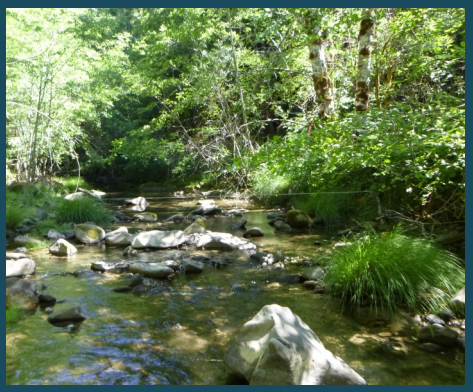
2020 Year in Review

The California Department of Fish & Wildlife

INSTREAM FLOW PROGRAM



2020 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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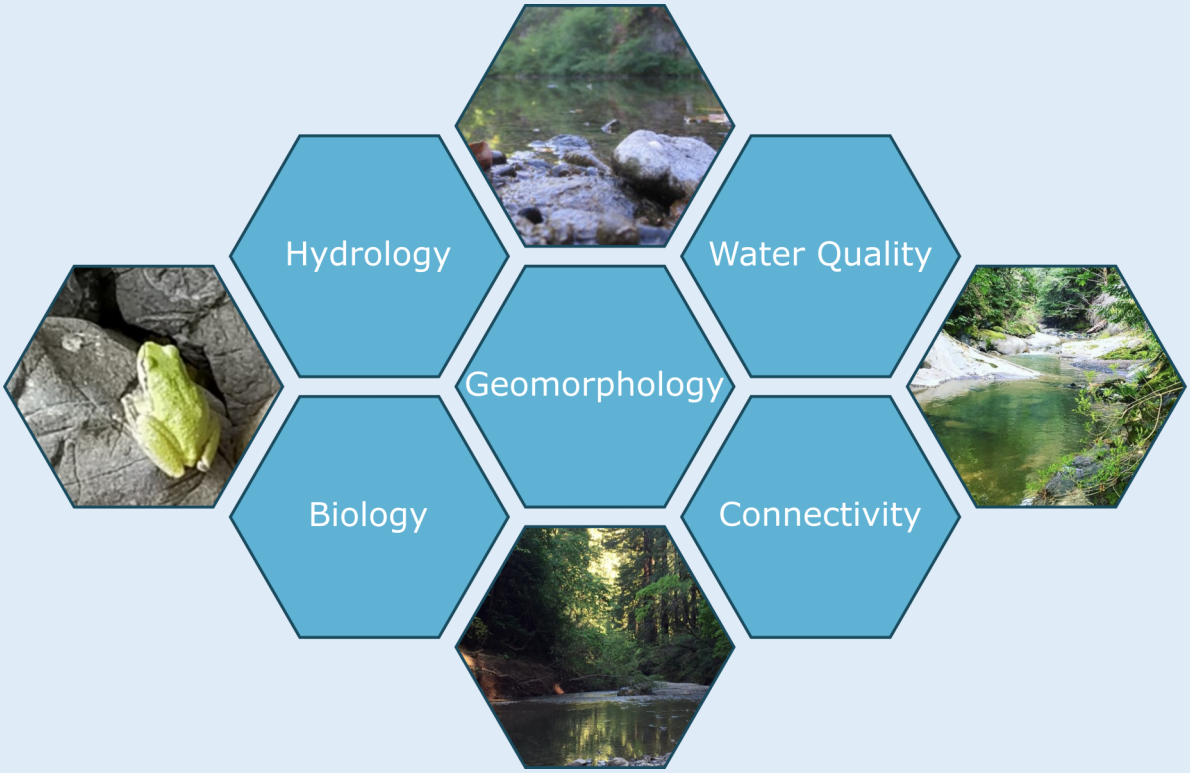


All photographs in this report were taken by Department staff.
Cover page, clockwise from top left: South Fork Eel River (Mendocino County); Fresno River (Fresno County); Mattole River (Humboldt County); Cogswell Reservoir on the West Fork San Gabriel River (Los Angeles County).

Response to COVID-19

In March 2020, California Governor Gavin Newsom issued a statewide Executive Order to protect the health and well-being of all Californians by slowing the spread of the Coronavirus (COVID-19). In response to the nationwide COVID-19 pandemic and the Governor's Stay Home Order, the California Department of Fish and Wildlife directed staff to work from home and cease all non-essential fieldwork activity until further notice. The fieldwork previously planned for 2020 has been postponed until it is safe for Department staff and the public to resume normal fieldwork activities.

Priority Streams Update

In order to protect public trust resources and fulfill legislative mandates put forward in the California Water Action Plan (CWAP) and Public Resources Code (PRC) §10000–10005, the IFP develops flow criteria for use in water management planning and decision-making processes.

In 2020, the IFP continued studies that will provide flow criteria to support fish, wildlife, and water management goals for streams and rivers throughout California.

For more information on CWAP and PRC priority streams, visit the Instream Flow Program website at: https://wildlife.ca.gov/Conservation/Watersheds/Instream-Flow.

