# STRIPED BASS (*MORONE SAXATILIS*) POPULATION CHARACTERISTICS AND SPAWNING ASSESSMENT IN THE BOUCTOUCHE AND COCAGNE RIVERS



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## 1. INTRODUCTION

Striped bass (*Morone saxatilis*) is a native anadromous fish species of the North American Atlantic coastline that spawns in fresh or brackish water. In the Bay of Fundy and Gulf of St Lawrence watersheds, spawning occurs in May and June. Juvenile Striped bass then migrate downstream to brackish waters and eventually salt water to feed and grow until they have reached maturity, a process that normally takes three to four years. Striped bass was considered a commercially important fish before it was designated as a threatened species by COSEWIC (the Committee on the Status of Endangered Wildlife in Canada) in November 2004. However, because there was such a decline in the population, Striped bass met the criteria for being listed as an ‘‘endangered’’ species. The Striped bass population of the Gulf of St Lawrence was ultimately designated as ‘‘threatened’’ because of the high degree of resilience of this species and the high abundance of spawners found prior to the designation. It is therefore important to gather more information on the current Striped bass population in rivers and estuaries draining into the Gulf of St Lawrence.

According to the Department of Fisheries and Oceans (DFO) of Canada, there is no evidence that Striped bass spawn successfully in any other rivers in New Brunswick other than the Northwest Miramichi river (DFO, 2011). However, the catch of male Striped bass producing milt by Gaspereau (Alewife: *Alosa pseudoharengus*) fisherman in the Bouctouche and Cocagne river could indicate otherwise. Striped bass are known to spawn in the water column, therefore making it possible to collect eggs and larvae with plankton nets.

## 2. MATERIALS AND METHODS

Field work was conducted from June 3rd to June 21st 2013. Two rivers, the Cocagne and the Bouctouche river were sampled. On the Bouctouche river, a total of five Gaspereau traps (B1; N46 24.709 W-064 49.101, B2; N46 24.444 W-064 49.485, B3; N46 24.823 W-064 48.951, B4; N46 24.908 W-064 48.868, B5; N46 25.168 W-064 48.667) were assessed and on the Cocagne river a total of four Gaspereau traps were assessed (C1; N46 19.426 W-0.64 40.530, C2; N46 19.484 W-064 40.213, C3; N46 19.505 W-064 40.073, C4; N46 19.589 W-064 39.163) (Fig.1). By-catched striped bass were counted, measured (total length) and then released during each fishing event.

