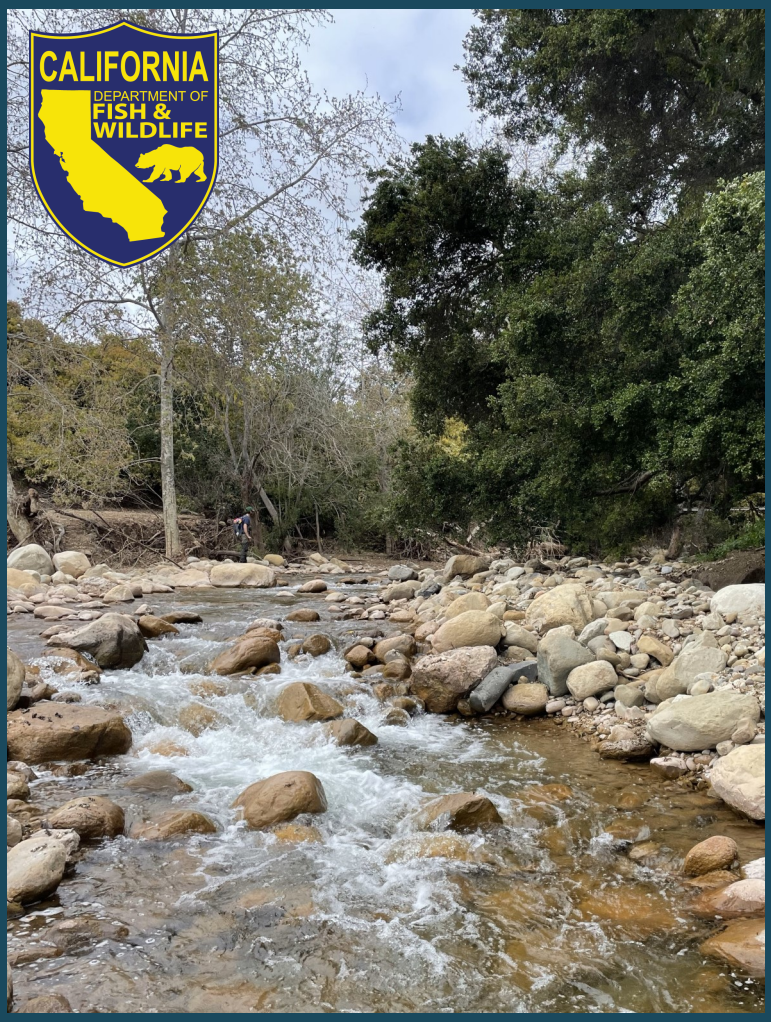

2023 Year in Review

The California Department of Fish & Wildlife

INSTREAM FLOW PROGRAM

2023 Year in Review

The California Department of Fish and Wildlife (Department) Instream Flow Program (IFP) conducts instream flow studies and develops ecological flow criteria needed for long-term protection, maintenance, and effective stewardship of fish and wildlife resources.

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Figure 1. The five riverine components (from Annear et al. 2004).

All photographs in this report are owned by the Department or Department staff.
Cover page (clockwise from top left): Carpinteria Creek in Santa Barbara County, tributary to the Mojave River watershed in San Bernardino County, Dry Creek in Placer County, and the Mojave River in San Bernardino County.

Annear, T., I. Chisholm, H. Beecher, A. Locke, P. Aarrestad, C. Coomer, C. Estes, J. Hunt, R. Jacobson, G. Jobsis, J. Kauffman, J. Marshall, K. Mayes, G. Smith, R. Wentworth and C. Stalnaker (2004). Instream flows for riverine resource stewardship. Revised edition. Instream Flow Council, Cheyenne, WY.

Instream Flow Council Workshop

In October 2023 the IFP hosted members from the Instream Flow Council's (IFC)[1] Western Region for a two-day workshop in Folsom, CA. The IFC is a member organization comprised of fish and wildlife agencies from across the United States and Canada that supports fish and wildlife agencies to better fulfill their public trust responsibilities by improving the effectiveness of state, provincial, and territorial instream flow programs, and activities in conserving aquatic ecosystems. The IFP has been a member of the IFC since its creation in 1998. The goal of this workshop was to learn, discuss, and perform instream flow science and field techniques aimed at making instream flow recommendations.