PRC Streams

Due to the Department's response to COVID-19, previously scheduled fieldwork has been rescheduled for 2021–2022. Study planning and coordination with regional staff is underway for the following watersheds:

- Dos Pueblos Creek
- Carpentaria Creek
- Mattole River
- Mojave River
- San Gregorio Creek
- Santa Ana River
- Santa Margarita River

CWAP Streams

Data collection is complete, and reports are in development for the following watersheds:

- Mark West Creek
- South Fork Eel River (SF Eel River)
- Ventura River

See Figure 1 for a map of priority streams.

South Fork Eel River, Humboldt County

Figure 1. PRC and CWAP priority stream watersheds map.

Ventura River

The Ventura River watershed, located in Ventura County, covers 226 square miles and provides essential habitat for endangered Southern California steelhead and other notable sensitive species such as California red-legged frog, foothill yellow-legged frog, western pond turtle, and the western spadefoot toad.

The watershed is characterized by short duration high intensity peak storm events and low summer baseflows. One unique feature is the unconfined aquifer that can rapidly recharge after storm events and provide prolonged baseflows which sustain ecological functions during dry periods.

The Ventura River is one of the four largest watersheds that still support Southern California steelhead populations, and likely supported one of the largest runs of steelhead on the south coast (CDFG 1996). However, due to prolonged drought and the construction of Matilija Dam, steelhead abundance has experienced a drastic decline (Allen 2015; Titus et al. 2010). Southern California steelhead are dependent on winter storm events to provide passage through seasonally intermittent sections of the river.

In 2014, the Ventura River was identified as a priority stream in former Governor Brown's CWAP because of its high resource value and potential for species recovery (CDFW 2017). The Department's Ventura River study has three components (see Figure 2 for study area locations):

- *Instream Flow Criteria on a Watershed-scale: Ventura River* (2020; Watershed Criteria Report)
- *Instream flow evaluation: Southern California steelhead adult spawning and juvenile rearing in San Antonio Creek* (in prep)
- *Instream flow evaluation: Southern California steelhead passage through the intermittent reach of the Ventura River* (in prep).

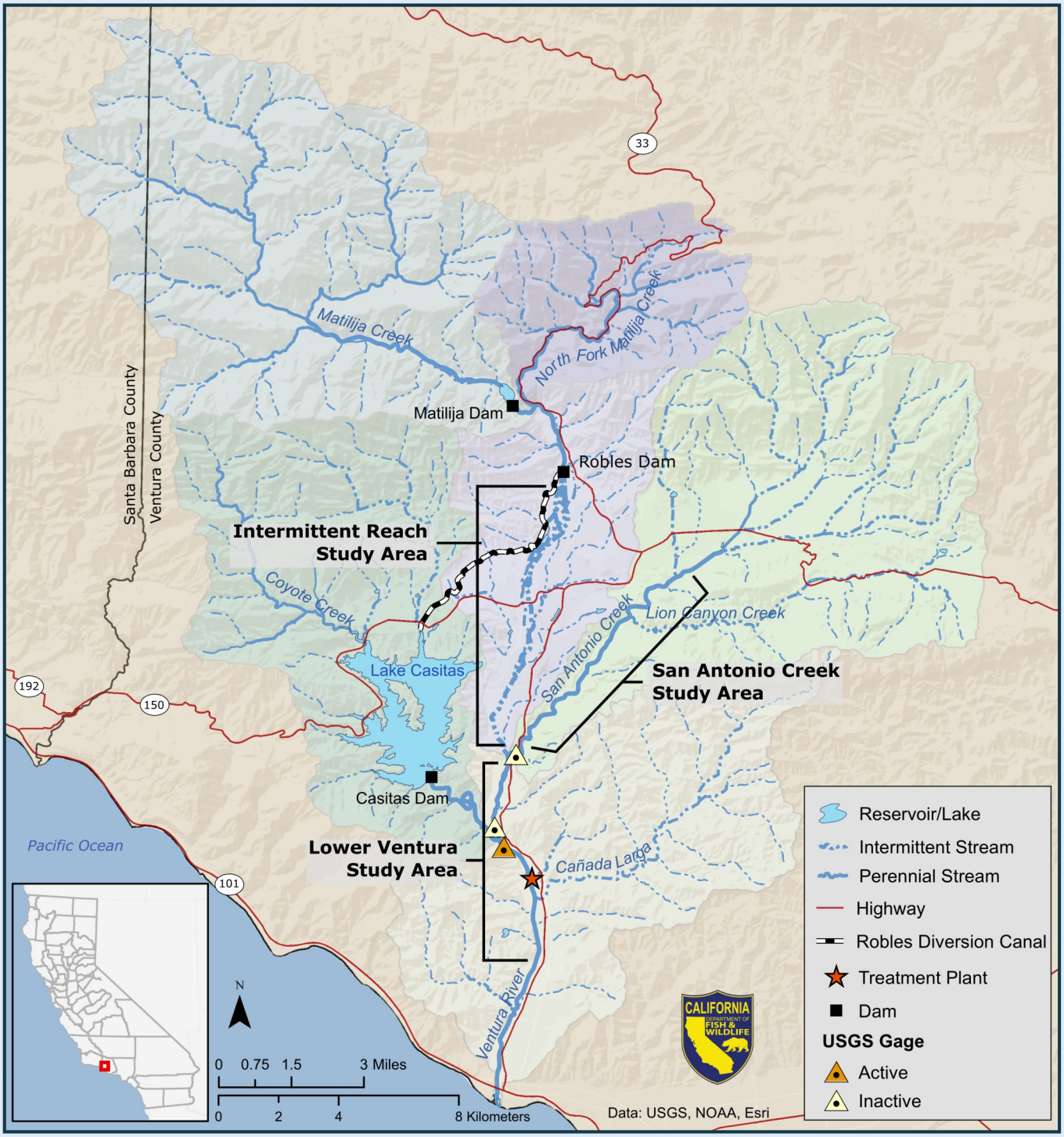


Figure 2. Map of Ventura River study areas.

