

**Assessment and mitigation of the effects of commercial fishing activities on aquatic
Species at Risk in Long Point Bay**

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Executive Summary

The Long Point Bay (LPB) wetland complex is considered a provincially significant wetland, and is recognized world-wide as a wetland area of extraordinary ecological and social importance. It is designated as a UNESCO World Biosphere Reserve. The LPB ecosystem supports a diverse aquatic community and a significant number of federally and provincially designated species at risk (SAR). LPB is important habitat for amphibians, turtles, fish and migratory birds. Commercial seine net fisheries have been operating in Long Point Bay for at least 130 years and hoop nets since around 1915. Commercial fishing activities continue to be socio-economically important for several LPB communities. Fishers have survived many changes and challenges over this period, the newest being the Ontario Endangered Species Act 2007, which came in to effect in 2008, and imposes a responsibility on commercial fishers to live-release all incidentally caught threatened and endangered SAR, to take actions to minimize impact, and to ensure that commercial fishing activity will not jeopardize the survival or recovery of the species. The objectives of this project were to monitor, and where necessary, reduce or eliminate any incidental harm to any aquatic species at risk (SAR) that might be associated with commercial fisheries, and to assist fishers in identifying these species and handling them properly. We defined species of interest (SoI) as all aquatic species with a conservation status set by COSEWIC and all turtles (regardless of COSEWIC status) that were caught in the commercial gear. Commercial fishing activities on inner Long Point Bay were monitored over the 2009 fishing season. We documented all SoI that were caught in the fishing gear, and the condition of the animals before and after release. SoI were photographed when weather permitted. Fishing was monitored for 17 days, ten days in the spring and 7 in the fall and total of 368 hoop net lifts were monitored. All SoI that were caught in commercial gear survived and were returned to the lake unharmed. Overall, 203 individuals of SoI were caught in 368 hoop net lifts for a mean catch per lift (CPL) of 0.55. Only one individual of a provincially and nationally threatened species, Spotted Gar (*Lepisosteus oculatus*), was caught with a mean catch per lift (CPL) of 0.0027. All other observed SoI

are designated Special Concern except for the Painted turtle which has no status. The most common SoI found in nets was Warmouth (*Lepomis gulosus*) which was caught 141 times (CPL = 0.38) and Northern Map Turtle (*Graptemys geographica*) caught 56 times (CPL = 0.15). Most lifts caught no SoI, i.e., 243 out of 368 lifts or 66.7% had no SoI, 21.1% had one, 7.6% had two and only 5.9% of lifts had three or more SoI per lift. Twenty-nine photo vouchers, consisting of 41 specimens, including 39 Warmouths, 1 Rudd and 1 Spotted Gar were submitted to the Royal Ontario Museum and were filed under ROM Accession 7690. The invasive species Rudd, (*Scardinius erythrophthalmus*) which is an European minnow was caught 3 times, and this is the first report of Rudd from inner Long Point Bay. This study demonstrates that existing commercial fishing practices have little or no effect on aquatic SAR and SoI in Long Point Bay and the current license conditions appear to provide more than adequate protection for these species. It also demonstrates the feasibility of using commercial fisheries to contribute valuable information on the status of SAR.

Introduction

Lake Erie contains one-third of the coastal wetlands in the Great Lakes system and a large proportion of these are within the Long Point ecosystem (Lawrence 2006). Long Point Bay (LPB) is located in Norfolk County on the north shore of Lake Erie, between the peninsula of Long Point and Turkey Point. The Long Point wetland complex encompasses 13,465 ha and includes more than 70% of the total wetland area along the north shore of Lake Erie (OMNR 2003) (Figure 1). Inner Long Point Bay is shallow with mean water depth of one meter and approximately 90% of the bottom is covered with submerged aquatic plants that provides habitat for diversity of aquatic animals (Lawrence 2006) (Figure 1).

The Long Point Bay ecosystem includes Long Point Provincial Park, the UNESCO Long Point World Biosphere Reserve and a Canadian Wildlife Service National Wildlife Area. The LPB ecosystem supports a high diversity of aquatic species, a significant number of federally and provincially

designated species at risk (SAR) and is a very important habitat for many turtles, fishes and migratory birds.

Seine net fisheries have been operating in inner Long Point Bay for at least 130 years, but hoop nets came later, around 1915. The fish community in Inner long Point Bay has changed significantly over the years (Whillans, 1979), and changes in species composition have followed general changes in fish community in Lake Erie (Lawrence 2006, Cox 1992). Most of the changes are correlated with depletion of specific fish species due to over harvesting and introduction or invasion of exotic species. However, some of the changes in the fish community and fisheries have also been related to human disturbance directly in Long Point area, such as the damming of Big Creek and the building of the Long Point causeway that restricted walleye and blue pickerel access to historical spawning grounds (Whillans 1979).

