



**El Dorado Hydroelectric Project**

**FERC Project No. 184**

# **Benthic Macroinvertebrate Monitoring Plan**

**EL DORADO IRRIGATION DISTRICT  
2890 Mosquito Road  
Placerville, CA 95667**

Prepared by  
Garcia and Associates  
1 Saunders Ave  
San Anselmo, CA 94960

December 2010  
Version 2.0

## **Project 184 Benthic Macroinvertebrate Monitoring Plan**

This study plan has been developed to satisfy the benthic macroinvertebrate monitoring requirements as required by the Federal Energy Regulatory Commission (FERC) license for the El Dorado Hydroelectric Project No. 184 (Project 184; FERC 2006).

### **1.0 License Requirements**

The Project 184 Monitoring Program<sup>1</sup> defines the specific monitoring requirements for benthic macroinvertebrates:

#### 1. Benthic Macroinvertebrates

Method: California Rapid Bioassessment Protocol methodology described in the Draft Benthic Macroinvertebrate Sampling Program (EID 2002) at the following sites:

- Echo Creek (EID site EC-B1)
- Pyramid Creek (EID site PY-B1)
- Caples Creek (EID site CA-B1)
- Silver Fork American River (EID site SV-B2)
- South Fork American River (EID site SO-B1)
- Carpenter Creek (EID sites CR-B1 and 2)
- No Name Creek (EID sites NN-B1 and 2)
- Alder Creek (EID sites AR-B1 and 2)
- Mill Creek (EID sites ML-B1 and 2)
- Bull Creek (EID sites BU-B1 and 2)
- Ogilby Creek (EID sites OG-B1 and 2)
- Esmeralda Creek (EID sites (ES-B1 and 2)

Reference streams that were sampled as part of the macroinvertebrate monitoring program during the relicensing shall be incorporated into the monitoring program. The FS, ERC, and SWRCB shall make their best efforts to ensure comparability of these reference sites to Project-affected sites but shall as expeditiously as possible identify more suitable sites. Reference sites may be substituted upon approval by the FS, ERC, and SWRCB. The upstream sample site locations on the feeder tributaries to the El Dorado Canal will serve as the reference sites for those locations.

- Strawberry Creek (EID site SB-B1)
- Sherman Canyon Creek (EID site SH-B1)
- Woods Creek (EID site WC-B1)

Frequency: Years 5, 6, 10, 11, 15, 16, 20, 21, 25, 26, 30, 31.

---

<sup>1</sup> Section 7 of the El Dorado Relicensing Settlement Agreement, U.S. Forest Service 4(e) Condition No. 37, and California State Water Resources Control Board Section 401 Clean Water Act Water Quality Certification Condition No. 13

Rationale: Same as for the Fish Populations monitoring element, which states: Sampling for two years in the beginning of each five-year period provides a mean of two years for comparison to the ecological resource objective, reduces the depletion of populations, and provides sufficient response time to the new streamflow regimes.

## **2.0 Background**

Benthic macroinvertebrate monitoring was conducted at selected locations during the Project 184 relicensing process in 1999-2001 (ECORP, 2002). The results of the 1999-2001 surveys were used to develop the ecological resource objectives identified in Appendix B, Section 1 of the Settlement Agreement, which provides the following benthic macroinvertebrate objective:

Macroinvertebrate indices (metrics) in Project-affected stream reaches should be similar to reference reaches located within and outside the South Fork American River (SFAR) drainage and the Truckee River. FS and CDFG will develop numerical objectives based on the collection and review of additional macroinvertebrate data.

## **3.0 Study Plan Objective**

The objective of this monitoring effort is to evaluate the community structure of the benthic macroinvertebrate populations in selected reaches for comparison to the ecological resource objectives in order to help determine if ecological resource objectives are achievable and being met as specified in the Project 184 Adaptive Management Program<sup>2</sup>.

