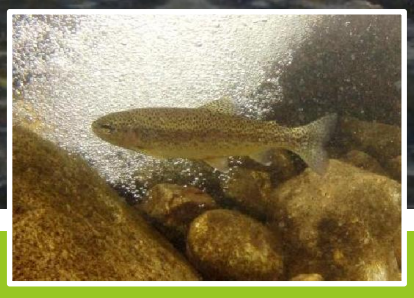
CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE

Instream Flow Program



2013 Annual Report

"Water is the driving force in nature."

~ Leonardo da Vinci

California Department of Fish and Wildlife
Instream Flow Program
830 S Street
Sacramento, CA 95811

For more information, please visit us at:
www.dfg.ca.gov/water/instream_flow.html

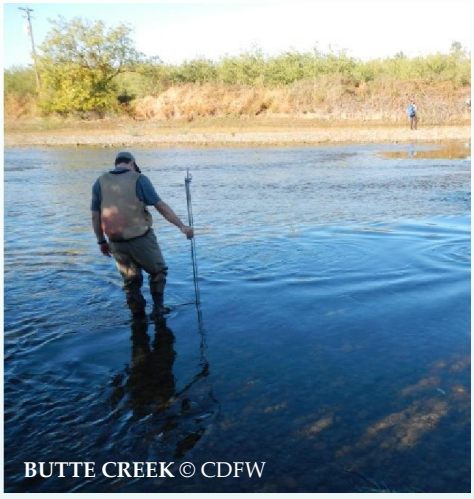
COVER PAGE PHOTOS
BACKGROUND: BUTTE CREEK
INSET: TOP - LAHAR FORMATION, BUTTE CREEK
MIDDLE - BIG SUR RIVER
BOTTOM – STEELHEAD TROUT, BIG SUR RIVER

All photographs in this document were taken by CDFW staff.

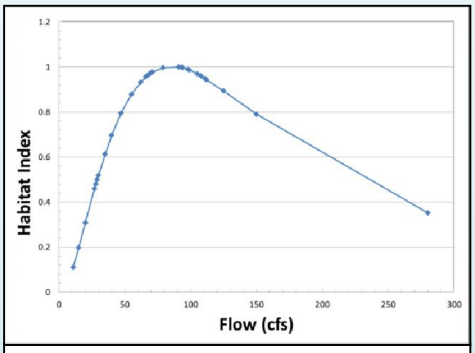
CHINOOK SALMON, BUTTE CREEK © CDFW

Introduction

Instream flows are needed to protect aquatic habitat, sustain wildlife, provide recreational opportunities, and support agriculture and domestic uses. While larger stream systems have flowing water throughout the year, it is often up to water managers to distribute the amount of water available each month, fairly, between the sometimes competing uses. Natural resource managers are therefore faced with the complicated task of identifying instream flows necessary for supporting aquatic resources so that they too can be considered and protected during water distribution activities.


BUTTE CREEK © CDFW

As trustee for California's fish and wildlife resources, the California Department of Fish and Wildlife (CDFW) has jurisdiction over the conservation, protection, and management of fish and wildlife. The Instream Flow Program is part of the Water Branch's Statewide Water Planning Unit. The Instream Flow Program identifies what volume of stream flow is needed at different times of the year to maintain fish and wildlife resources present in Californian streams. This is achieved by identifying the relationship between flow and available fish habitat, and using it to determine what flow is necessary to sustain and potentially improve the fishery. Flow recommendations are based on scientifically defensible assessments of a stream's hydrology, biology, geomorphology, connectivity, and water quality. Flow recommendations are transmitted to the State Water Resources Control Board (State Water Board) for consideration in the water rights program (pursuant to Public Resources Code §10000-10005).



EXAMPLE FLOW VS. HABITAT CURVE

In 2013, the Instream Flow Program participated indirectly and directly in eight different instream flow studies. The Instream Flow Program intends for these flow studies to inform water managers about the flows needed for fish rearing, spawning, and migration. Other activities of the program included the development of a Quality Assurance Program, and a new interactive flow recommendations map, as well as ongoing instream flow coordination with other agencies and interested groups.


BIG SUR RIVER © CDFW

This annual report outlines the activities that occurred in 2013.

