Prepared for:
US Fish and Wildlife Service
NJ Field Office
Galloway, New Jersey 08205
and
NJDEP Bureau of Marine Water Monitoring
Leeds Point, New Jersey 08220

2015 Wreck Pond Fish Inventory Study with Emphasis on Field Monitoring of Alewife and Blueback Herring

Fall Sampling Report

Wreck Pond, Spring Lake and Sea Girt, Monmouth County, New Jersey

February 2016

American Littoral Society
February, 2016
USFWS Cooperative Agreement #: F14AC00250

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1.0 INTRODUCTION

1.1 PURPOSE AND NEED

The United States Fish and Wildlife Service (USFWS) was awarded a grant in October 2013 through the Department of Interior (DOI) to reestablish fish passage for diadromous fishes to Wreck Pond, a 73-acre tidally influenced coastal lake located at the eastern end of the Wreck Pond Brook Watershed. The grant also funded the restoration of dune and beach habitat used by federally threatened wildlife.

Historically, Wreck Pond had a natural inlet; however, in the 1930's, the inlet was filled in, and a 500-foot long, 84-inch diameter pipe (later extended to 800-feet) was installed to connect the lake to the ocean (Wreck Pond Brook Watershed Technical Advisory Committee, 2008). Over time, the restricted tidal flow created by the pipe, coupled with impacts from increasing development in the surrounding area, led to a number of environmental issues within the watershed. Like many New Jersey coastal lakes, Wreck Pond has experienced impaired water quality that has impacted fish and wildlife populations within the pond. Flooding, caused by heavy rainfall and high tidal surges during severe storm events, has also been an issue. In addition, low river herring numbers seen in surveys conducted in 2006 through 2008, suggest the current outfall pipe may restrict or inhibit fish passage that, in turn, may lead to reduced spawning populations of diadromous fish. River herring (the collective term for alewife [*Alosa pseudoharengus*] and blueback herring [*Alosa aestivalis*]) once supported one of the largest commercial and recreational fisheries along the Atlantic coast. However, the blockage of spawning rivers, along with habitat degradation and overfishing, has led to severely diminished populations (Shad and River Herring, 2015). The blockage of rivers has also negatively affected American eel (*Anguilla rostrate*), the only freshwater eel in North America.

To help address these issues, the USFWS drafted and executed a cooperative agreement with the American Littoral Society (Society) to "Restore the Wreck Pond Inlet (Project)" by constructing and installing a secondary fish passage corridor consisting of a 5.5 x 8 x 600 foot concrete box culvert just north and parallel to the existing pipe. The completed Project will provide improved aquatic connectivity and fish passage for migratory fishes including anadromous alewife and blueback herring, and catadromous American eel, and is designed to maximize access into and from Wreck Pond and its tributaries during spring immigration and fall emigration. The culvert will also improve water quality through increased tidal flushing, and help reduce flood risk. Following culvert construction, USFWS will advise on the reconstruction of the dune and berm system impacted by Sandy to minimize impact to nesting habitat for the federally-listed threatened piping plover (*Charadrius melodus*) and the state-listed least tern (*Sterna antillarum*). Project construction started mid-December 2015.

This report covers pre-construction monitoring conducted in fall 2015 with funding to the Society through a cooperate agreement with USFWS (#F14AC00250; NJDEP Permit #1531).

Collected data will provide baseline pre-construction data to be compared with post-construction survey results. The fall survey objective is to identify if herring are spawning in Wreck Pond and to determine when fall emigration begins. The overall monitoring study, to include spring and fall sampling events, is designed to provide the following:

1) Baseline data for river herring movement within Wreck Pond during spring adult immigration and fall juvenile emigration;
2) An inventory of aquatic species collected using both passive (fyke net) and active (seine net) sampling methods at various locations throughout Wreck Pond;
3) A comparison of movement and abundance from past surveys in 2006, 2007, 2008, and 2014 to be applied to current data and data to be collected post-construction;
4) Measurements, weights, and enumeration of collected species; and
5) Verification of anadromous spawning in Wreck Pond Brook Watershed.

1.2 SITE LOCATION AND HISTORY

Wreck Pond is a 73-acre tidally-influenced coastal lake located between the boroughs of Sea Girt and Spring Lake in Monmouth County, New Jersey (Figure 1). It is currently connected to the Atlantic Ocean by an 84-inch diameter, 800-foot long pipe that serves as an intake and outfall structure. The pipe was originally 500-feet long, however it was extended by 300 feet into the Atlantic Ocean in 2006. This was done to lessen the impact to local beaches from the periodic high bacteria loads that exited the pipe during rain events. In 2014, the outfall extension, combined with other efforts (infrastructure upgrades and educational programs), resulted in the removal of previously enforced mandatory beach closures during times of heavy rainfall. Still, the area where Wreck Pond interacts with nearshore waters remains classified by the New Jersey Department of Environmental Protection (NJDEP) as “Prohibited for Shellfish Harvest” due to water quality issues.

Wreck Pond, itself, is part of the Wreck Pond Brook Watershed, which drains approximately 12.8 square miles (8,172 acres) of the Boroughs of Sea Girt, Spring Lake, Spring Lake Heights and Wall Township. The pond is considered a shallow waterbody with depths ranging between one to one and a half feet deep under normal water level conditions (Najarian, 2011). There are three major tributaries in the watershed including Hannabrand Brook, Wreck Pond Brook, and Black Creek, as well as several other ponds in the upper watershed. Land use consists of a mix of wooded areas, agricultural areas, low to medium density residential areas, and mixed-use areas. Drainage into the system originates from its tributary streams and from storm water runoff through storm drains located in surrounding residential areas.

1.3 SUMMARY OF RESULTS FROM PREVIOUS SAMPLING EFFORTS

Wreck Pond has been identified and documented as a confirmed anadromous spawning ground for alewife and blueback herring (Byrne, 1986). Results from the herring surveys performed during the spring of 2006 and 2007 using a fyke net indicated a viable run of alewife within Wreck Pond. In 2006, a total of 229 adult alewife were captured during 3 events held between mid-April and mid-May, and in 2007, a total of 49 adult alewife were captured during 3 events held between early May and early June (ENSR, 2006; ENSR, 2007). Results were inconclusive in confirming if mass movements of blueback existed. One individual blueback was captured on May 15, 2006 and two individuals were captured on May 18, 2007. To increase catch probability for blueback, the 2008 survey utilized seine netting at numerous locations throughout the entire watershed from early May to early June. The results of the 2008 sampling program verified a small presence and migration of alewife in Wreck Pond at the beginning of the sampling event (4 adults were captured on May 5) and some juvenile emigration towards the end of the program (June 3, 2008; ENSR, 2008). No blueback herring were captured during the 2008 surveys. In 2014, a total of 103 adult alewife were captured in a fyke net during 3 events held between mid-May to mid-June (American Littoral Society, 2014). The largest runs occurred in mid-May in 2007 and 2014, and in mid-April in 2006. It is possible that larger runs occurred in mid-April in 2007 and 2014, but were not observed because the sampling period did not cover this time during those years.

Specific sampling efforts focused on capturing young-of-year (YOY) or juvenile river herring in Wreck Pond began in fall 2014 (American Littoral Society, 2014). Active sampling was performed at four (4) areas within Wreck Pond with primary focus at two (2) sites (Sites 1A and 1B) located adjacent to the outfall along the Spring Lake and Sea Girt side of the waterbody respectively (Figure 1). Other areas sampled included Area #2 located along the northern shoreline of the main waterbody in Spring Lake along Ocean Road, Area #3 located along the southern shoreline of the Jimmy Burns property slightly north of the Route 71 bridge, Area #4 between Mill Pond and the Jimmy Burns site, and Area #5 located near the confluence of Hannabrand Creek and Old Mill. During the fall study, sampling was conducted five times over a period of five weeks starting on September 8th and ending on October 10th. Depending on site accessibility and water depth, the Society used either a 30-foot, ¼” nylon mesh bag seine with a 4’x 4’ x 4’ bag or a 100-foot ¼” nylon mesh bag seine with a 6’x6’x6’ bag to actively search for and confirm presence of juvenile river herring. Two YOY alewives were captured on October 10th. Afterwards, further sampling was halted. This was because in previous discussions with the NJDEP and USFWS, it was determined that once YOY herring were captured, no further sampling would be scheduled, in order to prevent excess species mortality.

Figure 1. Project Location Vicinity Map and Sample Locations, Wreck Pond, Spring Lake and Sea Girt, New Jersey.

2.0 RIVER HERRING LIFE HISTORY

2.1 SPECIES DESCRIPTIONS

Alewife and blueback herring are euryhaline, anadromous planktivores of the family Clupeidae. They are an important forage species, creating an energy link between zooplankton and piscivores, as well as an important commercial fishery species, primarily harvested for fish meal, fish oil, fish protein, and for use as bait in the New England lobster fishery (Mullen et al., 1986). They are currently listed as species of concern by the National Marine Fisheries Service.

Alewife and blueback are very similar morphologically, but are externally distinguishable by eye diameter and body color (when freshly caught) and internally by the color of their peritoneum and number of gill rakers on the lower limb of the first gill arch. Adult blueback herring usually have a black peritoneum, smaller eye diameter, and approximately 44 to 50 gill rakers on the first limb of the first gill arch, whereas alewife have a pale peritoneum, larger eye diameter (exceeds the length of the snout) and 39 to 41 gill rakers on the first limb of the first gill arch. Alewife also have a slightly deeper body (Loesch, 1987; Odom, 2010). Though it may appear that species have discernible characteristics, determinations without internal confirmation between the two species are often difficult due to an overlap in habitat.

2.2 LIFE HISTORY/SPAWNING CHARACTERISTICS

Alewife and blueback herring are sympatric species that exhibit an anadromous life history and are collectively referred to as river herring. They spawn in freshwater and migrate to the Atlantic Ocean as juveniles. After spending two to five years in the ocean, they return to freshwater to spawn. Alewife and blueback herring are iteroparous, returning to the ocean post-spawning. Post-spawning mortality of alewife, however, has been measured at 41% (Havey, 1961) and between 39 to 57% (Durbin et al., 1979). Although the majority of individuals exhibit this life history, there are landlocked populations of river herring (Rothschild, 1962; Jones et al., 1978; Klauda et al., 1991).

River herring are found in the Atlantic Ocean and spawn in coastal drainages of eastern North America. Alewife are distributed from at least Newfoundland to South Carolina (Jones et al., 1978; Scott and Scott, 1988) with higher abundance in the mid-Atlantic and northeastern states. Blueback herring are distributed from Nova Scotia to Florida (Hildebrand, 1963; Scott and Crossman, 1973; Williams et al., 1975) with higher abundance in warmer waters south of Chesapeake Bay (Manooch, 1988; Scott and Scott, 1988). New Jersey inshore waters up to 8km offshore are an important over-wintering area for juvenile blueback herring (Bigelow and Schroeder, 2002).

An anadromous clupeid inventory conducted by the New Jersey Department of Fish and Wildlife from 2002 to 2007 investigated the presence of anadromous clupeids in 115 locations. Alewife were confirmed in a total of 27 locations while blueback herring were confirmed in five locations. An additional 122 locations previously sampled were not re-sampled during this inventory. In total, there have been 147 locations from 60 drainages with a confirmed presence of river herring. One hundred and thirty two impediments to fish passage were documented within the 237 total sampling locations, 130 of which are man-made such as dams, flood gates, culverts and pipes. Seventy-two of the 130 locations have confirmation of a spawning clupeid run.

Initiation of spawning runs for alewife and blueback herring is temperature dependent, thus spawning run timing varies throughout their range. In the southern end of their range, alewife begin spawning in late February, while at the northern end of their range, they may spawn through early June (Loesch, 1987). In the mid-Atlantic, alewife spawning runs typically occur from early to mid-March through May, when water temperatures and water temperatures range from 10-18°C (Jones et al., 1978; Mowrer, 1982; Loesch, 1987). Blueback initiate spawning runs about a month later, but the spawning peaks can differ by about 2-3 weeks (Loesch, 1987). Ordinarily in New Jersey, there is a three to four week time difference between alewife and blueback spawning runs in sympatric areas (Don Byrne, NJDEP, pers. comm. November 2005). Spawning times can also extend through August as long as temperatures remain below 27°C. Both species use similar hard ground habitats (gravel, packed sand, stones and sticks) and prefer lentic areas for spawning (Loesch, 1987). However, when overlap occurs, blueback herring will spawn in lotic waters allowing alewife to use their preferred lentic areas (Loesch, 1987). When eggs are deposited, they remain sticky and adhere to hard substrate up until about 24 hours when the eggs water-harden. Some eggs remain suspended and are dispersed by currents. Eggs require an incubation time of 50 hours at 20- 21°C (Jones et al., 1978).

The factors influencing juvenile river herring emigration into the Atlantic Ocean, and the timing of these occurrences, are not yet clear. Water temperature, rainfall, stream discharge, prey availability, lunar phase, time of day, and life history characteristics have all been identified as factors inducing the egress of juvenile river herring from their natal waters (Greene et al., 2009; Able and Fahay, 2010). Studies suggest that large scale emigration events generally occur in short, one to two day pulses that can take place from late June through December, with smaller numbers migrating sporadically throughout this time period (Yako, Mather, and Juanes, 2002; Gahagan, Gherard, and Shultz, 2010).

3.0 SURVEY METHODOLOGY AND MATERIALS

A New Jersey Scientific Collections Permit (Permit #1531) was issued on March 17, 2015 (Appendix A). This permit had been applied for prior to the start of the spring sampling for adult river herring, and covered activities conducted in both the spring and fall monitoring studies. The following sections describe the sampling locations, equipment, and methodology used to sample for the presence/absence of juvenile river herring at Wreck Pond in fall 2015.