Ventura River Intermittent Reach

- The intermittent reach, located on the Ventura River mainstem, is wide, flashy, and alluvial with a high infiltration rate. It is typically dry during summer and fall and depends on winter storms for most winter and spring flow.
- Major impediment for adult steelhead passage to spawning and rearing habitat in upstream perennial reaches.
- Two-dimensional models, which use hydraulic rating curves and topographic data, were developed for a representative portion of the intermittent reach.
- The two-dimensional models were used to determine passage flow criteria suitable for adult steelhead migration during spawning season.

San Antonio Creek

- Major Ventura River tributary that provides important spawning and rearing habitat for Southern California steelhead.
- Using one-dimensional hydraulic modeling, streamflow versus habitat relationships are developed for juvenile and adult steelhead to support critical spawning and rearing habitat.
- Results from the technical study will be used to develop flow criteria in San Antonio Creek.

Watershed Criteria Report

- Report utilizes both field and desktop methods to evaluate the entire Ventura River watershed.
- Site-specific methods offer specific flows to support steelhead life stages.
- Functional flows maintain natural patterns and timing of flow to support the ecosystem over time:
  - Wet-season baseflow
  - Spring recession flow
  - Peak flows
  - Dry-season baseflow

Ventura River, Ventura County

Ventura River Public Outreach

The Department hosted a webinar on May 15, 2020, to present the Watershed Criteria Report to Ventura River Stakeholders.

On February 26, 2021, the Department held a follow up webinar to present the draft flow recommendations for the lower Ventura River and Coyote Creek and provide an overview of the two technical reports on San Antonio Creek and the intermittent reach of the Ventra River.

For more information, visit: https://wildlife.ca.gov/Conservation/Watersheds/Instream-Flow/Studies/Ventura-River-Studies.

Draft Flow Recommendations for the Lower Ventura River

The Department's *Draft Instream Flow Regime Recommendations for the Lower Ventura River, Ventura County* (draft flow recommendations) are drawn from the previously published Ventura River Watershed Criteria Report (CDFW 2020) and considers information from other existing studies. The Ventura River Watershed Criteria Report is a watershed-wide report outlining flow criteria using several desktop and field methods. We have assembled these criteria into flow recommendations, which are protective flows to provide habitat for fish and wildlife resources and maintain ecological functions in the lower Ventura River. The draft flow recommendations document was available for a public input period following its release. Input received will be reviewed and considered.

References:

Allen, M. A. (2015). Steelhead population and habitat assessment in the Ventura River/Matilija Creek basin 2006-2012. Prepared for Surfrider Foundation and California Department of Fish and Wildlife. Normandeau Enviromental Consultants, Arcata, CA. Final Report.

CDFG (1996). Steelhead restoration and management plan for California. California Department of Fish and Game, Inland Fisheries Division (CDFG), Sacramento, CA.

CDFW (2017). Study plan: Habitat and instream flow evaluation for steelhead in the Ventura River, Ventura County. California Department of Fish and Wildlife, Instream Flow Program (CDFW), Sacramento, CA. Available: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=137996.

CDFW (2020). Instream flow regime criteria on a watershed scale: Ventura River. California Department of Fish and Wildlife, Instream Flow Program (CDFW), West Sacramento, CA. Watershed criteria report No. 2020-01. Available: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=177834.

Titus, R. G., D. C. Erman and W. M. Snider (2010). Fish bulletin history and status of steelhead in California coastal drainages south of San Francisco Bay. In draft for publication as a Department of Fish and Game Fish Bulletin, Sacramento, CA.

