Walleye Population of Lake Erie

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Background

Walleye are top predators in the Lake Erie food web and they occupy habitat throughout the lake and its tributaries, including the Detroit River. As juveniles, they consume zooplankton (which are microscopic animals), aquatic insects, and other small fish, but as they mature and become the top predator their diets shift to predominately small bodied fish.

As a top predator, walleye have the ability to structure small-bodied prey fish communities within the lake through top-down pressure. Accordingly, instability in the walleye populations could also lead to instability of other fish populations with a potential to compromise the balance within Lake Erie's ecosystem. This role makes them a good indicator of ecological health.

In addition to their ecological role in Lake Erie, walleye also support important commercial and recreational fisheries in the U.S. and Canada. On average, approximately four million walleyes are harvested from the western and central basins of Lake Erie each year (Figure 1). The fisheries are cooperatively managed by the Lake Erie Committee (LEC) of the Great Lakes Fishery Commission. The LEC is a binational group, with representation from the Michigan Department of Natural Resources, the New York State Department of Environmental Conservation, the Ohio Department of Natural Resources, the Pennsylvania Fish and Boat Commission, and the Ontario Ministry of Natural Resources and Forestry.

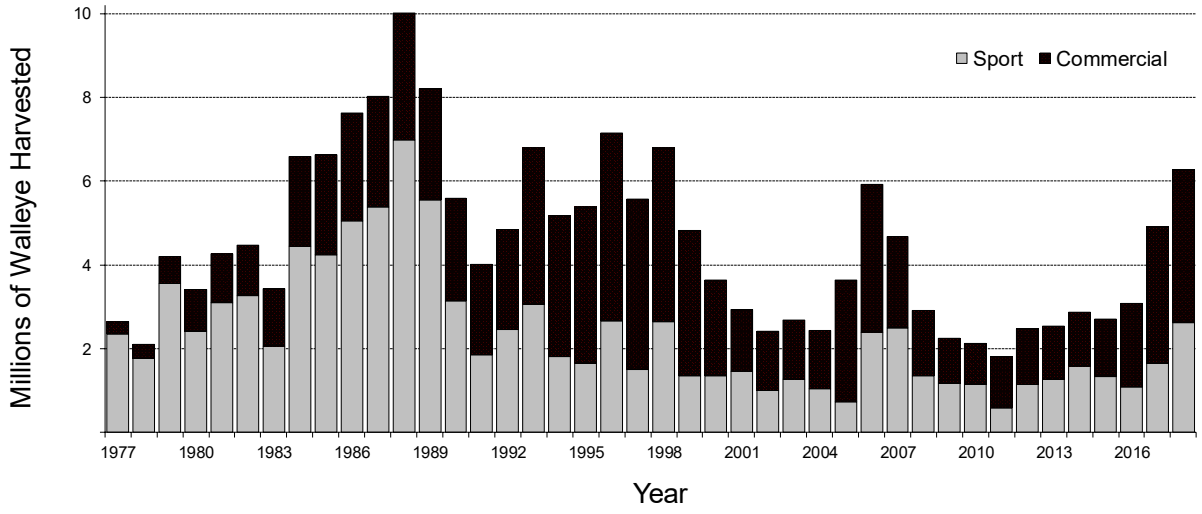

Figure 1. Annual harvest of Lake Erie walleye by fishery, 1977 to 2018.

Status and Trends

In 1970, walleye harvest was prohibited due to mercury contamination coming from the St. Clair and Detroit Rivers. Walleye harvest reopened in 1972 after mercury concentrations declined. International harvest quotas were introduced in 1976, and the LEC began estimating walleye population size in Lake Erie in 1978 (Lake Erie Walleye Task Group, 2019). These annual population estimates are generated using statistical catch at age models, which incorporate data from annual gill net and bottom trawl surveys, along with estimated recreational and commercial fisheries effort and harvest.

Figure 2 presents the population estimate for age 2 and older walleye from Lake Erie from 1978 through 2018. These trend data show an increase from the late 1970s through the mid-1980s, followed by a decline which began in the late 1980s and lasted 10-15 years. A critical minimum in the walleye population was reached in 2000, causing declining angler interest and compromised commercial economics.