3.1 SAMPLING LOCATION

Active sampling was conducted in one area: the eastern end of Wreck Pond, adjacent to the existing outfall pipe. Two sites (1A and 1B) were sampled within this location during each event (Figure 1). These sites corresponded to those that were the primary focus of the 2014 fall monitoring. Site 1A is located along the northern side of the waterbody within the municipal boundaries of Spring Lake. At this location, the northern shoreline is moderately to shallowly sloped, and is unevenly lined with herbaceous vegetation including common cocklebur (*Xanthium pennsylvanicum*), saltmeadow cordgrass (*Spartina patens*), and common reed (*Phragmites australis*). A large patch of common reed provides some overwater shading in the eastern part of this location close to the bank. There is a wooden bulkhead along the eastern bank of the site, which abuts the beach. This bulkhead extends along the entire extent of the eastern bank of Wreck Pond except for where the outfall pipe is located (between sites 1A and 1B). The pond bottom at Site 1A is sandy and uneven, and a two to three foot deep and three to four foot wide channel is present parallel to the northern shoreline approximately four feet from the bank.

Site 1B is located along the southern side of the waterbody within the municipal boundaries of Sea Girt. The southern shoreline is steeply sloped and lined with large patches of common reed. This thick vegetation provides more overwater shading than on the northern side of the pond. As with Site 1A, there is a channel present parallel to the southern shoreline approximately two to three feet from the bank. This channel is slightly deeper and wider than that on the Spring Lake side: it is approximately three to four feet deep and four to five feet wide.

3.2 EQUIPMENT

To maintain consistency with previous surveys, the Society used the same sampling equipment employed in the 2014 survey, namely a 100-foot ¼" nylon mesh bag seine with a 6'x6'x6' bag. Net mesh size was consistent with that previously used in the 2008 ENSR/AECOM spring study and was chosen in consultation with the Bureau of Marine Fisheries in 2007 and 2008 to ensure effective catch with minimal impact to collected fish.

Water quality was obtained during each sampling event with a multi-probed YSI Professional Series Environmental Monitoring System. Calibration was completed weekly by the NJDEP Bureau of Marine Water Monitoring Laboratory at Leeds Points, New Jersey. Parameters measured included specific conductivity (µS/cm), salinity (ppt), dissolved oxygen (% saturation and mg/L), water temperature (°C), air temperature (°C), pH, and turbidity.

Other equipment used included two Lovinglove Waterproof Digital Kitchen Scales, three Wildlife Supply Company Mini Fish Measure Boards, and several 5 gallon and 1 gallon plastic buckets.

3.3 SAMPLING METHODS

Sampling was conducted approximately once a week from the middle of September to the beginning of November, 2015, resulting in a total of 9 sampling events (**Table 1**). Tide tables were consulted prior to sampling to coincide sampling times with the ebb tide – or the change over from flood tide to ebb tide – as best possible, as it is believed that juveniles are more likely to emigrate out of Wreck Pond during the ebb tide.

Table 1. Sample event dates and times.

Date	Time
9/14/2015	9:00
9/21/2015	13:30
9/26/2015	9:00
10/1/2015	12:30
10/9/2015	9:00
10/14/2015	14:00
10/21/2015	14:00
10/29/2015	10:00
11/4/2015	13:30

3.3.1 PRELIMINARY GEAR INVESTIGATIONS

On September 9, 2015, the Society performed a preliminary seine pull at Wreck Pond to confirm the equipment was in proper working condition and to evaluate the proposed sampling methodology based on current site conditions. The equipment was found in good working order and the proposed methodology suitable for the site.

3.3.2 SAMPLING AND PROCESSING

Each sampling event consisted of two seine net pulls: one in Site 1A and one in Site 1B. At each site, the 100-foot seine net was deployed by hand. Small staging areas, devoid of excessive vegetation, were present on both the northern and southern banks of Wreck Pond each approximately 100 meters from the eastern bank. To conduct a seine pull, one or several people began by pulling one end of the seine net along the shoreline toward the eastern bank of Wreck Pond. As the net unfurled, a second person or team followed behind with the other end of the net. As the lead team approached the eastern bank, they moved towards the middle of the pond, forming a semicircle with the net. Both teams then pulled the net back towards the staging area (Appendix B). For both sites, the net was deployed in such a way as to target the main channels present on each side of the pond. On occasion, the seine net was deployed directly at the eastern edge of the pond instead of being walked down from the staging areas. In all cases, care was taken to make sure the bag of the seine unfolded properly. Where overhanging vegetation, pools, and undercut banks provided retreat habitat outside of the main channel, additional personnel walked ahead of the seine and attempted to flush out any species occupying shoreline habitat.

During net retrieval, measures were taken to limit stress to captured species, allow for sample accumulation within the bag at an even pace, and to ensure survivability of species collected. The net retrieval process consisted of hauling the seine net ashore and carefully monitoring the lead-line to ensure it stayed in contact with the substrate. Once the bag was close to the shoreline, the lead-line and float-line of the bag were pulled ashore simultaneously to limit the loss of captured species. Species were then removed from the net and placed into buckets for processing. The net's wings and bag were inspected again for any species that might have been missed during the initial sorting. Species collected at this time were processed with the original sample. During initial sorting, the bag remained partially submerged to increase survivability of collected species.

The processing of all species collected included confirmation of taxonomic identification and enumeration, and for all fishes, individual length and weight determination. Fork length (FL) and total length (TL) were recorded for herring species, while TL was recorded for all other fishes. In addition, sex, weight, and carapace width were recorded for encountered crab species. Other invertebrates collected were only counted. In all cases, length was calculated to the nearest half centimeter (cm) and weight to the nearest

0.1 gram.

To limit mortality during processing, a maximum of twenty-five individuals per species were measured and weighed. If more than twenty-five individuals were captured, twenty-five individuals were haphazardly selected to be processed, and the remaining fish were roughly counted in order to provide an estimate of the total number of individuals caught per species each seine pull.

Once individual processing was complete, live specimens were released back into the pond. When necessary, individuals were revived by gently passing water through their gills. Data were recorded on updated ALS data sheets (Appendix C).

While the 2015 sampling methodology mirrored that of the 2014 study in many ways, there were some differences. First, in 2014, a small twelve foot long skiff was used to deploy the net, which was then pulled ashore manually. Because dredge piping was present within the pond for much of the 2015 sampling, the skiff was not used as the piping restricted boat access. Second, more surveys were completed in 2015 (nine versus five), with additional surveys being conducted later in the year following an initial alewife capture (sampling was halted in 2014 after the initial detection of alewife due to mortality concerns associated with sampling). Lastly, in 2015, sampling focused on Sites 1A and 1B and did not included other sites that were sampled in 2014.

3.3.3 DATA ANALYSIS

Total abundance, mean length, and mean weight were calculated for all fishes and crabs caught in 2015. Two - two sample t-tests were used to measure whether there were significant differences in either the number of species caught, or the total number of organisms caught at each site in 2015. Test results with a p-value below 0.05 were considered significant, as this indicates a less than 5% chance that there are no meaningful differences between the sites for the parameters measured (total abundance and total number of species).

4.0 RESULTS

One river herring was captured during the 2015 study, a juvenile alewife caught on September 21st at Site 1B. The alewife measured ten and a half centimeters fork length and twelve centimeters total length, and weighed 13.7 grams. Overall, a total of 3,142 specimens comprising thirty-four different species were collected during this sampling period (Table 2; Figures 2A and 2B). No significant difference was seen between the number of species captured at each site, $t(16)=1.53$, $p=0.15$, or the total number of individuals captured at each site, $t(64)=0.48$, $p=0.63$. Mummichog (*Fundulus heteroclitus*) was the most abundant species collected, with 1180 specimens caught, followed by Atlantic silverside (*Menidia menidia*), with 1025 individuals captured (Table 2; Figure 2A). Additionally, Figures 3 and 4A, 4B, and 4C show the mean size and weight of fishes and crabs captured.

In total forty-nine different species have been captured between the 2014 and 2015 fall monitoring studies (Table 3).

Water quality data are given in Table 4.

Table 2. Abundance of species collected by event during the 2015 fall fish monitoring

		9/14/2015		9/21/2015		9/26/2015		10/1/2015		10/9/2015		10/14/2015		10/21/2015		10/29/2015		11/4/2015				
		Event #1		Event #2		Event #3		Event #4		Event #5		Event #6		Event #7		Event #8		Event #9		Total Number of Individuals Caught at Site 1A	Total Number of Individuals Caught at Site 1B	Total Number of Individuals Caught
Species		Site 1A	Site 1B	Site 1A	Site 1B	Site 1A	Site 1B	Site 1A	Site 1B	Site 1A	Site 1B	Site 1A	Site 1B	Site 1A	Site 1B	Site 1A	Site 1B	Site 1A	Site 1B			
Alewife (Alosa psuedoharengus)		0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Atlantic menhaden (Brevoortia tyrannus)		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	0	14	0	14
Atlantic silverside (Menidia menidia)		7	27	**68**	31	6	1	**99**	**141**	**120**	**121**	26	25	30	5	**75**	**183**	**40**	20	471	554	1025
Bay anchovy (Anchoa mitchilli)		0	0	1	2	0	0	0	0	0	0	0	0	0	0	5	**175**	0	0	6	177	183
Black Drum (Pogonius cromis)		0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	2	0	2
Blue crab (Callinectes sapidus)		1	3	1	3	3	0	4	8	1	0	2	1	0	0	3	0	0	0	15	15	30
Calico Crab (Ovalipes ocellatus)		0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	5	0	0	2	5	7
Crevalle Jack (Caranx hippos)		0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2
Gizzard Shad (Dorosoma cepedianum)		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
Grass shrimp (Palaemonetes sp.)		0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Green Crab (Carcinus maenas)		0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	1
Hake (Urophycis sp.)		0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	1
Long claw hermit crab (Pagurus longicarpus)		1	0	0	2	0	0	2	0	0	0	2	0	0	0	0	0	0	0	5	2	7
Lookdown (Selene vomer)		0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	3
Mangrove snapper (Lutjanus griseus)		0	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	2	1	3
Mummichog (Fundulus heteroclitus)		**55**	52	11	2	15	1	59	0	**130**	**196**	50	**92**	**175**	10	0	0	**330**	2	825	355	1180
Northern Kingfish (Menticirrhus saxatilis)		24	1	9	31	10	1	25	**36**	4	8	1	0	0	0	0	1	0	0	73	78	151
Northern Moon Snail (Euspira heros)		0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	1
Northern Sea Robin (Prionotus carolinus)		0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Northern Sennet (Sphyraena borealis)		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
Nothern pipefish (Syngnathus fuscus)		0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Nothern puffer (Sphoeroides maculatus)		0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Permit (Trachinotus falcatus)		0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	1
Pinfish (Lagodon rhomboides)		0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Sand shrimp (Crangon septemspinosa)		1	1	0	0	0	0	0	0	5	1	16	0	17	0	15	0	0	50	54	52	106
Sheepshead Minnow (Cyprinodon variegatus)		0	2	0	0	1	0	0	0	3	0	19	4	0	0	0	0	**110**	0	133	6	139
Smallmouth Flounder (Etropus microstomus)		0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	2	0	2
Spider Crab (Libinia emarginata)		0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	1
Spotfin mojarra (Eucinostomus argenteus)		1	0	2	0	0	0	2	0	5	0	1	0	0	0	0	0	0	0	11	0	11
Striped Killifish (Fundulus majalis)		2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**199**	0	201	1	202
Summer flounder (Paralichthys dentatus)		0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	4
White mullet (Mugil curema)		0	0	0	2	0	0	5	0	0	0	4	0	0	0	0	0	0	0	9	2	11
Winter flounder (Pseudopleuronectes americanus)		0	0	0	2	7	0	1	15	3	12	0	0	4	0	2	0	0	1	17	30	47
																				1849	1293	
Total Number of Individuals Captured Each Week	**Site**	92	92	96	82	43	4	204	200	271	339	121	122	227	15	102	366	693	73			
	Total	184		178		47		404		610		243		242		468		766				3142

Bolded values are estimates: the total number of individuals were roughly counted after processing twenty-five fish. Moon jellyfish (*Aurelia aurita*) were additionally encountered, but were not counted.

Figure 2A. Abundance of species caught in the 2015 fall fish monitoring (Top 7)

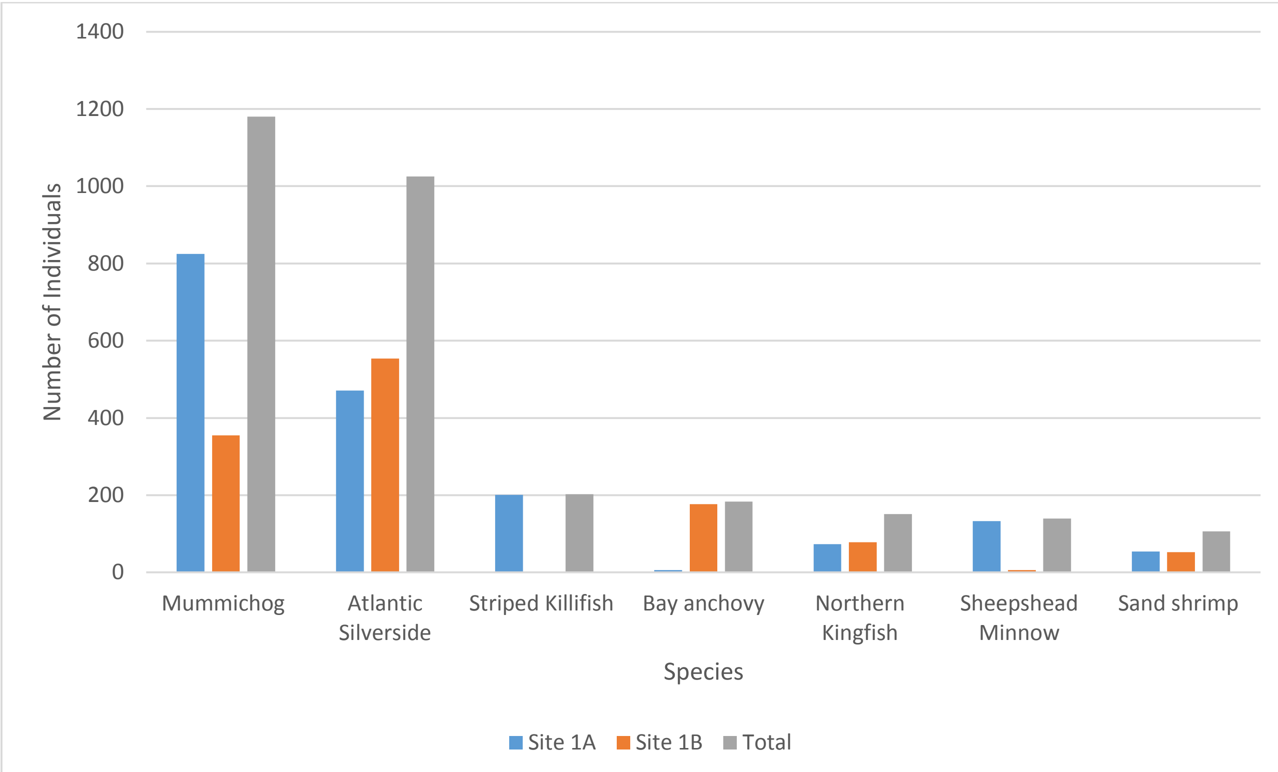

Figure 2B. Abundance of species caught in the 2015 fall fish monitoring (remaining species)

