

Big Chico Creek Watershed Citizen Monitoring Program Work Plan Year 2010 -2013

**A Program of:
California Urban Streams Alliance-The Stream Team**

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BIG CHICO CREEK WATERSHED

Citizen Monitoring Program

Year 2010-2013

1. Introduction

The intent of this plan is to outline the monitoring responsibilities of the Big Chico Creek Watershed Citizen Monitoring Program for Year 2010-2013.

This plan describes procedures for assessing indicators of watershed health associated with land use, and impacts of particular water quality stressors. “Watershed health” in this case refers to the relative state of the stream system in terms of maintenance of natural ecological, geological, and hydrological processes.

2. Organizational Structure

A. Program Management

Kristin Johnsen, will provide public outreach, education, and assist in monitoring activities.

Timmarie Hamill, will serve as Monitoring Program Director, and implement monitoring program activities, public outreach, and education.

B. Technical Advisors

A Technical Advisory Committee (TAC) has been established to provide on-going technical advice and oversight throughout the duration of this project.

Committee members include:

Guy Chetelat, Associate Engineering Geologist, Regional Water Quality Control Board
Erick Burrell, Citizen Monitoring Coordinator, State Water Resources Control Board
Randy Senock, Professor of Geological Sciences, CSU Chico
Paul Maslin, Professor of Biology, CSU Chico
Jennifer York, Aquatic Bioassessment Lab, Department of Fish and Game
Tricia Parker, Fisheries Biologist, U.S. Fish and Wildlife Service
Ruben Martinez, Director of Operations and Maintenance, City of Chico
Timmarie Hamill, Monitoring Program Coordinator

3. **Goals**

The primary goals of the Big Chico Creek Watershed Citizen Monitoring Program are:

- To document long-term trends in watershed condition cumulatively resulting from restoration activities, land use practices, and natural processes.
- To enhance the quality and quantity of data available for resource managers and decision makers in the Big Chico Creek Watershed.
- To involve student and community volunteers in monitoring efforts.
- To empower citizens to be responsible stewards and decision-makers.
- To build on prior monitoring efforts to facilitate data sharing and to improve data analysis.

4. **Objectives**

The primary objectives of the 2010 monitoring season are:

- To screen for water quality problems associated with common land use practices in the Big Chico Creek Watershed that typically affect water quality and habitat function by conducting chemical, physical, and biological surveys.
- To continuously monitor changes in water temperature during May - October in reaches where spring-run salmon are typically found holding during summer months.
- To involve students and public volunteers in monitoring efforts to engage and strengthen their understanding of local watershed processes and encourage watershed stewardship.
- To provide urban pollution prevention education and outreach associated with storm water run off.

5. **Outreach and Training**

Through community outreach meetings, public announcements, flyers, and the Internet the Big Chico Creek Watershed Citizen Monitoring Program will solicit volunteers for each monitoring season. Opportunities will be provided for community volunteers, teachers and students to participate in monitoring efforts. Volunteers will be provided training in the proper use of monitoring equipment and sampling protocols on an on-going basis. Additionally, volunteers will be provided materials and fact sheets regarding easy measures for preventing urban run off.

Outreach and training will be provided during;

- One-on-one visits to local schools, and CSU Chico Science Departments.
- Community forums and events.
- Endangered Species Fair
- Annual volunteer training workshop, to be held each April

6. Monitoring Program Description

A. Narrative

The Big Chico Creek watershed is located in a region that includes the interface between the Sierra Nevada Range to the south, and the remnant volcanic flows of the Cascade Range to the north. Headwaters originate from cold-water springs on Colby Mountain and flow 45 miles to its confluence with the Sacramento River. Watershed elevation ranges from about 120 feet at the mouth to 6000 feet on Colby Mountain (ECR, 1998). The watershed also encompasses three smaller sub-drainages to the north: Sycamore, Mud, and Rock. Figure 1 shows a map of the watershed.