## **4.0 Survey Locations**

Benthic macroinvertebrate monitoring will be conducted at 18 locations:

- Echo Creek (EID site EC-B1)
- Pyramid Creek (EID site PY-B1)
- Caples Creek (EID site CA-B1)
- Silver Fork American River (EID site SV-B2)
- South Fork American River (EID site SO-B1)
- No Name Creek (EID sites NN-B1 and 2)
- Alder Creek (EID sites AR-B1 and 2)
- Bull Creek (EID sites BU-B1 and 2)
- Ogilby Creek (EID sites OG-B1 and 2)
- Esmeralda Creek (EID sites ES-B1 and 2)
- Strawberry Creek (EID site SB-B1)
- Sherman Canyon Creek (EID site SH-B1)
- Woods Creek (EID site WC-B1)

---

<sup>2</sup> Section 8 of the El Dorado Relicensing Settlement Agreement and U.S. Forest Service 4(e) Condition No. 38

The approximate survey locations are depicted in Figure 1. Monitoring crews will attempt to locate survey reaches from previous surveys; however, if these reaches cannot be re-located, new survey reaches will be delineated and the boundaries recorded with a handheld GPS unit. Furthermore, the location of some sites may need to be adjusted to accommodate all the sampling provisions for the Surface Water Ambient Monitoring Protocol (SWAMP) protocol (*e.g.*, some sites may need to be relocated some distance upstream or downstream to capture a protocol length reach).

Sites at Mill Creek and Carpenter Creek have been removed from the list since the diversion structures on these creeks are not operational and are not anticipated to be returned to service during the course of the license.

## 5.0 Schedule

Benthic macroinvertebrate samples will be collected in two efforts based upon the hydrology of the target streams. Streams that have potential to go dry or become intermittent later in the summer will be surveyed in early summer. The remaining sites will be sampled in late summer and/or early fall. The Project 184 license requires benthic macroinvertebrate sampling in years 5, 6, 10, 11, 15, 16, 20, 21, 25, 26, 30, and 31.

## 6.0 Data Collection and Analysis

SWAMP - The Project 184 license requires macroinvertebrate sampling using the California Rapid Bioassessment Protocol (CSBP) method or such method as revised in the future as agreed upon by the FS, ERC and SRWCB. The current accepted methodology is the Surface Water Ambient Monitoring Program (SWAMP) Standard Operating Procedures for Collecting Benthic Macroinvertebrate Samples and Associated Physical and Chemical Data for Ambient Bioassessments in California (SWAMP 2007). The SWAMP protocol officially replaced the CSBP as the statewide standard for ambient bioassessment in 2007. Therefore, this monitoring effort will follow the SWAMP bioassessment protocol including the collection of both targeted riffle and multi-habitat (*i.e.*, reach-wide benthos) samples, and the “full” level of effort for physical habitat measurements.

Analysis - The following summary information will be prepared: a taxonomic list of identified organisms and their numbers; a listing of measured and estimated chemical and physical/habitat characteristics collected at each station from the SWAMP worksheets. Taxonomic identification will be performed at the Southwest Association of Freshwater Invertebrate Taxonomists’ professional level 2 effort (Richards and Rogers, 2006). During laboratory subsampling, all individuals in the last sample fraction used to achieve the minimum number of individuals will be identified in order to allow for full statistical analysis of the data.

All data (particularly targeted-riffle-sample data) will be compatible with the previously collected and/or calculated CSBP data modified as necessary. The application of appropriate multi-metric tools may be applied to these standardized data (*e.g.*, hydropower Index of Biotic Integrity (Rehn 2010) or other indices such as may be appropriate for data comparisons.

Field documentation and QA/QC - Monitoring information will be recorded on standardized field data sheets. The field sheets will be reviewed for completeness and accuracy at each station immediately following collection of the sample. All quality assurance procedures for the field and the laboratory, as described in the SWAMP protocol, will be followed. This includes validation of the taxonomic identification of the macroinvertebrates. Ten percent of the samples containing identified macroinvertebrates will be provided to CDFG for a separate check of taxonomic and enumeration. A Chain-of-Custody Record form will be completed for the purpose of tracking macroinvertebrate samples from the field to the laboratory and then to their final storage/disposition. Samples will be stored for a period of one year following collection and will then be disposed of according to all appropriate laws and regulations.

