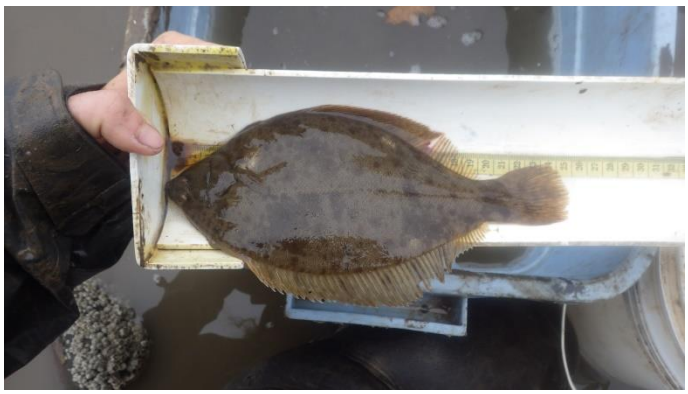

Striped Bass Monitoring in the Annapolis River, Bear River and Allain's Creek, Nova Scotia

Final Report

2015 Final

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2015 Report

Report Produced by Clean Annapolis River Project

Funded by:

Acadia University

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1. Executive Summary

Striped bass *(Morone saxatilis)* are an anadromous fish native to the Atlantic coast of North America. In Canada, three populations have been designated; the Bay of Fundy population is currently listed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) as endangered. Historically striped bass spawned in the Annapolis River system; however this spawning population appears to be functionally extirpated.

In order to provide data about striped bass in the Annapolis River system for the Striped Bass Research Team at Acadia University, Clean Annapolis River Project (CARP) was contracted to complete egg tow surveys and beach seine surveys at sites on the Annapolis River, Allain's Creek and Bear River, Nova Scotia. Additional outreach activities were completed for the project, including the distribution of angler kits to promote the submission of catch data and scale samples, and public education.

No eggs or juvenile or adult striped bass were collected during surveys in 2015. This is similar to surveys conducted by CARP in 2010-2011 and 2013-2014 and supports the theory that the Annapolis River spawning population is extirpated. Anecdotal evidence provided by recreational anglers indicates that adult fish can still be found in the Annapolis River system in low numbers.

2. Introduction

Striped bass, *Morone saxatilis*, are a member of the Moronidae family more commonly known as the temperate bass family. The striped bass has a dark olive green back while the sides fade to a silvery colour and the belly is white (COSEWIC, 2012; Scott and Scott, 1988). An adult striped bass is easily identifiable by the 7 or 8 dark stripes that run along its sides. Striped bass have been reported to weigh over 45.4 kg with the largest fish caught weighing in at 56.7 kg in North Carolina in 1891; however, today these weights would be extremely rare (Scott and Scott, 1988).

Striped bass are anadromous and can be found distributed along the Atlantic Coast of North America from the St. Lawrence River to the St. John's River in northeast Florida (COSEWIC, 2012). Striped bass in Canadian waters are divided into three populations: the Bay of Fundy, the Southern Gulf of St. Lawrence and the St. Lawrence River. Historically in Canada, striped bass are known to have spawned in 5 river systems: the Saint John and Miramichi rivers in New Brunswick, the Annapolis and Shubenacadie rivers in Nova Scotia and the St. Lawrence River in Quebec.

Striped bass make use of a variety of habitats. Often spawning, incubation and early larval stages occur in fresh or brackish water while juvenile and adult fish make use of coastal, estuarine and saltwater habitats (COSEWIC, 2012). Winter is spent in estuaries or freshwater habitats and spawning sites are returned to in the spring. Past studies have shown striped bass to spawn at the upper limit of the freshwater-saltwater boundary of an estuary (Raney, 1952). In the Annapolis River, this boundary can be found up to 40 km upstream from Annapolis Royal and has been identified as a historical striped bass spawning area (Harris & Rulifson, 1988).

Fisheries and Oceans Canada (DFO) has considered the Annapolis River striped bass spawning population to be extirpated since 2006, as a result of repeated spawning failures and negligible survival of larvae to the juvenile stage due to changes in water chemistry and circulation in the downstream portion of the river, attributed to the construction of the causeway and subsequent tidal power generating station in Annapolis Royal (DFO, 2014).Other reports from DFO indicate that there has been no evidence of successful spawning or recruitment in the Annapolis River since 1976 (COSEWIC, 2012). In a recent scientific advisory report (DFO, 2014), it was stated that the Annapolis River may now serve as only foraging and over-wintering habitat, as spawning and nursery habitat features and attributes have been significantly degraded.

The COSEWIC assessment and status report for striped bass was last examined in 2012. The Southern Gulf of St. Lawrence population was designated as a species of special concern and the Bay of Fundy and St. Lawrence River populations were designated as endangered. Threats to striped bass include: overfishing, habitat loss and degradation, contaminants and migration barriers.

Since 2010 CARP has been working collaboratively with the Striped Bass Research Team, based out of Acadia University, to support monitoring and research efforts in the Annapolis River watershed. In 2010, 2011, 2013 and 2014 CARP carried out a variety of surveys for both adult, juvenile and striped bass eggs. Since 2013 survey efforts have expanded to included sites on the Bear River and Allain's Creek, in addition to the

Annapolis River and estuary. To date no eggs, juvenile or adult striped bass have been collected during CARP's surveys.

3. Objectives

The overall research goal for this project was to collect information about striped bass in the Annapolis River Watershed. Three objectives were set to achieve this goal:

1. To conduct eggs tow surveys at known historical spawning sites on the Annapolis River;
2. To conduct beach seine surveys at sites on the Annapolis River and estuary, Bear River and Allain's Creek; and
3. To conduct a variety of outreach activities to encourage submission of recreational angler catch data and scale samples, and to raise general awareness about the project.

4. Methods

4.1. Egg Tows

Egg tow surveys were conducted at reported historical spawning sites between Paradise and Bridgetown, near the confluences of Daniel Brook, Bloody Creek and Paradise Brook.

A 14' aluminum boat was launched from the Bridgetown boat launch at Jubilee Park, and was fitted with gear to complete egg tow surveys. Surveys were completed using similar methods to those employed by Labenski (2011). A fine mesh (< 2 mm) plankton net was attached to the sampling boat using U-shaped rebar, and lowered approximately one meter into the water column. Boat speed was maintained at 2.0 to 2.5 kms/hour, and the net was towed at a constant distance from the boat to avoid influence from the motor. A zigzag pattern across sampled channels was used in the collection of egg tow data to maximize the amount of area covered during sampling. Surveys lasted from 10 to 20 minutes, after which point the plankton net was rinsed using a squirt bottle, and the sample flushed into a 500 mL glass jar. GPS coordinates were recorded at the start and end points of each survey, and the survey tracks were uploaded to ArcGIS for mapping. Glass sample jars were placed into coolers filled with ice after sampling, and were later sent to Acadia for laboratory analysis.

4.2. Beach Seine Surveys

A beach seine was used to target juvenile striped bass, as well as sampling all other by-catch. Duplicate samples were completed at each sampling site using a purse seine measuring 24.3 m in length, 2.10 m in height with a purse mesh diameter of approximately 0.3 cm. Water quality measurements were taken at each site using an YSI Professional Plus (Model: Pro 10102030). All information collected was recorded on a data sheet (Appendix A).

Beach seining consisted of person A walking the net out perpendicular to the shoreline while person B fed the seine out. Person A would walk upstream and then back into shore while person B held the net at the shoreline. If a site had a steep shoreline, person A would wade slightly downstream with the net and continue parallel to the bank and upstream before returning to person B at the shoreline. Once person A returned to the shoreline, person A and B would simultaneously draw the net in, ensuring the bottom and top of the net were pulled together, effectively trapping small fish in the purse.

Fish were transferred into buckets containing river water. Fish collected from the first tow of the seine were identified to family, counted, and released once the second tow was completed. Fish from the second tow of the seine were identified to species, counted, and measurements of total length and fork length recorded for the first 20 individuals of each species. All species of herring were kept from the second tows and preserved in 70% ethanol and brought back to the lab for identification to species; all other fish were released at the site once data was collected.

Annapolis River

Beach seine surveys were conducted at 8 predetermined sites above the Annapolis River causeway and 4 predetermined sites below the causeway (Figure 1, Figure 2, Table 1). The sites were previously surveyed by Department of Fisheries and Oceans (DFO) in the summers of 2001 and 2002 (Labenski, 2011), by Labenski (2011) in 2010 and by CARP in 2011, 2013, and 2014. The location of one site (AR 2) was modified from previous years, as the slope of the historically used site was too great to allow for the safe completion of a seine.

