Empire Wind 2024 Baited Remote Underwater Video (BRUV) and Environmental DNA (eDNA) Monitoring Survey

Annual Report

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ACRONYMS AND TERMS

ASV	Amplicon Sequence Variant
BAG	Before-After Gradient
BOEM	Bureau of Ocean Energy Management
BORIS	Behavioral Observation Research Interactive Software
BRUV	Baited Remote Underwater Video
C	Celsius
cm	centimeter(s)
CoC	chain of custody form
CTD	conductivity, temperature, and depth
eDNA	Environmental DNA
Empire Wind	Empire Offshore Wind LLC
EW 1	Empire Wind 1
EW 2	Empire Wind 2
FBMP	Fisheries and Benthic Monitoring Plan
F/V	fishing vessel
GB	gigabyte
INSPIRE	INSPIRE Environmental, Inc.
kg	kilogram(s)
km	kilometer(s)
L	liter(s)
m	meter(s)
MAB	Mid-Atlantic Bight
MaxN	maximum number of individuals observed for a given species in a single video frame per video
mi	mile(s)
MicroSD	micro secure digital
mm	millimeter(s)
NJDEP	New Jersey Department of Environmental Protection
nm	nautical mile(s)
NYSERDA	New York State Energy Research and Development Authority
PCR	polymerase chain reaction
psu	practical salinity unit
ROSA	Responsible Offshore Science Alliance
SSD	solid-state hard drive
WTG	wind turbine generator

LIST OF APPENDICES

1.0 OVERVIEW

Empire Offshore Wind LLC (Empire Wind) proposes to construct and operate an offshore wind farm located in the designated Renewable Energy Lease Area OCS-A 0512 (Empire Wind Lease Area). The Empire Wind Lease Area covers approximately 79,350 acres (32,112 hectares) and is located approximately 14 statute miles (mi) (12 nautical miles [nm], 22 kilometers [km]) south of Long Island, New York and 20 mi (17 nm, 32 km) east of Long Branch, New Jersey (Figure 1-1). The Empire Wind Lease Area will be developed as two wind farms, known as Empire Wind 1 (EW 1) and Empire Wind 2 (EW 2). Monitoring efforts are combined for the proposed wind farms, covering the entire Empire Wind Lease Area as described in the Fisheries and Benthic Monitoring Plan (FBMP) (INSPIRE 2023). The results provided in this report pertain to samples collected across the entire Empire Wind Lease Area.

The New York Bight supports diverse fish and invertebrate assemblages (Guida et al. 2017; Thorne et al. 2020; NJDEP 2022). Fisheries monitoring was designed to assess potential impacts of construction and operation activities within the Empire Wind Lease Area on these biological communities. The FBMP was developed in accordance with recommendations made by the Bureau of Ocean Energy Management's (BOEM) *Guidelines for Providing Information on Fisheries for Renewable Energy Development on the Atlantic Outer Continental Shelf* (BOEM 2019) and New York State Energy Research and Development Authority's (NYSERDA) *New York State Offshore Wind Master Plan: Fish and Fisheries Study* (NYSERDA 2017) and was created using an iterative process with the Empire Wind team coordinating with regional fishing organizations, working groups, and individual fishermen. In addition, throughout the permitting and development process the Empire Wind team consulted with state and federal fisheries resource management agencies and solicited feedback directly from stakeholders.

The FBMP (INSPIRE 2023) includes a fisheries monitoring survey that uses a Before-After-Gradient (BAG) design for assessing changes in fish diversity and abundance around wind turbines installed in the Empire Wind Lease Area. A BAG design is a statistically robust approach that samples at varying distances from a turbine both before and after construction and has proven effective for assessing offshore wind farm effects on marine mammals and birds in the North Sea (Methratta 2020, 2021) as well as haddock and flatfish in the Scottish portion of the North Sea (Bicknell et al. 2025). In comparison to other survey designs, a BAG design can evaluate spatial heterogeneity and the spatial scale of effect, it does not require a reference (control) location, and it is capable of comparing post-construction patterns to baseline conditions. However, the utility of this approach for assessing pre- vs. post-construction changes and spatial effects relies on the ability to sample fish near turbine foundations. Mobile fisheries sampling techniques such as bottom trawl and dredging are problematic due to their broad scale sampling resolution, potential interaction with wind structures, and detrimental impacts to habitat (reviewed by Methratta 2021). When also considering fish mortality associated with traditional sampling techniques, the use of non-destructive and non-extractive techniques is paramount to the accurate and sustainable assessment of marine fauna (Stat et al. 2019; Methratta 2021).

