Analysis Of Population Metrics to Assess the Efficacy of Lake Trout Suppression in Yellowstone Lake, Yellowstone National Park

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Introduced lake trout (*Salvelinus namaycush*) threaten to extirpate native Yellowstone cutthroat trout *Oncorhynchus clarkii bouvieri* from Yellowstone Lake, Yellowstone National Park. The USDI National Park Service removed nearly 280,000 lake trout from Yellowstone Lake between 1997 and 2007. Lake trout population size has not been estimated; therefore, it is difficult to determine what proportion has been removed. We evaluated several population metrics to determine if the removal program caused the lake trout population to exhibit characteristics typical of overharvested populations. Biomass of lake trout harvested has

increased through the duration of the suppression program and was 0.74 kg/ha in 2007. Catch-per-unit-effort of lake trout has increased in both targeted-removal and survey netting. Mean length at age declined from 2000 through 2006 for lake trout older than 8 years. Total annual mortality in 2007 was 37 percent for lake trout of ages 3 through 5 and 12 percent for lake trout over age-5. Population metrics do not indicate that lake trout suppression has been effective at reducing abundance in Yellowstone Lake, however, the quality of existing data limit the certainty of conclusions. Yield-per-recruit modeling indicates that growth overfishing may begin to occur when conditional fishing mortality exceeds 10 percent for lake trout of all ages. Spawning potential ratio computed with rates of mortality from 2007 was 0.14, and could be reduced to 0.04 with a conditional fishing mortality rate of 20 percent for lake trout over age-5. An increase in fishing mortality of lake trout over age-5 may increase effectiveness of lake trout suppression.