

DEGRADATION OF PHYTOPLANKTON AND ZOOPLANKTON POPULATIONS



Recent scientific evidence supports changing the status of the Degradation of Phytoplankton and Zooplankton Populations BUI from “Requires Further Assessment” to “Not Impaired”.

WHAT ARE PLANKTON?

Plankton are small organisms that live in the water. They are grouped into three general categories: phytoplankton, zooplankton and microbes. Plankton are an important food source for fish in the Niagara River such as Yellow Perch, Emerald Shiner, and Gizzard Shad.

Phytoplankton consist of microscopic plants that come in many forms. They make energy from sunlight, similar to land-based plants. An example of a well-known type of phytoplankton are diatoms.

Zooplankton range in size from microscopic organisms such as water fleas (*Daphnia sp.*) down to smaller organisms like mussel larvae (called veligers). Zooplankton feed on phytoplankton and smaller zooplankton.

Microbes include the smallest single celled organisms including bacteria and protozoans. Certain bacteria can be a problem in aquatic systems (e.g., *E. coli*), resulting in beach closures, but most are a natural part of the ecosystem and an important food source for zooplankton.

WHY ARE PLANKTON IMPORTANT?

Plankton form the base of the food web in aquatic environments. Phytoplankton are primary producers that make energy from sunlight, providing a food source for zooplankton. In turn, zooplankton become food for fish and other animals, which then may become food for people. There must be enough phytoplankton in the water to form the base of the food web. If there is not enough phytoplankton, the web is broken and the rest of the organisms in the food web may suffer.

On the other hand, too much plankton can be detrimental. When there is too much plankton due to excess nutrients in the water (known as eutrophication), harmful algal blooms can result. These can decrease the sunlight and oxygen in the water, which can disrupt the natural ecosystem.

WHY ARE PLANKTON A BENEFICIAL USE IMPAIRMENT INDICATOR?

Plankton are very sensitive to changes in water quality. As such, they can give clues about the overall health of an aquatic environment. In the Niagara River, plankton communities can be disturbed by:

- toxins from historical contamination;
- excess nutrients in the water (leading to eutrophication);
- sewer overflow and agricultural runoff;
- increased sunlight in very clear water; and
- physical damage from hydroelectric turbines and from the falls themselves.



HOW WAS THE PLANKTON BUI ASSESSED?

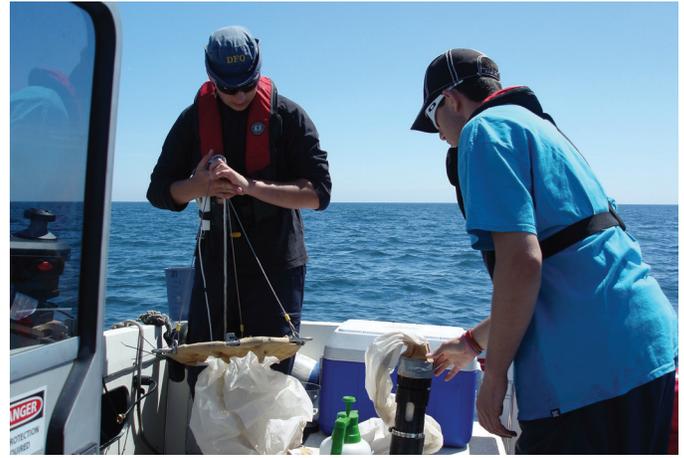
In 2014, six monitoring sites along the Niagara River were sampled monthly (from June to October) for water chemistry, phytoplankton and zooplankton composition. The assessment was conducted by scientists at Fisheries and Oceans Canada. The full report can be found on our website.

WHAT WERE THE FINDINGS?

The assessment showed that there are no issues related to populations of phytoplankton and zooplankton in the Niagara River Area of concern.

Below is a brief summary of results:

- Plankton population levels were low but consistent with expectations for a large river system with low nutrients (oligotrophic) and a high flow rate.
- The most prominent plankton in the Niagara River were rotifers, water fleas, copepods, mussel veligers, and filamentous diatom algae which thrives in high-flow environments.
- The amount of plankton decreased downstream with lowest plankton levels below the Niagara Falls.
- A small increase in plankton populations was found downstream of the hydroelectric reservoirs, where plankton have refuge from the fast-flowing river and time to recover.



- Minor diatom and algae peaks in August and September, respectively, did not negatively impact the environment.
- Phytoplankton levels were very low—similar to oligotrophic Lake Erie (consistent with the findings that the river is not impaired with respect to eutrophication and algae).
- There were no dramatic changes in zooplankton species composition down river.
- A reduction in zooplankton densities in the upper river (closest to Lake Erie) is most likely due to plankton-eating fishes such as Emerald Shiner and Yellow Perch.

FOR MORE INFORMATION

www.ourniagarariver.ca
info@ourniagarariver.ca

ABOUT THE NIAGARA RIVER

The Niagara River is a 58 km connecting channel, linking Lake Erie to Lake Ontario, shared by both Canada and the United States.

The Niagara River is one of 43 degraded locations called an Area of Concern (AOC) through the Canada-U.S. Great Lakes Water Quality Agreement. Each of these areas face significant water quality problems that could cause a negative impact on the way people or wildlife use the water resource. These negative impacts are known as Beneficial Use Impairments (BUIs). The Degradation of Phytoplankton and Zooplankton Populations BUI is one of 14 potential indicators that inform us about the health of the Niagara River.

The goal of the Niagara River (Ontario) Remedial Action Plan is to address the issues related to BUIs, and ultimately, remove the Niagara River from the list of Great Lakes AOCs. The focus of our efforts is on the Canadian side of the river only, while a separate plan is in place on the American side.