

Study 3.7

## **RESERVOIR FISH POPULATIONS**

August 2011

### **1.0 Project Nexus**

Yuba County Water Agency's (YCWA or Licensee) continued operation and maintenance (O&M) of the existing Yuba River Development Project (Project) has a potential to affect fish populations in reservoirs.

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

YCWA believes that four agencies have jurisdiction over fish in the geographic area covered in this study proposal: 1) the United States Department of Agriculture, Forest Service (Forest Service) on National Forest System (NFS) land; 2) United States Department of Interior, Fish and Wildlife Service (USFWS); 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, as understood by YCWA at this time, is discussed below.

#### Forest Service

The Forest Service's jurisdiction and applicable management goals are described by the Forest Service from page 59 to 76 in the Forest Service's March 2, 2011 letter to FERC providing the Forest Service's comments on YCWA's Pre-Application Document, or PAD (YCWA 2010). The Forest Service's jurisdiction and management goals are not repeated here.

#### 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 (PAD). USFWS's jurisdiction, goals and objectives are not repeated here.

#### 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 Existing Information and Need for Additional Information**

YCWA found multiple sources of information regarding fisheries resources within New Bullard’s Bar Reservoir and United States Army Corps of Engineer’s (USACE) Englebright Reservoir during research conducted in support of the Pre-Applictaion Document. California Department of Fish and Game (CDFG) stocking records, recreational fishing reports, and fish population surveys conducted in these reservoirs have identified numerous species that currently or historically existed in the reservoirs. Based on review of this information none of the species that are known to currently occur in the reservoirs area are listed under the federal or State of California Endangered Species Acts. Hardhead are the only special-status species (a California Species of Concern and Forest Service Sensitive Species) known to be present in Englebright Reservoir (J. Rowan, pers. comm., 2011).

Recreational angling and CDFG records (stocking and fish population surveys) have provided some information on fish species in New Bullard’s Bar and USACE’s Englebright reservoirs; a list of known game species that occur within these reservoirs based on this information is presented in Table 3.0-1 below.

**Table 3.0-1. Game fish species known to occur in New Bullard’s Bar Reservoir and USACE’s Englebright Reservoir based on recreational fishing reports.**

Family	Common Name/ Scientific Name	New Bullard’s Bar Reservoir	USACE’s Englebright Reservoir
Salmonid	Rainbow Trout/ <i>Oncorhynchus mykiss</i>	X	X
	Brown Trout/ <i>Salmo trutta</i>	X	X
	Kokanee/ <i>Oncorhynchus nerka</i>	X	X
Sunfishes	Largemouth Bass/ <i>Micropterus salmoides</i>	X	X
	Smallmouth Bass/ <i>Micropterus dolomieu</i>	X	X
	Spotted Bass/ <i>Micropterus punctulatus</i>	X	X
	Red Ear Sunfish/ <i>Lepomis microlophus</i>	X	X
	Crappie/ <i>Pomoxis spp.</i>	X	X
	Bluegill/ <i>Lepomis macrochirus</i>	X	X
Catfishes	Channel Catfish/ <i>Ictalurus punctatus</i>	X	X

Source: Fishsniffer.com 2009; CDWR 2006

CDFG has conducted surveys of fish in old and New Bullard’s Bar reservoirs since the 1950s. A 1959 survey of fish species in the old Bullard’s Bar Reservoir found 12 species of fish including bass, crappie, sunfish, bluegill, bullhead, shiners, Sacramento pikeminow (*Ptychocheilus*

*grandis*), sucker, and carp species. A subsequent summary report for CDFG fish survey activities in the reservoirs from 1959 through 1974 identified 16 species of fish as relatively common in the reservoirs, including smallmouth and largemouth bass, black crappie (*Pomoxis nigromaculatus*) white crappie (*Pomoxis annularis*), warmouth (*Lepomis gulosus*), green sunfish (*Lepomis cyanellus*) red-ear sunfish, bluegill, brown bullhead (*Ameiurus natalis*), Sacramento pikeminnow, Sacramento sucker (*Catostomus occidentalis*), common carp (*Cyprinus carpio*), rainbow trout, and Kokanee salmon (CDFG 1974). Brown trout and white catfish (*Ameiurus catus*) are noted as rare occurrences. Channel catfish, threadfin shad (*Dorosoma petenense*), and fathead minnow (*Pimephales promelas*) were reportedly planted by CDFG in the reservoir prior to 1960, but were not captured during any surveys. Golden shiners (*Notemigonus crysoleucas*) were observed only in 1959 (Central Valley Fish Hatchery 1959; CDFG 1974). The first documented CDFG capture of trout was reported in 1970 (CDFG 1963, 1970). Kokanee were first documented during CDFG survey efforts in 1972 (CDFG 1963, 1970, 1972).

