CELERON ISLAND HABITAT RESTORATION PROJECT PRE- CONSTRUCTION FISH MONITORING SUMMARY – Revision 1.0

The purpose of this summary is to present the fisheries collection data for pre-construction monitoring of the Celeron Island Restoration project. This document will outline the methods used to complete the monitoring and provide a summary of the data collected to date.

Methods

Sampling sites were located in areas around the Celeron Island shoreline and between the habitat shoals and the island (Figure 1) to determine the species present and their utilization of habitats within the project area prior to project construction. Three sampling methods were used: ichthyoplankton net tows (i.e., larval fish and eggs), fyke net sets, and boat electrofishing. Multiple sampling methods were chosen to capture all fish life stages present within the project area.

Ichthyoplankton

Ichthyoplankton sampling was conducted once a month from April to July 2018 at three sampling transects (Figure 1). Samples were collected using a net deployed approximately 10 m behind the boat. The conical net was equipped with a 0.5 m diameter mouth and 3.0 m body consisting of 500 µm mesh terminating in a 9 cm diameter by 30.4 cm long 500 µm mesh filtering cod end bucket. The volume of water sampled was approximated by calculating the area of the net opening multiplied by the length of the transect. All sampling transect speeds were conducted at approximately 2 m/s (5 mph).

Figure 1. Site Map of Celeron Island Fish Sampling Locations.

At the end of each sampling transect, samples were carefully rinsed from the cod end bucket into a pre-labeled Nalgene container using 95% ethanol. Samples were then preserved in 95% ethanol. Container labels (both exterior and interior) contained the following information: date, sampling times (start and end) for each tow, location, collectors, project site, and sample number. Sample containers were shipped to a taxonomy laboratory for processing and identification to the lowest possible taxonomic level and life stage. Terminology for the life stages included eggs, yolk-sac larvae, post yolk-sac larvae, and juveniles. The criteria for the three latter developmental phases are as follows:

- Yolk-sac larvae – Phase of development from the time of hatch to complete absorption of yolk
- Post yolk-sac larvae – Phase of development from complete absorption of yolk to development of full complement of adult fin rays and absorption of finfold.
- Juvenile – Phase of development from complete fin ray development and finfold absorption to sexual maturity (includes young-of-year fish).

Boat Electrofishing

Boat electrofishing on August 29, 2017 and July 25, 2018 for pre-construction consisted of using a boom-shocker mounted to a 22-ft aluminum welded boat powered by a 75-hp two-stroke outboard motor. The boom shocking equipment was powered by a Smith-Root GPP5.0 electrofisher supplying DC voltage to two boom-mounted electrode arrays manufactured by Oquawka Boats and Fabrication, Inc. The GPP5.0 was set for high-range voltage, between 40% and 50% power and 60 pulses per second, with a pulse width set between 6-8 amps. Boat electrofishing was conducted at near-shore and offshore locations to sample a variety of habitats and depths to gain a comprehensive coverage of the fish habitats and species present. At the end of each sampling transect, fish were identified to the species level and measured to the inch class. Fish were then released live back into the water.

Fyke Nets

Four fyke nets were deployed on August 30, 2017 and July 27, 2018 for pre-construction monitoring near the shoreline with adequate water depths and suitable substrates. Four mini fyke nets with a mouth opening 0.75 m high × 1.25 m wide constructed with 4 mm delta mesh, with a 1 m by 7.5 m single lead were set so the lead was perpendicular to the shore and the mouth sitting in approximately 1 m of water. Fyke nets were set in the same places for both monitoring events based on GPS

coordinates. The nets were set for one crepuscular (overnight) cycle. After the recovery of each net, fish were identified to the species level and measured to the nearest inch class. Fish were then released back into the water.

Data Analysis

Three project performance measures will be assessed (increase or decrease) based on the abundance and densities of young-of-year (YOY) and juvenile fish present within the project area during the pre and post construction monitoring. These metrics will be used as a baseline in NOAA reporting Section B. However, this report will not include a discussion of these measures, since post-construction monitoring has not been completed. However, these project performance measures are:

- # Larvae/m^3 of water volume
- # YOY and Juveniles per net night
- # YOY and Juveniles per minute of effort

Fish assemblage data for the pre-construction monitoring were assessed for species composition (richness), abundance, and size structure. Size structure for target species was assessed by plotting size-frequency distributions. Catch per unit effort (CPUE; an indirect measure of abundance) was calculated as:

$$\text{CPUE} = \frac{n}{t}$$

Where n = the number of individuals sampled, and t = the length of the sampling time in minutes.

