

# **RIPARIAN MONITORING PLAN**

## **BIG CREEK HYDROELECTRIC SYSTEM**

**MAMMOTH POOL (FERC Project No. 2085)  
BIG CREEK NOS. 1 AND 2 (FERC Project No. 2175)  
BIG CREEK 2A, 8, AND EASTWOOD (FERC Project No. 67)  
BIG CREEK NO. 3 (FERC Project No. 120)**

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**SUBMITTED BY  
SOUTHERN CALIFORNIA EDISON COMPANY**

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## 1.0 INTRODUCTION

This Riparian Monitoring Plan (Plan) has been developed for five of Southern California Edison's (SCE's) hydroelectric Projects that are a part of the Big Creek Hydroelectric System, located in the Upper San Joaquin River Watershed. The Plan covers the following four Big Creek Alternative Licensing Process (ALP) Projects: Mammoth Pool (FERC No. 2085), Big Creek Nos. 1 and 2 (FERC No. 2175), Big Creek Nos. 2A, 8, and Eastwood (FERC No. 67), and Big Creek No. 3 (FERC No. 120). In addition, the Plan covers the Portal Hydroelectric Project (FERC No. 2174). These Projects consist of eight powerhouses, and four major reservoirs, and have a combined dependable operating capacity of about 900 megawatts (MW).

Quantitative and qualitative riparian studies completed for the Big Creek ALP (SCE 2002 and 2003 Final Technical Study Reports (FTSR), CAWG 11, Riparian (SCE 2003a; SCE 2004) identified potential riparian or meadow resource issues along certain bypass streams. Channel Riparian Maintenance (CRM) flows to enhance and support riparian resources will occur along Mono Creek and Camp 61 Creek. CRM flow releases to enhance and support riparian and meadow resources will be provided along the South Fork San Joaquin River (Jackass Meadow area). Mono Creek and the South Fork San Joaquin River CRM flows are part of the Big Creek 2A, 8 and Eastwood Project (FERC No. 67). Camp 61 Creek CRM flows are part of Portal Hydroelectric Project (FERC No. 2174). This Plan is designed to monitor the status and trends of the riparian resources along these streams in response to the CRM flow and minimum instream flow (MIF) releases required under new licenses.

## 2.0 GOALS AND OBJECTIVES

Monitoring riparian vegetation provides a means of assessing the effects of the new CRM flow releases on the composition, structure, and health of the riparian resources in selected reaches. The goal of the Riparian Monitoring Plan is to evaluate the status of riparian resources in selected reaches under the new CRM flow regimes required by the new licenses for Camp 61 Creek, Mono Creek, and the South Fork San Joaquin River. The specific objectives for the monitoring include the following:

1. Monitor riparian and meadow vegetation composition in selected reaches.
2. Monitor riparian vegetation age class structure, including regeneration, in selected reaches.
3. Monitor trends in riparian and meadow health in selected reaches over the length of the new license.

## 3.0 GENERAL APPROACH

The main task of this Monitoring Plan is to collect data to monitor the riparian resources in the selected bypass reaches for which CRM flows will be required by the new license

to address riparian resource issues. The riparian vegetation will be monitored using the same or similar sampling methods previously established during the relicensing surveys (SCE 2003a; SCE 2004) to enable comparisons with this data. The riparian data collected, including regeneration success, species coverage, species presence/absence, distribution of stem size classes, and percent decadence of species present will provide information as to whether suitable flow conditions are occurring to promote healthy riparian and meadow communities, successful native species' establishment on alluvial surfaces in reaches with identified age class resource issues, to support native riparian or meadow species, and to discourage the establishment of mature woody vegetation and upland species on lower surfaces within the channel (channel encroachment).

Riparian vegetation along the streams will be monitored at least four times during the term of the license using a combination of ground-level photo documentation, and transects and plots located perpendicular to the channel (along surveyed transects). Plot locations will be selected in consultation with the resource agencies. Results, including resource evaluations, will be included in a draft Riparian Monitoring Report, which will be provided to the U.S. Department of Agriculture-Forest Service (USDA-FS), the Federal Energy Regulatory Commission (Commission or FERC), United States Fish and Wildlife Service (USFWS), California Department of Fish and Game (CDFG), and other interested federal and state agencies that express an interest in participating.

The stream reaches for monitoring and sampling methods are discussed in the following sections.

