

**California Environmental Flows Workgroup**  
**Glossary of Terms**  
**February 13, 2019**

Terms from Instream Flow Council's Instream Flow Manual (Annear et al. 2004) are indented and italicized for clarification.

*Biological condition (or ecological condition)* - a species or community and their attributes within the stream ecosystem influenced by flow and habitat conditions. Desired conditions are those attributes identified to achieve a management goal.

*Biological metrics* – quantitative measures of biological community (or species) composition that are used as a measure of the health or condition of an aquatic ecosystem.

*Bypass flows* - the quantity of natural flow that must be maintained at a point of diversion or impoundment to sustain downstream fisheries or other aquatic resource. Note that this is different from, but sometimes confused with, fish passage flows, which is focused specifically on flows needed to facilitate fish migration. The definition of fish passage flows is provided in the Instream Flow Manual.

*California Environmental Flows Framework* – conceptual structure that provides guidance on methods and analyses for determining ecological flow criteria, sharing data and tools, and case study examples of environmental flow assessments in various locations around California. Additional information can be found at [ceff.ucdavis.edu](http://ceff.ucdavis.edu). A central goal of this framework is to improve coordination of efforts (statewide, basin and local) and produce consistently interpretable ecological flow criteria.

- Tier 1 – Set of data and tools that provide statewide ecological flow criteria protective of river-dependent ecosystems. Tier 1 uses the functional flows methods (Yarnell et al. 2015) to estimate ecological flow criteria based on the natural variability of ecologically relevant functional flow metrics relative to reference conditions.
- Tier 2 – Guidance framework that provides additional considerations for estimating flow criteria when Tier 1 is not sufficient. Tier 2 provides guidance on appropriate methods for developing regional or site-specific ecological flow criteria based on local or regional hydrology, geomorphology, management context, and desired ecological outcomes.

*Dimensionless reference hydrograph* - a scalable representation of reference hydrology based on streamflow data from unimpaired catchments in a hydrologic stream class. The y-axis is expressed in dimensionless units by dividing the daily discharge by the average annual discharge. See Lane et al. 2018.

*Ecological flow criteria* – set of flow metric values necessary to determine a flow regime that sustains ecological outcomes within a lotic water body and its margins.

*Ecological flow prescription/recommendation* – consolidation of outcome-specific ecological flow criteria into an overall flow regime that balances the needs of all ecological outcomes. (e.g. CDFW recommendation transmitted to the SWB pursuant to public resource code 10,000).

*Ecological outcome (or biological outcome)* - The ecological or biological result that occurs due to a management action aimed at improving overall stream health or condition. Desired outcomes are those results that are intended from management objectives, but may or may not necessarily be achieved from a management action.

*Environmental flow prescriptions/recommendations*- ecological flow prescriptions adjusted to consider and balance other competing human uses to produce a flow regime that balances human and ecological needs.

*Instream flow prescription* - prescription with the objective to sustain, rehabilitate, or restore ecosystem processes through inter and intra annual variable flow regimes to the greatest extent possible. These must also address instream and out-of-stream needs and integrate biotic and abiotic processes.

*Environmental flow objectives* - regulatory set of mandatory environmental flow prescriptions established as part of a policy based on environmental flow recommendations. This transitions from technical recommendations to mandatory environmental flow objectives or standards.

*Flow alteration* - deviation of flow characteristics (or change in flow metric values) beyond a range deemed acceptable through ecological or environmental flow analysis.

*Flow characteristic* - quantifiable descriptor of a flow component: magnitude, timing, duration, frequency, rate of change (referred to in Poff et al. 1997 and by Annear et al. 2004 as flow components).

*Flow metrics* – discrete numeric measures of a flow characteristic that can be calculated directly from streamflow data and are typically selected to support development of ecological flow criteria. (e.g. IHA metrics, Konrad et al. metrics).

*Flow Regime* – inter-annual and intra-annual flow signature of a river that can be described in terms of flow components and flow characteristics.

