consultations (informal and formal) regarding effects on threatened species and designated critical habitats in the Yuba River, as well as areas downstream to the Bay/Delta;

The fulfillment of NMFS’ request is consistent with the following NMFS’ Resource Goals and Objectives for anadromous fishes and habitats in the Yuba River (Enclosure G):

Resource Goals:

3.1 - Protect, conserve, enhance, and recover native anadromous fishes and their habitats by providing access to suitable habitats and by restoring fully functioning habitat conditions for related rearing and feeding (see 4.1-4.4), migration (see 4.5), spawning (See 4.6), and adjoining riparian and aquatic benthic macroinvertebrate (BMI) habitats (see 4.7).

3.2 - Identify and implement measures to protect, mitigate or minimize direct, indirect, and cumulative impacts to, and enhance native anadromous fish resources, including related rearing and feeding (see 4.1-4.4), migration (see 4.5), spawning (See 4.6), riparian and BMI habitats (see 4.7), protection from adverse Fish Hatchery operations (see 4.8) and predation (see 4.9), and ensure coordination within and outside of the Project (see 4.10) to minimize risk to anadromous fishes.

Resource Objectives:

4.1-Flows; 4.2-Flow Ramping; 4.3-Water Quality; 4.4-Water Availability; 4.5-Fish Passage; 4.6-Channel Maintenance; 4.7-Riparian/LWD Habitat; 4.8-Hatchery Operations; 4.9-Predation; and 4.10-Coordination.

§ 5.9 (b): 3.0 Relevant Public Interest Considerations

If the requester is not a resource agency, explain any relevant public interest considerations in regard to the proposed study;

This content requirement is not applicable, as NMFS is a resource agency.

§ 5.9 (b): 4.0 Existing Information and Need for Additional Information

Describe existing information concerning the subject of the study proposal, and the need for additional information;

NMFS could find no existing information regarding the nutrient status of the Yuba River, with respect to the loss of marine-derived nutrients due to reduced escapement of anadromous Chinook or their blocked access to historic habitats. NMFS understanding is a nutrient study may have been planned by the Upper Yuba River Studies Program, but not carried out.

§ 5.9 (b): 5.0 Nexus Between Project Operations and Effects on the Resource Studied, and How the Study Results Would Inform Development of License Conditions

Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study results would inform the development of license requirements;

In NMFS' *Request for Information or Study: Effects of the Project and Related Facilities on Fish Passage for Anadromous Fish*, the Applicant is asked to conduct studies related to fish passage for all life stages of anadromous fish inhabiting the Yuba River; this includes passage requirements for Chinook salmon adults. In the "Background" section above, NMFS explains that the upstream migration of anadromous salmonids followed by their death is important to replenish or "fertilize" streams and rivers. This fertilization has been studied in several streams, where the uptake of nutrients has been found to enhance the abundances of periphyton, benthic macro invertebrates, the condition of juvenile salmon, the riparian shrub and tree growth, birds, mammals, and other wildlife and plants. Studies 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.

The Yuba River anadromous resources to be studied in this Request, all under the jurisdiction of NMFS, include:

- 1) Central Valley (CV) spring-run Chinook salmon Evolutionarily Significant Unit (ESU) (*Oncorhynchus tshawytscha*), threatened (June 28, 2005, 70 FR 37160);
- 2) CV spring-run Chinook salmon designated critical habitat (September 2, 2005, 70 FR 52488);
- 3) CV steelhead Distinct Population Segment (DPS) (*O. mykiss*), threatened (January 5, 2006, 71 FR 834);
- 4) CV steelhead designated critical habitat (September 2, 2005, 70 FR 52488);
- 5) CV fall/late-fall run Chinook salmon ESU, Species of Concern (April 15, 2004, 69 FR 19975);
- 6) CV spring-run and CV fall/late fall-run Chinook salmon identified “essential fish habitat” (EFH), (October 15, 2008 73 FR 60987);
- 7) CV fall/late fall-run Chinook salmon ESU, Species of Concern (April 15, 2004, 69 FR 19975).

The major nexus to this Project is that its facilities and operations may act to both reduce the abundances of returning Chinook salmon and/or impede or block their passage to upstream habitats. Since direct and indirect “feedbacks” occur whereby this salmon-borne “fertilizer” improves the quality of spawning and rearing habitat, and thus the reproductive success of subsequent generations of salmon, losses could beget more losses if this trend is not reversed. The consequences are vastly reduced stream and riparian productivity. The Project’s facilities and operations, and related activities, could impede or block anadromous fish passage at multiple locations in the watershed. NMFS constructed Table 2 (below) to note all these facilities locations where passage of adult Chinook could be impaired or blocked, and note it contains some 20 Project facilities. Due to relationship of Project operations with other facilities listed in

Table 2. Project and Project-related facilities encountered by anadromous fishes migrating in the Yuba River.

Reach	#	Facility Encountered (upstream direction)	RM	Total Migration Distance (mi.)
Lower Yuba				
	1	Daguerre Point Dam	11.4	11.4
	2	Hallwood-Cordua diversion	11.4	11.4
	3	South Yuba-Brophy diversion	11.6	11.6
	4	Brown's Valley diversion	12.2	12.2
	5	Narrows I Powerhouse	23.6	23.6
	6	Narrows II Powerhouse	23.9	23.9
	7	Narrows II Flow Bypass	23.9	23.9
	8	Englebright Dam	24.0	24.0
Upper Yuba				
	9	Englebright Reservoir	24.0	24.0
	10	Narrows I Intake	24.1	24.1
	11	Narrows II Intake	24.1	24.1
	12	Englebright Reservoir (end)	32.2	32.2
	13	New Colgate Powerhouse	33.9	33.9
Middle Yuba			0.0	40.1
	14	Our House Measurement Weir	11.9	51.6
	15	Our House Dam	12.0	51.7
	16	Our House Reservoir	12.0	51.7
	17	Lohman Diversion Intake	12.1	51.8
Oregon Creek			0.0	44.2
	18	Log Cabin Diversion Dam	4.1	48.3
	19	Log Cabin Reservoir	4.1	48.3
	20	Camptonville Diversion Intake	4.1	48.3
	21	Lohman Ridge Diversion Outlet	4.3	48.5
North Yuba			0.0	42.0
	22	New Bullards Bar Dam Spillway	2.1	44.1
	23	Fish Release Measurement Weir	2.2	44.2
	24	New Bullards Fish Flow Powerhouse	2.3	44.3
	25	New Bullards Dam	2.3	44.3
	26	New Bullards Reservoir	2.3	44.3
	27	New Colgate Power Intake	2.6	44.6
	28	Bullards Bar Dam (submerged)	2.7	44.7
	29	Camptonville Diversion Tunnel Outlet	2.8	44.8
	30	Recreation Facilities	3.0	45.0
	31	New Bullards Reservoir (end)	18.1	60.1

Table 2, there is a nexus to additional facilities that could block or impair upstream salmon migrations. Lastly, due to the effects of Project diversions, potential anadromous passage at additional areas of steep natural gradient within natural stream channels could be impaired or blocked.

§ 5.9 (b): 6.0 Consistency with Generally Accepted Practice

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 relevant tribal values and knowledge;

This request is consistent with evaluations of marine-derived nutrient status performed in California and the Pacific Northwest by Gresh et al. (2000). The request is also consistent with the methods applied by Merz and Moyle (2006) for the Central Valley Chinook salmon of the Central Valley of California. Ecological studies that rely on isotopes are widely performed and the results are available in the publicly available scientific journals.

NMFS is presenting an Information Request and not necessarily specific study methodology (preferred data collection and analysis techniques, or objectively quantified information). This is because the Applicant's responsibility under the FPA is to either provide the requested information or to develop a more detailed Study Plan to obtain such information. It is anticipated that through the reiterative study development process within the ILP that the Applicant and the Commission will work with ILP participants to develop a study that obtains the requested information, or that adequate information, approved by the Commission, is provided by the Applicant.

§ 5.9 (b): 7.0 Considerations of Level of Effort and Cost

Describe considerations of level of effort and cost, as applicable, and why any proposed alternative studies would not be sufficient to meet the stated information needs.

The Licensees do not request PURPA benefits in their PAD. NMFS considers that the cost of these studies will to be between \$10,000-\$20,000. The Project is considered vast and complex. Considering the number of dams, the amount of water diverted, the potential for environmental disturbance, the status of several species listed under the ESA, and the recent closure of Chinook fisheries on the West Coast of the United States, the level of effort and cost for the Applicant is commensurate with the magnitude and impacts of the Project, and the revenues derived from sales of generated energy.

8.0 References

- Bilby, R. E., B. R. Fransen, P. A. Bisson, and J. K. Walter. 1998. Response of juvenile coho salmon (*Oncorhynchus kisutch*) and steelhead (*Oncorhynchus mykiss*) to the addition of salmon carcasses to two streams in southwestern Washington, USA. *Canadian Journal of Fisheries and Aquatic Sciences* 55:1909-1918.
- Greathouse, R. 2010. Vaki Riverwatcher monitoring at Daguerre Point Dam. Presentation at the June 29, 2010 Lower Yuba River Accord River Management Team, Sacramento, CA.
- Gresh, T., Lichatowich, J., and P. Schoonmaker. 2000. An estimation of historic and current levels of salmon production in the Northeast Pacific ecosystem: evidence of a nutrient deficit in the freshwater systems of the Pacific Northwest. *Fisheries*: 25(1):15-21.
- Helfield, J.M. and R.J. Naiman. 2001. Effects of salmon-derived nitrogen on riparian forest growth and implications for stream productivity. *Ecology* 82(9): 2403-2409.
- Kohler, A. E., Rugenski, A., and D. Taki. 2008. Stream food web response to a salmon carcass analogue addition in two central Idaho, U.S.A. streams. *Freshwater Biology* 53: 446-460.
- Merz, J.E. and P.B. Moyle. 2006. Salmon, wildlife, and wine: marine-derived nutrients in human-dominated ecosystems of central California. *Ecological Applications* 16(3):999-1009.
- Quinn, T.P. 2005. The Ecology of Dead Salmon, Chapter 7 in *The Behavior and Ecology of Pacific Salmon and Trout*. University of Washington Press. Seattle.
- Wipfli, M. S., Hudson, J. P., and J. P. Caouette. 1998. Influence of salmon carcasses on stream productivity: response of biofilm and benthic macroinvertebrates in southeastern Alaska, USA. *Canadian Journal of Fisheries and Aquatic Sciences* 55:1503-1511.
- Yoshiyama, R.M., E.R. Gerstung, F.W. Fisher, and P.B. Moyle. 2001. Historical and Present Distribution of Chinook Salmon in the Central Valley Drainage of California in *Contributions to the Biology of Central Valley Salmonids*. Vol. 1. California Department of Fish and Game, Fish Bulletin 179, R.L. Brown, ed.

Federal Register Notices

- Federal Register Notice, 63 Fed. Reg. 13347, March 19, 1998. Endangered and Threatened Species: Threatened Status for Two Evolutionarily Significant Units of Steelhead in Washington, Oregon, and California. Final Rule.
- Federal Register Notice, 64 Fed. Reg. 50394, September 16, 1999. Endangered and Threatened Species: Threatened Status for Two Chinook Salmon Evolutionarily Significant Units in California. Final Rule.
- Federal Register Notice, 69 Fed. Reg. 19975, April 15, 2004. Endangered and Threatened Species; Establishment of Species of Concern List, Addition of Species to Species of Concern List, Description of Factors for Identifying Species of Concern, and Revision of Candidate Species List Under the Endangered Species Act. Final Rule.

Federal Register Notice, 70 Fed. Reg. 37160, June 28, 2005. Endangered and Threatened Species: Final Listing Determinations for 16 Evolutionarily Significant Units (ESUs) of West Coast Salmon, and Final 4(d) Protective Regulations for Threatened Salmonid ESUs. Final Rule.

