Red Bluff Technical Report Abstract

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  Johnson, R.R., and C.D. Martin, 1997. Abundance and Seasonal Spatial and Diel Distribution Patterns of Juvenile Salmonids Passing the Red Bluff Diversion Dam, Sacramento River, 1994, Red Bluff Research Pumping Plant Report Series, Volume 2, United States Department of the Interior, Fish and Wildlife Service and Bureau of Reclamation, Red Bluff, California. 64 pp.

This report summarizes information for the pilot year of juvenile salmonid outmigration monitoring in the Sacramento River at Red Bluff Diversion Dam (RBDD), Red Bluff, California. The Northern Central Valley Fish and Wildlife Office is using up to four rotary screw traps (traps) in a transect line across the river to evaluate absolute, relative, temporal, spatial and diel patterns of abundance.

The study period for this report began with the first trap deployment on 18 July 1994 until 30 June 1995. During this period over 90 thousand fish representing 28 species were sampled. Over 90% of the sampled fish were chinook salmon Oncorhynchus tshawytscha. Based on length criteria, fall chinook were the most abundant followed by spring, winter and late-fall. Steelhead/rainbow trout Oncorhynchus mykiss were sampled infrequently when compared to chinook salmon.

Abundance of naturally produced juvenile chinook salmon (all runs combined) peaked during January and mirrored the abundance of fall chinook salmon; indicating that total juvenile salmon production in the Sacramento River is primarily make up of this run. Abundance of spring chinook peaked in December and were relatively non-abundant during other months of the year. Winter and late-fall chinook, on the other hand, were abundant during peak periods in September and April, respectively, but demonstrated protracted periods of emigration when compared to fall and spring chinook salmon.

Outmigrating salmon exhibited distinct diel patterns of abundance. Catches from traps indicated that during eight of twelve months, juvenile salmonid abundance was significantly (P<0.05) greater in nocturnal periods. Typically diurnal levels of abundance were lower than those observed during nocturnal sampling except during months of increased river flows. For instance, abundance of spring chinook salmon was greatest during diurnal periods in December, January and February; demonstrating a propensity by this race for diurnal migrational patterns in months of high river flows, water turbidity and debris loads.

No distinct temporal (monthly) patterns of abundance were observed between the west and eastriver-channel at RBDD. However, greater numbers (P<0.05) of juvenile salmon outmigrated down the west-river-channel during gates-down and the east-river-channel during gates-up.

Absolute abundance estimates for salmonids were not included in this report because insufficient trap efficiency trials were obtained during this study period. Recent efforts have been directed at conducting efficiency tests to enable the building of a predictive model to accurately estimate the number of juvenile salmon migrating down-stream past RBDD. A wide range of factors such as total river discharge, water velocity, spatial location and additional environmental variables will be used to build the model and estimate abundance.

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