

## **Flow and temperature effects on life history diversity of *Oncorhynchus mykiss* in the Yakima River basin**

CASEY JUSTICE, IAN COURTER, AND STEVE CRAMER; *Cramer Fish Sciences*

To explore the effect of environmental conditions on the distribution of resident and anadromous *Oncorhynchus mykiss* in the Yakima River basin, we used a life-cycle modeling approach to simulate flow and temperature effects on relative reproductive success of each ecotype. Model results indicated that flow regimes providing cool temperatures and maintaining depths and velocities necessary to sustain adult *O. mykiss* throughout the summer produced habitats that favored a resident life history strategy, explaining in part why the upper Yakima Basin supports predominantly resident rainbow trout, while tributaries in the lower basin continue to produce predominantly steelhead. Channel type and location within the basin were also important factors determining the life history composition of *O. mykiss*. Mainstem habitats and upper basin sites favored a resident life history while tributary habitats and lower basin sites promoted a migratory life history strategy. Alteration of flow conditions in mainstem habitats had little effect on the relative reproductive success of anadromous *O. mykiss*. Our modeling demonstrated that tributary habitats were most likely to support an anadromous ecotype, and management actions that improve tributary habitats have the greatest potential to increase abundance of steelhead in the Yakima Basin.