Federal Register Notice, 70 Fed. Reg. 52488, September 2, 2005. Endangered and Threatened Species: Designation of Critical Habitat for Seven Evolutionarily Significant Units of Pacific Salmon and Steelhead in California. Final Rule.

Federal Register Notice, 71 Fed. Reg. 834, January 5, 2006. Endangered and Threatened Species: Final Listing Determinations for 10 Distinct Population Segments of West Coast Steelhead. Final Rule.

Federal Register Notice, 71 Fed. Reg. 17757, April 7, 2006. Endangered and Threatened Wildlife and Plants: Threatened Status for Southern Distinct Population Segment of North American Green Sturgeon. Final Rule.

Federal Register Notice, 71 Fed. Reg. 61022, October 17, 2006. Endangered and Threatened Species: Revision of Species of Concern List, Candidate Species Definition, and Candidate Species List.

Federal Register Notice, 73 FR 60987, October 15, 2008. Fisheries Off West Coast States; West Coast Salmon Fisheries; Amendment 14; Essential Fish Habitat Descriptions for Pacific Salmon. Final Rule.

Federal Register Notice, 74, FR 52300, October 9, 2009. Endangered and Threatened Wildlife and Plants: Final Rulemaking to Designate Critical Habitat for the Threatened Southern Distinct Population Segment of North American Green Sturgeon. Final Rule.

Federal Register Notice, 75 Fed. Reg. 30714, June 2, 2010. Endangered and Threatened Wildlife and Plants: Final Rulemaking To Establish Take Prohibitions for the Threatened Southern Distinct Population Segment of North American Green Sturgeon. Final Rule. June 2, 2010.

NMFS Request #7
Effects of the Project and Related Activities on
Aquatic Benthic Macroinvertebrates for Anadromous Fish
March 7, 2011

The National Oceanic and Atmospheric Administration's, National Marine Fisheries Service (NMFS) hereby files this request for additional information and study with the Federal Energy Regulatory Commission (Commission or FERC) for Yuba County Water Agency's (Applicant) Yuba River Hydroelectric Project (Project), FERC Project No. 2246, Yuba River, California.

NMFS is presenting an Information Request and not proposing a study or related study methodology (preferred data collection and analysis techniques, or objectively quantified information). This is because the Applicant's responsibility under the FPA is to either provide the requested information or to develop a more detailed study plan so as to obtain such information. It is anticipated that through the reiterative Study Development process within the ILP, that the Applicant and the Commission will work with all ILP participants to develop a study that obtains our requested information or that adequate information, approved by the Commission, is provided by the Applicant. However, preliminary guidance is provided below.

Request Element #1: Literature and Data Review

Describe the aquatic BMI communities found within the Project's action area including information on community structure and their habitat conditions.

Request Element #2: Qualitatively evaluate effects on the aquatic BMI communities

Applicant should develop qualitative relationships between Project operation and operational changes and existing aquatic BMI communities through field studies. Aquatic BMI form the basis of the aquatic food web and are excellent indicators of long-term water quality conditions since specific communities develop in response to specific stream conditions and perturbations. The Department of Fish and Game's California Stream Bioassessment Procedure (CSBP) will be used to assess aquatic macroinvertebrates communities (Harrington 1999). The CSBP is a regional adaptation of the national Rapid Bioassessment Protocols outlined by the U.S. Environmental Protection Agency in "*Rapid Bioassessment Protocols for use in Streams and Rivers*" (Barbour et al. 1999, EPA 841-D-97-002).

Habitat conditions downstream from major dams generally result in significant changes to macroinvertebrate community structure and function due to altered temperature, flow, food, and substrate regimes. Aquatic BMI will be assessed above and below Project's dams, within Project stream reaches and by-passed reaches, and will require at least one reference point that is upstream of any Project influences. Although more details may be worked out with the Applicant, based on how the Applicant proposes to address this information request, we request that BMI sampling be done in the following areas listed below.

NMFS Requested BMI Sampling Areas:

- 1) Reference Spot: Upper main stem NF Yuba, above New Bullards Bar Reservoir (somewhere within the 36 miles below Loves Falls);
- 2) NF Yuba, between New Bullards Bar Dam and Confluence of MF Yuba (somewhere within the 2.3 mi.);
- 3) NF Yuba, between confluence of MF Yuba and Colgate Powerhouse discharge (somewhere within the 5.8 mi.);
- 4) NF Yuba, between Colgate Powerhouse discharge and Englebright Reservoir (somewhere within the 1.7 mi.);
- 5) MF Yuba above Our House Reservoir;
- 6) MF Yuba, between Our House Dam and confluence of Oregon Creek (somewhere within the 7.5 mi.);
- 7) MF Yuba, between confluence of Oregon Creek and NF/MF Yuba confluence (somewhere within the 4.5 mi.);
- 8) Oregon Creek above Log Cabin Reservoir;
- 9) Oregon Creek, between Log Cabin Dam and Confluence of MF Yuba (somewhere within the 4.1 mi.);
- 10) SF Yuba, above Englbright Reservoir;
- 11) Main Stem Yuba, between Englbright Dam and Daguerre Point Dam (somewhere within the 12.6 mi.); and
- 12) Main Stem Yuba, between Daguerre Point Dam and confluence with Feather River (somewhere within the 11.4 mi.).

This request is formatted in accordance with:

Title 18 of the Federal regulations *Conservation of Power and Water Resources*;
Part 5 *Integrated License Application Process*; Section 5.9 *Comments and information or study requests*.

18 CFR § 5.9 (a): *Comments and study requests*. Comments on the pre-application document and the Commission staff's Scoping Document 1 must be filed with the Commission within 60 days following the Commission's notice of consultation procedures issued pursuant to §5.8. Comments, including those by Commission staff, must be accompanied by any information gathering and study requests, and should include information and studies needed for consultation under section 7 of the Endangered Species Act and water quality certification under Section 401 of the Clean Water Act. (Emphasis added for relevance to highlight NMFS' ESA concerns)

18 CFR § 5.9 (b): *Content of study request.* Any information or study request must:

- (1) Describe the goals and objectives of each study proposal and the information to be obtained;
 - (2) If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied;
 - (3) If the requester is not a resource agency, explain any relevant public interest considerations in regard to the proposed study;
 - (4) Describe existing information concerning the subject of the study proposal, and the need for additional information;
 - (5) Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study results would inform the development of license requirements;
 - (6) 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 relevant tribal values and knowledge; and
 - (7) Describe considerations of level of effort and cost, as applicable, and why any proposed alternative studies would not be sufficient to meet the stated information needs.
- (c) *Applicant seeking PURPA benefits; estimate of fees.* If a potential applicant has stated that it intends to seek PURPA benefits, comments on the pre-application document by a fish and wildlife agency must provide the potential applicant with a reasonable estimate of the total costs the agency anticipates it will incur in order to set mandatory terms and conditions for the proposed project. An agency may provide a potential applicant with an updated estimate as it deems necessary. If any agency believes that its most recent estimate will be exceeded by more than 25 percent, it must supply the potential applicant with a new estimate and submit a copy to the Commission.

§ 5.9 (a): The Information Gathering or Study Should Inform Consultation Under Section 7 of the Endangered Species Act

Comments, including those by Commission staff, must be accompanied by any information gathering and study requests, and should include information and studies needed for consultation under section 7 of the Endangered Species Act

The information or study resulting from this Request would inform future ESA consultation between NMFS and the Commission because the Project's effects on the resource(s) to be studied in this request affect ESA-listed salmonids or sturgeon, and/or their ESA-designated critical habitats, both in the Yuba River and in locations downstream.

NMFS has identified the following ESA-protected anadromous fishes and habitats (ESA resources) in the Yuba River that could be affected by the Project:

- 1) Central Valley (CV) spring-run Chinook salmon Evolutionarily Significant Unit (ESU) (*Oncorhynchus tshawytscha*), threatened (June 28, 2005, 70 FR 37160);
- 2) CV spring-run Chinook salmon designated critical habitat (September 2, 2005, 70 FR 52488);
- 3) CV steelhead Distinct Population Segment (DPS) (*O. mykiss*), threatened (January 5, 2006, 71 FR 834);
- 4) CV steelhead designated critical habitat (September 2, 2005, 70 FR 52488);
- 5) Southern DPS of North American green sturgeon (*Acipenser medirostris*), threatened (April 7, 2006, 71 FR 17757);
- 6) Southern DPS of North American green sturgeon designated critical habitat (October 9, 2009, 74 FR 52300);

ESA resources that occur downstream in the Feather River, Sacramento River, Sacramento-San Joaquin Delta, and San Francisco Bay may also be affected by the Project.

NMFS also identified the presence of an anadromous resource in the lower Yuba that is not listed under the ESA, but is a Federal Species of Concern (those species about which NMFS has concerns regarding status and threats, but for which insufficient information is available to indicate a need to list the species under the ESA):

- CV fall/late fall-run Chinook salmon ESU, Species of Concern (April 15, 2004, 69 FR 19975; October 17, 2006, 71 FR 61022).

This Federal Species of Concern also occurs downstream in the Feather River, Sacramento River, Sacramento-San Joaquin Delta, and San Francisco Bay, and may also be affected by the Project. While the fall/late-fall run Chinook ESU has no formal protection under the ESA, discussions with NMFS regarding effects to this species usually occurs during ESA consultation.

NMFS notes the facilities requested for review are not all considered part of the “Project” facilities by the Commission. However, for consultation under section 7 of the Endangered Species Act, the action, action area, and the effects of an action are defined more broadly. NMFS refers the Commission and Applicant to the following definitions from the Code of Federal Regulations (CFR), and to Enclosure B of this filing:

50 CFR § 402.02 Definitions.

Action means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies in the United States or upon the high seas. Examples include, but are not limited to:

- (a) actions intended to conserve listed species or their habitat;
- (b) the promulgation of regulations;
- (c) the granting of licenses, contracts, leases, easements, rights-of-way, permits, or grants-in-aid;
- or
- (d) actions directly or indirectly causing modifications to the land, water, or air.

Action area means all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action.

Effects of the action refers to the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action, that will be added to the environmental baseline. The environmental baseline includes the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation in process. Indirect effects are those that are caused by the proposed action and are later in time, but still are reasonably certain to occur. Interrelated actions are those that are part of a larger action and depend on the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration. (Emphasis added to highlight that evaluation of the effects of an action in the ESA sense is broader than evaluation of the action alone).

§ 5.9 (b): 1.0 Goals and Objectives of Request

Describe the goals and objectives of each study proposal and the information to be obtained;

Goals and Purpose: The overall goal is, first, to describe the aquatic BMI resources located within the Project's action area and, second, to evaluate the potential impacts to these resources that are a result of ongoing Project operations. This will focus specifically on aquatic BMI as they are indicators of overall water quality and the prey base for fish. The purpose is to document the existing condition and evaluate the operational effects of the Project on aquatic BMI residing in the Project's reservoirs and river habitats within the action area. The Project has the potential to affect aquatic BMI communities directly by operations or related actions that affect water quantity or quality parameters such as river flows, reservoir surface elevation, turbidity, dissolved oxygen, and temperature. In addition, Project actions that result in changes in fish abundance or the introduction/removal of fish species would have indirect, trophic level effects on the aquatic communities of interest.

Objectives: Information collected from this and other requests will facilitate our understanding of the potential changes in the physical, chemical, and/or biological resources associated with future changes in Project operations. Potential effects on BMI associated with the existing condition and any proposed operational changes, will be assessed through an evaluation of

published scientific data from other similar facilities and data collected as part of the field investigations associated with this and other information requests. All potential Project-related effects will be described in terms of changes to water quality or quantity parameters and subsequent likely effects on the existing aquatic BMI communities. NMFS suggests some specific objectives below.

