

**BATTLE CREEK HYDROELECTRIC PROJECT**

**FERC NO. 1121**

**LICENSE AMENDMENT APPLICATION**

**APPENDIX 3**

**DRAFT FACILITY MONITORING PLAN**

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## **1 INTRODUCTION**

This Facility Monitoring Plan has been developed in accord with the Battle Creek Salmon and Steelhead Restoration Project (Restoration Project) Memorandum of Understanding (MOU) provisions; specifically Section 7.2 and 7.5 of that document. The purpose of this Facility Monitoring Plan is to describe the means to monitor compliance with new instream flows and ramping rates and the performance of new fish ladders and fish screens, all of which are elements of the Restoration Project. This report also outlines the reporting and notice requirements associated with monitoring activities.

This document has been developed in consultation with the Resource Agencies (National Marine Fisheries Service, U.S. Fish and Wildlife Service, and California Department of Fish and Game [CDFG]).

## **2 DEFINITIONS**

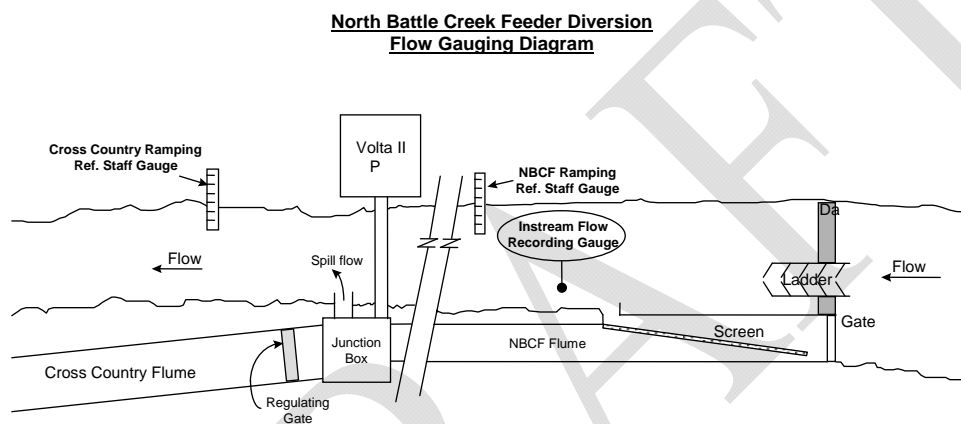
As this document is derived from the conditions specified in the MOU, all definitions described in Section 2.0 of the MOU apply herein.

## **3 INSTREAM FLOW**

At the outlet and spillway works described below for North Battle Creek Feeder, Eagle Canyon, Coleman and Asbury Pump (Baldwin Creek) diversion dams, Licensee will operate properly calibrated remote sensing devices that measure and record total flow and the change of stage at each dam during all operations for the purpose of verification of

compliance with instream flows (see Table A3-1). All flow and stage recording methodologies shall be approved by FERC and meet USGS standards. For an automated gaging station, the USGS standard for continuous flow measurement is to measure and record flows in 15-minute increments.