Today there are 18 licenses with total of 8 seine nets and 200 hoop nets (D. Cartier, Ontario Commercial Fisheries' Association, 46 James Street, Blenheim, ON, N0P 1A0, pers. comm.).

Commercial fishing is concentrated around the perimeter of the inner LPB. Commercial fishers are permitted to fish 400 yards of seine net set from shore and maximum of 16 hoop nets per license. No commercial fishing is permitted between May 13 and August 31, primarily to minimize conflicts with the large recreational fishery (Hamley & MacLean 1979). Almost all of the commercially harvested fish is sold to the live fish markets in Ontario. Fishing effort is highest in early spring when most fishers are active, and is much lower in the fall season.

The Ontario Endangered Species Act 2007, which came into effect in 2008, puts specific conditions on commercial fishing licenses requiring fishers to release any incidentally caught SAR, to take measures to minimize impact, surrender any dead incidentally caught SAR, and ensure that fishing activity will not jeopardize the survival or recovery of SAR. For this project we defined Species of Interest (SoI) as all species with a conservation status set by COSEWIC or COSSARO, and all turtles that might get caught in the hoop nets (Appendix B). The fundamental objective of the project was to monitor and

document SoI capture, and if necessary reduce or eliminate possible accidental harm to any aquatic SAR in Long Point Bay that might be associated with commercial fisheries. This objective was met via contribution of the fishers to monitoring of SoI, the education of fishers in the identification of SoI in their gear, the proper handling of SoI for release, and recognition of factors that represent threats to SoI in commercial fishing gear. The project will benefit aquatic SoI in inner Long Point Bay by providing information on the occurrence and distribution of SoI and will promote commercial fishers as stewards of the resource.

Methodology

Commercial hoop netting activities on Inner Long Point Bay were monitored from early April until May 13, (when fishers are required to pull their gear), and resumed in the fall, when commercial activity began again after August 31, continuing until mid-November. A fisheries biologist accompanied commercial fishermen as they lifted and tended their gear. Most of the hoop nets are 3.0 ft. in diameter but a few are 2.5 ft, and the leads are 25 – 50 m long. The hoop nets are usually set with the lead close to, and perpendicular to, the shore, often with 3 or more hoop nets set in a line extending out from the shore. In almost all cases, the hoop nets are fully submerged in the water with no area of the gear exposed to the surface. At each hoop net, the geo-coordinates of the net (GPS), size of net (diameter of the hoop), water depth, set time, weather conditions, water temperature and water clarity were recorded. Weather conditions permitting, we also recorded and digitally photographed all SoI caught in the fishing gear, and the condition of the animal before and upon release. The DFO's guide to photographing fish SAR for non-lethal vouchering purposes was used to document these SoI. Distribution maps and GIS analysis was carried out using DIVA-GIS (Hijmans et. al. 2004), maps were downloaded from Ontario Base Mapping (OBM) provided by OMNR and available at (<http://www.geographynetwork.ca/website/obm/viewer.htm>). Graphs and statistics were done in Gnumeric 1.9 (available at <http://projects.gnome.org/gnumeric/>) and STATISTICA, version 6.

(StatSoft, Inc. 2001).

Results

Commercial fishing activity was monitored for a total of 17 days, ten days in the spring and seven days in the fall and total of 368 hoop net lifts were monitored. Most of the observation effort was concentrated on the North Shore and Big Creek area, but few lifts were monitored in the Turkey Point Marsh and Long Point Company Marsh (Figure 1).

