Evaluation of the Entrainment Reduction Performance of 0.8-mm and 3.0-mm Cylindrical Wedgewire Screens at Schiller Station


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ACRONYMS AND ABBREVIATIONS

ADCP	Acoustic Doppler Current Profiler
AIF	Actual Intake Flow
AOQL	average outgoing quality limit
BTA	Best Technology Available
°C	Celsius
cm	Centimeter
Control	Existing Cooling Water Intake Structure for Schiller Station Units 5 and 6
CWIS	Cooling Water Intake Structure
CWWS	Cylindrical Wedgewire Screen
day	24-hour sampling event
DIF	Design intake flow
DO	Dissolved oxygen
DST	Daylight Savings Time
ENERCON	Enercon Services, Inc.
EST	Eastern Standard Time
ft/s	feet per second
ft	feet
GBD	Greatest body depth
GBW	Greatest body width
GPM	gallons per minute
GSP	GSP Schiller, LLC
Hz	Hertz
L	Liter
m^3	cubic meters
MIL-STD	Military Inspection Standard
mg	Milligram
MGD	million gallons per day
mm	Millimeters
µS	Microsiemens
MSL	Mean Sea Level
MW	Megawatts
Normandeau	Normandeau Associates, Inc.
NPDES	National Pollutant Discharge Elimination System
Performance Evaluation Period	Synchronized triplicate samples collected during Weeks of Monday, 11 March 2019 through Monday 23 September 2019
psi	Pound-force per square inch
PSU	Practical Salinity Unit
PYSL	Post Yolk-Sac Larvae
QA	Quality Assurance
QC	Quality Control
SOP	Standard Operating Procedures
TL	Total length
UNID	Unidentified larval stage
USEPA	United States Environmental Protection Agency Region 1
Yearlong Period	Weeks of Monday, 11 February 2019 through Monday 3 February 2020
VFD	Variable Frequency Drive
YOY	Young-of-the-Year
YROL	Yearling or older
YSL	Yolk-Sac Larvae

EXECUTIVE SUMMARY

GSP Schiller, LLC ("GSP") owns and operates Schiller Station in Portsmouth, New Hampshire. The two cooling water intake structures ("CWISs") at Schiller Station have a combined total design intake flow ("DIF") of 125.8 million gallons per day ("MGD") and use at least 25 percent of the water withdrawn exclusively for cooling purposes. As set forth by Schiller Station's renewed National Pollutant Discharge Elimination System Permit No. NH0001473, effective 1 July 2018 ("the NPDES Permit"), GSP shall modify their CWISs to "reflect the best technology available ("BTA") for minimizing adverse environmental impacts from the impingement and entrainment of various life stages of fish." Pursuant to Schiller Station's renewed NPDES Permit, the United States Environmental Protection Agency Region 1 ("USEPA") determined that the BTA for reducing entrainment mortality at the facility is the installation of fine mesh wedgewire screens with a slot or mesh size of no greater than 0.8-mm, "unless the permittee can demonstrate through a site-specific study that a larger slot size is equally or more effective for reducing entrainment mortality as a 0.8-mm slot or mesh size," as specified in Part I.A.11.a.1 of the NPDES Permit.

A study conducted in 2019 evaluated the entrainment reduction performance of a 0.8-mm cylindrical wedgewire screen ("CWWS") concurrently with a 3.0-mm CWWS, using Schiller Station Units 5 and 6 as representative of the facility. The primary objective of this study was to evaluate the performance of a wedgewire screen with a slot width (3.0-mm) larger than the 0.8-mm slot width at reducing the entrainment of ichthyoplankton at Schiller Station. This was completed by comparing the total entrainment abundance estimates over a common, synchronized sampling period at each test screen intake to the same data from the Control, at both actual and design intake flows. With the information obtained from the wedgewire screen study, the performance of the 0.8-mm and 3.0-mm CWWSs was evaluated as the entrainment reduction from baseline entrainment at Screen House #2 when withdrawing cooling water through ⅜-inch (9.5-mm) square mesh traveling screens (the Control).

Weekly entrainment abundance of fish was estimated from weekly mean densities of 100 m^3 samples collected simultaneously from the 0.8-mm and 3.0-mm CWWS intakes and from the existing CWIS for Schiller Station Units 5 and 6 ("Control") during each 6-hour diel period for a single 24-hour period or two consecutive 24-hour periods either weekly, biweekly, or monthly. Due to delays in securing and testing all equipment, the discovery of a misalignment of the 3.0-mm CWWS at the start of the study, instances of equipment malfunctions and heavy screen damage and biofouling at the end of the study, 640 of the 696 (92%) of the planned entrainment samples were collected and analyzed. The duration of the performance evaluation period was also shortened to weeks 10 through 38 (Monday, 11 March 2019 through Monday, 23 September 2019). Thus, a total of 522 valid samples were used for entrainment reduction results (82% of the 640 samples processed). This subset represented 95% of the entrained specimens collected at the existing CWIS over 232 diel periods across 41 weeks of the yearlong period from 11 February 2019 through 3 February 2020, and therefore the evaluation period was considered representative of annual entrainment.

Of the 37 species and 13 higher-level taxonomic categories of ichthyoplankton identified and enumerated from the performance evaluation period (weeks 10 through 38), an estimated 29,639 individuals of fish of all life stages were captured from the 0.8-mm CWWS, 44,735 from the 3.0-mm CWWS, and 57,296 from the Control. Cunner/Tautog/Yellowtail Flounder eggs (of which >92% were likely Cunner) were the most dominant taxa and life stage collected from each location, representing 84.2%, 83.3%, and 90.3% of all individuals of all life stages collected from the 0.8-mm CWWS, 3.0-mm CWWS, and the Control, respectively.

About 68% of the fish eggs entrained by the 0.8-mm CWWS had a maximum diameter (i.e., the larger diameter for non-spherical eggs) larger than the 0.8-mm slot opening, whereas 100% of the eggs entrained by the 3.0-mm CWWS were measured to have a maximum diameter dimension smaller than 3.0 mm. More than two-thirds of the most abundant taxon and life stage entrained at Schiller Station, Cunner (or Cunner/Tautog/Yellowtail Flounder), were extruded through the 0.8-mm CWWS, which contributed to the relative ineffectiveness of the 0.8-mm CWWS at reducing entrainment compared to the existing CWIS. Additionally, 26% of the fish larvae and juveniles entrained by the 0.8-mm CWWS had a greatest body depth ("GBD") larger than the 0.8-mm slot opening. Under the assumption that larvae and juveniles are oriented with sweeping flow and perpendicular to the CWWS slots, then the 26% extrusion estimated based on greatest body depth is an important factor in lower-than-expected performance of the 0.8-mm CWWS in reducing entrainment of fish larvae and juveniles at Schiller Station. At the 3.0-mm CWWS, less than 1% based on either GBD or greatest body width ("GBW") of fish larvae and juveniles entrained were larger than the nominal slot opening. Extrusion represents a meaningful phenomenon explaining the lower-than-expected effectiveness of the 0.8-mm CWWS at reducing entrainment at Schiller Station, which is lowest during flood and highest during low slack tidal stages.

Prior to this study, the estimated entrainment reduction for all ichthyoplankton was 72.9% for a 0.8-mm CWWS (ENERCON 2008). This estimated percent reduction was acknowledged by the USEPA through Fact Sheet AR-259. The cumulative entrainment abundance estimates of the 0.8-mm and 3.0-mm CWWSs, which were predominantly Cunner eggs, were about 49% and 23% lower, respectively, than the cumulative entrainment abundance at the Control under DIF (i.e., sum of the weekly product of mean entrainment density and design intake volume). Based on the cumulative entrainment abundance estimates using 2019 actual intake flow ("AIF"), entrainment reduction performance changed by less than 1% for both CWWSs compared to entrainment reduction performance under DIF.

While the use of AIF or DIF did not affect the estimated performance of the CWWSs at reducing egg entrainment, AIF resulted in lower estimates for entrainment reductions of fish larvae and juveniles for both CWWSs. The 34% entrainment reduction of larvae and juveniles by 0.8-mm CWWS at DIF was reduced to 25% when AIF was used. While there was no estimated entrainment reduction (0%) of fish larvae and juveniles at the 3.0-mm CWWS based on DIF, the 3.0-mm CWWS entrained about 13% more fish larvae and juveniles than the Control at AIF, which was largely attributed to cooling water withdrawal from a two-week period when the CWWSs had higher larval entrainment density than the Control.

At the 0.8-mm and 3.0-mm CWWSs, entrainment density of fish larvae and juveniles was considerably higher than the Control during the flood tidal stage (i.e., negative entrainment reduction), but was lower than the control during samples with low slack (i.e., statistically significant entrainment reduction). During flood tidal conditions, entrainment reduction performance of fish larvae and juveniles at both CWWSs decreased as sweeping velocity increased. High (3-6 ft/s) sweeping velocities may increase entrainment abundance and the rate of extrusion (passage of fish eggs or larvae with a larger limiting dimension than a given CWWS slot width through the smaller slot opening) through the 0.8-mm slot size at Schiller Station, bringing into question the effectiveness of CWWSs in this environment.

The lower-than-expected entrainment reduction observed for the 0.8-mm and 3.0-mm CWWSs tested in this site-specific study highlight several factors that could also reduce the expected entrainment reduction performance if full-scale wedgewire screens were installed and operated at Schiller Station.

- Extrusion through slot openings of wedgewire screens during the study resulted in lower entrainment reduction performance than expected based on physical exclusion, as indicated by the fact that 68% of fish eggs and 26% of fish larvae and juveniles entrained by the 0.8-mm CWWS that were larger than the nominal slot width.

- Given the complex shoreline, bathymetry, and riverbed topography adjacent to Schiller Station, the design of any full-scale installation must account for the location and the non-uniform performance across a large footprint of wedgewire screens because tidal dynamics and extreme sweeping velocities (up to near 6 ft/s) could increase entrainment abundance compared to the Control.
- The asymmetrical tidal channel flow during flood (closer to shore) and ebb (away from shore) presents another variable that must be carefully considered in the design of any full scale CWWS installation. These variable directional tidal flows may explain the observed increase in larval entrainment by the CWWSs during flood tide and entrainment reduction during low slack tidal conditions. These observations may be due to tidal effects on extrusion, the CWWSs being exposed to higher larval density under flood currents and lower larval density under ebb or slack currents, and/or differing avoidance behaviors or locations of larvae in the water column under certain tidal currents.
- Performance was far less than expected/predicted, with only 49% and 23% reduction in total fish entrainment at the 0.8-mm and 3.0-mm CWWSs, respectively.
- Biofouling and screen damage may have been a factor in these findings.

When performance was based on weekly AIF during 2019 rather than DIF, the overall and egg entrainment reduction benefit for both CWWSs changed less than 1%; however, larval entrainment reduction benefit was less at AIF. For the 3.0-mm CWWS, entrainment abundance of larvae and juveniles was higher compared to the Control during the performance evaluation period. Extrusion and strong tidal dynamics near Schiller Station, in conjunction with the short duration of low slack tidal conditions, would appear to create difficult conditions for a full-scale wedgewire screen intake system to achieve consistent and desired entrainment reduction performance. The sizable difference between Schiller Station’s AIF compared to DIF (43.6 MGD versus 125.8 MGD) over this evaluation period, and the fact that the timing of the facility’s actual and anticipated operations have coincided and likely will coincide in the future with periods of historically low entrainment, means the Control or an alternate compliance method may provide an equivalent or better option than wedgewire screens for reducing entrainment at Schiller Station.

1 INTRODUCTION

1.1 Background

GSP Schiller, LLC ("GSP") owns and operates Schiller Station in Portsmouth, New Hampshire (Figure 1). Schiller Station generates electric power through three generating units (Unit 4, Unit 5, and Unit 6) which have been in operation since 1952, 1955, and 1957, respectively. Schiller Station's discharge of non-contact cooling water to the Piscataqua River is currently authorized under their renewed National Pollutant Discharge Elimination System Permit No. NH0001473 ("the NPDES Permit") issued by the United States Environmental Protection Agency Region 1 ("USEPA") on 6 April 2018 and with an effective date of 1 July 2018.

As set forth by the NPDES Permit under Part I.A.11, GSP's Schiller Station shall modify their cooling water intake structures ("CWISs") to "reflect the best technology available ("BTA") for minimizing adverse environmental impacts from the impingement and entrainment of various life stages of fish." The USEPA determined that installation and operation of a fine mesh wedgewire screen intake system for the CWISs of Units 4, 5, and 6 is BTA for reducing entrainment and impingement impacts. As specified in Part I.A.11.a.1 of the NPDES Permit, a wedgewire screen with a slot or mesh size of no greater than 0.8-mm is required, "unless the permittee can demonstrate through a site-specific study that a larger slot size is equally or more effective for reducing entrainment mortality as a 0.8-mm slot or mesh size." A site-specific study was performed to evaluate and compare the performance of a 0.8-mm cylindrical wedgewire screen ("CWWS") and a 3.0-mm CWWS at reducing entrainment abundance relative to the existing CWIS #2 (Control) at Schiller Station.

1.2 Objectives

The site-specific wedgewire screen study was designed with the objective to evaluate the 0.8-mm slot screen concurrently with a screen of a larger slot size (i.e., 3.0-mm) while maintaining the through-screen velocity of the screens equal to or less than 0.5 feet per second ("ft/s") to minimize impingement mortality as specified in Part I.A.11.a.2 of the NPDES Permit. The primary objective of the study was to measure the entrainment reduction performance of a 0.8-mm CWWS compared with a 3.0-mm CWWS over a period representative of annual entrainment sampling at Schiller Station. The performance of the 0.8-mm and 3.0-mm CWWSs was evaluated as the entrainment abundance reduction from the baseline entrainment abundance at Screen House #2 when Unit 5 and/or 6 was withdrawing cooling water through ⅜-inch square mesh traveling screens ("Control"). This report describes the methods and results for the wedgewire screen study completed during 2019, as specified in the Study Plan and Standard Operating Procedures for the Wedgewire Screen Study at Schiller Station ("SOP"; Normandeau 2019).

Figure 1. Geographic location of Schiller Station on the Piscataqua River in Portsmouth, New Hampshire.

2 SITE DESCRIPTION

2.1 Cooling Water Intake Structure

The CWISs at Schiller Station withdraw tidally influenced water from the Piscataqua River estuary for non-contact cooling water purposes during electrical power generation, which reaches a rated combined capacity of 150 megawatts ("MW"; 50 MW each) among its three active generating units. Schiller Station withdraws once-through cooling water from two separate CWISs located in separate bulkheads on the shoreline of the Piscataqua River (Figure 2). Unit 4 draws water from an intake tunnel approximately 32 feet ("ft") offshore from the northern bulkhead (Screen House #1). The Unit 5 and Unit 6 CWIS withdraws water at the shoreline and is located within the southern bulkhead (Screen House #2). The two CWISs at Schiller Station have a combined total design intake flow ("DIF") of 125.8 million gallons per day ("MGD") and use at least 25 percent of the water withdrawn exclusively for cooling purposes.

Screen House #1 uses a 6.5-foot diameter tunnel to withdraw water through the Unit 4 CWIS. The Unit 4 CWIS is installed with a travelling water screen (a REX Chain Belt Company) that has ⅜-inch square copper wire mesh panels. A screen wash system used to clear debris from the screen has also been installed to return fish to the trough that runs along the CWIS. All aquatic organisms are then returned to the Piscataqua River through the trough that is extended with a 14-inch–diameter chute at an elevation of 4 ft above mean sea level ("MSL").

Screen House #2 has two circulating water pumps supplying cooling water to Unit 5 and two pumps supplying cooling water to Unit 6. Each set of pumps is installed with two traveling water screens (a REX Chain Belt Company) that have ⅜-inch square copper wire mesh panels. Like Screen House #1, Screen House #2 has a screen wash system used to clear debris from the screens to return aquatic organisms to the trough that runs along the length of Screen House #2. Organisms and debris are discharged into the Piscataqua River at 8 ft above MSL.

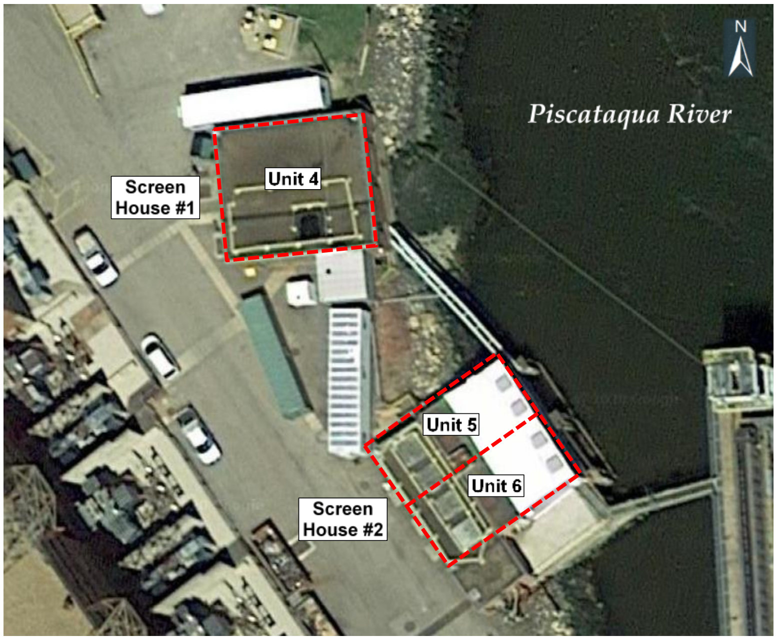


Figure 2. Aerial view of Schiller Station's Units 4 in Screen House #1 and Units 5 and 6 in Screen House #2.

2.2 Cylindrical Wedgewire Screens

Two CWWSs, one with 0.8-mm and one with 3.0-mm slot width, were installed and used to model the performance of a potential full-scale half CWWS (ENERCON 2020). The two screens were deployed near the existing intake structures at Schiller Station with planned locations of 43° 5'53.19" N, 70° 46'56.80" W for the 0.8-mm CWWS (upstream) and 43° 5'52.98" N, 70° 46'56.62" W for the 3.0-mm CWWS (downstream) with a design for both screens to be 34.3 inches off the ground of the centerline axis of each screen (Normandeau 2018b). The design locations were selected to be a suitable depth for a full-scale half CWWS installation over extreme tides and where sweeping flow would be adequate. The locations were based on site-specific mobile acoustic Doppler current profiler ("ADCP") surveys conducted across several tidal cycles and a bathymetric survey conducted in May and June 2018 to identify a location deeper than the tidal range and where current velocities were optimally bidirectional given local conditions (Normandeau 2018a and 2018b). Based on Normandeau Associates, Inc.'s ("Normandeau") ADCP data, the best placement for the screens was with the principal axis orientation at 165.3° (True North) to align with the dominant sweeping flow direction for ebb and flood (Normandeau 2018b). The 0.8-mm and 3.0-mm screens were each attached to six-inch diameter suction hoses that were both anchored to 1-ft tall concrete pads resting on the riverbed and field-routed to the northernmost offshore intake of Screen House #1 (ENERCON 2018).

The two CWWSs were model T-12 screens manufactured by Johnson Screens. Each CWWS was 12 inches in diameter by 35 inches long and constructed of Z-alloy metal with anti-biofouling properties (Figure 3). Each screen had two filtering sections, one on either side of the central riser pipe. The filtering surface consisted of wedgewire bars wrapped around the circumference of the cylindrical screen 0.8 mm apart for one screen and 3.0 mm apart for the other, so that the slots between the wedgewire bars were perpendicular to the long axis of the screen's cylinder and approximately perpendicular to the sweeping flow direction based on an orientation of 165.3° True North.

Figure 3. Test 12-inch diameter cylindrical wedgewire screens (CWWSs) used during the study in the Piscataqua River to test and compare the performance of 0.8-mm slot width (top CWWS) and 3.0-mm slot width (bottom CWWS) at reducing entrainment at Schiller Station.

The design flow rates for the pumps to draw river water through the 0.8-mm and 3.0-mm CWWSs were established during low tide to provide a flow of 201 gallons per minute ("GPM") and 361 GPM, respectively, so as to target a through-slot velocity of approximately 0.4 ft/s for each screen and not to exceed 0.5 ft/s at the expected system head loss (ENERCON 2018). A variable frequency drive ("VFD") for each CWWS pump was installed to achieve and maintain the required flow rate and to trip the pump in the event of low suction pressure (ENERCON 2018). A suction-side flowmeter and pressure gauge were installed for both pump systems to monitor intake flow and suction pressure. The 0.8-mm VFD was set to 24.80 Hertz ("Hz") and the 3.0-mm VFD was set to 29.00 Hz to meet this design flow for each pump at low tide.

Control samples were collected during this study for comparison with the 0.8-mm and 3.0-mm CWWSs. A portion of the intake water from the existing Unit 5 Screen 5A pump was diverted to provide water for Control sampling at Screen House #2 (ENERCON 2018). The test setup allowed flows from the 0.8-mm, the 3.0-mm and the Control pumps to be individually throttled using bypass valves to match each other so all three samples were taken simultaneously and collected approximately the same volume of water.

2.3 Actual Intake Flow

During the 2019 study, the actual intake flow (“AIF”) at Schiller Station (Units 4, 5, and 6 combined) averaged 42.48 MGD from the weeks beginning Monday, 11 February 2019, 2019 Week 6, through Monday, 3 February 2020, 2020 Week 5 (“yearlong period”), when entrainment abundance was sampled at the Control (Table 1). The average AIF was 43.58 MGD during the weeks beginning Monday, 11 March 2019 through Monday, 23 September 2020 (CWWS “performance evaluation period”; Table 1). The weekly total volume of cooling water withdrawal by Units 4, 5, and 6 combined at Schiller Station based on the AIF ranged from 73,441 cubic meters (“m^3”) to 2,390,971 m^3 during monitoring at the Control and 386,490 m^3 to 2,050,557 m^3 during CWWS testing (Table 1). There were five cases between 7 January 2020 and 5 February 2020 where the facility solely operated the pumps for sample collection and not for power generation, which accounted for about 0.1% of the annual mean AIF. The average AIF of 42.48 MGD during the yearlong period was 58.7% of the 72.4 MGD AIF from August 2012 through August 2015 that USEPA acknowledged with the final NPDES Permit.

The average, maximum and minimum daily withdrawal of water from the Piscataqua River by the Schiller Station CWISs for Units 4, 5, and 6, measured over the last five years (11 February 2015 through 10 February 2020), are summarized monthly (Table 2) and annually (Table 3). The five-year AIF history was summarized monthly and annually from the daily average AIF (MGD) provided by GSP. The date of the Monday for the week was used to define the month or year. The monthly average AIF for all CWISs over five years ranged from 33.18 MGD in April to 67.61 MGD in January (Table 2; Figure 4). The annual average AIF for this five-year period was 51.82 MGD (Table 3).

Table 1. Weekly mean actual intake flow (AIF) in million gallons per day (MGD) and weekly volume (m^3) of Piscataqua River water withdrawn by the cooling water intake structures (CWIS) at Schiller Station during the cylindrical wedgewire screen (CWWS) study from the weeks beginning Monday, 11 February 2019 through Monday, 3 February 2020. The synchronized samples collected from the performance evaluation period are highlighted in grey.

Week No.	Sampling Week (beginning Monday)	Mean AIF (MGD)				Weekly Volume (m^3)			
		Unit 4	Unit 5	Unit 6	Total	Unit 4	Unit 5	Unit 6	Total
6	11-Feb-2019	17.30	41.80	0	59.10	458,413	1,107,611	0	1,566,024
7	18-Feb-2019	19.81	40.20	17.91	77.93	525,036	1,065,214	474,690	2,064,941
8	25-Feb-2019	0.97	0	36.14	37.11	25,741	0	957,709	983,450
9	04-Mar-2019	13.49	10.30	36.84	60.63	357,343	272,928	976,257	1,606,528
10	11-Mar-2019	0	21.51	25.20	46.71	0	570,083	667,746	1,237,829
11	18-Mar-2019	0	41.80	0	41.80	0	1,107,611	0	1,107,611
12	25-Mar-2019	0	41.80	0	41.80	0	1,107,611	0	1,107,611
13	1-Apr-2019	0	40.27	0	40.27	0	1,067,107	0	1,067,107
14	8-Apr-2019	0	12.29	12.97	25.26	0	325,545	343,715	669,260
15	15-Apr-2019	0.29	20.90	0	21.19	7,571	553,805	0	561,376
16	22-Apr-2019	0	14.59	0	14.59	0	386,490	0	386,490
17	29-Apr-2019	0	29.86	0	29.86	0	791,151	0	791,151
18	6-May-2019	0	41.80	0	41.80	0	1,107,611	0	1,107,611
19	13-May-2019	0	41.80	0	41.80	0	1,107,611	0	1,107,611
20	20-May-2019	0	41.80	0	41.80	0	1,107,611	0	1,107,611
21	27-May-2019	0	36.41	0	36.41	0	964,708	0	964,708

(continued)

Table 1. (continued)

Week No.	Sampling Week (beginning Monday)	Mean AIF (MGD)				Weekly Volume (m^3)			
		Unit 4	Unit 5	Unit 6	Total	Unit 4	Unit 5	Unit 6	Total
22	3-Jun-2019	29.35	21.70	0	51.06	777,837	575,011	0	1,352,849
23	10-Jun-2019	0	36.39	0	36.39	0	964,280	0	964,280
24	17-Jun-2019	5.88	40.44	0	46.32	155,732	1,071,642	0	1,227,374
25	24-Jun-2019	23.63	20.46	0	44.09	626,145	542,078	0	1,168,223
26	1-Jul-2019	0	41.76	6.64	48.40	0	1,106,551	175,863	1,282,414
27	8-Jul-2019	0	41.76	0	41.76	0	1,106,551	0	1,106,551
28	15-Jul-2019	17.73	41.76	17.90	77.39	469,769	1,106,551	474,236	2,050,557
29	22-Jul-2019	22.17	41.76	3.70	67.64	587,533	1,106,551	98,141	1,792,225
30	29-Jul-2019	23.51	41.76	6.41	71.68	622,927	1,106,551	169,935	1,899,413
31	5-Aug-2019	0	41.76	4.28	46.04	0	1,106,551	113,290	1,219,841
32	12-Aug-2019	0.17	41.76	0.15	42.08	4,505	1,106,551	3,952	1,115,008
33	19-Aug-2019	12.60	41.76	17.10	71.47	333,987	1,106,551	453,159	1,893,697
34	26-Aug-2019	0	41.76	0	41.76	0	1,106,551	0	1,106,551
35	2-Sep-2019	0	31.74	7.69	39.44	0	841,111	203,856	1,044,966
36	9-Sep-2019	11.03	34.04	0	45.06	292,158	901,950	0	1,194,108
37	16-Sep-2019	3.11	16.16	6.84	26.10	82,371	428,100	181,128	691,598
38	23-Sep-2019	6.14	37.86	0	44.00	162,810	1,003,084	0	1,165,895
39	30-Sep-2019	30.77	32.81	0	63.58	815,339	869,433	0	1,684,772
40	07-Oct-2019	4.27	23.58	13.03	40.88	113,259	624,914	345,139	1,083,312
41	14-Oct-2019	0	20.88	28.39	49.27	0	553,276	752,191	1,305,467
42	21-Oct-2019	10.52	12.78	0.51	23.80	278,644	338,552	13,503	630,699
43	28-Oct-2019	0	3.43	24.41	27.84	0	90,895	646,745	737,640
44	04-Nov-2019	0	38.07	0	38.07	0	1,008,887	0	1,008,887
45	11-Nov-2019	0	41.76	18.37	60.13	0	1,106,551	486,751	1,593,302
46	18-Nov-2019	11.90	3.76	32.31	47.96	315,325	99,564	856,055	1,270,944
47	25-Nov-2019	0	19.76	2.21	21.97	0	523,636	58,621	582,257
48	02-Dec-2019	0	41.76	0	41.76	0	1,106,551	0	1,106,551
49	09-Dec-2019	0	41.76	0	41.76	0	1,106,551	0	1,106,551
50	16-Dec-2019	21.08	41.76	27.39	90.23	558,575	1,106,551	725,845	2,390,971
51	23-Dec-2019	0	41.76	0	41.76	0	1,106,551	0	1,106,551
52	30-Dec-2019	0	18.27	0	18.27	0	484,116	0	484,116
1	06-Jan-2020	0	2.77	0	2.77	0	73,441	0	73,441
2	13-Jan-2020	0	30.95	0	30.95	0	820,045	0	820,045
3	20-Jan-2020	0	41.76	0	41.76	0	1,106,551	0	1,106,551
4	27-Jan-2020	0	24.36	0	24.36	0	645,488	0	645,488
5	03-Feb-2020	0	2.88	0	2.88	0	76,405	0	76,405
Weeks 10-38 Minimum		**0**	**12.29**	**0**	**14.59**	**0**	**325,545**	**0**	**386,490**
Weeks 10-38 Maximum		**29.35**	**41.80**	**25.20**	**77.39**	**777,837**	**1,107,611**	**667,746**	**2,050,557**
Weeks 10-38 Mean		**5.37**	**34.46**	**3.75**	**43.58**	**142,184**	**913,212**	**99,483**	**1,154,880**
All Weeks Minimum		**0**	**0**	**0**	**2.77**	**0**	**0**	**0**	**73,441**
All Weeks Maximum		**30.77**	**41.80**	**36.84**	**90.23**	**815,339**	**1,107,611**	**976,257**	**2,390,971**
All Weeks Mean		**5.49**	**30.32**	**6.66**	**42.48**	**145,597**	**803,401**	**176,510**	**1,125,508**

Table 2. Mean, maximum, and minimum monthly average actual intake flow (AIF) in million gallons per day (MGD) of Piscataqua River water withdrawn by the cooling water intake structures (CWISs) at Schiller Station from 11 February 2015 through 10 February 2020.

	AIF (MGD)											
	Mean				Maximum				Minimum			
Month[1]	Unit 4	Unit 5	Unit 6	Total	Unit 4	Unit 5	Unit 6	Total	Unit 4	Unit 5	Unit 6	Total
January	14.18	39.25	14.19	67.61	31.71	45.89	33.01	106.53	0	24.96	0	24.96
February	12.74	31.63	13.73	58.09	40.80	41.80	41.80	116.57	0	2.52	0	2.52
March	9.33	33.67	9.56	52.55	23.33	40.05	15.57	70.67	1.99	28.72	2.95	43.00
April	10.17	11.75	11.26	33.18	26.84	24.74	34.41	45.51	0.06	0	0	26.23
May	1.76	34.92	3.58	40.26	2.80	41.80	13.25	46.10	0	16.75	0	32.05
June	5.33	39.39	1.96	46.68	14.72	41.80	4.26	50.86	1.21	29.75	0	44.26
July	11.55	41.60	7.03	60.18	25.00	41.80	11.02	77.06	4.30	40.82	2.08	48.18
August	7.93	33.06	5.87	46.86	19.78	41.76	10.45	64.13	2.47	8.96	0	17.40
September	7.26	34.06	4.26	45.58	10.54	41.80	11.47	53.93	0.66	24.79	0	39.56
October	5.43	35.78	5.94	47.15	17.73	41.80	16.58	67.47	0	15.17	0	35.45
November	6.59	35.59	10.71	52.89	18.79	41.80	16.75	69.24	0.94	25.84	0.97	42.04
December	12.41	33.67	11.95	58.03	31.45	41.80	33.57	98.29	0	8.87	0	8.87
Min	**1.76**	**11.75**	**1.96**	**33.18**	**2.80**	**24.74**	**4.26**	**45.51**	**0**	**0**	**0**	**2.52**
Max	**14.18**	**41.60**	**14.19**	**67.61**	**40.80**	**45.89**	**41.80**	**116.57**	**4.30**	**40.82**	**2.95**	**48.18**
Mean	**8.72**	**33.70**	**8.34**	**50.76**	**21.96**	**40.57**	**20.18**	**72.20**	**0.97**	**18.93**	**0.50**	**30.38**

[1] The date of the Monday for the week was used to define the Month for this table.

Table 3. Mean, maximum, and minimum yearly average actual intake flow (AIF) in million gallons per day (MGD) of Piscataqua River water withdrawn by the cooling water intake structures (CWISs) at Schiller Station from 11 February 2015 through 10 February 2020.

	AIF (MGD)											
	Mean				Maximum				Minimum			
Year	Unit 4	Unit 5	Unit 6	Total	Unit 4	Unit 5	Unit 6	Total	Unit 4	Unit 5	Unit 6	Total
2015-2016	13.05	37.49	8.85	59.39	28.92	41.80	27.86	93.45	2.56	24.74	0	32.54
2016-2017	9.89	35.81	5.25	50.95	31.45	45.89	24.65	88.95	0.94	0	0	30.41
2017-2018	10.29	36.58	10.94	57.81	31.71	41.80	33.57	106.53	1.79	10.41	0	31.19
2018-2019	5.96	32.04	10.74	48.74	18.79	41.80	34.41	72.27	0	0	3.03	17.40
2019-2020	5.36	30.02	6.80	42.18	14.72	41.76	16.58	61.37	0	15.17	0	24.96
Min	**5.36**	**30.02**	**5.25**	**42.18**	**14.72**	**41.76**	**16.58**	**61.37**	**0**	**0**	**0**	**17.40**
Max	**13.05**	**37.49**	**10.94**	**59.39**	**31.71**	**45.89**	**34.41**	**106.53**	**2.56**	**24.74**	**3.03**	**32.54**
Mean	**8.91**	**34.39**	**8.52**	**51.82**	**25.12**	**42.61**	**27.41**	**84.51**	**1.06**	**10.06**	**0.61**	**27.30**

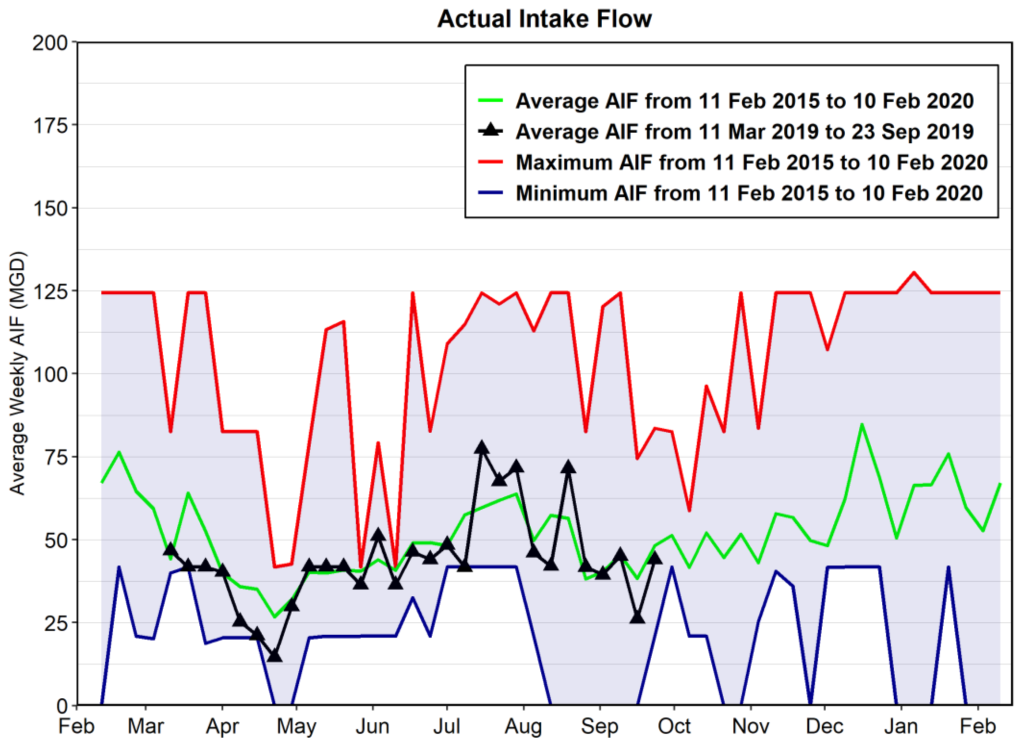


Figure 4. Average weekly actual intake flow (AIF, million gallons per day [MGD]) from 11 February 2015 through 10 February 2020 and weekly average AIF from weeks beginning Monday, 11 March 2019 through Monday, 23 September 2019 of Granite Shore Power's water withdrawn by the cooling water intake structures at Schiller Station.

3 SAMPLING METHODS

3.1 Entrainment Abundance Monitoring

3.1.1 Sampling Design and Schedule

The SOP provided that entrainment sampling was to occur within one 24-hour sampling event ("day") per week during the months of January through April 2019 and September 2019, twice weekly sampling (two consecutive 24-hour periods) from May through August 2019, and once a month sampling (one 24-hour period per month) from October through December 2019 where the date of Monday defined the sampling week and month. This stratification of sampling intensity was based on the ichthyoplankton seasonality observed during the 2006–2007 entrainment study (Normandeau 2008; Figure 5). This sampling design would have provided a total of 696 entrainment samples (232 sets of three synchronized samples; Normandeau 2019).

Due to required repairs and modifications discovered during installation and testing that began on 28 December 2018, the start of synchronized sample collection was delayed to the week of Monday, 11 February 2019. Due to discovered damage and biofouling of the 0.8-mm and 3.0-mm CWWSs, sampling of the test screens discontinued on 9 December 2019. To capture a full year of entrainment abundance data at Schiller Station's existing CWISs, sampling was extended weekly from 7 January 2020 through 5 February 2020 at the Control only. Throughout this wedgewire screen study, a total of 684 samples were collected, each over an approximately 2- to 3-hour period of pumping per sample within each 6-hour diel period (Table 4).

During each sampling day, four pump samples were collected and represented four consecutive 6-hour diel periods at Schiller Station. The four diel sampling periods were 09:00–14:59, 15:00–20:59, 21:00–02:59, and 03:00–08:59 (DST). In recognition of potential diel differences in ichthyoplankton density and susceptibility to entrainment, the intention was to separate the collection of daytime and nighttime entrainment samples symmetrically within the corresponding periods of each sampling day for estimating a representative 24-hour sample. Each sampling day was scheduled to begin mid-morning (09:00–14:59) on Tuesday of each week, ending 24 hours later at mid-morning on Wednesday.

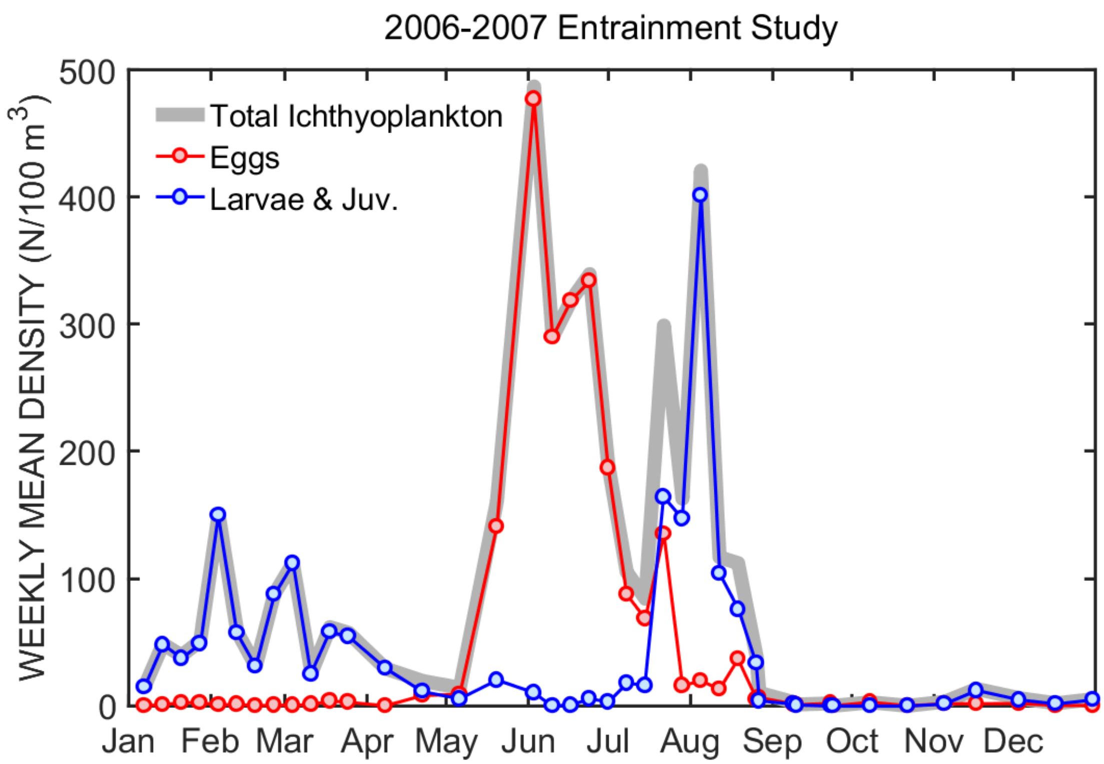


Figure 5. Weekly mean density (N/100 m^3) of entrained fish life stages combined, fish eggs, and fish larvae and juveniles from the calendar year based on samples collected at Schiller Station from 31 August 2006 through 27 September 2007 (Normandeau 2008).

Table 4. Weekly schedule and number of samples collected by Use Code from the 0.8-mm and 3.0-mm cylindrical wedgewire screen (CWWS) intakes and the existing cooling water intake structure (CWIS) for Units 5 and 6 (Control) from the weeks beginning Monday, 11 February 2019 through Monday, 3 February 2020.

Week No.	Sampling Week (beginning Monday)	Location	Use Code[1]						Total
			1	2	3	4	5	6	
6	11-Feb2019	0.8-mm CWWS				4			4
		3.0-mm CWWS				4			4
		Existing CWIS (Control)				4			4
7	18-Feb-2019	0.8-mm CWWS				4			4
		3.0-mm CWWS				4			4
		Existing CWIS (Control)				4			4
8	25-Feb-2019	0.8-mm CWWS				4			4
		3.0-mm CWWS				4			4
		Existing CWIS (Control)				4			4
9	04-Mar-2019	0.8-mm CWWS				4			4
		3.0-mm CWWS				4			4
		Existing CWIS (Control)				4			4
10	11-Mar-2019	0.8-mm CWWS	4						4
		3.0-mm CWWS	4						4
		Existing CWIS (Control)	4						4
11	18-Mar-2019	0.8-mm CWWS			4				4
		3.0-mm CWWS					4		4
		Existing CWIS (Control)			4				4
12	25-Mar-2019	0.8-mm CWWS	4						4
		3.0-mm CWWS	4						4
		Existing CWIS (Control)	4						4
13	01-Apr-2019	0.8-mm CWWS	4						4
		3.0-mm CWWS	4						4
		Existing CWIS (Control)	4						4
14	08-Apr-2019	0.8-mm CWWS	4						4
		3.0-mm CWWS	4						4
		Existing CWIS (Control)	4						4
15	15-Apr-2019	0.8-mm CWWS	4						4
		3.0-mm CWWS	4						4
		Existing CWIS (Control)	4						4
16	22-Apr-2019	0.8-mm CWWS	4						4
		3.0-mm CWWS	4						4
		Existing CWIS (Control)	4						4

(continued)

Table 4. (continued)

Week No.	Sampling Week (beginning Monday)	Location	Use Code[1]						Total
			1	2	3	4	5	6	
17	29-Apr-2019	0.8-mm CWWS	4						4
		3.0-mm CWWS	4						4
		Existing CWIS (Control)	4						4
18	06-May-2019	0.8-mm CWWS	8						8
		3.0-mm CWWS	8						8
		Existing CWIS (Control)	8						8
19	13-May-2019	0.8-mm CWWS	8						8
		3.0-mm CWWS	8						8
		Existing CWIS (Control)	8						8
20	20-May-2019	0.8-mm CWWS	8						8
		3.0-mm CWWS	8						8
		Existing CWIS (Control)	8						8
21	27-May-2019	0.8-mm CWWS	8						8
		3-mm CWWS	8						8
		Existing CWIS (Control)	8						8
22	03-Jun-2019	0.8-mm CWWS	8						8
		3.0-mm CWWS	8						8
		Existing CWIS (Control)	8						8
23	10-Jun-2019	0.8-mm CWWS	8						8
		3.0-mm CWWS	8						8
		Existing CWIS (Control)	8						8
24	17-Jun-2019	0.8-mm CWWS	8						8
		3.0-mm CWWS	8						8
		Existing CWIS (Control)	8						8
25	24-Jun-2019	0.8-mm CWWS	8						8
		3.0-mm CWWS	8						8
		Existing CWIS (Control)	8						8
26	01-Jul-2019	0.8-mm CWWS	8						8
		3.0-mm CWWS	8						8
		Existing CWIS (Control)	8						8
27	08-Jul-2019	0.8-mm CWWS	8						8
		3.0-mm CWWS	8						8
		Existing CWIS (Control)	8						8
28	15-Jul-2019	0.8-mm CWWS	7	1					8
		3.0-mm CWWS	7		1				8
		Existing CWIS (Control)	7		1				8

(continued)

Table 4. (continued)

Week No.	Sampling Week (beginning Monday)	Location	Use Code[1]						Total
			1	2	3	4	5	6	
29	22-Jul-2019	0.8-mm CWWS	8						8
		3.0-mm CWWS	8						8
		Existing CWIS (Control)	8						8
30	29-Jul-2019	0.8-mm CWWS	8						8
		3.0-mm CWWS	8						8
		Existing CWIS (Control)	8						8
31	05-Aug-2019	0.8-mm CWWS	8						8
		3.0-mm CWWS	8						8
		Existing CWIS (Control)	8						8
32	12-Aug-2019	0.8-mm CWWS	8						8
		3.0-mm CWWS	8						8
		Existing CWIS (Control)	8						8
33	19-Aug-2019	0.8-mm CWWS	8						8
		3.0-mm CWWS	8						8
		Existing CWIS (Control)	8						8
34	26-Aug-2019	0.8-mm CWWS	8						8
		3.0-mm CWWS	8						8
		Existing CWIS (Control)	8						8
35	02-Sep-2019	0.8-mm CWWS					8		8
		3.0-mm CWWS			4				4
		Existing CWIS (Control)			4				4
36	09-Sep-2019	0.8-mm CWWS	3		1				4
		3.0-mm CWWS	3		1				4
		Existing CWIS (Control)	3	1					4
37	16-Sep-2019	0.8-mm CWWS	4						4
		3.0-mm CWWS	4						4
		Existing CWIS (Control)	4						4
38	23-Sep-2019	0.8-mm CWWS	4						4
		3.0-mm CWWS	4						4
		Existing CWIS (Control)	4						4
40	07-Oct-2019	0.8-mm CWWS						4	4
		3.0-mm CWWS						4	4
		Existing CWIS (Control)			4				4
46	18-Nov-2019	0.8-mm CWWS						4	4
		3.0-mm CWWS						4	4
		Existing CWIS (Control)			4				4
49	09-Dec-2019	Existing CWIS (Control)			4				4
1	06-Jan-2019	Existing CWIS (Control)			4				4
2	13-Jan-2020	Existing CWIS (Control)			4				4

Table 4. (continued)

Week No.	Sampling Week (beginning Monday)	Location	Use Code[1]						Total
			1	2	3	4	5	6	
3	20-Jan-2020	Existing CWIS (Control)			4				4
4	27-Jan-2020	Existing CWIS (Control)			4				4
5	03-Feb-2020	Existing CWIS (Control)			4				4
Subtotal		0.8-mm CWWS	174	1	5	16	8	8	212
		3.0-mm CWWS	174		6	16	4	8	208
		Existing CWIS (Control)	174	1	41	16			232
		Total	**522**	**2**	**52**	**48**	**12**	**16**	**652**

[1] Use code designations are as follows:
1 = Assigned to samples that had no sampling problems with the gear and the deployment was as specified in the SOP
2 = Assigned to samples when sampling problems were encountered with the gear and/or volume measurements
3 = Assigned to samples when a synchronized triplicate of samples between the 0.8-mm, 3.0-mm, and Control locations was not collected
4 = Assigned to samples collected when there was a known screen misalignment
5 = Assigned to samples when sampling problems were encountered, and no fish or volume measurements were available
6 = Assigned to samples collected when cylindrical wedgewire screens showed evidence of being compromised

3.1.2 Entrainment Sampling Procedures

Electric-powered 6-inch diameter inlet pumps with open impellers capable of handling solids were used to collect entrainment samples from the 0.8-mm and 3.0-mm CWWSs in Screen House #1. Solids handling pumps are often used for pumping fluids with concentrations of solid materials, including applications where the suspended solids must be handled with a minimum amount of breakage or degradation. These pumps have a substantial clearance between the impeller and pump casing, allowing solids up to the size of the clearance to be passed through the pump without impact. This type of design minimizes the damage that eggs and larvae experience when passing through the pump. These pumps have successfully provided the required flow with very limited damage to the entrained eggs and larvae in previous entrainment abundance studies and wedgewire screen evaluations (Normandeau 2008; Normandeau 2017). Control entrainment samples were collected from a 4-inch raw river water tap drawing unchlorinated ambient cooling water at low pressure (about 15 psi) from a common service water feed line that tapped into both Unit 5 and Unit 6 circulating water pumps in Screen House #2.

Each entrainment sample was collected at an average sampling flow of about 180 GPM and targeted a total volume of about 100 m^3 (25,627–27,213 gallons) of withdrawn river water, measured by a factory-calibrated Signet flowmeter installed in the supply line to each collection tank. Each sample was filtered through a 300-micron mesh plankton net suspended in an aluminum tank with a short conical section at the lower end tapering to the cod end collection cup. Prior to sampling, the entrainment sampler was filled with ambient river water to buffer the flow and help ensure that the ichthyoplankton were in good condition for identification and enumeration (Figure 6 and Figure 7).

Each net was changed out frequently (about every 30 minutes) with a clean net and rinsed with filtered seawater into a collection jar during each sample to minimize damage to the collected ichthyoplankton. At the end of each 2- to 3- hour sampling interval, the remaining material in the collection net was washed into the sample jar to terminate the sample (Figure 8). All entrainment samples were preserved in 6% buffered formalin. Each sample container was uniquely labeled with the location, date, time and sample identification number and transported with chain-of-custody forms to the laboratory for sorting, identification and enumeration.

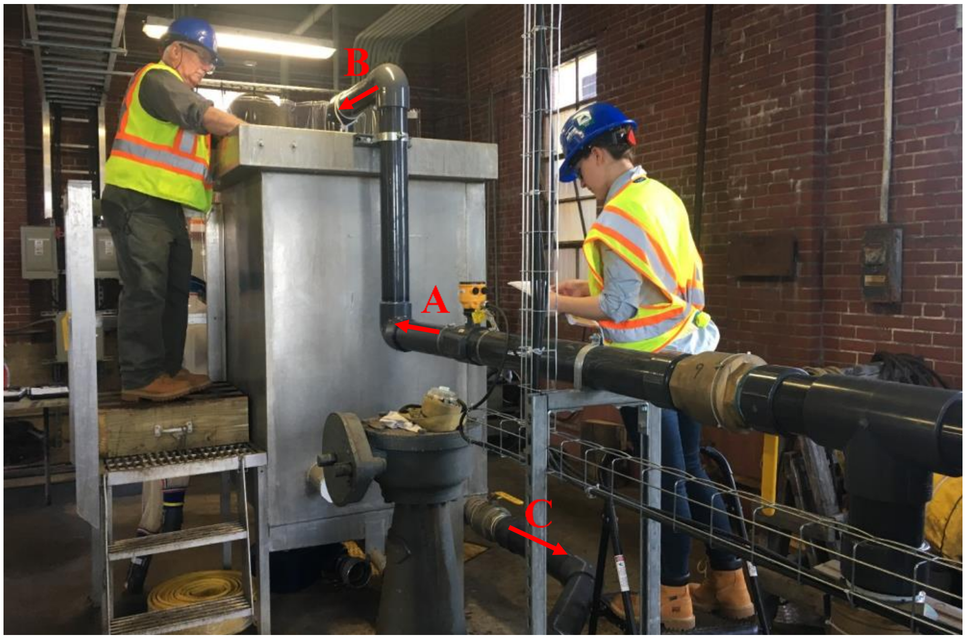


Figure 6. Entrainment sampler showing flow patterns through the tank. A: Intake flow to sampling tank. B: Flow path for water during entrainment sampling (top fill filters down through conical net and sample is collected in cod end). C: Drain line connected to tank stand pipe.

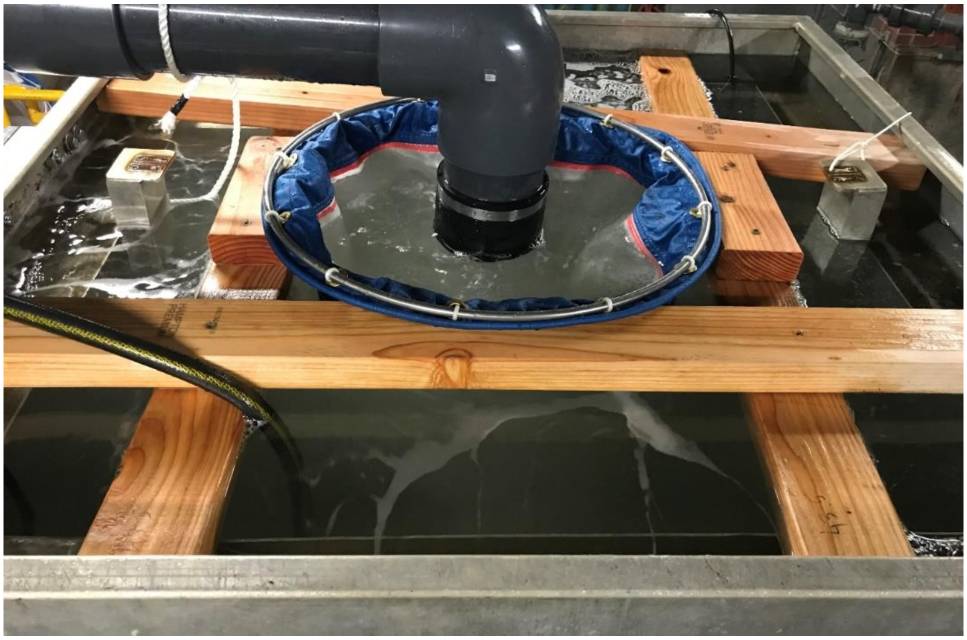


Figure 7. Top of an entrainment sampling tank where intake water flows gently into a conical 300-micron mesh net suspended in the tank with ambient water.

Figure 8. A 0.8-mm CWWS entrainment sample being rinsed with filtered seawater from a sampling cod end into a labeled sample jar.

Prior to the first sample of each scheduled sampling day, flowmeter calibrations were verified by calculating the sampling pump flow rate from the recorded elapsed time, to the nearest 1 second, to fill a tank of a known volume. The calibration was performed as a "manual" check on the flowrate readings specified by the in-line flowmeter. During this calibration/verification test, the pump was operating at the typical sampling flow of about 180 GPM. Measured flow rate was recorded as GPM indicated on the flowmeter gauge during the calibration test. The calculated flow rate from the calibration test was recorded, compared to the observed flow rate from the corresponding flowmeter gauge during the calibration test (GPM measured by gauge/ GPM calculated by calibration), and the percent deviation between the two readings was calculated and compared to a standard of ±5%. The absolute value of the average percent error was always less than 5%, indicating verification of the flowmeter calibration and confirming each tank was ready for sampling.

3.1.3 Current Velocity Measurements

The site-specific current velocity measurements were collected for the full duration of the 2019 wedgewire screen study using two Nortek 2 MHz Aquadopp Profilers (referred to herein as ADCPs) deployed on the river bed and connected via marine communications cables to interface boxes in Screen House #1 (described further in Appendix C). Based on engineering recommendations to avoid potential hydrodynamic interference, the two ADCPs were deployed no closer than 30 ft from each CWWS, proximally upriver and downriver of the 0.8-mm CWWS for the North ADCP and 3.0-mm CWWS for the South ADCP (ENERCON, pers. Comm.). Current velocity profile measurements were collected continuously over 6-minute intervals from approximately 1.75 to 6.30 ft above the riverbed, spanning the region of the water column representative of the water impacting the CWWSs.

It is important to note that although the long-term ADCPs were deployed approximately 80 ft from each other, the current velocity varied substantially across this distance, as evident in the statistics presented in Appendix C and previous work at the site (Normandeau 2018a). As such, the ADCPs were assumed representative of the current velocities experienced by the CWWSs, with the South ADCP likely presenting a more accurate representation of the current velocity field experienced by both CWWSs due to the similar amount of exposure to flood and ebb currents (the North ADCP being slightly more sheltered by the bathymetry and shoreline geometry).

3.2 Water Quality

Water quality information consisting of temperature (0.1°C), conductivity (1.0 µS/cm), dissolved oxygen ("DO"; 0.1 mg/L), and pH (0.1 pH unit) were recorded as one set of water quality measurements for each diel collection at each location during entrainment sampling. Salinity (Practical Salinity Scale of 1978) was calculated from the measured water temperature and conductivity. Water quality measurements for ichthyoplankton sampling were collected from the water flow sampled within each entrainment sampling tank.

Water quality meters were calibrated prior to each day of use, and again after each day of use (or before the next day of use), as specified in the YSI Professional Plus water quality meter manual (Normandeau 2019). All water quality meter calibrations were recorded in a calibration log.

4 LABORATORY METHODS

A total of 640 entrainment samples were processed out of the 684 entrainment samples collected for ichthyoplankton and juvenile fishes for the 2019 wedgewire screen study at Schiller Station (Table 4). All specimens in each processed entrainment sample or subsample were identified to the lowest practical fish taxon.

4.1 Sample Processing

Organisms that were determined to be dead prior to collection were excluded from the analysis to provide the most accurate and representative estimates of entrainment abundance. Fish eggs and larvae that were dead prior to capture and preservation were identified based on changes in their physical characteristics observed under microscopic examination so that only ichthyoplankton eggs and larvae that were alive at the time of collection and preservation were identified to the lowest practical taxon and enumerated. Specifically, the following criteria were used to distinguish alive and dead ichthyoplankton.

4.1.1 Larvae

Only live ichthyoplankton larvae and juvenile fish were sorted, identified, and enumerated. Larvae that were alive at the time of collection, and not intact, exhibited characteristic types of damage due to the collection method such as decapitation, severing at various points along the body, or stripping of delicate exterior features (such as fins). Severing may result from cavitation or contact with the joints in the piped connections in the pump sampling system or with various structures in the CWIS. Decomposing larvae that were dead at the time of collection and preservation exhibited an overall look of flesh deterioration and a marked difference in the physical condition compared to larvae that were alive at the time of preservation. Additionally, dead larvae tend to settle out of the water column and are less susceptible to collection in entrainment samples.

4.1.2 Eggs

Only live, fertilized eggs were sorted and enumerated. Dead eggs, while still spherical, often exhibit the growth of fungal hyphae or filamentous bacteria. Normandeau colloquially identifies these as “fuzzy” eggs and they were not counted. These “fuzzy” eggs look different from adhesive eggs with aquatic vegetation attached to them or eggs that naturally have filamentous structures.

Opaque eggs found while sorting or identifying a sample are considered to have been alive at the time of capture, and were sorted, identified and enumerated as live eggs because it is not possible to tell the acute cause and time of death of opaque eggs. They could have turned opaque just before their capture, during collection, or after collection at the time of preservation. The egg sometimes turns opaque because material inside the egg capsule bursts from the stress of collection.

“Polar bodies” are the interstitial material or oocytes found between fertilized eggs that will never become fertilized. These individual irregular egg-shaped structures are a bit more turgid (firm) and much smaller than the size range expected for fertilized eggs of species present. Polar bodies were not counted as live eggs.

4.2 Sorting

Only fish eggs, larvae, and juveniles that were alive at the time of collection were sorted for identification to the lowest practical taxon and enumerated in the laboratory. Prior to sorting, the sample contents were poured through a sieve with a mesh equivalent to 0.300 mm or finer and rinsed with water to remove the preservative. The sample contents retained on the sieve were carefully washed into a container, and portions of the sample were placed into a sorting tray for examination under magnification. Fish eggs, larvae, and juveniles were then removed from the sample using forceps, pipettes, or probes as appropriate and placed in vials with 6% buffered formalin for subsequent identification and enumeration. All fish eggs, larvae, and juveniles were removed for subsequent processing, even if there was damage to the organism.

Samples with high numbers of eggs or larvae were subsampled in the laboratory, with a minimum of 200 specimens of fish eggs and 100 specimens of fish larvae analyzed per sample. This quota applied to the total count of all species combined, not to individual species. All sample splitting was done with a Motoda splitter and samples were subject to a chi-square test to document the reliability of the splitting method by ensuring no statistically significant differences at a 95% confidence level ($P>0.05$) between randomly selected split pairs were found.

4.3 Identification

The sorted ichthyoplankton in each sample was identified, life stage was assigned, and each specimen was measured according to the following procedures. A binocular microscope with an ocular micrometer was used to examine the specimens and identify them to the lowest practical taxon (usually species).When species-level identification could not be made with high confidence, a higher taxonomic level (e.g., genus, family) or taxonomic complex (a group of species or genus with a morphologically similar life stage) was assigned to the specimen. Identification was supplemented by referring to literature, reference collections, and by consulting with fellow taxonomists. Life stage was determined for each specimen using the following life stage categories:

> ***Egg***: the embryonic developmental stage, from spawning until hatching. Eggs frequently become damaged during collection and sample processing. Damaged eggs are counted as the number of embryos (without regard to how many egg capsules are present). Non-fertilized eggs were not counted;

Unidentified larva ("UNID"): one or more key taxonomic features were observed to be missing upon microscopic examination of damaged larval specimens, rendering larva life stage unassigned;

Yolk-sac larva ("YSL"): the transitional stage from hatching through the development of a complete, functional digestive system (regardless of the degree of yolk and/or oil globule retention);

Post yolk-sac larva ("PYSL"): the transitional stage from development of a complete, functional digestive system to the transformation to juvenile form (regardless of the degree of yolk and/or oil globule retention), including the leptocephalus stage of eels;

Young-of-the-year ("YOY"): the stage from completed transformation to Age 1 (i.e., 12 months after hatching). A young-of-the-year has a full complement of fin rays identical to that of an adult. Eels are classified in this stage until Age 2; and

Yearling or older ("YROL"): a fish at least one year old.

Life stage was determined for Winter Flounder (*Pseudopleuronectes americanus)* larvae using the following life stage categories:

***WF I**:* yolk-sac present or eyes not pigmented;

***WF II**:* no yolk-sac present and eyes pigmented, but either no fin ray development or no flexion of the notochord;

***WF III**:* fin rays present and notochord flexion has begun, but the leading edge of the left eye has not reached the midline of the head; and

***WF IV**:* left eye has reached but not fully crossed the midline of the head and full fin complement has not yet been attained.

Identified ichthyoplankton specimens of each taxon were then counted by life stage and recorded.

4.4 Measurements

A maximum of 30 individuals from each fish taxon and life stage per sample were measured for total length ("TL"), greatest body depth ("GBD"), and greatest body width ("GBW") to the nearest 0.1 mm for larvae and 1.0 mm for juveniles. A maximum of 30 eggs per taxon per sample were measured to the nearest 0.1 mm for minimum and maximum diameters. If more than 30 eggs or larvae were present, a random selection of specimens was measured. Only whole (intact) ichthyoplankton were used for measurements, and all measurements were made with a calibrated ocular micrometer. Each ocular micrometer was calibrated at least weekly using a stage micrometer.

5 QUALITY ASSURANCE AND QUALITY CONTROL

All work for Schiller Station's wedgewire screen study was performed in accordance with the project-specific SOP (Normandeau 2019). The Quality Assurance ("QA") program described in the SOP was designed to meet or exceed the guidance criteria of the USEPA and was consistent with the intent of federal regulations (10 CFR 50), which require QA to be separate from operational and budgetary concerns. The QA Program implemented for Schiller Station's entrainment study was comprised of two systems: a QA system and a Quality Control ("QC") system. The QA Program was managed by Normandeau's QA Director using project-independent technical personnel during performance and system audits, and therefore was functionally independent from the QC system. The QA Program independently observed data products and operating procedures for consistency and accuracy when compared to the SOP. The QC system was managed by the project supervisor and project personnel. QA/QC procedures were applied to sample collection, sample analysis, and data processing procedures.

All field and laboratory work was completed only by trained technicians or experienced taxonomists, respectively, operating under Schiller Station's SOP (Normandeau 2019). Field sampling procedures were subjected to both QA and QC audits, and all instruments (e.g., flowmeters, water quality meters) used were frequently calibrated with records maintained in calibration logs as specified in the SOP. All laboratory sorting, fish identification and enumeration were subject to a standard and appropriate QA/QC review based on a Military Inspection Standard ("MIL-STD") inspection plan derived from MIL-STD 1235 Single and Multiple Level Continuous Sampling Procedures and Tables for Inspection by Attributes to achieve a 10% Average Outgoing Quality Limit ("AOQL"), and a 1% AOQL for all data files, computations and reports. An AOQL of 10% requires that 10 percent of each sorter's and 10 percent of each taxonomist's identification work be verified by a second work-up by a qualified independent technician. Samples for QC checks were randomly selected. To achieve a 10% or better AOQL, the CSP-1 continuous sampling plan was conducted in two modes:

> *Mode 1:* re-inspect one hundred percent of the samples until eight consecutive samples pass.
>
> *Mode 2:* after eight consecutive samples pass QC re-inspection, randomly choose one out of every seven samples for re-inspection. If any QC fails, then return to Mode 1.

Logs were maintained to document the QC inspection results, AOQL, the random selection process for the subsampling procedure used for morphometrics, and ocular micrometer calibrations.

All field and laboratory data sheets were submitted for data entry. Data were double entered and verified to remove data entry errors. Data files were subjected to a series of systematic error checking programs developed specifically for this project consisting of univariate, bivariate, and multivariate checks. An AOQL of 1% means that the final data files were certified through statistical inspection to document that less than one record (line of data) out of every 100 records were in error. This level of quality meets or exceeds industry standards for entrainment studies. Additional details are provided in the Study Plan.

6 ANALYTICAL METHODS

6.1 Density Calculations

The entrainment density of all fish taxa and life stages during this study was estimated from the respective laboratory counts and measured sampling volumes of individual uniquely labeled samples, which were collected at each intake screen (sampling tank) over four consecutive diel periods in each weekly 24-hour sampling event. Explicitly, the sample density of taxon *i* and life stage *j* in sample *k* for intake screen *s* ($D_{s,i,j,t,h,d,k}$) for the 24-hour sampling event *h* representing diel period *d* in week *t*, expressed as number per 100 cubic meters of sampled volume, was estimated as:

$$D_{s,i,j,t,h,d,k} = \frac{N_{s,i,j,t,h,d,k}\left(F_{s,i,j,t,h,d,k}/L_{s,i,j,t,h,d,k}\right)}{V_{s,t,h,d,k}}\left(\frac{100\ 1\text{-m}^3}{1\ 100\text{-m}^3}\right) \qquad \text{Equation 1}$$

where $N_{s,i,j,t,h,d,k}$ = laboratory count of taxon *i* at life stage *j* in the sample *k* during diel period *d*, 24-hour sampling event *h*, and week *t* for intake screen *s*;

$F_{s,i,j,t,h,d,k}$ = split factor of taxon *i* at life stage *j* for subsampling the sample *k* during diel period *d*, 24-hour sampling event *h*, and week *t* for intake screen *s*;

$L_{s,i,j,t,h,d,k}$ = number of splits (subsamples) of taxon *i* at life stage *j* processed for the sample *k* during diel period *d*, 24-hour sampling event *h*, and week *t* for intake screen *s*; and

$V_{s,t,h,d,k}$ = sampling volume (m^3) for sample *k* collected in one of four consecutive diel periods during diel period *d*, 24-hour sampling event *h*, and week *t* for intake screen *s*.

The sampling design planned to collect samples in each 6-hour diel period for a consecutive 24-hour period in an effort to account for natural variation during day and night. Because ichthyoplankton can have a patchy distribution and vary substantially in density during the season, the sampling intensity was allocated based on the seasonal abundance as described in Section 3.1.1. To account for this stratification, weekly mean sample density of taxon *i* and life stage *j* at each intake screen *s* during week *t* ($D_{s,i,j,t}$) was estimated by a two-stage calculation as follows:

$$D_{s,i,j,t,d} = \frac{\sum_{k=1}^{S_{s,t,d}} \left(D_{s,i,j,t,h,d,k}\right)}{S_{s,t,d}} \qquad \text{Equation 2}$$

where $D_{s,i,j,t,h,d,k}$ = density as defined in Equation 1, and

$S_{s,t,d}$ = the number of sampling events at intake screen *s* in diel period *d* during week *t*.

$$D_{s,i,j,t} = \frac{\sum_{k=1}^{S_{s,t}} \left(D_{s,i,j,t,d}\right)}{S_{s,t}} \qquad \text{Equation 3}$$

where $D_{s,i,j,t,d}$ = density as defined in Equation 2, and

$S_{s,t}$ = the number of diel periods at intake screen *s* during week *t*.

6.2 Entrainment Abundance Calculations

For each sampling week, the entrainment abundance of individuals for taxon *i* at life stage *j* during week *t* at intake screen *s* ($E_{s,i,j,t}$) was estimated based on weekly total volume based on actual or design intake flow (V_t) at Schiller Station for Units 4, 5, and 6 combined by:

$$E_{DIF,s,i,j,t} = \left(D_{s,i,j,t}\right)\left(\frac{1\ 100\text{-m}^3}{100\ 1\text{-m}^3}\right)\left(V_{DIF,t}\right) \qquad \text{Equation 4}$$

where $D_{s,i,j,t}$ = density (number per 100 m^3) as defined in Equation 3, and

$V_{DIF,t}$ = the weekly cooling water withdrawal volume (m^3) for Schiller Station Units 4, 5 and 6 combined during week *t* at DIF (125.8 MGD) calculated as $(7\text{ days})(125.8\text{ MGD})\left(\frac{10^6\text{ m}^3}{1\text{ MG}}\right)\left(\frac{0.00378541\text{ m}^3}{1\text{ gallon}}\right)$

and

$$E_{AIF,s,i,j,t} = (D_{s,i,j,t}) \left(\frac{1\ 100\text{-m}^3}{100\ 1\text{-m}^3} \right) (V_{AIF,t}) \qquad \text{Equation 5}$$

where $D_{s,i,j,t}$ = density (number per 100 m^3) as defined in Equation 3, and

$V_{AIF,t}$ = the weekly cooling water withdrawal volume (m^3) for Schiller Station Units 4, 5 and 6 combined during week *t* based on AIF (Table 1).

Total fish entrainment abundance (number of individuals) during week *t* at intake screen *s* can then be determined by summation at DIF or AIF ($E_{DIF,s,t}$ or $E_{AIF,s,t}$) respectively as:

$$E_{DIF,s,t} = \sum_{i=1}^{Ni} \sum_{j=j}^{Nj} E_{DIF,s,i,j,t}$$
$$E_{AIF,s,t} = \sum_{i=1}^{Ni} \sum_{j=j}^{Nj} E_{AIF,s,i,j,t} \qquad \text{Equation 6}$$

where $E_{DIF,s,i,j,t}$ = weekly entrainment abundance of taxon *i* and life stage *j* at intake screen *s* during week *t* based on DIF as defined by Equation 4, and

$E_{AIF,s,i,j,t}$ = weekly entrainment abundance of taxon *i* and life stage *j* at intake screen *s* during week *t* based on AIF as defined by Equation 5 (Table 1).

6.3 Entrainment Reduction Calculations

Cumulative entrainment abundance (i.e., annual entrainment) and paired density difference were two metrics used to evaluate the CWWS performance between the 0.8-mm and 3.0-mm slot widths for reducing entrainment from the baseline entrainment at Schiller Station.

6.3.1 Cumulative Entrainment Abundance

For facilities like Schiller Station that withdraw cooling water from a source waterbody where presence of ichthyoplankton is present year round, entrainment is characterized by estimating annual entrainment abundance from periodic sampling intake water throughout the year. Annual entrainment abundance estimates can be obtained from samples collected monthly, twice monthly, weekly, or using a stratified sampling design, as used in this study (EPRI 2005). The cumulative entrainment abundance, by summing abundance across sampled weeks throughout the year, was used as a proxy for annual entrainment abundance and was assumed to be representative of annual entrainment abundance for evaluating a full-scale CWWS installation. As a comparative study of two CWWSs, the objective of the study was not to accurately estimate annual entrainment abundance, but rather to compare the entrainment reduction performance of the two CWWSs tested in the study. Therefore, interpolation or extrapolation of entrainment abundance during un-sampled weeks was not performed because that may have unnecessarily introduced uncertainty (i.e., comparisons based on predictions). Cumulative entrainment abundance was estimated as:

$$E_{DIF,s} = \sum_{t=1}^{Nt} E_{DIF,s,t}$$
$$E_{AIF,s} = \sum_{t=1}^{Nt} E_{AIF,s,t} \qquad \text{Equation 7}$$

where $E_{DIF,s,t}$ and $E_{AIF,s,t}$ = total fish entrainment during week *t* at intake screen *s* based on DIF and AIF, respectively, as defined in Equation 6.

Entrainment reduction performance of each CWWS at DIF and AIF ($R_{s,DIF}$ and $R_{s,AIF}$, respectively) was estimated as the relative percent difference in the cumulative weekly entrainment abundance between the CWWS and Control, expressed as:

$$R_{CWWS,DIF} = \left(E_{DIF,CWWS} - E_{DIF,Control}\right)/E_{DIF,Control} \times 100,$$
$$R_{CWWS,AIF} = \left(E_{AIF,CWWS} - E_{AIF,Control}\right)/E_{AIF,Control} \times 100 \quad \text{Equation 8}$$

where $E_{DIF,s}$ and $E_{AIF,s}$ = cumulative entrainment abundance for each screen s (CWWS or Control) as defined in Equation 7.

The cumulative abundance and entrainment reduction estimates for individual taxa and life stages similarly follow Equation 7 and Equation 8. Negative relative percent differences were considered representative of the expected entrainment reduction from a full-scale wedgewire screen intake system if installed and operated at Schiller Station.

6.3.2 Paired Density Differences

Synchronized samples collected at all three locations were used to evaluate effects on entrainment reduction performance for each CWWS such as diel period, tidal stage, and sweeping velocity. For these analyses, the difference between the density of each CWWS and the Control for each matching diel period from synchronized samples was used to assess the potential entrainment reduction instead of relative percent difference to avoid instances of division of zero when the Control density (denominator) is zero. Given that ichthyoplankton density data vary and most often are not normally distributed, densities were log-transformed by $\log_{10}$(density+1) to approximate normality, reduce influence of extreme values (skewness), and accommodate zero densities. Log_{10}(density+1) data transformation is commonly used in analysis of ichthyoplankton density data (Smith 1988, Hubert and Fabrizio 2007). As such, the paired differences in log-transformed densities between each CWWS and the Control among synchronized samples ($\Delta D_{LOG,\ CWWS\text{-}Control}$) are calculated for all taxa and life stages combined, or by individual taxon i and life stage j, as:

$$\Delta D_{LOG,CWWS-Control,i,j,t,h,d} = \left[log_{10}\left(D_{CWWS,i,j,t,h,d} + 1\right) - log_{10}\left(D_{Control,i,j,t,h,d} + 1\right)\right] \quad \text{Equation 9}$$

where $D_{CWWS,i,j,t,h,d}$ = Density at either the 0.8-mm CWWS or 3.0-mm CWWS as defined in Equation 1 with a corresponding sample at the Control.

$D_{Control,i,j,t,h,d}$ = Density at the Control as defined in Equation 1 with a corresponding sample at each CWWS.

A negative difference indicates an entrainment reduction whereas a positive difference indicates an increase in entrainment from the Control. These paired differences ($\Delta D_{LOG,\ CWWS\text{-}Control}$) were compared graphically among the four diel periods and among four tidal stages using notched box plots to assess the presence of diel and tidal effects on CWWS performance. For each box plot, the center line is the median, box extent bounds the 25th and 75th percentiles, whiskers are $\pm$1.5 times the interquartile range, and the solid dot is the mean. Non-overlapping notches indicate medians that are statistically different at the 95% confidence level (McGill et al. 1978). If the notch around the median $\Delta D_{LOG,\ CWWS\text{-}Control}$ contains zero than there is no statistically significant difference between a CWWS and the Control; whereas a notch that is completely below the zero means there is a statistically significant negative difference (i.e., entrainment reduction).

For the tidal effect analysis, the field-recorded tides were based on tidal predictions; so tidal stages used here were defined by local conditions using the measured water velocity data obtained by the southern ADCP (Appendix C). Current velocity data measured by the ADCPs were post-processed to express the river current velocity component along the long axis of the CWWSs, with respect to the CWWS orientation of 165° True North (opposite to 345°), to provide representation of the current velocity along each CWWS referred to as the "sweeping velocity" (further detailed in Appendix C). To aid the assessment of the potential effects of tide stage and sweeping velocity magnitude on CWWS performance, velocity data from each ADCP were subset to concurrent time ranges for each entrainment sample and sample-averaged sweeping velocity, current direction, and tide stage were calculated for every sample. Tide stage was defined by the dominant direction of the sweeping velocity within each entrainment sample (Appendix C). For determining a relation between CWWS performance as a function of sweeping velocity, a simple regression analysis was performed.

7 RESULTS

7.1 Experimental and Environmental Conditions

7.1.1 Cylindrical Wedgewire Screen Test Conditions

The CWWS test systems were setup and first run on 28 December 2018, but several components to the sampling tanks and plumbing needed modification or repair. On 14 January 2019, prior to the start of sampling collection, it was discovered that the original deployment locations of the two CWWSs were 30-35 feet closer to the shoreline than planned. The CWWSs were relocated but the 3.0-mm was discovered to be out of orientation on 4 February 2019. After relocation, the 0.8-mm CWWS was within 5 feet of the planned location and the long axis was pointing 165° True North, within the ±2° of the proposed principal axis (165.3°) measured during the 19-day ADCP deployment period from 19 October through 8 November 2018. The 3.0-mm CWWS was about 15 feet downriver from the planned location and oriented 185° True North. The 3.0-mm CWWS was rotated 20° to be oriented 165° (True North) on 12 February 2019 prior to the start of sampling. On 7 March 2019 when divers were deployed to install the long-term ADCPs, after sampling had been taking place for four weeks, it was discovered that the 3.0-mm CWWS had been rotated 20 degrees in the wrong direction resulting in a net 30°off the estimated sweeping flow direction of 165°. The 3.0-mm CWWS was rotated to its proper orientation on 8 March 2019. The final locations for the 0.8-mm and 3.0-mm CWWSs were 43° 5'53.22" N, 70° 46' 56.76" W and 43° 5'53.04" N, 70° 46'56.64" W, respectively. The centerline for both screens was about 39.75 inches off the riverbed, and both screens were oriented 165° True North (Figure 9).

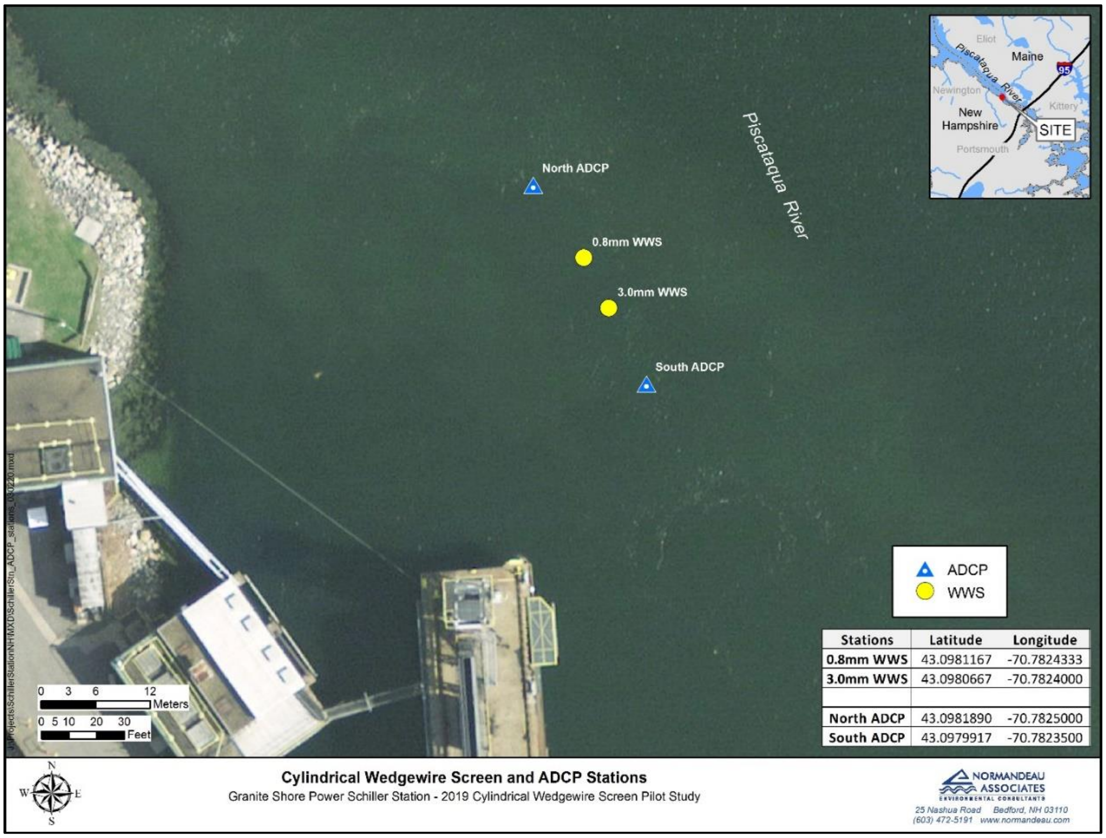


Figure 9. Location of the Cylindrical Wedgewire Screens (yellow dots) and ADCP units (blue triangles) in the Piscataqua River near Schiller Station.

Occasional equipment malfunctions occurred over the course of the yearlong study. A corroded nipple of a cam lock plug broke off on the 3.0-mm screen connection, discovered through a dive inspection on 20 March 2019. The damage was repaired, and sampling resumed the following week. During a dive inspection on 2 September 2019, a 16–24-inch slice was discovered on the 0.8-mm CWWS's 6-inch return hose where it entered Screen House #1; this slice was repaired, and sampling resumed. During this September dive, slight biofouling to both the 0.8-mm and 3.0-mm screens were observed (Figure 10). More significant biofouling and minor damage, 4% surface area damage to the 0.8-mm CWWS, was observed during the 1 October 2019 dive inspection (ENERCON 2020; Figure 10). Finally, data received from the North ADCP unit suggested the ADCP unit was impacted in some way on 20 November 2019. A lobster trap was found near the North ADCP during a dive inspection on 7 December 2019 before the next scheduled sampling event. Although no damage to the North ADCP or hose was found, the ADCP was immediately returned to its original location after being found approximately 30-40 feet away, indicating that the lobster pot pulled the ADCP along the riverbed. During the 7 December 2019 dive, biofouling and heavy deterioration on both the 0.8-mm and 3.0-mm CWWSs was observed, increasing the percentage of damaged surface area since the previous inspection on 1 October 2019 from 4% to 10.25% on the 0.8-mm CWWS and from 0% to 5.5% on the 3.0-mm CWWS (ENERCON 2020; Figure 10). Due to the increase in open area of the damaged screens and uncertainty in the validity of the CWWS data, a decision was made to immediately discontinue sampling at the 0.8-mm and 3.0-mm CWWSs and continue collecting samples at the control location to complete a full year's study.

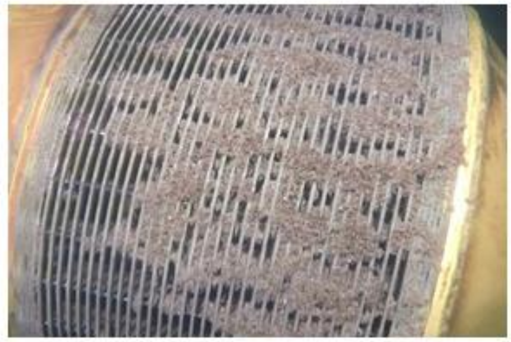
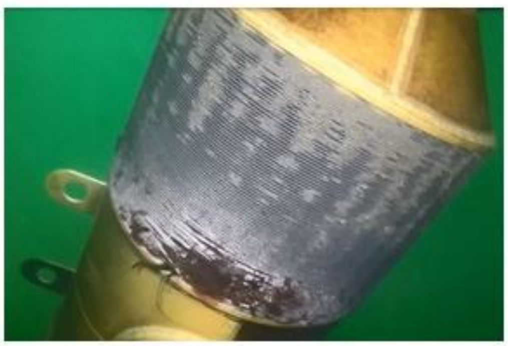
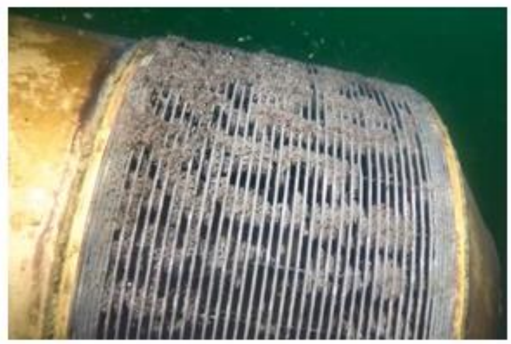
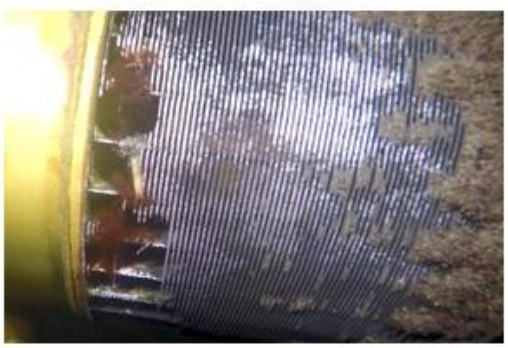
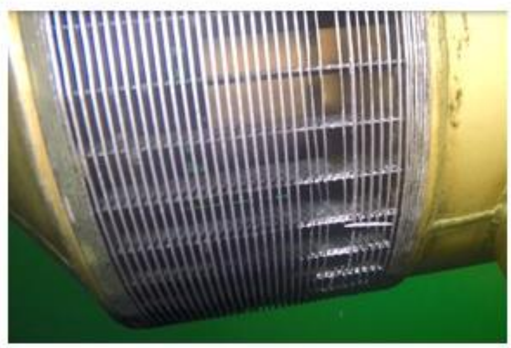
0.8-mm Cylindrical Wedgewire Screen	3.0-mm Cylindrical Wedgewire Screen
 2 September 2019	 2 September 2019
 1 October 2019	 1 October 2019
 7 December 2019	 7 December 2019

Figure 10. Underwater photographs of the 0.8-mm and 3.0-mm cylindrical wedgewire screens tested at Schiller Station from 2 September 2019, 1 October 2019, and 7 December 2019.