Objective 1. Describe the aquatic BMI communities found within Project waters and action area including information on community structure and their habitat conditions.

Objective 2. Qualitatively evaluate effects on the aquatic BMI communities that may result from current operations or operational changes at the Project.

§ 5.9 (b): 2.0 Resource Management Goals of NMFS

If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied;

NMFS' Resource Management Goal and Objectives (Sections in NMFS 2011) apply with respect to species listed under the and Magnuson-Stevens Fishery Conservation and Management Act (MSA) (16 U.S.C. §1801 *et seq.*) and the Endangered Species Act (ESA) (16 U.S.C. §1531 *et seq.*), as well as anadromous species that are not currently listed but are affected by continuing operations of the Project or may require listing in the future. Thus, our Resource Goals and Objectives serve to link our information requests with information needed to inform our various decisions that we will make during these proceedings:

- Information to inform how we may exercise our FPA Section 18 authority, to either reserve our fish passage prescriptive authority or to stipulate fish passage prescriptions;
- Information to inform the contents of our proposed FPA Section 10(j) and 10(a) protection, mitigation, and enhancement measures;
- Information to inform what we recommend as Essential Fish Habitat designations, pursuant to the MSA; and
- Information to inform our needs so that we may recommend Critical Habitat and conduct an adequate Section 7 consultation on listed species, pursuant to the ESA.

The fulfillment of our Information Request would serve, in part, towards satisfying the following NMFS' Resources Goals and Objectives (Sections in NMFS 2011) for anadromous fishes in the Yuba River:

Resource Goals: Sections in NMFS 2011

3.1 - Protect, conserve, enhance, and recover native anadromous fishes and their habitats by providing access to suitable habitats and by restoring fully functioning habitat conditions for related rearing and feeding (see 4.1-4.4), migration (see 4.5), spawning (See 4.6), and adjoining riparian and aquatic benthic macroinvertebrate (BMI) habitats (see 4.7).

3.2 - Identify and implement measures to protect, mitigate or minimize direct, indirect, and cumulative impacts to, and enhance native anadromous fish resources, including related related rearing and feeding (see 4.1-4.4), migration (see 4.5), spawning (See 4.6), riparian and BMI

habitats (see 4.7), protection from adverse Fish Hatchery operations (see 4.8) and predation (see 4.9), and ensure coordination within and outside of the Project (see 4.10) to minimize risk to anadromous fishes.

Resource Objectives: Sections in NMFS 2011

4.1-Flows; 4.2-Flow Ramping; 4.3-Water Quality; 4.6-Channel Maintenance; and 4.7-Riparian/LWD Habitat.

§ 5.9 (b): 3.0 Relevant Public Interest Considerations

If the requester is not a resource agency, explain any relevant public interest considerations in regard to the proposed study;

This content requirement is not applicable, as NMFS is a resource agency.

§ 5.9 (b): 4.0 Existing Information and Need for Additional Information

Describe existing information concerning the subject of the study proposal, and the need for additional information;

NMFS is requesting information, not a specific study at this time. However, we expect that the Applicant may need to design and conduct a study, through the ILP study development process, in order to satisfy our information request. Section 4.51(f)(3) of 18 CFR requires reporting of certain types of information in the Application for License of major hydropower projects, including a discussion of fish, wildlife, and botanical resources in the vicinity of the project. The discussion needs to identify the potential effects of the project on these resources, including a description of any anticipated continuing effect for on-going and future operations. This information request fulfills these requirements, by asking for information that evaluates the potential effects on aquatic BMI within the Project's action area. As part of the relicensing action, and to be consistent with the National Environmental Policy Act (NEPA 1969), the Commission requires an analysis of the potential impacts associated with continuing operation of the power generation facility.

§ 5.9 (b): 5.0 Nexus Between Project Operations and Effects on the Resource Studied, and How the Study Results Would Inform Development of License Conditions

Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study results would inform the development of license requirements;

Aquatic benthic macroinvertebrate (BMI) communities are important components of the food web for fish species in the various stream reaches of the Yuba River watershed within the Project action area as well as for anadromous salmonids and green sturgeon in the lower Yuba River downstream from the Project. Aquatic BMI harvest aquatic bacteria and other organic materials, thereby assimilating carbon, nitrogen, phosphorus, sulfur, and other trace elements. In turn, aquatic BMI are the food organisms utilized by fish at various life-stages. Thus, aquatic BMI are important food organisms for fish species and provide the critical inorganic and organic nutrients needed for fish species to survive and propagate.

Changes in aquatic BMI can be associated with variations in water quality, water quantity, and/or harvesting intensities (feeding rates). For example, changes in water temperature can result in changes in species composition that are as dramatic as the permanent elimination of some species from the community. A shift in predatory species or a change in abundance of predators/foragers within the system may similarly alter the BMI community structures. Such community level changes may, or may not, be reflected in total biomass or production estimates, but should be indicated in an evaluation of taxonomic and/or functional groups represented within the aquatic BMI communities. The composition of BMI communities, including representation by a diversity of functional groups and size structures, is an indicator of system health and long-term water quality conditions that may not be evident from traditional water quality sampling.

Chemical, biological, and physical parameters correlated with aquatic BMI communities could be changed by alternative Project operations, and therefore must be evaluated to determine existing baseline conditions. For example, changes in basic water chemistry, important nutrients, water temperature regimes, downstream flow regimes, stream substrate composition, and rate and extent of reservoir water surface elevation changes could result in changes to the BMI communities within the Project's action area. Even if changes were predicted or suspected as a result of some future study, those changes might not result in a negative impact to aquatic BMI resources. An important aspect of this information request is the determination whether any predicted or suspected changes would result in negative impacts. To successfully evaluate the effects of continued Project operation or of operational changes there must first be a clear identification and understanding of what potential operational changes may be implemented, how those changes could affect important chemical, physical, and biological parameters, and whether those changes would result in adverse changes to aquatic BMI communities or the habitats upon which they depend. NMFS assumes that the Applicant may need to develop a specific study to address our request.

The first task in our request is designed to review available literature and collate Project specific data. Subsequently, this information will be used to assess the effects of changes in reservoir and downstream operations on the aquatic BMI resources. Because of the complications associated with trophic dynamics, it would be difficult to predict specific changes in aquatic BMI communities that might potentially result from a future proposed action or operational change. Based on the review of existing information and future field study results, we anticipate being able to identify a general level of impact or qualitative change to the aquatic communities of concern. For example, a proposed action that would result in significantly increased turbidity would be expected to have a strong impact on primary production as well as associated cascading trophic effects. This information request, as well as an Applicant's appropriately designed field study, will collect information to assess whether on-going Project operations or changes in Project operations may affect the aquatic BMI resources present within or transitory to the Project's action area.

The Yuba River anadromous resources to be studied in this Request, all under the jurisdiction of NMFS, include:

- 1) Central Valley (CV) spring-run Chinook salmon Evolutionarily Significant Unit (ESU) (*Oncorhynchus tshawytscha*), threatened (June 28, 2005, 70 FR 37160);
- 2) CV spring-run Chinook salmon designated critical habitat (September 2, 2005, 70 FR 52488);
- 3) CV steelhead Distinct Population Segment (DPS) (*O. mykiss*), threatened (January 5, 2006, 71 FR 834);
- 4) CV steelhead designated critical habitat (September 2, 2005, 70 FR 52488);
- 5) Southern DPS of North American green sturgeon (*Acipenser medirostris*), threatened (April 7, 2006, 71 FR 17757);
- 6) Southern DPS of North American green sturgeon designated critical habitat (October 9, 2009, 74 FR 52300);
- 7) CV fall/late fall-run Chinook salmon ESU, Species of Concern (April 15, 2004, 69 FR 19975);
- 8) CV spring-run and CV fall/late-fall run Chinook salmon identified “essential fish habitat” (EFH), (October 15, 2008 73 FR 60987);
- 9) CV fall/late fall-run Chinook salmon ESU, Species of Concern (April 15, 2004, 69 FR 19975).

§ 5.9 (b): 6.0 Consistency with Generally Accepted Practice

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 relevant tribal values and knowledge;

This request for information or study is consistent with the goals and objectives outlined for recent FERC hydroelectric ILP studies in the Western U.S., and uses accepted methodologies from published scientific literature and protocols from the National Marine Fisheries Service, U.S. Fish and Wildlife Service, and California Department of Fish and Game.

NMFS is presenting an Information Request and not necessarily specific study methodology (preferred data collection and analysis techniques, or objectively quantified information). This is because the Applicant’s responsibility under the FPA is to either provide the requested information or to develop a more detailed Study Plan to obtain such information. It is anticipated that through the reiterative study development process within the ILP that the Applicant and the Commission will work with ILP participants to develop a study that obtains

the requested information, or that adequate information, approved by the Commission, is provided by the Applicant.

§ 5.9 (b): 7.0 Considerations of Level of Effort and Cost

Describe considerations of level of effort and cost, as applicable, and why any proposed alternative studies would not be sufficient to meet the stated information needs.

The Licensees do not request PURPA benefits in their PAD. NMFS considers that the cost of these studies will be between \$50,000-\$150,000. The Project is considered vast and complex. Considering the number of dams, the amount of water diverted, the potential for environmental disturbance, the status of several species listed under the ESA, and the recent closure of Chinook fisheries on the West Coast of the United States, the level of effort and cost for the Licensees is commensurate with the magnitude and impacts of the Project, and the revenues derived from sales of generated energy.

8.0 References

- Barbour, M.T., J. Gerritsen, B.D. Snyder and J.B. Stribling. 1999. Revision to rapid bioassessment protocols for use in stream and rivers: periphyton, BMIs and fish. EPA 841-D-97-002. U.S. Environmental Protection Agency. Washington DC.
- Harrington, J.M. 1999. California stream bioassessment procedures. California Department of Fish and Game, Water Pollution Control Laboratory. May 1999. Rancho Cordova, CA.
- Merz, J.E. and P.B. Moyle. 2006. Salmon, wildlife, and wine: marine-derived nutrients in human-dominated ecosystems of central California. *Ecological Applications* 16(3):999-1009.
- National Marine Fisheries Service (NMFS). 2009. "Public Draft Recovery Plan for Sacramento River Winter-run Chinook Salmon, Central Valley Spring-run Chinook Salmon, and Central Valley Steelhead." NMFS, Southwest Region, Sacramento, California. 7pp. October 2009.
- NMFS. 2011. Resource Management Goals and Objectives for the Yuba River and the Yuba River Hydroelectric Project, Federal Energy Regulatory Commission Project No. 2246, Yuba River, California. NMFS, Southwest Region, Santa Rosa, California. March 5, 2011.
- Pacific Fisheries Management Council (PFMC). 1999. Pacific Fishery Management Council. Description and identification of essential fish habitat, adverse impacts and recommended conservation measures for salmon. *Amendment 14 to the Pacific Coast Salmon Plan, Appendix A*. Pacific Fisheries Management Council, Portland, Oregon.
- PFMC. 2003. Pacific Fishery Management Council. Fishery Management Plan for Commercial and Recreational Salmon Fisheries off the Coasts of Washington, Oregon and California as Revised Through Amendment 14 (Adopted 1999).
- NEPA 1969. The National Environmental Policy Act of 1969, as amended (Pub. L. 91-190, 42 U.S.C. 4321-4347, January 1, 1970, as amended by Pub. L. 94-52, July 3, 1975, Pub. L. 94-83, August 9, 1975, and Pub. L. 97-258, § 4(b), Sept. 13, 1982)

Federal Register Notices

Federal Register Notice, 63 Fed. Reg. 13347, March 19, 1998. Endangered and Threatened Species: Threatened Status for Two Evolutionarily Significant Units of Steelhead in Washington, Oregon, and California. Final Rule.

Federal Register Notice, 64 Fed. Reg. 50394, September 16, 1999. Endangered and Threatened Species: Threatened Status for Two Chinook Salmon Evolutionarily Significant Units in California. Final Rule.