Group discussion of field methods

The workshop consisted of two in-person days and was completed with a virtual meeting in early 2024.

Instream Flow Program staff alongside IFC members

[1] Instream Flow Council website: https://www.instreamflowcouncil.org/.

Day 1: In-person classroom day

Department IFP staff and IFC members presented on topics such as:

- Common flow methods and models used in western states;
- Study design guidance;
- Lentic systems;
- Case studies; and
- Field method protocols.

Day 2: In-person field day

This day included hands-on field trainings and group discussions on the following topics:

- Habitat mapping and site selection;
- Discharge measurements;
- 1-D hydraulic modeling;
- 2-D hydraulic modeling; and
- Habitat Retention and Wetted Perimeter methods.

Day 3: Virtual Meeting

The virtual workshop wrapped up our three-day training. Staff in the IFP presented the results of the methods applied and models developed in a local stream for the training. Staff led discussions on using results of the analyses to develop flow regime criteria as well as how to use science to inform decision making in water resource management.

This session was attended by the IFC Western Region members as well as other IFC members nationwide.

IFC workshop habitat mapping exercise

Priority Streams Update

In order to protect public trust resources and fulfill legislative mandates put forward in the Public Resources Code Sections 10000–10005, the IFP develops flow criteria for use in water management planning and decision-making processes. In 2023, the IFP continued studies that will provide flow criteria to support fish, wildlife, and water management goals for streams and rivers identified as priority streams. For more information on PRC priority streams, visit the IFP website[2].

To meet this directive, watershed-wide instream flow criteria reports (Watershed Criteria Reports) are in the process of being developed for several priority streams: Carpinteria Creek, Dos Pueblos Creek, the Mattole River, the Mojave River, the North Fork Navarro River, San Gregorio Creek, the Santa Ana River, and the Santa Margarita River.

Each Watershed Criteria Report combines desktop analyses with field-based methods to create meaningful instream flow criteria at key points in the watershed utilizing hydrologic models to assess natural flows, functional flows, and ecosystem baseflows as well as presenting the results from site-specific surveys to assess aquatic habitat over a range of flows.

The Mojave River, North Fork Navarro River, and Carpinteria Creek are highlighted in this year's report.

See **Figure 2** for a map of priority watersheds.

Gobernador Creek in the Carpinteria Creek watershed
SANTA BARBARA COUNTY

[2] Instream Flow Program's website: https://wildlife.ca.gov/Conservation/Watersheds/Instream-Flow.

Figure 2. Map of priority watersheds.

The Mojave River

IFP conducting site selection in the Mojave River

The Mojave River watershed in San Bernardino County is listed as a priority stream under the Public Resources Code Section 10004. The watershed provides ample riverine and riparian habitat for endangered species with one of its tributaries, Deep Creek, designated as a Heritage and Wild Trout stream. A history of groundwater pumping, along with increasing urban development, has led to a reduction in streamflow within the watershed. The IFP was tasked with assessing flows that would maintain both aquatic habitat and ecosystem processes throughout the watershed.

In 2023, the IFP continued work on the Mojave River Watershed Criteria Report, which consisted of conducting site-specific surveys at three reaches within Deep Creek to assess aquatic habitat over a range of flows. In addition, 25 reaches were selected for desktop hydrologic analyses, resulting in flow criteria for four reaches that may be used as a tool for consideration in water management planning.

Deep Creek within the Mojave River watershed
SAN BERNARDINO COUNTY

The North Fork of the Navarro River

The Navarro River watershed is the largest coastal watershed in Mendocino County, covering approximately 315-square-miles and providing important habitat for Coho salmon, steelhead trout, and other native aquatic species. The North Fork Navarro River is on the Department's list of priority streams for instream flow assessments, pursuant to Public Resources Code Section 10004.