Creel surveys conducted from July 2003 through May 2004 documented 12 sport fish species in USACE's Englebright Reservoir, including spotted bass, smallmouth bass, largemouth bass, bluegill, brown trout, rainbow trout, carp, channel catfish, crappie, Kokanee, sucker, yellow perch (*Perca flavescens*), and Sacramento pikeminnow (CDWR 2006b).

New Bullard's Bar Reservoir has a long history of annual fish stocking activities by CDFG dating back to 1959 (Central Valley Fish Hatchery 1959; CDFG 1974). Based on actual CDFG stocking records, between 1969 and 2007 over 4.9 million Kokanee salmon, nearly 1.6 million rainbow trout, over 310,000 Eagle Lake rainbow trout, 40,000 brook trout (*Salvelinus fontinalis*), 200 eastern brook, 200 cutthroat (*Oncorhynchus clarki*), Kamloop rainbow trout (number not available), and 185 spotted bass were planted in New Bullard's Bar Reservoir by CDFG (CDFG 1989, 2007).

Similar to New Bullard's Bar Reservoir, CDFG stocking records indicate that fish plantings in USACE's Englebright Reservoir have taken place from 1965 through 2007. During this period, over 756,000 rainbow trout, 228,320 Kokanee salmon, 6,973 lake trout (*Salvelinus namaycush*), nearly 28,000 brown trout, 4,000 Eagle Lake rainbow trout, 2,640 brook trout, 45 white crappie, and 80 black crappie were planted (CDFG 2007). Stocked species were primarily from the Shasta and San Joaquin CDFG fish hatcheries.

In accordance with new fish planting regulations, stocking of kokanee and hatchery rainbow trout is scheduled to take place in New Bullard's Bar Reservoir (CDFG 2008b). Englebright Reservoir is not scheduled for stocking from 2008 to 2010 pending a pre-stocking evaluation (CDFG 2008a, b).

The available information presented above comes from recreational sources and historical records, but little current empirical information is available regarding fish in Project reservoirs. There is a need to accurately characterize current fish communities in order to assess the potential effect of Project operations and maintenance on fish communities.

## **4.0 Study Goals and Objectives**

The goal of this study is to provide information concerning the distribution, occurrence, and condition of fishes in the Project reservoir.

The objectives of the study are to: 1) characterize fish species composition, relative abundance (e.g., catch per unit effort [CPUE]), and size in Project reservoirs; 2) characterize management of reservoir water surface elevations and its relationship to availability of fish habitat under existing Project operations and potential Project operations; 3) characterize fish size and condition factor; and 4) assess tributary access for fish and composition of fish within accessible tributaries.

## **5.0 Study Methods and Analysis**

### **5.1 Study Area**

For the purposes of this study, the study area is the New Bullard's Bar Reservoir and USACE's Englebright Reservoir.

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.<sup>1</sup>

- 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 (no effort in addition the specific field tasks identified for the 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-128 [didecyl dimethyl ammonium chloride], scrub brush, etc.) for decontaminating their boots, waders, and other equipment between study sites. Major concerns are amphibian chytrid fungus (*Batrachochytrium dendrobatidis*), and invasive invertebrates (e.g. zebra mussels, *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

Sampling will occur using boat electrofishing, backpack electrofishing, and gill nets. Prior to boat electrofish sampling, YCWA will follow the study methods outlined below. However, the YCWA may adapt the existing methodologies to follow any additional criteria identified in the CDFG Scientific Collection Permit, as has been customary from many prior events utilizing boat electrofishing, backpack electrofishign, and gillnet sampling during other California relicensings. Sampling efforts will be coordinated with reservoir operators to avoid periods of reservoir fluctuation that could affect safety and sampling efficiency. Within New Bullard's Bar Reservoir sampling will be scheduled over the hydrologic year to coincide with the low pool in fall and high pool in spring. The determination of relative high and low water elevations will be made after consultation with the YCWA on historical water operations at New Bullard's Bar Dam. It is expected that sampling events will generally occur between January or February (low pool) and June or July (high pool) based on historic reservoir data. These two sample periods will also increase the potential of catching a higher number of different species. Within Englebright Reservoir, sampling will occur only once during the summer months as reservoir

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<sup>1</sup> The Forest Service and CDFG each have requested that a copy of the GIS maps be provided to them when the maps are available.

levels fluctuate primarily from New Bullard's Bar releases and are less influenced by seasonal variations.

