Characterization of the habitat and presence of juvenile Striped Bass (*Morone saxatilis*) along the south shore of the Gaspé Peninsula - 2016 Summary

-Technical report-

Mi'gmaq Maliseet Aboriginal Fisheries Management Association (MMAFMA)

June 2017

Characterization of the habitat and presence of juvenile striped bass (*Morone saxatilis*) **along the south shore of the Gaspé Peninsula** – **2016 summary**
-Technical report-
Presented by
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Arsenault L. M., P. A. Jerome and C. Lambert Koizumi. 2017. *Characterization of the habitat and presence of juvenile striped bass (*Morone saxatilis*) along the south shore of the Gaspé Peninsu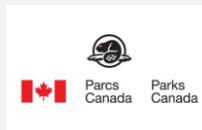la – 2016 summary;* Technical report. Mi'gmaq Maliseet Aboriginal Fisheries Management Association (MMAFMA). Gesgapegiag. 29 p. +2 appendices.

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PRESENTATION OF THE ORGANISATION

The **Mi'gmaq Maliseet Aboriginal Fisheries Management Association (MMAFMA)** is a not-for-profit organization created in 2012 within the framework of the *Aboriginal Aquatic Resources and Oceans Management* (AAROM) program of Fisheries and Oceans Canada. The mission of MMAFMA is to promote the sustainable management and conservation of aquatic and oceanic ecosystems within the territories and activity zones of the Micmacs of Gesgapegiag, the Nation Micmac de Gespeg and the Maliseet of Viger First Nation (Figure 1) while promoting their interests and participation in co-management processes. MMAFMA works closely with its three member communities to facilitate liaison with the commercial fisheries and to promote the collaborative management of fisheries resources, notably by participating in consultative committees, stock assessments, working groups, and consultations on species at risk and protected areas.

Figure 1. Locations of communities served by MMAFMA
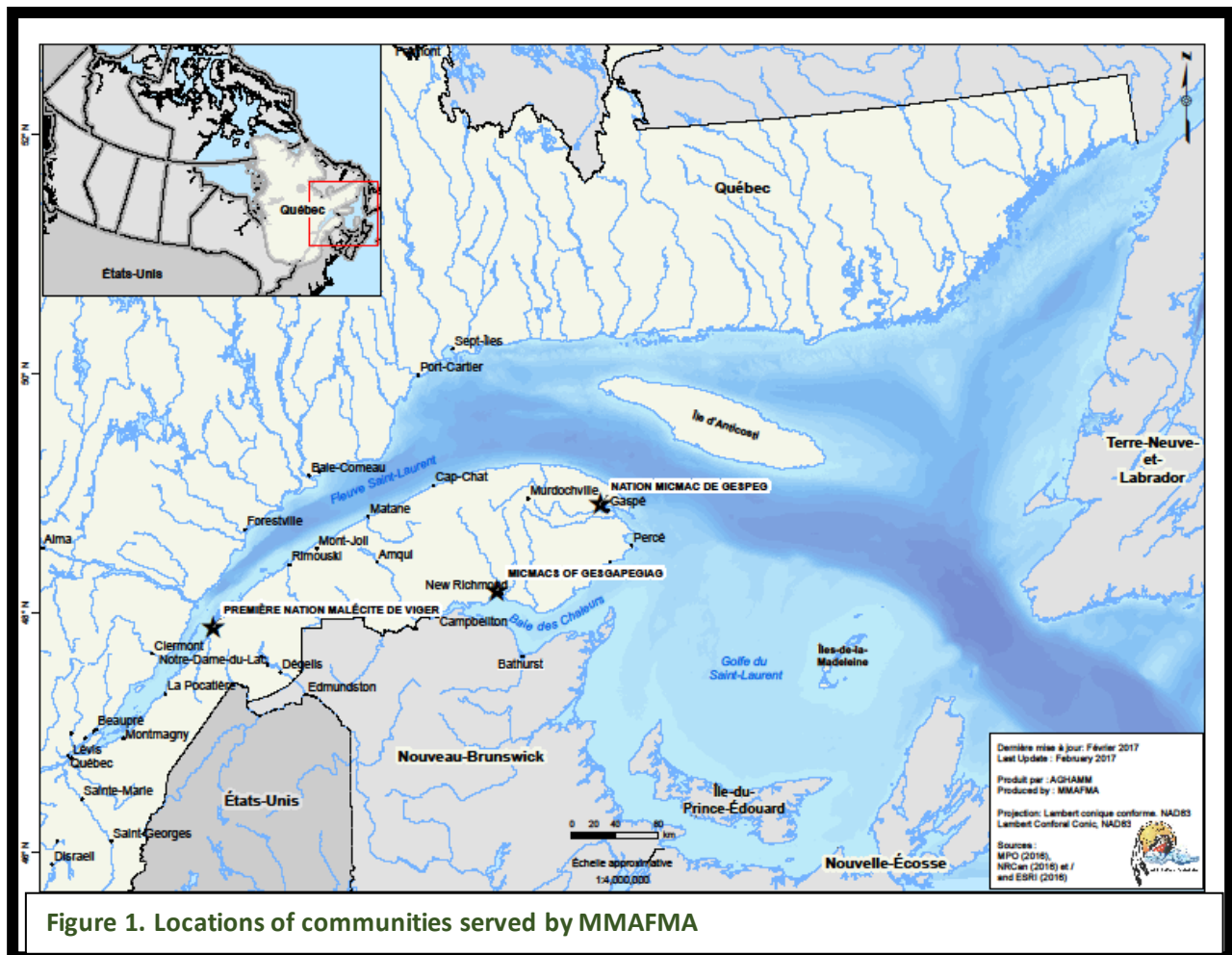
1.0 INTRODUCTION

The striped bass *(Morone saxatilis)* is an anadromous fish that inhabits estuaries and coastal zones in eastern North America (Scott and Scott 1988). The striped bass population in the southern Gulf of St. Lawrence is present in all the estuaries and coastal waters of the southern Gulf, from Cap Gaspé on the Gaspé Peninsula to the northern tip of Nova Scotia. It was long harvested by the commercial and sport fishery and its decline led to the closure of commercial fishing for this species in 1996, followed by the closure of recreational and aboriginal fishing in 2000. The recovery limit and target for the striped bass population were reached in 2011 since the population had expanded considerably. In 2013, a limited recreational fishery and an Aboriginal subsistence fishery were reopened in Québec although there is still no Aboriginal commercial fishery either for the Nation Micmac de Gespeg or for the Micmacs of Gesgapegiag.

On the other hand, this species is only known to spawn at one site (the Miramichi River), and the population continues to be vulnerable due to high rates of poaching and by-catch in legal fisheries. In the estuaries of southern Gaspé Peninsula rivers, like the Cascapédia, Malbaie and Saint-Jean, the population also appears to be growing, but the presence of adult and juvenile striped bass has yet to be characterized and there is still quite some uncertainty as to when striped bass disperse along the Gaspé coast and how they use these estuarine habitats (notably for overwintering). In 2010, the Rivière Cascapédia estuary was studied to determine whether striped bass were present there as part of an *Aboriginal fund for species at risk* (AFSAR) project conducted by the Comité ZIP and the community of Gesgapegiag. This sector is well-documented and there are reasons to believe that the situation has evolved considerably since 2010. This study and its eventual follow-up will serve to improve knowledge about this sector of importance to the Mi'gmaqs of Gesgapegiag, and about other areas of importance such as the estuaries also used every year by the Gespeg Mi'gmaqs. Moreover, the areas chosen for sampling are typical of the estuaries along Chaleur Bay on the southern Gaspé Peninsula, as far as its eastern tip, areas where this species feeds and grows.

