

Ecology of Walleye and Yellow Perch in Inland Waterway

Daniel Hayes

Partnership for Ecosystem Research and Management (PERM) Michigan State University

Background

Walleye within the Inland Waterway (Burt, Mullett, Crooked, and Pickerel Lakes) are managed jointly with several Native American Tribes in accordance with the 2007 Inland Consent Decree. In 2009, the population estimate of adult Walleye for the Mullet Lake System was substantially lower than a similar estimate conducted in 1998, causing concern over the status of the population. This sparked an investigation into the dynamics of walleye in the entire Inland Water, and how walleye have responded to changes in the limnology of these lakes as well as the potential for overharvest.

Study Objectives:

1. Determine movement among Inland Waterway lakes, in order to better understand Walleye in the waterway, with an emphasis on the implications of this movement for fisheries management.
2. Determine the diet of adult Walleye in each of the Inland Waterway lakes, with an emphasis on comparing food webs among these lakes, and the changes in food webs as the water chemistry and small food items (limnology) of these lakes has changed over time, as well as the lakes response to the invasion by Round Goby.

Key results

We found that after spawning, adult Walleye move extensively among these lakes and usually return to the same lake or river for spawning each year. Understanding movement patterns among lakes is important because harvest allocation between tribal fishers and state-licensed recreational anglers is based on the assumption that there is little movement. We are currently working on ways to use information on movement rates to make more accurate allocations between tribal fishers and recreational anglers. Although movement among lakes has the potential to lead to excessive harvest on the Walleye population in some locations, harvest rates in each of the lakes is below 30% and is likely sustainable at that level.

Even though harvest rates are acceptable, the population of adult Walleye in the Inland Waterway is lower than desired, particularly in Mullett Lake. Although many factors affect the abundance of adult Walleye, the survival of young fish is critical. Despite extensive efforts to collect young Walleye shortly after hatching (over 1000 samples!), very few young Walleye were caught. Moreover, the abundance of main young Walleye food item, zooplankton, was extremely low. The combination of few young Walleye being produced, along with poor food resources, is likely leading to low young fish survival resulting in poor adult population. There are many possible reasons for this “double whammy.” Our best understanding is that the number of young produced is low because of limited spawning sites (particularly in Mullett Lake), and because the number of adults is low. The limited food resources for young Walleyes is likely due to the large

number of zebra mussels that have invaded the Inland Waterway, and their capacity to filter out both zooplankton as well as the algae that is the food for zooplankton. In addition to the effect on juvenile Walleye, the abundance of zooplankton also plays a role in the survival of young Yellow Perch. Interestingly, young yellow perch are quite abundant in the Inland Waterway. We are examining the diet of young Yellow Perch in relation to the abundance of zooplankton to better understand how they manage to succeed in the Inland Waterway.

We are also examining the diet of adult Walleye, particularly focusing on the role that non-native fish play in their diet. In many lakes across the country, the dominant view of Walleye diet is that in the spring they feed extensively on Hexagenia nymphs, commonly called wigglers, and then shift to a diet of fish for the remainder of the year, with Yellow Perch often being dominant in their diet (Photo 1). With the generous help of anglers fishing the Inland Waterway, we were able to obtain well over 1,200 stomachs from adult Walleye. We found that adult Walleye did feed on wigglers during the spring, but fed on Yellow Perch to a much lesser extent than expected. In Crooked and Pickerel Lakes, Walleye fed extensively on crayfish in addition to fish. In Burt and Mullett Lakes, Yellow Perch made up a substantial part of their diet, but the non-native Round Goby were also an important part of their diet, particularly in the fall. Crayfish and other fish were also used seasonally in Burt and Mullett Lakes. The high use of food items like Round Goby and crayfish in Burt and Mullett Lakes was surprising, given the relatively small portion of the lakes' total area that is contained in shallow areas where these prey items are found. Instead, we expected Walleye from Burt and Mullett lakes to feed mostly on fish such as Alewife or Rainbow Smelt that inhabit the offshore deepwater habitats, which is the dominant habitat type in both of these lakes.



Photo 1. Common food items found in adult Walleye from the Inland Waterway. Upper left - wiggler, upper right – crayfish, middle right – yellow perch, bottom – round goby.

Additional detailed information on this study can be found at <http://www.michigan.gov/dnr/0,4570,7-153--373358--,00.html>.