

Study 7.2

POTENTIAL NARROWS 2 POWERHOUSE INTAKE EXTENSION¹

August 2011

1.0 Project Nexus

Yuba County Water Agency's (Licensee or YCWA) continued operation and maintenance (O&M) of the Yuba River Development Project (Project) may affect fish in the Yuba River downstream of the United States Army Corps of Engineers' (USACE) Englebright Dam² due to water temperature.

2.0 Resource Management Goals of Agencies with Jurisdiction Over the Resource to be Studied

YCWA believes that four agencies have jurisdiction over water temperature potentially affected in the geographic area included in this study proposal: 1) United States Department of Interior, Fish and Wildlife Service (USFWS); 2) United States Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NMFS); 3) California Department of Fish and Game (CDFG); and 4) State Water Resources Control Board, Division of Water Rights (SWRCB). Each of these agencies and their jurisdiction and management direction, as understood by YCWA at this time, is discussed below.

USFWS

USFWS's jurisdiction and goals and objectives are described by USFWS on pages 1 through 3 of USFWS's March 7, 2011 letter to FERC that provided USFWS's comments on YCWA's Pre-Application Document or PAD (YCWA 2010). USFWS's jurisdiction, goals and objectives are not repeated here.

NMFS

NMFS's statutory authorities and responsibilities are described by NMFS in Section 2.0 of Enclosure A in NMFS's March 7, 2011 letter to FERC providing NMFS's comments on YCWA's PAD. NMFS's jurisdiction and responsibilities are not repeated here.

¹ Where this study proposal states that information for the study is being developed by the Lower Yuba River Accord River Management Team (RMT), if the RMT does not develop the information as described in this study proposal, YCWA will develop the information. Also, all information developed as part of the relicensing, whether it is developed in the relicensing process or developed in the RMT process and brought into the relicensing, will be made public when YCWA files its final study report. Further, if this study relies on information from RMT data, report or analytics, YCWA will attach the relevant RMT work product to the relicensing report for this study.

² Englebright Dam was constructed by the California Debris Commission in 1941; is owned, operated and maintained by the United States Army Corps of Engineers; and is not included as a Project facility in FERC licenses for the Yuba River Development Project.

CDFG

CDFG's jurisdiction is described by CDFG on page 1 of CDFG's March 2, 2011 letter to FERC providing CDFG's comments on YCWA's PAD. CDFG's goal, as described on page 2 of CDFG's letter is to preserve, protect, and as needed, to restore habitat necessary to support native fish, wildlife and plant species.

SWRCB

SWRCB has authority under the federal Clean Water Act (33 U.S.C. §11251-1357) to restore and maintain the chemical, physical and biological integrity of the Nation's waters. Throughout the relicensing process the SWRCB maintains independent regulatory authority to condition the operation of the Project to protect water quality and the beneficial uses of stream reaches consistent with Section 401 of the federal Clean Water Act, the Regional Water Quality Control Board Basin Plans, State Water Board regulations, CEQA, and any other applicable state law.

3.0 Study Goals and Objectives

The overall goal of this three-phased study is to determine the need for and appropriate configuration of a Narrow 2 Powerhouse Intake modification. The goal of the first phase of the study is to determine appropriate target water temperatures (i.e., temperature range, times of year and locations) for steelhead (*Oncorhynchus mykiss irideus*) and spring- and fall-run Chinook salmon (*O. tshawytscha*) in the Yuba River downstream of Englebright Dam.

The goal of the second phase of the study is to determine if the current Narrows 2 Powerhouse Intake, in conjunction with operation of other existing Project facilities can provide the target water temperatures and, if not, how the intake might be modified to provide the target temperatures.

The goal of the third phase is to develop a conceptual design for a Narrows 2 Powerhouse intake modification, if the second phase determines a modification to the intake is needed to meet target water temperatures.

The objective of the study is to develop information to meet the study goals as described above.