Aquatic Environmental DNA (eDNA) and Baited Remote Underwater Video (BRUV) surveillance systems have emerged in recent years as alternative methods for monitoring marine biodiversity. In comparison to traditional sampling techniques, eDNA and BRUV are inexpensive and non-extractive approaches that can generate accurate, unbiased, and high-resolution data (Stat et al. 2019). When the methods were compared to each other on the south coast of the United Kingdom, BRUV was less expensive, but eDNA detected almost three times as many species (Clark et al. 2024). These sampling methods are fixed (relatively stationary) and can sample on or very close to turbine foundations, which is essential to assessing distance-based effects of wind turbine installations (Methratta 2021). Each sampling method, however, possesses its own limitations and biases that can impact monitoring efforts. For instance, BRUV surveillance systems can record a diverse assemblage of mobile fish species, but these systems only record video in a specific field of view where the utility of recorded footage can be influenced by the type of species in the area, the type of bait used, and underwater visibility (Colton and Swearer 2010; Griffin et al. 2016; Jones et al. 2021). Video analysis methods for BRUV data are also underdeveloped, often relying on manual review and annotation which are both time consuming and expensive (Langlois et al. 2020). eDNA metabarcoding can be used to assess fish and other taxa at lower financial and effort costs than BRUV surveillance, but results can be influenced by several factors, including DNA persistence and degradation, sampling strategies, workflows, and availability of taxa markers in reference databases (reviewed by Stat et al. 2019; Kopp et al. 2023).

Given the observed “reef effect” of structure-oriented species from offshore wind farms in Europe (e.g., Wilhelmsson et al. 2006; Bergstrom et al. 2013; Reubens et al. 2013) and North America (e.g., Wilber et al. 2022), INSPIRE Environmental (INSPIRE), under contract with Empire Wind, carried out a large-scale BAG survey effort in the Empire Wind Lease Area using eDNA and BRUV with stereo-video cameras. The survey is designed to occur seasonally (spring, summer, fall, winter) within the Empire Wind Lease Area, with monitoring targeted for two years pre-construction and two years post-construction. Monitoring is also planned during construction, provided the survey will not interfere with construction operations. Two years of sampling are planned prior to the commencement of offshore construction. The eDNA survey will continue during the construction phase and a minimum of two years of eDNA monitoring will be completed following offshore construction. The overall goal of the survey is to assess potential changes in the occurrence, diversity, and abundance of fish species in the Empire Wind Lease Area before, during, and after the installation of wind turbines.

1.1 Study Objectives

This report provides results of the second year of pre-construction BRUV/eDNA fisheries monitoring at the Empire Wind Lease Area. Pre-construction survey goals include the collection of baseline information on fish community composition and relative abundance for comparison to results from construction and post-construction time periods. The Empire Wind fisheries monitoring plan was conducted in accordance with the FBMP as well as guidance from NYSERDA and the Responsible Offshore Science Alliance (ROSA 2021).

2.0 METHODS

2.1 Sampling Design Overview

In-situ water measurements and videos were collected seasonally within the Lease Area aboard the fishing vessel (F/V) *Cailyn and Maren*, a commercial gillnetter and lobster vessel based out of Little Compton, Rhode Island. Samples were strategically collected at eight stations that coincided with proposed wind turbine generator (WTG) locations (Figure 2-1). To ensure even and full distribution of sampling stations in the Empire Wind Lease Area, these WTG stations were divided evenly into two depth strata using the 35-meter (m) depth contour that bisects the proposed wind farm, a “shallow” depth stratum (<35 m; Stations B17, C20, D03, D14) and a “deep” stratum (>35 m; Stations C22, F27, H21, L25) (see INSPIRE 2023 for details). Four bins at distances of 0 m, 50 m, 100 m, and 200 m from the base of each WTG station were designated for collecting stereo BRUV video footage for a period of 1 hour. Water column profiles and eDNA samples were collected 100 m from each WTG station. The seasonal excursions to collect these data (i.e., water column profiles, eDNA, stereo BRUV) are referred to as sampling events.