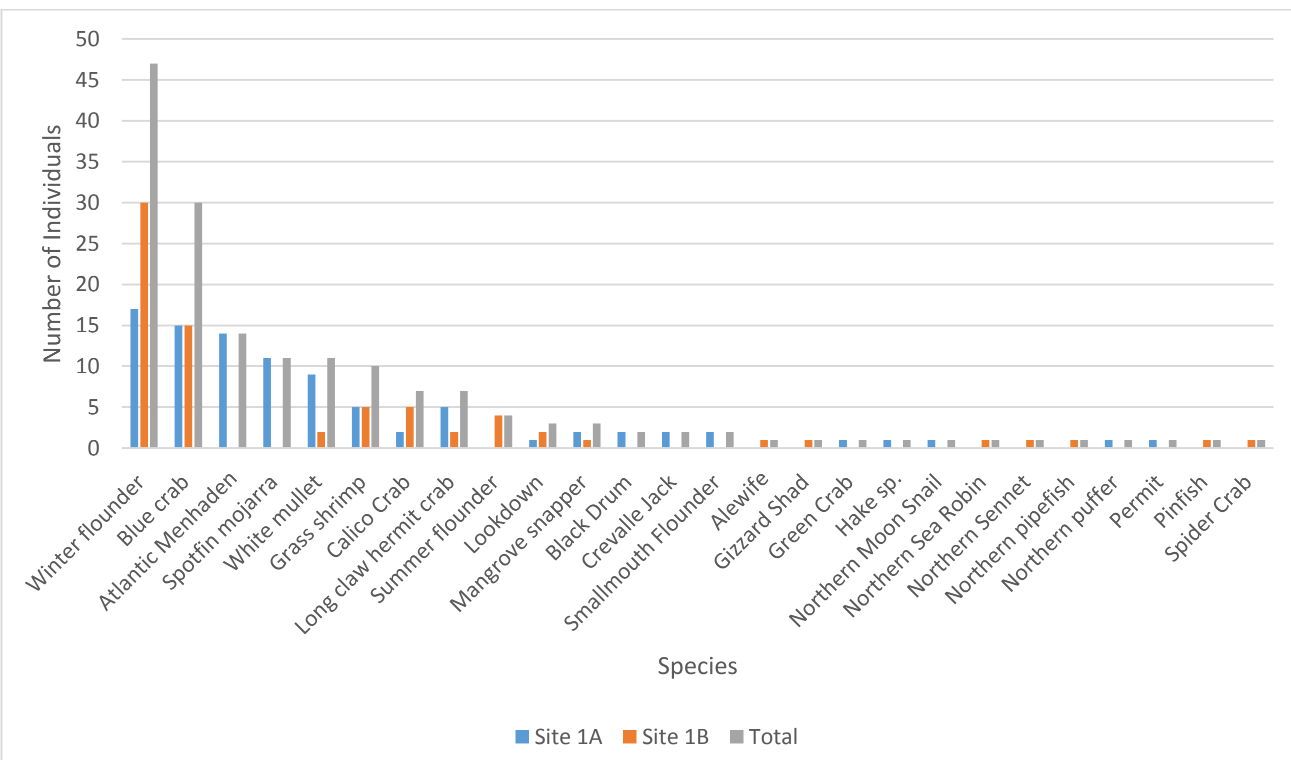

Figure 3. Mean length (cm) of species caught in the 2015 fall fish monitoring

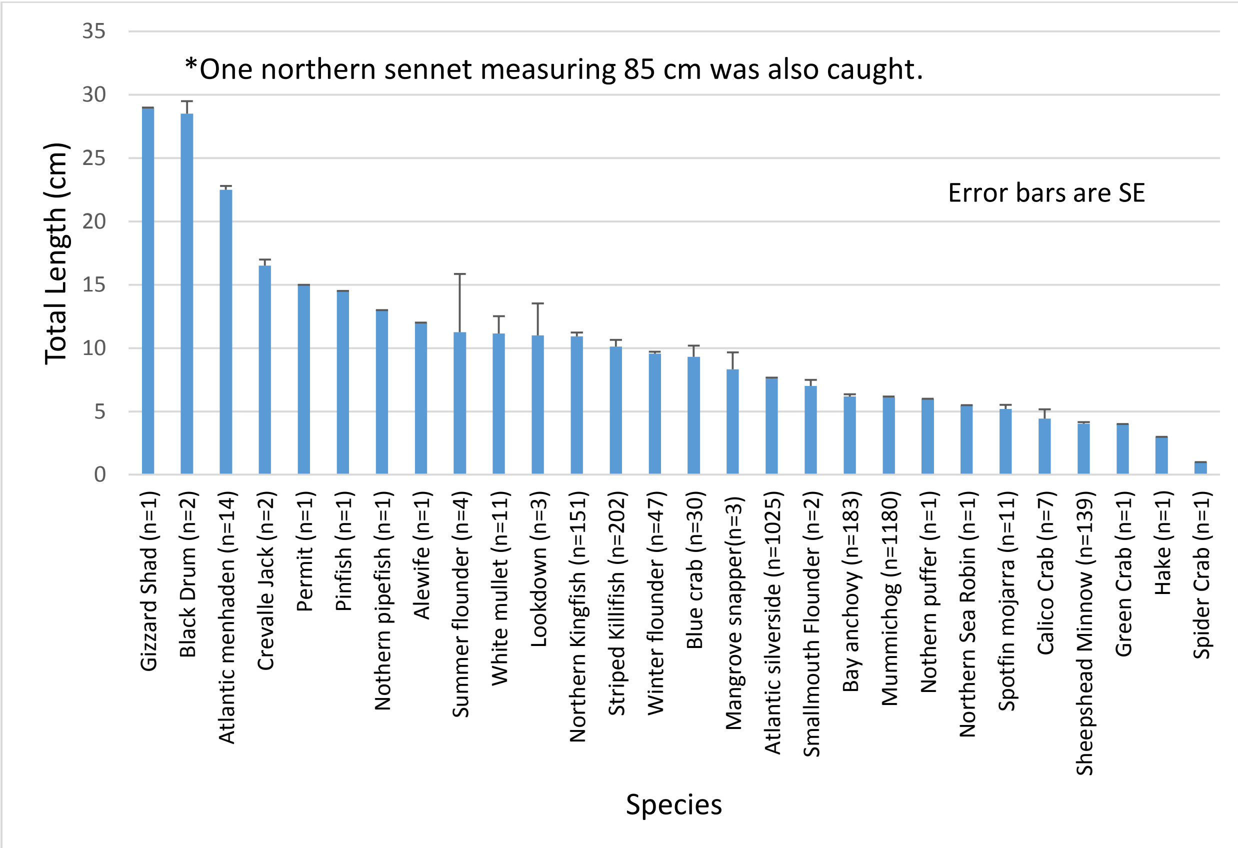

Figure 4A. Mean weight (g) of species caught in the 2015 fall fish monitoring

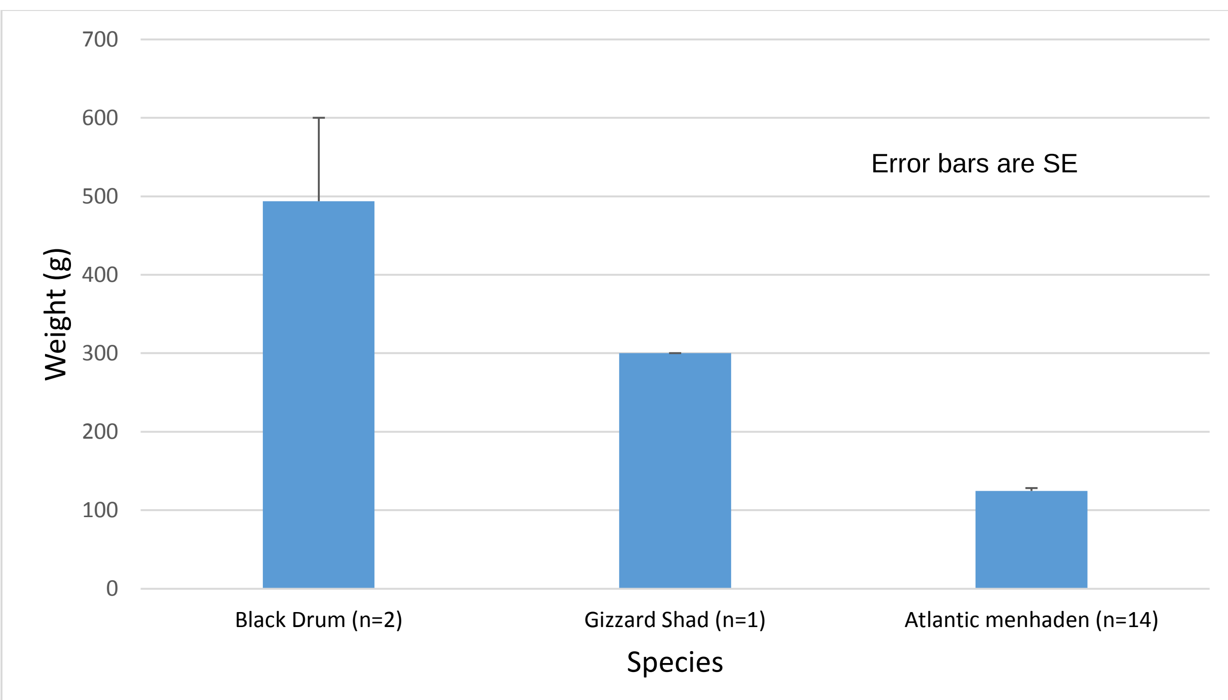

Figure 4B. Mean weight (g) of species caught in the 2015 fall fish monitoring

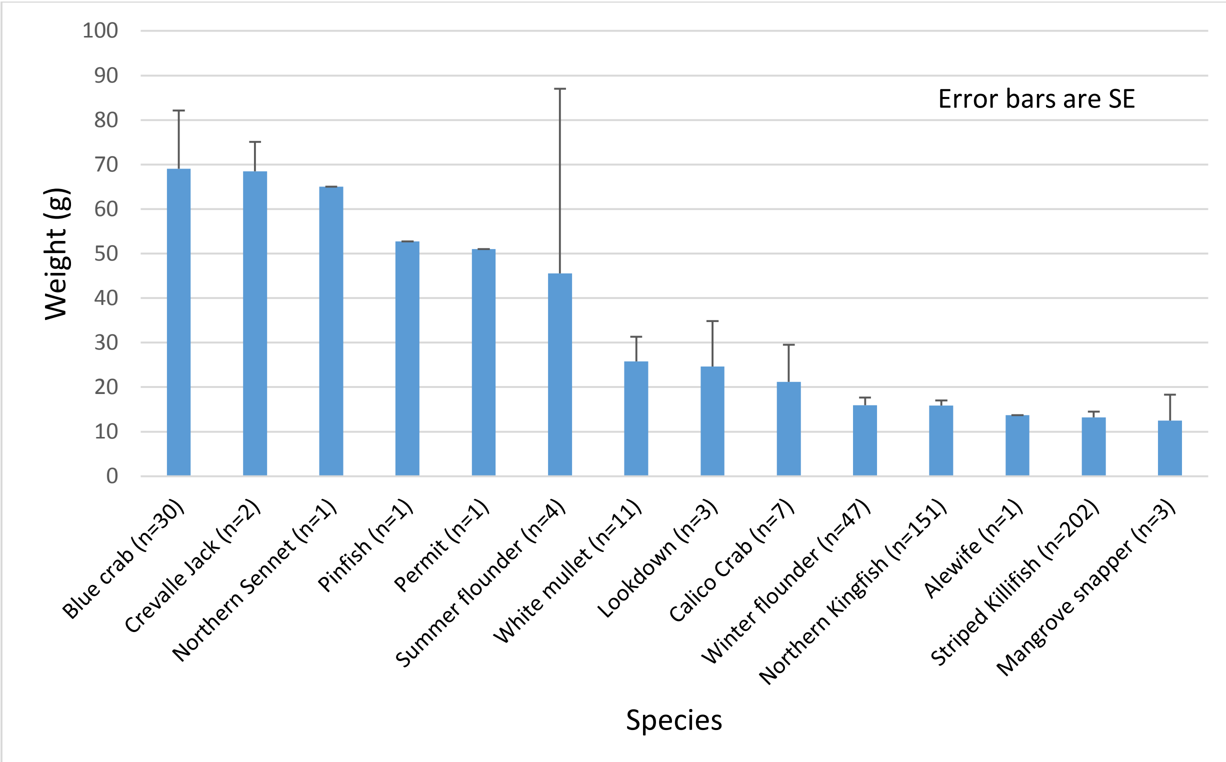

Figure 4C. Mean weight (g) of species caught in the 2015 fall fish monitoring

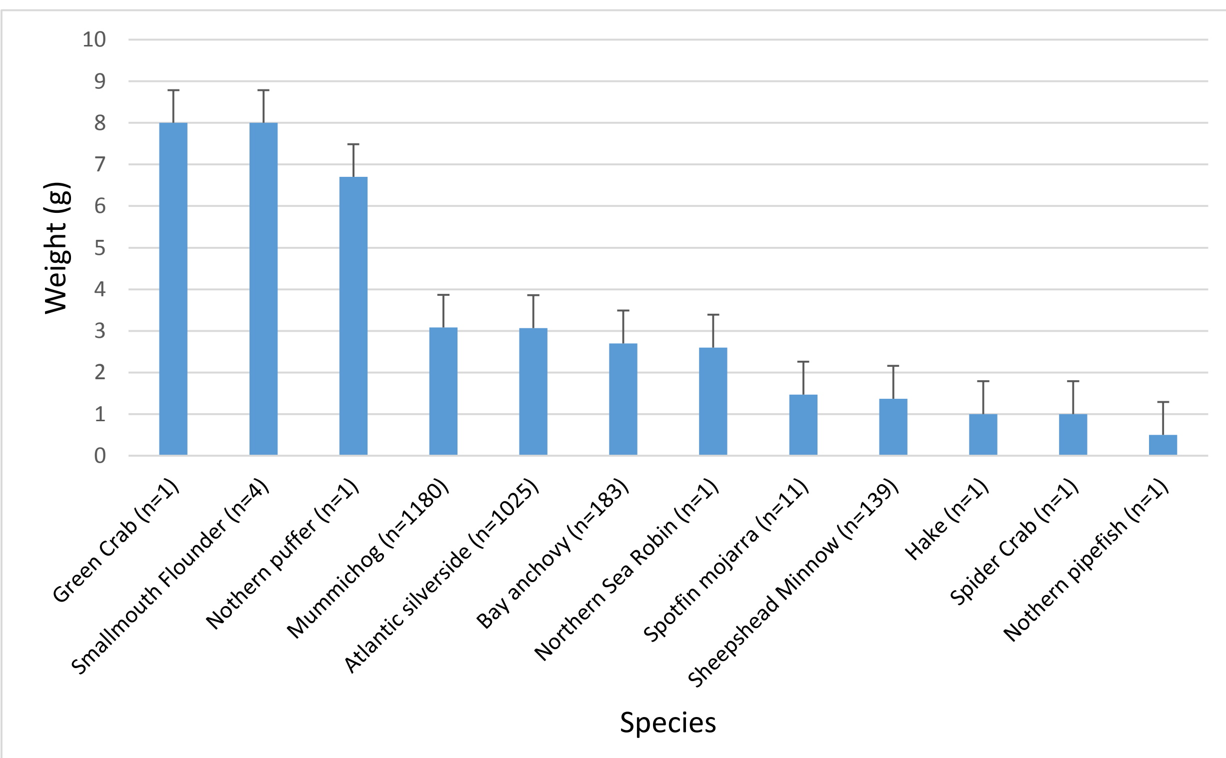

Table 3. Species Caught (2014-2015)

Species	Year Caught	Species	Year Caught
Alewife (*Alosa psuedoharengus*)	2014, 2015	Northern puffer (*Sphoeroides maculatus*)	2014, 2015
Atlantic menhaden (*Brevoortia tyrannus*)	2015	Permit (*Trachinotus falcatus*)	2015
Atlantic silverside (*Menidia menidia*)	2014, 2015	Pinfish (*Lagodon rhomboides*)	2015
Banded killifish (*Fundulus diaphanus*)	2014	Quahog (*Mercenaria mercenaria*)	2014
Bay anchovy (*Anchoa mitchilli*)	2014, 2015	Rock crab (*Cancer irroratus*)	2014
Black drum (*Pogonius cromis*)	2015	Sand eel (*Ammodytes tobianus*)	2014
Blue crab (*Callinectes sapidus*)	2014, 2015	Sand shrimp (*Crangon septemspinosa*)	2014, 2015
Bluefish (*Pomatomus saltatrix*)	2014	Sea horse (*Hippocampus erectus*)	2014
Bluegill (*Lepomis macrochirus*)	2014	Sheepshead minnow (*Cyrinodon variegatus*)	2014, 2015
Calico crab (*Ovalipes ocellatus*)	2014, 2015	Smallmouth flounder (*Etropus microstomus*)	2015
Crevalle jack (*Caranx hippos*)	2014, 2015	Southern kingfish (*Menticirrhus americanus*)	2014
Gizzard shad (*Dorosoma cepedianum*)	2015	Spider crab (*Libinia emarginata*)	2014, 2015
Shore shrimp (*Palaemonetes sp.*)	2014, 2015	Spotfin mojarra (*Eucinostomus argenteus*)	2015
Green crab (*Carcinus maenas*)	2014, 2015	Spottail flounder (*Bothus robinsi*)	2014
Hake (*Urophycis sp.*)	2015	Striped killifish (*Fundulus majalis*)	2014, 2015
Long claw hermit crab (*Pagurus longicarpus*)	2015	Summer flounder (*Paralichthys dentatus*)	2014, 2015
Lookdown (*Selene vomer*)	2015	Unknown sp.	2014
Mangrove snapper (*Lutjanus griseus*)	2015	Unknown flounder	2014
Moon jelly (*Aurelia aurita*)	2014, 2015	White fingered mud crab (*Rhithropanopeus harrisii*)	2014
Mummichog (*Fundulus heteroclitus*)	2014, 2015	White sucker (*Catostomus commersonii*)	2014
Northern Kingfish (*Menticirrhus saxatillis*)	2014, 2015	White mullet (*Mugil curema*)	2015
Northern Moon Snail (*Euspira heros*)	2015	Windowpane flounder (*Scopthalmus aquosus*)	2014
Northern Sea Robin (*Prionotus carolinus*)	2014, 2015	Winter flounder (*Pseudopleuronectes americanus*)	2014, 2015
Northern Sennet (*Sphyraena borealis*)	2015	Yellow perch (*Perca flavescens)*	2014
Northern pipefish (*Syngnathus fuscus*)	2015		

Table 4. Summary of water quality data collected during the 2015 fall fish monitoring.

Date	Time	Air Temp	Water Temp	DO	DO	Salinity	pH	Conductivity
m/d/y	HH:MM	°C	°C	mg/L	% sat.	ppt		µs/cm
9/14/2015	9:00	17.0	23.3	6.38	90.8	30.5	8.03	46895
9/21/2015	13:30	19.0	21.7	7.85	96.6	15.33	8.23	25010
9/26/2015	9:00	18.0	--	--	--	--	--	--
10/1/2015	12:30	14.0	--	--	--	--	--	--
10/9/2015	9:00	18.0	18.1	6.95	87.64	27.85	7.89	--
10/14/2015	14:00	18.0	19	8.62	109.39	24.65	8.01	38655
10/21/2015	14:00	24.0	17.2	8.24	105.51	31.59	8.07	48356
10/29/2015	10:00	19.0	15.9	8.66	108.11	31.55	7.93	48335
11/4/2015	13:30	18.0	15.9	7.73	96.63	31.89	7.99	48786

(--) indicates missing values. No water quality measurements were taken.
*The outfall pipe sluice gates were lowered during the 9/21/15 sampling event.

5.0 CONCLUSION

As summarized in Section 1.0, the objective of the 2015 Wreck Pond fish survey was to confirm if a viable herring run still exists within Wreck Pond and provide baseline pre-construction data to be compared with post-construction survey results. Overall, the primary goals of the fall surveys were to provide the following:

1) Baseline data for anadromous fish movement within Wreck Pond during fall migration;

2) An inventory of aquatic species collected at two sites adjacent to the outfall pipe using active sampling (seining).

3) A comparison of movement and abundance from past surveys in 2014 to be applied to current data and data to be collected post-construction; and

4) Measurements, weights, and enumeration of collected species

One juvenile alewife was caught in 2015. At twelve centimeters total length, this fish was over double the size of the two YOY alewives caught in 2014. While large, twelve centimeters is within the observed size range for YOY alewife, albeit at the upper end of the range limit (Able and Fahay, 2010). Thus, given its size, there is also a possibility that this is a juvenile (year 1+) fish that returned to estuarine waters following its initial emigration. Juvenile alewife movement can be complex, and evidence suggests that some YOY herring may return to their natal estuaries after an initial egress into marine waters within the same season (Turner and Limberg, 2012). Additionally, researchers suggest that juvenile alewives overwinter in inshore waters near the mouths of their natal estuaries for up to 1 to 2 years (Greene et al., 2009). Thus, it is possible that later stage juvenile alewives may also return to their natal estuaries from marine environments when conditions are suitable.

The date of juvenile alewife capture varied only slightly between years, occurring in early October in 2014 and late September in 2015. Interestingly, for both years, juvenile alewives were only caught in Site 1B. As previously mentioned, there are several differences between Site 1A and Site 1B. Namely, a slightly wider and deeper channel is present offshore at Site 1B and taller and denser vegetation is present on the site's southern bank resulting more overwater shade. Besides alewife, several other species were predominantly captured in one site versus another. Atlantic menhaden (*Brevoortia tyrannus*), sheepshead minnow (*Cyprinodon variegatus variegatus*), and stripped killifish (*Fundulus majalis*) were exclusively, or near exclusively, caught in Site 1A; whereas, bay anchovy (*Anchoa mitchilli*) were predominately caught in Site 1B. Whether these capture differences reflect actual preferences by species for particular site characteristics is unknown. The observed capture pattern could be a reflection of the natural spatiotemporal variation of population distribution, variation or stochasticity in capture probability, or the result of a limited data set (the majority of the captures of these species were seen during one event and limited comparisons can be made with the 2014 data set due to different sampling methodologies). Further monitoring will help determine whether there is a true pattern of site preference by species.

