CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE

Instream Flow Program

2015 Year Review

"No water, no life. No blue, no green."

~ Sylvia Earle

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

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

COVER PAGE PHOTOS
BACKGROUND: CHINOOK SALMON BUTTE CREEK
INSET: TOP – CHINOOK SALMON BUTTE CREEK
MIDDLE – DRY MAIN CHANNEL OF BIG SUR RIVER
BOTTOM – INSTREAM FLOW STUDY OUTLET CREEK

All photographs in this document were taken by CDFW staff.

Mill Creek Tehama County

2015 PROGRAM HIGHLIGHTS

The California Department of Fish and Wildlife's (CDFW) Instream Flow Program (IFP) was established in the Water Branch in 2007 to provide a scientific basis for CDFW recommendations and actions regarding in-stream flows and the impacts of water rights decisions. Today, the IFP has grown to two field units and an implementation unit comprised of scientists and an engineer. The IFP employs scientifically sound and defensible methods to identify the volumes of stream flow needed (flow prescriptions) at different times of the year (i.e. regimes) to protect fish and wildlife resources and the habitats that support them.

IFP 2015 Program Accomplishments:

- **California Water Action Plan (WAP):** The WAP is a five-year roadmap to an efficient and sustainable water management system for California. The WAP includes three objectives: 1) more reliable water supplies; 2) restoration of important species and habitat, and 3) a more resilient sustainable managed water resources system. The IFP's role in the WAP will be to develop instream flow criteria and flow prescriptions for flow enhancement activities in priority streams statewide (See Page 2).

- **Instream Flow Studies Underway:** The IFP is involved with multiple studies statewide. For example, data were collected in 2015 for assessing fish passage, developing temperature models, developing hydraulic-habitat models, and assessing geomorphic versus flow relationships on numerous Central Valley and Coastal streams and rivers (See Pages 3-6).

- **Quality Assurance (QA) Program:** IFP staff continued to work with Moss Landing Marine Laboratory (MLML) Quality Assurance Research Group to develop the IFP QA Program. The standardized QA methods and techniques used by MLML are necessary elements in developing a program that employs scientifically repeatable and defensible flow recommendations (See Page 7).

- **Drought Activities:** Streamflow monitoring data were collected by IFP staff on a number of creeks and streams throughout the Central Valley and Coastal regions to help assess the impacts of drought conditions on aquatic species and the environment (See Page 8).

- **Flow Criteria:** Developing flow criteria for fish and wildlife is a critical component of the IFP duties. Flow criteria are also an important first step before developing flow recommendations, and /or flow objectives (See Page 9).

- **Presentations and Publications:** IFP staff presented at multiple workshops and published instream flow study findings in peer reviewed literature (See Page 10).

- **Public Outreach:** Collaboration occurred with State and Federal Agencies like the State Water Resources Control Board (SWRCB), U.S. Fish and Wildlife Service (USFWS), and National Marine Fisheries Service (NMFS). The IFP also worked with universities, consultants, non-governmental organizations (NGO), and the public . Additionally, the IFP participated on a number of technical project teams, as needed, as part of a statewide effort (See Page 10).

CALIFORNIA WATER ACTION PLAN

The state must manage its water in a way which balances the public's health and safety, protects the environment, and supports the economy. The WAP was developed to move California toward a more sustainable water management system. Under the WAP action 4, CDFW and SWRCB have been identified to implement individual and coordinated efforts to enhance flow in at least five priority streams that support critical habitat for anadromous fish.

The five priority streams identified in the WAP are as follows:

- Mark West Creek
- Mill Creek
- South Fork Eel River
- Shasta River
- Ventura River

The IFP will develop instream flow criteria to protect fish and wildlife in WAP priority streams that support critical habitat for threatened and endangered anadromous salmonids including Chinook salmon, coho salmon, and steelhead trout. As flow criteria are developed, CDFW intends to submit flow recommendations to the SWRCB for their consideration in planning efforts and water allocation decisions, pursuant to Public Resources Code (PRC) §10000-10005.

2015 INSTREAM FLOW STUDIES

As part of CDFW's PRC §10000 mandate, the IFP began developing flow criteria in the following streams in 2015. Data collection, analysis, and reporting may continue in some or all of these streams into 2016.