1.2 Context and issues

As documented in the study conducted by the Mi'gmaq Maliseet Aboriginal Fisheries Management Association (MMAFMA) dealing with Mi'gmaq and Maliseet knowledge of the species at risk present in the Estuary and Gulf of St. Lawrence (AFSAR project, Jerome *et al.* 2016), the growing striped bass (*Morone saxatilis*) population along the Gaspé Peninsula is an issue of great concern and interest for members of the Gespeg and Gesgapegiag communities. Striped bass are prized for their cultural significance and their flesh; the recovery of this species could provide an opportunity for Aboriginal communities to consider the introduction of a food, ceremonial and social (FCS) fishery. On the other hand, the return of the striped bass to the estuaries of Gaspé Peninsula rivers could have an impact, notably through predation or competition, on the Atlantic Salmon (*Salmo salar*), which even today is central to the culture and lifestyle of Mi'gmaq peoples, as well as on some commercial fisheries practised by our communities. If it is determined that striped bass are present along the southern Gaspé Peninsula when the salmon smolts swim downstream in this area, it would indicate potential interaction with salmon and other species, both commercial and non-commercial, which could be investigated in future research.

Since the distribution patterns of the striped bass after they leave their presumed spawning grounds (Miramichi River in New Brunswick) are still poorly known, the overall goal of this project is to characterize the presence of adult and juvenile striped bass along the south shore of the Gaspé Peninsula, including the estuaries of most salmon rivers. In fact, there are still numerous uncertainties as to when striped bass disperse along the Gaspé coast and how they use these estuarine habitats (notably for overwintering). The selected sites are typical of the Chaleur Bay and the tip of the Gaspé Peninsula and are areas where the species feeds and grows.

1.3 Objectives

The primary goal of this study was to determine whether juvenile striped bass were present along the south shore of the Gaspé Peninsula and to characterize their habitat. The project also sought to build the capacity of the Mi'gmaq nations of Gespeg and Gesgapegiag to acquire scientific data on coastal aquatic wildlife and on the habitat of the striped bass as well as to contribute to the recovery of the southern Gulf population and the protection of its habitat. Ultimately, this project will also serve to improve the understanding of how Gaspé Peninsula inshore waters are used by southern Gulf striped bass and to acquire data that can contribute to an evaluation of possible interaction between the striped bass

population and native salmon in Gaspé Peninsula waters. Furthermore, this study will also serve to characterize the presence and relative abundance of other species at risk.

This report presents the results of the first year of sampling to detect the presence of juvenile striped bass and to characterize its habitat along the south shore of the Gaspé Peninsula.

2.0 METHOD
2.2 Description of the study area

The study area encompasses approximately 345 linear kilometres along the south shore of the Gaspé Peninsula, from Escuminac on Chaleur Bay to the Penouille sector in Forillon National Park, Gaspé (Figure 2). This study area corresponds to most of the north shore of Chaleur Bay and a large portion of the Gaspé Peninsula's south shore. The area surveyed lies in salt water and is subject to the tidal cycle. It includes the estuaries of most of the main salmon rivers in the southern portion of the Gaspé, including those traditionally important to the Mi'gmaq nations (Jerome *et al.* 2016), these being the Nouvelle, Cascapédia, Petite Cascapédia, Bonaventure, Malbaie, Saint-Jean, Dartmouth and York rivers.
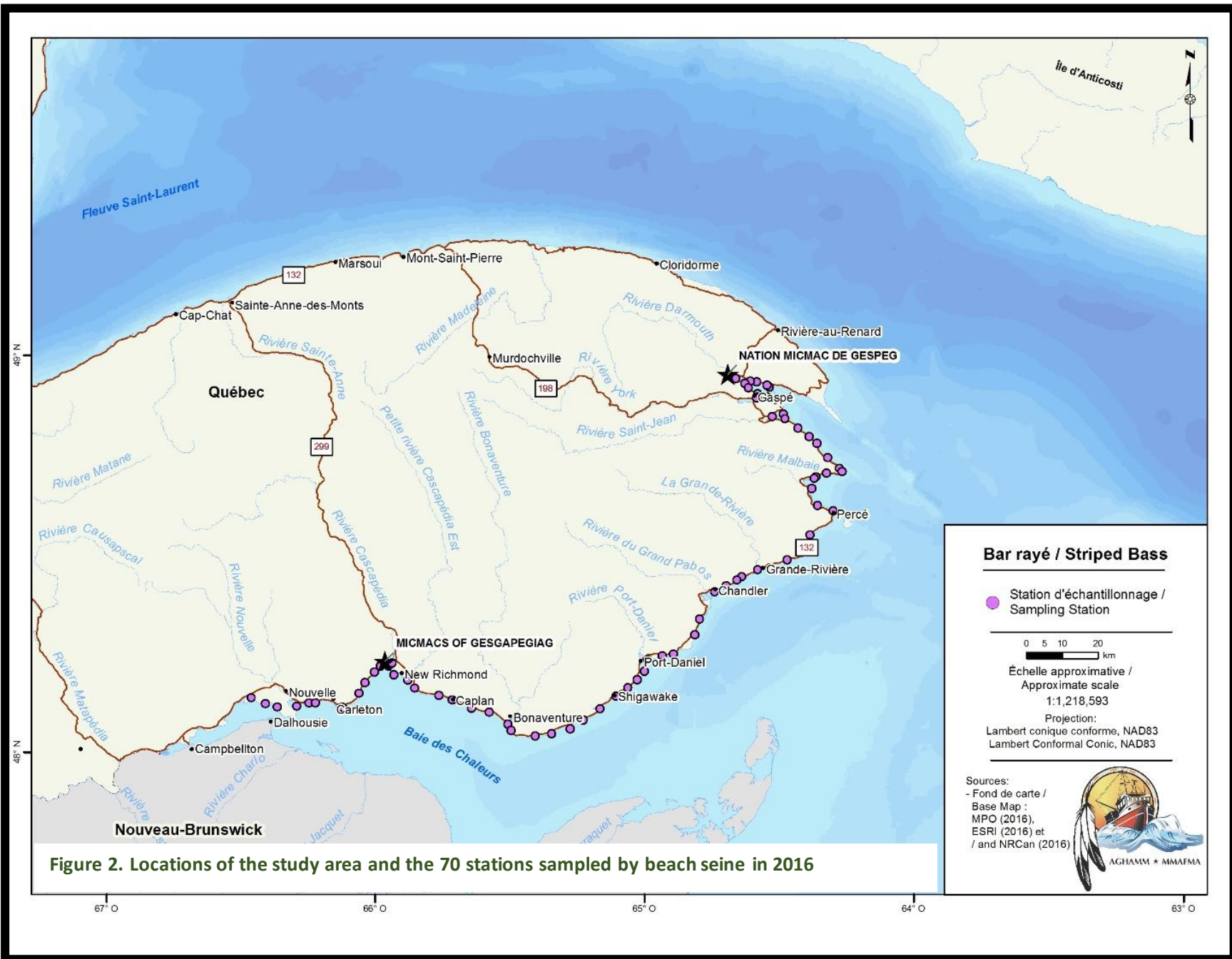
Figure 2. Locations of the study area and the 70 stations sampled by beach seine in 2016