## 7.0 Reporting

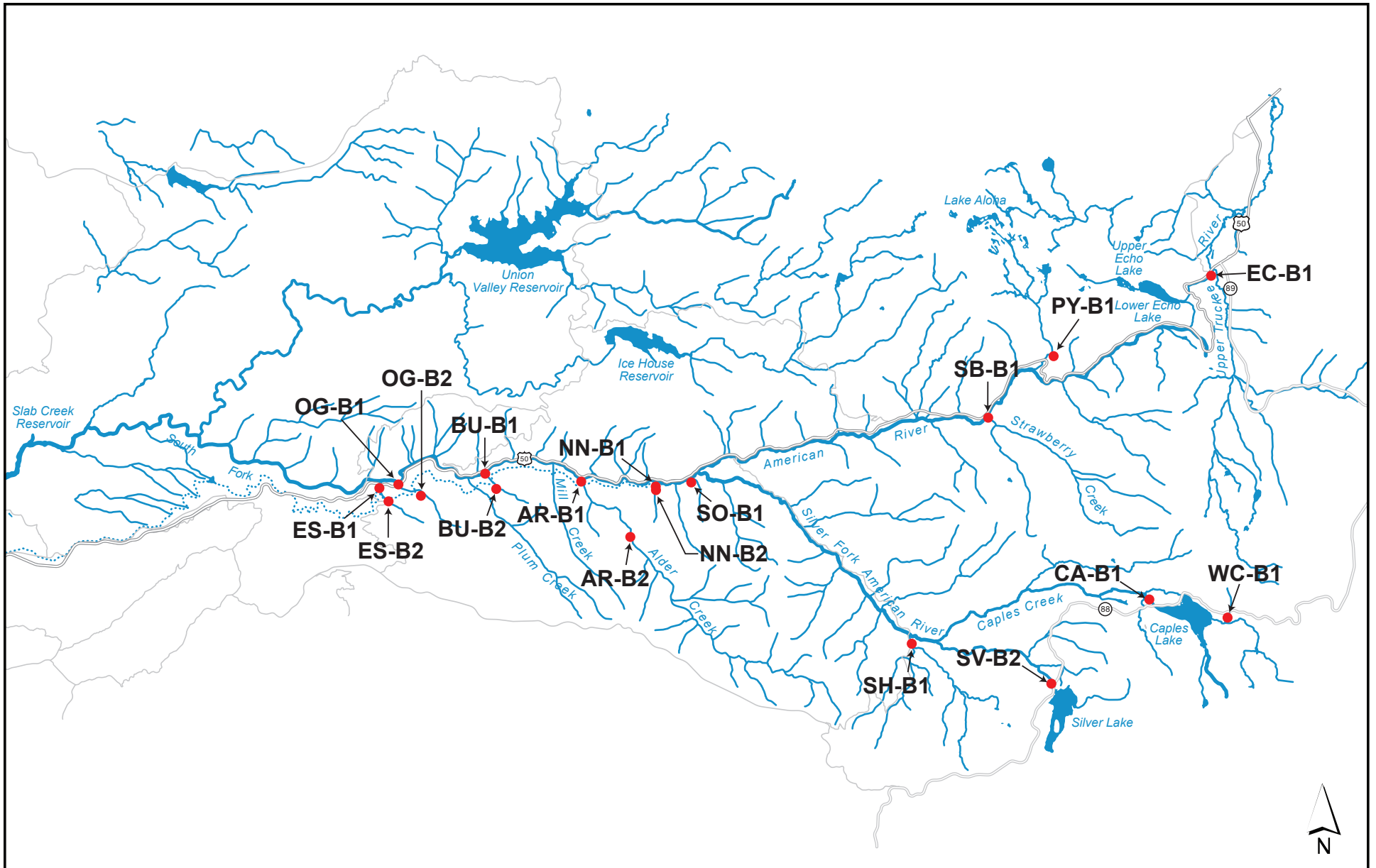
The data collected under this plan will be compiled into a report and distributed to the FS, ERC, and SWRCB for review and consideration at least two weeks prior to the annual ERC meeting. The report will include discussion appropriate to results and supportive of analyses and conclusions will be provided. All reports will be prepared in a format so that they can easily be reviewed by the ERC and filed with the FERC after approval.