7.1.2 Sampling Non-conformities

Each field sample is assigned a Use Code at the time of collection or during data audits, defining its availability for use in analysis. A Use Code 1 sample is one in which valid data were collected using the procedures specified in the SOP (Normandeau 2019) and no sampling problems were encountered. A Use Code 2 sample is one in which a sample or a portion of a sample was collected but sampling problems were encountered so that the sample collection was not as specified by the SOP. Pumped entrainment sampling problems are generally related to gear deployment, flow measurement, or timing that could affect the calculation of density (fish caught per unit volume of sample collected) and the comparison of fish density from sample to sample. A Use Code 5 sample is the same as a Use Code 2 sample but where no fish or no volume measurement exists and were considered void.

During sampling, there were two samples designated with Use Code 2. On 16 July 2019, the net of sample 391 from the 0.8-mm CWWS was dropped into the tank when a technician was attempting to retrieve the sample for a net rinse. Since it is unknown how much, if any, material floated out of the net during this short period of time, this sample was assigned a Use Code 2. Sample 577 from 10 September 2019 experienced a sampling delay when the plant needed to provide an electrician to restore the water supply for the Control. This delay of more than 1.5 hours was recorded, and the sample stayed within the correct diel period; however, because it became unsynchronized with the 0.8-mm and 3.0-mm CWWS samples, the sample was assigned a Use Code 2. Samples 62, 65, 68 and 71 were designated as Use Code 5 and all occurred on 19 March 2019 when large debris was collected from the 3.0-mm CWWS due to corrosion of the cam lock on the pipe connection (ENERCON 2020). Sampling was discontinued from the 3.0-mm CWWS at this time until divers could be deployed to investigate the CWWSs and repair the pipe connections. During sample collections for the week of 2 September 2019, the 0.8-mm CWWS hose outside Screen House #1 was being repaired, therefore no samples from the 0.8-mm CWWS were collected and all (n = 8) were given Use Code 5 designations. No Use Code 2 or 5 samples were used in the analysis.

Because of the discovery of the 3.0-mm CWWS being misaligned for the first four weeks of sampling, data collected from 14 February 2019 through 5 March 2019 were not used for estimating CWWS performance and, as such, the valid (Use Code 1) samples collected during this period were reassigned as Use Code 4. Use Code 3 was reassigned to valid samples when all three screens were not synchronized. Valid samples collected concurrently at all three screen locations prior to the 1 October 2019 dive were included in the CWWS performance evaluation since there was only slight CWWS damage observed at that time. However, since there is no way to determine when the major damage occurred to the 0.8-mm and 3.0-mm CWWSs between the October and December dives, data collected from this period were not used in the CWWS performance evaluation and were reassigned to Use Code 6. Results from entrainment monitoring from the yearlong period (Monday, 11 February 2019 through Monday, 3 February 2020) were provided using samples designated as Use Code 1, 3, 4, and 6, but only valid data (Use Code 1) collected during the performance evaluation period (Monday, 11 March 2019 through Monday, 23 September 2019) were used for evaluating entrainment reduction performance.

7.1.3 Achieved Sampling Design

Of the 696 planned entrainment samples, 640 (92.5%) were collected and analyzed in the laboratory, and 522 valid samples (Use Code 1) from the performance evaluation period were used for CWWS entrainment reduction results (81.6% of the 640 samples processed; Table 4).

During each diel sampling period, sample collection for the 0.8-mm CWWS, 3.0-mm CWWS, and Control began within an average of 3 minutes apart (ranging from 0 to 14 minutes apart) and ended within an average of 4 minutes apart (ranging from 0 to 20 minutes apart). The sample duration of valid (Use

Code 1) samples averaged 145 minutes and ranged from 129 to 213 minutes. Flow rate of the sampling pumps decreased as the river elevation dropped with tide, which led to varying sample durations. The entrainment samples collected from the 0.8-mm CWWS, 3.0-mm CWWS and Control all had average volumes of 100 m^3 per sample with a minimum of 97 m^3 from all three locations and a maximum of 105 m^3, 104 m^3, and 107 m^3, respectively (Table 5).

7.1.4 Water Quality Observations

Mean water temperature observations showed a typical north temperate seasonal water temperature pattern. Water temperature increased from 1.5°C at the 0.8-mm and 3.0-mm CWWSs and 1.8°C at the Control location in the beginning of the program. The water temperature at the CWWSs was often slightly cooler because they were deeper compared to the shoreline bulkhead CWIS. Water temperature peaked to 19.3°C at the 0.8-mm and 3.0-mm CWWSs and 19.5°C at the Control in late July, and then declined to 6.7°C and 6.5°C at the 0.8-mm and 3.0-mm CWWSs, respectively, at the end of sampling during the week of Monday, 18 November 2019, and 3.5°C at the Control at the end of sampling during the week of Monday, 3 February 2020 (Table 6).

DO concentrations showed a typical inverse relationship with water temperature, decreasing as water temperature increased from the yearlong period (Table 6). Mean DO observed at the 0.8-mm CWWS ranged from 7.1 mg/L to 13.2 mg/L (n = 212), the 3.0-mm CWWS ranged from 6.8 mg/L to 12.6 mg/L (n = 217) and the Control ranged from 6.8 mg/L to 14.8 mg/L (n = 239; Table 6).

To gain a better understanding of the environment, conductivity measurements collected in the field were converted to salinity. Mean salinity from the yearlong period was similar between the 0.8-mm CWWS, the 3.0-mm CWWS, and the Control with mean readings of 23.9 PSU, 24.0 PSU and 23.7 PSU, respectively (Table 6).

Finally, mean pH showed less variation throughout the CWWS study at Schiller Station than other water quality observations. Mean pH was 7.9 for all locations and ranged from a minimum of 7.3 to a maximum of 9.3 at the 0.8-mm CWWS, 7.4 to 9.3 at the 3.0-mm CWWS and from 7.3 to 9.2 at the Control (Table 6). After further review of calibration and sampling procedures, and measurements taken before and after samples collected during diel period 1 (0900–1500) on 9 April 2019 (Week 14), the pH measurements of 9.2–9.3 were likely made in error but could not be confirmed. Excluding pH values from Week 14, the next highest pH readings from the 0.8-mm CWWS, 3.0-mm CWWS, and Control were measured during Week 7 (19 February 2019) as 8.3, 8.4, and 8.3, respectively.

The approximate 18°C range in water temperature from entrainment samples mirrored the expected seasonal variation in the river. These observations confirmed salinity and pH of samples exhibited expected estuarine variation from freshwater and oceanic mixing. Dissolved oxygen measurements reflected expected river conditions and saturation under seasonal change in temperature. Lastly, differences in water quality among samples did not show any trend indicating the CWWSs or the Control was withdrawing different water masses.

Table 5. Weekly mean volume (m^3) of samples collected from the 0.8-mm and 3.0-mm cylindrical wedgewire screen (CWWS) intakes and the existing cooling water intake structure (CWIS) for Units 5 and 6 (Control) from the weeks beginning Monday, 11 February 2019 through Monday, 3 February 2020.

Week No.	Sampling Week (beginning Monday)	Weekly Mean Sampling Volume (m^3)		
		0.8-mm CWWS	3.0-mm CWWS	Existing CWIS (Control)
6	11-Feb-2019	102.7	100.8	98.6
7	18-Feb-2019	100.3	99.4	99.4
8	25-Feb-2019	101.2	100.8	100.1
9	04-Mar-2019	99.4	99.5	99.6
10	11-Mar-2019	100.1	101.4	99.8
11	18-Mar-2019	99.7		101.2
12	25-Mar-2019	100.5	100.7	98.3
13	01-Apr-2019	99.8	99.8	99.6
14	08-Apr-2019	100.2	100.2	100.1
15	15-Apr-2019	99.1	98.6	101.5
16	22-Apr-2019	99.2	100.2	99.5
17	29-Apr-2019	98.8	99.8	100.0
18	06-May-2019	99.1	99.8	100.3
19	13-May-2019	98.7	99.2	100.6
20	20-May-2019	98.9	99.2	99.1
21	27-May-2019	100.2	100.1	100.5
22	03-Jun-2019	99.6	99.7	100.4
23	10-Jun-2019	99.8	100.0	99.8
24	17-Jun-2019	99.5	100.1	98.3
25	24-Jun-2019	99.6	100.0	98.5
26	01-Jul-2019	100.1	100.1	100.8
27	08-Jul-2019	99.9	99.7	100.2
28	15-Jul-2019	99.5	99.4	100.7
29	22-Jul-2019	99.0	99.3	100.2
30	29-Jul-2019	98.9	99.5	100.3
31	05-Aug-2019	98.4	99.0	100.3
32	12-Aug-2019	100.2	100.2	100.7
33	19-Aug-2019	99.9	100.3	99.5
34	26-Aug-2019	99.8	99.8	98.7
35	02-Sep-2019		99.8	99.3
36	09-Sep-2019	98.5	98.9	98.1
37	16-Sep-2019	99.1	99.3	99.9
38	23-Sep-2019	98.8	99.1	100.0
40	07-Oct-2019	99.7	100.1	100.2
46	18-Nov-2019	100.0	100.2	99.6
49	09-Dec-2019			98.9
1	06-Jan-2020			99.4
2	13-Jan-2020			99.1
3	20-Jan-2020			99.7
4	27-Jan-2020			100.1
5	03-Feb-2020			99.2
Minimum		**97.1**	**97.1**	**97.0**
Maximum		**104.7**	**104.4**	**106.8**
Mean		**99.6**	**99.8**	**99.7**

Table 6. Summary statistics[1] for dissolved oxygen concentrations (±0.1 mg/L), pH (±0.1 unit), salinity (±1.0 PSU), and water temperature (±0.1°C) observed during sampling from the 0.8-mm and 3.0-mm cylindrical wedgewire screen (CWWS) intakes and the existing cooling water intake structure (CWIS) for Units 5 and 6 (Control) at Schiller Station from weeks beginning Monday, 11 February 2019 through Monday, 3 February 2020.

Week No.	Sampling Week (beginning Monday)	Location	Dissolved Oxygen (mg/L)					pH[2]					Salinity (PSU)					Water Temperature (°C)				
			N	Min	Mean	Max	sd	N	Min	Mean	Max	sd	N	Min	Mean	Max	sd	N	Min	Mean	Max	sd
6	11-Feb-2019	0.8-mm CWWS	4	11.8	13.2	15.9	1.9	4	7.3	7.7	7.9	0.3	4	21.6	22.4	23.3	0.7	4	1.3	1.5	1.7	0.2
		3.0-mm CWWS	4	11.6	12.3	12.9	0.6	4	7.6	7.8	7.9	0.1	4	22.0	22.6	23.3	0.6	4	1.3	1.5	1.7	0.2
		Existing CWIS (Control)	4	11.3	12.1	13.2	0.8	4	7.6	7.8	7.9	0.2	4	21.8	22.6	23.5	0.8	4	1.5	1.8	2.2	0.3
7	18-Feb-2019	0.8-mm CWWS	4	11.1	12.0	12.3	0.6	4	7.6	8.1	8.3	0.3	4	25.7	27.1	28.2	1.1	4	1.8	3.0	4.1	1.1
		3.0-mm CWWS	4	10.9	11.8	12.3	0.6	4	7.6	8.1	8.4	0.4	4	26.0	27.2	28.1	0.9	4	1.9	2.9	3.6	0.9
		Existing CWIS (Control)	4	10.4	11.8	12.4	0.9	4	8.2	8.3	8.3	0.1	4	26.9	27.7	29.2	1.1	4	2.3	2.8	3.5	0.6
8	25-Feb-2019	0.8-mm CWWS	4	11.4	12.3	13.0	0.8	4	7.8	7.9	8.2	0.2	4	22.2	24.3	26.7	2.3	4	1.4	1.8	2.4	0.5
		3.0-mm CWWS	4	11.7	12.2	12.8	0.5	4	7.9	8.0	8.2	0.1	4	22.1	24.4	26.8	2.3	4	1.3	1.8	2.4	0.5
		Existing CWIS (Control)	4	11.2	12.1	13.0	0.8	4	8.1	8.1	8.1	0.0	4	22.4	24.7	27.1	2.2	4	0.9	1.3	1.9	0.4
9	04-Mar-2019	0.8-mm CWWS	4	10.3	11.8	13.0	1.1	4	8.0	8.1	8.2	0.1	4	25.1	26.5	28.0	1.5	4	1.6	1.9	2.1	0.3
		3.0-mm CWWS	4	11.0	12.0	13.5	1.2	4	8.0	8.1	8.2	0.1	4	20.1	25.2	28.3	3.6	4	1.6	2.0	2.3	0.3
		Existing CWIS (Control)	4	11.4	12.3	13.4	1.0	4	8.0	8.1	8.1	0.0	4	25.2	26.8	28.1	1.4	4	2.1	2.1	2.2	0.1
10	11-Mar-2019	0.8-mm CWWS	4	9.4	11.7	14.2	2.0	4	8.0	8.1	8.2	0.1	4	23.2	25.4	27.3	2.2	4	1.8	2.3	2.6	0.3
		3.0-mm CWWS	4	9.8	11.9	14.2	1.9	4	8.1	8.1	8.2	0.0	4	23.3	25.6	27.4	2.2	4	1.9	2.3	2.6	0.3
		Existing CWIS (Control)	4	9.8	11.9	13.8	1.7	4	8.1	8.2	8.2	0.1	4	23.5	25.5	27.4	1.8	4	1.9	2.2	2.4	0.3
11	18-Mar-2019	0.8-mm CWWS	4	10.8	11.7	13.3	1.1	1	8.0	8.0	8.0		4	23.2	26.2	28.4	2.6	4	3.2	3.6	4.1	0.4
		3.0-mm CWWS	2	10.2	10.4	10.6	0.3	1	8.0	8.0	8.0		2	22.0	25.2	28.4	4.5	2	3.2	3.5	3.7	0.4
		Existing CWIS (Control)	4	10.5	11.7	13.9	1.6						4	22.1	25.6	28.1	3.0	4	3.3	3.7	4.1	0.4

(continued)

Table 6. (continued)

Week No.	Sampling Week (beginning Monday)	Location	Dissolved Oxygen (mg/L)					pH[2]					Salinity (PSU)					Water Temperature (°C)				
			N	Min	Mean	Max	sd	N	Min	Mean	Max	sd	N	Min	Mean	Max	sd	N	Min	Mean	Max	sd
12	25-Mar-2019	0.8-mm CWWS	4	10.8	11.8	12.7	1.0	4	8.2	8.2	8.3	0.1	4	19.9	21.0	21.7	0.8	4	4.5	4.5	4.5	0.0
		3.0-mm CWWS	4	10.9	11.8	12.6	0.9	4	8.2	8.2	8.3	0.1	4	20.2	20.9	22.2	0.9	4	4.5	4.6	4.6	0.1
		Existing CWIS (Control)	4	10.5	11.8	13.1	1.3	4	8.2	8.2	8.3	0.1	4	20.2	21.6	22.7	1.2	4	4.5	4.8	5.0	0.2
13	01-Apr-2019	0.8-mm CWWS	4	11.5	13.1	14.3	1.3	4	7.9	8.1	8.2	0.1	4	19.6	23.3	26.3	2.9	4	4.3	4.9	5.5	0.5
		3.0-mm CWWS	4	11.6	12.6	13.1	0.7	4	7.9	8.1	8.2	0.1	4	19.4	23.2	26.2	3.1	4	4.3	4.9	5.5	0.5
		Existing CWIS (Control)	4	10.9	12.3	13.8	1.5	4	8.0	8.1	8.2	0.1	4	20.4	23.6	26.4	2.7	4	4.4	5.1	6.0	0.7
14	08-Apr-2019	0.8-mm CWWS	4	9.8	11.1	12.1	1.0	4	7.9	8.3	9.3	0.7	4	18.8	24.2	26.7	3.7	4	4.6	5.0	5.6	0.5
		3.0-mm CWWS	4	10.9	11.3	11.8	0.4	4	7.9	8.3	9.3	0.7	4	18.8	24.2	26.7	3.7	4	4.6	5.0	5.6	0.5
		Existing CWIS (Control)	4	11.2	11.6	12.0	0.4	4	7.9	8.3	9.2	0.6	4	18.8	24.1	26.5	3.6	4	4.6	5.0	5.6	0.5
15	15-Apr-2019	0.8-mm CWWS	4	10.4	10.9	11.4	0.5	4	7.4	7.8	8.0	0.3	4	16.9	22.2	26.5	4.7	4	5.7	6.6	7.8	0.9
		3.0-mm CWWS	4	10.9	11.1	11.2	0.1	4	7.4	7.8	7.9	0.2	4	17.0	22.2	26.5	4.6	4	5.8	6.7	8.0	1.0
		Existing CWIS (Control)	4	10.8	11.2	11.5	0.4	4	7.3	7.7	8.0	0.4	4	16.9	22.2	26.6	4.5	4	5.5	6.5	7.7	1.0
16	22-Apr-2019	0.8-mm CWWS	4	9.7	10.2	10.7	0.6	4	7.8	7.9	8.0	0.1	4	18.7	22.2	25.8	4.0	4	6.7	8.3	10.0	1.7
		3.0-mm CWWS	4	8.2	9.7	10.7	1.1	4	7.8	7.9	8.0	0.1	4	18.7	22.3	25.9	4.0	4	6.7	8.2	10.0	1.7
		Existing CWIS (Control)	4	8.8	9.9	10.7	0.8	4	7.8	8.0	8.1	0.1	4	18.7	22.2	25.9	4.0	4	6.9	8.4	10.1	1.7
17	29-Apr-2019	0.8-mm CWWS	4	9.9	10.3	10.6	0.3	4	7.8	7.9	8.0	0.1	4	13.9	18.6	23.3	5.0	4	7.2	8.4	9.6	1.2
		3.0-mm CWWS	4	9.4	9.7	10.1	0.3	4	7.8	7.9	8.0	0.1	4	14.0	18.6	23.2	5.0	4	7.2	8.3	9.6	1.3
		Existing CWIS (Control)	4	10.0	10.2	10.4	0.2	4	7.8	7.9	8.0	0.1	4	14.5	18.5	22.6	4.5	4	7.4	8.7	9.9	1.2
18	06-May-2019	0.8-mm CWWS	8	9.0	10.9	12.5	1.1	8	7.8	7.9	8.0	0.1	8	14.9	20.7	24.4	3.9	8	7.3	9.1	10.8	1.5
		3.0-mm CWWS	8	9.5	10.6	11.7	0.7	8	7.8	7.9	8.0	0.1	8	15.0	20.8	24.5	4.0	8	7.3	9.1	10.7	1.4
		Existing CWIS (Control)	8	9.4	11.0	12.6	1.1	8	7.7	7.9	8.0	0.1	8	14.9	20.4	24.4	3.9	8	7.4	9.3	11.0	1.5

(continued)

Table 6. (continued)

Week No.	Sampling Week (beginning Monday)	Location	Dissolved Oxygen (mg/L)					pH[2]					Salinity (PSU)					Water Temperature (°C)				
			N	Min	Mean	Max	sd	N	Min	Mean	Max	sd	N	Min	Mean	Max	sd	N	Min	Mean	Max	sd
19	13-May-2019	0.8-mm CWWS	8	9.1	10.2	11.3	0.7	8	7.8	7.9	8.0	0.1	8	18.0	20.6	22.8	2.3	8	8.9	9.7	10.7	0.8
		3.0-mm CWWS	8	9.1	10.1	11.1	0.8	8	7.8	7.9	8.1	0.1	8	18.0	20.5	22.7	2.2	8	8.9	9.7	10.8	0.8
		Existing CWIS (Control)	8	9.3	10.1	11.3	0.6	8	7.8	7.9	8.1	0.1	8	17.9	20.5	22.7	2.2	8	9.0	10.0	10.9	0.8
20	20-May-2019	0.8-mm CWWS	8	8.8	10.9	13.0	1.3	8	7.8	7.9	8.0	0.1	8	18.0	21.0	24.2	2.4	8	7.6	10.1	12.4	1.9
		3.0-mm CWWS	8	9.9	11.0	11.9	0.8	8	7.9	8.0	8.1	0.1	8	18.1	21.1	24.3	2.4	8	7.6	10.1	12.2	1.8
		Existing CWIS (Control)	8	10.3	11.3	12.3	0.7	8	7.9	8.0	8.1	0.1	8	18.1	20.8	24.0	2.3	8	7.9	10.4	12.8	1.8
21	27-May-2019	0.8-mm CWWS	8	8.3	9.6	10.1	0.6	8	8.0	8.1	8.1	0.1	8	18.8	20.4	22.7	1.6	8	11.3	12.9	14.2	1.2
		3.0-mm CWWS	8	8.8	9.5	10.4	0.5	8	8.0	8.1	8.1	0.1	8	18.8	20.4	22.6	1.5	8	11.4	12.9	14.1	1.2
		Existing CWIS (Control)	8	8.8	9.7	10.3	0.5	8	7.9	8.0	8.1	0.1	8	18.9	20.3	22.5	1.5	8	11.4	13.2	14.3	1.1
22	03-Jun-2019	0.8-mm CWWS	8	9.6	10.5	11.3	0.6	8	7.9	7.9	8.0	0.0	8	19.9	22.3	23.7	1.4	8	9.2	10.9	13.5	1.6
		3.0-mm CWWS	8	9.2	10.1	11.1	0.5	8	7.9	8.0	8.0	0.1	8	20.0	22.4	23.7	1.3	8	9.2	10.8	13.4	1.5
		Existing CWIS (Control)	8	9.0	10.1	10.6	0.5	8	7.9	7.9	8.0	0.1	8	19.7	22.2	23.6	1.4	8	9.4	11.2	13.7	1.5
23	10-Jun-2019	0.8-mm CWWS	8	8.7	9.8	11.4	1.1	8	7.8	7.9	8.0	0.1	8	17.8	20.3	23.1	2.1	8	10.0	13.9	16.9	2.9
		3.0-mm CWWS	8	8.3	9.6	11.3	1.1	8	7.8	7.9	7.9	0.0	8	18.0	20.3	23.0	2.0	8	10.2	14.0	16.8	2.8
		Existing CWIS (Control)	8	8.3	9.6	11.3	1.2	8	7.8	7.9	7.9	0.1	8	18.1	20.3	23.1	2.1	8	10.5	14.2	17.0	2.7
24	17-Jun-2019	0.8-mm CWWS	8	8.8	12.7	15.3	1.8	8	7.8	7.9	8.0	0.1	8	19.6	21.5	22.5	1.0	8	10.7	11.8	14.4	1.3
		3.0-mm CWWS	7	7.7	12.1	13.7	2.1	8	7.8	7.9	8.0	0.1	8	19.7	21.6	22.4	0.9	8	10.5	11.8	14.3	1.2
		Existing CWIS (Control)	7	7.3	12.4	13.8	2.3	8	7.8	7.9	8.0	0.1	8	19.6	21.5	22.3	1.0	8	10.7	12.1	14.5	1.3
25	24-Jun-2019	0.8-mm CWWS	8	8.0	8.7	9.5	0.5	8	7.8	7.9	8.0	0.1	8	18.4	19.2	20.7	0.8	8	15.8	16.9	17.8	0.7
		3.0-mm CWWS	8	8.1	8.6	9.1	0.3	8	7.9	7.9	8.0	0.1	8	18.5	19.3	20.7	0.8	8	15.9	16.9	17.8	0.7
		Existing CWIS (Control)	8	8.0	8.7	9.1	0.4	8	7.8	7.9	8.0	0.1	8	18.4	19.4	21.0	1.0	8	15.5	16.8	17.9	0.9

(continued)

Table 6. (continued)

Week No.	Sampling Week (beginning Monday)	Location	Dissolved Oxygen (mg/L)					pH[2]					Salinity (PSU)					Water Temperature (°C)				
			N	Min	Mean	Max	sd	N	Min	Mean	Max	sd	N	Min	Mean	Max	sd	N	Min	Mean	Max	sd
26	01-Jul-2019	0.8-mm CWWS	8	6.8	8.6	9.2	0.8	8	7.9	8.0	8.0	0.1	8	19.9	20.4	21.0	0.4	8	15.2	16.3	17.5	0.9
		3.0-mm CWWS	8	8.1	8.8	9.1	0.4	8	7.9	8.0	8.0	0.0	8	19.7	20.4	21.0	0.5	8	14.8	16.3	17.5	1.0
		Existing CWIS (Control)	8	8.2	8.7	9.1	0.3	8	7.9	8.0	8.0	0.1	8	19.9	20.6	21.1	0.4	8	14.9	16.4	17.7	1.0
27	08-Jul-2019	0.8-mm CWWS	8	7.7	8.7	9.5	0.5	8	7.9	7.9	8.0	0.1	8	19.9	24.0	29.0	4.3	8	16.7	18.5	20.0	1.1
		3.0-mm CWWS	8	7.7	8.5	8.9	0.4	8	7.9	7.9	8.0	0.1	8	19.9	24.1	29.2	4.4	8	16.7	18.5	20.0	1.1
		Existing CWIS (Control)	8	7.8	8.6	9.0	0.5	8	7.8	7.9	8.0	0.1	8	19.6	24.2	29.7	4.5	8	16.1	18.7	20.2	1.4
28	15-Jul-2019	0.8-mm CWWS	8	7.9	8.7	9.1	0.5	8	7.7	7.9	8.1	0.1	8	29.1	29.8	30.6	0.6	8	13.5	16.4	18.1	1.5
		3.0-mm CWWS	8	8.2	8.7	9.0	0.3	8	7.8	8.0	8.1	0.1	8	29.1	29.9	30.7	0.6	8	13.5	16.4	18.0	1.5
		Existing CWIS (Control)	8	8.0	8.6	9.1	0.4	8	7.8	8.0	8.1	0.1	8	29.2	29.9	30.6	0.5	8	14.2	16.7	18.2	1.3
29	22-Jul-2019	0.8-mm CWWS	8	6.3	7.4	7.9	0.6	8	7.8	7.8	7.9	0.0	8	25.5	26.9	29.9	1.6	8	17.3	19.3	20.2	0.9
		3.0-mm CWWS	8	6.6	7.3	7.9	0.5	8	7.8	7.8	7.9	0.0	8	25.5	27.0	30.1	1.7	8	17.3	19.3	20.2	0.9
		Existing CWIS (Control)	8	6.9	7.2	7.7	0.2	8	7.7	7.8	7.9	0.1	8	25.5	26.9	29.6	1.6	8	17.6	19.5	20.6	1.0
30	29-Jul-2019	0.8-mm CWWS	8	7.7	8.1	8.7	0.4	8	7.8	7.9	7.9	0.1	8	26.5	27.5	28.3	0.6	8	13.3	15.6	18.8	1.7
		3.0-mm CWWS	8	7.4	8.1	8.6	0.4	8	7.8	7.9	7.9	0.1	8	26.5	27.9	30.4	1.2	8	13.2	15.6	18.8	1.8
		Existing CWIS (Control)	8	7.5	8.1	8.4	0.3	8	7.8	7.9	7.9	0.1	8	26.8	27.6	28.3	0.5	8	13.7	15.6	19.0	1.7
31	05-Aug-2019	0.8-mm CWWS	8	6.2	7.3	8.8	0.9	8	7.7	7.8	7.9	0.1	8	26.9	27.6	28.2	0.4	8	14.8	17.1	18.7	1.2
		3.0-mm CWWS	8	7.2	7.9	8.6	0.5	8	7.8	7.9	7.9	0.1	8	26.8	27.5	28.1	0.4	8	14.7	17.0	18.8	1.3
		Existing CWIS (Control)	8	7.0	7.8	8.6	0.5	8	7.8	7.9	7.9	0.1	8	26.8	27.6	28.2	0.5	8	15.1	17.3	19.0	1.3
32	12-Aug-2019	0.8-mm CWWS	8	6.9	8.1	8.9	0.6	8	7.8	7.9	7.9	0.0	8	27.7	28.0	28.3	0.2	8	13.8	15.1	15.9	0.7
		3.0-mm CWWS	8	7.6	8.3	9.3	0.6	8	7.8	7.9	7.9	0.0	8	27.8	28.0	28.3	0.2	8	13.7	15.0	15.7	0.7
		Existing CWIS (Control)	8	7.8	8.3	8.9	0.4	8	7.8	7.9	7.9	0.1	8	27.7	28.2	28.4	0.2	8	14.1	15.1	15.7	0.5

(continued)

Table 6. (continued)

Week No.	Sampling Week (beginning Monday)	Location	Dissolved Oxygen (mg/L)					pH[2]					Salinity (PSU)					Water Temperature (°C)				
			N	Min	Mean	Max	sd	N	Min	Mean	Max	sd	N	Min	Mean	Max	sd	N	Min	Mean	Max	sd
33	19-Aug-2019	0.8-mm CWWS	8	6.5	8.1	9.5	1.1	8	7.8	7.9	8.0	0.1	8	26.3	27.1	28.1	0.7	8	16.8	18.9	20.7	1.6
		3.0-mm CWWS	8	7.7	8.4	9.7	0.8	8	7.8	7.9	8.0	0.1	8	26.3	27.1	28.0	0.7	8	16.8	18.9	20.8	1.6
		Existing CWIS (Control)	8	7.4	8.2	9.8	0.8	8	7.8	7.9	8.0	0.1	8	26.4	27.2	28.1	0.6	8	16.9	19.1	20.9	1.6
34	26-Aug-2019	0.8-mm CWWS	8	6.4	7.5	8.2	0.7	8	7.9	7.9	8.0	0.0	8	26.3	27.0	27.8	0.5	8	16.7	18.7	20.1	1.1
		3.0-mm CWWS	8	7.2	7.6	8.2	0.4	8	7.9	7.9	8.0	0.0	8	26.4	27.0	27.9	0.5	8	16.7	18.7	20.1	1.2
		Existing CWIS (Control)	8	6.7	7.2	7.6	0.4	8	7.8	7.9	8.0	0.1	8	26.4	27.1	27.9	0.5	8	17.0	18.8	20.4	1.2
35	02-Sep-2019	3.0-mm CWWS	8	7.4	8.0	8.8	0.5	8	7.8	7.9	8.0	0.1	8	24.7	26.5	29.3	1.4	8	16.0	17.5	19.1	1.2
		Existing CWIS (Control)	8	7.0	7.6	8.4	0.6	8	7.8	7.9	7.9	0.1	8	24.8	26.1	27.0	0.7	8	16.4	17.7	19.2	1.1
36	09-Sep-2019	0.8-mm CWWS	4	7.2	8.0	8.3	0.5	4	7.9	8.0	8.0	0.0	4	22.0	24.2	26.2	2.0	4	16.9	17.2	17.5	0.3
		3.0-mm CWWS	4	7.6	8.0	8.4	0.3	4	7.9	8.0	8.0	0.0	4	22.2	24.2	26.2	1.9	4	16.9	17.2	17.5	0.3
		Existing CWIS (Control)	4	7.1	7.6	8.1	0.4	4	7.9	8.0	8.0	0.1	4	21.9	24.4	26.3	2.0	4	17.1	17.4	17.8	0.4
37	16-Sep-2019	0.8-mm CWWS	8	6.3	7.1	7.7	0.5	8	7.7	7.8	7.9	0.1	8	20.6	25.0	26.3	1.8	8	14.4	15.9	17.0	0.8
		3.0-mm CWWS	8	6.1	6.8	7.6	0.5	8	7.7	7.8	8.0	0.1	8	22.7	25.3	26.3	1.1	8	14.4	15.9	16.9	0.8
		Existing CWIS (Control)	8	6.0	6.8	7.2	0.5	8	7.7	7.8	7.9	0.1	8	20.4	25.0	26.4	1.9	8	14.5	16.0	16.9	0.8
38	23-Sep-2019	0.8-mm CWWS	8	6.4	7.2	7.5	0.3	8	7.7	7.8	7.8	0.1	8	25.1	25.6	26.0	0.4	8	13.6	15.3	17.2	1.4
		3.0-mm CWWS	8	6.8	7.0	7.2	0.2	8	7.7	7.8	7.8	0.0	8	25.1	25.6	25.9	0.3	8	13.6	15.3	17.1	1.4
		Existing CWIS (Control)	8	6.6	7.0	7.4	0.3	8	7.7	7.8	7.8	0.1	8	25.1	25.6	25.9	0.3	8	13.7	15.3	17.1	1.3
40	07-Oct-2019	0.8-mm CWWS	4	7.5	7.7	7.9	0.2	4	7.8	7.9	7.9	0.1	4	25.3	25.5	25.8	0.2	4	13.3	13.6	14.0	0.3
		3.0-mm CWWS	4	7.5	7.7	7.9	0.2	4	7.8	7.9	7.9	0.1	4	25.3	25.5	25.9	0.3	4	13.3	13.7	14.1	0.3
		Existing CWIS (Control)	4	7.2	7.6	7.8	0.3	4	7.8	7.9	7.9	0.1	4	25.5	25.6	25.9	0.2	4	13.3	13.7	14.2	0.4

(continued)

Table 6. (continued)

Week No.	Sampling Week (beginning Monday)	Location	Dissolved Oxygen (mg/L)					pH[2]					Salinity (PSU)					Water Temperature (°C)				
			N	Min	Mean	Max	sd	N	Min	Mean	Max	sd	N	Min	Mean	Max	sd	N	Min	Mean	Max	sd
46	18-Nov-2019	0.8-mm CWWS	4	10.6	11.3	11.8	0.6	4	7.8	7.9	7.9	0.1	4	23.6	24.9	25.6	0.9	4	6.2	6.7	7.1	0.4
		3.0-mm CWWS	4	10.5	10.7	11.1	0.3	4	7.8	7.9	7.9	0.1	4	23.6	24.9	25.6	0.9	4	5.8	6.5	7.1	0.6
		Existing CWIS (Control)	4	10.2	10.9	11.8	0.7	4	7.8	7.8	7.9	0.1	4	23.5	24.9	25.6	1.0	4	6.1	6.5	6.9	0.4
49	09-Dec-2019	Existing CWIS (Control)	4	10.1	11.6	13.0	1.3	4	7.8	7.8	7.8	0.0	4	21.3	21.9	23.2	0.9	4	5.2	5.6	6.0	0.4
1	06-Jan-2020	Existing CWIS (Control)	4	13.7	14.8	15.7	0.8	4	7.8	7.9	7.9	0.1	4	17.3	20.1	22.4	2.6	4	2.9	3.9	4.6	0.9
2	13-Jan-2020	Existing CWIS (Control)	4	13.1	14.4	16.5	1.5	4	7.8	7.9	7.9	0.1	4	15.2	19.2	22.1	3.4	4	3.7	4.5	5.1	0.7
3	20-Jan-2020	Existing CWIS (Control)	4	12.3	13.5	15.4	1.3	4	7.9	7.9	7.9	0.0	4	17.2	19.8	21.9	2.5	4	2.6	3.5	4.5	1.0
4	27-Jan-2020	Existing CWIS (Control)	2	12.5	12.8	13.1	0.4	4	7.8	7.9	7.9	0.1	2	14.5	17.9	21.2	4.7	4	3.4	4.2	5.1	0.8
5	03-Feb-2020	Existing CWIS (Control)	2	13.2	13.9	14.6	1.0	4	7.8	7.9	7.9	0.1						4	3.0	3.5	4.1	0.5
Overall		**0.8-mm CWWS**	**212**	**6.2**	**9.6**	**15.9**	**2.0**	**209**	**7.3**	**7.9**	**9.3**	**0.2**	**212**	**13.9**	**23.9**	**30.6**	**3.6**	**212**	**1.3**	**12.3**	**20.7**	**5.5**
Overall		**3.0-mm CWWS**	**217**	**6.1**	**9.4**	**14.2**	**1.8**	**217**	**7.4**	**7.9**	**9.3**	**0.2**	**218**	**14.0**	**24.0**	**30.7**	**3.6**	**218**	**1.3**	**12.6**	**20.8**	**5.4**
Overall		**Existing CWIS (Control)**	**239**	**6.0**	**9.8**	**16.5**	**2.2**	**240**	**7.3**	**7.9**	**9.2**	**0.2**	**238**	**14.5**	**23.7**	**30.6**	**3.7**	**244**	**0.9**	**11.8**	**20.9**	**5.8**

[1] N = number of observations, Min = minimum, Max = maximum, sd = standard deviation.

[2] pH values greater than 9.0 during Week 14 were likely made in error but cannot be confirmed. Excluding these values, the maximum pH values, occurring during Week 7, would be 8.3, 8.4, and 8.3 at the 0.8-mm CWWS, 3.0-mm CWWS, and control, respectively.

7.2 Entrainment Reduction Performance of CWWSs

7.2.1 Evaluation Period

The weeks of Monday, 11 March 2019 (week 10) through Monday, 23 September 2019 (week 38) are the weeks used for the CWWS performance evaluation period. Only Use Code 1 samples were used for this period to evaluate a synchronized comparison of entrainment abundance for the 0.8-mm and 3.0-mm CWWSs relative to the Control. This evaluation period represents 81.6% of all samples collected and analyzed for the study. Entrainment samples were collected concurrently at the 0.8-mm CWWS, 3.0-mm CWIS, and Control for 174 diel periods across 27 weeks, which represented 95% of the entrained specimens collected at the Control collected over 232 diel periods across 41 weeks from the yearlong period. This performance evaluation period represents the majority of the annual entrainment when the 3.0-mm CWWS was properly aligned and both CWWSs weren't substantially damaged (Figure 11; also see Appendix B). With the exception of the absence of a pronounced peak larval entrainment period during late summer, the general seasonal pattern during the study was similar to the 2006–2007 study for which was used in establishing the sampling frequency and intensity (Figure 11). In the summer months of 2019, weekly density of larvae and juveniles were about eight times less than the summer peak of the 2007 (Normandeau 2008).

7.2.2 Taxonomic and Life Stage Composition of Fish

A total of 37 species and 13 higher-level taxonomic categories of ichthyoplankton were identified and enumerated from the performance evaluation period (Table 7). Cod Family, Haddock, and Moustache Sculpin were identified during the yearlong period but were not present during the performance evaluation period. During this period, an estimated 29,637 individuals of fish of all life stages were captured from the 0.8-mm CWWS, 44,737 from the 3.0-mm CWWS, and 57,296 individuals of fish of all life stages from the Control (Table 8). The percentage of eggs enumerated during the performance evaluation period were 91.6% for the 0.8-mm CWWS, 91.9% for the 3.0-mm CWWS and 94.7% for the Control (Table 8).

The top five taxa/life stage combinations enumerated in the 0.8-mm CWWS samples during the performance evaluation period were Cunner/Tautog/Yellowtail Flounder eggs (84.2%), Cunner PYSL (2.9%), Hake eggs (2.0%), Fourbeard Rockling/Hake eggs (2.0%), and Cunner YSL (1.0%). The most abundant taxa of entrained eggs in the 0.8-mm CWWS samples were Cunner/Tautog/Yellowtail Flounder (84.2%), Hakes (2.0%), Fourbeard Rockling/Hakes (2.0%), Cunner (0.9%), and Fourbeard Rockling (0.6%). While Cunner/Tautog/Yellowtail Flounder cannot be conclusively identified due to their similar morphology, about 99% of these were likely Cunner based on the proportion of more developed eggs identified to species. The top five taxa of entrained larval and older life stages in the 0.8-mm CWWS samples were Cunner PYSL (2.9%), Cunner YSL (1%), Winter Flounder Stage II larvae (0.8%), Radiated Shanny PYSL (0.5%), and Silver Hake YSL (0.4%; Table 8).

The 3.0-mm CWWS had slightly different dominant species than the 0.8-mm CWWS during the performance evaluation period. The top five taxa/life stage combinations were Cunner/Tautog/Yellowtail Flounder eggs (83.3%), Cunner PYSL (2.2%), Fourbeard Rockling/Hake eggs (1.7%), Atlantic Menhaden eggs (1.6%), and Hake eggs (1.5%). The most dominant species of entrained egg in the 3.0-mm CWWS samples were Cunner/Tautog/Yellowtail Flounder (83.3%), Fourbeard Rockling/Hakes (1.7%), Atlantic Menhaden (1.6%), Hakes (1.5%), and American Plaice (0.9%). The top five species of entrained larval and older life stages in the 3.0-mm CWWS samples were Cunner PYSL (2.2%), Cunner YSL (1.2%), Winter Flounder Stage II larvae (0.6%), American Sand Lance PYSL (0.5%), and Radiated Shanny PYSL (0.5%; Table 8).

At the Control, the top five taxa/life stage combinations were Cunner/Tautog/Yellowtail Flounder eggs (90.3%), Fourbeard Rockling/Hake eggs (0.9%), Radiated Shanny PYSL (0.8%), Hake eggs (0.7%), and American Sand Lance PYSL (0.7%). The Control shared the same top five most dominant species of entrained eggs as the 3.0-mm CWWS in a slightly different order with 90.3% Cunner/Tautog/Yellowtail Flounder followed by Fourbeard Rockling/Hakes (0.9%), Hakes (0.7%), Atlantic Menhaden (0.6%), and American Plaice (0.6%). The top five taxa of entrained larval and older life stages in the Control samples were Radiated Shanny PYSL (0.8%), American Sand Lance PYSL (0.7%), Rock Gunnel PYSL (0.7%), Cunner PYSL (0.6%), and Winter Flounder Stage II larvae (0.5%; Table 8).

For each species complex, Table 9 breaks down the percent composition of each individual species within the complex based on their mean density. Overall, the breakdown of these individual species is consistent between both CWWSs and the Control with the exception of the single Witch Flounder egg and larval specimen collected only in the 0.8-mm CWWS samples (Table 8 and Table 9). Among the most abundant taxa, the species complex identified as Cunner/Tautog/Yellowtail Flounder eggs consisted of 99.7% Cunner, 0.2% Tautog, and 0.2% Yellowtail Flounder; and Fourbeard Rockling/Hakes consisted of 33.8% Fourbeard Rockling and 66.2% Hakes based on the percent composition of all life stages for member species from the Control (Table 9). In general, entrainment samples collected from the Control at Schiller Station were predominantly Cunner eggs (about 90%).

During the performance evaluation period, total species-level identification damage for eggs was 0.1%, 0.6% and <0.1% at the 0.8-mm CWWS, 3.0-mm CWWS, and Control, respectively. Species-level identification damage for larvae and older fish were 5.4%, 4.9%, and 2.9% at the 0.8-mm CWWS, 3.0-mm CWWS, and Control, respectively. Percent damage that prevented measurements at the 0.8-mm CWWS, 3.0-mm CWWS, and Control for eggs were 0.4%, 0.5%, and 0.3% and for larvae and juvenile fish, 22.0%, 21.6%, and 14.0%, respectively. Extrusion, entrainment of fish larvae or older life stages through a CWWS slot width smaller than their limiting body dimension, likely caused fin or body damage that contributed to the relatively higher percent damage preventing measurements.

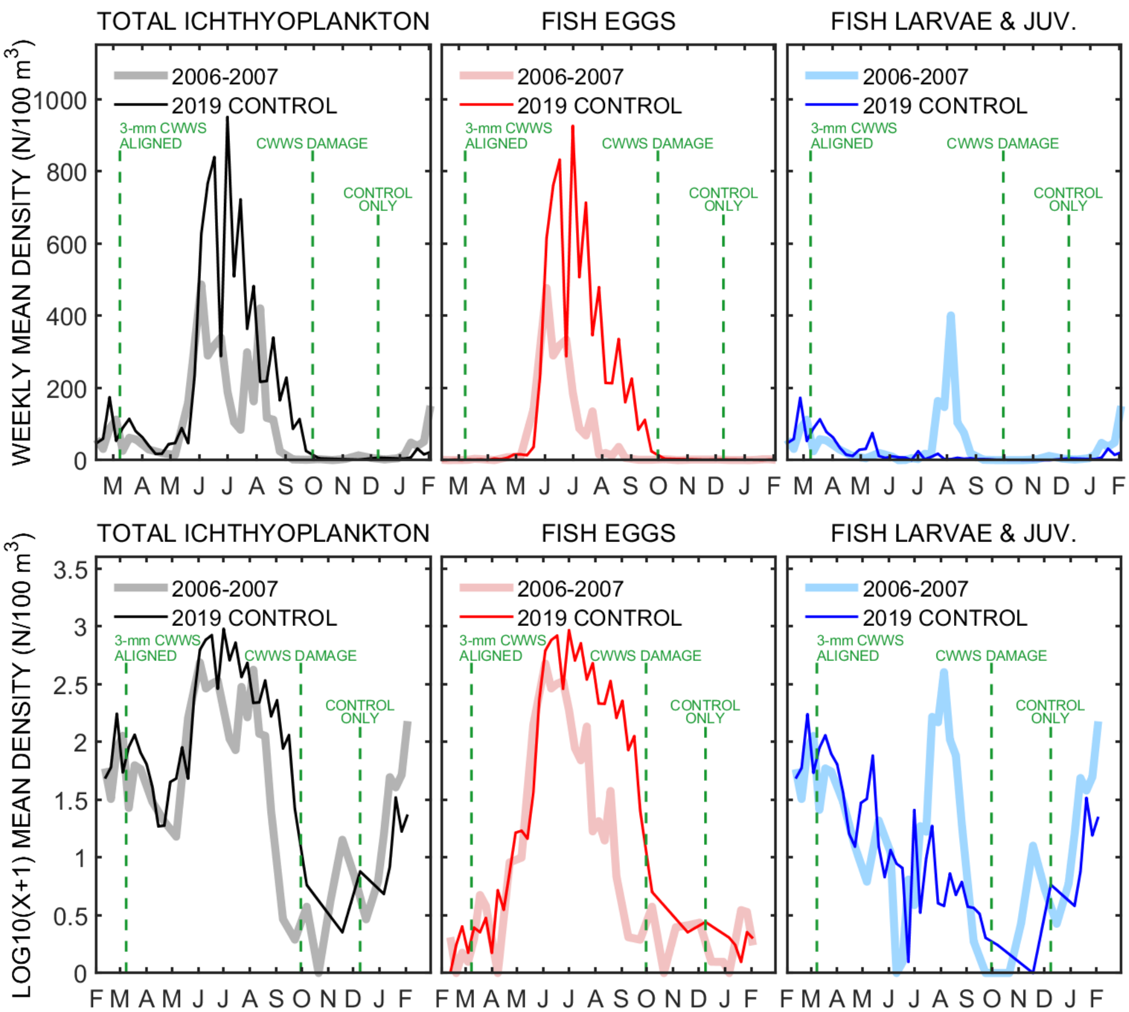


Figure 11. **Untransformed (top) and $log_{10}(x+1)$ transformed (bottom) weekly mean entrainment density of fish life stages combined, fish eggs, and fish larvae and juveniles comparing samples collected from the existing cooling water intake structure (CWIS) for Units 5 and 6 (Control) at Schiller Station from weeks beginning Monday, 11 February 2019 through Monday, 3 February 2020 to results from the 2006–2007 study.**

Table 7. List of fish taxa collected weekly and identified during the cylindrical wedgewire screen study at Schiller Station from weeks beginning Monday, 11 February 2019 through Monday, 3 February 2020.

Taxon	Scientific Name
Alligatorfish	*Aspidophoroides monopterygius*
American Eel	*Anguilla rostrata*
American Plaice	*Hippoglossoides platessoides*
American Sand Lance	*Ammodytes americanus*
Atlantic Cod	*Gadus morhua*
Atlantic Cod/Haddock	*Gadus morhua/Melanogrammus aeglefinus*
Atlantic Herring	*Clupea harengus*
Atlantic Mackerel	*Scomber scombrus*
Atlantic Mackerel/Cusk	*Scomber scombrus/Brosme brosme*
Atlantic Menhaden	*Brevoortia tyrannus*
Atlantic Seasnail	*Liparis atlanticus*
Atlantic Tomcod	*Microgadus tomcod*
Butterfish	*Peprilus triacanthus*
Cod Family*	Gadidae*
Cod Family/Witch Flounder	Gadidae/*Glyptocephalus cynoglossus*
Cunner	*Tautogolabrus adspersus*
Cusk	*Brosme brosme*
Fourbeard Rockling	*Enchelyopus cimbrius*
Fourbeard Rockling/*Urophycis* (Hake) spp.[1]	*Enchelyopus/Urophycis* spp.
Fourspot Flounder	*Paralichthys oblongus*
Goosefish	*Lophius americanus*
Grubby	*Myoxocephalus aenaeus*
Gulf Snailfish	*Liparis coheni*
Haddock*	*Melanogrammus aeglefinus**
Herring Family	Clupeidae
Inland Silverside	*Menidia beryllina*
Longhorn Sculpin	*Myoxocephalus octodecemspinosus*
Lumpfish	*Cyclopterus lumpus*
Moustache Sculpin*	*Triglops murrayi**
Mummichog	*Fundulus heteroclitus*
Sculpin, *Myoxocephalus* spp.	*Myoxocephalus* spp.
Northern Pipefish	*Syngnathus fuscus*
Pollock	*Pollachius virens*
Searobin, *Prionotus* spp.	*Prionotus* spp.
Radiated Shanny	*Ulvaria subbifurcata*
Rainbow Smelt	*Osmerus mordax*
Righteye Flounder Family	Pleuronectidae
Rock Gunnel	*Pholis gunnellus*
Sea Raven	*Hemitripterus americanus*
Shorthorn Sculpin	*Myoxocephalus scorpius*
Silver Hake	*Merluccius bilinearis*
Smooth Flounder	*Pleuronectes putnami*

(continued)

Table 7. (continued)

Taxon	Scientific Name
Tautog	*Tautoga onitis*
Threespine Stickleback	*Gasterosteus aculeatus*
Unidentified Osteichthyes	
Urophycis (Hake) spp.[2]	*Urophycis* spp.
Windowpane	*Scophthalmus aquosus*
Windowpane/Fourspot/Summer Flounder	*Scophthalmus aquosus/Paralichthys* spp.
Winter Flounder	*Pseudopleuronectes americanus*
Witch Flounder	*Glyptocephalus cynoglossus*
Wrasse and Parrotfish Family[3]	Labridae
Wrasse and Parrotfish Family/Yellowtail Flounder[4]	Labridae/*Limanda ferruginea*
Yellowtail Flounder	*Limanda ferruginea*

* species or taxonomic complexes not found during synchronized sampling from weeks beginning Monday, 11 March 2019 through Monday, 23 September 2019.

[1] From this point forward and within the report, this taxonomic complex will be referred to as Fourbeard Rockling/Hakes.

[2] From this point forward and within the report, this taxonomic complex will be referred to as Hakes.

[3] From this point forward and within the report, this taxonomic complex will be referred to as Cunner/Tautog.

[4] From this point forward and within the report, this taxonomic complex will be referred to as Cunner/Tautog/Yellowtail Flounder.

Table 8. Total laboratory counts and estimated sample counts of fish specimens by taxon and life stage in entrainment samples (n=522) collected and processed from the 0.8-mm and 3.0-mm cylindrical wedgewire screen (CWWS) intakes and the existing cooling water intake structure (CWIS) for Units 5 and 6 (Control) at Schiller Station based on synchronized samples collected from weeks beginning Monday, 11 March 2019 through Monday, 23 September 2019.

Taxon	Life Stage[1]	0.8-mm CWWS			3.0-mm CWWS			Existing CWIS (Control)		
		Total Count	Estimated Number Collected	%	Total Count	Estimated Number Collected	%	Total Count	Estimated Number Collected	%
Alligatorfish	PYSL							2	2	<0.1
American Eel	YROL							1	1	<0.1
American Plaice	Eggs	1	1	<0.1	314	394	0.9	293	319	0.6
	UNID	17	17	0.1	18	18	<0.1	13	13	<0.1
	YSL	12	12	<0.1	33	33	0.1	23	23	<0.1
	PYSL	56	56	0.2	52	52	0.1	14	14	<0.1
American Sand Lance	UNID				1	1	<0.1	2	2	<0.1
	YSL	2	2	<0.1	4	4	<0.1	4	4	<0.1
	PYSL	66	66	0.2	215	215	0.5	382	382	0.7
	YOY				2	2	<0.1	19	19	<0.1
Atlantic Cod	PYSL				1	1	<0.1	3	3	<0.1
Atlantic Cod/Haddock	Eggs				2	2	<0.1	1	1	<0.1
Atlantic Herring	PYSL				27	27	0.1	11	11	<0.1
Atlantic Mackerel	Eggs	9	10	<0.1	27	32	0.1	58	66	0.1
Atlantic Mackerel/Cusk	Eggs	51	58	0.2	104	132	0.3	59	86	0.2
Atlantic Menhaden	Eggs	49	62	0.2	366	711	1.6	175	332	0.6
	YSL				2	2	<0.1	2	2	<0.1
	PYSL				2	2	<0.1			
Atlantic Seasnail	UNID	1	1	<0.1				4	4	<0.1
	YSL	4	4	<0.1	8	8	<0.1	7	7	<0.1
	PYSL	66	66	0.2	70	70	0.2	168	170	0.3

(continued)

Table 8. (continued)

Taxon	Life Stage[1]	0.8-mm CWWS Total Count	0.8-mm CWWS Estimated Number Collected	0.8-mm CWWS %	3.0-mm CWWS Total Count	3.0-mm CWWS Estimated Number Collected	3.0-mm CWWS %	Existing CWIS (Control) Total Count	Existing CWIS (Control) Estimated Number Collected	Existing CWIS (Control) %
Atlantic Tomcod	YSL							1	1	<0.1
Butterfish	Eggs	54	56	0.2	63	66	0.1	23	26	<0.1
	UNID				1	1	<0.1			
	YSL	10	10	<0.1	1	2	<0.1			
	PYSL	2	2	<0.1	1	1	<0.1			
Cod Family/Witch Flounder	Eggs	1	1	<0.1	9	21	<0.1	7	7	<0.1
Cunner	Eggs	143	273	0.9	157	335	0.7	60	103	0.2
	UNID				6	7	<0.1	1	1	<0.1
	YSL	255	282	1.0	406	522	1.2	95	95	0.2
	PYSL	790	847	2.9	909	997	2.2	361	361	0.6
Cunner/Tautog	YSL	1	1	<0.1						
Cunner/Tautog/Yellowtail Flounder	Eggs	16,461	24,970	84.3	18,589	37,252	83.3	19,751	51,765	90.3
Cusk	Eggs				18	23	0.1	22	24	<0.1
	UNID	1	1	<0.1	1	1	<0.1			
	YSL	3	3	<0.1	3	3	<0.1	1	1	<0.1
Fourbeard Rockling	Eggs	145	165	0.6	182	219	0.5	167	219	0.4
	UNID	1	1	<0.1	6	6	<0.1	1	1	<0.1
	YSL	2	2	<0.1	8	11	<0.1	6	6	<0.1
	PYSL	33	35	0.1	26	26	0.1	11	11	<0.1
Fourbeard Rockling/Hakes	Eggs	511	579	2.0	572	772	1.7	426	533	0.9
Fourspot Flounder	YSL	2	2	<0.1						
Goosefish	Eggs							1	1	<0.1
	PYSL	1	1	<0.1	1	1	<0.1			

(continued)

Table 8. (continued)

Taxon	Life Stage[1]	0.8-mm CWWS			3.0-mm CWWS			Existing CWIS (Control)		
		Total Count	Estimated Number Collected	%	Total Count	Estimated Number Collected	%	Total Count	Estimated Number Collected	%
Grubby	UNID	2	2	<0.1	1	1	<0.1	6	6	<0.1
	YSL	30	30	0.1	46	46	0.1	100	100	0.2
	PYSL	49	49	0.2	154	154	0.3	238	238	0.4
	YOY				1	1	<0.1			
Gulf Snailfish	YSL							2	2	<0.1
	PYSL							2	2	<0.1
Hakes	Eggs	501	581	2.0	517	657	1.5	340	404	0.7
	UNID	31	31	0.1	29	32	0.1	3	3	<0.1
	YSL	60	60	0.2	65	89	0.2	12	12	<0.1
	PYSL	45	45	0.2	68	77	0.2	22	22	<0.1
	YOY							1	1	<0.1
Herring Family	UNID	11	11	<0.1	17	17	<0.1	1	1	<0.1
	YSL	8	8	<0.1	1	1	<0.1			
	PYSL	14	14	<0.1	12	12	<0.1	14	14	<0.1
Inland Silverside	UNID	1	1	<0.1						
Longhorn Sculpin	PYSL	2	2	<0.1	33	33	0.1	68	68	0.1
Lumpfish	PYSL							1	1	<0.1
Mummichog	YSL							1	1	<0.1
	PYSL							1	1	<0.1
Myoxocephalus spp.	Eggs				1	1	<0.1	12	12	<0.1
	UNID				1	1	<0.1			
Northern Pipefish	YSL				1	1	<0.1			
	PYSL	26	26	0.1	47	47	0.1	40	40	0.1

(continued)

Table 8. (continued)

Taxon	Life Stage[1]	0.8-mm CWWS Total Count	0.8-mm CWWS Estimated Number Collected	0.8-mm CWWS %	3.0-mm CWWS Total Count	3.0-mm CWWS Estimated Number Collected	3.0-mm CWWS %	Existing CWIS (Control) Total Count	Existing CWIS (Control) Estimated Number Collected	Existing CWIS (Control) %
Pollock	PYSL				2	2	<0.1	5	5	<0.1
	YOY							4	4	<0.1
Prionotus spp.	Eggs	2	2	<0.1	1	1	<0.1	3	3	<0.1
Radiated Shanny	UNID				3	3	<0.1	14	14	<0.1
	YSL	1	1	<0.1	3	3	<0.1	9	9	<0.1
	PYSL	145	147	0.5	213	213	0.5	419	457	0.8
Rainbow Smelt	UNID				1	1	<0.1	1	1	<0.1
	YSL	18	18	0.1	26	26	0.1	8	8	<0.1
	PYSL	8	8	<0.1	18	18	<0.1	6	6	<0.1
Righteye Flounder Family	YSL							1	1	<0.1
Rock Gunnel	UNID	1	1	<0.1				2	2	<0.1
	YSL	5	5	<0.1	3	3	<0.1	14	14	<0.1
	PYSL	55	55	0.2	185	185	0.4	373	373	0.7
	YROL							2	2	<0.1
Sea Raven	YSL							1	1	<0.1
	PYSL							1	1	<0.1
	YOY							1	1	<0.1
Shorthorn Sculpin	YSL				1	1	<0.1	1	1	<0.1
	PYSL				15	15	<0.1	47	47	0.1
	YOY							1	1	<0.1
Silver Hake	Eggs	142	164	0.6	186	219	0.5	111	161	0.3
	UNID	3	3	<0.1	6	7	<0.1	2	2	<0.1
	YSL	108	108	0.4	69	71	0.2	22	22	<0.1
	PYSL	17	17	0.1	15	19	<0.1			

(continued)

Table 8. (continued)

Taxon	Life Stage[1]	0.8-mm CWWS Total Count	0.8-mm CWWS Estimated Number Collected	0.8-mm CWWS %	3.0-mm CWWS Total Count	3.0-mm CWWS Estimated Number Collected	3.0-mm CWWS %	Existing CWIS (Control) Total Count	Existing CWIS (Control) Estimated Number Collected	Existing CWIS (Control) %
Smooth Flounder	PYSL	1	1	<0.1						
Tautog	Eggs	2	2	<0.1	1	1	<0.1			
	UNID	1	1	<0.1	1	2	<0.1			
	YSL				1	1	<0.1			
	PYSL	1	1	<0.1	2	3	<0.1			
Threespine Stickleback	YOY							1	1	<0.1
	YROL							1	1	<0.1
Unidentified Osteichthyes	Eggs	3	3	<0.1	4	4	<0.1	4	13	<0.1
	UNID	46	47	0.2	54	63	0.1	27	28	<0.1
	YSL				2	2	<0.1			
	PYSL	3	3	<0.1	2	2	<0.1	3	3	<0.1
Windowpane	Eggs	29	30	0.1	36	48	0.1	19	31	0.1
	UNID							1	1	<0.1
	YSL	1	1	<0.1	4	4	<0.1	1	1	<0.1
	PYSL	6	6	<0.1	1	1	<0.1	2	2	<0.1
Windowpane/Fourspot/Summer Flounder	Eggs	123	145	0.5	152	190	0.4	77	93	0.2
Winter Flounder	Eggs	30	33	0.1	39	39	0.1	41	41	0.1
	UNID	23	23	0.1	8	8	<0.1	17	18	<0.1
	WF I	31	31	0.1	23	23	0.1	28	28	<0.1
	WF II	247	249	0.8	287	287	0.6	268	273	0.5
	WF III	64	64	0.2	109	109	0.2	68	68	0.1
	WF IV	13	13	<0.1	15	15	<0.1	14	14	<0.1

(continued)

Table 8. (continued)

Taxon	Life Stage[1]	0.8-mm CWWS			3.0-mm CWWS			Existing CWIS (Control)		
		Total Count	Estimated Number Collected	%	Total Count	Estimated Number Collected	%	Total Count	Estimated Number Collected	%
Witch Flounder	Eggs	1	1	<0.1						
	PYSL	1	1	<0.1						
Yellowtail Flounder	Eggs	3	4	<0.1						
	UNID				1	1	<0.1			
	YSL	2	2	<0.1	1	1	<0.1	1	1	<0.1
	PYSL				4	4	<0.1			
All Taxa Combined	Eggs	18,261	27,140	91.6	21,340	41,121	91.9	21,650	54,239	94.7
	UNID	139	140	0.5	155	169	0.4	95	97	0.2
	YSL	524	551	1.9	688	834	1.9	312	312	0.5
	PYSL	1,387	1,449	4.9	2,075	2,177	4.9	2,194	2,234	3.9
	WF I	31	31	0.1	23	23	0.1	28	28	<0.1
	WF II	247	249	0.8	287	287	0.6	268	273	0.5
	WF III	64	64	0.2	109	109	0.2	68	68	0.1
	WF IV	13	13	<0.1	15	15	<0.1	14	14	<0.1
	YOY				3	3	<0.1	27	27	<0.1
	YROL							4	4	<0.1
Total		**20,666**	**29,637**	**100**	**24,695**	**44,737**	**100**	**24,660**	**57,296**	**100**

[1] UNID = unidentified larvae, YSL = yolk-sac larvae, PYSL = post yolk-sac larvae, YOY = young-of-the-year, YROL = yearling and older.

7.2.3 Size Composition of Entrained Ichthyoplankton

Total length (TL), greatest body depth (GBD), greatest body width (GBW), and egg diameter of ichthyoplankton collected during the performance evaluation period at Schiller Station were measured in the laboratory (Table 10 through Table 13). Cunner/Tautog/Yellowtail Flounder eggs, the most abundant taxonomic complex from all three locations, were round eggs with a mean diameter of 0.9 mm and range from 0.7 mm to 1.2 mm from the 0.8-mm CWWS, 3.0-mm CWWS, and Control (Table 10). The most abundant larvae from all three locations combined, Cunner PYSL, averaged 3.3 mm, 3.6 mm, and 4.3 mm TL from the 0.8-mm CWWS, 3.0-mm CWWS, and Control, respectively (Table 10).

The mean egg diameter of all taxa from samples collected from the 0.8-mm CWWS was 0.9 mm with a range from 0.6 mm to 1.8 mm (Table 10). Samples collected from the 3.0-mm CWWS and Control had mean egg diameters of 1.0 mm and a minimum of 0.6 mm and maximum of 2.5 mm and 2.6 mm, respectively (Table 10). The maximum egg diameter distribution peaked in the 0.8 to 0.9 mm size class with 66.8% from the 0.8-mm CWWS, 59.8% from 3.0-mm CWWS, and 68.0% from the Control samples (Table 11). The percentage of the total eggs entrained that were extruded through the slot widths of the 0.8-mm CWWS peaked at 92% during week of 27 May and was highest during the mid-May through mid-July when Cunner eggs were most abundant (Figure 12). The percentage of the total eggs entrained that were extruded in the 0.8-mm CWWS exceeded 75% again during the week of 16 September. No eggs were entrained by the 3.0-mm CWWS with a maximum diameter greater than the slot width.

All measured eggs from nine taxa entrained by the 0.8-mm CWWS had maximum egg diameters greater than the slot width (Table 12). The three taxa with the lowest observed extrusion of eggs were Winter Flounder (3.3%), Fourbeard Rocklings/Hakes (19.6%) and Fourbeard Rockling (56.6%). When extrapolated to estimated counts by sample, about 68% eggs collected in the 0.8-mm CWWS were extruded. More than two-thirds of the most abundant taxon and life stage entrained at Schiller Station, Cunner (or Cunner/Tautog/Yellowtail Flounder), were extruded through the 0.8-mm CWWS, which contributed to the relative ineffectiveness of the 0.8-mm CWWS at reducing entrainment relative to the existing CWIS.

The majority of measured larvae and juvenile life stages from the 0.8-mm and 3.0-mm CWWSs were in the 2.0 to 2.9 mm size class with 27.0% and 18.1%, respectively, and the highest percentages of measured larvae and juveniles from the Control were in the 6.0 to 6.9 mm size class (15.5%) and the 15+ mm size class (16.2%; Table 13). The 0.8-mm CWWS and 3.0-mm CWWS had substantially fewer larvae and juveniles equal to or greater than 15 mm total length (1.5% and 99%, respectively) compared to the Control (16.2%; Table 13). Generally, larval limiting dimensions were the smallest during their peak abundance in mid-June through early August, and for specimens entrained by the 0.8-mm CWWS (Figure 13). For the 0.8-mm CWWS, the percent extrusion of entrained larvae and juvenile fish with a GBD greater than the slot width appeared cyclic with highest extrusion occurring in March, mid-June, mid-August and last week of sampling in September (Figure 14). Some evidence of extrusion of larvae and juvenile fish was seen in the 3.0-mm CWWS during April and May (Figure 14). While GBD is considered the primary limiting dimension if fish are swept perpendicular to the CWWS slots, the temporal pattern of extrusion for larval and juvenile fish based on GBW shows a similar temporal pattern of extrusion except at a lower percentage compared to extrusion based on GBD (Figure 15).

When extrapolated to estimated counts by sample, overall extrusion of fish larvae and juveniles in the 0.8-mm CWWS was approximately 26% based on GBD and 13% based on GBW. Six species had 100% of larvae sampled with GBD greater than the 0.8-mm CWWS, but only two of them (Grubby and Rock Gunnel) occurred in relatively high abundance (Table 14). Four species had 100% of larvae sampled and measured with GBW greater than the 0.8-mm CWWS, and Grubby and Rock Gunnel being the most abundant of them (Table 15). Overall extrusion of fish larvae and juveniles in the 3.0-mm CWWS was approximately 0.7% based on GBD and 0.4% based on GBW. Larvae and juveniles entrained in the 3.0--mm CWWS with GBD or GBW greater than the 3.0-mm slot width were largely Atlantic Herring and one or two specimens of other species (Table 14 and Table 15). Under the assumption that larvae and juveniles are oriented with sweeping flow and perpendicular to the CWWS slots, the 26% extrusion estimated based on GBD is important factor in the lower-than-expected performance of the 0.8-mm CWWS in reducing entrainment at Schiller Station.

Table 9. Mean density (D, N/100 m^3) and percent composition (%) of identified species by life stage in each identified species complex in samples from the 0.8-mm and 3.0-mm cylindrical wedgewire screen (CWWS) intakes and the existing cooling water intake structure (CWIS) for Units 5 and 6 (Control) at Schiller Station based on synchronized samples collected from weeks beginning Monday, 11 March 2019 through Monday, 23 September 2019.

Species Complex		All screens								Existing CWIS only							
		Life Stage						Total		Life Stage						Total	
		Eggs		Larvae		YOY+				Eggs		Larvae		YOY+			
		D	%	D	%	D	%	D	%	D	%	D	%	D	%	D	%
Atlantic Cod/Haddock	Atlantic Cod	0.04	100.0	0.01	87.5			0.03	97.2	0.10	100.0	0.03	85.7			0.06	96.6
	Haddock			<0.01	12.5			<0.01	2.8			<0.01	14.3			<0.01	3.4
	Total	0.04	100.0	0.01	100.0			0.02	100.0	0.10	100.0	0.02	100.0			0.04	100.0
Atlantic Mackerel/Cusk	Atlantic Mackerel	0.17	70.1					0.17	66.3	0.29	73.8					0.29	73.0
	Cusk	0.07	29.9	0.01	100.0			0.04	33.7	0.10	26.2	<0.01	100.0			0.05	27.0
	Total	0.12	100.0	0.01	100.0			0.09	100.0	0.19	100.0	<0.01	100.0			0.13	100.0
Cod Family	Atlantic Cod	0.04	37.8	0.01	20.6			0.03	31.3	0.10	48.5	0.03	31.7			0.06	41.0
	Atlantic Tomcod			<0.01	2.9			<0.01	0.9			<0.01	5.2			<0.01	1.4
	Cusk	0.07	62.2	0.01	26.7			0.04	49.2	0.10	51.5	<0.01	5.3			0.05	35.8
	Haddock			<0.01	2.9			<0.01	0.9			<0.01	5.3			<0.01	1.5
	Pollock			0.03	46.9	0.01	100.0	0.02	17.8			0.04	52.5	0.02	100.0	0.03	20.3
	Total	0.06	100.0	0.01	100.0	0.01	100.0	0.02	100.0	0.10	100.0	0.02	100.0	0.02	100.0	0.04	100.0
Cod Family/Witch Flounder	Atlantic Cod	0.04	37.3	0.01	18.9			0.03	30.2	0.10	48.5	0.03	30.1			0.06	40.4
	Atlantic Tomcod			<0.01	2.7			<0.01	0.8			<0.01	4.9			<0.01	1.4
	Cod Family			<0.01	5.5			<0.01	1.7			<0.01	5.0			<0.01	1.4
	Cusk	0.07	61.3	0.01	24.5			0.04	47.5	0.10	51.5	<0.01	5.0			0.05	35.2
	Haddock			<0.01	2.7			<0.01	0.9			<0.01	5.0			<0.01	1.4
	Pollock			0.03	43.1	0.01	100.0	0.02	17.2			0.04	49.9	0.02	100.0	0.03	20.1
	Witch Flounder	<0.01	1.3	<0.01	2.7			<0.01	1.7								
	Total	0.04	100.0	0.01	100.0	0.01	100.0	0.02	100.0	0.07	100.0	0.01	100.0	0.02	100.0	0.03	100.0
Cunner/Tautog	Cunner	1.20	99.5	4.97	99.7			3.08	99.7	0.47	99.1	2.08	100.0			1.27	99.8
	Tautog	0.01	0.5	0.01	0.3			0.01	0.3	<0.01	0.9					<0.01	0.2
	Total	0.60	100.0	2.49	100.0			1.55	100.0	0.24	100.0	1.04	100.0			0.64	100.0

(continued)

Table 9. (continued)

Species Complex		All screens								Existing CWIS only							
		Eggs		Larvae		YOY+		Total		Eggs		Larvae		YOY+		Total	
		D	%	D	%	D	%	D	%	D	%	D	%	D	%	D	%
Cunner/Tautog/Yellowtail	Cunner	1.20	98.9	4.97	99.5			3.08	99.4	0.47	99.1	2.08	99.8			1.27	99.7
	Tautog	0.01	0.5	0.01	0.3			0.01	0.3	<0.01	0.9					<0.01	0.2
	Yellowtail Flounder	0.01	0.5	0.01	0.3			0.01	0.3			<0.01	0.2			<0.01	0.2
	Total	0.40	100.0	1.67	100.0			1.03	100.0	0.16	100.0	0.69	100.0			0.43	100.0
Fourbeard Rockling/Hakes	Fourbeard Rockling	0.95	26.0	0.16	21.2			0.55	25.1	0.95	33.9	0.09	34.1			0.52	33.8
	Hakes	2.70	74.0	0.60	78.8	<0.01	100.0	1.10	74.9	1.85	66.1	0.17	65.9	<0.01	100.0	0.68	66.2
	Total	1.83	100.0	0.38	100.0	<0.01	100.0	0.88	100.0	1.40	100.0	0.13	100.0	<0.01	100.0	0.61	100.0
Herring Family	Atlantic Herring			0.23	94.9			0.23	11.8			0.52	97.5			0.52	26.3
	Atlantic Menhaden	1.73	100.0	0.01	5.1			0.87	88.2	1.43	100.0	0.01	2.5			0.72	73.7
	Total	1.73	100.0	0.12	100.0			0.66	100.0	1.43	100.0	0.26	100.0			0.65	100.0
Windowpane/Fourspot/Summer Flounder	Fourspot Flounder			<0.01	11.2			<0.01	1.5								
	Windowpane	0.18	100.0	0.03	88.8			0.10	98.5	0.13	100.0	0.02	100.0			0.08	100.0
	Total	0.18	100.0	0.01	100.0			0.07	100.0	0.13	100.0	0.01	100.0			0.05	100.0

Table 10. Descriptive statistics[1] of minimum and maximum egg diameter (EDmin and EDmax), greatest body depth (GBD), greatest body width (GBW) and total length (TL) in millimeters for fish measured from entrainment samples collected at the 0.8-mm and 3.0-mm cylindrical wedgewire screen (CWWS) intakes and the existing cooling water intake structure (CWIS) for Units 5 and 6 (Control) at Schiller Station based on synchronized samples collected from weeks beginning Monday, 11 March 2019 through Monday, 23 September 2019.