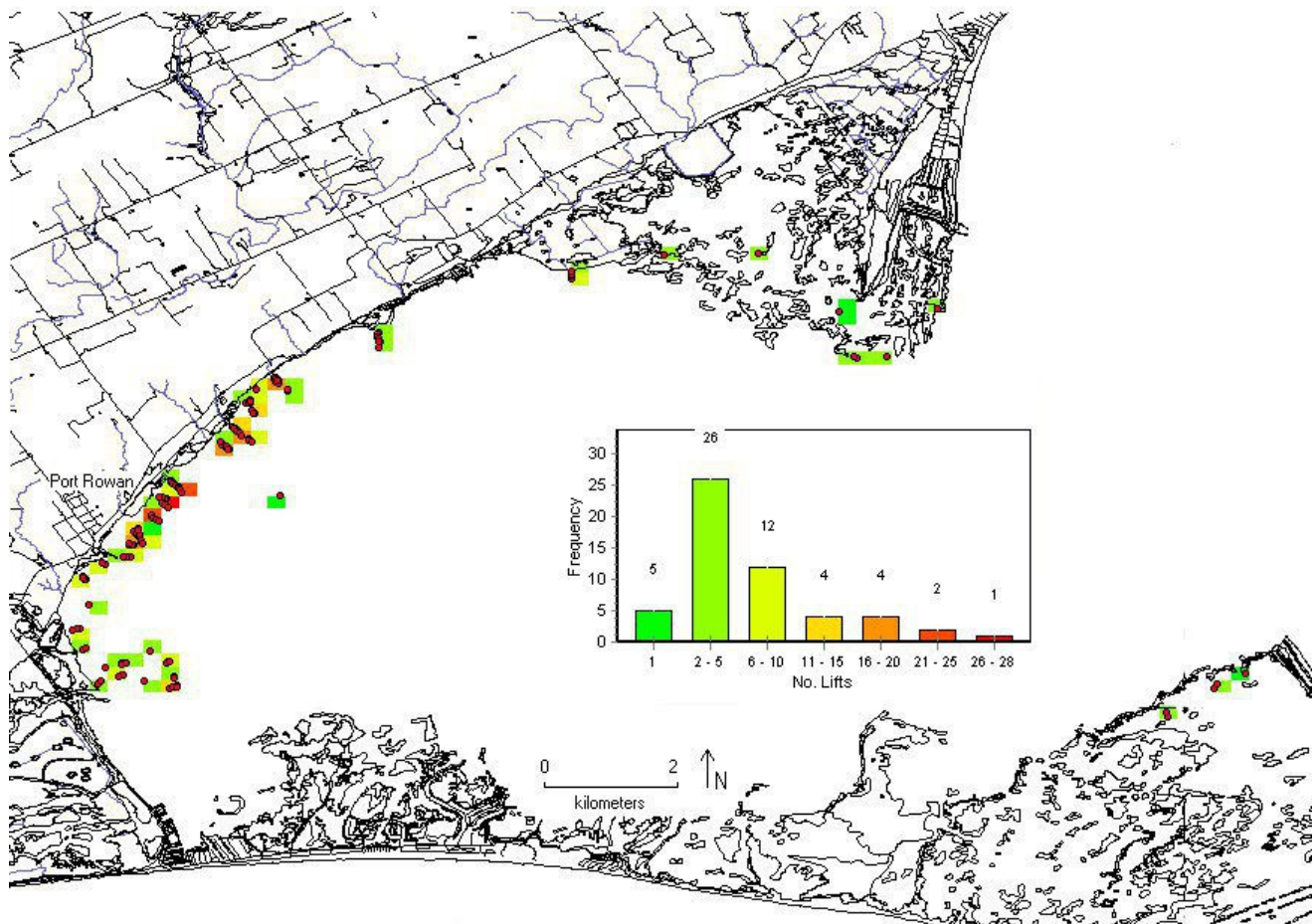


Figure 1. Location of hoop nets in Inner Long Point Bay. Red dots show the location of observed hoop nets. Inset histogram displays key for coloured squares and the frequency of squares that have 1, 2-5, 6-10, 11-15, 16-20, 21-25, 26-28 number of lifts in each 200x200 meter square.

All SoI that were observed in commercial hoop net lifts survived and were returned to the lake unharmed. A total of 203 individuals of SoI were caught in the observed nets with a catch per lift (CPL)

of 0.55. In only one instance did we observe the capture of a species with a threatened designation under COSEWIC; a Spotted Gar (*L. oculatus*) was observed in one lift with a CPL of 0.0027. All other captured SoI have a COSEWIC designation of Special Concern, with the exception of the Painted Turtle which is not designated as a SAR. The most common SoI found in commercial hoop net catches was Warmouth (*L. gulosus*), which was caught 141 times, (CPL = 0.38) (Appendix C). The next most common fish SoI was Grass pickerel (*Esox americanus vermiculatus*) which was observed twice (CPL = 0.005). A total of 56 Northern Map Turtles (*G. geographica*) caught making this species the most commonly observed turtle in commercial hoop net lifts (CPL = 0.15) (Appendix C). Snapping turtle (*C. serpentina*) and Painted turtle (*Chrysemys picta*) were caught 3 times each (CPL = 0.01).

