

**Preliminary assessment of aquatic habitat and biota
in Red Bay, Bruce County, Ontario: Final Report**

Prepared for a hearing of the Ontario Municipal Board

Prepared by: McMaster Coastal Wetlands Group
Pat Chow-Fraser, Supervisor
Research Team: Maja Cvetkovic, Jonathan Midwood, & Robert J. Christensen
McMaster University, Department of Biology

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Summary:

Bruce County is home to a complex, diverse, and integrated network of provincially significant wetlands (PSW) and ANSI (area of natural and scientific interest) sites, with numerous species-at-risk (SAR) using this critical habitat. Currently, a system of country roads exists in the region, allowing for low-density traffic to reach mainly residential and cottage properties. We know that the current roads dissect natural corridors and contribute to road-related mortality of a variety of species (Eco-Kare 2010). We are aware that the Spotted Turtles *Clemmys guttata*, a species at risk both provincially and federally, has been found in the area south of Petrel Point Road, but we suspect that they have a much wider distribution. The drainage basin has not been properly assessed for its fish communities to determine sensitive aquatic habitat. Currently, there is a proposal by Bruce County to expand these country roads to a County status road (termed West Road). This could have detrimental effects on water quality and the local wildlife. Proper studies and an environmental assessment are required in order to determine the effect of road expansion on the existing habitat and species.

We visited Red Bay (Town of South Bruce Peninsula, Bruce County, Ontario) at the end of August 2011 to conduct a preliminary assessment of the aquatic habitat in the area. During the one and a half field days, we focused our efforts on three regions: Howdenvale Bay, Sucker Creek, and a portion of a Mineral Swamp at the junction of Huron Rd. and Red Bay Rd. We assessed the nearshore fish community in Howdenvale Bay, and surveyed the latter two sites for aquatic and semi-aquatic species, particularly Spotted Turtles. Based on the fish species, mussel species, and suitability of turtle habitat that were found, we recommend that a proper three-season assessment be conducted in the region of Red Bay. This should include the areas that we sampled as well as the remainder of the extensive PSW's and tributaries in proximity to the roads that drain into Howdenvale Bay and Sucker Creek. Field seasons should include at the minimum spring, summer and fall surveys in order to obtain an adequate idea of the resident and migratory fish species, and determine the home range of various turtle species (including nesting and hibernation sites).

Methods:

Habitat assessment:

Fish and turtle habitat were identified through aerial photography (source: Southwestern Ontario Orthophotography Project) prior to conducting field work. To determine fish habitat, we looked for evidence of submerged vegetation in coastal marshes, which are hydrologically connected to Lake Huron. Turtles are found in semi-aquatic habitat, and the Red Bay region is rich in Mineral Cedar swamps (according to the Ecological Land Classification for Southern Ontario, Lee et al. (1998)) that contain pools of water, raised hummocks, and roots with many cavities (see Papoulias 2007b), which are ideal habitat for many turtle species, including the Blanding's *Emydoidea blandingii* and Spotted Turtles. Dr. Patricia Chow-Fraser and a field crew of three graduate students and one research assistant sampled the Red Bay region on August 30th and 31st, 2011. We determined the best locations to sample based on conversations with the land owner and from preliminary field exploration.

Fish sampling and analyses:

Howdenvale Bay was chosen as an appropriate sampling location for fish habitat (Figure 1). This site is classified as a Provincially Significant Wetland (PSW). Three paired fyke nets were set parallel to the shoreline in areas of submerged vegetation, after Seilheimer and Chow-Fraser (2007). This included two large sets of nets (13 and 4 mm bar mesh, 4.25 m length, 1 m × 1.25 m front opening) and one small set of nets (4 mm bar mesh, 2.1 m length, 0.5 m × 1.0 m front opening) each pair connected by a 7 m lead with 2.5 m wings on each side (see Figure 2). Large and small nets were placed in depths of 1 m and 0.5 m respectively, and were deployed for approximately 24 hours in order to capture the overnight fish migration. The following day fish were retrieved and placed into a bucket for identification and enumeration. Fish were identified to species according to Scott and Crossman (1998) and Holm et al. (2009) and released on site.

We used the fish information to calculate a Wetland Fish Index (WFI: Seilheimer and Chow-Fraser 2007) score for Howdenvale Bay. The WFI uses the presence-absence (WFI-PA) or abundance (WFI-AB) of fish species to infer the water quality of a coastal wetland. Each species has a value based on its tolerance level and niche breadth, as determined through a statistical relationship with water quality. The WFI ranges from 1 to 5, with higher values indicating higher quality wetlands. Based on the WFI's relationship to a Water Quality Index (WQI: Chow-Fraser 2006), values above 3.25 are deemed to correspond to sites with good or higher water quality (Seilheimer et al. 2009; Cvetkovic and Chow-Fraser 2011).