Habitat Suitability Criteria

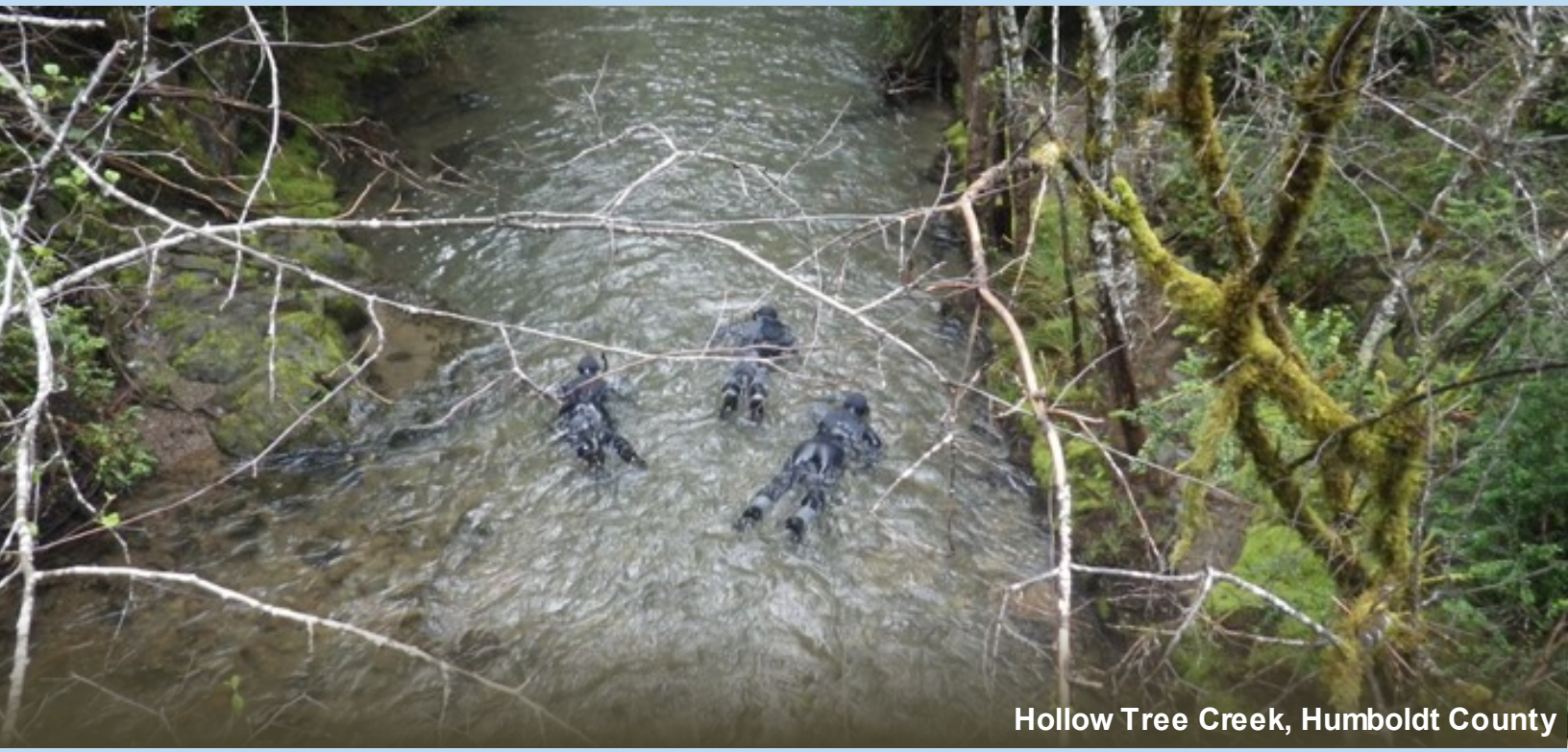
In September 2020, the IFP released the *Habitat Suitability Criteria for Juvenile Salmonids in the South Fork Eel River Watershed, Mendocino and Humboldt Counties* stream evaluation report (Gephart 2020). This report details data collection efforts and results for developing habitat suitability criteria (HSC) for rearing juvenile steelhead and Coho Salmon in Hollow Tree Creek, an unimpaired tributary to the South Fork Eel River (SF Eel River).

HSC are an integral biological component of an instream flow assessment (Annear et al. 2004) and are often used in streamflow management as a tool to link species and life stages to their physical environment. The criteria help us understand how microhabitat features (e.g., depth, velocity, substrate) influence the use of local stream mesohabitat types (e.g., riffle, pool, glide) by different aquatic species and life stages.

Snorkel surveys were conducted in the Spring and Summer of 2017 and 2018.

- Markers were placed where undisturbed juvenile steelhead and Coho Salmon were observed.
- Fish species, fork length, fish count, fish activity, fish focal position, and microhabitat data (e.g., cover and depth) was collected.
- 5,000 ft^2 of each mesohabitat type were surveyed.
- The final dataset includes: 446 steelhead observations, 785 Coho Salmon observations, and 441 habitat availability points.

Site-specific HSC are expected to provide protective estimates of habitat needs that may inform flow studies in similar streams (Bovee 1986), such as those in the SF Eel River watershed.



Hollow Tree Creek, Humboldt County

Using the HSC curves presented in the report, along with modeled depth and velocity, habitat area-weighted suitability (the area of suitable habitat per unit length) was calculated at a range of flows for each life stage and species (see Figure 3). The results of this analysis will be presented in the upcoming *Instream Flow Evaluation: Juvenile Steelhead and Coho Salmon Rearing in Redwood Creek, Humboldt County* report, expected to be released in 2021.

To read the report in its entirety, visit the IFP's SF Eel River webpage: https://wildlife.ca.gov/Conservation/Watersheds/Instream-Flow/Studies/South-Fork-Eel-Study.