Water samples for eDNA were transported to Monmouth University for analysis and BRUV video footage was analyzed in-house by INSPIRE scientists. A chain of custody (CoC) form was established to properly account for data collected by each method and transferred to the respective parties.

2.2 Data Collection

2.2.1 Water Column Profiles

Prior to the deployment of stereo BRUV systems, a single water column profile and eDNA sample were collected from the vessel at 100 m from each WTG station. Conductivity (i.e., salinity), temperature, and depth (CTD) were recorded for each WTG station using a SonTek CastAway CTD (Xylem, Inc., Washington D.C., USA) (Figure 2-2). The CTD was allowed to acclimate at the sea surface briefly before measuring physical parameters throughout the water column and stopping within 2 m of the seafloor to prevent disturbing the benthic environment. Collected water column data were downloaded after each deployment and exported to an external solid-state hard drive (SSD). Data collection activities were recorded on field data sheets, which included WTG station name, time, water depth, and coordinates, as well as CoC forms to document each completed CTD cast.

2.2.2 Environmental DNA (eDNA)

Water samples for eDNA analysis were collected alongside CTD casts at a distance of 100 m from each WTG. Each water sample was collected within 2 m from the seafloor using a 2.2-liter (L) water sampler (1520-C20 Kemmerer bottle; Wildco, Yulee, FL, USA) (Figure 2-2). After water samples were collected, sample water was used to rinse the 1-L Nalgene wide-mouth opaque amber storage bottle. The remainder of the sample was then decanted into the same pre-rinsed bottle, labeled with the appropriate sample number, and immediately stored in a chest freezer onboard the vessel in accordance with protocols provided by Monmouth University scientists. A control sample of distilled water underwent the same field processing as the eDNA samples to assess relative exposure to other elements and evaluate any anomalous results. Data collection activities were recorded on field data sheets, which included WTG station name, time, water depth, and coordinates, to document each collected eDNA sample.

After the completion of each survey, the chest freezer and eDNA samples were relocated from the vessel to INSPIRE storage facilities. Collected eDNA water samples remained frozen during packing and were shipped overnight to Monmouth University in an insulated shipping container. The nine frozen sample bottles (i.e., WTG station samples, 1 control sample) were received by Monmouth University and allowed to thaw for ~24 hours at 4°Celsius (°C). Thawed seawater was vacuum filtered onto 0.45-micrometer pore size, 47 millimeters (mm)-diameter filters (Cytiva-Whatman NC 45 ST #10401170). The filters were stored with the sample surface folded on the inside, frozen, in sterile tubes until extraction. DNA was extracted from the tubes using the Qiagen DNeasy PowerWater Kit (cat. Nos. 14900-50-NF and 14900-100-NF), with a slight modification to the final DNA elution step to increase yield (Stoeckle et al. 2022). Primers used for amplification were from Riaz et al. (2011) modified to include Illumina adapters for subsequent sequencing (Appendix A).

A portion of the polymerase chain reaction (PCR) product was visualized on a 2.5% agarose gel to confirm the presence of a dominant band at roughly 200 base pairs, indicating successful amplification of fish (and other vertebrate) sequences. With the samples, a positive (either striped bass DNA or a mixture of elasmobranch species, obtained from verified fin clips) and negative control (molecular grade water) were also run for quality assurance / quality control. Extracted DNA with a band was quantified, and quality checked on a NanoDrop spectrometer (ThermoFisher). Following the acceptance of results from the PCR amplification technique (based on gel electrophoresis, standard quality assessment and control), 20x diluted aliquots of PCR products were shipped to the Bioanalytical Services Lab for sequencing.

