

Walleye

Formerly indicator #9

Overall Assessment

Status:

Trend:

Rationale:

Lake-by-Lake Assessment

Lake Superior

Status: Fair

Trend: Undetermined

Rationale: Walleye abundance in all areas of Lake Superior, with the possible exception of the St. Louis River, is still below historical levels. Walleye in the St. Louis River (MN, WI) area contain the only healthy, self-sustain walleye population in Lake Superior, while other populations in Black, Nipigon, and Thunder Bays (Ontario), Chequamegon Bay and Bad River (WI), have low populations due to habitat loss and predation issues. Rehabilitation efforts of the walleye population in Black Bay, Ontario, are ongoing, but competing fish community objectives for walleye and sea lamprey (*Petromyzon marinus*) in the Black Sturgeon River, a Black Bay tributary, will complicate rehabilitation plans. Fish Community Objectives for walleye abundance and harvest are only being met in the St. Louis River. Rehabilitation strategies are developing with agencies and tribes addressing habitat loss, periodic stocking programs, and harvest control with highly-managed fisheries. Impediments to walleye rehabilitation in Lake Superior remain including: slow walleye growth, highly variable recruitment, habitat loss, variable stocking success, continued need for basin-wide long-term assessment, and predation on juvenile and adult walleye.

Lake Michigan

Status: Good

Trend: Improving

Rationale: Walleye are continuing to gain interest within the near shore fishery. On a lake-wide basis, harvest levels have reached the target sustainable levels of 200,000 to 400,000 pounds three of the last four years as outlined in the Fish Community Objectives (FCOs) for Lake Michigan. The average walleye harvest biomass was 260,770 pounds during the last four years, with a high of 311,350 pounds in 2009. This includes a 25,000 pound average commercial harvest by the Tribal commercial fishers for the 2007 to 2010 period as well as the sport-caught walleye from the four state jurisdictions. Michigan and Wisconsin sport anglers are the two main user groups contributing to the sport harvest, primarily in the northern end of the lake, Green Bay, and the Big and Little Bay De Noc areas. Most of the walleye harvested in Wisconsin were in Green Bay where strong spawning runs occur in the Fox, Oconto, Peshtigo and Menominee rivers that have resulted in strong year classes in 2003, 2008, 2009 and 2010. For data available from 1985-2007, FCOs for Lake Michigan walleye biomass harvested were only reached in 1994 to 1996, so recent FCO attainment in three of the last four years represents a substantial improvement.

Lake Huron

Status: Good

Trend: Improving

Rationale: Walleye production in Lake Huron declined in 2010 from the previous year but continues to show strong across most all fisheries. The increased production is credited to increased abundance stemming from greatly improved reproductive success since the collapse of alewives in Lake Huron. Gains have been most notable in the recreational fishery of the lake which is principally driven by that of Saginaw Bay, the single largest source

population for the lake. Michigan DNR maintains several recovery criteria for walleye in Saginaw Bay, all of which were met or exceeded in recent years. While yield is not a sole objective, it is noted that historical levels of annual walleye harvest averaged 453.6 metric tonnes. In 2010, a study conducted by Michigan State University documented that the commercial by-catch mortality of walleye in Saginaw Bay was substantial – estimated at approximately 104 metric tonnes that year. If that value is typical of recent years, then the total yield for walleye in the bay for 2009 was 460 metric tonnes, thereby achieving the historical average yield.

Five of the last eight year classes of walleye produced in Saginaw Bay were very strong compared to those produced before the alewife collapse. The turning point was in 2003, but recent data indicates that the 2008 walleye year class is a record when measured as abundance of yearling walleye in 2009. As the walleye stock rises in Saginaw Bay, density dependent stock/recruitment mechanisms are likely now regulating the recruitment magnitude. Since 2007, year class strength appears more variable, typical of a walleye population at carrying capacity.