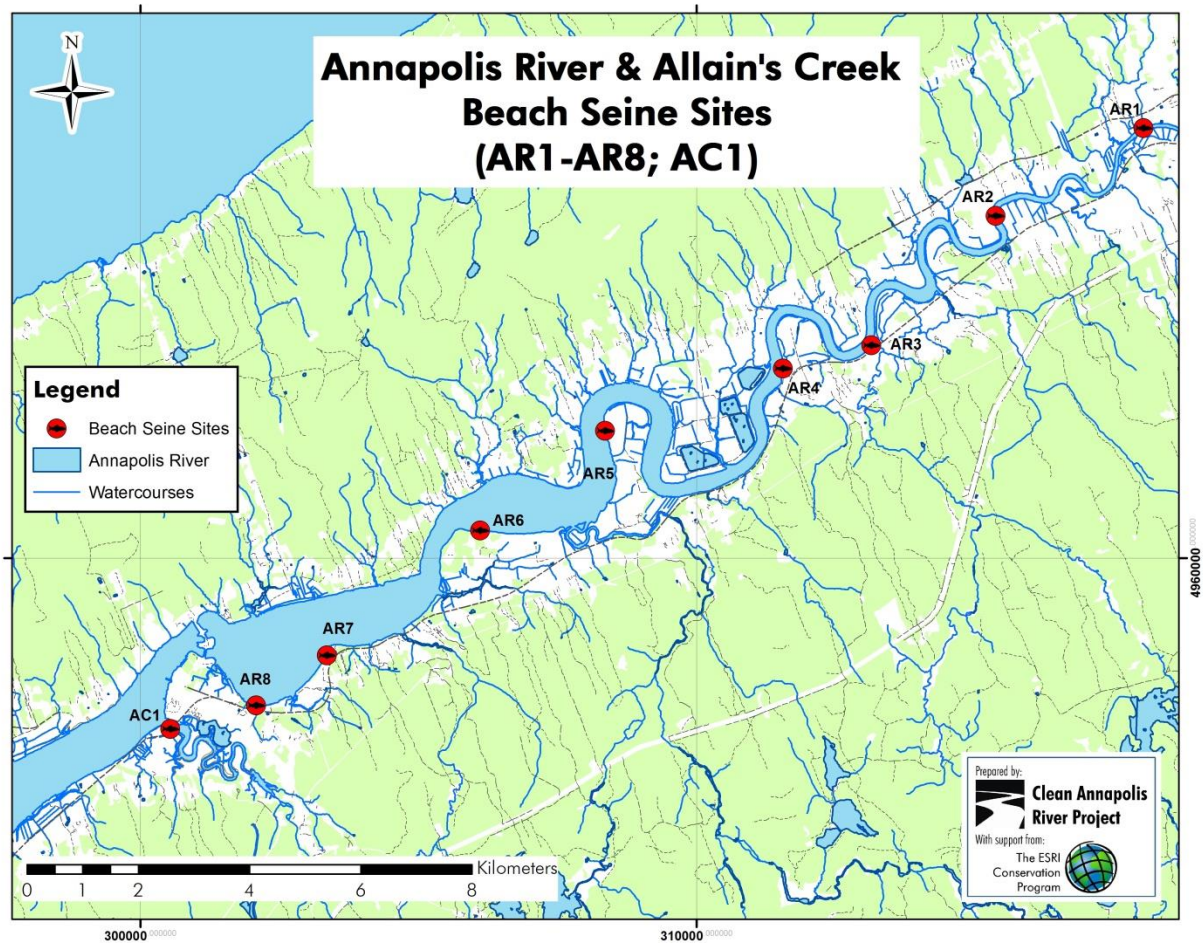

Figure 1. Beach seine survey sites (AR1-AR8) in the Annapolis River above the causeway and Allain's Creek (AC1).

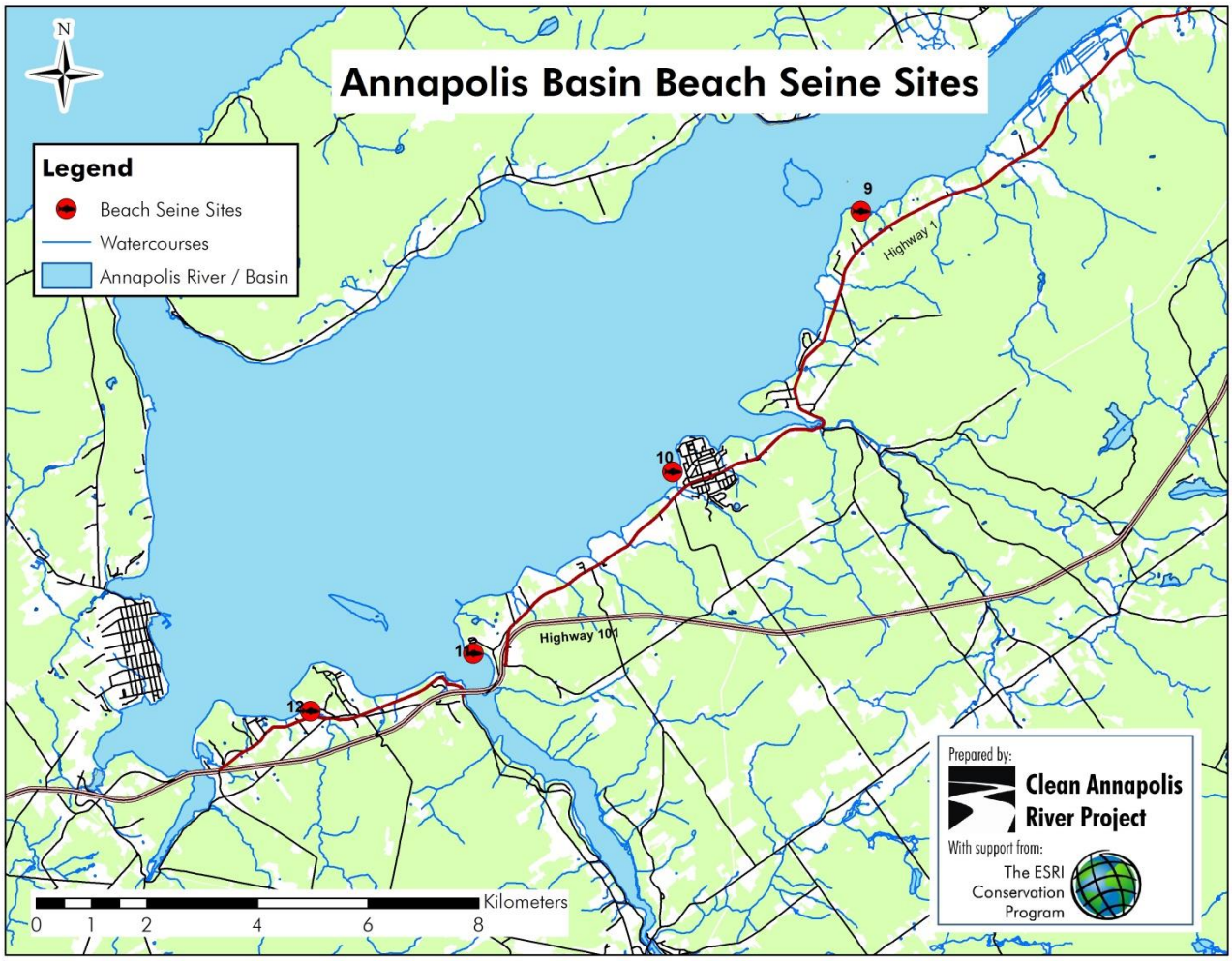

Figure 2. Beach seine survey sites (AR9-AR12) in the Annapolis River below the causeway.

Table 1. Site, location and UTM coordinates for Annapolis River beach seine sites AR1-AR12.

Site	location	GPS Coordinates (UTM, 20T, accuracy ± 3 m)	
		Easting	Northing
1	Jubilee Park	318045	4967745
2	Upper Granville	315348	4966055
3	Tupperville	313151	4963837
4	Belleisle	311562	4963417
5	Roundhill Road	308369	4962286
6	Marsh Road	306113	4960484
7	Head Pond	303355	4958257
8	Annapolis Royal	302081	4957354
9	Upper Clements	294183	4952401

10	Cornwallis	290913	4947705
11	Bear River	287235	4944429
12	Smith's Cove	284282	4943399

Bear River

Beach seine surveys were conducted at 4 predetermined sites in the Bear River (Figure 3, Table 2). Sites were selected based on collaboration with Bear River First Nations during the 2013 monitoring season.