### 3.1 North Battle Creek Feeder Diversion Dam

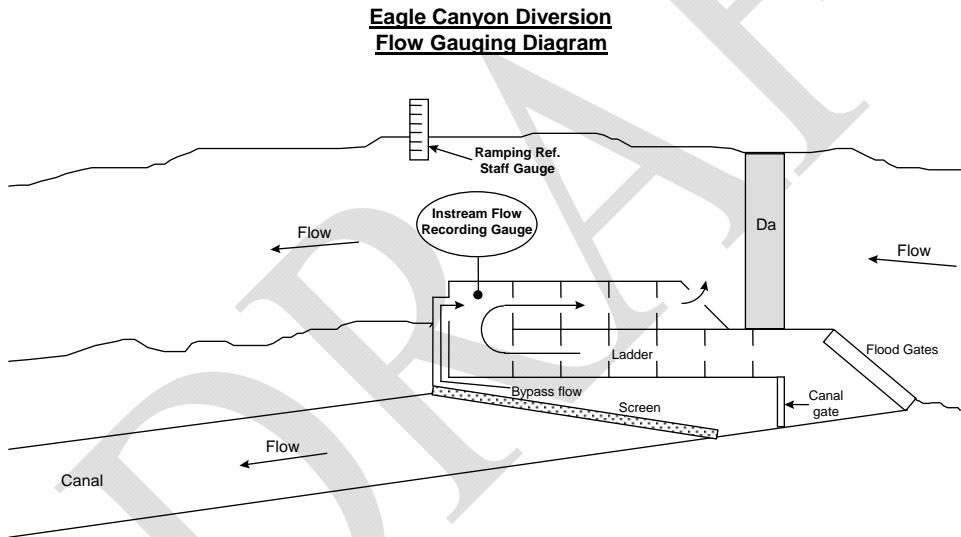


Minimum instream flows will be monitored at this site using a new stream gaging facility downstream of the North Battle Creek Feeder Diversion Dam fish screen and fish ladder discharge points. The gaging facility will be installed as part of the Restoration Project and will be compatible with other such equipment used by the Licensee for this purpose. In order to achieve stable and accurate monitoring, a fish-friendly low weir or other artificial control structure may also be required. Within the minimum flow requirement range of operation of the gage and up to a maximum of approximately 100 cfs, the stage-discharge relationship will be verified by periodic field measurements in accordance with

USGS standards. Personnel cannot safely measure flows in excess of approximately 100 cfs in the stream channel.

The monitoring and recording gage will be equipped to provide input to the diversion regulating gate and include alarms to notify the operating headquarters when flows are at or near the minimum requirement to allow timely response to correct problems as necessary.

### 3.2 Eagle Canyon Diversion Dam



Minimum instream flows at this site will be monitored at the existing gage located downstream (CB-112).

The gage will measure flows released through the fish ladder, spill flows and other accretion flows, notably spring flows. Provisions to monitor the fish ladder and spring flows are described in the following sections.

### *3.2.1 Fish Ladder Flows*

A monitoring and recording gage will be installed in the lower portion of the fish ladder as part of the Restoration Project modifications to Eagle Canyon Diversion Dam. The gage and associated recording equipment will be compatible with other such equipment used by Licensee at other monitoring locations for this purpose. The gage will provide input to the canal diversion regulating gate and be equipped with an alarm to notify the operating headquarters when flows are near the minimum requirement to allow a timely response. The stage-discharge rating for this gage, up to maximum fish ladder capacity, will be that derived through experimentation and from the standard ladder configuration being installed.

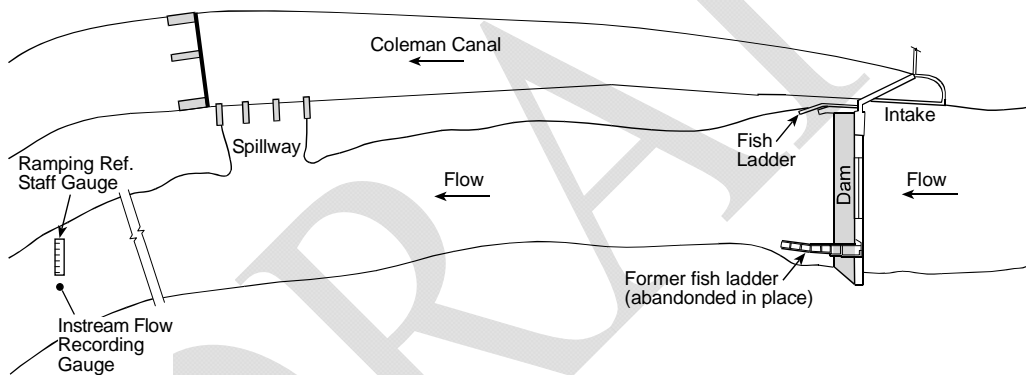
### *3.2.2 Spring Flows*

The majority of spring flow formerly collected near the headworks of Eagle Canyon Diversion Dam and conveyed to Eagle Canyon Canal has been released to the stream in conjunction with an Interim Flow Agreement<sup>1</sup> between PG&E and Reclamation and will continue as an element of the Restoration Project. It is estimated that spring flows of at least 10 cfs have been returned to the stream.

