

Historical Changes in the Distribution of Threatened Channel Darter (*Percina copelandi*) in Lake Erie with General Observations on the Beach Fish Assemblage

Scott M. Reid* and Nicholas E. Mandrak

Great Lakes Laboratory for Fisheries and Aquatic Sciences
Fisheries and Oceans Canada
Burlington, Ontario L7R 4A6

ABSTRACT. Laurentian Great Lakes beach fish assemblages and the factors influencing their composition have been rarely investigated. In this study, we investigated whether north shore Lake Erie beach fish assemblages, and the distribution of the channel darter (*Percina copelandi*), a threatened species in Canada, have changed since the late 1940s. Over this time period, Lake Erie has been severely altered by the combined effects of eutrophication, overexploitation of fishery resources, habitat degradation, and invasive species. Seining data from 34 north shore beach sites indicate that a large decline in species richness has occurred, and that several introduced species are present. Three fishes of federal conservation concern and four species of recreational and commercial importance, previously captured from central and eastern Lake Erie basin beaches, were absent. This included the channel darter, which was collected from only one of six historical collection sites, indicating a substantial decline in its Lake Erie distribution. Potential causes of this decline include eutrophication-induced ecosystem changes, the effect of extensive shoreline modification on beaches, and the invasive round goby (*Neogobius melanostomus*). Nearshore bottom trawls of Long Point Bay indicate that, since the establishment of round goby, concurrent short-term declines in the abundance of two other native benthic fishes (johnny darter *Etheostoma nigrum*, and logperch *P. caprodes*) have occurred.

INDEX WORDS: Beach, seine, round goby, benthic fishes, historical changes.

INTRODUCTION

Beaches account for approximately 20% of the Laurentian Great Lakes shoreline (Wei *et al.* 2004), and provide important reproductive and nursery habitats for fishes (Scott 1955, Heufelder *et al.* 1982, Wei *et al.* 2004). However, compared to coastal wetlands and other habitats, beach fish assemblages and the abiotic and biotic factors influencing their composition have been rarely investigated (Diers *et al.* 2001). In this study, we investigated whether north shore Lake Erie beach fish assemblages have changed since the late 1940s and early 1950s. Lake Erie is the shallowest and most southerly of the Laurentian Great Lakes (Hartman 1972), and supports a greater diversity of fishes than any of the other Laurentian Great Lakes (Coon 1999). However, the Lake Erie ecosystem has been severely altered through the combined effects of eu-

trophication, overexploitation of fishery resources, habitat degradation, and invasive species (Koonce *et al.* 1996).

Of specific interest to this study is the status of Lake Erie populations of the channel darter (*Percina copelandi*), a threatened species in Canada (COSEWIC 2006). Sampling of beaches during the 1940s and early 1950s indicated that it was widely distributed across the north shore of Lake Erie (Scott 1955, Phelps and Francis 2002). However, population declines in western Lake Erie (Ohio) have been occurring since the mid-1950s (Trautman 1981). More recently, in western Lake Erie (Ohio) and Lake St. Clair (Michigan), large increases in the abundance of the invasive round goby (*Neogobius melanostomus*), concurrent with declines to other darter species (*e.g.*, logperch *P. caprodes*), have been reported (Baker 2005, Thomas and Haas 2004). It is not known whether such changes have occurred in Canadian waters. Sampling in the mid-1990s confirmed the persistence of channel darter