In 2023, IFP staff conducted field surveys on Flynn Creek, a tributary to the North Fork Navarro River, at three locations using the Habitat Retention Method (CDFW 2018) and Wetted Perimeter Method (CDFW 2020). Surveys were conducted in conjunction with staff from the Department's Bay Delta Region and in support of monitoring efforts currently being conducted under the California Environmental Monitoring and Assessment Framework. A Watershed Criteria Report is being developed for the Navarro River watershed that will include results of field-based analyses as well as additional desktop hydrologic analyses.

References

CDFW (2018). Standard operating procedure for the habitat retention method in California. California Department of Fish and Wildlife, Instream Flow Program (CDFW), Sacramento, CA. CDFW-IFP-006. Version 2. Available: https://nrm.dfg.ca.gov/FileHandler.ashx? DocumentID=128310.

CDFW (2020). Standard operating procedure for the wetted perimeter method in California. California Department of Fish and Wildlife, Instream Flow Program (CDFW), West Sacramento, CA. CDFW-IFP-004. Version 3. Available: https://nrm.dfg.ca.gov/FileHandler.ashx? DocumentID=74182.

Carpinteria Creek

Carpinteria Creek in Santa Barbara County has historically supported the federally listed Southern California steelhead Distinct Population Segment (DPS). Draining roughly 15 square miles, the Carpinteria Creek watershed was impacted by the 2017 Thomas Fire, which damaged the USGS gage (USGS gage ID 11119500), threatened nearby residential communities, and significantly altered the landscape. Establishing flow regimes in the watershed is vital to ensuring the viability of steelhead trout and other stream-related fish and wildlife resources.

Field surveys occurred in May 2023 in collaboration with the Department's South Coast Region, in which field data were collected from the lower portion of Carpinteria Creek and Gobernador Creek, a tributary to Carpinteria Creek. In addition, five reaches of the watershed were analyzed using desktop analyses and instream flow criteria were developed for portions of the lower section of Carpinteria Creek and Gobernador Creek. A final report is expected to be available in 2024.


IFP staff capturing water surface elevation data

Clear Lake Watershed

Located in the North Coast Mountain Range within Lake County, the Clear Lake watershed is bounded by mountainous regions and valleys spread throughout and along the lake's shores. The tributaries surrounding Clear Lake provide critical habitat for the Clear Lake Hitch (*Lavinia exilicauda chi*; CLH), a large minnow endemic to Clear Lake and its surrounding tributaries. The CLH typically utilize the tributaries to Clear Lake for spawning and juvenile outmigration in the spring season when dry stream beds become inundated from seasonal rains (Feyrer 2019). Modifications to the watershed such as agricultural and urban developments, including modification of streambeds, have altered streamflow patterns. In addition to these alterations, climate, water diversions, and groundwater-surface water interactions have prompted streams to prematurely dry early in the spawning season, reducing access to critical habitat within the tributaries during the CLH's spawning, juvenile rearing, and outmigration period.

Clear Lake Hitch (CLH) historically supported subsistence fishing for many California Native American Tribes in the region. The CLH continue to be a culturally significant resource today.

The CLH was listed on the California Endangered Species Act list as a threatened species in 2014. In 2023, Governor Newsom signed Executive Order N-5-23[3] directing the Department and the State Water Resources Control Board (SWRCB)[4] to evaluate instream flows to protect the CLH. To address the Executive Order, the Department will conduct a study on Middle, Scotts, Manning, Adobe, Kelsey, and Cole Creeks (Figure 3) to evaluate minimum instream flows for CLH passage.

Clear Lake Hitch

Clear Lake Hitch, Chi

- Are endemic to Clear Lake and its surrounding tributaries.
- Live for up to six years.
- Potamodromous—a migratory fish that spends its whole life in freshwater.
- CLH spend most of their lives in the lake but migrate to the tributaries to spawn.
- Migration, juvenile rearing, and spawning period is typically February to May, but may continue into summer.
- Broadcast spawners—release sperm and eggs into open water for external fertilization.

[3] Executive Order N-5-23: https://www.gov.ca.gov/wp-content/uploads/2023/03/3.24.23-Drought-update-executive-order.pdf.

[4] SWRCB Clear Lake Hitch website: https://waterboards.ca.gov/clearlakehitch/.