To show project-wide utilization of the fish assemblage present within the Celeron Island restoration area, sampling units were combined for each of the three sampling gear types. For example, the inside and outside electrofishing transects were combined into one dataset, the four fyke nets were combined into one dataset, and the four larval fish tows were combined into one dataset. For size class distributions, all electrofishing and fyke net data were combined.

Fish species were also grouped based on their ecological or social importance into three categories: game, rough, and forage. Game fish are typically of recreational and commercial importance and are species commonly targeted by anglers. Examples would include Largemouth Bass *Micropterus salmoides* and Walleye *Sander vitreus*. Rough fish are typically species not commonly targeted by anglers or commonly eaten, within a regional context. Examples would include catfish, suckers, and redhorse

species. Forage fish are species that are commonly eaten as a prey source for aquatic and/or terrestrial animal species. Examples would include minnows and shiners.

Results - Pre-Construction

Ichthyoplankton

Ichthyoplankton were present during each month of sampling at Celeron Island. Eggs were only present in April and May, with April containing only Gizzard Shad *Dorosoma cepedianum* eggs (Figure 2). May samples had the highest density of ichthyoplankton, with 1.6 fish/m^3, the majority of which were White Perch *Morone americana* yolk-sac larvae (Table 1). May also contained the highest species richness (five individual species). During the June and July sampling events, only post yolk-sac larvae were present in the samples.

