

Overwintering of Striped Bass (*Morone saxatilis*) in Mira River estuary, Nova Scotia, Canada

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Introduction

Striped Bass (figure 1) *Morone saxatilis* (Walbaum, 1792) is an anadromous euryhaline fish, ranging from the Gulf of Mexico to the St. Lawrence River, Q.C. Recent COSEWIC (2012) assessments of the southern Gulf of St. Lawrence and Bay of Fundy Designatable Units resulted in a status of *Special Concern* and *Endangered*, respectively. Very little is known about Striped Bass occurring in the waters of Cape Breton Island, N.S. (figure 2), an area that straddles recreational fishery management zones at the northern extreme of the species' range.

Overwintering

- Striped Bass in Canadian waters exhibit autumn migrations into estuaries and freshwater to escape cold marine temperatures (Rulifson and Dadswell, 1995)
- Overwintering sites have been identified within estuaries in the southern Gulf of St. Lawrence and tributaries of the Bay of Fundy, but this is the first study to locate an overwintering site in Cape Breton
- Migrations from overwintering areas occur in spring and are followed by spawning migration into freshwater

Objectives

- The main objectives of this project are to describe the movements of Striped Bass in the Mira River system and to identify potential spawning, aggregation, and overwintering sites
- The purpose of this poster is to discuss preliminary overwintering results, relation of the project to OTN, and the implications of this project for future management decisions

Methods

- An array of VEMCO (Halifax, N.S.) VR2W receivers was deployed in the Mira River estuary in 2012 ($n = 6$) and expanded in 2013 ($n = 13$) to extend coverage of freshwater, lower estuary, and overwintering site (figure 2)
- Striped Bass ($n = 28$; 47.9—125.0 cm TL) were captured in the lower estuary via rod and reel angling and surgically implanted with V13 transmitters ($n = 14$, 2012; $n = 15$, 2013)



Figure 1. Mira River estuary Striped Bass with characteristic colouration and lateral stripes

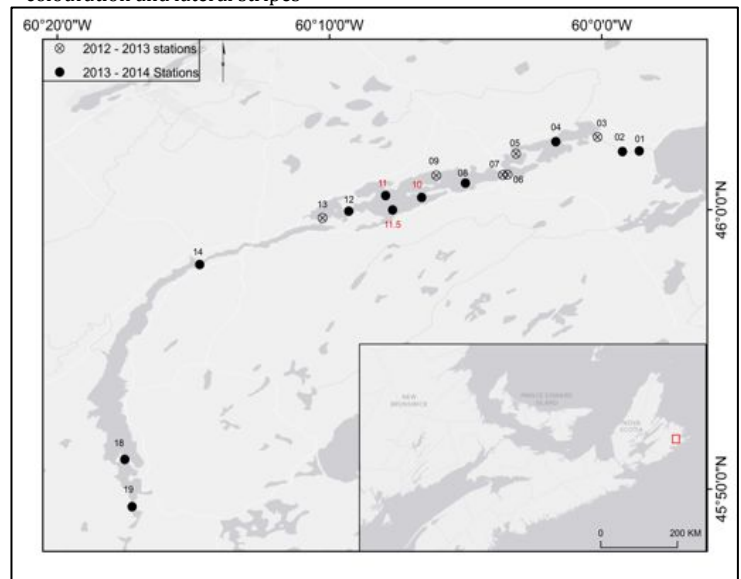


Figure 2. Map of the Mira River system and VR2W hydrophone array. Red labels indicate overwintering stations.

Preliminary Results

- November – December up estuary migration observed in 2012 and 2013; down estuary migration occurs in April and May (table 1, figure 3)
- Striped Bass overwintering aggregation was identified in winter of 2013–2014 and detected at multiple stations (figures 2 and 4) within the mid estuary
- Pressure sensor equipped Striped Bass ($n = 7$) occupied depths of 6.9 ± 1.3 m ($n = 114905$ detections; mean \pm SD), corresponding to salinities of 17–19 and temperatures of 3.5–5.1°C

Table 1. Tag IDs, length at tagging, and arrival and departure dates of Mira River Striped Bass detected in the overwintering site during 2013 - 2014.

| Tag ID | Length (TL, cm) | Arrival | | Departure | |
|---------------------|-----------------|------------|---------|------------|---------|
| | | Date | Station | Date | Station |
| 48407 ^a | 61.4 | 2013-11-16 | 11.5 | 2014-04-25 | 11.5 |
| 48408 ^a | 69.5 | 2013-11-20 | 11.5 | 2014-04-25 | 11 |
| 48409 ^a | 73.4 | 2013-11-22 | 10 | 2014-05-03 | 11 |
| 48410 ^a | 90.6 | 2013-11-15 | 10 | 2014-04-24 | 11 |
| 48411 ^a | 72.4 | 2013-11-15 | 11.5 | 2014-04-27 | 11 |
| 33158 ^b | 69.3 | 2013-11-19 | 11 | 2014-05-03 | 11 |
| 33159 ^b | 63.2 | 2013-11-15 | 11.5 | 2014-04-24 | 11 |
| 33160 ^b | 75.3 | 2013-11-20 | 11.5 | 2014-04-24 | 11 |
| 33161 ^b | 63.7 | 2013-11-15 | 11.5 | 2014-05-04 | 11 |
| 33162 ^b | 90.0 | 2013-11-15 | 10 | 2014-04-24 | 11 |
| 5729 ^{b,c} | 52.8 | 2013-11-15 | 11.5 | | |
| 5730 ^{b,c} | 49.7 | 2013-11-22 | 10 | | |
| 5732 ^{b,c} | 79.9 | 2013-11-15 | 10 | | |
| 5733 ^{b,c} | 50.0 | 2013-11-15 | 10 | | |
| 5734 ^{b,c} | 66.3 | 2013-11-15 | 10 | | |
| 5736 ^{b,c} | 82.5 | 2013-11-29 | 11 | | |
| 5737 ^{b,c} | 51.0 | 2013-11-15 | 10 | | |
| 5738 ^{b,c} | 49.9 | 2013-11-15 | 11 | | |
| 5739 ^b | 57.3 | 2013-12-05 | 11 | 2014-04-25 | 11.5 |

