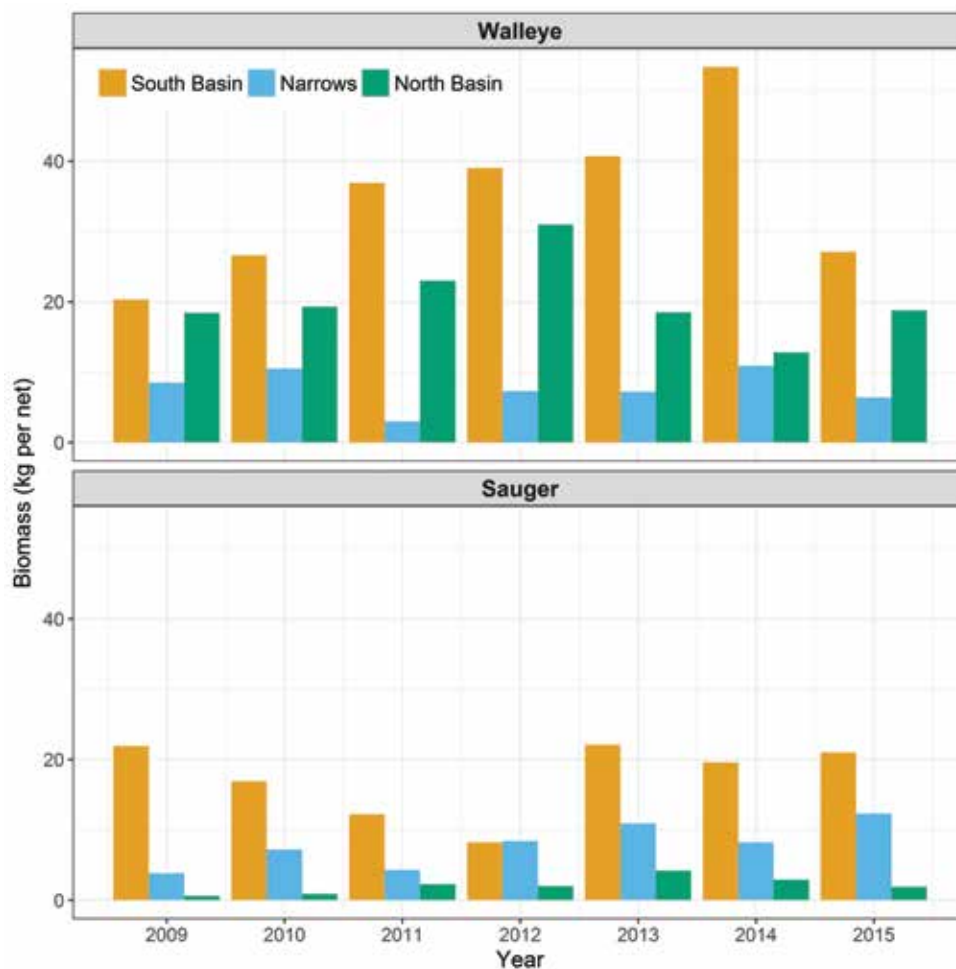


Fish Populations

LAKE WINNIPEG BASIN INDICATOR SERIES

SUMMARY

Lake Winnipeg supports an important subsistence fishery, and valuable recreational and commercial fisheries. Walleye and sauger are the primary target species. Small fish (prey fish) that walleye and sauger eat are also important to the overall health of the fishery. Manitoba Sustainable Development, Wildlife and Fisheries Branch, monitors walleye, sauger, and prey fish in Lake Winnipeg each year. This indicator reports on the weight (biomass) of walleye and sauger, condition (relative weight) and mortality of walleye, and on the weight (biomass) of prey fish, using this monitoring data.



■ **Figure 1.** Weight (biomass) of walleye and sauger in Lake Winnipeg from 2009 to 2015, by basin (south basin, north basin, and narrows).

WHAT DOES THIS INDICATOR TELL US?

The indicator provides a summary of status and trends of fish populations that support fisheries in Lake Winnipeg. For many communities around the lake, fishing is not only a major economic activity, but also an important source of food.



■ **Figure 3.** Walleye. Photo: Doug Watkinson, 2006.



■ **Figure 2.**
The basins of Lake Winnipeg.

NARROWS

SOUTH
BASIN

■ **Figure 4.**
Prey fish are sampled spring, summer, and fall with a mid-water trawl from the Lake Winnipeg Research Consortium vessel, the Namao, to get an estimate of weight (biomass) by volume of water sampled. Photo: Heather Clark, 2012.