Taxon	Life Stage[2]	Metric	0.8-mm CWWS					3.0-mm CWWS					Existing CWIS (Control)				
			N	Min	Mean	Max	SD	N	Min	Mean	Max	SD	N	Min	Mean	Max	SD
Alligatorfish	PYSL	GBD											2	1.1	1.4	1.6	0.4
		GBW											2	1	1.4	1.8	0.6
		TL											2	11.9	15.3	18.6	4.7
American Eel	YROL	GBD											1	24	24.0	24	
		GBW											1	21	21.0	21	
		TL											1	406.0	406.0	406.0	
American Plaice	EGGS	E_MAX						284	1.7	2.3	2.5	0.1	266	2	2.3	2.6	0.1
		E_MIN						284	1.7	2.3	2.5	0.1	266	2	2.3	2.6	0.1
	UNID	GBD											2	0.3	0.4	0.4	0.1
		GBW	2	0.4	0.4	0.4		2	0.4	0.4	0.4		3	0.3	0.4	0.5	0.1
		TL	7	3.3	3.6	4.2	0.3	6	3	3.7	3.9	0.4	4	3.4	3.7	4	0.3
	YSL	GBD	4	0.4	0.5	0.7	0.1	6	0.5	0.7	0.8	0.1	6	0.3	0.6	1.1	0.3
		GBW	5	0.3	0.4	0.6	0.1	11	0.4	0.5	0.6	0.1	7	0.3	0.5	0.9	0.2
		TL	8	2.6	3.8	5	0.7	16	3	4.2	5.2	0.7	15	1.9	3.9	5	0.8
	PYSL	GBD	46	0.4	0.5	0.9	0.1	34	0.4	0.5	0.9	0.1	9	0.4	0.7	1.5	0.4
		GBW	50	0.3	0.4	0.6	0.1	39	0.3	0.4	0.6	0.1	10	0.4	0.5	1.2	0.3
		TL	49	3.3	3.9	7.2	0.7	39	3.3	4.3	6.7	0.8	10	3.8	5.0	9.1	1.8
American Sand Lance	UNID	GBD											1	0.6	0.6	0.6	
		GBW											1	0.6	0.6	0.6	
	YSL	GBD	2	0.4	0.5	0.5	0.1	4	0.4	0.5	0.6	0.1	4	0.3	0.5	0.5	0.1
		GBW	2	0.4	0.5	0.5	0.1	4	0.4	0.5	0.5	0.1	4	0.5	0.6	0.6	0.1
		TL	2	4.1	5.0	5.8	1.2	3	4.6	5.0	5.2	0.3	4	4.6	5.0	5.6	0.5
	PYSL	GBD	56	0.5	0.9	1.9	0.4	197	0.5	1.4	3.1	0.6	264	0.5	1.5	2.8	0.6
		GBW	57	0.4	0.9	1.5	0.3	192	0.5	1.3	2.9	0.5	261	0.5	1.3	2.6	0.5
		TL	60	4.6	10.8	26.3	5.0	202	4	18.1	42.8	9.1	262	5.6	19.2	40.3	8.9

(continued)

Table 10. (continued)

Taxon	Life Stage[2]	Metric	0.8-mm CWWS					3.0-mm CWWS					Existing CWIS (Control)				
			N	Min	Mean	Max	SD	N	Min	Mean	Max	SD	N	Min	Mean	Max	SD
American Sand Lance (cont.)	YOY	GBD						2	2.9	3.2	3.5	0.4	16	2.5	3.0	3.7	0.3
		GBW						2	2.3	2.7	3.1	0.6	16	2.1	2.6	3	0.2
		TL						2	41	44.5	48	4.9	16	38	42.1	48	3.4
Atlantic Cod	PYSL	GBD						1	4.8	4.8	4.8		3	2.7	3.4	4	0.7
		GBW						1	3.5	3.5	3.5		3	2.1	2.7	3.4	0.7
		TL						1	25.5	25.5	25.5		3	16.9	18.9	20.8	2.0
Atlantic Cod/Haddock	EGGS	E_MAX						2	1.2	1.4	1.5	0.2	1	1.4	1.4	1.4	
		E_MIN						2	1.2	1.4	1.5	0.2	1	1.4	1.4	1.4	
Atlantic Herring	PYSL	GBD						27	1.8	3.9	6	1.2	10	1.8	2.7	6	1.2
		GBW						27	1.4	2.7	4.3	0.6	11	1.7	2.1	3.4	0.5
		TL						27	24.9	38.4	47.2	5.3	11	20.9	30.7	45.5	6.7
Atlantic Mackerel	EGGS	E_MAX	9	1	1.2	1.3	0.1	26	1.1	1.3	1.4	0.1	55	1	1.2	1.4	0.1
		E_MIN	9	1	1.2	1.3	0.1	26	1.1	1.3	1.4	0.1	55	1	1.2	1.4	0.1
Atlantic Mackerel/Cusk	EGGS	E_MAX	51	1.1	1.2	1.3	0.1	104	1	1.2	1.4	0.1	59	1	1.2	1.4	0.1
		E_MIN	51	1.1	1.2	1.3	0.1	104	1	1.2	1.4	0.1	59	1	1.2	1.4	0.1
Atlantic Menhaden	EGGS	E_MAX	42	1.4	1.6	1.8	0.1	230	1.4	1.6	1.9	0.1	132	1.4	1.6	1.8	0.1
		E_MIN	42	1.4	1.6	1.8	0.1	230	1.4	1.6	1.9	0.1	132	1.4	1.6	1.8	0.1
	YSL	GBD						1	0.5	0.5	0.5						
		GBW						2	0.3	0.4	0.4	0.1					
		TL						2	2.2	3.1	3.9	1.2	1	2.7	2.7	2.7	
	PYSL	GBD						2	1.2	1.3	1.3	0.1					
		GBW						2	1.1	1.2	1.2	0.1					
		TL						2	15.5	15.8	16	0.4					
Atlantic Seasnail	UNID	GBD											1	0.7	0.7	0.7	
		GBW	1	0.7	0.7	0.7							2	0.5	0.6	0.6	0.1
		TL	1	3.1	3.1	3.1							2	2.4	2.6	2.7	0.2
	YSL	GBD	4	0.7	0.8	0.8	0.1	8	0.5	0.7	0.8	0.1	6	0.6	0.7	0.8	0.1
		GBW	4	0.6	0.7	0.7	0.1	8	0.4	0.6	0.7	0.1	6	0.5	0.7	0.7	0.1
		TL	3	2.8	2.9	3	0.1	8	2.1	2.8	3.5	0.4	7	2.2	2.8	3.6	0.5
	PYSL	GBD	61	0.6	0.8	1.4	0.2	62	0.6	0.9	2.1	0.3	156	0.5	0.9	2.5	0.2
		GBW	63	0.5	0.7	1.1	0.1	66	0.4	0.8	1.9	0.2	166	0.5	0.7	2.2	0.2
		TL	62	2.5	3.5	6	0.7	69	2.2	3.6	7.8	1.0	156	1.9	3.6	9.7	1.0

(continued)

Table 10. (continued)

Taxon	Life Stage[2]	Metric	0.8-mm CWWS					3.0-mm CWWS					Existing CWIS (Control)				
			N	Min	Mean	Max	SD	N	Min	Mean	Max	SD	N	Min	Mean	Max	SD
Atlantic Tomcod	YSL	GBD											1	1.2	1.2	1.2	
		GBW											1	1.1	1.1	1.1	
		TL											1	6.2	6.2	6.2	
Butterfish	EGGS	E_MAX	54	0.6	0.6	0.7	0.0	63	0.6	0.6	0.7	0.0	23	0.6	0.6	0.7	0.0
		E_MIN	54	0.6	0.6	0.7	0.0	63	0.6	0.6	0.7	0.0	23	0.6	0.6	0.7	0.0
	UNID	GBW						1	0.4	0.4	0.4						
		TL						1	1.7	1.7	1.7						
	YSL	GBD	3	0.3	0.3	0.3		1	0.3	0.3	0.3						
		GBW	6	0.2	0.3	0.3	0.1	1	0.2	0.2	0.2						
		TL	6	1.4	1.6	1.7	0.1	1	1.9	1.9	1.9						
	PYSL	GBD	2	0.5	0.5	0.5											
		GBW	2	0.4	0.4	0.4		1	0.3	0.3	0.3						
		TL	2	1.8	1.9	2	0.1	1	2	2.0	2						
Cod Family/Witch Flounder	EGGS	E_MAX	1	1.2	1.2	1.2		9	1.2	1.3	1.4	0.1	7	1.2	1.3	1.4	0.1
		E_MIN	1	1.2	1.2	1.2		9	1.2	1.3	1.4	0.1	7	1.2	1.3	1.4	0.1
Cunner	EGGS	E_MAX	141	0.8	0.9	0.9	0.0	149	0.7	0.9	1	0.1	58	0.8	0.9	1	0.0
		E_MIN	141	0.8	0.9	0.9	0.0	149	0.7	0.9	1	0.1	58	0.8	0.9	1	0.0
	YSL	GBD	3	0.2	0.4	0.6	0.2	3	0.4	0.6	0.7	0.2					
		GBW	70	0.2	0.2	0.5	0.1	81	0.2	0.2	0.6	0.1	43	0.2	0.3	0.3	0.1
		TL	77	1.6	1.9	2.4	0.2	100	1.6	1.9	2.4	0.2	52	1.5	1.9	2.3	0.2
	PYSL	GBD	386	0.2	0.6	1.6	0.3	437	0.3	0.6	1.8	0.3	317	0.2	0.8	1.7	0.4
		GBW	402	0.2	0.5	1.1	0.2	457	0.2	0.5	1.4	0.2	328	0.2	0.6	1.5	0.3
		TL	399	1.8	3.3	7.3	1.1	465	1.9	3.6	8.8	1.4	333	1.8	4.3	9.6	1.9
Cunner/Tautog/Yellowtail Flounder	EGGS	E_MAX	2992	0.7	0.9	1.2	0.1	3117	0.7	0.9	1.2	0.1	3521	0.7	0.9	1.2	0.1
		E_MIN	2992	0.7	0.9	1.2	0.1	3117	0.7	0.9	1.2	0.1	3521	0.7	0.9	1.2	0.1
Cusk	EGGS	E_MAX						18	1.2	1.3	1.4	0.1	22	1.2	1.3	1.4	0.0
		E_MIN						18	1.2	1.3	1.4	0.1	22	1.2	1.3	1.4	0.0
	UNID	GBW						1	0.5	0.5	0.5						
		TL						1	3.8	3.8	3.8						
	YSL	GBD						1	0.4	0.4	0.4		1	1	1.0	1	
		GBW	3	0.4	0.4	0.4		1	0.4	0.4	0.4		1	0.9	0.9	0.9	
		TL	2	3.1	3.3	3.5	0.3	1	3.1	3.1	3.1		1	4	4.0	4	

(continued)

Table 10. (continued)

Taxon	Life Stage[2]	Metric	0.8-mm CWWS					3.0-mm CWWS					Existing CWIS (Control)				
			N	Min	Mean	Max	SD	N	Min	Mean	Max	SD	N	Min	Mean	Max	SD
Fourbeard Rockling	EGGS	E_MAX	143	0.7	0.9	1	0.1	182	0.7	0.9	1	0.1	166	0.8	0.9	0.9	0.0
		E_MIN	143	0.7	0.9	1	0.1	182	0.7	0.9	1	0.1	166	0.8	0.9	0.9	0.0
	UNID	GBD						1	0.3	0.3	0.3						
		GBW	1	0.4	0.4	0.4		5	0.3	0.3	0.4	0.0	1	0.7	0.7	0.7	
		TL	1	1.7	1.7	1.7		5	1.5	1.9	2.2	0.3	1	2.2	2.2	2.2	
	YSL	GBD	1	0.3	0.3	0.3		5	0.4	0.5	0.5	0.1	5	0.4	0.5	0.7	0.1
		GBW	1	0.3	0.3	0.3		6	0.3	0.4	0.4	0.1	6	0.3	0.4	0.5	0.1
		TL	2	1.4	1.7	1.9	0.4	6	1.6	1.7	1.9	0.1	6	1.7	1.8	2.1	0.2
	PYSL	GBD	30	0.3	0.8	1.5	0.3	25	0.5	0.8	1.6	0.2	10	0.4	1.0	2	0.5
		GBW	33	0.3	0.6	1.2	0.2	25	0.4	0.6	1.5	0.2	10	0.4	0.7	1.2	0.3
		TL	33	1.7	3.0	6.5	1.2	26	1.9	3.0	5.8	0.9	11	1.7	3.4	6.4	1.7
Fourbeard Rockling/Hakes	EGGS	E_MAX	474	0.7	0.8	1	0.1	545	0.7	0.8	0.9	0.1	423	0.7	0.8	0.9	0.1
		E_MIN	474	0.7	0.8	1	0.1	545	0.7	0.8	0.9	0.1	423	0.7	0.8	0.9	0.1
Fourspot Flounder	YSL	GBD	2	0.4	0.5	0.5	0.1										
		GBW	2	0.3	0.4	0.4	0.1										
		TL	2	2.7	2.8	2.9	0.1										
Goosefish	PYSL	GBD	1	1	1.0	1											
		GBW	1	0.8	0.8	0.8											
		TL	1	3.9	3.9	3.9											
Grubby	UNID	GBD											1	0.8	0.8	0.8	
		GBW	1	1.1	1.1	1.1		1	1.1	1.1	1.1		4	0.8	1.1	1.2	0.2
		TL	2	6.3	6.5	6.7	0.3	1	5	5.0	5		4	4.8	5.4	6.1	0.6
	YSL	GBD	30	1.1	1.2	1.3	0.1	46	1	1.1	1.3	0.1	98	1	1.1	1.5	0.1
		GBW	30	1	1.1	1.2	0.1	46	0.8	1.1	1.3	0.1	98	0.9	1.1	1.2	0.1
		TL	30	5	6.2	7	0.6	46	4.7	5.9	7.7	0.8	99	4.4	6.1	7.7	0.7
	PYSL	GBD	47	1	1.2	1.4	0.1	148	1	1.4	2.7	0.4	219	0.9	1.3	2.8	0.4
		GBW	49	1	1.1	1.3	0.1	151	0.9	1.3	2.8	0.5	220	0.9	1.2	2.9	0.3
		TL	48	4.6	6.4	7.8	0.6	151	4.9	7.3	13	1.9	218	4.9	7.2	13.8	1.7
	YOY	GBD						1	3.3	3.3	3.3						
		GBW						1	2.7	2.7	2.7						
		TL						1	17	17.0	17						

(continued)

Table 10. (continued)

Taxon	Life Stage[2]	Metric	0.8-mm CWWS					3.0-mm CWWS					Existing CWIS (Control)				
			N	Min	Mean	Max	SD	N	Min	Mean	Max	SD	N	Min	Mean	Max	SD
Gulf Snailfish	YSL	GBD											2	1	1.1	1.1	0.1
		GBW											2	0.9	1.0	1	0.1
		TL											2	4.4	4.5	4.5	0.1
	PYSL	GBD											2	1.4	1.5	1.5	0.1
		GBW											2	1	1.1	1.2	0.1
		TL											2	6	6.4	6.8	0.6
Hakes	EGGS	E_MAX	447	0.6	0.7	0.8	0.0	453	0.7	0.7	0.8	0.0	338	0.7	0.7	0.8	0.0
		E_MIN	447	0.6	0.7	0.8	0.0	453	0.7	0.7	0.8	0.0	338	0.7	0.7	0.8	0.0
	UNID	GBD	7	0.4	0.5	0.5	0.0	1	0.4	0.4	0.4		1	0.5	0.5	0.5	
		GBW	17	0.3	0.3	0.5	0.1	13	0.3	0.4	0.4	0.1	3	0.2	0.3	0.4	0.1
		TL	21	1.4	1.6	2.2	0.2	18	1.3	1.6	2	0.2	3	1.7	1.8	1.9	0.1
	YSL	GBD	52	0.3	0.4	0.5	0.1	47	0.3	0.4	0.5	0.1	8	0.3	0.4	0.5	0.1
		GBW	56	0.3	0.3	0.4	0.0	58	0.2	0.3	0.4	0.0	9	0.3	0.3	0.4	0.0
		TL	58	1.3	1.6	1.9	0.1	64	1.4	1.6	2	0.1	11	1.5	1.6	2	0.1
	PYSL	GBD	34	0.3	0.6	1.6	0.3	65	0.4	0.5	1	0.1	21	0.3	0.4	0.5	0.1
		GBW	40	0.3	0.5	1.3	0.2	67	0.3	0.4	0.8	0.1	20	0.3	0.3	0.4	0.0
		TL	42	1.5	2.2	6.2	1.0	67	1.6	1.9	6.2	0.7	22	1.6	1.8	2.2	0.2
	YOY	GBD											1	5.1	5.1	5.1	
		GBW											1	4.2	4.2	4.2	
		TL											1	29	29.0	29	
Herring Family	UNID	GBD						1	0.3	0.3	0.3		1	0.4	0.4	0.4	
		GBW	4	0.3	0.3	0.4	0.1	5	0.3	0.3	0.4	0.0	1	0.4	0.4	0.4	
		TL	8	2.4	2.9	3.9	0.5	8	2.7	3.2	4	0.4					
	YSL	GBD	4	0.3	0.4	0.4	0.1	1	0.5	0.5	0.5						
		GBW	5	0.3	0.4	0.5	0.1	1	0.5	0.5	0.5						
		TL	6	2.3	3.2	4.1	0.8	1	3.6	3.6	3.6						
	PYSL	GBD	9	0.3	0.5	1	0.2	3	0.5	0.8	1.1	0.3	11	0.3	0.6	1.5	0.4
		GBW	12	0.4	0.6	0.9	0.2	8	0.3	0.7	1	0.3	11	0.3	0.6	1.3	0.3
		TL	13	2.7	6.0	11.7	2.2	11	4	7.5	11.8	2.9	12	4.1	6.4	14.7	3.3

(continued)

Table 10. (continued)

Taxon	Life Stage[2]	Metric	0.8-mm CWWS					3.0-mm CWWS					Existing CWIS (Control)				
			N	Min	Mean	Max	SD	N	Min	Mean	Max	SD	N	Min	Mean	Max	SD
Inland Silverside	UNID	GBW	1	0.5	0.5	0.5											
		TL	1	4	4.0	4											
Longhorn Sculpin	PYSL	GBD	2	1.3	1.5	1.6	0.2	32	1.3	1.8	2.9	0.4	67	1.1	2.1	3.7	0.6
		GBW	2	1.2	1.3	1.4	0.1	32	1.2	1.8	3.7	0.5	67	1.1	1.9	4.3	0.7
		TL	2	6.2	7.6	9	2.0	33	6.7	10.0	14.6	1.9	68	7.9	11.5	17.3	2.5
Lumpfish	PYSL	GBD											1	3.5	3.5	3.5	
		GBW											1	4.1	4.1	4.1	
		TL											1	12.4	12.4	12.4	
Mummichog	YSL	GBD											1	1	1.0	1	
		GBW											1	1.2	1.2	1.2	
		TL											1	6.4	6.4	6.4	
	PYSL	GBD											1	1	1.0	1	
		GBW											1	1.2	1.2	1.2	
		TL											1	7	7.0	7	
Myoxocephalus spp.	EGGS	E_MAX						1	1.9	1.9	1.9		12	1.7	1.9	2	0.1
		E_MIN						1	1.9	1.9	1.9		12	1.7	1.9	2	0.1
	UNID	TL						1	4.7	4.7	4.7						
Northern Pipefish	YSL	GBD						1	0.7	0.7	0.7						
		GBW						1	0.6	0.6	0.6						
		TL						1	7.3	7.3	7.3						
	PYSL	GBD	26	0.7	0.9	1.2	0.1	46	0.6	0.9	1.3	0.1	38	0.6	0.8	1	0.1
		GBW	26	0.7	0.8	1.1	0.1	47	0.6	0.8	1.3	0.2	39	0.5	0.7	0.9	0.1
		TL	26	9.1	12.4	25.3	3.5	47	8.9	12.7	32.8	5.1	38	8.2	11.4	16.7	1.8
Pollock	PYSL	GBD						2	1.7	1.9	2	0.2	5	2.9	3.9	5	0.9
		GBW						2	1.2	1.4	1.5	0.2	5	2.5	3.2	4	0.7
		TL						2	8.4	9.9	11.3	2.1	5	17.6	21.6	25.1	2.8
	YOY	GBD											4	5	6.0	7.5	1.2
		GBW											4	3.1	4.1	5.5	1.0
		TL											4	26	30.5	35	4.7

(continued)

Table 10. (continued)

Taxon	Life Stage[2]	Metric	0.8-mm CWWS					3.0-mm CWWS					Existing CWIS (Control)				
			N	Min	Mean	Max	SD	N	Min	Mean	Max	SD	N	Min	Mean	Max	SD
Prionotus spp.	EGGS	E_MAX	2	1.1	1.1	1.1		1	1	1.0	1		3	1.1	1.1	1.1	
		E_MIN	2	1.1	1.1	1.1		1	1	1.0	1		3	1.1	1.1	1.1	
Radiated Shanny	UNID	GBD						1	0.9	0.9	0.9						
		GBW											2	0.6	0.7	0.7	0.1
		TL											3	5.2	5.9	6.3	0.6
	YSL	GBD	1	0.7	0.7	0.7		3	0.8	0.9	1	0.1	8	0.7	0.8	0.9	0.1
		GBW	1	0.6	0.6	0.6		3	0.7	0.8	0.8	0.1	7	0.6	0.8	1	0.1
		TL	1	5.4	5.4	5.4		3	5	5.5	6.2	0.6	8	5	5.9	7.2	0.7
	PYSL	GBD	126	0.6	0.9	1.5	0.2	177	0.5	0.9	1.8	0.2	251	0.6	0.9	1.7	0.2
		GBW	128	0.5	0.8	1.4	0.2	175	0.6	0.8	1.3	0.1	260	0.5	0.8	1.3	0.2
		TL	132	4.9	7.1	14.9	1.5	185	4.5	6.8	13.2	1.6	270	4.5	7.1	14.2	1.4
Rainbow Smelt	YSL	GBD	18	0.4	0.5	0.5	0.0	24	0.4	0.5	0.7	0.1	8	0.4	0.5	0.6	0.1
		GBW	18	0.4	0.5	0.5	0.0	25	0.4	0.5	0.6	0.1	8	0.4	0.5	0.7	0.1
		TL	18	3.8	4.9	5.9	0.6	26	4.2	5.0	6.2	0.5	8	3.6	5.0	5.7	0.7
	PYSL	GBD	7	0.4	0.8	1.1	0.3	17	0.4	0.7	1.1	0.2	6	0.4	1.1	3.6	1.3
		GBW	7	0.4	0.8	1.2	0.3	18	0.5	0.8	1.1	0.2	6	0.5	1.1	3	1.0
		TL	8	5.2	9.0	12.4	2.7	18	6.2	8.8	12.7	2.3	6	6.4	12.1	32.1	10.0
Righteye Flounder Family	YSL	TL											1	3	3.0	3	
Rock Gunnel	YSL	GBD	5	1	1.2	1.3	0.1	3	0.9	1.1	1.2	0.2	13	0.8	1.1	1.3	0.1
		GBW	5	1	1.1	1.2	0.1	3	1	1.1	1.2	0.1	13	0.9	1.2	1.5	0.2
		TL	5	9.6	10.8	13.1	1.4	3	11.1	11.6	12.4	0.7	13	7.8	12.0	13.6	1.5
	PYSL	GBD	53	0.9	1.3	2.1	0.2	152	0.9	1.4	2.7	0.4	247	0.8	1.6	3	0.5
		GBW	52	0.9	1.1	1.8	0.2	144	0.9	1.3	2.1	0.2	246	0.9	1.3	2	0.2
		TL	53	9.8	13.2	23.2	3.1	150	8	15.8	30.4	4.8	249	8.4	17.9	32.1	5.7
	YROL	GBD											2	6.4	8.7	10.9	3.2
		GBW											2	5.3	7.4	9.5	3.0
		TL											2	67	90.5	114	33.2

(continued)

Table 10. (continued)

Taxon	Life Stage[2]	Metric	0.8-mm CWWS					3.0-mm CWWS					Existing CWIS (Control)				
			N	Min	Mean	Max	SD	N	Min	Mean	Max	SD	N	Min	Mean	Max	SD
Sea Raven	YSL	GBD											1	2.5	2.5	2.5	
		GBW											1	2.1	2.1	2.1	
		TL											1	14	14.0	14	
	PYSL	GBD											1	2.7	2.7	2.7	
		GBW											1	2.2	2.2	2.2	
		TL											1	16	16.0	16	
	YOY	GBD											1	4.7	4.7	4.7	
		GBW											1	5	5.0	5	
		TL											1	28	28.0	28	
Shorthorn Sculpin	YSL	GBD						1	1.7	1.7	1.7		1	1.5	1.5	1.5	
		GBW						1	1.6	1.6	1.6		1	1.4	1.4	1.4	
		TL						1	7.9	7.9	7.9		1	9.2	9.2	9.2	
	PYSL	GBD						14	1.6	2.1	3.5	0.5	46	1.5	2.4	4.3	0.8
		GBW						15	1.4	1.9	3.6	0.5	47	1.4	2.3	4.6	1.0
		TL						15	8.6	10.8	19.3	2.6	47	8.4	12.8	19	3.4
	YOY	GBD											1	7.1	7.1	7.1	
		GBW											1	9.2	9.2	9.2	
		TL											1	30	30.0	30	
Silver Hake	EGGS	E_MAX	137	0.8	0.9	1	0.0	184	0.8	0.9	1	0.0	110	0.8	0.9	1	0.0
		E_MIN	137	0.8	0.9	1	0.0	184	0.8	0.9	1	0.0	110	0.8	0.9	1	0.0
	UNID	GBW	1	0.4	0.4	0.4		3	0.3	0.4	0.4	0.1	1	0.4	0.4	0.4	
		TL	1	2.6	2.6	2.6		3	2.6	2.7	2.8	0.1	2	2.4	2.6	2.7	0.2
	YSL	GBD	20	0.3	0.5	0.8	0.1	11	0.4	0.5	0.6	0.1	6	0.4	0.5	0.7	0.1
		GBW	55	0.2	0.4	0.8	0.1	38	0.2	0.4	0.5	0.1	17	0.3	0.4	0.5	0.1
		TL	76	1.8	2.4	3	0.3	53	2	2.5	3	0.3	22	2.2	2.5	2.8	0.2
	PYSL	GBD	12	0.4	0.6	0.6	0.1	10	0.4	0.5	0.7	0.1					
		GBW	14	0.3	0.4	0.5	0.1	15	0.3	0.4	0.5	0.1					
		TL	14	2.3	2.6	2.9	0.2	15	2.3	2.5	2.8	0.1					

(continued)

Table 10. (continued)

Taxon	Life Stage[2]	Metric	0.8-mm CWWS					3.0-mm CWWS					Existing CWIS (Control)				
			N	Min	Mean	Max	SD	N	Min	Mean	Max	SD	N	Min	Mean	Max	SD
Smooth Flounder	PYSL	GBD	1	1	1.0	1											
		GBW	1	0.7	0.7	0.7											
		TL	1	6.9	6.9	6.9											
Tautog	EGGS	E_MAX	1	1	1.0	1											
		E_MIN	1	1	1.0	1											
	UNID	GBW						1	0.3	0.3	0.3						
		TL						1	2.3	2.3	2.3						
	YSL	GBD						1	0.3	0.3	0.3						
		GBW						1	0.2	0.2	0.2						
		TL						1	2.4	2.4	2.4						
	PYSL	GBD	1	1.2	1.2	1.2		2	0.3	0.4	0.4	0.1					
		GBW	1	0.9	0.9	0.9		2	0.3	0.4	0.4	0.1					
		TL						2	2.4	3.1	3.7	0.9					
Threespine Stickleback	YOY	GBD											1	4	4.0	4	
		GBW											1	2.5	2.5	2.5	
		TL											1	22	22.0	22	
	YROL	GBD											1	5.2	5.2	5.2	
		GBW											1	3.4	3.4	3.4	
		TL											1	30	30.0	30	
Windowpane	EGGS	E_MAX	29	1	1.1	1.3	0.1	36	1.1	1.2	1.3	0.1	19	1.1	1.1	1.3	0.1
		E_MIN	29	1	1.1	1.3	0.1	36	1.1	1.2	1.3	0.1	19	1.1	1.1	1.3	0.1
	UNID	GBD											1	0.6	0.6	0.6	
		GBW											1	0.4	0.4	0.4	
		TL											1	2	2.0	2	
	YSL	GBD	1	0.5	0.5	0.5		4	0.5	0.6	0.6	0.1	1	0.5	0.5	0.5	
		GBW	1	0.4	0.4	0.4		4	0.4	0.5	0.6	0.1	1	0.4	0.4	0.4	
		TL	1	2.8	2.8	2.8		4	2.1	2.4	2.7	0.3	1	2.3	2.3	2.3	
	PYSL	GBD	6	0.7	1.0	1.6	0.3	1	0.7	0.7	0.7		2	0.7	0.8	0.9	0.1
		GBW	6	0.6	0.7	0.9	0.1	1	0.5	0.5	0.5		2	0.5	0.6	0.7	0.1
		TL	6	2.3	3.2	5	1.0	1	2.6	2.6	2.6		2	2.5	2.8	3.1	0.4

(continued)

Table 10. (continued)

Taxon	Life Stage[2]	Metric	0.8-mm CWWS					3.0-mm CWWS					Existing CWIS (Control)				
			N	Min	Mean	Max	SD	N	Min	Mean	Max	SD	N	Min	Mean	Max	SD
Windowpane/Fourspot/Summer Flounder	EGGS	E_MAX	122	0.9	1.0	1.1	0.1	151	0.9	1.0	1.1	0.1	77	0.9	1.0	1.1	0.0
		E_MIN	122	0.9	1.0	1.1	0.1	151	0.9	1.0	1.1	0.1	77	0.9	1.0	1.1	0.0
Winter Flounder	EGGS	E_MAX	30	0.7	0.8	0.9	0.1	39	0.7	0.8	0.9	0.1	40	0.7	0.8	0.9	0.1
		E_MIN	30	0.6	0.8	0.9	0.1	39	0.7	0.8	0.9	0.1	40	0.7	0.8	0.9	0.1
	UNID	GBD	3	0.4	0.4	0.5	0.1						4	0.5	0.5	0.6	0.1
		GBW	12	0.4	0.4	0.5	0.0	1	0.4	0.4	0.4		7	0.4	0.4	0.4	
		TL	12	2	2.8	3.3	0.4	3	1.9	2.3	2.6	0.4	7	2.2	2.8	3.2	0.3
	WF I	GBD	29	0.3	0.4	0.6	0.1	22	0.3	0.4	0.5	0.1	23	0.3	0.4	0.5	0.1
		GBW	30	0.3	0.4	0.5	0.1	22	0.2	0.4	0.5	0.1	27	0.3	0.4	0.4	0.1
		TL	30	1.9	2.4	3.6	0.5	22	1.7	2.2	2.8	0.3	27	2	2.4	3.5	0.4
	WF II	GBD	200	0.3	0.7	1.5	0.3	221	0.3	0.7	2	0.3	209	0.3	0.8	1.9	0.3
		GBW	215	0.2	0.5	0.8	0.1	233	0.3	0.5	0.9	0.1	228	0.3	0.5	0.8	0.1
		TL	219	2.2	3.9	6.5	1.1	242	2.1	4.1	7	1.1	234	2.2	4.4	7.5	1.2
	WF III	GBD	63	1	1.7	2.3	0.3	101	0.9	1.8	2.3	0.3	62	1	1.7	2.5	0.3
		GBW	63	0.6	0.8	1	0.1	104	0.5	0.8	1.1	0.1	65	0.6	0.8	0.9	0.1
		TL	64	4.7	6.5	7.9	0.7	104	4.5	6.6	8.1	0.7	66	5.4	6.7	8	0.6
	WF IV	GBD	13	1.5	2.0	2.2	0.2	15	1.7	2.2	2.5	0.2	14	1.6	2.0	2.5	0.2
		GBW	13	0.8	0.8	0.9	0.0	15	0.7	0.8	1	0.1	14	0.8	0.9	1	0.1
		TL	13	6.3	7.3	8	0.6	15	6.4	7.5	8.9	0.6	14	6.1	7.6	11.7	1.3
Witch Flounder	EGGS	E_MAX	1	1.4	1.4	1.4											
		E_MIN	1	1.4	1.4	1.4											
	PYSL	GBD	1	0.4	0.4	0.4											
		GBW	1	0.4	0.4	0.4											
		TL	1	4.4	4.4	4.4											
Yellowtail Flounder	EGGS	E_MAX	3	0.8	0.8	0.8											
		E_MIN	3	0.8	0.8	0.8											
	YSL	GBD	1	0.4	0.4	0.4											
		GBW	2	0.3	0.4	0.4	0.1	1	0.2	0.2	0.2						
		TL	2	1.8	2.2	2.5	0.5	1	2.3	2.3	2.3		1	2.5	2.5	2.5	
	PYSL	GBD						3	0.4	0.4	0.5	0.1					
		GBW						3	0.4	0.4	0.5	0.1					
		TL						3	2.5	2.9	3.7	0.7					

(continued)

Table 10. (continued)

Taxon	Life Stage[2]	Metric	0.8-mm CWWS					3.0-mm CWWS					Existing CWIS (Control)				
			N	Min	Mean	Max	SD	N	Min	Mean	Max	SD	N	Min	Mean	Max	SD
All Taxon Combined	EGGS	E_MAX	4679	0.6	0.9	1.8	0.1	5594	0.6	1.0	2.5	0.4	5332	0.6	1.0	2.6	0.3
		E_MIN	4679	0.6	0.9	1.8	0.1	5594	0.6	1.0	2.5	0.4	5332	0.6	1.0	2.6	0.3
	UNID	GBD	10	0.4	0.5	0.5	0.0	4	0.3	0.5	0.9	0.3	12	0.3	0.5	0.8	0.1
		GBW	40	0.3	0.4	1.1	0.1	33	0.3	0.4	1.1	0.1	26	0.2	0.5	1.2	0.3
		TL	54	1.4	2.6	6.7	1.1	48	1.3	2.5	5.0	1.0	27	1.7	3.5	6.3	1.4
	YSL	GBD	151	0.2	0.6	1.3	0.3	171	0.3	0.7	1.7	0.3	170	0.3	1.0	2.5	0.3
		GBW	266	0.2	0.4	1.2	0.3	296	0.2	0.5	1.6	0.3	226	0.2	0.8	2.1	0.4
		TL	299	1.3	2.9	13.1	1.8	341	1.4	3.0	12.4	1.8	256	1.5	4.6	14.0	2.7
	PYSL	GBD	907	0.2	0.7	2.1	0.3	1457	0.3	1.0	6.0	0.7	1689	0.2	1.2	6.0	0.6
		GBW	947	0.2	0.6	1.8	0.3	1490	0.2	0.9	4.3	0.6	1719	0.2	1.1	4.6	0.6
		TL	952	1.5	5.3	26.3	3.7	1532	1.6	8.6	47.2	7.9	1730	1.6	10.2	45.5	7.6
	YOY	GBD	0	0.0	0.0	0.0	0.0	3	2.9	3.2	3.5	0.3	24	2.5	3.9	7.5	1.5
		GBW	0	0.0	0.0	0.0	0.0	3	2.3	2.7	3.1	0.4	24	2.1	3.3	9.2	1.5
		TL	0	0.0	0.0	0.0	0.0	3	17.0	35.3	48.0	16.3	24	22.0	37.7	48.0	7.3
	YROL	GBD	0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	4	5.2	11.6	24.0	8.6
		GBW	0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	4	3.4	9.8	21.0	7.9
		TL	0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	4	30.0	154.3	406.0	171.3
	WF I	GBD	29	0.3	0.4	0.6	0.1	22	0.3	0.4	0.5	0.1	23	0.3	0.4	0.5	0.1
		GBW	30	0.3	0.4	0.5	0.1	22	0.2	0.4	0.5	0.1	27	0.3	0.4	0.4	0.1
		TL	30	1.9	2.4	3.6	0.5	22	1.7	2.2	2.8	0.3	27	2.0	2.4	3.5	0.4
	WF II	GBD	200	0.3	0.7	1.5	0.3	221	0.3	0.7	2.0	0.3	209	0.3	0.8	1.9	0.3
		GBW	215	0.2	0.5	0.8	0.1	233	0.3	0.5	0.9	0.1	228	0.3	0.5	0.8	0.1
		TL	219	2.2	3.9	6.5	1.1	242	2.1	4.1	7.0	1.1	234	2.2	4.4	7.5	1.2
	WF III	GBD	63	1.0	1.7	2.3	0.3	101	0.9	1.8	2.3	0.3	62	1.0	1.7	2.5	0.3
		GBW	63	0.6	0.8	1.0	0.1	104	0.5	0.8	1.1	0.1	65	0.6	0.8	0.9	0.1
		TL	64	4.7	6.5	7.9	0.7	104	4.5	6.6	8.1	0.7	66	5.4	6.7	8.0	0.6
	WF IV	GBD	13	1.5	2.0	2.2	0.2	15	1.7	2.2	2.5	0.2	14	1.6	2.0	2.5	0.2
		GBW	13	0.8	0.8	0.9	0.0	15	0.7	0.8	1.0	0.1	14	0.8	0.9	1.0	0.1
		TL	13	6.3	7.3	8.0	0.6	15	6.4	7.5	8.9	0.6	14	6.1	7.6	11.7	1.3

[1] Min = minimum, Max = maximum, SD = standard deviation.

[2] UNID = unidentified larvae, YSL = yolk-sac larvae, PYSL = post yolk-sac larvae, YOY = young-of-the-year, YROL = yearling and older.

Table 11. Percent distribution of maximum egg diameter of ichthyoplankton by size class size (every 0.2 mm) for each taxon measured from samples collected from the 0.8-mm and 3.0-mm cylindrical wedgewire screen (CWWS) intakes and the existing cooling water intake structure (CWIS) for Units 5 and 6 (Control) at Schiller Station from Monday, 11 March 2019 through Monday, 23 September 2019. The value of each size class increment is shown (e.g., 1.0 = 1.0 to 1.1 mm, etc.).

Taxon	Location	Percent Distribution of Maximum Egg Diameter by 0.2-mm Size Class											Total (N)
		0.6	0.8	1.0	1.2	1.4	1.6	1.8	2.0	2.2	2.4	2.6	
American Plaice	0.8-mm CWWS												0
	3.0-mm CWWS						0.4		10.2	48.9	40.5		284
	Existing CWIS (Control)								7.5	58.3	33.5	0.8	266
Atlantic Cod/Haddock	0.8-mm CWWS												0
	3.0-mm CWWS				50.0	50.0							2
	Existing CWIS (Control)					100.0							1
Atlantic Mackerel	0.8-mm CWWS			33.3	66.7								9
	3.0-mm CWWS			3.8	88.5	7.7							26
	Existing CWIS (Control)			23.6	72.7	3.6							55
Atlantic Mackerel/Cusk	0.8-mm CWWS			15.7	84.3								51
	3.0-mm CWWS			14.4	76.9	8.7							104
	Existing CWIS (Control)			20.3	78.0	1.7							59
Atlantic Menhaden	0.8-mm CWWS					21.4	71.4	7.1					42
	3.0-mm CWWS					18.7	70.4	10.9					230
	Existing CWIS (Control)					15.2	83.3	1.5					132
Butterfish	0.8-mm CWWS	100.0											54
	3.0-mm CWWS	100.0											63
	Existing CWIS (Control)	100.0											23
Cod Family/Witch Flounder	0.8-mm CWWS				100.0								1
	3.0-mm CWWS				66.7	33.3							9
	Existing CWIS (Control)				85.7	14.3							7
Cunner	0.8-mm CWWS		100.0										141
	3.0-mm CWWS	8.7	89.9	1.3									149
	Existing CWIS (Control)		98.3	1.7									58
Cunner/Tautog/Yellowtail Flounder	0.8-mm CWWS	0.3	79.6	19.9	0.2								2992
	3.0-mm CWWS	0.2	77.8	21.8	0.1								3117
	Existing CWIS (Control)	0.1	83.6	16.3	0.0								3521
Cusk	0.8-mm CWWS												0
	3.0-mm CWWS				83.3	16.7							18
	Existing CWIS (Control)				95.5	4.5							22

(continued)

Table 11. (continued)

Taxon	Location	Percent Distribution of Maximum Egg Diameter by 0.2-mm Size Class											Total (N)
		0.6	0.8	1.0	1.2	1.4	1.6	1.8	2.0	2.2	2.4	2.6	
Fourbeard Rockling	0.8-mm CWWS	2.8	95.8	1.4									143
	3.0-mm CWWS	2.7	96.2	1.1									182
	Existing CWIS (Control)		100.0										166
Fourbeard Rockling/Hakes	0.8-mm CWWS	38.6	61.2	0.2									474
	3.0-mm CWWS	34.9	65.1										545
	Existing CWIS (Control)	29.8	70.2										423
Hakes	0.8-mm CWWS	97.1	2.9										447
	3.0-mm CWWS	94.5	5.5										453
	Existing CWIS (Control)	91.7	8.3										338
Myoxocephalus spp.	0.8-mm CWWS												0
	3.0-mm CWWS							100.0					1
	Existing CWIS (Control)						8.3	83.3	8.3				12
Prionotus spp.	0.8-mm CWWS			100.0									2
	3.0-mm CWWS			100.0									1
	Existing CWIS (Control)			100.0									3
Silver Hake	0.8-mm CWWS		86.1	13.9									137
	3.0-mm CWWS		91.8	8.2									184
	Existing CWIS (Control)		88.2	11.8									110
Tautog	0.8-mm CWWS			100.0									1
	3.0-mm CWWS												0
	Existing CWIS (Control)												0
Windowpane	0.8-mm CWWS			58.6	41.4								29
	3.0-mm CWWS			52.8	47.2								36
	Existing CWIS (Control)			73.7	26.3								19
Windowpane/Fourspot/Summer Flounder	0.8-mm CWWS		18.0	82.0									122
	3.0-mm CWWS		26.5	73.5									151
	Existing CWIS (Control)		14.3	85.7									77
Winter Flounder	0.8-mm CWWS	33.3	66.7										30
	3.0-mm CWWS	38.5	61.5										39
	Existing CWIS (Control)	30.0	70.0										40
Witch Flounder	0.8-mm CWWS					100.0							1
	3.0-mm CWWS												0
	Existing CWIS (Control)												0

(continued)

Table 11. (continued)

Taxon	Location	Percent Distribution of Maximum Egg Diameter by 0.2-mm Size Class											Total (N)
		0.6	0.8	1.0	1.2	1.4	1.6	1.8	2.0	2.2	2.4	2.6	
Yellowtail Flounder	0.8-mm CWWS		100.0										3
	3.0-mm CWWS												0
	Existing CWIS (Control)												0
Total	0.8-mm CWWS	14.9	66.8	16.0	1.4	0.2	0.6	0.1	0.0	0.0	0.0	0.0	4679
	3.0-mm CWWS	12.9	59.8	15.1	2.6	1.1	2.9	0.5	0.5	2.5	2.1	0.0	5594
	Existing CWIS (Control)	8.9	68.0	13.1	2.2	0.5	2.1	0.2	0.4	2.9	1.7	0.0	5332

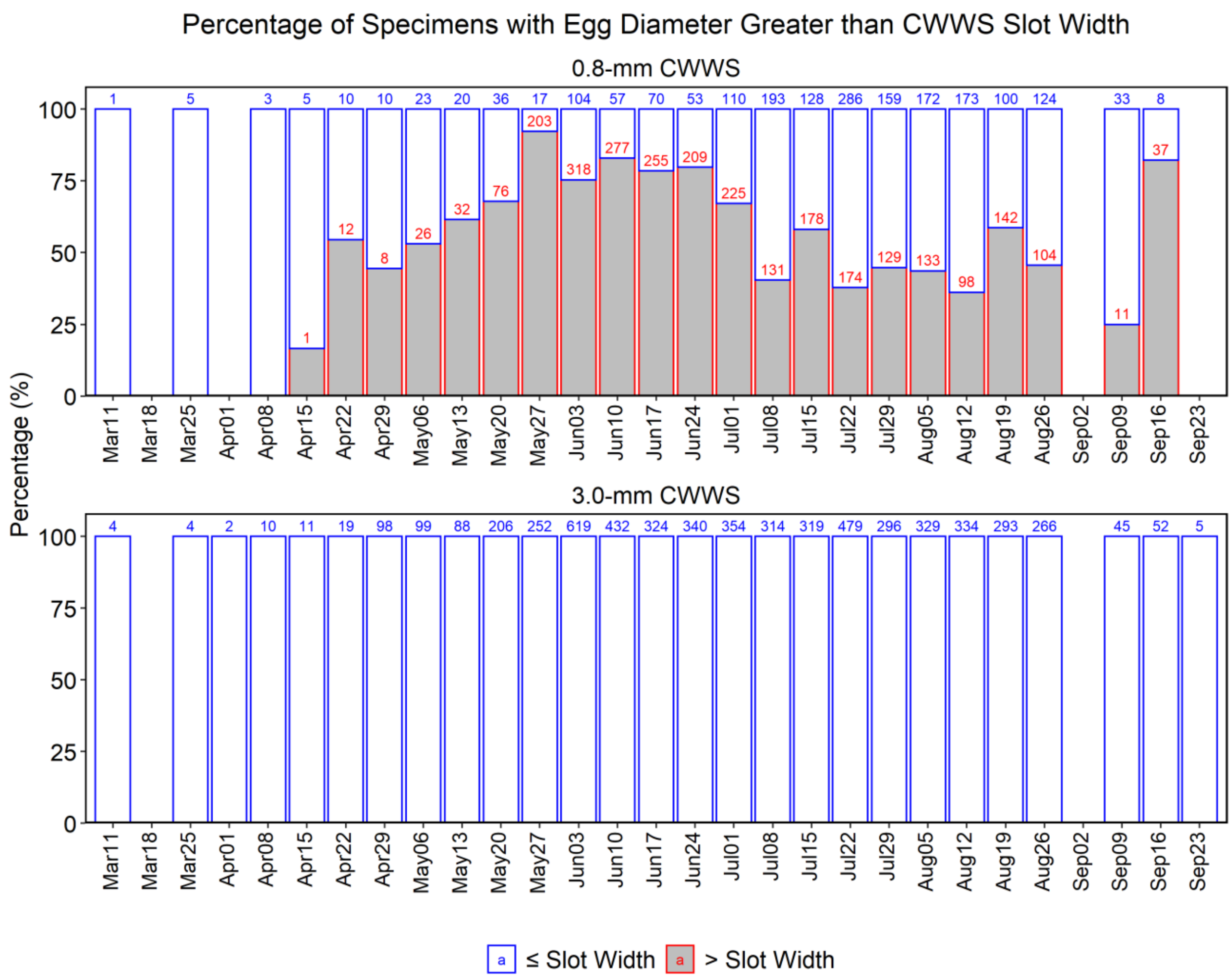


Figure 12. Weekly percentage of measured eggs with a maximum egg diameter greater than the slot widths of the 0.8-mm and 3.0-mm cylindrical wedgewire screen (CWWS) intakes at Schiller Station based on synchronized entrainment samples from weeks beginning Monday, 11 March 2019 through Monday, 23 September 2019.

Table 12. Percent extrusion by taxon of fish eggs entrained by the 0.8-mm cylindrical wedgewire screen based on total count (N) and percentage (%) of measured fish eggs with a maximum egg diameter greater than the 0.8-mm slot width opening from synchronized samples collected at Schiller Station from weeks beginning Monday, 11 March 2019 through Monday, 23 September 2019.

Taxon	N > 0.8 mm	N	%
Atlantic Mackerel	9	9	100.0
Atlantic Mackerel/Cusk	51	51	100.0
Atlantic Menhaden	42	42	100.0
Cod Family/Witch Flounder	1	1	100.0
Cunner	131	141	92.9
Cunner/Tautog/Yellowtail Flounder	2089	2992	69.8
Fourbeard Rockling	81	143	56.6
Fourbeard Rockling/Hakes	93	474	19.6
Prionotus spp.	2	2	100.0
Silver Hake	126	137	92.0
Tautog	1	1	100.0
Windowpane	29	29	100.0
Windowpane/Fourspot/Summer Flounder	122	122	100.0
Winter Flounder	1	30	3.3
Witch Flounder	1	1	100.0

Table 13. Percent distribution of total length of ichthyoplankton larvae and older (yolk-sac, post yolk-sac, young-of-the-year, yearling-and-older, unidentified larvae and all Winter Flounder stages combined) for each taxon measured from samples collected from the 0.8-mm and 3.0-mm cylindrical wedgewire screen (CWWS) intakes and the existing cooling water intake structure (CWIS) for Units 5 and 6 (Control) at Schiller Station from Monday, 11 March 2019 through Monday, 23 September 2019. The integer value of each length size class is shown (e.g., 3 = 3.0 to 3.9 mm, etc.).

		Percent Distribution of Total Length (1-mm Size Class)															
Taxon	**Location**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15+**	**Total (N)**
Alligatorfish	0.8-mm CWWS																0
	3.0-mm CWWS																0
	Existing CWIS (Control)											50.0				50.0	2
American Eel	0.8-mm CWWS																0
	3.0-mm CWWS																0
	Existing CWIS (Control)															100.0	1
American Plaice	0.8-mm CWWS		1.6	76.6	15.6	3.1	1.6	1.6									64
	3.0-mm CWWS			44.3	37.7	14.8	3.3										61
	Existing CWIS (Control)	3.4		41.4	41.4	6.9		3.4		3.4							29
American Sand Lance	0.8-mm CWWS				4.8	11.3	14.5	6.5	6.5	14.5	1.6	8.1	8.1	1.6	4.8	17.7	62
	3.0-mm CWWS				1.9	1.9	3.4	2.4	5.3	5.3	7.2	6.8	2.4	1.4	3.9	58.0	207
	Existing CWIS (Control)				0.7	2.5	2.8	1.8	2.8	3.9	4.6	1.8	5.0	5.0	5.3	63.8	282
Atlantic Cod	0.8-mm CWWS																0
	3.0-mm CWWS															100.0	1
	Existing CWIS (Control)															100.0	3
Atlantic Herring	0.8-mm CWWS																0
	3.0-mm CWWS															100.0	27
	Existing CWIS (Control)															100.0	11
Atlantic Menhaden	0.8-mm CWWS																0
	3.0-mm CWWS		25.0	25.0												50.0	4
	Existing CWIS (Control)		100.0														1
Atlantic Seasnail	0.8-mm CWWS		19.7	63.6	12.1	3.0	1.5										66
	3.0-mm CWWS		31.2	44.2	15.6	5.2	2.6	1.3									77
	Existing CWIS (Control)	0.6	22.4	54.5	13.9	4.8	2.4	0.6		0.6							165

(continued)

Table 13. (continued)

Taxon	Location	Percent Distribution of Total Length (1-mm Size Class)															Total (N)
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15+	
Atlantic Tomcod	0.8-mm CWWS																0
	3.0-mm CWWS																0
	Existing CWIS (Control)						100.0										1
Butterfish	0.8-mm CWWS	87.5	12.5														8
	3.0-mm CWWS	66.7	33.3														3
	Existing CWIS (Control)																0
Cunner	0.8-mm CWWS	12.0	47.5	19.7	13.2	4.2	2.5	0.8									476
	3.0-mm CWWS	11.7	39.8	23.2	12.2	5.7	5.0	1.8	0.7								565
	Existing CWIS (Control)	10.4	33.0	14.0	12.7	8.6	11.9	6.8	1.6	1.0							385
Cusk	0.8-mm CWWS			100.0													2
	3.0-mm CWWS			100.0													2
	Existing CWIS (Control)				100.0												1
Fourbeard Rockling	0.8-mm CWWS	30.6	27.8	22.2	11.1	5.6	2.8										36
	3.0-mm CWWS	27.0	37.8	29.7	2.7	2.7											37
	Existing CWIS (Control)	44.4	22.2	11.1	11.1	5.6	5.6										18
Fourspot Flounder	0.8-mm CWWS		100.0														2
	3.0-mm CWWS																0
	Existing CWIS (Control)																0
Goosefish	0.8-mm CWWS			100.0													1
	3.0-mm CWWS																0
	Existing CWIS (Control)																0
Grubby	0.8-mm CWWS				1.3	26.3	55.0	17.5									80
	3.0-mm CWWS				3.5	24.6	35.2	17.6	7.0	1.0	3.0	4.5	2.5	0.5		0.5	199
	Existing CWIS (Control)				1.6	22.4	42.1	21.8	4.0	1.6	1.9	2.2	1.6	0.9			321
Gulf Snailfish	0.8-mm CWWS																0
	3.0-mm CWWS																0
	Existing CWIS (Control)				50.0		50.0										4
Hakes	0.8-mm CWWS	86.8	9.9	0.8	1.7		0.8										121
	3.0-mm CWWS	90.6	7.4	1.3			0.7										149
	Existing CWIS (Control)	83.8	13.5													2.7	37

(continued)

Table 13. (continued)

Taxon	Location	Percent Distribution of Total Length (1-mm Size Class)															Total (N)
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15+	
Herring Family	0.8-mm CWWS		33.3	18.5	11.1	11.1	18.5		3.7			3.7					27
	3.0-mm CWWS		10.0	30.0	20.0	10.0	5.0		5.0	5.0	5.0	10.0					20
	Existing CWIS (Control)				58.3	8.3	8.3	8.3				8.3			8.3		12
Inland Silverside	0.8-mm CWWS				100.0												1
	3.0-mm CWWS																0
	Existing CWIS (Control)																0
Longhorn Sculpin	0.8-mm CWWS						50.0			50.0							2
	3.0-mm CWWS						3.0	9.1	18.2	27.3	15.2	12.1	6.1	6.1	3.0		33
	Existing CWIS (Control)							1.5	10.3	22.1	20.6	13.2	4.4	7.4	8.8	11.8	68
Lumpfish	0.8-mm CWWS																0
	3.0-mm CWWS																0
	Existing CWIS (Control)												100.0				1
Mummichog	0.8-mm CWWS																0
	3.0-mm CWWS																0
	Existing CWIS (Control)						50.0	50.0									2
Myoxocephalus spp.	0.8-mm CWWS																0
	3.0-mm CWWS				100.0												1
	Existing CWIS (Control)																0
Northern Pipefish	0.8-mm CWWS									11.5	26.9	26.9	11.5	3.8	3.8	15.4	26
	3.0-mm CWWS							2.1	4.2	27.1	16.7	20.8	6.3		4.2	18.8	48
	Existing CWIS (Control)								5.3	18.4	18.4	28.9	15.8	2.6	5.3	5.3	38
Pollock	0.8-mm CWWS																0
	3.0-mm CWWS								50.0			50.0					2
	Existing CWIS (Control)															100.0	9
Radiated Shanny	0.8-mm CWWS				1.5	22.6	28.6	24.8	12.0	5.3	3.0	1.5			0.8		133
	3.0-mm CWWS				4.3	30.9	29.3	14.4	11.2	5.3	3.2	1.1		0.5			188
	Existing CWIS (Control)				2.1	16.4	37.7	22.8	12.1	5.0	2.5	0.7	0.4		0.4		281
Rainbow Smelt	0.8-mm CWWS			3.8	26.9	42.3	7.7			3.8	7.7	3.8	3.8				26
	3.0-mm CWWS				25.0	31.8	11.4	11.4	4.5	4.5		2.3	9.1				44
	Existing CWIS (Control)			7.1	14.3	35.7	14.3		14.3			7.1				7.1	14

(continued)

Table 13. (continued)

Taxon	Location	Percent Distribution of Total Length (1-mm Size Class)															Total (N)
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15+	
Righteye Flounder Family	0.8-mm CWWS																0
	3.0-mm CWWS																0
	Existing CWIS (Control)			100.0													1
Rock Gunnel	0.8-mm CWWS									5.2	20.7	17.2	17.2	17.2	5.2	17.2	58
	3.0-mm CWWS								0.7	1.3	6.5	12.4	11.8	13.7	9.2	44.4	153
	Existing CWIS (Control)							0.4	0.8	1.9	4.5	5.3	7.6	12.9	9.5	57.2	264
Sea Raven	0.8-mm CWWS																0
	3.0-mm CWWS																0
	Existing CWIS (Control)														33.3	66.7	3
Shorthorn Sculpin	0.8-mm CWWS																0
	3.0-mm CWWS							6.3	18.8	25.0	18.8	12.5	12.5			6.3	16
	Existing CWIS (Control)								2.0	16.3	20.4	16.3	10.2	6.1	2.0	26.5	49
Silver Hake	0.8-mm CWWS	5.5	93.4	1.1													91
	3.0-mm CWWS		97.2	2.8													71
	Existing CWIS (Control)		100.0														24
Smooth Flounder	0.8-mm CWWS						100.0										1
	3.0-mm CWWS																0
	Existing CWIS (Control)																0
Tautog	0.8-mm CWWS																0
	3.0-mm CWWS		75.0	25.0													4
	Existing CWIS (Control)																0
Threespine Stickleback	0.8-mm CWWS																0
	3.0-mm CWWS																0
	Existing CWIS (Control)															100.0	2
Windowpane	0.8-mm CWWS		57.1	28.6		14.3											7
	3.0-mm CWWS		100.0														5
	Existing CWIS (Control)		75.0	25.0													4
Winter Flounder	0.8-mm CWWS	0.6	22.8	25.7	16.9	12.4	12.4	8.6	0.6								338
	3.0-mm CWWS	1.3	15.3	18.9	18.4	15.5	17.4	12.2	1.0								386
	Existing CWIS (Control)		15.8	18.7	20.1	17.5	17.8	8.9	0.9			0.3					348

(continued)

Table 13. (continued)

Taxon	Location	Percent Distribution of Total Length (1-mm Size Class)															Total (N)
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15+	
Witch Flounder	0.8-mm CWWS				100.0												1
	3.0-mm CWWS																0
	Existing CWIS (Control)																0
Yellowtail Flounder	0.8-mm CWWS	50.0	50.0														2
	3.0-mm CWWS		75.0	25.0													4
	Existing CWIS (Control)		100.0														1
Total	**0.8-mm CWWS**	**11.5**	**27.0**	**18.0**	**9.9**	**8.6**	**9.7**	**5.2**	**1.4**	**1.5**	**1.6**	**1.6**	**1.2**	**0.7**	**0.5**	**1.5**	**1631**
	3.0-mm CWWS	**9.4**	**18.1**	**12.6**	**9.1**	**10.1**	**10.4**	**5.9**	**3.0**	**2.3**	**2.3**	**2.8**	**1.7**	**1.2**	**1.1**	**9.9**	**2307**
	Existing CWIS (Control)	**3.4**	**10.8**	**9.5**	**7.6**	**9.9**	**15.5**	**8.5**	**3.3**	**3.0**	**2.9**	**2.5**	**2.3**	**2.5**	**2.2**	**16.2**	**2382**

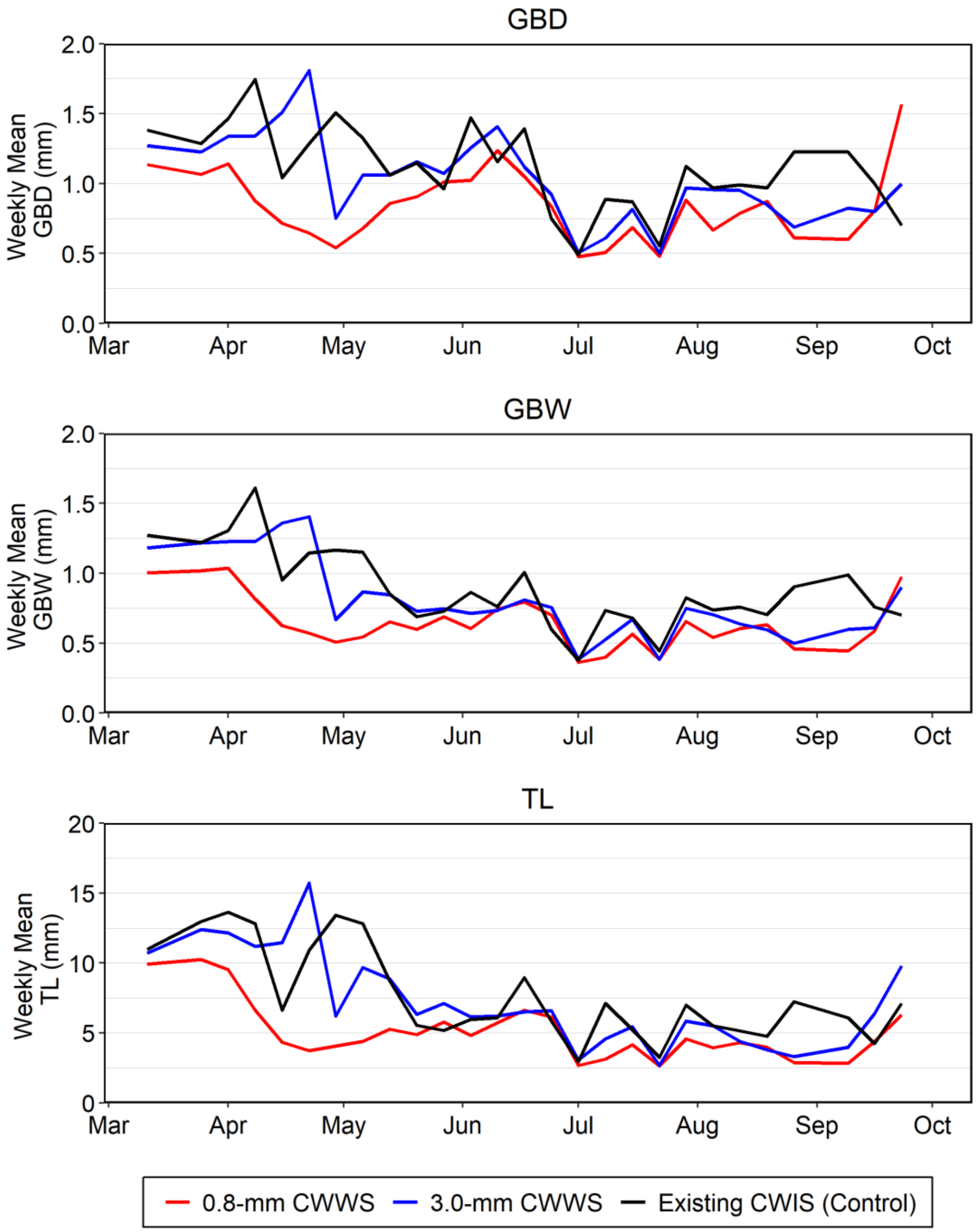


Figure 13. Average weekly greatest body depth (GBD), greatest body width (GBW) and total length (TL) of larval and juvenile fish of all taxa collected from the 0.8-mm and 3.0-mm cylindrical wedgewire screen (CWWS) intakes and the existing cooling water intake structure (CWIS) for Units 5 and 6 (Control) at Schiller Station based on synchronized samples collected from weeks beginning Monday, 11 March 2019 through Monday, 23 September 2019.

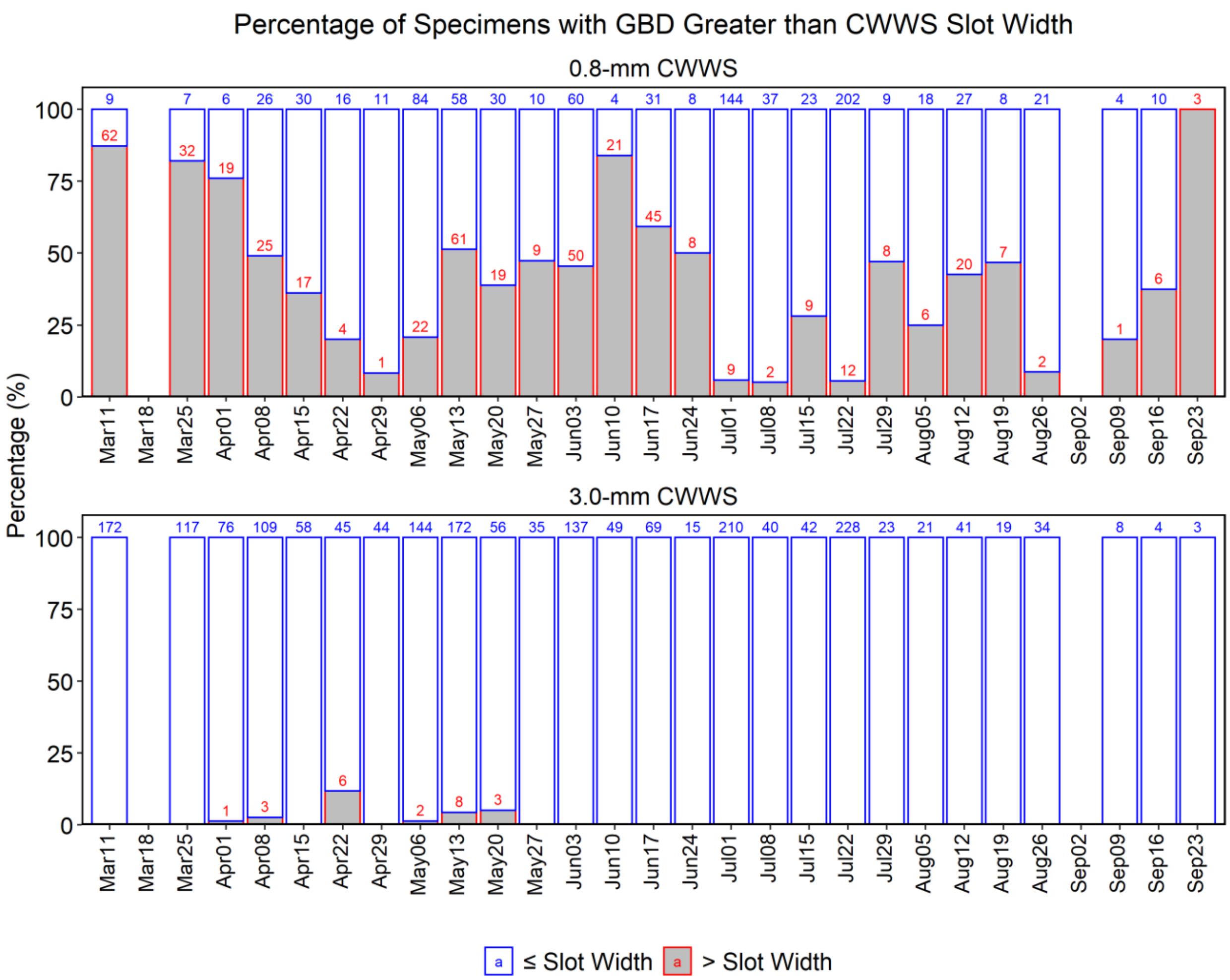


Figure 14. Weekly percentage of measured larval and juvenile fish with a greatest body depth (GBD) greater than the slot widths of the 0.8-mm and 3.0-mm cylindrical wedgewire screen (CWWS) intakes at Schiller Station based on synchronized samples collected from weeks beginning Monday, 11 March 2019 through Monday, 23 September 2019.

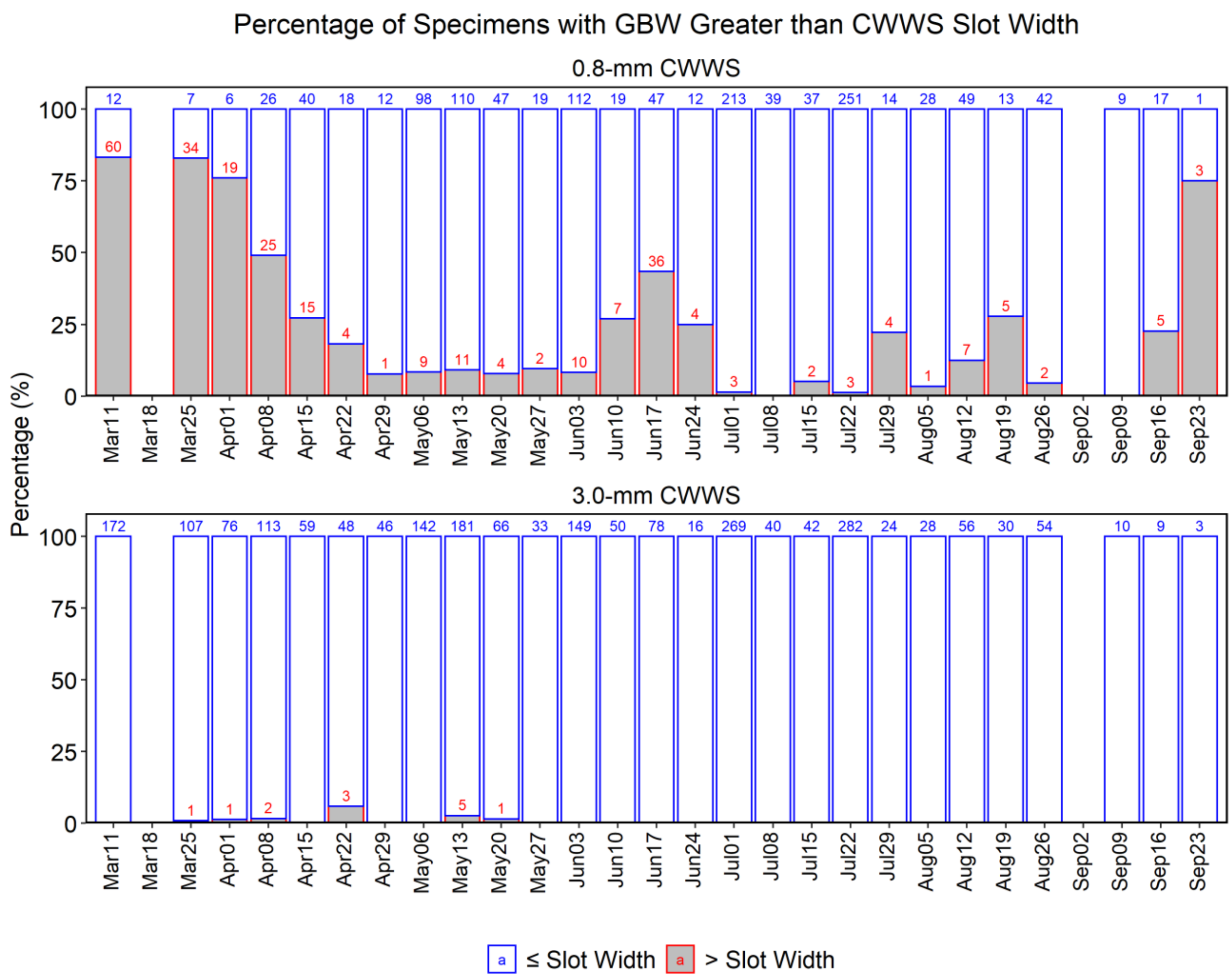


Figure 15. Weekly percentage of measured larval and juvenile fish with a greatest body width (GBW) greater than the slot widths of the 0.8-mm and 3.0-mm cylindrical wedgewire screen (CWWS) intakes at Schiller Station based on synchronized samples collected from weeks beginning Monday, 11 March 2019 through Monday, 23 September 2019.

Table 14. Percent extrusion by taxon of larvae and juvenile fish entrained by the 0.8-mm and 3.0-mm cylindrical wedgewire screens (CWWS) based on total count (N) and percentage (%) of measured larval and juvenile fish with a greatest body depth (GBD) greater than 0.8-mm and 3.0-mm slot width of the CWWS intakes from synchronized samples collected at Schiller Station from weeks beginning Monday, 11 March 2019 through Monday, 23 September 2019.

	0.8-mm CWWS			3.0-mm CWWS		
Taxon	N > 0.8 mm	N	%	N > 3.0 mm	N	%
American Plaice	1	50	2.0			
American Sand Lance	27	58	46.6	2	203	1.0
Atlantic Cod				1	1	100.0
Atlantic Herring				18	27	66.7
Atlantic Seasnail	16	65	24.6			
Cunner	58	389	14.9			
Fourbeard Rockling	12	31	38.7			
Goosefish	1	1	100.0			
Grubby	77	77	100.0	1	195	0.5
Hakes	3	93	3.2			
Herring Family	1	13	7.7			
Longhorn Sculpin	2	2	100.0			
Northern Pipefish	14	26	53.9			
Radiated Shanny	77	127	60.6			
Rainbow Smelt	4	25	16.0			
Rock Gunnel	58	58	100.0			
Shorthorn Sculpin				1	15	6.7
Smooth Flounder	1	1	100.0			
Tautog	1	1	100.0			
Windowpane	3	7	42.9			
Winter Flounder	124	308	40.3			

Table 15. Percent extrusion by taxon of larvae and juvenile fish entrained by the 0.8-mm and 3.0-mm cylindrical wedgewire screen (CWWS) based on total count (N) and percentage (%) of measured larval and juvenile fish with a greatest body width (GBW) greater than 0.8-mm and 3.0-mm slot width of the CWWS intakes from synchronized samples collected at Schiller Station from weeks beginning Monday, 11 March 2019 through Monday, 23 September 2019.

Taxon	0.8-mm CWWS			3.0-mm CWWS		
	N > 0.8 mm	N	%	N > 3.0 mm	N	%
American Sand Lance	24	59	40.7	1	198	0.5
Atlantic Cod				1	1	100.0
Atlantic Herring				9	27	33.3
Atlantic Seasnail	5	68	7.4			
Cunner	23	472	4.9			
Fourbeard Rockling	6	35	17.1			
Grubby	80	80	100.0			
Hakes	2	113	1.8			
Herring Family	1	21	4.8			
Longhorn Sculpin	2	2	100.0	1	32	3.1
Northern Pipefish	8	26	30.8			
Radiated Shanny	43	129	33.3			
Rainbow Smelt	4	25	16.0			
Rock Gunnel	57	57	100.0			
Shorthorn Sculpin				1	16	6.3
Tautog	1	1	100.0			
Windowpane	1	7	14.3			
Winter Flounder	19	333	5.7			

7.2.4 Entrainment Density

Ichthyoplankton densities vary throughout the year based on when each individual species spawns and when the dominant species are present in the estuary. During the performance evaluation period, weekly mean entrainment density of total ichthyoplankton at the 0.8-mm and 3.0-mm CWWS intakes and the Control at Schiller Station varied between zero and approximately 1,100 N/100 m^3, with the peak density in the first week of July (Table 16; Figure 16). Table 9 shows mean entrainment density by species for eggs only able to be identified to species complex or family for all screens combined and for the Control during the performance evaluation period. Appendix A provides a breakdown of the weekly entrainment densities by taxon and life stage for the yearlong monitoring period.

Table 16. Weekly mean entrainment density of all fish taxa and life stages entrained by the 0.8-mm and 3.0-mm cylindrical wedgewire screen (CWWS) intakes and existing cooling water intake structure (CWIS) from synchronized samples collected at Schiller Station from weeks beginning Monday, 11 March 2019 through Monday, 23 September 2019.

Week No.	Sampling Week (beginning Monday)	Weekly Mean Entrainment Density (N/100m^3)		
		0.8-mm CWWS	3.0-mm CWWS	Existing CWIS (Control)
10	11-Mar-2019	19.2	51.4	89.2
12	25-Mar-2019	13.4	33.3	79.8
13	01-Apr-2019	6.5	21.6	63.5
14	08-Apr-2019	14.7	32.2	39.5
15	15-Apr-2019	16.1	18.5	17.6
16	22-Apr-2019	11.1	18.3	17.9
17	29-Apr-2019	8.6	36.9	44.1
18	06-May-2019	20.8	33.7	47.2
19	13-May-2019	24.8	38.8	88.6
20	20-May-2019	22.0	38.2	47.3
21	27-May-2019	86.2	143.6	237.9
22	03-Jun-2019	273.2	503.8	626.8
23	10-Jun-2019	301.4	579.8	768.7
24	17-Jun-2019	705.3	886.2	839.4
25	24-Jun-2019	223.6	356.2	288.4
26	01-Jul-2019	761.4	1072.6	950.3
27	08-Jul-2019	219.3	350.4	509.4
28	15-Jul-2019	358.8	516.7	709.8
29	22-Jul-2019	338.5	486.4	364.1
30	29-Jul-2019	162.6	249.4	481.8
31	05-Aug-2019	63.4	88.2	216.9
32	12-Aug-2019	48.5	71.0	219.3
33	19-Aug-2019	36.7	49.5	339.1
34	26-Aug-2019	37.2	47.6	165.8
36	09-Sep-2019	19.1	20.1	86.8
37	16-Sep-2019	20.0	16.3	113.5
38	23-Sep-2019	1.0	2.8	25.3
Overall Mean		**141.2**	**213.5**	**277.0**

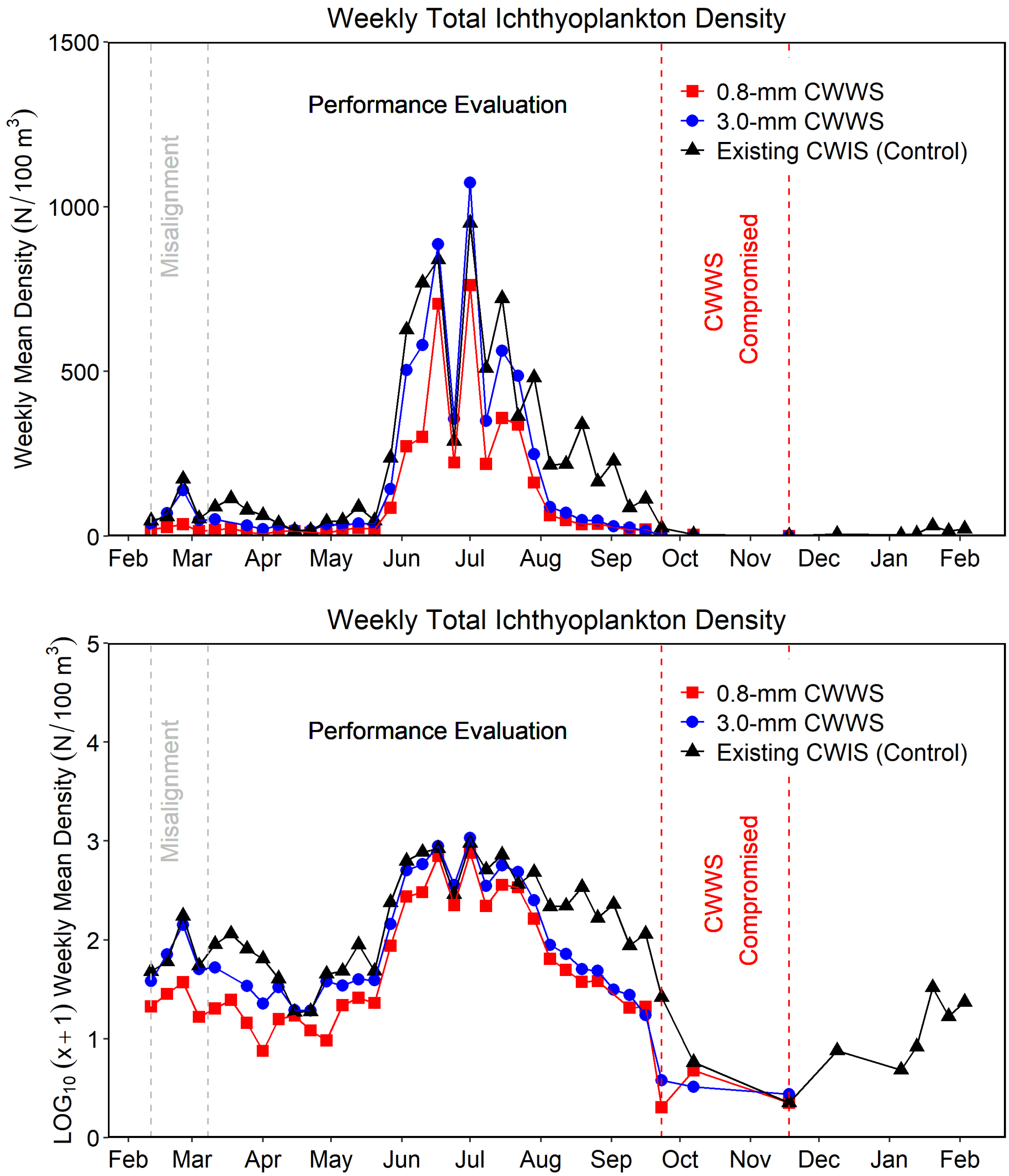


Figure 16. Untransformed (top) and $\log_{10}(x+1)$ transformed (bottom) weekly mean entrainment density of all fish taxa and life stages collected from the 0.8-mm and 3.0-mm cylindrical wedgewire screen (CWWS) intakes and the existing cooling water intake structure (CWIS) for Units 5 and 6 (Control) at Schiller Station from weeks beginning Monday, 11 February 2019 through Monday, 3 February 2020.

For each CWWS, total entrainment density differed slightly, with the highest densities observed at the 3.0-mm CWWS or Control and the lowest at the 0.8-mm CWWS (Figure 16). Ichthyoplankton densities were driven in large part by fish eggs (Figure 17), which occurred in much greater abundance in samples than larvae and juveniles (Figure 18) except for in the later winter and early spring. Egg entrainment density was low or zero from February through May, then rapidly increased to peaks in June and July before tapering gradually through the fall and early winter months. The seasonal pattern in larval and juvenile density was vastly different from egg density, with the highest value in March and several secondary peaks following through the spring and summer. These seasonal patterns in density by life stage are driven by the spawning and growth periods of the dominant species present, discussed further below. Figure 17 and Figure 18 also suggest that the CWWS had a more significant impact on larval entrainment density than egg entrainment density, illustrated by the larger differences between the Control and the 0.8-mm CWWS, particularly during times of high larval entrainment in March through May. However, the weekly mean entrainment density of larvae and juveniles became consistently lower in the Control than both CWWSs from June onward (Figure 18).

Diel period did not appear to have an impact on screen performance regarding total ichthyoplankton log-transformed densities, though the highest density was observed during 1500–2059 (Figure 19). The seasonal patterns observed in the combined data were largely still visible when examined by diel period, though the overall peak period appeared slightly longer (mid-late July) during 1500–2059.

The top four species or taxonomic complexes entrained by the Control based on mean density with all life stages combined were Cunner/Tautog/Yellowtail Flounder (i.e., Cunner complex), American Sand Lance, Grubby, and Rock Gunnel, with the Cunner complex eggs making up the majority of the ichthyoplankton (Figure 20). At the Control location, the dominant species with the highest egg entrainment were Cunner/Tautog/Yellowtail Flounder (>92% Cunner), American Plaice, Fourbeard Rockling/Hakes, and Hakes (Figure 21). Seasonality of these eggs densities varied, with the Cunner complex appearing in May and present at high densities through the fall and Fourbeard Rockling/Hakes and Hakes following a similar pattern but at lower densities, while American Plaice eggs appeared in March and disappeared by early July. The CWWSs did not show a large difference in egg density of Fourbeard/Hakes and Hakes from the Control but the 0.8-mm CWWS did show substantial lower egg densities than the Control and both CWWSs had lower entrainment densities of the Cunner complex from late July through October.

Larvae and juveniles entrained by the Control were dominated by American Sand Lance, Grubby, Radiated Shanny, and Rock Gunnel, and all but Radiated Shanny followed a seasonal density pattern of being highest in spring with a slow decrease toward the summer months (Figure 22). Radiated Shanny also peaked in spring, but showed a more gradual increase and a longer, slower decrease in density through the fall. The performance of the CWWSs is more obvious for American Sand Lance, Grubby and Rock Gunnel larvae and juveniles, where for almost all sample weeks, the highest densities were at the Control, followed by the 3.0-mm CWWS and finally lowest at the 0.8-mm CWWS.

The impact of CWWSs on the density of total ichthyoplankton is seen in both the untransformed and log-transformed data, where, with few exceptions in June and July, the 0.8-mm and the 3.0-mm CWWS mean densities were lower than the Control mean density (Figure 16). Total ichthyoplankton density peaked for all three locations in July. During the larval and juvenile density peaks of Week 26 (1 July 2019) and Week 29 (22 July 2019) when the CWWSs collected higher densities of fish larvae and juveniles than the Control, Cunner larvae were the dominant species collected but densities of all larvae and juvenile species were higher at the CWWSs than at the Control (i.e., a consistent pattern rather than a species-specific pattern).

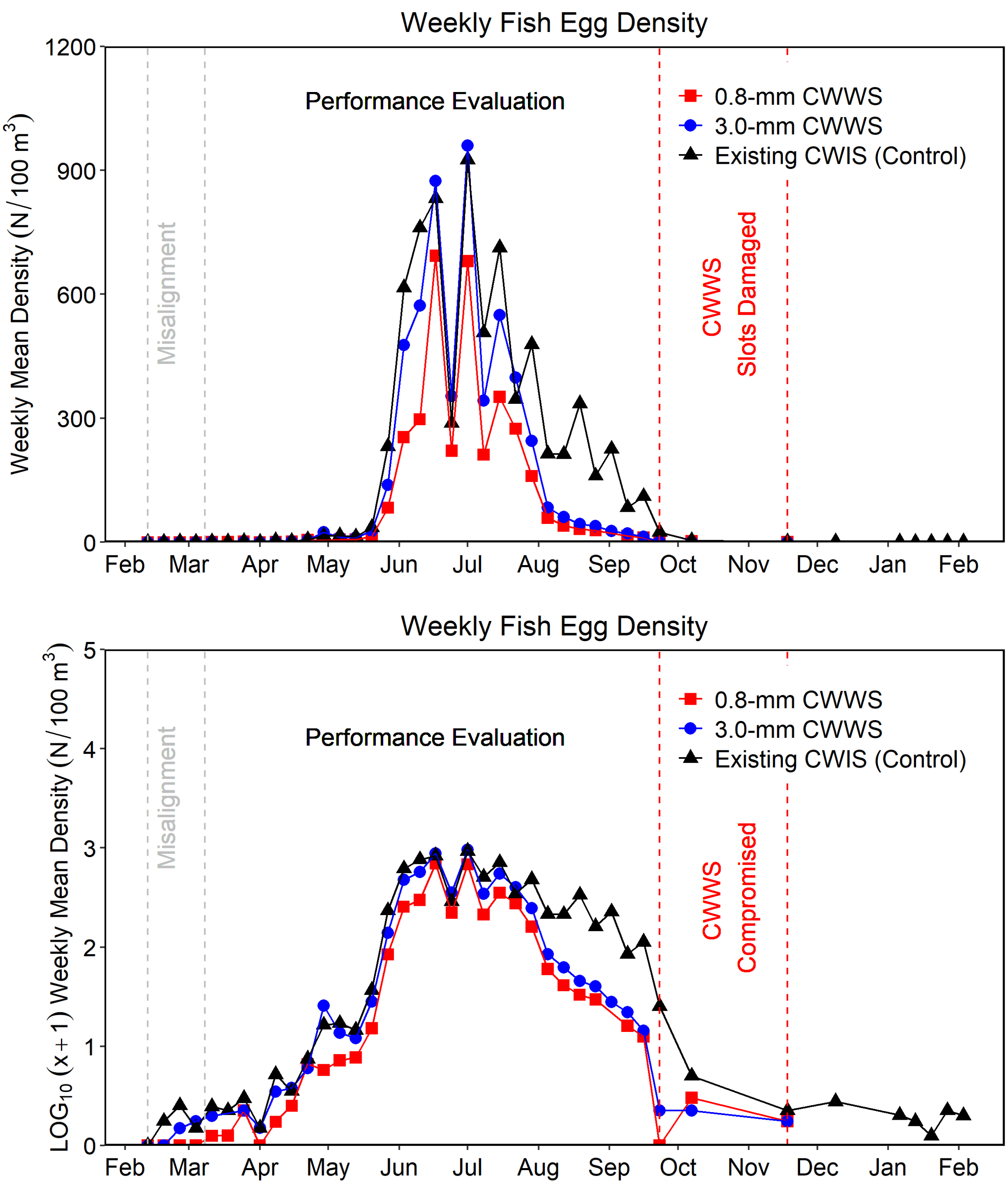


Figure 17. **Untransformed (top) and $log_{10}(x+1)$ transformed (bottom) weekly mean entrainment density of egg ichthyoplankton collected from the 0.8-mm and 3.0-mm cylindrical wedgewire screen (CWWS) intakes and the existing cooling water intake structure (CWIS) for Units 5 and 6 (Control) at Schiller Station from weeks beginning Monday, 11 February 2019 through Monday, 3 February 2020.**

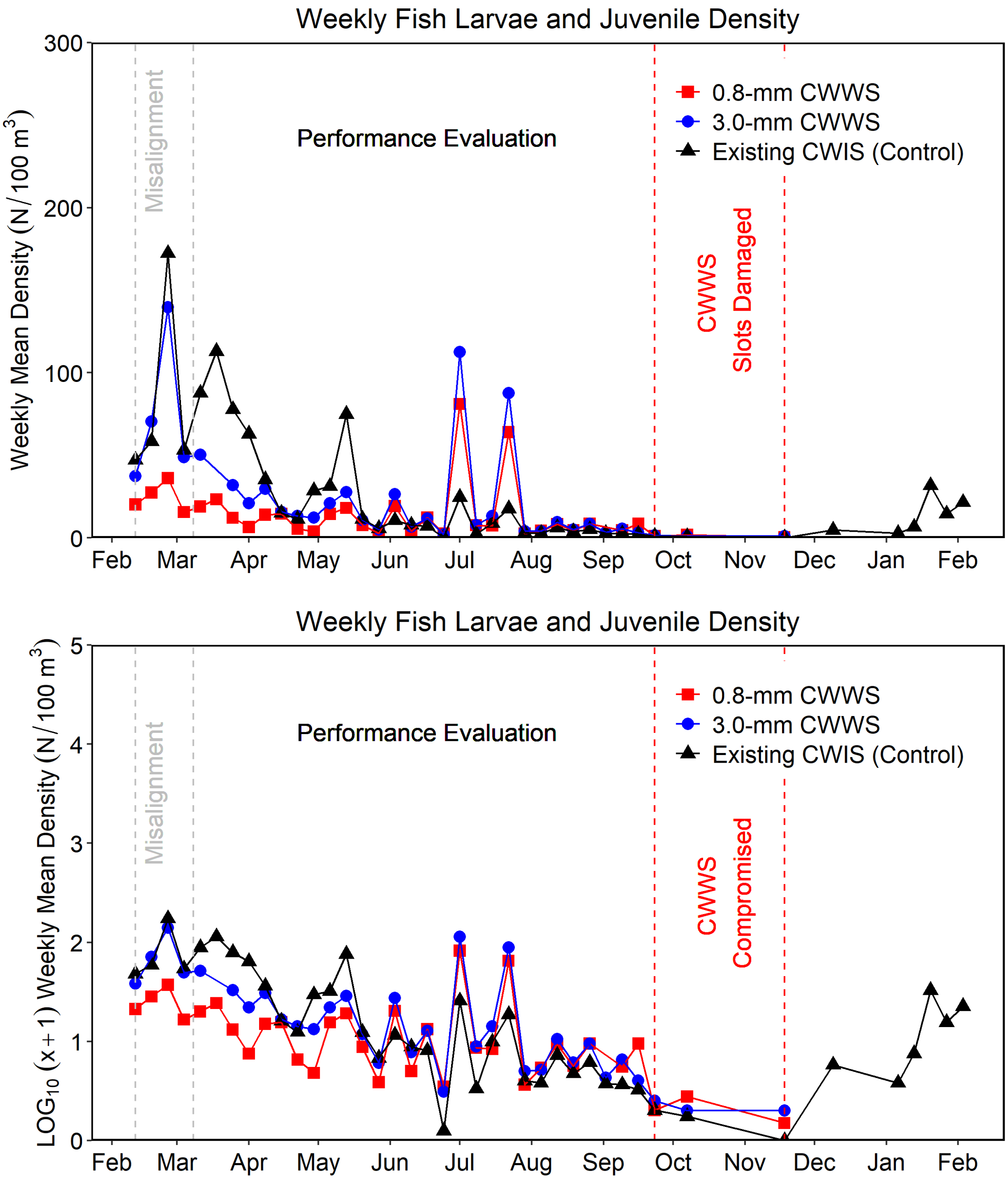


Figure 18. **Untransformed (top) and $\log_{10}(x+1)$ transformed (bottom) weekly mean entrainment density of larval and juvenile fish collected from the 0.8-mm and 3.0-mm cylindrical wedgewire screen (CWWS) intakes and the existing cooling water intake structure (CWIS) for Units 5 and 6 (Control) at Schiller Station from weeks beginning Monday, 11 February 2019 through Monday, 3 February 2020.**

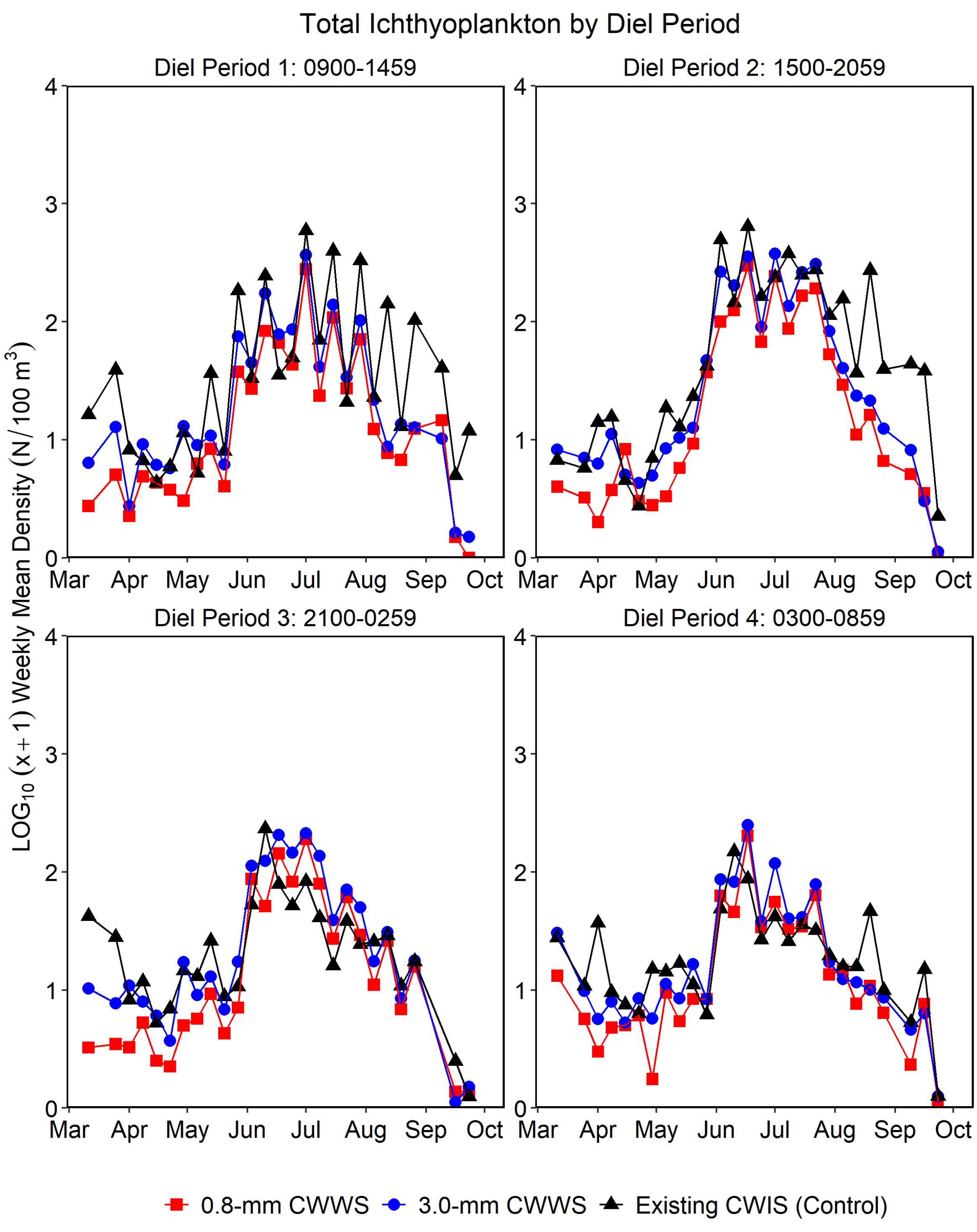


Figure 19. **$Log_{10}(x+1)$ transformed weekly mean entrainment density of all fish taxa and life stages by diel period collected from the 0.8-mm and 3.0-mm cylindrical wedgewire screen (CWWS) intakes and the existing cooling water intake structure (CWIS) for Units 5 and 6 (Control) at Schiller Station based on synchronized samples collected from weeks beginning Monday, 11 March 2019 through Monday, 23 September 2019.**

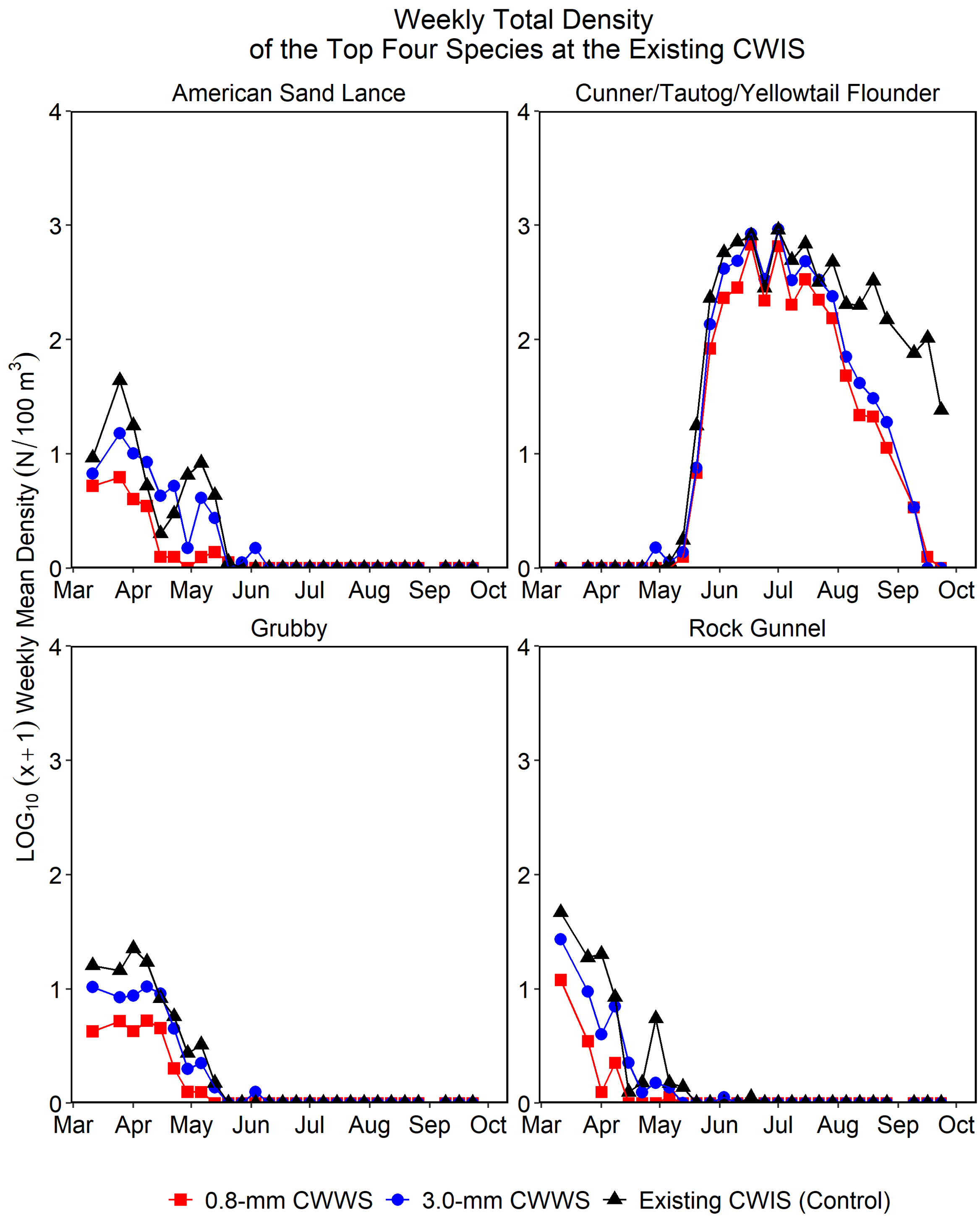


Figure 20. **$Log_{10}(x+1)$ transformed weekly mean entrainment density by the existing cooling water intake structure (CWIS) for Units 5 and 6 (Control) most entrained taxa and combined life stages collected from the 0.8-mm and 3.0-mm cylindrical wedgewire screen (CWWS) intakes and the Control at Schiller Station based on synchronized samples collected from weeks beginning Monday, 11 March 2019 through Monday, 23 September 2019.**

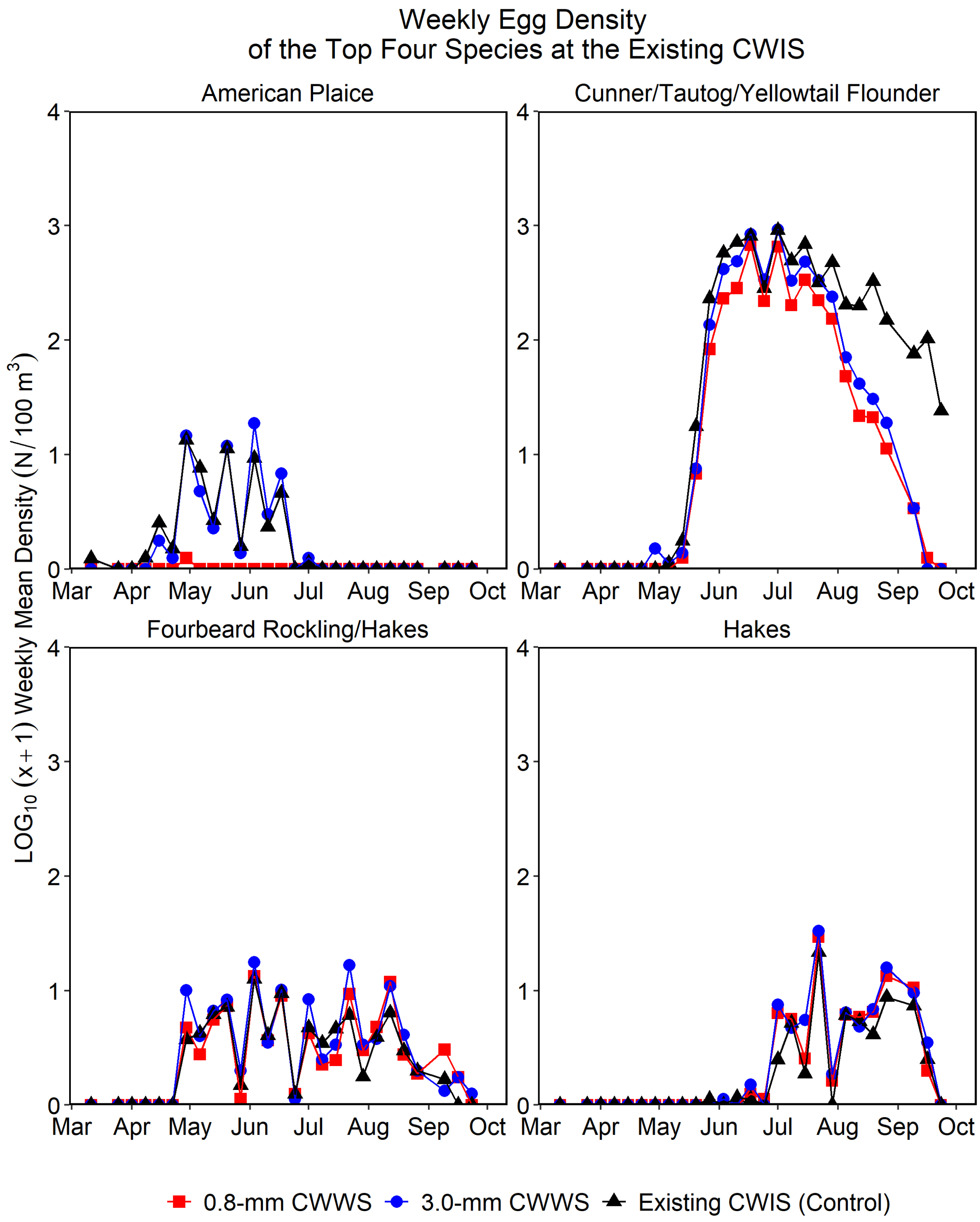


Figure 21. **$Log_{10}(x+1)$ transformed weekly mean entrainment density by the existing cooling water intake structure (CWIS) for Units 5 and 6 (Control) most entrained egg ichthyoplankton collected from the 0.8-mm and 3.0-mm cylindrical wedgewire screen (CWWS) intakes and the Control at Schiller Station based on synchronized samples collected from weeks beginning Monday, 11 March 2019 through Monday, 23 September 2019.**

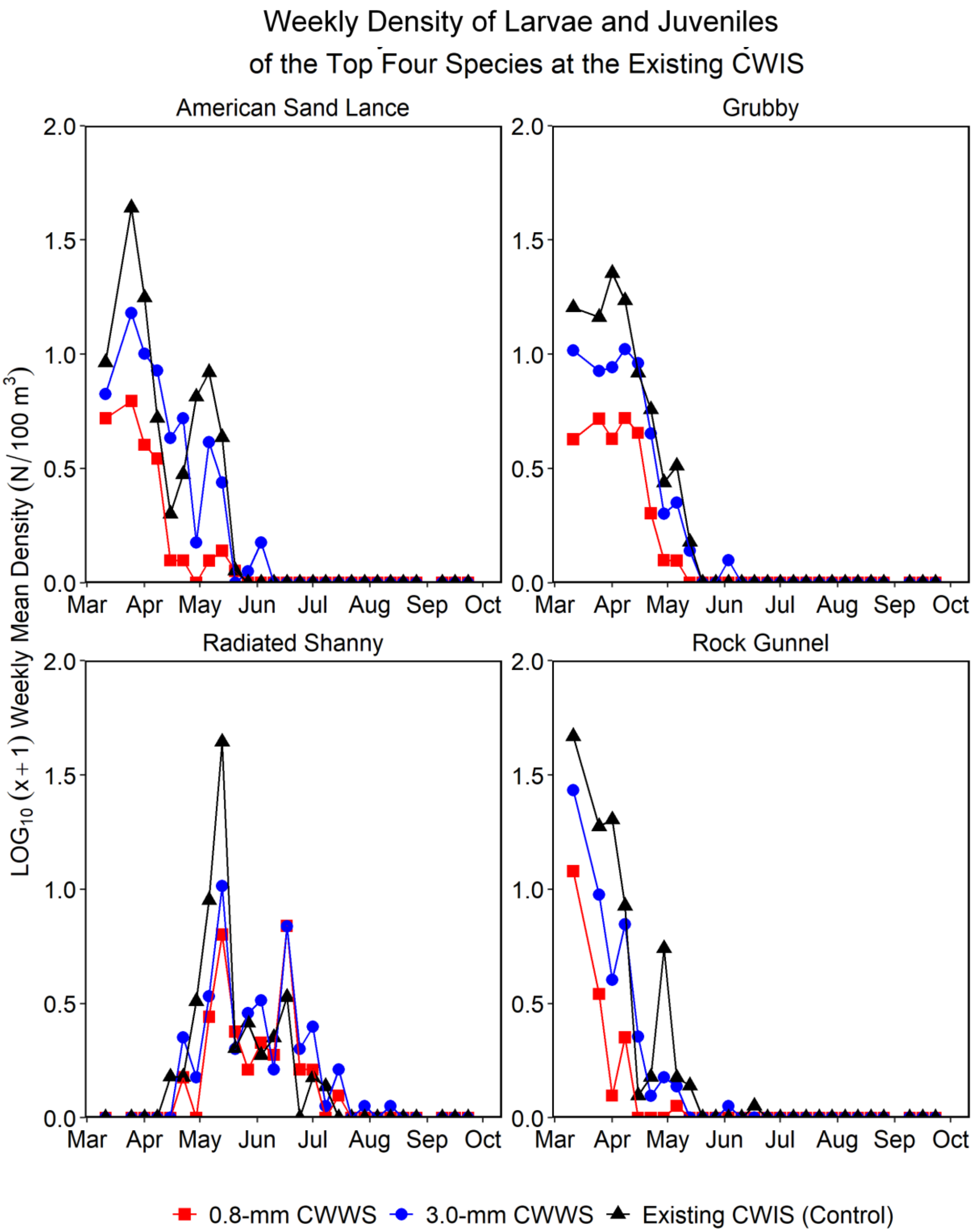


Figure 22. **$Log_{10}(x+1)$ transformed weekly mean entrainment density by the existing cooling water intake structure (CWIS) for Units 5 and 6 (Control) most entrained larval and juvenile fish collected from the 0.8-mm and 3.0-mm cylindrical wedgewire screen (CWWS) intakes and the Control at Schiller Station based on synchronized samples collected from weeks beginning Monday, 11 March 2019 through Monday, 23 September 2019.**

7.2.5 Diel Effects on CWWS Performance

As ichthyoplankton densities often vary throughout the diel cycle in coastal and marine environments, some differences in entrainment densities were observed in the synchronized samples collected in the wedgewire screen study at Schiller Station. For each CWWS, total entrainment density did not appear to differ significantly among the four 6-hour diel periods, but at the Control, the median log-transformed density of all fish taxa and life stages combined during 1500–2059 and 0300–0859 was statistically higher than the median during 2100–0259 (Figure 23). The pattern in total entrainment density, as discussed previously, is driven by the abundance of fish eggs. Diel differences in density of entrained fish eggs were not found at each CWWS, but in the Control samples, median fish egg density was higher during 1500–1459 than during 0300-0859 (Figure 24). In general, median densities of fish larvae and juveniles entrained by each intake screen, including the Control, increased from 0900–1459 to 0300–0859 (Figure 24). However, the only significant differences observed were between the highest median density during 0300–0859 and the lowest median densities during 0900–1459 and 1500-2059, and higher median densities during 2100–0259 and 0300–0859 and the lowest median density during 0900–1459 at the Control.