In Ontario waters, the commercial yield of walleye in the main basin of Lake Huron increased in 2009 and again in 2010. Yield in the main basin is the highest it has been in 15 years and is currently equal to the 30-year average. Recent increases have resulted from improved recruitment, particularly from the relatively strong 2003 and 2005 year classes. Commercial harvests have been more variable, with modest increases in the North Channel and no definite trends in Georgian Bay. Limited targeted effort for this species in these regions does not necessarily reflect the current abundance of walleye.

Recreational surveys for walleye in Ontario waters have not been conducted in recent years. Restrictive regulations governing the recreational harvest of walleye from Georgian Bay and the North Channel were instituted in 2003 primarily to aid in the recovery of depressed populations.

Independent assessment of walleye populations in all three basins of Lake Huron suggest that walleye abundance has increased in recent years. Relative abundance criteria established from standardized surveys have been above average in several locations in recent years.

Lake Erie

Status: Fair

Trend: Mixed

Rationale: The walleye population and associated fisheries in Lake Erie are managed individually by four United States state agencies and one Canadian provincial agency. Under the auspices of the Great Lakes Fishery Commission's Lake Erie Committee, a Walleye Management Plan was implemented in 2005 and is undergoing a review process. Annual Total Allowable Catches, fishery quotas set for the west and central basins of Lake Erie, steadily declined since the recent peak in 2006, with the exception of a slight increase in 2011. The Walleye Management Plan called for the adjustment fishing rates downward as the population in the west and central basins declined. Fishery harvests, in numbers of walleye, steadily declined for sport and commercial fisheries in the west and central basins in the years that followed full recruitment of the exceptional 2003 year class (Walleye Task Group 2011). Annual sport fishing effort and catch rates for the west and central basins are generally lower compared to highs seen in the 1990s and early 2000s. A slight increase in the sport fishery catches and effort has been observed in the eastern basin. The Lake Erie Committee does not set an international annual quota in the eastern basin of the lake, but agencies' fisheries regulations have maintained relatively smaller fisheries. Commercial effort and number of walleye harvested declined in the past five years across all basins, yet catch rates improved substantially in 2010. Lake Erie walleye fisheries have been largely dependent on the strong 2003 cohort, and more recently a moderate 2007 cohort. Mean age of walleye in the sport harvest has risen for the past three years, while the trend for mean age declined for the commercial fishery for the same time period.

Walleye biological characteristics in Lake Erie remain good, with the exception of variable recruitment in the west and central basins. Biomass of mature walleye, particularly females, is still well above the long-term mean, with a very high relative number of older females primarily from the 2003 cohort. Growth for the last several years has been good, with annual median lengths and weights for ages 2-5 walleye in assessment surveys meeting or exceeding long-term median values (Walleye Task Group experimental sample data). The 2010 cohort was assessed to be moderate in strength as young-of-the-year; however, other cohorts, with the exception of 2003 and 2007, are poor and have contributed little to the fishery. The high growth rate and the 2010 cohort abundance will stem the

declines of walleye in the Lake Erie western and central basins in the short-term, but more consistent recruitment of stronger cohorts is needed to rebuild the walleye populations in the long-term to preferred maintenance levels. Some recovery and expansion is apparent in eastern basin walleye stocks with increased recruitment in a few of the recent years, but it is difficult to quantify because of the highly migratory nature of stocks of walleye from the western and central basins of Lake Erie.

Lake Ontario

Status: Fair

Trend: Unchanging

Rationale: The largest walleye population, fishery, and assessment focus revolves around the Bay of Quinte walleye population. This population spawns in the four major rivers and shoreline of the Bay of Quinte. Young walleye (less than 4 or 5 years of age) remain in the Bay year-round while the mature portion of the population migrates to eastern Lake Ontario for the summer months. Annual summer gillnetting in both the Bay of Quinte and eastern Lake Ontario (Ontario and New York waters) provides excellent long-term abundance trends for juvenile and adult walleye. Catches in eastern Lake Ontario are likely comprised of both migrating Bay of Quinte adult fish as well as walleye produced in eastern Lake Ontario proper. Annual bottom trawling during August in the Bay of Quinte provides a long-term index of YOY abundance that is highly correlated with gillnet catches at older ages.