Federal Register Notice, 69 Fed. Reg. 19975, April 15, 2004. Endangered and Threatened Species; Establishment of Species of Concern List, Addition of Species to Species of Concern List, Description of Factors for Identifying Species of Concern, and Revision of Candidate Species List Under the Endangered Species Act. Final Rule.

Federal Register Notice, 70 Fed. Reg. 37160, June 28, 2005. Endangered and Threatened Species: Final Listing Determinations for 16 Evolutionarily Significant Units (ESUs) of West Coast Salmon, and Final 4(d) Protective Regulations for Threatened Salmonid ESUs. Final Rule.

Federal Register Notice, 70 Fed. Reg. 52488, September 2, 2005. Endangered and Threatened Species: Designation of Critical Habitat for Seven Evolutionarily Significant Units of Pacific Salmon and Steelhead in California. Final Rule.

Federal Register Notice, 71 Fed. Reg. 834, January 5, 2006. Endangered and Threatened Species: Final Listing Determinations for 10 Distinct Population Segments of West Coast Steelhead. Final Rule.

Federal Register Notice, 71 Fed. Reg. 17757, April 7, 2006. Endangered and Threatened Wildlife and Plants: Threatened Status for Southern Distinct Population Segment of North American Green Sturgeon. Final Rule.

Federal Register Notice, 71 Fed. Reg. 61022, October 17, 2006. Endangered and Threatened Species: Revision of Species of Concern List, Candidate Species Definition, and Candidate Species List.

Federal Register Notice, 73 FR 60987, October 15, 2008. Fisheries Off West Coast States; West Coast Salmon Fisheries; Amendment 14; Essential Fish Habitat Descriptions for Pacific Salmon. Final Rule.

Federal Register Notice, 74, FR 52300, October 9, 2009. Endangered and Threatened Wildlife and Plants: Final Rulemaking to Designate Critical Habitat for the Threatened Southern Distinct Population Segment of North American Green Sturgeon. Final Rule.

Federal Register Notice, 75 Fed. Reg. 30714, June 2, 2010. Endangered and Threatened Wildlife and Plants: Final Rulemaking To Establish Take Prohibitions for the Threatened Southern Distinct Population Segment of North American Green Sturgeon. Final Rule. June 2, 2010.

NMFS Request #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
March 7, 2011

The National Oceanic and Atmospheric Administration's, National Marine Fisheries Service (NMFS) hereby files this request for additional information and study with the Federal Energy Regulatory Commission (Commission or FERC) for Yuba County Water Agency's (Applicant) Yuba River Hydroelectric Project (Project), FERC Project No. 2246, Yuba River, California.

This request compiles and synthesizes information generated from the following NMFS requests:

NMFS #1. Effects of the Project and Related Activities on Fish Passage for Anadromous Fish

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

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

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

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

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

NMFS #7. Effects of the Project and Related Activities on Aquatic Benthic Macroinvertebrates for Anadromous Fish

This request aims to synthesize the various abiotic and biotic categories studied in the ILP process (i.e. water resources, geology and soils, etc.) into a holistic and comprehensive assessment of the direct, indirect and cumulative effects of the Project, along with the effects of other activities that are interrelated or interdependent with the Project action, on anadromous fishes and their habitats. The assessment should be a synthesis that applies the results not only from the above requested elements (NMFS #1-7), but also considers the combined effects on each life stage of a species as well as on population structure and composition. Therefore this information request is arranged into sub-elements that correspond to the life history stages of the species, as well as a population dynamics element.

Although the above information requests (NMFS #1-7) were specifically crafted for inclusion into this information request (NMFS #8), this request may still be satisfied with information developed outside NMFS' requests, such as by the results of studies done by the Lower Yuba Accord River Management Team, or other studies to be completed by the Applicant. However, it is expected that other such studies will be combined with the NMFS information requests above, and synthesized, to fulfill this request. Table 1 lists Project and related facilities that could directly affect anadromous fish. These facilities also produce indirect and cumulative

Table 1. Project and Project-related facilities encountered by anadromous fishes migrating in the Yuba River.

Reach	#	Facility Encountered (upstream direction)	RM	Total Migration Distance (mi.)
Lower Yuba				
	1	Daguerre Point Dam	11.4	11.4
	2	Hallwood-Cordua diversion	11.4	11.4
	3	South Yuba-Brophy diversion	11.6	11.6
	4	Brown's Valley diversion	12.2	12.2
	5	Narrows I Powerhouse	23.6	23.6
	6	Narrows II Powerhouse	23.9	23.9
	7	Narrows II Flow Bypass	23.9	23.9
	8	Englebright Dam	24.0	24.0
Upper Yuba				
	9	Englebright Reservoir	24.0	24.0
	10	Narrows I Intake	24.1	24.1
	11	Narrows II Intake	24.1	24.1
	12	Englebright Reservoir (end)	32.2	32.2
	13	New Colgate Powerhouse	33.9	33.9
Middle Yuba			0.0	40.1
	14	Our House Measurement Weir	11.9	51.6
	15	Our House Dam	12.0	51.7
	16	Our House Reservoir	12.0	51.7
	17	Lohman Diversion Intake	12.1	51.8
Oregon Creek			0.0	44.2
	18	Log Cabin Diversion Dam	4.1	48.3
	19	Log Cabin Reservoir	4.1	48.3
	20	Camptonville Diversion Intake	4.1	48.3
	21	Lohman Ridge Diversion Outlet	4.3	48.5
North Yuba			0.0	42.0
	22	New Bullards Bar Dam Spillway	2.1	44.1
	23	Fish Release Measurement Weir	2.2	44.2
	24	New Bullards Fish Flow Powerhouse	2.3	44.3
	25	New Bullards Dam	2.3	44.3
	26	New Bullards Reservoir	2.3	44.3
	27	New Colgate Power Intake	2.6	44.6
	28	Bullards Bar Dam (submerged)	2.7	44.7
	29	Camptonville Diversion Tunnel Outlet	2.8	44.8
	30	Recreation Facilities	3.0	45.0
	31	New Bullards Reservoir (end)	18.1	60.1

effects that have the potential to produce even greater affects to anadromous fish and the ecosystems that support them. These indirect and cumulative effects are not adequately considered in the ILP process where Project effects are in “silos” where the holistic effects of the Project to the ecosystems which support anadromous fish are not adequately addressed. Facilities 4-8 in Table 1 not only affect streamflow but they affect, sediment, LWD, benthic macroinvertebrates, and temperature simultaneously, producing cumulative effects not addressed in investigations of any particular silo. For instance, reduced sediment supply may cause channel incision which leaves LWD “stranded” above normal flows which might reduce pool frequency and benthic macroinvertebrate frequency downstream, both vital components of anadromous fish ecosystems.

Request Element #1: Adult Migration

Although this element focuses on the life history of spring-run Chinook salmon, information generated will be applicable to fall/late fall run Chinook salmon and steelhead. The main sources of information for assessment of adult migration will come from NMFS information requests #1-7. The Project facilities have direct, indirect and cumulative effects on the adult migration life stage of anadromous fish. These information requests should be synthesized with other existing and developed information to assess timing and magnitude of flows during migration seasons, natural and artificial barriers to upstream adult migration, as well as the effects to the ecosystems which support salmonids during this life stage. Some of the main questions to be answered in this synthesis are:

- 1) What effects do Project altered hydrology/water temperature at the Feather/Sacramento and Yuba/Feather confluences have on adult salmonid migration into the Yuba River?
- 2) What is the effect of Project altered hydrology/geomorphology at Daguerre Point Dam on successful use and operation of the fish ladders?
- 3) How does the Project affect migration timing or delay at Daguerre Point Dam?
- 4) What are the alternatives for Project-related improvements regarding the safe, timely, and effective fish passage at Daguerre Point Dam?
- 5) What are the alternatives for Project-related improvements regarding the safe, timely, and effective fish passage at the Narrows 1/Narrows 2/Englebright Dam complex?
- 6) What are the constraints and opportunities for successful adult migration through Englebright reservoir?
- 7) What effect does Project altered hydrology/water temperature at the Yuba/South Yuba River confluence have on potential adult salmonid migration into both rivers?
- 8) How does the operation of New Colgate powerhouse effect velocities, water depths, and other factors that could cause potential fish passage barriers to migration through the downstream, flow (peaking) affected reach?
- 9) How does the operation of New Colgate powerhouse effect water temperature, attraction flows and potential fish passage timing through this reach?
- 10) What effect does Project altered hydrology/water temperature at the Middle/North Yuba River confluence have on potential adult salmonid migration into each River?
- 11) Considering altered hydrology and temperature regimes and sedimentation processes, what are safe and effective alternatives for fish passage at New Bullards Bar, Our House, and Log Cabin Dams?
- 12) Considering altered hydrology and temperature regimes and sedimentation processes,

what are the constraints and opportunities for successful adult migration through New Bullards Bar Reservoir?

- 13) What are the effects of Project altered hydrology on adult salmonid migration “windows” at natural gradient impediments or low-flow barriers?
- 14) What are the locations of the complete (high and low-flow) natural (gradient) barriers to migration in the upper mainstem Yuba, and the North, Middle, and South Yuba rivers? and major tributaries?

Request Element #2: Holding

The main sources of information for assessment of holding habitat will come from NMFS information requests #1-7. These information requests will be synthesized with other existing and developed information to assess current and potential utilization of holding habitat and the ecosystems which support salmonids during this lifestage. This synthesis will take into account adult migration opportunities developed above. Some of the main questions to be answered in this synthesis are:

- 1) What are the locations and physical characteristics (e.g. pools depths, overhanging cover, bubble curtains, etc.) of current spring-run Chinook and steelhead holding habitat in the lower Yuba River?
- 2) What is the current thermal regime of holding habitat and how have Project operations affected the thermal regime of current or potential holding habitat?
- 3) What is the effect of the Project on creation and maintenance of holding habitat through alterations of peak flows, LWD and sediment transport in the lower Yuba River and in Project affected reaches in the upper Yuba, upstream of Englebright Dam?
- 4) What are the locations and physical characteristics of potential holding habitat upstream of Project facilities?
- 5) How has operation of the Project affected the physical characteristics and thermal regimes of potential holding habitat?
- 6) How has Project alteration of recruitment, transport and deposition of LWD influenced creation of holding habitat?
- 7) What is the carrying capacity of current and potential holding habitat?
- 8) What is the proximity of spawning habitat to holding habitat?
- 9) How has the carrying capacity of current and potential holding habitat been affected by Project operations?

Request Element #3: Spawning

The main sources of information for assessment of spawning should come from NMFS information requests NMFS #1-7. These information requests should be synthesized with other existing and developed information to assess current and potential utilization of spawning habitat. This synthesis should take into account adult migration and holding opportunities developed above. Some of the main questions to be answered in this synthesis are:

- 1) What are the locations and physical characteristics of spawning habitat in the Lower Yuba River?
- 2) How do spring-run and fall/late fall-run preferentially select spawning locations in the Lower Yuba?

- 3) What is the extent of spatial overlap between spring and fall run in the spawning habitats of the Lower Yuba River?
- 4) How much coarse sediment of suitable size for salmonid spawning is trapped by Project diversions and associated facilities?
- 5) Where would the spawning-sized sediment trapped behind Project facilities have been deposited if it were allowed to flow downstream?
- 6) How does alteration of peak flow components of the hydrograph affect the transportation and distribution of spawning gravels below Project facilities?
- 7) How do Project-caused hydrograph alterations and changes to LWD supply, transport, and depositional processes affect potential deposition of spawning gravels?
- 8) What are the locations and physical characteristics of potential spawning habitat in the upper Yuba River above Englebright Dam?
- 9) Where are the current and historic river reaches that provide adequate water temperatures for spawning of Chinook salmon and steelhead?
- 10) What is the current deficit of spawning gravels below Project reservoirs relative to unimpaired conditions?
- 11) What is the carrying capacity of current and potential spawning habitat upstream and downstream of Englebright Dam, respectively?
- 12) What is the proximity of spawning habitat to holding and rearing habitat?
- 13) How has the carrying capacity of current and potential spawning habitat been affected by Project operations?