2013 Year At A Glance

Sound science plays a vital role in the management of our natural resources, especially when it comes to water. To ensure high quality science that is robust, credible, transparent, and relevant, the Instream Flow Program conducts flow studies, collects field data, develops guidelines for quality assurance, conducts outreach, and coordinates with other agencies and interested parties on program related activities throughout the year.

The following program elements and activities related to instream flow were conducted during the 2013 calendar year.

- **Instream flow studies:** Flow studies are developed for eight inland and coastal streams to assess the quantity and timing of flow necessary for aquatic resources; collect instream flow data; and/or generate reports (see Instream Flow Studies on pages 3-7).
- **Quality Assurance/Quality Control (QA/QC) Program:** In collaboration with Moss Landing Marine Laboratories (MLML), a QA/QC program was developed to encourage comparability among current and future instream flow studies. QA/QC and Standard Operating Procedure (SOP) documents were created as part of this effort (see QA/QC Program on page 8).
- **Interactive Instream Flow Recommendations Map:** An online map was developed to allow the public to view instream flow recommendations and associated reports by simply clicking on a stream (see Flow Recommendations Map on page 9).
- **Coordination of Instream Flow efforts:** Comprehensive flow studies require collaboration with State and Federal Agencies like the State Water Board, U.S. Fish and Wildlife Service (USFWS), and the National Marine Fisheries Service (NMFS), as well as other universities, consultants, non-governmental organizations, and the public. The Instream Flow Program participated on a number of technical project teams, as needed, as part of a Statewide effort.
- **Presentations and outreach**: The QA/QC Program was presented at the first annual CDFW Science Symposium in October of 2013. A poster on Delta tributary studies underway was also provided.

AUBURN RAVINE © CDFW

BIG SUR RIVER © CDFW

Instream Flow Studies

Many of California's rivers and streams are known for the salmon and steelhead trout that begin and end their life cycles in them. To protect these anadromous fish, studies are needed to better understand their habitat requirements in stream systems where flow and sometimes temperature have been altered from their historical condition.

In 2013, the Instream Flow Program supported instream flow studies in the following streams:

- **Auburn Ravine (Placer County)** – CDFW Regional staff were trained and assisted in conducting an instream flow study to characterize Chinook salmon habitat.
- **Big Sur River (Monterey County)** – Habitat and flow requirements for steelhead trout spawning and rearing were investigated.
- **Butte Creek (Butte County)** – Flow requirements were assessed for passage of adult salmon through shallow riffles and a unique volcanic bedrock formation in the lower portion of the creek.
- **Deer Creek (Tehama County)** – Site reconnaissance was conducted and a study plan was initiated to evaluate flow and temperature impediments on adult and juvenile Chinook salmon and steelhead trout passage.
- **Kimball Creek (Napa County)** – An instream flow study was conducted to determine what flow release schedule from Kimball Reservoir would be appropriate for maintaining populations of Central Coast steelhead trout during rearing, migration, and spawning.
- **Mill Creek (Tehama County)** –Problem identification and site reconnaissance activities were initiated for assessment of adult and juvenile Chinook salmon and steelhead trout passage through the lower creek.
- **Scott and Shasta Rivers (Siskiyou County)** – Contract oversight and study coordination occurred utilizing consultant services to develop comprehensive study plans for instream flow assessment in both the Scott and Shasta Rivers.

Select core projects are discussed further on the following pages.

DEER CREEK (TEHAMA CO.) © CDFW

Instream Flow Studies

Effective management of instream flows requires comprehensive knowledge of a river ecosystem. This includes familiarity with a stream's five riverine components: hydrology; biology; geomorphology; water quality; and connectivity. Documentation of these elements is necessary when developing flow recommendations for a species or species life stage. Instream flow studies typically include the following steps to ensure appropriate assessment and documentation of the riverine components occur:

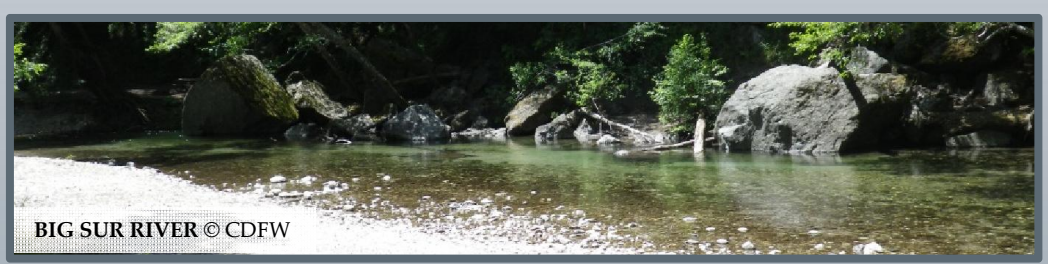
1) Issue identification and project design;
2) Field reconnaissance;
3) Habitat mapping and site selection;
4) Identification of species and lifestage specific habitat requirements;
5) Hydraulic data collection;
6) Construction and calibration of hydraulic and habitat simulation models;
7) Identification of flow alternatives;
8) Development of flow recommendation; and
9) Peer review.


AUBURN RAVINE © CDFW

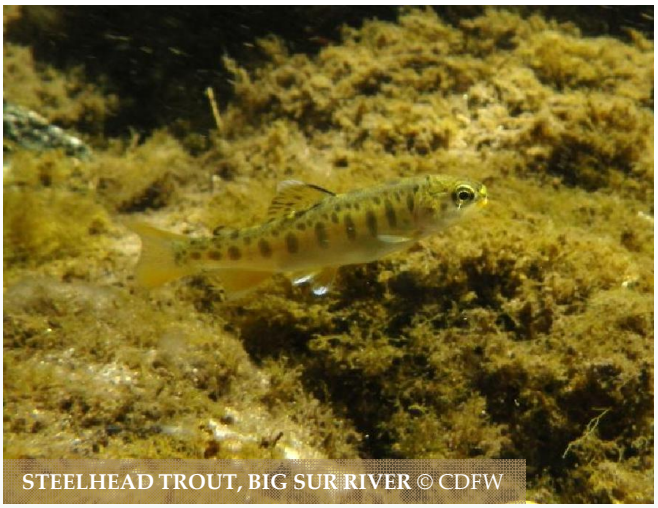
While instream flow studies focus on the amount of flow necessary to protect fish populations and habitat in high priority watersheds, the amount of flow determined to be necessary for a target species and/or life stage is of interest to many different groups of people (e.g., farmers, fisherman, kayakers, local residence, etc.). Therefore, instream flow studies usually include multi-agency and stakeholder involvement.

The Instream Flow Program coordinates study design, field data collection, and study implementation with CDFW Regions and other state, federal, and non-governmental organizations. The site-specific field data collected as part of a flow study is used to develop a flow recommendation.

The following pages describe some of the core instream flow studies currently underway in greater detail.


BIG SUR RIVER © CDFW

BIG SUR RIVER (MONTEREY COUNTY)


STEELHEAD TROUT, BIG SUR RIVER © CDFW

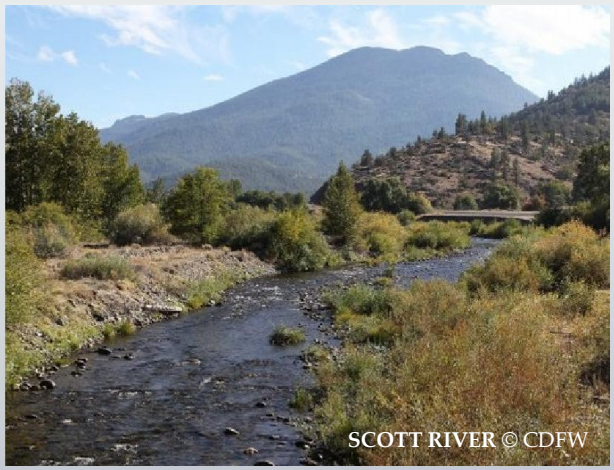
The Big Sur River is a stronghold for one of the most important wild steelhead trout populations on California's Central Coast. However, in recent years the Big Sur River steelhead trout population has declined from historical levels.

To assess insteam habitat conditions and subsequent trout population conditions, an instream flow study was conducted. The Big Sur River study focused on quantifying south-central steelhead trout habitat as a function of flow with the aim of identifying what flow would provide optimal habitat conditions for various life-stages of the fish. Stream flow, habitat, topographical, and fish observation data were collected and multiple modeling tools were utilized to show how stream flow affects fish and their habitat.