Turtle surveys:

The field crew visited three sites that were identified as potential turtle habitat, and focused their effort on one site located at the junction of Huron Rd. and Red Bay Rd. because it had ideal turtle habitat (Figure 1 and 3). This site is identified as being part of a

PSW according to Ontario Ministry of Natural Resources (OMNR) (see Papoulias 2007a). The field crew spent three hours walking through this Mineral Cedar swamp, covering a range of approximately 4.1 ha, and searching for evidence of turtles. Sucker Creek is an ANSI site that is located west of the proposed West Rd., and has numerous tributaries that are in the direct path of the proposed West Rd. (Figure 1 and 4). Sucker Creek was surveyed for evidence of wildlife, although time did not permit us to sample the fish community.

GIS:

ArcMap 10 (ESRI Inc., Redlands, California, U.S.A.) was used to create a map of the Red Bay region (Figure 1). Based on information in the document provided by the County of Bruce's Planning and Economic Development Department, we digitized Huron Road and created a rural buffer (15 m) and urban buffer (10 m) to simulate the footprint of the proposed development.

The location of fyke nets, turtles, and ideal habitat were displayed on the map based on geographic coordinates collected in the field and also extracted from maps provided by Papoulias (2007b). Around each location of known or potential turtle habitat and areas where there were confirmed turtle sightings, a 216 m buffer was drawn to represent the average home range for Spotted Turtles as suggested by Haxton and Berrill (1999) (Figure 1). This study was based on turtles sampled in central Ontario, and can be considered a conservative estimate, since studies conducted in other regions have found larger home ranges for Spotted Turtles (Litzgus and Mousseau 2004).

Results and Recommendations:

Twelve fish species were captured in Howdenvale Bay, with total catch equaling 190 fish (Table 1). Bluntnose minnow *Pimephales notatus*, rock bass *Ambloplites rupestris*, and spotfin shiners *Cyprinella spilopterus* dominated the catch (64%), while mimic shiner *Notropis volucellus*, yellow perch *Perca flavescens*, and pumpkinseed *Lepomis gibbosus* accounted for the majority of the remaining catch (25%). Length of fishes ranged from 21 – 244 mm (mean \pm SE: 77.3 \pm 2.84) (Table 1; Figure 5).

The WFI-PA and AB values were 3.85 and 3.81, respectively. These are above the 3.25 threshold that corresponds to good water quality (Cvetkovic and Chow-Fraser 2011), and are among the highest scores obtained for Lake Huron wetlands. This score indicates that Howdenvale Bay currently experiences little or no disturbance from human activities in the watershed (i.e. related to agricultural or urban runoff). This should be confirmed by sampling Howdenvale Bay during the active growing season, and should include a full suite of water-quality parameters such as conductivity, dissolved oxygen, pH, turbidity, and nutrient content such as total phosphorus, total ammonia nitrogen, and total nitrate nitrogen. This is critical information necessary to properly manage a PSW, and can be used as baseline data against which we can assess the impacts of future development.

It is essential to gather baseline information on the fish assemblage in Howdenvale Bay because it is an ANSI and a PSW, and we need to document the seasonal use of this wetland as a spawning and nursery ground for fishes in order to understand its full value. Water quality and habitat shifts may change in the future due to continued decline in water levels (Midwood and Chow-Fraser 2011) and increasing encroachment of human development, which may occur as a result of expanded road allowances (DeCatanzaro et al. 2009).

We recommend similar surveys for the tributaries adjacent to West Rd. and draining into Sucker Creek and Howdenvale Bay. Land owners in the area have provided some information regarding the fish assemblages but no standardized sampling has been applied to prepare a proper inventory. During our survey of Sucker Creek, we found two species of mussels (Figure 6) and numerous amphibian species, both of which are extremely sensitive to habitat change. If the West Rd. expansion project is approved, we expect increased runoff from higher road traffic and mandatory winter maintenance, and this could have a negative impact on the water quality of streams draining the area unless proper mitigations are implemented (Houlahan and Findlay 2004). Only a proper environmental assessment can provide the necessary information to determine the best way to protect these sensitive aquatic habitats from unintended consequences.

