

# Building a geomorphology tool to improve flow management

Researchers are developing tools and best-practices methods to help watershed managers rapidly and consistently set environmental flow targets statewide

## Flow management inconsistent across California

Multiple state and local agencies in California share responsibility for setting environmental flow targets to protect and improve the ecological health of streams. The tools and technical approaches being used in California historically have not been standardized, resulting in fragmentation and inconsistencies in how hydrologic flows are managed across watersheds.

### How flow targets are typically set in California

To set scientifically defensible environmental flow targets that protect stream integrity, California watershed managers typically commission a site-specific study that considers multiple aspects of stream health. Managers traditionally have weighed three main factors:

- **Biological communities**, especially developing an understanding of which species are most impacted by changing flow patterns
- **Hydrologic flow patterns**, which play an influential role in determining which biological species can be supported
- **Management drivers**, which consist of the priorities and needs that drive management decision-making on flow targets

Managers typically start flow target analyses from scratch, and often must synthesize multiple data sets, multiple sources of information about ecological functioning, and multiple technical approaches. The California Environmental Flows Framework (CEFF), which is under development, will help managers improve the speed, consistency, standardization, and technical rigor of these analyses.



» Streams like California's Eel River, above, flowing through Humboldt Redwoods State Park, would benefit from a coordinated, consistent approach for setting environmental flow targets.

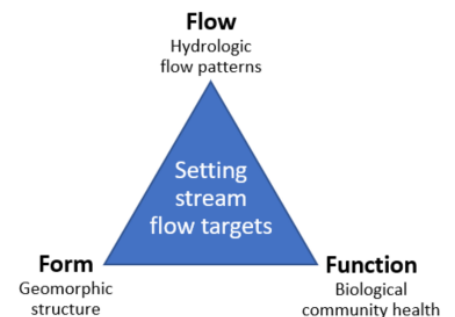
## Standardized management framework being built

The California Environmental Flows Workgroup, a group of technical experts organized under the California Water Quality Monitoring Council, is working to build a management framework that provides best-practices technical guidance to rapidly set scientifically defensible flow targets. The California Environmental Flows Framework (CEFF) will consist of multiple tools and standardized best-practices methodologies that will guide managers through the multi-step process of setting flow targets. The CEFF, which is being developed in phases, is intended to:

- Inject standardization and transparency into the development of flow criteria
- Improve coordination and data sharing among watershed management agencies
- Streamline the process of conducting intensive flow target analyses
- Offer enough flexibility to accommodate management goals and priorities specific to a watershed

## Three prongs to setting flow targets

Setting environmental flow targets that will protect a stream's ecological integrity is often an intensive, multi-step process. A full analysis requires watershed managers to evaluate three main aspects:



- **Flow:** Hydrologic flow patterns at a site include how these flows vary across seasons and across years.
- **Form:** A site's geomorphology (i.e., the physical form and structure of the stream channel) can significantly impact flow patterns through a site and the types of biological communities that can be supported.
- **Function:** The ecological functioning of a site – and therefore overall stream health – is determined by both flow and form.

## Geomorphology tool now under development

Over the past couple of years, the California Environmental Flows Workgroup has been building a hydrology analysis tool that enables watershed managers to rapidly gain access to information on the hydrologic flow patterns for a given stream site.

The workgroup is now turning its attention to building a geomorphology analysis tool that will help watershed managers more readily and rapidly conduct geomorphology analyses. Geomorphology analyses often serve as an important component when establishing environmental flow targets. By providing critical contextualizing information about geomorphic structure and sediment particle size, managers will be positioned to conduct geomorphology analyses that are streamlined, comprehensive, standardized and scientifically defensible.

### How the geomorphology analysis tool will be built

The geomorphology analysis tool will use computer modeling to classify stream sites across coastal California into categories based on physical habitat characteristics. To obtain the data needed to develop this model, project researchers are collecting field data from 240 stream sites – including 60 in southern California – that represent the diversity of geomorphic structure found across coastal California. At each site, a field crew is measuring slope, width, depth and size of sediment particles.

The geomorphology analysis tool will be available in draft form as early as 2020. Once built, watershed managers will be able to use this modeling tool to rapidly gain access to geomorphic information for thousands of miles of streams across coastal California.

### Key benefits of the geomorphology analysis tool

The geomorphology analysis tool will help California watershed managers to:

- Properly consider the role that geomorphic form plays in influencing hydrologic flow patterns at a given site
- Inject greater standardization and technical rigor into how geomorphology analyses are conducted
- Constrain the margin of error associated with using geomorphic form data to set flow targets, which will improve precision and reduce reliance on excessively broad or overly conservative targets
- Provide greater transparency into how geomorphology analyses are used to inform flow target setting

### Why a geomorphology analysis tool?

Geomorphic form plays an influential role in shaping hydrologic flow patterns of a stream and its overall ecosystem functioning. California watershed managers typically analyze geomorphic form as part of developing environmental flow targets intended to protect watershed health. But managers don't have standardized, streamlined methods for rapidly conducting stream geomorphology analyses. Consequently, the process for setting targets for environmental flows in California is typically protracted, with managers applying non-standardized technical approaches that introduce imprecision and inconsistency into flow target setting.

### How geomorphology data inform management actions

California watershed managers rely on a comprehensive understanding of stream geomorphology to inform numerous key management decisions, including:

- Determining how much flow can be sustainably diverted from a stream for crop irrigation or to meet water recycling goals, especially as weather patterns shift in response to global climate change
- Understanding what types of hydrologic flow patterns should be created during stream restoration projects to optimally protect sensitive habitats and threatened/endangered species
- Informing sediment management practices that promote stable, ecologically resilient stream channels