The Instream Flow Program is currently completing the data analysis and final reports. The Big Sur River project Study Plan can be viewed on the Instream Flow Program's web page (www.dfg.ca.gov/water/instream_flow.html).

SCOTT & SHASTA RIVERS (SISKIYOU COUNTY)

The Scott and Shasta Rivers were both identified by CDFW as high priority watersheds for coho salmon recovery. Threats to coho salmon, such as low water levels in the late summer and fall, may reduce available juvenile rearing habitat as well as make adult passage to spawning areas difficult or impossible.

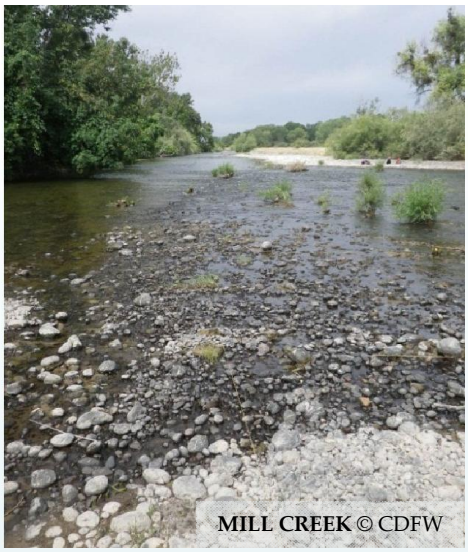

SCOTT RIVER © CDFW

The current effort is focused on working with stakeholders, landowners, other agencies, and non-governmental organizations to collect information, identify issues and concerns, and define future study needs on the Scott and Shasta Rivers. Consultant services were utilized to guide the process of developing comprehensive study plans using the Instream Flow Incremental Methodology for both rivers. These study plans will identify what studies are needed to determine flow requirements for coho salmon recovery.

Phase I and II of the Instream Flow Incremental Methodology process continue with final study plan reports under development.

MILL CREEK (TEHAMA COUNTY)

Mill Creek is one of three Sacramento River tributaries that supports a self-sustaining, wild population of threatened spring-run Chinook salmon. Mill Creek also supports Central Valley steelhead trout and fall-run Chinook salmon. Due to persistent insufficient instream flow and elevated stream temperatures during summer months, Mill Creek was identified by CDFW as a priority stream for developing passage flow recommendations for adult and juvenile Chinook salmon and steelhead trout.


MILL CREEK © CDFW

The current effort will assess stream flows required for adult and juvenile Chinook salmon and steelhead trout passage through the lower watershed. A stream temperature study is also being developed to evaluate the effects of stream flow on water temperature, with assistance from USFWS.

Study plans for both the critical riffle and temperature components are being developed and will be posted to the Instream Flow Program's web page upon completion. Field work will initiate in spring of 2014.

DEER CREEK (TEHAMA COUNTY)


DEER CREEK © CDFW

Deer Creek is another Sacramento River tributary that supports a wild, genetically distinct population of spring-run Chinook salmon, as well as fall-run Chinook salmon and steelhead trout. Deer Creek was identified as a high priority stream by CDFW for instream flow assessment. Natural and artificial passage barriers are preventing adult Chinook salmon and steelhead trout from reaching spawning habitat in Deer Creek during low flows. In particular, spring-run Chinook salmon are threatened by summer low flow and high water temperatures in the lower watershed.

The current study will assess natural passage barriers and temperature constraints in lower Deer Creek. In 2013, preliminary surveys began to identify fish passage impediments, but were not completed.

Surveys will commence in 2014 to finish identifying passage barriers. Study plans are currently being developed, and field work will be initiated in the spring of 2014.