As already touched upon, direct comparisons between the 2014 and 2015 data sets cannot be made as there were slightly different sampling methodologies employed each year and sampling ceased once juvenile herring were detected to better promote survivability. However, it is interesting to note that several species were caught in 2015 that were not seen in 2014 including Atlantic menhaden, black drum (*Pogonias cromis*), gizzard shad (*Dorosoma cepedianum*), hake sp. (*Urophycis sp*.), long claw hermit crab (Pagurus longicarpus), lookdown (*Selene vomer*), mangrove snapper (*Lutjanus griseus*), northern moon snail (*Euspira heros*), northern sennet (*Sphyraena borealis*), northern pipefish (*Syngnathus fuscus*), spotfin mojarra (*Eucinostomus argenteus*), and white mullet (*Mugil curema*) (Tables 2 and 3).

The presence of YOY alewife in 2014 and what is likely a YOY alewife in 2015 provides further evidence that alewife spawning is occurring in Wreck Pond. However, it appears that a viable blueback herring run does not currently exist in Wreck Pond. This is evidenced by the lack of juvenile blueback captured in either fall monitoring study, as well as the low number of adult blueback collected during the 2006 and 2007 spring sampling, and the lack of adult blueback seen in 2014 and 2015. The Society's 2015 spring monitoring report provides further discussion on the apparent absence of blueback herring in Wreck Pond (American Littoral Society, 2015).

There are a number of explanations for the low number of juvenile alewives caught the past two years in regards to catch per unit of effort. From the spring monitoring studies, it appears that the number of adult alewives spawning in Wreck Pond is low, and YOY mortality may be leading to low recruitment. Black drum, American eel (*Anguilla rostrata*), white perch (*Morone americana*), yellow perch (*Perca flavescens*), largemouth bass *(Micropterus salmoides*), pumpkinseed (*Lepomis gibbosus*), and bluefish (*Pomatomus saltatrix*) are all confirmed predators of juvenile alewife and have been observed in Wreck Pond (Greene et al., 2009; Able and Fahay, 2010).

Critically, the uncertainty surrounding the timing of YOY alewife emigration is almost surely leading to low YOY capture rates per events. Weekly seining provides only a limited window (approximately two to three hours one day each week) during which migrant river herring can be captured, and the ambiguity surrounding the triggers and timing of YOY alewife emigration make it difficult to anticipate when alewife may be emigrating in Wreck Pond en masse. For example, the length of time YOY alewives remain in their natal waters before emigrating can range anywhere from 3 to 8 months (Greene et al., 2009). Additionally, as previously mentioned, water temperature, rainfall, stream discharge, prey availability, lunar phase, and time of day have all been associated with YOY alewife emigration (Greene et al., 2009; Able and Fahay, 2010). Further, it is possible that juvenile alewives employ different emigration strategies. Infrate and Oliveria (2008) and Yaro, Mather, and Juanes (2002) both observed a bimodal pattern of YOY alewife emigration in studies of Massachusetts populations. Infrate and Oliveria (2008) saw an initial peak of emigration between July and August and a second peak between November and December. Yaro, Mather, and Juanes (2002) also observed two peaks of emigration: one in early July and another in early September. Early migrants may represent a cohort born earlier in the season, but the bimodal pattern of emigration may also be the result of different life history strategies employed by YOY alewives. Early migrants are smaller than late migrants and may be emigrating in response to high competition for food sources within their natal waters or they may be trying to take advantage of early season marine food sources, or both. Exacerbating the difficulty of anticipating the fall YOY emigration in Wreck Pond is the fact that evidence suggests that large scale juvenile alewife emigration may occur in only 1 or 2 day pulses (Gahagan, Gherard, and Shultz, 2010). Finally, it is also possible that Hurricane Joaquin influenced the 2015 emigration. Hurricane Joaquin passed by New Jersey several days after our first detection of alewife. If our initial alewife capture represented the start of fall emigration, the heavy precipitation and the increased water flow caused by Joaquin, coupled with the closing of the outfall structure and then reopening to lower lake elevations, may have prompted the full egress of YOY alewives from the Wreck Pond Brook Watershed.

Despite these obstacles, the 2015 fall sampling was successful in capturing one juvenile alewife and provided further evidence that alewife spawning is taking place in the Wreck Pond Brook Watershed. Future monitoring should continue to be exploratory in nature given the current low capture rate of YOY river herring in Wreck Pond. In particular, it may be beneficial to conduct several sampling events earlier in the year. Three juvenile alewives were caught in early June 2008, and it is possible that alewife are emigrating earlier in the season within the Wreck Pond Brook Watershed, or displaying the bimodal pattern of migration as seen in other watersheds. More frequent sampling should also be conducted following the initial detection of alewife in the future.