*Corresponding author. E-mail: screid@trentu.ca

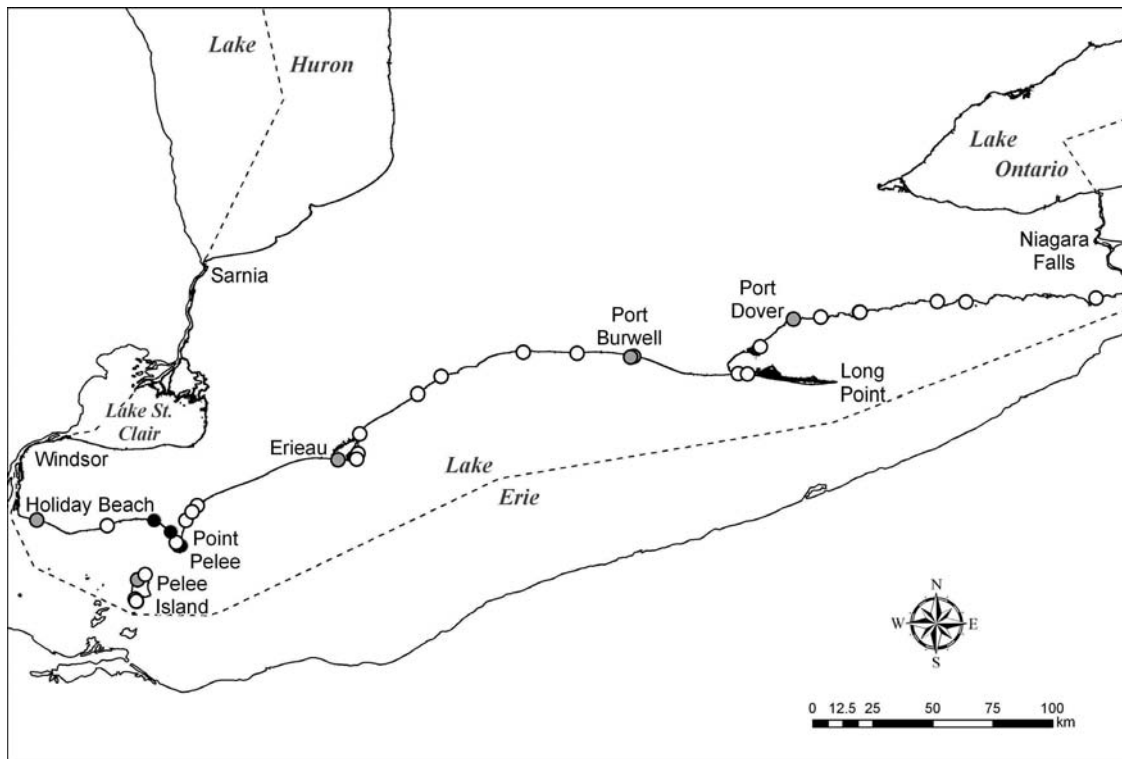


FIG. 1. Distribution of beach sampling sites (○) across the north shore of Lake Erie; including previous (●) and 2005/06 (●) channel darter collection sites.

populations in the Huron-Erie corridor (Phelps and Francis 2002), but the status of Lake Erie populations is unknown. Improved information on its distribution and habitat requirements is a priority for channel darter recovery (Jacobs *et al.* 2005). While recent studies have investigated riverine populations (Reid 2004, Reid *et al.* 2005), little study has occurred on the populations in the Laurentian Great Lakes and connecting waters.

During the spring and fall of 2005 and 2006, we seined beaches along the north shore of Lake Erie and on Pelee Island to: 1) describe the current distribution and habitats of the channel darter, and 2) characterize the fish assemblage and document changes that have occurred since sampling in the late 1940s.

METHODS

Field Sampling

In 2005 and 2006, 34 sites were sampled on Pelee Island and along the north shore of Lake Erie (Fig. 1). Sites represented a mix of sand and sand/gravel beaches, and were primarily located in

municipal, provincial, and federal parks. Maximum sampled water depths ranged between 0.5 and 1.5 m. A range of bottom types was sampled including: sand, sand/gravel, and gravel/cobble/boulder. Spring and fall water temperatures were similar in the two years: 12.9 to 27.0°C and 12.5 to 25.0°C. Measurements of conductivity and water clarity (Secchi depth) ranged from 213.5 to 329.5 $\mu\text{s}/\text{cm}$ and 0.04 to 1.2 m, respectively. Site selection was based on the following criteria: 1) resample all past channel darter collection sites; 2) sample additional beaches in the same area seined by the Royal Ontario Museum (ROM) in the 1940s; 3) sample beaches in all three Lake Erie basins; and, 4) ensure sites are accessible for both day and night sampling. Past channel darter collection sites included: Holiday Beach Conservation Area, Point Pelee, Pelee Island (Scudder), Eriean, Port Burwell, and Port Dover.

Sites were sampled with consecutive 50 m long seine hauls pulled parallel to the beach. Depending on beach length, two to five seine hauls were completed at each site. The bag seine was 15.2 m \times 2.4 m with a 2.4 m \times 2.4 m \times 2.4 m bag. Mesh size was

Download English Version:

<https://daneshyari.com/en/article/4399160>

Download Persian Version:

<https://daneshyari.com/article/4399160>

[Daneshyari.com](https://daneshyari.com)