

## **4.1.22 Pyramid Lake Tributaries Fish Passage Barriers Study**

### **4.1.22.1 Project Nexus**

Continued Project O&M and Project-related recreation have the potential to affect access to tributaries of Pyramid Lake by local fish populations.

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

Existing, relevant, and reasonably available information regarding fish communities and operations of Pyramid Lake is provided in Sections 4.5.4 and 3.2, respectively, of the Licensees' PAD. As summary, 19 species of fish have been documented in Pyramid Lake including rainbow trout (*Oncorhynchus mykiss*). Rainbow trout have also been documented in Piru Creek upstream of Pyramid Lake but not in any other tributaries to Pyramid Lake. Current operating agreements limit fluctuation of the lake to only the upper 19 feet under normal operating conditions.

Additional information, which will be provided by this *Pyramid Lake Tributaries Fish Passage Barriers Study*, is needed to determine upstream passage barriers in Pyramid Lake.

### **4.1.22.3 Study Goals and Objectives**

The goal of this *Pyramid Lake Tributaries Fish Passage Barriers Study* is to identify any upstream fish passage barriers on identified tributaries to Pyramid Lake below the NMWSE of Pyramid Lake. The objective of this *Pyramid Lake Tributaries Fish Passage Barriers Study* is to fill recognized gaps in existing information regarding fish passage on tributaries to Pyramid Lake.

### **4.1.22.4 Study Methods**

#### **Study Area**

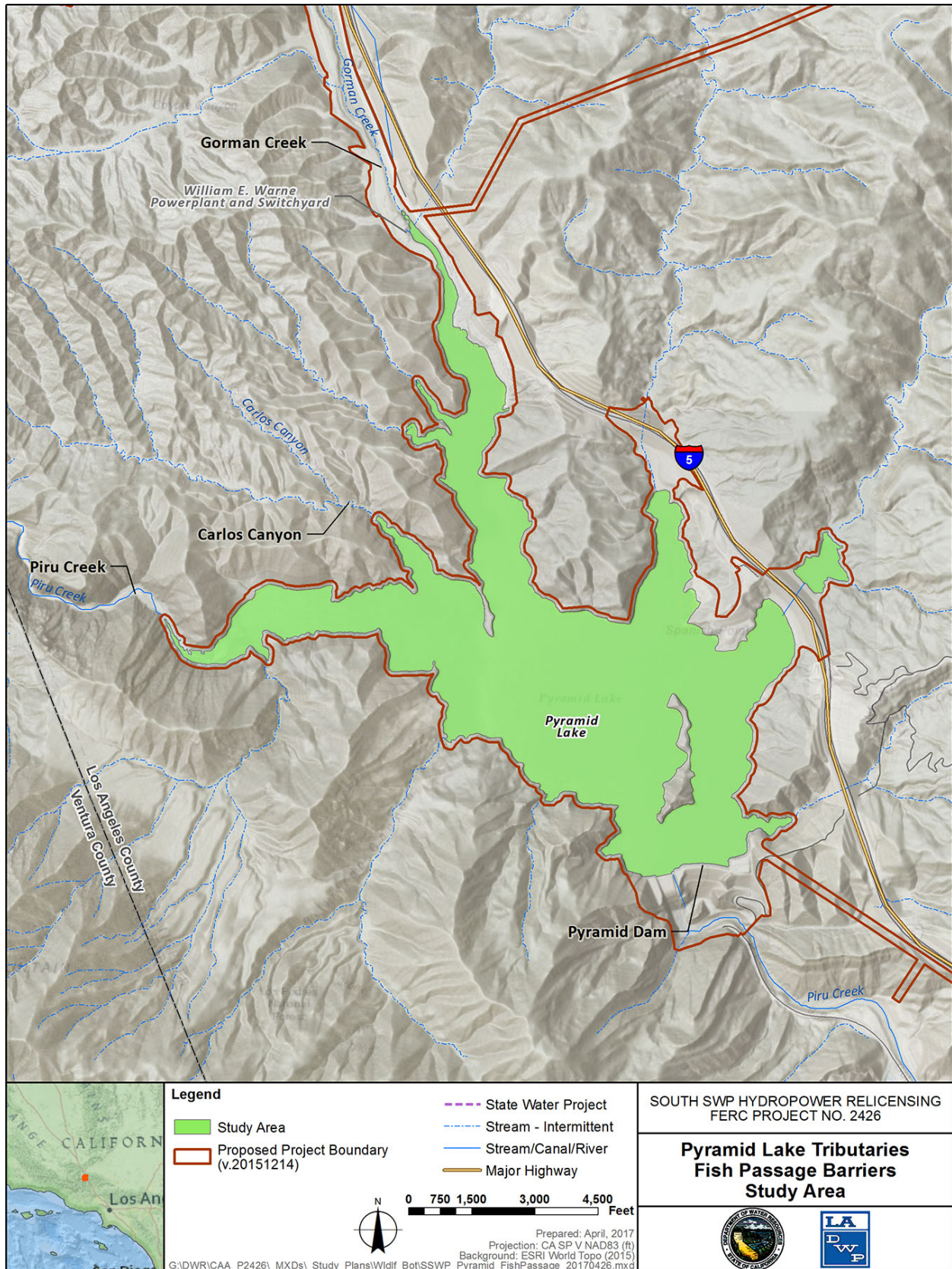
The *Pyramid Lake Tributaries Fish Passage Barriers Study* area includes Pyramid Lake between its NMWSE of 2,578 feet to the area of normal drawdown during the time when fish in the lake would access the tributaries. The portion of the tributaries to be assessed lie within the lake fluctuation zone. Tributaries to be studied include: Piru Creek, Gorman Creek, and Carlos Canyon. The *Pyramid Lake Tributaries Fish Passage Barriers Study* area is shown in Figure 4.1-30.