Request Element #4: Incubation/Emergence

The main sources of information for assessment of incubation/emergence should come from NMFS information requests #1-7. These information requests should be synthesized with other existing and developed information to assess project effect on incubation and emergence life stages. This synthesis should take into account adult migration, holding and spawning information developed above. Some of the main questions to be answered in this synthesis are:

- 1) What are the Project's effects on the grain size, embeddedness, and permeability of current and potential spawning gravel?
- 2) How often and at what time of the year are spawning gravels mobilized, in current and potential spawning habitat upstream and downstream of Englebright Dam, respectively?
- 3) How do the Project's effects on water temperature affect the timing and success of incubation and emergence?
- 4) How do the Project's effects on peak flow alteration and sediment transport affect the scour or entombment of redds and embryos?
- 5) How do the Project's effects on the hydrologic regime influence dewatering of redds in current and potential spawning areas?

Request Element #5: Fry/Juvenile Rearing

The main sources of information for assessment of fry/juvenile rearing should come from NMFS information requests #1-7. These information requests should be synthesized with other existing and developed information to assess project effect on fry/juvenile rearing life stages. This

synthesis should take into account adult migration, holding, spawning, and incubation/emergence information developed above. Some of the main questions to be answered in this synthesis are:

- 1) What are the Project's effects on benthic macroinvertebrate (BMI) standing crop and diversity, that affect feeding and growth opportunities for fry/juveniles?
- 2) How does the Project's effects on LWD recruitment, transport and deposition impact rearing habitat for fry/juvenile salmonids?
- 3) What effects do alterations to the sediment and LWD mass balance have on BMI diversity and production downstream, given the importance of this prey for fry and juveniles?
- 4) What are the Project's effects on floodplain inundation and floodplain BMI production in terms of rearing opportunities for juveniles?
- 5) How do Project flow and temperature alterations affect juvenile rearing opportunities?
- 6) How do flow, temperature, and floodplain inundation affect predator abundance?
- 7) How do changes to the LWD supply, transport, and storage continuum affect juvenile cover habitat and predator avoidance?
- 8) How does peak flow and sediment alteration affect pool depth and other habitats used as cover by juvenile salmonids?
- 9) How do Project alterations to flow, temperature, BMI and rearing opportunities affect the physiological condition of juvenile salmonids?
- 10) What is the current and historical area, depth and inundation frequency of floodplain habitat?
- 11) What is current and historical rearing carrying capacity in the upper and lower Yuba?

Request Element #6: Fry/Juvenile Outmigration

The main sources of information for assessment of fry/juvenile outmigration should come from NMFS information requests #1-7. These information requests should be synthesized with other existing and developed information to assess project effect on fry/juvenile rearing life stages. This synthesis should take into account adult migration, holding, spawning, and incubation / emergence information developed above. Some of the main questions to be answered in this synthesis are:

- 1) How have the Project's effects on pulse flows and temperature altered outmigration timing?
- 2) Considering the Project's alterations of flows and temperatures, what is the likelihood of successful juvenile outmigration?
- 3) Considering the Project's impoundments, what is the likelihood of successful juvenile outmigration through Project reservoirs?
- 4) Considering the Project's dams, what is the likelihood of successful juvenile outmigration around Project dams?
- 5) Considering the Project's powerhouses and their alterations of flows and temperatures, what is the likelihood of successful juvenile outmigration around Project powerhouses?
- 6) How do project alterations of flow, temperature, BMI and rearing opportunities affect the physiological condition of salmonids, smoltification, and their outmigration timing, and life-history expressions?
- 7) Considering the Project's alterations, do anadromous salmonids out migrate predominantly as fry or smolts?

- 8) Considering flow, temperature, sediment and LWD dynamics what are the best suitable locations for juvenile collection facilities for transport around Project dams and Englebright Dam?

Request Element #7: Population Structure and Dynamics

Information should be synthesized from the life-stage analysis above to analyze the population structure and dynamics of spring-run Chinook salmon and steelhead in the Yuba watershed. Quantitative measurement of habitat quality, quantity, and carrying capacity for each life stage should be used in a population dynamics model. Available population dynamics models which could be used to fulfill this request include models such as RIPPLE developed by Stillwater Sciences or SHIRAZ developed at the University of Washington. The specific quantitative information needed for each models' development should guide information gathering for each life-stage. At a minimum the carrying capacities for each life stage at the appropriate geomorphic unit should be developed. This population model should initially be developed for the existing population of spring-run Chinook salmon and steelhead below Englebright dam. Next, the best and most effective estimates of fish passage alternatives and improvements to Project facilities should be incorporated into a larger population dynamics model that takes into account access to potential habitat above currently impassable barriers. Survival estimates of each fish passage scenario should be incorporated into the carrying capacity estimates for each life-stage. The quantitative assessment of habitat quality, quantity and carrying capacity for each life stage for habitats above Englebright reservoir should be incorporated into the larger population dynamics model. An assessment of the genetic makeup of any population above or below Englebright should also be incorporated into this analysis including hatchery influence and spring/fall run interbreeding. This information should inform a final analysis on the Project effects on population viability.

This request is formatted in accordance with:

Title 18 of the Federal regulations *Conservation of Power and Water Resources*;
Part 5 *Integrated License Application Process*; Section 5.9 *Comments and information or study requests*.

18 CFR § 5.9 (a): *Comments and study requests*. Comments on the pre-application document and the Commission staff's Scoping Document 1 must be filed with the Commission within 60 days following the Commission's notice of consultation procedures issued pursuant to §5.8. Comments, including those by Commission staff, must be accompanied by any information gathering and study requests, and should include information and studies needed for consultation under section 7 of the Endangered Species Act and water quality certification under Section 401 of the Clean Water Act. (Emphasis added for relevance to highlight NMFS' ESA concerns)

18 CFR § 5.9 (b): *Content of study request*. Any information or study request must:

- (1) Describe the goals and objectives of each study proposal and the information to be obtained;
- (2) If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied;
- (3) If the requester is not a resource agency, explain any relevant public interest considerations in regard to the proposed study;

(4) Describe existing information concerning the subject of the study proposal, and the need for additional information;

(5) Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study results would inform the development of license requirements;

(6) 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 relevant tribal values and knowledge; and

(7) Describe considerations of level of effort and cost, as applicable, and why any proposed alternative studies would not be sufficient to meet the stated information needs.

(c) *Applicant seeking PURPA benefits; estimate of fees.* If a potential applicant has stated that it intends to seek PURPA benefits, comments on the pre-application document by a fish and wildlife agency must provide the potential applicant with a reasonable estimate of the total costs the agency anticipates it will incur in order to set mandatory terms and conditions for the proposed project. An agency may provide a potential applicant with an updated estimate as it deems necessary. If any agency believes that its most recent estimate will be exceeded by more than 25 percent, it must supply the potential applicant with a new estimate and submit a copy to the Commission.

§ 5.9 (a): The Information Gathering or Study Should Inform Consultation Under Section 7 of the Endangered Species Act

Comments, including those by Commission staff, must be accompanied by any information gathering and study requests, and should include information and studies needed for consultation under section 7 of the Endangered Species Act

The information or study resulting from this Request would inform future ESA consultation between NMFS and the Commission because the Project's effects on the resource(s) to be studied in this request affect ESA-listed salmonids or sturgeon, and/or their ESA-designated critical habitats, both in the Yuba River and in locations downstream.

NMFS has identified the following ESA-protected anadromous fishes and habitats (ESA resources) in the Yuba River that could be affected by the Project:

- 1) Central Valley (CV) spring-run Chinook salmon Evolutionarily Significant Unit (ESU) (*Oncorhynchus tshawytscha*), threatened (June 28, 2005, 70 FR 37160);
- 2) CV spring-run Chinook salmon designated critical habitat (September 2, 2005, 70 FR 52488);
- 3) CV steelhead Distinct Population Segment (DPS) (*O. mykiss*), threatened (January 5, 2006, 71 FR 834);
- 4) CV steelhead designated critical habitat (September 2, 2005, 70 FR 52488);

- 5) Southern DPS of North American green sturgeon (*Acipenser medirostris*), threatened (April 7, 2006, 71 FR 17757);
- 6) Southern DPS of North American green sturgeon designated critical habitat (October 9, 2009, 74 FR 52300);

ESA resources that occur downstream in the Feather River, Sacramento River, Sacramento-San Joaquin Delta, and San Francisco Bay may also be affected by the Project.

NMFS also identified the presence of an anadromous resource in the lower Yuba that is not listed under the ESA, but is a Federal Species of Concern (those species about which NMFS has concerns regarding status and threats, but for which insufficient information is available to indicate a need to list the species under the ESA):

- CV fall/late fall-run Chinook salmon ESU, Species of Concern (April 15, 2004, 69 FR 19975; October 17, 2006, 71 FR 61022).

This Federal Species of Concern also occurs downstream in the Feather River, Sacramento River, Sacramento-San Joaquin Delta, and San Francisco Bay, and may also be affected by the Project. While the fall/late-fall run Chinook ESU has no formal protection under the ESA, discussions with NMFS regarding effects to this species usually occurs during ESA consultation.

NMFS notes the facilities requested for review are not all considered part of the “Project” facilities by the Commission. However, for consultation under section 7 of the Endangered Species Act, the action, action area, and the effects of an action are defined more broadly. NMFS refers the Commission and Applicant to the following definitions from the Code of Federal Regulations (CFR), and to Enclosure B of this filing:

50 CFR § 402.02 Definitions.

Action means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies in the United States or upon the high seas. Examples include, but are not limited to:

- (a) actions intended to conserve listed species or their habitat;
- (b) the promulgation of regulations;
- (c) the granting of licenses, contracts, leases, easements, rights-of-way, permits, or grants-in-aid;
or
- (d) actions directly or indirectly causing modifications to the land, water, or air.

Action area means all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action.

Effects of the action refers to the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action, that will be added to the environmental baseline. The environmental baseline includes the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action

area that have already undergone formal or early section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation in process. Indirect effects are those that are caused by the proposed action and are later in time, but still are reasonably certain to occur. Interrelated actions are those that are part of a larger action and depend on the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration. (Emphasis added to highlight that evaluation of the effects of an action in the ESA sense is broader than evaluation of the action alone).

§ 5.9 (b): 1.0 Goals and Objectives of Request

Describe the goals and objectives of each study proposal and the information to be obtained;

The goal of this information request is: (1) Synthesize the Project's effects on the various biotic and abiotic factors that affect each life stage of anadromous fish and the ecosystems that support them; (2) Combine and synthesize Project's effects into a holistic and comprehensive analysis on the Project's effects on anadromous fish population structure and dynamics.