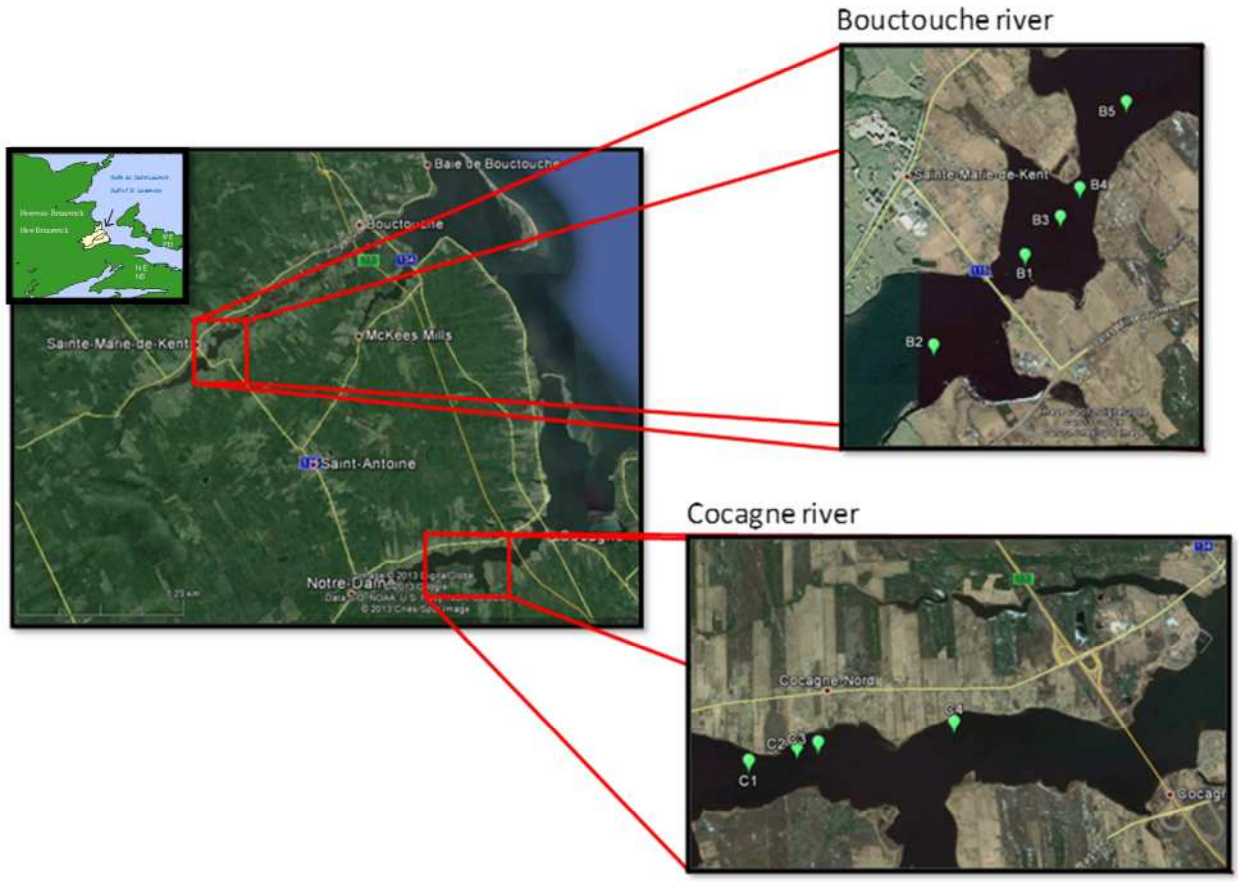


**Figure 1.** Location of Gaspereau traps within the Bouctouche and Cocagne rivers.

To verify the presence of striped bass larvae and eggs in both rivers, a plankton net (208 cm long and with an opening of 52 cm in diameter) with a sample bucket with 500 µm pores was towed at idle speed at different locations in the vicinity of the Gaspereau traps. The net was sinked until it got close to the bottom, then towed at idle speed while being raised gradually for 5 minutes as per the method indicated in the guide on Standard Operating Procedure for Zooplankton Sample Collection and Preservation (1994) and in Moncheva and Parr (2010). Once the net was pulled back in the boat, the sample bucket was removed, rinsed from the outside with seawater to dislodge organisms from the mesh net, and poured into a mason jar. In each river, two 5-minute sampling was conducted and the samples were pooled together.

In the laboratory, the seawater from the larvae samples was replaced by 10% buffered formaldehyde (Galenova, Quebec) by refiltering the sample through the filter bottle and rinsing from the outside with to dislodge organisms from the mesh net. The sample was then poured into a mason jar and kept in a refrigerator at 4°C. All sampling dates were pooled together, but the two sampling sites, namely the Bouctouche and Cocagne rivers were kept separate. Because of

our inability to process the larvae samples stored in formaldehyde safely, the samples were ultimately refiltered through 0.063 mm sieves and the formaldehyde was replaced with 95% ethanol. The striped bass larvae samples were examined under a microscope (Wild M5-52426 6-50x, Heerbrugg Switzerland) to detect the presence of striped bass larvae and/or eggs. The larvae or eggs that were found were kept in vials in 95% ethanol for further identification.

## 3. RESULTS

### 3.1. Striped bass population characteristics

In total, 788 Striped bass were counted in the Bouctouche river out of which 436 were measured. In Cocagne, 575 Striped bass were counted and 216 were measured. Striped bass catches were the highest on June 3rd, and rapidly decreased after that date (Fig.2).