Given the diel differences observed, CWWS performance in reducing entrainment relative to the Control, as expressed by paired differences in log-transformed densities between each CWWS and the Control, was compared among diel periods. The density differences of all fish life stages between the 0.8-mm CWWS and the Control during each diel period had a median that was significantly less than zero, indicating the 0.8-mm CWWS had statistically significant entrainment reduction relative to the Control (Figure 24). However, the 0.8-mm CWWS performance to reduce entrainment was considerably better during 0900–1459 and 1500–2059 compared to 0300–0859. When diel patterns in entrainment reduction performance were examined for fish eggs only, the 0.8-mm CWWS performance to reduce entrainment of fish eggs was statistically better during 0900–1459 and 1500–2059 than during the other two diel periods (Figure 24). The median in the paired density differences during 2100–0259 was not statistically different from zero, suggesting fish eggs during this time were equally entrained by the 0.8-mm CWWS and the Control. Based on carefully synchronized sampling, there was no evidence of statistically significant entrainment reduction of fish larvae and juveniles by the 0.8-mm CWWS during each diel period, and no statistically significant differences were observed among the diel periods (Figure 24).

For the comparisons between the 3.0-mm CWWS and the Control, the paired differences in log-transformed densities of total ichthyoplankton indicated a statistically significant entrainment reduction during 0900–1459 and 1500–2059, but were not statistically different from zero during the other two diel periods (Figure 24). Again, with fish eggs driving total ichthyoplankton densities, analysis of eggs only showed similar results to all ichthyoplankton for the difference between the 3.0-mm CWWS and the Control, except that egg density was statistically higher at the Control than the 3.0-mm CWWS during 2100–0259 (Figure 24). When examined by diel period, the paired differences in log-transformed density of fish larvae and juveniles between the 3.0-mm CWWS and the Control were not statistically less than zero, and, in fact, was statistically greater than zero during 0900–1459 (Figure 24). These 3.0-mm CWWS-to-Control differences in larvae and juveniles did not statistically differ among diel periods.

While diel vertical migration and stronger gear avoidance behavior during daylight hours can lead to differences in ichthyoplankton sample densities, these behavioral mechanisms do not appear to affect CWWS performance in reducing entrainment of fish larvae and juveniles among the four diel periods at Schiller Station. However, there were significant differences in CWWS performance in reducing egg entrainment among some diel periods for both the 0.8-mm and 3.0-mm CWWS. Unless there are diel differences in spawning in close proximity to the CWWSs, the observed diel differences in CWWS performance in reducing entrainment is not believed to be biologically meaningful since fish eggs behave as passive particles.

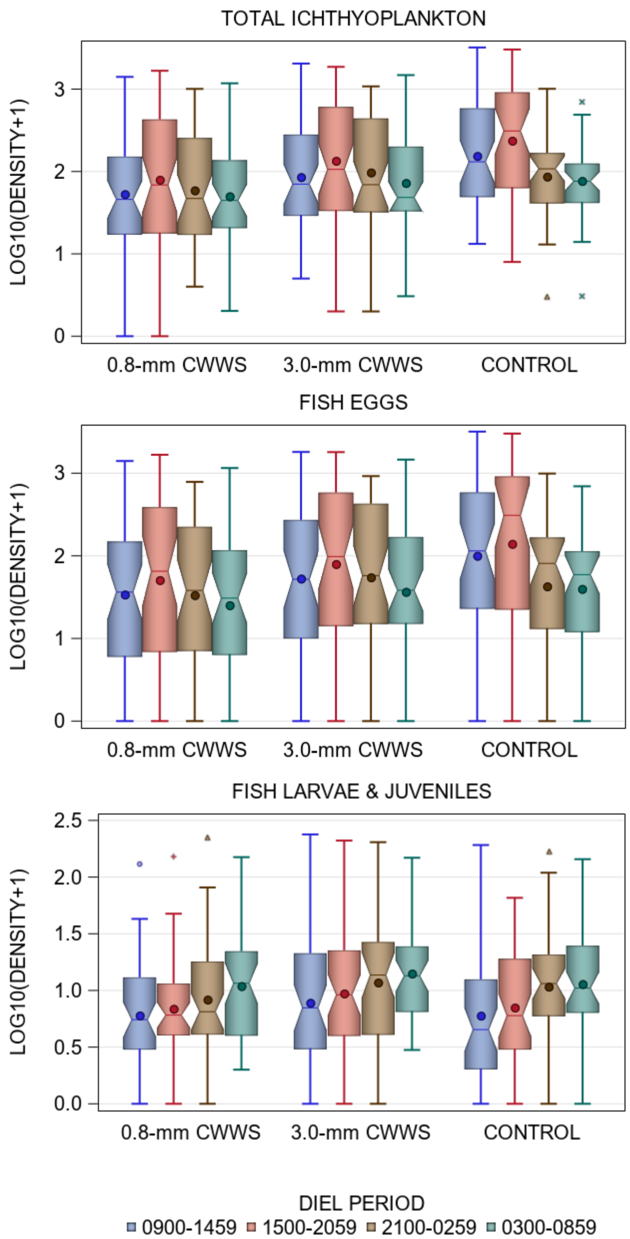


Figure 23. Notched box plots of log10(x+1) transformed densities by diel period of all fish taxa and life stages (top), fish eggs (middle), and fish larvae and juveniles (bottom) entrained by the 0.8-mm and 3.0-mm cylindrical wedgewire screen (CWWS) intakes and the existing cooling water intake structure (CWIS) for Units 5 and 6 (Control) at Schiller Station based on synchronized samples collected from weeks beginning Monday, 11 March 2019 through Monday, 23 September 2019. Solid dot = Mean. Non-overlapping notches indicate differences in medians are statistically significant.

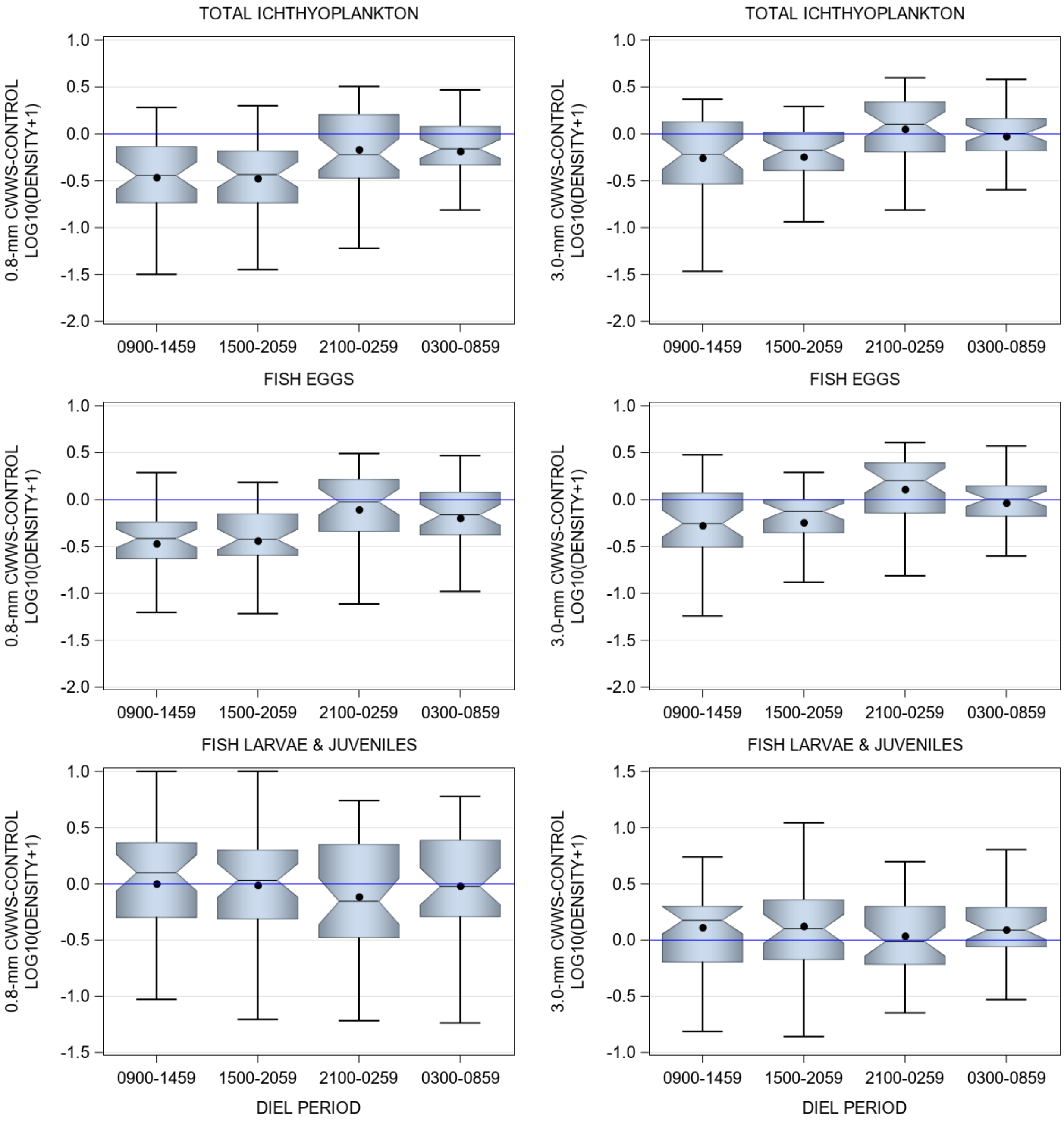


Figure 24. **Notched box plots of differences in log10(x+1) transformed entrainment densities between the 0.8-mm or 3.0-mm cylindrical wedgewire screen (CWWS) and the existing cooling water intake structure (CWIS) for Units 5 and 6 (Control) by diel period of all fish taxa and life stages combined (top), fish eggs (center) and fish larvae and juveniles (bottom) at Schiller Station based on synchronized samples collected from weeks beginning Monday, 11 March 2019 through Monday, 23 September 2019. Solid dot = Mean. Non-overlapping notches indicate differences in medians are statistically significant.**

7.2.6 Tidal Effects on CWWS Performance

Much like diel effects, the tidal stage can affect entrainment densities and the performance of CWWSs to reduce entrainment. Tidal stage may change the salinity, susceptible ichthyoplankton in the source waterbody, sweeping flow velocity, and current direction with respect to the CWWS slot alignment. Tidal stage for the entrainment samples was assigned using the sign (i.e. positive sweeping velocity during flood currents, negative sweeping velocity during ebb currents) of the sweeping current velocity data from the South ADCP (Appendix C). Entrainment samples were assigned high or low slack tides if the tidal sweeping current velocity switched directions during an entrainment sample (but greater than 18 minutes from the start of the sample and less than 18 minutes from the end of the entrainment sample; i.e. a sample was not categorized as slack if the sweeping current velocity switched directions near the beginning or end of the sample). High slack tides were assigned to samples when the sweeping current velocity switched from flood to ebb within a sample period as described above; low slack tides were assigned when the opposite occurred within a sample period (switching from ebb to flood). Log-transformed densities of total ichthyoplankton significantly differed among some tidal stages (Figure 25).

For the 3.0-mm CWWS, total entrainment densities were statistically higher during flood than samples with high slack and also were higher during ebb than samples with low slack at the Control; no tidal differences were observed at the 0.8-mm CWWS. When fish eggs were examined, the only statistically significant difference in median log-transformed densities was the higher median during flood compared to high slack at the 3.0-mm CWWS (Figure 25). At the 0.8-mm CWWS, the median log-transformed density of fish larvae and juveniles combined was statistically higher under flood and high slack conditions than ebb or low slack conditions (Figure 25). Similarly, the low slack stage for the 3.0-mm CWWS showed statistically lower densities for these life stages compared to the flood, high slack, and ebb stages. At the Control, there were no tidal differences in density of fish larvae and juveniles.

The potential tidal effect on the performance of the two test CWWSs to reduce entrainment relative to the Control was examined by paired differences in log-transformed densities. The 0.8-mm CWWS-to-Control density differences of all ichthyoplankton did not differ among tidal stages, but were statistically less than zero, indicating a statistically significant entrainment reduction (Figure 25). The same was true for fish eggs only (Figure 26). For fish larvae and juvenile, density differences between the 0.8-mm CWWS and the Control were statistically greater than zero during flood (i.e., increased entrainment at the 0.8-mm CWWS), not different than zero during high slack or ebb (i.e., the 0.8-mm CWWS was not effective at reducing entrainment), and significantly less than zero during low slack (i.e., effective entrainment reduction at the 0.8-mm CWWS) (Figure 26). The paired differences between the 3.0-mm CWWS and Control in density of total ichthyoplankton or fish eggs was not statistically different from zero during each tidal stage (Figure 26). The difference between the 3.0-mm CWWS and the Control in fish larval and juvenile density statistically differed between flood and low slack tidal stages, when entrainment at the 3.0-mm CWWS was higher than the Control during flood and lower than the Control during low slack (Figure 26).

The notched box plots of paired CWWSs and Control differences in log-transformed densities indicate the entrainment reduction of fish eggs by the 0.8-mm CWWS was statistically significant and that tide had no statistically significant effect on entrainment reduction, whereas the 3.0-mm CWWS did not have a statistically significant reduction of entrained fish eggs and there was no statistically significant tidal effect detected. However, tidal stage did have a statistically significant effect on entrainment density of fish larvae and juveniles and entrainment reduction relative to the Control. For both the 0.8-mm and 3.0-mm CWWSs, entrainment density of fish larvae and juveniles was statistically higher than the Control during flood and lower than the Control during low slack, with no statistically significant difference during high slack and ebb tidal stages. These results indicate that tidal dynamics did not significantly affect egg entrainment reduction by the 0.8-mm CWWS and the lack of egg entrainment reduction by the 3.0-mm CWWS, whereas flood currents increased entrainment of fish larvae and juveniles by both CWWSs and only under low slack conditions was the entrainment reduction of larvae and juveniles by both CWWSs statistically significant. The strong tidal dynamics near Schiller Station, in conjunction with the short duration of low slack tidal conditions (the only tidal period with significant entrainment reduction of fish larvae and juveniles), would appear to create difficult conditions for a full-scale wedgewire screen intake system to achieve consistent entrainment reduction performance.

Extrusion of early life stages of fish through the CWWS slot openings may be an important factor contributing to the observed differences in entrainment between the CWWSs and the Control, which may also be dependent on tidal stage. No fish eggs were greater than 3.0 mm in diameter, but there was evidence of extrusion of fish eggs in the 0.8-mm CWWS (Table 12). After extrapolating the measurement data to the total catch, about 68% of entrained eggs were extruded through the 0.8-mm slot width, but ranged from 64% during ebb to 74% during high slack (Figure 27). The percentage of eggs greater than 0.8 mm in diameter that were entrained by the Control was 65% with a range of 54% during high slack to 76% during ebb. As expected, the percentage of entrained larvae and juveniles with GBD or GBW greater than the slot widths was substantially lower in CWWSs than in the Control (Figure 28 and Figure 29). At the 0.8-mm CWWS, percent extrusion of fish larvae and juveniles was 26% based on GBD and ranged from 22% during flood to 48% during low slack. At the 3.0-mm CWWS, percent extrusion of fish larvae and juveniles was 0.7% overall based on GBD and ranged from 0% during low slack to 0.9% during flood. Extrusion based on GBW was less than based on GBD because GBD was likely a more consistent limiting body dimension; however, the tidal pattern in extrusion was similar to that for extrusion based on GBD. As such, there is evidence that extrusion represents a meaningful phenomenon explaining the lower-than-expected effectiveness of the 0.8-mm CWWS at reducing entrainment at Schiller Station, which varies across the tidal stages.

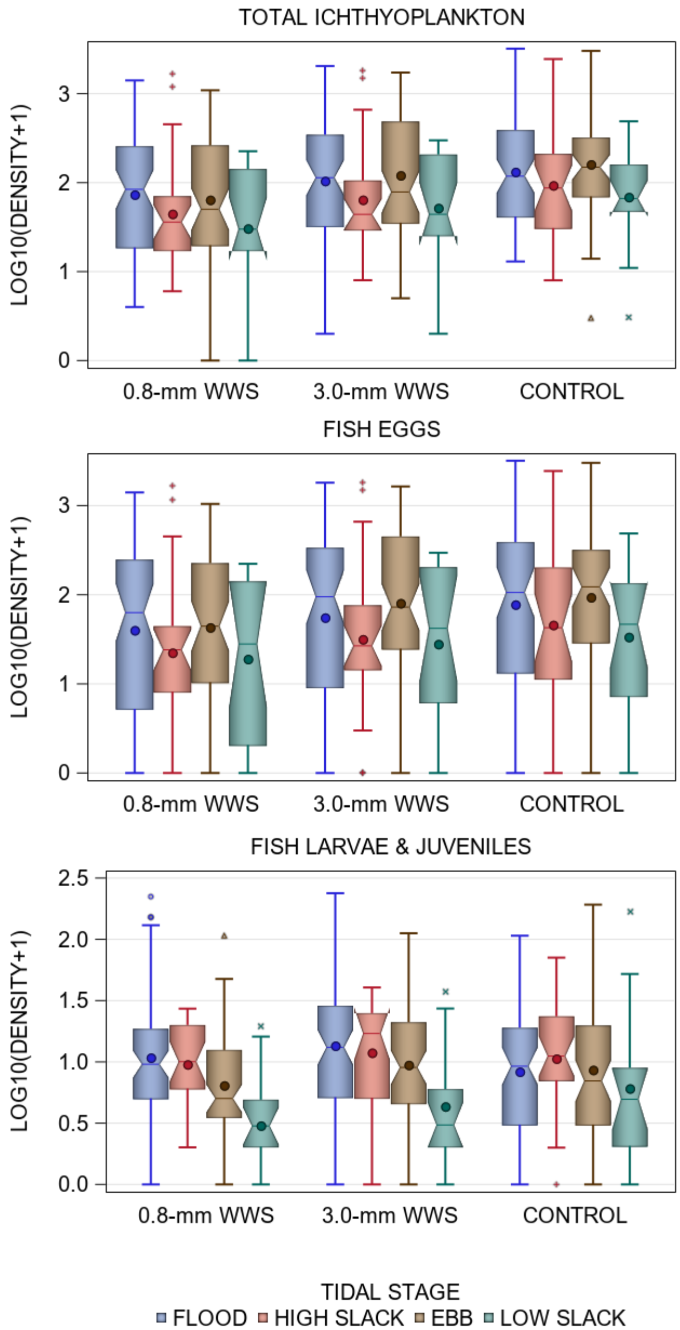


Figure 25. **Notched box plots of log10(x+1) transformed densities by tidal stage of all fish taxa and life stages (top), fish eggs (middle), and fish larvae and juveniles (bottom) entrained by the 0.8-mm and 3.0-mm cylindrical wedgewire screen (CWWS) intakes and the existing cooling water intake structure (CWIS) for Units 5 and 6 (Control) at Schiller Station based on synchronized samples collected from weeks beginning Monday, 11 March 2019 through Monday, 23 September 2019. Solid dot = Mean. Non-overlapping notches indicate differences in medians are statistically significant.**

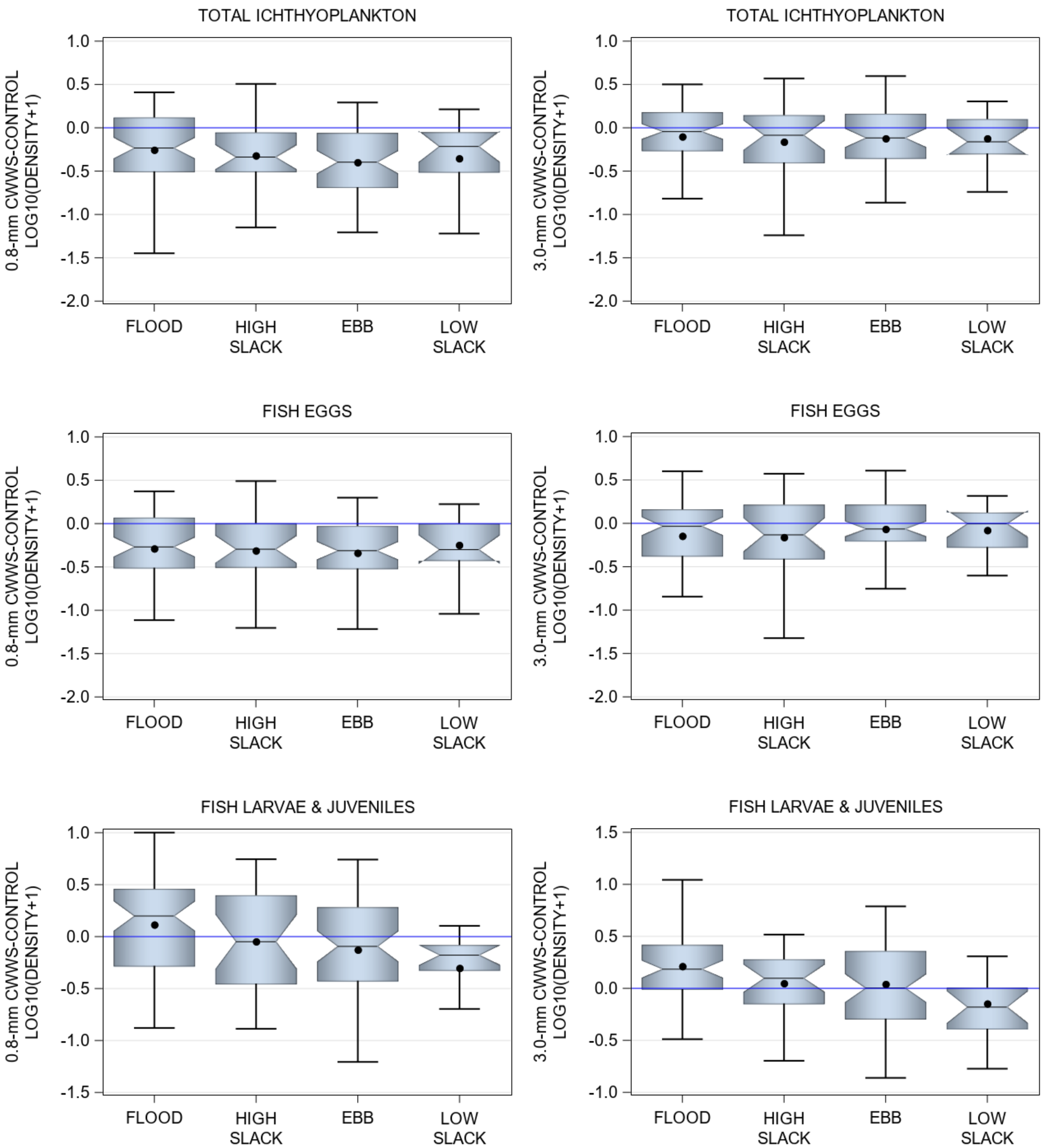


Figure 26. Notched box plots of differences in log10(x+1) transformed entrainment densities between the 0.8-mm or 3.0-mm cylindrical wedgewire screen (CWWS) and the existing cooling water intake structure (CWIS) for Units 5 and 6 (Control) by tidal stage of all fish taxa and life stages (top), fish eggs (middle) and fish larvae and juveniles (bottom) at Schiller Station based on synchronized samples collected from weeks beginning Monday, 11 March 2019 through Monday, 23 September 2019. Solid dot = Mean. Non-overlapping notches indicate differences in medians are statistically significant.

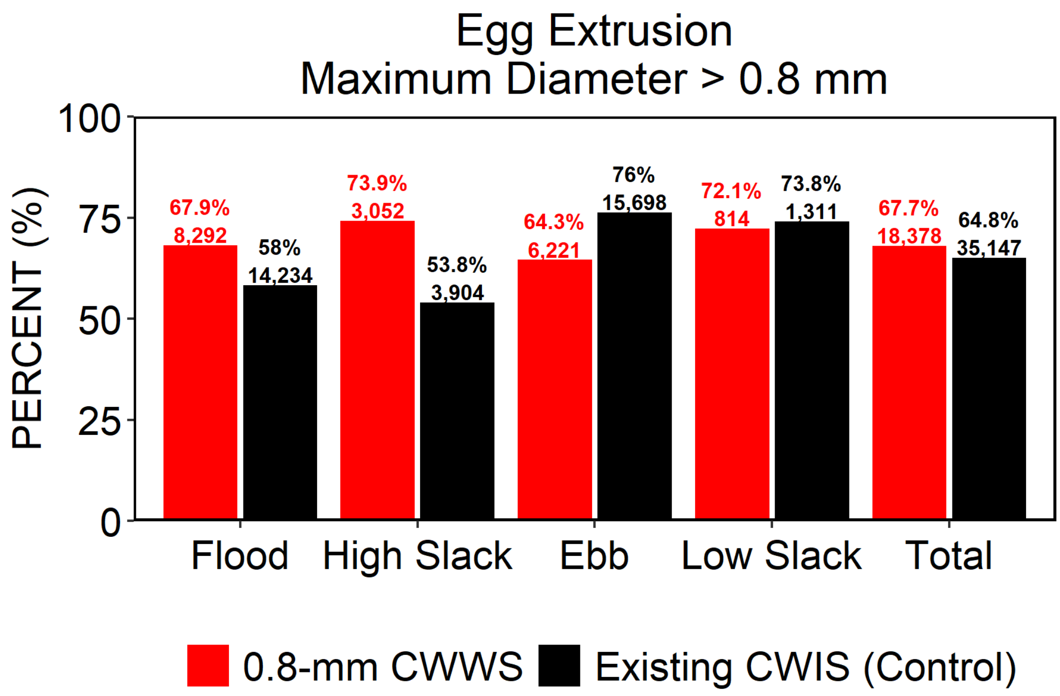


Figure 27. **Percent of entrained eggs extruded through the 0.8-mm cylindrical wedgewire screen (CWWS) by tidal stage compared to the percent greater than 0.8 mm entrained by the existing cooling water intake structure (CWIS) for Units 5 and 6 (Control) at Schiller Station based on synchronized samples collected from weeks beginning Monday, 11 March 2019 through Monday, 23 September 2019.**

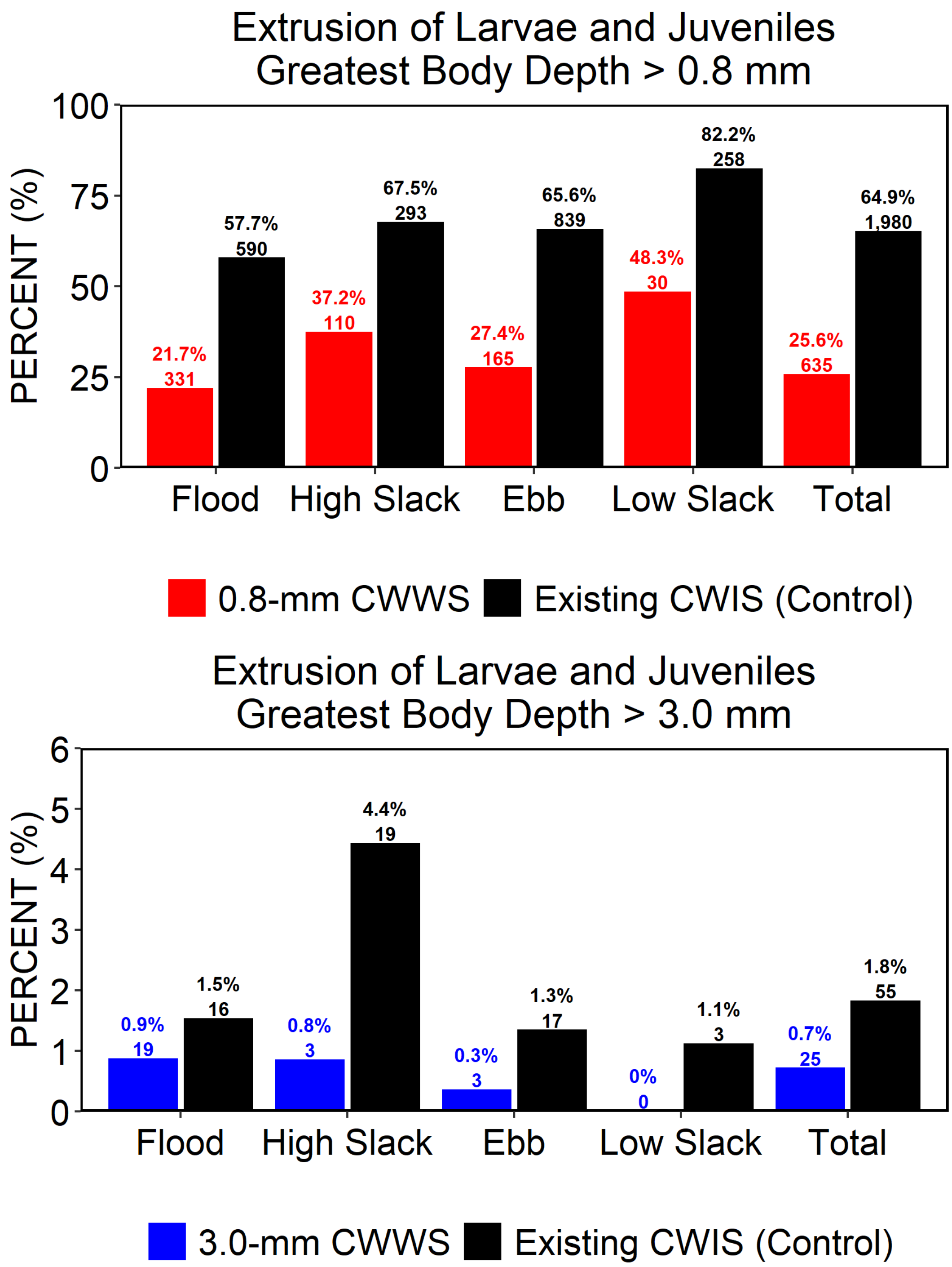
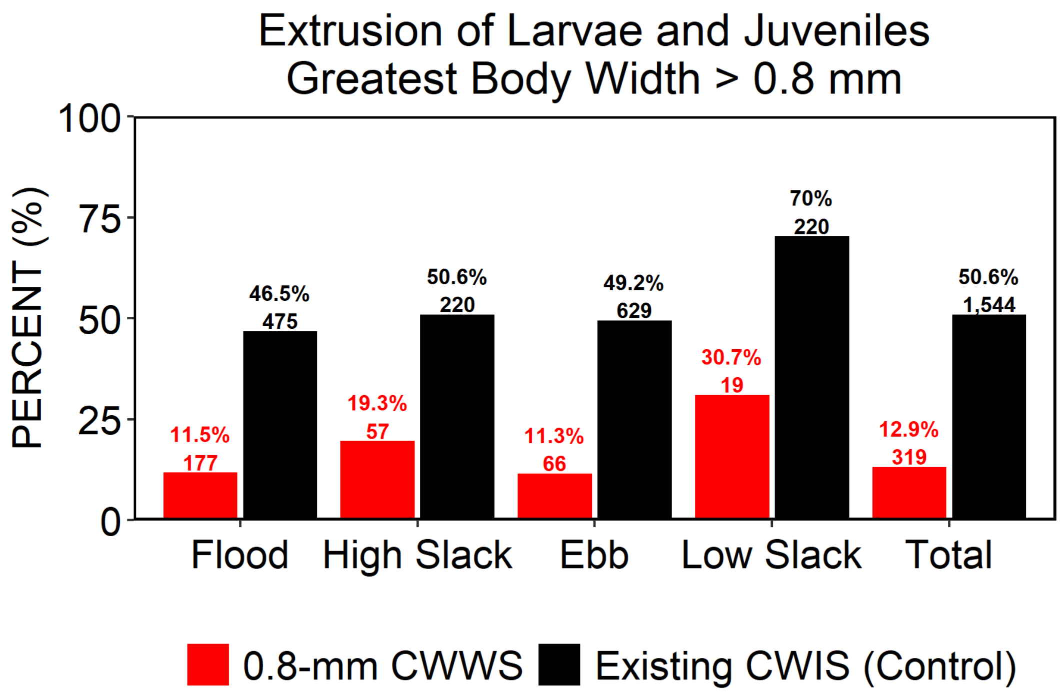


Figure 28. **Percent of entrained fish larvae and juveniles with greatest body depth greater than the slot width of the 0.8-mm and 3.0-mm cylindrical wedgewire screen (CWWS) by tidal stage compared to percent greater than the slot width entrained by the existing cooling water intake structure (CWIS) for Units 5 and 6 (Control) at Schiller Station based on synchronized samples collected from weeks beginning Monday, 11 March 2019 through Monday, 23 September 2019.**



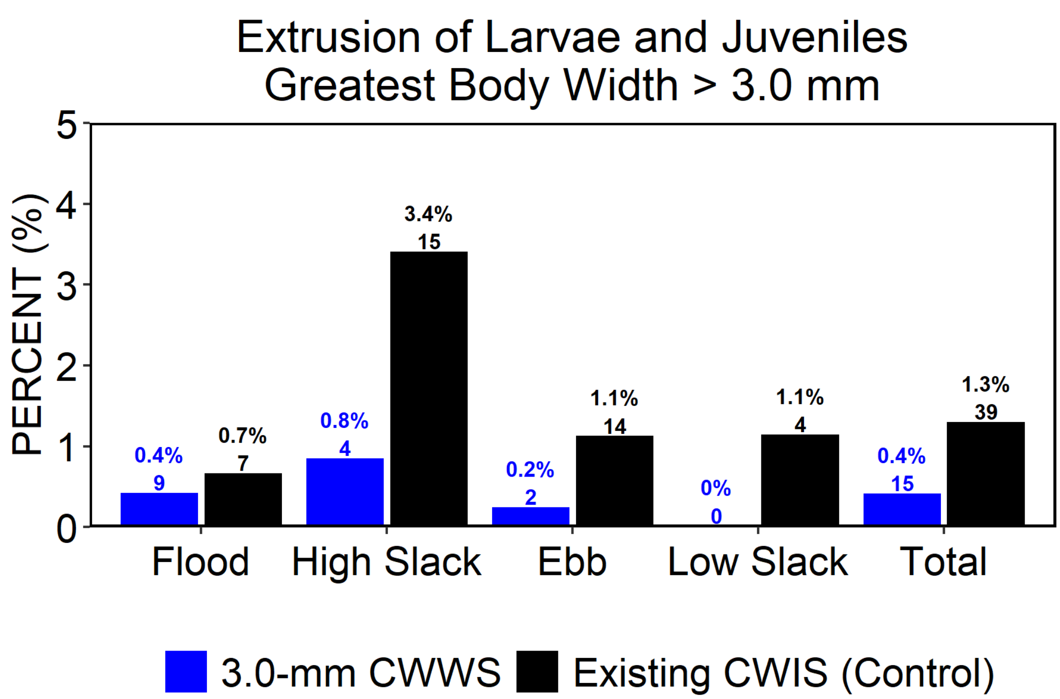


Figure 29. **Percent of entrained fish larvae and juveniles with greatest body width greater than the slot width of the 0.8-mm and 3.0-mm cylindrical wedgewire screen (CWWS) by tidal stage compared to percent greater than the slot width entrained by the existing cooling water intake structure (CWIS) for Units 5 and 6 (Control) at Schiller Station based on synchronized samples collected from weeks beginning Monday, 11 March 2019 through Monday, 23 September 2019.**

7.2.7 CWWS Performance based on Sweeping Velocity

Entrainment reduction performance of each CWWS was evaluated at different sweeping velocities and off-screen axis angles, defined as the magnitude of the difference between the sample-averaged current direction and the 165° orientation axis of the CWWS (Appendix C), to assess whether avoidance behavior and hydraulic bypass may have improved screen performance. Wedgewire screens reduce entrainment primarily by excluding fish eggs and larvae due to narrow slot width openings being less than the physical limiting dimensions of the organisms in the intake flow. However, as previous studies have demonstrated under certain conditions, entrainment reduction performance may increase by avoidance behavior and hydraulic bypass at higher sweeping velocity-to-through-slot velocity ratios (EPRI 2003; Mattson et al. 2011, 2014). With through-slot velocity maintained at less than 0.5 ft/s by design, but varied with tide (ENERCON 2020), the difference in log10(x+1)-transformed densities between each CWWS and the Control was used to assess entrainment reduction performance of each CWWS as a function of sweeping velocity. While no entrainment reduction benefit due to avoidance behavior was expected for eggs, the lack of a relation between egg density differences with the Control and sweeping velocity suggest hydraulic bypass was not an important factor in the performance of the 0.8-mm and 3.0-mm CWWSs in reducing entrainment relative to the Control (Figure 30). Even when examined under similar tidal conditions, there was no statistically significant linear trend in density differences of fish eggs as sweeping velocity increased at each CWWS (Figure 31 and Figure 32).

There was a statistically significant, but weak, positive relation between the density difference of the CWWSs with the Control and sweeping velocity observed for fish larvae and juveniles. Sweeping velocities explained about 15% and 12% of the variation in density differences in the 0.8-mm and 3.0-mm CWWSs, respectively (Figure 33). However, when partitioned by tidal stage, this relation for the 0.8-mm CWWS was only statistically significant during flood and low slack tidal stages where sweeping velocity explained about 13% and 24% of the density difference variation, respectively (Figure 34). While a statistically significant, although weaker, relation was also observed during flood tide for the 3.0-mm CWWS, there was no statistically significant relation observed during low slack tidal conditions (Figure 35). A statistically significant relation between larval and juvenile density difference and sweeping velocity was detected for the 3.0-mm CWWS during high slack tidal conditions and explained about 19% of the variation in density difference. If a negative density difference between a CWWS and the Control describes entrainment reduction, then a positive relation between density difference and sweeping velocity indicates entrainment reduction performance diminishes with increasing sweeping velocity. High (3–6 ft/s) sweeping velocities appear to increase entrainment abundance at Schiller Station as the density difference begins to trend above zero at 3 ft/s and higher.

With the wide range of water current velocities observed in the Piscataqua River at Schiller Station, a component of high velocities perpendicular to the slot opening (i.e., directly into the openings) may have a meaningful effect on the entrainment reduction performance of the CWWSs when the current is flowing off the screen axis direction. As such, the density difference between CWWSs and the Control was compared across different magnitudes of off-screen axis angles of current velocity. For eggs, the median density differences at different ranges of off-screen axis angles were not statistically different for the 0.8-mm and 3.0-mm CWWS for fish eggs (Figure 36) and larvae and juveniles (Figure 37). At the 3.0-mm CWWS, there was evidence that entrainment reduction performance of fish larvae and juveniles was actually worse when currents were aligned within 6° of the screen axis based on median density differences being statistically greater than zero.

While there was evidence that higher sweeping velocities reduced larval entrainment reduction performance of each CWWS, other factors such as tidal stage and off-screen axis angle are likely confounding factors. Entrainment reduction performance, expressed by density differences, was not evident or, in some cases, was negative when examined by off-screen axis angle alone. The coupling between sweeping velocity and off-screen axis angle among tidal stages suggest potential limitations in the ability to investigate these relations and that tidal stage alone may be a better explanatory factor that describes the variation in sweeping velocity and off-screen axis angle together (Figure 38).

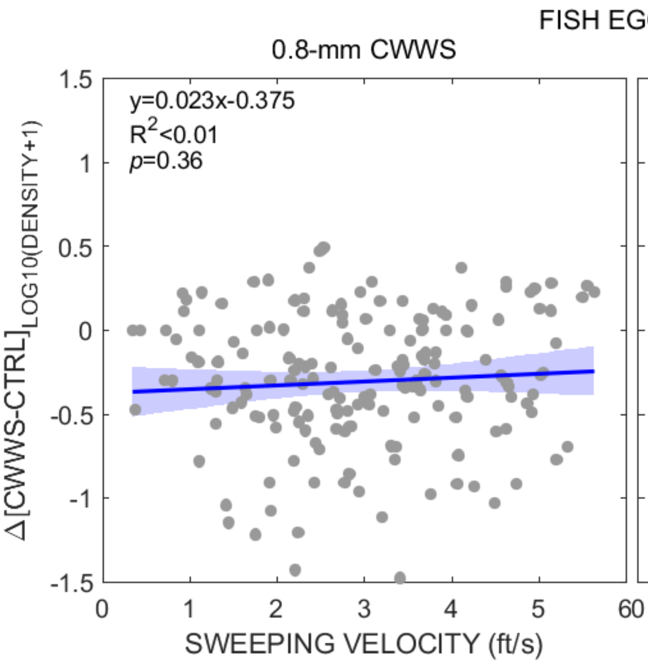


Figure 30. Regression plots of differences in $\log_{10}(x+1)$ transformed entrainment densities of fish eggs between the 0.8-mm (left) and 3.0-mm (right) cylindrical wedgewire screen (CWWS) and the existing cooling water intake structure (CWIS) for Units 5 and 6 (Control) as a function of sweeping velocity at Schiller Station based on synchronized samples collected from weeks beginning Monday, 11 March 2019 through Monday, 23 September 2019. Shaded band represents 95% confidence interval of the predicted response (blue line).

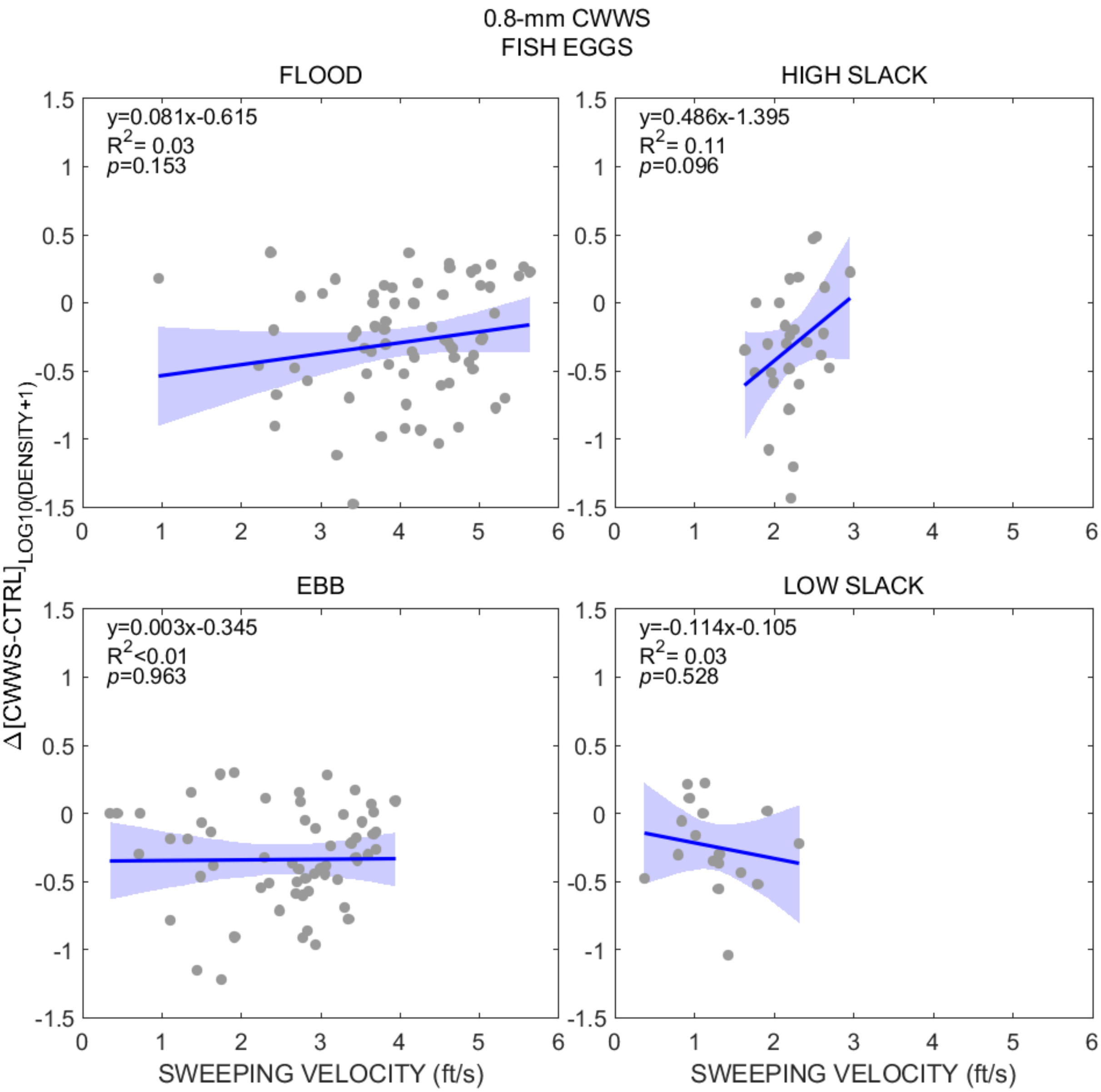


Figure 31. Regression plots of differences in $\log_{10}(x+1)$ transformed entrainment densities of fish eggs between the 0.8-mm cylindrical wedgewire screen (CWWS) and the existing cooling water intake structure (CWIS) for Units 5 and 6 (Control) as a function of sweeping velocity by tidal stage at Schiller Station based on synchronized samples collected from weeks beginning Monday, 11 March 2019 through Monday, 23 September 2019. Shaded band represents 95% confidence interval of the predicted response (blue line).

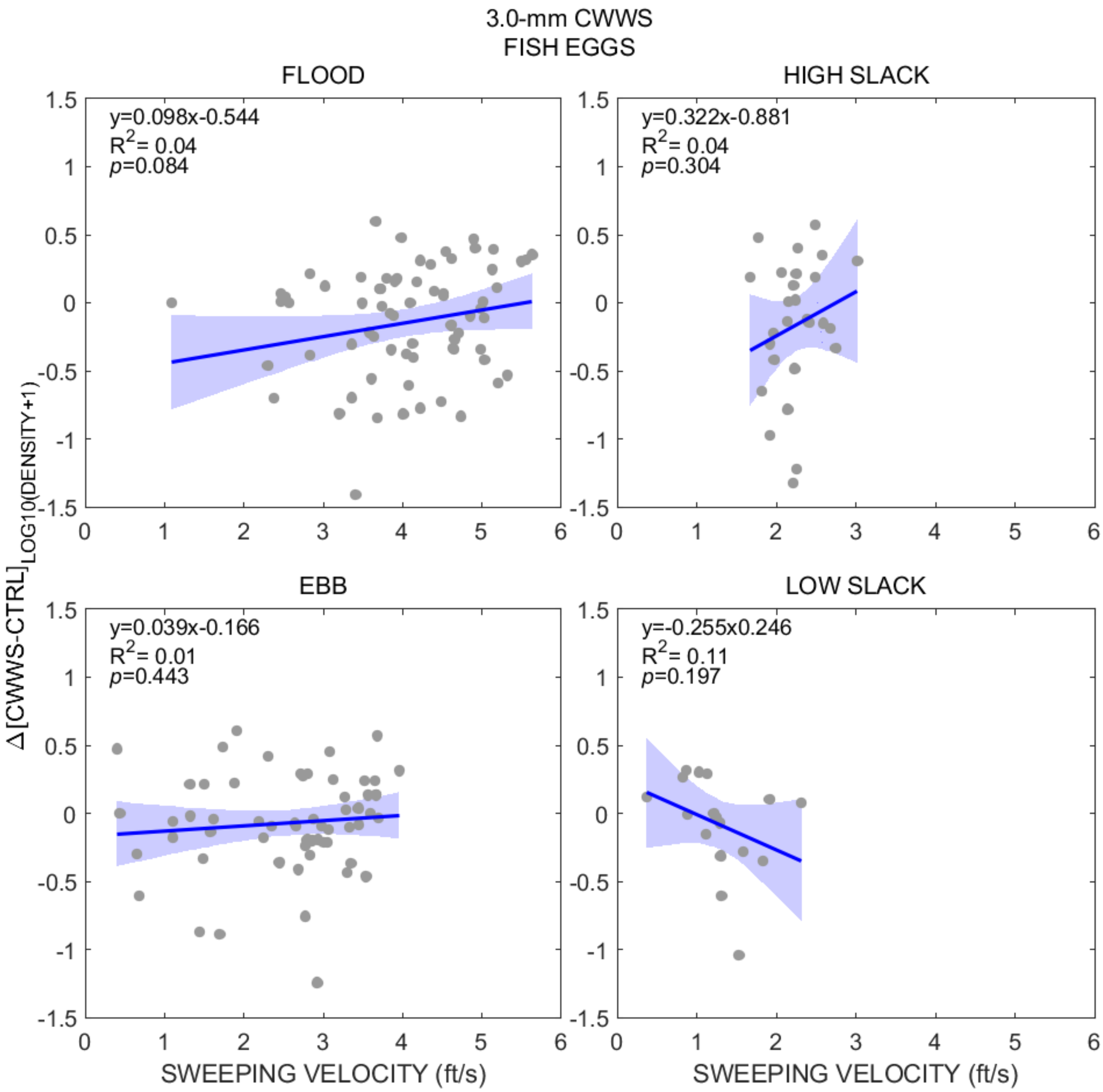


Figure 32. Regression plots of differences in $\log_{10}(x+1)$ transformed entrainment densities of fish eggs between the 3.0-mm cylindrical wedgewire screen (CWWS) and the existing cooling water intake structure (CWIS) for Units 5 and 6 (Control) as a function of sweeping velocity by tidal stage at Schiller Station based on synchronized samples collected from weeks beginning Monday, 11 March 2019 through Monday, 23 September 2019. Shaded band represents 95% confidence interval of the predicted response (blue line).

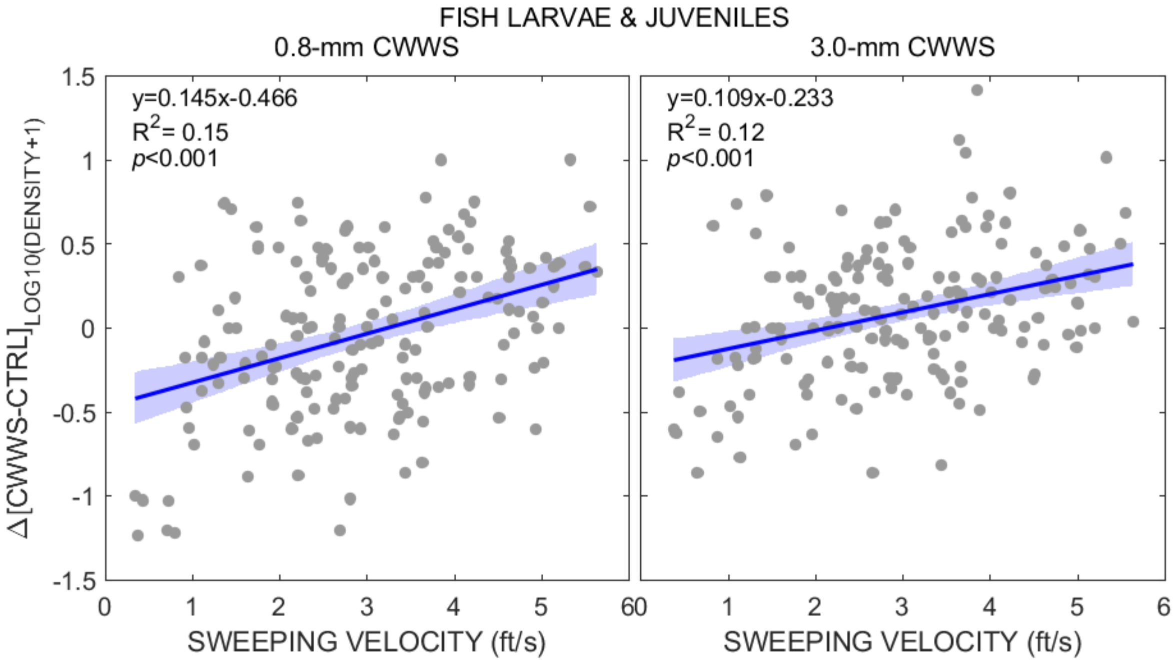


Figure 33. Regression plots of differences in $\log_{10}(x+1)$ transformed entrainment densities of fish larvae and juveniles between the 0.8-mm (left) and 3.0-mm (right) cylindrical wedgewire screen (CWWS) and the existing cooling water intake structure (CWIS) for Units 5 and 6 (Control) as a function of sweeping velocity at Schiller Station based on synchronized samples collected from weeks beginning Monday, 11 March 2019 through Monday, 23 September 2019. Shaded band represents 95% confidence interval of the predicted response (blue line).

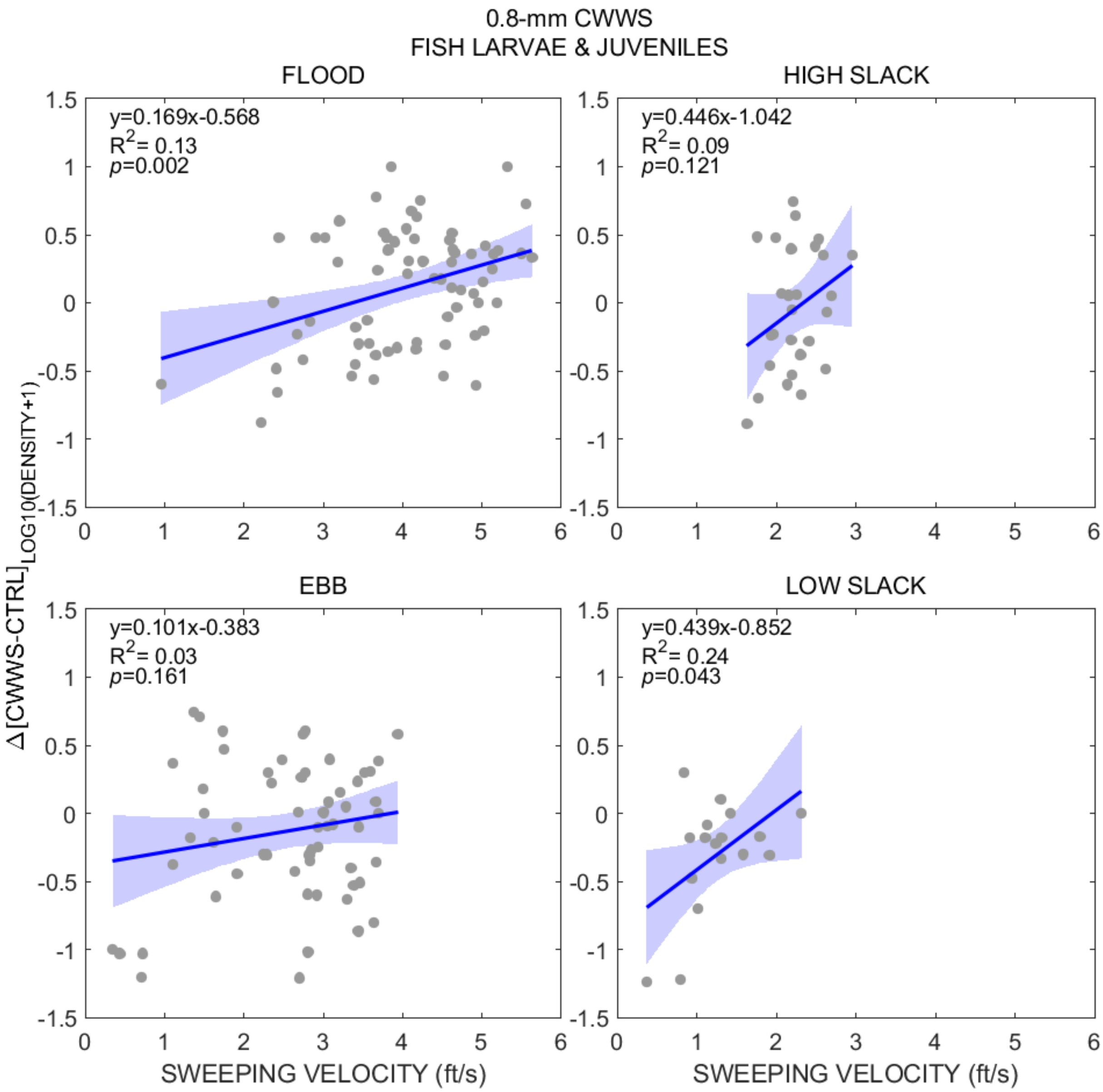


Figure 34. **Regression plots of differences in $log_{10}(x+1)$ transformed entrainment densities of fish larvae and juveniles between the 0.8-mm cylindrical wedgewire screen (CWWS) and the existing cooling water intake structure (CWIS) for Units 5 and 6 (Control) as a function of sweeping velocity by tidal stage at Schiller Station based on synchronized samples collected from weeks beginning Monday, 11 March 2019 through Monday, 23 September 2019. Shaded band represents 95% confidence interval of the predicted response (blue line).**

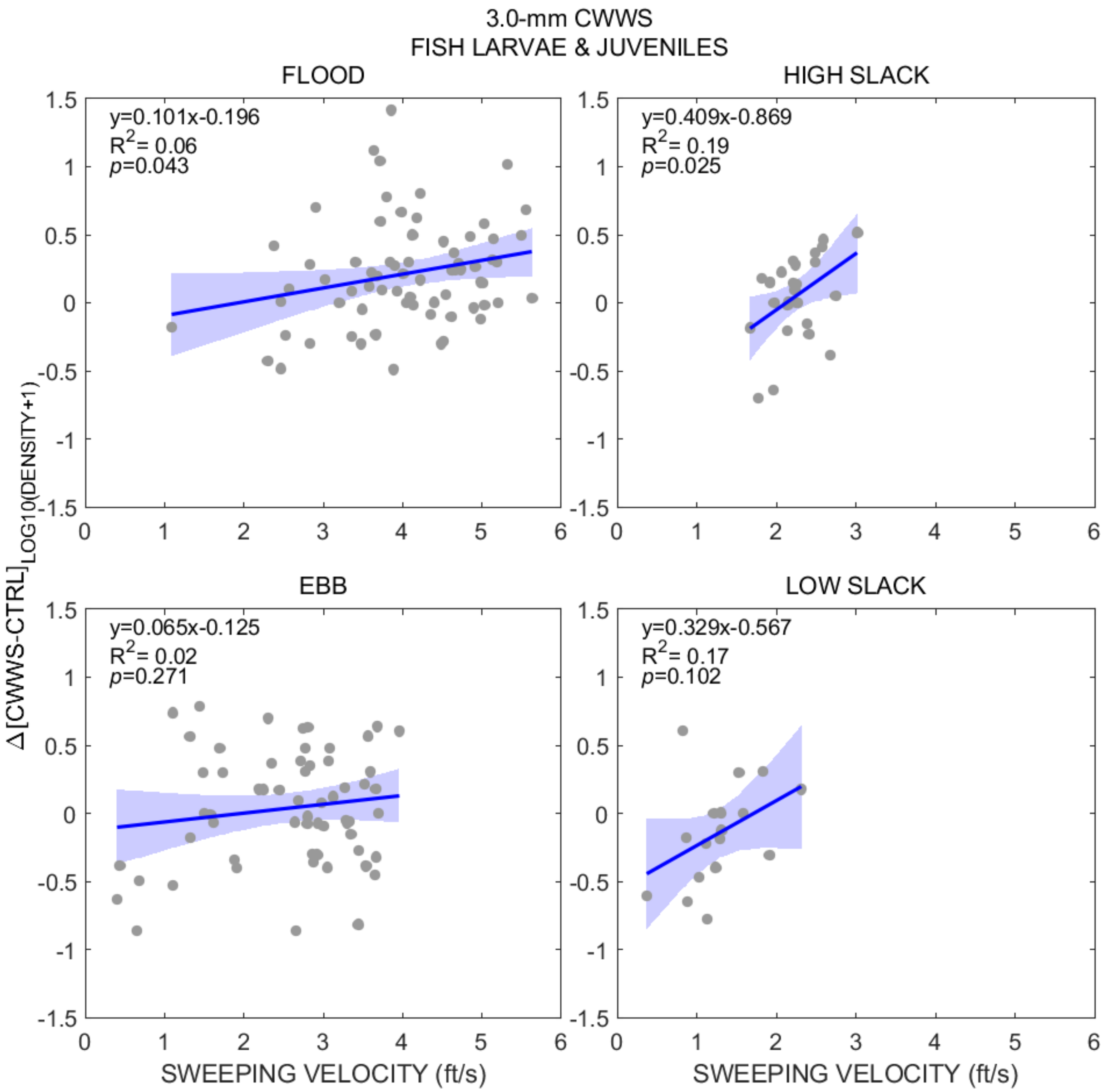


Figure 35. **Regression plots of differences in $\log_{10}(x+1)$ transformed entrainment densities of fish larvae and juveniles between the 3.0-mm cylindrical wedgewire screen (CWWS) and the existing cooling water intake structure (CWIS) for Units 5 and 6 (Control) as a function of sweeping velocity by tidal stage at Schiller Station based on synchronized samples collected from weeks beginning Monday, 11 March 2019 through Monday, 23 September 2019. Shaded band represents 95% confidence interval of the predicted response (blue line).**

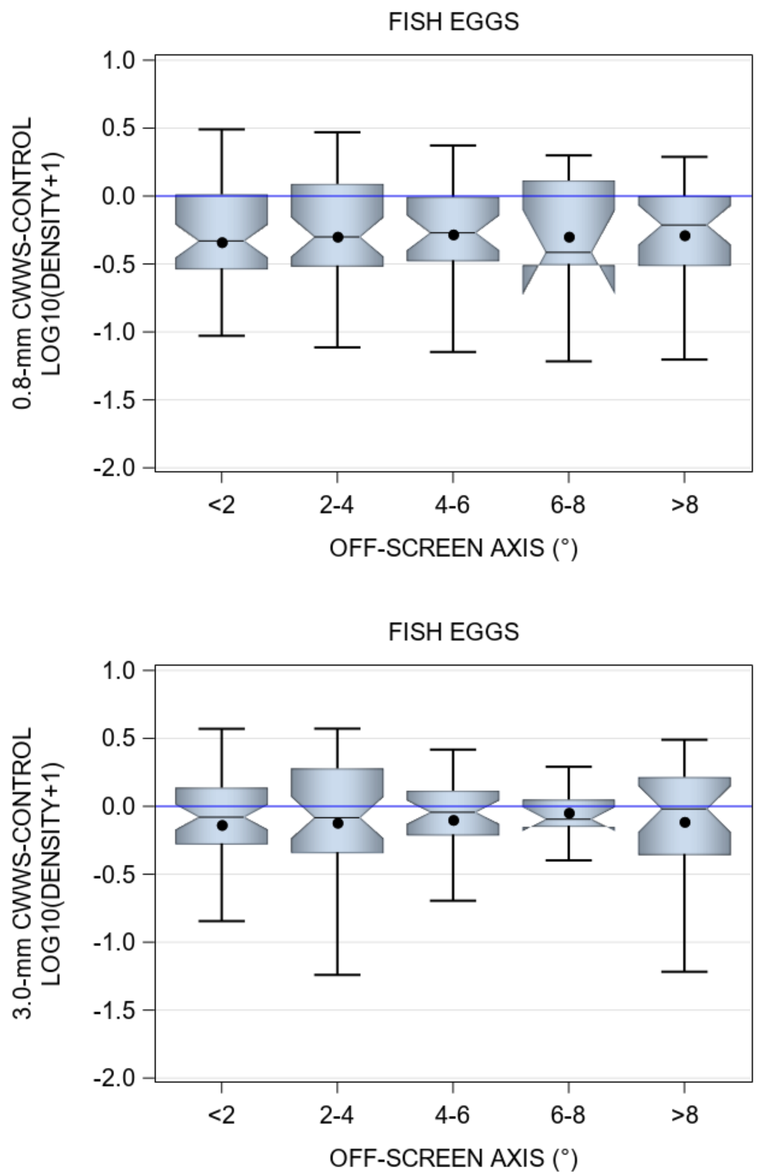


Figure 36. Notched box plots of differences in $\log_{10}(x+1)$ transformed entrainment densities of all fish eggs between the 0.8-mm (top) and 3.0-mm (top) cylindrical wedgewire screen (CWWS) and the existing cooling water intake structure (CWIS) for Units 5 and 6 (Control) by the magnitude of the off-screen axis angle of current velocity direction at Schiller Station based on synchronized samples collected from weeks beginning Monday, 11 March 2019 through Monday, 23 September 2019. Solid dot = Mean. Non-overlapping notches indicate differences in medians are statistically significant. Off-screen axis angle was defined as the difference between the observed sample-averaged current direction (i.e. average of all ADCP measurements within an entrainment sample period) and the CWWS orientation axis of 165° True North.

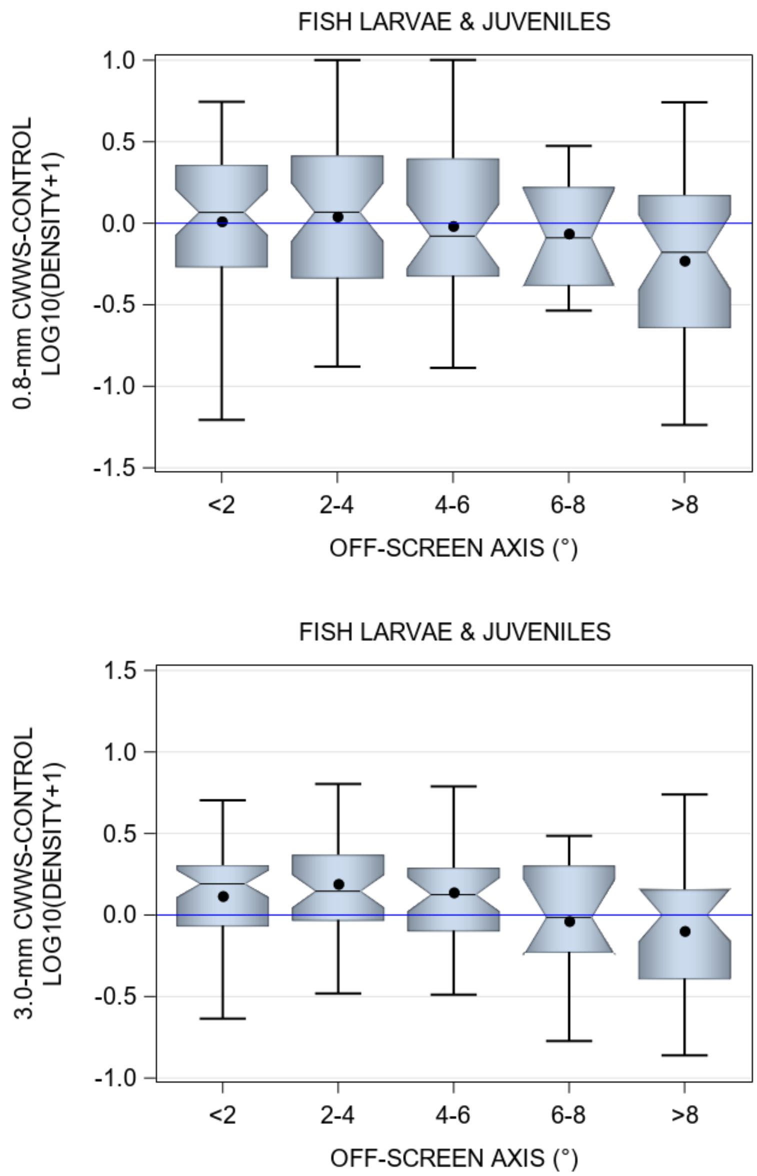


Figure 37. **Notched box plots of differences in $\log_{10}(x+1)$ transformed entrainment densities of all fish larvae and juveniles between the 0.8-mm (top) and 3.0-mm (top) cylindrical wedgewire screen (CWWS) and the existing cooling water intake structure (CWIS) for Units 5 and 6 (Control) by the magnitude of the off-screen axis angle of current velocity direction at Schiller Station based on synchronized samples collected from weeks beginning Monday, 11 March 2019 through Monday, 23 September 2019. Solid dot = Mean. Non-overlapping notches indicate differences in medians are statistically significant. Off-screen axis angle was defined as the difference between the observed sample-averaged current direction (i.e. average of all ADCP measurements within an entrainment sample period) and the CWWS orientation axis of 165° True North.**

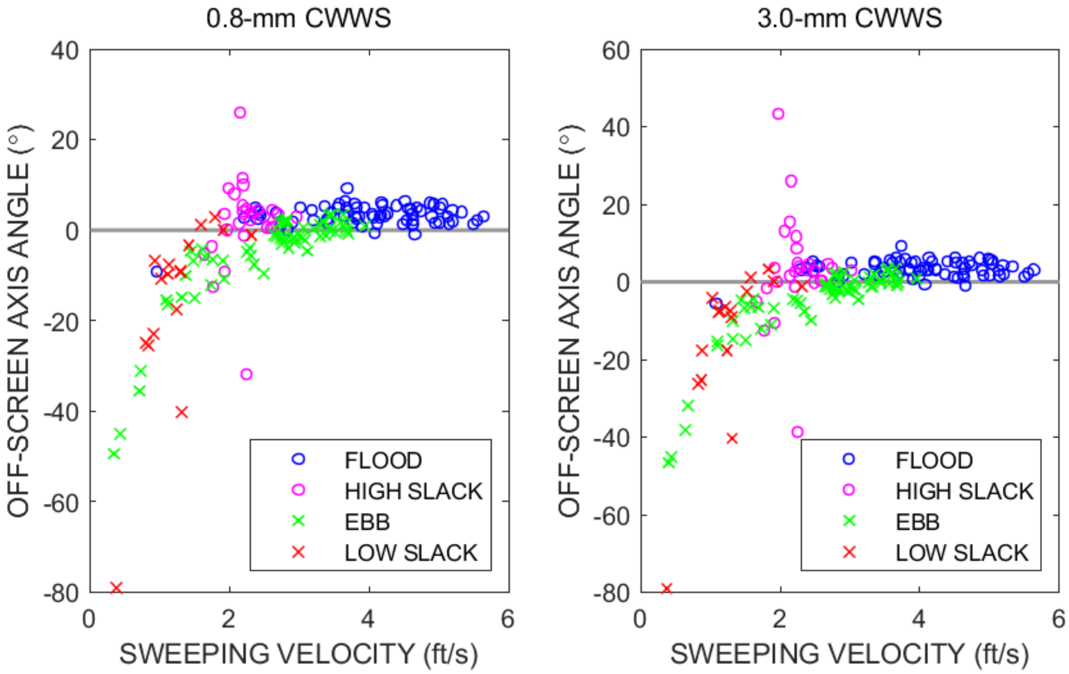


Figure 38. **Scatter plot of off-screen axis angle and sweeping velocity for each tidal stage observed at the 0.8-mm and 3.0-mm CWWSs based on synchronized samples collected at Schiller Station from weeks beginning Monday, 11 March 2019 through Monday, 23 September 2019. Off-screen axis angle was defined as the difference between the observed sample-averaged current direction (i.e. average of all ADCP measurements within an entrainment sample period) and the CWWS orientation axis of 165° True North.**

7.2.8 Cumulative Entrainment Reduction

The CWWS performance evaluation period provided 174 synchronized trios of samples for evaluating the performance of the 0.8-mm and 3.0-mm CWWSs to reduce entrainment relative to the Control. While 41 weeks (79%) of one year were sampled, the peak 27 weeks (75% of the sampled weeks) with concurrent sample collections with properly aligned, undamaged CWWSs were used in the evaluation.

The cumulative entrainment abundance over the performance evaluation period provided a proxy for annual entrainment abundance at the two tested CWWSs and the Control. In accordance with standard methods of estimating annual entrainment abundance by weekly or monthly mean entrainment density multiplied by the corresponding cooling water withdrawal volume, the cumulative abundance estimates at each screen in this study were based on weekly mean entrainment density and weekly volume based on DIF or AIF. At DIF, the observed differences are attributed solely to differences in density and the potential effect of wedgewire screen slot width and intake location. The peak week for all locations of Monday, 1 July 2019 (Week 26) had an estimated entrainment abundance of 25.4 million fish entrainment at the 0.8-mm CWWS, 35.8 million fish entrained at the 3.0-mm CWWS, and 31.7 million fish entrained at the Control (Table 17). At AIF, the entrainment reduction performance of the CWWSs takes into account the timing interaction between ichthyoplankton densities and cooling water withdrawal. Based on AIF, the same peak week beginning 1 July 2019 had an estimated entrainment abundance of 9.7 million fish entrainment at the 0.8-mm CWWS, 13.8 million fish entrained at the 3.0-mm CWWS, and 12.2 million fish entrained at the Control (Table 18).