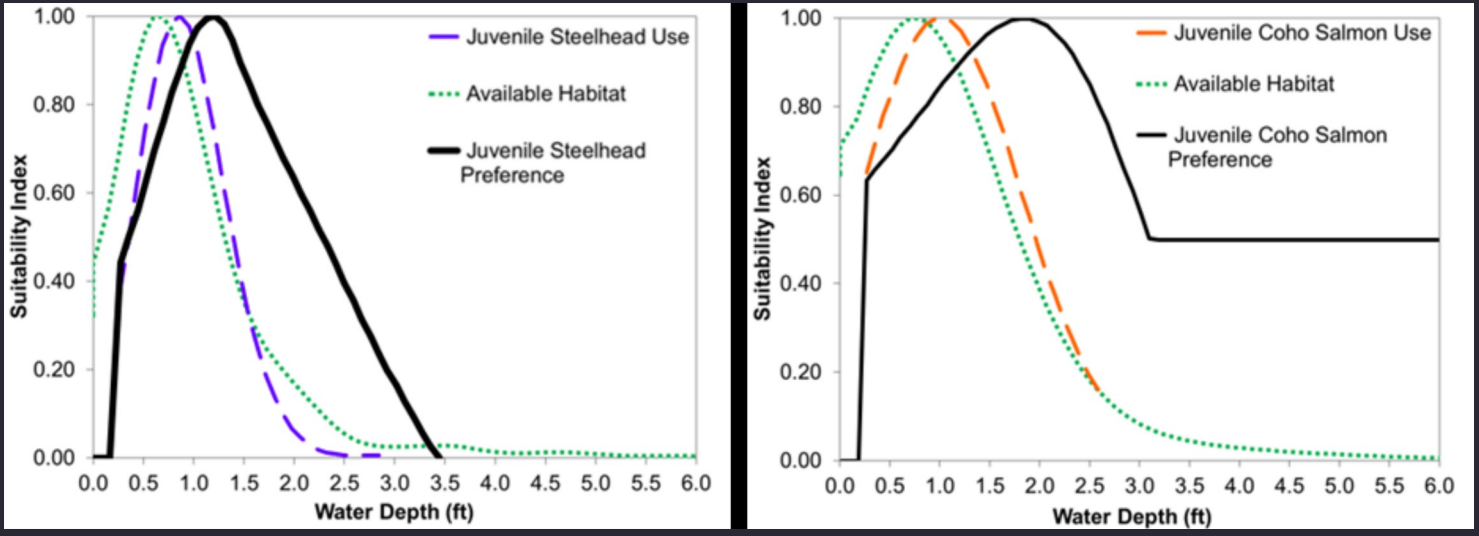


Figure 3. Juvenile steelhead and Coho Salmon HSC curves.

References:

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.

Bovee, K. D. (1986). Development and evaluation of habitat suitability criteria for use in the instream flow incremental methodology. U.S. Fish and Wildlife Service, Instream Flow and Aquatic Systems Group, National Ecology Center (USFWS), Fort Collins, CO. Biological Report 86(7).

Gephart, N., H. Casares, D. Haas, J. Hwan, and R. Holmes (2020). Habitat suitability criteria for juvenile salmonids in the South Fork Eel River watershed, Mendocino and Humboldt counties. Report No. 2020-01. California Department of Fish and Wildlife, Instream Flow Program, West Sacramento, CA.

Cannabis Program Support

The IFP participates as part of a multidisciplinary effort with cannabis staff in Fisheries and Wildlife Branches. This team is developing a statewide monitoring framework that aims to assess whether cannabis cultivation may be having a significant adverse impact on the environment. Throughout 2020, staff solicited input throughout the Department and revised the framework based off review and comments submitted.

This effort is conducting a pilot study in 2021 to trial-run the methods and analyses originally planned for 2020 but delayed due to COVID-19. The framework will use a suite of monitoring approaches and protocols that includes both terrestrial, vegetative, and aquatic monitoring. The team will rely on watershed-wide instream flow criteria for the study watersheds to help understand how the timing and duration of biologically relevant instream flow and water quality parameters are affected by water diversions for cannabis cultivation and other land uses.

For more information on the Department's Cannabis Program, visit: https://wildlife.ca.gov/Conservation/Cannabis/Environment.

Method Spotlight: Functional Flows

Developed by Yarnell et al. (2015), the functional flows approach focuses on identifying and retaining key aspects of the natural hydrograph to support ecological and geomorphological processes (Figure 4). These key elements, or functional flows, can then be used to inform the development of instream flow criteria and flow recommendations that preserve ecological function.

Yarnell et al. (2020) identifies five functional flow components common to most streams in California:

- **Fall pulse flow** is the first major storm event following the dry season. These flows flush nutrients downstream, support riparian vegetation, and provide biological cues for species.
- **Peak magnitude flows** are the large-scale flow events that transport sediment, restructure the river channel, and maintain habitat diversity.
- **Wet-season baseflow** is defined as the period of elevated baseflow during the winter and spring. These flows provide overwintering habitat for native species.
- **Spring recession flow** represents the transition between wet and dry-season flows. These gradually receding flows redistribute sediment deposited by higher flows earlier in the year and provide important biological cues for aquatic species.
- **Dry-season baseflow** signifies the most sensitive period during the year for native species, during which water quality and quantity limit habitat suitability.