Following declines in juvenile and adult walleye abundance in the 1990s, associated with reduced YOY production in the mid-1990s, the walleye population appears to have stabilized or increased slightly in Bay of Quinte and NY and Ontario waters of the eastern basin. Walleye performance targets, identified in the Bay of Quinte Fisheries Management Plan (2010) and based on a post-dreissenid time-period (2002-2006), are currently being met or exceeded. Recent hatches should keep the population at current or somewhat improved levels of abundance for the next several years. Smaller, local walleye populations exist in other areas of Lake Ontario, both open-coastal and embayments. Some areas support small but healthy and self-sustaining populations (e.g., Wellers Bay, West Lake) while other areas with degraded habitat require rehabilitation efforts (e.g., Hamilton Harbour); however, these areas receive much less walleye population assessment.

Other Spatial Scales

Huron-Erie Corridor (St. Clair River-Lake St. Clair-Detroit River)

Status: Fair

Trend: Mixed

Rationale: Walleye harvest in Lake St. Clair is down from the early 2000s and the 1980s. Catch rates for walleye anglers in Lake St. Clair have also decreased. Angler catch rates for walleye in 2009 were the lowest on record in Lake St. Clair (0.151 walleye per rod hour, from 2009 creel survey in the Ontario waters of Lake St. Clair); however, catch rates in the Detroit River remained high. Walleye harvest in the Detroit River is similar to the early 2000's and early 1990's, and catch rates in this area remain good. Over time angler effort in Lake St. Clair has shifted away from walleye towards other Huron-Erie Corridor species (i.e., muskie and smallmouth bass); however, walleye remains an important part of the recreational fishery. This fishery has been evaluated on an inconsistent basis and no continuous fishery data are available to incorporate estimates into our metric ton yield figure. There exists the potential for sizable harvest in the Huron-Erie Corridor. This harvest cannot be overlooked in the scale of Great Lakes walleye fisheries and production, and should be included in the indicator description.

The mean weight of walleye harvested from Lake St. Clair is 1.4 kg (from 2009 creel survey in the Ontario waters of Lake St. Clair). Growth rate of walleye in the Ontario fall trap net survey has increased each decade since the survey began. The highest growth rate of walleye occurred from 2007-2009 (this time period also had very low catch rates). Recent recruitment of walleye in Lake St. Clair has been poor. The last year-class of even moderate strength that was produced in Lake St. Clair was in 1986. Since then, very few age-1 walleye have been caught in the Ontario fall trap net survey.

Purpose

Ecosystem Objective

Protection, enhancement and restoration of historically important, mesotrophic habitats that support natural stocks of walleye as the top fish predator. These habitats are necessary for stable, balanced, and productive elements in the Great Lakes ecosystem.

Ecological Condition

Relative abundance, biomass, and annual production of walleye populations in historical, cool water, mesotrophic habitats of the Great Lakes are important metrics for Great Lakes health. Biological and economic fishery measures such as walleye recruitment (hatches), growth, fishery performance and harvest, and natural mortality can be used to ascertain changes over time. We can look at temporal changes in the short-term, i.e. since the previous reporting cycle, and in the long-term, over the breadth of available data.

Appropriate quantitative measures of relative abundance, yield, or biomass should be established as reference values for self-sustaining populations of walleye in mesotrophic habitats in each lake. The indicator target(s) for walleye can be based on the values provided in the Fish Community Goals and Objectives (FCGOs) and/or for desired value(s) gained from analysis of the range and distribution of measures above compared to the ecosystem conditions.

Lake Superior: Maintain, enhance and rehabilitate self-sustaining populations of walleye and their habitat over their historical range.

Lake Michigan: Expected annual yield: 0.1-0.2 million kg (100-200 metric tonnes).

Lake Huron: Re-establish and/or maintain walleye with populations capable of sustaining an annual harvest of 0.7 million kg.