4.0 Existing Information and Need for Additional Information

4.1 History of Temperature Regime in the Yuba River

The Yuba River downstream of Englebright Dam supports significant, naturally spawning populations of anadromous fish, including Central Valley fall-run Chinook salmon, spring-run Chinook salmon, and steelhead. Central Valley spring-run Chinook salmon is currently listed as a threatened species under both the federal and State of California Endangered Species Acts (ESA and CESA, respectively), and steelhead is listed as threatened under the ESA. Central

Valley fall-run Chinook salmon have been designated a candidate for listing under the federal ESA.

Since 1941, water temperature in the Yuba River downstream of Englebright Dam has been significantly affected by releases from the 260-foot-high Englebright Dam. From 1941 through 1970, outflow from Englebright Reservoir was controlled through Pacific Gas and Electric Company's (PG&E) Narrows 1 Project, constructed concurrently with Englebright Dam. The Narrows 1 Powerhouse is located on the south bank of the Yuba River about 1,500 feet downstream of Englebright Dam, and the powerhouse has a maximum flow capacity of about 740 cfs. Since Englebright Dam does not contain a low-level outlet,³ flows that could not be controlled by PG&E's Narrows 1 Project overflowed the dam. Englebright Reservoir is fairly small (70,000 acre-feet, or ac-ft, of total storage in 1970), and is reportedly over 25 percent filled with sediment. There was likely minimal cold water during the summer in Englebright Reservoir prior to the construction of New Bullards Bar Dam, and likely water temperatures in the Yuba River downstream of Englebright Dam were similar to natural flow conditions (i.e. quite warm in summer and fall periods).

In 1970, YCWA constructed the Yuba River Development Project, which included two significant components that lowered summertime water temperatures in the Yuba River downstream of Englebright Dam. The first was the combination of New Bullards Bar Dam and New Colgate Powerhouse. The dam forms New Bullards Bar Reservoir, which has a large supply of cold water. That cold water is released to the Yuba River through New Colgate Powerhouse located just upstream of Englebright Reservoir.

The second Project component was Narrows 2 Powerhouse, which greatly increased the capability for controlled releases from Englebright Dam. The intake for the Narrows 2 Powerhouse is a tower located on the northwest side of Englebright Reservoir adjacent to Englebright Dam. The tower receives water from the surface of Englebright Reservoir down to an elevation of 439 feet, about 80 feet below the normal maximum water surface elevation.⁴

As a result of the above, water temperature in the Yuba River downstream of Englebright Dam were significantly cooler in the late spring, summer and fall after 1970 than it had been from 1941 through 1970 and also cooler than pre-dam, natural conditions for much of the warmer months of the year. However, water temperature continued to be a major concern of resource agencies for management and recovery of Chinook salmon and steelhead on the Yuba River downstream of Englebright Dam (CDFG 1991). To address this concern, starting in about 1999 YCWA conducted preliminary investigations of the potential benefits of installing an intake extension for the Narrows 2 Powerhouse that would access the colder, deeper water in Englebright Reservoir. Initial modeling indicated that temperature reductions of 1 to 6 degrees Fahrenheit (°F) could potentially be achieved, depending on hydrologic conditions, release rates from New Bullards Bar Reservoir, and the final design and operation of a new intake. YCWA

³ Since the California Debris Commission designed Englebright Dam as a debris storage dam, it did not include a low-level outlet in the dam.

⁴ Under current operations, Englebright Reservoir fluctuates about 7 feet, from full pool at elevation 527 ft down to an elevation of about 520 feet, except during the winter and spring when the reservoir often spills over the Englebright Dam spillway.

pursued grant funding from CalFed and other sources for design and installation of an intake device; however, funding was not secured. In 2000, the State Water Resources Control Board (SWRCB) in Order D-1644 directed YCWA to “diligently pursue” funding for the intake extension.