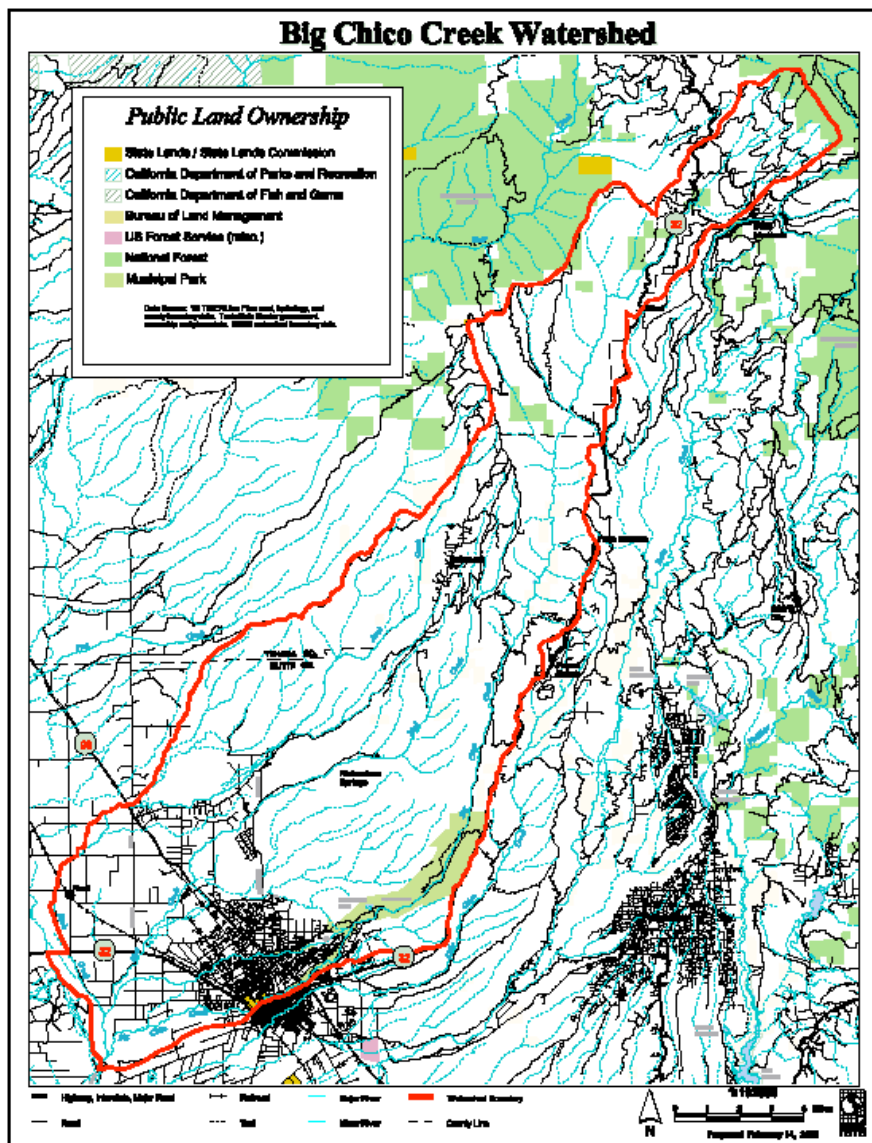


Figure 1. Watershed Map

As described in the 1998 Big Chico Creek Existing Conditions Report, the watershed can be divided into three gradient zones. Boundaries to the zones are formed partly by physiological limitations of the biotic community but mostly by geological barriers. The physical barriers divide Big Chico Creek into a mountain zone from the headwaters to Higgin's Hole, a foothill zone between Higgin's Hole and Iron Canyon, and a valley zone between Iron Canyon and the river.