Huron-Erie Corridor: Maintain self-sustaining populations and favorable habitats of predators such as walleye, muskellunge, northern pike, longnose gar, largemouth bass, smallmouth bass, and yellow perch to ensure piscivore functions and provide quality fishing opportunities. From: MacLennan, D.S, R.C. Haas, G.L. Towns, M.V. Thomas, E. Roseman, L. Halyk, B. Locke, and M. Morencie . 2011. Fish-community goal and objectives for the Huron-Erie Corridor. Great Lakes Fish. Comm. Spec. Pub. (*in press*).

Lake Erie : Manage the western, central and eastern basin ecosystems to provide sustainable harvests of valued fish species, including walleye. This is done within the construct of objectives stated in the Lake Erie Committee's Walleye Management Plan. These objectives are: 1) to maintain walleye catch rates at average (1978-2004) or better levels; and 2) to maintain both sport and commercial harvest at average (1978-2004) or better levels. Additionally, the age and size structure of the fishery should be sufficient to promote migration of walleye towards the eastern basin, provide diverse fishing opportunities to anglers, and provide sufficient numbers of commercially desirable fish. The second component is an exploitation policy for age-2 and older walleye. The exploitation policy is designed to achieve four things: 1) ensure the sustainability of the walleye population; 2) help maintain walleye within the optimal population threshold (26-40 million walleye ages 2 and older); 3) allow user groups to take advantage of large walleye populations; and 4) be straightforward so that its implementation will be simple to understand and is able to rely on current stock status information.

Lake Ontario

A Fisheries Management Plan has been developed for the Bay of Quinte (2010), which sets a performance target for young-of-year (YOY) walleye recruitment of just over 2 YOY walleye per trawl, the average from 2002-2006, in the post-dreissenid time period. Summer gillnet assessments by Lake Ontario agencies also provide long-term abundance trends for juvenile and adult walleye.

The walleye is a highly-valued species that is usually heavily exploited by recreational fisheries and commercial fisheries (where permitted). Harvest or yield reference values established for self-sustaining populations probably

represent an attempt to fully utilize annual production; as a result, harvest or yield reference values for these populations can be taken as surrogates for production reference values.

- Excellent – meets or exceeds attainment of targets in all (recent) reporting years
- Good – meets or exceeds attainment of targets in a majority of reporting years
- Fair – met target in one year and approached 50% of target levels in all years
- Poor – did not attain 50% of target levels in all years
- Unavailable – target not defined or data unavailable/incomplete to address attainment.

Additional Information

The historical dominance of walleye in mesotrophic habitats in the Great Lakes provides a good basis for a basin-wide evaluation of ecosystem health. Maintaining or re-establishing historical levels of relative abundance, biomass, or production of self-sustaining walleye populations throughout their native range in the Great Lakes basin will help ensure dominance of this species in the ecosystem and the maintenance of a desirable and balanced aquatic community in cool water, mesotrophic habitats. Historical data can be used to develop status and trend information on walleye populations. Commercial catch records for walleye in the Great Lakes extend back to the late 1800s; recreational catch data and assessment fishing data supplement these commercial catch records in some areas in recent decades and sport fishing data are especially useful in areas where the commercial fishery for the species has been closed.

Data Limitations

- Walleye abundance can be significantly reduced by overfishing; harvest restrictions designed to promote sustained use are required if the species is to be used as an indicator of ecosystem health.
- The walleye indicator cannot reliably diagnose causes of degraded ecosystem health.
- Target reference values have not been developed for all management objectives in the Great Lakes
- The use of yield (especially in metric tonnes harvested) as a target reference value is problematic in that annual yield is not the most commonly assessed parameter across all Great Lakes.

Linkages

The walleye indicator is linked to the following SOLEC indicators: toxic chemicals in offshore waters, nutrients in lakes, aquatic non-native species, and fish habitat.

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Information Sources

List of Figures

Figure 1. Walleye harvest, reported in metric tonnes, split into contributions from tribal, recreational and commercial fisheries in the five Great Lakes.