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Attachment 1

New Jersey Scientific Collections Permit

Date Issued: 03/17/15
MFA-SCP No.: 1531

State of New Jersey

DEPARTMENT OF ENVIRONMENTAL PROTECTION

CHRIS CHRISTIE
Governor

KIM GUADAGNO
Lt. Governor

Division of Fish and Wildlife
Mail Code 501-03
PO Box 420
Trenton, NJ 08625-0420
David Chanda, Director
njfishandwildlife.com
609-292-2965

BOB MARTIN
Commissioner

03/17/15 to 12/31/015

SCIENTIFIC COLLECTING PERMIT

TO WHOM IT MAY CONCERN:

Under provisions of New Jersey Statutes Annotated Title 23:4-52, permission is hereby given to:

Captain Aleksandr C. Modjeski, American Littoral Society, 18 Hartshorne Drive, Highlands, NJ 07732 to conduct a Fish Inventory Study with emphasis on field monitoring of alewife and blueback herring in Wreck Pond, Monmouth County. Spring sampling, will be done from May 2nd to June 18th, will focus on adult migratory runs and collection will be done using a 15' deep, 4' high—modified fyke net (25' wings and 1" stretch mesh). There will also be a Fall sampling program, September - October to confirm presence of YOY herring and will use a 30' (1/4" nylon mesh bag seine with a 4'x4'x4' bag) and a 100' (1/4" nylon mesh bag seine with a 6'x6'x6' bag). Sampling will be done at various locations within the Wreck Pond Watershed. A small aluminum 12' skiff (Registration # NJ 8162HC)will be used to help deploy nets from the beach.

This permit is subject, but not limited to, the following conditions:

1. The person(s) named herein shall have this permit in their possession when collecting scientific specimens in marine, fresh, or estuarine waters of the State and must present it upon request to any official or citizen.

2. **The holder of this permit shall notify the Marine Law Enforcement Region Office of his/her scientific collecting activities in any of the State's marine, fresh, or estuarine waters at least 24 hours in advance of their activities. Notification can be made in writing to the Marine Enforcement Office, P.O. Box 418, Port Republic, NJ 08241, or by calling 609-748-2050.**

3. A **report** of the organisms collected (species, numbers, specific location where taken, dates of sampling) or a final report for the study for which the permit is requested shall be sent to the Administrator, Marine Fisheries, P.O. Box 400, Trenton, NJ 08625, within

four (4) weeks of the expiration date or upon request for permit renewal, whichever is earlier.

4. This permit does not authorize the collection of any species listed by the United States Government as endangered. Special provisions may apply for endangered species. It is the permittee's responsibility to obtain, from the United States Government, any required permits to interact with any Federally listed endangered species.

5. This permit does not convey the right to trespass.

6. Violation by the permittee or subsidiary permit holders of any condition of the permit or any state law or regulation promulgated pursuant to N.J.S.A. 23 or 50 or N.J.A.C. 7:25 or 7:25A shall render this permit null and void and subject all parties to prosecution in addition to permit revocation upon conviction. Applications for future permits may also be denied.

7. The holder of this Scientific Collecting Permit is also required to have in his/her possession a "Special Permit for Research" from the Division of Watershed Management, Bureau of Marine Water Monitoring, P.O. Box 405, Leeds Point, NJ 08220, prior to the taking of shellfish (clams, oysters, mussels) for scientific purposes from the marine or estuarine waters of the State that are designated "Prohibited," "Special Restricted," or "Seasonal Special Restricted" (N.J.S.A. 58:24-3, and N.J.A.C. 7:12-2). A chart of these designated waters may be obtained from the Bureau of Marine Water Monitoring or by visiting www.nj.gov/dep/wms/bmw.

Brandon Muffley

Brandon Muffley, Administrator
Marine Fisheries Administration

c: Capt. Dominick Fresco, Chief, Bureau of Law Enforcement-Marine Enforcement Region Office
Capt. Dennis Tully, NJ State Police-Marine Services Bureau
Deborah Watkins, Bureau of Marine Water Monitoring

Subsidiary Student or Employee Permit Holders:
Sheri Shifron
Katie Conrad
Jeff Derment
Jenna Krug
Quin Whitesall
Shane Godshall
Stevie Thorenson
Megan Molok

Attachment 2

Photograph Log

Wreck Pond Fall 2015 Fish Survey Photograph Log

Figure 1. View of existing outfall pipe from staging area of Site 1A
September 14, 2015

Figure 2. Alewife (*Alosa pseudoharengus*)
September 21, 2015

Figure 3. Bay anchovy (*Anchoa mitchilli*)
September 21, 2015

Figure 4. Lookdown (*Selene vomer*)
September 21, 2015

Figure 5. Mangrove snapper (*Lutjanus griseus*)
September 21, 2015

Figure 6. Northern puffer (*Sphoeroides maculate*)
September 21, 2015

Figure 7. Pinfish (*Lagodon rhomboides*)
September 21, 2015

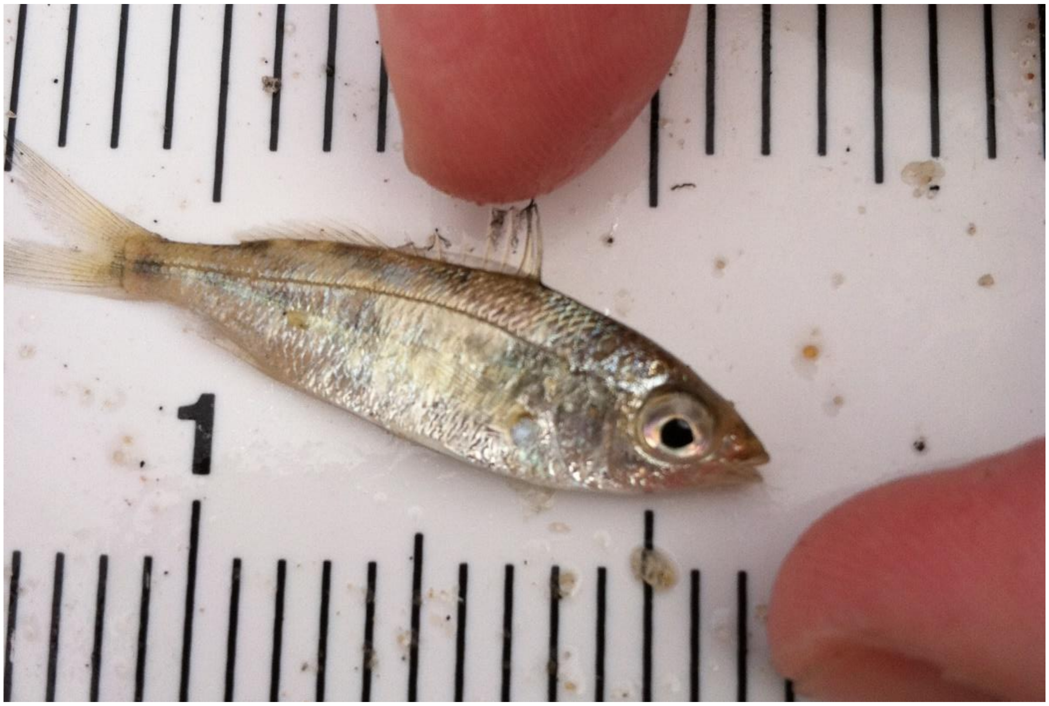

Figure 8. Spotfin mojarra (*Eucinostomus argenteus*)
September 21, 2015

Wreck Pond Fall 2015 Fish Survey Photograph Log

Figure 9. Local scout troop assisting with sampling
September 26, 2015

Figure 10. Seining Site 1A
October 1, 2015

Figure 11. Black drum (*Pogonias cromis*)
October 1, 2015

Figure 12. Monmouth University students assisting with sampling
October 9, 2015

Figure 13. ALS volunteer processing fish
October 21, 2015

Figure 14. Seining Site 1B
October 29, 2015

Figure 15. Northern moon snail (*Euspira heros*)
October 29, 2015

Figure 16. Northern sennet (*Sphyraena borealis*)
October 29, 2015

Figure 17. Gizzard shad (*Dorosoma cepedianum*)
October 29, 2015

Figure 18. Hake (*Urophycis sp.*)
October 29, 2015

Attachment 3

Data Sheets

HERRING PROJECT DATA SHEET

Location: Wreck Pond Site 1-Spring Lake **Field Crew:** Zack, Captain Al, Sheri **Date:** 9/14/15
Sample Number: WP-091415-001 **Weather:** sunny, 60-70s, breezy **Water Quality Taken (circle):** Y N
Net Deployment Time: 9:30 **Net Retrieval Time:** 9:30 **Time Net Collecting:** 9:45
Tides (time/ft) – Low: ______ **High (time/ft):** ______ **Precipitation in Last 24 hrs (circle):** Y N
Total Number of Species: ______ **Total Number of Individuals:** ______ **T&E Species Collected (circle):** Y N
Data Recorder: Sheri Shifren **Signature (team lead):** ______

SPECIES	Total wt/sub	Total Count/Sub ct	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)
spot fin mojarra		1	4	2	L												
northern Kingfish		5	9	6.3	L	8	46	L	10	11.6	L	12	16.7	L	8	5.1	L
long claw hermit crab		1			L												
northern Kingfish		5	7	2.5	FD	4	1		9	6.5		3	0.7		11	12	
northern Kingfish		5	5	0.8		7	3.2		12	13.5		13	21.9		3	0.6	
northern Kingfish		5	4	1.2		9	5.9		6	2.7		5	1.8		6	2.8	
northern Kingfish		24 / 4	8	3.8		8	5.0		3	0.6		5	1.2				
atlantic silversides		5	8	2.3		8	2.2		7	2.0		5	0.7		7	1.2	
atlantic silversides		7 / 2	6	1.3		6	1.4										
mumichaug		5	5	2.3		6	2		6	2		7	4.1		8	5.9	
mumichaug		5	5	1.3		7	4		6	1.7		6	2.4		9	8.9	
mumichaug		5	6	3.0		6	2.7		6	2.3		7	4.1		6	2.4	
mumichaug		5	5	1.5		6	1.9		6	2.3		6	1.7		5	0.7	
mumichaug		* / 5	5	0.9		5	1		6	2.7		6	2.2		6	2	
striped killifish		2 / 2	5	1.4		5	1.2										

NOTES

9:21 am
temp 23.3
DO 6.38 mg/L
DO 90.8%
salinity 30.5
pH 8.03
specific cond. 46895 µS/cm

*approx. 30 additional mumichaugs (not measured)

WATER QUALITY: Time: 9:21 **Location/Depth:** Site 1-Spring Lake **Recorders:** Sheri Shifren **Equipment:** YSI
Air Temp. (°C): ______ **Water Temp. (°C):** 23.3 **Dissolved Oxygen (mg/L):** 6.38 **Salinity (ppt):** 30.5 **pH:** 8.03 **Cond. (µS/cm):** 46895

NOTES – CIRCLE NAMES/INITIALS OF VOLUNTEERS/VETERANS; CIRCLE LENGTH(S) OF SPECIES WITH ABNORMALITIES AND DESCRIBE IN SPACE TO RIGHT; NOTE T&E SPECIES (ADDITIONAL NOTES ON BACK)

HERRING PROJECT DATA SHEET

Location: Wreck Pond Site 1 Spring Lake
Field Crew: Zack, Captain Al, Sheri
Date: 9/14/15

Sample Number: WP-091415-001
Weather: sunny, 60-70s, breezy
Water Quality Taken (circle): Y N

Net Deployment Time: 9:30
Net Retrieval Time: 9:30
Time Net Collecting: 9:45

Tides (time/ft) – Low: ______
High (time/ft): ______
Precipitation in Last 24 hrs (circle): Y N

Total Number of Species: ______
Total Number of Individuals: ______
T&E Species Collected (circle): Y N

Data Recorder: Sheri Shifren
Signature (team lead): ______

SPECIES	Total wt/sub	Total Count/sub ct.	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	NOTES
Krangen (shrimp)		1																
blue crab			8	45.2	male													see page 1 of 2 for water quality

WATER QUALITY: Time: ______ Location/Depth: ______ Recorders: ______ Equipment: ______

Air Temp. (°C): ______ Water Temp. (°C): ______ Dissolved Oxygen (mg/L): ______ Salinity (ppt): ______ pH: ______ Cond. (µS/cm): ______

NOTES – CIRCLE NAMES/INITIALS OF VOLUNTEERS/VETERANS; CIRCLE LENGTH(S) OF SPECIES WITH ABNORMALITIES AND DESCRIBE IN SPACE TO RIGHT; NOTE T&E SPECIES (ADDITIONAL NOTES ON BACK)

HERRING PROJECT DATA SHEET

Location: Wreck Pond Site 2 Sea Girt Field Crew: Zack, Captain Al, Sheri Date: 9/14/15
Sample Number: WP-091415-002 Weather: sunny, 60-70s, breezy Water Quality Taken (circle): Y N
Net Deployment Time: 10:40 Net Retrieval Time: 10:40 Time Net Collecting: 10:52
Tides (time/ft) – Low: ______ High (time/ft): ______ Precipitation in Last 24 hrs (circle): Y N
Total Number of Species: ______ Total Number of Individuals: ______ T&E Species Collected (circle): Y N
Data Recorder: Sheri Shifren Signature (team lead): ______

SPECIES	Total wt (lb)	Total Count	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	NOTES
mumichaug		5	5	2.2		6	2.5		6	2.4		5	2.1		5	1.3		Water quality taken @ Site 1
mumichaug		5	5	0.6		4	0.7		6	2.5		5	1.7		5	1.3		* kragon shrimp not measured
mumichaug	45	5	5	0.7		5	0.8		5	1		4	0.7		5	1.2		
sheeps head minnow	2	2	4	1.2		3	0.5											
Kragon shrimp*	2	2																
summer flounder	4	4	25	170		8	7.5		6	2.7		6	1.9					
blue crab	3	3	13	130	female	15	154.2	female	10	79.1	male							

WATER QUALITY: Time: ______ Location/Depth: ______ Recorders: ______ Equipment: ______
Air Temp. (°C): ______ Water Temp. (°C): ______ Dissolved Oxygen (mg/L): ______ Salinity (ppt): ______ pH: ______ Cond. (µS/cm): ______