2.2 Stations

The stations, 70 in all, were divided into two sectors. Because we had two field crews, from the communities of Gesgapegiag and Gespeg respectively, the study area was subdivided into two zones. The first sector, located in the southwest of the peninsula, between the communities of Escuminac and Newport (Figure 3), stretched along the shore for approximately 82 kilometres and included stations 1 to 36, which were surveyed by the crew from Gesgapegiag. As for the second sampling sector; it stretched from Chandler to Penouille (Gaspé) and included stations numbered 37 to 70 (Figure 4), a distance of approximately 162 km; it was surveyed by the crew from Gespeg. The stations were chosen for their physical characteristics to ensure that seine sampling would be as effective as possible and for logistical reasons; they had to be easy to reach for the technicians and their equipment. In particular, when selecting the stations the following physical characteristics were taken into account: small particle size, low vegetation density and a slope neither too steep nor too slight.
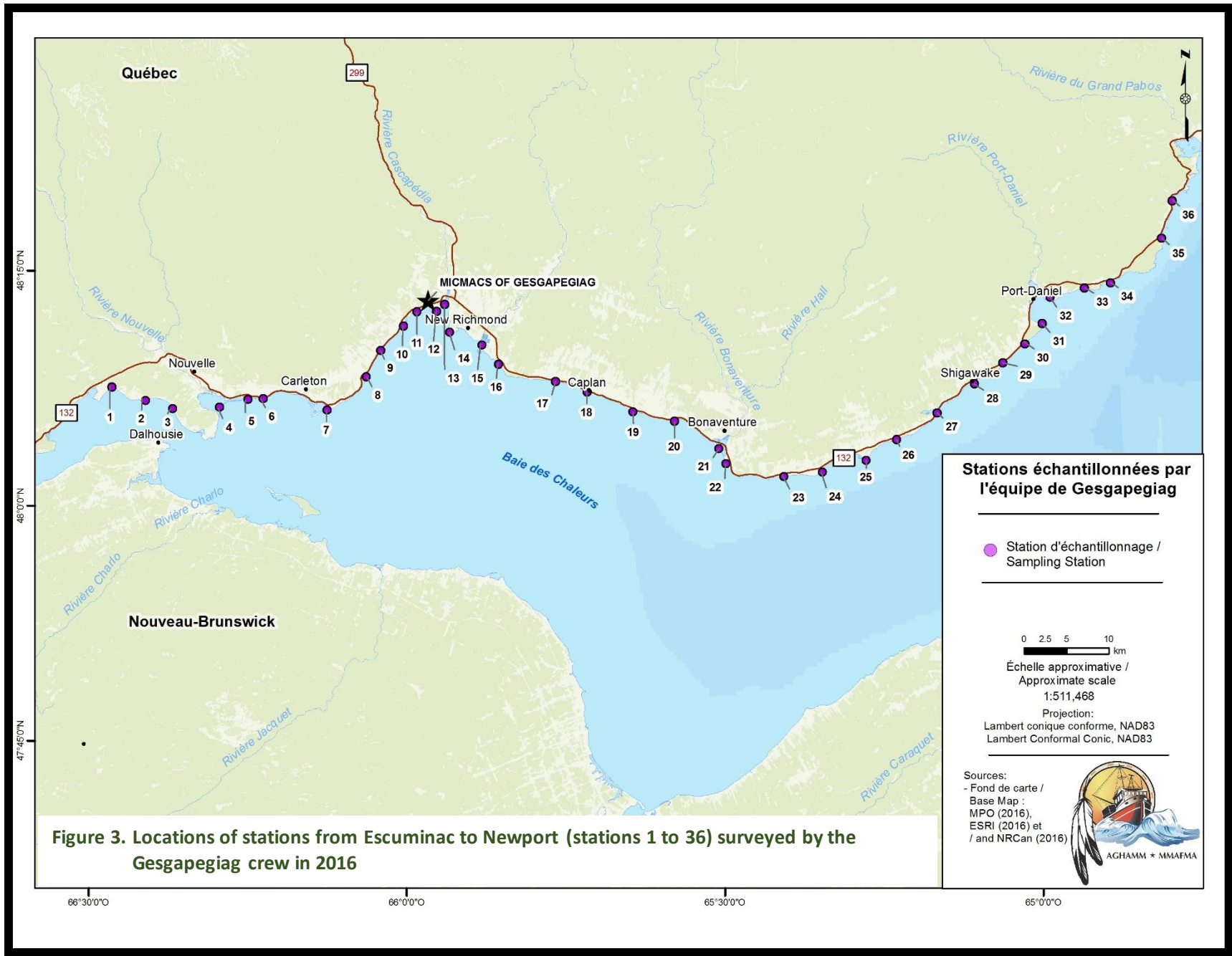
Figure 3. Locations of stations from Escuminac to Newport (stations 1 to 36) surveyed by the Gesgapegiag crew in 2016
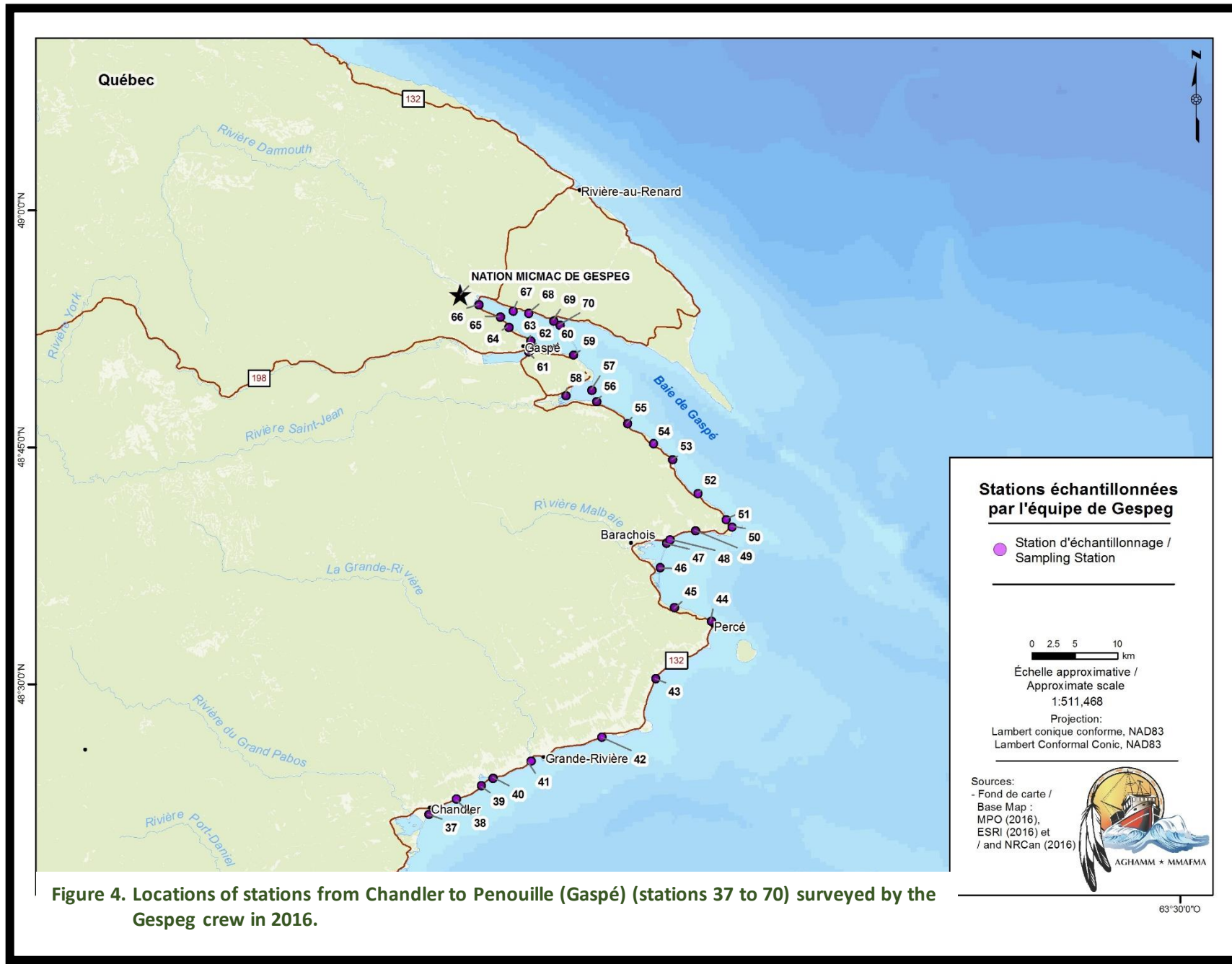
Figure 4. Locations of stations from Chandler to Penouille (Gaspé) (stations 37 to 70) surveyed by the Gespeg crew in 2016.