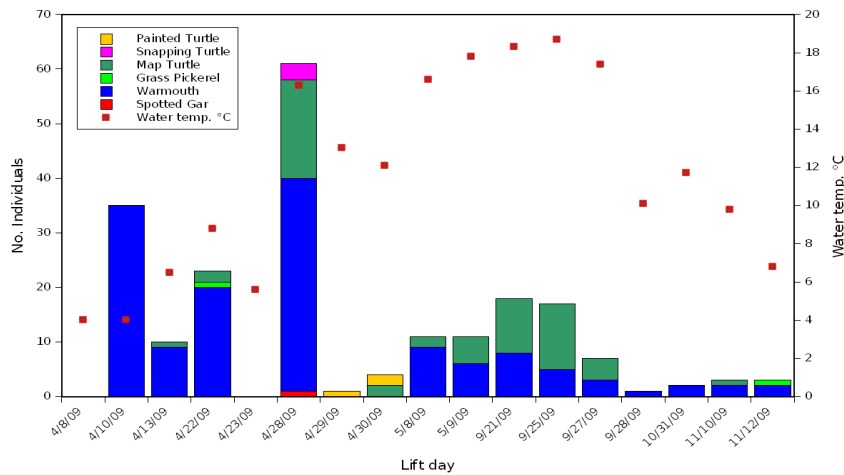


Figure 2. The number of individuals from all species of interest (SoI) observed in hoop net lifts and mean water temperature °C each lifting day.

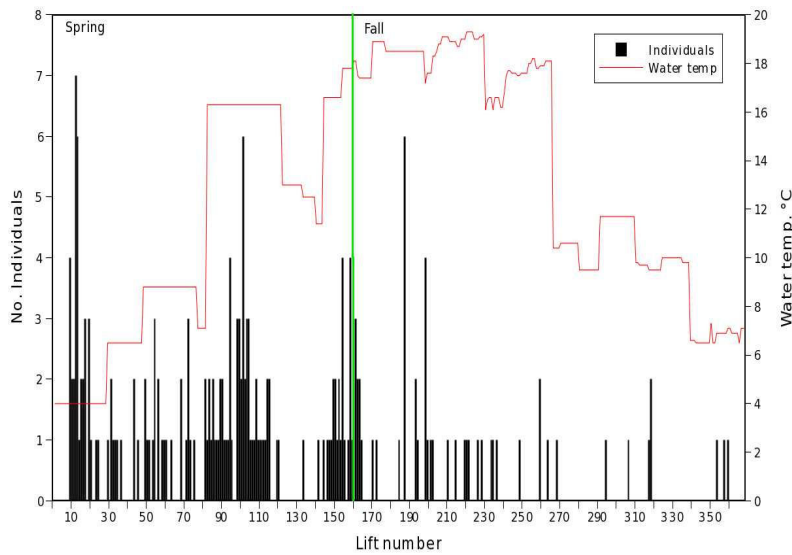


Figure 3. Frequency of observation of SoI by hoop net lift and water temperature °C at each lift location. Green vertical line divides data between the spring and fall seasons.

The number of SoI caught in each hoop net lift is highly variable, ranging from 0 to seven, with the mean number of 0.55 SoI caught per lift (Figure 3). Most hoop net lifts contained no SoI - 243 out of 368 lifts or 66.7% had no observed individuals of SoI, 21.1% of lifts had one individual SoI and 7.6% had two individual SoI. Only 5.9% of lifts have three or more individual SoI per lift (Figure 4).

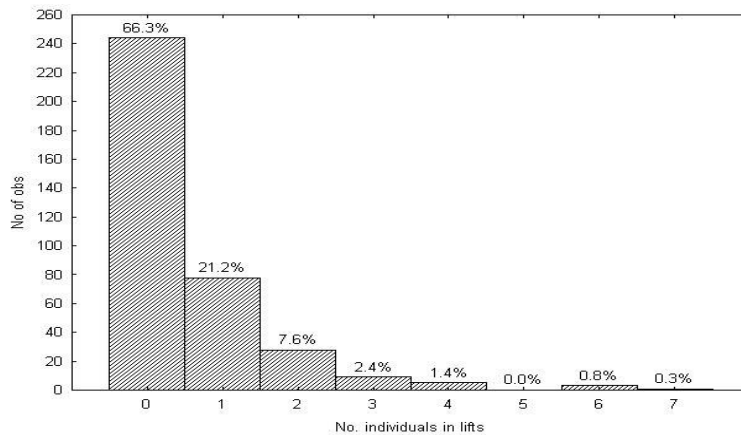


Figure 4. Number of individuals of species of interest in each hoop net lift.