*Flow Regime* - the distribution of annual surface runoff from a watershed over time, such as hours, days or months

*Functional flow components* – quantitatively distinctive aspect of a flow regime shown to directly relate to ecological, geomorphic or biogeochemical processes, and thus are relevant to specific life history stages or habitat needs of a species of management concern (as defined by Yarnell et al. 2015). Each component is quantified by functional flow metrics, where timing of some metrics may vary based on latitude and elevation. CEFF recognizes four functional flow components:

- wet season initiation flows: the first significant increase in flow following the dry season baseflow.
- peak magnitude flows: annual peak flows and various flood exceedance flows.
- spring recession flows: the seasonal transition from wet season high flows to dry season low flows. Note this transition may occur in early summer at high elevations or late winter at lower latitudes.
- dry season low flow: annual low flows or baseflow during the dry season.

*Annear et al. 2004 describes five “components” of riverine flow (hydrology, geomorphology, water quality, biology, and connectivity). These components include the flows listed below, which are elements of, though not analogous to, what we define as functional flows.*

- *Channel-forming flow: a theoretical discharge that, if maintained indefinitely, would produce the same channel geometry as the natural long-term hydrograph. Generally applicable only to stable, alluvial streams that have the ability to change their shape and are neither aggrading nor degrading. Often referred to as the bankfull flow, dominant flow, or a flow of a specific recurrence interval, typically between the mean annual and 5-year peak flow.*
- *Channel-maintenance flow: a range of flows making up a portion of the rising and falling limbs of the annual hydrograph that is capable of keeping the stream in a condition of sediment equilibrium over time (years) by moving all sizes and amounts of bedload sediment, scouring vegetation and maintaining riparian vegetation. The range of flows required begins at a flow that mobilizes hydraulically limited gravels and extends up to the instantaneous 25-year flow.*
- *Flushing flow: a stream discharge with sufficient power to remove silt and sand from a gravel/cobble substrate but not enough power to remove gravels.*
- *Subsistence flow (from CDFW): minimum flow levels necessary to achieve maintenance of water quality criteria. Flow levels characterized by infrequent and seasonal periods of low flow levels.*

*Functional flow metrics* – discrete numeric measures of the flow characteristics estimated for each functional flow component that can be calculated directly from streamflow data. (e.g. magnitude of annual winter flood (cfs), daily rate of spring snowmelt recession (percent per day), summer baseflow duration (days)). For further details see functional flow Metrics overview document (eflows.ucdavis.edu) and Yarnell et al. in review.

*Habitat flows* - are generally those flows providing suitable hydraulic habitat for aquatic organisms.

*Hydraulic habitat* - defined through hydraulic characteristics (such as water depth and velocity) and channel characteristics (such as substrate, cover, wetted perimeter).

*Instream flows* - the volume of water in a stream to adequately provide for instream uses within the stream channel (i.e., aquatic organisms and riverine processes). Instream flows include flows for hydrology, water quality, biology, geomorphology and connectivity. See Instream Flows Council manual for additional details.

*Instream flows* - any quantity of water flowing in a natural stream channel at any time of year. The quantity may or may not be adequate to sustain natural ecological processes and may or may not be protected or administered under a permit, water right, or other legally recognized means.

*Management goal* – mandated protection and conservation goals aimed at improving overall stream health or condition.

*Physical/Habitat conditions* – physical characteristics within the stream ecosystem influenced by flow and biological conditions (channel morphology, substrate, water quality, temperature). Desired conditions are those characteristics identified to achieve a management goal.

*Reference hydrograph* – a graph showing discharge over time representing the unimpaired daily flows based on long-term period of record. Reference hydrographs may represent variability in a single reference gage or in a set of reference gages for a single hydrologic stream class.

*Natural hydrograph* - a graph showing the variation in discharge (or river stage) that would exist in the absence of any human alteration, over a specific time period.

*Stream class (or Hydrologic stream class)* – one of nine stream classes based on the reconciled hydrologic stream classification for California completed by Lane et al. (2018).

*Stream classification* - various systems of grouping or identifying streams possessing similar features according to hydrogeomorphic structure, water source, associated biota, or other characteristics.

*Unimpaired/natural flows* – Flow characteristics or flow metrics that are similar to flows observed (or modeled) in reference stream reaches. Reference is typically defined by the lack of obstructions, diversions, and predominance of natural land use/cover in the contributing catchment. Also refer to the State Water Board's definition of reference under the Reference Condition Management Program for streams. Similarity to reference can typically be assessed through statistical methods that determine if flows deviate from reference within a prescribed confidence interval.

*Natural flow* - the flow regime of a stream as it would occur under completely unregulated conditions; that is, not subjected to regulation by reservoirs, diversions, or other human works. Also referred to as virgin flow.

## References

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