^a tagged in 2012

^b tagged in 2013

^c battery expired during overwintering

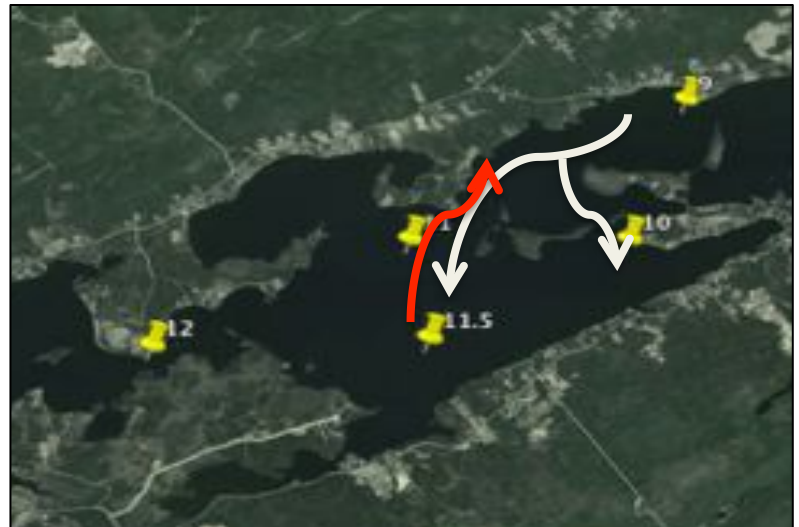


Figure 3. Mira River estuary Striped Bass overwintering site. White and red arrows indicate likely arrival and departure routes, respectively

Where does this project fit into the OTN?

This research is a subproject of the Atlantic Sturgeon project and brainchild of Dr. M. J. Dadswell. Initial intent of the project included searching for both Atlantic Sturgeon and Striped Bass in Cape Breton; however, the scope of the project was narrowed upon the discovery of the aggregation of bass within the Mira River estuary. Due to the highly migratory nature of Striped Bass and the absence of a known spawning population in Cape Breton, we expected telemetered Striped Bass to leave the Mira River estuary and encounter OTN arrays in the Bras D'Or Lakes, Cabot Strait, Halifax Line, or potentially the Minas Passage. The project has evolved since inception in 2012, yet continues to maintain relevance to OTN Canada Phase II scope, focus, and objectives.

Research objectives of this project fall under OTN Phase II *Framework Question 1* and *Cross Cutting Activity 4*, with specific emphasis on a species at risk, environmental features influencing migration and habitat use, and providing resource managers with more data to inform their decisions. The St. Lawrence River Striped Bass stock is listed as *Schedule 1* under SARA, while the southern Gulf of St. Lawrence and Bay of Fundy stocks are COSEWIC assessed as *Special Concern* and *Endangered*, respectively. Monitoring of physical variables (temperature, salinity, dissolved oxygen, and water level) in the Mira River system is a component of this project and will provide a more detailed understanding of in-system migrations and habitat use when coupled with telemetry data. The information stemming from this project fills gaps in the baseline understanding of the species' distribution at the northern extreme of its range and is of particular interest to fisheries managers.

Contribution to Management

Management decisions in Nova Scotia and New Brunswick are currently based on a two stock scenario and consider Striped Bass in eastern Nova Scotia as coastal migrants; Striped Bass occurring from the eastern tip of Cape Breton to the southwest corner of Nova Scotia are managed as Bay of Fundy stock. Identification of Striped Bass residency, overwintering, and potential spawning activity within the Mira River system suggests another Atlantic Canadian stock may exist. Additional angling regulations or a three-zone management approach may be appropriate to prevent overexploitation of overwintering aggregations and protect critical habitat. The results from our work highlight the need for more exploratory Striped Bass research in eastern Nova Scotia.



Figure 5. From left to right: YSI 63 and 550a meters used to measure temperature, salinity, and dissolved oxygen; Hobo water level logger in mooring; largest Striped Bass acoustically tagged in Mira system; Using VEMCO VR100 to locate the overwintering site in February 2014

References

COSEWIC 2012. COSEWIC assessment and status report on the Striped Bass *Morone saxatilis* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa

Rulifson, R.A., and Dadswell, M.J. 1995. Life history and Population Characteristics of Striped Bass in Atlantic Canada. *Trans. Am. Fish. Soc.*, 124: 477-507.

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