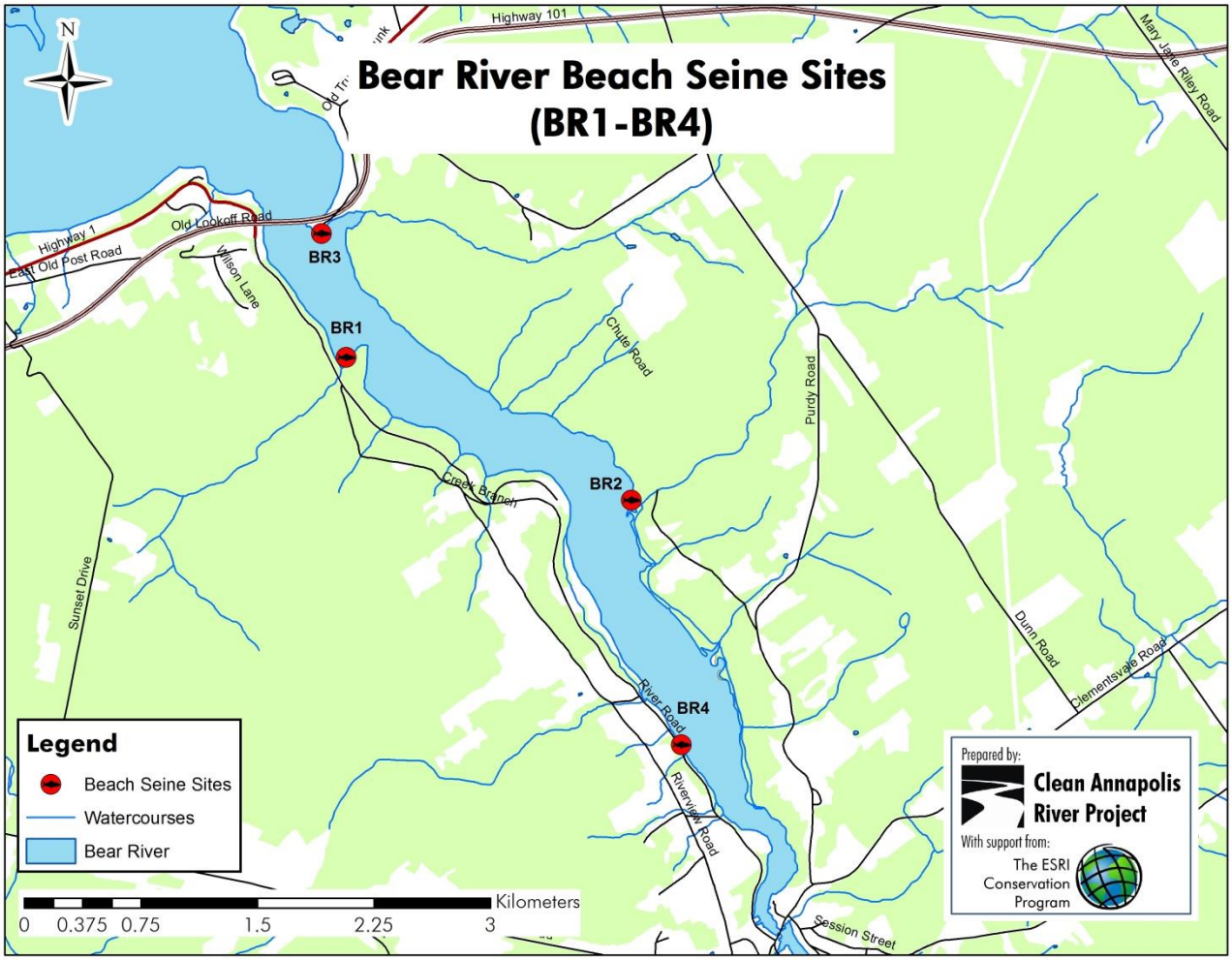

Figure 3. Beach seine survey sites (BR1-BR4) in the Bear River.

Table 2. Site, location and UTM coordinates for Bear River beach seine sites BR1-BR4.

Site	Location	GPS Coordinates (UTM, Zone 20T, accuracy ± 3 m)

		Easting	Northing
BR1	Raymond's Point	287625	4942840
BR2	Kniffen's Hollow	289447	4941958
BR3	Bear River Bridge	287470	4943717
BR4	River Rd	289780	4940387

Allain's Creek

One beach seine survey was conducted at Allain's Creek (Figure 1**Error! Reference source not found.**,Table 3). The site was selected during the 2014 monitoring season.

Table 3. Site, location and UTM coordinates for Allain's Creek beach seine site AC1.

Site	Location	GPS Coordinates (UTM, Zone 20T, accuracy ± 3 m)	
		Easting	Northing
AC1	Old rail bridge	300541	4956931

4.3. Outreach

Outreach activities focused on two goals: (1) obtaining catch-data and scale samples from recreational anglers, and (2) raising awareness about the project and the status of striped bass in the Annapolis River watershed.

Recreational Angler Outreach

Angler kits were prepared at the CARP office, and included:

- 1 cover letter
- 1 angler log book
- 5 scale sample envelopes
- Copies of Striped Bass Research Team outreach materials
- CARP Fish Habitat Conservation pamphlet

General Outreach

General outreach activities employed a variety of tools and mediums for the communication project goals and objectives. These included:

- Traditional press releases in local newspapers
- Exhibits
- Social media, including Facebook and Twitter
- Website and electronic resources
- Print resources
- Public presentations and seminars
- Striped Bass Stewardship Center hosted out of the CARP office

5. Results

5.1. Egg Tows

Egg tow surveys were conducted at three sites on the Annapolis River: Bloody Creek (

Figure 4), Daniel Brook (Figure 5), and Paradise Creek (Figure 6). No striped bass eggs were collected during these surveys (Table 7). Water quality data was collected at each site, and is presented in Table 5.

