

**POTENTIAL RESOURCE ISSUE:**

Maintain and enhance riparian resources.

**PROJECT NEXUS:**

Project operations and potential Project betterments modify or could potentially modify the flow regime in bypass reaches and the peaking reach, affecting riparian resources. Operations of Project reservoirs or potential Project betterments could also modify the water surface elevations and potentially affect riparian resources. Additionally, Project maintenance activities could result in removal of riparian resources.

**POTENTIAL LICENSE CONDITION:**

- Channel riparian maintenance flows [\(CRMF\)](#).

**STUDY OBJECTIVE(S):**

- Characterize the relationship between riparian resources and the hydrologic regime(s) in the bypass and peaking reaches.
- Characterize the relationship between riparian resources and fluctuations in reservoir water surface elevations in Project reservoirs.
- Document the location of riparian resources at potential Project betterment construction, staging and disposal sites, and new inundation areas.

**EXTENT OF STUDY AREA:**

The study area includes bypass reaches and the peaking reach, comparison streams, and Project reservoirs and diversion pools.

The study area will be expanded to include buffer areas around potential Project betterments construction, staging, and disposal sites; and new inundation area. These include:

- 15 [vertical](#) feet above the existing ordinary high water mark of French Meadows and Hell Hole reservoirs ~~around the potential inundation area of large reservoirs~~ where Project betterments are proposed;
- 300 feet around construction areas;
- 100 feet around staging areas; and
- 100 feet around disposal sites.

**STUDY APPROACH:**

[The following describes the riparian resources study approach which includes data collection and analyses for \(1\) Project bypass and comparison reaches, \(2\), Project reservoirs, \(3\) potential Project betterments, and \(4\) Project maintenance activities.](#)

[Project Bypass and Comparison Streams](#)

- [Conduct initial riparian habitat characterization studies to identify, map, and describe the riparian and meadow habitat upstream and downstream of the Project dams and diversions \(Table AQ10-1\). This information was collected during studies completed by PCWA as described in the Existing Environment Studies in 2005 and 2006 \(PCWA 2005 and 2006\), which is available at the PCWA Hydroelectric website: <http://relicensing.pcwa.net/>. A technical report summarizing the 2005 data is also available on the web site. The 2006 data will be summarized in a report available in early 2007. The objectives for these studies are summarized in Table AQ10-2.](#)
- ~~Select~~ [Conduct quantitative studies in](#) comparison stream ~~reaches for quantitative studies~~ consistent with data collection completed along the bypass reaches and the peaking reach, and develop stage-discharge relationships.
  - The selection ~~was will be~~ based on similarities in watershed characteristics, including drainage area, geology, substrate, geomorphic landform development, channel gradient, valley width, availability of hydrology data, and existing and historical land uses.
  - [Assess riparian resources along selected comparison stream reaches using the same methods, as appropriate, described in the Existing Environment Study Plan Package \(PCWA 2005 and 2006\).](#)
- Evaluate distribution, characteristics, and condition of the riparian resources in relation to the life history strategies of the dominant species and fluvial geomorphic processes along bypass reaches, the peaking reach, and comparison reaches.
  - Assess the life history strategy requirements of dominant woody riparian species based on existing scientific information and expert knowledge.
  - [Determine water surface elevations over a wide range of discharges appropriate to the Project hydrology at selected study sites on Project bypass and comparison streams, and the peaking reach. These reaches are identified in the Instream Flow Technical Study Plan. ~~Use modeling results obtained from implementation of the Instream Flow Technical Study to analyze the relationship\(s\) between instream flows and the establishment, distribution, and characteristics of riparian resources.~~](#)
    - [Select transect locations as part of the Instream Flow Technical Study Plan.](#)
    - [Collect additional riparian resource data using the same methods, as appropriate, described in the Existing Environment Study Plan Package \(PCWA 2005 and 2006\), if needed, at the hydraulic modeling transects.](#)
  - [Evaluate impaired and unimpaired hydrologic regimes using modeling results from the Instream Flow Technical Study to determine:](#) the relationship of impaired and unimpaired hydrologic regimes to:
    - ~~Floodplain connectivity;~~
    - [Extent of inundation of floodplains and bars over a range of flows](#)
    - Frequency, duration, and timing of inundation of riparian zones
    - Rate of flow recession in selected reaches
    - Flow paths through bars and floodplain surfaces
    - ~~Minimum instream flows and~~ [Water availability in summer months](#)
  - [Identify reaches with possible encroached riparian vegetation.](#)

- Relate recruitment classes, regeneration success, and potential encroachment to historic and current hydrologic conditions [on Project and comparison streams using quantitative data and tree cores.](#)
- Characterize the relationship between historic and existing land uses, recreation activities, and riparian resources.