#### **4.0 RIPARIAN MONITORING REACHES**

Riparian monitoring will be conducted in the following reaches, which were also surveyed in support of the relicensing processes, along Camp 61 Creek, Mono Creek, and South Fork San Joaquin River:

1. Camp 61 Creek: River Miles (RM) 1.1-1.6; 1.87-1.95
2. Mono Creek: RM 2.3-2.7; 3.5-3.7; 4.4-4.7
3. South Fork San Joaquin River: RM 26.1-27.7

The locations of these reaches are shown on Figure 1.

The riparian resource issues that were identified along each stream during the relicensing process include:

- Camp 61 Creek: Riparian resource issues include channel encroachment and riparian health in certain reaches. The potential for increased bank erosion was also identified as a potential consequence of the higher flows to be required by the new FERC license (FERC 2006).

- Mono Creek: Resource issues include channel encroachment and reduced regeneration success (age class structure resource issue), change in community composition, reduced floodplain connectivity and bar inundation along adjustable reaches, and altered frequency and timing of peak flows.
- South Fork San Joaquin River (Jackass Meadow Complex): Major riparian resource issues include decreased flow connectivity, change in community composition, upland species encroachment (lodgepole pine), and stress to herbaceous vegetation and willows within the meadow (also caused by grazing and recreation). Last, the USDA-FS has expressed an interest in the regeneration of sedge beds in certain locations along the meadow.

## 5.0 SAMPLING METHODS

Monitoring along all three streams will include the collection of baseline data within one year of the license issuance, prior to the initiation of MIFs and CRM flows in the selected reaches. The USDA-FS, USFWS, CDFG, and State Water Board will participate in the selection of sampling sites and refining protocols. If an agency does not respond or declines to participate after notification, SCE can move forward with site selection or protocol refinement. When scheduling sampling site selection or field data collections, SCE will give interested governmental agencies 30 days advance notice to provide them with the opportunity to participate or observe. If field conditions or operational situations preclude a 30 day notification, SCE will provide notice as far in advance as feasible. CRM flows will not be provided during this first year when these data are collected. The data collected will be similar to that collected for the Big Creek ALP and will include plant species composition, percent cover, height and canopy structure, relative density, size classes present, evidence of unusual mortality, structural diversity, width of the riparian zone, and observations of other stressors potentially impacting riparian and/or meadow resources. Incidental wildlife observation, presence of diagnostic sign (e.g. tracks, scat, feathers, etc) and habitat suitability will also be collected. After the initial surveys, measured flows since the preceding monitoring period will be evaluated.

Along all three streams, riparian vegetation will be monitored using a combination of ground-level photo documentation and surveyed transects and plots. To the extent feasible, the monitoring will be conducted at the same time of year each monitoring period, in the summer. As different riparian resource issues were identified along each of these streams, aspects of the riparian monitoring have been designed for each to concentrate on assessing the trends of these specific riparian attributes.

Photo documentation and vegetation transect composition and structure, which will be conducted along each stream, is described below. The additional monitoring is described in the following section by stream.

## 5.1 PHOTO DOCUMENTATION

Photo documentation will provide a visual record of the conditions of the riparian and meadow communities and land use (Elzinga et al. 1998; Bureau of Land Management 1999). The photographs will document species present, vegetation type and cover, species health, and land uses.

Permanent photo points were not established during the riparian Big Creek ALP studies, although numerous photographs were taken along the reaches and reach transects, as part of the various Big Creek ALP studies. These photographs will be evaluated for each of the monitoring reaches to determine if the exact spots can be re-located in the first monitoring season. Permanent photo points will be established in consultation with the USDA-FS, USFWS, CDFG, State Water Board, and other interested government agencies prior to the implementation of the photo documentation, at either the re-located or appropriate new positions, within one year of the license issuance. Each point will be marked with a scribed platform on a pole at the photographer's location and the location will be recorded with a Global Positioning System (GPS). The photographs will be taken at approximately the same location, time of year (season), and time of day. The photographs will be stored by year electronically in a photolog with pertinent information such as date, time, number, environmental information (such as recent high flows, etc). Hard copies of the photographs and accompanying information will be provided to the USDA-FS as a back up.

The photographs will be used to document changes in herbaceous and woody cover along the stream banks and within the meadows, position of the vegetation along the channel, other activities within the reaches, and to a lesser extent, species composition. The photographs will be compared to baseline conditions and each preceding monitoring season. Results will be included in the subsequent Riparian Monitoring Report.