The watershed study area includes all three zones of Big Chico Creek watershed from below the Hwy 32 crossing to below the Chico urban area. Migratory fish including three anadromous species dominate the foothill zone: spring run Chinook salmon, steelhead rainbow trout, and Pacific lamprey. Also found are populations of Sacramento squawfish, brown trout, hardhead, California roach, riffle sculpin, invertebrates, amphibians, reptiles, mammals, birds, and riparian plants of importance for watershed health (ECR, 1998).

Habitat problems that currently exist for aquatic and riparian populations include: human population growth, water diversions, reduced downstream gravel recruitment, reduced summer flow, cattle grazing, home-site construction and road building, erosion, upland fire protection practices, clear-cutting, non-native fish introductions, genetic contamination from hatchery raised spring run Chinook salmon, and fish passage problems. Of particular concern are watershed changes that might affect summer water temperatures, impacting spring run salmon (ECR, 1998).

B. Criteria for Site Selection

Criteria were developed to establish the monitoring locations for the Big Chico Creek Watershed Citizen Monitoring Program. Criteria for initial selection of sites included the following:

- Is there an existing flow gauging station?
- Is there or has there historically been a major land use (agriculture, municipal, industrial, mining, recreational, etc.) that may affect water quality in the area?
- Does the site have easy and safe access for sampling?
- Is there a potential water quality impairment?
- Is there previous water quality data to compare results?
- Is the site part of an existing watershed restoration program?
- Does the site incorporate different water conditions than other sites (for example: different land uses, different stream/river size, tributary junctions, different altitudes, areas receiving point-source discharge)?

The criteria originally used to establish monitoring stations has been expanded to include criteria for maintaining the integrity of the long-term data set, and ability to correlate data results with historical data collected through previous monitoring efforts of the Big Chico Creek Watershed Citizen Monitoring Program. Substantial data has been collected over the past 6 years, and it is important to maintain consistency with established monitoring stations in order to track the cumulative condition of watershed health over time.

C. Sites

Figure 2 shows a map of monitoring site locations.

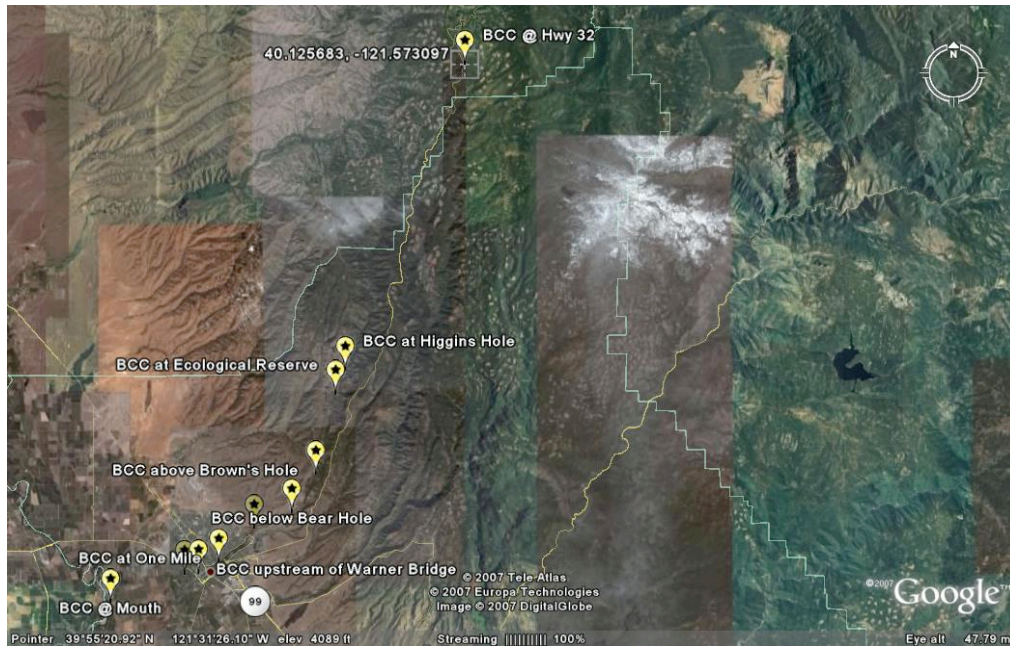


Figure 2. Monitoring Site Map

The following tables provide a description of monitoring site locations:

Table 1. Monthly Monitoring Sites

Site #	Site Name	Site Description	GPS
1	Hwy 32	Hwy 32 Bridge	40°07'32.46" N 121°34'23.15"W
2	Higgins	Ponderosa Bridge	39°53'17.53" N 121°41'48.57"W
3	Reserve	Dance Floor Hole	39°52'10.61"N 121°42'24.62"W
4	Above Browns Hole	End of Upper Park	39°48'22.22"N 121°43'39.23W
5	Below Bear Hole	Downstream of hazard marker	39°46'33.44"N 121°45'08.94"W
6	Five- Mile	Near Picnic Area	39°45'48.28"N 121°47'28.93"W
7	One-Mile	@ Restoration Site	39°44'10.65"N 121°49'40.97"W
8	Warner	Warner Bridge	39°43'39.32"N 121°50'55.81"W
9	Rose	Rose Ave. Bridge	39°43'37.38"N 121°51'47.74"W
10	Mouth	River Road Bridge	39°42'15.59"N 121°56'21.44"W

Table 2. Continuous Temperature Monitoring Sites

Site #	Site Name	Site Description	GPS
T-1	Hwy 32	Downstream of Hwy 32 bridge crossing	40°07'32.46" N 121°34'23.15" W
T-2	Higgins	Higgins Hole	39°53'17.53" N 121°41'48.57" W
T-3	Dance Floor	Dance Floor Hole Ecological Reserve	39°52'10.61" N 121°42'24.62" W
T-4	Henning	Henning Hole Ecological Reserve	39°51'48.26" N 121°42'34.25" W
T-5	Pool T	Pool T Ecological Reserve	39°50'37.15" N 121°42'55.59" W
T-6	Salmon	Salmon Hole	39°50'37.15" N
T-7	Rose	Rose Ave	39°43'37.38" N 121°51'47.74" W

* Additional sites will be added based on access above Higgin's and below Hwy 32

Table 3. Benthic Monitoring Sites

Site #	Site Name	Site Description	GPS
1	Hwy 32	Hwy 32 bridge	40°07'32.46" N 121°34'23.15" W
3	Reserve	Dance Floor Hole	39°52'10.61" N 121°42'24.62" W
6	Five- Mile	Above Footbridge	39°45'48.28" N 121°47'28.93" W
9	Rose	Rose Ave	39°43'39.32" N 121°50'55.81" W

* Additional sites will added providing adequate budget

Table 4. Outfall Monitoring

Site #	Site Name	Site Description	GPS
7	Near One-Mile	Below Outfall	39°44'10.65" N 121°49'40.97" W
9	Near Rose	Below Outfall	39°43'39.32" N 121°50'55.81" W

* 1-2 Storm drain outlets near the above sites will be monitored during storm events

Table 5. Post Photo Monitoring

Site #	Site Name	Site Description	GPS
V	Verbena Fields Restoration Site	1 st and Verbena	N/A

D. Narrative Description for Sites

Monthly Monitoring Sites:

Site 1- Hwy 32 Bridge represents a reach of the creek in the upper mountain zone influenced by cool water springs.

Site 2- Higgin's Hole represents a reach of the creek in the lower mountain zone and includes a large deep pool where spring-run salmon historically have been found holding over summer.

Geological barriers prevent further upstream migration.

Site 3 – Reserve comprises a relatively pristine reach of the creek with good representation of stream conditions in the upper foothill zone. This site also represents an area above Bidwell Park with little recreational impacts, and active restoration activities.

Site 4 – Above Brown's Hole represents the beginning of a steep gradient reach within the foothill zone (above iron canyon), located at the end of the road in upper Bidwell Park. This site will also provide a separation between the foothill and valley zones, and the Ecological Reserve.