2.2.3 Baited Remote Underwater Video (BRUV)

Stereo BRUV systems, hereafter referred to as BRUV systems, typically consist of an aluminum frame that supports two convergent video cameras inside waterproof housings with some type of baited container positioned in front of the cameras (Langlois et al. 2020) (Figure 2-2). Aluminum frames, which support the videography hardware and bait, were fabricated locally (The Metal Guy LLC; Newport, RI, USA) and modeled after BRUV systems produced by commercial businesses (e.g., SeaGIS 2023) and academic research efforts (e.g., Langlois et al. 2020). Steel weights (3.2 kilograms [kg]) were used to stabilize the aluminum frames on the seafloor. The number of steel weights added to base of BRUV system varied from four to six, depending on sea conditions, which provided a maximum of 19.2 kg of additional weight for stability on the seafloor. To precisely estimate body size measurements of fish from collected video footage, each BRUV system was fitted with two GoPro HERO11 video cameras. Each

GoPro HERO11 video camera was equipped with a 64 gigabyte (GB) micro secure digital (MicroSD) card, a GoPro Enduro battery, and a silica desiccant pack and sealed inside a SeaGIS photogrammetric underwater camera housing (230-mm diameter; SeaGIS Pty Ltd, Victoria, Australia). Camera housings were secured to a central support bar and set for stereoscopic measurements, i.e., positioned 58.5 centimeters (cm) apart at a 7-degree convergence angle to point at the bait bag, following instructions from SeaGIS (SeaGIS 2023). Each system consists of two dive lights (eLED Light Cannons; Underwater Kinetics, Poway, CA, USA), which were mounted directly above the SeaGIS camera housings to prevent light refraction from interfering with video quality (Figure 2-2). The bait bag, a Heavy-Duty bag (Rainbow Net & Rigging) filled with three to four individual Atlantic mackerel (*Scomber scombrus*), was attached to a 2-m-long bait arm (constructed from schedule-40 PVC) that was marked every 10 cm. A surface marking system was attached to the aluminum frame to aid in the safe deployment, identification, and retrieval of each BRUV system. Red Sea Alex buoys were appropriately marked with the project name and INSPIRE contact information. Each buoy was attached to 18 m of 11.1 mm-ProFlex Sink Rope that goes to 37 m of floating line that is secured to the top of each BRUV system. In the center of the floating line there is one plastic weak link that is placed on the floating line to prevent entanglement, which has a breaking strength of 771 kg.

BRUV systems and associated hardware were assembled, calibrated, and baited prior to deployment at the previously identified distance bins from each WTG station (Figure 2-3). Video camera calibrations were conducted to support stereoscopic measurements of fish body size from collected video footage. A HOBO temperature data logger (MX2203, 120 m depth rating; Onset, Bourne, MA, USA) was also fastened to the BRUV system deployed at the 100-m distance bin to record additional bottom water temperature during deployments. After each system was synchronized using photodiode flash to facilitate video synchronization and future stereo measurements, BRUV systems were deployed on the seafloor in order of increasing distance from the base of the WTG for a period of 1 hour (Figure 2-3). In other words, four BRUV systems were deployed at each previously identified distance from a WTG station in quick succession to ensure video collected at each distance from a WTG station occurred over a similar period. BRUV systems were then hauled onto the vessel after the 1-hour monitoring period whereupon recorded video footage and temperature data were reviewed and transferred to an external SSD; camera batteries and bait were also replaced before deployment at the next station. The subsea light batteries were replaced every other station. Field and survey information, including WTG number, BRUV system number, time, coordinates, depth, wind speed, wave height, and Beaufort Sea state, were recorded on field data sheets during the deployment and retrieval of each BRUV system.

2.3 Data Analysis

2.3.1 Water Column Profiles

Collected water column data from each CTD cast were reviewed for inconsistencies and visualized using the statistical computing software R (R Core Team 2023).

2.3.2 Environmental DNA (eDNA)

Sample indexing, normalization, denaturing, and Illumina sequencing were performed at the Biological Services Laboratory according to standard protocols (complete protocols available upon request). For each sample, a set of two FastQ files containing forward and reverse sequences of the amplified DNA was produced. These were delivered via Illumina's data transfer server, BaseSpace, and stored backed up on several different servers when received.

