Abstract:

The behavior of anglers targeting Muskellunge Esox masquinongy in Wisconsin has changed over time from being harvest oriented to catch-and-release oriented. Our objectives were to use the long-term tagging data set (1956–2016) available on the Muskellunge population of Escanaba Lake, Wisconsin, to characterize sex-specific age structure, length at age, and survival in relation to a potential change in angler harvest. We hypothesized that (1) angler harvest has changed over time, (2) age structure and length at age have changed in relation to the change in angler harvest, and (3) annual survival has changed over time in relation to changes in angler harvest. A breakpoint analysis revealed distinct changes in angler total harvest over time, occurring in 1995 and 2011. Muskellunge harvest (1956–1994) was significantly higher (29.7 ± 15.9 fish/year [mean ± SD]) than that observed during 1995–2010 (6.5 ± 2.9 fish/year) and 2011–2016 (0.83 ± 1.1 fish/year). Sex-specific growth did not differ between fishery type (i.e., high and low harvest). However, there was evidence that the asymptotic length of female Muskellunge was higher during the high harvest fishery. The top model in program MARK suggested that survival (S) differed by fishery type; i.e., S_{high} ± SD = 0.72 ± 0.01 and S_{low} ± SD = 0.99 ± 0.006. Exploitation was the primary component of annual mortality. Natural and discard mortality could not be differentiated. Natural and discard mortality was 9.2 ± 11%/year during the high harvest fishery and 4.9 ± 5.9%/year during the low harvest fishery. Reductions in Muskellunge exploitation led to increased survival and no apparent change in length at age. These results from Escanaba Lake suggest that the lack of harvest leading to an unexploited Muskellunge fishery may result in population stability, improved age structure distribution, and adult survival, but could potentially hinder management actions meant to further increase population density or growth potential to trophy size.