Since the 2006, water temperatures in the Yuba River downstream of Englebright Dam have been lowered as a result of higher instream flows when the first Pilot Program year of the Yuba Accord was implemented. The Lower Yuba Accord is a consensus-based, comprehensive set of agreements designed, among other things, to protect and enhance the Yuba River downstream of Englebright Dam. The EIR/EIS undertaken for the Accord demonstrated that summer and fall month temperatures in the Yuba River downstream of Englebright Dam would generally be colder by 1° to 5°F (depending on hydrologic conditions & release schedule) as a result of the Accord. The EIR/EIS also demonstrated that the long-term average water temperatures in most year classes, including Dry and Critical water years would be lower than the CDFG 1991 suggested temperatures that initially prompted the consideration of a new intake structure for Narrows 2.

At this time, it appears appropriate to re-evaluate the potential Narrows 2 Powerhouse Intake extension in context with the FERC relicensing studies and Lower Yuba Accord River Management Team (RTM) studies.

4.2 Existing and Available Information for Temperature Regime in the Yuba River

Temperature conditions in the Yuba River below Englebright Dam have been evaluated on several occasions using a variety of techniques. CDFG undertook an analysis using existing data in CDFG’s “Lower Yuba River Fisheries Management Plan” (CDFG 1991). Additional analysis of temperature data was completed in support of the SWRCB hearings on flows for the Yuba River below Englebright (SWRI et al. 2000).

A Technical Team comprised of representatives from YCWA, NMFS, CDFG, USFWS, and non-governmental organizations undertook a qualitative review of temperature conditions in 2001-2003 during the course of the development of the Lower Yuba River Accord flow schedules. (Yuba Accord Fisheries Agreement, 2005). Subsequent analysis of the Accord flow schedules during the preparation of the *Draft Environmental Impact Report/Environmental Impact Statement for the Proposed Lower Yuba River Accord* (YCWA 2007) utilized additional temperature data and a temperature model developed for the EIR/EIS analysis to compare temperature conditions under various CEQA and NEPA scenarios including No Action/No Project and various flow alternatives.

Recently, the Yuba Accord River Management Team (RMT) revisited water temperature management considerations for the Yuba River below Englebright Dam. In November of 2010 the RMT prepared a Technical Memorandum (Attachment A to this Study Plan) in which they reviewed the appropriateness of the water temperature regime associated with implementation of the Yuba Accord using previously available data and information, updated in consideration of

recent and ongoing monitoring activities conducted by the RMT since the pilot programs were initiated in 2006. The RMT reviewed and updated the lifestage periodicities of target species (spring-run Chinook salmon, steelhead, fall-run Chinook salmon, green sturgeon) in the lower Yuba River, identified the appropriate thermal regime for each target fish species taking into account individual species and lifestage water temperature requirements, identified water temperature index values, assessed the probability of occurrence that those water temperature index values would be achieved with implementation of the Yuba Accord, reviewed water temperature monitoring data collected from 2006 – 2010, and evaluated whether alternative water temperature regimes are warranted. The RMT also addressed the issue regarding the potential that cold water conditions could affect adult spring-run Chinook salmon immigration and holding, and the issue of *O. mykiss* anadromy versus residency.

Given the entire suite of considerations in the Technical Memorandum, the RMT concluded that implementation of the Yuba Accord provides a suitable thermal regime for target species in the lower Yuba River, and did not recommend water temperature-related operational or infrastructure modifications at this time. Further, the RMT recommended that the Technical Memorandum be supplemented by incorporating additional data and information obtained from ongoing monitoring and evaluation activities, and by the application of a daily time-step water temperature model, when such a model becomes available, to provide greater resolution and to validate the exceedance estimates of the Yuba Accord Water Temperature Model.

The RMT is comprised of representatives of NMFS, USFWS, CDFG, DWR, YCWA, PG&E and NGOs. Because the RMT membership includes or represents all of the jurisdictional agencies and most concerned stakeholders for the Yuba River below Englebright Dam, it is anticipated that the RMT's technical analysis of water temperature conditions in the Yuba River below Englebright Dam will be sufficient for use by relicensing stakeholders, resource agencies, and YCWA for assessment of potential water temperature impacts in the Lower Yuba River.