Last Updated

State of the Lakes Ecosystem Conference (SOLEC) 2011

STATE OF THE GREAT LAKES 2012 - DRAFT

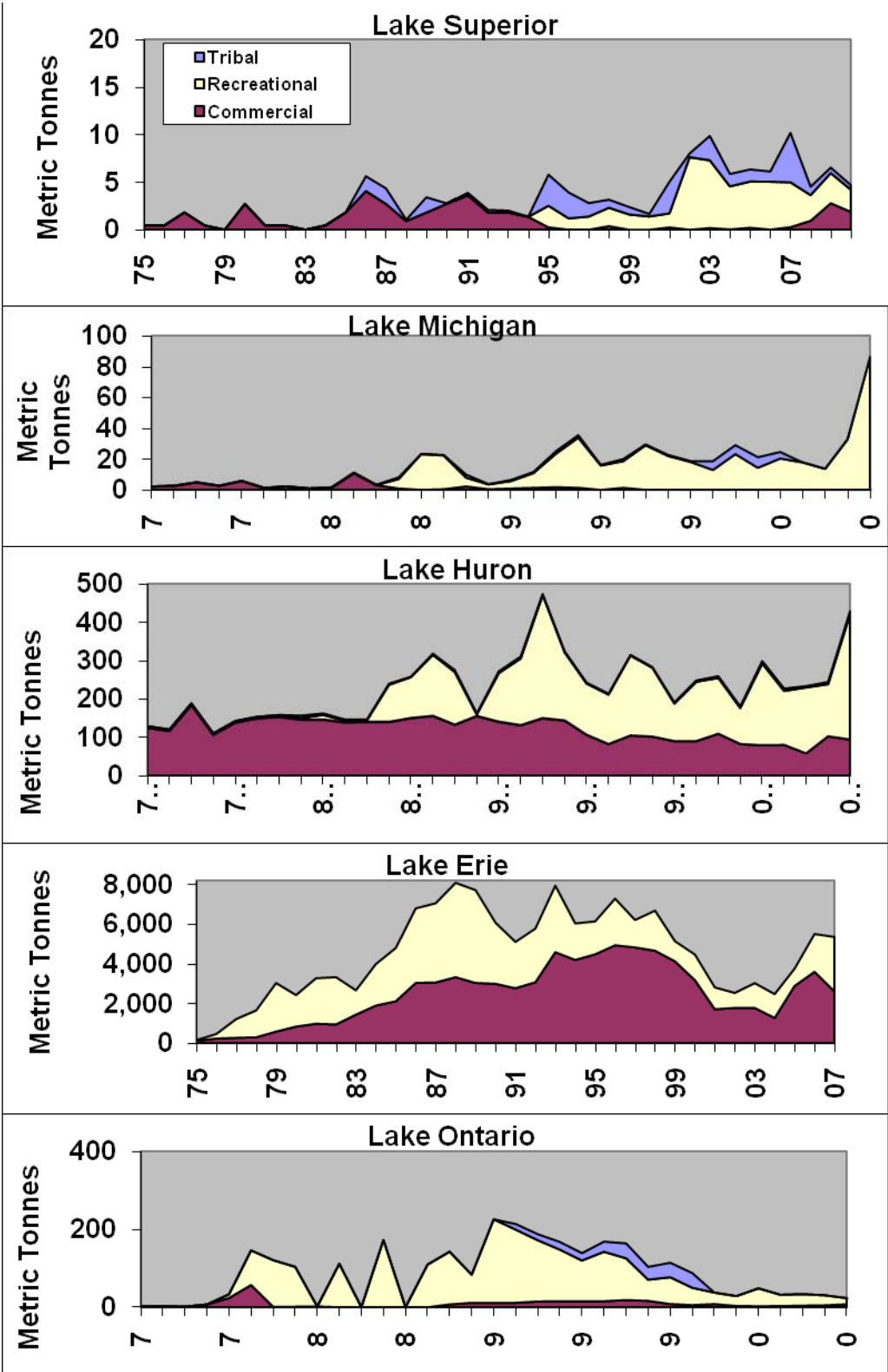


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