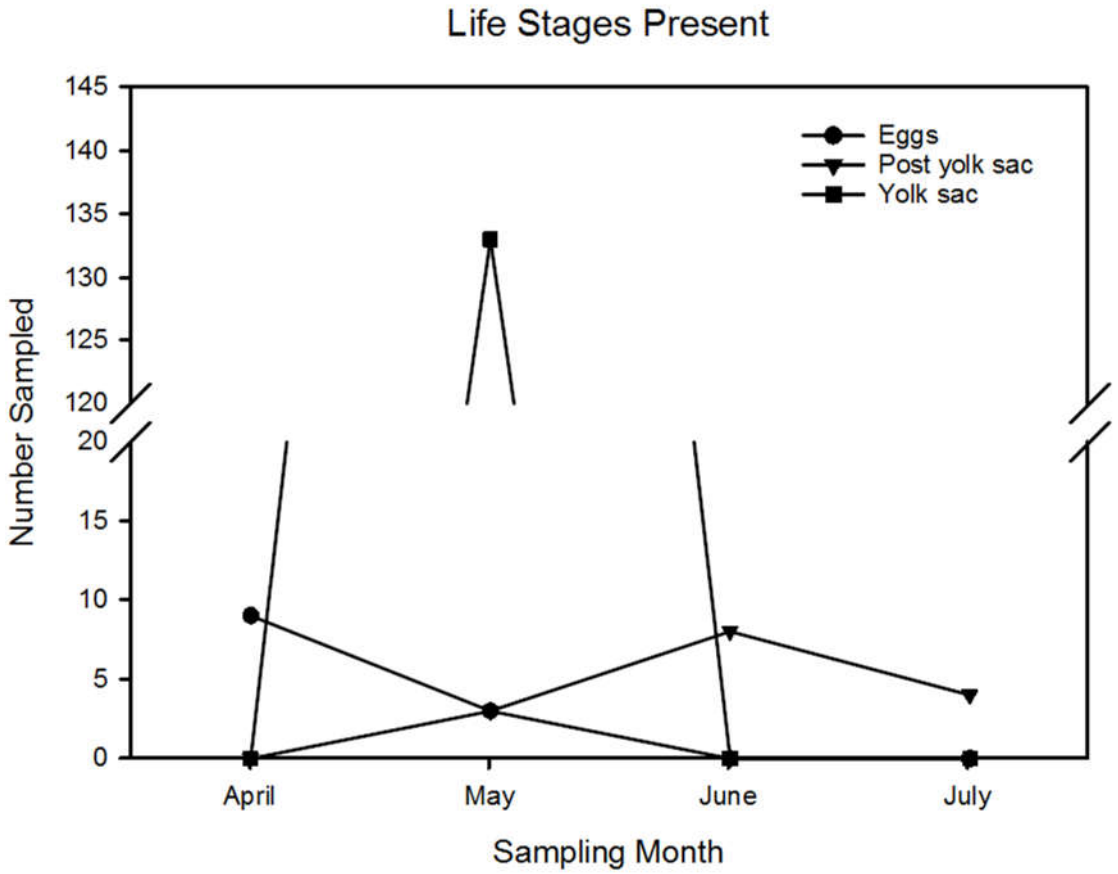

Figure 2. Ichthyoplankton Sampled During the Pre-Construction Monitoring.

Table 1. Catch Data from the Larval Fish Sampling Conducted from April-July 2018.

			April		May		June		July		Combined	
Common Name	Scientific Name	Life Stage	Number	Density (#/m³)	Number	Density (#/m³)	Number	Density (#/m³)	Number	Density (#/m³)	Number	Density (#/m³)
Bluegill	*Lepomis macrochirus*	PYSL					7	0.079	1	0.011	8	0.023
Brook Silverside	*Labidesthes sicculus*	PYSL					1	0.011	1	0.011	2	0.006
Brook Silverside		YSL			1	0.011					1	0.003
Emerald Shiner	*Notropis atherinoides*	PYSL							2	0.023	2	0.006
Gizzard Shad		PYSL			1	0.011					1	0.003
Gizzard Shad	*Dorosoma cepedianum*	YSL			3	0.034					3	0.008
Gizzard Shad		EGG	9	0.102							9	0.025
White Bass	*Morone chrysops*	YSL			1	0.011					1	0.003
White Perch	*Morone americana*	EGG			3	0.034					3	0.008
White Perch		YSL			128	1.450					128	0.363
Yellow Perch	*Perca flavescens*	PYSL			2	0.023					2	0.006
Total			9	0.102	139	1.575	8	0.091	4	0.045	160	0.453

PYSL = Post yolk-sac larvae
YSL = Yolk-sac larvae

Fyke Nets

Nineteen species and 156 individuals were captured in fyke nets recovered on August 30, 2017 and July 27, 2018 (Table 2). Nearly half of the species captured were in the Centrarchidae (sunfish) family. While 2018 contained more individuals, species richness was higher in 2017. In 2018, increased numbers of Largemouth Bass *Micropeteus salmoides*, White Perch *Morone americana*, and Yellow Perch were captured in fyke nets compared to 2017. Spottail Shiner *Notropis hudsonius* were only sampled in 2018, while Brown Bullhead *Ameiurus melas*, Green Sunfish *Lepomis cyanellus*, Pumpkinseed *Lepomis gibbosus*, and Silver Redhorse *Moxostoma anisurum* were only sampled in 2017.

Table 2. Fish Assemblage Data from Electrofishing Surveys, Conducted at Celeron Island in 2017 and 2018.

Common name	Scientific name	8/30/2017	7/27/2018
Black Bullhead	*Ameiurus melas*		1
Bluegill	*Lepomis macrochirus*	14	12
Bluntnose Minnow	*Pimephales notatus*	1	2
Bowfin	*Amia calva*	2	1
Brown Bullhead	*Ameiurus nebulosus*	1	
Green Sunfish	*Lepomis cyanellus*	1	
Gizzard Shad	*Dorosoma cepedianum*		5
Largemouth Bass	*Micropterus salmoides*	2	12
Logperch	*Perca caprodes*	2	5
Pumpkinseed	*Lepomis gibbosus*	1	
Rock Bass	*Ambloplites rupestris*	15	10
Round Goby	*Neogobius melanostomus*	5	3
Silver Redhorse	*Moxostoma anisurum*	1	
Smallmouth Bass	*Micropterus dolomieu*	2	7
Spottail Shiner	*Notropis hudsonius*		17
Spotted Sucker	*Minytrema melanops*	2	
Tubenose Goby	*Proterorhinus semilunaris*		1
Unidentified minnow		1	
White Perch	*Morone americana*	1	13
Yellow Perch	*Perca flavescens*	2	14
	Total	**53**	**103**