The objectives of this information request are:

Assess the direct, indirect and cumulative effects of the Project on:

Central Valley Spring-run Chinook salmon (*O. tshawytscha*) and habitats

- a) Adult Migration (including fish passage)
- b) Adult Holding
- c) Spawning
- d) Incubation/Emergence
- e) Fry/Juvenile Rearing
- f) Fry/Juvenile Outmigration (including fish passage)
- g) Population structure (including genetic makeup/hatchery influence)
- h) Population Dynamics

Central Valley Steelhead (*O. mykiss*) and habitats

- a) Adult Migration (including fish passage)
- b) Adult growth
- c) Spawning
- d) Incubation/Emergence
- e) Fry/Juvenile Rearing
- f) Fry/Juvenile Outmigration (including fish passage)
- g) Population structure (including anadromous/resident proportions)
- h) Population dynamics

North American Green Sturgeon (*Acipenser medirostris*) and habitats

- a) Adult Migration (including fish passage)
- b) Adult growth/holding
- c) Spawning
- d) Incubation/Emergence
- e) Fry/Juvenile Rearing

- f) Fry/Juvenile Outmigration (including fish passage)
- g) Population structure
- h) Population dynamics

§ 5.9 (b): 2.0 Resource Management Goals of NMFS

If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied;

NMFS' Resource Management Goal and Objectives, provided in full as Enclosure G, apply with respect to species listed under the Magnuson-Stevens Fishery Conservation and Management Act (MSA) (16 U.S.C. §1801 *et seq.*) and the Endangered Species Act (ESA) (16 U.S.C. §1531 *et seq.*), as well as anadromous species that are not currently listed but are affected by continuing operations of the Project and may require listing in the future. Thus, our requests for information or study are linked with NMFS' Resource Management Goals and Objectives. If NMFS' requests are included in the Applicant's Study Plan and approved in the Commission's Study Plan Determination, then successfully implemented, the results would inform:

- (A) Whether and how NMFS may exercise its FPA Section 18 authority, to either prescribe fishways at the Project or to reserve its prescriptive authority;
- (B) NMFS' decisions regarding its future FPA Section 10(j) and 10(a) proposals for protection, mitigation, and enhancement measures;
- (C) NMFS' decisions regarding its future recommended measures to improve EFH for Chinook salmon in the upper and lower Yuba, as well as areas downstream to the Bay/Delta;
- (D) The ESA Section 7 consultations (informal and formal) regarding effects on threatened species and designated critical habitats in the Yuba River.

The fulfillment of NMFS' request is consistent with the following NMFS' Resource Goals and Objectives for anadromous fishes and habitats in the Yuba River (Enclosure G):

Resource Goals:

3.1 - Protect, conserve, enhance, and recover native anadromous fishes and their habitats by providing access to suitable habitats and by restoring fully functioning habitat conditions for related rearing and feeding (see 4.1-4.4), migration (see 4.5), spawning (See 4.6), and adjoining riparian and aquatic benthic macroinvertebrate (BMI) habitats (see 4.7).

3.2 - Identify and implement measures to protect, mitigate or minimize direct, indirect, and cumulative impacts to, and enhance native anadromous fish resources, including related rearing and feeding (see 4.1-4.4), migration (see 4.5), spawning (See 4.6), riparian and BMI habitats (see 4.7), protection from adverse Fish Hatchery operations (see 4.8) and predation (see 4.9), and ensure coordination within and outside of the Project (see 4.10) to minimize risk to anadromous fishes.

Resource Objectives:

4.1-Flows; 4.2-Flow Ramping; 4.3-Water Quality; 4.4-Water Availability; 4.5-Fish Passage; 4.6-Channel Maintenance; 4.7-Riparian/LWD Habitat; 4.8-Hatchery Operations; 4.9-Predation; and 4.10-Coordination.

§ 5.9 (b): 3.0 Relevant Public Interest Considerations

If the requester is not a resource agency, explain any relevant public interest considerations in regard to the proposed study;

This content requirement is not applicable, as NMFS is a resource agency.

§ 5.9 (b): 4.0 Existing Information and Need for Additional Information

Describe existing information concerning the subject of the study proposal, and the need for additional information;

The Applicant discusses anadromous fishes in the PAD sections 7.3 Aquatic Resources, and section 7.7, Threatened, Endangered and Fully Protected species. The PAD does not in any great detail discuss the direct, indirect, or cumulative effects of the Project on anadromous fishes or their habitats. The PAD identifies some Project effects on individual, abiotic resources (such as water, geology and soils, etc.). This information is not adequate for a comprehensive biological evaluation of the Project's effects, on anadromous fishes and the ecosystems which support them.

The Project and related facilities currently impact anadromous fish passage, hydrology and geomorphology, coarse substrate and LWD supply and transport, riparian habitats, BMI communities, and the import of marine-derived nutrients. The combined impacts of the Project on these individual factors that support anadromous fish ecosystems within the Yuba River Basin represents a continuing impact of the Project on the biological resources of the area.

Section 4.51(f)(3) of 18 CFR requires reporting of certain types of information in the Application for License for major hydropower projects, including a discussion of the fish, wildlife and botanical resources in the vicinity of the Project. The discussion needs to identify the potential impacts of the Project on these resources, including a description of any anticipated continuing impact for on-going and future operation of the Project. This information request fulfills these requirements, by asking for information that evaluates the potential effects of the Project and its facilities on the suite of environmental factors that could contribute to the anadromous fish ecosystem within the Project's action area. As part of the relicensing action, and to be consistent with the National Environmental Policy Act (NEPA 1969), the Commission requires an analysis of the potential impacts associated with continuing operation of the power generation facility. In addition to fulfilling these requirements, the specific investigations developed by the Applicant's eventual study plan will also be used in determining protection, mitigation, and enhancement measures.

§ 5.9 (b): 5.0 Nexus Between Project Operations and Effects on the Resource Studied, and How the Study Results Would Inform Development of License Conditions

Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study results would inform the development of license requirements;

This request aims to synthesize the various abiotic and biotic categories studied in NMFS requests #1-7 listed above into a holistic and comprehensive assessment of the direct, indirect and cumulative effects of the Project on anadromous fish. Project effects not only include those categories of requested information (NMFS #1-7) but the combination of those effects on each life stage, as well as the population structure and dynamics of each species over time.

The Project facilities exert direct, indirect and cumulative effects on the adult migration life stage of anadromous fish. In this request, NMFS seeks a synthesized analysis that makes use of other existing and developed information to assess timing and magnitude of flows during the seasons of migration, holding, spawning, incubation, hatching, fry/juvenile rearing, smoltification, and out migration. These complex and interdependent life stage functions may be adversely affected by natural and artificial barriers to upstream adult migration, water flows, sediment flows, large wood flows, temperature modifications, and other factors directly attributable to dams, diversions, and hydroelectric facilities such as those of the Project.

Information about the combinations of the Project's effects can help design and construct safe and effective fishways. Under Section 18 of the Federal Power Act, 16 U.S.C. § 811, the secretary of Commerce has the mandatory conditioning authority to prescribe fishways. Successful operation of fishways may require adults and/or juveniles to successfully navigate Project reservoirs and Project affected riverine reaches, detailed information of life stage carrying capacity and population dynamics may help design more effective fish passage alternatives. The effectiveness of fish ladders or other volitional, semi-volitional (e.g. tramway), or non-volitional (e.g. collection and transport) of fish passage may be affected by the population structure and dynamics of the fish species that are being passed.

The Yuba River anadromous resources to be studied in this Request, all under the jurisdiction of NMFS, are listed in sections above. The results of NMFS' request would inform the development of license requirements to protect, enhance, and contribute to the recovery of these species, which (as indicated by their status) are in peril. The Project's dams, diversions, powerhouses, and other facilities cause direct, indirect, and cumulative effects on these species. NMFS provides more detail on the potential geographic "reach" of the Project's potential effects in Enclosure E, but the intent of this request is to more fully understand these effects.

The Yuba River anadromous resources to be studied in this Request, all under the jurisdiction of NMFS, include:

- 1) Central Valley (CV) spring-run Chinook salmon Evolutionarily Significant Unit (ESU) (*Oncorhynchus tshawytscha*), threatened (June 28, 2005, 70 FR 37160);
- 2) CV spring-run Chinook salmon designated critical habitat (September 2, 2005, 70 FR 52488);
- 3) CV steelhead Distinct Population Segment (DPS) (*O. mykiss*), threatened (January 5, 2006, 71 FR 834);
- 4) CV steelhead designated critical habitat (September 2, 2005, 70 FR 52488);
- 5) Southern DPS of North American green sturgeon (*Acipenser medirostris*), threatened (April 7, 2006, 71 FR 17757);
- 6) Southern DPS of North American green sturgeon designated critical habitat (October 9, 2009, 74 FR 52300);

- 7) CV fall/late fall-run Chinook salmon ESU, Species of Concern (April 15, 2004, 69 FR 19975);
- 8) CV spring-run and CV fall/late-fall run Chinook salmon identified “essential fish habitat” (EFH), (October 15, 2008 73 FR 60987);
- 9) CV fall/late fall-run Chinook salmon ESU, Species of Concern (April 15, 2004, 69 FR 19975).

§ 5.9 (b): 6.0 Consistency with Generally Accepted Practice

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 relevant tribal values and knowledge;

This request for information or study is consistent with the goals and objectives outlined for recent FERC hydroelectric ILP studies in the Western U.S., and uses accepted methodologies from published scientific literature and protocols from the National Marine Fisheries Service, U.S. Fish and Wildlife Service, and California Department of Fish and Game.

NMFS is presenting an Information Request and not necessarily specific study methodology (preferred data collection and analysis techniques, or objectively quantified information). This is because the Applicant’s responsibility under the FPA is to either provide the requested information or to develop a more detailed Study Plan to obtain such information. It is anticipated that through the reiterative study development process within the ILP that the Applicant and the Commission will work with ILP participants to develop a study that obtains the requested information, or that adequate information, approved by the Commission, is provided by the Applicant.

§ 5.9 (b): 7.0 Considerations of Level of Effort and Cost

Describe considerations of level of effort and cost, as applicable, and why any proposed alternative studies would not be sufficient to meet the stated information needs.

The Licensees do not request PURPA benefits in their PAD. NMFS considers that the cost of these studies will to be between \$50,000-\$250,000. The Project is considered vast and complex. Considering the number of dams, the amount of water diverted, the potential for environmental disturbance, the status of several species listed under the ESA, and the recent closure of Chinook fisheries on the West Coast of the United States, the level of effort and cost for the Licensees is commensurate with the magnitude and impacts of the Project, and the revenues derived from sales of generated energy.

8.0 References

Merz, J.E. and P.B. Moyle. 2006. Salmon, wildlife, and wine: marine-derived nutrients in human-dominated ecosystems of central California. *Ecological Applications* 16(3):999-1009.

NMFS 2009. "Public Draft Recovery Plan for Sacramento River Winter-run Chinook Salmon, Central Valley Spring-run Chinook Salmon, and Central Valley Steelhead." NMFS, Southwest Region, Sacramento, California. 7pp. October 2009.

Pacific Fisheries Management Council (PFMC). 1999. Pacific Fishery Management Council. Description and identification of essential fish habitat, adverse impacts and recommended conservation measures for salmon. *Amendment 14 to the Pacific Coast Salmon Plan, Appendix A*. Pacific Fisheries Management Council, Portland, Oregon.

PFMC. 2003. Pacific Fishery Management Council. Fishery Management Plan for Commercial and Recreational Salmon Fisheries off the Coasts of Washington, Oregon and California as Revised Through Amendment 14 (Adopted 1999).

Federal Register Notices

Federal Register Notice, 63 Fed. Reg. 13347, March 19, 1998. Endangered and Threatened Species: Threatened Status for Two Evolutionarily Significant Units of Steelhead in Washington, Oregon, and California. Final Rule.

Federal Register Notice, 64 Fed. Reg. 50394, September 16, 1999. Endangered and Threatened Species: Threatened Status for Two Chinook Salmon Evolutionarily Significant Units in California. Final Rule.

Federal Register Notice, 69 Fed. Reg. 19975, April 15, 2004. Endangered and Threatened Species; Establishment of Species of Concern List, Addition of Species to Species of Concern List, Description of Factors for Identifying Species of Concern, and Revision of Candidate Species List Under the Endangered Species Act. Final Rule.

Federal Register Notice, 70 Fed. Reg. 37160, June 28, 2005. Endangered and Threatened Species: Final Listing Determinations for 16 Evolutionarily Significant Units (ESUs) of West Coast Salmon, and Final 4(d) Protective Regulations for Threatened Salmonid ESUs. Final Rule.