2.3 Beach seine sampling

2.3.1 Fishing gear

A beach seine measuring 1.8 m wide by 15 m long , made of polypropylene line woven without knots was used for sampling. The seine net had a central pocket, 1.22 m long by 1.22 m wide by 0.92 m deep. It also had a 12.5 m line at each end. The net's wings had a mesh-size of 0.95 cm while the central pocket had a mesh-size of 0.63 cm. This fishing gear is the standard model used by the Réseau de suivi ichtyologique du fleuve St-Laurent (Deschamps 2011 and Pelletier 2013).

2.3.2 Beach seining

The beach seining technique used was the one developed by the Réseau de suivi ichtyologique du fleuve St-Laurent (Deschamps 2011 and Pelletier 2013). At each station, the seine was deployed parallel to the shore, 12.5 m out whenever possible, and then hauled into shore by the technical crew. This produced a maximum sampling surface of about 187.5 m^2. However, in some cases, where water depth did not allow the technicians to deploy the net for the full length of the seine's 12.5-metre lines, a different line deployment length was recorded on the data sheet. Most sites were sampled from land and seining was done on foot. A boat had to be used at some sites that were harder to reach by land. In addition, in some places, depending on tide height, seining was done from a boat so that the lines could be fully deployed. The seining approach used was also recorded on the data sheet.

Each station was sampled three times (rounds) and at most stations, the seine was deployed three times for each round, except for the stations from Chandler to Penouille (37 to 70) because time was short when the third round of sampling took place. At these stations, the seine was deployed only twice during the third round. These replicates were conducted to optimize the catch of juvenile striped bass. The replicates were conducted at intervals of at least 15 minutes and about ten metres apart.

2.3.3 Physical and chemical parameters

The water's physical and chemical parameters, such as salinity, temperature and dissolved oxygen, were recorded when sampling was done using a YSI Pro 2030 water quality sampler. The geographical coordinates were also recorded for each seine haul at each station using a GPSMAP Garmin 78 sc receiver. In addition, data concerning maximum and minimum water depth, dominant and subdominant particle size, and the percentage of plant cover at the area sampled were also recorded. For each of the three rounds, the stations were sampled by means of three seine hauls and the following parameters were recorded: date, time and tidal height and stage. A photo was taken of each station using a Nikon Coolpix AW130 camera.

2.3.4 Catch count and identification

The fish species caught were counted on the spot; most species were identified on site as well, using dichotomous identification keys (Desroches and Picard 2013, Desroches 2010 and Nozères *et al*. 2010). The individuals that could not be identified in the field, as well as the rainbow smelt (*Osmerus mordax*) less than 15 cm in length, were kept (no more than 30 individuals per site). Striped bass less than 15 cm in length were first euthanatized using a eugenol solution (ethanol-clove oil). They were preserved in jars containing a 70% denatured ethanol solution to be identified later in the lab, or, in the case of the rainbow smelt, to be given to the Gaspésie-Îles-de-la-Madeleine Wildlife Management Directorate of the Ministère des Forêts, de la Faune et des Parcs (MFFP) located in Gaspé.

The species processed in the field and in the lab were identified by species and were measured using a measuring board. The large fish (> 15 cm) were weighed using a Rapala (25 kg) digital scale directly in the field before being released into the water. For individuals less than 15 cm in length, up to 30 randomly selected individuals of each species present were measured and then counted only. This 30-individual limit was inspired by a field formula used by Forillon National Park for its ecological monitoring efforts (Daniel Sigouin, Parks Canada, personal communication).

Sub-sampling was done to estimate the abundance of species present in large numbers in cases where the number of individuals caught was so large that counting them fully would require a great deal of time, in addition to compromising their survival. In such cases, when all that was left was very abundant species and the 30 individuals per species had been measured, sub-sampling was done for the remaining fish. To this end, the number of individuals per sub-sampled species in a container, which served as the standard, was counted. Each sub-sampled species was counted and identified; the number of containers holding the remaining individuals

was then counted. The total number of individuals from the sub-sample container was then recorded on the data sheet. This sub-sampling method was inspired by the protocol developed by the Réseau de suivi ichtyologique du fleuve Saint-Laurent (Deschamps 2011).

The fish kept for later identification were identified using the dichotomous identification keys mentioned above and ZEISS Steimi 305 stereo microscope with 8-40 magnification.

2.4 Data analysis

The data were compiled and sorted using a Microsoft Excel 2016 spreadsheet. Statistical analysis of the distribution, length and mass of the surveyed striped bass were done using SYSTAT 13 software (Systat Software Inc. 2009). The materiality threshold $\alpha = 0.05$ was used when testing hypotheses concerning the masses and lengths of the striped bass caught by each crew.

3.0 RESULTS

3.1 Sampling

Between July 25 and September 27, 2016, the two field crews surveyed 36 and 33 stations for Gesgapegiag and Gespeg respectively, in addition to one station that was sampled only once and had to be abandoned because it was inadequate due to the presence of too many aquatic plants. A grand total of 69 (+1) stations along the south shore of the Gaspé Peninsula were sampled over the course of this period, a total of 49 sampling days, by the two crews (Table 1).

Table 1. Number of stations, sampling days, fish species and individuals caught during the beach seine survey along the south shore of the Gaspé Peninsula in 2016

Crew	Number of stations	Number of sampling days	Start date	End date	Number of species	Total number of individuals
Gesgapegiag	36	41	2016-07-25	2016-09-23	**27**	142,428
Gespeg	33 (+1)	46	2016-07-25	2016-09-27	**31**	99,853
Total	69 (+1)	49	2016-07-25	2016-09-27	**34**	242,281

3.2 Catch

A broad diversity of species were caught during the sampling done by the two crews in summer 2016 – a grand total of 34 species, including 27 species in the zone between Escuminac and Newport caught by the Gesgapegiag crew and 31 species caught between Chandler and Penouille by the Gespeg crew (Table 1). Twenty-five species were caught by both crews during their sampling efforts. If we compare the fish caught by the two field crews, in terms of biodiversity, the Gesgapegiag crew caught 3 species not caught by the Gespeg crew while the latter caught 7 species not caught by the Gesgapegiag crew, 4 more than those caught by Gesgapegiag (including one species labelled "unknown" (Table 2). A grand total of 242,281 individuals were caught, 142,428 and 99,853 respectively by the Gesgapegiag and Gespeg crews (Table 1).

The names and number of species caught in each zone during this survey, as well as the number of stations where these species were caught are listed in Table 2 below. The results of the 2016 sampling season show that the 5 most common species caught were: sand-lance sp (*Ammodytes sp.*) (N = 108,052), followed by Shrimp (sand and other species) (N = 89,646); Atlantic Silverside (*Menidia menidia*) (N = 15,888); Three-spine Stickleback (including the Blackspotted Stickleback) (*Gasterosteus aculeatus*) (N = 12,621); and Atlantic Herring (*Clupea harengus*) (N = 4,676) (Table 2).