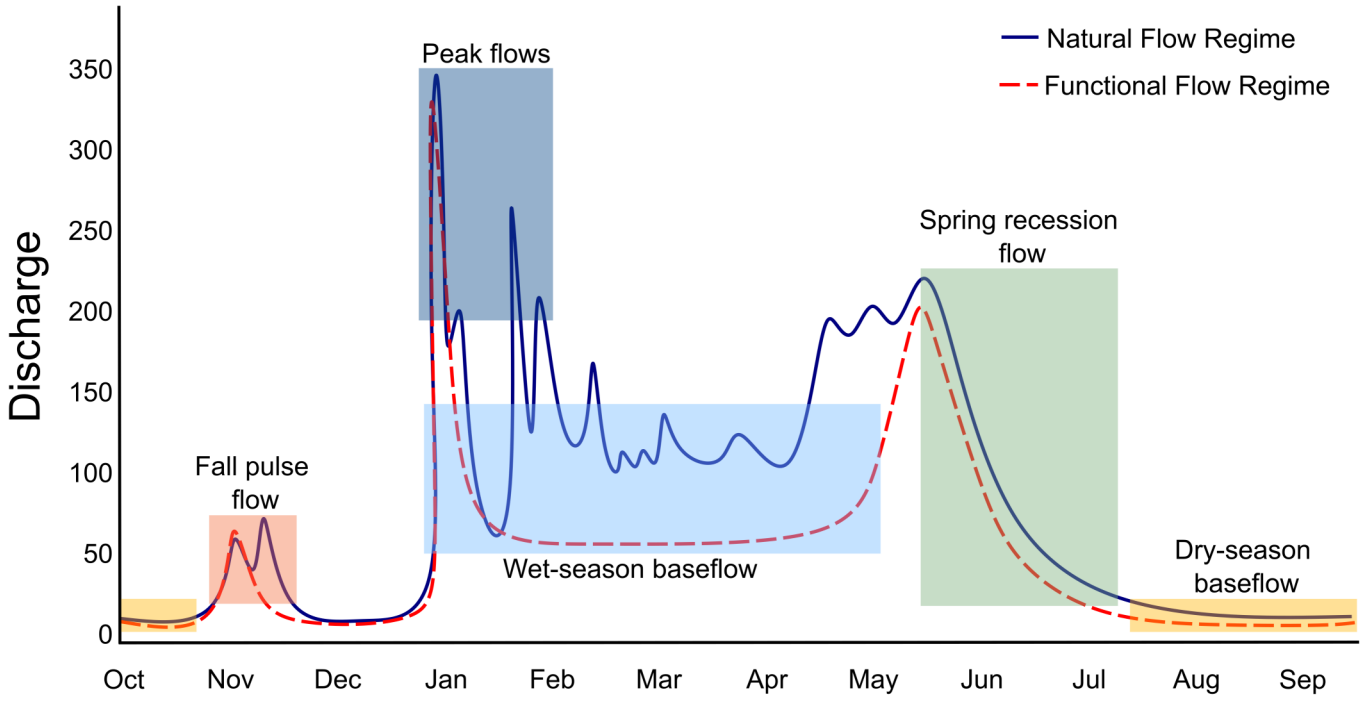


Figure 4. Functional flow components (adapted from Yarnell 2015).

Each of the five functional flow components is quantified by a set of functional flow metrics, which describe the timing, magnitude, duration, frequency, and rate of change of flows.

Functional flows have been calculated for every stream reach in California (CEFWG 2021). Because these data are widely available and do not require additional processing or site-specific data collection, functional flows provide a rapid approach for understanding broad ecological flow requirements.

The IFP incorporates the functional flow approach in the Watershed Criteria Reports and other technical studies to inform the development of instream flow criteria. The functional flows approach is also being employed by a larger statewide effort, the California Environmental Flows Framework Technical Workgroup (CEFF), a subgroup of the CA Water Quality Monitoring Council. This Framework provides guidance and tools for developing environmental flow recommendations statewide based on functional flows.

For more information on functional flows, visit https://ceff.ucdavis.edu/.

Mark West Creek, Sonoma County

References:

CEFWG (2021). California Natural Flows Database: Functional flow metrics v1.2.0. California Environmental Flows Working Group (CEFWG). Available: https://rivers.codefornature.org. Accessed: March 25, 2021.

Yarnell, S. M., G. E. Petts, J. C. Schmidt, A. A. Whipple, E. E. Beller, C. N. Dahm, P. Goodwin and J. H. Viers (2015). Functional Flows in Modified Riverscapes: Hydrographs, Habitats and Opportunities. BioScience 65(10): 963-972.