HERRING PROJECT DATA SHEET

Location: Wreck Pond Site 2 Sea Girt
Field Crew: Zack, Captain Al, Sheri
Date: 9/14/15
Sample Number: WP-091415-002
Weather: sunny, 60-70, breezy
Water Quality Taken (circle): Y (N)
Net Deployment Time: 10:40
Net Retrieval Time: 10:40
Time Net Collecting: 10:52
Tides (time/ft) – Low: ______
High (time/ft): ______
Precipitation in Last 24 hrs (circle): Y N
Total Number of Species: ______
Total Number of Individuals: ______
T&E Species Collected (circle): Y N
Data Recorder: Sheri Shifren
Signature (team lead): ______

SPECIES	Total wt/sub	Total Count/sub ct	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	NOTES
silver sides		5	7	2		6	1.6		7	2		6	0.9		6	1.5		
silver side		5	5	0.7		6	1		5	1.3		7	2.5		7	2		Water Quality taken @ site 1
silver side		5	6	1.7		7	1.9		6	1.3		6	0.9		6	1.6		
silver side		5	6	1.2		6	0.8		7	2		6	1.9		6	1.5		* grass shrimp not measured
silver side		5	6	1.1		6	1.3		6	1.2		6	1.1		5	2.9		
silver side		27 2	6	1.1		5	0.9											
northern kingfish		1 1	5	1.3														
striped killifish			3	0.1														
grass shrimp *		25																
mummichaug		5	6	3.2		5	1.7		6	2.1		6	2		6	2.3		
mumichaug		5	6	2		7	4.4		7	2.8		6	2.1		5	2.1		
mumichaug		5	7	3.7		6	2.3		5	2		4	1.2		6	3.2		
mumichaug		5	7	4		6	2.3		5	1.4		6	2		5	1.4		
mumichaug		5	5	1.6		6	2.5		6	2.2		5	1.5		5	1.4		
mumichaug		5	9	0.9		6	1		6	2		6	3.1		4	1		

WATER QUALITY: Time: ______ Location/Depth: ______ Recorders: ______ Equipment: ______

Air Temp. (°C): ______ Water Temp. (°C): ______ Dissolved Oxygen (mg/L): ______ Salinity (ppt): ______ pH: ______ Cond. (µS/cm): ______

NOTES -- CIRCLE NAMES/INITIALS OF VOLUNTEERS/VETERANS; CIRCLE LENGTH(S) OF SPECIES WITH ABNORMALITIES AND DESCRIBE IN SPACE TO RIGHT; NOTE T&E SPECIES (ADDITIONAL NOTES ON BACK)

HERRING PROJECT DATA SHEET

Location: WP 01 Spring Lake Field Crew: Zack, Sheri, Lisa Date: 09/21/15
Sample Number: UP 092115 001 Weather: partly cloudy, windy - 70s Water Quality Taken (circle): Y N
Net Deployment Time: 12:45 Net Retrieval Time: ______ Time Net Collecting: ______
Tides (time/ft) – Low: ______ High (time/ft): ______ Precipitation in Last 24 hrs (circle): Y N
Total Number of Species: ______ Total Number of Individuals: ______ T&E Species Collected (circle): Y N
Data Recorder: Sheri Shifren Signature (team lead): ______

SPECIES	Total wt/sub	Total Count/sub ct.	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)
AT/.S [illegible]			6	1.82													
"			11	7.90													
"			6	2.1													
"			6	1.2													
"			4	0.7													
"			10	9.5													
"			4	1.5													
"			7	2.5													
"			5	1.4													
"			4	.9													
"			5	1													
"			5	1.2													
"			5	1.2													
"			7	3.[illegible]													

NOTES

Dredge pipes in water – not dredging though

Air Temp. (°C): ______ Water Temp. (°C): 21.7 Dissolved Oxygen (mg/L): 7.85 %: 96.6 Salinity (ppt): 15.33 pH: 8.23 Cond. (µS/cm): 2501

HERRING PROJECT DATA SHEET

Location: Spring Lake
Field Crew: ______
Date: 9/2/15
Sample Number: WP 090215 001
Weather: ______
Water Quality Taken (circle): Y N
Net Deployment Time: 1245
Net Retrieval Time: ______
Time Net Collecting: ______
Tides (time/ft) – Low: ______
High (time/ft): ______
Precipitation in Last 24 hrs (circle): Y N
Total Number of Species: ______
Total Number of Individuals: ______
T&E Species Collected (circle): Y N
Data Recorder: ______
Signature (team lead): [illegible]

SPECIES	Total wt/sub	Total Count/sub ct	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	NOTES
silversides		[illegible]	5	1.7														
"			6	1.7														
"			5	1.6														
"			8	3.5														
"			6	1.5														
"			3.5	0.8														
"			5	1.7														
"			5	1.4														
"			4	1.3														
"			4.5	1.1														
"			4	1.5														
"			4	0.5														
"			4	0.5														
"			4	9.6														

Air Temp. (°C): ______ Water Temp. (°C): ______ Dissolved Oxygen (mg/L): ______ Salinity (ppt): ______ pH: ______ Cond. (µS/cm): ______

30 To 40 more menidia menidia all [illegible] 4cm TL

HERRING PROJECT DATA SHEET

Location: Spring Lake ______ Field Crew: ______ Date: ______
Sample Number: ______ Weather: ______ Water Quality Taken (circle): Y N
Net Deployment Time: ______ Net Retrieval Time: ______ Time Net Collecting: ______
Tides (time/ft) – Low: ______ High (time/ft): ______ Precipitation in Last 24 hrs (circle): Y N
Total Number of Species: ______ Total Number of Individuals: ______ T&E Species Collected (circle): Y N
Data Recorder: ______ Signature (team lead): ______

SPECIES	Total wt/sub	Total Count/sub ct.	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	NOTES
Jack crevalle			15 17	75.8														
//			14.5 16	61.9														
Northern Kingfish			16	35.2														
//			11	14.3														
//			12	16.8														
//			8.5	7.1														
//			13	22														
//			9	7.5														
//			10.5	10.6														
//			6	3.5														
//			6	3														
Anchoa sp.			6.5	1.7														
mummichog			5	1.7														
//			6	4.4														

Air Temp. (°C): ______ Water Temp. (°C): ______ Dissolved Oxygen (mg/L): ______ Salinity (ppt): ______ pH: ______ Cond. (µS/cm): ______

HERRING PROJECT DATA SHEET

Location: Spc y Lake ____ Field Crew: ____ Date: ____
Sample Number: ____ Weather: ____ Water Quality Taken (circle): Y N
Net Deployment Time: ____ Net Retrieval Time: ____ Time Net Collecting: ____
Tides (time/ft) – Low: ____ High (time/ft): ____ Precipitation in Last 24 hrs (circle): Y N
Total Number of Species: ____ Total Number of Individuals: ____ T&E Species Collected (circle): Y N
Data Recorder: ____ Signature (team lead): ____

SPECIES	Total wt/sub	Total Count/sub ct.	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	NOTES
mummichog			5.5	2.1														
* Lookdown			5.5 6	4.7														-5.5 FL/6TL
mummichog			5	2.1														
"			4.5	1														
"			7	4.2														
"			5	0.7														
"			4	1.7														
"			6	3.4														
* Mojarra sp			4.5 5	1.2														-check photo
"			4 4.5	1.3														
mummichog			5	1.4														
mojarra sp			4 4.5	1														-check photo
mummichog			5	1.1														
"			4.5	1														

Air Temp. (°C): ____ Water Temp. (°C): ____ Dissolved Oxygen (mg/L): ____ Salinity (ppt): ____ pH: ____ Cond. (µS/cm):

HERRING PROJECT DATA SHEET

Location: Spring Lake Field Crew: ______ Date: 9/21/15
Sample Number: ______ Weather: ______ Water Quality Taken (circle): Y N
Net Deployment Time: ______ Net Retrieval Time: ______ Time Net Collecting: ______
Tides (time/ft) – Low: ______ High (time/ft): ______ Precipitation in Last 24 hrs (circle): Y N
Total Number of Species: ______ Total Number of Individuals: ______ T&E Species Collected (circle): Y N
Data Recorder: ______ Signature (team lead): ______

SPECIES	Total wt/sub	Total Count/sub ct	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	NOTES
Blue claw crab			12	88														
unknown			7	5.5														- check photo (mangrove snapper or BSB?)

Air Temp. (°C): ______ Water Temp. (°C): ______ Dissolved Oxygen (mg/L): ______ Salinity (ppt): ______ pH: ______ Cond. (µS/cm):

HERRING PROJECT DATA SHEET

Location: Vrck Pond / seag. 002 Field Crew: Zak, Shari, Lisa, Jeff Date: 9/21/15
Sample Number: WP 092115-002 Weather: ___ Water Quality Taken (circle): Y N
Net Deployment Time: 1330 Net Retrieval Time: ___ Time Net Collecting: ___
Tides (time/ft) – Low: ___ High (time/ft): ___ Precipitation in Last 24 hrs (circle): Y N
Total Number of Species: ___ Total Number of Individuals: ___ T&E Species Collected (circle): Y N
Data Recorder: Jeff Dennt Signature (team lead): ___

SPECIES	Total wt/sub	Total Count/sub ct	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	NOTES
Blue crab			14	136		13.5	118		17	185.3								-All females. Every gravid
Nor. Kingfish			14	20		17	44.9		17	43.2		15	30.4		17	39.1		
"			12.5	17.5		16.5	42.3		17	50.8		15.5	38.7		14	33.8		
"			16.5	45.1		16	38.7		16.5	20		14.5	30.2		15.5	38.8		
"			14	27.4		13	22.2		12	14		14.5	31.7		15	37.3		
"			12	17.9		14.5	25		12	14.9		12.5	16.1		12.5	14		
"			16	33.5		11	10		8.5	8.7		13	22.1		5.5	3.6		
"			6	3.5														
Northern pipefish			13	.5														
Atl. silversides			4	1		7.0	2		4	0.5		6	2.5		6	2.5		
"			6.5	1.6		7	5		6	1.8		6.5	2.0		5	1.6		
"			6.5	2		6.5	1.6		7	2.5		8	3.1		4	0.5		
"			4	0.6		4.5	0.8		4.5	1		6	1.2		4.5	0.7		
"			4.5	0.5		4	0.7		6	1.8		7	3.7		7	4.1		
"			5.5	1.3		4	1.5		4	2.0		4	0.5		6	8.5		
			4	0.5														

Air Temp. (°C): ___ Water Temp. (°C): ___ Dissolved Oxygen (mg/L): ___ Salinity (ppt): ___ pH: ___ Cond. (µS/cm): ___

2 Flat-clawed? Hermit crabs

Lookdown moonfish	11/14cm	38.2g
	11/13	31g
white mullet	14	3?.9
	15	45.0
Mangrove snapper (see photo)	11	24
Anchoa sp. (see photo)	8/9	7.2
	8/9	7.2
Pinfish (see photo)	~~[illegible]~~ 14.5	~~[illegible]~~ 52.7
winter flounder	9	7.5
	8	6.5
northern puffer	6	6.7

mumichog	2.5	0.3
	4	1.0
Herring sp.	10.5/12	13.7

HERRING PROJECT DATA SHEET

Location: Spring Lake / Sea Girt
Field Crew: Zak, AM, Scouts
Date: 9/26/15

Sample Number: WP-092615-007
Weather: Overcast / windy
Water Quality Taken (circle): Y N

Net Deployment Time: ≈12:30
Net Retrieval Time: ______
Time Net Collecting: ______

Tides (time/ft) – Low: ______
High (time/ft): ______
Precipitation in Last 24 hrs (circle): Y N

Total Number of Species: ______
Total Number of Individuals: 7
T&E Species Collected (circle): Y N

Data Recorder: Zak Roth
Signature (team lead): [illegible]

SPECIES	Total wt/sub	Total Count/sub ct	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	NOTES
N. Kingfish			16	33		14	14.3		10	5.9		11.5	4.3		10	7.4		
			13.5	14.3		5.5	4.0		11	5.8		9	3.1		8.5	3.6		
Weakfish			8.5	6.4		10	8.2		8.5	6.4		8	—		9.5	6.1		6.5 12.4
			9.5	10.6														
Atlantic silverside			8	1.6		9	4.1		9	3.3		9	6.4		9.5	5.9		9 16.6
[illegible]			7.5	4.6		4.5	1.7		5	4.6		8	9.6		7.5	6.7		
			7	6.4		7	5.6		7.5	7.0		6	7.3		7	17.1		
			7	7		6	8.2		5	8.2		6	5.4		6	3.0		
Blue crab			4	5.2														
N Sea Robin			5.5	2.6														
																		Calico crab
	See Girt		side															

WATER QUALITY: Time: ______ Location/Depth: ______ Recorders: ______ Equipment: ______

Air Temp. (°C): ______ Water Temp. (°C): ______ Dissolved Oxygen (mg/L): ______ Salinity (ppt): ______ pH: ______ Cond. (µS/cm): ______

HERRING PROJECT DATA SHEET

Location: Wreck Pond (Spring Lake) Field Crew: AM, ZR, JS, DK, KD Thompson Mu Hurricane Date: 10/1/15

Sample Number: ______ Weather: Dreary Windy Cloud Water Quality Taken (circle): Y N

Net Deployment Time: ______ Net Retrieval Time: ______ Time Net Collecting: ______

Tides (time/ft) – Low: ______ High (time/ft): ______ Precipitation in Last 24 hrs (circle): Y N

Total Number of Species: ______ Total Number of Individuals: ______ T&E Species Collected (circle): Y N

Data Recorder: ______ Signature (team lead): ______

SPECIES	Total wt/sub	Total Count/sub ct	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	NOTES
Permit			15	51	L													
Kingfish			12	8	L	11	1		10.5	7		11	11.9		12	9		
			9	2		15	11		10.5	1		~~8~~ 9	6		14	12		
			15	25		9	5.7		11	11		13	22		10	9		
			11	10.5		9	6.5		9.5	6		7	7.5		12	12		
			10	7.1		12	1.6		14	23		11	13		12.5	15		
Mullut			14.5	40														
Silverside			6.5	3		8	1.5		8	1		9	5		4	1		
			7.5	4		7.5	2		2.5	1		7.5	4		6.5	3		
			8	2.9		5.5	3		8	7.3		9	8		6	6		

WATER QUALITY: Time: ______ Location/Depth: ______ Recorders: ______ Equipment: ______

