

Lake Trout Assessment And Management In Michigan Waters Of Lake Superior, 1988-92

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Abstract.- Five years (1988-92) of lean and siscowet lake trout *Salvelinus namaycush* population data from Michigan waters of Lake Superior are presented and analyzed in this report. Otoliths replaced scales as the principal structure for aging lean lake trout (leans) larger than 23 in and all siscowet lake trout (siscowets). Stocking of hatchery lake trout, which had been curtailed during the 1980s due to disease problems in hatcheries, resumed at pre-disease levels by 1992 (700-800 thousand yearlings per year). Commercial-sized (≥ 17 in, total length) leans were mostly wild fish ($>80\%$) in all management areas. Abundance, based on number per 1,000 feet of gill net (CPE), was highest in MI-5 (33.1) and lowest in MI-3 (10.0). Abundance of wild leans decreased in MI-2 through MI-6, and remained constant in MI-7 during 1988-92. Abundance of mature-sized (≥ 25 in, total length) wild leans was highest in MI-2 (5.2) and lowest in MI-3 (1.0). Abundance decreased in MI-2, MI-3, and MI-5, and remained unchanged in MI-4, MI-6, and MI-7. Sea lamprey *Petromyzon marinus* wounding (number of wounds per 100 fish) on mature-sized leans was highest in MI-7 (28.7) and lowest in MI-2 (10.8). Wounding on commercial-sized lake trout in MI-2 through MI-7 increased during 1988-90 then decreased, except in MI-3 where it continued to increase. Average total annual mortality of wild leans exceeded 50% in MI-3 through MI-7, and averaged 49% in MI-7. Growth (as measured by total length of age-7 wild leans) increased in MI-5, decreased in MI-2, and remained unchanged in other areas. Wild lake trout made up 80-90% of leans collected in the pre-recruit assessment during 1988-92. Abundance of pre-recruit (<17 in, total length) wild leans decreased in MI-2, MI-4, and MI-5, remained unchanged in MI-3 and MI-6, and increased in MI-7. Pre-recruit wild leans were most abundant in MI-4 (13.3) and least abundant in MI-7 (2.8). Pre-recruit siscowets increased in abundance in MI-2 and MI-3, were without trend in MI-4 and MI-5, and decreased in MI-6 and MI-7. Abundance of pre-recruit siscowets was highest in MI-3 (14.4) and lowest in MI-7 (2.0). Total annual mortality calculated for leans in the pre-recruit assessment always exceeded 50% and often exceeded 60%, but mortality of siscowets was 30-46%. Sport harvest of lake trout in surveyed management areas (MI-2, MI-4, MI-5, and MI-6) averaged about 27,000 fish each year, with decreasing catches in MI-2 and MI-4 and increasing catches in MI-5 and MI-6. Siscowets made up 1%-43% of the sport harvest among management areas. Tribal commercial fisheries harvested about 307,000 lb (dressed weight) of lean lake trout and 134,000 lb of siscowets annually in Michigan waters. Although wild self-sustaining populations of leans have been re-established in Michigan waters, mortality rates in excess of 50% and decreasing abundance in recent years indicate the need for reduced harvest and/or further reduction of sea lamprey abundance. Assessment-program recommendations are 1) continue current commercial-sized assessment in MI-2 through MI-7 and re-establish the

assessment in MI-8; 2) continue current pre-recruit assessment in MI-2 through MI-7 and assess pre-recruits in MI-8; 3) continue current creel survey in MI-2, MI-4, MI-5, and MI-6, and initiate surveys in MI-7 and MI-8; 4) locate and assess siscowet spawning populations; and 5) continue to evaluate otoliths for aging leans and siscowets. Management recommendations are 1) complete update of total allowable catch (TAC) model for best TAC estimates; 2) continue to participate in interagency management of lake trout; 3) negotiate with tribal fisheries agencies to reduce commercial harvest in some areas and to change the status of populations in MI-7 and MI-8 from deferred rehabilitation to rehabilitation; 4) maintain or increase restrictions on the harvest of lean lake trout in state-licensed sport and commercial fisheries; 4) support United States Fish and Wildlife Service efforts to reduce sea lamprey abundance; 5) develop criteria for the discontinuance of stocking of hatchery lake trout; and 6) support strategies to increase survival of hatchery lake trout in areas where stocking is justified.

Restoration of lake trout *Salvelinus namaycush* populations in Lake Superior has been the primary goal of resource agencies since the late 1950s. Stocking hatchery fish, controlling sea lamprey *Petromyzon marinus* abundance, and regulating fisheries have been the major efforts. Hansen et al. (in press) presented a critical assessment of lake trout restoration efforts in Lake Superior from 1959 to 1993. Abundance and biological assessment of commercial-sized (≥ 17 in, total length) lake trout stocks in Lake Superior was initiated in 1959 (Pycha and King 1975). This assessment has continued on an annual basis and has been complemented with periodic assessments of spawning lake trout since 1973 and pre-recruit (< 17 in, total length) lake trout since 1975. Annual assessment of the sport fishery began in 1967 (G. C. Jansen, Michigan Department of Natural Resources, personal communication). Pycha and King (1975) documented decline of lake trout populations, initial efforts to restore them, and assessment methods used to evaluate restoration in United States waters of Lake Superior during 1950-70. Peck and Schorfhaar (1991) described assessment and management of lake trout in Michigan waters of Lake Superior during 1970-87.

Lean lake trout (leans), siscowet lake trout (siscowets), and humper lake trout (humpers) are the three contemporary varieties of lake trout that exist in Lake Superior (Eschmeyer 1955; Rahrer 1965; Patriarche and Peck 1970; Peck 1975; Burnham-Curtis 1993). Leans are generally the most abundant variety in 40 fathoms (240 feet)

and shallower, are preferred by sport and commercial fisheries, and the focus of assessment and restoration efforts by all agencies. Periodic assessments have been done on Michigan's offshore lean populations at Isle Royale (MI-1) and Stannard Rock (MI-5) and are documented by Curtis et al. (in press) and Curtis (1990), respectively, but other lean lake trout populations in offshore waters have not been studied (for example, Big Reef in MI-6). Siscowets are the most abundant variety at depths deeper than 40 fathoms, they have a high fat content (Eschmeyer and Phillips 1965) and the presence of contaminants (chlordane) in their flesh has restricted their use as a food fish in recent years.

There has been little effort made to assess siscowet populations and no efforts directed at restoration. However, siscowets likely benefited from sea lamprey control and restrictions on fishing implemented to restore leans. Humpers are a small slow-growing variety found on isolated reefs around Isle Royale (MI-1) and south of Caribou Island (MI-7) in Michigan waters. Humpers are rarely collected with leans in waters contiguous with Michigan's shoreline, and there has been little information gathered on their populations in the past 20 years.

In this report, we describe lean and siscowet lake trout assessment methods and results in Lake Superior management areas MI-2, MI-3, MI-4, MI-5, MI-6, and MI-7 during 1988-92 (Figure 1). We make recommendations for future assessment and management of lean and siscowet lake trout in these waters. We also present data on lake trout stocking since 1978,