- **Deer Creek (Tehama County)**: The study area is located in the lower section of the creek, extending 11.8 River Miles (RM) from the canyon mouth at the Deer Creek Irrigation District Diversion Dam to the Sacramento River confluence. IFP staff investigated fish passage conditions based on water temperature and depth for anadromous salmonids, including Central Valley spring-run Chinook salmon (SRCS), and steelhead trout.

- **Mill Creek (Tehama County)**: The study area is located within the lower portion of the creek and extends 5.4 RM from the Upper Diversion Dam downstream to the Sacramento River confluence. Fish passage conditions were investigated based on water temperature, depth, velocity, cover, and substrate for anadromous salmonids, including Central Valley SRCS, and steelhead trout.

- **Outlet Creek (Mendocino County):** The study area includes the entire length of the creek from the confluence of the Middle Fork Eel River to its headwaters near Willits, California. Representative riffle transects were sampled to evaluate habitat maintenance flow thresholds and benthic invertebrate production for anadromous salmonids, including coho salmon, Chinook salmon, and steelhead trout.

- **Central Coast (Multiple Counties):** IFP staff initiated sampling in twenty-two coastal California streams spanning from southern Santa Barbara County to northern San Mateo County. Representative riffle transects are being sampled to determine ecological flow thresholds.

- **South Fork Eel River Watershed:** Delineation of the study reaches will occur within the South Fork Eel River watershed in spring of 2016. This study will identify flow regimes necessary to protect various life stages of; coho salmon, Chinook salmon, and steelhead trout, and the habitats that support them.

Instream flow study transects at Stenner Creek

California is a state that experiences many droughts and severe floods. Californian's will continue to face these pressures along with climate change in the coming decades.

Juvenile steelhead, Big Sur River

INSTREAM FLOW STUDY: PLANS COMPLETED

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 high water temperatures and 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.

IFP staff coordinated with stakeholders, landowners, other agencies, and NGO's 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 Phases 1 and 2 of the Instream Flow Incremental Methodology (IFIM). Multiple study plans have been completed and the IFP is currently working with CDFW regional staff to obtain funding to implement (Phase 3 of IFIM) these projects.

Scott River, Siskiyou County

Study plans include but are not limited to:

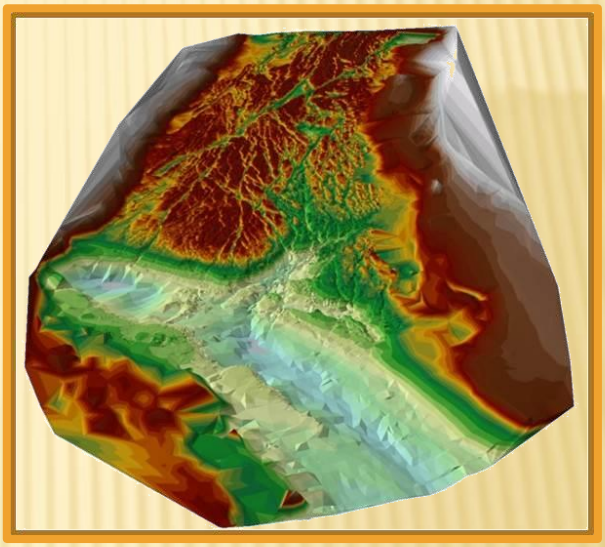
- Hydraulic habitat modeling
- Mesohabitat delineation
- Riparian vegetation assessment
- Habitat suitability criteria
- Fish passage
- Floodplain habitat connectivity
- Temperature assessment
- Scott River hydrology water balance modeling

All reports are posted to the public on the Instream Flow Program webpage upon completion:
http://www.dfg.ca.gov/water/instream_flow.html

INSTREAM FLOW STUDY: REPORTING UNDERWAY

BUTTE CREEK (BUTTE COUNTY)

Butte Creek has the largest self-sustaining, naturally spawning, wild population of SRCS in the Central Valley. A flow study was performed by IFP staff to assess passage conditions for adult SRCS migrating upstream through the valley floor section of Butte Creek. The primary passage concern is an exposed bedrock formation near Chico comprised of the Tuscan Formation, also known as the "Lahar" formation.



