Simple Population Models: What Can They Tell Us About Lake Trout Suppression?

Lisa Eby and John Syslo, Division of Biological Sciences, 32 Campus Drive, University of Montana, Missoula, Montana 59812, lisa.eby@umontana.edu

Simple population model projections and elasticity analyses have been used in evaluating and prioritizing techniques for population conservation. These types of analyses have been particularly effective in comparing the relative impact of different conservation efforts. These same techniques can help us compare potential lake trout population suppression efforts. We built an age-based matrix model for a lake trout population and parameterized it with both unpublished data of lake trout in Flathead Lake and other published demographic studies of lake trout. We then examined multiple model simulations to begin to evaluate potential suppression scenarios for a newly established lake trout population. Overall lake trout adult survival had high elasticity values, implying that a proportional change in demographic rates of this life stage would produce a relatively large impact on population growth rates. Eradication often requires decreased survival of multiple life stages. Techniques that reduce egg survival in addition to decreased adult survival can influence population numbers substantially. Scenarios with adult and egg survival reduced (75 and 50%, respectively), population sizes decreased by one-half after 15 years over reducing adult survival alone. This benefit of increased egg mortality is dependent upon the role of density-dependence in early life history stages. Finally, we examined scenarios associated with delaying suppression a decade as the population continues to increase. As expected, to either maintain the lake trout population at a set reduced level or eradicate the population, delaying suppression efforts results in either more or a longer effort