Relicensing Participants with an interest in issues related to temperatures in the Yuba River below Englebright Dam are encouraged to interact with their respective RMT representatives during the technical analysis. Additionally, the RMT can make interim work products, data and findings available to the Relicensing Stakeholders

5.0 Study Methods and Analysis

5.1 Study Area

For the purpose of this study, the study area includes Englebright Dam in the vicinity of the Narrows 2 Powerhouse Intake and the Yuba River downstream of Englebright Dam.

This study will draw on information being developed primarily by two other Relicensing studies, each of which has a broader study area: YCWA's Water Balance/Operations Model and Water Temperature Model Study.

If YCWA proposes an addition to the Project, the study area will be expanded if necessary to include areas potentially affected by the addition.

5.2 General Concepts and Procedures

The following general concepts and practices apply to the study:

- Personal safety is the most important consideration of each fieldwork team.
- Licensee will make a good faith effort to obtain permission to access private property where needed well in advance of entering the property.
- Field crews may make minor variances to the FERC-approved study in the field to accommodate actual field conditions and unforeseen problems. When minor variances are made, Licensee's field crew will follow the protocols in the FERC-approved study.
- When Licensee becomes aware of major variances to the FERC-approved study, Licensee will issue an e-mail to the Relicensing Contact List describing the variance and reason for the variance. Licensee will contact by phone the Forest Service (if the variance is on National Forest System land), USFWS, SWRCB and CDFG to provide an opportunity for input regarding how to address the variance. Licensee will issue an e-mail to the Relicensing Contact List advising them of the resolution of the variance. Licensee will summarize in the final study report all variances and resolutions.
- Licensee's performance of the study does not presume that Licensee is responsible in whole or in part for measures that may arise from the study.
- Global Positioning System (GPS) data will be collected using either a Map Grade Trimble GPS (sub-meter data collection accuracy under ideal conditions), a Recreation Grade Garmin GPS unit (3 meter data collection accuracy under ideal conditions), or similar units. GPS data will be post-processed and exported from the GPS unit into Geographic Information System (GIS) compatible file format in an appropriate coordinate system using desktop software. The resulting GIS file will then be reviewed by both field staff and Licensee's relicensing GIS analyst. Metadata will be developed for deliverable GIS data sets. Upon request, GIS maps will be provided to agencies in a form, such as ESRI Shapefiles, GeoDatabases, or Coverage with appropriate metadata, that is useful for interactive data analysis and interpretation. Metadata will be Federal Geographic Data Committee (FGDC) compliant.⁵
- Licensee's field crews will record incidental observations of aquatic and wildlife species observed during the performance of this study. All incidental observations will be reported in the appropriate Licensee report (e.g., incidental observations of special-status fish recorded during fieldwork for the Special-Status Turtles – Western Pond Turtle Study will be reported in Licensee's Stream Fish Populations Study report). The purpose of this effort is not to conduct a focus study (i.e., no effort in addition the specific field tasks identified for the

⁵ The Forest Service and CDFG each have requested that a copy of the GIS maps be provided to them when the maps are available.

specific study) or to make all field crews experts in identifying all species, but only to opportunistically gather data during the performance of the study.

- Field crews will be trained on and provided with materials (e.g. Quat) for decontaminating their boots, waders, and other equipment between study sites. Major concerns are amphibian chytrid fungus, and invasive invertebrates (e.g. zebra mussel, *Dreissena polymorpha*). This is of primary importance when moving: 1) between tributaries and mainstem reaches; 2) between basins (e.g. Middle Yuba River, Yuba River, and North Yuba River); and 3) between isolated wetlands or ponds and river or stream environments.

5.3 Study Methods

The study will be conducted in three steps, each of which is described below.

5.3.1 Step 1 – Assess Ability of Existing Intake and Alternatives to Meet Target Water Temperatures

In this step, YCWA will use the Relicensing Water Balance/Operations Model in combination with the Relicensing Water Temperature Model to determine if, and under what conditions, the existing Narrows 2 Power Tunnel Intake structure can be used to meet the target water temperatures developed by the RMT. The model will also be used to investigate if the withdrawal of water from deeper portions of the Englebright Reservoir would facilitate meeting the target water temperatures. YCWA will consult with the Relicensing Participants regarding model assumptions, and model results.