2-D Model of Lahar Formation

Water drains over and through the Lahar via a complex braided network of trenches and gullies varying in depth. IFP staff worked with USFWS to conduct the flow study and develop rigorous hydraulic-habitat models of the Lahar Formation. The study team employed two-dimensional (2D) modeling techniques to evaluate passage microhabitat conditions including depth, width, velocity, and jump height through the complex impediment.

Location map of Lahar Formation

Study results were compared with existing depth criteria for adult SRCS and site-specific flow conditions. In 2015 the model results were further evaluated with historical hydrology patterns and fish monitoring data. The IFP will seek to finalize draft flow criteria and make the findings of the study available to the public in 2016.

INSTREAM FLOW STUDY: REPORTING FINALIZED

BIG SUR RIVER (MONTEREY COUNTY)

The free-flowing, unregulated, Big Sur River in Monterey County was selected for development of flow recommendations because it is an important source stream for the South-Central Coast Distinct Population Segment (DPS) of steelhead (*Oncorhynchus mykiss*) per NOAA's South-Central California Steelhead Recovery Plan (NMFS 2013).

Insufficient instream flows have been identified as a key factor preventing recovery of the steelhead population viability in the Big Sur River. Increasing instream flows is expected to provide substantive progress towards recovery of steelhead in the Big Sur River. The IFP, along with project partners including the USFWS, Pacific States Marine Fisheries Commission, U.S. Geological Survey, and others, conducted several technical studies during 2009–2013 as part of the CDFW's instream flow regime assessment. The Big Sur River technical studies were completed in 2014. A stakeholder meeting is being planned for 2016 to present the findings of the technical studies and discuss how the information was used to develop draft flow recommendations pursuant to the PRC. After a public comment period, CDFW intends to transmit the flow recommendations for the Big Sur River to the SWRCB.

Steelhead trout, Big Sur River

Snorkel survey on Big Sur River for developing juvenile steelhead habitat suitability criteria

NMFS (2013). South-central California steelhead recovery plan. National Marine Fisheries Service, West Coast Region, California Coastal Area Office, Long Beach California.

QUALITY ASSURANCE PROGRAM

The IFP continues to work with MLML's Marine Pollution Studies Laboratory's (MPSL) Quality Assurance Research Team to develop general programmatic documents and provide technical assistance with the implementation of the QA Program. The QA Program has publications available on a variety of technical data collection procedures for use by CDFW staff, as well as potential partners from other organizations. In 2016, the QA Program will expand the procedural document library and will introduce additional new tools for use within and outside of CDFW. The IFP is also working with MLML to develop a CDFW staff training course on a variety of QA topics, which will enhance CDFW's ability to accurately assess instream flow reports and data. The QA Program supports the IFP's goal to produce credible, comparable, coordinated and scientifically defensible data that may be used by various organizations and agencies throughout California.

Photos taken at CDFW IFP training event

IFP QA Program Facts

- ✓ *Known and documented data are necessary to address CDFW mandates.*
- ✓ *Understanding and documenting quality of data is essential for defensibility.*
- ✓ *Comparable data is one of our most powerful tools for improving instream flows.*
- ✓ *Comparable data contributes to the bigger picture by allowing data leveraging and informed decision making.*

All QA program documents are posted to the public on the Instream Flow Program webpage upon completion: http://www.dfg.ca.gov/water/instream_flow.html

CALIFORNIA DROUGHT: IFP ASSISTANCE

2015 marked the fourth consecutive extremely dry year recorded in California, and water availability was drastically limited. This relentless drought has caused significant impacts to fish and wildlife species.

Dry fish ladder along a California stream

The IFP worked with CDFW regional offices, and other state and federal agencies to help mitigate drought impacts and preserve and protect the state's fish and wildlife resources. The IFP plans to continue assisting with drought monitoring activities throughout the state on an as needed basis.

CDFW drought monitoring at Pescadero Creek

WHAT ARE FLOW CRITERIA?