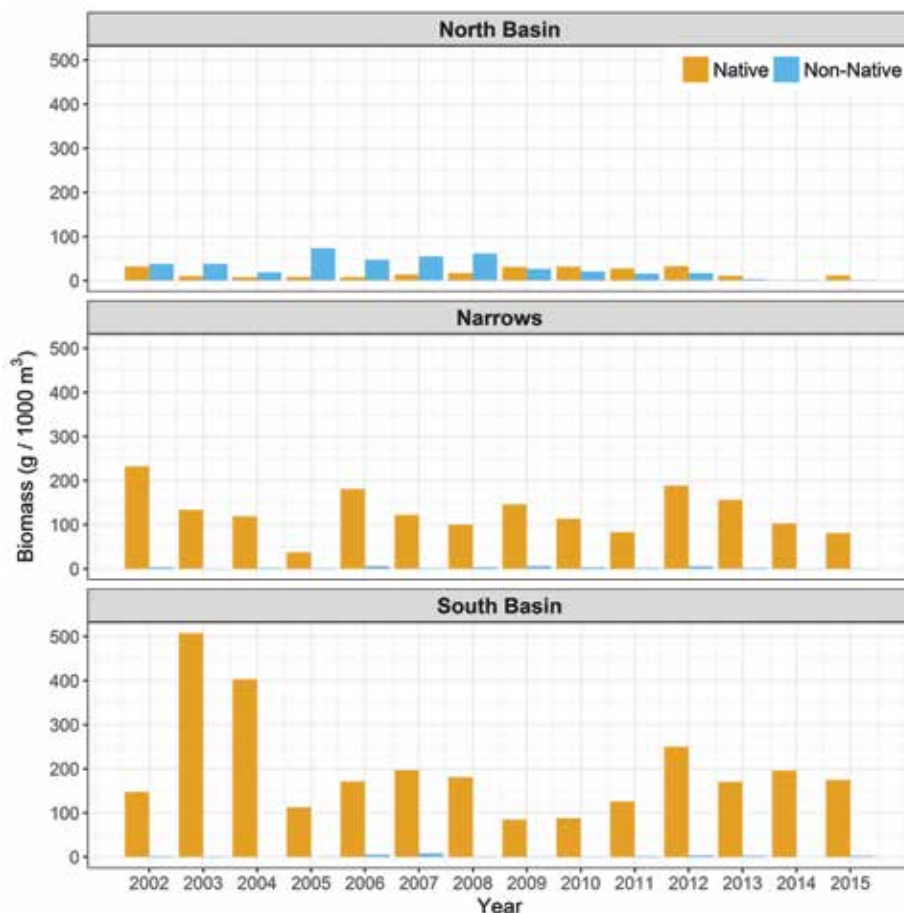


■ **Figure 5.** Sauger.
Photo: Doug
Watkinson, 2016.

Walleye and sauger are surveyed by Manitoba Sustainable Development, Wildlife and Fisheries Branch each year to estimate the relative population size and to track trends. Populations of fish that walleye and sauger use as a food source (prey fish) are also surveyed.

From 2009 to 2015 (Figure 1), walleye weight (biomass) in the north basin, the largest area of the lake, was highest in 2012, whereas biomass in the smaller south basin and narrows was highest in 2014. Over the same time period, north basin sauger (Figure 1) was highest in 2013. In the south basin and narrows, sauger biomass has been high since 2013.

Native emerald shiner and cisco comprise most of the mid-water prey fish community by weight (biomass) in the south basin, while non-native rainbow smelt was dominant in the north basin until 2009 (Figure 6). Native prey fish biomass has generally been greatest in the south basin.



■ **Figure 6.** Prey fish weight (biomass) for Lake Winnipeg from surveys conducted in the north basin, south basin, and narrows, grouped as native and non-native. Collection and processing of prey fish was funded through grants from the Fisheries Enhancement Fund, the Fish and Wildlife Enhancement Fund and the Species at Risk Program.

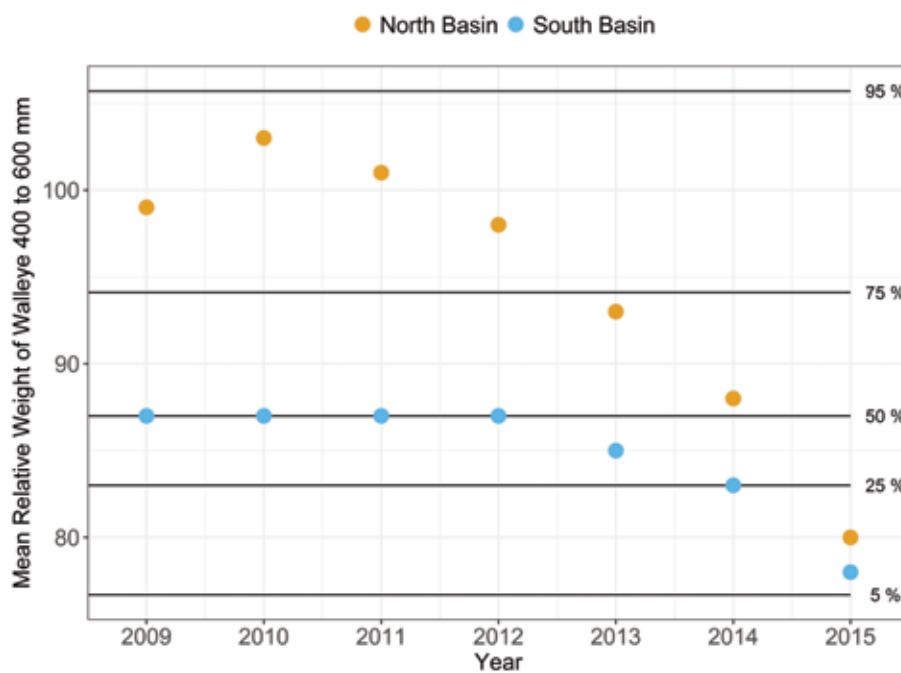


Figure 7. Condition (fish weight compared to a length-specific standard weight, which is an index of plumpness) of walleye in the north and south basins, for fish between 400 and 600 mm in length. Percentiles on the right vertical axis show how the condition of Lake Winnipeg fish compare to 83 populations of walleye from similar kinds of lakes.