Air Temp. (°C): ______ Water Temp. (°C): ______ Dissolved Oxygen (mg/L): ______ Salinity (ppt): ______ pH: ______ Cond. (µS/cm): ______

HERRING PROJECT DATA SHEET

Location: Spring Lake (Spring Lake) Field Crew: ______ Date: 10/1/15
Sample Number: ______ Weather: ______ Water Quality Taken (circle): Y N
Net Deployment Time: ______ Net Retrieval Time: ______ Time Net Collecting: ______
Tides (time/ft) – Low: ______ High (time/ft): ______ Precipitation in Last 24 hrs (circle): Y N
Total Number of Species: ______ Total Number of Individuals: ______ T&E Species Collected (circle): Y N
Data Recorder: ______ Signature (team lead): 7

SPECIES	Total wt/sub	Total Count/sub ct	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	NOTES
Silverside			5	1.1		7.5	13		7	1.7		9	3.8		4.5	8		
			6.5	1.5		6.5	1.1		6	7		5.5	10		5.5	6		
		+75																
Spotfin Mojarra			4.5	3		5.5	2											
Mummichog			5.5	13		5.5	3.5		5.5	1.2		6	17		5.5	3.3		
			5.5	3		6	3		5.3	2.1		5	1		4.3	0.8		
			5	2		5	5		5	2		5.5	1		5	0.7		
			5	2		5.3	1.3		5	2		4.5	1		5	3		
			3	0.5		6.1	1.2		5	3		4.4	0.4		4	1		
		+34																

WATER QUALITY: Time: ______ Location/Depth: ______ Recorders: ______ Equipment: ______
Air Temp. (°C): ______ Water Temp. (°C): ______ Dissolved Oxygen (mg/L): ______ Salinity (ppt): ______ pH: ______ Cond. (μS/cm): ______

NOTES – CIRCLE NAMES/INITIALS OF VOLUNTEERS/VETERANS; CIRCLE LENGTH(S) OF SPECIES WITH ABNORMALITIES AND DESCRIBE IN SPACE TO RIGHT; NOTE T&E SPECIES (ADDITIONAL NOTES ON BACK)

HERRING PROJECT DATA SHEET

Location: Spring Lake
Field Crew:
Date: 10/1/15
Sample Number:
Weather:
Water Quality Taken (circle): Y N
Net Deployment Time:
Net Retrieval Time:
Time Net Collecting:
Tides (time/ft) – Low:
High (time/ft):
Precipitation in Last 24 hrs (circle): Y N
Total Number of Species:
Total Number of Individuals:
T&E Species Collected (circle): Y N
Data Recorder: Marlena Grebocki
Signature (team lead):

SPECIES	Total wt/sub	Total Count/sub ct	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	NOTES
Mullet			13.5	39		13.5	39		15	39		14.75	58					
Blackdrum			29.5	600		27.5	387											

WATER QUALITY: Time: Location/Depth: Recorders: Equipment:

Air Temp. (°C): Water Temp. (°C): Dissolved Oxygen (mg/L): Salinity (ppt): pH: Cond. (µS/cm):

NOTES – CIRCLE NAMES/INITIALS OF VOLUNTEERS/VETERANS; CIRCLE LENGTH(S) OF SPECIES WITH ABNORMALITIES AND DESCRIBE IN SPACE TO RIGHT; NOTE T&E SPECIES (ADDITIONAL NOTES ON BACK)

HERRING PROJECT DATA SHEET

Location: Spring Lake
Field Crew: ______
Date: 10/1/15
Sample Number: ______
Weather: ______
Water Quality Taken (circle): Y N
Net Deployment Time: ______
Net Retrieval Time: ______
Time Net Collecting: ______
Tides (time/ft) – Low: ______
High (time/ft): ______
Precipitation in Last 24 hrs (circle): Y N
Total Number of Species: ______
Total Number of Individuals: ______
T&E Species Collected (circle): Y N
Data Recorder: ______
Signature (team lead): 2

SPECIES	Total wt/sub	Total Count/sub ct	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	NOTES
W. Flounder			9.5	9														
Long Claw Hermit		2																
Smallmouth Flounder			6.5	6		7.5	10											
Mangrove Snapper			7	8														
Blueclaw Crab			M 11	89		M 13	124		F 12	15		M 7	25					
Lady/Calico			M 2	2														

WATER QUALITY: Time: ______ Location/Depth: ______ Recorders: ______ Equipment: ______

Air Temp. (°C): ______ Water Temp. (°C): ______ Dissolved Oxygen (mg/L): ______ Salinity (ppt): ______ pH: ______ Cond. (µS/cm): ______

NOTES – CIRCLE NAMES/INITIALS OF VOLUNTEERS/VETERANS; CIRCLE LENGTH(S) OF SPECIES WITH ABNORMALITIES AND DESCRIBE IN SPACE TO RIGHT; NOTE T&E SPECIES (ADDITIONAL NOTES ON BACK)

HERRING PROJECT DATA SHEET

Page ___ of ___

Location: Sea Girt
Field Crew: ______
Date: 10/1/15
Sample Number: ______
Weather: ______
Water Quality Taken (circle): Y N
Net Deployment Time: ______
Net Retrieval Time: ______
Time Net Collecting: ______
Tides (time/ft) – Low: ______
High (time/ft): ______
Precipitation in Last 24 hrs (circle): Y N
Total Number of Species: ______
Total Number of Individuals: ______
T&E Species Collected (circle): Y N
Data Recorder: ______
Signature (team lead): ______

SPECIES	Total wt/sub	Total Count/sub ct	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	NOTES
[illegible]			[illegible]															
W Flounder			9.5	[illegible]	L	8.2	23	L	10.2	37	L	9.5	24	L	8.3	28	L	
W Flounder			9.5	31	L	10	45	L	16.5	37	L							
Kingfish		34	11.9	36.5	L	14.5	55	L	11.9	23	L	15.1	38.7	L	11 13		L	
"			9	13.0	L	13.4	31.3	L	10.2	11	L	14	34	L	13.3 27		L	
"			15.3	45.8	L	13.4	23	L	11.4	18.3	L	13.9	16.2	L	9.4	12.3	L	
"			13.3		L	15	56	L	[illegible]	[illegible]	[illegible]	13.9	38.2	L	11	23	L	
"			12	15	L	12.1	19	L										

WATER QUALITY: Time: ______ Location/Depth: ______ Recorders: ______ Equipment: ______

Air Temp. (°C): ______ Water Temp. (°C): ______ Dissolved Oxygen (mg/L): ______ Salinity (ppt): ______ pH: ______ Cond. (µS/cm): ______

NOTES – CIRCLE NAMES/INITIALS OF VOLUNTEERS/VETERANS; CIRCLE LENGTH(S) OF SPECIES WITH ABNORMALITIES AND DESCRIBE IN SPACE TO RIGHT; NOTE T&E SPECIES (ADDITIONAL NOTES ON BACK)

HERRING PROJECT DATA SHEET

Location: SL | Field Crew: | Date: 10/9/15
Sample Number: | Weather: | Water Quality Taken (circle): Y N
Net Deployment Time: 2900 | Net Retrieval Time: | Time Net Collecting:
Tides (time/ft) – Low: | High (time/ft): | Precipitation in Last 24 hrs (circle): Y N
Total Number of Species: | Total Number of Individuals: | T&E Species Collected (circle): Y N
Data Recorder: | Signature (team lead):

SPECIES	Total wt/sub	Total Count/sub ct	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	NOTES
Flounder			10 5	8		10 5	8		10 7	8								
Silverside			9 7	3		9 6	3		8 9	2		9 5	3		6 4	1		
			6 2	1		5 9	1		8 9	2		9 2	3		9 2	3		Silverside
			8 7	2		5 9	1		5 7	1		9 0	2		10 8	5		
			6 0	1		9 2	2		7 6	1		9 8	5		10 5	6		
			9 7	3		11 2	6		5 9	1		9 2	2		8 5	2		
Mummichog			6 0	1		7 9	3		6 9	2		6 3	1		6 2	1		
			6 2	1		7 4	3		6 3	1		6 9	2		6 2	1		Mummichog
			7 5	2		7 4	2		7 4	1		6 5	1		7 0	1		
			7 3	1		6 4	1		7 0	1		6 8	1		6 7	1		
			6 0	1		6 5	2		5 8	1		7 1	1		6 6	2		
King Fish			8 0	2		9 0	3		5 5	1		4 6	1					
Spotfin Mojarra			7 5	2		5 2	1		6 6	1		3 5	1		5 5	1		
Sheepshead Minnow			6 3	1														
Sheepshead Minnow			3 7	1		3 5	1											

WATER QUALITY: Time: ______ Location/Depth: ______ Recorders: ______ Equipment: ______

Air Temp. (°C): ______ Water Temp. (°C): ______ Dissolved Oxygen (mg/L): ______ Salinity (ppt): ______ pH: ______ Cond. (µS/cm): ______

HERRING PROJECT DATA SHEET

Location: SL
Field Crew:
Date: 10/10/15
Sample Number:
Weather:
Water Quality Taken (circle): Y N
Net Deployment Time: 1:900am
Net Retrieval Time:
Time Net Collecting:
Tides (time/ft) – Low:
High (time/ft):
Precipitation in Last 24 hrs (circle): Y N
Total Number of Species:
Total Number of Individuals:
T&E Species Collected (circle): Y N
Data Recorder:
Signature (team lead):

SPECIES	Total wt/sub	Total Count/sub ct	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	NOTES
Blue claw crab		~~4~~ ~~2~~	11 / 8	78														
Crangon Shrimp																		
		5																

WATER QUALITY: Time: ________ Location/Depth: ________ Recorders: ________ Equipment: ________

Air Temp. (°C): ____ Water Temp. (°C): ____ Dissolved Oxygen (mg/L): ____ Salinity (ppt): ____ pH: ____ Cond. (µS/cm): ____

NOTES – CIRCLE NAMES/INITIALS OF VOLUNTEERS/VETERANS; CIRCLE LENGTH(S) OF SPECIES WITH ABNORMALITIES AND DESCRIBE IN SPACE TO RIGHT; NOTE T&E SPECIES (ADDITIONAL NOTES ON BACK)

HERRING PROJECT DATA SHEET

Location: 56
Field Crew:
Date: 10/9/15
Sample Number:
Weather:
Water Quality Taken (circle): Y N
Net Deployment Time:
Net Retrieval Time:
Time Net Collecting:
Tides (time/ft) – Low: 21:30
High (time/ft):
Precipitation in Last 24 hrs (circle): Y N
Total Number of Species:
Total Number of Individuals:
T&E Species Collected (circle): Y N
Data Recorder:
Signature (team lead):

SPECIES	Total w/sub	Total Count/Sub ct.	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	NOTES
Left Over Summer																		
winter flounder			12/1	13		9/2	5		9/5	7		9/8	9		10/0	6		
↓			9/0	9		10/4	7		11/9	12		9/6	11		9/0	9		
↓			10/8	11		10/3	10											
King fish			12/0	11		10/8	13		10/6	6		11/8	11		9/5	9		
↓			10/8	7		8/7	3		7/6	3								
mummy chugs			7/6	4		6/3	3		6/1	2		7/6	5		6/7	3		15,8,6,17,7,11,
			6/6	4		6/4	4		7/6	5		8/4	5		5/5	4		12,7,6,4,5,3,
			7/7	4		7/6	3		6/3	3		7/8	5		7/0	3		2,2,1,1
			7/1	3		5/3	2		7/2	4		7/3	6		7/1	5		
			8/1	5		7/5	5		6/0	4		6/7	4		6/9	4		
↓			6/2	3		6/5	2		7/4	4		6/5	5		6/5	4		
Silver sides			8/3	3		8/3	4		8/4	3		8/8	3		7/0	4		1,6,6,3,5,3,4,
↓			9/9	4		8/2	4		6/7	3		7/5	3		8/8	4		2,3,3,4,4,2,
			8/5	5		8/4	4		7/6	5		9/6	5		7/7	4		5,1,2,3,4,4,5,2

5,2,2,2,2,2,2,
2,2,1,2

WATER QUALITY: Time:
Location/Depth:
Recorders:
Equipment:

Air Temp. (°C):
Water Temp. (°C): 18.1
Dissolved Oxygen (mg/L): 6.95
Salinity (ppt): 27.85
pH: 7.89
Cond. (µS/cm):

NOTES – CIRCLE NAMES/INITIALS OF VOLUNTEERS/VETERANS; CIRCLE LENGTH(S) OF SPECIES WITH ABNORMALITIES AND DESCRIBE IN SPACE TO RIGHT; NOTE T&E SPECIES (ADDITIONAL NOTES ON BACK)

HERRING PROJECT DATA SHEET

Location: 56 Field Crew: ______ Date: 10/29/15
Sample Number: ______ Weather: ______ Water Quality Taken (circle): Y N
Net Deployment Time: ±1030 Net Retrieval Time: ______ Time Net Collecting: ______
Tides (time/ft) – Low: ______ High (time/ft): ______ Precipitation in Last 24 hrs (circle): Y N
Total Number of Species: ______ Total Number of Individuals: ______ T&E Species Collected (circle): Y N
Data Recorder: ______ Signature (team lead): ______

SPECIES	Total wt/sub	Total Count/sub ct.	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	NOTES
Silver			8 3	4		9 8	6		8 4	4		10 3	5		7 7	4		craion shrimp
↓			8 4	4		10 0	5		8 2	4		9 2	5		8 4	4		
~~[illegible]~~																		(3)
Crab (blue claw)			2 8	1		8 5	48		1 7	1		2 8	1					Sideeye shrimp
Spider crab			1 0	1														(21)

WATER QUALITY: Time: ______ Location/Depth: ______ Recorders: ______ Equipment: ______
Air Temp. (°C): ______ Water Temp. (°C): ______ Dissolved Oxygen (mg/L): ______ Salinity (ppt): ______ pH: ______ Cond. (µS/cm): ______

NOTES – CIRCLE NAMES/INITIALS OF VOLUNTEERS/VETERANS; CIRCLE LENGTH(S) OF SPECIES WITH ABNORMALITIES AND DESCRIBE IN SPACE TO RIGHT; NOTE T&E SPECIES (ADDITIONAL NOTES ON BACK)

