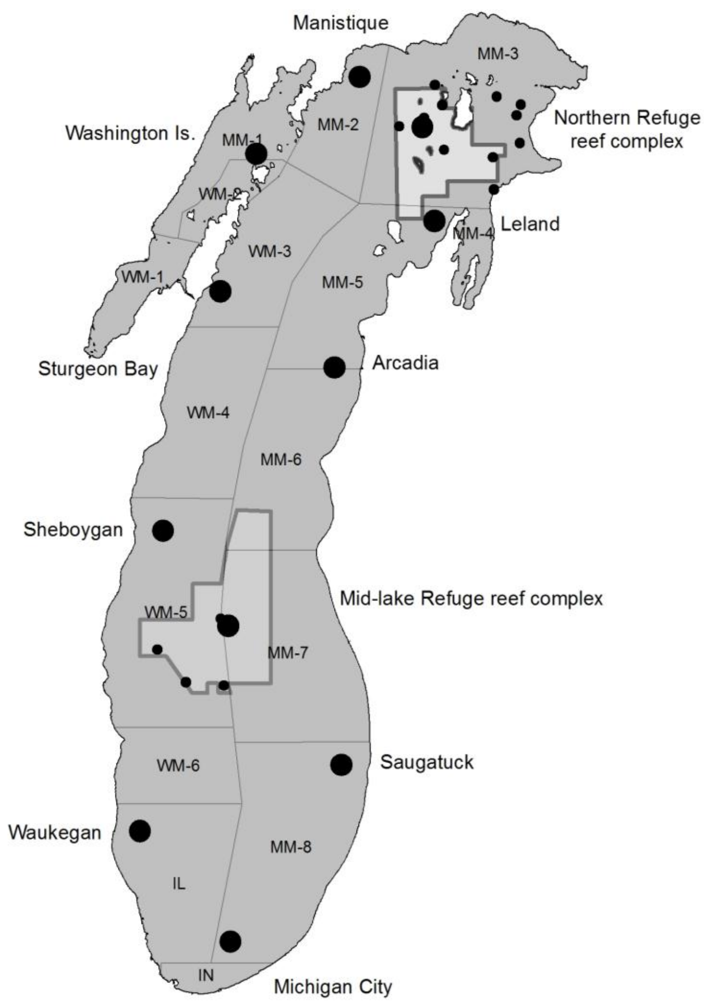
2013 Lake Michigan Lake Trout Working Group Report

This report provides a brief overview of the status of lake trout populations and restoration efforts in Lake Michigan from the spring lakewide assessment plan (LWAP) survey and fall spawner surveys (refer to Figure 1 for sampling locations). It provides a quick, graphical representation of pertinent data, and is structured to review the population objectives articulated in *A Lake Trout Restoration Guide for Lake Michigan* (Bronte et al. 2008*).* Spring and fall lake trout survey data are evaluated in terms of measurable objectives that generally follow the ontogeny of lake trout and recommend population benchmarks to increase the probability of significant and sustained natural reproduction by hatchery-reared fish. Graphical presentations provide current measures within a time series (when available) and compare current values with target values to gauge progress towards restoration.

Figure 1. The large black circles show the nine nearshore spring LWAP sampling sites and the two offshore complexes within and near the refuges; the small black circles represent reefs that are sampled within each refuge reef complex.



Lake Michigan Committee Meeting
March 26, 2014
Windsor, Ontario

Overall Goal: In targeted rehabilitation areas, reestablish genetically diverse populations of lake trout composed predominately of wild fish able to sustain fisheries.