More net lifts were observed in the fall than the spring with 208 and 160 observed lifts in the fall and spring, respectively. More individual SoI were caught in the spring than in the fall, the mean number of SoI caught per lift day was 15.5, (Var=367.83) and 7.28, (Var=52.24) for the spring and fall respectively. The differences between mean number of individual SoI per day between spring and fall are not significantly different primarily because of the small sample size and large, significant differences ($p < 0.05$) in variation in catches per day. The mean number of individual SoI per lift in the spring is 0.96, (Var=1.57) and is significantly higher ($p < 0.0001$) than the mean for the fall of 0.24, (Var=0.46). Significant differences ($p < 0.0001$) are also found between spring and fall in variation for the mean number of individuals in hoop nets with the larger variation occurring in the spring.

Rudd (*Scardinius erythrophthalmus*), an exotic species from Europe, was observed three times over the survey and appears to be more common in inner Long Point Bay than some of the species of interest that have the COSWIC designation of Special Concern, e.g., Grass pickerel. Other more common but interesting species that were observed in hoop nets lifts were Longnose Gar (5), Northern Quillback (1) and Sea lamprey (2).

Twenty nine photo vouchers with a total of 41 specimens including 39 Warmouths, 1 Rudd and 1 Spotted Gar were submitted to the Royal Ontario Museum for identification by specialist. All the fish were correctly identified in the field, although there is slim chance that the Spotted Gar could be a Florida Gar (*Lepisosteus platyrhincus*). The photo vouchers were filed in ROM Accession 7690 and the locality data entered into the Distribution Database

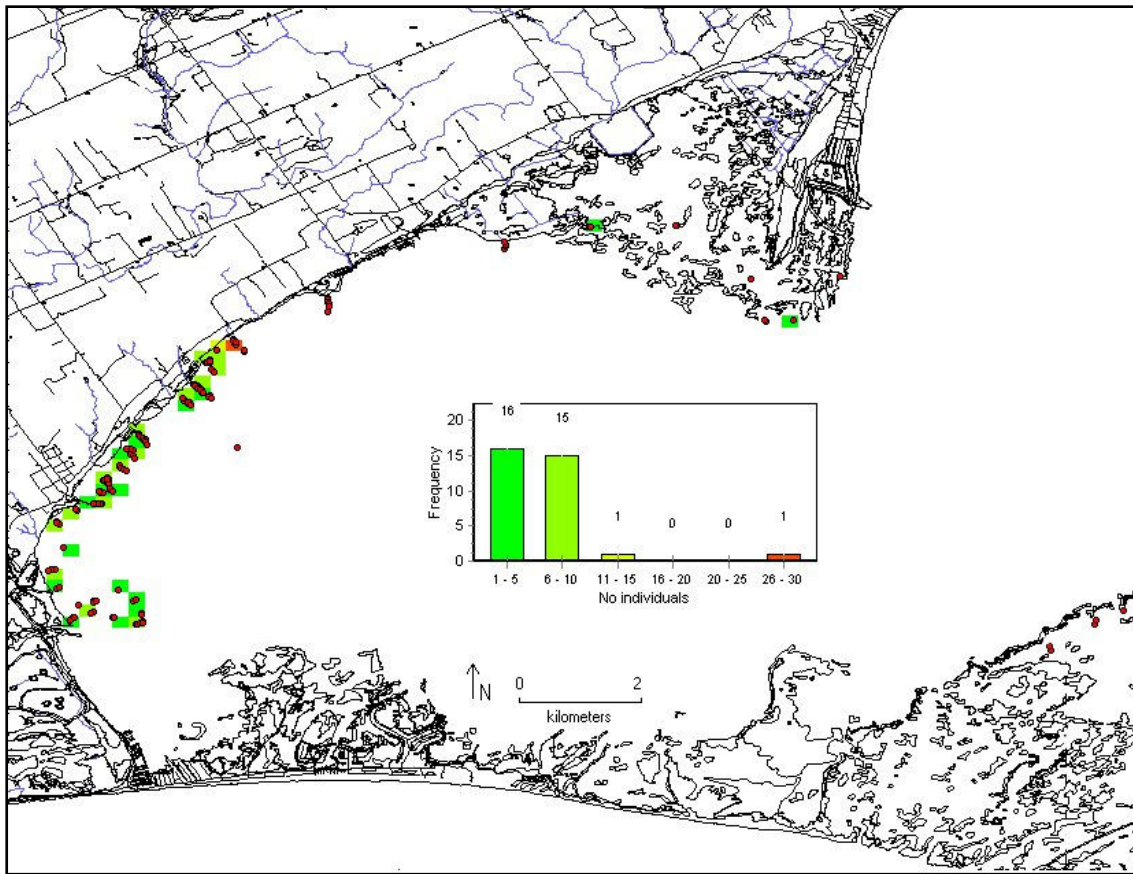


Figure 5. Distribution of species of interest in inner LPB on a 200x200 meter grid. Inserted histogram displays key for coloured squares and the frequency of squares with 1-5, 6-10, 11-15, 16-20, 21-25 and 26-30 individuals in each square.