Federal Register Notice, 70 Fed. Reg. 52488, September 2, 2005. Endangered and Threatened Species: Designation of Critical Habitat for Seven Evolutionarily Significant Units of Pacific Salmon and Steelhead in California. Final Rule.

Federal Register Notice, 71 Fed. Reg. 834, January 5, 2006. Endangered and Threatened Species: Final Listing Determinations for 10 Distinct Population Segments of West Coast Steelhead. Final Rule.

Federal Register Notice, 71 Fed. Reg. 17757, April 7, 2006. Endangered and Threatened Wildlife and Plants: Threatened Status for Southern Distinct Population Segment of North American Green Sturgeon. Final Rule.

Federal Register Notice, 71 Fed. Reg. 61022, October 17, 2006. Endangered and Threatened Species: Revision of Species of Concern List, Candidate Species Definition, and Candidate Species List.

Federal Register Notice, 73 FR 60987, October 15, 2008. Fisheries Off West Coast States; West Coast Salmon Fisheries; Amendment 14; Essential Fish Habitat Descriptions for Pacific Salmon. Final Rule.

Federal Register Notice, 74, FR 52300, October 9, 2009. Endangered and Threatened Wildlife and Plants: Final Rulemaking to Designate Critical Habitat for the Threatened Southern Distinct Population Segment of North American Green Sturgeon. Final Rule.

Federal Register Notice, 75 Fed. Reg. 30714, June 2, 2010. Endangered and Threatened Wildlife and Plants: Final Rulemaking To Establish Take Prohibitions for the Threatened Southern Distinct Population Segment of North American Green Sturgeon. Final Rule. June 2, 2010.

**RESOURCE MANAGEMENT GOALS AND OBJECTIVES
FOR THE YUBA RIVER
NOAA's NATIONAL MARINE FISHERIES SERVICE

UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION**

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

1.0 Introduction

The U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NMFS) hereby files with the Federal Energy Regulatory Commission (Commission or FERC) its Resource Management Goals and Objectives (Goals and Objectives) for Yuba County Water Agency's (YCWA or Applicant) Yuba River Hydroelectric Project, FERC No. 2246 (Project), Yuba River, California.

Subject to certain exceptions, the Federal Power Act (FPA) Section 10(j) states,

“in order to adequately and equitably protect, mitigate damages to, and enhance, fish and wildlife (including related spawning grounds and habitat) affected by the development, operation, and management of the project, each license issued under this subchapter shall include conditions for such protection, mitigation, and enhancement... based on recommendations received pursuant to the Fish and Wildlife Coordination Act (16 U.S.C. 661 et seq.) from the National Marine Fisheries Service, the United States Fish and Wildlife Service, and State fish and wildlife agencies.” [16 U.S.C. § 803(j)]

The Commission's licensing regulations likewise request that resource agencies list their resource management goals and objectives to serve as the basis for study recommendations and subsequent prescriptions and recommendations for a project's protection, mitigation, and enhancement measures to be incorporated into a new license. See, e.g., 18 CFR §5.9(b)(2) and

18 CFR §5.26(b). NMFS articulates its Goals and Objectives broadly in connection with these responsibilities, and consistently with the guidelines for determining the scope of a licensing action.

The National Environmental Policy Act of 1969 (42 U.S.C. 4321 *et seq.*), together with its implementing regulations, requires the Commission to analyze the direct and indirect environmental effects and cumulative impacts of a project's alternatives and connected actions. The Council on Environmental Quality regulations under 40 CFR 1508.8 (b) defines indirect effects as:

“[effects]...which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include human population growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems.”

Cumulative impacts, in turn, are those combined effects on the quality of the human environment that result from:

“[... the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what Federal or non-Federal agency or person undertakes such other actions...”] (40 CFR 1508.7, 1508.25(a), and 1508.25(c)).

Therefore, NMFS' Goals and Objectives for the Project, as well as our comments and requests for information or study, seek information relating not simply to the direct and immediate effects of the Project, but also its indirect and cumulative effects. In the context of the foregoing authorities, NMFS' Goals and Objectives apply with respect to species listed under the Magnuson-Stevens Fishery Conservation and Management Act (MSA) (16 U.S.C. §1801 *et seq.*) and the Endangered Species Act (ESA) (16 U.S.C. §1531 *et seq.*), as well as anadromous species

that are not currently listed but are affected by continuing operations of the Project or may require listing in the future.

2.0 Current State of Anadromous Fishes

NMFS is concerned with ESA-listed fishes in the Yuba River watershed and downstream, and their critical habitats designated under the ESA. NMFS is further concerned with Essential Fish Habitat (EFH) identified for Chinook salmon in the Yuba River and downstream, under the MSA.

2.1 Central Valley (CV) steelhead: The distinct population segment (DPS) of CV steelhead (*Oncorhynchus mykiss*) is present in the Yuba River and currently listed as threatened under the ESA (January 5, 2006, 71 FR 834). Critical habitat has been designated for CV steelhead in the Yuba River downstream of Englebright Dam, the Feather River, the Sacramento River, and in the Sacramento-San Joaquin River Delta (September 2, 2005, 70 FR 52488).

2.2 CV spring-run Chinook salmon: The evolutionarily significant unit (ESU) of CV spring-run Chinook salmon (*O. tshawytscha*) is present in the Yuba River, and is currently listed as threatened under the ESA (June 28, 2005, 70 FR 37160). Critical habitat has been designated for CV spring-run Chinook salmon in the Yuba River downstream of Englebright Dam, the Feather River, the Sacramento River, and in the Sacramento-San Joaquin Delta (September 2, 2005, 70 FR 52488).

2.3 Green sturgeon: The Southern DPS of North American green sturgeon (*Acipenser medirostris*) is present in the Yuba River, and is currently listed as threatened under the ESA (April 7, 2006, 71 FR 17757). Critical habitat has been designated for green sturgeon in the

Yuba River downstream of Daguerre Point Dam, the Feather River, the Sacramento River, and in the Sacramento-San Joaquin River Delta (October 9, 2009, 74 FR 52300).

2.4 CV fall / late fall-run Chinook salmon: The ESU of CV fall/late fall-run Chinook salmon (*O. tshawytscha*) is present in the Yuba River, and is currently a Federal species of concern (April 15, 2004, 69 FR 19975; October 17, 2006, 71 FR 61022).

2.5 Chinook salmon EFH: The MSA, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), establishes procedures designed to identify, conserve, and enhance EFH for those species regulated under a Federal fisheries management plan (FMP). Pacific coast salmon stocks, highly prized by commercial, sport, and subsistence fishers, are managed by the Pacific Fishery Management Council (Council) under the Pacific Coast Salmon FMP adopted in 1999 (PFMC 1999; 2003). EFH has been designated in the Yuba River watershed for CV spring-run and CV fall/late fall-run Chinook salmon (*O. tshawytscha*), pursuant to the MSA. EFH is identified in both the upper and lower Yuba River (we define the upper Yuba as the watershed upstream of Englebright Dam). Based on considerations discussed in Amendment 14 of the Plan (PFMC 2003), the PFMC excluded certain man-made barriers (dams) from the list of those representing the upstream extent of EFH; the exclusion list names Englebright Dam on the Yuba River. Therefore, EFH in the Yuba River extends from its confluence with the Feather River upstream to the habitat historically accessible to Chinook below natural, impassable waterfalls in the North Yuba, Middle Yuba, and South Yuba rivers, and their tributaries.

2.6 ESA and MSA Consultation: Based in part on the foregoing facts, NMFS finds that consultation will be necessary under the ESA and the MSA for the effects of the Project on the anadromous fishes and habitats noted above. Thus, NMFS' Goals and Objectives (listed below)

provide rationale linking its information or study requests in this ILP with its anticipated future uses of the results. The results are intended to be used to:

- (A) Inform NMFS regarding how it may exercise its FPA Section 18 authority, to either prescribe fishways at the Project or to reserve its prescriptive authority;
- (B) Inform NMFS' future FPA Section 10(j) and 10(a) proposals for protection, mitigation, and enhancement measures;
- (C) Inform NMFS' recommended measures to improve EFH for Chinook salmon identified in the upper and lower Yuba, as well as within areas downstream to the Bay/Delta; and
- (D) Inform ESA Section 7 consultations (informal and, potentially, formal) regarding effects on threatened species and designated critical habitats in the Yuba River.

3.0 Resource Goals

3.1 - Protect, conserve, enhance, and recover native anadromous fishes and their habitats by providing access to suitable habitats, and by restoring fully functioning habitat conditions (including in riparian areas) for migration and holding (6.5), spawning and rearing (6.6), and feeding (see 6.1-6.4, 6.7),.

3.2 - Identify and implement measures to protect, enhance, mitigate or minimize (direct, indirect, and cumulative) impacts to native anadromous fish resources, including from adverse fish hatchery operations and influences. (see 6.8).

3.3 - Identify and implement measures to protect, enhance, mitigate or minimize (direct, indirect, and cumulative) impacts to native anadromous fish resources, including from adverse predation (see 6.9).

3.4 - Identify and implement measures to ensure coordination within and outside of the Project (see 6.10) to minimize risks to anadromous fishes.

3.5 - Protect, conserve, enhance, and improve the viability of anadromous fish populations, through recovery actions guided by species recovery plans, including efforts to expand or establish additional viable populations in areas where anadromous access is now blocked or reduced.

4.0 Resource Objectives

4.1 Flows - Implement scheduled flows in the Yuba River to the benefit of native anadromous fishes and their habitats. A range or schedule of flows is necessary to:

- (A) Provide suitable and available habitat for anadromous migration, holding, spawning, and rearing, and for native aquatic communities.
- (B) Optimize spawning and incubation of in-gravel forms;
- (C) Facilitate the efficient immigration of spawning adults, the safe and timely emigration of smolts and kelts, and movement of rearing juveniles between feeding and sheltering rearing habitats;
- (D) Ensure redd placement in viable areas;
- (E) Promote channel, benthic, and riparian functionality and change; and
- (F) Mitigate for impacts of flood control, irrigation or other Project facilities or operations that act to displace individuals or their forage, or degrade the physical, chemical, or biological quality of habitat.

4.2 Flow Ramping - Modify the Project's structures or operations as necessary to minimize impacts of flow fluctuations associated with increases or decreases in the Project's discharges on anadromous salmonids, sturgeon, and native aquatic species, as well as their habitats.

4.3 Water Quality - Modify the Project's structures or operations as necessary to mitigate or enhance their direct, indirect, or cumulative water temperature and quality impacts. This includes water temperature management necessary to ensure the optimal survival and distribution of all life stages of anadromous fishes and native aquatic communities, within and downstream of the Project.

4.4 Water Availability - Coordinate operations with other projects, programs, or initiatives and/or use water transfers, water exchanges, water purchases, or other forms of agreements to benefit anadromous fishes and their habitats.

4.5 Fish Passage – Provide the safe and effective passage of anadromous fishes, to and between suitable habitats (immigration, holding, spawning, rearing, and emigration areas) both within and beyond the Project's vicinity, necessary for anadromous fishes to complete their life cycles and increase their populations. Due primarily to the construction of dams, other barriers, and the dewatering of stream reaches, an estimated 1,057 miles (or 48%) of the stream lengths historically available to Chinook salmon have been lost from the original total of 2,183 miles in the Central Valley; if only spawning and holding habitat (excluding migration corridors in the lower elevations) are considered, the reduction in historical range probably exceeds 72% because most of the former spawning and holding habitat was located in upstream reaches now

inaccessible to Chinook salmon (Yoshiyama et al. 2001). Improving passage conditions for green sturgeon into historically-accessible areas will also allow the use of potential spawning habitats now unavailable to this species.