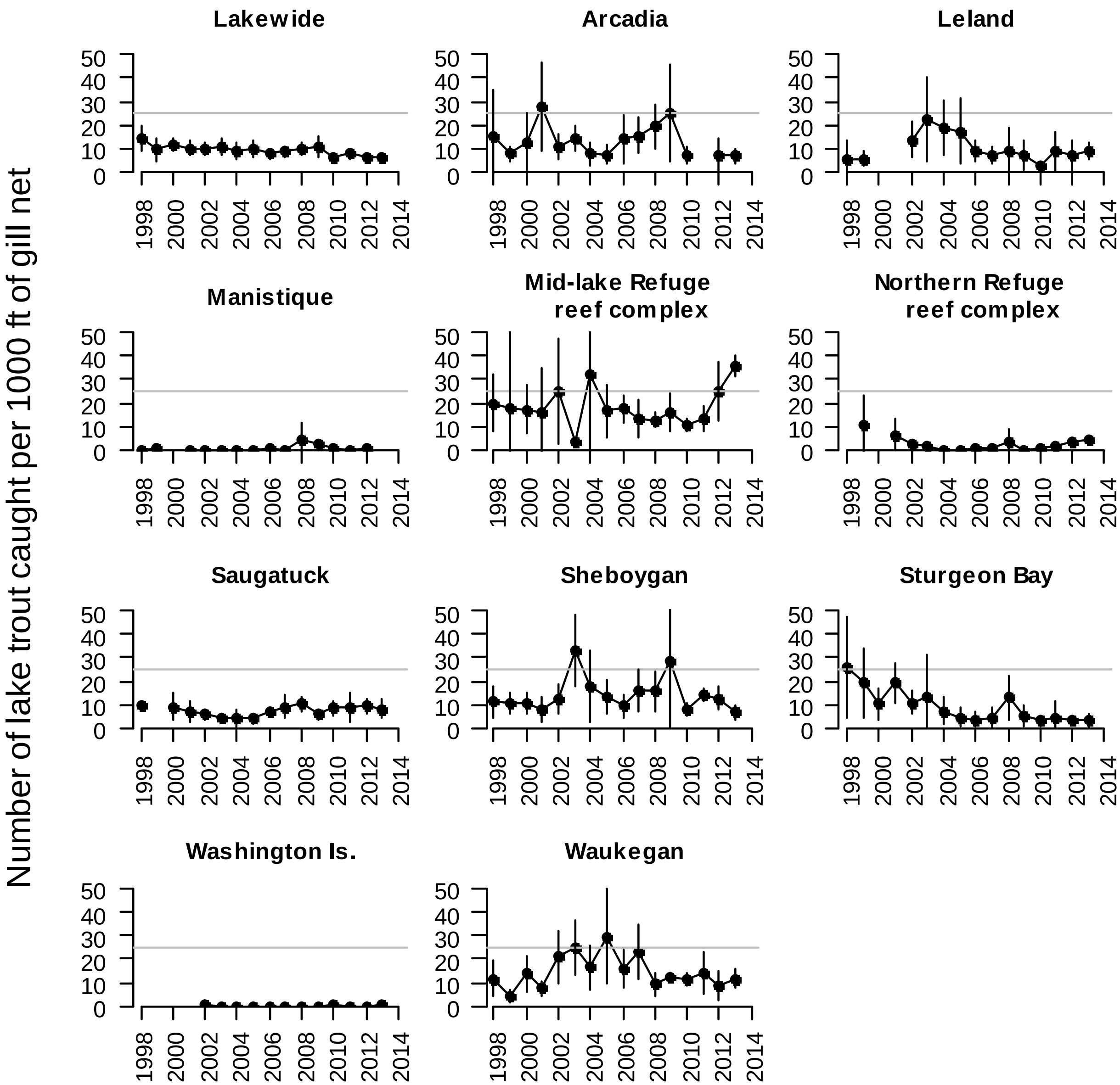
Objective 1 (Increase genetic diversity): Increase the genetic diversity of lake trout by introducing morphotypes adapted to survive and reproduce in deep-water, offshore habitats, while continuing to stock shallow-water morphotypes.