Prior to this study, the estimated entrainment reduction for all ichthyoplankton was 72.9% for an 0.8-mm CWWS (ENERCON 2008). The estimated percent reduction of 72.9% was embraced by the USEPA through Fact Sheet AR-259. The cumulative entrainment abundance of the 0.8-mm and 3.0-mm CWWSs during this study was about 49.0% and 22.9% lower than the cumulative entrainment abundance at the Control under constant DIF conditions (Table 17; Figure 39). Based on the cumulative abundance estimates using AIF, entrainment reduction performance was estimated as 48.7% for the 0.8-mm CWWS and 23.3% for the 3.0-mm CWWS (Table 18; Figure 39). The estimated cumulative entrainment abundance of fish based on DIF was 127.1 million fish entrained by the 0.8-mm CWWS, 192.1 million fish entrained by the 3.0-mm CWWS, and 249.3 million fish entrained by the Control (Table 19). Based on AIF, estimated cumulative entrainment abundance was 51.7 million, 77.4 million, and 100.9 million fish entrained by the 0.8-mm CWWS, the 3.0-mm CWWS, and the Control, respectively (Table 20). These differences were largely driven by fish eggs, which provided similar results to all fish taxa and life stages. Entrainment reduction performance for fish eggs was about 50.3% for the 0.8-mm CWWS and 25.6% for the 3.0-mm CWWS at AIF (Figure 40). For fish larvae and juveniles, the primary target life stages expected to benefit from CWWS, the 0.8-mm CWWS only reduced entrainment from the Control by 34.3% whereas 3.0-mm CWWS had no entrainment reduction benefit based on DIF (Figure 41). However, at AIF, the entrainment reduction benefit for fish larvae and juveniles was about 24.6% for the 0.8-mm CWWS, but entrainment abundance actually increased at the 3.0-mm CWWS relative to the Control by 12.9% because AIF was highest during peak density periods when the density was highest at the 3.0-mm CWWS (Figure 41).

The contribution of different fish taxa and life stages to the cumulative entrainment abundance during the performance evaluation of the 0.8-mm and 3.0-mm CWWSs at Schiller Station is presented in Table 19 at DIF and Table 20 at AIF. Based on AIF, eggs identified as Cunner and Cunner/Tautog/Yellowtail Flounder (0.2% and 89.9%, respectively; or 90,902,043 and 91.1% combined) were the most abundant taxon and life stage entrained at the existing CWIS (Control) at Schiller Station. Their abundance estimates were lower were lower for the 0.8-mm CWWS (1.1% and 83.6%, respectively; or 43,771,365 and 84.7% combined) and 3.0-mm CWWS (0.9% and 82.7%, respectively; or 64,625,328 and 83.6% combined; Table 20). The next top three taxa entrained by the Control were Rock Gunnel PYSL (1,020,691 and 1.0%), American Sand Lance PYSL (914,998 and 0.9%), and Fourbeard Rockling/Hake eggs (891,160 and 0.9%). The entrainment abundance estimates of these taxa were 159,415 Rock Gunnel PYSL (0.3%), 164,262 American Sand Lance PYSL (1.9%), and 978,917 Fourbeard Rockling/Hake eggs (1.9%) for the 0.8-mm CWWS; and 501,118 Rock Gunnel PYSL (0.6%), 458,145 American Sand Lance PYSL (0.6%), and 1,334,722 Fourbeard Rockling/Hake eggs (1.7%) for the 3.0-mm CWWS (Table 20). After Cunner eggs, the three most abundant taxa entrained by the CWWSs were Cunner PYSL (3.1%), Hake eggs (2.2%), and Fourbeard Rockling/Hake eggs (1.9%) for the 0.8-mm CWWS; and Cunner PYSL (2.5%), Fourbeard Rockling/Hake eggs (1.7%), and Hake eggs (1.7%) for the 3.0-mm CWWS (Table 20). As previously discussed, the entrainment reduction benefit of the CWWSs largely benefited Cunner eggs, but for some taxa and life stages the CWWS increased entrainment, as was the case for Fourbeard Rockling/Hake and Hake eggs, and Cunner larvae.

Table 17. Weekly entrainment abundance (by number and %) of all taxa and life stages based on design intake flow (DIF) at the 0.8-mm cylindrical wedgewire screen (CWWS), 3.0-mm CWWS, and the existing cooling water intake structure (CWIS) for Units 5 and 6 (Control) at Schiller Station based on synchronized samples collected during the week beginning 11 March 2019 through the week beginning 23 September 2019.

Week No.	Sampling Week (beginning Monday)	Abundance			Entrainment Reduction (%)	
		0.8-mm CWWS	3.0-mm CWWS	Existing CWIS (Control)	0.8-mm CWWS	3.0-mm CWWS
10	11-Mar-2019	640,854	1,714,123	2,971,874	-78	-42
12	25-Mar-2019	447,908	1,109,264	2,660,169	-83	-58
13	01-Apr-2019	217,276	719,864	2,115,258	-90	-66
14	8-Apr-2019	490,949	1,074,285	1,317,898	-63	-18
15	15-Apr-2019	537,757	617,280	587,681	-8	5
16	22-Apr-2019	370,759	608,397	596,847	-38	2
17	29-Apr-2019	285,788	1,231,273	1,470,179	-81	-16
18	06-May-2019	691,937	1,122,267	1,574,621	-56	-29
19	13-May-2019	828,117	1,293,378	2,951,757	-72	-56
20	20-May-2019	732,201	1,271,893	1,576,697	-54	-19
21	27-May-2019	2,873,789	4,785,767	7,930,180	-64	-40
22	03-Jun-2019	9,107,615	16,794,081	20,892,497	-56	-20
23	10-Jun-2019	10,047,081	19,326,186	25,623,792	-61	-25
24	17-Jun-2019	23,511,246	29,540,954	27,979,892	-16	6
25	24-Jun-2019	7,454,241	11,872,139	9,614,986	-22	23
26	01-Jul-2019	25,382,357	35,755,856	31,678,662	-20	13
27	08-Jul-2019	7,311,438	11,679,308	16,981,656	-57	-31
28	15-Jul-2019	11,961,585	17,222,401	23,659,400	-49	-27
29	22-Jul-2019	11,284,074	16,214,109	12,137,356	-7	34
30	29-Jul-2019	5,418,661	8,313,628	16,061,654	-66	-48
31	05-Aug-2019	2,111,909	2,940,339	7,230,221	-71	-59
32	12-Aug-2019	1,617,970	2,365,585	7,311,203	-78	-68
33	19-Aug-2019	1,223,020	1,651,057	11,303,179	-89	-85
34	26-Aug-2019	1,238,839	1,585,094	5,526,643	-78	-71
36	09-Sep-2019	636,197	668,836	2,894,643	-78	-77
37	16-Sep-2019	668,165	543,534	3,783,176	-82	-86
38	23-Sep-2019	34,209	92,814	844,714	-96	-89
Total		**127,125,942**	**192,113,715**	**249,276,835**	**-49**	**-23**

Table 18. Weekly abundance from samples collected from the 0.8-mm and 3.0-mm cylindrical wedgewire screen (CWWS) intakes and the existing cooling water intake structure (CWIS) for Units 5 and 6 (Control) at Schiller Station and entrainment reduction benefits from the 0.8-mm and 3.0-mm CWWS based on the actual intake flow (AIF) at Schiller Station from weeks beginning Monday, 11 March 2019 through Monday, 23 September 2019.

Week No.	Sampling Week (beginning Monday)	Abundance			Entrainment Reduction (%)	
		0.8-mm CWWS	3.0-mm CWWS	Existing CWIS (Control)	0.8-mm CWWS	3.0-mm CWWS
10	11-Mar-2019	237,973	636,519	1,103,569	-78	-42
12	25-Mar-2019	148,828	368,579	883,904	-83	-58
13	01-Apr-2019	69,555	230,445	677,142	-90	-66
14	8-Apr-2019	98,569	215,687	264,597	-63	-18
15	15-Apr-2019	90,563	103,955	98,970	-8	5
16	22-Apr-2019	42,987	70,540	69,201	-38	2
17	29-Apr-2019	67,828	292,228	348,930	-81	-16
18	06-May-2019	229,912	372,899	523,205	-56	-29
19	13-May-2019	275,161	429,755	980,791	-72	-56
20	20-May-2019	243,291	422,616	523,895	-54	-19
21	27-May-2019	831,686	1,385,019	2,295,024	-64	-40
22	03-Jun-2019	3,696,258	6,815,754	8,479,066	-56	-20
23	10-Jun-2019	2,906,374	5,590,592	7,412,335	-61	-25
24	17-Jun-2019	8,656,869	10,877,016	10,302,231	-16	6
25	24-Jun-2019	2,612,387	4,160,668	3,369,634	-22	23
26	01-Jul-2019	9,764,915	13,755,732	12,187,183	-20	13
27	08-Jul-2019	2,427,072	3,877,010	5,637,154	-57	-31
28	15-Jul-2019	7,358,154	10,594,339	14,554,051	-49	-27
29	22-Jul-2019	6,066,901	8,717,541	6,525,669	-7	34
30	29-Jul-2019	3,087,590	4,737,163	9,152,042	-66	-48
31	05-Aug-2019	772,835	1,075,992	2,645,837	-71	-59
32	12-Aug-2019	541,199	791,270	2,445,542	-78	-68
33	19-Aug-2019	694,788	937,953	6,421,248	-89	-85
34	26-Aug-2019	411,239	526,181	1,834,599	-78	-71
36	09-Sep-2019	227,899	239,591	1,036,924	-78	-77
37	16-Sep-2019	138,626	112,769	784,908	-82	-86
38	23-Sep-2019	11,965	32,463	295,446	-96	-89
Total		**51,711,427**	**77,370,276**	**100,853,095**	**-49**	**-23**

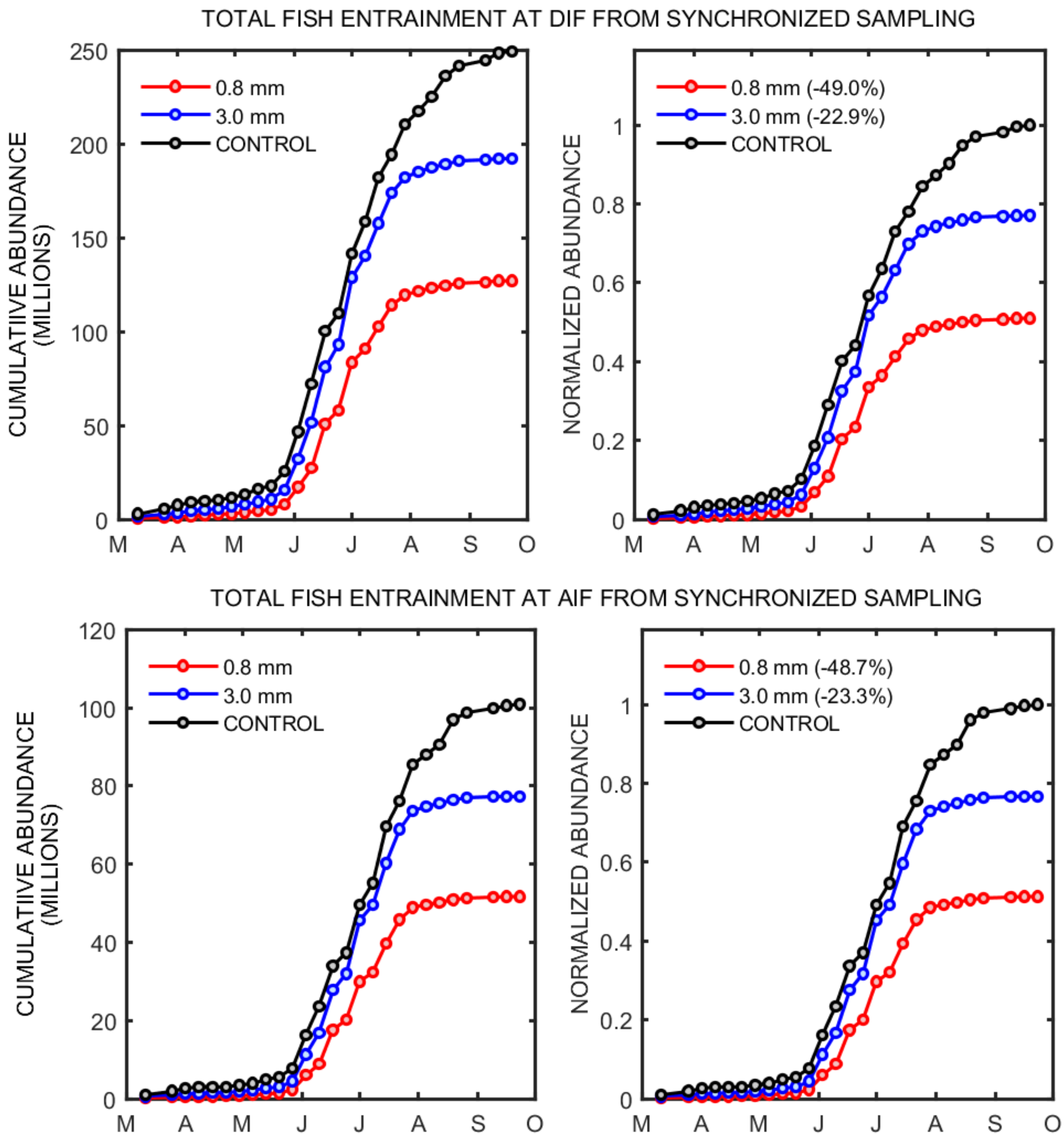


Figure 39. **Cumulative weekly abundance of all fish taxa and life stages entrained by the 0.8-mm and 3.0-mm cylindrical wedgewire screen (CWWS) intakes and the existing cooling water intake structure (CWIS) for Units 5 and 6 (Control) at Schiller Station based on design intake flow (DIF) and actual intake flow (AIF) for synchronized samples collected from weeks beginning Monday, 11 March 2019 through Monday, 23 September 2019.**

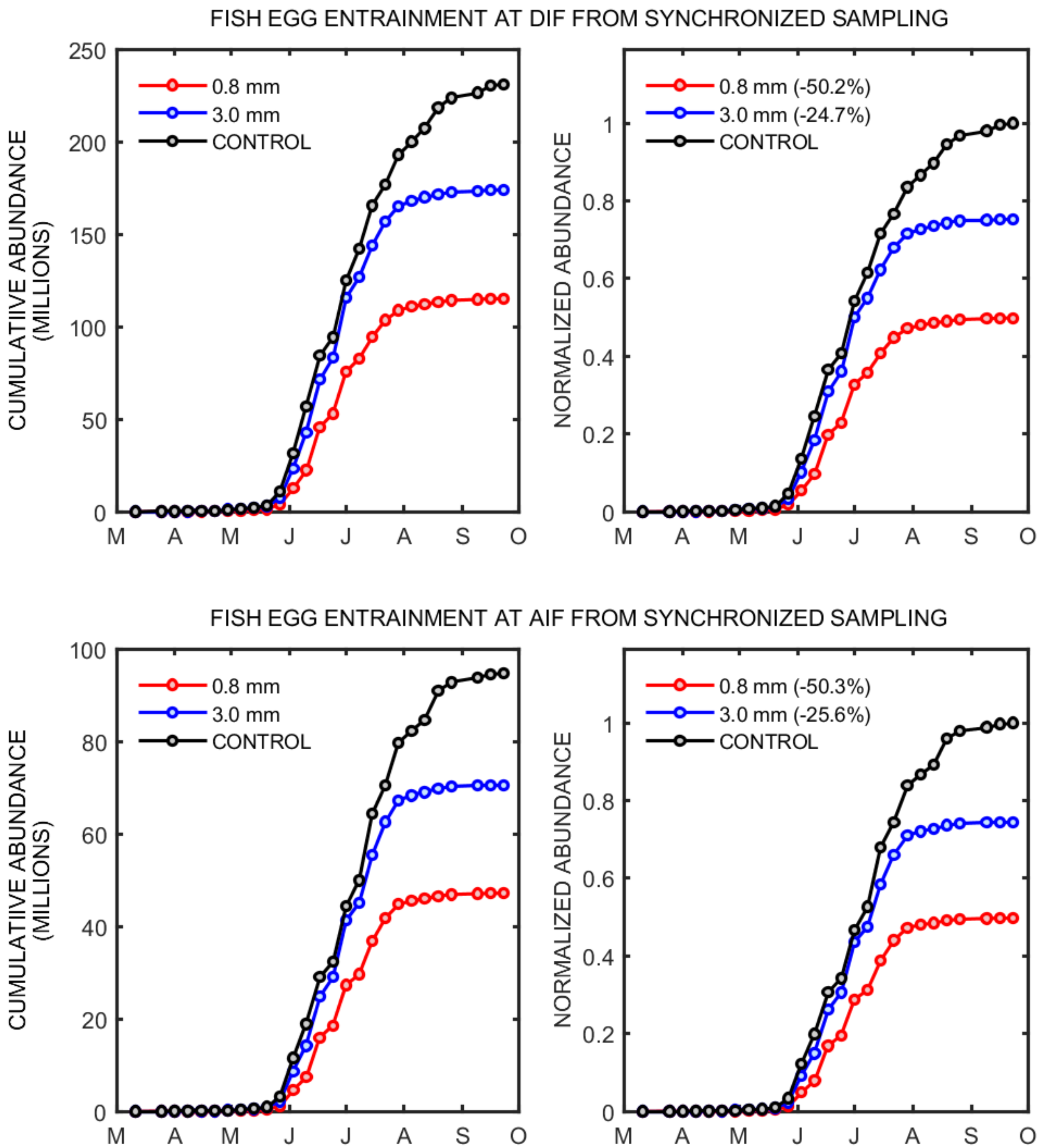


Figure 40. **Cumulative weekly abundance of all fish eggs entrained by the 0.8-mm and 3.0-mm cylindrical wedgewire screen (CWWS) intakes and the existing cooling water intake structure (CWIS) for Units 5 and 6 (Control) at Schiller Station based on design intake flow (DIF) and actual intake flow (AIF) for synchronized samples collected from weeks beginning Monday, 11 March 2019 through Monday, 23 September 2019.**

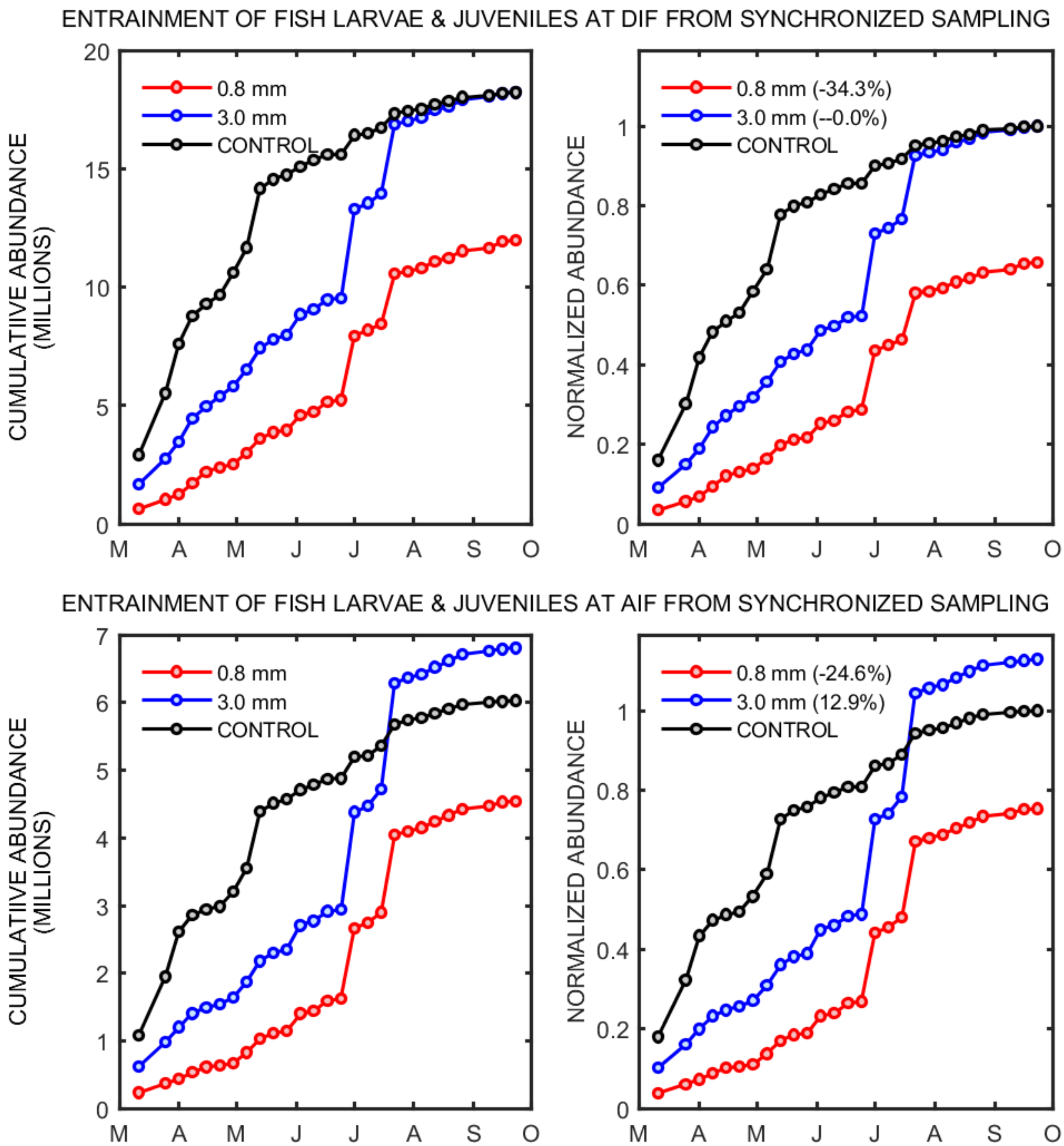


Figure 41. Cumulative weekly abundance of all fish larvae and juveniles entrained by the 0.8-mm and 3.0-mm cylindrical wedgewire screen (CWWS) intakes and the existing cooling water intake structure (CWIS) for Units 5 and 6 (Control) at Schiller Station based on design intake flow (DIF) and actual intake flow (AIF) for synchronized samples collected from weeks beginning Monday, 11 March 2019 through Monday, 23 September 2019.

Table 19. Cumulative entrainment abundance (by number, N, and %) of taxa and life stages based on DIF at the 0.8-mm cylindrical wedgewire screen (CWWS), 3.0-mm CWWS, and the existing cooling water intake structure (CWIS) for Units 5 and 6 (Control) at Schiller Station based on synchronized samples collected during the week beginning 11 March 2019 through the week beginning 23 September 2019.

		Location					
		0.8-mm CWWS		3.0-mm CWWS		Existing CWIS (Control)	
Taxon	Life Stage[1]	N	%	N	%	N	%
Alligatorfish	PYSL					16,542	<0.1
American Eel	YROL					4,285	<0.1
American Plaice	Eggs	8,313	<0.1	1,891,860	1.0	1,581,424	0.6
	UNID	70,844	0.1	74,943	<0.1	53,607	<0.1
	YSL	54,441	<0.1	141,902	0.1	100,674	<0.1
	PYSL	234,843	0.2	221,176	0.1	58,152	<0.1
American Sand Lance	UNID			8,142	<0.1	16,637	<0.1
	YSL	16,565	<0.1	32,996	<0.1	32,924	<0.1
	PYSL	524,790	0.4	1,613,637	0.8	2,909,147	1.2
	YOY			8,311	<0.1	79,003	<0.1
Atlantic Cod	PYSL			8,253	<0.1	24,834	<0.1
Atlantic Cod/Haddock	Eggs			16,498	<0.1	8,350	<0.1
Atlantic Herring	PYSL			166,938	0.1	87,158	<0.1
Atlantic Mackerel	Eggs	41,901	<0.1	138,046	0.1	277,014	0.1
Atlantic Mackerel/Cusk	Eggs	243,686	0.2	551,682	0.3	358,925	0.1
Atlantic Menhaden	Eggs	260,965	0.2	2,962,588	1.5	1,381,668	0.6
	YSL			8,293	<0.1	8,287	<0.1
	PYSL			17,039	<0.1		
Atlantic Seasnail	UNID	4,220	<0.1			18,260	<0.1
	YSL	16,932	<0.1	41,626	<0.1	37,304	<0.1
	PYSL	302,480	0.2	339,015	0.2	826,808	0.3
Atlantic Tomcod	YSL					8,214	<0.1
Butterfish	Eggs	233,757	0.2	306,652	0.2	107,152	<0.1
	UNID			4,162	<0.1		
	YSL	42,158	<0.1	8,369	<0.1		
	PYSL	8,379	<0.1	4,158	<0.1		
Cod Family/Witch Flounder	Eggs	4,209	<0.1	91,651	<0.1	37,132	<0.1
Cunner	Eggs	1,160,826	0.9	1,423,135	0.7	438,709	0.2
	UNID			27,845	<0.1	4,268	<0.1
	YSL	1,184,774	0.9	2,179,745	1.1	396,552	0.2
	PYSL	3,575,791	2.8	4,210,885	2.2	1,590,880	0.6
Cunner/Tautog	YSL	4,252	<0.1				
Cunner/Tautog/Yellowtail Flounder	Eggs	105,333,099	82.9	156,494,149	81.5	219,779,956	88.2

(continued)

Table 19. (continued)

Taxon	Life Stage[1]	Location					
		0.8-mm CWWS		3.0-mm CWWS		Existing CWIS (Control)	
		N	%	N	%	N	%
Cusk	Eggs			94,594	<0.1	98,150	<0.1
	UNID	4,179	<0.1	4,153	<0.1		
	YSL	12,685	<0.1	12,682	<0.1	4,164	<0.1
Fourbeard Rockling	Eggs	764,811	0.6	986,696	0.5	960,021	0.4
	UNID	5,538	<0.1	24,988	<0.1	4,173	<0.1
	YSL	8,289	<0.1	53,200	<0.1	25,050	<0.1
	PYSL	157,530	0.1	108,345	0.1	45,679	<0.1
Fourbeard Rockling/Hakes	Eggs	2,542,198	2.0	3,398,548	1.8	2,300,005	0.9
Fourspot Flounder	YSL	8,423	<0.1				
Goosefish	Eggs					4,124	<0.1
	PYSL	4,177	<0.1	4,098	<0.1		
Grubby	UNID	16,643	<0.1	8,294	<0.1	49,892	<0.1
	YSL	251,051	0.2	379,539	0.2	811,722	0.3
	PYSL	399,618	0.3	1,227,732	0.6	1,899,267	0.8
	YOY			4,118	<0.1		
Gulf Snailfish	YSL					16,755	<0.1
	PYSL					8,362	<0.1
Hakes	Eggs	2,654,641	2.1	2,989,173	1.6	1,862,755	0.7
	UNID	144,770	0.1	144,971	0.1	12,732	<0.1
	YSL	260,428	0.2	380,940	0.2	50,648	<0.1
	PYSL	227,128	0.2	329,988	0.2	93,522	<0.1
	YOY					4,229	<0.1
Herring Family	UNID	55,653	<0.1	70,724	<0.1	4,171	<0.1
	YSL	41,826	<0.1	4,160	<0.1		
	PYSL	71,510	0.1	83,854	<0.1	79,815	<0.1
Inland Silverside	UNID	4,216	<0.1				
Longhorn Sculpin	PYSL	16,629	<0.1	272,651	0.1	562,417	0.2
Lumpfish	PYSL					4,091	<0.1
Mummichog	YSL					4,141	<0.1
	PYSL					4,274	<0.1
Myoxocephalus spp.	Eggs			8,146	<0.1	98,397	<0.1
	UNID			8,392	<0.1		
Northern Pipefish	YSL			10,931	<0.1		
	PYSL	112,858	0.1	205,930	0.1	166,769	0.1
Pollock	PYSL			16,952	<0.1	41,633	<0.1
	YOY					20,945	<0.1
Prionotus spp.	Eggs	8,281	<0.1	4,163	<0.1	12,356	<0.1

(continued)

Table 19. (continued)

Taxon	Life Stage[1]	Location					
		0.8-mm CWWS		3.0-mm CWWS		Existing CWIS (Control)	
		N	%	N	%	N	%
Radiated Shanny	UNID			12,519	<0.1	58,922	<0.1
	YSL	4,268	<0.1	12,536	<0.1	42,306	<0.1
	PYSL	630,253	0.5	928,971	0.5	1,977,766	0.8
Rainbow Smelt	UNID			4,235	<0.1	4,197	<0.1
	YSL	101,567	0.1	158,319	0.1	43,319	<0.1
	PYSL	33,536	<0.1	75,068	<0.1	29,004	<0.1
Righteye Flounder Family	YSL					4,127	<0.1
Rock Gunnel	UNID	8,323	<0.1			16,216	<0.1
	YSL	37,448	<0.1	25,071	<0.1	112,128	<0.1
	PYSL	457,417	0.4	1,516,489	0.8	3,072,127	1.2
	YROL					12,548	<0.1
Sea Raven	YSL					8,359	<0.1
	PYSL					8,266	<0.1
	YOY					8,359	<0.1
Shorthorn Sculpin	YSL			8,270	<0.1	8,350	<0.1
	PYSL			124,018	0.1	388,924	0.2
	YOY					4,207	<0.1
Silver Hake	Eggs	784,388	0.6	1,068,822	0.6	774,419	0.3
	UNID	12,554	<0.1	29,172	<0.1	8,389	<0.1
	YSL	496,770	0.4	329,222	0.2	104,458	<0.1
	PYSL	103,332	0.1	90,331	<0.1		
Smooth Flounder	PYSL	8,377	<0.1				
Tautog	Eggs	8,365	<0.1	4,290	<0.1		
	UNID	4,189	<0.1	8,369	<0.1		
	YSL			4,124	<0.1		
	PYSL	8,329	<0.1	12,520	<0.1		
Threespine Stickleback	YOY					4,163	<0.1
	YROL					4,280	<0.1
Unidentified Osteichthyes	Eggs	16,883	<0.1	22,240	<0.1	54,197	<0.1
	UNID	221,813	0.2	286,446	0.1	124,763	0.1
	YSL			8,293	<0.1		
	PYSL	12,841	<0.1	8,325	<0.1	12,683	<0.1
Windowpane	Eggs	131,008	0.1	213,162	0.1	136,307	0.1
	UNID					11,201	<0.1
	YSL	4,130	<0.1	20,920	<0.1	4,133	<0.1
	PYSL	46,219	<0.1	8,435	<0.1	16,636	<0.1
Windowpane/Fourspot/Summer Flounder	Eggs	706,962	0.6	931,382	0.5	483,464	0.2

(continued)

Table 19. (continued)

Taxon	Life Stage[1]	Location					
		0.8-mm CWWS		3.0-mm CWWS		Existing CWIS (Control)	
		N	%	N	%	N	%
Winter Flounder	Eggs	221,210	0.2	288,396	0.2	297,732	0.1
	UNID	172,018	0.1	45,834	<0.1	114,463	<0.1
	WF I	238,869	0.2	170,412	0.1	212,600	0.1
	WF II	1,195,168	0.9	1,323,043	0.7	1,269,080	0.5
	WF III	267,116	0.2	455,192	0.2	288,013	0.1
	WF IV	54,299	<0.1	62,681	<0.1	58,427	<0.1
Witch Flounder	Eggs	8,332	<0.1				
	PYSL	4,157	<0.1				
Yellowtail Flounder	Eggs	17,089	<0.1				
	UNID			4,143	<0.1		
	YSL	8,409	<0.1	4,155	<0.1	4,177	<0.1
	PYSL			16,648	<0.1		
All Taxa Combined	Eggs	115,150,924	90.6	173,885,875	90.5	231,052,257	92.7
	UNID	724,958	0.6	767,333	0.4	501,892	0.2
	YSL	2,554,415	2	3,825,293	2	1,827,792	0.7
	PYSL	6,940,193	5.5	11,611,457	6	13,924,756	5.6
	WF I	238,869	0.2	170,412	0.1	212,600	0.1
	WF II	1,195,168	0.9	1,323,043	0.7	1,269,080	0.5
	WF III	267,116	0.2	455,192	0.2	288,013	0.1
	WF IV	54,299	<0.1	62,681	<0.1	58,427	<0.1
	YOY			12,429	<0.1	120,906	<0.1
	YROL					21,113	<0.1
Total		**127,125,942**	**100.0**	**192,113,715**	**100.0**	**249,276,835**	**100.0**

[1] UNID = unidentified larvae, YSL = yolk-sac larvae, PYSL = post yolk-sac larvae, YOY = young-of-the-year, YROL = yearling and older.

Table 20. Cumulative entrainment abundance (by number, N, and %) of taxa and life stages based on AIF at the 0.8-mm cylindrical wedgewire screen (CWWS), 3.0-mm CWWS, and the existing cooling water intake structure (CWIS) for Units 5 and 6 (Control) at Schiller Station based on synchronized samples collected during the week beginning 11 March 2019 through the week beginning 23 September 2019.

Taxon	Life Stage[1]	Location					
		0.8-mm CWWS		3.0-mm CWWS		Existing CWIS (Control)	
		N	%	N	%	N	%
Alligatorfish	PYSL					3,626	<0.1
American Eel	YROL					1,424	<0.1
American Plaice	Eggs	1,973	<0.1	627,211	0.8	495,431	0.5
	UNID	27,232	0.1	27,987	<0.1	20,582	<0.1
	YSL	17,773	<0.1	50,926	0.1	32,734	<0.1
	PYSL	92,506	0.2	84,051	0.1	21,554	<0.1
American Sand Lance	UNID			3,024	<0.1	5,428	<0.1
	YSL	5,830	<0.1	10,488	<0.1	10,800	<0.1
	PYSL	164,262	0.3	458,145	0.6	914,998	0.9
	YOY			2,762	<0.1	26,251	<0.1
Atlantic Cod	PYSL			2,642	<0.1	6,268	<0.1
Atlantic Cod/Haddock	Eggs			5,007	<0.1	3,101	<0.1
Atlantic Herring	PYSL			38,790	0.1	24,090	<0.1
Atlantic Mackerel	Eggs	14,145	<0.1	50,520	0.1	92,306	0.1
Atlantic Mackerel/Cusk	Eggs	85,720	0.2	206,933	0.3	133,308	0.1
Atlantic Menhaden	Eggs	85,915	0.2	898,890	1.2	409,858	0.4
	YSL			3,190	<0.1	3,188	<0.1
	PYSL			5,960	<0.1		
Atlantic Seasnail	UNID	1,713	<0.1			6,067	<0.1
	YSL	6,557	<0.1	12,138	<0.1	9,024	<0.1
	PYSL	92,404	0.2	100,922	0.1	248,354	0.2
Atlantic Tomcod	YSL					2,729	<0.1
Butterfish	Eggs	112,164	0.2	131,439	0.2	48,318	<0.1
	UNID			1,382	<0.1		
	YSL	22,666	<0.1	4,500	<0.1		
	PYSL	4,505	<0.1	1,380	<0.1		
Cod Family/Witch Flounder	Eggs	1,550	<0.1	31,371	<0.1	12,620	<0.1
Cunner	Eggs	555,986	1.1	662,037	0.9	203,640	0.2
	UNID			13,980	<0.1	1,562	<0.1
	YSL	494,877	1.0	928,259	1.2	165,457	0.2
	PYSL	1,592,693	3.1	1,907,665	2.5	714,771	0.7
Cunner/Tautog	YSL	1,411	<0.1				
Cunner/Tautog/Yellowtail Flounder	Eggs	43,215,379	83.6	63,963,291	82.7	90,698,403	89.9

(continued)

Table 20. (continued)

Taxon	Life Stage[1]	Location					
		0.8-mm CWWS		3.0-mm CWWS		Existing CWIS (Control)	
		N	%	N	%	N	%
Cusk	Eggs			36,320	<0.1	38,268	<0.1
	UNID	1,539	<0.1	1,201	<0.1		
	YSL	4,671	<0.1	4,655	<0.1	1,533	<0.1
Fourbeard Rockling	Eggs	245,204	0.5	325,247	0.4	331,776	0.3
	UNID	2,131	<0.1	8,932	<0.1	1,606	<0.1
	YSL	2,754	<0.1	20,524	<0.1	8,282	<0.1
	PYSL	60,849	0.1	41,057	0.1	15,458	<0.1
Fourbeard Rockling/Hakes	Eggs	978,917	1.9	1,334,722	1.7	891,160	0.9
Fourspot Flounder	YSL	4,529	<0.1				
Goosefish	Eggs					1,369	<0.1
	PYSL	2,373	<0.1	2,328	<0.1		
Grubby	UNID	4,422	<0.1	1,665	<0.1	10,550	<0.1
	YSL	61,756	0.1	91,818	0.1	217,376	0.2
	PYSL	112,432	0.2	338,601	0.4	549,886	0.5
	YOY			1,368	<0.1		
Gulf Snailfish	YSL					3,093	<0.1
	PYSL					2,778	<0.1
Hakes	Eggs	1,160,601	2.2	1,325,277	1.7	800,615	0.8
	UNID	61,715	0.1	67,139	0.1	6,973	<0.1
	YSL	138,161	0.3	192,760	0.2	25,734	<0.1
	PYSL	100,348	0.2	162,672	0.2	49,645	<0.1
	YOY					1,404	<0.1
Herring Family	UNID	18,723	<0.1	27,066	<0.1	1,385	<0.1
	YSL	12,597	<0.1	1,204	<0.1		
	PYSL	23,769	<0.1	24,738	<0.1	27,724	<0.1
Inland Silverside	UNID	1,543	<0.1				
Longhorn Sculpin	PYSL	6,175	<0.1	95,727	0.1	196,626	0.2
Lumpfish	PYSL					1,184	<0.1
Mummichog	YSL					1,593	<0.1
	PYSL					2,629	<0.1
Myoxocephalus spp.	Eggs			2,707	<0.1	17,870	<0.1
	UNID			1,413	<0.1		
Northern Pipefish	YSL			3,916	<0.1		
	PYSL	47,085	0.1	84,711	0.1	68,888	0.1
Pollock	PYSL			2,855	<0.1	11,359	<0.1
	YOY					6,166	<0.1
Prionotus spp.	Eggs	2,749	<0.1	1,382	<0.1	4,102	<0.1

(continued)

Table 20. (continued)

Taxon	Life Stage[1]	Location					
		0.8-mm CWWS		3.0-mm CWWS		Existing CWIS (Control)	
		N	%	N	%	N	%
Radiated Shanny	UNID			4,460	<0.1	19,885	<0.1
	YSL	1,418	<0.1	4,165	<0.1	13,269	<0.1
	PYSL	217,312	0.4	316,918	0.4	645,895	0.6
Rainbow Smelt	UNID			1,407	<0.1	1,395	<0.1
	YSL	28,913	0.1	43,124	0.1	12,813	<0.1
	PYSL	10,554	<0.1	24,190	<0.1	8,671	<0.1
Righteye Flounder Family	YSL					2,539	<0.1
Rock Gunnel	UNID	3,091	<0.1			6,021	<0.1
	YSL	13,418	<0.1	7,542	<0.1	37,568	<0.1
	PYSL	159,415	0.3	501,118	0.6	1,020,691	1.0
	YROL					3,218	<0.1
Sea Raven	YSL					1,678	<0.1
	PYSL					2,646	<0.1
	YOY					1,678	<0.1
Shorthorn Sculpin	YSL			3,071	<0.1	3,101	<0.1
	PYSL			42,476	0.1	123,788	0.1
	YOY					1,707	<0.1
Silver Hake	Eggs	336,054	0.6	463,394	0.6	329,530	0.3
	UNID	5,902	<0.1	13,601	<0.1	4,765	<0.1
	YSL	200,480	0.4	139,232	0.2	41,330	<0.1
	PYSL	32,518	0.1	38,133	<0.1		
Smooth Flounder	PYSL	1,411	<0.1				
Tautog	Eggs	3,755	<0.1	2,445	<0.1		
	UNID	1,390	<0.1	4,500	<0.1		
	YSL			2,217	<0.1		
	PYSL	1,728	<0.1	6,097	<0.1		
Threespine Stickleback	YOY					1,204	<0.1
	YROL					1,422	<0.1
Unidentified Osteichthyes	Eggs	6,464	<0.1	8,563	<0.1	23,914	<0.1
	UNID	88,618	0.2	131,155	0.2	41,814	<0.1
	YSL			3,190	<0.1		
	PYSL	6,025	<0.1	3,072	<0.1	4,214	<0.1
Windowpane	Eggs	43,340	0.1	71,865	0.1	48,383	<0.1
	UNID					4,013	<0.1
	YSL	1,589	<0.1	7,299	<0.1	2,348	<0.1
	PYSL	12,189	<0.1	1,750	<0.1	3,451	<0.1
Windowpane/Fourspot/Summer Flounder	Eggs	252,508	0.5	345,390	0.4	167,390	0.2

(continued)

Table 20. (continued)

Taxon	Life Stage[1]	Location					
		0.8-mm CWWS		3.0-mm CWWS		Existing CWIS (Control)	
		N	%	N	%	N	%
Winter Flounder	Eggs	55,933	0.1	69,362	0.1	72,675	0.1
	UNID	35,102	0.1	12,122	<0.1	28,958	<0.1
	WF I	45,929	0.1	37,609	<0.1	41,213	<0.1
	WF II	359,274	0.7	426,080	0.6	395,655	0.4
	WF III	97,527	0.2	162,372	0.2	98,244	0.1
	WF IV	20,546	<0.1	23,183	<0.1	21,476	<0.1
Witch Flounder	Eggs	1,729	<0.1				
	PYSL	2,557	<0.1				
Yellowtail Flounder	Eggs	8,410	<0.1				
	UNID			2,549	<0.1		
	YSL	4,027	<0.1	2,556	<0.1	1,607	<0.1
	PYSL			7,173	<0.1		
All Taxa Combined	Eggs	47,168,495	91.2	70,563,374	91.2	94,824,037	94.0
	UNID	253,119	0.5	323,582	0.4	161,005	0.2
	YSL	1,023,428	2.0	1,536,775	2.0	597,796	0.6
	PYSL	2,743,109	5.3	4,293,171	5.5	4,669,195	4.6
	WF I	45,929	0.1	37,609	<0.1	41,213	<0.1
	WF II	359,274	0.7	426,080	0.6	395,655	0.4
	WF III	97,527	0.2	162,372	0.2	98,244	0.1
	WF IV	20,546	<0.1	23,183	<0.1	21,476	<0.1
	YOY			4,130	<0.1	38,411	<0.1
	YROL					6,064	<0.1
Total		**51,711,427**	**100.0**	**77,370,276**	**100.0**	**100,853,095**	**100.0**

[1] UNID = unidentified larvae, YSL = yolk-sac larvae, PYSL = post yolk-sac larvae, YOY = young-of-the-year, YROL = yearling and older.

8 CONCLUSIONS

Entrainment samples were collected concurrently at the 0.8-mm CWWS, 3.0-mm CWIS, and Control for 174 diel periods across 27 weeks from the performance evaluation period, which represented 95% of the entrained specimens collected at the Control (yearlong period). At the Control only, samples were collected over 232 diel periods across 41 weeks from the yearlong period to characterize entrainment densities over a one-year period.

During the CWWS performance evaluation period, the top three dominant eggs by taxa were Cunner/Tautog/Yellowtail Flounder, Hakes, and Fourbeard Rockling/Hake for the 0.8-mm CWWS; and the larvae and juveniles were Cunner PYSL, Winter Flounder WF II larvae, and Radiated Shanny PYSL. At the 3.0-mm CWWS, the top three taxa were, for eggs, Cunner/Tautog/Yellowtail Flounder, Fourbeard Rockling/Hakes, and Atlantic Menhaden; and for larvae/juveniles, Cunner PYSL, Cunner YSL, and Winter Flounder WF II larvae. Finally, at the Control, the top three taxa for eggs were Cunner/Tautog/Yellowtail Flounder, Fourbeard Rockling/Hakes, and Hake; and the top three larvae and juveniles were Radiated

Shanny PYSL, American Sand Lance PYSL, and Rock Gunnel PYSL. For all three intakes, based on the subsample of eggs and larvae identified to member species, 95% or more of the Cunner/Tautog/Yellowtail species complex eggs were likely Cunner eggs.

The timing of peak egg density was very similar between the 2019-2020 and 2006-2007 studies with the substantial exception that the June egg density in 2019 was about 75% higher than that in June 2007, driven by Cunner/Tautog/Yellowtail flounder eggs. The higher density of eggs from this species complex was observed through the end of September, which were predominantly Cunner (>95%). Larval density peaked during late February, at approximately 171 larvae per 100 m^3, prior to the proper alignment of the test screens. These samples consisted mostly of Rock Gunnel larvae, and, much like the 2006-2007 study, were present from February through mid-July. From mid-July through September, larval density differed substantially between the present study and the 2006-2007 study, the latter of which contained a Cunner larval peak in early to mid-August 2007 (about 400 larvae per 100 m^3). There was no equivalent larval peak in 2019; instead, a minor summer larval peak of about 25 larvae per 100 m^3 occurred earlier in July during 2019 (Figure 11 and Figure 18).

There were a few differences in densities observed, but there was no clear pattern in entrainment density by diel period , but the paired differences in egg density between the 3.0-mm CWWS and the Control in all diel periods were not statistically different from zero (i.e., no statistically significant entrainment reduction of eggs). There was a statistically significant entrainment reduction of fish eggs by the 0.8-mm CWWS compared to the Control, but it was not affected by tidal stage. Tidal stage also did not affect differences in egg entrainment between the 3.0-mm CWWS and the Control. However, there were some important tidal effects on CWWS performance on fish larvae and juveniles. At the 0.8-mm and 3.0-mm CWWSs, entrainment density of fish larvae and juveniles was statistically higher than the Control during the flood tidal stage (negative entrainment reduction), but was statistically lower than the Control during samples with low slack (i.e., statistically significant entrainment reduction). During flood tidal conditions, entrainment reduction performance of fish larvae and juveniles decreased as sweeping velocity increased. High (3-6 ft/s) sweeping velocities may potentially increase entrainment abundance at Schiller Station. These results indicate that the strong tidal dynamics near Schiller Station, in conjunction with the short duration of low slack tidal conditions, create difficult conditions for a full-scale wedgewire screen intake system to achieve consistent entrainment reduction performance.

Expected entrainment reduction performance estimated by physical exclusion based on limiting dimensions of fish does not account for the extrusion through the CWWS slots that was observed in this study at Schiller Station. About 68% of the fish eggs entrained by the 0.8-mm CWWS had a maximum diameter larger than the 0.8-mm slot opening, whereas 100% of the eggs entrained by the 3.0-mm CWWS were measured to have a maximum diameter dimension smaller than 3.0 mm. More than two-thirds of the most abundant taxon and life stage entrained at Schiller Station, Cunner (or Cunner/Tautog/Yellowtail Flounder), were extruded through the 0.8-mm CWWS, which contributed to the relative ineffectiveness of the 0.8-mm CWWS at reducing entrainment relative to the existing CWIS. During the performance evaluation period, 26% of larval and juvenile fish entrained by the 0.8-mm CWWS had a GBD greater than 0.8 mm and 13% had a GBW greater than 0.8 mm. At the 3.0-mm CWWS, less than 1% based on either GBD or GBW of fish larvae and juveniles entrained were larger than the nominal slot opening. If larvae and juveniles are oriented with sweeping flow and perpendicular to the CWWS slots, then the 26% extrusion estimated based on GBD is an important factor in lower-than-expected performance of the 0.8-mm CWWS in reducing entrainment at Schiller Station. Extrusion represents a meaningful phenomenon explaining the lower-than-expected effectiveness of the 0.8-mm CWWS at reducing entrainment at Schiller Station, which is lowest during flood and highest during low slack tidal stages.

The primary objective of this study was to evaluate the performance of a wedgewire screen with a slot width (3.0-mm) larger than the 0.8-mm slot width at reducing the entrainment of ichthyoplankton at Schiller Station. This was completed by comparing the total entrainment abundance estimates over a common, synchronized sampling period at each test screen intake to the same data from the Control, at both actual and design intake flows. Based on the average weekly water withdrawal volume at the 2019 AIF (43.6 MGD) and weekly mean densities during the performance evaluation period, the cumulative entrainment abundance at the Control was estimated as 100.8 million fish (of all life stages from egg to yearling and older). The estimated total fish entrainment abundance during the same period for the 0.8-mm CWWS was 49% less than the Control, or 51.7 million fish, and the estimated total fish entrainment abundance at the 3.0-mm CWWS was about 23% less than the Control, or 77.3 million fish. The 0.8-mm CWWS entrained about 50% fewer fish eggs than the Control and the 3.0-mm CWWS entrained about 26% fewer fish eggs than the Control at 2019 AIF. The 0.8-mm CWWS entrained about 25% fewer fish larvae and juveniles than the Control and the 3.0-mm CWWS entrained about 13% more fish larvae and juveniles than the Control at 2019 AIF.

Similarly, the total fish entrainment abundance for the 0.8-mm CWWS was 49% less than the Control and the 3.0-mm CWWS was about 23% less than the Control based on DIF (125.8 MGD) and weekly mean densities during the performance evaluation period. The 0.8-mm CWWS entrained about 50% fewer fish eggs than the Control and the 3.0-mm CWWS entrained about 25% fewer fish eggs than the Control at DIF. The 0.8-mm CWWS entrained about 34% fewer fish larvae and juveniles than the Control and the 3.0-mm CWWS was equal to the fish larvae and juveniles entrained at the Control (0% reduction) at DIF. Results of the entrainment reduction of a 0.8-mm CWWS from this 2019-2020 study of 49% for ichthyoplankton of all life stages was short of the expected entrainment reduction performance of 72.9% (ENERCON 2008). Increasing the CWWS slot width by over three times to 3 mm was able to achieve about half the entrainment reduction as the 0.8-mm CWWS.

The results for the 0.8-mm and 3.0-mm CWWSs tested in this site-specific study highlight several factors that reduce the expected entrainment reduction performance if full-scale wedgewire screens were installed and operated at Schiller Station.

- Extrusion through slot openings of wedgewire screens during the study resulted in lower entrainment reduction performance than expected based on physical exclusion, as indicated by the fact that 68% of fish eggs and 26% of fish larvae and juveniles entrained by the 0.8-mm CWWS that were larger than the nominal slot width.
- Given the complex shoreline, bathymetry, and riverbed topography adjacent to Schiller Station, any full-scale design must carefully consider the location and the non-uniform performance across a large footprint of wedgewire screens because tidal dynamics and extreme sweeping velocities (up to near 6 ft/s) could increase entrainment abundance compared to the Control.
- The tidal channel asymmetry during flood (closer to shore) and ebb (away from shore) may also explain the observed increase in larval entrainment by the CWWSs during flood tide and entrainment reduction during low slack tidal conditions; where CWWSs are exposed to higher larval density under flood currents and lower larval density under ebb or low slack currents. Alternatively, the avoidance behavior or location of larvae in the water column is different under certain tidal currents.
- The latter period of the yearlong study was excluded from the performance evaluation of the CWWS due to increasing damage and biofouling observed by underwater inspection, which suggests difficulty in maintaining a full-scale wedgewire intake screens year-round and lower entrainment reduction from bypass withdrawal from the screens or reduction in the exclusion of ichthyoplankton.

Given all of the consequences related to CWWS siting/operation and the surrounding environment, as well as the reduced magnitude of AIF (42.5 MGD versus the DIF of 125.8 MGD), operational timing of the units may provide a more predictable, consistent and higher performance than wedgewire screens for reducing entrainment at Schiller Station.

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APPENDIX A. ENTRAINMENT MONITORING RESULTS FROM THE YEARLONG PERIOD

A-1 Taxonomic and Life Stage Composition of Fish Collected in Entrainment Samples

A total of 39 species and 14 higher-level taxonomic categories of ichthyoplankton were identified and enumerated among all entrainment samples collected and analyzed from the yearlong period at Schiller Station (Table 7). Table A–1 displays the specimen counts by taxon and life stage from all entrainment samples or subsamples when samples were split due to high abundance. After extrapolating the subsamples, the estimates for the total number of individuals of fish of all life stages in the samples were 30,174 from the 0.8-mm CWWS, 46,775 from the 3.0-mm CWWS and 60,578 from the Control, respectively. The total estimated number of entrained individuals of fish of all life stages combined was 137,527 (Table A–1).

The most abundant taxon and life stage combination from samples collected during the yearlong period was the taxonomic complex Cunner/Tautog/Yellowtail Flounder eggs which made up 82.8% of specimens collected from the 0.8-mm CWWS, 80.9% from the 3.0-mm CWWS, and 87.1% from the Control (Table A–1). Cunner PYSL was the second most abundant taxon/life stage from the 0.8-mm and 3.0-mm CWWSs with 2.8% and 2.2%, respectively, but was not one of the top five most abundant taxa/life stages at the Control location. Rock Gunnel PYSL was the second most abundant taxon/life stage at the Control with a percent composition of 1.8% (Table A–1), this taxon/life stage was not in the top five from the 0.8-mm or 3.0-mm CWWSs. At the 0.8-mm CWWS, the next three most abundant taxa/life stages were Hake eggs (1.9%), Fourbeard Rockling/Hake eggs (1.9%), and Cunner YSL (0.9%; Table A–1). The 3.0-mm CWWS next three dominant taxa/life stages were Fourbeard Rockling/Hake eggs (1.7%), Atlantic Menhaden eggs (1.5%), and Hake eggs (1.5%; Table A–1). Finally, the Control samples consisted of American Sand Lance PYSL (1.1%), Fourbeard Rockling/Hake eggs (0.9%), and Radiated Shanny YSL (0.8%) as the next three most abundant taxa/life stages (Table A–1).

For each taxonomic complex, Table A–2 breaks down the percent composition of each individual species within the complex based on their mean density. Overall, the breakdown of these individual species is consistent between both CWWSs and the Control with the exception of the single Witch Flounder egg and larval specimen collected only in the 0.8-mm CWWS samples (Table A–1 and Table A–2). Among the dominant taxa, the taxonomic complex of Cunner/Tautog/Yellowtail Flounder were 99.7% Cunner, 0.2% Tautog, and 0.2% Yellowtail Flounder and Fourbeard Rockling/Hakes are 33.8% Fourbeard Rockling and 66.2% Hakes based on percent composition of all life stages of member species at the Control (Table A–2).

Throughout the yearlong study, total species-level identification damage for eggs was 3.0%, 0.6% and <0.1% at the 0.8-mm CWWS, 3.0-mm CWWS, and Control, respectively. Species-level identification damage for larvae and juvenile fish were 5.4%, 4.5%, and 4.0% at the 0.8-mm CWWS, 3.0-mm CWWS, and Control, respectively. These percentages of damaged specimens are equal or less than other studies (EPRI 2014). Percent damage prevented measurements at the 0.8-mm CWWS, 3.0-mm CWWS, and Control for eggs were 0.4%, 0.4%, and 0.3% and for larvae and juvenile fish, 23.0%, 24.7%, and 16.8%, respectively. Percent damage preventing measurements from other studies is unknown, but the percent damage of fins limiting all valid measurements to be taken were relatively higher for larvae and juvenile fish entrained by both CWWS. This could be partly explained by extrusion of their body and fins through a slot width smaller than their greatest body dimension.

A-2 Size Composition of Entrained Ichthyoplankton

Total length, greatest body depth, greatest body width, and egg diameter of ichthyoplankton collected from the yearlong period at Schiller Station were measured in the laboratory (Table A–3). Cunner/Tautog/Yellowtail Flounder eggs, the most abundant taxonomic complex from all three locations, were round eggs with a mean diameter of 0.9 mm and range from 0.7 mm to 1.2 mm from the 0.8-mm CWWS, 3.0-mm CWWS, and Control combined (Table A–3). The most abundant larva from all three locations were Cunner PYSL with mean total lengths of 3.3 mm, 3.7 mm, and 4.3 mm from the 0.8-mm CWWS, 3.0-mm CWWS, and Control, respectively (Table A–3).

The mean egg diameter of all taxa from samples collected from the 0.8-mm CWWS was 0.9 mm with a range from 0.6 mm to 1.8 mm (Table A–3). Samples collected from the 3.0-mm CWWS and Control had mean egg diameters of 1.0 mm and a minimum of 0.6 mm, and maximum of 2.5 mm and 2.6 mm, respectively (Table A–3).

Of the fish larvae and juveniles measured from the yearlong period collected from the 0.8-mm CWWS at Schiller Station, 42.3% had GBDs greater than the 0.8-mm slot width (Table A–4) and 28.1% had GBWs greater than the 0.8-mm slot width (Table A–5). The larvae and juveniles collected from the 3.0-mm CWWS largely had a GBD less than or equal to the 3.0-mm slot width, with only 0.8% measuring greater than 3.0 mm (Table A–4), and only 0.4% of larvae and juveniles were measured with GBWs greater than the 3.0-mm slot width (Table A–5). Grubby (100%) and Rock Gunnel (99%) were two species with high total counts that were measured with the highest percentages of GBDs and GBWs greater than the 0.8-mm slot width, and their entrainment was highest in March, June, and September (Figure A–2; Figure A–3).

The maximum egg diameter distribution peaked in the 0.8 to 0.9 mm size class with 66.6% from the 0.8-mm CWWS, 59.5% from 3.0-mm CWWS, and 67.5% from the Control samples (Table A–6). The majority of measured larvae and juvenile life stages from the 0.8-mm and 3.0-mm CWWSs were in the 2.0 to 2.9 mm size class (total length) with 21.2% and 13.3%, respectively, and the highest percentages of measured larvae and juveniles from the Control were in the 6.0 to 6.9 mm size class (14.1%) and the 15+ mm size class (14.6%; Table A–7 and Figure A–4). The 0.8-mm CWWS and 3.0-mm CWWS had substantially fewer larvae and juveniles equal to or greater than 15 mm total length (2.0% and 7.9%, respectively) compared to the Control (14.6%; Table A–7), but that may be partially explained by additional collections at the Control during December 2019 through February 2020. Generally, larval limiting dimensions were the smallest during their peak abundance in late-June through early August, and from the 0.8-mm CWWS samples (Figure A–4).

A-3 Entrainment Density

Weekly mean densities of all samples collected at Schiller Station by taxon, life stage, and location were obtained from the yearlong period. Total mean density peaked during Week 26 (2 July 2019) at all locations (Figure 11 and Figure 16). Fish eggs peaked during the week of Monday, 17 June 2019 (Week 24) at the 0.8-mm CWWS and during the week of Monday, 1 July 2019 (Week 26) for the 3.0-mm CWWS and Control (Figure 11 and Figure 17). Weekly fish larvae and juvenile mean density peaked at the 3.0-mm CWWS and Control during Week 8 (25 February 2019) and Week 26 (1 July 2019) for the 0.8-mm CWWS (Figure 11 and Figure 18). During the larval and juvenile density peaks of Week 26 (1 July 2019) and Week 29 (22 July 2019) when the CWWSs collected higher densities of fish larvae and juveniles than the Control, Cunner larvae were the dominant species collected but densities of all larvae and juvenile species were higher at the CWWSs than at the Control (not species-specific but a consistent pattern).

The greatest mean entrainment density by taxon for all samples and life stages collected from the CWWSs was for Cunner at 3.08 individuals/100 m^3, followed by Hakes at 1.10 individuals/100 m^3, Atlantic Menhaden at 0.87 individuals/100 m^3, and Fourbeard Rockling at 0.55 individuals/100 m^3 (Table A–2). Generally, these mean values were driven by higher densities of eggs for each species or taxonomic complex, with the exception of Cunner which were dominated by the larval stage (4.97 individuals/100 m^3) only because Cunner eggs were identified as a species complex due to difficulty in distinguishing them from Tautog and Yellowtail Flounder. Mean weekly entrainment densities of the YOY+ stages at the CWWSs were greater than zero for only two taxa: Pollock and Hakes. Results were similar for densities at the Control with the same species representing the highest densities for that location.

Total ichthyoplankton density peaked for all three locations in July, with much smaller peaks in late February-early March 2019 and late January-early February 2020 (Figure 16). The Control showed higher densities of ichthyoplankton in August and September than the two test screens. The fish egg mean densities mirrored total ichthyoplankton mean densities closely because the total densities were driven largely by eggs, except for the winter months (Figure 17). Fish larval and juvenile mean densities peaked in February and early March 2019 during the period of screen misalignment, but also showed peaks in late March, mid-May, and July (Figure 18). Untransformed and log-transformed mean densities show that the 0.8-mm CWWS performed best at reducing ichthyoplankton density during nearly all weeks and for all life stages. The 3.0-mm CWWS did not show that it was effective at reducing entrained egg densities when they were at their peak during June and early July. The differences between the test screens and the Control were most pronounced for mean fish egg density in early-May, mid-July and October. The test screens seemed to perform well in reducing entrainment densities for larvae and juveniles during the early months of the study, with the 0.8-mm CWWS cutting the density nearly in half compared to the Control (Figure 11). However, this did not hold, and in the months from June to November, the three locations performed similarly when compared by entrainment density except for the peak weeks in July where the 0.8-mm and 3.0-mm CWWSs had larval and juvenile densities greater than the Control (Figure 18).

By diel period, the peak total ichthyoplankton log-transformed density was highest in July at the 3.0-mm CWWS during diel period 2, from 1500 to 2059 (Figure A–5). Mean weekly entrainment density did not otherwise show a strong pattern or indicate enhanced performance by any screen during any diel period.

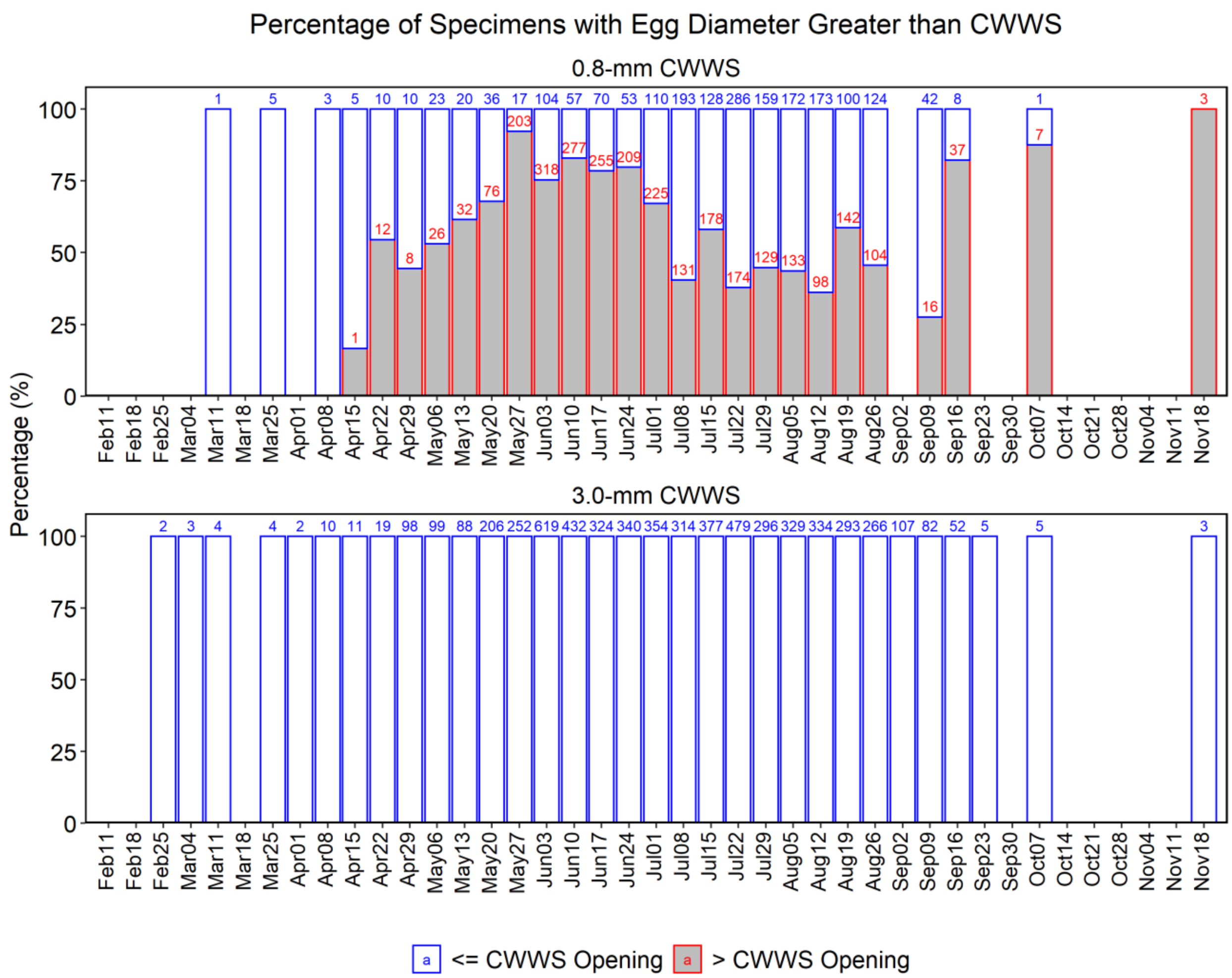

Figure A–1. Weekly percentage of measured eggs with a maximum egg diameter greater than the slot widths of the 0.8-mm and 3.0-mm cylindrical wedgewire screen (CWWS) intakes at Schiller Station based on synchronized entrainment samples from weeks beginning Monday, 11 February 2019 through Monday, 18 November 2019.

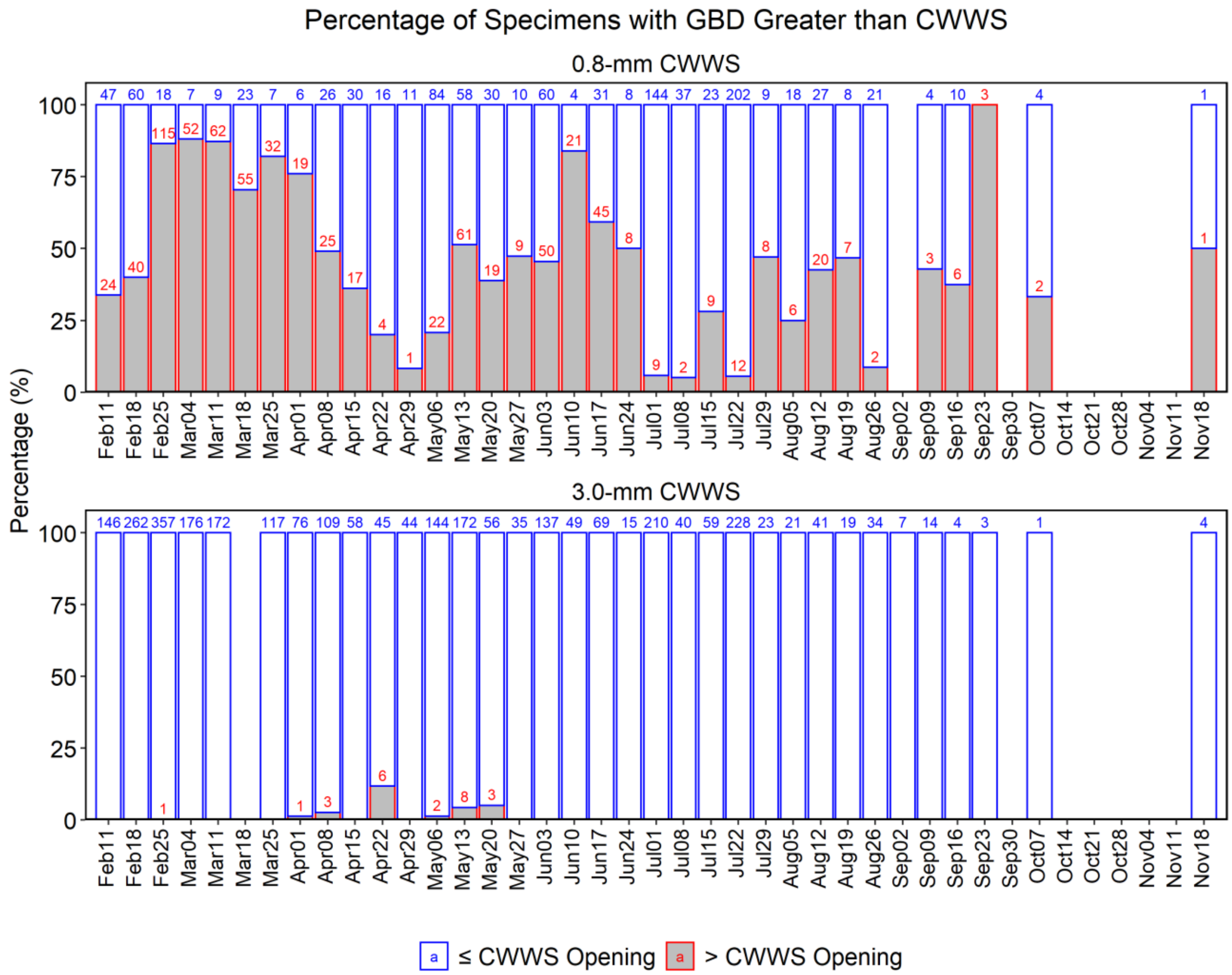

Figure A–2. Weekly percentage of measured larval and juvenile fish with a greatest body depth (GBD) greater than the slot widths of the 0.8-mm and 3.0-mm cylindrical wedgewire screen (CWWS) intakes at Schiller Station based on synchronized samples collected from weeks beginning Monday, 11 February 2019 through Monday, 18 November 2019.

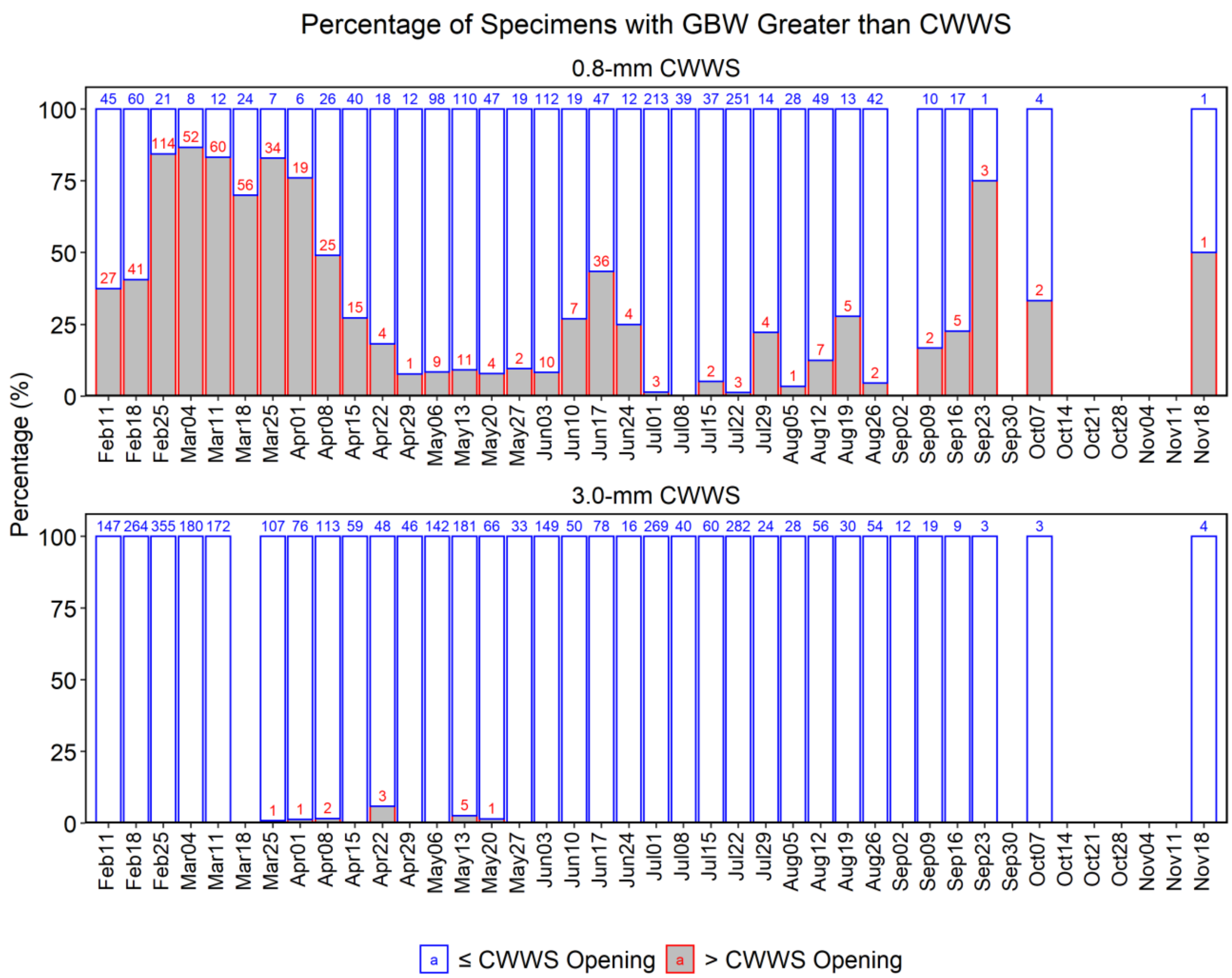

Figure A–3. **Weekly percentage of measured larval and juvenile fish with a greatest body depth (GBD) greater than the slot widths of the 0.8-mm and 3.0-mm cylindrical wedgewire screen (CWWS) intakes at Schiller Station based on synchronized samples collected from weeks beginning Monday, 11 February 2019 through Monday, 18 November 2019.**

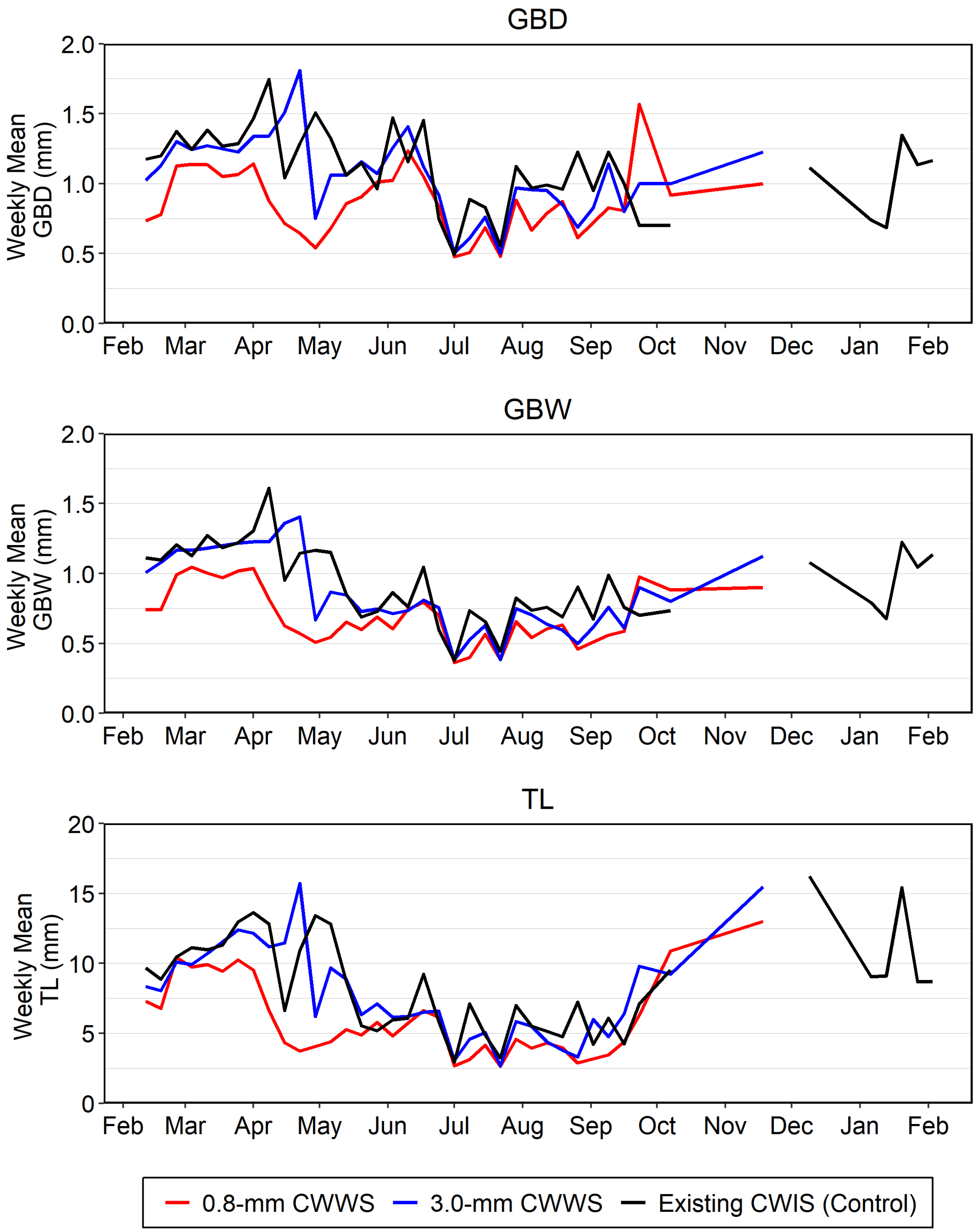

Figure A–4. Average weekly greatest body depth (GBD), greatest body width (GBW) and total length (TL) of larval and juvenile fish of all taxa collected from the 0.8-mm and 3.0-mm cylindrical wedgewire screen (CWWS) intakes and the existing cooling water intake structure (CWIS) for Units 5 and 6 (Control) at Schiller Station based on synchronized samples collected from weeks beginning Monday, 11 February 2019 through Monday, 3 February 2020.

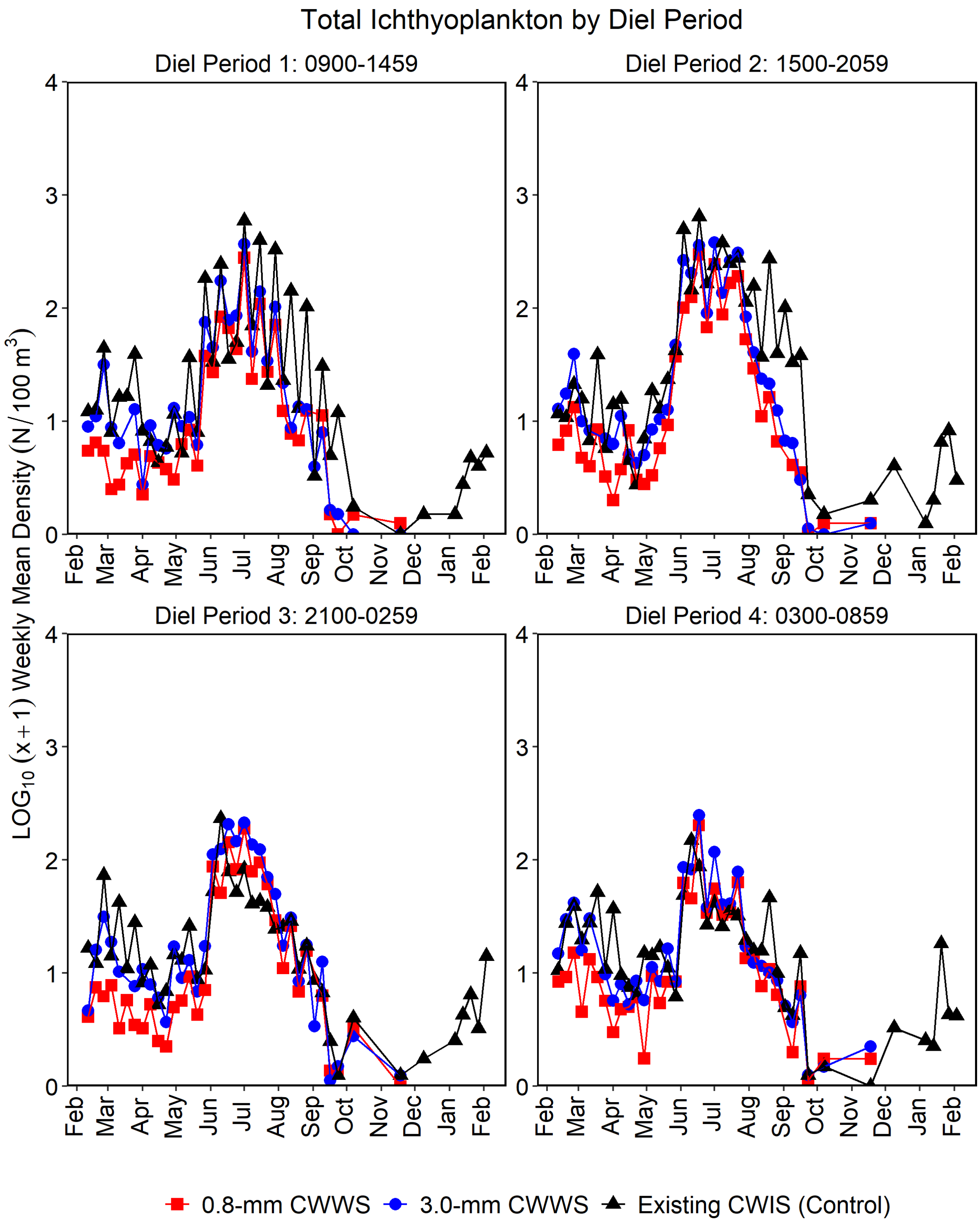

Figure A–5. **$Log_{10}(x+1)$ transformed weekly mean entrainment density of all fish taxa and life stages by diel period collected from the 0.8-mm and 3.0-mm cylindrical wedgewire screen (CWWS) intakes and the existing cooling water intake structure (CWIS) for Units 5 and 6 (Control) at Schiller Station from weeks beginning Monday, 11 February 2019 through Monday, 3 February 2020.**

Table A–1. Total laboratory counts and estimated sample counts of fish specimens by taxon and life stage in entrainment samples (n=638) collected and processed from the 0.8-mm and 3.0-mm cylindrical wedgewire screen (CWWS) intakes and the existing cooling water intake structure (CWIS) for Units 5 and 6 (Control) at Schiller Station from weeks beginning Monday, 11 February 2019 through Monday, 3 February 2020.