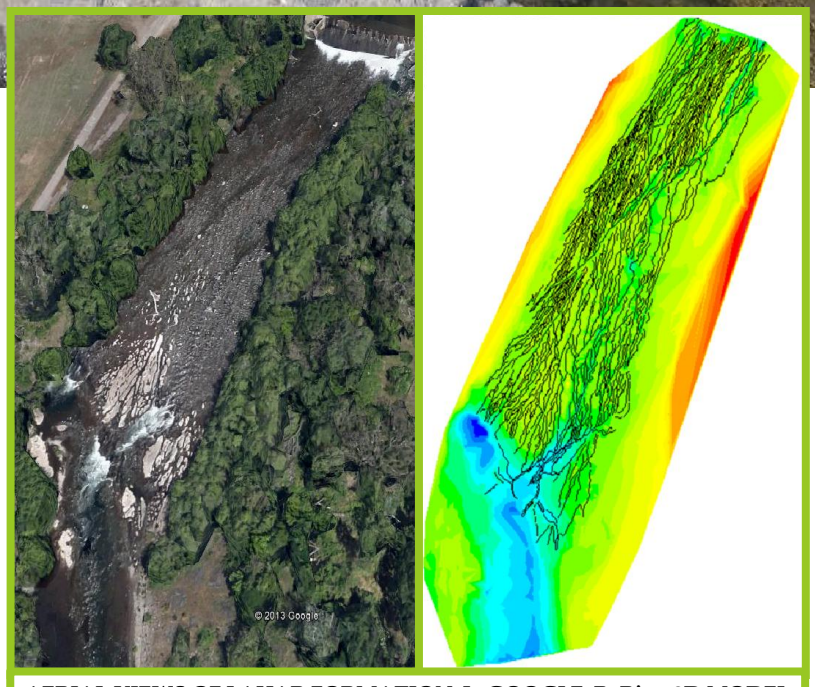
BUTTE CREEK (BUTTE COUNTY)

Butte Creek has the largest self-sustaining, naturally spawning, wild population of spring-run Chinook salmon in the Central Valley. Every year, hundreds to thousands of fish migrate up the stream to spawn in the upper watershed. However, passage of migrating adult spring-run Chinook salmon may be blocked in lower Butte Creek at a unique volcanic outcropping known as the Lahar formation (pictured). This formation, combined with low flow, elevated water temperature, and shallow riffles, can limit spring-run Chinook salmon passage through the lower watershed.

The Instream Flow Program has been working with USWFS to complete a passage study at the Lahar formation and down stream at three low-gradient riffles. Topographic surveys were conducted to identify migration pathways through the Lahar formation. This data is combined with measures of discharge, depth, and velocity to construct a two-dimensional hydraulic model that will allow for CDFW to evaluate the depths and velocities necessary for fish to pass through lower Butte Creek over a range of flows.

LAHAR FORMATION © CDFW

The Lower Butte Creek study extends from the Parrot-Phelan Diversion Dam to the downstream Western Canal Siphon. Hydraulic model data was collected throughout 2013, and included water surface elevations, bed topography, cover, and substrate distribution. Total stations, Real-Time Kinematic (RTK) GPS units, and Acoustic Doppler Current Profilers (ADCP) were used during topographic surveys. USFWS is training CDFW staff on the use of River 2D Model software. Models will be run in 2014 after field work has been completed.

