MOVEMENTS, HABITAT USE AND PHYSIOLOGY OF COASTAL CUTTHROAT TROUT

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EXTENDED ABSTRACT ONLY- DO NOT CITE

Of the Pacific salmonids found in the Columbia River, USA, the migratory behavior and physiology of cutthroat trout is least understood. Cutthroat trout have extremely complex life histories with resident, fluvial and anadromous components. Coastal cutthroat trout in the Columbia River are believed to make extensive use of the main-stem and estuary (as both juveniles and adults) and are thought to be more susceptible to changes in estuarine productivity than any other Pacific salmonid. Migrant juvenile cutthroat trout are often captured in downstream traps on Columbia River tributaries. "Smolting" and rapid seaward migration are assumed. However, most evidence of life history characteristics of cutthroat trout in the Columbia River is based in historical/anecdotal information. The goal of this study was to characterize the movement and timing of migrant (fluvial or anadromous) cutthroat trout and correlate movement with physiological status within tributaries and through the main-stem of the Columbia River. The Chinook River and Mill, Abernathy and Germany Creeks (river km 6, 74,76 and 80) were studied. Methods used include long range PIT (Passive Integrated Transponder) tag technology and acoustic and radio telemetry.

From August through September of 2001, cutthroat juveniles (>10 cm, n = 473) were captured in Abernathy Creek and internally tagged with 23 mm PIT tags. In-stream movements of these fish were monitored continuously (at 50 msec intervals) at two downstream interrogation arrays 5 and 3 km from the confluence with the Columbia River. Also, migrant cutthroat trout were captured using 5ft screw traps fished within two km of the mouth of Abernathy, Mill, and Germany Creeks respectively. Captured fish greater than 43 g (n = 97) were implanted with a Lotek NTC-4-2S digitally coded radio tag and released downstream from the capture site. Movements were monitored by boat, car and stationary radio antennae arrays from the Creeks to the salt wedge.

In the Chinook River and Mill and Abernathy Creeks, migrant juveniles (n = 49) captured by screw trap were implanted with Vemco V8SC-6L-R256 coded pingers. An array of Vemco VR2 fixed acoustic receivers was maintained to monitor movements into and through the estuary and out into the ocean.

To characterize the parr-smolt transformation of cutthroat trout, hatchery fish were reared and sampled. Prior to and during the assumed period of migration (April - July) gill tissue was sampled to measure gill Na^+,K^+-ATPase activity. From April through July, cutthroat trout were also subjected to bi-weekly isothermal seawater transfers. After 24 h at 35 ppt, challenged fish were sacrificed and blood was taken for ion analysis. All tagged fish in the telemetry portion of this study had gill biopsies taken for the measurement of gill Na^+,K^+-ATPase activity.

Based on seawater challenges and gill Na^+,K^+-ATPase activity, cutthroat trout appear to undergo a distinct parr-smolt transformation. Juvenile hatchery fish held through the period of downstream migration demonstrated increased physiological tolerance to seawater from April to June. Observations of movements passed the fixed PIT tag interrogation arrays was directional and of greatest magnitude in May. Once in the main-stem of the Columbia River, most radio tagged cutthroat trout juveniles demonstrated directed and rapid downstream movement. Individuals tagged with acoustic pingers were observed to travel through the estuary and into the Columbia River Plume. These characters are consistent with observations of other Columbia River salmonid smolts.