Figure 3. Map of the Clear Lake watershed.

The goal of this study is to inform water resource decisions and protect instream flows to support critical habitat for CLH. This study is highly collaborative; the IFP is working with the Department's North Central Region, Fisheries Branch, Conservation Engineering Branch, and several government partners including California Native American Tribes in the Clear Lake region as well as local, state and federal agencies (Figure 4).

The objectives for this study are to:

- Identify the relationships between streamflow and habitat/fish passage using a combination of habitat and hydraulic modeling, and empirical approaches.
- Identify flows needed to maintain fish passage in tributary streams of Clear Lake for CLH.
- Identify habitat maintenance flows for Clear Lake tributary streams.
- Coordinate and collaborate with California Native American Tribes as well as local, state, and federal agencies.

For more information, see the Instream Flow Evaluation for Clear Lake Hitch Passage in Tributaries of the Clear Lake Watershed study plan on our program's website[5].

References

Feyrer, F. (2019). Observations of the spawning ecology of the imperiled Clear Lake Hitch. California Fish and Game 105(4): 225-232.

Figure 4. Collaborative partners in the Clear Lake Hitch conservation effort.

[5] The IFP Clear Lake Watershed page: https://wildlife.ca.gov/Conservation/Watersheds/Instream-Flow/Studies/Clear-Lake-Watershed-Studies.

Instream Flow Program Website

The IFP's website[6] is the best place to stay updated about program activities as it hosts several webpages that provide an overview of the program, current and completed instream flow studies, and other information such as:

- Documents available for download including technical reports, standard operating procedures, quality assurance guidance, and journal publications.
- The Instream Flow Criteria Map (Figure 5), which is an interactive web map that allows users to view instream flow studies by stream, along with associated reports.
- Webpages on the quality assurance program, previous presentations, and external instream flow resources are also available.

In 2023, the IFP instituted two sitewide updates. The first, was the addition of two new fact sheets to the Program Documents webpage: *Two-Dimensional Modeling of the Ventura River* and *Instream Flow and Habitat Suitability Criteria*. The second, an extensive redesign of the Instream Flow Recommendations Map. The new statewide interactive Flow Criteria Map incorporates all studies where instream flow criteria have been developed by the IFP along with existing flow recommendations from the previous map. Studies are grouped by watershed, and when selected, a summary of the studies conducted and links to any associated documents are provided in a convenient pop-up.