Results: Klondike Reef strain from Lake Superior has been recommended for introduction to deep-water habitats; the Lake Michigan Committee (LMC) has decided that a limited number should be stocked experimentally. In 2012, about 80,000 Klondike Reef strain yearlings were stocked on Northeast Reef in the Mid-lake Refuge (MLR), also known as the Southern Refuge (Figure 1). In 2013, about 130,000 Klondike Reef strain yearlings were stocked on Northeast Reef. Lean lake trout from Seneca Lake (Finger Lakes, NY), Apostle Islands (Lake Superior), and Lewis Lake (Lake Michigan remnant) have been selected as the primary lean lake trout strains. Additionally, a remnant, nearshore form of lean lake trout from Parry Sound (Lake Huron) has been raised in USFWS hatcheries. In 2013, about 203,000 Parry Sound strain yearlings were stocked within the Northern Refuge reef complex, and roughly 46,000 Parry Sound strain fall fingerlings were stocked in Wisconsin nearshore waters.

Objective 2 (Increase overall abundance): By 2014, increase densities of lake trout populations in targeted rehabilitation areas to levels observed in other Great Lakes locations where recruitment of wild fish to the adult population has occurred. To achieve this objective, CPUE in spring assessments should consistently exceed 25 lake trout per 1000 ft of graded-mesh (2.0 – 6.0 inch) gill net fished.