Amplified sequences were then processed by Monmouth University using the DADA2 pipeline (Callahan et al. 2016) in the statistical computing program R (R Core Team 2023) to identify unique sequence variants and match them to a reference of known sequences. The output of DADA2 bioinformatics includes a 'taxa table' that contains detected Amplicon Sequence Variants (ASVs), associated taxa names for known ASVs from a reference database, and the number of times that ASVs were detected for a given sample (i.e., number of reads). ASVs are bits of DNA code that have been ascribed to specific taxa and used to characterize community composition. For instance, the number of unique ASVs detected for a species increases confidence in the identification of the species. It is also common practice to interpret the number of ASV reads of all variants for a given taxa as a relative approximation of a taxa's abundance in a sampled environment (Deagle et al. 2019). However, it should be noted that eDNA methodology assumes DNA release correlates with the abundance of individuals present and therefore cannot determine the true number of individuals in an area. The availability of eDNA for inferring relative abundance can be influenced by various factors, including DNA release and from differences in animal density, degradation from environmental conditions, mechanical force, microbial activity, and chemical reactions (reviewed by Ramirez-Amaro et al. 2022), and masking from overabundant taxa (Skelton et al. 2023) as well as differences in applied methodologies (reviewed by Goldberg et al. 2016).

2.3.3 Baited Remote Underwater Video (BRUV)

Collected video footage was uploaded to INSPIRE's network after returning to shore and demobilizing efforts. Original video files were archived on the project-specific external SSD for two months until backups were confirmed. Videos were organized by sampling event, station, distance bin and associated BRUV system, and camera and then reviewed for completeness and any file corruption. Due to overall visibility conditions observed during video playback and potential analytical implications, uncorrupted video files were ranked in terms of quality using a modified ordinal scale from Jones et al. (2021) (Table 2-1).

Videos assigned a visibility score of "0.5 – Very Poor" and greater were analyzed further to ensure reviewers could confidently identify fish species to the lowest practical identification level for future analyses. Figure 2-4 provides examples of these visibility scores using footage collected from the 2024 sampling events.

Videos assigned acceptable quality scores were processed using the video editing software Shotcut (Meltytech, LLC; https://shotcut.org/). Left and right videos were first synchronized using a photodiode flash recorded prior to deployment, ensuring video stills (i.e., frames) collected from both cameras on the same BRUV system aligned in space and time, i.e., a fish interacting with the bait bag at five minutes time can be seen on the same video frame in each camera. Synchronized videos were then trimmed to the full length of time the system recorded environmental conditions on the seafloor and exported in a compressed file format (e.g., MPEG-4 Part 14 [.mp4]) for analysis. In cases where visibility could be improved, color correcting filters were applied.

Exported videos were then analyzed for species composition and behavioral metrics using the Behavioral Observation Research Interactive Software (BORIS, Friard and Gamba 2016). Specifically, videos assigned a visibility score of at least "0.5 – Very Poor" were analyzed for the species present, their arrival times, and their relative abundance, i.e., the maximum number of individuals observed in a single video frame per video (MaxN; Priede et al. 1994). If recorded organisms could not be identified at the species level, either due to poor visibility conditions, large aggregations of fish, or both, generic taxa identifications were used (e.g., 'fish,' 'skate sp.,' and 'dogfish sp.'). Although BRUV systems recorded video footage using two video cameras, time of first arrival and MaxN values were only estimated using video footage from one camera.

Taxa accumulation curves were created to examine the timing of the cumulative number of first arrival during each sampling event over the 60(+)-minute video recordings. These evaluations were conducted by considering both the full taxonomic record (i.e., generic identifications such as 'fish,' 'skate sp.,' and 'dogfish sp.' were included) and considering only data for species-level identifications or groupings (e.g., little/winter skate). The rationale for these two approaches is to examine whether potential duplication of first arrival sightings for a species, e.g., recording times for both dogfish sp. and spiny dogfish, affects the trajectory of the taxa accumulation curve.