Spring flow may be measured periodically by Licensee to accurately determine its contribution to the instream flow requirement below Eagle Canyon Diversion Dam.

Records demonstrating compliance with the instream flow requirement will include the measured discharge from the fish ladder and an estimate of the contribution from the springs.

### 3.3 Coleman Diversion Dam



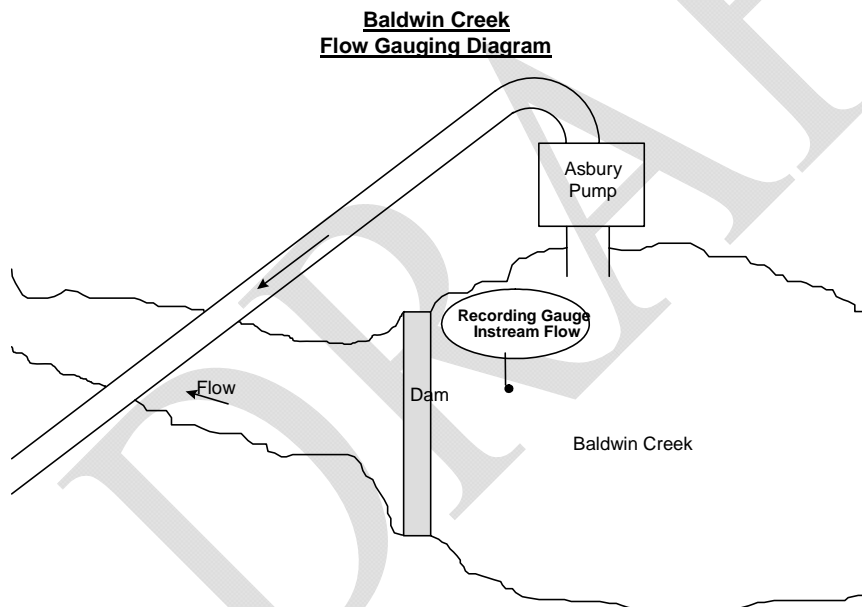
Minimum instream flows will continue to be monitored and recorded at the existing stream gaging facility, CB-110, which is located downstream of the existing canal side gate, discharge point. Within the instream flow requirement range of operation of the gage, the stage-discharge relationship will be verified by periodic field measurements in accordance with USGS standards when stream conditions allow for safe verification.

<sup>1</sup> Agreement No. 06-WC-20-3522

Personnel cannot safely measure flows in excess of approximately 60 cfs in the stream channel.

The gage is equipped with an alarm which notifies the operating headquarters when flows are at or near the minimum requirement to allow timely response to correct problems as necessary.

### 3.4 Asbury Pump (Baldwin Creek)



Instream flow will be monitored for minimum flow compliance at a new stream gaging facility installed as part of the Restoration Plan modifications at a location upstream of the dam. The necessary monitoring and recording equipment compatible with other such equipment used by Licensee for this purpose will be installed at the new gage.

Within the minimum flow requirement range of operation of the gage and up to a maximum of approximately 75 cfs, the stage-discharge relationship will be verified by periodic field measurements in accordance with USGS standards. Personnel cannot safely measure flows in excess of approximately 75 cfs in the stream channel.