Passage of anadromous salmonids into presently inaccessible habitats will also restore the transport of marine-derived nutrients into these basins, which have experienced nutrient deficits since paths to and from the ocean were blocked (Gresh et al. 2000; Merz and Moyle 2006). Such nutrients enhance the riparian habitat, aquatic forage communities, conditions and food for juvenile salmonids, and provide other benefits; positive “feedbacks” occur whereby this salmon-borne “fertilizer” improves the quality of spawning and rearing habitat, and thus the reproductive success of subsequent generations (Quinn 2005). The “ecosystem services” provided by dead salmon remain important and economically significant, even in the impaired watersheds of California (Merz and Moyle 2006).

4.6 Channel Maintenance - Implement flow regimes (including higher flow events of adequate frequency and duration) and non-flow related measures (such as coarse sediment augmentations below dams) necessary to mitigate and minimize direct, indirect, and cumulative impacts of the Project’s facilities and operations on hydrologic alterations and on sediment supply, transport, deposition, storage, and recruitment. These regimes and measures are necessary to avoid impaired river function, geometry, benthic condition, channel morphology, flood plain connectivity, and riparian conditions that in turn negatively affect anadromous fish freshwater life stages through loss of habitat quality and diversity, and food resources.

4.7 Riparian Condition - Identify and implement measures to protect, enhance, mitigate or minimize (direct, indirect, and cumulative) impacts of the Project on riparian conditions, and on the supply, transport, deposition, storage, and recruitment of large wood to instream areas.

4.8 Hatchery Operations - Identify and implement Project-related measures to protect, enhance, mitigate or minimize (direct, indirect, and cumulative) impacts to native anadromous fish resources, including from adverse fish hatchery operations and influences. Minimize and mitigate the impacts of hatchery facilities and/or operations on native, wild anadromous salmonids.

4.9 Predation - Minimize and mitigate the impact of the Project's structures or operations that either have introduced, and/or continue to introduce, non-native predators, or that create suitable habitats for them, promote the size and range of their populations, or create conditions conducive to their excessive predation upon juvenile anadromous fishes.

4.10 Coordination - In developing alternatives for potential licensing, include a full range of alternatives for modifying Project and related structures or operations to the benefit of anadromous fishes and their habitats, while minimizing conflicts with operational requirements and other beneficial uses. This includes developing alternatives for greater coordination with other stakeholders and water development projects to ensure that, at a minimum, the Project's structures and operations are consistent with, and can potentially enhance, on-going and future restoration and recovery efforts.

5.0 Recovery Goals for the Yuba River

Both the upper and lower Yuba are identified in the NMFS *Public Draft Recovery Plan for Sacramento River Winter-run Chinook Salmon, Central Valley Spring-run Chinook Salmon, and Central Valley Steelhead* (Recovery Plan) (NMFS 2009) as locations important for the recovery of CV steelhead and CV spring-run Chinook salmon. The Recovery Plan emphasizes that in order to meet the viability requirements for recovery of CV steelhead and CV spring-run Chinook salmon, existing Core 1 populations must be stabilized within current habitats and then additional viable populations established through reintroductions into upstream watershed habitats that have a Primary priority. The Recovery Plan states that Core 1 populations should be the first focus of an overall recovery effort. Core 1 populations are those populations identified as having the highest priority for recovery action implementation based on the known ability or significant immediate potential to support independent populations, thereby contributing to meeting the ESU/DPS-level recovery criteria (Recovery Plan, page 63). Primary priority watersheds have a high potential to support spawning populations of anadromous fish and either high quality existing conditions or a high restoration potential for anadromous fish (Recovery Plan, page 64).

CV steelhead: The lower Yuba River has been designated a Core 1 population area for CV steelhead, and the conceptual recovery scenario for the Yuba River includes the maintenance of a CV steelhead spawning population in the lower Yuba. Furthermore, the conceptual recovery scenario is a Primary action that includes the reintroduction of CV steelhead upstream of

Englebright Dam and the Project's facilities into the Primary watersheds of the mainstem upper Yuba, North Fork, Middle Fork, and South Fork Yuba rivers.

Recovery actions have been categorized into eleven geographic scales or regions. In the Yuba River (within the Northern Sierra Diversity Group), the development and implementation of the following Primary recovery actions are identified to re-colonize historic habitats above Englebright Dam (Recovery Plan, pages 139-140, 161):

- 1) Enhance habitat conditions, including providing flows and suitable water temperatures for successful upstream and downstream passage, holding, spawning and rearing; and
- 2) Improve access within the area above Englebright Dam, including increasing minimum flows, providing passage at Our House, New Bullards Bar, and Log Cabin dams, and assessing feasibility of passage improvement at natural barriers.

CV Spring-run Chinook salmon: The lower Yuba River has been designated in the Recovery Plan as a Core 1 population area for CV spring-run Chinook salmon, and the conceptual recovery scenario for the Yuba River includes the maintenance of a CV spring-run Chinook salmon spawning population in the lower Yuba. In addition, the Recovery Plan's conceptual recovery scenario is a Primary action that includes the reintroduction of CV spring-run Chinook salmon upstream of Englebright Dam and the Project's facilities into the Primary watersheds of the mainstem upper Yuba, North Fork, Middle Fork, and South Fork Yuba rivers. In the Yuba River, the development and implementation of the following Primary recovery actions are identified to re-colonize historic habitats above Englebright Dam (Recovery Plan, pages 115-116, 161):

- 1) Enhance habitat conditions, including providing flows and suitable water temperatures for successful upstream and downstream passage, holding, spawning and rearing; and
- 2) Improve access within the area above Englebright Dam, including increasing minimum flows, providing passage at Our House, New Bullards Bar, and Log Cabin dams, and assessing feasibility of passage improvement at natural barriers.

Green sturgeon: Improve habitat conditions in the lower Yuba and lower Feather Rivers, important potential spawning rivers for green sturgeon, by restoring the necessary flows and passage to raise the conservation value of these habitats from “Medium” to “High”. These areas are deemed to have “High” conservation value because of their proximity to the Sacramento River, because green sturgeon consistently occupy the lower Feather River, and because green sturgeon have been observed downstream of Daguerre Point Dam on the lower Yuba. NMFS’ goal is to obtain more information to help determine the optimal flow regime for green sturgeon in the lower Yuba River and how this compares with flows established for salmonids. Actions in FPA and ESA processes (consultation under section 7 of the ESA) will assess the habitat needs (e.g. for passage and flows) of both green sturgeon and anadromous salmonids.

6.0 Literature Cited

- Gresh, T., Lichatowich, J., and P. Schoonmaker. 2000. An estimation of historic and current levels of salmon production in the Northeast Pacific ecosystem: evidence of a nutrient deficit in the freshwater systems of the Pacific Northwest. *Fisheries*: 25(1):15-21.
- Merz, J.E. and P.B. Moyle. 2006. Salmon, wildlife, and wine: marine-derived nutrients in human-dominated ecosystems of central California. *Ecological Applications* 16(3):999-1009.
- Montgomery, Watson, Harza Americas, Inc. (MWH). 2010. Yuba River Fish Passage Conceptual Engineering Options. Prepared for the National Marine Fisheries Service, Southwest Region, by MWH Americas, Inc., Sacramento California.
- NMFS. National Marine Fisheries Service. 2009. Public Draft Recovery Plan for Sacramento River Winter-run Chinook Salmon, Central Valley Spring-run Chinook Salmon, and Central Valley Steelhead. Southwest Region, Sacramento, California. 7pp. October 2009.
- PFMC. 1999. Pacific Fishery Management Council. Description and identification of essential fish habitat, adverse impacts and recommended conservation measures for salmon. *Amendment 14 to the Pacific Coast Salmon Plan, Appendix A*. Portland, Oregon.

PFMC. 2003. Pacific Fishery Management Council. Fishery Management Plan for Commercial and Recreational Salmon Fisheries off the Coasts of Washington, Oregon and California as Revised Through Amendment 14 (adopted 1999).

Yoshiyama, R.M., E.R. Gerstung, F.W. Fisher, and P.B. Moyle. 2001. Historical and Present Distribution of Chinook Salmon in the Central Valley Drainage of California in Contributions to the Biology of Central Valley Salmonids. Vol. 1. California Department of Fish and Game, Fish Bulletin 179, R.L. Brown, ed.

Federal Register Notices

Federal Register Notice, 63 Fed. Reg. 13347, March 19, 1998. Endangered and Threatened Species: Threatened Status for Two Evolutionarily Significant Units of Steelhead in Washington, Oregon, and California. Final Rule.

Federal Register Notice, 64 Fed. Reg. 50394, September 16, 1999. Endangered and Threatened Species: Threatened Status for Two Chinook Salmon Evolutionarily Significant Units in California. Final Rule.

Federal Register Notice, 69 Fed. Reg. 19975, April 15, 2004. Endangered and Threatened Species; Establishment of Species of Concern List, Addition of Species to Species of Concern List, Description of Factors for Identifying Species of Concern, and Revision of Candidate Species List Under the Endangered Species Act. Final Rule.

Federal Register Notice, 70 Fed. Reg. 37160, June 28, 2005. Endangered and Threatened Species: Final Listing Determinations for 16 Evolutionarily Significant Units (ESUs) of West Coast Salmon, and Final 4(d) Protective Regulations for Threatened Salmonid ESUs. Final Rule.

Federal Register Notice, 70 Fed. Reg. 52488, September 2, 2005. Endangered and Threatened Species: Designation of Critical Habitat for Seven Evolutionarily Significant Units of Pacific Salmon and Steelhead in California. Final Rule.

Federal Register Notice, 71 Fed. Reg. 834, January 5, 2006. Endangered and Threatened Species: Final Listing Determinations for 10 Distinct Population Segments of West Coast Steelhead. Final Rule.

Federal Register Notice, 71 Fed. Reg. 17757, April 7, 2006. Endangered and Threatened Wildlife and Plants: Threatened Status for Southern Distinct Population Segment of North American Green Sturgeon. Final Rule.

Federal Register Notice, 71 Fed. Reg. 61022, October 17, 2006. Endangered and Threatened Species: Revision of Species of Concern List, Candidate Species Definition, and Candidate Species List.

Federal Register Notice, 73 FR 60987, October 15, 2008. Fisheries Off West Coast States; West Coast Salmon Fisheries; Amendment 14; Essential Fish Habitat Descriptions for Pacific Salmon. Final Rule.

Federal Register Notice, 74, FR 52300, October 9, 2009. Endangered and Threatened Wildlife and Plants: Final Rulemaking to Designate Critical Habitat for the Threatened Southern Distinct Population Segment of North American Green Sturgeon. Final Rule.

Federal Register Notice, 75 Fed. Reg. 30714, June 2, 2010. Endangered and Threatened Wildlife and Plants: Final Rulemaking To Establish Take Prohibitions for the Threatened Southern Distinct Population Segment of North American Green Sturgeon. Final Rule. June 2, 2010.

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

Yuba County Water Agency)
Yuba River Hydroelectric Project)
_____)

Project No. P-2246-058

E-Filed Documents

Montgomery, Watson, Harza Americas, Inc. (MWH). 2010. Yuba River Fish Passage Conceptual Engineering Options. Prepared for the National Marine Fisheries Service, Southwest Region, by MWH Americas, Inc., Sacramento California.

California Department of Water Resources (CDWR). 2007. Upper Yuba River Watershed Chinook Salmon and Steelhead Habitat Assessment. Technical Report. Prepared for the California Department of Water Resources by the Upper Yuba River Studies Program Study Team.

CERTIFICATE OF SERVICE

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

Yuba County Water Agency)
Yuba River Hydroelectric Project)
_____)

Project No. P-2246-058

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 Preliminary Application Document, comments on the Commission's Scoping Document 1 and public scoping meeting, and the Service's requests for information or study 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 proceedings.

Dated this 7th day of March, 2011



William Foster
National Marine Fisheries Service