#### **General Concepts and Procedures**

- Personal safety is the most important consideration of each fieldwork team. Fieldwork will only occur in safely accessible areas and under conditions deemed safe by the field crews. Locations within the study area that cannot be accessed in a safe manner (e.g., locations containing dense vegetation or unsafe slopes) and areas inundated when the surveys are performed, will not be surveyed;

these areas will be identified in the data summary and an explanation for survey exclusion will be provided.

- The *Pyramid Lake Tributaries Fish Passage Barriers Study* will begin after FERC issues its Study Plan Determination.
- The *Pyramid Lake Tributaries Fish Passage Barriers Study* does not include the development of requirements for the new license, which will be addressed outside the study.
- The *Pyramid Lake Tributaries Fish Passage Barriers Study* focuses specifically on fish passage barriers within Pyramid Lake and the portions of the tributaries that are located within the lake elevation fluctuation zone (the area between the Pyramid Lake NMWSE of 2,578 feet to normal drawdown elevation during the time when fish in the lake would access the tributaries).
- If required for the performance of the *Pyramid Lake Tributaries Fish Passage Barriers Study*, the Licensees will make a good faith effort to obtain permission to access private property well in advance of initiating the study. The Licensees will only enter private property if permission has been provided by the landowner.
- The Licensees will acquire all necessary agency permits and approvals prior to beginning fieldwork for the *Pyramid Lake Tributaries Fish Passage Barriers Study*.
- Field crews may make variances to the *Pyramid Lake Tributaries Fish Passage Barriers Study* in the field to accommodate actual field conditions and unforeseen problems. Any variances in the *Pyramid Lake Tributaries Fish Passage Barriers Study* will be noted in the data resulting from the *Pyramid Lake Tributaries Fish Passage Barriers Study*.
- To prevent the introduction and transmittal of amphibian chytrid fungus and invasive aquatic species (e.g., quagga mussels, zebra mussel, and Asian clams), field crews will be trained on, provided with, and use materials (e.g., Quat) for decontaminating their boots, waders, and other equipment when leaving or traveling between water-based study sites. Field crews will follow DWR's Quagga and Zebra Mussel Rapid Response Plan and CDFW's Aquatic Invasive Species Decontamination Protocol which can be found at the following link: (<https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=43333>). All boats used during the study will follow cleaning protocols, including inspections before and after use. All decontamination requirements in place at Project reservoirs including those of DWR's Quagga and Zebra Mussel Rapid Response Plan for the SWP will be strictly followed (DWR 2010).