Table 2-1. Video Quality Categories and Scores that Describe Visibility in Videos and Ability to Identify Organisms

Quality Category	Quality Code	Description
Excellent	3	Can see the bait bag clearly plus 1 m in the distance; organisms can be identified
Good	2	Can see the bait bag and seafloor clearly but no distance beyond the bait bag; organisms can be identified
Poor	1	Can see the bait bag but seafloor is not visible; organisms can be identified
Very Poor	0.5	Cannot see the bait bag or seafloor; organisms can be identified
Unusable	0	Cannot see the bait bag or seafloor; organisms cannot be identified

3.0 RESULTS

In total, four sampling events were conducted from March to December of 2024: 26 to 28 March, 11 to 13 June, 10 to 12 September, and 9 to 11 December. Water column profiles, eDNA water samples, and BRUV video footage were collected at each station and for each sampling event. Vessel operations adhered to the specific vessel strike avoidance measures provided by BOEM Management Practices.

Scientific sampling activities did not result in the inadvertent take, or the accidental killing or injuring, of any marine mammals or federally endangered species.

3.1 Water Column Profiles

Water column profiles were collected at each sampling station and sampling event, resulting in 32 sets of salinity and temperature data. There was little variation in salinity throughout the water column within any sampling period, with the most variation in June when salinity ranged from approximately 29 practical salinity unit (psu) at the surface to 31 psu near the seafloor. Average salinity at each station was lowest in June and highest in December, but this difference was only approximately 3 psu (Figure 3-1). Water temperature ranges throughout the water column were minimal across stations in March (6.3 to 6.9°C) and December (10.6 to 12.6°C), whereas there was substantial thermal stratification in June and September (Figure 3-2A-D), with temperatures declining up to 12°C from the surface to the seafloor. The small temperature variation across the water column in December included a slight temperature inversion at the shallow stations where surface water temperatures were lower than water temperatures near the seafloor (Figure 3-2D).

3.2 Environmental DNA (eDNA)

Eight eDNA samples were collected 100 m from each WTG station during each of the four sampling events, resulting in the collection of 32 water samples. Freezing and light protection successfully prevented excessive DNA degradation. For the purposes of the eDNA results, “taxa” in this section refers to ASV reads that are associated with taxa (usually species) listed in a DNA library. The text of this report refers to taxa that are detected or observed in BRUV imagery by their common names and the corresponding scientific names are provided in the tables.

A total of 13 elasmobranch and 33 teleost taxa were identified using eDNA methods (Table 3-1; Figure 3-3). Elasmobranch taxonomic richness detected by eDNA was highest in September (n=11) and teleost taxa richness was greatest in December (n=22) (Figure 3-3). Combined elasmobranch and teleost taxa richness was highest in December (Figure 3-4). Little/winter skate and barndoor skate were the elasmobranchs detected during all sampling events. Atlantic menhaden, butterfish, Atlantic menhaden/river herrings, silver hake, red/spotted/white hake, black sea bass, Atlantic/northern sand lance, and windowpane flounder were the teleost taxa detected in all sampling events (Figure 3-3). Elasmobranch taxa with high detection rates in terms of the relative number of ASV reads included little/winter skate in March, June, and December and spiny dogfish in December (Figure 3-3). Teleost taxa with relatively high ASV read numbers included monkfish in March and striped bass, scup, and butterfish in December (Figure 3-3). In December, taxonomic richness of teleosts and elasmobranchs tended to decrease with increasing depth (Figure 3-5). Additional information on identified taxa and number of reads by station and sampling event are provided in Appendix B.