HERRING PROJECT DATA SHEET

Location: WP Inlet S.L. Field Crew: ____ Date: 10/14/2015
Sample Number: ____ Weather: ____ Water Quality Taken (circle): Y N ✓
Net Deployment Time: ____ Net Retrieval Time: ____ Time Net Collecting: ____
Tides (time/ft) – Low: ____ High (time/ft): ____ Precipitation in Last 24 hrs (circle): Y N
Total Number of Species: ____ Total Number of Individuals: ____ T&E Species Collected (circle): Y N
Data Recorder: ____ Signature (team lead): ____

SPECIES	Total wt/sub	Total Count/sub ct	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	NOTES
Sheeps Head Minnow			55	2		35	1		35	2		30	1		35	1		
			36	1		40	1		40	1		39	1		30	<1		
			32	1		40	1		34	1		40	1		33	1		
			35	<1		31	1		34	1		32	1					
Spot fin mojarra			50	1														
silver sides			105	6		93	4		80	2		80	3		110	6		1
			95	5		85	4		96	3		90	4		72	3		
			85	6		94	4		75	2		87	4		75	2		
			77	3		85	3		76	3		80	2		85	4		
			71	2		76	2		84	3		75	2		51	1		
Mullet	5		55	3		61	3		65	3		47	3					
Grass shrimp																		16
Blue claw	5 total		5 male	11		4 male	3											

WATER QUALITY: Time: ____ Location/Depth: ____ Recorders: ____ Equipment: ____
Air Temp. (°C): ____ Water Temp. (°C): 19 Dissolved Oxygen (mg/L): 8.62 Salinity (ppt): 24.65 pH: 8.01 Cond. (µS/cm): 38.655

NOTES – CIRCLE NAMES/INITIALS OF VOLUNTEERS/VETERANS; CIRCLE LENGTH(S) OF SPECIES WITH ABNORMALITIES AND DESCRIBE IN SPACE TO RIGHT; NOTE T&E SPECIES (ADDITIONAL NOTES ON BACK)

HERRING PROJECT DATA SHEET

Location: SL
Field Crew:
Date: 10/14/15
Sample Number:
Weather:
Water Quality Taken (circle): Y N
Net Deployment Time:
Net Retrieval Time:
Time Net Collecting:
Tides (time/ft) – Low:
High (time/ft):
Precipitation in Last 24 hrs (circle): Y N
Total Number of Species:
Total Number of Individuals:
T&E Species Collected (circle): Y N
0
Data Recorder:
Signature (team lead):

SPECIES	Total w/sub	Total Count/Sub'd	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	NOTES
menhaden			55	2		6	7		5	7		5	2		55	2		~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~
			47	1		55	1		63	3		45	2		70	4		~~IIII~~ IIII
			52	2		60	2		35	<1		55	2		55	2		8
			35	<1		53	3		50	1		42	<1		40	2		
			40	1		50	1		47	1		45	1		43	1		
long claw men																		2
king fish			2	<1														

WATER QUALITY: Time: Location/Depth: Recorders: Equipment:

Air Temp. (°C): Water Temp. (°C): Dissolved Oxygen (mg/L): Salinity (ppt): pH: Cond. (µS/cm):

HERRING PROJECT DATA SHEET

Location: W-P Inlet Sea Girt
Field Crew:
Date: 10/14/15
Sample Number:
Weather:
Water Quality Taken (circle): Y N
Net Deployment Time:
Net Retrieval Time:
Time Net Collecting:
Tides (time/ft) – Low:
High (time/ft):
Precipitation in Last 24 hrs (circle): Y N
Total Number of Species:
Total Number of Individuals:
T&E Species Collected (circle): Y N
Data Recorder:
Signature (team lead):

SPECIES	Total w/sub	Total Count/sub ct.	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	NOTES
Atl silverside			5 5	<1		7 0	1		7 2	2		7 0	2		6 5	2		+25
			7 0	2		8 5	3		8 0	3		8 5	4		7 0	2		
			7 5	2		10 [illegible]	5		7 5	3		6 0	1		7 0	2		
			6 5	1		8 0	3		9 0	4		9 0	4		7 0	2		
			7 5	3		6 0	1		7 0	1		6 5	2		7 0	2		
Mummi chug			7	4		10	13		8.5	10		7	4		7	4		
			6.5	4		9.5	10		6.5	3		7	4		6	4		
			10.5	18		8	8		7.5	5		5.5	2		5.5	2		
			6	3		6.5	4		6.3	[illegible]		6.5	3		7	5		
			6.5	4		7	4		5.5	2		6.5	3		5.5	3		+67
grass shrimp			26															
sheepshead			3.5	1		4	2		3.5	1		3	1					
minnow																		
blue claw			3	2	male													
crab																		

WATER QUALITY: Time: Location/Depth: Recorders: Equipment:

Air Temp. (°C): Water Temp. (°C): Dissolved Oxygen (mg/L): Salinity (ppt): pH: Cond. (µS/cm):

NOTES – CIRCLE NAMES/INITIALS OF VOLUNTEERS/VETERANS; CIRCLE LENGTH(S) OF SPECIES WITH ABNORMALITIES AND DESCRIBE IN SPACE TO RIGHT; NOTE T&E SPECIES (ADDITIONAL NOTES ON BACK)

HERRING PROJECT DATA SHEET

Location: Spring Lake / Sea Girt
Field Crew:
Weather:
Sample Number:
Net Deployment Time:
Net Retrieval Time:
Tides (time/ft) – Low:
High (time/ft):
Total Number of Species:
Total Number of Individuals:
Data Recorder:
Signature (team lead):
Date: 10/31/15
Water Quality Taken (circle): Y N
Time Net Collecting:
Precipitation in Last 24 hrs (circle): Y N
T&E Species Collected (circle): Y N

SPECIES	Total wt/sub	Total Count/sub ct.	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	NOTES
menhaden			8.5/9	4		7/7.5	3		8/8.5	4		8/8.5	3		5.5/6	1		+5 more silverside
"			8.5/9	3		7.5/8	3		8/8.5	3		5.5/6	1		6.5/7	2		
"			6.5/9	4		5.5/6	1		8.5/9	3		10/10.5	5		7.5/8	3		Strong incoming
"			8/8.5	4		5.5/6	1		7.5/8	3		6.5/7	2		6.5/7	1		wind swell
"			6.5/7	2		3/3.5	1		8/8.5	3		7/7.5	2		6.5/7	2		☺ on beach
mummichog			7	6		5	2		5.5	2		5	1		7	4		to follow
"			6	2		5.5	2		6.5	5		6	4		7	4		wind
"			5.5	3		8.5	8		7.5	5		6	2		7	4		+150
"			7	6		5	2		7	4		7	4		7	5		mummichog
"			5.5	2		8.5	8		6	4		6	3		7.5	[illegible]		17 sand shrimp
winter flounder			8.5	6		10.5	12		8	5		8	5					1 crab
																		see pic
																		4cm 8g
																		female

WATER QUALITY: Time: Location/Depth: Recorders: Equipment:

Air Temp. (°C): Water Temp. (°C): 17.2 Dissolved Oxygen (mg/L): 8.21 Salinity (ppt): 31.59 pH: 8.07 Cond. (µS/cm): 48356

NOTES – CIRCLE NAMES/INITIALS OF VOLUNTEERS/VETERANS; CIRCLE LENGTH(S) OF SPECIES WITH ABNORMALITIES AND DESCRIBE IN SPACE TO RIGHT; NOTE T&E SPECIES (ADDITIONAL NOTES ON BACK)

10 [illegible]
11 silverside [illegible] on SL → no measurements

HERRING PROJECT DATA SHEET

Location: Spring Lake **Field Crew:** ZA, JK, KC **Date:** 11/4/15
Sample Number: WP-110415-001 **Weather:** Sunny 70's **Water Quality Taken (circle):** Y N
Net Deployment Time: 1330 **Net Retrieval Time:** RHS **Time Net Collecting:** —
Tides (time/ft) – Low: ___ **High (time/ft):** ___ **Precipitation in Last 24 hrs (circle):** Y N
Total Number of Species: ___ **Total Number of Individuals:** ___ **T&E Species Collected (circle):** Y N
Data Recorder: ___ **Signature (team lead):** ___

SPECIES	Total wt/sub	Total Count/sub ct	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	NOTES
Shad sp.			21/24	140	L	20/23	153	L	24.5/23.5	132	L	17.5/20	96	L	20/23	124	L	
			20/23	130	L	21/24	132	L	19/21.5	116	L	20/22.5	128	L	20/23	120	L	
			19/21.5	112	L	19/21.5	111	L	20/23	120	L	19.5/21.5	130	L				
Striped killifish			12	17	L	9.5	8	L	11.5	15	L	9.5	8	L	11.5	17	L	
			10.5	11	L	12	17	L	10.5	11	L	11	14	L	12	23	L	
			11	17	L	11	20	L	12	16	L	11.5	19	L	10	11	L	
			11.5	20	L	11	16	L	10	10	L	11.5	17	L				
Atlantic silverside			8.5/9	2	L	8.5/9	2	L	8/8.5	2	L	8.5/9	2	L	6/6.5	1	L	
			6/6.5	1	L	6.5/7	1	L	4.5/5	1	L	5.5/6	1	L	6.5/7	2	L	
Sheepshead minnow			4.5	2	L	4.5	1	L	4.5	1	L	4.5	1	L	5	2	L	
			4.5	1	L	4.5	1	L	4.5	1	L	4.5	1	L	4.5	2	L	
			4.5	1	L	5	4	L	4.5	4	L	4.5	2	L	5.5	4	L	
			4.6	2	L	4.5	1	L	4	2	L	4	1	L	4.5	1	L	
Mummichog			9	8	L	7	4	L	6	3	L	9	10	L	8	6	L	
			8	7	L	6	6	L	9	8	L	6.5	3	L	7	6	L	

WATER QUALITY: Time: ___ **Location/Depth:** ___ **Recorders:** ___ **Equipment:** ___
Air Temp. (°C): ___ **Water Temp. (°C):** ___ **Dissolved Oxygen (mg/L):** ___ **Salinity (ppt):** ___ **pH:** ___ **Cond. (µS/cm):** ___

NOTES – CIRCLE NAMES/INITIALS OF VOLUNTEERS/VETERANS; CIRCLE LENGTH(S) OF SPECIES WITH ABNORMALITIES AND DESCRIBE IN SPACE TO RIGHT; NOTE T&E SPECIES (ADDITIONAL NOTES ON BACK)

HERRING PROJECT DATA SHEET

Location: Spring Lake
Field Crew: 2R, JK, KC
Date: 11/4/15
Sample Number: WP-110415-001
Weather:
Water Quality Taken (circle): Y N
Net Deployment Time: 1330
Net Retrieval Time:
Time Net Collecting:
Tides (time/ft) – Low:
High (time/ft):
Precipitation in Last 24 hrs (circle): Y N
Total Number of Species:
Total Number of Individuals:
T&E Species Collected (circle): Y N
Data Recorder:
Signature (team lead):

SPECIES	Total wt/sub	Total Count/sub ct	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	NOTES
mummichog			8	6	L	6.5	2	L	7	4	L	7	4	L	6	2	L	
			5.5	1	L	9.5	9	L	6.5	2	L	6	2	L	6.5	2	L	600 more

~~75% killifish 25%~~

50% mummi
30% striped killi
15% ~~20%~~ sheephead
5% silverside

WATER QUALITY: Time: 1458 Location/Depth: Sea fit / 50 cm Recorders: JK Equipment: YSI Pro Plus
Air Temp. (°C): 18.2 Water Temp. (°C): 15.9 Dissolved Oxygen (mg/L): 7.73 / 94.7% Salinity (ppt): 31.89 pH: 7.79 Cond. (µS/cm): 48786

NOTES – CIRCLE NAMES/INITIALS OF VOLUNTEERS/VETERANS; CIRCLE LENGTH(S) OF SPECIES WITH ABNORMALITIES AND DESCRIBE IN SPACE TO RIGHT; NOTE T&E SPECIES (ADDITIONAL NOTES ON BACK)

HERRING PROJECT DATA SHEET

Location: Sea Girt
Field Crew: KC, JK, ZR
Date: 11/4/15
Sample Number:
Weather:
Water Quality Taken (circle): Y N
Net Deployment Time:
Net Retrieval Time:
Time Net Collecting:
Tides (time/ft) – Low:
High (time/ft):
Precipitation in Last 24 hrs (circle): Y N
Total Number of Species:
Total Number of Individuals:
T&E Species Collected (circle): Y N
Data Recorder: Katie
Signature (team lead): [signature]

SPECIES	Total w/sub	Total Count/sub ct.	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	Length (cm) FL/TL	Weight (g)	Live (L) Fresh Dead (FD) Dead (D)	NOTES
winter flounder			10.5	12	L													
silverside			7 / 7.5	2	L	11.5 / 9	3	L	5 / 8.5	13	L	8 / 8.5	3	L	8.5 / 9	3	L	
			9.5 / 10	4	L	10.5 / 11	5	L	8 / 8.5	2	L	8 / 8.5	3	L	8.5 / 9	4	L	
			9.5 / 10	4	L	11 / 11.5	9	L	11.5 / 12	8	L	11 / 12	6	L	11 / 11.5	7	L	
			8.5 / 9	4	L	11 / 12	8	L	6.5 / 7	8	L	8 / 9.5	3	L	9.5 / 10	5	L	
mummi			6.5	2	L	7.5	4	L	~~[illegible]~~	~~4~~	~~L~~	~~11 / 11.5~~	~~2~~	~~L~~				
shrimp	50																	

WATER QUALITY: Time: ______ Location/Depth: ______ Recorders: ______ Equipment: ______

Air Temp. (°C): ______ Water Temp. (°C): ______ Dissolved Oxygen (mg/L): ______ Salinity (ppt): ______ pH: ______ Cond. (µS/cm): ______

NOTES – CIRCLE NAMES/INITIALS OF VOLUNTEERS/VETERANS; CIRCLE LENGTH(S) OF SPECIES WITH ABNORMALITIES AND DESCRIBE IN SPACE TO RIGHT; NOTE T&E SPECIES (ADDITIONAL NOTES ON BACK)