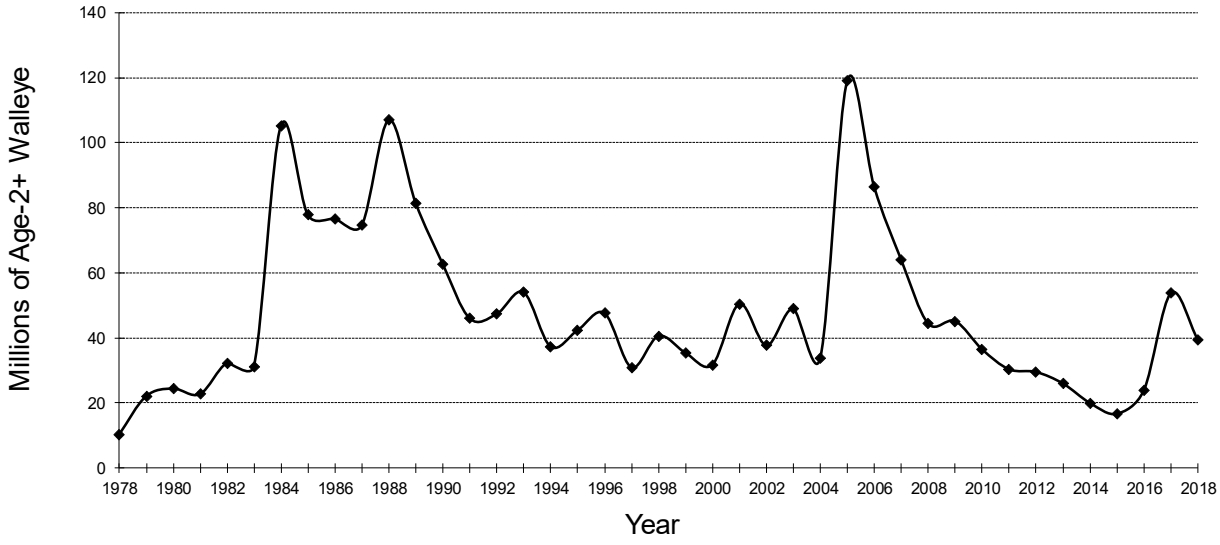

Figure 2. Population estimate of age 2 and older Lake Erie walleye, 1978-2018.

The declining population trajectory changed in 2005, with the recruitment of the large 2003-year class. The estimated abundance of age 2 and older walleye jumped, exceeding the peak estimates observed in the 1980s (Figure 2).

The walleye population experienced another declining trend through 2015 (Figure 2), as the 2003-year class aged. However, moderate to strong year classes were produced in 2014, 2015, and 2017, which have increased walleye abundance in recent years (Figure 2).

Management Next Steps

The first Lake Erie Walleye Management Plan (WMP; Locke et al., 2005) was adopted in 2005, establishing fishery quality objectives that the LEC employed as a basis for walleye management. The WMP is a cooperative and collaborative product of the LEC member jurisdictions and an example of each jurisdictions' commitment to the ongoing sustainability and

economic viability of this important fishery. This culture of collaboration is critical to the sustainable management of Lake Erie's walleye fishery.

The 2005 WMP identified limits and uncertainties on walleye management as well as sustainability thresholds and recognized the Fish Community Goals and Objectives for Lake Erie (Ryan et al., 2003), which indicate that a sufficient number of walleye need to be present to act as a keystone predator and allow stakeholders to realize a broad distribution of benefits throughout the lake (Kayle et al., 2015). The LEC also recognized the need to improve transparency and incorporate stakeholder input into structured and science-based walleye management decisions, including setting annual TACs, and began to consider mechanisms to support this. This was realized in 2011 with the formation of the Lake Erie Percid Management Advisory Group (LEPMAG), which developed an updated Walleye model that was implemented in 2013 (Lake Erie Walleye Task Group, 2019). The second WMP (Kayle et al., 2015) was adopted in 2014 and was recently extended for an additional five years, with a performance evaluation scheduled near the end of that period.

The following are the goal and objective from the Lake Erie's Fish Community Goals and Objectives (Ryan et al., 2003) that are relevant to walleye:

- Relevant Goal – Secure a balanced, predominantly cool water fish community with walleye as a key predator in the western basin, central basin, and the nearshore waters of the Eastern Basin.
- Relevant Objective – Provide sustainable harvests of walleye for all areas of the lake and maintain and promote genetic diversity by identifying, rehabilitating, conserving, and/or protecting locally adapted stocks.

Research/Monitoring Needs

To help ensure maintenance of walleye stock diversity and sustainability of the population, a number of areas of research and investigation must be addressed. These needs are reflected in the charges of the Lake Erie Walleye Task Group (WTG) and are addressed collaboratively by individual agencies as well as their federal and academic partners. In addition to maintaining and updating the centralized time series of datasets required for binational population models and assessment producing the annual Recommended Allowable Harvest (RAH), the WTG maintains a working knowledge of, and actively participates in, research relating to walleye abundance estimation and forecasting, age/size/spatial stock structure (migration rates), recruitment, and mortality. The WTG also provides evaluation and guidance for incorporating new research into Lake Erie walleye management to produce the most scientifically sound and reliable population models.

References

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Ryan, P., R. Knight, R. MacGregor, G. Towns, R. Hoopes, and W. Culligan. 2003. Fish Community Goals and Objectives of Lake Erie. Great Lakes Fishery Commission Special Publication 03-02, Ann Arbor, Michigan, USA.

Contact Information regarding Walleye Population of Lake Erie

Questions regarding the Lake Erie walleye population can be addressed to individual fisheries management agencies in the LEC jurisdictions of Michigan, New York, Ohio, Ontario, and Pennsylvania. More information on Lake Erie walleye is also available on the Great Lakes Fishery Commission LEC website: http://www.glfc.org/lake-erie-committee.php.