### Project Reservoirs

- Evaluate distribution, characteristics, and condition of the riparian resources in relation to the life history strategies of the dominant species and operations of Project reservoirs such as:
  - Annual patterns and inter-annual fluctuations
  - Inundation area-water surface elevation relationships

### Potential Project Betterments

- Identify and map the distribution of riparian resources at Project betterments construction, staging and disposal sites, and new inundation areas.

### Project Maintenance Activities

- Identify Project maintenance activities that may result in the removal of riparian resources.

### **SCHEDULE:**

To be developed in early 2007.

### **REFERENCES:**

~~None.~~

[Placer County Water Agency \(PCWA\). 2005. Middle Fork American River Hydroelectric Project \(FERC 2079\). 2005-2006 Existing Environment Study Plan Package. June 17, 2005.](#)

[PCWA 2006. Middle Fork American River Hydroelectric Project \(FERC 2079\) 2006 Aquatics Habitat Characterization Study Plan. September 8, 2006.](#)

**Table AQ10-1. Middle Fork Project Bypass and Peaking Reaches and Comparison Reaches.**

<b>River or Stream</b>	<b>Bypass Reach<sup>1</sup></b>
Middle Fork American River	French Meadows Dam to Middle Fork Interbay Middle Fork Interbay Dam to Ralston Afterbay
Duncan Creek	Duncan Creek Diversion Dam to the Middle Fork American River Confluence
Rubicon River	Hell Hole Dam to Ralston Afterbay
North Fork Long Canyon Creek	North Fork Long Canyon Diversion Dam to the Confluence of Long Canyon Creek
South Fork Long Canyon Creek	South Fork Long Canyon Diversion Dam to the Confluence of Long Canyon Creek
Long Canyon Creek	Confluence of North and South Forks of Long Canyon Creek to confluence of Rubicon River
	<b>Peaking Reaches<sup>2</sup></b>
Middle Fork American River	Oxbow Powerhouse to the North Fork American River Confluence
North Fork American River	Middle Fork American River Confluence to the Folsom Reservoir High Water Mark
	<b>Comparison Reaches<sup>3</sup></b>
Middle Fork American River	French Meadows Reservoir to approximately 3 miles upstream
Duncan Creek	Duncan Creek Diversion to approximately 3 miles upstream
North Fork Long Canyon Creek	North Fork Long Canyon Creek Diversion to approximately 2 miles upstream
South Fork Long Canyon Creek	South Fork Long Canyon Creek Diversion to approximately 2 miles upstream
North Fork Middle Fork American River	Confluence with Middle Fork American River to approximately 1 mile upstream
North Fork American River	Lake Clementine to approximately 5 miles upstream

<sup>1</sup> Bypass reaches are those where water is rerouted from the stream or river at a diversion dam and reintroduced below a powerhouse.

<sup>2</sup> Peaking reaches are those reaches where daily and within-day changes in river flow occur as a result of power releases that are scheduled to follow power demand.

<sup>3</sup>The approximate locations for comparison stream reaches are shown on Figure AQ1-1.

**Table AQ10-2. 2005 and 2006 Riparian Habitat Characterization Study Objectives.**

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<b>2005 and 2006 Riparian Habitat Characterization Purpose</b>
Identify, map, and describe the riparian and meadow habitat upstream and downstream of the Project dams and diversions.
<b>2005 Study Plan Objectives</b>
Identify the locations of riparian and meadow habitat along the streams and rivers upstream and downstream of the MFP dams and reservoirs.
Qualitatively describe riparian and meadow habitats.
Identify unregulated streams in the vicinity of the Project that could serve as comparison reaches for subsequent studies.
Identify potential historical and existing activities that may have or are currently affecting the development of the riparian habitat.