The monitoring and recording gage will be equipped to provide input to the pumping station and alarms to notify the operating headquarters when flows are at or near the minimum requirement to allow timely response to correct problems as necessary. In addition, the monitoring gage will be equipped to send an alarm to the operating headquarters when flows are high enough in Baldwin Creek to enable fish passage over the dam. Pursuant to an agreement with the CDFG, the Licensee will use its best efforts to notify CDFG personnel of this event to allow CDFG to take appropriate measures.

#### **4 RAMPING RATES**

Planned maintenance requiring dewatering of the North Battle Creek Feeder Flume, Cross-Country Canal, Eagle Canyon Canal, Inskip and Coleman Canals will be scheduled during the period from February 1 through April 30 or at a mutually agreeable time, upon consultation with CDFG, NMFS, USFWS, and the Coleman National Fish Hatchery.

When returning these water conveyance facilities to service, following forced or scheduled outages, where the flow that had been available for diversion into the water conveyance facility had instead been released to the natural stream channel, the water

shall be diverted from the natural stream channel back into the water conveyance facility at a target ramping rate in the natural stream channel of 0.1 ft/hour. Compliance with the ramping rate requirement will be met if at least 75 percent of the actual incremental changes in flow are less than or equal to the specified ramping rate, and all of the actual incremental changes in flow are less than 150 percent of the specified ramping rate.

This restriction shall not apply above threshold flows as determined by consensus of the Resource Agencies and Licensee. Field measurements on the South Fork Battle Creek have determined that ramping-related fish stranding would be avoided at flows greater than 460 cfs. These flows fill the South Fork channel sufficiently to inundate all potential stranding habitat. Therefore, ramping rate criteria will only apply in the South Fork at flows less than 460 cfs.

Readily-observable gages will be installed in a confined, (i.e., narrow) stream transect below the diversion points for the conveyance facilities being returned to service or, alternatively in the conveyance facilities themselves. The Licensee will use the gages to monitor ramping rates using one of the following methods:

Manually monitor and record stage readings during ramping operations; or,  
Install equipment to remotely control and record stage readings during ramping operations.

The License will consult with the Resource Agencies to determine the most appropriate gage location upon completion of the associated facility modifications.

## **5 FISH LADDER OPERATIONS**

Sensors, monitoring equipment, and alarms will be included with the installation of the new fish ladders at North Battle Creek Feeder and Eagle Canyon Diversion Dams. One water level sensor will be installed at an appropriate location near the upstream end of the new fish ladder and another near the downstream end. These will allow the Licensee to monitor water surface elevations at the top and bottom of the ladder to identify potential debris problems. The sensors will be monitored by automated equipment to detect occurrence of an abnormal water level or abnormal water level differential and provide an alarm to operating headquarters to allow timely response to the condition. The magnitude of the differential requiring an alarm will be determined at each specific location during startup testing of the new fish ladder through consensus of the Resource Agencies and Licensee and may be modified from time to time by consensus as operational experience is gained.

Underwater video monitoring equipment will also be installed at the new fish ladders. Equipment will be specified by the Adaptive Management Policy Team and will be suited to the particular conditions at each site.<sup>2</sup> The Licensee will operate the monitoring

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<sup>2</sup> During a conference call on June 23, 2005 the Adaptive Management Policy and Technical teams agreed that the new ladder designs would incorporate underwater video cameras. The current technologies for other counting systems are not suitable for deployment due to technical limitations and the potential to accumulate debris.

equipment during the initial three-year period of operation. In addition, operating personnel will note any congregations or stacking of fish below the fish ladders and fish passing up the ladder observed during routine visits to service the site.

The fish ladder at Coleman Diversion Dam was closed by agreement with the Resource Agencies in November of 1998.

