

# **Carmel River 20-Year Bioassessment Report Workplan**

**Prepared for the Monterey Peninsula Water Management District (District)**

**Prepared by Tom King, BioAssessment Services (BAS)**

## **Scope of Work**

### **Task I – Literature Review**

The Carmel River Bioassessment Program (CRBP) has compiled 20 years of benthic macroinvertebrate (BMI) and associated habitat data. A 10-year report of results was prepared in December 2010, which consolidated historical information as well summarized BMI and habitat data (King et. al. 2010). Pertinent historical information compiled in the 10-year bioassessment report will be included in the 20-year report along with more recent information such as the bioassessment monitoring of the Carmel River diversion channel. In addition, CSCI scores for sites in nearby watersheds will be examined for additional perspective. The District will assist BAS by identifying sources of relevant background information.

### **Task II - Data Processing and Analysis**

BMI data for the 20-year monitoring period will be reviewed for consistency with current taxonomic naming criteria developed by the Southwest Association of Freshwater Invertebrate Taxonomists (SAFIT). BMI data files will be formatted for use in statistical programs such as “R” for calculating the California Stream Condition Index (CSCI) and non-metric multidimensional scaling (NMS) for further analysis including identifying possible relationships with habitat data. The calculation of the CSCI is a complex procedure, involving the use of geographical information systems (GIS) and the statistical program “R”. Staff at Applied Marine Sciences (AMS) will calculate CSCI scores for most or all of the pre-existing BMI data using taxonomic lists formatted by BAS. AMS may also provide additional consulting services for GIS and data analysis where needed upon approval of the District.

Physical habitat data collected by the District using the State Board’s Reach-wide Benthic Procedure (RWB) will be entered into a structured spreadsheet file for the purpose of data storage and calculating site level statistics pertaining to substrate, channel characteristics, canopy, and hydrologic habitat types.

### **Task III - Report Preparation**

A draft report will include five sections:

- 1) Introduction - Background on the CRBP, its value as an indicator of water quality and implementation of the program in 2000. Much of this background information was consolidated into the 2010 summary report but it is anticipated that this section may be updated to include changes in the monitoring program that occurred since 2010.
- 2) Methods – Description of study design, field sample collection methods, site locations, laboratory procedures, and analyses of data. Information pertinent to the study design will be provided by District staff, most of which was summarized in the 2010 report.

## **EXHIBIT 7-A**

- 3) Literature Review – Summaries of work done in the Carmel River watershed pertaining to BMIs. Background bioassessment information was consolidated into the 10-year summary report but it is anticipated that this section will be updated to include any pertinent information available after 2010. Some of the information sources will be provided by District staff.
- 4) Results – Organization of taxonomic lists, BMI metrics, CSCI, and site-scale habitat data into tables and presented in appendices for the 20-year monitoring effort. Results of analyses including CSCI and NMS ordination will be presented in the body of the report. Tables of site scale habitat and water quality data will also be included in the body of the report. BAS will coordinate with District staff regarding selection of BMI data summaries to be used in the report. Maps, supplemental habitat data, site coordinates and background program information will be provided by District staff with possible collaboration with AMS.
- 5) Discussion/Conclusions - Patterns, relationships and trends in biological and habitat data will be discussed including possible changes to the findings in the 10-year summary report. A discussion of the relative quality of Carmel River BMIs in terms of metrics will be enhanced since the 10-year summary report because of the recent development of the CSCI, which will likely provide more robust biological signals when compared to previous indices. In addition, CSCI results from sites within nearby watersheds will be included for additional perspective.

### **Literature Cited**

King, J.T., B. Chaney, and T. Lindberg. 2010. Ten year summary of the Monterey Peninsula Water Management District's bioassessment program on the Carmel River. MPWMD, Monterey, CA.

**EXHIBIT 7-A**

**Cost Summary**

**Task I – Literature Review (BAS<sup>1</sup>)**

8 hours @ \$65.00 per hour.....\$ 520.00

**Task II - Data Processing and Analysis**

50 hours @ \$65.00 per hour (BAS) .....\$3,250.00

20 hours @ \$105.00 per hour (AMS <sup>2</sup>).....\$2,100.00

14 hours @ \$150.00 per hour (AMS) .....\$2,100.00

**Task III – Report Preparation**

48 hours @ \$65.00 per hour (BAS) .....\$3,120.00

15 hours @ \$150.00 per hour (AMS) .....\$2,250.00

**Total..... \$13,340.00**

<sup>1</sup> BioAssessment Services (BAS)

<sup>2</sup> Applied Marine Sciences (AMS)

AMS may provide other services as well on an “as needed” basis at the discretion of the District.

**Work Schedule**

A draft report will be prepared and submitted to District staff by the end of March 2020 for review and comment. District staff will be informed if target date needs to be pushed forward. Recommendations or comments by District staff will be integrated into a final report. Final report will be completed and submitted to MPWMD by May 30, 2020.