The ability of the existing Narrows 2 intake structure to meet other water temperature targets (i.e., alternatives to the targets developed by the RMT) will be assessed for any targets collaboratively agreed to by YCWA and Relicensing Participants.

If this step determines that the existing Narrow 2 Power Tunnel Intake as configured is adequate to meet the RMT target water temperatures and other water temperature targets, if collaboratively agreed to, the study will skip Step 2 and proceed to Step 3.

5.3.2 Step 2 – Develop Conceptual Design for Preferred Alternative

If Step 1 determines that a reconfiguration of the Narrow 2 Power Tunnel Intake would be necessary to achieve target water temperatures, YCWA will develop alternative conceptual designs for intake. The goal of this step is to develop enough detail so that the intake, including its construction, can be included in YCWA's Application for a New Licensee and evaluated in the National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA) reviews to support issuance of a new license by FERC, and all necessary agency permits and approvals to construct and operate the modified intake, if one is proposed. YCWA will work collaboratively with the Relicensing Participants regarding the conceptual design.

5.3.3 Step 3 – Prepare Report

YCWA will prepare a report that includes the following sections: 1) Study Goals and Objectives; 2) Methods and Analysis; 3) Results; 4) Discussion; and 5) Description of Variances from the FERC-approved study proposal, if any. The report will include the RMT’s final white paper, results of the model runs, and conceptual design and supporting information for the modified Narrows 2 Power Tunnel Intake, if one is proposed by YCWA.

6.0 Study-Specific Consultation

The study includes the following study-specific consultation:

- YCWA will consult with the Relicensing Participants regarding model assumptions, and model results (Step1).
- YCWA will collaborate with Relicensing Participants the need for alternative to the RMT water temperature targets. If YCWA and Relicensing Participants collaboratively agree that alternatives are needed, YCWA will collaborate with Relicensing Participants to develop the alternative water temperature targets (Step 1).
- YCWA will seek comments from the Relicensing Participants regarding the conceptual design of the Narrows 2 Intake structure (Step 2).

7.0 Schedule

YCWA anticipates the schedule to complete the study as follows assuming FERC issues its Study Determination by September 16, 2011 and the study is not disputed by a mandatory conditioning agency:

Assess Existing and Alternative Intakes (Step 1) November 2012 – March 2013
Develop Conceptual Design (Step 2)..... April 2013 – July 2013
Prepare Report (Step 3)..... August – September 2013

8.0 Consistency of Methodology with Generally Accepted Scientific Practices

The study is unlike studies performed for other relicensings, and therefore, does not conform to standard scientific practices. However, identifying goals, assessing the ability of existing structures to meet those goals and developing conceptual designs for modifications to existing structures so the goals can be met meets the criteria for good engineering practice.

9.0 Level of Effort and Cost

YCWA estimates the cost to complete this study in 2011 dollars is between \$50,000 and \$100,000.

10.0 References Cited

- California Department of Fish and Game (CDFG). 1991. Lower Yuba River Fisheries Management Plan. Stream Evaluation Report No. 91-1. Sacramento, CA.
- Childs, J.R., Snyder, N.P., and Hampton, M.A., 2003, Bathymetric and geophysical surveys of Englebright Lake, Yuba-Nevada Counties, California, U.S. Geological Survey Open-File Report 03-383 <http://geopubs.wr.usgs.gov/open-file/of03-383>.
- Yuba County Water Agency, California Department of Fish and Game, South Yuba River Citizens League, The Bay Institute, Trout Unlimited, Friends of the River, 2005. Lower Yuba River Fisheries Agreement Sacramento, 2005.
- Yuba Accord River Management Team. 2009. Lower Yuba River Accord Monitoring and Evaluation Program. Draft. June 2009. <www.yubaaccordrmt.com>
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