Improving coordination to support California river ecosystems

A technical team of experts is developing a statewide framework to determine environmental flows criteria

The challenge

Multiple state and local agencies across California share responsibility for setting flow criteria that protect and improve the ecological health of California’s water resources. These approaches historically have not been coordinated at the statewide level, resulting in fragmented and siloed flow management programs. Consequently:

- There is no overall framework or guidance for estimating flow criteria
- Agencies tend to focus on site-specific solutions, instead of holistically managing the health of California watersheds
- Environmental flow data are not readily available or comparable across the state

Improving coordination across California is a challenge. Environmental conditions and pressures vary widely, as do the priorities and capacities of agencies responsible for water resource management.

Technical Team formed to develop a statewide strategy for setting flow criteria

In 2016, a group of experts self-organized to pool knowledge and data, evaluate methods, and ultimately develop a statewide framework for determining environmental flow criteria for California. The strategy is organized into a two-tiered approach that varies in scale and detail.

California Environmental Flows Framework - CEFF

The two-tiered framework will provide a set of coarse flow criteria for all streams in California (Tier 1) and a technical guidance document for estimating refined flow criteria at regional to site-specific scales (Tier 2).

**Tier 1:** Use the California natural stream classes and the functional flows method to set coarse flow criteria statewide

» Statewide applicable approach to set flow criteria protective of river-dependent ecosystems

**Tier 2:** Provide guidelines for estimating refined flow criteria depending on the regional, local or site-specific context

» A tailored approach that incorporates specific environmental and water management factors and priorities

Key features of framework

- Avoids a “one size fits all” approach
- Offers a cost-effective statewide method and guidance on more intensive methods for setting refined flow criteria
- Focuses on specific functional elements of flows linked to ecosystem health and other beneficial uses
- Can be applied to gauged and ungauged streams
- Enables use of multiple ecological targets (e.g., fish and invertebrates)
- Assumes competing demands on limited water resources

Importance of determining environmental flows

Flow alterations are a significant driver of species population declines and biodiversity loss in California and globally. When stream flows are altered by human intervention, a wide range of physical and biological processes can be affected, triggering fundamental changes to habitat condition, and the distribution, diversity, and abundance of species. Ensuring the preservation of key flow components can improve riparian and freshwater ecosystem health by restoring physical processes and habitat conditions.
Tier 1 – An approach for setting coarse flow criteria

1) Stream classification
A stream classification defines nine distinct types of streams based on their flow regime characteristics.

<table>
<thead>
<tr>
<th>Flow Component</th>
<th>Magnitude</th>
<th>Timing</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Winter High Flows</td>
<td>2,000 cfs</td>
<td>Jan 3</td>
<td>7 days</td>
</tr>
<tr>
<td>First Fall Flush</td>
<td>200 cfs</td>
<td>Nov 22</td>
<td>3 days</td>
</tr>
<tr>
<td>Spring Transition</td>
<td>-10 cfs/day</td>
<td>May 19</td>
<td>82 days</td>
</tr>
<tr>
<td>Summer Baseflow</td>
<td>50</td>
<td>Aug 20</td>
<td>123 days</td>
</tr>
</tbody>
</table>

2) Identify functional flow components
For each stream class, reference hydrographs are generated and statistical properties of key flow components are quantified.

3) Estimate and predict flow metrics
A set of functional flow metrics is calculated to characterize key flow components associated with ecological or physical functions that support life history needs, habitats, or ecological processes.

4) Develop quantitative flow criteria
Natural ranges (upper and lower bounds) of flow metric values under dry, normal and wet conditions are predicted using statistical models, providing coarse flow criteria.

Tier 2 – Guidelines for refined flow criteria

In some cases, Tier 1 flow criteria are sufficient. Tier 2 provides approaches where additional detail or specificity is needed.

1) Identify locally relevant assessment endpoints and methods
Develop a guidance document that describes the selection of appropriate ecological endpoints (e.g. fish, riparian habitat, water quality) based on management needs, databases, models, and environmental flow methods most relevant to local questions.

2) Create shared information repository
Compile and upload study data to an open-source, web-based platform for water resources managers to share data, models, tools, flow metrics, and case study information.

3) Testing the framework through a local or regional flow study
Conduct a flow study using the recommended guidelines and databases. Generate site-specific data to inform flow criteria based on local hydrologic, geomorphic, and ecological relationships and conditions.

Ongoing Coordination
The Technical team will continue communicating and collaborating with diverse partners at the state and local level engaged in flow management.