Electrofishing

Electrofishing surveys yielded a total of 21 species and 281 individuals in 2017 and 15 species comprised of 77 individuals in 2018. The dominant species captured in 2017 were Logperch, Yellow Perch, and Bluntnose Minnow (Table 3). The dominant species captured in 2018 were Yellow Perch, Logperch, and White Perch. Catch per unit effort was similar for Yellow Perch between the two years.

Table 3. Fish Assemblage Data from Electrofishing Surveys, Conducted at Celeron Island in 2017 and 2018.

		8/29/2017			7/25/2018		
Common name	**Scientific name**	**Number**	**%**	**CPUE (fish/minute)**	**Number**	**%**	**CPUE (fish/minute)**
Black Crappie	*Pomoxis negromaculatus*	1	0.4	0.04			
Blacknose Shiner	*Notropis heterolepis*	1	0.4	0.04			
Bluegill	*Lepomis macrochirus*	2	0.7	0.08			
Bluntnose Minnow	*Pimephales notatus*	30	10.7	1.27			
Bowfin	*Amia calva*	1	0.4	0.04			
Brook Silverside	*Labidesthes sicculus*				1	1.3	0.05
Brown Bullhead	*Ameiurus nebulosus*	1	0.4	0.04	1	1.3	0.05
Common Carp	*Cyprinus carpio*	1	0.4	0.04	3	3.9	0.14
Freshwater Drum	*Aplodinotus grunniens*	4	1.4	0.17	3	3.9	0.14
Gizzard Shad	*Dorosoma cepedianum*				1	1.3	0.05
Golden Redhorse	*Moxostoma erythrurum*	3	1.1	0.13	3	3.9	0.14
Golden Shiner	*Notemigonus crysoleucas*	1	0.4	0.04			
Goldfish	*Carassius auratus*	6	2.1	0.25			
Greater Redhorse	*Moxostoma valenciennesi*				3	3.9	0.14
Largemouth Bass	*Micropterus salmoides*	7	2.5	0.30	2	2.6	0.09
Logperch	*Perca caprodes*	133	47.3	5.61	11	14.3	0.51
Rock Bass	*Ambloplites rupestris*	2	0.7	0.08	1	1.3	0.05
Round Goby	*Neogobius melanostomus*	19	6.8	0.80	2	2.6	0.09
Smallmouth Bass	*Micropterus dolomieu*	5	1.8	0.21	3	3.9	0.14
Spottail Shiner	*Notropis hudsonius*	12	4.3	0.51			
Tubenose Goby	*Proterorhinus semilunaris*	7	2.5	0.30			
Unidentified minnow		1	0.4	0.04			
White Bass	*Morone chrysops*				1	1.3	0.05
White Perch	*Morone americana*	6	2.1	0.25	9	11.7	0.42
Yellow Perch	*Perca flavescens*	38	13.5	1.60	33	42.9	1.54
	Total	**281**			**77**		
	Effort (minutes):	**24**			**21**		

Size Trends and Performance Metrics

The baseline performance metrics that will be used to compare to post-construction monitoring are included in Table 4. Small size classes were abundant for fish captured around Celeron Island during the electrofishing and fyke net surveys (Figure 3). While larger adults were captured for many species, the majority of sport fish captured during the two surveys, with the exception of Rock Bass, were in the zero to three-inch size classes, which typically correspond to age 0 and 1 fishes. This is evident with Largemouth Bass and Yellow Perch. (Figure 3). Because of the trend of fishes captured that were young-of-year or juveniles, the data indicate that littoral habitats around Celeron Island are being utilized by numerous species for spawning and nursery habitat.

Table 4. Performance Metrics to be Used in NOAA Reporting Section B.

Performance Metric	Value
# Larvae/m^3	0.453
# YOY and Juveniles per net night	1.5[1]
# YOY and Juveniles per minute of effort	44

[1] The previous report listed the incorrect performance metric value. This table reflects the updated and correct value for # YOY and Juveniles per net night.