## 5.2 VEGETATION TRANSECT COMPOSITION AND STRUCTURE

Quantitative data will be collected within each reach with plots distributed along surveyed transects established perpendicular to the channel. Vegetation will be sampled from the low flow water's edge to the valley walls or hillslope, and will include bars if present. Data will be collected in paired plots established along the transects at changes in elevations with potential differences in flow connectivity and hydroperiod.

Data will be collected in two plot sizes at each plot location. Herbaceous and other cover data will be collected within 1 m<sup>2</sup> plots along transects. Shrub and tree data will be collected within 5 x 2 m plots along transects. Herbarium specimens of all vascular plant and bryophyte species will be made the first time each species is encountered or as necessary to conclusively confirm identification to species, and deposited at the Sierra National Forest herbarium

Plot-transect data collection will be used to collect quantitative data, including:

Shrub and Tree Layers (5 x 2 m plots):

- Canopy coverage class (%)
- Total number of stems (class)
- Stem count per individual or species (class)<sup>1</sup>
- Tree diameter (diameter at breast height)
- Dominant species relative decadence (%)
- Dominant species coverage (%)
- Total plot decadence (%)
- All tree and shrub species present in each plot (species richness) and whether native or nonnative

Ground Layer (1 x 1 m plots)

- Dominant species coverage (%)
- Total canopy coverage
- Ground layer canopy coverage
- Shrub layer canopy coverage
- Tree layer canopy coverage
- All species present in each plot (species richness) and whether native or nonnative

Other pertinent information will be recorded as observed in the field, including: substrate, channel encroachment, large woody debris within the riparian corridor, bank instability, and evidence of recreational and other land use activities (e.g. fishing trails, vegetation trampling or clipping, horses or cattle present). Evidence of unusual stress or mortality, and/or evidence of wildlife use, will also be noted. In addition, noxious weed and special-status plant species will be documented if encountered during field surveys.

The total plot number of plots along each transect will vary depending on the width of the riparian corridor. However, plots will be established to sample at least five percent of the total transect length, with a minimum of four 5 x 2 plots and six 1 x 1 plots per transect, as feasible based on feasibility and the width of the valley bottom. A plot will

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<sup>1</sup> Many observers have difficulty differentiating willow and mountain alder individuals, particularly mature individuals. Stems per individual will not be assessed if this occurs; rather stems per area (densities) will be determined. Seedlings or young individuals will be identified as this information is important for assessing regeneration. In addition, when stem densities are high, the accuracy of the counting tends to decrease. To minimize this error in the field, stem densities have been grouped. The groupings are finer at lower densities and broader as densities increase.

always be established at the water's edge, and plots will also be established on bar features, if present along the transect.

In reaches with poorly developed or narrow floodplains in which only one or two plots would be placed along the transect, additional plots will be established parallel to the channel to evaluate a minimum of four 5 x 2 plots and six 1 x 1 plots per transect.

### 5.2.1 CAMP 61 CREEK

Riparian vegetation will be monitored within the same reaches along which Proper Functioning Condition (PFC) Assessments (Prichard 1988) were completed for the preparation of the Portal License Application (RM 1.1-1.3, 1.3-1.45, 1.45-1.60) (SCE 2003b). One additional reach will be established within the encroached reach downstream of Portal Forebay (RM 1.87-1.95). A minimum of three and maximum of five transects will be established within each reach. If transects have been previously established for the geomorphology or aquatics relicensing studies, the riparian monitoring will occur along those transects.

In addition to the data described above, data on bank protection by riparian vegetation within the reach will be collected by a modified greenline method<sup>2</sup> (Winward 2000; Coles-Ritchie et al. 2004). For this method, dominant species (ground, shrub, and tree species), bare ground, leaf litter, and large woody debris are assessed by walking along the stream bank for approximately 100 m (300 feet)<sup>3</sup> and recording the length of each along each stream bank. The lengths of the vegetation community types and other corridor attributes are then related to the length of the greenline to determine the proportion of each along the stream bank. The existing vegetation will be evaluated and rated for its ability to buffer the erosional effects of the flows on the stream banks, which includes rooting structure (Winward 2000; Potter 2005).

### 5.2.2 MONO CREEK

Riparian vegetation will be monitored along the same reaches where data was collected during the Big Creek ALP studies (RM 2.3-2.8, 3.5-3.7, and 4.4-4.7). Data were collected in randomly selected plots along surveyed transects that were permanently installed and surveyed. Data, as described above, will be collected in paired plots along these same transects. Permanent plots were not established along the transects during the Big Creek ALP studies, and it is unlikely that the exact same plot locations would be re-sampled during the monitoring studies. Plots, however, will be located at similar distances and elevations as were sampled in the Big Creek ALP studies.