Taxon	Life Stage[1]	0.8-mm CWWS			3.0-mm CWWS			Existing CWIS (Control)		
		Total Count	Estimated Number Collected	%	Total Count	Estimated Number Collected	%	Total Count	Estimated Number Collected	%
Alligatorfish	PYSL							4	4	< 0.1
American Eel	YROL							1	1	< 0.1
American Plaice	Eggs	1	1	<0.1	314	394	0.8	297	323	0.5
	UNID	17	17	0.1	18	18	<0.1	13	13	<0.1
	YSL	12	12	<0.1	33	33	0.1	23	23	<0.1
	PYSL	56	56	0.2	52	52	0.1	14	14	<0.1
American Sand Lance	UNID	5	5	<0.1	1	1	<0.1	3	3	<0.1
	YSL	66	66	0.2	80	80	0.2	118	118	0.2
	PYSL	190	190	0.6	330	330	0.7	691	691	1.1
	YOY				2	2	<0.1	19	19	<0.1
Atlantic Cod	Eggs	3	3	<0.1	3	3	<0.1	22	22	<0.1
	PYSL				1	1	<0.1	6	6	<0.1
Atlantic Cod/Haddock	Eggs				6	6	<0.1	13	13	<0.1
Atlantic Herring	PYSL	1	1	<0.1	29	29	0.1	119	119	0.2
Atlantic Mackerel	Eggs	9	10	<0.1	27	32	0.1	58	66	0.1
Atlantic Mackerel/Cusk	Eggs	51	58	0.2	104	132	0.3	59	86	0.1
Atlantic Menhaden	Eggs	49	62	0.2	366	711	1.5	175	332	0.5
	YSL				2	2	<0.1	2	2	<0.1
	PYSL				3	3	<0.1	1	1	<0.1
Atlantic Seasnail	UNID	1	1	<0.1				4	4	<0.1
	YSL	4	4	<0.1	8	8	<0.1	7	7	<0.1
	PYSL	66	66	0.2	70	70	0.1	168	170	0.3
Atlantic Tomcod	YSL							1	1	< 0.1

(continued)

Table A–1. (continued)

Taxon	Life Stage[1]	0.8-mm CWWS Total Count	0.8-mm CWWS Estimated Number Collected	0.8-mm CWWS %	3.0-mm CWWS Total Count	3.0-mm CWWS Estimated Number Collected	3.0-mm CWWS %	Existing CWIS (Control) Total Count	Existing CWIS (Control) Estimated Number Collected	Existing CWIS (Control) %
Butterfish	Eggs	54	56	0.2	72	75	0.2	25	28	<0.1
	UNID				1	1	<0.1			
	YSL	10	10	<0.1	1	2	<0.1			
	PYSL	2	2	<0.1	1	1	<0.1	1	1	<0.1
Cod Family	UNID							1	1	<0.1
	PYSL				1	1	<0.1			
Cod Family/Witch Flounder	Eggs	1	1	<0.1	9	21	<0.1	7	7	<0.1
Cunner	Eggs	143	273	0.9	174	379	0.8	65	108	0.2
	UNID				6	7	<0.1	1	1	<0.1
	YSL	255	282	0.9	406	522	1.1	103	103	0.2
	PYSL	793	850	2.8	932	1,020	2.2	373	373	0.6
Cunner/Tautog	YSL	1	1	<0.1						
Cunner/Tautog/Yellowtail Flounder	Eggs	16,461	24,970	82.8	18,837	37,855	80.9	20,198	52,782	87.1
Cusk	Eggs				18	23	<0.1	22	24	<0.1
	UNID	1	1	<0.1	1	1	<0.1			
	YSL	3	3	<0.1	3	3	<0.1	1	1	<0.1
Fourbeard Rockling	Eggs	145	165	0.5	182	219	0.5	167	219	0.4
	UNID	1	1	<0.1	6	6	<0.1	1	1	<0.1
	YSL	2	2	<0.1	8	11	<0.1	6	6	<0.1
	PYSL	33	35	0.1	27	27	0.1	13	13	<0.1
Fourbeard Rockling/Hakes	Eggs	514	582	1.9	586	791	1.7	437	547	0.9
Fourspot Flounder	YSL	2	2	<0.1						
Goosefish	Eggs							1	1	<0.1
	PYSL	1	1	<0.1	1	1	<0.1			
Grubby	UNID	2	2	<0.1	4	4	<0.1	7	7	<0.1
	YSL	41	41	0.1	62	62	0.1	222	222	0.4
	PYSL	101	101	0.3	296	296	0.6	410	410	0.7
	YOY				1	1	<0.1			

(continued)

Table A–1. (continued)

Taxon	Life Stage[1]	0.8-mm CWWS Total Count	0.8-mm CWWS Estimated Number Collected	0.8-mm CWWS %	3.0-mm CWWS Total Count	3.0-mm CWWS Estimated Number Collected	3.0-mm CWWS %	Existing CWIS (Control) Total Count	Existing CWIS (Control) Estimated Number Collected	Existing CWIS (Control) %
Gulf Snailfish	YSL				1	1	<0.1	2	2	<0.1
	PYSL	10	10	<0.1	11	11	<0.1	32	32	0.1
Haddock	PYSL							1	1	<0.1
Hakes	Eggs	508	588	1.9	556	700	1.5	354	424	0.7
	UNID	31	31	0.1	32	35	0.1	3	3	<0.1
	YSL	60	60	0.2	65	89	0.2	12	12	<0.1
	PYSL	45	45	0.1	70	79	0.2	23	23	<0.1
	YOY							1	1	<0.1
Herring Family	UNID	11	11	<0.1	17	17	<0.1	1	1	<0.1
	YSL	8	8	<0.1	1	1	<0.1			
	PYSL	23	23	0.1	20	20	<0.1	22	22	<0.1
Inland Silverside	UNID	1	1	<0.1						
	YSL	1	1	<0.1						
Longhorn Sculpin	YSL	1	1	<0.1	5	5	<0.1	18	18	<0.1
	PYSL	17	17	0.1	141	141	0.3	180	180	0.3
Lumpfish	Eggs							1	1	<0.1
	PYSL							1	1	<0.1
Moustache Sculpin	PYSL							1	1	<0.1
Mummichog	YSL							1	1	<0.1
	PYSL							1	1	<0.1
Myoxocephalus spp.	Eggs				1	1	<0.1	12	12	<0.1
	UNID	2	2	<0.1	2	2	<0.1	6	6	<0.1
	PYSL	1	1	<0.1	8	8	<0.1	5	5	<0.1
Northern Pipefish	YSL				1	1	<0.1			
	PYSL	26	26	0.1	50	50	0.1	40	40	0.1
Pollock	PYSL	1	1	<0.1	5	5	<0.1	10	10	<0.1
	YOY							4	4	<0.1
Prionotus spp.	Eggs	2	2	<0.1	1	1	<0.1	3	3	<0.1

(continued)

Table A–1. (continued)

Taxon	Life Stage[1]	0.8-mm CWWS Total Count	0.8-mm CWWS Estimated Number Collected	0.8-mm CWWS %	3.0-mm CWWS Total Count	3.0-mm CWWS Estimated Number Collected	3.0-mm CWWS %	Existing CWIS (Control) Total Count	Existing CWIS (Control) Estimated Number Collected	Existing CWIS (Control) %
Radiated Shanny	UNID				3	3	<0.1	14	14	<0.1
	YSL	1	1	<0.1	3	3	<0.1	9	9	<0.1
	PYSL	145	147	0.5	213	213	0.5	419	457	0.8
Rainbow Smelt	UNID				1	1	<0.1	1	1	<0.1
	YSL	18	18	0.1	26	26	0.1	8	8	<0.1
	PYSL	8	8	<0.1	18	18	<0.1	6	6	<0.1
Righteye Flounder Family	YSL							1	1	<0.1
Rock Gunnel	UNID	2	2	<0.1	2	2	<0.1	13	13	<0.1
	YSL	13	13	<0.1	30	30	0.1	102	102	0.2
	PYSL	239	239	0.8	672	672	1.4	1,097	1,097	1.8
	YROL							2	2	<0.1
Sea Raven	YSL							1	1	<0.1
	PYSL							3	3	<0.1
	YOY							1	1	<0.1
Shorthorn Sculpin	UNID	2	2	<0.1				5	5	<0.1
	YSL	5	5	<0.1	58	58	0.1	59	59	0.1
	PYSL	6	6	<0.1	132	132	0.3	231	231	0.4
	YOY							1	1	<0.1
Silver Hake	Eggs	145	167	0.6	212	257	0.5	122	178	0.3
	UNID	3	3	<0.1	6	7	<0.1	2	2	<0.1
	YSL	109	109	0.4	72	74	0.2	26	26	<0.1
	PYSL	19	19	0.1	19	23	<0.1			
Smooth Flounder	PYSL	1	1	<0.1						
Tautog	Eggs	2	2	<0.1	1	1	<0.1	1	1	<0.1
	UNID	1	1	<0.1	1	2	<0.1			
	YSL				1	1	<0.1			
	PYSL	1	1	<0.1	2	3	<0.1			
Threespine Stickleback	YOY							1	1	<0.1
	YROL							1	1	<0.1

(continued)

Table A–1. (continued)

Taxon	Life Stage[1]	0.8-mm CWWS			3.0-mm CWWS			Existing CWIS (Control)		
		Total Count	Estimated Number Collected	%	Total Count	Estimated Number Collected	%	Total Count	Estimated Number Collected	%
Unidentified Osteichthyes	Eggs	4	4	<0.1	4	4	<0.1	5	14	<0.1
	UNID	48	49	0.2	58	67	0.1	35	36	0.1
	YSL				3	3	<0.1			
	PYSL	3	3	<0.1	5	5	<0.1	6	6	<0.1
Windowpane	Eggs	29	30	0.1	42	54	0.1	19	31	0.1
	UNID							1	1	<0.1
	YSL	1	1	<0.1	4	4	<0.1	1	1	<0.1
	PYSL	6	6	<0.1	1	1	<0.1	2	2	<0.1
Windowpane/Fourspot/Summer Flounder	Eggs	132	154	0.5	183	221	0.5	94	122	0.2
Winter Flounder	Eggs	30	33	0.1	40	40	0.1	46	46	0.1
	UNID	23	23	0.1	8	8	<0.1	17	18	<0.1
	WF I	31	31	0.1	23	23	<0.1	28	28	<0.1
	WF II	247	249	0.8	287	287	0.6	268	273	0.5
	WF III	64	64	0.2	109	109	0.2	69	69	0.1
	WF IV	13	13	<0.1	15	15	<0.1	14	14	<0.1
Witch Flounder	Eggs	1	1	<0.1						
	PYSL	1	1	<0.1						
Yellowtail Flounder	Eggs	3	4	<0.1						
	UNID				1	1	<0.1			
	YSL	2	2	<0.1	1	1	<0.1	1	1	<0.1
	PYSL				4	4	<0.1			
All Taxa Combined	Eggs	18,287	27,166	90.0	21,738	41,920	89.6	22,203	55,389	91.4
	UNID	151	152	0.5	168	182	0.4	128	130	0.2
	YSL	615	642	2.1	874	1,020	2.2	724	724	1.2
	PYSL	1,795	1,857	6.2	3,114	3,216	6.9	3,880	3,920	6.5
	WF I	31	31	0.1	23	23	<0.1	28	28	<0.1
	WF II	247	249	0.8	287	287	0.6	268	273	0.5
	WF III	64	64	0.2	109	109	0.2	69	69	0.1
	WF IV	13	13	<0.1	15	15	<0.1	14	14	<0.1
	YOY				3	3	<0.1	27	27	<0.1
	YROL							4	4	<0.1
Total		**21,203**	**30,174**	**100**	**26,331**	**46,775**	**100**	**27,345**	**60,578**	**100**

[1] UNID = unidentified larvae, YSL = yolk-sac larvae, PYSL = post yolk-sac larvae, YOY = young-of-the-year, YROL = yearling and older.

Table A–2. Mean density (D, N/100 m³) and percent composition (%) of identified species by life stage in each identified species complex in samples from the 0.8-mm and 3.0-mm cylindrical wedgewire screen (CWWS) intakes and the existing cooling water intake structure (CWIS) for Units 5 and 6 (Control) at Schiller Station during the weeks beginning Monday, 11 February 2019 through Monday, 3 February 2020.

Species Complex		All screens								Existing CWIS only							
		Life Stage						Total		Life Stage						Total	
		Eggs		Larvae		YOY+				Eggs		Larvae		YOY+			
		D	%	D	%	D	%	D	%	D	%	D	%	D	%	D	%
Atlantic Cod/Haddock	Atlantic Cod	0.04	100.0	0.01	87.5			0.03	97.2	0.10	100.0	0.03	85.7			0.06	96.6
	Haddock			<0.01	12.5			<0.01	2.8			<0.01	14.3			<0.01	3.4
	Total	0.04	100.0	0.01	100.0			0.02	100.0	0.10	100.0	0.02	100.0			0.04	100.0
Atlantic Mackerel/Cusk	Atlantic Mackerel	0.17	70.1					0.17	66.3	0.29	73.8					0.29	73.0
	Cusk	0.07	29.9	0.01	100.0			0.04	33.7	0.10	26.2	<0.01	100.0			0.05	27.0
	Total	0.12	100.0	0.01	100.0			0.09	100.0	0.19	100.0	<0.01	100.0			0.13	100.0
Cod Family	Atlantic Cod	0.04	37.8	0.01	20.6			0.03	31.3	0.10	48.5	0.03	31.7			0.06	41.0
	Atlantic Tomcod			<0.01	2.9			<0.01	0.9			<0.01	5.2			<0.01	1.4
	Cusk	0.07	62.2	0.01	26.7			0.04	49.2	0.10	51.5	<0.01	5.3			0.05	35.8
	Haddock			<0.01	2.9			<0.01	0.9			<0.01	5.3			<0.01	1.5
	Pollock			0.03	46.9	0.01	100.0	0.02	17.8			0.04	52.5	0.02	100.0	0.03	20.3
	Total	0.06	100.0	0.01	100.0	0.01	100.0	0.02	100.0	0.10	100.0	0.02	100.0	0.02	100.0	0.04	100.0
Cod Family/Witch Flounder	Atlantic Cod	0.04	37.3	0.01	18.9			0.03	30.2	0.10	48.5	0.03	30.1			0.06	40.4
	Atlantic Tomcod			<0.01	2.7			<0.01	0.8			<0.01	4.9			<0.01	1.4
	Cod Family			<0.01	5.5			<0.01	1.7			<0.01	5.0			<0.01	1.4
	Cusk	0.07	61.3	0.01	24.5			0.04	47.5	0.10	51.5	<0.01	5.0			0.05	35.2
	Haddock			<0.01	2.7			<0.01	0.9			<0.01	5.0			<0.01	1.4
	Pollock			0.03	43.1	0.01	100.0	0.02	17.2			0.04	49.9	0.02	100.0	0.03	20.1
	Witch Flounder	<0.01	1.3	<0.01	2.7			<0.01	1.7								
	Total	0.04	100.0	0.01	100.0	0.01	100.0	0.02	100.0	0.07	100.0	0.01	100.0	0.02	100.0	0.03	100.0

(continued)

Table A–2. (continued)

Species Complex		All screens								Existing CWIS only							
		Life Stage						Total		Life Stage						Total	
		Eggs		Larvae		YOY+				Eggs		Larvae		YOY+			
		D	%	D	%	D	%	D	%	D	%	D	%	D	%	D	%
Cunner/Tautog	Cunner	1.20	99.5	4.97	99.7			3.08	99.7	0.47	99.1	2.08	100.0			1.27	99.8
	Tautog	0.01	0.5	0.01	0.3			0.01	0.3	<0.01	0.9					<0.01	0.2
	Total	0.60	100.0	2.49	100.0			1.55	100.0	0.24	100.0	1.04	100.0			0.64	100.0
Cunner/Tautog/Yellowtail Flounder	Cunner	1.20	98.9	4.97	99.5			3.08	99.4	0.47	99.1	2.08	99.8			1.27	99.7
	Tautog	0.01	0.5	0.01	0.3			0.01	0.3	<0.01	0.9					<0.01	0.2
	Yellowtail Flounder	0.01	0.5	0.01	0.3			0.01	0.3			<0.01	0.2			<0.01	0.2
	Total	0.40	100.0	1.67	100.0			1.03	100.0	0.16	100.0	0.69	100.0			0.43	100.0
Fourbeard Rockling/Hakes	Fourbeard Rockling	0.95	26.0	0.16	21.2			0.55	25.1	0.95	33.9	0.09	34.1			0.52	33.8
	Hakes	2.70	74.0	0.60	78.8	<0.01	100.0	1.10	74.9	1.85	66.1	0.17	65.9	<0.01	100.0	0.68	66.2
	Total	1.83	100.0	0.38	100.0	<0.01	100.0	0.88	100.0	1.40	100.0	0.13	100.0	<0.01	100.0	0.61	100.0
Herring Family	Atlantic Herring			0.23	94.9			0.23	11.8			0.52	97.5			0.52	26.3
	Atlantic Menhaden	1.73	100.0	0.01	5.1			0.87	88.2	1.43	100.0	0.01	2.5			0.72	73.7
	Total	1.73	100.0	0.12	100.0			0.66	100.0	1.43	100.0	0.26	100.0			0.65	100.0
Windowpane/Fourspot/Summer Flounder	Fourspot Flounder			<0.01	11.2			<0.01	1.5								
	Windowpane	0.18	100.0	0.03	88.8			0.10	98.5	0.13	100.0	0.02	100.0			0.08	100.0
	Total	0.18	100.0	0.01	100.0			0.07	100.0	0.13	100.0	0.01	100.0			0.05	100.0

Table A–3. Descriptive statistics[1] of minimum and maximum egg diameter (EDmin and EDmax), greatest body depth (GBD), greatest body width (GBW) and total length (TL) in millimeters for fish measured from entrainment samples collected at the 0.8-mm and 3.0-mm cylindrical wedgewire screen (CWWS) intakes and the existing cooling water intake structure (CWIS) for Units 5 and 6 (Control) at Schiller Station from weeks beginning Monday, 11 February 2019 through Monday, 3 February 2020.

Taxon	Life Stage[2]	Metric	0.8-mm CWWS					3.0-mm CWWS					Existing CWIS (Control)				
			N	Min	Mean	Max	SD	N	Min	Mean	Max	SD	N	Min	Mean	Max	SD
Alligatorfish	PYSL	GBD											4	0.8	1.1	1.6	0.3
		GBW											3	1.0	1.3	1.8	0.4
		TL											4	6.2	11.5	18.6	5.3
American Eel	YROL	GBD											1	24.0	24.0	24.0	
		GBW											1	21.0	21.0	21.0	
		TL											1	406.0	406.0	406.0	
American Plaice	EGGS	E_MAX						284	1.7	2.3	2.5	0.1	270	2.0	2.3	2.6	0.1
		E_MIN						284	1.7	2.3	2.5	0.1	270	2.0	2.3	2.6	0.1
	UNID	GBD											2	0.3	0.4	0.4	0.1
		GBW	2	0.4	0.4	0.4		2	0.4	0.4	0.4		3	0.3	0.4	0.5	0.1
		TL	7	3.3	3.6	4.2	0.3	6	3.0	3.7	3.9	0.4	4	3.4	3.7	4.0	0.3
	YSL	GBD	4	0.4	0.5	0.7	0.1	6	0.5	0.7	0.8	0.1	6	0.3	0.6	1.1	0.3
		GBW	5	0.3	0.4	0.6	0.1	11	0.4	0.5	0.6	0.1	7	0.3	0.5	0.9	0.2
		TL	8	2.6	3.8	5.0	0.7	16	3.0	4.2	5.2	0.7	15	1.9	3.9	5.0	0.8
	PYSL	GBD	46	0.4	0.5	0.9	0.1	34	0.4	0.5	0.9	0.1	9	0.4	0.7	1.5	0.4
		GBW	50	0.3	0.4	0.6	0.1	39	0.3	0.4	0.6	0.1	10	0.4	0.5	1.2	0.3
		TL	49	3.3	3.9	7.2	0.7	39	3.3	4.3	6.7	0.8	10	3.8	5.0	9.1	1.8
American Sand Lance	UNID	GBD											1	0.6	0.6	0.6	
		GBW											1	0.6	0.6	0.6	
	YSL	GBD	65	0.3	0.4	0.5	0.1	80	0.3	0.5	0.6	0.1	100	0.3	0.5	0.6	0.1
		GBW	65	0.3	0.4	0.5	0.1	80	0.3	0.5	0.5	0.1	104	0.3	0.5	0.7	0.1
		TL	64	2.8	4.3	6.1	0.8	79	2.8	4.4	6.3	0.9	107	3.5	5.0	6.4	0.7
	PYSL	GBD	156	0.3	0.7	1.9	0.3	301	0.3	1.2	3.1	0.6	460	0.3	1.2	2.8	0.5
		GBW	159	0.3	0.7	1.5	0.2	296	0.4	1.1	2.9	0.5	456	0.4	1.1	2.6	0.5
		TL	164	4.3	8.7	26.3	4.0	306	4.0	14.6	42.8	9.0	456	4.2	15.5	40.3	8.3

(continued)

Table A–3. (continued)

Taxon	Life Stage[2]	Metric	0.8-mm CWWS					3.0-mm CWWS					Existing CWIS (Control)				
			N	Min	Mean	Max	SD	N	Min	Mean	Max	SD	N	Min	Mean	Max	SD
American Sand Lance (cont.)	YOY	GBD						2	2.9	3.2	3.5	0.4	16	2.5	3.0	3.7	0.3
		GBW						2	2.3	2.7	3.1	0.6	16	2.1	2.6	3.0	0.2
		TL						2	41.0	44.5	48.0	4.9	16	38.0	42.1	48.0	3.4
Atlantic Cod	EGGS	E_MAX	3	1.3	1.4	1.4	0.1	3	1.3	1.4	1.4	0.1	22	1.2	1.4	1.5	0.1
		E_MIN	3	1.3	1.4	1.4	0.1	3	1.3	1.4	1.4	0.1	22	1.2	1.4	1.5	0.1
	PYSL	GBD						1	4.8	4.8	4.8		6	1.6	3.0	4.0	0.8
		GBW						1	3.5	3.5	3.5		6	1.4	2.4	3.4	0.7
		TL						1	25.5	25.5	25.5		6	9.4	17.3	20.8	4.1
Atlantic Cod/Haddock	EGGS	E_MAX						6	1.2	1.4	1.5	0.1	13	1.2	1.4	1.6	0.1
		E_MIN						6	1.2	1.4	1.5	0.1	13	1.2	1.4	1.6	0.1
Atlantic Herring	PYSL	GBD	1	1.0	1.0	1.0		29	1.8	3.8	6.0	1.1	83	1.0	1.8	6.0	0.6
		GBW	1	0.9	0.9	0.9		29	1.4	2.7	4.3	0.6	84	1.0	1.6	3.4	0.4
		TL	1	13.5	13.5	13.5		29	24.9	38.3	47.2	5.2	84	13.5	25.3	45.5	5.4
Atlantic Mackerel	EGGS	E_MAX	9	1.0	1.2	1.3	0.1	26	1.1	1.3	1.4	0.1	55	1.0	1.2	1.4	0.1
		E_MIN	9	1.0	1.2	1.3	0.1	26	1.1	1.3	1.4	0.1	55	1.0	1.2	1.4	0.1
Atlantic Mackerel/Cusk	EGGS	E_MAX	51	1.1	1.2	1.3	0.1	104	1.0	1.2	1.4	0.1	59	1.0	1.2	1.4	0.1
		E_MIN	51	1.1	1.2	1.3	0.1	104	1.0	1.2	1.4	0.1	59	1.0	1.2	1.4	0.1
Atlantic Menhaden	EGGS	E_MAX	42	1.4	1.6	1.8	0.1	230	1.4	1.6	1.9	0.1	132	1.4	1.6	1.8	0.1
		E_MIN	42	1.4	1.6	1.8	0.1	230	1.4	1.6	1.9	0.1	132	1.4	1.6	1.8	0.1
	YSL	GBD						1	0.5	0.5	0.5						
		GBW						2	0.3	0.4	0.4	0.1					
		TL						2	2.2	3.1	3.9	1.2	1	2.7	2.7	2.7	
	PYSL	GBD						3	1.2	1.4	1.7	0.3	1	1.4	1.4	1.4	
		GBW						3	1.1	1.3	1.5	0.2	1	1.2	1.2	1.2	
		TL						3	15.5	17.1	19.8	2.4	1	20.5	20.5	20.5	
Atlantic Seasnail	UNID	GBD											1	0.7	0.7	0.7	
		GBW	1	0.7	0.7	0.7							2	0.5	0.6	0.6	0.1
		TL	1	3.1	3.1	3.1							2	2.4	2.6	2.7	0.2
	YSL	GBD	4	0.7	0.8	0.8	0.1	8	0.5	0.7	0.8	0.1	6	0.6	0.7	0.8	0.1
		GBW	4	0.6	0.7	0.7	0.1	8	0.4	0.6	0.7	0.1	6	0.5	0.7	0.7	0.1
		TL	3	2.8	2.9	3.0	0.1	8	2.1	2.8	3.5	0.4	7	2.2	2.8	3.6	0.5
	PYSL	GBD	61	0.6	0.8	1.4	0.2	62	0.6	0.9	2.1	0.3	156	0.5	0.9	2.5	0.2
		GBW	63	0.5	0.7	1.1	0.1	66	0.4	0.8	1.9	0.2	166	0.5	0.7	2.2	0.2
		TL	62	2.5	3.5	6.0	0.7	69	2.2	3.6	7.8	1.0	156	1.9	3.6	9.7	1.0

(continued)

Table A–3. (continued)

Taxon	Life Stage[2]	Metric	0.8-mm CWWS					3.0-mm CWWS					Existing CWIS (Control)				
			N	Min	Mean	Max	SD	N	Min	Mean	Max	SD	N	Min	Mean	Max	SD
Atlantic Tomcod	YSL	GBD											1	1.2	1.2	1.2	
		GBW											1	1.1	1.1	1.1	
		TL											1	6.2	6.2	6.2	
Butterfish	EGGS	E_MAX	54	0.6	0.6	0.7	0.0	72	0.6	0.6	0.7	0.0	25	0.6	0.6	0.7	0.0
		E_MIN	54	0.6	0.6	0.7	0.0	72	0.6	0.6	0.7	0.0	25	0.6	0.6	0.7	0.0
	UNID	GBW						1	0.4	0.4	0.4						
		TL						1	1.7	1.7	1.7						
	YSL	GBD	3	0.3	0.3	0.3		1	0.3	0.3	0.3						
		GBW	6	0.2	0.3	0.3	0.1	1	0.2	0.2	0.2						
		TL	6	1.4	1.6	1.7	0.1	1	1.9	1.9	1.9						
	PYSL	GBD	2	0.5	0.5	0.5							1	0.9	0.9	0.9	
		GBW	2	0.4	0.4	0.4		1	0.3	0.3	0.3		1	0.6	0.6	0.6	
		TL	2	1.8	1.9	2.0	0.1	1	2.0	2.0	2.0		1	3.6	3.6	3.6	
Cod Family/Witch Flounder	EGGS	E_MAX	1	1.2	1.2	1.2		9	1.2	1.3	1.4	0.1	7	1.2	1.3	1.4	0.1
		E_MIN	1	1.2	1.2	1.2		9	1.2	1.3	1.4	0.1	7	1.2	1.3	1.4	0.1
Cunner	EGGS	E_MAX	141	0.8	0.9	0.9	0.0	166	0.7	0.9	1.0	0.1	63	0.8	0.9	1.0	0.0
		E_MIN	141	0.8	0.9	0.9	0.0	166	0.7	0.9	1.0	0.1	63	0.8	0.9	1.0	0.0
	YSL	GBD	3	0.2	0.4	0.6	0.2	3	0.4	0.6	0.7	0.2	2	0.3	0.3	0.3	
		GBW	70	0.2	0.2	0.5	0.1	81	0.2	0.2	0.6	0.1	45	0.2	0.3	0.3	0.1
		TL	77	1.6	1.9	2.4	0.2	100	1.6	1.9	2.4	0.2	56	1.5	1.9	2.3	0.2
	PYSL	GBD	388	0.2	0.6	1.6	0.3	459	0.2	0.6	1.8	0.3	327	0.2	0.8	1.7	0.4
		GBW	404	0.2	0.5	1.2	0.2	480	0.2	0.5	1.4	0.2	338	0.2	0.6	1.5	0.3
		TL	401	1.8	3.3	8.2	1.2	487	1.9	3.7	8.8	1.4	342	1.8	4.3	9.6	1.9
Cunner/Tautog/Yellowtail Flounder	EGGS	E_MAX	2992	0.7	0.9	1.2	0.1	3181	0.7	0.9	1.2	0.1	3642	0.7	0.9	1.2	0.1
		E_MIN	2992	0.7	0.9	1.2	0.1	3181	0.7	0.9	1.2	0.1	3642	0.7	0.9	1.2	0.1
Cusk	EGGS	E_MAX						18	1.2	1.3	1.4	0.1	22	1.2	1.3	1.4	0.0
		E_MIN						18	1.2	1.3	1.4	0.1	22	1.2	1.3	1.4	0.0
	UNID	GBW						1	0.5	0.5	0.5						
		TL						1	3.8	3.8	3.8						
	YSL	GBD						1	0.4	0.4	0.4		1	1.0	1.0	1.0	
		GBW	3	0.4	0.4	0.4		1	0.4	0.4	0.4		1	0.9	0.9	0.9	
		TL	2	3.1	3.3	3.5	0.3	1	3.1	3.1	3.1		1	4.0	4.0	4.0	

(continued)

Table A–3. (continued)

Taxon	Life Stage[2]	Metric	0.8-mm CWWS					3.0-mm CWWS					Existing CWIS (Control)				
			N	Min	Mean	Max	SD	N	Min	Mean	Max	SD	N	Min	Mean	Max	SD
Fourbeard Rockling	EGGS	E_MAX	143	0.7	0.9	1.0	0.1	182	0.7	0.9	1.0	0.1	166	0.8	0.9	0.9	0.0
		E_MIN	143	0.7	0.9	1.0	0.1	182	0.7	0.9	1.0	0.1	166	0.8	0.9	0.9	0.0
	UNID	GBD						1	0.3	0.3	0.3						
		GBW	1	0.4	0.4	0.4		5	0.3	0.3	0.4	0.0	1	0.7	0.7	0.7	
		TL	1	1.7	1.7	1.7		5	1.5	1.9	2.2	0.3	1	2.2	2.2	2.2	
	YSL	GBD	1	0.3	0.3	0.3		5	0.4	0.5	0.5	0.1	5	0.4	0.5	0.7	0.1
		GBW	1	0.3	0.3	0.3		6	0.3	0.4	0.4	0.1	6	0.3	0.4	0.5	0.1
		TL	2	1.4	1.7	1.9	0.4	6	1.6	1.7	1.9	0.1	6	1.7	1.8	2.1	0.2
	PYSL	GBD	30	0.3	0.8	1.5	0.3	26	0.5	0.8	1.6	0.2	12	0.4	1.0	2.0	0.5
		GBW	33	0.3	0.6	1.2	0.2	26	0.4	0.6	1.5	0.2	12	0.4	0.7	1.2	0.3
		TL	33	1.7	3.0	6.5	1.2	27	1.9	3.0	5.8	0.9	13	1.7	3.5	6.4	1.5
Fourbeard Rockling/Hakes	EGGS	E_MAX	477	0.7	0.8	1.0	0.1	559	0.7	0.8	0.9	0.1	434	0.7	0.8	0.9	0.1
		E_MIN	477	0.7	0.8	1.0	0.1	559	0.7	0.8	0.9	0.1	434	0.7	0.8	0.9	0.1
Fourspot Flounder	YSL	GBD	2	0.4	0.5	0.5	0.1										
		GBW	2	0.3	0.4	0.4	0.1										
		TL	2	2.7	2.8	2.9	0.1										
Goosefish	PYSL	GBD	1	1.0	1.0	1.0											
		GBW	1	0.8	0.8	0.8											
		TL	1	3.9	3.9	3.9											
Grubby	UNID	GBD						3	1.0	1.2	1.5	0.3	2	0.8	0.9	1.0	0.1
		GBW	1	1.1	1.1	1.1		2	0.8	1.0	1.1	0.2	5	0.8	1.0	1.2	0.2
		TL	2	6.3	6.5	6.7	0.3	3	5.0	5.5	6.5	0.9	4	4.8	5.4	6.1	0.6
	YSL	GBD	41	1.0	1.2	1.3	0.1	61	1.0	1.2	1.4	0.1	216	1.0	1.2	1.6	0.1
		GBW	41	0.9	1.1	1.2	0.1	61	0.8	1.1	1.3	0.1	220	0.9	1.1	1.5	0.1
		TL	41	5.0	6.3	7.0	0.6	61	4.7	6.0	7.7	0.8	221	4.4	6.5	7.9	0.7
	PYSL	GBD	98	1.0	1.2	1.4	0.1	283	1.0	1.3	2.7	0.3	389	0.9	1.3	2.8	0.3
		GBW	100	1.0	1.1	1.3	0.1	287	0.9	1.3	2.8	0.4	391	0.8	1.2	2.9	0.3
		TL	99	4.6	6.5	7.9	0.7	288	4.9	7.2	13.0	1.5	387	4.9	7.2	13.8	1.4
	YOY	GBD						1	3.3	3.3	3.3						
		GBW						1	2.7	2.7	2.7						
		TL						1	17.0	17.0	17.0						

(continued)

Table A–3. (continued)

Taxon	Life Stage[2]	Metric	0.8-mm CWWS					3.0-mm CWWS					Existing CWIS (Control)				
			N	Min	Mean	Max	SD	N	Min	Mean	Max	SD	N	Min	Mean	Max	SD
Gulf Snailfish	YSL	GBD						1	1.2	1.2	1.2		2	1.0	1.1	1.1	0.1
		GBW						1	1.0	1.0	1.0		2	0.9	1.0	1.0	0.1
		TL						1	3.0	3.0	3.0		2	4.4	4.5	4.5	0.1
	PYSL	GBD	10	1.1	1.2	1.5	0.1	11	1.0	1.3	1.9	0.3	32	1.0	1.4	2.5	0.3
		GBW	10	0.9	1.0	1.2	0.1	11	0.8	1.0	1.3	0.1	32	0.8	1.1	2.0	0.2
		TL	10	4.0	5.0	6.3	0.7	11	3.7	5.2	7.4	1.1	32	4.0	5.7	9.6	1.1
Haddock	PYSL	GBW											1	0.9	0.9	0.9	
		TL											1	5.6	5.6	5.6	
Hakes	EGGS	E_MAX	454	0.6	0.7	1.0	0.0	492	0.7	0.7	0.8	0.0	352	0.7	0.7	0.8	0.0
		E_MIN	454	0.6	0.7	1.0	0.0	492	0.7	0.7	0.8	0.0	352	0.7	0.7	0.8	0.0
	UNID	GBD	7	0.4	0.5	0.5	0.0	1	0.4	0.4	0.4		1	0.5	0.5	0.5	
		GBW	17	0.3	0.3	0.5	0.1	16	0.3	0.4	0.5	0.1	3	0.2	0.3	0.4	0.1
		TL	21	1.4	1.6	2.2	0.2	21	1.3	1.7	2.9	0.4	3	1.7	1.8	1.9	0.1
	YSL	GBD	52	0.3	0.4	0.5	0.1	47	0.3	0.4	0.5	0.1	8	0.3	0.4	0.5	0.1
		GBW	56	0.3	0.3	0.4	0.0	58	0.2	0.3	0.4	0.0	9	0.3	0.3	0.4	0.0
		TL	58	1.3	1.6	1.9	0.1	64	1.4	1.6	2.0	0.1	11	1.5	1.6	2.0	0.1
	PYSL	GBD	34	0.3	0.6	1.6	0.3	67	0.4	0.5	2.1	0.3	22	0.3	0.4	0.7	0.1
		GBW	40	0.3	0.5	1.3	0.2	69	0.3	0.4	1.5	0.2	21	0.3	0.3	0.6	0.1
		TL	42	1.5	2.2	6.2	1.0	69	1.6	2.1	9.2	1.1	23	1.6	1.9	3.0	0.3
	YOY	GBD											1	5.1	5.1	5.1	
		GBW											1	4.2	4.2	4.2	
		TL											1	29.0	29.0	29.0	
Herring Family	UNID	GBD						1	0.3	0.3	0.3		1	0.4	0.4	0.4	
		GBW	4	0.3	0.3	0.4	0.1	5	0.3	0.3	0.4	0.0	1	0.4	0.4	0.4	
		TL	8	2.4	2.9	3.9	0.5	8	2.7	3.2	4.0	0.4					
	YSL	GBD	4	0.3	0.4	0.4	0.1	1	0.5	0.5	0.5						
		GBW	5	0.3	0.4	0.5	0.1	1	0.5	0.5	0.5						
		TL	6	2.3	3.2	4.1	0.8	1	3.6	3.6	3.6						
	PYSL	GBD	17	0.3	0.7	1.4	0.3	7	0.5	0.9	1.3	0.3	14	0.3	0.6	1.5	0.3
		GBW	20	0.4	0.7	1.3	0.3	15	0.3	0.8	1.2	0.3	18	0.3	0.7	1.3	0.3
		TL	22	2.7	8.2	19.3	4.5	19	4.0	9.3	17.8	4.1	18	4.1	7.8	14.7	3.4

(continued)

Table A–3. (continued)

Taxon	Life Stage[2]	Metric	0.8-mm CWWS					3.0-mm CWWS					Existing CWIS (Control)				
			N	Min	Mean	Max	SD	N	Min	Mean	Max	SD	N	Min	Mean	Max	SD
Inland Silverside	UNID	GBW	1	0.5	0.5	0.5											
		TL	1	4.0	4.0	4.0											
	YSL	GBD	1	0.7	0.7	0.7											
		GBW	1	0.6	0.6	0.6											
		TL	1	4.8	4.8	4.8											
Longhorn Sculpin	YSL	GBD	1	1.5	1.5	1.5		5	1.2	1.4	1.5	0.1	18	1.2	1.4	1.5	0.1
		GBW	1	1.2	1.2	1.2		5	1.1	1.2	1.4	0.1	18	1.1	1.2	1.5	0.1
		TL	1	6.8	6.8	6.8		5	6.0	7.6	8.9	1.3	18	7.1	8.7	10.8	1.2
	PYSL	GBD	17	1.1	1.5	2.0	0.2	139	1.2	1.6	2.9	0.3	178	1.1	1.8	3.7	0.5
		GBW	17	1.0	1.3	1.6	0.2	140	1.0	1.5	3.7	0.3	179	1.0	1.6	4.3	0.6
		TL	17	6.2	7.9	9.7	1.0	140	6.3	9.0	14.6	1.5	179	6.4	10.2	17.3	2.4
Lumpfish	EGGS	E_MAX											1	2.4	2.4	2.4	
		E_MIN											1	2.4	2.4	2.4	
	PYSL	GBD											1	3.5	3.5	3.5	
		GBW											1	4.1	4.1	4.1	
		TL											1	12.4	12.4	12.4	
Moustache Sculpin	PYSL	GBD											1	1.5	1.5	1.5	
		GBW											1	1.2	1.2	1.2	
		TL											1	9.9	9.9	9.9	
Mummichog	YSL	GBD											1	1.0	1.0	1.0	
		GBW											1	1.2	1.2	1.2	
		TL											1	6.4	6.4	6.4	
	PYSL	GBD											1	1.0	1.0	1.0	
		GBW											1	1.2	1.2	1.2	
		TL											1	7.0	7.0	7.0	
Myoxocephalus spp.	EGGS	E_MAX						1	1.9	1.9	1.9		12	1.7	1.9	2.0	0.1
		E_MIN						1	1.9	1.9	1.9		12	1.7	1.9	2.0	0.1
	UNID	GBW	2	0.9	1.1	1.2	0.2	1	1.1	1.1	1.1		1	1.0	1.0	1.0	
		TL	1	5.8	5.8	5.8		2	4.7	5.1	5.4	0.5	1	5.9	5.9	5.9	
	PYSL	GBD						4	1.1	1.4	1.7	0.3					
		GBW						4	1.0	1.3	1.6	0.3	1	1.0	1.0	1.0	
		TL	1	5.0	5.0	5.0		6	5.6	7.8	9.5	1.7	1	6.2	6.2	6.2	

(continued)

Table A–3. (continued)

Taxon	Life Stage[2]	Metric	0.8-mm CWWS					3.0-mm CWWS					Existing CWIS (Control)				
			N	Min	Mean	Max	SD	N	Min	Mean	Max	SD	N	Min	Mean	Max	SD
Northern Pipefish	YSL	GBD						1	0.7	0.7	0.7						
		GBW						1	0.6	0.6	0.6						
		TL						1	7.3	7.3	7.3						
	PYSL	GBD	26	0.7	0.9	1.2	0.1	49	0.6	0.9	1.3	0.1	38	0.6	0.8	1.0	0.1
		GBW	26	0.7	0.8	1.1	0.1	50	0.6	0.8	1.3	0.2	39	0.5	0.7	0.9	0.1
		TL	26	9.1	12.4	25.3	3.5	50	8.9	12.5	32.8	5.0	38	8.2	11.4	16.7	1.8
Pollock	PYSL	GBD	1	0.9	0.9	0.9		5	0.9	1.8	2.4	0.6	10	2.1	3.3	5.0	0.9
		GBW	1	0.6	0.6	0.6		5	0.8	1.5	2.1	0.5	10	2.0	2.8	4.0	0.7
		TL	1	5.1	5.1	5.1		5	5.9	10.7	14.5	3.6	10	12.5	19.4	25.2	4.4
	YOY	GBD											4	5.0	6.0	7.5	1.2
		GBW											4	3.1	4.1	5.5	1.0
		TL											4	26.0	30.5	35.0	4.7
Prionotus spp.	EGGS	E_MAX	2	1.1	1.1	1.1		1	1.0	1.0	1.0		3	1.1	1.1	1.1	
		E_MIN	2	1.1	1.1	1.1		1	1.0	1.0	1.0		3	1.1	1.1	1.1	
Radiated Shanny	UNID	GBD						1	0.9	0.9	0.9						
		GBW											2	0.6	0.7	0.7	0.1
		TL											3	5.2	5.9	6.3	0.6
	YSL	GBD	1	0.7	0.7	0.7		3	0.8	0.9	1.0	0.1	8	0.7	0.8	0.9	0.1
		GBW	1	0.6	0.6	0.6		3	0.7	0.8	0.8	0.1	7	0.6	0.8	1.0	0.1
		TL	1	5.4	5.4	5.4		3	5.0	5.5	6.2	0.6	8	5.0	5.9	7.2	0.7
	PYSL	GBD	126	0.6	0.9	1.5	0.2	177	0.5	0.9	1.8	0.2	251	0.6	0.9	1.7	0.2
		GBW	128	0.5	0.8	1.4	0.2	175	0.6	0.8	1.3	0.1	260	0.5	0.8	1.3	0.2
		TL	132	4.9	7.1	14.9	1.5	185	4.5	6.8	13.2	1.6	270	4.5	7.1	14.2	1.4
Rainbow Smelt	YSL	GBD	18	0.4	0.5	0.5	0.0	24	0.4	0.5	0.7	0.1	8	0.4	0.5	0.6	0.1
		GBW	18	0.4	0.5	0.5	0.0	25	0.4	0.5	0.6	0.1	8	0.4	0.5	0.7	0.1
		TL	18	3.8	4.9	5.9	0.6	26	4.2	5.0	6.2	0.5	8	3.6	5.0	5.7	0.7
	PYSL	GBD	7	0.4	0.8	1.1	0.3	17	0.4	0.7	1.1	0.2	6	0.4	1.1	3.6	1.3
		GBW	7	0.4	0.8	1.2	0.3	18	0.5	0.8	1.1	0.2	6	0.5	1.1	3.0	1.0
		TL	8	5.2	9.0	12.4	2.7	18	6.2	8.8	12.7	2.3	6	6.4	12.1	32.1	10.0
Righteye Flounder Family	YSL	TL											1	3.0	3.0	3.0	

(continued)

Table A–3. (continued)

Taxon	Life Stage[2]	Metric	0.8-mm CWWS					3.0-mm CWWS					Existing CWIS (Control)				
			N	Min	Mean	Max	SD	N	Min	Mean	Max	SD	N	Min	Mean	Max	SD
Rock Gunnel	UNID	GBW						1	0.9	0.9	0.9						
	YSL	GBD	13	1.0	1.1	1.3	0.1	23	0.9	1.1	1.3	0.1	56	0.8	1.2	1.5	0.1
		GBW	13	0.8	1.1	1.5	0.2	23	0.9	1.1	1.2	0.1	55	0.9	1.1	1.5	0.1
		TL	13	9.6	11.8	14.0	1.5	23	7.8	11.7	14.3	1.9	56	7.8	12.2	14.9	1.4
	PYSL	GBD	221	0.8	1.2	2.1	0.2	437	0.8	1.2	2.7	0.3	642	0.7	1.3	3.0	0.4
		GBW	221	0.8	1.1	1.8	0.1	429	0.8	1.1	2.1	0.2	639	0.8	1.2	2.0	0.2
		TL	222	8.2	12.6	23.2	2.1	431	8.0	13.6	30.4	3.5	643	8.3	15.0	32.1	4.6
	YROL	GBD											2	6.4	8.7	10.9	3.2
		GBW											2	5.3	7.4	9.5	3.0
		TL											2	67.0	90.5	114.0	33.2
Sea Raven	YSL	GBD											1	2.5	2.5	2.5	
		GBW											1	2.1	2.1	2.1	
		TL											1	14.0	14.0	14.0	
	PYSL	GBD											3	2.7	2.7	2.8	0.1
		GBW											3	2.2	2.5	2.8	0.3
		TL											3	14.9	15.3	16.0	0.6
	YOY	GBD											1	4.7	4.7	4.7	
		GBW											1	5.0	5.0	5.0	
		TL											1	28.0	28.0	28.0	
Shorthorn Sculpin	UNID	GBW	2	1.4	1.5	1.6	0.1						1	1.2	1.2	1.2	
		TL	2	7.4	8.2	8.9	1.1										
	YSL	GBD	5	1.5	1.6	1.8	0.1	58	1.4	1.6	1.8	0.1	54	1.3	1.7	2.0	0.2
		GBW	5	1.3	1.4	1.5	0.1	58	1.1	1.5	1.7	0.2	54	1.2	1.4	1.8	0.1
		TL	5	7.5	8.1	8.9	0.6	58	6.1	8.5	11.4	1.0	54	6.2	8.7	10.2	1.0
	PYSL	GBD	6	1.6	1.8	1.9	0.1	128	1.4	1.7	3.5	0.2	179	1.2	1.9	4.3	0.5
		GBW	6	1.2	1.5	1.8	0.2	131	1.2	1.6	3.6	0.2	182	1.2	1.7	4.6	0.6
		TL	6	6.8	8.9	10.2	1.3	131	7.2	9.6	19.3	1.3	184	7.5	10.6	19.0	2.4
	YOY	GBD											1	7.1	7.1	7.1	
		GBW											1	9.2	9.2	9.2	
		TL											1	30.0	30.0	30.0	

(continued)

Table A–3. (continued)

Taxon	Life Stage[2]	Metric	0.8-mm CWWS					3.0-mm CWWS					Existing CWIS (Control)				
			N	Min	Mean	Max	SD	N	Min	Mean	Max	SD	N	Min	Mean	Max	SD
Silver Hake	EGGS	E_MAX	140	0.8	0.9	1.0	0.0	210	0.8	0.9	1.0	0.0	121	0.8	0.9	1.0	0.0
		E_MIN	140	0.8	0.9	1.0	0.0	210	0.8	0.9	1.0	0.0	121	0.8	0.9	1.0	0.0
	UNID	GBW	1	0.4	0.4	0.4		3	0.3	0.4	0.4	0.1	1	0.4	0.4	0.4	
		TL	1	2.6	2.6	2.6		3	2.6	2.7	2.8	0.1	2	2.4	2.6	2.7	0.2
	YSL	GBD	20	0.3	0.5	0.8	0.1	11	0.4	0.5	0.6	0.1	7	0.4	0.5	0.7	0.1
		GBW	55	0.2	0.4	0.8	0.1	41	0.2	0.4	0.5	0.1	18	0.3	0.4	0.5	0.1
		TL	77	1.8	2.4	3.0	0.3	56	2.0	2.5	3.0	0.3	23	2.2	2.5	2.8	0.2
	PYSL	GBD	12	0.4	0.6	0.6	0.1	12	0.4	0.6	0.7	0.1					
		GBW	15	0.3	0.4	0.5	0.1	18	0.3	0.4	0.5	0.1					
		TL	16	2.3	2.6	3.2	0.2	18	2.3	2.5	2.8	0.2					
Smooth Flounder	PYSL	GBD	1	1.0	1.0	1.0											
		GBW	1	0.7	0.7	0.7											
		TL	1	6.9	6.9	6.9											
Tautog	EGGS	E_MAX	1	1.0	1.0	1.0							1	0.9	0.9	0.9	
		E_MIN	1	1.0	1.0	1.0							1	0.9	0.9	0.9	
	UNID	GBW						1	0.3	0.3	0.3						
		TL						1	2.3	2.3	2.3						
	YSL	GBD						1	0.3	0.3	0.3						
		GBW						1	0.2	0.2	0.2						
		TL						1	2.4	2.4	2.4						
	PYSL	GBD	1	1.2	1.2	1.2		2	0.3	0.4	0.4	0.1					
		GBW	1	0.9	0.9	0.9		2	0.3	0.4	0.4	0.1					
		TL						2	2.4	3.1	3.7	0.9					
Threespine Stickleback	YOY	GBD											1	4.0	4.0	4.0	
		GBW											1	2.5	2.5	2.5	
		TL											1	22.0	22.0	22.0	
	YROL	GBD											1	5.2	5.2	5.2	
		GBW											1	3.4	3.4	3.4	
		TL											1	30.0	30.0	30.0	

(continued)

Table A–3. (continued)

Taxon	Life Stage[2]	Metric	0.8-mm CWWS					3.0-mm CWWS					Existing CWIS (Control)				
			N	Min	Mean	Max	SD	N	Min	Mean	Max	SD	N	Min	Mean	Max	SD
Windowpane	EGGS	E_MAX	29	1.0	1.1	1.3	0.1	42	1.1	1.2	1.3	0.1	19	1.1	1.1	1.3	0.1
		E_MIN	29	1.0	1.1	1.3	0.1	42	1.1	1.2	1.3	0.1	19	1.1	1.1	1.3	0.1
	UNID	GBD											1	0.6	0.6	0.6	
		GBW											1	0.4	0.4	0.4	
		TL											1	2.0	2.0	2.0	
	YSL	GBD	1	0.5	0.5	0.5		4	0.5	0.6	0.6	0.1	1	0.5	0.5	0.5	
		GBW	1	0.4	0.4	0.4		4	0.4	0.5	0.6	0.1	1	0.4	0.4	0.4	
		TL	1	2.8	2.8	2.8		4	2.1	2.4	2.7	0.3	1	2.3	2.3	2.3	
	PYSL	GBD	6	0.7	1.0	1.6	0.3	1	0.7	0.7	0.7		2	0.7	0.8	0.9	0.1
		GBW	6	0.6	0.7	0.9	0.1	1	0.5	0.5	0.5		2	0.5	0.6	0.7	0.1
		TL	6	2.3	3.2	5.0	1.0	1	2.6	2.6	2.6		2	2.5	2.8	3.1	0.4
Windowpane/Fourspot/Summer Flounder	EGGS	E_MAX	131	0.8	1.0	1.1	0.1	182	0.8	1.0	1.1	0.1	94	0.9	1.0	1.1	0.0
		E_MIN	131	0.8	1.0	1.1	0.1	182	0.8	1.0	1.1	0.1	94	0.9	1.0	1.1	0.0
Winter Flounder	EGGS	E_MAX	30	0.7	0.8	0.9	0.1	40	0.7	0.8	0.9	0.1	45	0.7	0.8	0.9	0.1
		E_MIN	30	0.6	0.8	0.9	0.1	40	0.7	0.8	0.9	0.1	45	0.6	0.8	0.9	0.1
	UNID	GBD	3	0.4	0.4	0.5	0.1						4	0.5	0.5	0.6	0.1
		GBW	12	0.4	0.4	0.5	0.0	1	0.4	0.4	0.4		7	0.4	0.4	0.4	
		TL	12	2.0	2.8	3.3	0.4	3	1.9	2.3	2.6	0.4	7	2.2	2.8	3.2	0.3
	WF I	GBD	29	0.3	0.4	0.6	0.1	22	0.3	0.4	0.5	0.1	23	0.3	0.4	0.5	0.1
		GBW	30	0.3	0.4	0.5	0.1	22	0.2	0.4	0.5	0.1	27	0.3	0.4	0.4	0.1
		TL	30	1.9	2.4	3.6	0.5	22	1.7	2.2	2.8	0.3	27	2.0	2.4	3.5	0.4
	WF II	GBD	200	0.3	0.7	1.5	0.3	221	0.3	0.7	2.0	0.3	209	0.3	0.8	1.9	0.3
		GBW	215	0.2	0.5	0.8	0.1	233	0.3	0.5	0.9	0.1	228	0.3	0.5	0.8	0.1
		TL	219	2.2	3.9	6.5	1.1	242	2.1	4.1	7.0	1.1	234	2.2	4.4	7.5	1.2
	WF III	GBD	63	1.0	1.7	2.3	0.3	101	0.9	1.8	2.3	0.3	62	1.0	1.7	2.5	0.3
		GBW	63	0.6	0.8	1.0	0.1	104	0.5	0.8	1.1	0.1	66	0.6	0.8	0.9	0.1
		TL	64	4.7	6.5	7.9	0.7	104	4.5	6.6	8.1	0.7	67	4.4	6.6	8.0	0.6
	WF IV	GBD	13	1.5	2.0	2.2	0.2	15	1.7	2.2	2.5	0.2	14	1.6	2.0	2.5	0.2
		GBW	13	0.8	0.8	0.9	0.0	15	0.7	0.8	1.0	0.1	14	0.8	0.9	1.0	0.1
		TL	13	6.3	7.3	8.0	0.6	15	6.4	7.5	8.9	0.6	14	6.1	7.6	11.7	1.3

(continued)

Table A–3. (continued)

Taxon	Life Stage[2]	Metric	0.8-mm CWWS					3.0-mm CWWS					Existing CWIS (Control)				
			N	Min	Mean	Max	SD	N	Min	Mean	Max	SD	N	Min	Mean	Max	SD
Witch Flounder	EGGS	E_MAX	1	1.4	1.4	1.4											
		E_MIN	1	1.4	1.4	1.4											
	PYSL	GBD	1	0.4	0.4	0.4											
		GBW	1	0.4	0.4	0.4											
		TL	1	4.4	4.4	4.4											
Yellowtail Flounder	EGGS	E_MAX	3	0.8	0.8	0.8											
		E_MIN	3	0.8	0.8	0.8											
	YSL	GBD	1	0.4	0.4	0.4											
		GBW	2	0.3	0.4	0.4	0.1	1	0.2	0.2	0.2						
		TL	2	1.8	2.2	2.5	0.5	1	2.3	2.3	2.3		1	2.5	2.5	2.5	
	PYSL	GBD						3	0.4	0.4	0.5	0.1					
		GBW						3	0.4	0.4	0.5	0.1					
		TL						3	2.5	2.9	3.7	0.7					
All Taxon Combined	EGGS	E_MAX	4704	0.6	0.9	1.8	0.1	5808	0.6	1.0	2.5	0.4	5558	0.6	1.0	2.6	0.3
		E_MIN	4704	0.6	0.9	1.8	0.1	5808	0.6	1.0	2.5	0.4	5558	0.6	1.0	2.6	0.3
	UNID	GBD	10	0.4	0.5	0.5	0.0	7	0.3	0.8	1.5	0.5	13	0.3	0.6	1.0	0.2
		GBW	44	0.3	0.5	1.6	0.3	39	0.3	0.4	1.1	0.2	29	0.2	0.6	1.2	0.3
		TL	57	1.4	2.9	8.9	1.6	54	1.3	2.6	6.5	1.2	28	1.7	3.5	6.3	1.5
	WF I	GBD	29	0.3	0.4	0.6	0.1	22	0.3	0.4	0.5	0.1	23	0.3	0.4	0.5	0.1
		GBW	30	0.3	0.4	0.5	0.1	22	0.2	0.4	0.5	0.1	27	0.3	0.4	0.4	0.1
		TL	30	1.9	2.4	3.6	0.5	22	1.7	2.2	2.8	0.3	27	2.0	2.4	3.5	0.4
	WF II	GBD	200	0.3	0.7	1.5	0.3	221	0.3	0.7	2.0	0.3	209	0.3	0.8	1.9	0.3
		GBW	215	0.2	0.5	0.8	0.1	233	0.3	0.5	0.9	0.1	228	0.3	0.5	0.8	0.1
		TL	219	2.2	3.9	6.5	1.1	242	2.1	4.1	7.0	1.1	234	2.2	4.4	7.5	1.2
	WF III	GBD	63	1.0	1.7	2.3	0.3	101	0.9	1.8	2.3	0.3	62	1.0	1.7	2.5	0.3
		GBW	63	0.6	0.8	1.0	0.1	104	0.5	0.8	1.1	0.1	66	0.6	0.8	0.9	0.1
		TL	64	4.7	6.5	7.9	0.7	104	4.5	6.6	8.1	0.7	67	4.4	6.6	8.0	0.6
	WF IV	GBD	13	1.5	2.0	2.2	0.2	15	1.7	2.2	2.5	0.2	14	1.6	2.0	2.5	0.2
		GBW	13	0.8	0.8	0.9	0.0	15	0.7	0.8	1.0	0.1	14	0.8	0.9	1.0	0.1
		TL	13	6.3	7.3	8.0	0.6	15	6.4	7.5	8.9	0.6	14	6.1	7.6	11.7	1.3

(continued)

Table A–3. (continued)

Taxon	Life Stage[2]	Metric	0.8-mm CWWS					3.0-mm CWWS					Existing CWIS (Control)				
			N	Min	Mean	Max	SD	N	Min	Mean	Max	SD	N	Min	Mean	Max	SD
All Taxon Combined (cont.)	YSL	GBD	240	0.2	0.6	1.8	0.4	345	0.3	0.8	1.8	0.5	501	0.3	1.0	2.5	0.4
		GBW	355	0.2	0.5	1.5	0.3	473	0.2	0.6	1.7	0.4	564	0.2	0.9	2.1	0.4
		TL	388	1.3	3.5	14.0	2.3	518	1.4	4.3	14.3	2.8	600	1.5	6.1	14.9	2.9
	PYSL	GBD	1269	0.2	0.8	2.1	0.4	2257	0.2	1.1	6.0	0.6	2828	0.2	1.2	6.0	0.6
		GBW	1313	0.2	0.7	1.8	0.3	2299	0.2	1.0	4.3	0.5	2864	0.2	1.1	4.6	0.5
		TL	1323	1.5	6.5	26.3	4.1	2339	1.6	9.0	47.2	6.7	2873	1.6	10.7	45.5	6.7
	YOY	GBD	0	0.0	0.0	0.0	0.0	3	2.9	3.2	3.5	0.3	24	2.5	3.9	7.5	1.5
		GBW	0	0.0	0.0	0.0	0.0	3	2.3	2.7	3.1	0.4	24	2.1	3.3	9.2	1.5
		TL	0	0.0	0.0	0.0	0.0	3	17.0	35.3	48.0	16.3	24	22.0	37.7	48.0	7.3
	YROL	GBD	0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	4	5.2	11.6	24.0	8.6
		GBW	0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	4	3.4	9.8	21.0	7.9
		TL	0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	4	30.0	154.3	406.0	171.3

[1] Min = minimum, Max = maximum, SD = standard deviation.

[2] UNID = unidentified larvae, YSL = yolk-sac larvae, PYSL = post yolk-sac larvae, YOY = young-of-the-year, YROL = yearling and older.

Table A–4. Percent extrusion by taxon of larvae and juvenile fish entrained by the 0.8-mm and 3.0-mm cylindrical wedgewire screens (CWWS) based on total count (N) and percentage (%) of measured larval and juvenile fish with a greatest body depth (GBD) greater than 0.8-mm and 3.0-mm slot width of the CWWS intakes from synchronized samples collected at Schiller Station from weeks beginning Monday, 11 February 2019 through Monday, 18 November 2019.

	0.8-mm CWWS			3.0-mm CWWS		
Taxon	N > 0.8 mm	N	%	N > 3.0 mm	N	%
American Plaice	1	50	2.0			
American Sand Lance	38	221	17.2	2	383	0.5
Atlantic Cod				1	1	100.0
Atlantic Herring	1	1	100.0	19	29	65.5
Atlantic Seasnail	16	65	24.6			
Cunner	60	391	15.4			
Fourbeard Rockling	12	31	38.7			
Goosefish	1	1	100.0			
Grubby	139	139	100.0	1	348	0.3
Gulf Snailfish	10	10	100.0			
Hakes	3	93	3.2			
Herring Family	4	21	19.1			
Longhorn Sculpin	18	18	100.0			
Northern Pipefish	14	26	53.9			
Pollock	1	1	100.0			
Radiated Shanny	77	127	60.6			
Rainbow Smelt	4	25	16.0			
Rock Gunnel	232	234	99.2			
Shorthorn Sculpin	11	11	100.0	1	186	0.5
Smooth Flounder	1	1	100.0			
Tautog	1	1	100.0			
Windowpane	3	7	42.9			
Winter Flounder	124	308	40.3			

Table A–5. Percent extrusion by taxon of larvae and juvenile fish entrained by the 0.8-mm and 3.0-mm cylindrical wedgewire screens (CWWS) based on total count (N) and percentage (%) of measured larval and juvenile fish with a greatest body depth (GBW) greater than 0.8-mm and 3.0-mm slot width of the CWWS intakes from synchronized samples collected at Schiller Station from weeks beginning Monday, 11 February 2019 through Monday, 18 November 2019.

	0.8-mm CWWS			3.0-mm CWWS		
Taxon	N > 0.8 mm	N	%	N > 3.0 mm	N	%
American Sand Lance	35	224	15.6	1	378	0.3
Atlantic Cod				1	1	100.0
Atlantic Herring	1	1	100.0	9	29	31.0
Atlantic Seasnail	5	68	7.4			
Cunner	25	474	5.3			
Fourbeard Rockling	6	35	17.1			
Grubby	142	142	100.0			
Gulf Snailfish	10	10	100.0			
Hakes	2	113	1.8			
Herring Family	4	29	13.8			
Longhorn Sculpin	18	18	100.0	1	145	0.7
Myoxocephalus spp.	2	2	100.0			
Northern Pipefish	8	26	30.8			
Radiated Shanny	43	129	33.3			
Rainbow Smelt	4	25	16.0			
Rock Gunnel	232	234	99.2			
Shorthorn Sculpin	13	13	100.0	1	189	0.5
Tautog	1	1	100.0			
Windowpane	1	7	14.3			
Winter Flounder	19	333	5.7			

Table A–6. Percent distribution of maximum egg diameter of ichthyoplankton by size class size (every 0.2 mm) for each taxon measured from samples collected from the 0.8-mm and 3.0-mm cylindrical wedgewire screen (CWWS) intakes and the existing cooling water intake structure (CWIS) for Units 5 and 6 (Control) at Schiller Station from Monday, 11 February 2019 through Monday, 3 February 2020. The value of each size class increment is shown (e.g., 1.0 = 1.0 to 1.1 mm, etc.).

Taxon	Location	Percent Distribution of Maximum Egg Diameter by 0.2-mm Size Class											Total (N)
		0.6	0.8	1.0	1.2	1.4	1.6	1.8	2.0	2.2	2.4	2.6	
American Plaice	0.8-mm CWWS												0
	3.0-mm CWWS						0.4		10.2	48.9	40.5		284
	Existing CWIS (Control)								7.8	58.1	33.3	0.7	270
Atlantic Cod	0.8-mm CWWS				33.3	66.7							3
	3.0-mm CWWS				33.3	66.7							3
	Existing CWIS (Control)				40.9	59.1							22
Atlantic Cod/Haddock	0.8-mm CWWS												0
	3.0-mm CWWS				50.0	50.0							6
	Existing CWIS (Control)				23.1	69.2	7.7						13
Atlantic Mackerel	0.8-mm CWWS			33.3	66.7								9
	3.0-mm CWWS			3.8	88.5	7.7							26
	Existing CWIS (Control)			23.6	72.7	3.6							55
Atlantic Mackerel/Cusk	0.8-mm CWWS			15.7	84.3								51
	3.0-mm CWWS			14.4	76.9	8.7							104
	Existing CWIS (Control)			20.3	78.0	1.7							59
Atlantic Menhaden	0.8-mm CWWS					21.4	71.4	7.1					42
	3.0-mm CWWS					18.7	70.4	10.9					230
	Existing CWIS (Control)					15.2	83.3	1.5					132
Butterfish	0.8-mm CWWS	100.0											54
	3.0-mm CWWS	100.0											72
	Existing CWIS (Control)	100.0											25
Cod Family/Witch Flounder	0.8-mm CWWS				100.0								1
	3.0-mm CWWS				66.7	33.3							9
	Existing CWIS (Control)				85.7	14.3							7
Cunner	0.8-mm CWWS		100.0										141
	3.0-mm CWWS	7.8	91.0	1.2									166
	Existing CWIS (Control)		98.4	1.6									63

(continued)

Table A–6. (continued)

Taxon	Location	Percent Distribution of Maximum Egg Diameter by 0.2-mm Size Class											Total (N)
		0.6	0.8	1.0	1.2	1.4	1.6	1.8	2.0	2.2	2.4	2.6	
Cunner/Tautog/Yellowtail Flounder	0.8-mm CWWS	0.3	79.6	19.9	0.2								2992
	3.0-mm CWWS	0.2	77.7	22.0	0.1								3182
	Existing CWIS (Control)	0.1	83.7	16.2	0.0								3642
Cusk	0.8-mm CWWS												0
	3.0-mm CWWS				83.3	16.7							18
	Existing CWIS (Control)				95.5	4.5							22
Fourbeard Rockling	0.8-mm CWWS	2.8	95.8	1.4									143
	3.0-mm CWWS	2.7	96.2	1.1									182
	Existing CWIS (Control)		100.0										166
Fourbeard Rockling/Hakes	0.8-mm CWWS	39.0	60.8	0.2									477
	3.0-mm CWWS	36.0	64.0										559
	Existing CWIS (Control)	31.1	68.9										434
Hakes	0.8-mm CWWS	96.9	2.9	0.2									454
	3.0-mm CWWS	94.9	5.1										492
	Existing CWIS (Control)	91.8	8.2										352
Lumpfish	0.8-mm CWWS												0
	3.0-mm CWWS												0
	Existing CWIS (Control)										100.0		1
Myoxocephalus spp.	0.8-mm CWWS												0
	3.0-mm CWWS							100.0					1
	Existing CWIS (Control)						8.3	83.3	8.3				12
Prionotus spp.	0.8-mm CWWS			100.0									2
	3.0-mm CWWS			100.0									1
	Existing CWIS (Control)			100.0									3
Silver Hake	0.8-mm CWWS		86.4	13.6									140
	3.0-mm CWWS		92.9	7.1									210
	Existing CWIS (Control)		86.0	14.0									121
Tautog	0.8-mm CWWS			100.0									1
	3.0-mm CWWS												0
	Existing CWIS (Control)		100.0										1
Windowpane	0.8-mm CWWS			58.6	41.4								29
	3.0-mm CWWS			59.5	40.5								42
	Existing CWIS (Control)			73.7	26.3								19

(continued)

Table A–6. (continued)

Taxon	Location	Percent Distribution of Maximum Egg Diameter by 0.2-mm Size Class											Total (N)
		0.6	0.8	1.0	1.2	1.4	1.6	1.8	2.0	2.2	2.4	2.6	
Windowpane/Fourspot/Summer Flounder	0.8-mm CWWS		18.3	81.7									131
	3.0-mm CWWS		29.7	70.3									182
	Existing CWIS (Control)		12.8	87.2									94
Winter Flounder	0.8-mm CWWS	33.3	66.7										30
	3.0-mm CWWS	37.5	62.5										40
	Existing CWIS (Control)	33.3	66.7										45
Witch Flounder	0.8-mm CWWS					100.0							1
	3.0-mm CWWS												0
	Existing CWIS (Control)												0
Yellowtail Flounder	0.8-mm CWWS		100.0										3
	3.0-mm CWWS												0
	Existing CWIS (Control)												0
Total	**0.8-mm CWWS**	**15.0**	**66.6**	**16.1**	**1.4**	**0.3**	**0.6**	**0.1**	**0.0**	**0.0**	**0.0**	**0.0**	**4704**
	3.0-mm CWWS	**13.4**	**59.5**	**15.3**	**2.6**	**1.1**	**2.8**	**0.4**	**0.5**	**2.4**	**2.0**	**0.0**	**5809**
	Existing CWIS (Control)	**9.0**	**67.5**	**13.2**	**2.4**	**0.8**	**2.0**	**0.2**	**0.4**	**2.8**	**1.6**	**0.0**	**5558**

Table A–7. Percent distribution of total length of ichthyoplankton larvae and older (yolk-sac, post yolk-sac, young-of-the-year, yearling-and-older, unidentified larvae and all Winter Flounder stages combined) for each taxon measured from samples collected from the 0.8-mm and 3.0-mm cylindrical wedgewire screen (CWWS) intakes and the existing cooling water intake structure (CWIS) for Units 5 and 6 (Control) at Schiller Station from Monday, 11 February 2019 through Monday, 3 February 2020. The integer value of each size class is shown (e.g., 3 = 3.0 to 3.9 mm, etc.).

Taxon	Location	Percent Distribution of Total Length by 1-mm Size Class															Total (N)
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15+	
Alligatorfish	0.8-mm CWWS																0
	3.0-mm CWWS																0
	Existing CWIS (Control)						25.0			25.0		25.0				25.0	4
American Eel	0.8-mm CWWS																0
	3.0-mm CWWS																0
	Existing CWIS (Control)															100.0	1
American Plaice	0.8-mm CWWS		1.6	76.6	15.6	3.1	1.6	1.6									64
	3.0-mm CWWS			44.3	37.7	14.8	3.3										61
	Existing CWIS (Control)	3.4		41.4	41.4	6.9		3.4		3.4							29
American Sand Lance	0.8-mm CWWS		0.4	9.6	16.7	18.0	13.6	11.8	7.0	4.8	2.6	3.1	2.6	0.4	3.1	6.1	228
	3.0-mm CWWS		0.8	5.9	10.9	11.4	7.8	4.4	6.7	4.9	5.4	5.2	1.8	1.6	2.1	31.3	387
	Existing CWIS (Control)			1.6	8.3	10.7	6.6	5.5	4.3	5.2	4.7	3.3	4.5	4.7	4.3	36.4	579
Atlantic Cod	0.8-mm CWWS																0
	3.0-mm CWWS															100.0	1
	Existing CWIS (Control)									16.7						83.3	6
Atlantic Herring	0.8-mm CWWS													100.0			1
	3.0-mm CWWS															100.0	29
	Existing CWIS (Control)													2.4		97.6	84
Atlantic Menhaden	0.8-mm CWWS																0
	3.0-mm CWWS		20.0	20.0												60.0	5
	Existing CWIS (Control)		50.0													50.0	2
Atlantic Seasnail	0.8-mm CWWS		19.7	63.6	12.1	3.0	1.5										66
	3.0-mm CWWS		31.2	44.2	15.6	5.2	2.6	1.3									77
	Existing CWIS (Control)	0.6	22.4	54.5	13.9	4.8	2.4	0.6		0.6							165
Atlantic Tomcod	0.8-mm CWWS																0
	3.0-mm CWWS																0
	Existing CWIS (Control)						100.0										1

(continued)

Table A–7. (continued)

Taxon	Location	Percent Distribution of Total Length by 1-mm Size Class															Total (N)
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15+	
Butterfish	0.8-mm CWWS	87.5	12.5														8
	3.0-mm CWWS	66.7	33.3														3
	Existing CWIS (Control)			100.0													1
Cunner	0.8-mm CWWS	11.9	47.3	19.7	13.2	4.2	2.7	0.8	0.2								478
	3.0-mm CWWS	11.4	39.9	22.5	12.4	5.8	5.3	1.9	0.9								587
	Existing CWIS (Control)	10.6	32.9	14.1	12.6	8.5	12.3	6.5	1.5	1.0							398
Cusk	0.8-mm CWWS			100.0													2
	3.0-mm CWWS			100.0													2
	Existing CWIS (Control)				100.0												1
Fourbeard Rockling	0.8-mm CWWS	30.6	27.8	22.2	11.1	5.6	2.8										36
	3.0-mm CWWS	26.3	39.5	28.9	2.6	2.6											38
	Existing CWIS (Control)	40.0	20.0	15.0	15.0	5.0	5.0										20
Fourspot Flounder	0.8-mm CWWS		100.0														2
	3.0-mm CWWS																0
	Existing CWIS (Control)																0
Goosefish	0.8-mm CWWS			100.0													1
	3.0-mm CWWS																0
	Existing CWIS (Control)																0
Grubby	0.8-mm CWWS				0.7	23.2	54.9	21.1									142
	3.0-mm CWWS				2.0	19.3	35.4	28.0	7.9	0.8	2.0	2.5	1.4	0.3		0.3	353
	Existing CWIS (Control)				0.8	15.0	42.3	32.2	5.1	1.1	1.0	1.1	0.8	0.5			612
Gulf Snailfish	0.8-mm CWWS				50.0	40.0	10.0										10
	3.0-mm CWWS			25.0	25.0	33.3	8.3	8.3									12
	Existing CWIS (Control)				20.6	55.9	14.7	5.9		2.9							34
Haddock	0.8-mm CWWS																0
	3.0-mm CWWS																0
	Existing CWIS (Control)					100.0											1
Hakes	0.8-mm CWWS	86.8	9.9	0.8	1.7		0.8										121
	3.0-mm CWWS	88.3	8.4	1.3	0.6		0.6			0.6							154
	Existing CWIS (Control)	81.6	13.2	2.6												2.6	38
Herring Family	0.8-mm CWWS		25.0	13.9	8.3	8.3	22.2		2.8	5.6	2.8	2.8				8.3	36
	3.0-mm CWWS		7.1	21.4	14.3	7.1	3.6	3.6	10.7	7.1	3.6	10.7				10.7	28
	Existing CWIS (Control)				38.9	5.6	5.6	5.6	11.1			27.8			5.6		18

(continued)

Table A–7. (continued)

Taxon	Location	Percent Distribution of Total Length by 1-mm Size Class															Total (N)
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15+	
Inland Silverside	0.8-mm CWWS				100.0												2
	3.0-mm CWWS																0
	Existing CWIS (Control)																0
Longhorn Sculpin	0.8-mm CWWS						22.2	38.9	16.7	22.2							18
	3.0-mm CWWS						6.2	25.5	26.2	19.3	13.8	4.1	2.1	2.1	0.7		145
	Existing CWIS (Control)						4.6	12.7	18.3	23.4	13.7	11.7	3.6	4.1	3.6	4.6	197
Lumpfish	0.8-mm CWWS																0
	3.0-mm CWWS																0
	Existing CWIS (Control)												100.0				1
Moustache Sculpin	0.8-mm CWWS																0
	3.0-mm CWWS																0
	Existing CWIS (Control)									100.0							1
Mummichog	0.8-mm CWWS																0
	3.0-mm CWWS																0
	Existing CWIS (Control)						50.0	50.0									2
Myoxocephalus spp.	0.8-mm CWWS					100.0											2
	3.0-mm CWWS				12.5	37.5			25.0	25.0							8
	Existing CWIS (Control)					50.0	50.0										2
Northern Pipefish	0.8-mm CWWS									11.5	26.9	26.9	11.5	3.8	3.8	15.4	26
	3.0-mm CWWS							2.0	3.9	29.4	17.6	19.6	5.9		3.9	17.6	51
	Existing CWIS (Control)								5.3	18.4	18.4	28.9	15.8	2.6	5.3	5.3	38
Pollock	0.8-mm CWWS					100.0											1
	3.0-mm CWWS					20.0			20.0			20.0		20.0	20.0		5
	Existing CWIS (Control)												7.1		7.1	85.7	14
Radiated Shanny	0.8-mm CWWS				1.5	22.6	28.6	24.8	12.0	5.3	3.0	1.5			0.8		133
	3.0-mm CWWS				4.3	30.9	29.3	14.4	11.2	5.3	3.2	1.1		0.5			188
	Existing CWIS (Control)				2.1	16.4	37.7	22.8	12.1	5.0	2.5	0.7	0.4		0.4		281
Rainbow Smelt	0.8-mm CWWS			3.8	26.9	42.3	7.7			3.8	7.7	3.8	3.8				26
	3.0-mm CWWS				25.0	31.8	11.4	11.4	4.5	4.5		2.3	9.1				44
	Existing CWIS (Control)			7.1	14.3	35.7	14.3		14.3			7.1				7.1	14
Righteye Flounder Family	0.8-mm CWWS																0
	3.0-mm CWWS																0
	Existing CWIS (Control)			100.0													1

(continued)

Table A–7. (continued)

Taxon	Location	Percent Distribution of Total Length by 1-mm Size Class															Total (N)
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15+	
Rock Gunnel	0.8-mm CWWS								0.9	5.5	14.5	20.0	24.3	18.3	7.7	8.9	235
	3.0-mm CWWS							0.2	2.0	6.6	9.9	13.7	18.7	16.1	12.6	20.3	454
	Existing CWIS (Control)							0.1	1.1	3.6	7.0	9.4	16.7	18.8	11.3	32.0	701
Sea Raven	0.8-mm CWWS																0
	3.0-mm CWWS																0
	Existing CWIS (Control)														60.0	40.0	5
Shorthorn Sculpin	0.8-mm CWWS						7.7	30.8	30.8	15.4	15.4						13
	3.0-mm CWWS						1.1	13.2	26.5	33.9	17.5	6.3	1.1			0.5	189
	Existing CWIS (Control)						1.7	5.9	15.9	34.7	21.3	10.0	2.5	1.3	1.3	5.4	239
Silver Hake	0.8-mm CWWS	5.3	92.6	2.1													94
	3.0-mm CWWS		97.4	2.6													77
	Existing CWIS (Control)		100.0														25
Smooth Flounder	0.8-mm CWWS						100.0										1
	3.0-mm CWWS																0
	Existing CWIS (Control)																0
Tautog	0.8-mm CWWS																0
	3.0-mm CWWS		75.0	25.0													4
	Existing CWIS (Control)																0
Threespine Stickleback	0.8-mm CWWS																0
	3.0-mm CWWS																0
	Existing CWIS (Control)															100.0	2
Windowpane	0.8-mm CWWS		57.1	28.6		14.3											7
	3.0-mm CWWS		100.0														5
	Existing CWIS (Control)		75.0	25.0													4
Winter Flounder	0.8-mm CWWS	0.6	22.8	25.7	16.9	12.4	12.4	8.6	0.6								338
	3.0-mm CWWS	1.3	15.3	18.9	18.4	15.5	17.4	12.2	1.0								386
	Existing CWIS (Control)		15.8	18.6	20.3	17.5	17.8	8.9	0.9			0.3					349
Witch Flounder	0.8-mm CWWS				100.0												1
	3.0-mm CWWS																0
	Existing CWIS (Control)																0
Yellowtail Flounder	0.8-mm CWWS	50.0	50.0														2
	3.0-mm CWWS		75.0	25.0													4
	Existing CWIS (Control)		100.0														1

(continued)

Table A–7. (continued)

Taxon	Location	Percent Distribution of Total Length by 1-mm Size Class															Total (N)
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15+	
Total	0.8-mm CWWS	9.0	21.2	15.1	9.7	9.3	10.6	6.4	2.1	2.1	2.7	3.1	3.2	2.2	1.3	2.0	2094
	3.0-mm CWWS	6.7	13.3	9.6	7.8	9.2	10.0	8.3	5.8	5.3	4.3	3.8	3.3	2.6	2.1	7.9	3297
	Existing CWIS (Control)	2.1	6.8	6.2	6.1	8.6	14.1	10.2	4.8	5.7	4.5	4.1	4.4	4.5	3.2	14.6	3871

APPENDIX B. ENTRAINMENT SAMPLE DENSITY TABLES

Table B–1. Densities (N/100 m^3) of entrained fish and life stages by each screen type among synchronized samples used for evaluation of cylindrical wedgewire screen (CWWS) performance in reducing entrainment relative to the existing cooling water intake structure (CWIS; Control) at Schiller Station for weeks beginning Monday, 11 March 2019 (Week 10) through Monday, 23 September 2019 (Week 38).