A summary of the findings of the monitoring effort and an electronic copy of the report will be included in the Project 184 annual monitoring report, which the District is required to file with FERC by June 30 of each year. The District will distribute the draft annual monitoring report to the FS, ERC, and SWRCB to review at least 30 days prior to filing with FERC.

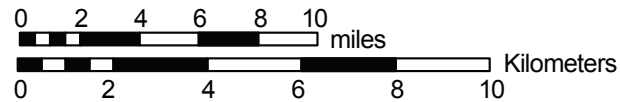
## 8.0 Literature Cited

- ECORP 2002. Draft Benthic Macroinvertebrate Sampling Program: El Dorado Irrigation District, Hydroelectric Project 184 (El Dorado County, California). June 4, 2002. Available at: [http://www.project184.org/doc\\_lib/documents/2002/0605/Macroinvert\\_PDF%27s\\_20020604.zip](http://www.project184.org/doc_lib/documents/2002/0605/Macroinvert_PDF%27s_20020604.zip)
- El Dorado Irrigation District (EID). 2003. El Dorado Relicensing Settlement Agreement. El Dorado Project FERC Project 184.
- FERC 2006. Federal Energy Regulatory Commission Order Issuing New License for the El Dorado Hydroelectric Project FERC Project No. 184. October 18, 2006.
- Rehn, Andrew C. 2010. *Benthic Macroinvertebrates as Indicators of Biological Condition Below Hydropower Dams*. California Energy Commission, PIER Energy-Related Environmental Research Program. CEC-500-2009-060
- Richards, A.B. and D. C. Rogers. 2006. Southwest Association of Freshwater Invertebrate Taxonomists (SAFIT) List of Freshwater Macroinvertebrate Taxa from California and Adjacent States including Standard Taxonomic Effort Levels. 28 November 2006.
- Surface Water Ambient Monitoring Program (SWAMP). 2007. Standard Operating Procedures for Collecting Benthic Macroinvertebrate Samples and Associated Physical and Chemical

Data for Ambient Bioassessments in California. February 2007. Prepared by the State Water Board and the CDFG Aquatic Bioassessment Laboratory.



- Benthic Macroinvertebrate Survey Site
- Major Waterway
- U.S. Highway/Paved Road
- Other Road
- El Dorado Canal



**Figure 1. Benthic Macroinvertebrate Survey Site Locations.**

El Dorado County, CA

134 FERC ¶ 62,078  
UNITED STATES OF AMERICA  
FEDERAL ENERGY REGULATORY COMMISSION

El Dorado Irrigation District

Project No. 184-219

ORDER APPROVING BENTHIC MACROINVERTEBRATE MONITORING  
PLAN UNDER ARTICLE 401, 4(e) CONDITION NO. 37, AND WATER QUALITY  
CERTIFICATE CONDITION NO. 13

(Issued January 27, 2011)

1. On January 10, 2011, El Dorado Irrigation District (licensee) filed a Benthic Macroinvertebrate Monitoring Plan (Plan) to fulfill its requirement under article 401, the U.S. Forest Service (FS) Section 4(e) Condition No. 37, and the Water Quality Certificate Condition No. 13 of the license for the El Dorado Hydroelectric Project, FERC No. 184.<sup>1</sup> The project is located on the South Fork of the American River and its tributaries in El Dorado, Alpine, and Amador Counties, California, and occupies federal lands administered by the U.S. Forest Service (FS).