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<sup>2</sup> The greenline is defined as: '*The first perennial vegetation that forms a lineal grouping of community types on or near the water's edge. Most often it occurs at or slightly below the bankfull stage*' (Winward 2000).

<sup>3</sup> The length of the greenline survey is based on protocols outlined in Winward, 2000.

### 5.2.3 SOUTH FORK SAN JOAQUIN RIVER

Riparian vegetation will be monitored within the Jackass Meadow Complex in paired plots with and without enclosures at locations similar to those evaluated as part of the relicensing studies (RM 26.1-27.7). The microtopography will be surveyed as part of the *Channel and Riparian Maintenance (CRM) Flows for the South Fork San Joaquin River below Florence Reservoir*. This data will be reviewed and used to assist in the selection of plot locations for monitoring. The locations of the plots will also consider the data collected as part of the 2005 and 2006 studies focused on assessing inundation, soil moisture conditions, and vegetation within the meadow (SCE 2005; SCE 2007). Plot locations will be based on topography and vegetation present.

## 6.0 FREQUENCY OF MONITORING

Riparian resources will be evaluated the first year after license issuance, five years following CRM flow releases made in the first Wet Water Year for Mono Creek and Camp 61 Creek and the second Wet Water Year for the South Fork San Joaquin River, and at 10 year intervals for the remainder of the license term.

## 7.0 QUALITY CONTROL AND ASSURANCE

All field personnel will be familiar with the dominant species, recent hydrology, and field data that will be collected and supervised by a riparian ecologist. The supervisor will ensure that the field personnel are adequately prepared to collect the data accurately and correctly. All data collected onto field datasheets will be checked by the accompanying field crewmember. All electronically entered data will be checked for accuracy and completeness against the field data sheets. All data will be stored both electronically and as a hard copy to ensure that the data will be accessible through the term of the next license.

## 8.0 ANALYSIS AND STATISTICAL FRAMEWORK

The quantitative riparian data for each reach will be compiled to determine descriptive statistics<sup>4</sup>, as well as frequency distributions (i.e., histograms), of woody riparian and tree seedling densities and stem densities by size class on alluvial surfaces, and riparian plant association based on Potter (2005) or similar classification. Qualitative data collected for each reach will be compiled and summarized, including observations of encroachment, bank instability due to lack of vegetation, and species lists, classified according to wetland or upland indicator, native or non-native, noxious weed, or special-status species.

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<sup>4</sup> Descriptive statistics include mean, median, range, and measurement of variability of the attribute within the reach.

During each monitoring period, the hydrology, climate, and other environmental factors that may affect the trends in riparian resource condition (upward or downward) since the previous sampling period will be assessed. Climate trends will also be evaluated, such as distribution of particularly wet or dry years in between sampling periods. Other activities or changes in the magnitude of activities within the watersheds, such as grazing, recreation, fire, or timber management, will also be assessed.

## **9.0 REPORTING AND AGENCY CONSULTATION**

After each monitoring event (see Section 6), a draft Riparian Monitoring Report providing the results of the riparian surveys will be provided to the USDA-FS, USFWS, CDFG, State Water Board, and other interested federal and state resource agencies requesting copies of the report at least two months prior to the Consultation Meetings specified in Condition 1. The report will include a map showing the monitoring locations, a summary of the data collected, and a time series of the photo points. In addition to summarizing and describing the results, the report will compare the results with the previous riparian studies completed in support of the latest relicensing and previous monitoring surveys for each of the three streams and will discuss implications regarding trends in the health and quality of the riparian resources. The climate, hydrology, and sequencing of water years between monitoring periods will also be summarized in the reports. The purpose of the report is to document trends in the riparian community during the course of the license.

A 60 day review period will be provided. Results would be discussed during the annual consultation meeting with the USDA-FS. Within 30 days following the receipt of comments, or 30 days following the meeting, comments will be addressed and the final progress report will be filed with the USDA-FS, USFWS, CDFG, State Water Board, other interested federal and state resource agencies having expressed an interest in participating, and the FERC.

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**FIGURE**

## Placeholder for

### Figure 1. Locations for Riparian Monitoring

### Non-Internet Public Information

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