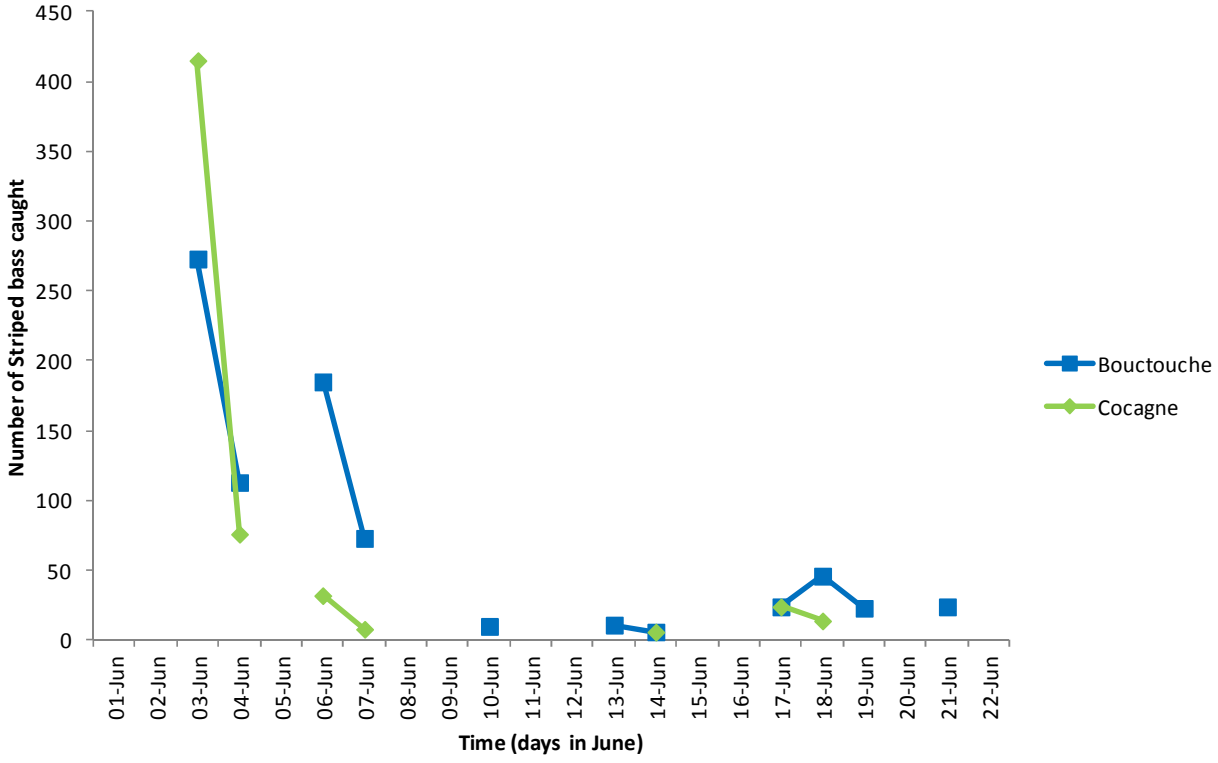


**Figure 2.** Number of Striped bass captured throughout the month of June 2013.

On average, striped bass were 4.20 cm longer in the Cocagne river than in the Bouctouche river (Table 1). This could be related to the high abundance of smaller sized Striped bass found in the Bouctouche river.

**Table 1.** Average, median and mode of the total lengths of Striped bass captured in the Bouctouche and Cocagne river.

| | **Bouctouche** | **Cocagne** |
|---|---|---|
| **Average total length (cm)** | 29.95 ± 0.64 | 34.15 ± 0.55 |
| **Median (cm)** | 27.94 | 35.56 |
| **Mode (cm)** | 15.24 | 25.94 |

Allthough more large-sized Striped bass were caught in the Bouctouche river, this latter also had alot more smaller-sized Striped bass than the Cocagne river as shown in Fig. 3.