Results: In 2013, six gillnet lifts were performed in each nearshore LWAP location except for Manistique, which was not sampled in 2013. Three lifts were completed on the Mid-lake Refuge, while 32 lifts were completed within the Northern Refuge reef complex. On a lakewide basis, spring CPUE has remained substantially below the target level of 25 lake trout per 1000 ft of gill net (horizontal line) (Figure 2). At most locations, lake trout abundance was well below the target level in 2013. However, lake trout abundance has, at times, approached or exceeded the target level in a few statistical districts (Illinois waters, MM-5, MM-6, WM-3, and WM-5) and in the MLR. In 2013, spring CPUE was equal to 35.8 lake trout per 1000 ft of gill net in the Mid-lake Refuge reef complex, whereas spring lakewide CPUE was 6.5 lake trout per 1000 ft of gill net (Figure 2).

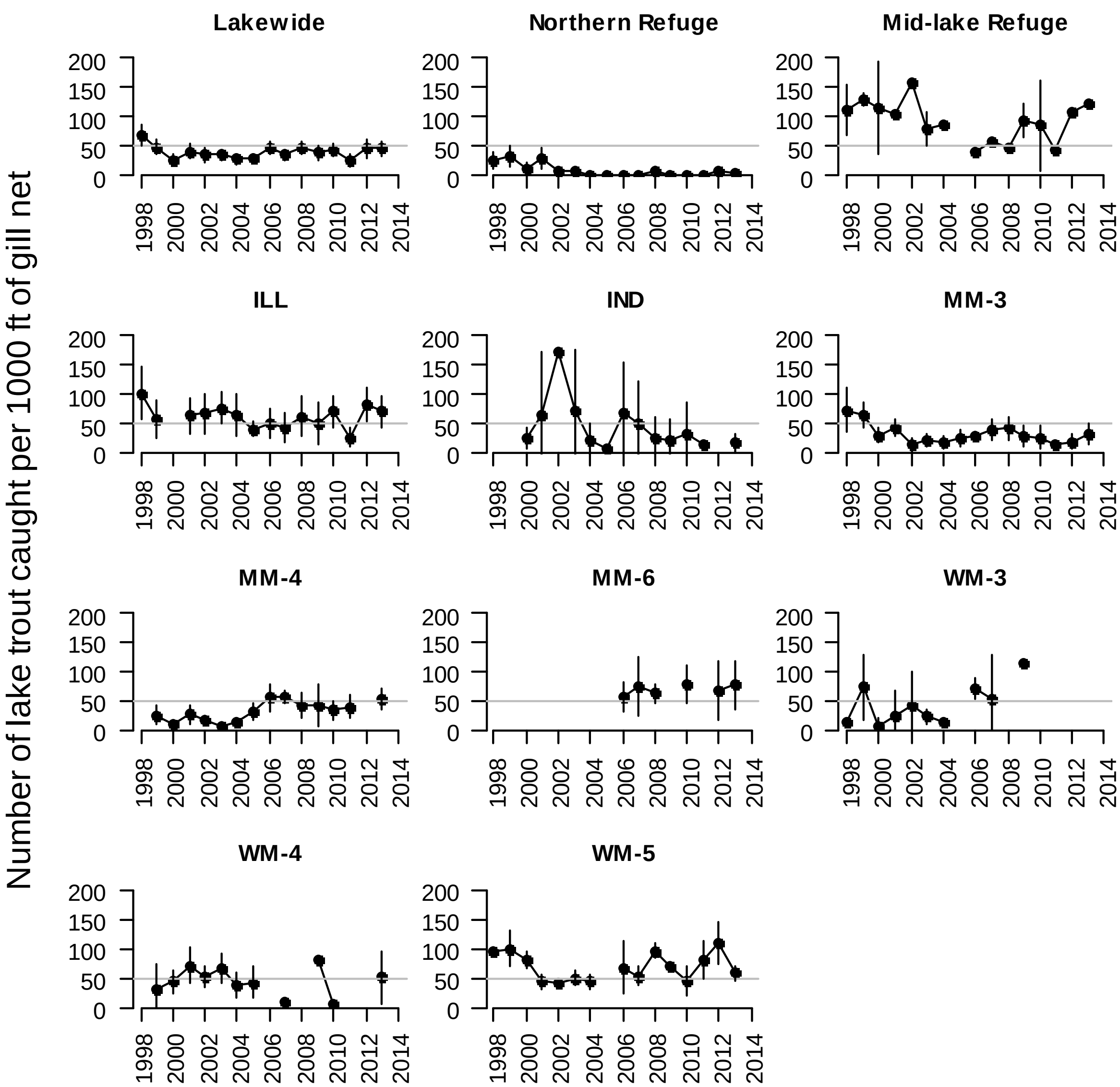
Figure 2. Spring survey lake trout catch per unit effort (mean number of fish per 1000 ft of graded-mesh gill net) for eight nearshore sites and the Northern Refuge and Mid-lake Refuge reef complexes, 1998-2013.