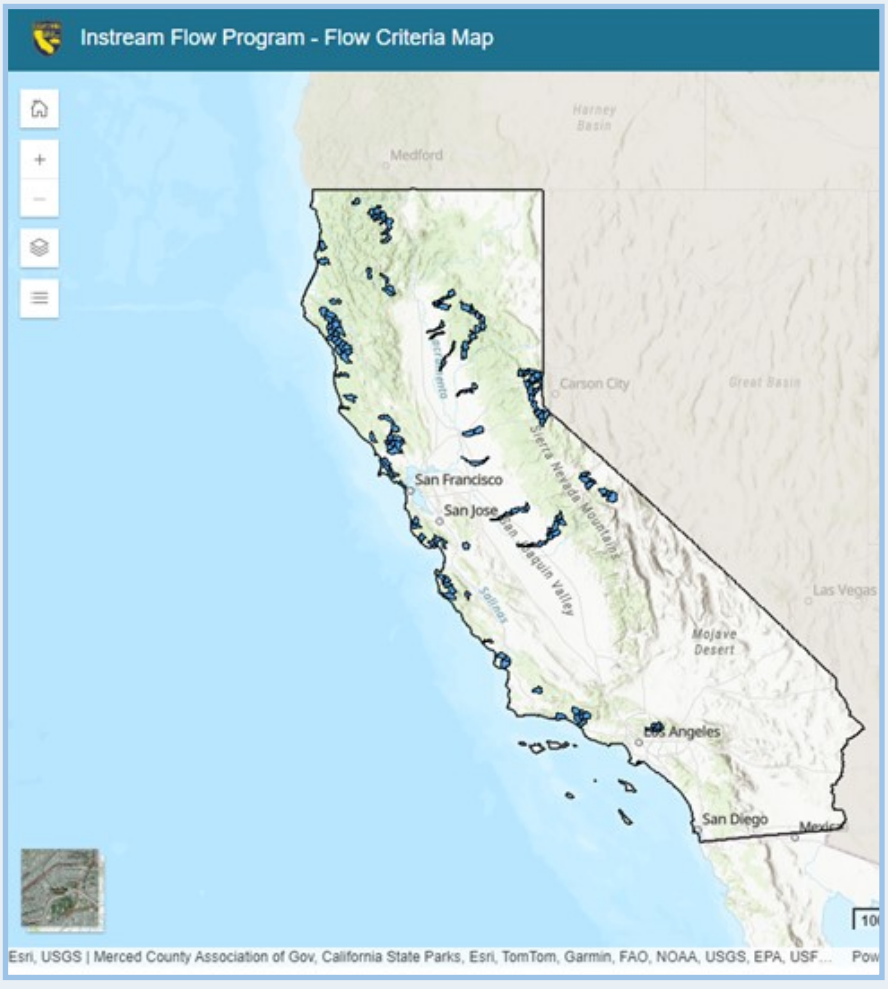

Figure 5. Instream Flow Criteria Map.

[6] Instream Flow Program's website: https://wildlife.ca.gov/Conservation/Watersheds/Instream-Flow.

Quality Assurance and Training

Quality Assurance and Quality Control

The IFP is committed to collecting, analyzing, and reporting high quality, consistent, and defensible data for use in decision making processes. In 2023, the IFP continued quality assurance (QA) efforts by developing a Quality Assurance Program Plan (QAPrP). The purpose of a QAPrP is to document planning for environmental data generation and to provide a program-specific "blueprint" for obtaining the type and quality of environmental data needed for the range of decisions or uses reflected by program activities. The QAPrP follows the scope and format used by the US Environmental Protection Agency, promoting comparability with other agencies using QAPrPs and wider application than internal documentation, and improving defensibility of studies. This document was developed with assistance from the Marine Pollution Studies Laboratory QA Team.

The QAPrP comprehensively documents the IFP's QA system associated with project management, data generation and acquisition, assessment and oversight, and data validation and usability. Project management includes program organization, roles, and purpose; applicable regulations and water management processes; program tasks and associated measurements, devices, and criteria; and training and documentation. Data generation and acquisition includes analytical methods; instrument testing, maintenance, and calibration; model considerations; and data management. Assessment and oversight include assessments, response actions (i.e., audits), and reporting. Data validation and usability include data review, validation, and verification requirements and approaches.

San Gregorio Creek
SAN MATEO COUNTY

Staff Training

Annual calibration training is an opportunity for staff to refresh their knowledge and promote consistency and accuracy in data collection by practicing standardized field methods. In 2023, IFP staff applied their skills during practical field exercises in a local stream throughout the year. Staff reviewed habitat mapping, discharge data collection, differential leveling, bankfull identification, and topographic survey techniques.

IFP staff practice to obtain their CPR certification

Safe practices are also important to the IFP, especially when working in remote areas in and around streams. IFP staff completed a River and Stream Safety course in the South Fork American River to be better prepared for safe field work in riverine environments. Staff developed awareness of hazards for easier prevention of accidents, practiced skills in moving water and safe wading, and learned self-rescue techniques. In addition, IFP staff completed a Wilderness First Aid course to be better prepared for preventing and responding properly to medical emergencies outdoors. In this hands-on training, staff reviewed first aid concepts, practiced basic life support skills, and identified environmental and medical problems through integrated scenarios. Staff received first aid, CPR, and AED certification which met Wilderness Medical Society, American Heart Association, and Occupational Safety and Health Administration standards.

River safety training on the American River
EL DORADO COUNTY

Presentations and Publications

Carlin, T. (2023). Introduction to habitat mapping. In-person presentation at the Instream Flow Council Region 1 Workshop. Folsom, CA. October 3, 2023.