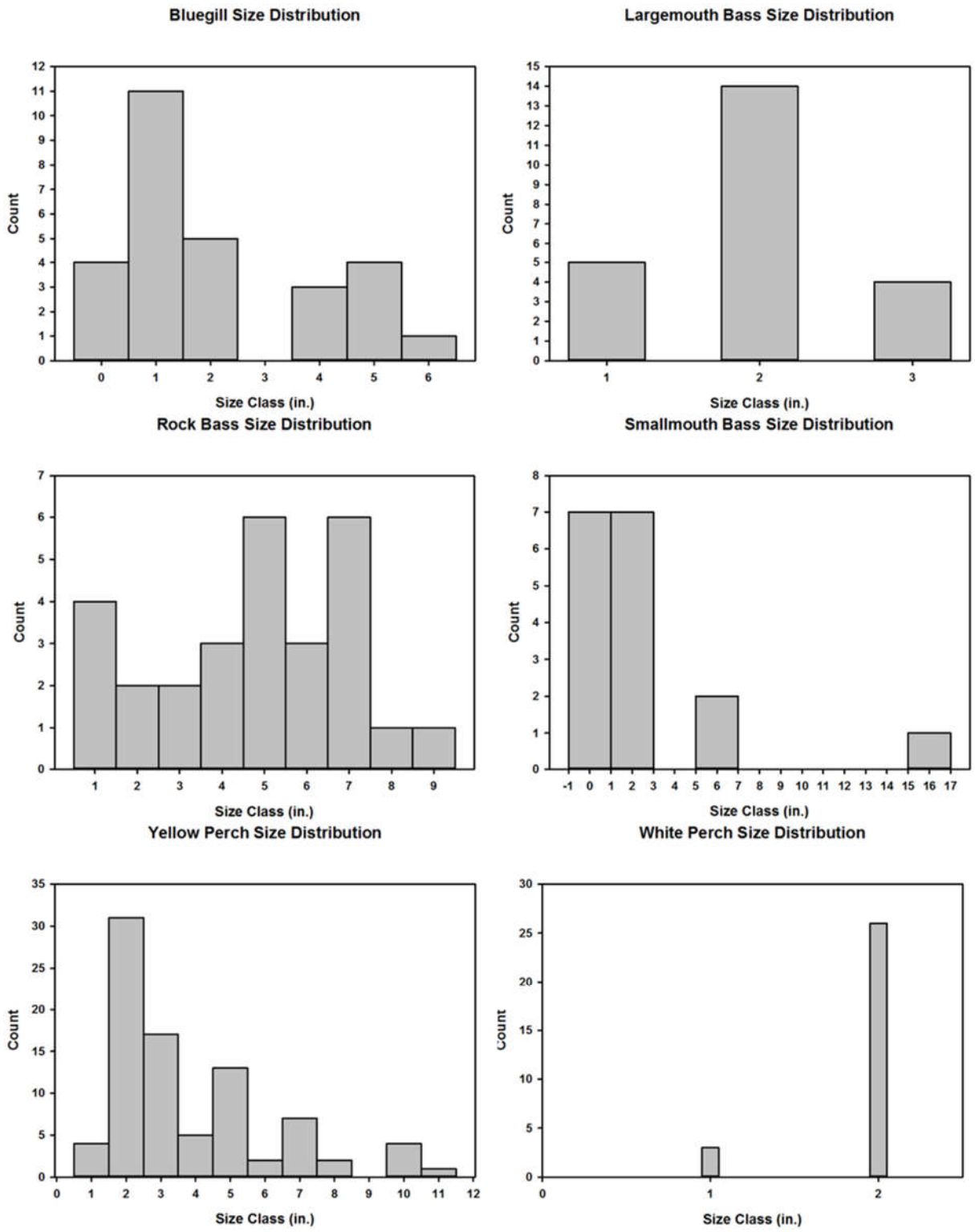

Figure 3. Size Class Distributions for Fish Captured During Electrofishing and Fyke Net Sampling Around Celeron Island During the Pre-Construction Collections.