Site 5 – Below Bear Hole represents the uppermost reach of the low gradient valley zone in upper Bidwell Park, below the lovejoy basalt formation, and above the golf course.

Site 6 – Five-Mile represents a reach of creek within the low gradient valley zone with urban influence below the golf course. This site is also below a USGS gauging station just upstream.

Site 7 – One-Mile represents a reach of creek in the valley zone in lower Bidwell Park with urban influence and includes a section of stream where the channel has been cemented to form a large public swimming pool.

Site 8 – Warner Street Bridge represents another reach of the creek with urban influence, located on the CSU campus and includes a large pool where spring-run salmon have historically been found holding over summer.

Site 9 – Rose Avenue Bridge represents the lower reach of the urban zone, where it begins to transition to more of an agricultural influence. It is also where a USGS gauging station is located, and where the creek water migrates underground during most summer months. This site also serves to represent a reference reach for the Bidwell Avenue restoration effort.

Site 10 – Mouth represents a reach of the creek below the confluence of Lindo Channel, Mud and Rock Creek (Kusal Slough) just before it enters the Sacramento River.

Continuous Temperature Sites:

Site T-1 – Hwy 32 represents the upper mountain zone where temperature is influenced year-round by cold-water springs.

Site T-2 – Higgin's Hole represents the upper most reach of the foothill zone where spring-run salmon hold over summer, and consists of a very large deep pool. Geologic barriers prevent salmon from any further migration upstream.

Site T-3 – Dance Floor represents a reach within the Reserve with a year-round weather station.

Site T-4 – Henning Hole represents a fairly large pool downstream from Higgin's Hole where spring-run salmon have been found holding over summer.

Site T-5 – Pool-T represents another pool in the foothill zone a bit further downstream where spring-run have also been found to hold over summer.

Site T-6 – Salmon Hole represents a large pool in the lower foothill zone. In low to moderate flow years, this site represents the end of upstream migration for spring-run salmon, which are stranded by a deteriorated fish ladder preventing any further upstream passage.

Site T-7 – Rose Ave represents a site below the Bidwell Ave. restoration project and in low water years represents where the creek goes subsurface.

Benthic Monitoring Sites:

The list below describes sites with multiple years of baseline data, and will serve as reference sites for particular land use zones. Additional sites will be selected in the valley zone to investigate possible correlations of land use practices and storm water run-off with benthic diversity.

Site 1- Hwy 32 represents the upper mountain zone.

Site 3 – Reserve represents the foothill zone.

Site 6 – Five-Mile represents the upper reach of the urban zone (below golf course).

Site 9 – Rose Ave represents the lower reach of the urban zone above agricultural influences.

Outfall Monitoring Sites:

The sites below are located within the urban zone, where storm drain outlets exist. Storm drains will be selected that can be monitored above and below the following sites:

Site 7 – Site 7 represents a reach of creek in the valley zone in lower Bidwell Park with urban influence and includes a section of stream where the channel has been cemented to form a large public swimming pool.

Site 9 – Site 9 is located at the Rose Ave. Bridge, and represents the lower reach of the urban zone, where it begins to transition to more of an agricultural influence. It is also where a USGS gauging station is located, and where the creek water migrates underground during most summer months. This site also serves to represent a reference reach for the Bidwell Avenue restoration effort.

Post Restoration Site Photo Monitoring Sites:

The site below represents a large restoration project, where construction has been completed during 2009. Pre restoration site photo documentation was conducted during 2007 through 2009 according to previous monitoring plans. Post restoration site photo documentation will be conducted in the fall of 2010 at the following site:

Site V- Site V is located near 1st Ave. and Verbena St. adjacent to Lindo Channel, “Verbena Fields”.

