

Fish Habitat Modeling on the Sacramento River

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The Fish Habitat Assessment and Simulation Tool (FHAST) is an open-source program was developed by the University of California, Santa Cruz and NOAA Fisheries for evaluating pre- and post-habitat alteration actions for anadromous fish on the Sacramento and American Rivers in the Central Valley of California, USA. Specifically, the model estimates the with and without project effects for levee protection construction and associated habitat mitigation for Chinook Salmon, Steelhead, and Green Sturgeon. FHAST uses hydraulic, vegetative and substrate information in combination with fish physiology and behavior to estimate fish habitat and population metrics. The model is written using an agent-based modeling framework (NetLogo) with R software for implementing analyses. FHAST is designed to estimate shaded riverine aquatic and inundated riparian habitat used by anadromous species at scales ranging from individual sites to river reaches.

The Fish Habitat Assessment and Simulation Tool framework is robust for transfer to other river systems with the Salmon and Sturgeon and adaptable for adding fish species of interest for evaluation. Expansion to other river systems requires hydraulic modeling and vegetation map layers for those systems. Common 2D riverine hydraulic models provide depth and velocity data for describing river flow as fish habitat parameters. Vegetation derived from existing geospatial data sources is the basis for the canopy and vegetative cover layers to estimate inundated riparian and shaded riverine habitat. The model has the potential to estimate habitat for other life stages like spawning redds and rearing habitat for Chinook Salmon, Steelhead, and Green Sturgeon.

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