In addition to reservoir sampling, YCWA will conduct several additional assessments. These supplemental investigations include an assessment of tributaries surrounding the two reservoirs, a review of past surveys, and a summary of historic stocking practices. These additional efforts will supplement knowledge gained from the reservoir sampling assessment to allow for a better understand of the current health of reservoir fish populations in light of Project O&M.

YCWA will obtain all necessary permits prior to performing fieldwork.

The study methods will consist of four steps, each of which is described below.

### **5.3.1 Step 1 – Field Reconnaissance**

A field survey will be conducted prior to sampling to view the existing lacustrine habitat and identify suitable areas for reservoir sampling. Boat electrofishing and gillnet sampling require specific characteristics in order to accurately sample fishes. Upon documenting habitat with photos and GPS, YCWA will collaborate regarding sampling location for Englebright Reservoir with CDFG and for New Bullards Bar Reservoir with the Forest Service and CDFG. YCWA will accept comments from all Relicensing Participants regarding sampling locations for each methodology, nonetheless. YCWA will make a good faith effort to schedule the consultation on a day or days convenient to YCWA and interested Relicensing Participants, and will provide an email notice at least 14 days in advance of the meeting or site visit. If collaborative agreement is not reached, YCWA will note the disagreements in its final report, including why YCWA did not adopt the recommendation.

Sampling units for electrofishing stations will be approximately 1,000 meters (m) in length and established around the Project reservoir to obtain representative samples among the diversity of identified near-shore habitats that are feasible to sample by boat electrofishing. To address level of sampling effort, it is currently estimated that ten boat electrofishing sites will be conducted for New Bullard's Bar Reservoir and five for USACE's Englebright Reservoir; however, the exact number of sampling stations to be used will depend on the diversity of near-shore habitat conditions, including depth, cover, substrate, and proximity to sources of inflow assessed during field reconnaissance. Sampling stations will be designated on orthophotographs of the Project reservoirs and documented using GPS.

Similarly, gillnet sample locations will be established around Bullard's Bar Reservoir and Englebright Reservoir to obtain representative samples among the diversity of identified pelagic habitats. A total of eight sample stations will be attempted for gillnetting in New Bullard's Bar Reservoir and four for USACE's Englebright Reservoir. Boat electrofishing will be conducted prior to gillnetting efforts to alleviate issues that may arise from overlap of sampling areas. It is expected that one sample location will be placed near the project intakes of both reservoirs to sample fish presence and inform the potential for interaction. Sampling stations will be designated on orthophotographs of the reservoirs and documented using GPS.

### **5.3.2 Step 2a – Boat Electrofishing**

Boat electrofishing will be used to sample reservoir near-shore habitat at New Bullard’s Bar Reservoir and Englebright Reservoir. Sampling will occur twice during the year, coinciding with high and low pool levels within New Bullard’s Bar Reservoir and once during the summer months in Englebright Reservoir. Field activity will be conducted at night, beginning one hour after civil twilight. Boat electrofishing will take place using standard methods (Reynolds 1996). One or two electrode booms will be employed, and the booms and boat will be outfitted with standard non-conductive material in appropriate places for safety. Electrofisher “time on” will be recorded for each sampling site and a consistent effort and pace will be employed at all sites. Fish will be identified, where possible, as to origin; hatchery or wild stock (i.e., basic visual identification, such as a clipped adipose fin). Data recorded for each fish will include species identification, length (total length of all fish species without forked caudle fins and fork length for all species with forked caudle fins), weight, and, if applicable, notes on general condition.

General information recorded will include impoundment name, GPS sample site location, crew member names, weather conditions, air temperature, and water chemistry at approximate fish sampling location (i.e., water temperature, dissolved oxygen, and conductivity). Minimum, maximum, and mean water depths will be recorded.

### **5.3.3 Step 2b – Gillnetting**

Gill net sampling will occur twice during the year, coinciding with high and low pool levels within New Bullard’s Bar Reservoir and once during the summer months in Englebright Reservoir. Samples will be taken using variable mesh gillnets (i.e., adult net: 1-in. to 3-in. mesh, and juvenile net: 0.5-in to 0.75-in. mesh). If the reservoir is stratified, six gillnets will be deployed at each location: one adult and juvenile net in pelagic water near the surface; one adult and juvenile net in pelagic water in the metalimnion; and one adult and juvenile net in the hypolimnion. If the reservoir is not stratified, than the nets will be placed at the surface, at 40 percent of total depth, and 80 percent of total depth (not exceeding 100 feet of depth). The times of deployment and locations of each gillnet set will be recorded, and photographs will be taken of each gillnet after deployment to document both location and placement relative to the shoreline. The gillnets will be set for one day and night period (i.e., approximately 24 hours, dependant on CDFG approval) to facilitate good coverage and will be checked each morning and evening to separate the diel period.

