



## Study Site and Transect Location Selection Guidance for Instream Flow Hydraulic Habitat Analyses

### Objective

Instream flow study sites and transect locations must be representative of the hydraulic and physical microhabitat variability within the river of interest. Representative sites and transect locations are necessary for accurate modeling of hydraulic habitats using one-dimensional (1D) models. This document is intended as a starting point for determining the number of transects for hydraulic modeling. Actual transect numbers may vary based upon study goal, presence of habitat types, and communication with the California Department of Fish and Wildlife (CDFW) Instream Flow Program. To confirm the appropriateness of selected sites, the steps

in this guidance document should be done in collaboration with CDFW Instream Flow Program biologists and engineers, and any other interested parties. All processes and decisions should be fully documented.



### Background

The river and tributaries of interest are identified and segmented into homologous reaches using such criteria as hydrology, geomorphology, and gradient. An inventory of each habitat type (e.g., pool, riffle, and run) is then created for each river reach using mesohabitat delineation procedures. The habitat inventory is an essential component of a defensible site selection strategy, and is necessary to select habitat units and transect locations that are representative of each reach.

Prior to selecting sites and transects, it is necessary to identify sites that are hazardous to sample or that may be impossible to model using 1D models. In some cases, such mesohabitat types may be removed from the inventory prior to site selection. However, if such mesohabitat types represent a significant portion of the river reach, or if the mesohabitat types include an important function for a target species, it may be necessary to explore different assessment techniques. Please check with the CDFW Instream Flow Program for alternatives to dealing with such circumstances.



## Site Selection Overview

**Step 1:** Partition each homologous river reach into three sub-reaches based upon length.

**Step 2:** Using the habitat inventory for each reach, randomly select three representative habitat types (i.e., units) of each mesohabitat type (e.g., three runs, three riffles, and three pools) that represents greater than 5% of the linear distance within each river sub-reach. Include unique mesohabitat types that are less than 5% of the linear distance of the reach if they are biologically important habitat types for the target species.

**Step 3:** Verify that each mesohabitat type unit selected by random identification is an appropriate mesohabitat type that can be sampled and modeled. If additional units need to be added or replaced in the sampling design, the same random selection process is used.

**Step 4:** Repeat this process for each of the three sub-reaches of each reach.

## Transect Selection Overview

**Step 1:** Partition each site into three relatively homogenous microhabitat sub-units, each delineated with an upstream and downstream boundary.

**Step 2:** Randomly place a transect within each microhabitat sub-unit.

**Step 3:** Verify that the significant microhabitat site features are represented by the three transects. If transect placement does not effectively reflect all of the hydraulic and physical characteristics present, adjust transect placement and/or add additional transects as necessary. In cases of extremely simple habitat units such as hydraulically uniform sites, it may be appropriate to use fewer than three transects.



Pool sites should have at least three transects, with one randomly placed in the head, one randomly placed in the body, and one randomly placed in the tail. Large or complex pools may require additional transects. Very small pools with low habitat variability, on the other hand, may justify evaluation of fewer than three transects.

Hydraulic control transects are often an important component of the sampling strategy for 1D hydraulic habitat modeling. Such transects should be identified, at a minimum for each pool site, so that the thalweg elevation of each control can be identified and surveyed during data collection efforts.

**Note: Site access, property ownership, and related logistics must be considered when selecting sites and transect locations for instream flow studies.**