Table 2.   Species, number of individuals (N) per species, and number of stations where the species was caught during the 2016 sampling effort.

English Name	French Name	Scientific Name	N (species) Gesgapegiag	Number of stations Gesgapegiag	N (species) Gespeg	Number of stations Gespeg	N (species) Total	Total number of stations
American Shad	**alose savoureuse**	*Alosa sapidissima*	2,028	14	2	2	**2,030**	16
American Eel	**anguille d'Amérique**	*Anguilla rostrata*	32	8	38	14	**70**	22
Striped Bass	**bar rayé**	*Morone saxatilis*	8	6	43	11	**51**	17
Capelin	**capelan**	*Mallotus villosus*	170	12	251	12	**421**	24
Atlantic Silverside	**capucette**	*Menidia menida*	12,771	29	3,117	25	**15,888**	55
Sculpin family	**Chaboisseau/merluche**	*Myoxocephalus sp.*	44	18	112	32	**156**	51
Killifish family	**fondule sp.**	*Fondulus sp.*	52	9	200	9	**252**	18
Atlantic Rock Crab	**crabe commun**	*Cancer irroratus*	194	22	146	23	**340**	45
Shrimp sp.	**crevette sp.**		81,448	35	8,198	27	**89,646**	62
Rainbow Smelt	**éperlan arc-en-ciel**	*Osmerus mordax*	2,896	22	612	15	**3,508**	37
Ninespine Stickleback	**épinoche à neuf épines**	*Pungitius pungitius*	1,075	20	270	14	**1,345**	34
Fourspine Stickleback	**épinoche à quatre épines**	*Apeltes quadracus*	78	6	1,831	16	**1,909**	22
Three-spined Stickleback Blackspotted Stickleback	**épinoche à trois épines / épinoche tacheté**	*Gasterosteus aculeatus/ Gasterosteus wheatlandi*	720	23	11,901	23	**12,621**	46
Lumpfish	**grosse poule de mer**	*Cyclopterus lumpus*	5	4	41	11	**46**	15
Atlantic Herring	**hareng atlantique**	*Clupea harengus*	409	11	4,267	15	**4676**	26
Sea Raven	**hémitriptère atlantique**	*Hemitripterus americanus*	2	1	0	0	**2**	1
Lobster	**Homard**	*Homarus americanus*	1	1	23	11	**24**	12
Unknown	**Inconnu**	Unknown	0	0	61	13	**61**	13
Sand-lance family	**lançon sp.**	*Ammodytes sp.*	39,844	22	68,208	25	**108052**	47
Seasnail family	**limace sp.**		6	5	11	9	**17**	14
Atlantic Mackerel	**maquereau bleu**	*Scomber scombrus*	0	0	4	2	**4**	2

English name	French name	Scientific name	N (species) Gesgapegiag	Number of stations Gesgapegiag	N (species) Gespeg	Number of stations Gespeg	N (species) Total	Total number of stations
Atlantic Cod / Greenland Cod	morue franche / morue ogac	*Gadus morhua/Gadus ogac*	0	0	9	4	**9**	4
Sea Tadpole	petite limace de mer	*Careproctus reinhardti*	33	4	0	0	**33**	4
Atlantic Spiny Lumpsucker	petite poule de mer atlantique	*Eumicrotremus spinosus*	0	0	1	1	**1**	1
Witch Flounder	plie grise	*Glyptocephalus cynoglosus*	0	0	3	2	**3**	2
American Smooth Flounder	plie lisse	*Liopsetta putnami*	359	35	57	13	**416**	48
Winter Flounder	plie rouge	*Pseudopleuronectes americanus*	44	15	131	22	**175**	37
Atlantic Tomcod	poulamon atlantique	*Microgadus tomcod*	115	16	58	13	**173**	29
Atlantic Salmon	saumon atlantique	*Salmo salar*	0	0	2	1	**2**	1
Rock Gunnel	sigouine de roche	*Pholis gunnellus*	7	4	4	3	**11**	7
Arctic Shanny	stichée arctique	*Stichaeus punctatus*	0	0	2	1	**2**	1
Northern Pipefish	sygnathe brun	*Syngnathus fuscus*	1	1	1	1	**2**	2
Cunner	tanche-tautogue	*Tautogolabrus adspersus*	80	10	249	8	**329**	18
Trout /Char	truite / omble		6	2	0	0	**6**	2
(N) Species Total			**142 428**		**99 853**		**242 281**	

3.2 Striped bass catch

During this fist yea of beach seine survey, no juvenile striped bass were caught. However, several adult striped bass were caught during this period: a total of 51 individuals at 17 sampling stations (Table 3). Most of the striped bass, 43 individuals, were caught by the Gespeg crew in the eastern portion of the study area, while 8 individuals were caught by the Gesgapegiag crew (Figure 5). The adult striped bass were caught at 6 different stations in the area between Caplan and Port Daniel (Figure 6) by the Gesgapegiag crew, and at 11 sampling stations between Chandler and Rosebridge (Gaspé) by the Gespeg crew.

The adult striped bass caught varied in mass and length (Table 3). The smallest individual, measuring 147 mm in length, was caught at station 68 in the Rosebridge area (Gaspé) and had to be analyzed in the lab by an MFFP (Gaspé) technician to determine its age. It was confirmed to be a young striped bass from the previous year (1+) and not a juvenile. For the adult striped bass caught, on the whole, the lengths varied from 147 to 740 mm and the weight from 40 to 2,580 g (Table 3). Although no statistically significant difference in terms of length was detected for the fish caught by the two crews, the striped bass caught by the Gesgapegiag crew were larger in mass than those caught by the Gespeg crew (t = 2.63, ddl = 6.28, p = 0.04).

Table 3. Number (N) of stations where striped bass were caught, number (N) of striped bass caught per crew, minimum and maximum lengths and weights of the striped bass measured by each crew

Crew	Number of stations with striped bass catches	N striped bass	Min. length (mm)	Max. length (mm)	Mean length ± Standard deviation (mm)	Min. mass (g)	Max. mass (g)	Mean mass ± Standard deviation (g)
Gesgapegiag	6	**8**	180	740	583 ± 189	952	3901	2,082 ±1,041
Gespeg	11	**43**	147	650	474 ± 70	40	2580	1,034 ± 383
Total	17	**51**	147	740	492 ± 103	40	2580	1,187 ±6,35S

A more detailed portrait for each of the 51 individuals caught is appended to this report and includes the following parameters: date; sampling station number; length and mass of the fish caught; tide stage (incoming or outgoing); water temperature and maximum water depth at the area sampled as well as the method used to deploy the seine (from the shore or from a boat) (see Appendix 1).