Week No.	Sampling Week (beginning Monday)	Period No.	Diel Period	Taxon	Life Stage[1]	0.8-mm CWWS	3.0-mm CWWS	Existing CWIS (Control)
10	11-Mar-2019	17	0900-1459	American Plaice	Eggs			0.9
				American Sand Lance	YSL			0.9
					PYSL			2.8
				Grubby	YSL	2.0		
					PYSL		6.9	17.0
				Longhorn Sculpin	PYSL		1.0	9.4
				Rock Gunnel	UNID			0.9
					YSL			0.9
					PYSL	5.0	10.8	22.7
				Shorthorn Sculpin	PYSL		2.0	4.7
				Winter Flounder	Eggs			0.9
					WF I		1.0	
		18	1500-2059	American Sand Lance	PYSL	1.0		1.0
				Grubby	YSL		3.0	5.0
					PYSL	5.0	5.0	5.0
				Longhorn Sculpin	PYSL	1.0	1.0	1.0
				Rock Gunnel	YSL			1.0
					PYSL	5.0	16.0	8.0
				Shorthorn Sculpin	PYSL		2.0	
				Winter Flounder	Eggs		2.0	2.0
		19	2100-0259	American Sand Lance	UNID		1.0	
					YSL	1.0	2.0	2.0
					PYSL			10.0
				Atlantic Cod/Haddock	Eggs		1.0	1.0
				Grubby	YSL		2.9	2.0
					PYSL	1.0	5.9	19.0
				Longhorn Sculpin	PYSL		3.9	22.0
				Rock Gunnel	UNID			1.0
					YSL			3.0
					PYSL	7.0	19.5	86.2
				Shorthorn Sculpin	YSL			1.0
					PYSL		1.0	18.0

(continued)

Table B–1. (continued)

Week No.	Sampling Week (beginning Monday)	Period No.	Diel Period	Taxon	Life Stage[1]	0.8-mm CWWS	3.0-mm CWWS	Existing CWIS (Control)
10 (cont.)	11-Mar-2019 (cont.)	20	0300-0859	American Sand Lance	PYSL	15.0	19.8	16.0
				Atlantic Herring	PYSL		1.0	
				Grubby	YSL	2.0	4.0	
					PYSL	3.0	9.9	12.0
				Longhorn Sculpin	PYSL	1.0	16.9	11.0
				Rock Gunnel	UNI	1.0		
					YSL	3.0	1.0	
					PYSL	23.0	57.6	59.0
				Shorthorn Sculpin	YSL		1.0	
					PYSL		6.0	8.0
				Winter Flounder	Eggs	1.0	1.0	1.0
12	25-Mar-2019	25	0900-1459	American Sand Lance	PYSL	9.1	18.0	108.1
				Grubby	YSL	2.0		12.1
					PYSL	1.0	6.0	5.0
				Longhorn Sculpin	PYSL		3.0	4.0
				Rock Gunnel	YSL		1.0	
					PYSL	1.0	18.0	20.2
				Shorthorn Sculpin	PYSL		1.0	
				Winter Flounder	Eggs	3.0		3.0
		26	1500-2059	American Sand Lance	PYSL	5.0	7.0	5.0
				Grubby	YSL			3.0
					PYSL	1.0	8.0	6.0
				Longhorn Sculpin	PYSL		2.0	
				Rock Gunnel	PYSL	2.0	5.0	4.0
				Winter Flounder	Eggs	1.0	2.0	1.0
		27	2100-0259	American Sand Lance	UNID			1.0
					YSL		1.0	
					PYSL	2.0	12.9	40.1
				Atlantic Herring	PYSL			1.0
				Grubby	UNID			2.0
					YSL	1.0	3.0	4.0
					PYSL	4.0	3.0	9.0
				Longhorn Sculpin	PYSL			6.0
				Pollock	PYSL			1.0
				Rock Gunnel	YSL			2.0
					PYSL	3.0	5.0	42.1
				Unidentified Osteichthyes	Eggs		1.0	
				Winter Flounder	Eggs		1.0	
		28	0300-0859	American Sand Lance	YSL	1.0		
					PYSL	3.9	17.6	16.8
				Atlantic Herring	PYSL			1.0
				Atlantic Seasnail	PYSL			1.0
				Atlantic Tomcod	YSL			1.0

(continued)

Table B–1. (continued)

Week No.	Sampling Week (beginning Monday)	Period No.	Diel Period	Taxon	Life Stage[1]	0.8-mm CWWS	3.0-mm CWWS	Existing CWIS (Control)
12 (cont.)	25-Mar-2019 (cont.)	28 (cont.)	0300-0859 (cont.)	Cod Family/Witch Flounder	Eggs			1.0
				Grubby	UNID	1.0		
					YSL	3.0		6.9
					PYSL	3.9	9.8	5.9
				Longhorn Sculpin	PYSL		2.0	
				Myoxocephalus spp.	Eggs		1.0	3.0
				Rock Gunnel	YSL	1.0		
					PYSL	3.0	4.9	3.0
				Unidentified Osteichthyes	UNID	1.0		
				Winter Flounder	Eggs	1.0		
13	01-Apr-2019	29	0900-1459	American Sand Lance	UNID			1.0
					PYSL	1.0	2.0	5.0
				Atlantic Herring	PYSL			1.0
				Grubby	YSL			11.9
					PYSL	4.0	3.0	4.0
				Longhorn Sculpin	PYSL			1.0
				Rock Gunnel	YSL			1.0
					PYSL			4.0
				Winter Flounder	Eggs		2.0	
		30	1500-2059	Alligatorfish	PYSL			1.0
				American Sand Lance	PYSL	1.0	10.0	16.1
				Atlantic Herring	PYSL		1.0	
				Grubby	YSL	1.0	2.0	5.0
					PYSL	2.0	3.0	7.0
				Rock Gunnel	YSL			2.0
					PYSL		5.0	20.1
				Shorthorn Sculpin	PYSL			1.0
		31	2100-0259	American Sand Lance	PYSL	7.0	20.2	9.0
				Atlantic Cod	PYSL			1.0
				Atlantic Seasnail	PYSL		1.0	
				Grubby	YSL		1.0	
					PYSL	2.0	11.1	11.0
				Longhorn Sculpin	PYSL		1.0	4.0
				Rock Gunnel	PYSL		4.0	3.0
				Shorthorn Sculpin	PYSL		1.0	
				Winter Flounder	Eggs			1.0
		32	0300-0859	American Sand Lance	PYSL	3.0	4.0	35.7
				Atlantic Cod	PYSL		1.0	1.0
				Atlantic Herring	PYSL			3.0
				Grubby	YSL			3.0
					PYSL	4.0	10.9	44.6
				Longhorn Sculpin	PYSL			6.0
				Pollock	PYSL			1.0

(continued)

Table B–1. (continued)

Week No.	Sampling Week (beginning Monday)	Period No.	Diel Period	Taxon	Life Stage[1]	0.8-mm CWWS	3.0-mm CWWS	Existing CWIS (Control)
13 (cont.)	01-Apr-2019 (cont.)	32 (cont.)	0300-0859 (cont.)	Rock Gunnel	YSL			2.0
					PYSL	1.0	3.0	44.6
				Sea Raven	PYSL			1.0
				Shorthorn Sculpin	PYSL			1.0
				Winter Flounder	Eggs			1.0
14	08-Apr-2019	33	0900-1459	American Sand Lance	PYSL	3.9	5.9	2.0
				Atlantic Seasnail	YSL		1.0	
					PYSL		1.0	
				Grubby	YSL		3.0	3.9
					PYSL	2.9	3.0	6.9
				Longhorn Sculpin	PYSL		1.0	
				Myoxocephalus spp.	Eggs			1.0
				Shorthorn Sculpin	PYSL		1.0	
				Winter Flounder	Eggs	2.9	4.9	7.8
					UNID	1.0	2.0	
					WF I	2.9	5.9	1.0
					WF II	1.9	4.0	
		34	1500-2059	American Sand Lance	YSL		1.0	
					PYSL	1.0	6.1	3.0
				Atlantic Seasnail	PYSL		1.0	
				Grubby	YSL	2.0	5.1	7.9
					PYSL	2.0	10.1	13.8
				Rock Gunnel	YSL		1.0	
					PYSL	4.0	14.2	18.8
				Shorthorn Sculpin	PYSL			8.9
				Winter Flounder	Eggs		2.0	3.0
					WF I	2.0		2.0
					WF II			1.0
		35	2100-0259	American Sand Lance	YSL			1.0
					PYSL	1.0	6.0	9.0
				Atlantic Herring	PYSL		2.0	1.0
				Grubby	UNID	1.0		
					YSL	3.0	4.0	5.0
					PYSL		4.0	9.0
				Longhorn Sculpin	PYSL		1.0	3.0
				Rock Gunnel	PYSL		3.0	7.0
				Sea Raven	YSL			1.0
					YOY			1.0
				Shorthorn Sculpin	PYSL		1.0	1.0
				Unidentified Osteichthyes	UNID	1.0		

(continued)

Table B–1. (continued)

Week No.	Sampling Week (beginning Monday)	Period No.	Diel Period	Taxon	Life Stage[1]	0.8-mm CWWS	3.0-mm CWWS	Existing CWIS (Control)
14 (cont.)	08-Apr-2019 (cont.)	35 (cont.)	2100-0259 (cont.)	Winter Flounder	Eggs		3.0	
					UNID	3.0	1.0	
					WF I	4.0	2.0	4.0
					WF II	4.0	1.0	1.0
		36	0300-0859	American Plaice	Eggs			1.0
				American Sand Lance	PYSL	4.0	10.9	2.0
				Atlantic Seasnail	PYSL	2.0	1.0	
				Fourbeard Rockling	Eggs			1.0
				Grubby	UNID		1.0	1.0
					YSL	5.1	2.0	3.0
					PYSL	1.0	6.0	14.1
				Gulf Snailfish	YSL			1.0
				Rock Gunnel	PYSL	1.0	6.0	3.0
					YROL			1.0
				Shorthorn Sculpin	PYSL			4.0
				Winter Flounder	Eggs			3.0
					UNID	1.0		
					WF I	1.0	1.0	
15	15-Apr-2019	37	0900-1459	American Plaice	Eggs			5.1
					YSL			1.0
				Atlantic Seasnail	PYSL	1.0		1.0
				Grubby	YSL	1.0	5.1	2.0
					PYSL	1.0	3.1	2.0
				Pollock	PYSL		1.0	
				Radiated Shanny	PYSL			2.0
				Winter Flounder	Eggs	1.0	7.1	
					WF I	6.1	2.0	
					WF II	3.1	2.0	
		38	1500-2059	American Sand Lance	PYSL		8.1	1.0
				Grubby	UNID			1.0
					YSL	2.0		8.1
					PYSL	2.0	4.1	2.0
				Pollock	PYSL		1.0	
				Rock Gunnel	PYSL		1.0	
				Smooth Flounder	PYSL	1.0		
				Windowpane/Fourspot/Summer Flounder	Eggs			1.0
				Winter Flounder	Eggs	2.0		
					UNID	10.1		
					WF I	7.0		
					WF II	5.0	2.0	1.0
		39	2100-0259	American Plaice	Eggs		3.0	
				Atlantic Seasnail	YSL			2.0
					PYSL		1.0	3.0
				Grubby	YSL	1.0	2.0	2.0

Table B–1. (continued)

Week No.	Sampling Week (beginning Monday)	Period No.	Diel Period	Taxon	Life Stage[1]	0.8-mm CWWS	3.0-mm CWWS	Existing CWIS (Control)
					PYSL	1.0	10.2	5.0
				Gulf Snailfish	YSL			1.0
				Rock Gunnel	PYSL		3.0	
				Winter Flounder	Eggs	2.0	1.0	1.0
					UNID			1.0
					WF I	1.0		2.0
					WF II	1.0		
		40	0300-0859	American Plaice	Eggs			1.0
					YSL	1.0		
				American Sand Lance	PYSL	1.0	5.0	3.0
				Atlantic Herring	PYSL		1.0	
				Atlantic Seasnail	PYSL		1.0	
				Grubby	YSL	4.0	3.0	4.0
					PYSL	2.0	5.0	3.0
				Myoxocephalus spp.	Eggs			1.0
					UNID		1.0	
				Rock Gunnel	PYSL		1.0	1.0
				Winter Flounder	Eggs	1.0		1.0
					UNID	1.0		
					WF I	1.0		10.0
					WF II	5.0		2.0
16	22-Apr-2019	41	0900-1459	Alligatorfish	PYSL			1.0
				American Sand Lance	PYSL		8.0	1.0
				Atlantic Herring	PYSL		3.0	
				Atlantic Seasnail	PYSL		1.0	
				Grubby	UNID			1.0
					YSL		1.0	
					PYSL	1.0	1.0	2.9
				Myoxocephalus spp.	Eggs			6.9
				Radiated Shanny	PYSL		1.0	
				Windowpane/Fourspot/Summer Flounder	Eggs	1.0		
				Winter Flounder	Eggs	3.0	2.0	2.9
					WF II	6.0	2.0	3.9
		42	1500-2059	American Sand Lance	PYSL	1.0	3.0	
				Atlantic Seasnail	PYSL	1.0	3.0	
				Cod Family/Witch Flounder	Eggs		1.0	
				Fourbeard Rockling	Eggs		3.0	
				Grubby	YSL		1.0	1.0
					PYSL	1.0		4.0
				Radiated Shanny	PYSL	1.0	1.0	
				Windowpane/Fourspot/Summer Flounder	Eggs	2.0		2.0
				Winter Flounder	WF I		1.0	
					WF II	2.0		

Table B–1. (continued)

Week No.	Sampling Week (beginning Monday)	Period No.	Diel Period	Taxon	Life Stage[1]	0.8-mm CWWS	3.0-mm CWWS	Existing CWIS (Control)
		43	2100-0259	American Sand Lance	PYSL		2.0	5.9
				Atlantic Cod	PYSL			1.0
				Atlantic Herring	PYSL		2.0	1.0
				Atlantic Seasnail	PYSL			2.0
				Fourbeard Rockling	Eggs			3.0
				Grubby	UNID			1.0
					YSL		1.0	
					PYSL		2.0	4.9
				Radiated Shanny	PYSL	1.0	1.0	
				Rock Gunnel	PYSL		1.0	
				Winter Flounder	Eggs			1.0
					UNID			1.0
					WF I	1.0	1.0	1.0
					WF II	3.0	1.0	2.0
		44	0300-0859	American Plaice	Eggs		1.0	2.0
				American Sand Lance	PYSL		4.0	1.0
				Atlantic Herring	PYSL		2.0	
				Atlantic Seasnail	PYSL	2.0		1.0
				Fourbeard Rockling	Eggs	16.3	13.0	7.1
				Grubby	YSL		1.0	3.0
					PYSL	2.0	7.0	1.0
				Radiated Shanny	PYSL		2.0	2.0
				Rock Gunnel	PYSL			2.0
				Winter Flounder	Eggs			1.0
					WF I			1.0
17	29-Apr-2019	45	0900-1459	American Plaice	Eggs		23.1	18.6
				Atlantic Cod/Haddock	Eggs		1.0	
				Atlantic Seasnail	PYSL			4.9
				Cod Family/Witch Flounder	Eggs			1.0
				Cunner/Tautog/Yellowtail Flounder	Eggs		1.0	
				Fourbeard Rockling	Eggs	1.0		
				Fourbeard Rockling/Hakes	Eggs	1.0	12.0	3.9
				Grubby	YSL	1.0		2.0
					PYSL		1.0	
				Radiated Shanny	PYSL		1.0	2.9
				Rainbow Smelt	YSL	4.1	3.0	
				Rock Gunnel	PYSL			1.0
				Windowpane	Eggs		1.0	
				Winter Flounder	Eggs		2.0	
					UNID			6.9
					WF II	1.0	3.0	1.0
		46	1500-2059	American Plaice	Eggs			1.0
					YSL		1.0	
				American Sand Lance	PYSL		1.0	3.0
				Atlantic Herring	PYSL		1.0	

Table B–1. (continued)

Week No.	Sampling Week (beginning Monday)	Period No.	Diel Period	Taxon	Life Stage[1]	0.8-mm CWWS	3.0-mm CWWS	Existing CWIS (Control)
				Atlantic Seasnail	PYSL		1.0	5.0
				Fourbeard Rockling	Eggs		1.0	
				Fourbeard Rockling/Hakes	Eggs	1.0		
				Grubby	PYSL		1.0	1.0
				Pollock	PYSL			1.0
				Radiated Shanny	YSL			1.0
					PYSL			1.0
				Rainbow Smelt	YSL	1.0	5.0	1.0
					PYSL			1.0
				Rock Gunnel	PYSL		1.0	1.0
				Unidentified Osteichthyes	UNID	1.0		
				Winter Flounder	Eggs	1.0		
					UNID	1.0		
					WF I			1.0
					WF II	2.0	4.0	7.0
		47	2100-0259	American Plaice	Eggs	1.0	26.3	26.1
					PYSL		1.0	
				American Sand Lance	PYSL			2.0
				Atlantic Mackerel	Eggs		1.0	
				Atlantic Seasnail	YSL		1.0	
					PYSL			3.0
				Cunner/Tautog/Yellowtail Flounder	Eggs		1.0	
				Fourbeard Rockling/Hakes	Eggs	12.0	22.2	6.0
				Grubby	PYSL			3.0
				Radiated Shanny	PYSL			1.0
				Rock Gunnel	YSL			1.0
					PYSL		1.0	7.0
				Unidentified Osteichthyes	UNID		1.0	
				Winter Flounder	Eggs	1.0		
					WF I		2.0	1.0
					WF II	2.0	8.1	4.0
		48	0300-0859	American Plaice	Eggs		5.0	4.0
				American Sand Lance	PYSL		1.0	17.0
				Atlantic Herring	PYSL			2.0
				Atlantic Seasnail	PYSL			7.0
				Fourbeard Rockling/Hakes	Eggs	1.0	2.0	1.0
				Grubby	YSL		1.0	
					PYSL		1.0	1.0
				Pollock	PYSL			2.0
					YOY			1.0
				Radiated Shanny	PYSL		1.0	3.0
				Rainbow Smelt	YSL	1.0	4.0	1.0
				Rock Gunnel	PYSL			8.0
				Unidentified Osteichthyes	UNID			1.0
				Winter Flounder	UNID	1.0		1.0

Table B–1. (continued)

Week No.	Sampling Week (beginning Monday)	Period No.	Diel Period	Taxon	Life Stage[1]	0.8-mm CWWS	3.0-mm CWWS	Existing CWIS (Control)
					WF I		2.0	
					WF II		2.0	6.0
					WF III			1.0
18	06-May-2019	49	0900-1459	American Plaice	Eggs			1.0
					PYSL		1.0	
				American Sand Lance	PYSL		1.0	
				Atlantic Seasnail	PYSL	1.0	1.0	
				Fourbeard Rockling	Eggs	4.1	6.1	7.1
				Grubby	PYSL			1.0
				Radiated Shanny	PYSL	2.0	7.1	
				Rainbow Smelt	YSL	2.0	2.0	
					PYSL	1.0		
				Rock Gunnel	YSL	1.0		
				Winter Flounder	WF II	5.1	6.1	3.1
		50	1500-2059	American Plaice	Eggs		3.0	5.1
					YSL			1.0
				American Sand Lance	PYSL		1.0	
				Atlantic Mackerel	Eggs		1.0	1.0
				Atlantic Seasnail	YSL	1.0		
					PYSL		2.0	7.2
				Fourbeard Rockling	Eggs	4.1	8.0	1.0
				Fourbeard Rockling/Hakes	Eggs			6.2
				Grubby	PYSL		1.0	
				Radiated Shanny	PYSL			18.5
				Rainbow Smelt	YSL		2.0	
					PYSL		1.0	
				Rock Gunnel	PYSL		1.0	
				Winter Flounder	Eggs		1.0	1.0
					WF I		1.0	
					WF II	1.0	4.0	4.1
		51	2100-0259	American Plaice	Eggs		1.0	5.0
					YSL	1.0	2.0	2.0
					PYSL		2.0	
				American Sand Lance	PYSL		3.0	7.0
					YOY			4.0
				Atlantic Seasnail	PYSL	1.0	1.0	1.0
				Fourbeard Rockling	Eggs	4.0	3.0	5.0
				Grubby	YSL			2.0
					PYSL	1.0	1.0	2.0
					YOY		1.0	
				Pollock	YOY			1.0
				Radiated Shanny	PYSL	3.0		3.0
				Rainbow Smelt	YSL	1.0	2.0	1.0
				Rock Gunnel	PYSL			1.0
				Unidentified Osteichthyes	UNID		2.0	

Table B–1. (continued)

Week No.	Sampling Week (beginning Monday)	Period No.	Diel Period	Taxon	Life Stage[1]	0.8-mm CWWS	3.0-mm CWWS	Existing CWIS (Control)
				Winter Flounder	Eggs	2.0		2.0
					WF II	10.0	12.8	4.0
		52	0300-0859	American Plaice	Eggs		7.0	10.0
					YSL	2.0		3.0
				American Sand Lance	PYSL		9.0	
					YOY			3.0
				Atlantic Mackerel	Eggs		1.0	2.0
				Atlantic Seasnail	PYSL	7.0	6.0	14.0
				Fourbeard Rockling	Eggs	13.0	12.0	16.1
				Grubby	YSL			3.0
					PYSL	1.0	4.0	4.0
				Gulf Snailfish	PYSL			2.0
				Radiated Shanny	PYSL	1.0		
				Rainbow Smelt	YSL		3.0	1.0
				Rock Gunnel	PYSL			1.0
				Unidentified Osteichthyes	PYSL		1.0	
				Winter Flounder	Eggs	1.0		
					WF II	10.0	1.0	10.0
		53	0900-1459	American Plaice	Eggs		2.0	4.0
					UNID			1.0
					YSL	1.0	1.0	
					PYSL	1.0		
				American Sand Lance	PYSL		2.0	
				Atlantic Herring	PYSL		1.0	
				Atlantic Mackerel	Eggs			2.0
				Atlantic Seasnail	UNID			1.0
					PYSL	5.1	1.0	1.0
				Cunner/Tautog/Yellowtail Flounder	Eggs		1.0	
				Fourbeard Rockling	Eggs	4.1	6.1	3.0
				Fourbeard Rockling/Hakes	Eggs			2.0
				Grubby	YSL		1.0	
				Radiated Shanny	YSL		1.0	
					PYSL	3.1	6.1	2.0
				Rainbow Smelt	YSL	2.1	2.0	
				Rock Gunnel	PYSL		1.0	1.0
				Unidentified Osteichthyes	UNID			3.0
					PYSL	1.0		
				Winter Flounder	Eggs		1.0	2.0
					WF II	8.2	13.1	
		54	1500-2059	American Plaice	Eggs		11.1	18.2
					PYSL			2.0
				Atlantic Mackerel	Eggs		1.0	3.0
				Atlantic Seasnail	PYSL			5.0
				Fourbeard Rockling	Eggs		2.0	2.0
				Fourbeard Rockling/Hakes	Eggs	8.2	9.1	8.1

Table B–1. (continued)

Week No.	Sampling Week (beginning Monday)	Period No.	Diel Period	Taxon	Life Stage[1]	0.8-mm CWWS	3.0-mm CWWS	Existing CWIS (Control)
				Radiated Shanny	PYSL	2.1		37.4
				Rainbow Smelt	YSL		1.0	1.0
				Rock Gunnel	PYSL			1.0
				Unidentified Osteichthyes	UNID	1.0	1.0	6.1
					PYSL			1.0
				Winter Flounder	Eggs	1.0	2.0	
					WF I			1.0
					WF II		6.1	9.1
					WF III			1.0
		55	2100-0259	American Plaice	Eggs		2.0	4.0
					YSL		1.0	
				American Sand Lance	PYSL		7.9	30.8
					YOY			9.9
				Atlantic Herring	PYSL		1.0	
				Atlantic Seasnail	YSL		2.0	
					PYSL	2.0		3.0
				Fourbeard Rockling	Eggs	1.0		
				Fourbeard Rockling/Hakes	Eggs		4.9	2.0
				Grubby	PYSL		2.0	2.0
				Radiated Shanny	UNID			1.0
					PYSL	2.0	2.0	1.0
				Rainbow Smelt	YSL	2.9		
				Rock Gunnel	PYSL		1.0	
				Unidentified Osteichthyes	UNID			1.0
				Winter Flounder	Eggs		1.0	1.0
					UNID	1.0		
					WF I	1.0		
					WF II	4.9	8.9	1.0
		56	0300-0859	American Plaice	Eggs		4.0	5.9
					UNID			1.0
					PYSL	1.0	1.0	
				American Sand Lance	PYSL	2.0	1.0	3.9
				Atlantic Mackerel	Eggs		1.0	
				Atlantic Seasnail	PYSL	2.0	4.0	2.9
				Cunner/Tautog/Yellowtail Flounder	Eggs			1.0
				Fourbeard Rockling	Eggs	1.0		
				Fourbeard Rockling/Hakes	Eggs	6.0	10.0	7.8
				Grubby	PYSL			3.9
				Radiated Shanny	PYSL	1.0	3.0	1.0
				Winter Flounder	WF I	1.0	2.0	1.0
					WF II	18.9	12.0	8.8
19	13-May-2019	57	0900-1459	American Plaice	Eggs		4.1	1.0
				American Sand Lance	PYSL			1.4
				Atlantic Mackerel	Eggs		3.0	6.1
				Atlantic Seasnail	UNID			1.4

Table B–1. (continued)

Week No.	Sampling Week (beginning Monday)	Period No.	Diel Period	Taxon	Life Stage[1]	0.8-mm CWWS	3.0-mm CWWS	Existing CWIS (Control)
					PYSL	4.0	1.0	6.8
				Cunner/Tautog/Yellowtail Flounder	Eggs		1.0	1.0
				Fourbeard Rockling	Eggs	2.0	4.1	7.1
					YSL	1.0		
					PYSL	1.0		
				Fourbeard Rockling/Hakes	Eggs	6.1	9.1	5.1
				Radiated Shanny	PYSL	6.1	13.2	152.9
				Rainbow Smelt	UNID		1.0	
					YSL			1.4
					PYSL		1.0	
				Unidentified Osteichthyes	UNID			2.7
				Winter Flounder	Eggs	1.0	1.0	
					UNID			2.7
					WF II	10.1	11.2	21.6
					WF III	3.0	1.0	
		58	1500-2059	American Plaice	Eggs		1.0	1.0
					YSL		1.0	
				Atlantic Herring	PYSL		4.1	
				Atlantic Mackerel	Eggs			1.0
				Atlantic Seasnail	PYSL	2.1	1.0	2.1
				Cod Family/Witch Flounder	Eggs		1.0	
				Cunner/Tautog/Yellowtail Flounder	Eggs		1.0	
				Fourbeard Rockling	Eggs			1.0
				Fourbeard Rockling/Hakes	Eggs	3.1	3.1	3.1
				Radiated Shanny	UNID			1.0
					PYSL	7.2	17.4	24.7
				Rainbow Smelt	YSL	2.1		1.0
					PYSL		1.0	
				Rock Gunnel	YSL			1.0
				Winter Flounder	UNID			1.0
					WF I			1.0
					WF II	3.1	13.3	10.3
		59	2100-0259	American Eel	YROL			1.0
				American Plaice	Eggs			2.1
				American Sand Lance	PYSL	1.0	2.0	3.1
					YOY		2.0	1.0
				Atlantic Herring	PYSL		1.0	
				Atlantic Mackerel	Eggs	1.0	3.0	
				Atlantic Seasnail	PYSL	1.0	1.0	8.2
				Cunner/Tautog/Yellowtail Flounder	Eggs	1.0		1.0
				Fourbeard Rockling	Eggs	2.9	3.0	1.0
					YSL	1.0	1.0	
				Fourbeard Rockling/Hakes	Eggs	3.9	8.0	2.1
				Radiated Shanny	YSL			4.1
					PYSL	2.9	7.0	45.2

Table B–1. (continued)

Week No.	Sampling Week (beginning Monday)	Period No.	Diel Period	Taxon	Life Stage[1]	0.8-mm CWWS	3.0-mm CWWS	Existing CWIS (Control)
				Rock Gunnel	PYSL			1.0
				Unidentified Osteichthyes	Eggs			1.0
					UNID			1.0
				Winter Flounder	Eggs	1.0	1.0	1.0
					WF I		2.0	
					WF II	5.9	13.0	21.6
					WF III	1.0	1.0	
		60	0300-0859	American Sand Lance	PYSL		6.9	10.1
				Atlantic Herring	PYSL		3.0	
				Atlantic Mackerel	Eggs		3.0	1.0
				Atlantic Seasnail	PYSL	1.0	2.0	2.0
				Fourbeard Rockling	Eggs			5.0
				Fourbeard Rockling/Hakes	Eggs		4.0	1.0
				Herring Family	PYSL			2.0
				Radiated Shanny	UNID			4.0
					YSL			3.0
					PYSL	7.0	8.9	22.2
				Rainbow Smelt	UNID			1.0
					YSL		1.0	
					PYSL		4.0	2.0
				Unidentified Osteichthyes	UNID			1.0
				Winter Flounder	Eggs		1.0	
					WF II	4.0	5.9	10.1
					WF III		1.0	
		61	0900-1459	American Plaice	Eggs			4.1
					YSL			1.0
				American Sand Lance	PYSL	1.0		1.0
				Atlantic Mackerel	Eggs			2.0
				Atlantic Seasnail	PYSL		1.0	8.1
				Cunner/Tautog/Yellowtail Flounder	Eggs	1.0		1.0
				Fourbeard Rockling	Eggs	2.1	1.0	5.1
					YSL			1.0
				Fourbeard Rockling/Hakes	Eggs	5.1	4.0	7.1
				Radiated Shanny	PYSL		4.0	20.3
				Rainbow Smelt	YSL	1.0	1.0	
				Unidentified Osteichthyes	UNID		1.0	
					PYSL			2.0
				Winter Flounder	Eggs		1.0	
					WF II	14.4	12.0	21.4
					WF III		3.0	
		62	1500-2059	American Sand Lance	PYSL	1.0	1.0	
				Atlantic Mackerel	Eggs		2.0	1.0
				Atlantic Seasnail	YSL		1.0	
					PYSL	2.1	2.0	4.1
				Cunner/Tautog/Yellowtail Flounder	Eggs		1.0	3.1

Table B–1. (continued)

Week No.	Sampling Week (beginning Monday)	Period No.	Diel Period	Taxon	Life Stage[1]	0.8-mm CWWS	3.0-mm CWWS	Existing CWIS (Control)
				Fourbeard Rockling/Hakes	Eggs	2.1	2.0	1.0
				Grubby	PYSL		1.0	
				Radiated Shanny	PYSL	9.3	13.1	29.5
				Rainbow Smelt	PYSL	1.0	2.0	
				Windowpane	Eggs			1.0
				Winter Flounder	WF II	5.1	5.0	7.1
					WF III		1.0	
		63	2100-0259	American Plaice	Eggs		4.0	5.1
					YSL		1.0	
				American Sand Lance	YOY			1.0
				Atlantic Herring	PYSL		1.0	
				Atlantic Mackerel	Eggs	2.0	4.0	5.1
				Atlantic Seasnail	PYSL	4.1	3.0	18.2
				Fourbeard Rockling	Eggs	2.0	2.0	6.1
					PYSL		1.0	
				Fourbeard Rockling/Hakes	Eggs	16.3	13.1	20.3
				Grubby	PYSL		2.0	3.0
				Pollock	YOY			2.0
				Radiated Shanny	UNID			7.1
					PYSL	2.0	3.0	2.0
				Rock Gunnel	PYSL			1.0
				Winter Flounder	Eggs	1.0		
					UNID			1.0
					WF II	16.3	16.1	31.4
					WF III		1.0	3.0
		64	0300-0859	American Plaice	Eggs		1.0	
				American Sand Lance	PYSL		2.0	9.1
				Atlantic Herring	PYSL			1.0
				Atlantic Mackerel	Eggs			1.0
				Atlantic Seasnail	PYSL	6.1	1.0	9.1
				Fourbeard Rockling	Eggs			2.0
					YSL			1.0
				Fourbeard Rockling/Hakes	Eggs		2.0	2.0
				Grubby	PYSL			1.0
				Radiated Shanny	YSL	1.0		
					PYSL	7.2	8.1	29.2
				Rainbow Smelt	YSL	1.0		1.0
					PYSL			1.0
				Winter Flounder	UNID		1.0	
					WF I	1.0		1.0
					WF II	7.2	4.1	4.0
20	20-May-2019	65	0900-1459	American Plaice	Eggs		1.0	8.2
				Atlantic Mackerel	Eggs		1.0	2.1
				Atlantic Seasnail	UNID			1.0
					PYSL	1.0	2.0	

Table B–1. (continued)

Week No.	Sampling Week (beginning Monday)	Period No.	Diel Period	Taxon	Life Stage[1]	0.8-mm CWWS	3.0-mm CWWS	Existing CWIS (Control)
				Cunner/Tautog/Yellowtail Flounder	Eggs	1.0	2.0	3.1
				Cusk	Eggs		1.0	
				Fourbeard Rockling	Eggs	1.0	1.0	2.1
				Fourbeard Rockling/Hakes	Eggs	7.2	4.1	7.2
				Radiated Shanny	YSL			1.0
				Rainbow Smelt	PYSL		1.0	
				Unidentified Osteichthyes	UNID	1.0		5.1
				Windowpane/Fourspot/Summer Flounder	Eggs			1.0
				Winter Flounder	UNID		2.0	
					WF II		8.2	3.1
					WF III		3.1	1.0
		66	1500-2059	American Plaice	Eggs		15.4	15.4
					YSL		1.0	1.0
				Atlantic Seasnail	PYSL		1.0	1.0
				Cunner/Tautog/Yellowtail Flounder	Eggs	12.3	12.3	57.4
				Fourbeard Rockling	Eggs	2.1	3.1	
				Fourbeard Rockling/Hakes	Eggs	11.3	5.1	6.1
				Radiated Shanny	PYSL		2.1	
				Rainbow Smelt	PYSL		1.0	
				Unidentified Osteichthyes	UNID	1.0		
				Winter Flounder	UNID	3.1		
					WF I	2.1		
					WF II		3.1	5.1
					WF III	2.1		
		67	2100-0259	American Plaice	Eggs		4.1	9.3
					YSL			1.0
				American Sand Lance	PYSL			1.0
				Atlantic Herring	PYSL		3.1	
				Atlantic Mackerel	Eggs			1.0
				Atlantic Seasnail	PYSL	3.0	2.1	1.0
				Cunner/Tautog/Yellowtail Flounder	Eggs	4.0	7.2	3.1
				Fourbeard Rockling	Eggs		3.1	2.1
				Fourbeard Rockling/Hakes	Eggs	2.0	3.1	5.1
				Radiated Shanny	PYSL	2.0		
				Unidentified Osteichthyes	Eggs		1.0	
				Winter Flounder	WF II	2.0	3.1	7.2
					WF III	2.0	4.1	6.2
		68	0300-0859	American Plaice	Eggs		8.1	8.1
					YSL		4.0	
				Atlantic Seasnail	UNID			1.0
					PYSL		1.0	1.0
				Cunner/Tautog/Yellowtail Flounder	Eggs	4.0	1.0	3.0
				Fourbeard Rockling	Eggs		1.0	
				Fourbeard Rockling/Hakes	Eggs	4.0	6.1	3.0

Table B–1. (continued)

Week No.	Sampling Week (beginning Monday)	Period No.	Diel Period	Taxon	Life Stage[1]	0.8-mm CWWS	3.0-mm CWWS	Existing CWIS (Control)
				Radiated Shanny	PYSL			1.0
				Windowpane	Eggs	1.0	1.0	2.0
				Winter Flounder	UNID			1.0
					WF II	9.0	15.1	3.0
					WF III			3.0
		69	0900-1459	American Plaice	Eggs		2.0	2.0
				American Sand Lance	PYSL	1.0		
				Atlantic Mackerel	Eggs		1.0	2.0
				Atlantic Seasnail	PYSL	2.0		1.0
				Cunner/Tautog/Yellowtail Flounder	Eggs	1.0	2.0	4.0
				Fourbeard Rockling	Eggs			1.0
				Fourbeard Rockling/Hakes	Eggs	3.0	2.0	3.0
				Radiated Shanny	PYSL		3.0	2.0
				Windowpane	Eggs		1.0	
				Winter Flounder	Eggs	2.0		
					UNID		1.0	
					WF II	1.0	2.0	2.0
					WF III	3.0	1.0	4.0
		70	1500-2059	American Plaice	Eggs		18.8	15.1
					YSL	1.0		
				Atlantic Seasnail	PYSL	2.0		3.0
				Cunner/Tautog/Yellowtail Flounder	Eggs	12.1	15.8	49.4
				Fourbeard Rockling	Eggs	3.0	1.0	2.0
					YSL		1.0	
				Fourbeard Rockling/Hakes	Eggs	8.0	9.9	10.1
				Radiated Shanny	PYSL			2.0
				Winter Flounder	WF II	6.0	2.0	11.1
		71	2100-0259	American Plaice	Eggs		5.0	4.1
					YSL		1.0	2.1
				Atlantic Seasnail	PYSL			1.0
				Cunner/Tautog/Yellowtail Flounder	Eggs	7.2	8.0	10.3
				Fourbeard Rockling	Eggs	1.0		1.0
				Fourbeard Rockling/Hakes	Eggs		1.0	2.1
				Herring Family	PYSL			1.0
				Radiated Shanny	PYSL	1.0		1.0
				Threespine Stickleback	YROL			1.0
				Winter Flounder	WF II	1.0	1.0	
					WF III	1.0		2.1
		72	0300-0859	American Plaice	Eggs		33.0	19.8
					YSL	2.0	3.0	2.0
					PYSL			2.0
				Atlantic Seasnail	PYSL		2.0	
				Cunner/Tautog/Yellowtail Flounder	Eggs	5.0	4.0	3.0
				Fourbeard Rockling	Eggs	4.0	5.0	5.0
					YSL			1.0

Table B–1. (continued)

Week No.	Sampling Week (beginning Monday)	Period No.	Diel Period	Taxon	Life Stage[1]	0.8-mm CWWS	3.0-mm CWWS	Existing CWIS (Control)
				Fourbeard Rockling/Hakes	Eggs	15.0	27.0	12.9
				Radiated Shanny	UNID		1.0	
					YSL		2.0	
					PYSL	8.0		1.0
				Windowpane	Eggs	2.0		
				Windowpane/Fourspot/Summer Flounder	Eggs			1.0
				Winter Flounder	WF II	5.0	6.0	6.0
					WF III		4.0	1.0
21	27-May-2019	73	0900-1459	American Plaice	Eggs		2.0	2.7
					PYSL		1.0	
				Cunner/Tautog/Yellowtail Flounder	Eggs	133.8	297.5	689.0
				Fourbeard Rockling	Eggs		1.0	
				Fourbeard Rockling/Hakes	Eggs		1.0	
				Herring Family	YSL	1.0	1.0	
				Radiated Shanny	PYSL			1.0
				Rainbow Smelt	PYSL	2.0		
				Winter Flounder	WF II	1.0		
		74	1500-2059	Atlantic Seasnail	PYSL	1.0		
				Cunner/Tautog/Yellowtail Flounder	Eggs	96.1	135.5	144.6
				Fourbeard Rockling	Eggs			1.0
					PYSL			1.0
				Fourbeard Rockling/Hakes	Eggs	1.0	2.0	1.0
				Radiated Shanny	PYSL	1.0		
				Rainbow Smelt	PYSL	2.0		
				Windowpane/Fourspot/Summer Flounder	Eggs	1.0	1.0	
				Winter Flounder	WF I			1.0
					WF II	1.0	2.0	1.0
					WF III	1.0	2.0	
		75	2100-0259	American Plaice	UNID		1.0	
				American Sand Lance	PYSL		1.0	
				Atlantic Mackerel/Cusk	Eggs		3.0	
				Atlantic Seasnail	PYSL	1.0		3.9
				Cunner/Tautog/Yellowtail Flounder	Eggs	16.7	43.4	26.6
				Fourbeard Rockling	Eggs		2.0	
				Fourbeard Rockling/Hakes	Eggs		3.0	2.0
				Radiated Shanny	PYSL		1.0	
				Windowpane	Eggs		2.0	1.0
				Winter Flounder	WF II	1.0	1.0	1.0
					WF III	2.0	3.0	
		76	0300-0859	Atlantic Mackerel/Cusk	Eggs	1.0		
				Cunner/Tautog/Yellowtail Flounder	Eggs	28.0	13.0	10.7
				Fourbeard Rockling/Hakes	Eggs		1.0	
				Hakes	Eggs			1.0

Table B–1. (continued)

Week No.	Sampling Week (beginning Monday)	Period No.	Diel Period	Taxon	Life Stage[1]	0.8-mm CWWS	3.0-mm CWWS	Existing CWIS (Control)
				Herring Family	PYSL			1.0
				Radiated Shanny	PYSL	1.0	2.0	
				Winter Flounder	WF II	1.0		1.0
		77	0900-1459	Atlantic Mackerel/Cusk	Eggs		1.0	
				Atlantic Seasnail	YSL			3.9
					PYSL			1.0
				Cunner/Tautog/Yellowtail Flounder	Eggs	152.7	276.5	751.5
				Fourbeard Rockling	PYSL			1.0
				Lumpfish	PYSL			1.0
				Radiated Shanny	PYSL	1.0	3.0	2.9
				Rainbow Smelt	PYSL		4.9	
				Winter Flounder	WF II		2.0	1.0
					WF III			1.0
					WF IV	1.0		
		78	1500-2059	Atlantic Mackerel/Cusk	Eggs	1.0		
				Atlantic Seasnail	PYSL			1.0
				Cunner/Tautog/Yellowtail Flounder	Eggs	184.3	224.4	177.8
				Fourbeard Rockling	Eggs		1.0	
		79	2100-0259	American Plaice	Eggs		1.0	1.0
				Atlantic Mackerel/Cusk	Eggs		3.0	1.9
				Atlantic Seasnail	PYSL	1.0	2.0	1.9
				Cunner/Tautog/Yellowtail Flounder	Eggs	24.0	49.7	23.4
				Fourbeard Rockling	UNID		1.0	
				Fourbeard Rockling/Hakes	Eggs		1.0	1.0
				Radiated Shanny	PYSL	1.0	7.9	4.9
				Windowpane	Eggs	1.0	2.0	1.0
				Winter Flounder	WF II		2.0	3.9
					WF III	1.0	1.0	3.9
		80	0300-0859	American Plaice	Eggs			1.0
					UNID			1.0
				Atlantic Mackerel/Cusk	Eggs	1.0		
				Atlantic Seasnail	PYSL	1.0		
				Cunner/Tautog/Yellowtail Flounder	Eggs	24.2	39.0	14.9
				Fourbeard Rockling	PYSL			1.0
				Radiated Shanny	PYSL	1.0	1.0	4.0
				Rainbow Smelt	PYSL			1.0
				Windowpane	Eggs	1.0	2.1	1.0
				Winter Flounder	Eggs			3.0
					WF II		1.0	
					WF IV			1.0
22	03-Jun-2019	81	0900-1459	American Plaice	Eggs		29.9	16.8
					UNID	3.0	5.0	3.0
					YSL			1.0
					PYSL	23.9	18.9	2.0
				Atlantic Mackerel	Eggs	1.0		4.9

Table B–1. (continued)

Week No.	Sampling Week (beginning Monday)	Period No.	Diel Period	Taxon	Life Stage[1]	0.8-mm CWWS	3.0-mm CWWS	Existing CWIS (Control)
				Atlantic Mackerel/Cusk	Eggs	2.0	27.9	4.9
				Atlantic Seasnail	PYSL	1.0	1.0	1.0
				Cunner/Tautog/Yellowtail Flounder	Eggs	31.8	43.8	71.2
				Cusk	Eggs		5.0	5.9
				Fourbeard Rockling	Eggs	8.0	9.0	5.9
					PYSL		1.0	
				Fourbeard Rockling/Hakes	Eggs	22.9	27.9	15.8
				Hakes	Eggs		1.0	
				Radiated Shanny	PYSL		2.0	1.0
				Rainbow Smelt	PYSL	1.0		
				Windowpane/Fourspot/Summer Flounder	Eggs		3.0	1.0
				Winter Flounder	WF II	6.0	9.0	1.0
					WF III	7.0	3.0	4.0
					WF IV		1.0	1.0
		82	1500-2059	American Plaice	Eggs		21.2	
					UNID		1.0	1.0
					YSL		7.0	1.0
					PYSL	2.0	3.0	
				Atlantic Mackerel/Cusk	Eggs	3.0	5.3	
				Atlantic Seasnail	PYSL			1.0
				Cod Family/Witch Flounder	Eggs		5.3	
				Cunner/Tautog/Yellowtail Flounder	Eggs	409.6	1444.9	2983.4
				Fourbeard Rockling	Eggs	3.0	5.3	10.8
				Fourbeard Rockling/Hakes	Eggs	2.0	10.6	10.8
				Shorthorn Sculpin	YOY			1.0
				Unidentified Osteichthyes	UNID		1.0	2.0
				Windowpane	Eggs			10.8
				Winter Flounder	WF II	1.0	5.0	1.0
					WF III	1.0	6.0	2.0
					WF IV		1.0	1.0
		83	2100-0259	American Plaice	Eggs		18.6	11.0
					UNID	4.0		
					PYSL		4.0	
				American Sand Lance	PYSL		1.0	
				Atlantic Mackerel	Eggs			2.0
				Atlantic Mackerel/Cusk	Eggs	7.9	24.0	8.0
				Atlantic Seasnail	PYSL	3.0	2.0	
				Cod Family/Witch Flounder	Eggs			1.0
				Cunner/Tautog/Yellowtail Flounder	Eggs	300.6	342.2	168.3
				Cusk	Eggs		2.7	2.0
				Fourbeard Rockling	Eggs	9.9	20.0	7.0
				Fourbeard Rockling/Hakes	Eggs	22.8	28.0	15.0
				Radiated Shanny	UNID			1.0
					PYSL	3.0	6.0	

Table B–1. (continued)

Week No.	Sampling Week (beginning Monday)	Period No.	Diel Period	Taxon	Life Stage[1]	0.8-mm CWWS	3.0-mm CWWS	Existing CWIS (Control)
				Unidentified Osteichthyes	PYSL		1.0	
				Windowpane	Eggs		2.7	
				Windowpane/Fourspot/Summer Flounder	Eggs			2.0
				Winter Flounder	WF II	9.9	7.0	4.0
					WF III	6.9	15.0	3.0
					WF IV		1.0	3.0
		84	0300-0859	American Plaice	Eggs		23.2	14.7
					UNID	2.0		2.0
					YSL	2.0		
					PYSL	1.0		
				American Sand Lance	PYSL		2.0	
				Atlantic Mackerel	Eggs		1.0	
				Atlantic Mackerel/Cusk	Eggs	1.0	6.0	10.8
				Atlantic Seasnail	UNID	1.0		
					YSL	3.0		
					PYSL		2.0	3.9
				Cod Family/Witch Flounder	Eggs		1.0	1.0
				Cunner/Tautog/Yellowtail Flounder	Eggs	81.0	137.9	94.3
				Cusk	Eggs		1.0	
				Fourbeard Rockling	Eggs	9.1	15.1	15.7
				Fourbeard Rockling/Hakes	Eggs	12.2	18.1	13.8
				Radiated Shanny	PYSL	2.0	2.0	1.0
				Unidentified Osteichthyes	UNID	1.0	1.0	
				Windowpane	Eggs	2.0	2.0	
				Windowpane/Fourspot/Summer Flounder	Eggs	2.0	4.0	2.0
				Winter Flounder	WF II	4.1	6.0	5.9
					WF III	5.1	14.1	6.9
					WF IV	3.0	3.0	
		85	0900-1459	American Plaice	Eggs		9.0	3.0
					YSL		5.0	
					PYSL			2.0
				Atlantic Mackerel/Cusk	Eggs	1.0	12.1	9.0
				Atlantic Seasnail	PYSL			2.0
				Cunner/Tautog/Yellowtail Flounder	Eggs	75.4	90.4	79.1
				Cusk	Eggs		5.0	3.0
				Fourbeard Rockling	Eggs	4.0	9.0	7.0
				Fourbeard Rockling/Hakes	Eggs	11.1	15.1	6.0
				Radiated Shanny	PYSL	3.0	2.0	1.0
				Rainbow Smelt	PYSL		1.0	
				Windowpane	Eggs		2.0	2.0
				Winter Flounder	WF II	2.0	9.0	2.0
					WF III	4.0	2.0	2.0
		86		American Plaice	Eggs		18.9	15.8

Table B–1. (continued)

Week No.	Sampling Week (beginning Monday)	Period No.	Diel Period	Taxon	Life Stage[1]	0.8-mm CWWS	3.0-mm CWWS	Existing CWIS (Control)
			1500-2059		UNID			3.0
					PYSL	2.0	8.1	
				Atlantic Mackerel/Cusk	Eggs	2.7	8.1	
				Atlantic Seasnail	PYSL		2.0	1.0
				Cunner/Tautog/Yellowtail Flounder	Eggs	339.2	525.3	884.5
				Cusk	Eggs			2.6
				Fourbeard Rockling	Eggs	5.4		13.2
				Fourbeard Rockling/Hakes	Eggs	10.8	16.2	13.2
				Radiated Shanny	PYSL		2.0	
				Windowpane	Eggs	4.1	2.7	
				Windowpane/Fourspot/Summer Flounder	Eggs	2.7		
				Winter Flounder	WF II	4.1	5.1	
					WF III	2.0	2.0	
					WF IV		1.0	
		87	2100-0259	American Plaice	Eggs		7.0	
					PYSL	7.0		
				American Sand Lance	PYSL		1.0	
				Atlantic Mackerel/Cusk	Eggs	3.0	5.0	7.2
				Atlantic Seasnail	PYSL		1.0	1.0
				Cunner/Tautog/Yellowtail Flounder	Eggs	287.1	381.4	158.3
				Cusk	Eggs		1.0	
				Fourbeard Rockling	Eggs	4.0	4.0	3.1
					PYSL	1.0		
				Fourbeard Rockling/Hakes	Eggs	6.0	8.0	9.3
				Radiated Shanny	PYSL	1.0	1.0	2.1
				Rock Gunnel	PYSL		1.0	
				Windowpane	Eggs	2.0		1.0
				Windowpane/Fourspot/Summer Flounder	Eggs	1.0		
				Winter Flounder	WF II	5.0	3.0	2.1
					WF III	5.0	2.0	2.1
					WF IV			1.0
		88	0300-0859	American Plaice	Eggs		14.2	4.9
					UNID		1.0	
					PYSL	8.1	4.1	2.0
				Atlantic Mackerel/Cusk	Eggs	4.1	7.1	3.9
				Atlantic Seasnail	PYSL		2.0	2.0
				Cunner/Tautog/Yellowtail Flounder	Eggs	315.9	367.4	175.5
				Cusk	YSL		2.0	
				Fourbeard Rockling	Eggs	6.1	10.1	4.9
				Fourbeard Rockling/Hakes	Eggs	11.1	9.1	8.9
				Grubby	PYSL		2.0	
				Radiated Shanny	PYSL		3.0	1.0
				Windowpane	Eggs	3.0	3.0	3.0

Table B–1. (continued)

Week No.	Sampling Week (beginning Monday)	Period No.	Diel Period	Taxon	Life Stage[1]	0.8-mm CWWS	3.0-mm CWWS	Existing CWIS (Control)
				Winter Flounder	WF II	8.1	12.2	3.0
					WF III	2.0	3.0	1.0
					WF IV	3.0	2.0	
23	10-Jun-2019	89	0900-1459	American Plaice	Eggs			2.7
					UNID		1.0	
					YSL			1.0
				Atlantic Mackerel	Eggs			2.7
				Atlantic Menhaden	Eggs	9.0	241.9	42.4
				Atlantic Seasnail	PYSL		1.0	
				Cunner/Tautog/Yellowtail Flounder	Eggs	252.3	443.9	795.3
				Cusk	UNID		1.0	
				Fourbeard Rockling	PYSL	2.0		
				Fourbeard Rockling/Hakes	Eggs	1.0		8.0
				Radiated Shanny	PYSL		1.0	
				Windowpane	Eggs	1.0		
				Windowpane/Fourspot/Summer Flounder	Eggs	1.0		2.7
				Winter Flounder	WF II	2.0		
					WF III		2.0	1.0
		90	1500-2059	American Plaice	PYSL		2.0	
				Atlantic Mackerel	Eggs			6.0
				Atlantic Mackerel/Cusk	Eggs	4.1	2.0	4.0
				Atlantic Menhaden	Eggs	14.2	137.9	118.0
				Atlantic Seasnail	PYSL		1.0	1.0
				Cunner/Tautog/Yellowtail Flounder	Eggs	417.0	663.0	532.0
				Cusk	YSL		1.0	
				Fourbeard Rockling/Hakes	Eggs	4.1	6.1	2.0
				Radiated Shanny	PYSL	4.1		
				Windowpane/Fourspot/Summer Flounder	Eggs	2.0	2.0	
				Winter Flounder	WF II	4.1		1.0
					WF III		1.0	2.0
					WF IV			1.0
		91	2100-0259	American Plaice	UNID		1.0	
					PYSL			1.0
				Atlantic Mackerel/Cusk	Eggs	3.0		4.0
				Atlantic Menhaden	Eggs	1.0	42.6	28.0
				Atlantic Seasnail	PYSL		1.0	5.0
				Cod Family/Witch Flounder	Eggs		2.7	
				Cunner/Tautog/Yellowtail Flounder	Eggs	210.7	482.2	803.3
				Fourbeard Rockling	Eggs	2.0	2.7	
				Fourbeard Rockling/Hakes	Eggs	3.0		
				Radiated Shanny	PYSL			1.0
				Rainbow Smelt	PYSL	1.0		
				Threespine Stickleback	YOY			1.0

Table B–1. (continued)

Week No.	Sampling Week (beginning Monday)	Period No.	Diel Period	Taxon	Life Stage[1]	0.8-mm CWWS	3.0-mm CWWS	Existing CWIS (Control)
				Windowpane	Eggs	1.0		
				Windowpane/Fourspot/Summer Flounder	Eggs	3.0	8.0	
				Winter Flounder	WF II			2.0
					WF III	5.0	7.0	2.0
					WF IV		1.0	
		92	0300-0859	American Plaice	Eggs		4.0	
					PYSL		1.0	
				Atlantic Mackerel	Eggs	3.0		4.0
				Atlantic Mackerel/Cusk	Eggs	3.0	4.0	6.0
				Atlantic Menhaden	Eggs	5.0	53.9	44.0
				Atlantic Seasnail	YSL		1.0	
					PYSL			1.0
				Cunner/Tautog/Yellowtail Flounder	Eggs	185.3	341.6	631.5
				Cusk	Eggs		2.0	
				Fourbeard Rockling	Eggs		2.0	2.0
					YSL			1.0
					PYSL			1.0
				Fourbeard Rockling/Hakes	Eggs	4.0	4.0	4.0
				Radiated Shanny	PYSL	2.0	1.0	1.0
				Rainbow Smelt	PYSL		1.0	
				Windowpane	Eggs	3.0	10.0	2.0
				Windowpane/Fourspot/Summer Flounder	Eggs	6.0		
				Winter Flounder	WF II		1.0	
					WF III		1.0	
					WF IV		1.0	1.0
		93	0900-1459	American Plaice	UNID	1.0		
				Atlantic Mackerel/Cusk	Eggs		6.0	4.0
				Atlantic Menhaden	Eggs		6.0	8.0
				Atlantic Seasnail	PYSL		1.0	4.0
				Cunner/Tautog/Yellowtail Flounder	Eggs	383.4	664.6	1069.3
				Fourbeard Rockling	Eggs	2.7	4.0	
				Fourbeard Rockling/Hakes	Eggs	4.0	2.0	4.0
				Northern Pipefish	PYSL			1.0
				Radiated Shanny	PYSL		1.0	2.0
				Windowpane/Fourspot/Summer Flounder	Eggs		4.0	
				Winter Flounder	WF II		1.0	2.0
					WF III	1.0	2.0	2.0
		94	1500-2059	American Plaice	Eggs		2.0	
					YSL			1.0
					PYSL	1.0		
				Atlantic Mackerel	Eggs			6.5
				Atlantic Mackerel/Cusk	Eggs	8.0	2.0	1.3
				Atlantic Menhaden	Eggs	1.3	55.3	20.8

Table B–1. (continued)

Week No.	Sampling Week (beginning Monday)	Period No.	Diel Period	Taxon	Life Stage[1]	0.8-mm CWWS	3.0-mm CWWS	Existing CWIS (Control)
				Atlantic Seasnail	PYSL		2.0	2.0
				Cunner/Tautog/Yellowtail Flounder	Eggs	525.0	736.8	449.6
				Fourbeard Rockling/Hakes	Eggs	1.3		2.6
				Hakes	Eggs			1.3
				Herring Family	PYSL			1.0
				Northern Pipefish	PYSL		1.0	2.0
				Radiated Shanny	PYSL			1.0
				Windowpane	Eggs	1.3		
				Windowpane/Fourspot/Summer Flounder	Eggs	1.3		
				Winter Flounder	WF III	1.0		
		95	2100-0259	American Plaice	Eggs		10.0	8.0
					YSL			1.0
					PYSL	1.0		
				Atlantic Mackerel/Cusk	Eggs	2.0	12.0	
				Atlantic Menhaden	Eggs		4.0	4.0
				Atlantic Seasnail	PYSL	1.0		3.0
				Cunner/Tautog/Yellowtail Flounder	Eggs	158.0	384.5	973.2
				Fourbeard Rockling	Eggs		4.0	
					PYSL			1.0
				Fourbeard Rockling/Hakes	Eggs	4.0	8.0	4.0
				Radiated Shanny	PYSL		2.0	5.0
				Windowpane	Eggs	2.0	4.0	
				Winter Flounder	WF II	3.0		
					WF III	2.0	9.0	9.0
					WF IV		2.0	
		96	0300-0859	American Plaice	PYSL		1.0	
				Atlantic Mackerel	Eggs		1.0	
				Atlantic Mackerel/Cusk	Eggs	1.0	1.0	
				Atlantic Menhaden	Eggs	1.0	25.0	25.5
				Cunner/Tautog/Yellowtail Flounder	Eggs	134.0	186.4	458.4
				Fourbeard Rockling	Eggs	1.0		
				Northern Pipefish	PYSL		2.0	2.0
				Radiated Shanny	PYSL	1.0		
				Windowpane	Eggs	4.0	5.0	2.0
				Windowpane/Fourspot/Summer Flounder	Eggs	5.0		
				Winter Flounder	WF II		1.0	
					WF III		1.0	
24	17-Jun-2019	97	0900-1459	American Plaice	Eggs			4.0
					UNID		3.0	
					YSL			2.0
				Atlantic Mackerel	Eggs	1.0		1.0
				Atlantic Seasnail	PYSL	1.0	1.0	1.0
				Cod Family/Witch Flounder	Eggs			1.0

Table B–1. (continued)

Week No.	Sampling Week (beginning Monday)	Period No.	Diel Period	Taxon	Life Stage[1]	0.8-mm CWWS	3.0-mm CWWS	Existing CWIS (Control)
				Cunner	Eggs		2.0	
				Cunner/Tautog/Yellowtail Flounder	Eggs	258.2	310.9	112.9
				Cusk	Eggs		1.0	5.0
					YSL			1.0
				Fourbeard Rockling	Eggs	1.0	5.0	1.0
					PYSL	1.0		
				Fourbeard Rockling/Hakes	Eggs	9.0	14.0	14.0
				Hakes	Eggs	1.0		
				Northern Pipefish	PYSL			1.0
				Radiated Shanny	PYSL	3.0	1.0	
				Windowpane	Eggs		1.0	
				Windowpane/Fourspot/Summer Flounder	Eggs	2.0	2.0	1.0
				Winter Flounder	WF II	2.0	1.0	
					WF III	1.0	1.0	
					WF IV			1.0
		98	1500-2059	American Plaice	Eggs		8.0	7.9
					YSL		1.0	
					PYSL	1.0		
				Atlantic Mackerel	Eggs	2.0		
				Atlantic Mackerel/Cusk	Eggs	2.0		
				Atlantic Seasnail	PYSL			1.0
				Cunner	Eggs	2.0		
					YSL		1.0	
				Cunner/Tautog/Yellowtail Flounder	Eggs	674.1	1017.4	2659.3
				Fourbeard Rockling	Eggs	4.1	4.0	
				Fourbeard Rockling/Hakes	Eggs	8.2	4.0	7.9
				Radiated Shanny	PYSL	1.0		1.0
				Windowpane/Fourspot/Summer Flounder	Eggs		4.0	
				Winter Flounder	WF III		2.0	
					WF IV	1.0		1.0
				Yellowtail Flounder	Eggs	2.0		
		99	2100-0259	American Plaice	UNID	1.0		
					YSL		1.0	1.0
					PYSL	2.0	2.0	1.0
				Atlantic Seasnail	PYSL	2.0	2.0	
				Cod Family/Witch Flounder	Eggs		4.0	1.0
				Cunner	Eggs	2.0	4.0	
				Cunner/Tautog/Yellowtail Flounder	Eggs	701.5	905.1	358.3
				Fourbeard Rockling	Eggs	2.0		1.0
					PYSL	1.0		
				Fourbeard Rockling/Hakes	Eggs	5.9	7.9	9.1
				Northern Pipefish	PYSL		2.0	1.0
				Radiated Shanny	PYSL	5.9	11.9	2.0

Table B–1. (continued)

Week No.	Sampling Week (beginning Monday)	Period No.	Diel Period	Taxon	Life Stage[1]	0.8-mm CWWS	3.0-mm CWWS	Existing CWIS (Control)
				Windowpane/Fourspot/Summer Flounder	Eggs			1.0
				Winter Flounder	WF II	1.0		
					WF III	2.0	3.0	
					WF IV	2.9	1.0	2.0
		100	0300-0859	American Plaice	Eggs			6.9
					UNID	1.0	1.0	
					YSL		1.0	
					PYSL	4.0		
				Atlantic Mackerel	Eggs		4.0	
				Atlantic Mackerel/Cusk	Eggs	1.0		1.0
				Atlantic Seasnail	PYSL	1.0	1.0	1.0
				Cod Family/Witch Flounder	Eggs			1.0
				Cunner	Eggs	2.0	2.0	
				Cunner/Tautog/Yellowtail Flounder	Eggs	395.2	465.8	254.8
				Cusk	Eggs			1.0
					YSL	1.0		
				Fourbeard Rockling	Eggs	2.0	2.0	5.9
					PYSL	1.0	1.0	1.0
				Fourbeard Rockling/Hakes	Eggs	13.1	10.0	6.9
				Radiated Shanny	PYSL	7.0	7.0	4.9
				Unidentified Osteichthyes	UNID		1.0	
				Windowpane/Fourspot/Summer Flounder	Eggs	2.0	6.0	2.0
				Winter Flounder	WF II	4.0	3.0	3.0
					WF III	1.0	4.0	1.0
					WF IV	1.0	1.0	1.0
		101	0900-1459	American Plaice	Eggs			2.0
					UNID	1.0		
				Atlantic Mackerel	Eggs			6.0
				Atlantic Mackerel/Cusk	Eggs	1.0	3.0	1.0
				Atlantic Menhaden	Eggs	1.0		1.0
				Butterfish	Eggs		1.0	
				Cod Family/Witch Flounder	Eggs	1.0		
				Cunner	Eggs	1.0		1.0
				Cunner/Tautog/Yellowtail Flounder	Eggs	214.2	252.9	104.9
				Cusk	Eggs			3.0
				Fourbeard Rockling	Eggs	3.0	2.0	1.0
				Fourbeard Rockling/Hakes	Eggs	8.1	4.0	6.0
				Northern Pipefish	PYSL	1.0		1.0
				Radiated Shanny	PYSL	5.1	5.0	1.0
				Unidentified Osteichthyes	UNID	1.0		
				Windowpane/Fourspot/Summer Flounder	Eggs	1.0	3.0	
				Winter Flounder	UNID	1.0		
					WF II	3.0		

Table B–1. (continued)

Week No.	Sampling Week (beginning Monday)	Period No.	Diel Period	Taxon	Life Stage[1]	0.8-mm CWWS	3.0-mm CWWS	Existing CWIS (Control)
					WF III		1.0	1.0
		102	1500-2059	American Plaice	Eggs		24.0	
					UNID	1.0		
				Atlantic Seasnail	YSL		1.0	
					PYSL		1.0	
				Cunner	Eggs	12.1	32.0	
				Cunner/Tautog/Yellowtail Flounder	Eggs	1633.2	1718.5	2394.4
				Fourbeard Rockling	Eggs		8.0	23.9
				Fourbeard Rockling/Hakes	Eggs	16.1	16.0	16.0
				Herring Family	PYSL		1.0	
				Northern Pipefish	PYSL			1.0
				Radiated Shanny	PYSL			4.0
				Unidentified Osteichthyes	Eggs			8.0
				Windowpane/Fourspot/Summer Flounder	Eggs	4.0		
				Winter Flounder	Eggs	4.0		
					UNID		1.0	
					WF II			2.0
		103	2100-0259	American Plaice	Eggs		2.7	4.0
					UNID	1.0		
					PYSL		2.0	
				Atlantic Seasnail	PYSL			2.0
				Cunner/Tautog/Yellowtail Flounder	Eggs	389.1	679.9	225.2
				Cusk	Eggs			1.0
					UNID	1.0		
				Fourbeard Rockling	Eggs	1.0		
					PYSL		1.0	
				Fourbeard Rockling/Hakes	Eggs	4.0	5.4	4.0
				Hakes	Eggs	1.0		
				Northern Pipefish	PYSL	1.0		1.0
				Radiated Shanny	PYSL	9.0	7.0	4.0
				Rock Gunnel	YROL			1.0
				Windowpane/Fourspot/Summer Flounder	Eggs	2.0		
				Winter Flounder	WF II	1.0		2.0
					WF III			1.0
		104	0300-0859	American Plaice	Eggs		12.0	4.0
					UNID	1.0		
					YSL			1.0
				Atlantic Mackerel	Eggs			2.0
				Atlantic Mackerel/Cusk	Eggs			1.0
				Atlantic Seasnail	PYSL			1.0
				Cod Family/Witch Flounder	Eggs		4.0	
				Cunner	Eggs		12.0	1.0
				Cunner/Tautog/Yellowtail Flounder	Eggs	1141.7	1403.3	372.8

Table B–1. (continued)

Week No.	Sampling Week (beginning Monday)	Period No.	Diel Period	Taxon	Life Stage[1]	0.8-mm CWWS	3.0-mm CWWS	Existing CWIS (Control)
				Cusk	Eggs		4.0	
					YSL	2.0		
				Fourbeard Rockling	Eggs	8.2		3.0
					PYSL			1.0
				Fourbeard Rockling/Hakes	Eggs		12.0	4.0
				Hakes	Eggs		4.0	1.0
				Northern Pipefish	PYSL		1.0	
				Radiated Shanny	UNID		2.0	
					PYSL	16.3	13.0	2.0
				Windowpane/Fourspot/Summer Flounder	Eggs	4.1	8.0	2.0
				Winter Flounder	UNID			2.0
					WF II	2.0	3.0	1.0
					WF III	1.0	1.0	
25	24-Jun-2019	105	0900-1459	Atlantic Menhaden	Eggs		6.1	2.0
				Cunner	Eggs	1.0	1.0	
				Cunner/Tautog/Yellowtail Flounder	Eggs	139.3	285.7	157.1
				Northern Pipefish	PYSL		2.0	
				Radiated Shanny	PYSL	1.0	1.0	
				Windowpane/Fourspot/Summer Flounder	Eggs		2.0	
		106	1500-2059	Atlantic Menhaden	Eggs	1.0		
				Atlantic Seasnail	YSL			1.0
				Cunner	Eggs		2.0	
					PYSL	2.0		
				Cunner/Tautog/Yellowtail Flounder	Eggs	276.4	379.8	915.2
				Fourbeard Rockling/Hakes	Eggs		1.0	
				Northern Pipefish	PYSL	2.0		
				Radiated Shanny	PYSL		1.0	
				Unidentified Osteichthyes	UNID	2.0		
				Windowpane/Fourspot/Summer Flounder	Eggs		1.0	
		107	2100-0259	Atlantic Menhaden	Eggs	1.0	2.7	1.0
				Cunner	Eggs	1.0		
				Cunner/Tautog/Yellowtail Flounder	Eggs	365.9	583.7	188.0
				Fourbeard Rockling	PYSL	1.0		
				Fourbeard Rockling/Hakes	Eggs			1.0
				Radiated Shanny	PYSL	2.0	1.0	
				Windowpane/Fourspot/Summer Flounder	Eggs	2.0	2.7	
		108	0300-0859	Atlantic Menhaden	Eggs	2.0	4.0	
				Cunner	Eggs			1.0
				Cunner/Tautog/Yellowtail Flounder	Eggs	135.8	152.2	102.4
				Fourbeard Rockling	PYSL	1.0		
				Fourbeard Rockling/Hakes	Eggs	1.0		
				Northern Pipefish	PYSL		1.0	

Table B–1. (continued)

Week No.	Sampling Week (beginning Monday)	Period No.	Diel Period	Taxon	Life Stage[1]	0.8-mm CWWS	3.0-mm CWWS	Existing CWIS (Control)
				Radiated Shanny	PYSL		4.0	
				Winter Flounder	WF IV	1.0		
		109	0900-1459	Atlantic Menhaden	Eggs	3.0	25.2	4.0
				Cunner	Eggs	1.0		
				Cunner/Tautog/Yellowtail Flounder	Eggs	193.4	351.3	226.4
				Windowpane/Fourspot/Summer Flounder	Eggs		3.0	
		110	1500-2059	Atlantic Mackerel/Cusk	Eggs	1.0		
				Atlantic Menhaden	Eggs	4.0	9.9	2.0
				Cunner	Eggs	1.0		
				Cunner/Tautog/Yellowtail Flounder	Eggs	239.4	315.6	385.6
				Fourbeard Rockling	PYSL	1.0		
				Fourbeard Rockling/Hakes	Eggs			1.0
				Hakes	Eggs	1.0		
				Radiated Shanny	PYSL	1.0	1.0	
				Windowpane	Eggs			1.0
		111	2100-0259	Atlantic Menhaden	Eggs	1.0	21.9	2.0
				Atlantic Seasnail	PYSL	1.0	1.0	
				Cunner	UNID		1.0	
				Cunner/Tautog/Yellowtail Flounder	Eggs	278.9	544.5	213.8
				Herring Family	UNID		1.0	
				Windowpane/Fourspot/Summer Flounder	Eggs		2.0	1.0
				Winter Flounder	WF III		1.0	
		112	0300-0859	Atlantic Menhaden	Eggs	1.0	35.7	21.0
				Cod Family/Witch Flounder	Eggs		1.0	
				Cunner/Tautog/Yellowtail Flounder	Eggs	116.6	98.2	80.1
				Fourbeard Rockling	PYSL		1.0	
				Fourbeard Rockling/Hakes	Eggs	1.0		
				Herring Family	UNID	1.0		
					YSL	1.0		
				Northern Pipefish	PYSL	2.0	1.0	1.0
				Radiated Shanny	PYSL	1.0		
26	01-Jul-2019	113	0900-1459	Atlantic Mackerel/Cusk	Eggs			16.0
				Cunner	YSL	2.0	156.6	7.0
					PYSL	1.0	72.3	9.0
				Cunner/Tautog/Yellowtail Flounder	Eggs	1382.6	1782.4	3170.3
				Fourbeard Rockling	Eggs	5.3		
					YSL		6.0	
				Fourbeard Rockling/Hakes	Eggs		16.1	
				Hakes	Eggs	10.6	8.0	
				Northern Pipefish	PYSL	1.0		
				Unidentified Osteichthyes	UNID		2.0	1.0
				Windowpane/Fourspot/Summer Flounder	Eggs	5.3		
		114		Atlantic Menhaden	Eggs	4.0	15.9	2.0

Table B–1. (continued)

Week No.	Sampling Week (beginning Monday)	Period No.	Diel Period	Taxon	Life Stage[1]	0.8-mm CWWS	3.0-mm CWWS	Existing CWIS (Control)
			1500-2059	Cunner	YSL	15.0	15.0	5.9
					PYSL	15.0	17.9	2.0
				Cunner/Tautog/Yellowtail Flounder	Eggs	805.5	1232.0	640.5
				Fourbeard Rockling	Eggs			2.0
				Fourbeard Rockling/Hakes	Eggs		4.0	11.9
				Hakes	Eggs			2.0
				Herring Family	UNID	3.0	1.0	
				Northern Pipefish	PYSL		1.0	
				Unidentified Osteichthyes	UNID		1.0	
				Yellowtail Flounder	PYSL		1.0	
		115	2100-0259	American Plaice	Eggs		2.0	
					UNID	1.0	4.0	
					YSL	1.0	2.0	
					PYSL			1.0
				Atlantic Mackerel	Eggs			1.0
				Atlantic Mackerel/Cusk	Eggs	1.0		
				Atlantic Menhaden	Eggs		2.0	1.0
				Atlantic Seasnail	YSL		1.0	
				Cunner	Eggs			3.0
					YSL	30.0	16.1	5.0
					PYSL	41.0	36.1	5.0
				Cunner/Tautog/Yellowtail Flounder	Eggs	405.2	498.0	160.4
				Fourbeard Rockling	Eggs		10.0	5.0
					UNID		2.0	
					PYSL	1.0	3.0	1.0
				Fourbeard Rockling/Hakes	Eggs	10.0	12.0	2.0
				Hakes	Eggs	3.0	14.1	3.0
				Herring Family	UNID	1.0	5.0	
					PYSL	1.0		
				Northern Pipefish	PYSL		1.0	
				Radiated Shanny	PYSL	3.0	6.0	
				Unidentified Osteichthyes	UNID	1.0	1.0	
				Windowpane	YSL		1.0	
				Windowpane/Fourspot/Summer Flounder	Eggs	1.0	2.0	3.0
				Winter Flounder	WF II			2.0
					WF III			1.0
				Yellowtail Flounder	YSL			1.0
		116	0300-0859	Atlantic Menhaden	Eggs	3.0	2.0	1.0
				Cunner	Eggs		5.0	
					YSL	11.0	18.0	
					PYSL	9.0	26.0	3.0
				Cunner/Tautog/Yellowtail Flounder	Eggs	67.0	363.3	99.4
				Fourbeard Rockling	Eggs		2.0	2.0
					PYSL	2.0	2.0	1.0

Table B–1. (continued)

Week No.	Sampling Week (beginning Monday)	Period No.	Diel Period	Taxon	Life Stage[1]	0.8-mm CWWS	3.0-mm CWWS	Existing CWIS (Control)
				Fourbeard Rockling/Hakes	Eggs	4.0	8.0	2.0
				Hakes	Eggs	2.0	2.0	1.0
				Herring Family	UNID	1.0	2.0	
					YSL	1.0		
				Mummichog	YSL			1.0
				Northern Pipefish	PYSL	1.0	2.0	3.0
				Radiated Shanny	PYSL	1.0	1.0	2.0
				Silver Hake	Eggs		10.0	
				Unidentified Osteichthyes	UNID	1.0		1.0
				Windowpane/Fourspot/Summer Flounder	Eggs	1.0	2.0	
				Winter Flounder	WF III	1.0		
		117	0900-1459	American Plaice	UNID			1.0
				Atlantic Menhaden	YSL			1.0
				Cunner	Eggs	34.7	6.0	
					YSL	42.7	38.0	24.0
					PYSL	81.3	49.0	23.0
				Cunner/Tautog/Yellowtail Flounder	Eggs	631.9	757.6	1463.9
				Fourbeard Rockling	PYSL	2.7	2.0	2.0
				Fourbeard Rockling/Hakes	Eggs	2.7	8.0	4.0
				Hakes	Eggs	2.7	16.0	
					YSL			1.0
					PYSL			1.0
				Herring Family	UNID	1.3	2.0	
				Northern Pipefish	PYSL		2.0	
				Radiated Shanny	PYSL		3.0	1.0
				Silver Hake	Eggs	5.3		
					YSL			1.0
				Unidentified Osteichthyes	UNID	1.3	1.0	
				Windowpane/Fourspot/Summer Flounder	Eggs		6.0	
		118	1500-2059	American Plaice	PYSL			1.0
				Atlantic Menhaden	Eggs	4.0	7.9	
					YSL		1.0	1.0
				Cunner	Eggs	12.1	7.9	4.0
					YSL	12.1	31.7	5.9
					PYSL	26.3	49.5	12.9
				Cunner/Tautog/Yellowtail Flounder	Eggs	1003.2	1606.7	1194.5
				Fourbeard Rockling	Eggs	4.0		
					YSL		1.0	
					PYSL	2.0		
				Fourbeard Rockling/Hakes	Eggs	4.0	7.9	
				Hakes	Eggs	16.2	4.0	4.0
				Herring Family	UNID		2.0	
					YSL	3.0		

Table B–1. (continued)

Week No.	Sampling Week (beginning Monday)	Period No.	Diel Period	Taxon	Life Stage[1]	0.8-mm CWWS	3.0-mm CWWS	Existing CWIS (Control)
				Northern Pipefish	PYSL	1.0	1.0	2.0
				Unidentified Osteichthyes	UNID	2.0		
					YSL		1.0	
				Windowpane	Eggs		4.0	
		119	2100-0259	American Plaice	PYSL	1.3		
				Atlantic Mackerel/Cusk	Eggs	2.7		2.0
				Atlantic Menhaden	Eggs		8.0	
				Cunner	Eggs	34.6	47.8	30.0
					YSL	65.1	62.8	15.0
					PYSL	147.5	126.5	24.0
				Cunner/Tautog/Yellowtail Flounder	Eggs	723.0	813.0	378.6
				Fourbeard Rockling	Eggs	2.7	4.0	2.0
					UNID	1.3		1.0
					PYSL	5.3	4.0	
				Fourbeard Rockling/Hakes	Eggs	5.3		6.0
				Hakes	Eggs	5.3	4.0	2.0
				Herring Family	UNID		4.0	
				Northern Pipefish	PYSL			1.0
				Radiated Shanny	PYSL		2.0	
				Silver Hake	Eggs	2.7		
				Tautog	PYSL		1.0	
				Unidentified Osteichthyes	UNID	1.3	2.0	
				Windowpane/Fourspot/Summer Flounder	Eggs	8.0		2.0
		120	0300-0859	American Plaice	Eggs			1.0
					YSL	1.0		
				Atlantic Menhaden	Eggs	5.9	1.0	2.0
					YSL		1.0	
				Cunner	Eggs	8.9	19.0	9.0
					YSL	30.7	32.0	8.0
					PYSL	66.4	65.1	18.0
				Cunner/Tautog/Yellowtail Flounder	Eggs	207.2	345.3	162.6
				Fourbeard Rockling	Eggs		3.0	2.0
					UNID		1.0	
					PYSL	5.0	3.0	
				Fourbeard Rockling/Hakes	Eggs		3.0	4.0
				Hakes	Eggs	3.0	4.0	
					YSL		4.0	
				Northern Pipefish	PYSL		1.0	
				Radiated Shanny	PYSL	1.0		1.0
				Silver Hake	Eggs			2.0
				Unidentified Osteichthyes	UNID		1.0	
					YSL		1.0	
				Windowpane	YSL	1.0		

Table B–1. (continued)

Week No.	Sampling Week (beginning Monday)	Period No.	Diel Period	Taxon	Life Stage[1]	0.8-mm CWWS	3.0-mm CWWS	Existing CWIS (Control)
				Windowpane/Fourspot/Summer Flounder	Eggs	2.0	4.0	1.0
				Yellowtail Flounder	YSL	1.0		
					PYSL		2.0	
27	08-Jul-2019	121	0900-1459	Atlantic Menhaden	Eggs		2.0	
				Butterfish	Eggs		1.0	
				Cunner	PYSL	2.0	3.1	1.0
				Cunner/Tautog	YSL	1.0		
				Cunner/Tautog/Yellowtail Flounder	Eggs	109.2	198.3	400.4
				Fourbeard Rockling/Hakes	Eggs			12.0
				Hakes	Eggs	4.1	2.0	2.0
				Herring Family	UNID			1.0
					PYSL	1.0		
				Northern Pipefish	PYSL			1.0
				Silver Hake	Eggs	1.0		2.0
				Tautog	Eggs	1.0		
		122	1500-2059	Cunner	Eggs	2.0	6.0	
					YSL	6.0	10.1	
					PYSL	22.1	16.1	1.0
				Cunner/Tautog/Yellowtail Flounder	Eggs	376.6	563.1	1995.7
				Fourbeard Rockling	Eggs	1.0	2.0	8.0
					PYSL	1.0	2.0	
				Fourbeard Rockling/Hakes	Eggs	5.0		
				Hakes	Eggs	8.0	8.0	8.0
				Northern Pipefish	PYSL		1.0	1.0
				Silver Hake	Eggs	14.1	10.1	8.0
					YSL		1.0	
				Windowpane/Fourspot/Summer Flounder	Eggs		6.0	8.0
		123	2100-0259	Butterfish	Eggs	2.0		
				Cunner	Eggs	2.0	2.7	
					PYSL	3.0		2.0
				Cunner/Tautog/Yellowtail Flounder	Eggs	293.7	602.5	140.4
				Fourbeard Rockling/Hakes	Eggs		2.7	1.0
				Hakes	Eggs	1.0		4.0
				Northern Pipefish	PYSL		1.0	
				Radiated Shanny	PYSL			2.0
				Silver Hake	Eggs			3.0
				Windowpane/Fourspot/Summer Flounder	Eggs			1.0
		124	0300-0859	Butterfish	Eggs			1.0
				Cunner	Eggs		3.0	
					YSL	3.0	3.0	1.0
					PYSL	5.9	8.0	3.8
				Cunner/Tautog/Yellowtail Flounder	Eggs	135.2	176.3	96.2
				Fourbeard Rockling	PYSL		1.0	

Table B–1. (continued)

Week No.	Sampling Week (beginning Monday)	Period No.	Diel Period	Taxon	Life Stage[1]	0.8-mm CWWS	3.0-mm CWWS	Existing CWIS (Control)
				Fourbeard Rockling/Hakes	Eggs	3.0	4.0	3.8
				Hakes	Eggs	3.0	7.0	6.7
				Herring Family	UNID	1.0		
				Northern Pipefish	PYSL		1.0	
				Rainbow Smelt	PYSL			1.0
				Silver Hake	Eggs	2.0	3.0	1.9
					YSL	1.0		
				Windowpane/Fourspot/Summer Flounder	Eggs	2.0	2.0	1.0
		125	0900-1459	Cunner	Eggs		3.0	
					PYSL		1.0	
				Cunner/Tautog/Yellowtail Flounder	Eggs	58.6	102.8	120.6
				Fourbeard Rockling	Eggs	1.0		
				Fourbeard Rockling/Hakes	Eggs	1.0		2.0
				Hakes	Eggs	1.0	2.0	3.0
				Northern Pipefish	PYSL			1.0
				Radiated Shanny	PYSL		1.0	
				Silver Hake	Eggs		6.0	4.0
				Windowpane/Fourspot/Summer Flounder	Eggs			1.0
		126	1500-2059	Atlantic Mackerel/Cusk	Eggs	1.0		
				Butterfish	Eggs	1.0		
				Cunner	Eggs	1.0		
					YSL	1.0		1.0
					PYSL	3.0	4.0	1.0
				Cunner/Tautog/Yellowtail Flounder	Eggs	237.6	429.9	962.1
				Fourbeard Rockling	PYSL		1.0	
				Fourbeard Rockling/Hakes	Eggs		1.3	
				Hakes	Eggs	9.0	6.7	4.0
				Northern Pipefish	PYSL		1.0	
				Silver Hake	Eggs	1.0	2.7	4.0
				Unidentified Osteichthyes	UNID	1.0		
				Windowpane/Fourspot/Summer Flounder	Eggs		4.0	4.0
		127	2100-0259	Butterfish	Eggs		1.3	
				Cunner	YSL		1.0	
					PYSL	3.0	3.0	
				Cunner/Tautog/Yellowtail Flounder	Eggs	310.0	469.7	160.2
				Fourbeard Rockling/Hakes	Eggs	1.0		1.0
				Hakes	Eggs	6.0		2.0
				Northern Pipefish	PYSL	1.0	1.0	
				Radiated Shanny	PYSL			1.0
				Silver Hake	Eggs	3.0	2.7	2.0
				Unidentified Osteichthyes	Eggs		1.3	
				Windowpane/Fourspot/Summer Flounder	Eggs	2.0		1.0

Table B–1. (continued)

Week No.	Sampling Week (beginning Monday)	Period No.	Diel Period	Taxon	Life Stage[1]	0.8-mm CWWS	3.0-mm CWWS	Existing CWIS (Control)
		128	0300-0859	Butterfish	Eggs	1.0	2.0	1.0
				Cunner	Eggs	1.0		
					PYSL	4.0	1.0	
				Cunner/Tautog/Yellowtail Flounder	Eggs	85.8	92.5	76.9
				Fourbeard Rockling/Hakes	Eggs		4.0	
				Hakes	Eggs	5.0	4.0	4.0
				Northern Pipefish	PYSL	1.0	2.0	
				Silver Hake	Eggs	1.0	1.0	
				Windowpane/Fourspot/Summer Flounder	Eggs		1.0	
28	15-Jul-2019	129	0900-1459	Cunner	Eggs	10.7		8.0
					UNID		2.0	
					YSL	2.0	11.0	
					PYSL	4.0	8.0	
				Cunner/Tautog/Yellowtail Flounder	Eggs	670.3	869.2	1973.9
				Fourbeard Rockling	PYSL	2.0	1.0	
				Fourbeard Rockling/Hakes	Eggs	2.7	4.0	
				Hakes	Eggs	5.3	8.0	
				Silver Hake	Eggs	16.0	15.9	8.0
					YSL	1.0	3.0	
				Windowpane/Fourspot/Summer Flounder	Eggs		4.0	
		130	1500-2059	Butterfish	Eggs	2.0	4.0	2.0
				Cunner	Eggs	6.0		6.0
					YSL	3.0	3.0	3.0
					PYSL	6.0	8.9	3.0
				Cunner/Tautog/Yellowtail Flounder	Eggs	674.5	922.8	459.7
				Fourbeard Rockling/Hakes	Eggs	2.0	4.0	2.0
				Hakes	Eggs		4.0	
				Northern Pipefish	PYSL	1.0	1.0	
				Silver Hake	Eggs	2.0	4.0	8.0
					YSL		1.0	
					PYSL	1.0		
				Unidentified Osteichthyes	Eggs			4.0
				Windowpane	YSL		1.0	
				Windowpane/Fourspot/Summer Flounder	Eggs	2.0		
				Witch Flounder	PYSL	1.0		
				Yellowtail Flounder	UNID		1.0	
		132	0300-0859	Butterfish	Eggs		1.0	
				Cunner	Eggs	8.2	7.2	3.1
					YSL			1.0
					PYSL	9.3	11.3	21.5
				Cunner/Tautog/Yellowtail Flounder	Eggs	109.1	153.2	113.9
				Fourbeard Rockling/Hakes	Eggs	2.1	1.0	5.1
				Hakes	Eggs	2.1	4.1	1.0

Table B–1. (continued)

Week No.	Sampling Week (beginning Monday)	Period No.	Diel Period	Taxon	Life Stage[1]	0.8-mm CWWS	3.0-mm CWWS	Existing CWIS (Control)
				Mummichog	PYSL			1.0
				Northern Pipefish	PYSL			1.0
				Silver Hake	Eggs	9.3	9.3	9.2
				Unidentified Osteichthyes	UNID	1.0		
				Windowpane/Fourspot/Summer Flounder	Eggs	2.1	5.1	
				Yellowtail Flounder	Eggs	2.1		
		133	0900-1459	Butterfish	Eggs	1.0	1.0	
				Cunner	Eggs	13.0	11.1	
					YSL	1.0		
					PYSL	3.0	5.0	3.0
				Cunner/Tautog/Yellowtail Flounder	Eggs	114.2	138.3	1154.1
				Fourbeard Rockling/Hakes	Eggs	3.0	4.0	16.1
				Hakes	Eggs	3.0	8.1	4.0
				Northern Pipefish	PYSL		1.0	
				Silver Hake	Eggs	8.0	9.1	8.0
				Windowpane	Eggs		1.0	
				Windowpane/Fourspot/Summer Flounder	Eggs	1.0	1.0	
		134	1500-2059	Atlantic Mackerel	Eggs		4.0	
				Cunner	YSL	1.0	1.0	
					PYSL	4.0	6.0	2.0
				Cunner/Tautog/Yellowtail Flounder	Eggs	612.8	1110.0	1477.9
				Fourbeard Rockling/Hakes	Eggs		4.0	
				Hakes	Eggs		4.0	
				Northern Pipefish	PYSL		1.0	1.0
				Righteye Flounder Family	YSL			1.0
				Silver Hake	Eggs	2.7	4.0	11.9
					YSL		1.0	
				Unidentified Osteichthyes	UNID		2.0	
				Windowpane/Fourspot/Summer Flounder	Eggs		4.0	
		135	2100-0259	Cunner	Eggs	4.0	5.0	2.0
					YSL	1.0		
					PYSL	3.0	6.0	5.0
				Cunner/Tautog/Yellowtail Flounder	Eggs	198.1	275.0	107.8
				Fourbeard Rockling/Hakes	Eggs			3.0
				Hakes	Eggs		3.0	1.0
				Northern Pipefish	PYSL		1.0	
				Radiated Shanny	PYSL	1.0	2.0	
				Silver Hake	Eggs	2.0	10.0	2.0
				Unidentified Osteichthyes	UNID		1.0	
				Windowpane/Fourspot/Summer Flounder	Eggs	1.0	2.0	
		136	0300-0859	Butterfish	Eggs			1.0
				Cunner	Eggs	2.0	3.0	1.0

Table B–1. (continued)

Week No.	Sampling Week (beginning Monday)	Period No.	Diel Period	Taxon	Life Stage[1]	0.8-mm CWWS	3.0-mm CWWS	Existing CWIS (Control)
					PYSL	9.0	3.0	6.9
				Cunner/Tautog/Yellowtail Flounder	Eggs	98.1	111.7	109.1
				Fourbeard Rockling/Hakes	Eggs	2.0	2.0	
				Hakes	Eggs	2.0	2.0	
				Northern Pipefish	PYSL		1.0	1.0
				Radiated Shanny	PYSL		1.0	
				Silver Hake	Eggs	8.0	3.0	4.0
					UNID		1.0	
				Unidentified Osteichthyes	Eggs		1.0	
				Windowpane/Fourspot/Summer Flounder	Eggs	2.0		
				Yellowtail Flounder	YSL		1.0	
29	22-Jul-2019	137	0900-1459	Butterfish	Eggs	4.9	1.9	2.0
				Cunner	PYSL	2.0		3.0
				Cunner/Tautog/Yellowtail Flounder	Eggs	151.8	179.0	89.7
				Fourbeard Rockling/Hakes	Eggs			1.0
				Hakes	Eggs		2.9	
				Northern Pipefish	PYSL	2.0		2.0
				Windowpane/Fourspot/Summer Flounder	Eggs	1.0		1.0
		138	1500-2059	Butterfish	YSL	7.1	2.0	
				Cunner	Eggs	76.9	96.4	16.0
					YSL	3.0	60.3	4.0
					PYSL	16.2	68.3	7.0
				Cunner/Tautog/Yellowtail Flounder	Eggs	768.6	1397.9	1268.8
				Fourbeard Rockling/Hakes	Eggs	36.4	80.3	4.0
				Fourspot Flounder	YSL	1.0		
				Hakes	Eggs	68.8	80.3	12.0
					YSL	6.1	48.2	5.0
				Herring Family	PYSL			1.0
				Silver Hake	UNID		2.0	
					YSL	12.1		1.0
					PYSL		8.0	
				Tautog	UNID		2.0	
					PYSL		2.0	
				Unidentified Osteichthyes	UNID		16.1	
				Windowpane/Fourspot/Summer Flounder	Eggs	4.0		
		139	2100-0259	Butterfish	Eggs		1.0	
				Cunner	Eggs		5.1	
					YSL		1.0	
					PYSL	1.0	1.0	4.1
				Cunner/Tautog/Yellowtail Flounder	Eggs	211.0	262.5	99.7
				Fourbeard Rockling/Hakes	Eggs	2.0	2.0	9.3
				Hakes	Eggs	6.1	7.1	22.6
					YSL	1.0		

Table B–1. (continued)

Week No.	Sampling Week (beginning Monday)	Period No.	Diel Period	Taxon	Life Stage[1]	0.8-mm CWWS	3.0-mm CWWS	Existing CWIS (Control)
				Northern Pipefish	PYSL	1.0		1.0
				Silver Hake	Eggs			2.1
				Unidentified Osteichthyes	Eggs	1.0		
					UNID		1.0	
				Windowpane/Fourspot/Summer Flounder	Eggs	1.0		
		140	0300-0859	Butterfish	Eggs	4.0		
					YSL	2.0		
					PYSL	2.0		
				Cunner	Eggs	5.0	18.4	2.1
					YSL	17.1	15.3	2.1
					PYSL	63.3	71.6	11.3
				Cunner/Tautog/Yellowtail Flounder	Eggs	94.5	137.1	67.0
				Fourbeard Rockling/Hakes	Eggs	9.0	16.4	5.2
				Hakes	Eggs	32.2	40.9	29.9
					UNID	7.0	2.0	1.0
					YSL	5.0	15.3	3.1
					PYSL	8.0	13.3	1.0
				Herring Family	UNID	1.0		
				Northern Pipefish	PYSL		2.0	
				Silver Hake	Eggs	2.0	2.0	
					UNID	2.0		
					YSL	5.0	4.1	1.0
					PYSL	1.0	1.0	
				Unidentified Osteichthyes	UNID		5.1	
				Windowpane	PYSL	1.0		
		141	0900-1459	Butterfish	Eggs		1.0	
				Cunner	Eggs	1.0		
					YSL	3.0	2.0	
					PYSL	9.0	20.8	4.0
				Cunner/Tautog/Yellowtail Flounder	Eggs	26.0	30.7	24.8
				Fourbeard Rockling/Hakes	Eggs	1.0	1.0	
				Hakes	Eggs	7.0	13.9	29.7
					PYSL		3.0	
				Northern Pipefish	PYSL			1.0
				Tautog	YSL		1.0	
				Unidentified Osteichthyes	UNID	1.0	4.9	
				Windowpane/Fourspot/Summer Flounder	Eggs		1.0	
		142	1500-2059	Cunner	Eggs	13.1	14.8	4.1
					UNID		2.7	
					YSL	16.2	32.3	6.1
					PYSL	84.8	71.3	25.5
				Cunner/Tautog/Yellowtail Flounder	Eggs	263.6	310.9	798.6
				Fourbeard Rockling	Eggs			4.1

Table B–1. (continued)

