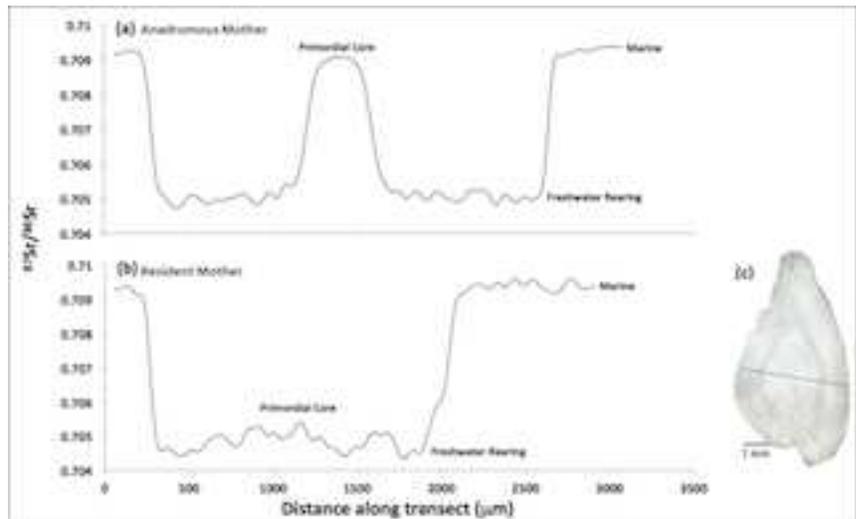


Do Resident Rainbow Trout Produce Steelhead?

An earlier CFS Bulletin ([September, 2011](#)) highlighted ongoing research on the maternal origin of steelhead in the Yakima Basin, Washington. Data collection and analysis for the study were completed in late 2012 and study results have now been published in the *Canadian Journal of Fisheries and Aquatic Sciences* (Courter et al. 2013). Rainbow trout (*Oncorhynchus mykiss*) have diverse life histories, including both freshwater-resident and anadromous 'steelhead' life-history forms. There is some evidence that steelhead are produced by resident rainbow trout, but do these offspring contribute to steelhead populations? CFS scientist Ian Courter led a research effort aimed at answering this question. Contributing authors included David Child, DC Consulting, LLC, Jim Hobbs and Justin Glessner, UC Davis, and Tommy Garrison and Shadia Duery, CFS. This study represents the first successful attempt to quantify



steelhead production rates from female resident rainbow trout across a large watershed, and study results demonstrate that female resident rainbow trout produce anadromous offspring that survive and return to spawn as adult steelhead. Otolith microchemistry techniques were used to determine the maternal life-history (resident or anadromous) of 498 emigrating steelhead kelts by analyzing the Strontium isotope ratios in primordial cores [[click the picture](#) for a larger view with captions]. Five geochemically distinct freshwater rearing regions were identified within the basin, and all five regions were predicted to produce steelhead with resident maternal life-histories. Basin-wide, 20% and 7% of steelhead collected in 2010 and 2011, respectively, had resident maternal life-histories. These findings emphasize the importance of freshwater life-histories to the persistence of anadromous fish species. The study results were recently reported in a paper titled "Resident rainbow trout produce anadromous offspring in a large interior watershed" which is available in the Just-IN section of the *Canadian Journal of Fisheries and Aquatic Sciences* website:

<http://www.nrcresearchpress.com/journal/cjfas>. For more information, contact Ian Courter at (503) 491-9577 or ian.courter@fishsciences.net.

Which Delta Conditions Strongly Influence Ocean Recovery Rates of Chinook Salmon?

As a result of declining adult salmon returns to upstream tributaries, considerable resources have been committed to improve conditions for juvenile salmon in the freshwater tidal reaches of the San Francisco estuary. This effort has largely focused on the manipulation of freshwater inflows from upstream and also through restriction of freshwater exports from two massive diversions within the Sacramento-San Joaquin Delta. However, the benefit of these actions for salmon at the population level remains equivocal. CFS scientists Steve Zeug and Brad Cavallo sought to evaluate alternative hypotheses of the Delta conditions that influence ocean recovery rates using 10 years of release and recovery data for hatchery-origin, coded-wire-tagged fall-run Chinook salmon combined with physicochemical data from long-term monitoring programs. Study results suggest that temperature and mean fork length strongly influenced the ocean recovery rate for fish released in the San Joaquin River, while recovery rates of fish released in the Sacramento River were strongly influenced by water quality parameters. Study results were recently reported in *Ecology of Freshwater Fish* and are available as a PDF: [Influence of estuary conditions on the recovery of coded-wire-tagged Chinook salmon \(*Oncorhynchus tshawytscha*\) in an ocean fishery](#). For more information, contact Steve Zeug at (530) 888-1443 or steve.zeug@fishsciences.net.