The results show that adult striped bass catches occurred fairly regularly throughout the sampling period, from July 27 to September 29, 2016 for the Gespeg crew. For the Gesgapegiag crew adult striped bass were caught from mid-August to mid-September 2016 (Appendix 1). The largest number of adult striped bass, a total of 13, was caught by the Gespeg crew at station 50, located on Pointe Saint Pierre (Figure 4). An interesting point: 30 of the 51 adult striped bass caught were netted when the tide was going out. Another observation was that just over half (27 / 51) of the striped bass were caught when the seine was deployed from the boat, an approach used when the water was too deep to deploy the net fully from the beach (Appendix 1). As for the water depth at the stations where striped bass were caught, the maximum depth at the sample sites varied from 1.1 to 2 m. Water temperatures at the time these fish were caught ranged from 10.5 to 21.6 degrees Celsius.
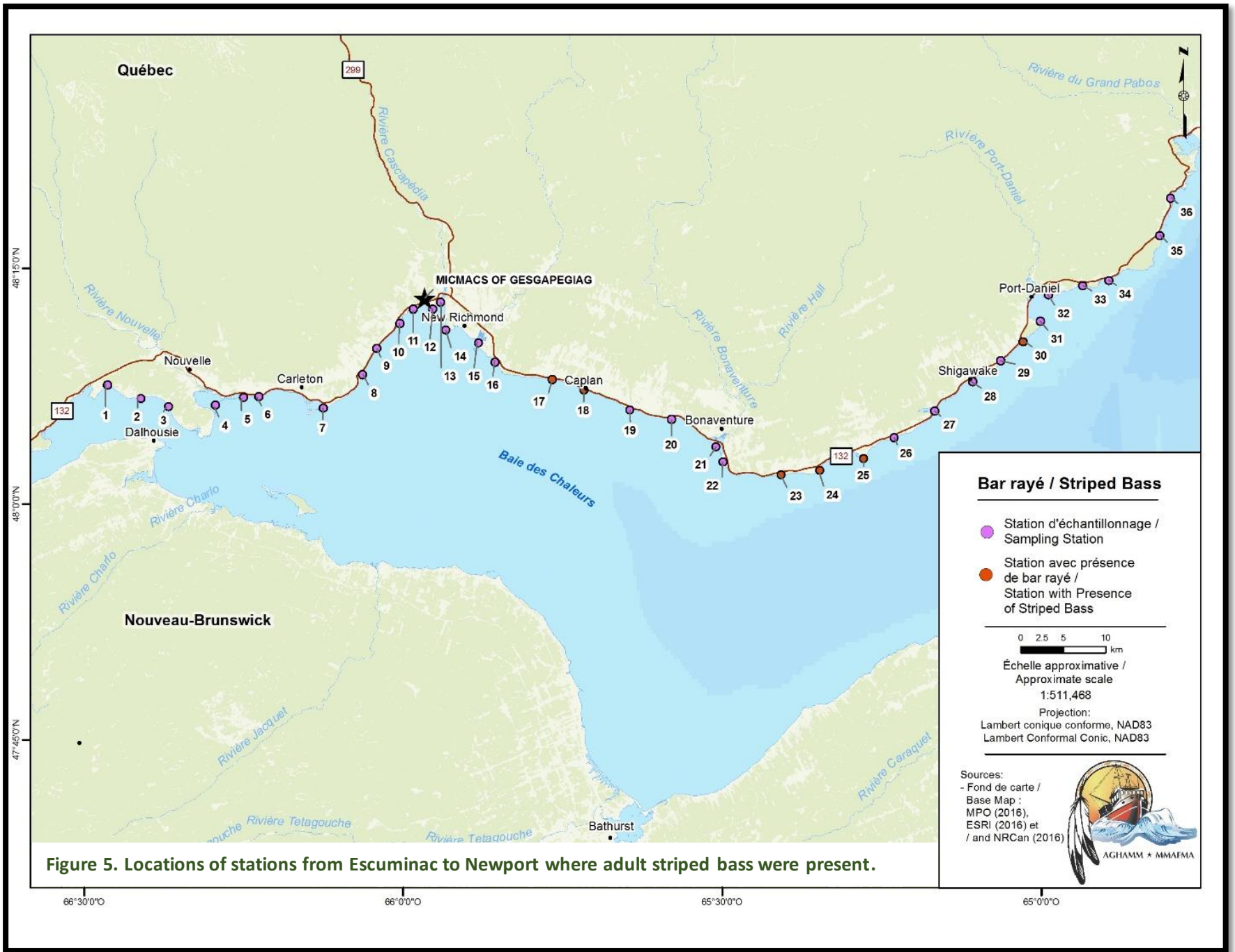
Figure 5. Locations of stations from Escuminac to Newport where adult striped bass were present.
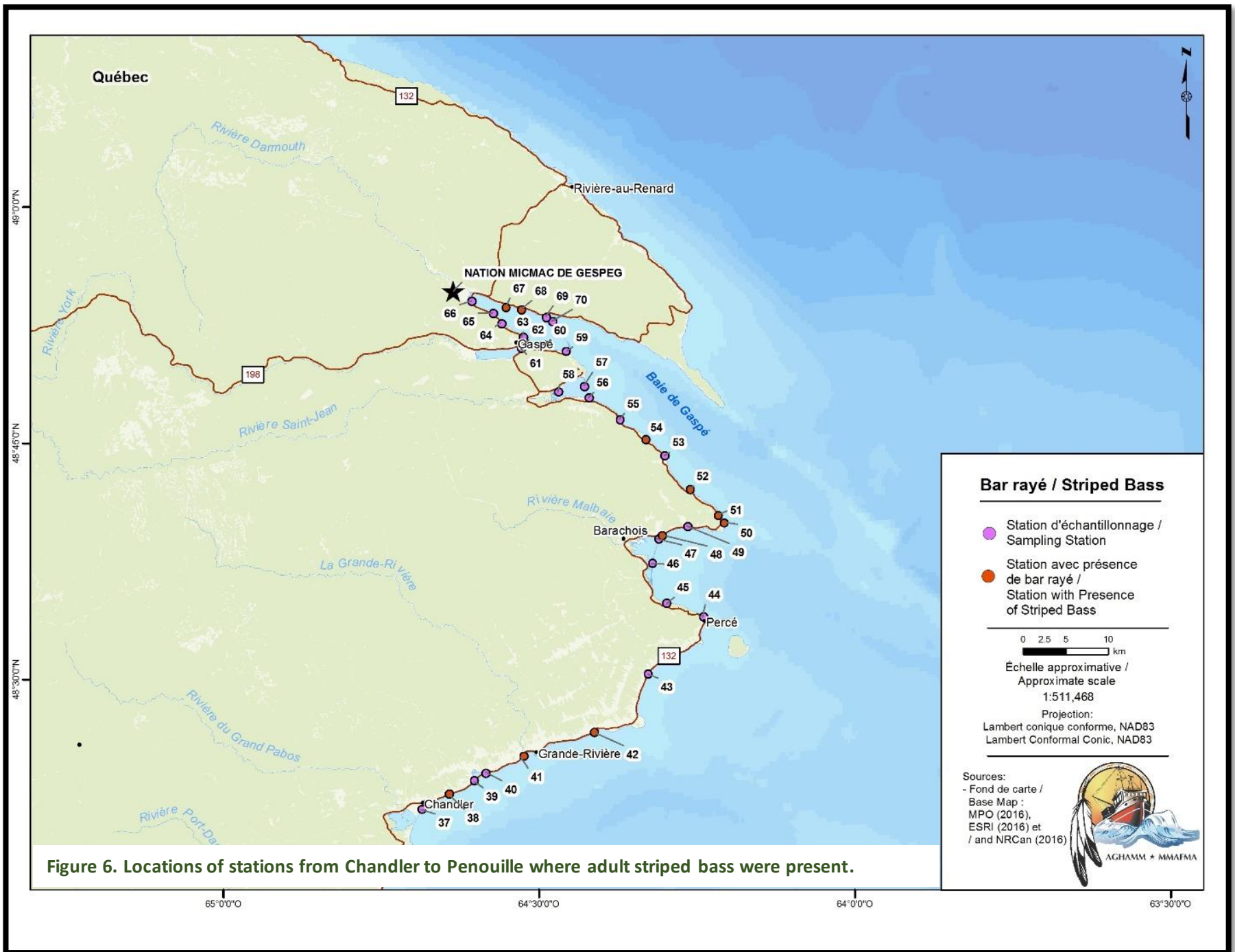
Figure 6. Locations of stations from Chandler to Penouille where adult striped bass were present.