**Figure 4.1-30. Pyramid Lake Tributaries Fish Passage Barriers Study Area**

## **Methods**

Data collection for the *Pyramid Lake Tributaries Fish Passage Barriers Study* will consist of one step: complete fish passage barriers assessment, as described below.

Step 1 – Complete Fish Passage Assessment. This assessment will focus on potential barriers to rainbow trout movement out of Pyramid Lake into the tributaries when the reservoir is drawn down – that is, the assessment will identify barriers within the reservoir 19 feet below the NMWSE of 2,578 feet and above the elevation of normal drawdown. As discussed under Section 3.2 of the Licensees' PAD, current operating agreements limit fluctuation of the lake to only the upper 19 feet under normal operating conditions.

At each tributary, a surveyor will map the channel topography moving in an upstream direction from the Pyramid Lake water surface elevation to the reservoir's NMWSE using Real Time Kinetic (RTK) GPS survey equipment. At each data collection location the surveyor will collect a data point for the bed elevation in the thalweg and a water surface elevation over the bed in the North American Vertical Datum of 1988. The resulting data set will produce a detailed longitudinal profile of the channel bed and water surface elevations. Dominate/sub-dominate substrate in each tributary will be mapped along the survey path. Potential barriers will be identified for each rainbow trout lifestage and classified as either a leaping barrier, a shallow water barrier, or a velocity barrier. Photos will be taken to document the tributary survey generally, and for each identified barrier specifically. The location of each barrier will be identified with the RTK GPS. The stream profile will be compared with the leaping ability of rainbow trout identified from the Pyramid Lake creel census data, to determine if the stream profile represents a barrier to fish that might want to move upstream.

Fieldwork will occur at a time when Pyramid Lake is at its normal lowest elevation, which is typically about 19 feet below NMWSE and occurs in the August to September period. The reservoir will not be drawn down for the study; Licensees will make a good faith effort to perform the fieldwork when the lake is at its lowest point in the August-September period.

Reservoir operations data will be acquired and described to relate project operations to the annual time period for which potential barriers may be exposed. This will be done by calculating the percentage of the year in which each barrier was exposed and therefore presented a potential impediment to fish movement.

## **Quality Assurance and Quality Control**

Field data gathered during this *Pyramid Lake Tributaries Fish Passage Barriers Study* will be collected in a manner that promotes high quality results, and will be subject to QA/QC for sample collection equipment, procedures, and cross-checking of data. As part of the QA/QC procedures, extreme care will be taken to ensure the data collected is accurate and maintained in a safe environment.

## **Analysis**

As described above, a longitudinal profile presenting the results of the RTK GPS survey will be produced for each tributary. Each profile will describe the channel elevation and water surface elevation at the time of each survey. Photos for each tributary will be presented and organized from downstream to upstream. The results of the *Pyramid Lake Tributaries Fish Passage Barriers Study* will be considered in relation to typical Project operations, particularly during rainbow trout spawning periods.

## **Reporting**

*Pyramid Lake Tributaries Fish Passage Barriers Study* results will be included, to the extent completed and ready for inclusion, in the Licensees' ISR, USR, DLA, and FLA.

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

The methods are consistent with the methods used for recent FERC hydroelectric relicensing efforts in California, including the Merced River Hydroelectric Project (FERC Project No. 2179) and the Yuba River Development Project (FERC Project No. 2246).

### **4.1.22.6 Schedule**

The *Pyramid Lake Tributaries Fish Passage Barriers Study* will begin after FERC issues its Study Plan Determination. Licensees anticipate the schedule below will be followed to complete the *Pyramid Lake Tributaries Fish Passage Barriers Study*.

Fieldwork Preparation	June 2017 – July 2017
Fieldwork	August 2017 – September 2017
Data QA/QC	October 2017
Data Analysis and Reporting	November 2017

### **4.1.22.7 Level of Effort and Cost**

Based on the work effort described above, the Licensees estimate the current cost to complete this *Pyramid Lake Tributaries Fish Passage Barriers Study* is between \$15,000 and \$25,000.

### **4.1.22.8 References**

DWR. 2010. The Quagga and Zebra Mussel Rapid Response Plan for the State Water Project. 93 pp. CONFIDENTIAL/PRIVILEGED – Not for Public Distribution.