#### BACKGROUND AND REQUIREMENTS

2. Ordering paragraph (D) of the project license specifies that the license is subject to the applicable conditions submitted by Department of Agriculture (DOA) under Section 4(e) of the Federal Power Act. DOA's Condition No. 37, as set forth in appendix A of the license, discusses a FS-approved final monitoring plan for macroinvertebrates using the California Rapid Bioassessment Protocol (CRBP) methodology at 22 sites. The monitoring is to occur in Year 5 after relicensing, then at alternating one-year and 4-year frequencies (Years 5, 6, 10, 11, 15, 16, etc.) for the term of the license.

3. Ordering paragraph (E) of the project license specifies that the license is subject to the applicable conditions of the water quality certification (WQC) issued by the California State Water Resources Control Board (SWRCB) under section 401(a) of the Clean Water Act. The WQC Condition No. 13, as set forth in appendix B of the license, discusses a Division of Water Rights, SWRCB-approved final monitoring plan for macroinvertebrates as described in Paragraph No. 2 above.

4. Lastly, license article 401 requires that the licensee file its macroinvertebrate monitoring plan with the Commission for approval, and that the filing include documentation of consultation with agencies, comments, and recommendations, a

---

<sup>1</sup> See 117 FERC ¶ 62,044, Order Issuing New License (issued October 18, 2006).



Project No. 184-219

- 2 -

description of how the comments and recommendations are accommodated, and once approved that the licensee implement the plan.

#### LICENSEE'S PLAN

5. The licensee's proposed Plan specifies 18 monitoring sites. No sites are proposed at Carpenter Creek or Mill Creek. The Plan states that the Mill and Carpenter Creek sites located upstream and downstream of diversion structures were removed from the plan since the diversions are neither currently operational nor anticipated to be operational during the term of the license.

6. The licensee's Plan proposes to use the Surface Water Ambient Monitoring Program Standard Operating Procedures for Collecting Benthic Macroinvertebrate Samples and Associated Physical and Chemical Data for Ambient Bioassessments in California (SWAMP) instead of the CRBP. The Plan states that SWAMP officially replaced the CRBP in 2007 as the statewide standard.

7. The proposed Plan includes a schedule identical to that specified in license requirements, with sampling to begin in 2011 (Year 5 after license issuance).

#### RESOURCE AGENCY COMMENTS

8. The licensee's filing includes approvals from the Ecological Resources Committee, the U.S. Forest Service, and the California State Water Resources Control Board by correspondence dated December 8, 2010, January 3, 2011 and December 21, 2010, respectively.

#### DISCUSSION

9. The licensee's Plan indicates that the Mill Creek and Carpenter Creek Diversions are not operational and that they are not anticipated to be returned to service during the term of the license. Therefore no monitoring is proposed for these areas (two sites were listed for Mill Creek and two sites were listed for Carpenter Creek in the license requirements). The resource agencies approved the Plan without monitoring at these two creeks. The licensee's Plan provides for monitoring of macroinvertebrates at the remaining required sites and, accordingly, should be approved.

#### The Director orders:

(A) El Dorado Irrigation District's (licensee), Benthic Macroinvertebrate Monitoring Plan, filed January 10, 2011, under license article 401, 4(e) condition No. 37

Project No. 184-219

- 3 -

of license appendix A, and water quality certificate condition No. 13 of license appendix B, for the El Dorado Hydroelectric Project, is approved.

(B) This order constitutes final agency action. Any party may file a request for rehearing of this order within 30 days from the date of its issuance, as provided in section 313(a) of the Federal Power Act, 16 U.S.C. § 8251 (2006), and the Commission's regulations at 18 C.F.R. § 385.713 (2010). The filing of a request for rehearing does not operate as a stay of the effective date of this order, or of any other date specified in this order. The licensee's failure to file a request for rehearing shall constitute acceptance of this order.

Thomas J. Lovullo  
Acting Chief, Aquatic Resources Branch  
Division of Hydropower Administration  
and Compliance

Document Content(s)

P-184-219.DOC.....1-3