3.3 Seine hauls

With an eye to increasing the likelihood of detecting juvenile and adult striped bass at a site, the beach seine was deployed 3 times (replicates) at each station, as mentioned above in the section dealing with the method. An analysis was done to verify the pertinence of these three seine hauls in terms of the striped bass catch rate per unit of effort per station per seine haul for each round of sampling and globally (all rounds taken together) (Table 4).

The results show that it is advantageous to use three seine hauls to improve the likelihood of detecting adult striped bass. In fact, the percentage of stations where striped bass were present evolved from 10% to 14% to 24% respectively for each of the 3 seine hauls (Table 4). These results are interesting in a perspective where sampling is done in a second consecutive year (2017); the 2016 data could then be compared to the new results obtained in 2017. It would, consequently, be possible to compare the distribution and abundance of adult striped bass over two consecutive sampling years.

Table 4. Cumulative striped bass catches per seine haul at each station during the three sampling rounds

	Round 1 (Late-July to mid-August)			Round 2 (Late-August to mid-September)			Round 3 (Mid-September to late September)			Regardless of round (rounds 1,2 and 3)			
	1st haul	2nd haul	3rd haul	1st haul	2nd haul	3rd haul	1st haul	2nd haul	3rd haul	1st haul	2nd haul	3rd haul	Total
TOTAL striped bass per seine haul	1	2	7	9	16	9	6	1	0	16	19	16	**51**
Cumulative total striped bass caught	1	3	10	9	25	34	6	7	7	16	35	51	**51**
Number of stations sampled	70	69	68	69	68	63	69	69	36	70	70	70	**70**
Cumulative number of stations where striped bass were present	1	2	6	3	5	8	6	6	6	7	10	17	**17**
% of stations where striped bass were present	1%	3%	9%	4%	7%	13%	9%	9%	17%	10%	14%	24%	**24%**
Mean number of striped bass caught per station	0.0014	0.043	0.147	0.130	0.368	0.540	0.087	0.101	0.194	0.229	0.500	0.729	**0.729**
Catch per unit of effort	0.0014	0.029	0.104	0.130	0.237	0.172	0.087	0.014	0.093	0.229	0.271	0.229	**0.729**

3.3 Species at risk catch

In addition to the striped bass, a total of three other species whose status is considered at risk to varying degrees by the provincial (ATVS) and federal (COSEWIC/SARA) governments were caught during the beach seine sampling effort in 2016 (Table 5): the American Shad (*Alosa sapidissima*), American Eel (*Anguilla rostrata*), and the Atlantic Salmon (*Salmo salar*). As shown in Figure 7, the American Shad were caught primarily in Chaleur Bay (at 14 stations) by the Gesgapegiag crew and at 2 stations by the Gespeg crew (Table 2). A total of 70 American eels were caught east of New Richmond, mainly in the area covered by the Gespeg crew. A total of 2 young Atlantic salmon were caught in the sector of Seal Cove (Douglastown) by the Gespeg crew.

Table 5. Species designated as being at risk by the provincial (ATVS) and federal (COSEWIC/SARA) governments identified during the beach seine sampling effort, 2016.

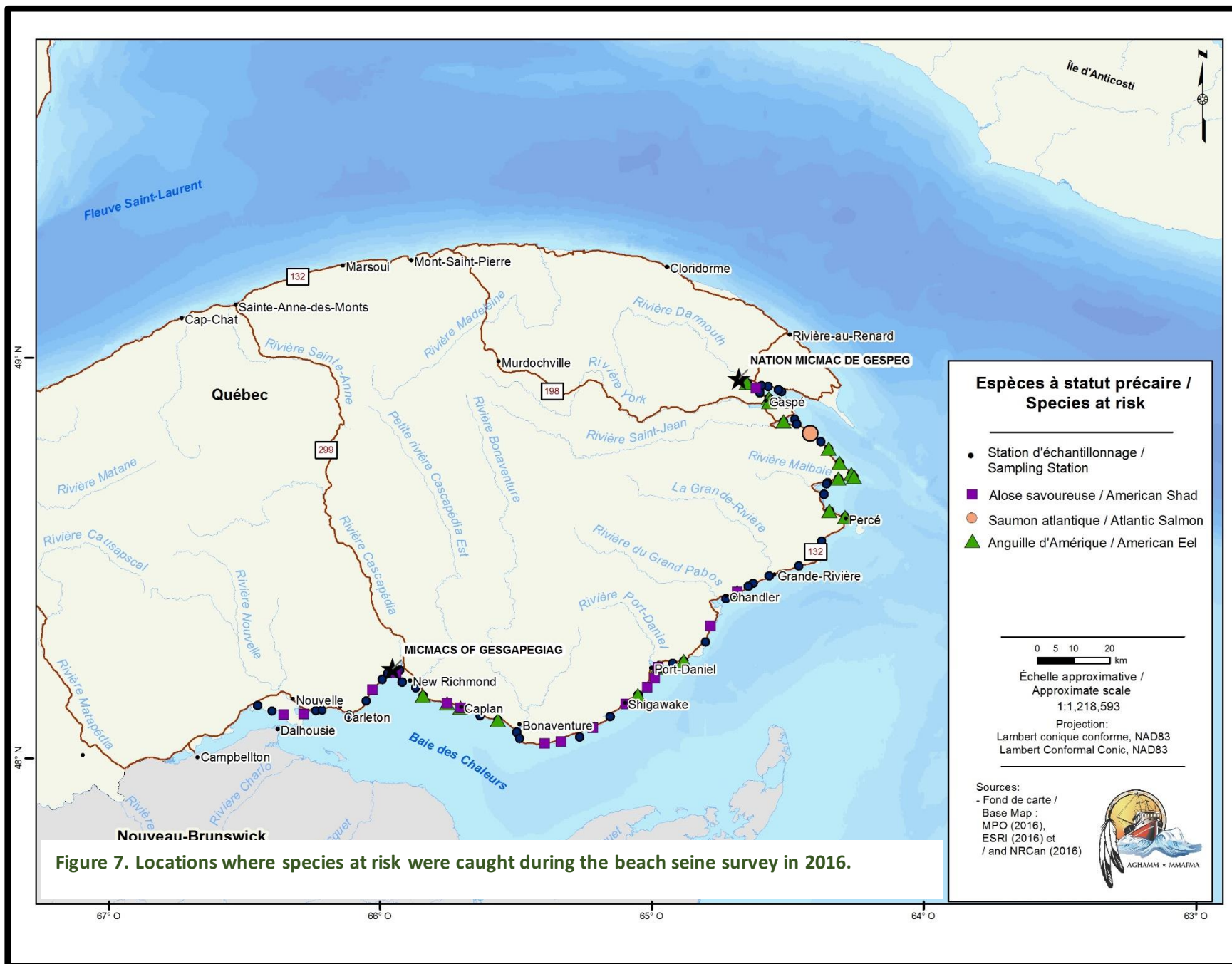| English name	French name	Scientific name	ATVS	COSEWIC / SARA
American Eel	**Anguille d'Amérique**	*Anguilla rostrata*	**Likely to be designated at threatened or vulnerable**	Threatened
American Shad	**Alose savoureuse**	*Alosa sapidissima*	**Vulnerable**	No status
Atlantic Salmon	**Saumon atlantique**	*Salmo salar*	**No status**	Of concern

Figure 7. Locations where species at risk were caught during the beach seine survey in 2016.

