

The California Environmental Flows Framework

Improving environmental water management in California

Flow alterations are a significant driver of biodiversity loss in California. When stream flows are altered by human actions, stream habitat can change dramatically, affecting the distribution, diversity, and abundance of species. Managing streams to preserve key flow components, or **functional flows**, can improve riparian and freshwater ecosystem health by restoring physical processes and habitat conditions.

The Challenge

Water managers need a consistent statewide approach for creating environmental flow recommendations that

- are easy-to-understand
- support a broad range of ecosystem functions
- preserve the many benefits provided by healthy rivers and streams
- can be applied across the diversity of streams in California

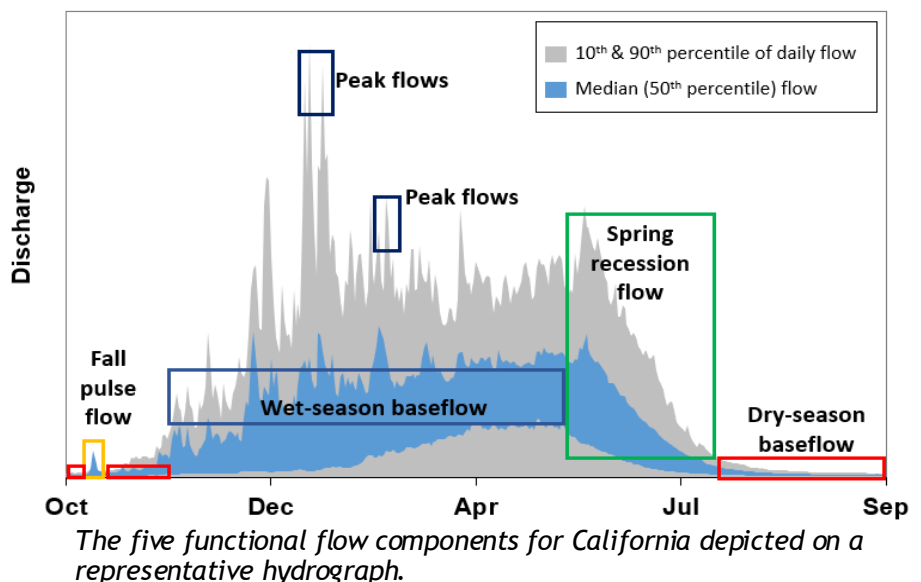
To address this challenge, the [California Water Quality Monitoring Council](#) established the [California Environmental Flows Working Group](#). In addition to providing a forum for ongoing coordination, a key product of this workgroup is the California Environmental Flows Framework.

WHAT ARE FUNCTIONAL FLOWS?

Functional flows are components of the hydrograph that perform distinct geomorphic or ecological functions. The functional flows approach provides a basis for estimating how much water is needed for the environment, where key components of the natural flow regime are targeted rather than the full natural flow regime. In California, functional flow components include the fall pulse flow, wet-season baseflow, peak flows, spring recession flow, and dry-season baseflow.

The Framework

The California Environmental Flows Framework uses a Functional Flows approach for developing scientifically defensible environmental flow recommendations that balance human and ecosystem needs for water. The Framework is described in a detailed technical report available at ceff.ucdavis.edu. Each of the three sections of the Framework emphasizes the importance of five key **functional flow components** for California.



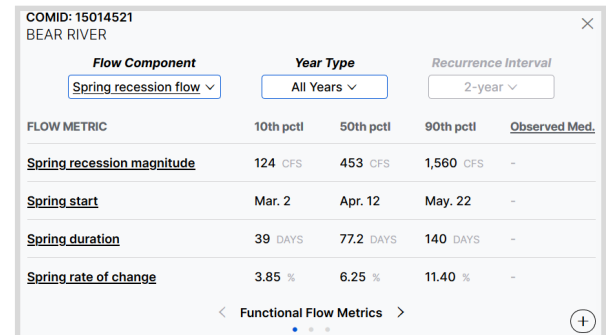
Framework Overview

- Focuses on specific functional elements of the flow regime linked to ecosystem health (i.e., functional flows)
- Can be applied to gauged and ungauged streams
- Incorporates multiple ecological targets (e.g., fish, invertebrates, riparian species) with a goal of protecting overall ecosystem condition
- Includes recommendations for balancing multiple objectives when developing environmental flow recommendations
- Provides examples of monitoring and adaptive management programs.

The Framework is divided into three sections:

Section A: Review Natural Functional Flows

Natural functional flows have been predicted for all stream segments in California. The predicted functional flows are available for wet, moderate, and dry conditions, and represent the natural variation that the stream ecosystem adapted to. Functional flows can also be calculated using reference gages or user-uploaded data. These natural functional flows can be used to develop ecological flow criteria.



COMID: 15014521
BEAR RIVER

Flow Component: Spring recession flow | Year Type: All Years | Recurrence Interval: 2-year

FLOW METRIC	10th pctl	50th pctl	90th pctl	Observed Med.
Spring recession magnitude	124 CFS	453 CFS	1,560 CFS	-
Spring start	Mar. 2	Apr. 12	May. 22	-
Spring duration	39 DAYS	77.2 DAYS	140 DAYS	-
Spring rate of change	3.85 %	6.25 %	11.40 %	-

< Functional Flow Metrics >

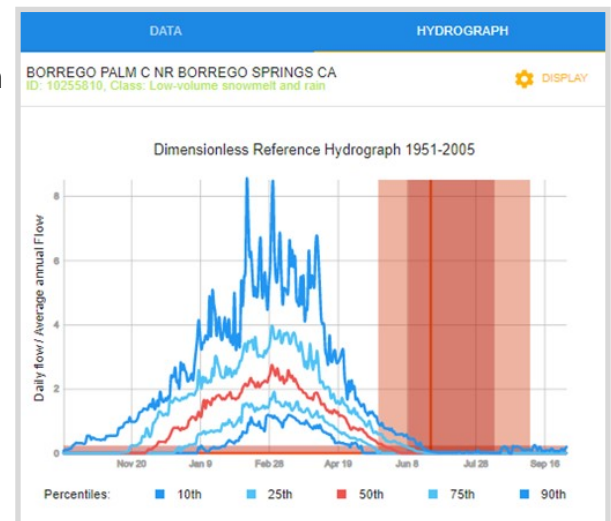
Predictions can be obtained at
rivers.codefornature.org

Section B: Incorporate Additional Information

Alterations to water quality or physical habitat may change the relationship between natural functional flows and their ecological functions. Additional information can be incorporated in this section to identify ecological flow criteria for functional flows affected by non-flow impairments, such as altered channel morphology.

Section C: Develop Environmental Flow Recommendations

The ecological flow criteria can be used to develop environmental flow recommendations through a stakeholder process. The Framework provides suggestions for assessing flow alteration and balancing ecological and non-ecological management objectives (and constraints) through tradeoff analyses. The Framework also outlines strategies for implementation and steps to adaptively manage environmental flows.



Users can calculate functional flows at
eflows.ucdavis.edu

The Technical Team of the Environmental Flow Working Group will continue communicating and collaborating with diverse partners at the state and local level engaged in flow management. For updates and further information visit ceff.ucdavis.edu.