Objective 3 (Increase adult abundance): By 2020, achieve densities of spawning adult lake trout in targeted rehabilitation areas comparable to those observed in other Great Lakes locations where recruitment of wild fish to the adult population has occurred. To achieve this objective, CPUE in fall assessments should consistently exceed 50 fish per 1000 ft of graded-mesh (4.5-6.0 inch) gill net fished.

Results: Of the 9 spawning areas sampled during fall 2013, 6 areas met or exceeded the target (Figure 3). Fall CPUE in 2013 was highest in the Mid-lake Refuge (120.8 lake trout per 1000 ft of gill net) and lowest in the Northern Refuge (3.5 fish per 1000 ft of gill net). The low abundance in the Northern Refuge could be attributed, in part, to reduced stocking rates within the Northern Refuge during 1995-2008.

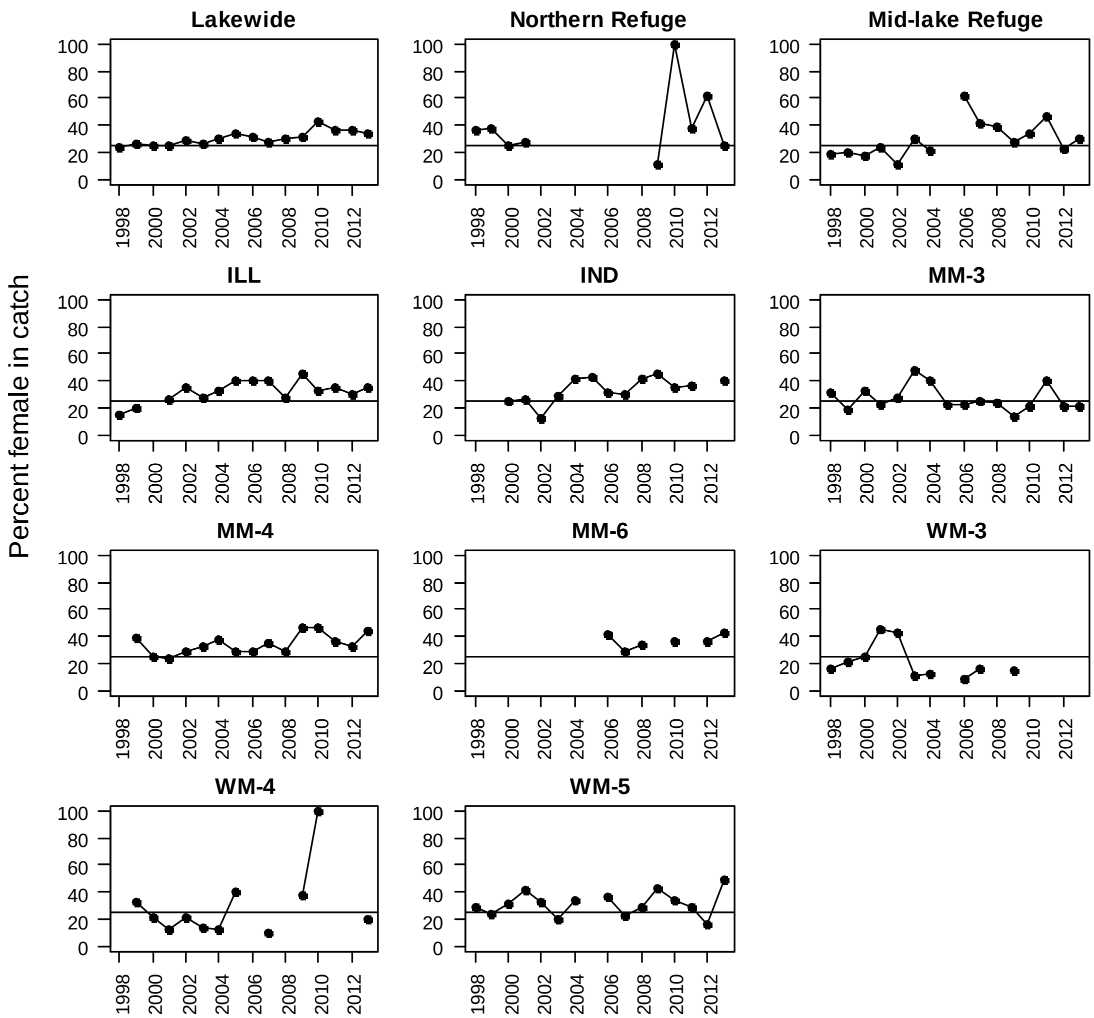
Figure 3. Fall lake trout spawner survey catch per unit effort (mean number of fish per 1000 ft of graded-mesh gill net) for nearshore reefs pooled by management unit and for offshore reefs pooled by refuge, 1998-2013.



<u>Objective 4 (Build spawning populations)</u>: By 2024, spawning populations in targeted rehabilitation areas stocked prior to 2008 should be at least 25% females and contain 10 or more age groups older than age 7. These milestones should be achieved by 2032 in areas stocked after 2008.

Results: On a lakewide basis, the percentage of females in the fall spawner surveys has exceeded the benchmark value of 25% since 1999 (Figure 4). Moreover, the percentage of females in the fall spawner catch during 2013 exceeded 25% at 6 of the 9 areas sampled.

Figure 4. Percentage of fall spawners that were female by management unit for nearshore surveys and by refuge for offshore surveys, 1998 - 2013. Horizontal black line represents the LTWG fall survey benchmark value of 25%.