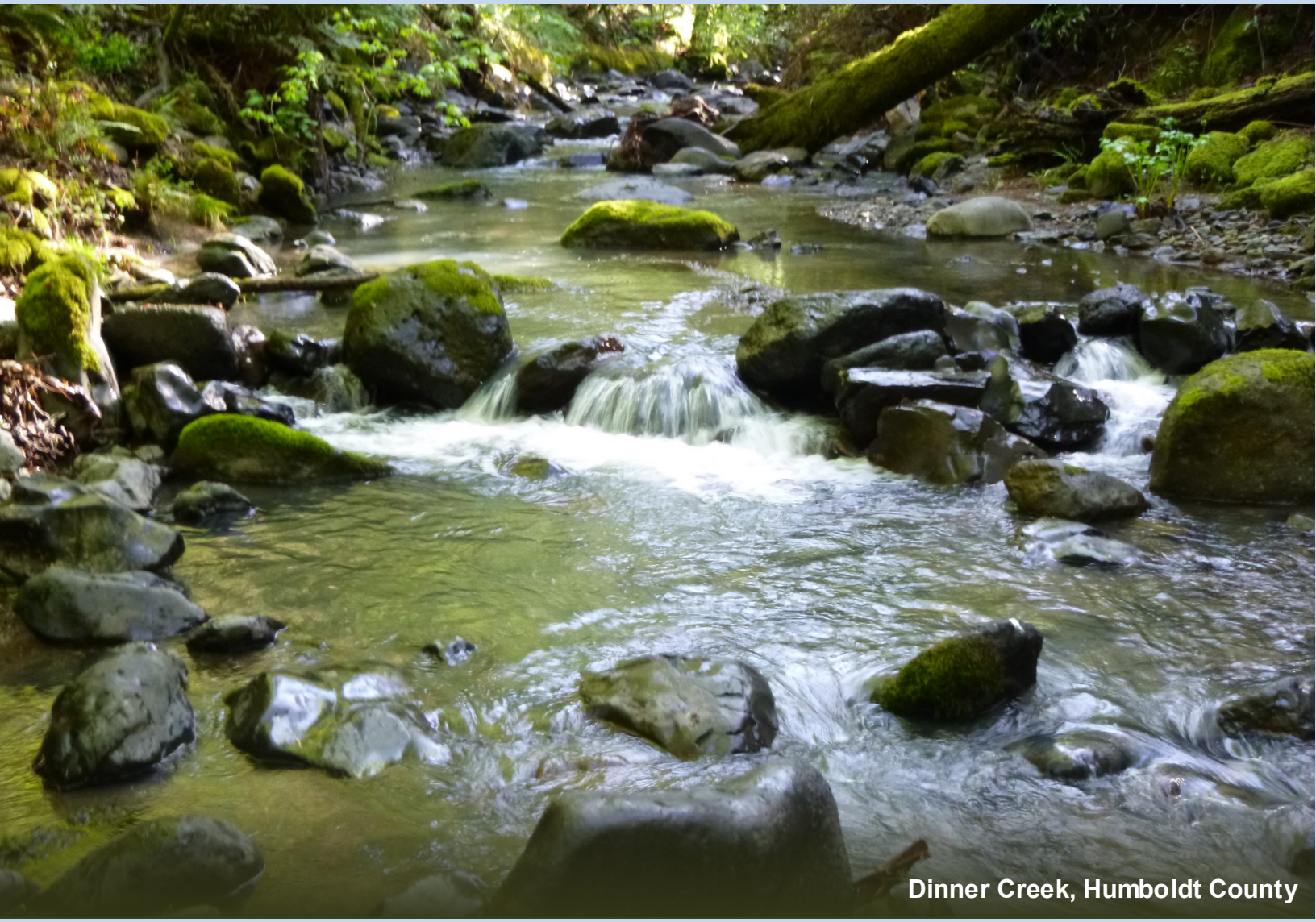
Yarnell, S. M., E. D. Stein, J. A. Webb, T. Grantham, R. A. Lusardi, J. Zimmerman, R. A. Peek, B. A. Lane, J. Howard and S. Sandoval Solis (2020). A functional flows approach to selecting ecologically relevant flow metrics for environmental flow applications. River Research and Applications 36(2): 318-324.

Quality Assurance and Training

The IFP is committed to collecting, analyzing, and reporting high quality, consistent, and defensible data for use in decision making processes. Since 2012, the IFP has worked with the Quality Assurance (QA) Team at the Marine Pollution Studies Laboratory at Moss Landing Marine Laboratories. The QA Team has provided technical services related to instream flow, water rights, and water quality. In 2020, the QA Team continued to support quality assurance efforts by assisting with fact sheet development and technical review of study reports.

In support of sound quality assurance practices, IFP staff regularly review data collection methods, data analysis techniques, and safe field procedures. Annual calibration trainings provide staff with opportunities to refresh their knowledge and practice field methods using standardized techniques.

In 2020, the IFP completed a wetted perimeter method training. Staff reviewed the wetted perimeter method as it is a component of watershed flow criteria and can be used to identify the sensitive low-flow period. The training included a review of the method and overall procedures where staff participated in training exercises focused on modeling and data analysis.



Dinner Creek, Humboldt County

Presentations and Publications

Carlin, T. and Stanford, B. (2020). *Mark West Creek Habitat and Instream Flow Evaluation*. Virtual presentation at the CA Sea Grant Russian River tributaries low flow monitoring meeting. October 29, 2020.

Drescher, B. and Stanford, B. (2020). *Ecological flow criteria for the Ventura River watershed*. Virtual presentation to the Ventura River Watershed Council. May 2020.

Gephart, N. (2020). *Development of habitat suitability criteria for juvenile salmonids in the South Fork Eel River watershed*. Presentation at the CDFW Science Symposium. February 26, 2020.

Gephart, N. (2020). *Development of habitat suitability criteria for juvenile salmonids in the South Fork Eel River watershed*. Presentation at the American Fisheries Society Cal-Neva Chapter Virtual Spring Conference. May 5, 2020.

Maher, M. (2020). *Assessment of juvenile rearing habitat in the South Fork Eel watershed during the summer low flow period*. Presentation at the CDFW Science Symposium. February 26, 2020.

McDougall, L. (2020). *Developing instream flow criteria for the West Fork San Gabriel River*. Presentation at the CDFW Science Symposium. February 26, 2020.

Obester, A. (2020). *A rapid approach for developing instream flow criteria on a watershed scale*. Virtual poster presentation at the California Aquatic Bioassessment Workgroup (CABW) and California Society for Freshwater Science (Cal SFS) annual meeting. October 13, 2020.