Discussion

The results indicate that commercial hoop net fishing in inner Long Point Bay has little if any effect on aquatic species at risk. Only one individual with a COSWIC designation of threatened (TH) was observed, and all other observed SoI have a COSEWIC designation of special concern (SC). Results show that 2/3 of lifts contain no SoI and that all individual SoI came out of the hoop nets alive and were return to the water without harm. Fish species of interest were all in good condition after spending a maximum of 24 hours in the gear. The hoop nets have a small mesh size and are well

maintained making it improbable that a fish can become gilled or otherwise caught in the mesh of the net and cause harm to themselves. All turtles caught in nets came out of the nets in good condition, even if the net was not exposed to the surface. Turtles are air breathers, but can survive extended time (days) underwater if water temperature is under 20°C (Ultsch 1985). In most years, including 2009, water temperature does not reach 20°C in the inner LPB until after fishers stop fishing in late spring, and the water temperature has generally fallen below 20°C by the time fishers start up again in the fall. Conditions on the 2009 licenses for commercial fishers in inner LPB stated that fishers are required to lift their hoops every 24 hours if the nets are not open to air in order to prevent harms to turtles in the nets. This study showed that the 24 hour license condition was more than effective in preventing harm to turtles. Consequently, in response to concerns about the effort required to lift every hoop net every day, the 24 hour license condition was changed to 48 hours starting in 2010.

License conditions also state that any species caught in nets that is listed on the species of risk in Ontario as extirpated, endangered or threatened species under the Endangered Species Act, 2007, must be returned to the water in manner that causes the least harm, if alive and any dead species at risk that is caught shall be brought in and handed to MNR. In both cases fisher is required to document the species in his daily catch report. Education of the fishermen in effectively identifying, handling and reporting species at risk in the hoop net benefits species at risk in inner LPB by reducing incidental harm if caught and by providing enhanced data on occurrence of these species. Although a COSWIG designation of SC does not provide the same protection to a species as would higher status like END and TH, the commercial fishers of inner LPB appear to handle these species and turtles the same as species at risk with the higher designations.

The invasive Rudd, a European minnow that was introduced to some states in the U.S.A as a bait fish, but was released to the wild (Crossman *et. al.* 1992) was observed in 3 hoop nets. This is the first report of Rudd in inner Long Point Bay, although the species has been found in the eastern part of Lake

Erie (OFAH 2010) and has been moving slowly to the west and has been found as far west as Long Point. Rudd may be a serious threat to the fish community in inner Long Point Bay and Lake Erie and its establishment may have unpredictable consequences. As a consequence of this project, and a presentation of the results at the spring 2010 meeting of the inner Long Point Bay fishers, the fishers are now aware of this species, and will destroy any Rudd that are caught in their nets.

Acknowledgements

We thank the commercial fishers of inner LPB for their cooperation and assistance. In particular, Frank Schram, David Wamsley, Ray Ferris, and Brad Woodward were key participants who contributed a great deal to the success of the project. Thanks also to Bernie Solymar (Long Point World Biosphere Co-ordinator) for his strong support of this project and to Mike Morencie (MNR) for suggesting the study in the first place. This study was supported through funding from SARRFO, the Ontario Commercial Fisheries' Association and MNR's Lake Erie Management Unit.

Appendix A

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Appendix B.

Table B1. Species of interest as defined for the study. Table show species of concern, COSEWIC status and frequency in hoop nets. Species of interest is defined as all species with COSEWIC status and all turtles that get caught in commercial hoop nets. COSEWIC status categories are: Extinct (EX), Extirpated (XT), Endangered (END), Threatened, (THR), Special Concern, (SC), Data deficit (DD) and Not At Risk (NAR).