Flow criteria are numerical standards developed for the purposes of identifying and recommending instream flow levels to protect fish and wildlife and the habitats that support them. Flow criteria have many potential uses for safeguarding aquatic species throughout their various life stages and habitat needs. For example, flow criteria can be used as watershed specific targets for voluntary flow enhancement activities, or for more formal regulatory and enforcement activities. Flow criteria developed by the IFP for the protection of fish and wildlife are provided to the SWRCB and used as part of a suite of information by the SRWCB to inform decision-making on water allocation and development of flow objectives throughout the state. While flow criteria established to protect public trust resources do not have regulatory effect, flow objectives adopted by the SWRCB must be legally adhered to.

- **Required for Flow Criteria Development:**
  - Project specific study with identification of species and their life stages
  - Scientifically sound and defensible study plan methods
  - Q/A protocols for accuracy of data collection and analysis
- **Example Species/Life Stage Flow Criteria:**
  - Salmonid Spawning
  - Fish Passage Flows
  - Juvenile Salmonid Summer Rearing
  - Summer Holding

Spring-run Chinook salmon summer holding habitat at Butte Creek

Fall-run Chinook salmon spawning in a California stream

INSTREAM FLOW PROGRAM PRESENTATIONS & PUBLICATIONS

Recent Presentations:

- California Aquatic Bioassessment Workshop, Davis California: "Assessing Aquatic Habitat Connectivity and Low-flow Ecological Thresholds." R. Holmes.

- FLOW 2015 Instream Flow Council Workshop, Portland Oregon: "Linking Data Collection with Decision Making – The California Perspective on Managing Uncertainty with Instream Flow Regime Assessments." B. van Buuren and R. Holmes.

- CDFW Science Symposium, Davis California. "Hydraulic modeling of an Upstream Passage Impediment to Adult Spring-run Chinook salmon in Butte Creek." W. Cowan, P.E.

- CDFW Science Symposium, Davis California. "Seasonal microhabitat selectivity by juvenile steelhead in a central California costal river." R.W. Holmes.

- American Fisheries Society-CalNeva Conference, Santa Cruz California. "Go with the Flow: Standard Procedures for Instream Flow Studies," poster presentation. D. Haas.

Recent Publications:

- Holmes, R. W., M. A. Allen, and S. Bros-Seeman. 2014. Seasonal microhabitat selectivity by juvenile steelhead in a central California coastal river. *California Fish and Game: Special Fisheries Issue* 100:590–615. Available from http://www.dfg.ca.gov/publications/journal/

- Holmes, R.W., D.E. Rankin, E. Ballard, and M. Gard. 2015. Evaluation of steelhead passage flows using hydraulic modeling on an unregulated coastal California river. *River Research and Applications* DOI: 10.1002/rra.2884

LOOKING FORWARD AT 2016

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 and productive ecological conditions in streams and rivers. In 2016, the IFP expects to continue collecting data and assess flow and habitat relationships, so that up-to-date information relevant to instream flow management can be collected and long term management solutions can be developed.

IFP 2016 Performance Objectives:

- Planning activities for the five WAP priority streams will be initiated.
- The IFP will be expanding their work with Central Coast Regional Water Quality Control Board integrating flow measure assessments for aquatic habitats in northern California coastal streams.
- The QA Program will develop a full-day training on the design and execution of instream flow studies. The training sessions will emphasize the instream flow applications most commonly encountered by CDFW staff: low flow thresholds, habitat connectivity flows, habitat maintenance flows, and fish passage flows. The trainings will assist CDFW staff in: selecting study-appropriate methods and models; establishing strong relationships between habitat and flow; generating defensible instream flow criteria and recommendations supported by data of known and documented quality; and verifying and validating instream flow data.
- The IFP will continue drought monitoring and data collection, as needed, on priority Central Valley and coastal streams.
- The IFP will continue to participate and present instream flow study findings at seminars and workshops across the state. When feasible, IFP staff will submit study findings for publication in peer reviewed literature.
- Coordination and outreach efforts will continue on a quarterly basis with the SWRCB, NMFS, and USFWS. Public and stakeholder engagement will be supported by continuing outreach efforts.

For flow study questions or to learn more about the Instream Flow Program please contact Diane Haas, Instream Flow Coordinator at Diane.Haas@wildlife.ca.gov or visit our website at: http://www.dfg.ca.gov/water/instream_flow.html