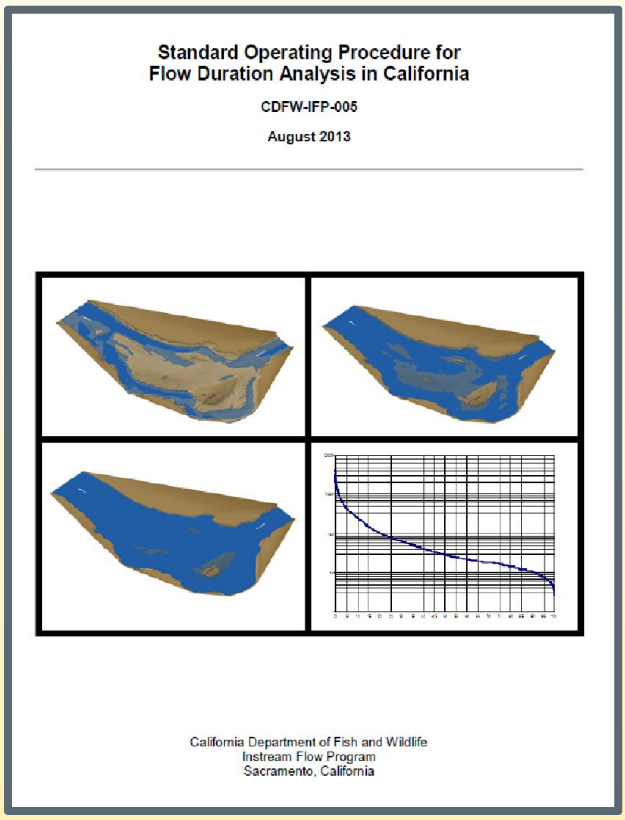


AERIAL VIEWS OF LAHAR FORMATION. L: GOOGLE. R: River2D MODEL

QA/QC Program

With the constant need for scientific information on our streams and rivers, instream flow studies may be conducted throughout the state by multiple agencies, consultants, or other organizations at any given time. To support the production of complete, consistent, and defensible data, CDFW Instream Flow Program developed a Quality Assurance/ Quality Control (QA/QC) Program for instream flow assessments.

The goal of the QA/QC Program is to enable comparability among current and future instream flow studies prepared by CDFW staff and its partners through standardized data collection procedures. In coordination with the Quality Assurance Research Group at Moss Landing Marine Laboratories, the QA/QC Program is developing equipment checklists, and method guidance documents and templates for study plans and reports. Instream Flow Program FAQ sheets and five standard operating procedures (SOPs) for public use under appropriate circumstances have been developed.