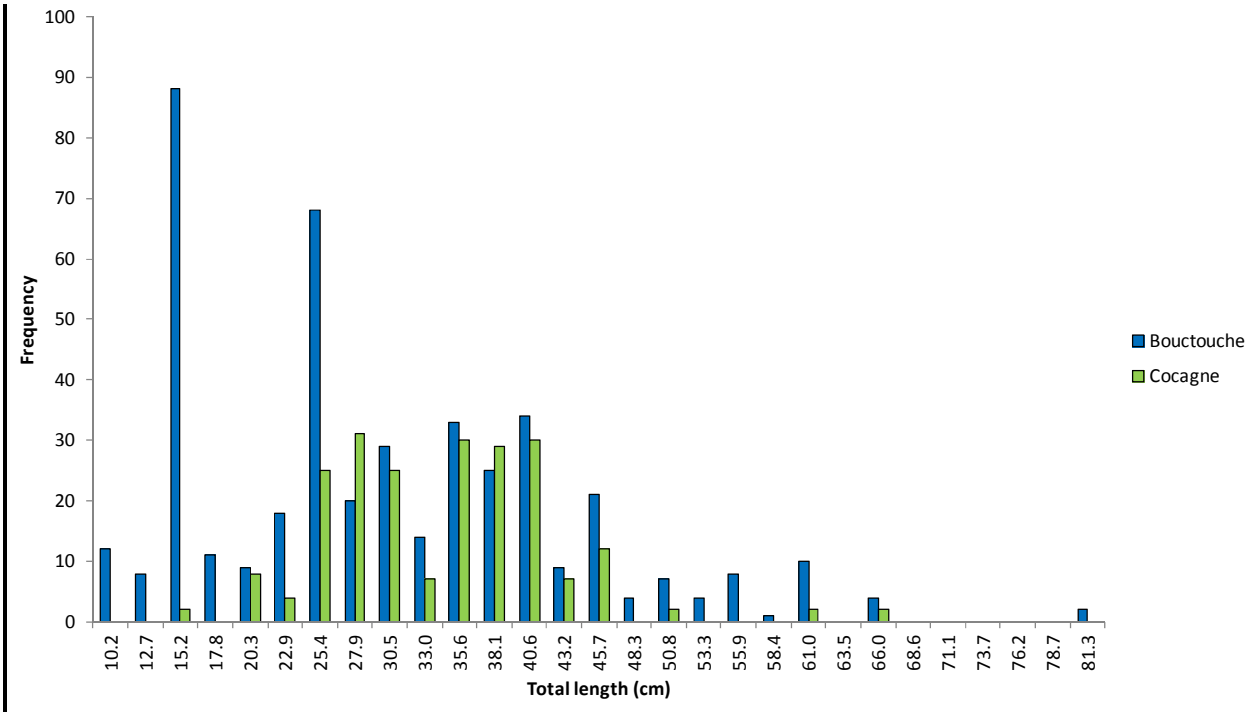


**Figure 3.** Size-class frequency distribution of Striped bass from the Cocagne and Bouctouche river.

### 3.1. Striped bass larvae

Numerous fish larvae (Annexe 1, Fig.4) were found in both the Bouctouche and Cocagne river. Eggs (Annexe 1, Fig.5) were also found, but will have to be verified by an expert to determine if they are fish eggs. Both the larvae and the eggs were kept in vials in 95% ethanol for further identification.

## 4. DISCUSSION

Both rivers had lower Striped bass abundance than our previous assessment conducted in 2011. From June 7 to June 26 2011, 1534 Striped bass were caught in two traps on the Bouctouche river whereas 2296 Striped bass were caught in two nets on the Cocagne river. This could suggest that Striped bass stocks are still on the decline in the studied waterways. However, we stress that the monitoring of striped bass in both rivers should have started earlier, as our results indicate that we missed the peak abundance of Striped bass. This should give us better estimate of Striped bass numbers in our waterways.

Numerous fish larvae were found in the plankton net samples from both the Cocagne and Bouctouche rivers. Some of these larvae were identified (from pictures) by DFO staff as smelt larvae because of their elongated shape. However, other larvae with less elongated bodies such as the individual shown in Annexe 1, Fig.2 were found. It is therefore important that the fish larvae found and eggs go through a rigorous identification process. Allthough it was not possible this year to get a positive identification on all fish larvae found, the capture of adult Striped bass that were releasing milt (Annexe 1, Fig.6) could indicate that these fish might use the Bouctouche and Cocagne rivers as spawning grounds.

In 2013, because of Striped bass population reaching target (conservation limits) numbers in the Miramichi river for five consecutive years, the DFO opened two harvesting seasons, one in the spring and one in the fall. It will be interesting to see if this open season will have an impact on Striped bass abundance in our rivers in upcoming years. Also, it would be interesting to try to identify the factors and mechanisms that affect the Striped bass population as well as to assess the impacts of Striped bass on other fish important species such as brook trout (*Salvelinus fontinalis*) and Atlantic salmon (*Salmo salar*) in Atlantic Canada.

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**ANNEXE 1.**


**Figure 4.** Picture of a fish larvae found in the larvae samples.

**Figure 5.** Picture of eggs found in plankton net samples.

**Figure 6.** A 42 cm Striped bass caught in the Bouctouche river on June 13th 2013 producing milt.