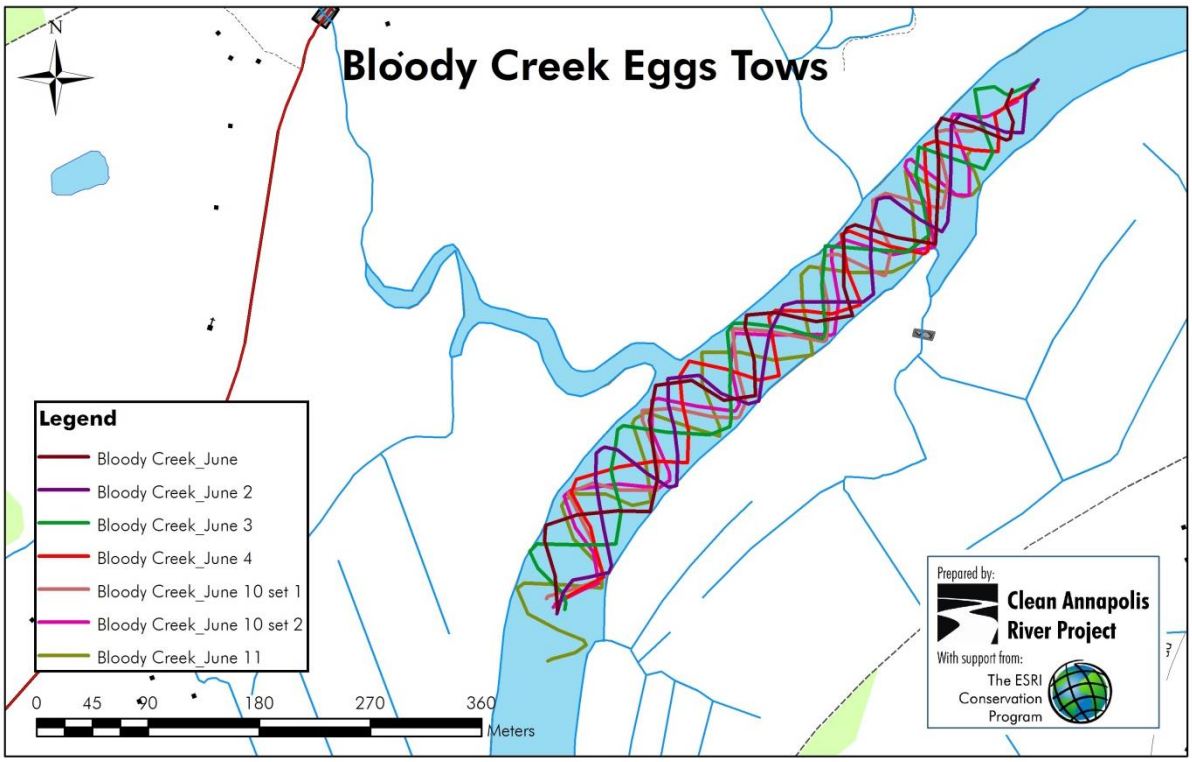

Figure 4. Bloody Creek Egg Tows

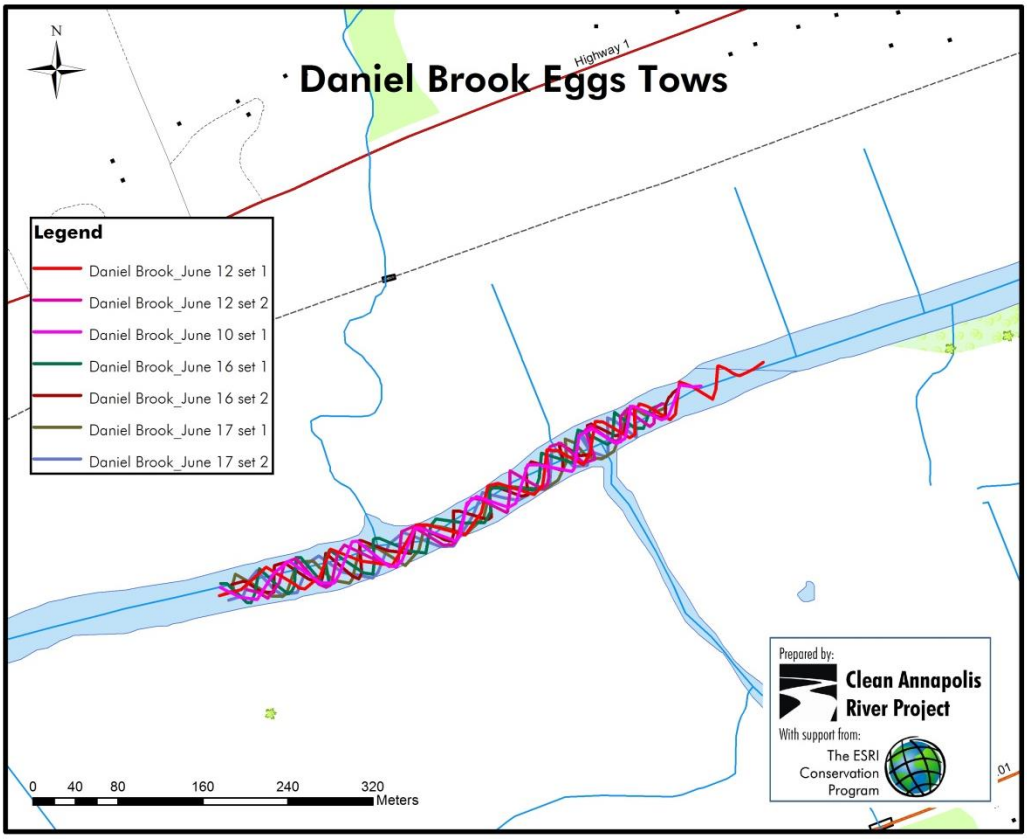

Figure 5. Daniel Brook Egg Tows

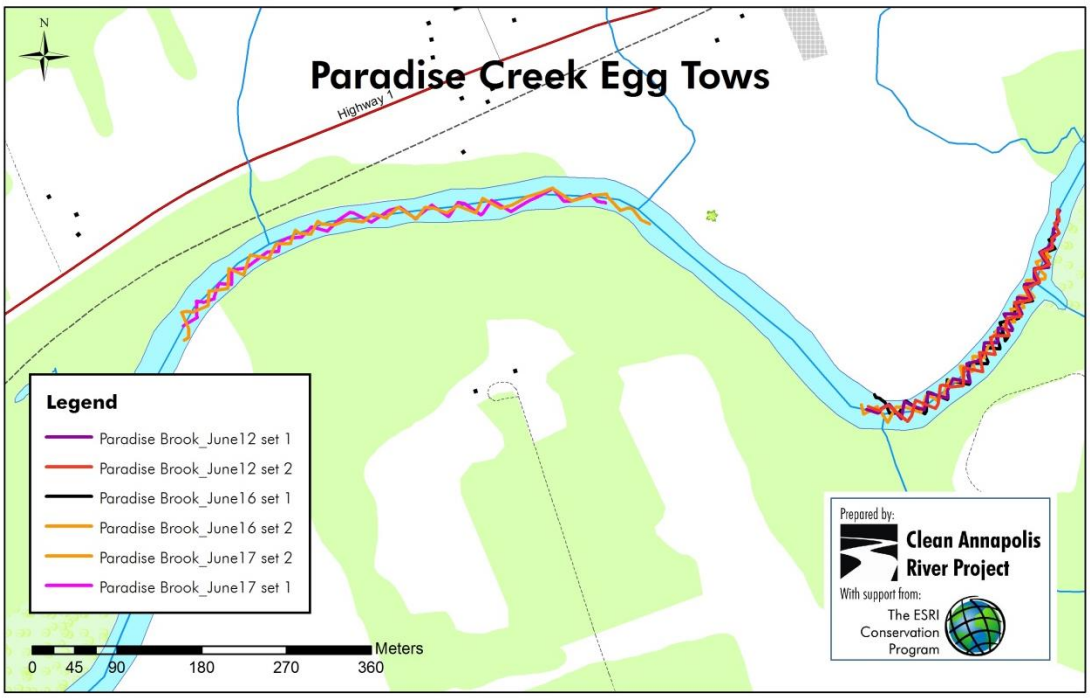

Figure 6. Paradise Creek Egg Tows

Table 4. Egg tow survey results

Location	Date (2015)	Start time	Flow #	End time	Flow #	Time	Eggs
Bloody Creek	29-May-	1:08	200876	1:25	242701	0:17	no
	29-May-	1:41	242701	1:57	281568	0:16	no
	04-Jun-	5:05	358403	5:20	405684	0:15	no
	11-Jun-	10:47	486211	10:59	520807	0:12	no
	11-Jun-	11:17	520807	11:30	549207	0:13	no
	12-Jun-	1:10	633301	1:21	661633	0:11	no
	12-Jun-	1:36	661637	1:49	691179	0:13	no
	16-Jun-	4:07	780500	4:19	804785	0:12	no
	16-Jun-	4:28	804786	4:41	832138	0:13	no
	17-Jun-	3:01	832141	3:18	853047	0:17	no
	17-Jun-	3:36	853732	3:49	870587	0:13	no
	02-Jul-	5:21	030327	5:33	055199	0:12	no
	02-Jul-	5:43	055200	5:58	081738	0:15	no
Daniel Brook	04-Jun-	4:10	322076	4:25	358415	0:15	no
	11-Jun-	9:30	433558	9:42	462891	0:12	no
	11-Jun-	10:04	482208	10:15	462883	0:11	no
	12-Jun-	12:00	584840	12:10	608518	0:10	no
	12-Jun-	12:24	608505	12:35	633298	0:11	no
	16-Jun-	2:59	734660	3:10	758963	0:11	no
	17-Jun-	4:48	917699	5:00	933658	0:12	no
	17-Jun-	6:20	917696	6:34	917699	0:14	no
	02-Jul-	4:20	993975	4:31	011649	0:11	no
	02-Jul-	4:40	016655	4:53	030329	0:13	no
	16-Jun-	3:22	758965	3:34	780509	0:12	no
Paradise Brook	29-May-	11:41	113634	12:02	158527	0:21	no
	29-May-	12:20	158527	12:38	200880	0:18	no
	04-Jun-	3:00	2816565	3:22	322064	0:22	no
	11-Jun-	8:38	405658	8:50	433562	0:12	no
	12-Jun-	10:41	549905	10:51	563371	0:10	no
	12-Jun-	11:10	563370	11:21	584840	0:11	no
	16-Jun-	1:53	580066	2:03	713032	0:10	no
	16-Jun-	2:13	713020	2:23	734650	0:10	no
	17-Jun-	4:59	870585	5:12	891468	0:13	no
	17-Jun-	5:27	891465	5:42	917690	0:15	no
	02-Jul-	3:05	933658	3:19	962297	0:14	no
	02-Jul-	3:35	962300	3:46	993982	0:11	no

Table 5. Water quality data collected during egg tow surveys

Location	Date (2015)	Air Temperature (°C)	Water Temperature (°C)	Dissolved Oxygen (%)	Total Dissolved Solids (g/L)	Specific Conductivity (µS/cmc)	Conductivity (µS/cm)	Salinity (g/L)	pH	pHmV
Bloody Creek	29-May-	19.6	19.2	95.5	8.79	70.2	61.6	0.03	6.3	
	29-May-	19.6	19.2	95.5	8.79	70.2	61.6	0.03	6.3	
	04-Jun-	15.9	13.8	100.8	10.62	56.6	44.4	0.03	5.93	
	11-Jun-	19.6	17.3	98.5	9.65	63.7	54.4	0.03	6.2	6.2
	11-Jun-	19.6	17.3	98.5	9.65	63.7	54.4	0.03	6.2	6.2
	12-Jun-	21.9	19.4	109.9	10.11	68.8	61.3	0.03	6.24	3.8
	12-Jun-	21.9	19.4	109.9	10.11	68.8	61.3	0.03	6.24	3.8
	16-Jun-	17.6	18.6	108.2	9.5	70.4	61.7	0.03	6.36	-1.7
	16-Jun-	17.6	18.6	108.2	9.5	70.4	61.7	0.03	6.36	-1.7
	17-Jun-	22	19.6	99.6	9.23	67.4	60	0.03	6.48	-7.5
	17-Jun-	22	19.6	99.6	9.23	67.4	60	0.03	6.48	-7.5
	02-Jul-	19.1	20	94.7	8.63	67.6	61.1	0.03	6.83	11
	02-Jul-	19.1	20	94.7	8.63	67.6	61.1	0.03	6.83	11
Daniel Brook	04-Jun-		13.5	102.2	10.62	55.8	43.5	0.03	6.24	
	11-Jun-		17.6	98	9.39	63.1	54	0.03	6.22	6.9
	11-Jun-		17.6	98	9.39	63.1	54	0.03	6.22	6.9
	12-Jun-	20.8	19.2	110.5	10.2	66.3	42.9	0.03	5.97	21.2
	12-Jun-	20.8	19.2	110.5	10.2	66.3	42.9	0.03	5.97	21.2
	16-Jun-	17.6	18	106.1	10.71	69	18.4	0.03	6.41	-5.3
	17-Jun-	22	20	104.2	9.46	66.1	58.7	0.03	6.96	-2.3
	17-Jun-	22	20	104.2	9.46	66.1	58.7	0.03	6.96	-2.3
	02-Jul-	19.1	20.5	96.3	8.61	65.1	60.2	0.03	6.83	11.6
	02-Jul-	19.1	20.5	96.3	8.61	65.1	60.2	0.03	6.83	11.6
	16-Jun-	17.6	18	106.1	10.71	69	18.4	0.03	6.41	-5.3
Paradise Brook	29-May-		18.4	90.3	8.46	67.8	59.3	0.03	6.69	
	29-May-		18.4	90.3	8.46	67.8	59.3	0.03	6.69	
	04-Jun-	17.6	13.2	99.4	10.42	52.5	34.9	0.03	6.66	
	11-Jun-		17.6	98.6	9.5	64.7	55.6	0.03	6.38	-2.4
	12-Jun-	18.2	18.8	106.5	9.93	66.5	58.5	0.03	6.19	8
	12-Jun-	18.2	18.8	106.5	9.93	66.5	58.5	0.03	6.19	8
	16-Jun-	15.9	17.9	104.2	10.12	78.5	68.2	0.04	6.6	-15.8
	16-Jun-	15.9	17.9	104.2	10.12	78.5	68.2	0.04	6.6	-15.8
	17-Jun-	22	19.9	101.4	9.31	79.6	72.1	0.04	6.39	-3.8
	17-Jun-	22	19.9	101.4	9.31	79.6	72.1	0.04	6.39	-3.8
	02-Jul-	20.2	20.2	94.1	8.6	81	73.5	0.04	7.31	-15.6
	02-Jul-	20.2	20.2	94.1	8.6	81	73.5	0.04	7.31	-15.6

5.2 Beach Seine Surveys

Seine surveys yielded a total of 4742 individual fish at all of the sites sampled along the Annapolis River, Bear River and Allain's Creek.

Annapolis River

Two sets of duplicate beach seine surveys were completed at 12 sites on the Annapolis River, with 8 sites located above the causeway and 4 sites below the causeway (Table 1). No striped bass were collected during these surveys. Surveys yielded 3838 fish belonging to 11 families (Table 7). Results from water quality samples collected at each site are presented in Table 6.