E. Sampling Frequency and Sampling Dates

Standard Set:

Temperature (Air and Water)
Dissolved Oxygen
Conductivity
Total Dissolved Solids
Turbidity
PH
Bacteria
Flow
Photos: Upstream, Downstream, and Substrate Photos

Additional Parameters:

Benthics
Photo Documentation
Storm: Standard (minus flow), Total Suspended Solids (TSS)
*additional parameters may be added based on lab budget

The following tables provide a list of monitoring frequency and parameters:

Table 6 . Monitoring Frequency and Parameters

Site #	Site Name	Monitoring Parameter(s)*	Sampling Frequency	Sampling Dates
1	Hwy 32	Standard Set Storm Set Benthics	Monthly Twice Once	May-Oct. 2 Storms Fall
2	Higgins	Standard Set	Monthly	May-Oct.
3	Reserve	Standard Set Benthics	Monthly Once	May-Oct. Fall
4	Above Browns	Standard Set	Monthly	May-Oct.
5	Below Bear	Standard Set	Monthly	May-Oct.
6	Five- Mile	Standard Set Storm Set Benthics	Monthly Twice Once	May-Oct. 2 Storms Fall
7	One-Mile	Standard Set Storm Set	Monthly Twice	May-Oct. May-Oct.
8	Warner	Standard Set	Monthly	May-Oct.
9	Rose	Standard Set Storm Set Benthics	Monthly Twice Once	May-Oct. 2 Storms Fall
10	Mouth	Standard Set	Monthly	May-Oct
7 or 9	Above Outfall	Standard Set Storm Set	Monthly Twice Once	May-Oct. 2 Storm Fall
7 or 9	Below Outfall	Standard Set Storm Set	Monthly Twice	May-Oct. 2 Storms
V	Verbena	Photo Doc.	Once	?

7. **Use of Data**

Data will be used to educate the public on issues affecting the health of Big Chico Creek watershed and help prioritize and direct future management decisions.

8. **Field Procedures**

Each Volunteer Monitor will be given a field procedures manual. Each manual will contain:

- a. Site location
- b. Schedule of sampling dates
- c. Specific parameters to be measured for that site
- d. Field data sheets
- e. Instructions for sample handling, labeling and transport
- f. Safety considerations including emergency contact information

9. **Monitoring Methods**

All samples will be taken and analyzed in accordance with the Quality Assurance Project Plan for the Big Chico Creek Watershed Citizen Monitoring Program.

10. **Quality Assurance Policy and Protocols**

A Quality Assurance Project Plan (QAPP) has been developed for the Big Chico Creek Watershed Citizen Monitoring Program, which outlines the procedures for Volunteer Monitors to collect and transport data. The SWRCB Clean Water Team provided a model QAPP that was used as a basis for the Big Chico Creek Watershed Citizen Monitoring Program QAPP. The original QAPP and Monitoring Plan were approved in 2005, which has been updated as needed to align with subsequent monitoring objectives.

11. **Sample Analyses**

- Volunteers will analyze samples in the field.
- Bacteria, and Turbidity will be analyzed by Monitoring Program Director/Volunteers
- A certified lab will analyze benthic, TSS, and other samples as needed.

12. **Data Management**

Water quality data will be stored in an Excel database that supports sorting and the use of the data in various types of models. This storage device will allow the development and updating of the information management system for the Big Chico Creek Watershed Citizen Monitoring Program on a long-term basis. The database management program and accompanying website will be based on the specific needs of the Big Chico Creek Watershed Citizen Monitoring Program and the Big Chico Creek Watershed Alliance.

- Data will be entered and stored in Monitoring Program Director's office, on an external hard drive, and on Dr. Randy Senock's CSU Geosciences laboratory computer.

13. Data Analysis

- Data will be summarized and graphed.
- The TAC will provide input on options for data analysis.
- An Annual Data Report will be prepared.

14. Reporting

- A Data Report will be posted on the Big Chico Creek Watershed Alliance website.
- Monitoring program updates, will be provided to volunteers.

15. Landowner Notification

- Landowners will be provided with an overview of monitoring program, a list of monitoring site locations, and a monitoring schedule.
- Signed Landowners Access Agreements will be secured prior to conducting any monitoring.