Week No.	Sampling Week (beginning Monday)	Period No.	Diel Period	Taxon	Life Stage[1]	0.8-mm CWWS	3.0-mm CWWS	Existing CWIS (Control)
				Fourbeard Rockling/Hakes	Eggs	13.1	14.8	8.1
				Hakes	Eggs	77.8	79.4	24.4
					UNID		10.8	1.0
					YSL	31.3		
					PYSL		35.0	16.3
				Fourspot Flounder	YSL	1.0		
				Herring Family	PYSL	1.0		
				Northern Pipefish	PYSL		1.3	
				Silver Hake	Eggs		4.0	
					YSL	7.1	6.7	1.0
				Unidentified Osteichthyes	UNID	9.1		
				Windowpane/Fourspot/Summer Flounder	Eggs	1.0	1.3	
		143	2100-0259	Butterfish	Eggs	2.0	3.1	
				Cunner	Eggs	2.0	1.0	
					PYSL	20.5	16.4	5.1
				Cunner/Tautog/Yellowtail Flounder	Eggs	209.0	244.8	132.2
				Fourbeard Rockling/Hakes	Eggs	1.0		4.1
				Hakes	Eggs	8.2	5.1	18.4
					UNID	6.1	1.0	
					PYSL	1.0	2.0	
				Northern Pipefish	PYSL	1.0		
				Silver Hake	YSL	1.0		
				Unidentified Osteichthyes	UNID	3.1	2.0	
		144	0300-0859	Butterfish	YSL	1.0		
				Cunner	Eggs	3.1	2.0	
					YSL	14.4	12.3	2.1
					PYSL	88.3	103.2	25.7
				Cunner/Tautog/Yellowtail Flounder	Eggs	52.4	85.8	52.5
				Fourbeard Rockling/Hakes	Eggs	4.1	11.2	9.3
				Hakes	Eggs	28.8	28.6	27.8
					UNID	2.1	9.2	
					YSL	15.4	12.3	2.1
					PYSL	16.4	8.2	4.1
				Northern Pipefish	PYSL	2.1	1.0	
				Silver Hake	Eggs		3.1	1.0
					YSL	1.0		
				Unidentified Osteichthyes	UNID	6.2	1.0	
					PYSL	2.1		
				Windowpane/Fourspot/Summer Flounder	Eggs	1.0		
30	29-Jul-2019	145	0900-1459	Butterfish	Eggs	2.0		
				Cunner	PYSL	1.0		
				Cunner/Tautog/Yellowtail Flounder	Eggs	427.8	646.5	1722.0
				Fourbeard Rockling/Hakes	Eggs	10.0	4.0	

Table B–1. (continued)

Week No.	Sampling Week (beginning Monday)	Period No.	Diel Period	Taxon	Life Stage[1]	0.8-mm CWWS	3.0-mm CWWS	Existing CWIS (Control)
				Hakes	Eggs		2.0	
					YSL	1.0		
				Silver Hake	Eggs	8.0	6.0	
				Windowpane/Fourspot/Summer Flounder	Eggs	2.0		
		146	1500-2059	Butterfish	Eggs	3.0	1.0	
				Cunner	Eggs		1.0	
					YSL			1.0
					PYSL	1.0	1.0	1.0
				Cunner/Tautog/Yellowtail Flounder	Eggs	203.0	302.7	318.6
				Hakes	Eggs		1.0	
				Silver Hake	Eggs			1.0
				Windowpane/Fourspot/Summer Flounder	Eggs	1.0		
		147	2100-0259	Cunner	PYSL	5.0	12.0	6.0
				Cunner/Tautog/Yellowtail Flounder	Eggs	114.5	202.3	92.2
				Fourbeard Rockling/Hakes	Eggs	3.0	3.0	1.0
				Hakes	Eggs	1.0	2.0	
				Northern Pipefish	PYSL		1.0	
				Silver Hake	Eggs	4.0	4.0	1.0
					UNID		1.0	
					YSL		1.0	
				Unidentified Osteichthyes	UNID		1.0	
				Windowpane/Fourspot/Summer Flounder	Eggs	1.0	1.0	
				Yellowtail Flounder	PYSL		1.0	
		148	0300-0859	Butterfish	Eggs	4.9	3.0	2.0
				Cunner	PYSL	3.0	2.0	3.0
				Cunner/Tautog/Yellowtail Flounder	Eggs	51.3	56.1	73.8
				Fourbeard Rockling/Hakes	Eggs		1.0	
				Hakes	Eggs	1.0		
				Northern Pipefish	PYSL		2.0	1.0
				Silver Hake	Eggs	1.0	2.0	2.0
				Tautog	Eggs	1.0		
				Unidentified Osteichthyes	UNID		1.0	
				Windowpane/Fourspot/Summer Flounder	Eggs	1.0	1.0	
		149	0900-1459	Butterfish	Eggs	1.0	3.0	2.7
				Cunner	Eggs	3.1		
					PYSL	2.0	2.0	1.0
				Cunner/Tautog/Yellowtail Flounder	Eggs	98.1	136.7	893.9
				Fourbeard Rockling/Hakes	Eggs		5.9	
				Hakes	Eggs	2.0	1.0	
				Northern Pipefish	PYSL	1.0		
				Silver Hake	Eggs		3.9	2.7

Table B–1. (continued)

Week No.	Sampling Week (beginning Monday)	Period No.	Diel Period	Taxon	Life Stage[1]	0.8-mm CWWS	3.0-mm CWWS	Existing CWIS (Control)
				Windowpane/Fourspot/Summer Flounder	Eggs		1.0	
		150	1500-2059	Butterfish	Eggs	1.0		
				Cunner	PYSL	2.0	1.0	3.0
				Cunner/Tautog/Yellowtail Flounder	Eggs	201.9	350.4	568.3
				Fourbeard Rockling	PYSL	1.0		
				Hakes	Eggs	1.0	1.0	
				Northern Pipefish	PYSL			1.0
				Silver Hake	Eggs		1.0	2.0
		151	2100-0259	Cunner	Eggs		2.0	1.0
					PYSL	2.1	3.0	4.1
				Cunner/Tautog/Yellowtail Flounder	Eggs	90.4	148.8	76.2
				Fourbeard Rockling/Hakes	Eggs	2.1	5.1	5.1
				Northern Pipefish	PYSL			1.0
				Radiated Shanny	PYSL		1.0	
				Silver Hake	Eggs		2.0	
				Unidentified Osteichthyes	Eggs	1.0		
				Windowpane/Fourspot/Summer Flounder	Eggs	2.1	2.0	
		152	0300-0859	Butterfish	Eggs	2.1	2.1	1.0
				Cunner	PYSL	1.0	1.0	1.0
				Cunner/Tautog/Yellowtail Flounder	Eggs	31.8	56.6	61.8
				Fourbeard Rockling	YSL		1.0	
				Fourbeard Rockling/Hakes	Eggs	1.0		
				Northern Pipefish	PYSL			1.0
				Silver Hake	Eggs			1.0
				Tautog	Eggs		1.0	
				Windowpane/Fourspot/Summer Flounder	Eggs			1.0
				Yellowtail Flounder	YSL	1.0		
31	05-Aug-2019	153	0900-1459	Butterfish	Eggs	1.0	5.1	1.0
				Cunner	PYSL		1.0	1.0
				Cunner/Tautog/Yellowtail Flounder	Eggs	61.8	122.7	100.2
				Fourbeard Rockling/Hakes	Eggs		1.0	4.1
				Hakes	Eggs	3.1	3.1	4.1
				Northern Pipefish	PYSL		1.0	
				Silver Hake	YSL	1.0		
		154	1500-2059	Cunner	UNID			1.0
					PYSL	1.0	3.0	
				Cunner/Tautog/Yellowtail Flounder	Eggs	144.2	201.9	909.7
				Hakes	Eggs	7.2	11.2	4.1
				Fourbeard Rockling/Hakes	Eggs	9.3	6.1	
				Silver Hake	Eggs	2.1	7.1	
					YSL	2.1		
				Windowpane/Fourspot/Summer Flounder	Eggs	1.0	1.0	

Table B–1. (continued)

Week No.	Sampling Week (beginning Monday)	Period No.	Diel Period	Taxon	Life Stage[1]	0.8-mm CWWS	3.0-mm CWWS	Existing CWIS (Control)
		155	2100-0259	Butterfish	Eggs	1.0	1.0	
				Cunner	PYSL		3.0	3.1
				Cunner/Tautog/Yellowtail Flounder	Eggs	26.7	48.7	73.5
				Fourbeard Rockling/Hakes	Eggs	1.0	2.0	1.0
				Hakes	Eggs	1.0	3.0	2.0
				Silver Hake	Eggs			1.0
				Windowpane/Fourspot/Summer Flounder	Eggs	2.1	2.0	
		156	0300-0859	Cunner	Eggs	2.0	4.0	
					YSL			1.0
					PYSL	6.1	7.0	6.2
				Cunner/Tautog/Yellowtail Flounder	Eggs	37.4	31.9	29.9
				Fourbeard Rockling	Eggs	1.0	1.0	
					UNID		1.0	
					PYSL	1.0	1.0	
				Fourbeard Rockling/Hakes	Eggs	8.1	2.0	4.1
				Hakes	Eggs	7.1	1.0	5.1
				Herring Family	PYSL	3.0		
				Northern Pipefish	PYSL		2.0	
				Silver Hake	Eggs	3.0	3.0	2.1
					YSL	2.0	1.0	
				Unidentified Osteichthyes	UNID			1.0
				Windowpane/Fourspot/Summer Flounder	Eggs		1.0	2.1
		157	0900-1459	Butterfish	Eggs		3.1	2.0
				Cunner	YSL			1.0
					PYSL	2.1		
				Cunner/Tautog/Yellowtail Flounder	Eggs	17.4	16.4	49.1
				Fourbeard Rockling	Eggs		3.1	1.0
				Fourbeard Rockling/Hakes	Eggs	2.1		2.0
				Hakes	Eggs	2.1	4.1	6.1
					PYSL		1.0	
				Silver Hake	Eggs		2.0	3.1
					PYSL		1.0	
				Unidentified Osteichthyes	UNID		1.0	
				Windowpane/Fourspot/Summer Flounder	Eggs		1.0	1.0
		158	1500-2059	Butterfish	Eggs	1.0	1.0	2.0
				Cunner	YSL	1.0		
					PYSL	1.0	1.0	
				Cunner/Tautog/Yellowtail Flounder	Eggs	37.1	60.0	316.2
				Fourbeard Rockling/Hakes	Eggs	5.9	5.1	8.1
				Hakes	Eggs	8.8	11.2	1.0
				Herring Family	PYSL	1.0		1.0
				Silver Hake	Eggs	2.0	6.1	
					PYSL	1.0		

Table B–1. (continued)

Week No.	Sampling Week (beginning Monday)	Period No.	Diel Period	Taxon	Life Stage[1]	0.8-mm CWWS	3.0-mm CWWS	Existing CWIS (Control)
				Windowpane/Fourspot/Summer Flounder	Eggs		1.0	
		159	2100-0259	Butterfish	Eggs	1.0	2.0	
				Cunner	Eggs		1.0	1.0
					PYSL	1.0	2.0	2.0
				Cunner/Tautog/Yellowtail Flounder	Eggs	33.4	56.4	106.2
				Fourbeard Rockling	YSL			1.0
				Fourbeard Rockling/Hakes	Eggs		3.0	
				Hakes	Eggs	7.1	4.0	4.0
				Herring Family	PYSL		1.0	
				Inland Silverside	UNID	1.0		
				Northern Pipefish	PYSL			1.0
				Silver Hake	Eggs	3.0	1.0	2.0
					YSL	2.0		
				Windowpane/Fourspot/Summer Flounder	Eggs		2.0	
		160	0300-0859	Butterfish	Eggs	1.0		1.0
				Cunner	Eggs			2.1
					PYSL	6.1	3.0	2.1
				Cunner/Tautog/Yellowtail Flounder	Eggs	19.4	17.2	41.2
				Fourbeard Rockling	Eggs	1.0		
				Fourbeard Rockling/Hakes	Eggs	4.1	3.0	4.1
				Hakes	Eggs	5.1	6.1	14.4
					YSL		1.0	
				Herring Family	PYSL	2.0	1.0	
				Northern Pipefish	PYSL		1.0	1.0
				Unidentified Osteichthyes	UNID	1.0		
				Windowpane/Fourspot/Summer Flounder	Eggs		3.0	1.0
32	12-Aug-2019	161	0900-1459	Cunner	Eggs		2.0	
					PYSL		2.0	
				Cunner/Tautog/Yellowtail Flounder	Eggs	18.0	15.2	933.0
				Fourbeard Rockling	Eggs	1.0		
				Fourbeard Rockling/Hakes	Eggs	1.0	4.1	4.0
				Hakes	Eggs	6.0	3.0	8.0
				Silver Hake	Eggs		2.0	
					UNID	1.0		
					YSL	1.0	1.0	
					PYSL		1.0	
				Windowpane/Fourspot/Summer Flounder	Eggs	1.0	1.0	
		162	1500-2059	Butterfish	Eggs	1.0	3.0	
				Cunner	PYSL		1.0	1.0
				Cunner/Tautog/Yellowtail Flounder	Eggs	28.1	63.9	109.8
				Fourbeard Rockling	Eggs		1.0	
				Fourbeard Rockling/Hakes	Eggs		3.0	

Table B–1. (continued)

Week No.	Sampling Week (beginning Monday)	Period No.	Diel Period	Taxon	Life Stage[1]	0.8-mm CWWS	3.0-mm CWWS	Existing CWIS (Control)
				Hakes	Eggs	2.0		1.0
				Northern Pipefish	PYSL		1.0	
				Silver Hake	Eggs		3.0	
				Windowpane/Fourspot/Summer Flounder	Eggs			1.0
		163	2100-0259	Cod Family/Witch Flounder	Eggs		1.0	
				Cunner	PYSL	6.1	17.0	12.0
				Cunner/Tautog/Yellowtail Flounder	Eggs	18.2	27.9	89.3
				Fourbeard Rockling	Eggs		2.0	
					UNID		1.0	
					PYSL		1.0	
				Fourbeard Rockling/Hakes	Eggs	1.0		
				Hakes	Eggs	3.0	3.0	2.0
				Herring Family	PYSL	1.0		1.0
				Silver Hake	Eggs	2.0	2.0	1.0
					YSL	2.0	8.0	1.0
					PYSL	1.0		
				Windowpane	YSL		1.0	
				Windowpane/Fourspot/Summer Flounder	Eggs		2.0	1.0
		164	0300-0859	Butterfish	Eggs	2.0	1.0	
				Cunner	PYSL	2.0	1.0	5.0
				Cunner/Tautog/Yellowtail Flounder	Eggs	2.0	25.7	42.0
				Fourbeard Rockling/Hakes	Eggs		1.0	
				Hakes	Eggs			2.0
				Herring Family	PYSL		1.0	
				Radiated Shanny	PYSL		1.0	
				Silver Hake	UNID		1.0	
					YSL			1.0
					PYSL	1.0	1.0	
				Windowpane	Eggs			1.0
				Windowpane/Fourspot/Summer Flounder	Eggs		1.0	
		165	0900-1459	Cunner	Eggs	1.0		1.0
					PYSL	2.0	2.0	
				Cunner/Tautog/Yellowtail Flounder	Eggs	8.9	10.8	170.7
				Fourbeard Rockling	Eggs	1.0	1.0	
				Fourbeard Rockling/Hakes	Eggs	6.9	4.9	
				Hakes	Eggs	1.0	3.9	5.0
				Northern Pipefish	PYSL	1.0		
				Silver Hake	Eggs	2.0	5.9	2.0
					YSL	1.0	2.0	2.0
		166	1500-2059	Butterfish	Eggs	1.0	2.0	
				Cunner	Eggs		1.0	
					PYSL	3.9	2.0	3.0
				Cunner/Tautog/Yellowtail Flounder	Eggs	34.4	89.5	166.5

Table B–1. (continued)

Week No.	Sampling Week (beginning Monday)	Period No.	Diel Period	Taxon	Life Stage[1]	0.8-mm CWWS	3.0-mm CWWS	Existing CWIS (Control)
				Fourbeard Rockling/Hakes	Eggs	3.9	2.0	2.0
				Hakes	Eggs	1.0	2.0	2.0
				Silver Hake	Eggs		2.0	1.0
					UNID		2.0	
					YSL	2.0	3.0	
					PYSL	1.0		
				Windowpane	Eggs	1.0		
				Windowpane/Fourspot/Summer Flounder	Eggs	1.0		
		167	2100-0259	Cunner	Eggs	2.0	1.0	4.0
					PYSL	23.0	13.9	8.0
				Cunner/Tautog/Yellowtail Flounder	Eggs	41.0	70.5	59.1
				Fourbeard Rockling/Hakes	Eggs	63.9	53.6	27.0
				Northern Pipefish	PYSL	1.0		
				Hakes	Eggs	21.0	12.9	8.0
					YSL		2.0	
				Silver Hake	Eggs	4.0	5.0	5.0
					YSL	6.0	4.0	2.0
				Windowpane/Fourspot/Summer Flounder	Eggs	5.0	10.9	3.0
		168	0300-0859	Butterfish	Eggs	2.0	1.0	2.0
				Cunner	Eggs			2.0
					PYSL	8.0	6.0	14.0
				Cunner/Tautog/Yellowtail Flounder	Eggs	16.1	22.0	28.1
				Fourbeard Rockling	Eggs		1.0	1.0
				Fourbeard Rockling/Hakes	Eggs	10.0	11.0	10.0
				Hakes	Eggs	5.0	6.0	7.0
					UNID		1.0	
				Herring Family	PYSL	1.0		
				Silver Hake	Eggs	1.0	3.0	2.0
					YSL	2.0		
				Windowpane/Fourspot/Summer Flounder	Eggs	1.0		1.0
33	19-Aug-2019	169	0900-1459	Butterfish	Eggs	1.0	3.0	
				Cunner	PYSL			1.0
				Cunner/Tautog/Yellowtail Flounder	Eggs	28.0	63.2	45.0
				Fourbeard Rockling/Hakes	Eggs		1.0	
				Hakes	Eggs	1.0	7.0	4.0
				Silver Hake	Eggs		2.0	
		170	1500-2059	Cunner	Eggs		1.0	
					PYSL	1.0		1.0
				Cunner/Tautog/Yellowtail Flounder	Eggs	39.1	59.8	892.6
				Fourbeard Rockling/Hakes	Eggs	3.0	7.0	4.0
				Hakes	Eggs	24.0	23.9	
				Silver Hake	Eggs	8.0	3.0	11.9
					YSL		8.0	4.0

Table B–1. (continued)

Week No.	Sampling Week (beginning Monday)	Period No.	Diel Period	Taxon	Life Stage[1]	0.8-mm CWWS	3.0-mm CWWS	Existing CWIS (Control)
					PYSL	2.0		
				Unidentified Osteichthyes	UNID		1.0	
				Windowpane	YSL			1.0
				Windowpane/Fourspot/Summer Flounder	Eggs	1.0	1.0	
		171	2100-0259	Butterfish	Eggs		1.0	
				Cunner	Eggs			1.0
					PYSL		1.0	2.0
				Cunner/Tautog/Yellowtail Flounder	Eggs	12.0	19.0	20.2
				Hakes	Eggs	2.0	3.0	3.0
				Herring Family	PYSL			1.0
				Northern Pipefish	PYSL	1.0		1.0
				Silver Hake	Eggs	1.0		
				Unidentified Osteichthyes	UNID			1.0
				Windowpane/Fourspot/Summer Flounder	Eggs		2.0	
		172	0300-0859	Butterfish	Eggs	1.0	1.0	
				Cunner	PYSL	2.0	3.0	
				Cunner/Tautog/Yellowtail Flounder	Eggs	14.2	9.8	101.7
				Fourbeard Rockling	Eggs	1.0		
				Fourbeard Rockling/Hakes	Eggs	1.0		2.0
				Hakes	Eggs	1.0	3.0	6.0
					PYSL	3.0		
				Goosefish	PYSL		1.0	
				Northern Pipefish	PYSL	1.0		
				Silver Hake	Eggs	5.1	7.9	6.0
					UNID			1.0
					YSL	2.0	2.0	1.0
					PYSL		1.0	
				Windowpane/Fourspot/Summer Flounder	Eggs	1.0	1.0	2.0
		173	0900-1459	Butterfish	Eggs	1.0		
				Cunner	PYSL			1.0
				Cunner/Tautog/Yellowtail Flounder	Eggs	14.0	22.0	41.8
				Fourbeard Rockling/Hakes	Eggs			1.0
				Hakes	Eggs			1.0
				Northern Pipefish	PYSL		1.0	
				Windowpane/Fourspot/Summer Flounder	Eggs	1.0	1.0	1.0
		174	1500-2059	Butterfish	Eggs	1.0		
				Cunner	Eggs		3.0	
					PYSL		7.0	4.0
				Cunner/Tautog/Yellowtail Flounder	Eggs	22.0	25.0	1235.1
				Fourbeard Rockling/Hakes	Eggs	7.0	11.0	8.0
				Hakes	Eggs	5.0	1.0	8.0
					PYSL	1.0		

Table B–1. (continued)

Week No.	Sampling Week (beginning Monday)	Period No.	Diel Period	Taxon	Life Stage[1]	0.8-mm CWWS	3.0-mm CWWS	Existing CWIS (Control)
				Silver Hake	Eggs	5.0	7.0	
					YSL	2.0	4.0	1.0
				Windowpane/Fourspot/Summer Flounder	Eggs	1.0	1.0	4.0
		175	2100-0259	Butterfish	Eggs	3.0	2.0	1.0
				Cunner	PYSL		2.0	4.0
				Cunner/Tautog/Yellowtail Flounder	Eggs	24.0	27.9	43.7
				Hakes	Eggs	3.0		
				Silver Hake	Eggs	1.0		
				Windowpane/Fourspot/Summer Flounder	Eggs		2.0	1.0
		176	0300-0859	Cunner	Eggs	1.0		
					PYSL	5.0	8.0	3.0
				Cunner/Tautog/Yellowtail Flounder	Eggs	8.0	10.0	229.5
				Fourbeard Rockling/Hakes	Eggs	3.0	6.0	1.0
				Hakes	Eggs	8.0	9.0	3.0
					UNID			1.0
				Goosefish	PYSL	1.0		
				Silver Hake	Eggs	2.0	6.0	2.0
					UNID			1.0
					YSL	16.0	2.0	1.0
				Windowpane/Fourspot/Summer Flounder	Eggs	2.0	2.0	2.0
34	26-Aug-2019	177	0900-1459	Butterfish	Eggs	1.0		1.0
				Cunner	UNID		1.0	
					YSL			1.0
					PYSL	1.0		1.0
				Cunner/Tautog/Yellowtail Flounder	Eggs	5.0	12.0	282.7
				Fourbeard Rockling/Hakes	Eggs	3.0	2.0	2.0
				Hakes	Eggs	24.1	36.0	26.0
					UNID	3.0	1.0	
					PYSL		1.0	
				Silver Hake	Eggs	5.0	3.0	4.0
					YSL	3.0		
					PYSL	1.0		
				Tautog	UNID	1.0		
				Unidentified Osteichthyes	UNID	2.0	5.0	
				Windowpane/Fourspot/Summer Flounder	Eggs		2.0	1.0
		178	1500-2059	Butterfish	Eggs	1.0	2.0	1.0
				Cunner	PYSL			3.0
				Cunner/Tautog/Yellowtail Flounder	Eggs	20.0	52.7	53.4
				Fourbeard Rockling	Eggs	2.0		
				Fourbeard Rockling/Hakes	Eggs			1.0
				Hakes	Eggs	2.0	3.0	4.0
					UNID	1.0		

Table B–1. (continued)

Week No.	Sampling Week (beginning Monday)	Period No.	Diel Period	Taxon	Life Stage[1]	0.8-mm CWWS	3.0-mm CWWS	Existing CWIS (Control)
					YSL		1.0	
				Northern Pipefish	PYSL			1.0
				Prionotus spp.	Eggs			1.0
				Silver Hake	PYSL	1.0		
				Windowpane/Fourspot/Summer Flounder	Eggs	2.0		1.0
		179	2100-0259	Butterfish	Eggs			1.0
				Cunner	PYSL	2.0	6.0	7.0
				Cunner/Tautog/Yellowtail Flounder	Eggs	9.1	18.1	75.2
				Fourbeard Rockling	Eggs		1.0	
					YSL			1.0
				Fourbeard Rockling/Hakes	Eggs	4.0	2.0	3.0
				Hakes	Eggs	24.2	46.2	20.1
					UNID	6.0	4.0	
					YSL			1.0
					PYSL	6.0	12.0	
				Northern Pipefish	PYSL			1.0
				Prionotus spp.	Eggs			1.0
				Silver Hake	Eggs	1.0	2.0	2.0
					YSL	11.1	10.0	1.0
				Unidentified Osteichthyes	UNID	1.0	2.0	
				Windowpane	Eggs		1.0	
				Windowpane/Fourspot/Summer Flounder	Eggs	5.0	5.0	4.0
		180	0300-0859	Butterfish	Eggs		2.0	
					PYSL		1.0	
				Cunner	PYSL		2.0	10.1
				Cunner/Tautog/Yellowtail Flounder	Eggs	10.0	14.0	19.3
				Fourbeard Rockling/Hakes	Eggs		1.0	
				Hakes	Eggs	8.0	6.0	3.0
					UNID	2.0		
					YSL		3.0	
					PYSL	3.0		
					YOY			1.0
				Northern Pipefish	PYSL		2.0	3.0
				Silver Hake	YSL	2.0		1.0
					PYSL		4.0	
				Unidentified Osteichthyes	UNID	2.0	1.0	
				Windowpane/Fourspot/Summer Flounder	Eggs	1.0	1.0	4.1
		181	0900-1459	Butterfish	Eggs		1.0	
					UNID		1.0	
				Cunner	PYSL	1.0		2.0
				Cunner/Tautog/Yellowtail Flounder	Eggs	5.0	4.0	483.6
				Fourbeard Rockling/Hakes	Eggs		1.0	2.0
				Hakes	Eggs	21.0	15.0	5.9

Table B–1. (continued)

Week No.	Sampling Week (beginning Monday)	Period No.	Diel Period	Taxon	Life Stage[1]	0.8-mm CWWS	3.0-mm CWWS	Existing CWIS (Control)
					UNID	2.0	1.0	
					PYSL	1.0		
				Northern Pipefish	PYSL	1.0		
				Prionotus spp.	Eggs	1.0		
				Silver Hake	Eggs			2.0
					YSL	7.0		
				Windowpane/Fourspot/Summer Flounder	Eggs	3.0	8.0	
		182	1500-2059	Butterfish	Eggs	3.0	2.0	
				Cunner/Tautog/Yellowtail Flounder	Eggs	8.9	22.0	242.5
				Fourbeard Rockling/Hakes	Eggs		2.0	
				Goosefish	Eggs			1.0
				Hakes	Eggs	2.0	4.0	
					YSL		1.0	
				Prionotus spp.	Eggs		1.0	
				Silver Hake	YSL	2.0	1.0	
		183	2100-0259	Cunner	PYSL	1.0	1.0	
				Cunner/Tautog/Yellowtail Flounder	Eggs	14.8	5.1	11.3
				Hakes	Eggs	15.8	7.1	1.0
					PYSL		1.0	
				Northern Pipefish	PYSL	1.0	1.0	1.0
				Prionotus spp.	Eggs	1.0		
				Silver Hake	Eggs	2.0	2.0	
					YSL	3.0		
				Windowpane/Fourspot/Summer Flounder	Eggs	9.9	7.1	1.0
		184	0300-0859	Butterfish	Eggs	1.0	1.0	1.0
				Cunner	Eggs	1.0	1.0	
					PYSL		3.0	5.8
				Cunner/Tautog/Yellowtail Flounder	Eggs	9.3	15.1	18.5
				Hakes	Eggs	2.1	2.0	1.9
					YSL		1.0	
				Prionotus spp.	Eggs			1.0
				Silver Hake	YSL	1.0	1.0	
				Windowpane/Fourspot/Summer Flounder	Eggs	1.0		1.9
36	09-Sep-2019	193	0900-1459	Cunner/Tautog/Yellowtail Flounder	Eggs	2.0		98.8
				Fourbeard Rockling	YSL		1.0	
				Fourbeard Rockling/Hakes	Eggs	6.1		2.0
				Hakes	Eggs	24.6	20.6	14.1
					UNID	2.0		
					PYSL	2.0		
				Silver Hake	YSL	1.0		
				Unidentified Osteichthyes	UNID		1.0	
				Windowpane	UNID			1.0

Table B–1. (continued)

Week No.	Sampling Week (beginning Monday)	Period No.	Diel Period	Taxon	Life Stage[1]	0.8-mm CWWS	3.0-mm CWWS	Existing CWIS (Control)
				Windowpane/Fourspot/Summer Flounder	Eggs	3.1	5.1	3.0
		194	1500-2059	Butterfish	Eggs		1.0	
				Cunner/Tautog/Yellowtail Flounder	Eggs	4.1	7.2	122.4
				Fourbeard Rockling	PYSL	1.0		
				Hakes	Eggs	4.1	4.1	3.1
					UNID		1.0	
					PYSL	2.1		
				Silver Hake	YSL		3.1	
					PYSL	1.0		
				Unidentified Osteichthyes	UNID		1.0	
				Windowpane	Eggs		1.0	
				Windowpane/Fourspot/Summer Flounder	Eggs		3.1	3.1
		196	0300-0859	Butterfish	Eggs		2.0	
				Cunner	PYSL	1.0	2.0	7.0
				Cunner/Tautog/Yellowtail Flounder	Eggs	1.0		4.0
				Fourbeard Rockling/Hakes	Eggs		1.0	
				Hakes	Eggs		1.0	2.0
					YSL	1.0	1.0	
					PYSL		1.0	
				Northern Pipefish	YSL		1.0	
				Silver Hake	Eggs		1.0	
					PYSL		1.0	
				Windowpane/Fourspot/Summer Flounder	Eggs	1.0		
37	16-Sep-2019	197	0900-1459	Cunner	PYSL			1.0
				Cunner/Tautog/Yellowtail Flounder	Eggs			29.0
				Hakes	Eggs	1.0		1.0
				Northern Pipefish	PYSL	1.0		
				Silver Hake	Eggs		3.0	1.0
				Windowpane	PYSL	1.0		
				Windowpane/Fourspot/Summer Flounder	Eggs	1.0	2.0	
		198	1500-2059	Butterfish	Eggs		2.0	
				Cunner	YSL	1.0		
				Cunner/Tautog/Yellowtail Flounder	Eggs			288.0
				Fourbeard Rockling/Hakes	Eggs		1.0	
				Hakes	Eggs		5.1	1.0
				Herring Family	UNID	1.0		
					PYSL	1.0		
				Silver Hake	Eggs	6.1		7.0
					YSL		1.0	
					PYSL	4.0		
				Unidentified Osteichthyes	UNID	1.0		
				Windowpane	YSL		1.0	

Table B–1. (continued)

Week No.	Sampling Week (beginning Monday)	Period No.	Diel Period	Taxon	Life Stage[1]	0.8-mm CWWS	3.0-mm CWWS	Existing CWIS (Control)
					PYSL	2.0	1.0	1.0
				Windowpane/Fourspot/Summer Flounder	Eggs	4.0	5.1	1.0
		199	2100-0259	Cunner	PYSL	1.0		
				Cunner/Tautog/Yellowtail Flounder	Eggs			10.0
				Silver Hake	Eggs		1.0	
				Tautog	PYSL	1.0		
				Windowpane	PYSL	1.0		
				Windowpane/Fourspot/Summer Flounder	Eggs			2.0
		200	0300-0859	Atlantic Menhaden	Eggs			1.0
				Cunner	PYSL			1.0
				Cunner/Tautog/Yellowtail Flounder	Eggs	1.0		81.0
				Fourbeard Rockling/Hakes	Eggs	3.0	2.0	
				Hakes	Eggs	3.0	5.0	4.0
					UNID		1.0	
					PYSL	2.0		
				Herring Family	UNID	1.0		
					YSL	2.0		
					PYSL	1.0	4.0	1.0
				Northern Pipefish	PYSL		1.0	
				Silver Hake	Eggs	16.0	21.0	15.0
					YSL	9.0	2.0	3.0
					PYSL	2.0	1.0	
				Unidentified Osteichthyes	Eggs	1.0		
					UNID	2.0		1.0
				Windowpane	Eggs	1.0		1.0
					PYSL			1.0
				Windowpane/Fourspot/Summer Flounder	Eggs	8.0	6.0	3.0
				Witch Flounder	Eggs	1.0		
38	23-Sep-2019	205	2100-0259	Atlantic Menhaden	PYSL		1.0	
				Cunner	PYSL	1.0		
				Fourbeard Rockling/Hakes	Eggs		1.0	
				Herring Family	PYSL	1.0	2.0	1.0
				Windowpane	Eggs			1.0
					PYSL	1.0		
		206	0300-0859	Atlantic Menhaden	PYSL		1.0	
				Fourbeard Rockling	PYSL	1.0		
				Herring Family	PYSL		1.0	2.1
		207	0900-1459	Cunner/Tautog/Yellowtail Flounder	Eggs			84.3
				Herring Family	PYSL			1.0
				Windowpane/Fourspot/Summer Flounder	Eggs		4.0	2.0
		208	1500-2059	Cunner/Tautog/Yellowtail Flounder	Eggs			8.0
				Herring Family	PYSL		1.0	

Table B–1. (continued)

Week No.	Sampling Week (beginning Monday)	Period No.	Diel Period	Taxon	Life Stage[1]	0.8-mm CWWS	3.0-mm CWWS	Existing CWIS (Control)
				Windowpane/Fourspot/Summer Flounder	Eggs			2.0

[1] UNID = unidentified larvae, YSL = yolk-sac larvae, PYSL = post yolk-sac larvae, YOY = young-of-the-year, YROL = yearling and older.

APPENDIX C. EVALUATION OF CURRENT VELOCITY DURING THE 2019 CYLINDRICAL WEDGEWIRE SCREEN PILOT STUDY AT SCHILLER STATION

C-1 Introduction

A site-specific evaluation of current velocity was performed coincident with the 2019 Wedgewire Screen Study at Granite Shore Power Schiller Station to characterize the current velocity in the Piscataqua River proximal to the CWWS deployment locations, specifically the velocity along the axes of the CWWSs ("sweeping velocity") during the entrainment sampling test period. Continuous water velocity measurements of near-bottom currents at the proximal height of the CWWSs were collected using two upward-looking acoustic Doppler current profilers (ADCPs) at Schiller Station deployed to the North of the 0.8-mm CWWS and South of the 3.0-mm CWWS (Figure 9; ADCP sites referred to as "North ADCP" and "South ADCP" herein). The ADCPs were deployed at locations as proximal to each CWWS as possible without the potential to cause flow disturbances that may impact the CWWSs (ENERCON 2018).

The primary objectives of the site-specific current velocity evaluation were:

1) To describe the sweeping velocities at the CWWSs for the observed entrainment reduction performance period during the 2019 Wedgewire Screen Study, and
2) to determine the optimal screen orientation and describe current direction variability for the duration of the 2019 Wedgewire Screen Study that could inform a potential full-scale CWWS design.

C-2 Methods

C-2.1 Equipment

The site-specific current velocity measurements were collected with Nortek 2 MHz Aquadopp Profilers (referred to herein as "ADCP") mounted facing upward in low-profile aluminum frames and weighted on the seafloor with lead ballast weights (Figure C–1). The ADCPs have a velocity measurement resolution of 0.1 cm/s (0.0033 ft/s) and velocity measurement accuracy of 1% of the measured water velocity ±0.5 cm/s (0.0164 ft/s). The ADCPs were mounted in instrument frames such that the transducers of the ADCP were 0.33 m (1.1 ft) above the riverbed, which enabled data collection to begin at 0.53 m (1.74 ft) above the riverbed. Prior to deployment, each ADCP was installed in the aluminum frame at the office and underwent diagnostic system and sensor testing performed with Nortek's AquaPro software (version 1.37.08); all ADCPs passed diagnostic testing prior to deployment. Compass calibration and verifications were also conducted prior to deployment with AquaPro software, resulting in an overall directional error of less than the 2.0° accuracy specification published by the manufacturer (Nortek 2017). AquaPro software was used to program the ADCP sampling configuration and set the ADCP to record data on the internal system data logger. Additional details on the ADCP sampling configuration are provided in Section B-2.2. The ADCPs deployed for the full duration of the 2019 Wedgewire Screen Study were connected to Nortek interface boxes onshore in Screen House #1 for power and communications through a marine communications cables (Figure C–2). All ADCPs and instrument cable assemblies were deployed and recovered from a 26-ft Privateer outboard vessel with the assistance of Normandeau's scientific dive team.

C-2.2 ADCP Deployment

During the planning phase of the ADCP deployment and data collection effort, the locations and the sampling specifications were determined based on the nominal specifications for the installation of the test CWWSs, described in Section 2.2 (Figure 9; ENERCON 2018; Normandeau 2018a, 2018b). It was determined that two ADCPs would be deployed no closer than 30 ft from each CWWS and at least 10° outside of the longitudinal axis of each CWWS centerline (165° with respect to True North), one immediately upstream of the 0.8-mm CWWS ("North ADCP") and one immediately downstream of the 3.0-mm CWWS ("South ADCP"). Each ADCP frame was deployed from a 26-ft Privateer vessel with assistance from Normandeau's scientific divers to anchor and stabilize the frame at the riverbed. After stabilizing the ADCP frames and setting the secondary anchor, the marine power and communications cable was incrementally weighted and secured to the riverbed along the respective CWWS hose corridor from the deployment site inshore to Screen House #1.

The ADCP cables were secured inside of Screen House #1 and connected the instrument computer interface boxes in a temporary instrument shelter (Figure C–2). The North ADCP was initially deployed on 5 March 2019, and the South ADCP was deployed on 7 March 2019; each ADCP system required a dedicated field day to safely deploy the frame in the brief tidal slack window and secure the frame and cabling along the length of the CWWS suction hose into Screen House #1. Due to the project schedule and the extended lead time of the ADCP cable assemblies, a short-term autonomous ADCP was deployed near the South ADCP location prior to the start of entrainment sampling on 4 February 2019 at 43° 05'52.80" N, 70° 46'56.64" W, slightly offshore of the final South ADCP location (not indicated on Figure 9 due to short-term deployment). This ADCP (referred to as "Standalone ADCP") was deployed to ensure current velocity data collection began prior to the start of the 2019 Wedgewire Screen Study. It was deployed at a slightly different location than the final, long-term cabled-to-shore deployment, to allow deployment of the South ADCP at the planned final location without requiring recovery of the Standalone ADCP prior to the long-term deployment. The Standalone ADCP was recovered on 8 March 2019, following deployment of the long-term South ADCP. Table C–1 presents the deployment locations and dates of the ADCPs.

C-2.3 Sampling Configuration

To ensure adequate coverage in the water column but also achieve high accuracy and precision near-bottom current velocity data, the ADCPs were configured to sample the water column in 10 cm (0.33 ft) vertical "bins" with a 10 cm "blanking distance," collecting data from 0.53 m (1.74 ft) to 1.93 m (6.33 ft) above the riverbed. The blanking distance is required so that the ADCP does not process data contaminated from the transducer ringing and also to avoid any potential acoustic interference with the deployment frame. This sampling configuration enabled current velocity profiles to be measured across the depth layer of the CWWS cross-section as well as below and above the depth of the CWWSs. The ADCPs were configured to transmit acoustic pulses ("pings") into the water column as fast as possible while maintaining the backup battery power to remain deployed for up to 45 days (if required in the event of a cabled power failure, or for the Standalone ADCP). Current velocity profile measurements represented an ensemble of 2400 pings from sampling at 8 Hz for 300 seconds every 6 minutes. This sampling configuration was chosen to allow for intensive current velocity sampling and increased precision desired for measurements collected in the highly turbulent estuarine environment at the project site (Table C–1). The ADCP deployment design and sampling configuration were based in part on prior experience from previous studies at the project area (Normandeau 2018b). Brief gaps of up to a few hours exist in each time series on the days during which data were downloaded from the ADCPs through remote communication.

C-2.4 Data Processing

All ADCP data were processed using a combination of manufacturer's software (Nortek) and Normandeau-developed post-processing routines in MATLAB software (MATLAB software, MathWorks; Natick, MA). The raw ADCP data were first reviewed to verify the sampling configuration and were then exported from AquaPro software as ascii text data files for post-processing in MATLAB software. The current velocity data were further reviewed using Normandeau's customized processing routines to perform additional QC and review of the current velocity measurements. All data collected while the ADCP was out of water (e.g. before deployment and after recovery) were excluded from the processed dataset. Additional QC checks on the current velocity data included analysis of the acoustic signal amplitude from each ADCP beam to determine if any interference or acoustic noise was present in the data, to verify that the data met QC thresholds for signal-to-noise ratio for each data point (profile and depth bin), and to analyze vertical velocity outliers that may indicate inhomogeneity in the acoustic sampling volume in the water column.

Following additional post-processing, data quality review, and saving of the processed dataset in MATLAB, additional calculations were performed on the current velocity data to yield the representative current velocity at the CWWS centerline height above the seabed. After instrument and recovery, the CWWS heights were measured at 39.75" (3.3 ft, 1.01 m) above ground and to best represent the current velocity experienced by the CWWSs, the current velocity data from bins 5 through 7 were averaged together to produce the velocity time series presented in this report. These velocity bins were centered at 0.93 m (3.05 ft), 1.03 m (3.38 ft), and 1.13 m (3.71 ft) above the riverbed, respectively, bracketing the height above the riverbed of the CWWSs. The velocity data from these bins were considered representative of the current velocity experienced by the CWWSs during the 2019 Wedgewire Screen Study, to provide evaluation of the hydrodynamics for the CWWS performance.

Current velocity data were processed to express the velocity component of the along-CWWS axis, relevant to the installation axis of the CWWSs (165° True North, opposite 345°), the along-CWWS current velocities (referred to herein as the "sweeping velocity", v_{sweep}) were computed as:

$$v_{sweep} = -(v_E \cos\theta + v_N \sin\theta)$$ Equation C–1

where v_E and v_N are the east and north velocity components, respectively, and θ is the orientation axis of the CWWSs determined during installation with respect to due East, for calculation purposes (e.g. θ = -75° inclination angle). The sweeping velocities were calculated to conform with the convention that along-axis velocity values during ebb currents were of negative sign and those during flood currents were of positive sign (NOAA 2019). All velocity data were transformed into the CWWS sweeping axis yielding time series of the sweeping velocity at the nominal height of the CWWSs above the riverbed at each deployment site. The sweeping velocity data were then evaluated statistically for (i) the CWWS performance evaluation period and (ii) for the entire ADCP data collection period at each deployment site. All current directions referenced herein are with respect to True North.

In addition to the sweeping velocity assessment in support of the CWWS performance evaluation, the principal axis of current velocity (α) for each ADCP deployment was determined by principal component analysis, to compare the CWWS installation axis to the long-term current velocity patterns observed by the ADCPs (i.e., to provide assessment of current direction variability) as:

$$\alpha = \frac{1}{2}\tan^{-1}\left[\frac{\left[2\overline{u'v'}\right]}{\overline{u'^2} - \overline{v'^2}}\right]$$ Equation C–2

where $\overline{u'^2}$ and $\overline{v'^2}$ are variances of the east and north velocity components respectively, $\overline{u'v'}$ is the covariance of the east and north velocity components, and α the principal axis angle. The principal component analysis was performed with the same depth-averaged velocities from ADCP bins 5 through 7. The decomposition of the velocity vectors into principal component axes allows for expression of the data such that the maximum amount of velocity variance is aligned with the major principal axis (Thomson and Emery 2014).

C-3 Results

C-3.1 2019 Data Collection Period

ADCP data were obtained to provide information necessary to (i) describe the sweeping velocities at the CWWSs for the observed entrainment reduction performance evaluation period during the 2019 Wedgewire Screen Study, and (ii) to determine the optimal screen orientation (i.e., the long-term principal axis) and describe current direction variability for the duration of the 2019 Wedgewire Screen Study that could inform a potential full-scale CWWS design. The deployment information for each ADCP is presented in Table C–1. To illustrate the general tidal current pattern and show the area of the water column of the CWWS and ADCP profiles, current velocity data observed at the South ADCP from the 48-hour data period that consisted of the maximum velocities observed during the deployment are presented as color contour plots (Figure C–3). The same 48-hour period of data is presented as time series for current speed and direction at the height of the CWWSs, water depth measured by the South ADCP, and the sweeping current velocity at the height of the CWWS were plotted in Figure C–4. The observed tidal current patterns at the sites were consistent and the 48-hour period presented in Figure C–3 and Figure C–4 is generally representative of the current velocity features observed during the deployment; namely, that flood current velocity at the site was stronger and more consistent directionally than the ebb current velocity, which was weaker and more variable in direction. This general pattern was also observed in previous ADCP studies conducted at Schiller Station (Normandeau 2018a, 2018b), and is likely due to the site's protected position from the main ebb current channel and stronger ebb currents further offshore of the Station.

For the purpose of data presentation and comparison of data between the ADCP stations, the data collected for the duration of the evaluation period (weeks of Monday, 11 March 2019 through Monday, 23 September 2019) from the North and South ADCPs were plotted in the remaining figures described below, during which both ADCPs were sampling for equal deployment duration. However, statistical analyses were performed with all data collected in addition to the shorter CWWS performance evaluation period (Table C–2 and Table C–3). The velocity time series parameters for both the North and South ADCPs were presented in Figure C–5 and Table C–2 presents summary statistics of the sweeping current velocity. Note that the Standalone ADCP data were excluded from these plots. The measured velocity components (v_E and v_N), used for the sweeping current velocity analyses from both the North and South ADCPs were presented in Figure C–6. Ebb and flood currents were depicted as blue and red colored points for presentation, respectively (slight tidal asymmetry is evident in the scatter diagram). The CWWS orientation axes were depicted on the scatter plots for reference to show the CWWS alignment with the currents. Lastly, to highlight the difference in sweeping current velocity magnitude observed at the North and South ADCPs, empirical cumulative distribution functions of the sweeping velocity magnitude (i.e. the absolute value of sweeping velocity) are shown in Figure C–7.

Table C–3 presents the same velocity statistics as Table C–2 with the inclusion of the principal axes determined by principal component analyses from each ADCP for the entire deployment duration of each station. The sweeping current velocities observed at the South ADCP were substantially stronger than at the North ADCP. This pattern is due to the complex bathymetry in the deployment area, specifically the curvature of the shoreline and the bottom contours in the area of the North ADCP deployment. Previous studies in the project area have shown that the current velocity within the project area, particularly near the North ADCP location, is relatively turbulent, susceptible to eddies formed by the shoreline, and appears to experience a wider range of current velocity directions than the less sheltered location of the South ADCP, especially at the onset of ebb currents (Normandeau 2018a). The sweeping velocity magnitude at the South ADCP averaged 2.88 ft/s, and ranged from zero to 6.84 ft/s while the sweeping velocity magnitude at the North ADCP averaged 1.63 ft/s, and ranged from zero to 4.84 ft/s. At the project area near Schiller Station, the flood tidal currents were significantly stronger than the ebb currents. This characteristic of the tidal currents is due to the deployment location with respect to the complex bathymetry and shoreline geometry with respect to the main ebb and flood tidal channels: the nearfield area of Schiller Station is somewhat sheltered from the Piscataqua River's dominant ebb tidal current channel, which manifests further offshore from the Station (i.e., the maximum ebb tidal currents for the entire cross-section of the Piscataqua River occur offshore from the Station, whereas for flood tidal currents, the maximum velocities are observed from the channel shoreward towards the project area; Normandeau 2018a). The principal axes from the South and North ADCPs for the entire deployment duration of each station were 162.2° and 166.1°, respectively. These determinations were in good agreement with the estimated principal axis of 165.3° determined from the preliminary ADCP deployment at Schiller Station used to plan the CWWS deployment orientation axis, while indicating minor statistical differences in spatial velocity variation in the project area (Normandeau 2018b). It is anticipated that the minor differences in principal velocity axes are due to slight location differences between the deployments, as even small changes in the bathymetry and bottom contours have an effect on the statistical current velocity field at the project site. These velocity data indicated that the CWWSs were oriented optimally for the installation locations at Schiller Station.

C-3.2 Sampling Nonconformities

There were two events requiring unique handling of the current velocity data collected by the North and South ADCPs during the 2019 Wedgewire Screen Study. The first was a brief period during which a coal ship was docked at Schiller Station, which caused interference with the compasses on both ADCPs and therefore resulted in corrupted velocity data (Figure C–8). Figure C–8 shows the ship docked at the Station and indicates the general location of the CWWS. This period was evident in the ADCP compass heading data and occurred from 25 May 2019 05:30 EST to 29 May 2019 14:54 EST, evident as a "shift" in apparent instrument heading which erroneously shifted the ADCP-derived current velocities (Figure C–9). The raw velocity data were corrected during this period by rotating the ADCP-derived current velocity by the difference between the corrupted heading measurement back to the ADCP heading measurement at 25 May 2019 05:24 EST, prior to the interference caused by the ship. It should be noted that the presence of the coal ship docked at Schiller Station appeared to reduce the current velocity magnitudes at both the North and South ADCPs during flood currents, and slightly increase the current velocities on ebb at the South ADCP due to potential induced turbulence.

The second event was previously described in Section 7.1 when the North ADCP appeared to have been snagged by lobster gear and dragged approximately 30-40 ft inshore before being hung up against the 0.8-mm CWWS suction hose. This period was obvious in the ADCP data, indicated by anomalous sensor orientation data from 20 November 2019 12:12 EST until it was repositioned by Normandeau's scientific dive team on 7 December 2019 09:18 EST. Because the data collected by the North ADCP during this period were at a different location and depth, entangled with lobster fishing gear, and improperly positioned next to the CWWS hose which resulted in acoustic interference during flood currents, the

North ADCP data during this period were excluded from the processed dataset for the full 2019 Wedgewire Screen Study period.

C-3.3 CWWS Performance Evaluation Period

As described in Section 7.1, the period of data spanning the entrainment samples used to assess CWWS entrainment reduction performance was represented by samples collected during the week beginning Monday, 11 March 2019 through the week beginning Monday, 23 September 2019 (weeks 10 through 38). To aid the assessment of the potential effect of the sweeping velocity on CWWS performance, statistics for the sweeping velocity magnitude (i.e., absolute value of sweeping velocity) and vector-average current direction were calculated for each entrainment sample, using the data collected from the North and South ADCPs. Sweeping velocities were calculated using Equation C–1 for all 6-minute ADCP ensembles, and the ADCP data were then subset into the coincident time periods of each entrainment sample for the CWWS performance evaluation period. Additionally, the "off-screen axis angle" was calculated for each sample as the magnitude of the angular difference between the sample-averaged current direction and the orientation axis of the CWWS (i.e., difference between the sample-averaged current direction and the CWWS alignment axis of 165° True North). The sample-averaged sweeping velocity and current direction statistics for the entrainment sample periods are presented in Table C–4 and were discussed in Section 7.2.6 and Section 7.2.7. The sweeping velocity statistics were also presented by tidal stage, where tidal stage was defined based on the sign of the sweeping velocity. High and low slack tides were assigned if the tidal sweeping current velocity switched directions during an entrainment sample (but greater than 18 minutes from the start of the sample and less than 18 minutes from the end of the entrainment sample; i.e. a sample was not categorized as slack if the sweeping current velocity switched directions near the beginning or end of the sample). High slack tides were assigned to samples when the sweeping current velocity switched from flood to ebb within a sample period as described above; low slack tides were assigned when the opposite occurred within a sample period (switching from ebb to flood). CWWS performance results with respect to these data were described in Section 7.2.6 and Section 7.2.7.

C-4 Literature Cited

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Nortek. 2017. The Comprehensive Manual and Principles of Operation. Rud, Norway.

Thomson, R. E., and W. J. Emery. 2014. Data Analysis Methods in Physical Oceanography, 3rd ed. Elsevier Science; Waltham, MA.

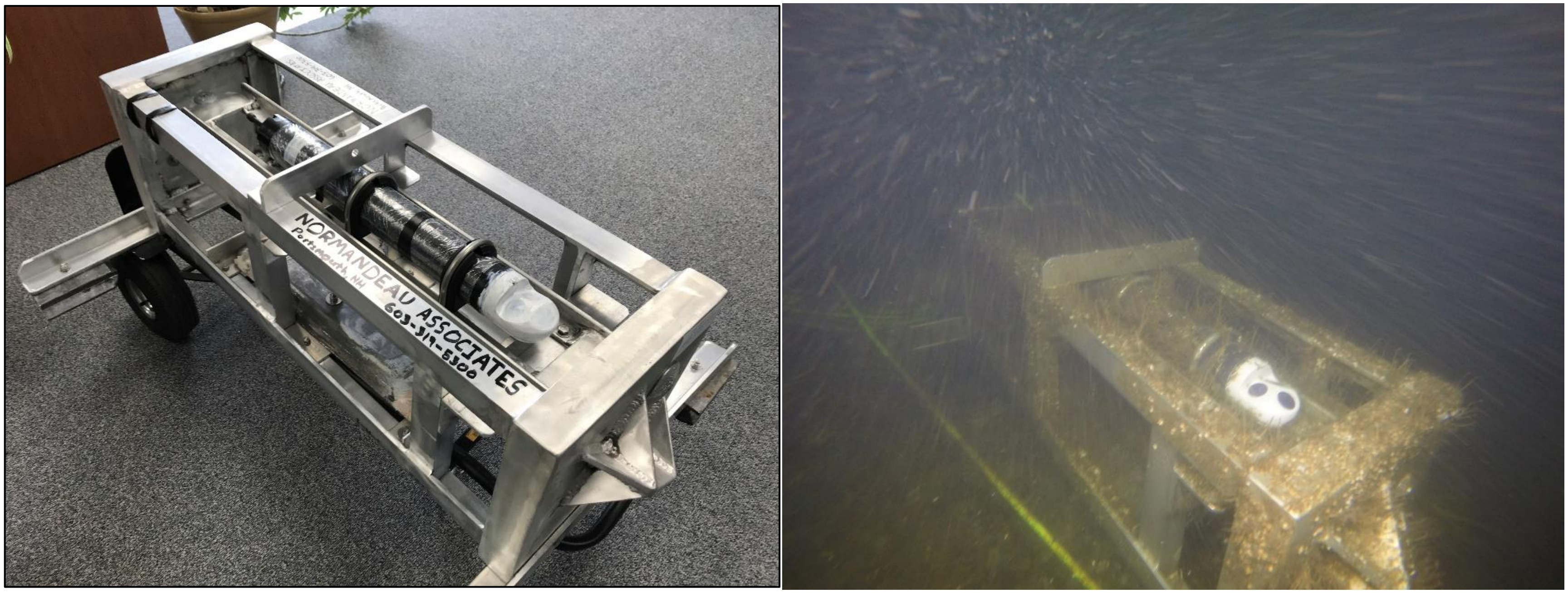

Figure C–1. Photos of one of the ADCP frames installed in the office (left panel) and while deployed in the Piscataqua River at Schiller Station (right panel).

Figure C–2. Photos of the ADCP power and communication cable assemblies and the computer interface systems for the ADCPs, installed in Screen House #1 at Schiller Station.

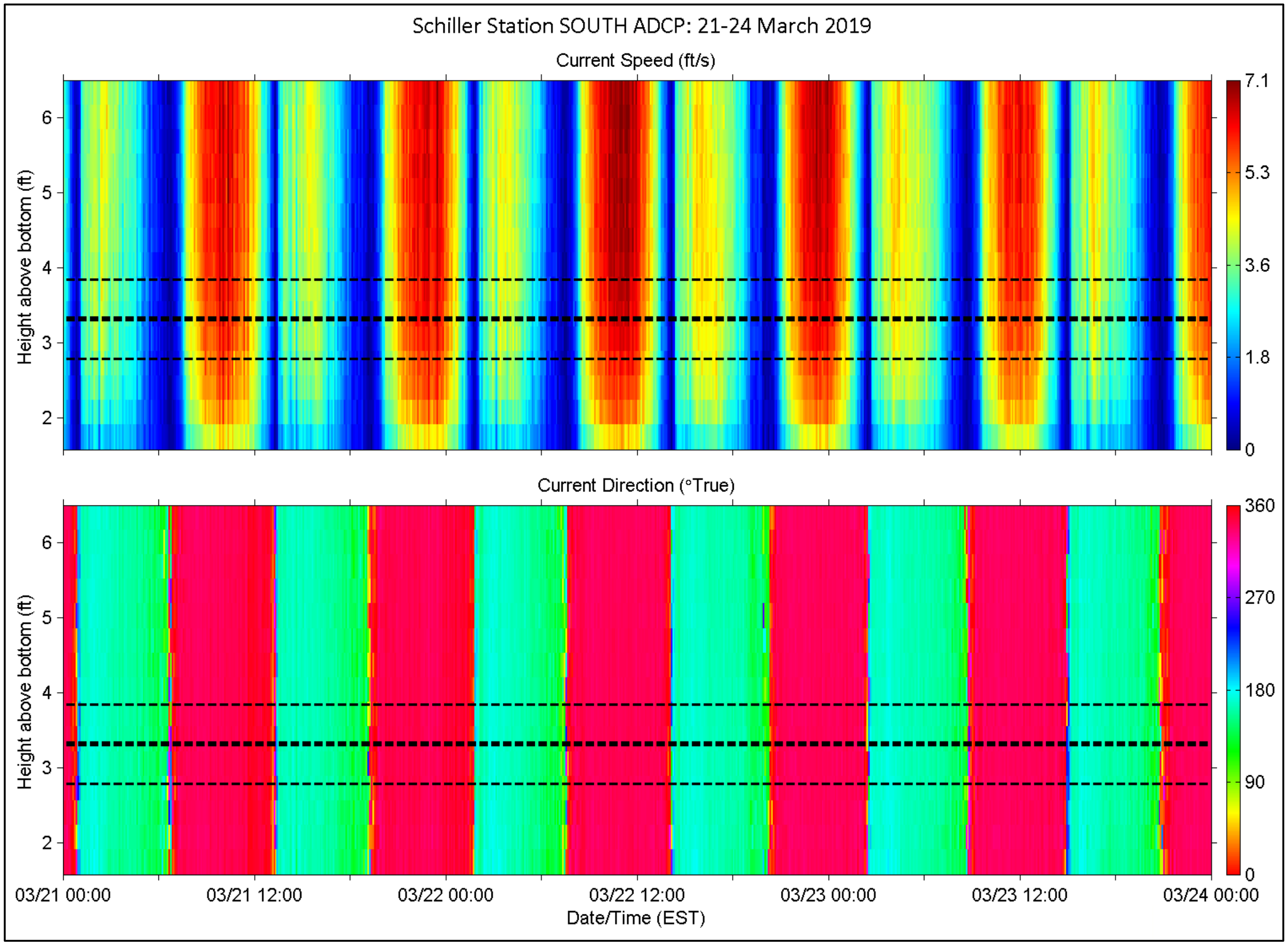

Figure C–3. Color contour plots of current speed (top) and direction (bottom) measured by the South ADCP during a 48-hour period in which the maximum current velocities during the 2019 Wedgewire Screen study were observed (21-24 March 2019) to illustrate the current velocity pattern near the riverbed at Schiller Station. The dashed lines indicate the nominal heights above the seabed of the CWWS centerline (bolded line), top and bottom lines represent the vertical dimension of the installed CWWS.

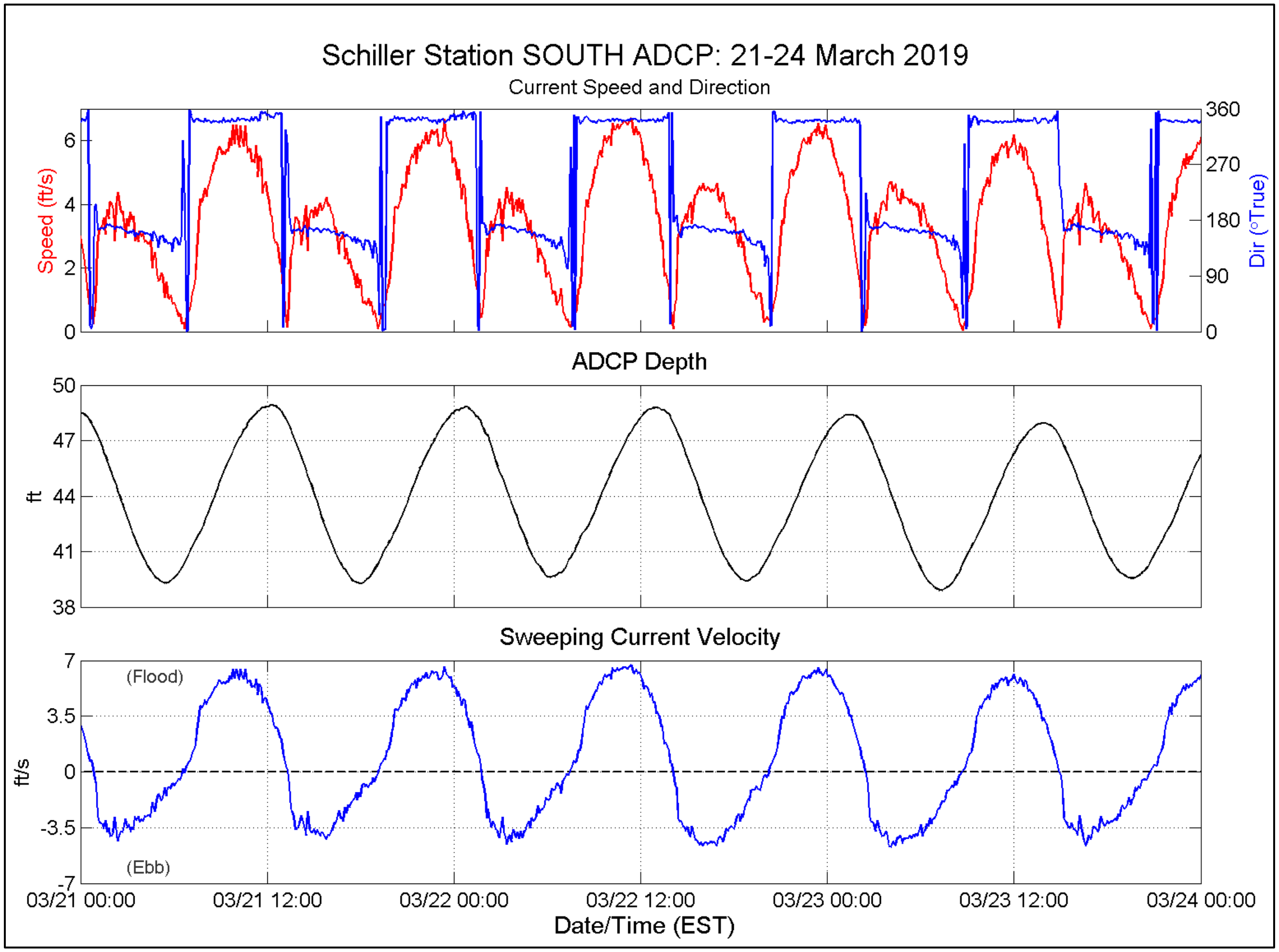

Figure C–4. **Time series plots of current speed and direction (top panel), ADCP depth (middle panel), and sweeping current velocity (bottom panel) measured at the height of the CWWS by the South ADCP during a 48-hour period in which the maximum current velocities during the 2019 Wedgewire Screen study were observed (21-24 March 2019) to illustrate the current velocity pattern near the riverbed at Schiller Station. Note that positive sweeping velocity indicates flood currents and negative sweeping velocity indicates ebb currents.**

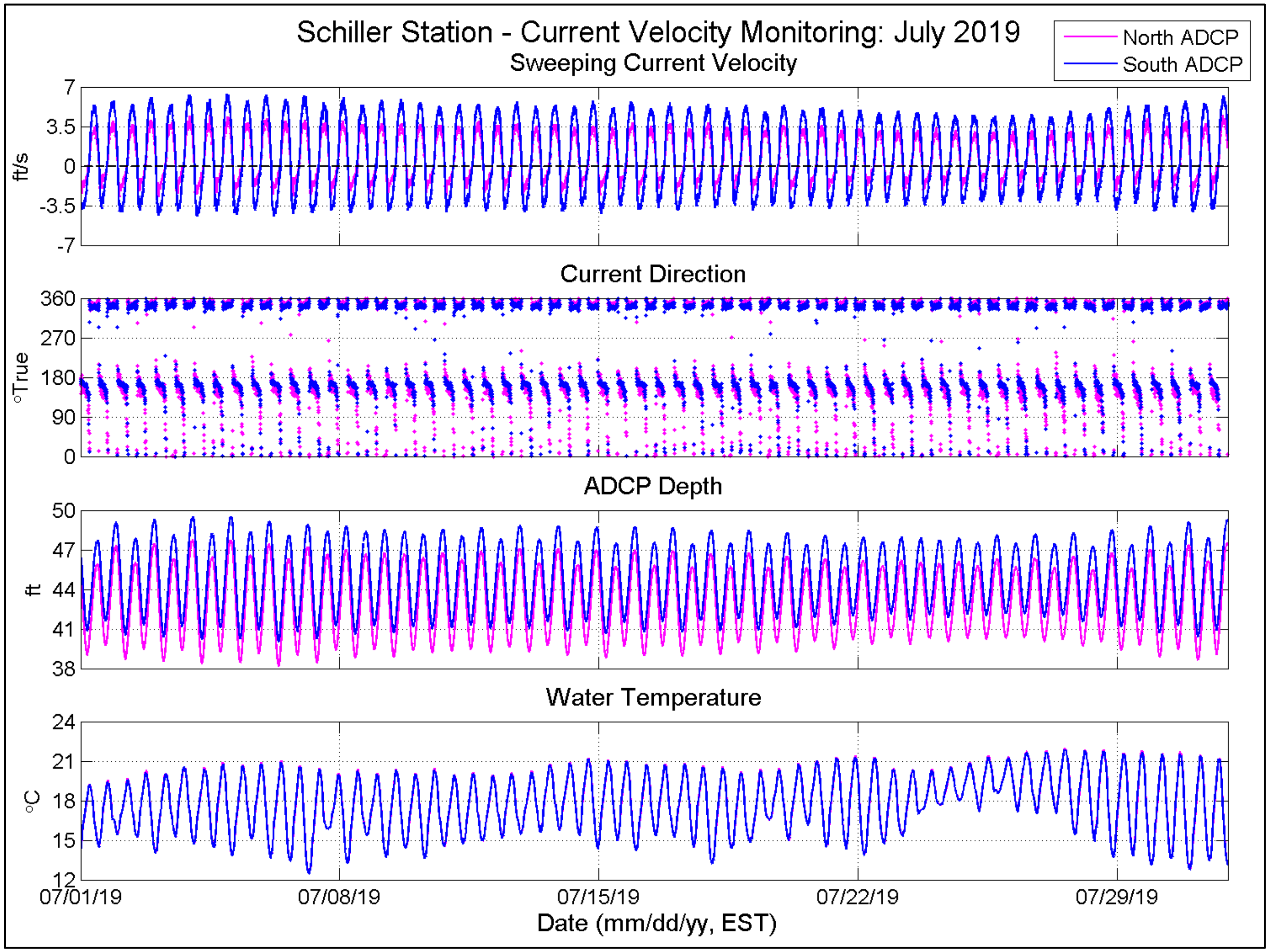

Figure C–5. Time series plots of sweeping current velocity, current direction, ADCP depth, and water temperature measured in July 2019 by both the North ADCP and South ADCP during the CWWS performance evaluation period for the 2019 Wedgewire Screen Study. One month of data is presented for the sake of visualization of the time series. Note that positive sweeping velocity indicates flood currents and negative sweeping velocity indicates ebb currents.

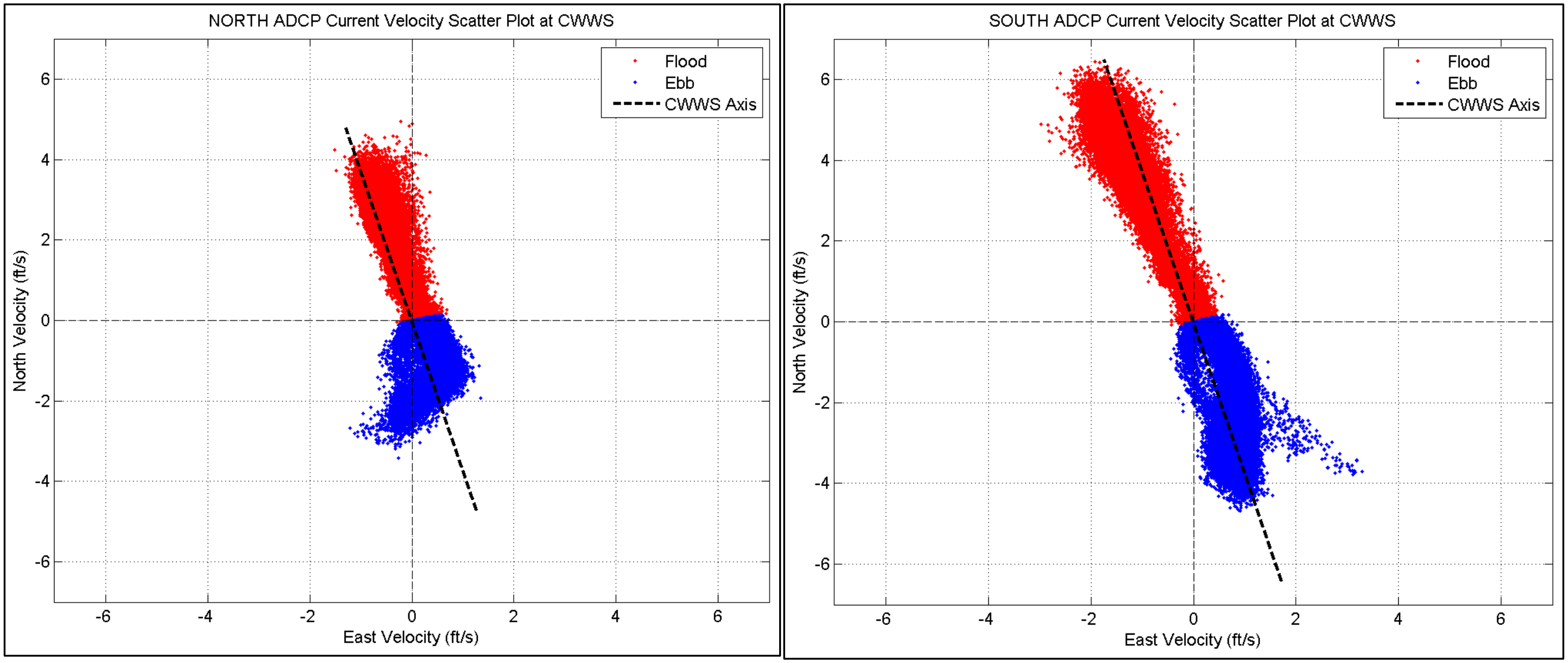

Figure C–6. Scatter plots of current velocity measured at the height of the CWWSs at both the North ADCP (left panel) and South ADCP (right panel) during the CWWS performance evaluation period from the weeks of Monday, 11 March 2019 through Monday, 23 September 2019. The bold dashed line provides a reference for the orientation axis of the CWWSs as installed for the 2019 Wedgewire Screen Study in the Piscataqua River at Schiller Station, scaled to the maximum observed sweeping current velocity for presentation purposes. Flood (red dots) and ebb (blue dots) are indicated as determined by the direction of the sweeping current velocity.

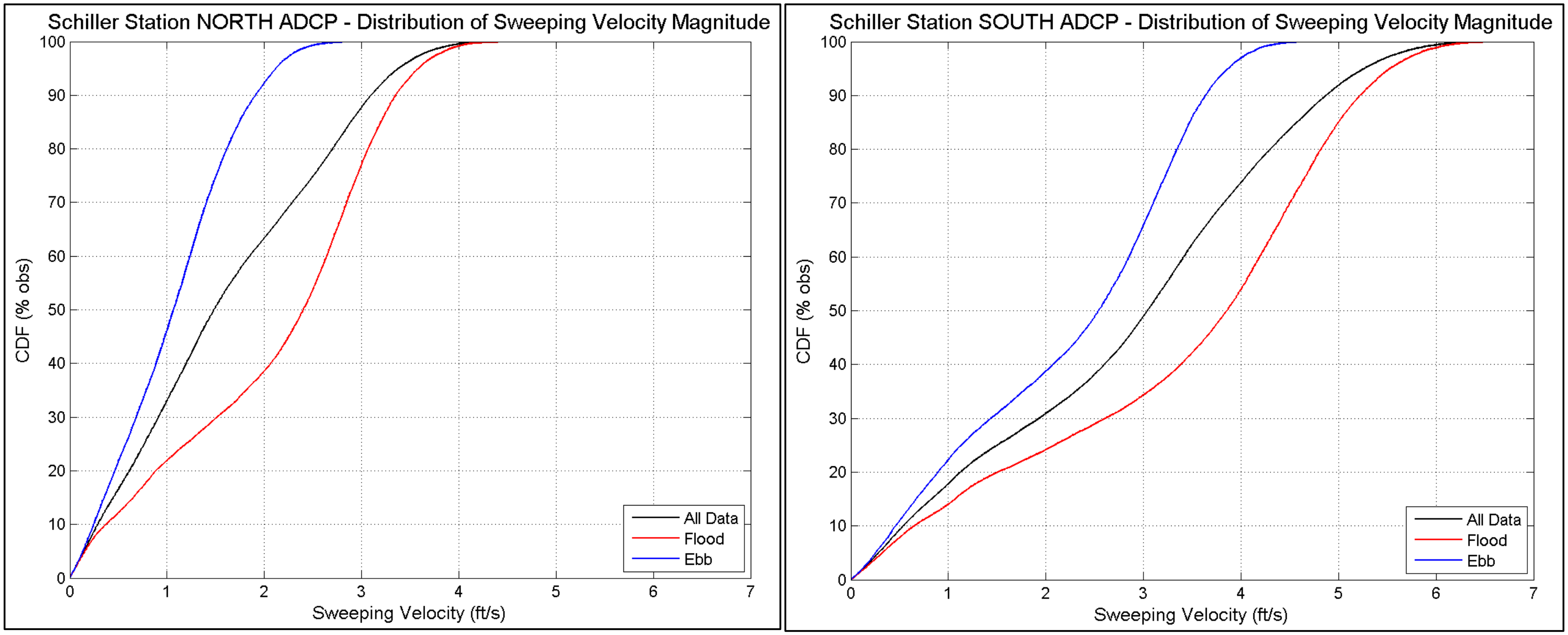

Figure C–7. Empirical cumulative distribution functions of sweeping current velocity measured at the height of the CWWSs at both the North ADCP (left panel) and South ADCP (right panel) during the CWWS performance evaluation period from the weeks of Monday, 11 March 2019 through Monday, 23 September 2019. For both ADCPs, all sweeping current velocity data during this period (black line) are compared to both flood sweeping velocity (red lines) and ebb sweeping velocity (blue lines). The y-axis represents the cumulative percentage of all measurements during the performance evaluation period.

Figure C–8. Photo of the coal ship Virgo Colossus docked at Schiller Station from 25-29 May 2019. The red circle highlights the location of a surface float marking the CWWS locations. Both ADCPs were impacted by the ship, the North ADCP more so due to deployment position relative to the ship's hull.

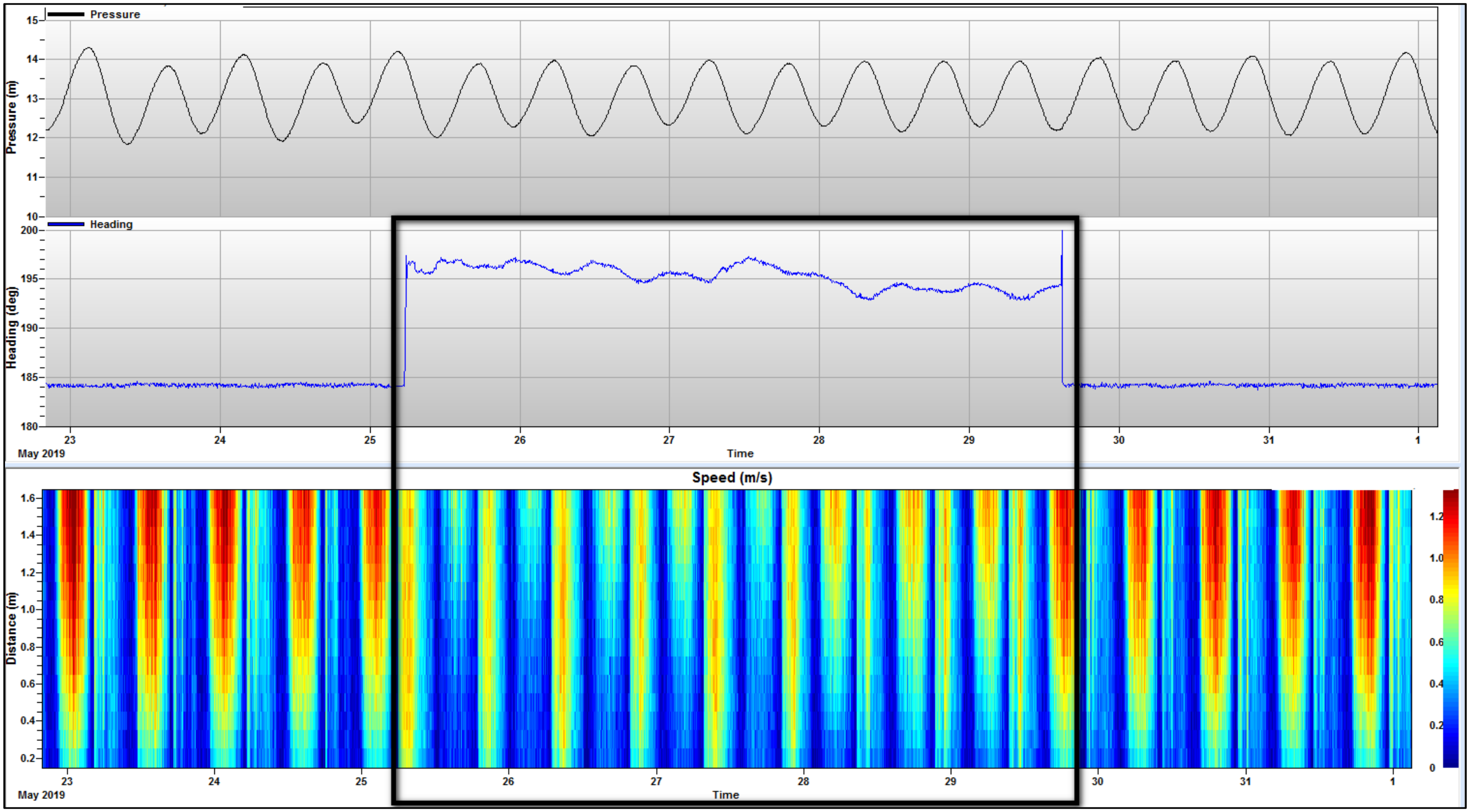

Figure C–9. Image of raw ADCP data from the North ADCP showing the period during which the coal ship was docked at Schiller Station (highlighted by the black square). ADCP pressure (top panel), raw magnetic heading (middle panel), and current speed (bottom panel) are presented. Note the overall decrease in current speed while the ship was present as well as the magnetic compass heading interference. The North ADCP was slightly more impacted than the South ADCP due to being upriver of the ship.

Table C–1. Deployment information for the ADCPs deployed in the Piscataqua River near Schiller Station from 4 February 2019 to 27 December 2019 in support of the 2019 Wedgewire Screen Study at Schiller Station.

ADCP Station	Latitude	Longitude	Start Date	End Date
South ADCP	43° 05' 52.77" N	70° 46' 56.46" W	7 March 2019	27 December 2019
North ADCP	43° 05' 53.48" N	70° 46' 57.00" W	5 March 2019	27 December 2019
Standalone ADCP*	43° 05’ 52.80” N	70° 46' 56.28" W	4 February 2019	8 March 2019

**Standalone ADCP was a short-term autonomous deployment prior to acquisition of ADCP cable assemblies for the long-term deployments.*

Table C–2. Summary statistics of the sweeping current velocity magnitude and current direction measured by the North and South ADCPs during the CWWS performance evaluation period at Schiller Station: the weeks of Monday, 11 March 2019 through Monday, 23 September 2019. Units are feet per second unless otherwise noted.

ADCP	Tide	% of obs	N obs	Min	Mean	Max	s.d.	1%	10%	25%	50%	75%	90%	99%	Avg Dir (°)	s.d. Dir (°)
South ADCP	All	100.0	47,941	0.00	2.86	6.71	1.57	0.07	0.54	1.50	3.04	4.06	4.87	5.86	–	–
	Flood	53.9	25,820	0.00	3.38	6.71	1.66	0.08	0.66	2.09	3.86	4.67	5.23	6.03	341.8	11.8
	Ebb	46.1	22,121	0.00	2.24	4.76	1.19	0.06	0.46	1.13	2.54	3.22	3.64	4.22	161.8	17.8
North ADCP	All	100.0	47,928	0.00	1.63	4.84	1.04	0.03	0.29	0.76	1.48	2.51	3.10	3.85	–	–
	Flood	53.9	25,845	0.00	2.11	4.84	1.09	0.03	0.37	1.19	2.40	2.95	3.35	3.97	348.5	17.1
	Ebb	46.1	22,082	0.00	1.07	3.24	0.61	0.03	0.25	0.58	1.07	1.51	1.91	2.44	158.5	24.1

Table C–3. Summary statistics of the sweeping current velocity magnitude and current direction measured by each ADCP for the full duration of each deployment at Schiller Station during the 2019 Wedgewire Screen Study. Units are feet per second unless otherwise noted.

ADCP	Tide	% of obs	N obs	Min	Mean	Max	s.d.	1%	10%	25%	50%	75%	90%	99%	Avg Dir (°)	s.d. Dir (°)	Principal Axis (°)
South ADCP[i]	All	100.0	70,721	0.00	2.88	6.84	1.57	0.06	0.55	1.53	3.07	4.09	4.89	5.90	–	–	162.2
	Flood	53.8	38,041	0.00	3.40	6.84	1.67	0.07	0.66	2.10	3.88	4.69	5.25	6.07	341.9	11.9	–
	Ebb	46.2	32,680	0.00	2.28	5.00	1.19	0.05	0.48	1.18	2.57	3.26	3.67	4.28	162.1	17.5	–
North ADCP[ii]	All	100.0	67,152	0.00	1.63	4.84	1.04	0.03	0.31	0.80	1.59	2.68	3.41	3.87	–	–	166.1
	Flood	53.8	36,125	0.00	2.11	4.84	1.09	0.03	0.37	1.22	2.40	2.95	3.35	4.00	348.5	17.0	–
	Ebb	46.2	31,025	0.00	1.07	3.57	0.61	0.03	0.25	0.57	1.05	1.51	1.92	2.44	159.0	23.8	–
Standalone ADCP[iii]	All	100.0	7,692	0.00	2.92	6.52	1.37	0.13	0.91	2.01	2.98	3.89	4.66	5.87	–	–	155.6
	Flood	51.8	3,983	0.01	3.33	6.52	1.55	0.14	0.83	2.20	3.74	4.45	5.10	6.00	342.9	12.7	–
	Ebb	48.2	3,709	0.00	2.48	4.64	0.95	0.09	1.02	1.95	2.67	3.17	3.57	4.10	145.2	14.0	–

[i] *South ADCP deployed from 7 March 2019 to 27 December 2019.*

[ii] *North ADCP deployed from 5 March 2019 to 27 December 2019; data from 20 November 2019 to 7 December 2019 excluded from analyses.*

[iii] *Standalone ADCP deployed from 4 February 2019 to 8 March 2019.*

Table C–4. Summary statistics of the sample-averaged sweeping current velocity magnitude, current direction, and off-screen axis angle measured by each ADCP concurrent with the entrainment samples collected during the CWWS performance evaluation period at Schiller Station: weeks of Monday, 11 March 2019 through Monday, 23 September 2019. Off-screen axis angle is the magnitude of the angular difference between the CWWS orientation axis and the sample-averaged current direction. Units are feet per second unless otherwise noted.

ADCP	Tide	% of Samples	N Samples	Min SV[i]	Mean SV	Max SV	s.d. SV	Avg Dir (°)	s.d. Dir (°)	Min Off-Axis[ii] (°)	Mean Off-Axis (°)	Max Off-Axis (°)	s.d. Off-Axis (°)
South ADCP	All	100.00	579	0.34	2.95	5.66	1.24	–	–	0.0	6.9	87.4	11.5
	Flood	39.55	229	0.96	4.04	5.66	0.90	341.7	2.2	0.0	3.5	9.3	1.8
	High Slack	17.62	102	1.63	2.28	4.31	0.37	170.1	72.4	0.0	9.9	79.5	15.6
	Ebb	31.43	182	0.34	2.53	3.99	0.93	162.4	10.5	0.1	6.5	49.4	10.2
	Low Slack	11.40	66	0.37	1.34	2.32	0.44	0.9	61.8	0.1	15.2	87.4	19.5
North ADCP	All	100.00	579	0.23	1.70	3.59	0.86	–	–	0.1	11.6	88.5	14.6
	Flood	39.21	227	0.95	2.58	3.59	0.58	347.8	2.0	0.1	3.0	10.1	2.0
	High Slack	15.89	92	0.78	1.33	1.73	0.20	179.1	74.1	0.3	13.8	88.5	17.6
	Ebb	31.95	185	0.28	1.20	2.02	0.44	157.1	14.4	0.1	14.5	56.0	12.2
	Low Slack	12.95	75	0.23	0.75	1.40	0.27	25.1	56.6	3.0	27.7	87.6	19.5

[i]SV is the sample-averaged sweeping velocity magnitude (i.e. average of all ADCP measurements within an entrainment sample period).

[ii]Off-axis angle represents the difference between the sample-averaged current direction (i.e. average of all ADCP measurements within an entrainment sample period) and the CWWS orientation axis (165° True North).