Bear River

Two sets of duplicate beach seine surveys were completed on 4 sites on the Bear River (Table 2). No striped bass were collected during these surveys. Surveys yielded 869 fish belonging to 6 families (Table 7). Results from water quality samples collected at each site are presented in Table 6.

Allain's Creek

One set of duplicate beach seine surveys were completed on 1 site on Allain's Creek (Table 3). No striped bass were collected during these surveys. Surveys yielded 35 fish belonging to 6 families (Table 7). Results from water quality samples collected at each site are presented in Table 6.

Table 6. Water quality data collected during beach seine surveys.

Site	Date	Pass #	Air Temperature (°C)	Water Temperature (°C)	Specific Conductivity (µS/cm)	Conductivity (µS/cm)	Total Dissolved Solids (mg/L)	Salinity (g/L)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	pH	pHmV
AC1	03-Nov-15	1	8	9.8	36599	25968	23777	23.1	108.1	10.67	8.42	-68.3
		2	8	9.8	37082	26318	24128	23.41	108.1	10.53	8.48	-70.9
	21-Oct-15	1	8	11.1	29970	22039	19526	18.53	93.2	9.13	7.13	-55.8
		2	8	11.1	28479	20948	18492.5	17.5	90.7	8.87	7.28	-63.1
AR1	02-Nov-15	1	13	8.5	83.2	56.8	53.95	0.04	109.5	12.78	7.451	-20.3
		2	13	8.5	89.8	61.7	57.5	0.04	110.9	12.9	7.36	-17.2
	05-Oct-15	1	15	/	/	/	/	/	/	/	/	/
		2	15	13.3	3417	267.3	224.9	0.17	98.8	10.35	6.77	-32.1
AR2	02-Nov-15	1	13	8.6	483.1	330.6	313.3	0.23	111.4	12.37	7.89	-42.3
		2	13	8.1	397.8	270.3	255.15	0.19	115.6	13.47	7.34	-17

Site	Date	Pass #	Air Temperature (°C)	Water Temperature (°C)	Specific Conductivity (µS/cm)	Conductivity (µS/cm)	Total Dissolved Solids (mg/L)	Salinity (g/L)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	pH	pHmV
	19-Oct-15	1	4	9.9	1197	856	780	0.8	90.6	10.16	7.07	-52.9
		2	4	9.7	1309	929	858	0.66	91.1	10.25	7.07	-33.3
AR3	02-Nov-15	1	12	8.4	4541	3100	2957.5	2.43	104	12.15	7.68	-32.6
		2	12	8.4	4002	2748	2606.5	2.13	106.7	12.35	7.6	-29
	19-Oct-15	1	4	8.8	5503	3805	3581.5	2.98	96.6	11	7.38	-66.9
		2	4	9.3	5313	3720	3451.5	2.87	94.1	10.64	7.19	-58.3
AR4	05-Nov-15	1	10	8.7	7160	4935	4660.5	3.95	86	9.76	7.88	-42.1
		2	10	8.6	7261	4995	4719	4.01	73.4	8.32	7.77	-37
	20-Oct-15	1	11	9.8	8848	6285	5846	4.95	105.6	11.5	7.01	-49.6
		2	11	9.7	8426	5968	5479.5	4.7	100.9	11.11	6.99	-48.5
AR5	05-Nov-15	1	12	9.4	9270	6513	6025.5	5.19	102.9	11.45	8.78	-84.9
		2	12	9.4	9187	6440	5967.5	5.15	104.1	11.72	8.42	-67.7
	20-Oct-15	1	11	8.9	12731	8827	8281	7.32	100.1	10.98	6.78	-39.1
		2	11	9.4	12839	9000	8352	7.39	100.5	10.7	6.96	-47.5
AR6	04-Nov-15	1	8	8.5	8890	6095	5785	4.98	104.7	11.84	8.27	-61.2
		2	8	8.6	8990	6171	5843.5	5.03	103.6	11.73	8.07	-51.4
	19-Oct-15	1	4	7.7	14059	9423	9132.5	8.11	100.4	11.32	7.51	-79.2
		2	4	7.4	13805	9184	8976.5	7.97	101.9	12.51	7.39	-67.9
AR7	04-Nov-15	1	8	8.5	13400	4183	8716.5	7.73	107.5	11.98	8.31	-63.1
		2	8	8.2	13547	9298	8807.5	7.81	109.8	12.24	8.23	-58.6
	06-Oct-15	1	9	13.8	38317	30267	25135	24.62	92.3	8.09	6.94	-56
		2	9	13.5	31602	25171	20800	20.03	98.8	8.83	7.38	-63.2
AR8	04-Nov-15	1	8	8.7	18770	12939	12207	11.2	106.9	11.59	8.02	-49.3
		2	8	8.7	19094	13155	12415	11.32	103.5	11.19	8.25	-60
	06-Oct-15	1	11	15	31703	25668	20572.5	19.76	97.5	8.55	7.45	-66.2
		2	11	15.9	28628	23780	18232.5	17.35	99.1	8.78	7.42	-64.7
AR9	05-Nov-15	1	9	9.9	43561	31007	28281.5	27.87	109.6	10.37	8.4	-67.9
		2	9	10.5	43784	37625	28450.5	28.06	112	10.5	8.59	-76.8
	09-Oct-15	1	14	/	/	/	/	/	/	/	/	/
		2	16	/	/	/	/	/	/	/	/	/
AR10	03-Nov-15	1	6	10.7	48551	35360	31609.5	31.58	99.8	9.07	8.26	-61.2
		2	6	10.8	47420	34597	30849	30.74	99.5	9.11	8.36	-65.7
	13-Oct-15	1	16	13	49470	37940	32155.5	32.28	89.9	7.92	7.34	-61.4
		2	16	12.7	49617	37868	32259.5	32.4	89.9	7.87	7.52	-69.5

Site	Date	Pass #	Air Temperature (°C)	Water Temperature (°C)	Specific Conductivity (µS/cm)	Conductivity (µS/cm)	Total Dissolved Solids (mg/L)	Salinity (g/L)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	pH	pHmV
AR11	13-Nov-15	1	13	10	47708	33932	31024.5	30.3	102.4	9.49	8.58	-76.2
		2	13	10.3	46046	33071	29952	29.69	105.5	9.78	8.61	-77.7
	16-Oct-15	1	14	12.4	45451	34360	29536	29.37	98.3	8.79	7.42	-70.4
		2	14	12.4	45135	34315	29334.5	29.16	99.8	8.85	7.59	-78
AR12	09-Nov-15	1	11	8.6	47767	32489	31050.5	30.84	114.2	10.8	8.61	-77.2
		2	11	8	46358	31250	30179.5	29.85	109.4	10.69	8.66	-79.4
	13-Oct-15	1	17	12.7	50126	38320	32578.5	32.77	86.1	7.43	7.51	-68.9
		2	17	12.4	50020	38259	32519.5	32.43	91.1	7.96	7.6	-73.2
BR1	06-Nov-15	1	13	10.6	3848	27190	24804	24.78	59.6	5.73	8.56	76.2
		2	13	10.6	44590	32606	28990	28.75	32.4	2.98	8.56	-75.7
	15-Oct-15	1	6.5	12.2	47079	35576	30602	30.54	96.5	8.53	7.46	-71.6
		2	7	12.1	46316	35069	29759	28.6	92	8.11	7.53	-75.1
BR2	01-Nov-15	1	15	10	42803	30565	27872.5	27.41	95.7	9	8.38	-66.5
		2	15	10.1	45638	32632	29562.1	29.13	91.8	8.34	8.42	-68.6
	15-Oct-15	1	6	13.8	45933	36011	29861.5	29.78	108.8	9.33	7.49	-73.8
		2	7	13.8	46754	36458	30374.5	30.34	111.5	9.63	7.65	-80.9
BR3	06-Nov-15	1	13	10.8	46388	33782	30719	29.78	95.4	9.02	8.45	-70.2
		2	13	10.9	43624	32400	29607.5	29.37	85	7.83	8.56	-75.2
	16-Oct-15	1	14	12.5	43966	33360	28567.5	28.3	95	8.49	7.54	-75.8
		2	14	12.3	45092	34140	29321.5	29.13	94.1	8.25	7.59	-77.8
BR4	09-Nov-15	1	12	9	24161	16772	15730	14.63	110.3	11.6	8.49	-71.3
		2	12	8.7	21278	14721	13851.5	12.74	105.7	11.31	8.36	-65.8
	15-Oct-15	1	7	13.1	22410	17700	6630	4.52	97.3	9.32	79.6	-95.3
		2	7	13.1	4324	3317	2853.5	2.33	93.8	9.6	7.78	-86.2

Table 7. Beach seine survey results

Site	Date	Pass #	Family	Species	Fish species	Count
AC1	21-Oct-15	1	Atherinopsidae	*M. menidia*	Atlantic silverside	7
			Cottidae	*M. octodecemspinosus*	Longhorn sculpin	1
			Gadidae		Gadidae sp.	2
			Pleuronectidae	*P. putnami*	Smooth flounder	2
		2	Atherinopsidae	*M. menidia*	Atlantic silverside	3
	03-	1	Atherinopsidae	*M. menidia*	Atlantic silverside	6