Species	Scientific name	COSEWIC status	Found in study
Pugnose Shiner	<i>Notropis anogenus</i>	END	no
Stinkpot	<i>Sternotherus odoratus</i>	END	no
Spotted Gar	<i>Lepisosteus oculatus</i>	THR	1
Lake Chubsucker	<i>Erimyzon sucetta</i>	THR	no
Spotted turtle	<i>Clemmys guttata</i>	THR	no
Spiny Softshell	<i>Apalone spinifera spinifera</i>	THR	no
Blanding's Turtle	<i>Emydoidea blandingii</i>	THR	no
Grass Pickerel	<i>Esox americanus vermiculatus</i>	SC	2
Warmouth	<i>Lepomis gulosus</i>	SC	141
Silver Chub	<i>Macrhybopsis storeriana</i>	SC	no
Northern Brook Lamprey	<i>Ichthyomyzon fossor</i>	SC	no
Northern Map Turtle	<i>Graptemys geographica</i>	SC	
Snapping Turtle	<i>Celytra serpentina</i>	SC	3
Painted Turtle	<i>Chrysemys picta</i>	NAR	3

Appendix C

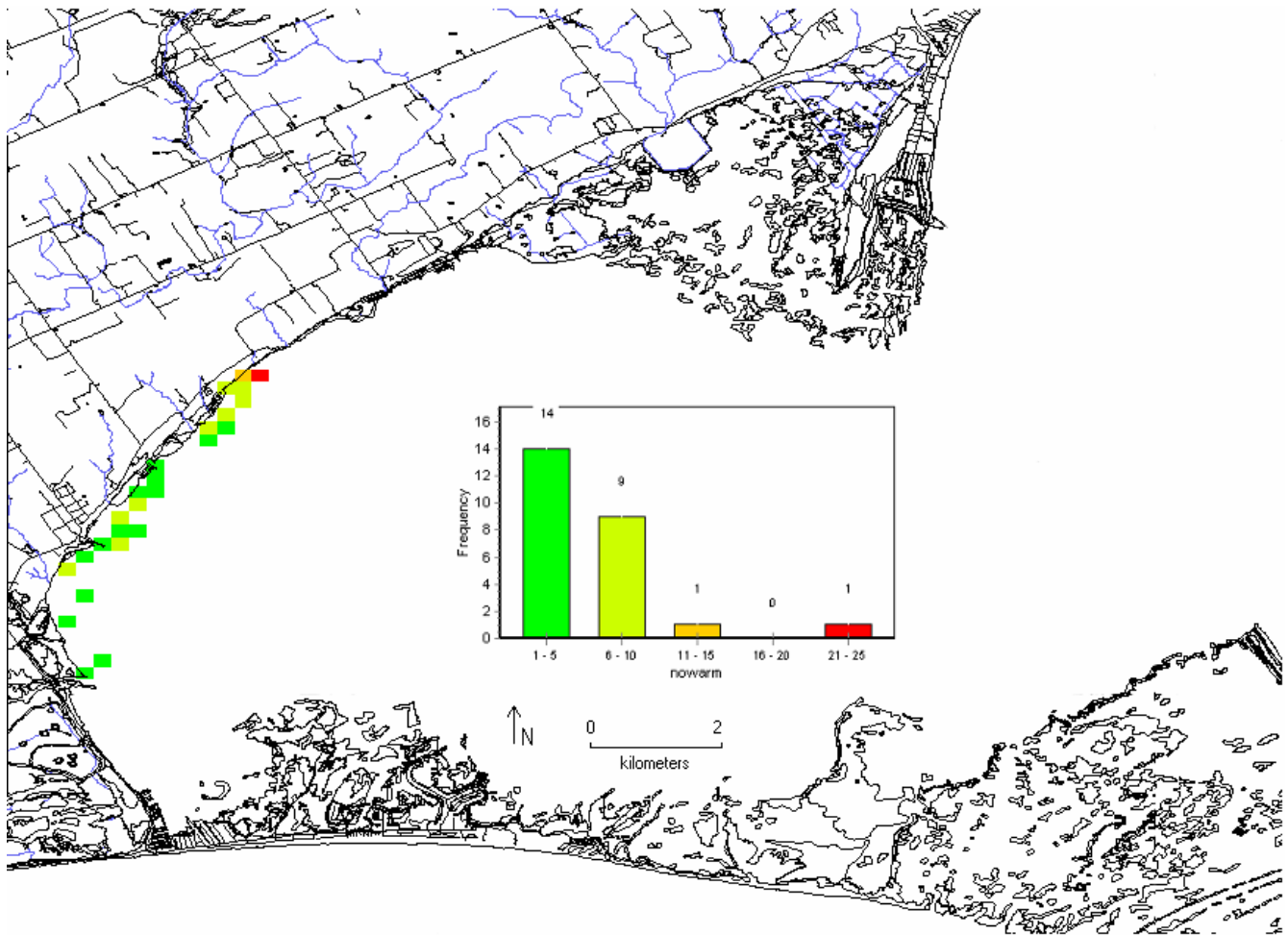


Figure C1. Distribution of Warmouth in inner Long Point Bay on a 200x200 meter squares. Inserted histogram displays the key for coloured squares and the frequency of squares with 1-5, 6-10, 11-15, 16-20 and 21-25 individual in each square.