Based on our surveys of turtle habitat, we believe that the Mineral Cedar swamp located at Huron Rd. and Red Bay Rd. represents ideal Spotted Turtle habitat. The pooled water system and raised hummocks found here are classified as appropriate breeding, nesting, and hibernating sites (Litzgus 1999; Papoulias 2007b). Furthermore, we found excavated turtle nests immediately adjacent to the Mineral swamp and West Rd., deposited in sandy sediment with evidence of turtle shells around each nest (Figure 7). It can be assumed that if Huron Rd. were to be expanded, this nesting habitat would be eliminated, given that it was located directly adjacent to the road (Figure 1). Since the eggs had hatched already and only scraps of shell remained, it was impossible to identify the species; hence, it is essential that this and similar areas throughout Red Bay be surveyed during the breeding season to ascertain the identity of the species. The area we surveyed is part of a much larger system of provincially significant wetlands, and a spring survey of all such habitats is required in order to identify habitat used by species such as the endangered Spotted Turtle, as well as other species at risk such as the Blanding's Turtle and the Snapping Turtle *Chelydra serpentina*. Summer and fall surveys will provide information as to the breeding and hibernation locations of these species.

In conclusion, since this environmentally sensitive region has not been fully assessed, we do not have enough information to quantify the degree of impact of the proposed road development on this critical habitat and associated species. We believe that, first and foremost, an Environmental Assessment needs to be conducted in order to fully characterize the habitat within and surrounding the proposed road expansion, over four seasons, with special considerations being given to mitigation measures if West Rd. construction is implemented.

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Table 1: Summary of fish catch data from Howdenvale Bay, Bruce County, sampled by fyke nets during August 30-31st, 2011.

Common name	Latin name	Abundance	Length range (mm)	Mean length (\pm SE)
Banded killifish	<i>Fundulus diaphanus</i>	1	—	52
Blackchin shiner	<i>Notropis heterodon</i>	6	44 – 50	48 (0.86)
Bluntnose minnow	<i>Pimephales notatus</i>	44	27 – 89	55.3 (3.55)
Brown bullhead	<i>Ameiurus nebulosus</i>	2	134 – 244	189.0 (55.0)
Mimic shiner	<i>Notropis volucellus</i>	18	32 – 51	45.8 (1.46)
Pumpkinseed	<i>Lepomis gibbosus</i>	14	61 – 110	80.0 (4.13)
Rockbass	<i>Ambloplites rupestris</i>	43	68 – 159	115.8 (5.53)
Round goby	<i>Neogobius melanostomus</i>	5	40 – 65	55.2 (5.11)
Sand shiner	<i>Notropis stramineus</i>	1	—	48
Smallmouth bass	<i>Micropterus dolomieu</i>	5	66 – 108	88.2 (6.69)
Spotfin shiner	<i>Cyprinella spiloptera</i>	34	21 – 75	63.1 (2.91)
Shiner (juvenile)	<i>Notropis</i> spp.	1	—	65
Yellow perch	<i>Perca flavescens</i>	16	76 – 135	103.0 (4.75)
	Total	190	21 – 244	77.3 (2.84)