From 2009 through 2012, walleye in the north basin were in above-average condition (plumpness), and south basin walleye condition was healthy, as indicated by relative weight (Figure 7). After the decline of rainbow smelt (non-native prey fish) in the north basin, walleye condition declined markedly from 2013 to 2015, indicating a lack of food. By 2015, walleye condition in the south basin had also decreased.

Mortality is the death or removal of fish from a population through natural causes and different types of fishing. Mortality is an important measurement used in determining maximum sustainable yield, that is, the highest possible annual catch that can be sustained over the long-term. The walleye mortality rate has increased since 2013, and remained higher than the rate that produces the highest long-term yields.

The mortality rate for sauger in 2015 was roughly equal to the mortality that would be associated with the highest sustainable yield.

Figure 8. Emerald Shiner. Photo: Doug Watkinson, 2017.



OUTLOOK

The overall lake-wide status for walleye is **fair** 😊 and the trend is **deteriorating** for the 2009 to 2015 period. Because the relative abundance declined after 2012, adult fish relative weight has dropped, and mortality is above the maximum sustainable yield. Also, the prey biomass has undergone a strong decline in the north basin. In particular, rainbow smelt biomass, the predominant diet of north basin walleye, declined from 2009 to 2015. Further abundance data will be needed to see if this trend continues.

The status of sauger is **fair** 😊 and the overall lake-wide trend for sauger is **stable**, based on the current mortality rate, although fluctuations in the prey base may be cause for future concern. The biomass of sauger generally increased after 2012, when mortality was roughly equal to the level of maximum sustainable yield, and south basin prey fish biomass has been relatively constant.

The overall lake-wide status for native prey fish is **good** ✅ and the trend is **stable**. Lake-wide status for non-native prey fish is **fair** 😊 and the trend is **deteriorating**.

To sustain thriving subsistence, recreational and commercial fisheries, Lake Winnipeg needs healthy fish populations. Fish populations are influenced by many environmental factors, including temperatures, nutrients, habitat, and interactions between species (predation and competition) as well as harvest.



■ **Figure 9.** The mid-water trawl is passing through an algal bloom, as it is towed through the water to catch prey fish. Photo: Heather Clark, 2012.

FOR MORE INFORMATION:

Environment Canada and Manitoba Water Stewardship. 2011. State of Lake Winnipeg: 1999 to 2007.

www.manitoba.ca/sd/waterstewardship/water_quality/state_lk_winnipeg_report/index.html

Lumb C. E., W. G. Franzin, and D. A. Watkinson. 2012. Temporal and spatial patterns in pelagic trawl fish catches in Lake Winnipeg. *Journal of Great Lakes Research* 38: 14-25.

www.sciencedirect.com/science/article/pii/S0380133011001717

Sheppard K.T., G. K. Davoren, and B. J. Hann. 2015. Diet of walleye and sauger and morphological characteristics of their prey in Lake Winnipeg. *Journal of Great Lakes Research* 41: 907-915.

CONTRIBUTORS:

Chelsey Lumb, Manitoba Sustainable Development, Wildlife and Fisheries Branch
Geoff Klein, Manitoba Sustainable Development, Wildlife and Fisheries Branch
Doug Watkinson, Fisheries and Oceans Canada
Colin Charles, Fisheries and Oceans Canada
Ross Tallman, Fisheries and Oceans Canada

Last Updated: 2 February 2018

Data Source: Manitoba Sustainable Development, Wildlife and Fisheries Branch.

This publication has been developed through the collaborative efforts of the Government of Canada and Manitoba government.

In the Lake Winnipeg indicator fact sheet series, the following colours and symbols will show the general status of each indicator.



Good: Most or all of the indicator (and/or components) are in acceptable condition.



Fair: Only some indicator components are in acceptable condition.



Poor: Very few or no indicator components are in acceptable condition.



Undetermined: Data are not available or are insufficient to assess the condition of the components.

In the Lake Winnipeg indicator fact sheet series, the following terms show the general trend of each indicator.

Improving: Metrics show a change toward a more acceptable condition.

Stable: Metrics generally show no overall change in condition.

Deteriorating: Metrics show a change away from acceptable condition.

Undetermined: Metrics do not indicate a clear overall direction, or data are not available.

Cat. No.: En4-318/2-2018E-PDF
ISBN: 978-0-660-25186-8

© Her Majesty the Queen in Right of Canada, represented by the Minister of the Environment and Climate Change, 2018.
© Manitoba government, 2018

1st Edition, March 2018

Aussi disponible en français