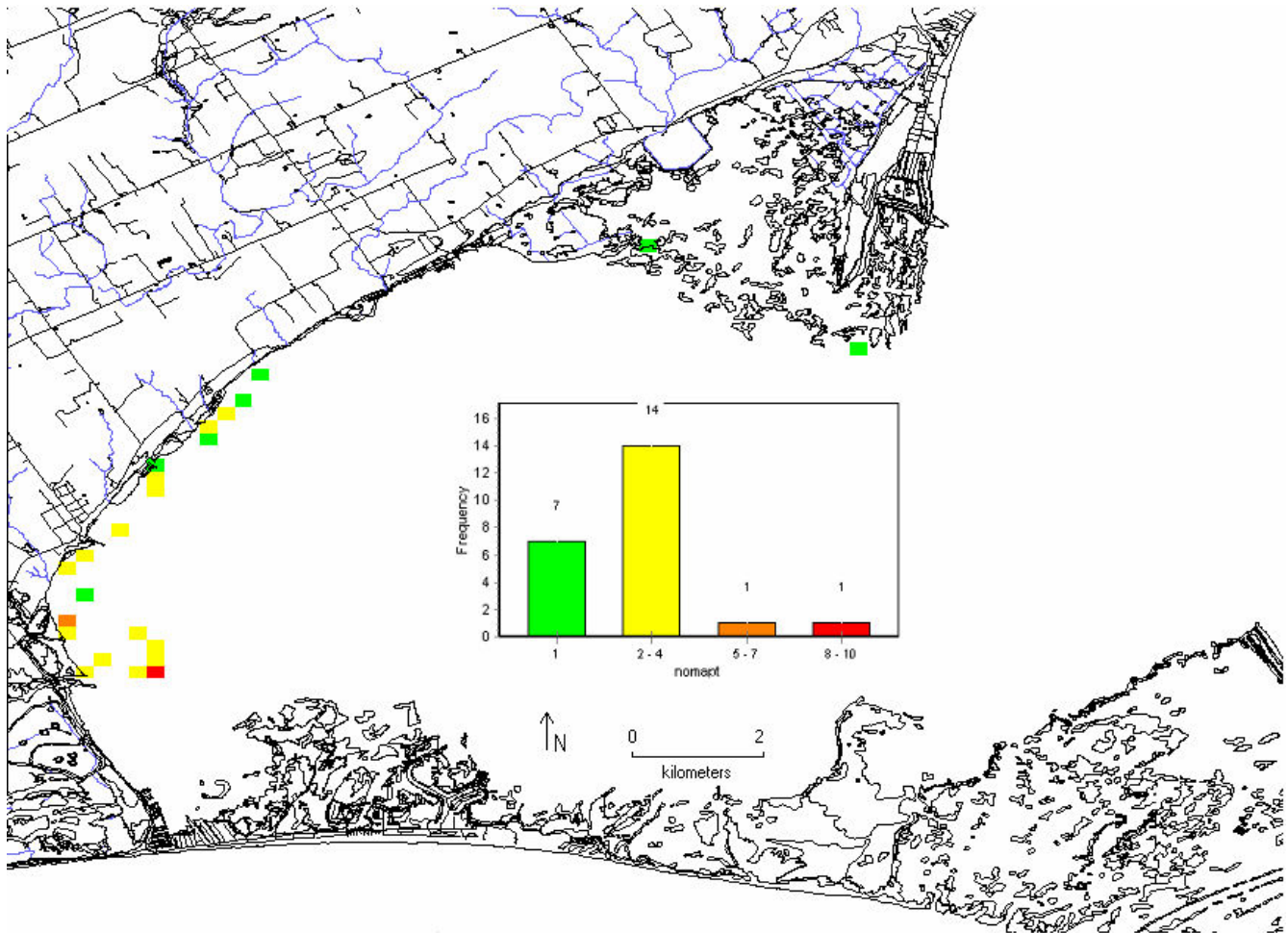


Figure C2. Distribution of Northern Map Turtle in inner Long Point Bay on a 200x200 meter squares. Inset histogram displays the key for coloured squares and the frequency of squares with 1, 2-4, 5-7 and 8-10 individual in each square.