Standard Operating Procedure for
Flow Duration Analysis in California

CDFW-IFP-005

August 2013

California Department of Fish and Wildlife
Instream Flow Program
Sacramento, California

To date, the QA/QC Program has developed the following SOPs to guide instream flow studies in California:

- Critical Riffle Analysis for Fish Passage
- Discharge Measurements in Wadeable Streams
- Streambed and Water Surface Elevation Data Collection
- Flow Duration Analysis
- Wetted Perimeter Data Collection


DRY CREEK (PLACER CO.) © CDFW

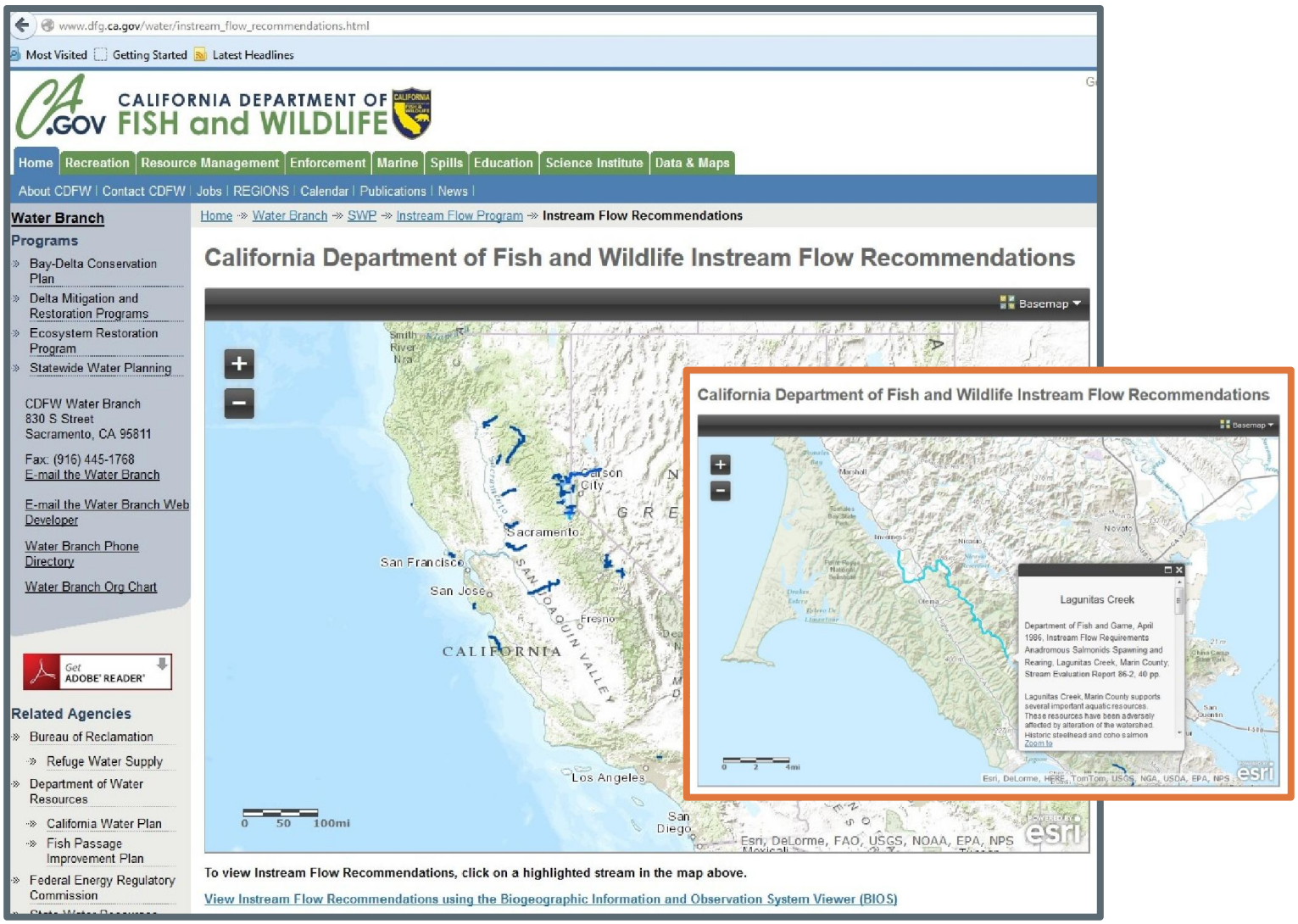
SOPs provide guidelines and enable consistent methods to be used throughout California. The Instream Flow Program plans to provide training opportunities for staff from CDFW Regional offices, State Water Board, and other interested agencies through training workshops. The QA/QC Program will continue to develop its quality management system in the coming years.