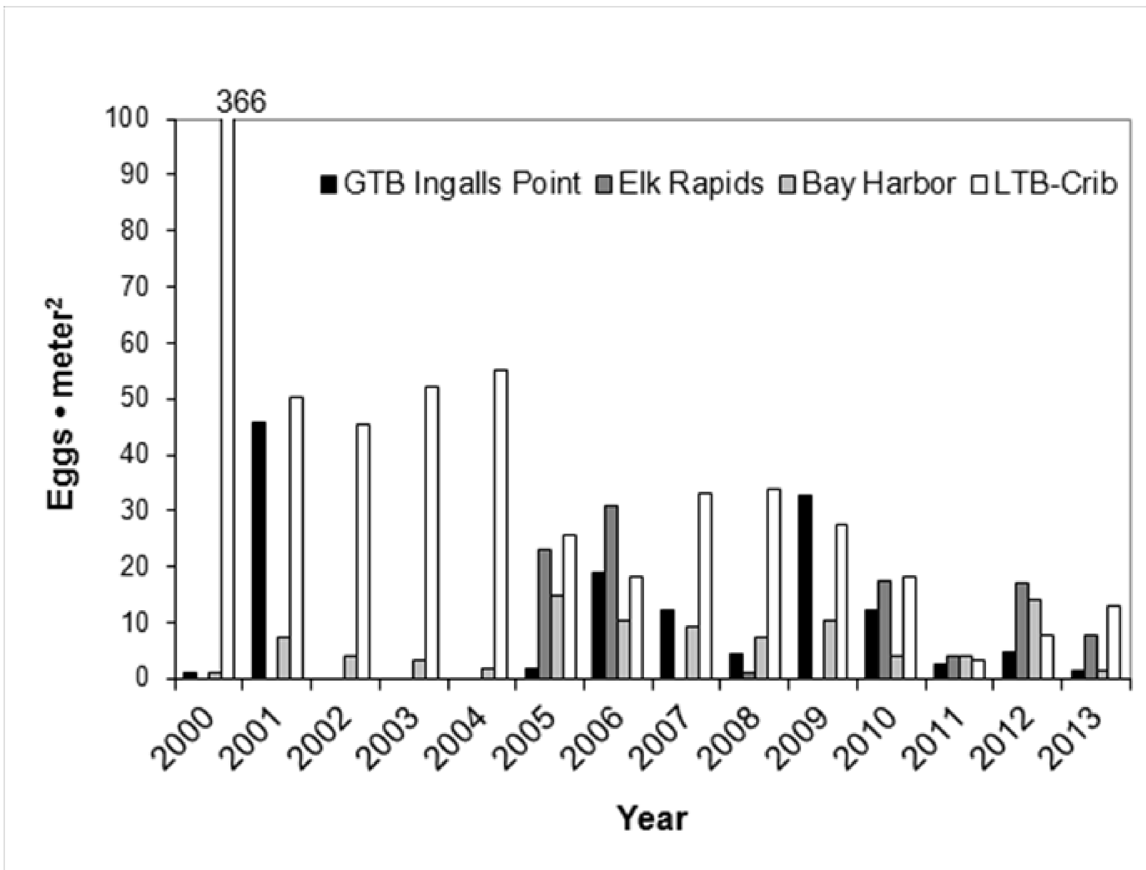


Data on the age composition of spawning lake trout is not routinely reported by all agencies. Consequently, the second part of Objective 4 regarding age composition of the lake trout spawners could not be assessed.

Objective 5 (Detect egg deposition): By 2021, detect a minimum density of 500 viable eggs/m^2 (eggs with thiamine concentrations > 4 nmol/g) in previously stocked areas. This milestone should be achieved by 2025 in newly stocked areas.

Results: Egg deposition rates have remained low at the sites where egg deposition has been measured in northern Lake Michigan during 2000-2013. Nearly all of the measured densities of lake trout eggs have been less than 60 eggs/m^2 (Figure 5).

Figure 5. Numbers of lake trout eggs observed per square meter in northern Lake Michigan fall egg deposition surveys, 2000-2013. Egg deposition was measured using standard egg bag methodologies (Jonas et al.2005).