4.0 DISCUSSION AND PROSPECTS

The presence of juvenile striped bass could not be confirmed during the first year of beach seine sampling done as part of this study to characterize the habitat and presence of juvenile striped bass along the south shore of the Gaspé Peninsula. However, sampling did serve to catch and identify a broad diversity of fish and marine organisms in the coastal environment. It would be interesting to observe whether this diversity in species and their abundance fluctuates from year to year and with changing environmental conditions, which explains why it is important to continue to identify all the species collected and to gather data on the sampled habitats.

Although the fishing gear used was not designed for adult striped bass, they were caught during the sampling effort, in notable abundance in the eastern portion of the study area. Although the presence of adult striped bass in the study sector was confirmed prior to this study, the adult striped bass catch data provide information on their distribution in the area during the sampling period. Moreover, it would be pertinent to continue sampling efforts in the future to obtain a more precise idea of the distribution and characteristics of the striped bass present. The protocol could be improved to include taking a scale sample from the adult bass, which would be used to evaluate, spatially and temporally, the age of individuals caught during a second year of sampling. These additional combined data could serve to generate an abundance and age distribution index for adult striped bass, in spatial and temporal terms, within the study area.

In addition, the results of the analysis concerning the pertinence of the three seine hauls (replicates) used during this first year of sampling suggest that it would advantageous to keep the second and third seine haul in the protocol so that comparative analyses can be conducted on adult striped bass using data obtained during a second year of sampling.

Three species at risk, other that the Striped Bass, were also caught during the first season of beach seine sampling in 2016. By continuing to identify the species caught during a second sampling season, these data could prove useful to monitor the presence and distribution of such species within the study area as they evolve.

The first year of sampling to characterize the habitat and presence of juvenile striped bass along the south shore of the Gaspé Peninsula took place in 2016. The presence of juvenile striped bass could not be confirmed during this first year, but with this objective in mind, the work should be repeated in 2017. In addition, the data collected during a second year of sampling could be used to compile a portrait of the distribution and abundance of adult striped bass within the study area as well as that of some species at risk present there.

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Detailed data gathered for each of the 51 adult striped bass caught during the MMAFMA beach seine sampling effort conducted along the south shore of the Gaspé Peninsula by the two field crews between July 27 and September 29, 2016

Individual #	Sampling date	Station #	Crew	Length (mm)	Mass (g)	Tide stage	Water temperature (∘C)	Max. depth (m)	Seine haul from a boat or from shore
1	2016-07-27	68	Gespeg	147	40	Outgoing	19.9	1.2	From shore
2	2016-07-27	67	Gespeg	450	900	Outgoing	21.6	1.5	From shore
3	2016-07-27	67	Gespeg	420	710	Outgoing	21.6	1.5	From shore
4	2016-08-03	17	Gesgapegiag	670	1542	Incoming	21.6	1	From shore
5	2016-08-03	18	Gesgapegiag	500	953	Incoming	21.6	1	From shore
6	2016-08-15	48	Gespeg	520	1290	Outgoing	17.6	2	From a boat
7	2016-08-15	48	Gespeg	480	1210	Outgoing	17.6	2	From a boat
8	2016-08-15	48	Gespeg	460	1220	Outgoing	17.6	2	From a boat
9	2016-08-17	41	Gespeg	560	1750	Incoming	18.1	1	From shore
10	2016-08-23	23	Gesgapegiag	525	N/A	Outgoing	18.8	1	From shore
11	2016-08-23	23	Gesgapegiag	740	3901	Outgoing	17.5	1.2	From shore
12	2016-08-24	24	Gesgapegiag	730	2570	Outgoing	13.5	1.5	From shore
13	2016-08-24	25	Gesgapegiag	740	2580	Outgoing	13.5	1.5	From shore
14	2016-08-24	61	Gespeg	460	680	Outgoing	15.6	1.7	From a boat
15	2016-08-24	61	Gespeg	490	710	Outgoing	15.6	1.7	From a boat
16	2016-08-24	61	Gespeg	490	990	Outgoing	15.6	1.7	From a boat
17	2016-08-24	61	Gespeg	490	840	Outgoing	15.6	1.7	From a boat
18	2016-08-24	61	Gespeg	450	710	Outgoing	15.6	1.7	From a boat
19	2016-08-30	52	Gespeg	440	960	Outgoing	16.5	1	From shore
20	2016-08-30	52	Gespeg	449	840	Outgoing	16.5	1	From shore
21	2016-08-30	52	Gespeg	500	1240	Outgoing	16.5	1	From shore
22	2016-08-30	52	Gespeg	448	928	Outgoing	16.5	1	From shore

Individual #	Sampling date	Station #	Crew	Length (mm)	Mass (g)	Tide stage	Water temperature (∘C)	Max. depth (m)	Seine set from boat or from shore
23	2016-08-30	52	Gespeg	455	1140	Outgoing	16.5	1	From shore
24	2016-08-30	52	Gespeg	490	1010	Outgoing	16.5	1	From shore
25	2016-08-31	54	Gespeg	470	1010	Outgoing	15	2	From a boat
26	2016-08-31	51	Gespeg	500	1157	Incoming	14.8	1.8	From a boat
27	2016-08-31	51	Gespeg	452	917	Incoming	14.8	1.8	From a boat
28	2016-08-31	51	Gespeg	430	837	Incoming	14.8	1.8	From a boat
29	2016-08-31	51	Gespeg	460	987	Incoming	14.8	1.8	From a boat
30	2016-09-01	50	Gespeg	650	2580	Outgoing	14.4	2	From a boat
31	2016-09-01	50	Gespeg	570	1100	Outgoing	14.4	2	From a boat
32	2016-09-01	50	Gespeg	440	910	Outgoing	14.4	2	From a boat
33	2016-09-01	50	Gespeg	490	1170	Outgoing	14.4	2	From a boat
34	2016-09-01	50	Gespeg	472	1000	Outgoing	14.3	2	From a boat
35	2016-09-01	50	Gespeg	530	1360	Outgoing	14.3	2	From a boat
36	2016-09-01	50	Gespeg	484	1230	Outgoing	14.3	2	From a boat
37	2016-09-01	50	Gespeg	462	980	Outgoing	14.3	2	From a boat
38	2016-09-01	50	Gespeg	520	1380	Outgoing	14.3	2	From a boat
39	2016-09-01	50	Gespeg	430	740	Outgoing	14.3	2	From a boat
40	2016-09-01	50	Gespeg	442	490	Outgoing	14.3	2	From a boat
41	2016-09-01	50	Gespeg	443	460	Outgoing	14.3	2	From a boat
42	2016-09-08	42	Gespeg	461	1327	Outgoing	14.2	1	From shore
43	2016-09-08	42	Gespeg	472	1110	Incoming	14.1	1.1	From shore
44	2016-09-08	42	Gespeg	481	1060	Incoming	14.1	1.1	From shore
45	2016-09-15	30	Gesgapegiag	580	2009	Incoming	12	1.1	From shore
46	2016-09-20	30	Gesgapegiag	180	1016	Outgoing	N/A	1.5	From shore
47	2016-09-21	50	Gespeg	460	980	Outgoing	11.3	1.2	From shore
48	2016-09-22	54	Gespeg	450	1180	Outgoing	13.3	2	From a boat
49	2016-09-22	54	Gespeg	500	1277	Outgoing	13.1	2	From a boat
50	2016-09-28	42	Gespeg	620	N/A	Incoming	10.5	1.1	From shore
51	2016-09-29	38	Gespeg	517	N/A	Incoming	11.3	1	From shore