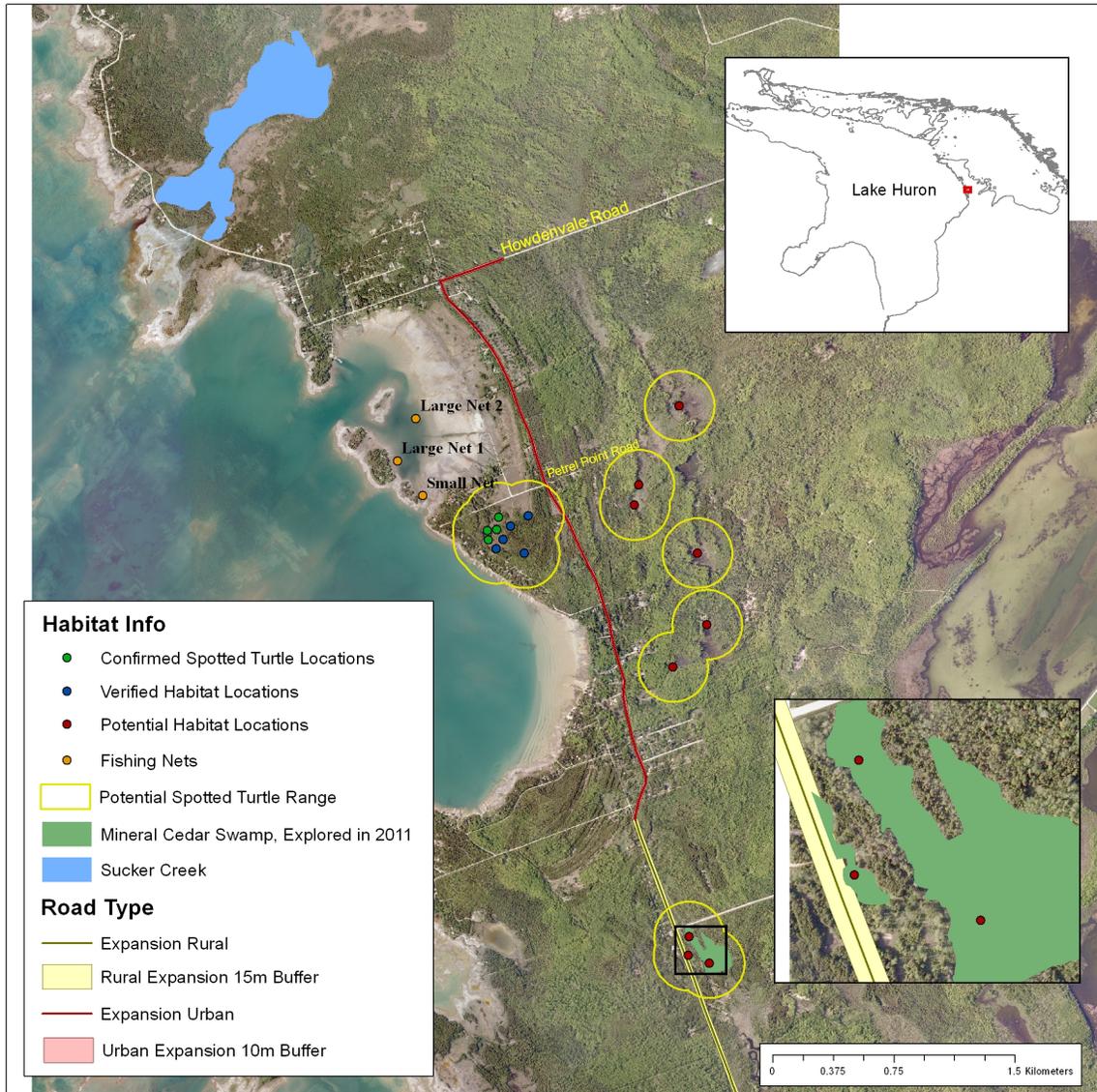


Figure 1: Map of the Red Bay community, Bruce County, highlighting only a portion of the proposed West Rd., at the locations that the McMaster Coastal Wetland Group surveyed fish and turtle assemblages in August 2011.



Figure 2: Example of a large paired fyke net in a coastal wetland, set parallel to shore.



a)



b)

Figure 3: Photographs of a Mineral Cedar Swamp surveyed by the McMaster Coastal Wetland Group in Red Bay, Bruce Country, near Huron Rd. and Red Bay Rd. in August 2011, where a) shows logs with numerous cavities for turtle activity, and b) shows the extent of pooled water and hummock habitat.



Figure 4: A McMaster Coastal Wetland Group student surveys Sucker Creek, Red Bay, Bruce County, for evidence of turtle habitat in August 2011.



Figure 5: McMaster Coastal Wetland Group measuring fish (Brown bullhead *Ameiurus nebulosus*) caught in fyke nets in Howdenvale Bay, Red Bay, Bruce County, in August 2011.



Figure 6: Examples of mussel species (a and b, same specimen unidentified; c and d, same specimen unidentified) found in Sucker Creek, Red Bay, Bruce County, by McMaster Coastal Wetland Group in August 2011.

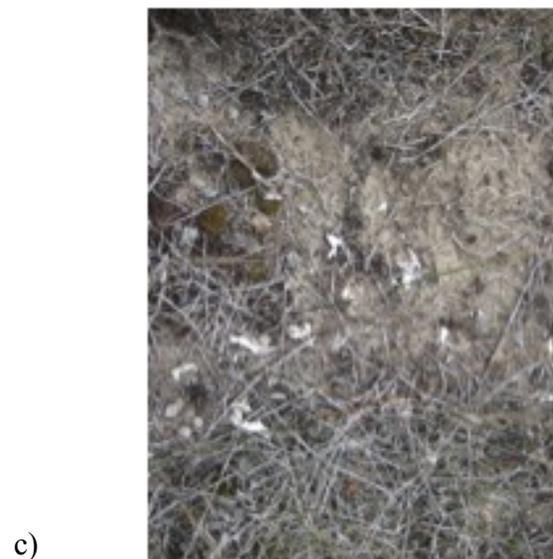


Figure 7: Photographs showing a) area where turtle nests were found, between the Mineral Cedar Swamp and current Huron Rd., b) and c) turtle scrap shells near nests in August 2011.