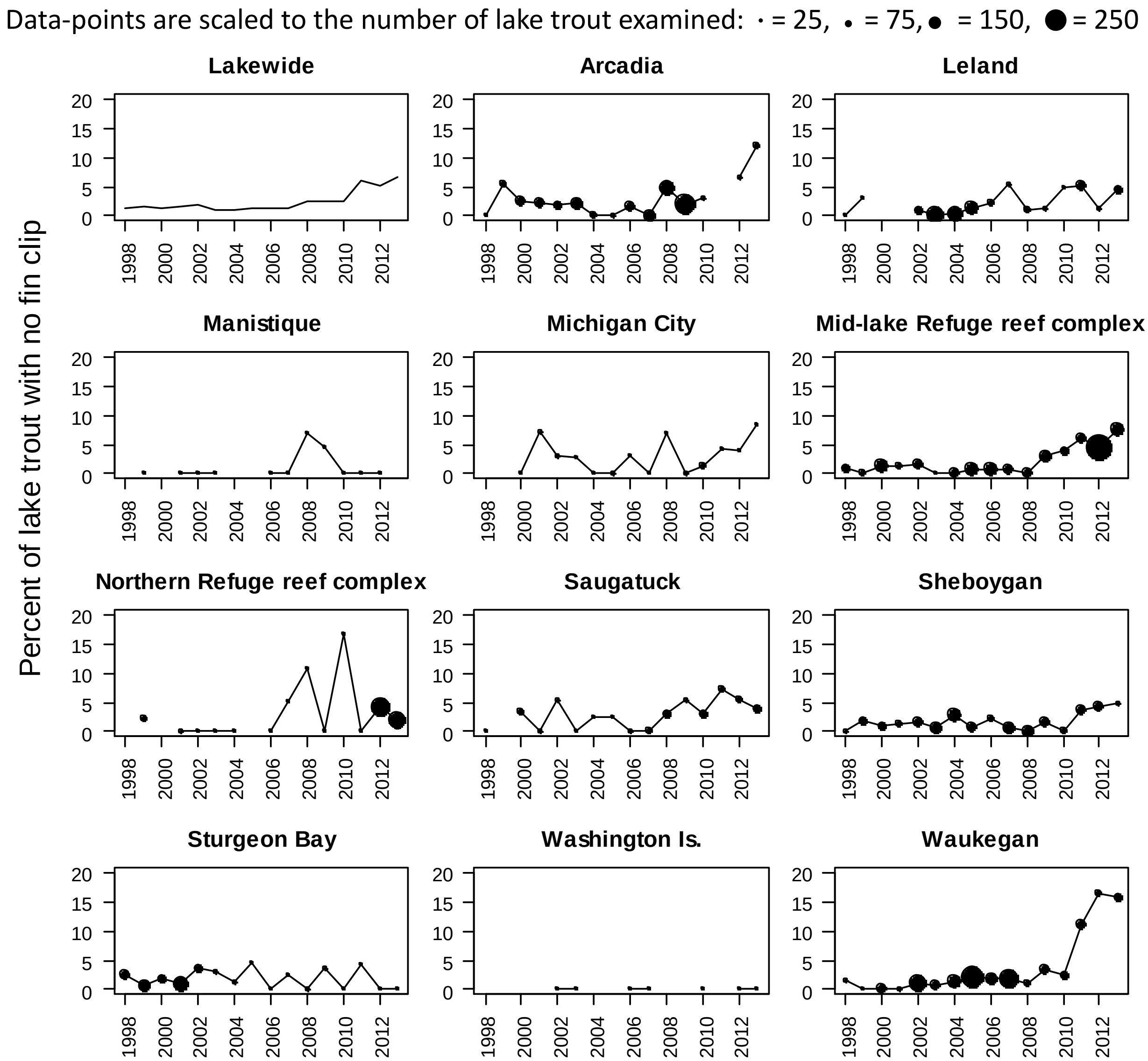


Jonas, J. L., R. M. Claramunt, J. D. Fitzsimons, J. E. Marsden, and B. J. Ellrott. 2005. Estimates of egg deposition and effects of lake trout (Salvelinus namaycush) egg predators in three regions of the Great Lakes. Canadian Journal of Fisheries and Aquatic Sciences 62(10):2254-2264.