## **6 FISH SCREEN OPERATION AND MAINTENANCE**

New fish screens and associated sensors, monitoring equipment, alarms and control equipment will be installed at North Battle Creek Feeder and Eagle Canyon diversion dams. The Licensee will operate remote sensing devices that monitor water surface elevation differences on the inlet and outlet sides of screens to identify potential plugging. One water level sensor will be installed at an appropriate location near the inlet side of the new fish screen and another near the outlet side. The sensors will be monitored by automated equipment to: (1) detect occurrence of an abnormal water level or water level differential, (2) automatically close the associated canal diversion gate when critical water level differential is exceeded, and (3) provide an alarm to operating headquarters to allow timely response to the suspect condition and closure of the associated canal intake gate when critical differential is exceeded. The magnitude of the water level differential requiring initiation of canal intake gate closure will be determined at each specific location during startup testing of the new fish screen through consensus of the Resource Agencies and Licensee and may be modified from time to time by consensus as further operational experience is gained.

The fish screen operating and control systems will also incorporate alarms to indicate occurrence of electrical and/or mechanical malfunctions. Alarms will be transmitted to operating headquarters to allow timely response to the suspect condition.

The diversions will be closed in the event of a screen failure.

Annual inspections of the fish screens will be made to verify that no gaps exceeding design criteria exist in the structure, the screen is being properly maintained, and site conditions have not significantly changed.

## **7 OPERATION OF WASTE GATES, OVERPOURS, AND SPILLWAYS**

Licensee will record the operation of waste gates, overpours and spillways used to release water from the water conveyance facilities. Their use is primarily for dewatering the conveyance for planned maintenance or to release excess water in the case of emergencies. Records of releases from the water conveyance facilities include time and duration of the release and the estimated rate of flow.

## **8 REPORTING SUMMARY**

### **8.1 Event Reporting**

Upon discovery, FERC and the Resource Agencies will be notified of the following events as soon as possible, but not later than the next business day:

- Water release mechanism outside of requisite specifications
- Minimum instream flow below license requirement
- Fish ladder operation outside of requisite specifications
- Fish screen operation outside of requisite specifications
- Catastrophic failure of features jeopardizing Restoration Project objectives

Within 30 days the Licensee will follow up with a written report to include a description of the event, any necessary corrective measures taken or proposed, and an implementation schedule if the situation has not been corrected.

The Licensee will verbally notify the Resource Agencies of any observed congregations or stacking of fish below the fish ladders which may indicate a problem with the fish ladder.

## **8.2 Monthly Reporting**

During the first three years of operation, a monthly report of fish ladder usage will be available to the Resource Agencies.

## **8.3 Facility Monitoring Records**

The following records will be available to FERC and the Resource Agencies upon specific request:

- Instream flow records
- Gage records monitoring ramping rates when returning conveyance facilities to service
- Report of waste gate and spillway operations
- Report of fish ladder operations
- Report of fish screen operations
- Confirmation of release of Eagle Canyon springs to stream

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**TABLE A3-1. HYDROELECTRIC PROJECT MONTHLY MINIMUM INSTREAM FLOW REQUIREMENTS - POST PHASE 1A RESTORATION.**

DAM	MONTHLY MINIMUM FLOW RELEASE (CFS)											
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
<b>NORTH FORK BATTLE CREEK</b>												
<b>NORTH BATTLE CREEK FEEDER</b>	88	88	88	67	47	47	47	47	47	47	47	88
<b>EAGLE CANYON</b>	46	46	46	46	35	35	35	35	35	35	35	46
<b>SOUTH FORK BATTLE CREEK</b>												
<b>SOUTH</b>	5	5	5	5	5	5	5	5	5	5	5	5
<b>INSKIP</b>	5	5	5	5	5	5	5	5	5	5	5	5
<b>COLEMAN</b>	5	5	5	5	5	5	5	5	5	5	5	5
<b>RIPLEY CREEK</b>												
<b>LOWER RIPLEY</b>	NO INSTREAM FLOW REQUIREMENT											
<b>SOAP CREEK</b>												
<b>SOAP</b>	NO INSTREAM FLOW REQUIREMENT											
<b>BALDWIN CREEK</b>												
<b>ASBURY</b>	5	5	5	5	5	5	5	5	5	5	5	5