Fish will be identified, where possible, as to origin; hatchery or wild stock (i.e., basic visual identification, such as a clipped adipose fin). After fish are captured, each fish will be processed, and information will be collected regarding species identification, length (total length of all fish species without forked caudle fins and fork length for all species with forked caudle fins), weight, and, if applicable, notes on general condition.

General information recorded will include impoundment name, GPS sample site location, crew member names, weather conditions, air temperature, secchi depth and water chemistry (i.e., water temperature, and dissolved oxygen). Minimum, maximum, and mean water depths will be recorded along with the depth placement of each gillnet. Dissolved oxygen profiles will be

collected using a Hydrolab at 10 foot intervals at four (25% intervals of length along the thalweg of the reservoir) locations within the reservoir to determine the presence and potential location of the thermocline to determine mid-water net depth.

### **5.3.4 Step 2c – New Bullards Bar Reservoir Tributary Assessment**

A reservoir tributary assessment will be conducted to assess accessible streams from New Bullard's Bar Reservoir.<sup>2</sup> The tributary assessment will be conducted in two parts: a passage assessment; and a species composition assessment. The following streams will be considered for the assessment:

- North Yuba (main stem)
- Lost Creek
- Mill Creek
- Bridger Creek
- Willow Creek
- Cottage Creek
- Burnt Bridge Creek
- Little Oregon Creek
- Indian Creek
- Slapjack Creek
- Empire Creek
- Hampshire Creek
- Slate Creek
- Deadwood Creek

All of the tributaries will be visited to assess if they are accessible to fish and have nominal flow. A determination of whether the tributary meets this criteria will be made at each stream with supporting notes and pictures. Those tributaries that are found to be accessible and have nominal flow will be further surveyed with the two-part assessment described below.

#### **5.3.4.1 Fish Passage Assessment**

This assessment will focus on potential barriers to fish movement out of New Bullards Bar Reservoir when the reservoir is drawn down – that is, the assessment will identify barriers within the reservoir normal maximum water surface elevation. The potential for fish passage will be identified by estimating the gradient of the tributary within the reservoir (from the confluence with the normal maximum water surface elevation to normal low pool in spring when some fish might move out of the reservoir for spawning) and available connective flow at this time of year. Accessible streams will be marked with GPS and potential shallow water or leaping barriers within the exposed reservoir mapped. For the purposes of this study, a potential upstream fish barrier is a single vertical rise of 3 feet in height or greater, or a thalweg depth of less than 0.3

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<sup>2</sup> A tributary assessment will not be performed for USACE's Englebright Reservoir since multiple parties affect reservoir elevations in that reservoir.

foot for an extended distance (i.e., sheet flow for about 3 feet). Similar criteria have been used in other relicensing efforts. Surveyors will move upstream from reservoir water surface at the time of the survey to the reservoir normal maximum water surface elevation. At any identified potential barrier, a point identifier (ID) will be assigned and measurements of potential barrier attributes will be collected. At a potential shallow water barrier point ID, surveyors will collect a width, maximum depth, and depth range of the thalweg and a wetted width as well as the length of the shallow section. A point ID identified at a potential leaping barrier will include length, width, height, and max depth of the jumping and landing pools at the barrier. Dominate/sub-dominate substrate of the tributary will be documented at all point ID locations. A brief description of barrier substrate or structural composition will be recorded. Photos will also be taken to document the tributary visually at all point IDs. Surveyors will continue from the mouth of the tributary to the reservoir normal maximum water surface elevation.

#### 5.3.4.2 Fish Species Composition Assessment

A single qualitative backpack electrofishing assessment will be conducted. Sampling will focus on habitat in the tributary from the reservoir water surface to the normal maximum water surface elevation.

Backpack electrofishing will be performed and collected fish will be placed in buckets and processed. During processing, fish information will be collected. This information will include: species identification, weight, length (total length of all fish species without forked caudle fins and fork length for all species with forked caudle fins), and if applicable notes on fish condition or removed scales. Species length and weight will be collected in order to develop a condition factor. All fish will be returned to waters in the immediate vicinity where they were collected.

Electrofishing effort will be measured as ‘time on’ to determine relative abundance reported as catch per unit effort (CPUE). Sampling conditions within tributaries exceeding depths of 1.5 m will be considered unsafe for backpack electrofishing.

