COLLAPSE OF THE YELLOW PERCH FISHERY IN LES CHENAUX ISLANDS, LAKE HURON AND POSSIBLE CAUSES

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Introduction. The Les Cheneaux Islands region of Lake Huron is an archipelago along the south shore of Michigan’s upper peninsula. The area provides about 2,023 hectares of pristine coolwater habitat situated in a series of channels and embayments. The region has long been famous for its yellow perch (Perca flavescens) sport fishery dating back to the early 1900s.

Quantifiable estimates of harvest and harvest rate are available from only a series of years when creel surveys were in place. Harvest has been estimated from these surveys to be as high as 389,000 yellow perch in a single open-water fishing season (Lucchesi 1988). During the 1980s, there was concern of the possibility of over harvest and a 178 mm minimum length limit was instituted in 1988. The yellow perch fishery remained relatively stable through the mid 1990s, and then abruptly declined to a near total collapse in 2000 (Figure 1).

Figure 1. Yellow perch harvest and angler catch-per-unit-effort (CPUE) for the Les Cheneaux Islands, Lake Huron, 1979-2002. Harvest estimates adjusted for aerial pressure count method.

The objective of this Communication is to identify possible explanations for the collapse.

Methods. Since 1969, the Michigan Department of Natural Resources has conducted an annual assessment of the fish community in the Les Cheneaux Islands via gill netting with graded-mesh nets. The gill net mesh sizes ranged from 38.1 mm to 152.4 mm stretch-measure mesh. Two such nets were fished overnight in three stations each October. Catch was identified, measured for total length, round weight, sexed, and aged.

Trends in abundance were examined by comparing mean catch-per-unit-effort (CPUE) with one effort unit being one net lift. Total annual mortality rate was determined by the Robson-Chapman method. Trends in recruitment were examined by comparing mean CPUE of age-2 yellow perch over time. Age-2 perch were believed to be the first age completely vulnerable to the sampling gear. Trends in abundance of double-crested cormorants (Phalacrocorax auritus) were examined based on nest counts performed by various researchers since 1980.

Results and Discussion. Mean annual catch rate of yellow perch in survey nets declined in 1985 but remained relatively stable (Figure 2) despite the collapse in the fishery. Change of one station location in the assessment survey beginning in 1985 partly accounts for the change in mean catch rate beginning that same year. On the whole, trends in abundance based on survey catch rate did not reflect trends in the fishery. Closer examination of patterns of catch in the survey, however, indicated that the vast majority of the catch in recent years came from one location (Muskellunge Bay) while yellow perch became rare in the eastern most station (Hessel Bay). In addition, much of the survey catch was comprised of fish less than the minimum length limit and thus were not available to the fishery. Local fishery managers generally regarded the collapse in the fishery to be genuine and not just an artifact of some change in fishing preference.

Figure 2. Mean yellow perch catch-per-unit-of-effort (CPUE) in survey nets from the Les Cheneaux Island, 1969 – 2002.

Recruitment of yellow perch during this time was examined based on mean CPUE of age-2 fish in the survey catch (Figure 3). Reliable age data were not available for every year of the survey since 1969, but remaining years did provide some indication of
recruitment trends. This series suggests that annual recruitment has continued during the decline and collapse of the fishery. Despite the collapse in angler harvest and fishing pressure, total annual mortality rate of yellow perch remained high, ranging from 67% to 78% from 1997 through 2002. Mean age of perch has also declined from 4.5 years in 1997 to 1.5 years in 2002.

![Figure 3. Trends in yellow perch recruitment in the Les Cheneaux Islands based on mean CPUE of age-2 fish for 20 years between 1969 and 2002. Graphed years are limited to those for which reliable age data existed.](image)

Concurrent with the decline and collapse of the fishery and the loss of perch in certain areas of the Les Cheneaux Islands, was the proliferation of cormorant nesting in the area. Trends in nest numbers indicated a near exponential increase in usage during the early 1990s (Figure 4).

![Figure 4. Numbers of cormorant nests in the Les Cheneaux Islands vicinity 1980 - 2003.](image)

Maruca (1997) examined feeding habits of cormorants in the Les Cheneaux Islands in 1995 and confirmed that yellow perch are part of their regular diet. However, that study also concluded that the overall impact was generally low because of the then relatively high abundance of perch and because their predation was buffered for much of the year by abundant alevives (*Alosa pseudoharengus*). Alevives, however, were scarce in the late 1990s (James Johnson, Michigan DNR, Personal communication) raising the question of whether cormorant predation on perch may have been greater than measured by Maruca (1997). The timing of the rise in the cormorant population coincides closely with the collapse of the yellow perch fishery and such a predation scenario would account for the continued high total annual mortality rate and decline in mean age.

These data indicate that the collapse of the fishery and range contraction of perch were caused at least in part by the predatory effects of cormorants. It is not entirely clear, however, whether trends in recruitment also contributed. Better recruitment indices will be necessary to fully answer what function (if any) trends in recruitment play in the suppression of the perch population.

A contributory or competing explanation is that heavy angler harvest through the 1980s and early 1990s reduced the yellow perch population to a point where the fishery was vulnerable to collapse with the addition of the predatory effects of cormorants. Under this scenario, cormorant predation would then account alone or principally for the ongoing suppression of the population, once initially reduced to low levels and contracted in range.

Additional research is needed to better quantify the exact role of cormorant predation in the collapse and suppression of the yellow perch fishery and contraction in range of the population in the Les Cheneaux Islands. However, in the absence of other explanations, it is compelling to conclude that cormorant predation is at least part of the explanation.

**Acknowledgements.** Much of the survey work was funded by the Sport Fish Restoration Program. Contributing either data or manuscript review were Dale Trexel (Univ. of Minnesota), of the Michigan DNR; Gerald Rakocy, James Johnson, and the Lake Huron Basin Team.

**References.**