	Nov-15		Cottidae	*M. octodecemspinosus*	Longhorn sculpin	1
			Fundulidae	*F. hetericlitus*	Mummichog	1
			Gadidae		Gadidae sp.	2
			Osmeridae	*O. mordax*	Rainbow smelt	2
			Pleuronectidae	*P. americanus*	Winter flounder	2
		2	Atherinopsidae	*M. menidia*	Atlantic silverside	2
			Fundulidae	*F. hetericlitus*	Mummichog	1
			Gadidae		Gadidae sp.	2
			Osmeridae	*O. mordax*	Rainbow smelt	1
AR1	05-Oct-15	1	Fundulidae	*F. diaphanus*	Banded killifish	24
			Gasterosteidae	*G. aculeatus*	Threespine stickleback	1
			Gasterosteidae	*A. quadracus*	Fourspine stickleback	6
		2	Catostomidae	*C. commersonii*	White Sucker	6
			Fundulidae	*F. diaphanus*	Banded Killifish	93
			Gasterosteidae	*P. pungitius*	Ninespine stickleback	19
			Gasterosteidae	*A. quadracus*	Fourspine stickleback	102
			Gasterosteidae	*G. aculeatus*	Threespine stickleback	115
	02-Nov-15	1	Catostomidae	*C. commersonii*	White sucker	2
			Fundulidae	*F. hetericlitus*	Mummichog	6
			Fundulidae	*F. diaphanus*	Banded killifish	23
			Gasterosteidae	*P. pungitius*	Ninespine stickleback	12
			Gasterosteidae	*A. quadracus*	Fourspine stickleback	286
		2	Catostomidae	*C. commersonii*	White sucker	1
			Fundulidae	*F. hetericlitus*	Mummichog	4
			Fundulidae	*F. diaphanus*	Banded killifish	25
			Gasterosteidae	*G. aculeatus*	Threespine stickleback	6
			Gasterosteidae	*A. quadracus*	Fourspine stickleback	148
AR2	19-Oct-15	1	Fundulidae	*F. hetericlitus*	Mummichog	9
			Fundulidae	*F. diaphanus*	Banded killifish	27
			Gadidae	*M. tomcod*	Atlantic tomcod	1
			Gasterosteidae	*P. pungitius*	Ninespine stickleback	6
			Gasterosteidae	*A. quadracus*	Fourspine stickleback	166
		2	Fundulidae	*F. hetericlitus*	Mummichog	2

			Fundulidae	*F. diaphanus*	Banded killifish	17
			Gasterosteidae	*P. pungitius*	Ninespine stickleback	3
			Gasterosteidae	*A. quadracus*	Fourspine stickleback	41
	02-Nov-15	1	Fundulidae	*F. hetericlitus*	Mummichog	94
			Fundulidae	*F. diaphanus*	Banded Killifish	117
			Gasterosteidae	*A. quadracus*	Fourspne stickleback	16
		2	Fundulidae	*F. hetericlitus*	Mummichog	6
			Fundulidae	*F. diaphanus*	Banded killifish	45
			Gasterosteidae	*P. pungitius*	Ninespine stickleback	4
			Gasterosteidae	*A. quadracus*	Fourspine stickleback	45
AR3	19-Oct-15	1	Fundulidae	*F. hetericlitus*	Mummichog	3
			Gasterosteidae	*A. quadracus*	Fourspine stickleback	12
			Gasterosteidae	*P. pungitius*	Ninespine stickleback	12
		2	Fundulidae	*F. diaphanus*	Banded killifish	3
			Fundulidae	*F. hetericlitus*	Mummichog	79
			Gasterosteidae	*P. pungitius*	Ninespine stickleback	9
			Gasterosteidae	*A. quadracus*	Fourspine stickleback	22
	02-Nov-15	1	Gasterosteidae	*P. pungitius*	Ninespine stickleback	5
			Gasterosteidae	*A. quadracus*	Fourspine stickleback	28
		2	Atherinopsidae	*M. menidia*	Atlantic silverside	1
			Fundulidae	*F. hetericlitus*	Mummichog	1
			Gasterosteidae	*P. pungitius*	Ninespine stickleback	4
			Gasterosteidae	*A. quadracus*	Fourspine stickleback	7
			Petromyzonidae	*Petromyzon marinus*	Lamprey	1
AR4	20-Oct-15	1	Atherinopsidae	*M. menidia*	Atlantic silverside	2
			Fundulidae	*F. hetericlitus*	Mummichog	2
			Gadidae	*M. tomcod*	Atlantic tomcod	1
			Gasterosteidae	*A. quadracus*	Fourspine stickleback	7
		2	Anguillidae	*A. rostrata*	American eel	1
			Fundulidae	*F. hetericlitus*	Mummichog	2
			Gasterosteidae	*A. quadracus*	Fourspine stickleback	5

			Pleuronectidae	*P. americanus*	Winter flounder	1
	05-Nov-15	1	Fundulidae	*F. hetericlitus*	Mummichog	5
			Gasterosteidae	*A. quadracus*	Fourspine stickleback	2
			Pleuronectidae	*P. putnami*	Smooth flounder	1
			Pleuronectidae	*P. americanus*	Winter flounder	1
		2	Gasterosteidae	*P. pungitius*	Ninespine stickleback	1
			Gasterosteidae	*A. quadracus*	Fourspine stickleback	2
AR5	20-Oct-15	1	Atherinopsidae	*M. menidia*	Atlantic silverside	118
			Fundulidae	*F. hetericlitus*	Mummichog	4
			Gasterosteidae	*A. quadracus*	Fourspine stickleback	16
			Pleuronectidae	*P. americanus*	Winter flounder	2
		2	Atherinopsidae	*M. menidia*	Atlantic silverside	15
			Fundulidae	*F. diaphanus*	Banded killifish	1
			Fundulidae	*F. hetericlitus*	Mummichog	8
			Gasterosteidae	*A. quadracus*	Fourspine stickleback	16
			Pleuronectidae	*P. americanus*	Winter flounder	2
	05-Nov-15	1	Atherinopsidae	*M. menidia*	Atlantic silverside	84
			Gasterosteidae	*A. quadracus*	Fourspine Stickleback	2
			Pleuronectidae	*P. americanus*	Winter flounder	1
		2	Atherinopsidae	*M. menidia*	Atlantic silverside	8
			Gasterosteidae	*A. quadracus*	Fourspine stickleback	1
			Pleuronectidae	*P. putnami*	Smooth flounder	3
			Syngnathidae	*S. fuscus*	Northern pipefish	1
AR6	20-Oct-15	1	Atherinopsidae	*M. menidia*	Atlantic Silverside	22
			Gasterosteidae	*A. quadracus*	Fourspine stickleback	5
		2	Atherinopsidae	*M. menidia*	Atlantic silverside	22
			Gasterosteidae	*A. quadracus*	Fourspine stickleback	3
	04-Nov-15	1	Atherinopsidae	*M. menidia*	Atlantic silverside	2
		2	Atherinopsidae	*M. menidia*	Atlantic silverside	36
			Pleuronectidae	*P. americanus*	Winter flounder	1
AR7	06-Oct-15	1	Atherinopsidae	*M. menidia*	Atlantic silverside	77
			Gasterosteidae	*A. quadracus*	Fourspine stickleback	4
			Pleuronectidae	*P. americanus*	Winter flounder	5
		2	Atherinopsidae	*M. menidia*	Atlantic silverside	482

			Clupeidae	*A. pseudoharengus*	Alewife herring	3
			Gasterosteidae	*A. quadracus*	Fourspine stickleback	1
			Osmeridae	*O. mordax*	Rainbow smelt	1
			Pleuronectidae	*P. americanus*	Winter flounder	2
	04-Nov-15	1	Atherinopsidae	*M. menidia*	Atlantic silverside	185
			Gasterosteidae	*A. quadracus*	Fourspine stickleback	1
			Gasterosteidae	*G. aculeatus*	Threespine stickleback	4
		2	Atherinopsidae	*M. menidia*	Atlantic silverside	1
			Gasterosteidae	*G. aculeatus*	Threespine stickelback	1
AR8	06-Oct-15	1	Atherinopsidae	*M. menidia*	Atlantic silverside	194
			Pleuronectidae	*P. americanus*	Winter flounder	4
		2	Atherinopsidae	*M. menidia*	Atlantic silverside	51
			Fundulidae	*F. hetericlitus*	Mummichog	1
			Gasterosteidae	*A. quadracus*	Fourspine stickleback	1
			Pleuronectidae	*P. americanus*	Winter flounder	3
	04-Nov-15	1	Atherinopsidae	*M. menidia*	Atlantic silverside	73
			Gasterosteidae	*A. quadracus*	Fourspine stickleback	1
			Pleuronectidae	*P. putnami*	Smooth flounder	1
		2	Atherinopsidae	*M. menidia*	Atlantic silverside	8
			Gasterosteidae	*A. quadracus*	Fourspine stickleback	2
			Pleuronectidae	*P. putnami*	Smooth flounder	2
			Pleuronectidae	*P. americanus*	Winter flounder	3
AR9	09-Oct-15	1	Atherinopsidae	*M. menidia*	Atlantic silverside	50
		2	Atherinopsidae	*M. menidia*	Atlantic silverside	329
	05-Nov-15	1	Atherinopsidae	*M. menidia*	Atlantic silverside	21
		2	Atherinopsidae	*M. menidia*	Atlantic silverside	8
AR10	13-Oct-15	1	Atherinopsidae	*M. menidia*	Atlantic silverside	15
			Pleuronectidae	*P. americanus*	Winter flounder	9
		2	Atherinopsidae	*M. menidia*	Atlantic silverside	36
			Gasterosteidae	*A. quadracus*	Fourspine stickleback	1
			Pleuronectidae	*P. americanus*	Winter flounder	11
	03-Nov-15	1	none	*none*	none	0
		2	Atherinopsidae	*M. menidia*	Atlantic silverside	86
AR11	16-Oct-	1	Atherinopsidae	*M. menidia*	Atlantic silverside	50

