

Bioeconomic Model of Rainbow Trout (*Oncorhynchus mykiss*) and Humpback Chub (*Gila cypha*) Management in the Grand Canyon

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The Colorado River, from Glen Canyon Dam (GCD) to the Little Colorado River (LCR) confluence, includes both non-native Rainbow Trout (*Oncorhynchus mykiss*) and endangered native Humpback Chub (*Gila cypha*). While both Rainbow Trout and Humpback Chub are valued fish species in this system, Rainbow Trout can have a negative effect on Humpback Chub survival. We developed a bioeconomic model to determine management actions that minimize the costs of controlling Rainbow Trout abundance subject to achieving Humpback Chub population goals. The model is compartmentalized into population and management components. The population component characterizes the stylized dynamics of Rainbow Trout and Humpback Chub from GCD to the LCR confluence within the Colorado River. The management component of the model identifies Rainbow Trout mechanical removal strategies that achieve average annual juvenile Humpback Chub survival targets while minimizing management costs. This research is an interdisciplinary effort combining biological models and economic methods to address federal, state and tribal stakeholder resource goals related to Rainbow Trout and Humpback Chub management in this complex social-ecological system.