Abstract

Oncorhynchus mykiss exhibits a vast array of life histories, which increases its likelihood of persistence by spreading risk of extirpation among different pathways. The Klamath River basin (California–Oregon) provides a particularly interesting backdrop for the study of life history diversity in O. mykiss, in part because the river is slated for a historic and potentially influential dam removal and habitat recolonization project. We used scale and otolith strontium isotope (87Sr/86Sr) analyses to characterize life history diversity in wild O. mykiss from the lower Klamath River basin. We also determined maternal origin (anadromous or nonanadromous) and migratory history (anadromous or nonanadromous) of O. mykiss and compared length and fecundity at age between anadromous (steelhead) and nonanadromous (Rainbow Trout) phenotypes of O. mykiss. We identified a total of 38 life history categories at maturity, which differed in duration of freshwater and ocean rearing, age at maturation, and incidence of repeat spawning. Approximately 10% of adult fish sampled were nonanadromous. Rainbow Trout generally grew faster in freshwater than juvenile steelhead; however, ocean growth afforded adult steelhead greater length and fecundity than adult Rainbow Trout. Although 75% of individuals followed the migratory path of their mother, steelhead produced nonanadromous progeny and Rainbow Trout produced anadromous progeny. Overall, we observed a highly diverse array of life histories among Klamath River O. mykiss. While this diversity should increase population resilience, recent declines in the abundance of Klamath River steelhead suggest that life history diversity alone is not sufficient to stabilize a population. Our finding that steelhead and Rainbow Trout give rise to progeny of the alternate form (1) suggests that dam removal might lead to a facultatively anadromous O. mykiss population in the upper basin and (2) raises the question of whether both forms of O. mykiss in the Klamath River should be managed under the same strategy.