Qualitative direct observation snorkeling will be conducted as an alternative if the tributary depth precludes electrofishing, which is not expected to occur. If needed, snorkelers (i.e., number of snorkelers to be determined by stream width) will occupy lanes and move in tandem upstream. Observed individual fish will be identified to species and size will be estimated in two-inch intervals (0>2 in, 2>4in, etc.). Surveys will be conducted during the day when sufficient light is present. Catch will be reported as number per area sampled. This is not intended to be a statistically quantifiable estimate, but only to provide relative abundance. General site information for all stream survey locations will include stream name, sampled stream length and mean width, crew members, time of day, environmental (weather) conditions, riparian/channel conditions (i.e., percent canopy, substrate, mean depth, and maximum depth), aquatic habitat condition (i.e., habitat type(s), and cover), air temperature, water chemistry (water temperature, dissolved oxygen, and conductivity), and GPS location. Photographs will also document the specific location and conditions of the site. Site information will be collected in similar fashion regardless of the use of backpack electrofishing or snorkeling.

### **5.3.5 Step 3 – Data Entry and Data Analysis**

Data will be entered into a database. The database will be organized, compiled and subjected to QA/QC procedures. Data will be analyzed graphically and summarize species composition, relative abundance, length frequency, and location.

Gill net and boat electrofishing results will be reported both as total catch and in terms of CPUE. CPUE for fishes captured by boat electrofishing and gill net will be calculated by dividing number of fish of each species captured by the length of time fished (e.g., fish/hr). CPUE for fishes captured by backpack electrofishing will be calculated by dividing number of fish of each species by the length of time fished (e.g., fish/min). CPUE will be summarized by reservoir or tributary and species.

The relative abundance of fish at each site will be calculated to identify fish species composition and distribution patterns throughout the Project Area.<sup>3</sup>

Fish size and weight will be summarized by fish species and site. Length-weight regressions will be generated to calculate a relative condition factor ( $K_n$ ) for fish species.

### **5.3.6 Step 4 – Historic Sampling and Stocking Record Assessment**

Historical sampling efforts will be included in the discussion of the report including any new fisheries data provided by CDFG and other fisheries data available prior to report development. The current findings will be assessed based upon prior research to better understand how the current information compares to previous research.

A review of available stocking records will also be conducted. Expected products from the fish stocking review will include a detailed description of planting records. Data will be tabulated to the extent possible and summarized by year. These data will be addressed in light of the results of the reservoir sampling in order to better understand how the past activities are reflected in the current fish populations.

### **5.3.7 Step 5 – 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, if any. The report will also contain GIS maps of sampled areas and relevant summary tables and graphs. Further, the report will describe daily water surface elevation patterns and approximate pool volumes. The report will include a summary of water quality information with respect to thermocline location, epilimnion and hypolimnion water temperatures and dissolved oxygen concentrations. The report will also include:

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<sup>3</sup> For the purposes of the Relicensing, the Project Area is defined as the area within a border of about 0.5 mile surrounding the Federal Energy Regulatory Commission (FERC) Project Boundary.

- Stocking assessment
- Fish species composition, relative abundance (i.e., CPUE), location, and condition factor by species in the reservoir and surrounding tributaries
- Water quality information with respect to thermocline location, epilimnion and hypolimnion water temperatures and dissolved oxygen concentrations will be summarized from the current study and the separate water quality study, as pertinent
- Photo documentation of survey efforts and areas assessed or sampled

If YCWA observes any special-status fish species, YCWA will complete the appropriate California Natural Diversity Database (CNDDDB) form and transmit the form to the CNDDDB.

## **6.0 Study-Specific Consultation**

YCWA will engage in the following study-specific consultation:

- YCWA will collaborate regarding sampling location for Englebright Reservoir with CDFG and for New Bullards Bar Reservoir with the Forest Service and CDFG. YCWA will accept comments from all Relicensing Participants regarding sampling locations for each methodology, nonetheless. (Step 1.)

## **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:

Planning (Step 1).....	October – November 2011
Field Work (Step 2a through 2b; low pool event) .....	October – November 2011
Field Work (Step 2a through 2c) .....	March 2012 – June 2012
Office Work (Step 3a, 3b, and 4).....	July 2012
Report Preparation (Step 5) .....	August – September 2012

## **8.0 Consistency of Methodology with Generally Accepted Scientific Practices**

The study methods discussed above are consistent with the study methods followed in several other relicensings. The methods presented in this study plan also are consistent with those used in recent relicensings in California.

## **9.0 Level of Effort and Cost**

YCWA estimates the cost to complete this study in 2011 dollars is between \$290,000 and \$395,000.

## 10.0 References Cited

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