	15		Fundulidae	*F. hetericlitus*	Mummichog	1
		2	Atherinopsidae	*M. menidia*	Atlantic silverside	6
	13-Nov-15	1	Atherinopsidae	*M. menidia*	Atlantic silverside	1
		2	Atherinopsidae	*M. menidia*	Atlantic silverside	1
AR12	13-Oct-15	1	Atherinopsidae	*M. menidia*	Atlantic silverside	10
			Gasterosteidae	*A. quadracus*	Fourspine stickleback	1
		2	Atherinopsidae	*M. menidia*	Atlantic silverside	4
			Fundulidae	*F. hetericlitus*	Mummichog	1
	09-Nov-15	1	Atherinopsidae	*M. menidia*	Atlantic silverside	14
		2	Fundulidae	*F. hetericlitus*	Mummichog	1
BR1	15-Oct-15	1	Atherinopsidae	*M. menidia*	Atlantic silverside	104
		2	Atherinopsidae	*M. menidia*	Atlantic silverside	77
			Clupeidae	*A. pseudoharengus*	Alewife herring	1
			Fundulidae	*F. hetericlitus*	Mummichog	1
	06-Nov-15	1	Atherinopsidae	*M. menidia*	Atlantic silverside	10
		1	Pleuronectidae	*P. putnami*	Smooth flounder	1
		2	Atherinopsidae	*M. menidia*	Atlantic silverside	259
			Clupeidae	*A. pseudoharengus*	Alewife herring	2
			Fundulidae	*F. hetericlitus*	Mummichog	1
			Zoarcidae	*M. americanus*	Ocean eelpout	1
BR2	15-Oct-15	1	Atherinopsidae	*M. menidia*	Atlantic silverside	108
			Fundulidae	*F. hetericlitus*	Mummichog	6
		2	Atherinopsidae	*M. menidia*	Atlantic silverside	2
			Fundulidae	*F. hetericlitus*	Mummichog	2
	01-Nov-15	1	Atherinopsidae	*M. menidia*	Atlantic silverside	11
		2	none	*none*	none	0
BR3	16-Oct-15	1	Atherinopsidae	*M. menidia*	Atlantic silverside	130
			Pleuronectidae	*P. putnami*	Smooth flounder	1
		2	Atherinopsidae	*M. menidia*	Atlantic silverside	18
			Fundulidae	*F. hetericlitus*	Mummichog	3
	06-Nov-15	1	Atherinopsidae	*M. menidia*	Atlantic silverside	61
		2	Atherinopsidae	*M. menidia*	Atlantic silverside	13
BR4	15-Oct-15	1	Atherinopsidae	*M. menidia*	Atlantic silverside	33
			Clupeidae	*A. pseudoharengus*	Alewife herring	1
			Fundulidae	*F. hetericlitus*	Mummichog	1
			Gadidae	*M. tomcod*	Atlantic tomcod	1
			Pleuronectidae	*P. americanus*	Winter flounder	1
		2	Atherinopsidae	*M. menidia*	Atlantic silverside	7
			Clupeidae	*A. pseudoharengus*	Alewife herring	1
			Fundulidae	*F. hetericlitus*	Mummichog	9
	09-	1	Atherinopsidae	*M. menidia*	Atlantic silverside	1

	Nov-15		Pleuronectidae	*P. putnami*	Smooth flounder	2
		2	none	*none*	none	0

5.3. Outreach

Recreational Angler Outreach

A total of 10 Angler Outreach Kits were distributed between June and October 2015. Many of the anglers engaged with through the project identified that the Annapolis River system is not their preferred destination for striped bass angling, as a result of lower catch success when compared to other potential destinations. Follow up with anglers who received kits was conducted in November 2015, however none of the anglers who received kits returned any catch data or scale samples.

General Outreach

Five presentations and seminars highlighting the striped bass research project and the status of striped bass in the Annapolis watershed were delivered between June to November 2015. Four exhibits highlighting the project were displayed at the following locations: the Citizen Science Exposition, Wolfville, April 16, 2015; the Annapolis Royal Mackerel Derby, August 1, 2015; the Nova Scotia Community College (NSCC) Sustainability Days at the Center of Geographic Sciences, Lawrencetown, October 28, 2015, and at the NSCC Middleton Campus, October 29, 2015.

Printed resources, produced by the Striped Bass Research Team, were distributed through the CARP office and at all exhibits that the CARP outreach coordinator participated in during the project timeline.

One press release was issued to local newspapers in August 2015 (Appendix B) and articles were included in each edition of CARP's quarterly newsletter, the Waterstrider.

A striped bass project page was hosted on the CARP website, receiving 116 views between March 1, 2015 and November 30, 2015. Regular social media updates were made on the CARP Facebook and Twitter accounts. During the project period (March 2015 to November 2015), CARP Facebook posts reached over 100,000 viewers.

6. Discussion

6.1. Eggs Tows

No striped bass eggs were collected during the 36 egg tows that were conducted during the 2015 field season. This is similar to 2014, where no eggs were collected during surveys. It is possible that spawning locations have shifted over time, providing an alternate explanation to the lack of identified eggs.

It was expected that egg tows would yield some American shad eggs, as there is an active spawning population in the Annapolis during the sampling window. The absence of any shad eggs may be an indication of a problem with the method used for sampling. The net used for sampling may be limited in terms of the depth at which is can collect eggs from; the wake of the boat may also interfere with the collection of eggs. It is recommended that that a larger net secured to the side(s) of the boat be explored as an alternative.

6.2. Beach Seine Surveys

No juvenile or adult striped bass were collected during beach seine surveys. This is similar to beach seine surveys conducted by Labenski (2011) in 2010 and by CARP in past surveys between 2011, 2013 and 2014.

A variety of forage fish were collected during beach seine surveys, with a total of 4742 individual fish collected, representing 17species from 13 families (Figure 7), indicating that availability of prey is likely not a limiting factor for striped bass.

Data collected from beach seine surveys has been submitted to the Striped Bass Research Team for further analysis.

6.1. Outreach

The distribution and collection of angler logs and scale samples has been a continually challenging component of the project. Relatively few of the recreational anglers contacted indicate that the Annapolis River is their main destination for targeting striped bass. Low visibility within the active striped bass recreational angler community also limits the number of individuals that CARP can distribute angler kits to. In order to address this issue it is recommended that public signage be placed at boat access points frequently used by striped bass anglers.

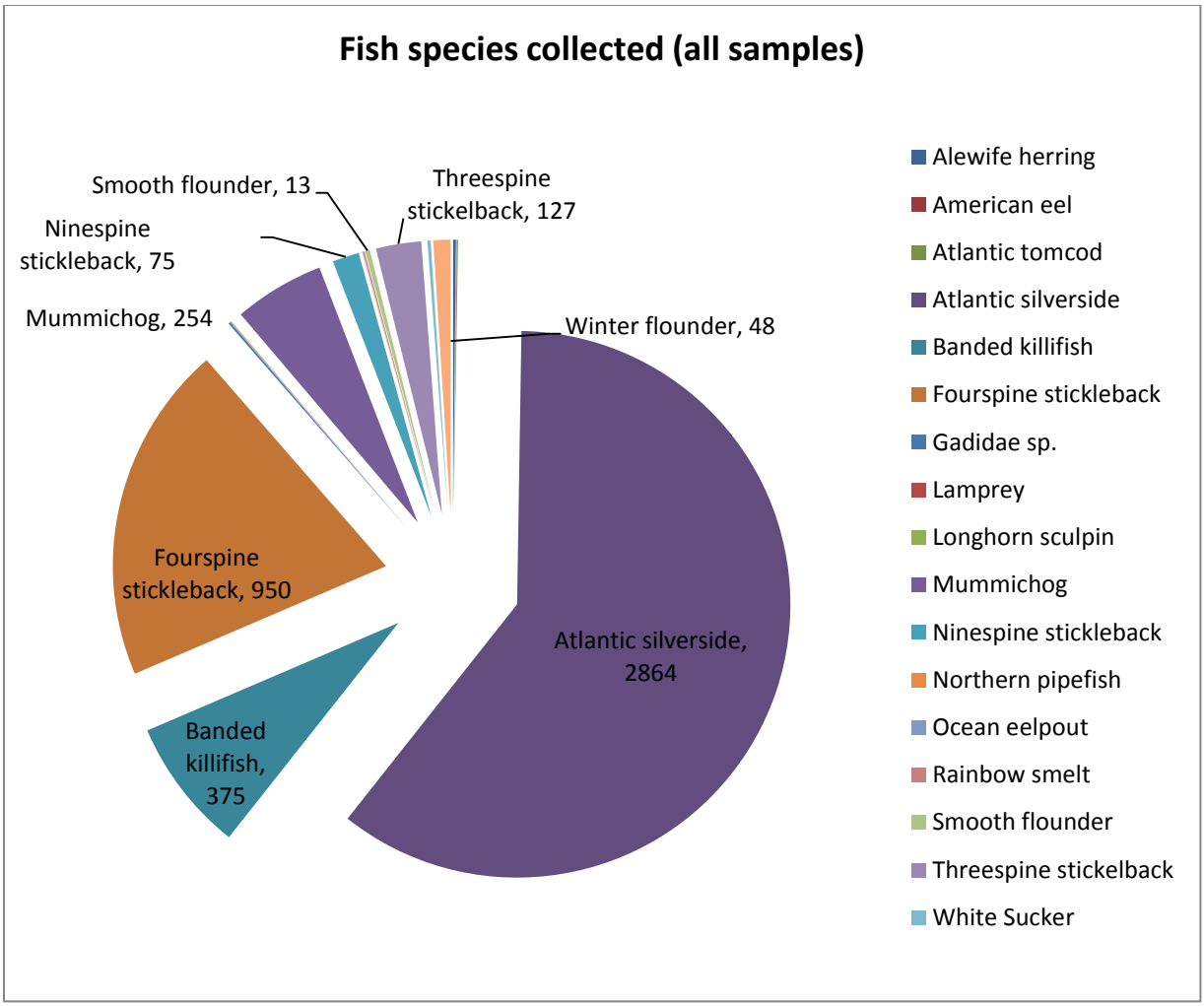

Figure 7. Abundance and relative proportion of fish species collected at all beach seine survey sites

7. Conclusion

Surveys conducted on the Annapolis River, Bear River and Allain's Creek in 2015 yielded no evidence of the presence of striped bass eggs or juvenile fish. Anecdotal evidence from recreational anglers indicates that migrant adult fish still access these waterways. This supports DFO's (2014) conclusion that the Annapolis River spawning population is extirpated, but that the river still acts as foraging and/or overwintering ground for migrant adults.