Casares, H., and N. Gephart (2023). Instream Flow and habitat suitability criteria fact sheet. California Department of Fish and Wildlife, Instream Flow Program (CDFW), West Sacramento, CA. Available at: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=214966.

CDFW (2023). Instream Flow Program quality assurance plan. California Department of Fish and Wildlife, Instream Flow Program (CDFW), West Sacramento, CA. Available at: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=213723.

Cowan, W. (2023). One-dimensional model study design and data collection. In-person presentation at the Instream Flow Council Region 1 Workshop. Folsom, CA. October 3, 2023.

Cowan, W. (2023). Two-dimensional model study site set-up and topography. In-person presentation at the Instream Flow Council Region 1 Workshop. Folsom, CA. October 3, 2023.

Cowan, W. (2023). Two-dimensional modeling of the Ventura River fact sheet. California Department of Fish and Wildlife, Instream Flow Program (CDFW), West Sacramento, CA. Available at: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=213284.

Cowan, W., and Gard, M. (2023). California case study: Butte Creek two-dimensional model for fish passage. In-person presentation at the Instream Flow Council Region 1 Workshop. Folsom, CA. October 3, 2023.

Drescher, B. (2023). CDFW Instream Flow Program. Virtual presentation at the Lake and Streambed Alteration Program quarterly meeting. May 31, 2023.

Haas, D. (2023). CDFW guidelines to the application and use of the Physical Habitat Simulation System. In-person presentation at the Instream Flow Council Region 1 Workshop. Folsom, CA. October 3, 2023.

Larkin, S., and Milward, A. (2023). California Environmental Flows Framework. In-person presentation at the Instream Flow Council Region 1 Instream Flow Workshop. Folsom, CA. October 3, 2023.

McDougall, L. (2023). Overview of the habitat retention method and wetted perimeter method. In-person presentation at the Instream Flow Council Region 1 Instream Flow Workshop. Folsom, CA. October 3, 2023.

Prowse, R. (2023). Overview of discharge measurements. In-person presentation at the Instream Flow Council Region 1 Workshop. Folsom, CA. October 3, 2023.

Ralston, I. (2023). Streambed and water surface elevation data collection. In-person presentation at the Instream Flow Council Region 1 Instream Flow Workshop. Folsom, CA. October 3, 2023.

2024 Performance Objectives

Instream Flow Program activities in 2024 will focus on completing studies already underway, continuing efforts to develop watershed-scale flow criteria for priority streams and providing regional support in the face of climate uncertainty. Continued coordination with regional staff, stakeholders, and other project collaborators will be critical to completing ongoing projects.

- ⇒ Continue IFP activities for the PRC Section 10000–10005 priority stream studies.
- ⇒ Conduct instream flow analyses to protect and enhance public trust values consistent with Governor Newsom's California Water Resilience Portfolio[7].
- ⇒ Perform instream flow assessments to support watersheds impacted by cannabis through the California Environmental Monitoring and Assessment Framework (CEMAF) pilot study.
- ⇒ Provide hydrological and flow-related technical support to regional staff.
- ⇒ Continue to participate in the California Environmental Flows Framework (CEFF) workgroup and partnership to further refine available instream flow tools and application of the CEFF statewide.
- ⇒ Maintain quality assurance activities, document generation, and training in support of consistent, comparable, and defensible flow studies and information development.
- ⇒ Continue coordination and outreach efforts with the State Water Resources Control Board, National Marine Fisheries Service, US Fish and Wildlife Service, the Regional Water Quality Control Board, and other agencies.
- ⇒ Support public and stakeholder engagement by continuing outreach efforts.
- ⇒ Participate in and present instream flow study findings at meetings and workshops across the state.
- ⇒ Continue to build partnerships with California Native American Tribes to support streamflow enhancement for native species.

[7] California Water Resilience Portfolio: https://resources.ca.gov/-/media/CNRA-Website/Files/Initiatives/Water-Resilience/Final_California-Water-Resilience-Portfolio-2020_ADA3_v2_ay11-opt.pdf.

"An understanding of the natural world and what's in it is a source of not only a great curiosity but great fulfillment."

- David Attenborough

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Instream Flow Program

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