Richardson, L. (2020). *Through fire and flood: assessing steelhead passage in the Ventura River watershed*. Presentation at the CDFW Science Symposium. February 26, 2020.

Stanford, B. (2020). *Making the most of water for the environment*. Panel participant representing CDFW for the Public Policy Institute of California. September 2020. Available at: https://www.ppic.org/event/making-the-most-of-water-for-the-environment/.

Stanford, B. (2020). *Ecological flow criteria for the Ventura River watershed*. Virtual presentation to the Tri-County FISH Council. October 2020.

Windell, S. (2020). *A watershed-scale approach to producing instream flow criteria for the Fresno River*. Presentation at the CDFW Science Symposium. February 26, 2020.

2021 Performance Objectives

IFP activities in 2021 will focus on completing studies already underway and continuing efforts to develop watershed-scale flow criteria for priority streams and watersheds impacted by cannabis. Continued coordination with regional staff, stakeholders, and other project collaborators will be critical to completing ongoing projects.

⇒ Continue IFP activities for the California Water Action Plan and PRC §10000–10005 priority stream studies.

⇒ Conduct instream flow analyses to protect and enhance public trust values consistent with the California Water Resilience Portfolio.

⇒ Complete instream flow assessments to support watersheds impacted by cannabis through the Cannabis Program Monitoring Framework Pilot Study.

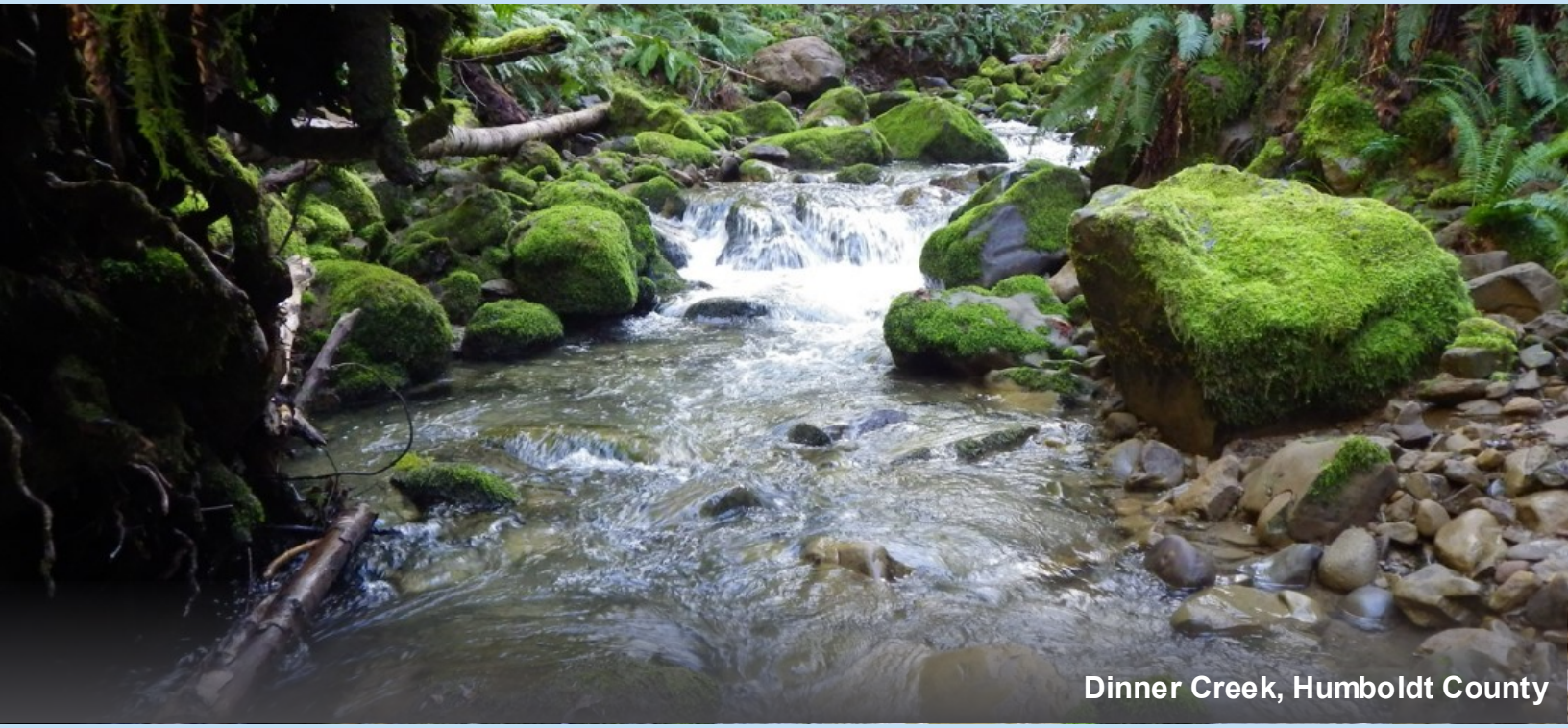
⇒ Continue to participate in the CEFF workgroup and partnership to further refine available instream flow tools and application of the CEFF statewide.

⇒ Develop 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 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.



Dinner Creek, Humboldt County

“The wonderful thing about nature is its resilience.”

-Mike McDaniel

California Department of Fish and Wildlife

Instream Flow Program

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