8. Recommendations

1. Seine surveys on Annapolis River sites 1, 2, 3, 4 and 5 should be sampled at lower tide levels as they have steep slopes and/or no beach at high tide.
2. Seine surveys on Annapolis River sites 9-12 should be sampled as the tide is rising, ideally within 2 hours of high tide. AR11 (Smith's Cove) should be sampled close to high tide, to minimize the distance required to walk through mud flats.
3. Bear River sites BR1-BR4 and Allain's Creek site AC1 should be sampled on a rising tide, in order to catch fish as they are coming in with the tide. BR1 (Raymond's Point) can be sampled close to high tide, reducing the walking distance through mud flats. BR3 (Bear River Bridge), and BR4 (River Road) should be sampled within at least 2 hours of high tide, to reduce the distance needed to walk through mud flats.
4. Sites were accessed using the following:

Type of access	Annapolis River Sites	Bear River Sites	Allain's Creek Site
Boat access	AR1-8, AR11		
Vehicle/foot	AR 9-10, AR12	BR1-4	AC1

5. Consider using an alternative net for eggs tows, such as a larger net secured to the side(s) of the boat, allowing for a greater depth to be sampled, and ensuring that the wake of the boat does not interfere with egg collection.
6. Different survey methods could be considered on the Bear River and the Annapolis River to improve sampling efforts targeting juvenile and adult striped bass. Plankton net surveys for juveniles and use of a weir might be methods worth investigating.
7. In order to increase awareness about the angler log books and scale sample collection among recreational anglers, signage should be erected at frequently used boat access points.

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Appendices

Appendix A: Striped Bass – Beach Seine Sampling Datasheet

STRIPED BASS – Beach Seine Sampling

Site # and Location _____ **N:**_____ **E:** _____

Researchers: _____

Date: _____ Time: _____ Weather: _____ Air Temp: _____

WATER QUALITY -

SONDE	Temp (°C)	SpC (µS/cm°)	Cond (µS/cm)	TDS (g/L)	Sal (g/L)	DO%	DO (mg/)	pH	pHmV

Site Map

Fish Abundance

Species	Count

Number of Passes: ____
Second Pass Sample Collected ☐

Site # and Location _____ **N:**_____ **E:** _____

Researchers: _____

Date: _____ Time:_____ Weather:_____ Air Temp: _____

WATER QUALITY -

SONDE	Temp (°C)	SpC (µS/cm°)	Cond (µS/cm)	TDS (g/L)	Sal (g/L)	DO%	DO (mg/)	pH	pHmV

Site Map

Fish Abundance

Species	Count

Number of Passes: ____
Second Pass Sample Collected ☐

Appendix B: Striped Bass Press Release

History and Citizen Scientists are Key to the Conservation of Striped Bass

Dr. Trevor Avery, Striped Bass Research Team, Acadia University
Katie McLean, Clean Annapolis River Project

In March of 1982 Field and Stream magazine published an article, *Fishing Across Canada*, 'Canada's fabled waters, ranging from serene lakes to wild rivers, yield a wealth of gamefish for the visiting angler". The article boasts of the Annapolis as Nova Scotia's best striper stream. There is no doubt that the Annapolis has a legacy of striper fishing. What is in doubt is the future of striped bass in the Annapolis River.

The Annapolis River is one of three rivers draining into the Bay of Fundy that historically supported striped bass spawning populations, the others being the Saint John River, and the Shubenacadie River. Today the Shubenacadie River supports the only remaining spawning population in the Bay of Fundy.

Striped bass are an anadramous species, meaning they spend most of their life at sea, but return to freshwater to spawn. Some striped bass overwinter in freshwater lakes; others overwinter in the ocean. They can be found in just about every river, estuary, bay, and basin in the Bay of Fundy.

The decline of spawning in the Annapolis River

According to Fisheries and Oceans Canada (DFO) there has been no evidence of successful spawning or recruitment in the Annapolis River since 1976.

Poor water quality was perceived to be one of the major factors impacting the viability of eggs spawned in the Annapolis. In 1979 researchers collected approximately 68,000 eggs from the Annapolis River, which were held in suitable water quality for egg development, to see if they could be experimentally hatched. Forty-two percent of these eggs were successfully hatched. A similar experiment was conducted the following year, also yielding successful egg development when the eggs were allowed to develop in suitable water. Despite the presence of eggs, sampling during these years yielded no juvenile bass.

In 1994 Clean Annapolis River Project and Bear River First Nation conducting spawning surveys, collecting 400 eggs. However, during beach seines no juveniles were collected. DFO conducted beach seine surveys in 2001and 2002 and also did not collect any striped bass larvae or juveniles.

As a result of their decline, inner Bay of Fundy striped bass (*Morone saxatilis*) is listed as endangered by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC, 2012).

In 2010 CARP and Acadia Honours student, Tom Labenski, began conducting egg trawl surveys, beach seining, Fyke net, and angler surveys for adult and juvenile striped bass in the Annapolis River under the direction of Dr. Trevor Avery and the Striped Bass Research Team (SBRT) at Acadia University, and with the help of Traditional Ecological Knowledge from Bear River First Nation. Since 2013 sampling has expanded to include Allain's Creek and Bear River. Eggs tows are also conducted by CARP staff in historical spawning areas. To date no eggs, juvenile or adult striped bass have been located during these surveys.

According to DFO, "Concerns are that agricultural pollution, pesticides or changes in pH have affected egg and larval survival. The construction of the Annapolis Royal causeway, near the mouth of the river may also have altered incubation and rearing habitat, further affecting recruitment."

Eggs survival and larval development for striped bass is known to be closely linked to physiochemical water properties, particularly water temperature, salinity, dissolved oxygen, and the presence of a moderate current, which keeps the eggs in suspension.

Angler Outreach

Collaborating with local anglers is an important component of the project. While the Annapolis River may not draw crowds to fish stripers as it historically did, anyone who continues to fish this area is encouraged to participate as a Striped AmBassador. The Striped AmBassador campaign seeks to enlist anglers to submit catch data and scale samples for any striped bass they catch, provide historical catch records, and participate in workshops. This research is undertaken to engage anglers to become striped bass habitat stewards through identifying striped bass habitat. Not only are striped bass a prized recreational fish, they are an important component of the aquatic ecosystem, and contribute to the biodiversity and health of our marine environment.

As a Striped Bass Stewardship Centre, fishing log books and scale sample enveloped are available at the CARP office for any interested anglers. Catch data includes fish length, fishing location, date and time, gear used, and total number of fish caught. Fish lengths can be estimated. Scale samples are used for genetic research being undertaken by the SBRT to identify the river of origin of striped bass.

Anglers are also asked to report any tagged bass they catch, and to report sightings of tagged bass. Striped bass are being tagged by SBRT and other research groups. Tags provide information on habitat use, movement patterns, and growth. If you catch a tagged fish, an accurate (to 0.5 cm or ½ inch) length is very helpful to determine growth rates. Workshops are available to teach anglers how to tag striped bass with the view to eventually help the SBRT tag bass throughout their range.

Historical catch information is very useful to provide historical perspective on bass populations. Information such as fish size, numbers caught, location of catches, and time of the year all help to inform conservation efforts.

CARP and the SBRT hopes that the survival of our fish populations will give stakeholders across the watershed another reason to become more active in the stewardship of our natural resources.

More information on this project is available at www.stripedbass.ca or www.annapolisriver.ca. Local anglers who are interested in supporting striped bass stewardship and encouraged to contact the CARP office (902)-532-7533, 314 St. George St., Annapolis Royal, or katiemclean@annapolisriver.ca, or the SBRT (Dr. Trevor Avery) at Acadia University (902)-585-1873, stripedbass@acadiau.ca.

About Clean Annapolis River Project

Clean Annapolis River Project is an environmental NGO that operates throughout the Annapolis River Watershed, with an office in Annapolis Royal, Nova Scotia. Their mission is to enhance the ecological health of the Annapolis River watershed through science, leadership and community engagement. For more information visit www.annapolisriver.ca.

About the Striped Bass Research Team

The SBRT is dedicated to conserving striped bass through collaborations with recreational anglers, commercial fishers, and community members. Our methods are to enlist and engage Citizen Scientists to become Habitat Stewards of the lakes, rivers, estuaries, and coasts where striped bass reside. For more information visit www.stripedbass.ca.