The SOPs and Instream Flow Program FAQ Sheet can be found on the Instream Flow Program web page at www.dfg.ca.gov/water/instream_flow.html.

Flow Recommendations Map

The CDFW Biogeographic Data Branch (BDB) developed an Instream Flow Recommendations map to enhance public access to information and deliver recommendations, reports, and data in a user-friendly and comprehensive way. This statewide interactive web map allows users to view Instream Flow Recommendations by clicking on a stream; detailed information about the stream, species, and life stages of concern is then displayed. The information box also has a link to the instream flow report.

Currently, instream flow recommendations are available for 22 streams, located in multiple counties throughout California. This interactive web map will be updated as new flow recommendations are developed.



The CDFW Instream Flow Recommendations map can be found on the Instream Flow Program web page at http://www.dfg.ca.gov/water/instream_flow_recommendations.html.

Looking Ahead

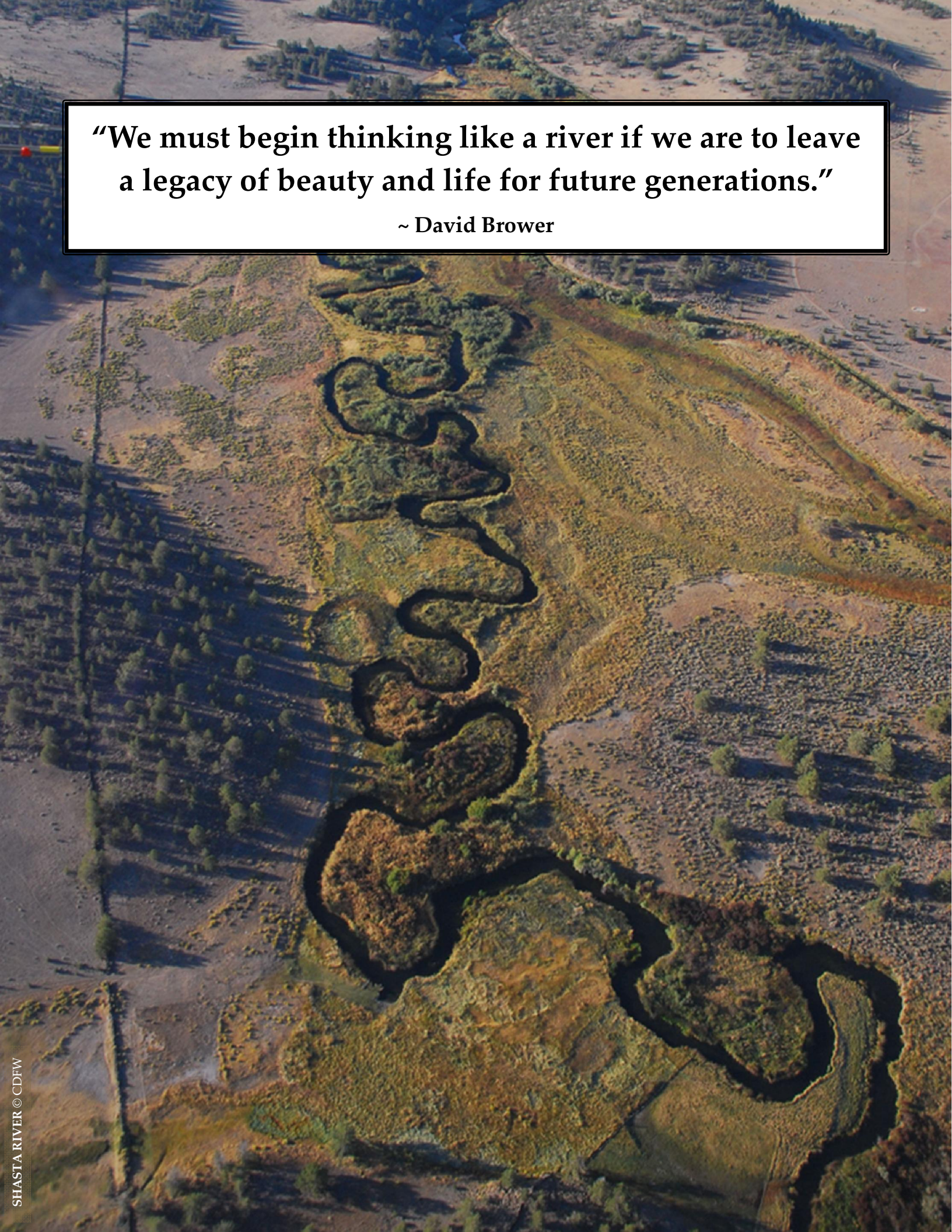
The importance of instream flow studies in California is illustrated by the continued need for water managers to determine what flow conditions are necessary to maintain healthy populations of fish and wildlife. In 2014, the Instream Flow Program expects to complete flow recommendations, begin field work, and continue to develop SOPs and templates.

- Flow related projects will continue in the following streams:
  - Big Sur River – An instream flow report will be finalized, and flow recommendations will be submitted to the State Water Board;
  - Butte Creek – Field work will be completed. Data analysis and modeling are underway. The study report is projected to be completed in early 2015 with a subsequent flow recommendation to the State Water Board;
  - Deer Creek – The study plan will be completed in early 2014, with field work initiating in spring 2014;
  - Kimball Creek – Bypass releases from Kimball Creek Reservoir will continue to be measured when flows permit;
  - Mill Creek – The study plan will be completed in early 2014, with field work initiating in spring 2014;
  - Scott and Shasta Rivers – Final study planning reports are being prepared by utilizing consultant services.
- The QA/QC Program will be developing the following: 1) Study Plan Template; 2) Sample Design for Hydraulic Modeling SOP; and 3) Site-specific Habitat Suitability Criteria SOP. Additional documents will be developed as needed.
- Coordination and outreach efforts will continue on a quarterly basis with the State Water Board, NMFS, and USFWS. The Instream Flow Program will assist with flow studies and method review for projects throughout California as requested. Coordination with the State Water Board on the development of flow objectives (Phase 4 of Bay-Delta Effort) is planned. Public and stakeholder engagement will be supported by continuing outreach efforts.
- Planning activities for new streams will be initiated. These coastal and inland streams will be determined with input from CDFW Regional staff and other agencies.

LAMPREY, BIG SUR RIVER © CD`FW

BUTTE CREEK © CDFW

MILL CREEK © CDFW



"We must begin thinking like a river if we are to leave a legacy of beauty and life for future generations."

~ David Brower

SHASTA RIVER © CDFW