Objective 6 (Detect recruitment of wild fish): Consistent recruitment of wild lake trout in targeted rehabilitation areas should occur as follows: by 2022 detect age-1 fish in bottom trawls, by 2025 detect age-3 fish in spring graded-mesh-gill-net assessments, and by 2028 consistently detect sub-adults.

Results: The rate of natural reproduction by lake trout in Lake Michigan has increased during the past 10 years. On a lakewide basis, the percentage of lake trout without a fin clip of the total lake trout catch in the spring LWAP survey increased from 1.2% in 2004 to 6.5% in 2013 (Figure 6). This increase coincided with a period of reduced abundance of alewives, which are suspected of interfering with lake trout reproduction via predation on lake trout fry and via reduction of thiamine levels in lake trout eggs, thereby lowering egg survival. The recently estimated rate of marking error (fish released from the hatchery without a fin clip) for lake trout is 3%, and therefore percentages of unclipped lake trout exceeding 3% imply natural reproduction. At Waukegan, the percentage of lake trout without a fin clip of the total lake trout catch from the spring LWAP survey ranged from 11.1% to 16.3% during 2011-2013 (Figure 6). In 2011 and 2012, about 20% of the juvenile lake trout incidentally caught in gill nets set for bloaters off the Door Peninsula and Mid-lake Reef in Wisconsin during February were unclipped fish, and most of these lake trout were <500 mm in total length. During February 2013, gill nets fished off the Door Peninsula yielded lake trout catches with 22% (29 of 129) of the fish unclipped, while lake trout caught in bottom trawls near Manitowoc had an unclipped rate of 21% (7 of 33). In addition, of the catches of lake trout in the 2012 and 2013 fall spawner surveys in Illinois waters, 50% (262 of 528) and 54% (242 of 452), respectively, of the fish were unclipped. Lastly, of 14 lake trout caught in the USGS Great Lakes Science Center (GLSC) fall bottom trawl survey of Lake Michigan during September 2013, 6 lake trout (43%) were unclipped. One of these unclipped lake trout was an age-0 wild fish (only 57 mm in total length) caught at the Waukegan transect. Since 2005, 24 of the 127 lake trout, or 19% of the lake trout, caught in the GLSC bottom trawl survey were unclipped. Prior to 2005, less than 2% of the lake trout caught in the GLSC bottom trawl survey were unclipped.

Figure 6. Percentage of lake trout recovered in spring LWAP surveys with no fin clip, 1998-2013. Size of data points are scaled to represent the total number of lake trout examined for fin clips within each site. Mean fin-clipping error is 3.0% in recent years and natural reproduction is inferred when percentage of unclipped lake trout exceeds 3.0% of the lake trout catch.



Objective 7 (Achieve restoration): By 2037, 75% or more of the lake trout in deep- and shallow-water habitats should be age-10 and younger and of wild origin.

Results: Populations far from targets.

Lake trout stocking

The U. S. Fish and Wildlife Service stocked a total of 2.95 million yearling (14-16 months old) lake trout into Lake Michigan in 2013. Stocking totals for each state jurisdiction were 124,021 in Illinois, 42,386 in Indiana, 2,078,629 in Michigan, and 708,951 in Wisconsin. All yearling fish received an AD fin clip paired with a coded wire tag. The stocked yearling lake trout consisted of five strains: Apostle Islands (291,632 fish), Lewis Lake (1,093,537 fish), Seneca Lake (1,237,335 fish), Klondike Reef (128,542 fish), and Parry Sound (202,941 fish). All Klondike Reef strain lake trout were stocked at Northeast Reef, and all Parry Sound strain yearlings were stocked in the Northern Refuge reef complex. Additionally, 415,198 fall fingerlings were stocked into nearshore waters of Lake Michigan during 2013. Fall fingerling stocking totals for each state jurisdiction were 52,500 in Indiana, 252,289 in Michigan, and 110,409 in Wisconsin. Fall fingerling totals by strain were 68,744 Parry Sound strain, 131,664 Lewis Lake strain, and 214,790 Seneca Lake strain. All Parry Sound strain fall fingerlings were stocked into nearshore Wisconsin waters.

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