3.3 Baited Remote Underwater Video (BRUV)

BRUV systems were successfully deployed at each distance bin and WTG station for each sampling event, resulting in 128 BRUV system deployments and 256 video camera recordings for analysis (i.e., two video cameras per system). Overall, at least 98% (n=251) of the 256 video camera recordings from the four sampling events were uncorrupted (Table 3-2). The five corrupted videos were recorded at three stations during the September sampling event. Specifically, videos from both the left and right cameras at two stations (B17 and C20) at the fourth distance bin were corrupted at the 38-minute mark and therefore data were not obtained from these stations and distance bin during this sampling event. Only a single video collected from the right camera at one distance bin for Station D14 was corrupted, leaving the video from the left camera available for analysis. Of the 256 videos, 7% (n=18) were assigned a visibility score of “Unusable,” 12% (n=30) were “Very Poor,” 8% (n=20) were “Poor,” 56% (n=144) were “Good,” and 17% (n=44) were “Excellent” (Table 3-2). The videos assigned a visibility score of either “0.5 – Very Poor”, “1 – Poor”, “2 – Good”, or “3 – Excellent” were used for community composition and relative abundance analyses. Overall, 73% of the videos were suitable for analysis, although visibility scores varied by sampling event with the fewest number of videos suitable for analysis collected in March 2024 (9%) compared to 100% in June and December (Table 3-2).

In total, 30 taxa, including teleosts (n=18) and elasmobranchs (n=7) (Tables 3-1 and 3-3), as well as invertebrates (n=5) were identified at the four sampling events. An object of unknown identity was observed in June at Station F27 and is not included in any tabulations or analyses. Taxa observed during all four sampling events included butterfish, cancer crab, dogfish sp., little/winter skate, spiny dogfish, squid sp., and summer flounder (Table 3-3). The number of taxa observed across all stations was lowest in March (n=12) when fewer videos were suitable for analysis, higher in June (n=21) and September (n=19), and lower in December (n=16) (Table 3-3). In general, more taxa were observed at the shallow stations (mean = 18 taxa) than at the deep stations (mean = 13 taxa) (Table 3-4). Flatfish were observed at all shallow stations and summer flounder were observed at one deep station (F27) (Table 3-4). Dogfish sp., spiny dogfish, little/winter skate, cancer crab, and black sea bass were common across all stations at both depths.

In March, the timing of first arrival was generally shortest for butterfish, occurring within the first ten minutes of the video analysis (Figure 3-6). Other early arrivers to the bait arm of the video system in March were dogfish sp., little/winter skate, and spiny dogfish. In June, cancer crab were among the first to arrive, along with flatfish sp. and spiny dogfish (Figure 3-7). In September, cancer crab and flatfish sp. were again among the early arrivers (Figure 3-8). In December, there was an overwhelming occurrence of dogfish sp. and spiny dogfish as the first to arrive, with spiny dogfish arriving within the first few minutes at every video system deployment (Figure 3-9).

The two approaches to calculating taxa accumulation curves in Section 2.3.3 produced similar results (Figure 3-10), with relatively shorter times occurring in December compared to the other sampling events. In December, approximately 50% of all taxa were observed within the first ten minutes of the videos, whereas during the other sampling events, new taxa arrivals in the videos occurred over a more prolonged period of time. For all sampling periods, an asymptote was approximated within the 60-minute viewing period, indicating longer soak durations would not contribute substantially to taxa richness.

MaxN values (> one individual) ranged from two to 24 individuals in a video frame for a given taxon. Dogfish sp. and cancer crab occurred in the largest single-species aggregations (Figure 3-11), with a maximum MaxN for dogfish sp. of 24 individuals in December. There were MaxN estimates of 15 or more dogfish in eight videos recorded at three shallow stations (D03, D14, and C20) in December. Cancer crab aggregations in single video frames occurred in all months except March and at both depth strata and ranged from two to seven individuals. Butterfish aggregations were most common in March and ranged from two to 16 individuals.

The time to MaxN in March was examined for four taxa with sightings of multiple individuals in a single video frame, with the shortest time to MaxN for little/winter skate (~ 10 minutes) and longest time to MaxN for spiny dogfish (~ 50 minutes) (Figure 3-12). In June, four taxa had relatively similar MaxN time distributions to each other, averaging approximately 30 to 35 minutes (Figure 3-13). September MaxN distributions were similar to June, with the exception of squid sp. with a longer (~ 50 minute) MaxN time (Figure 3-14). MaxN times in December were varied, with dogfish sp. and spiny dogfish recorded with MaxN times generally under 30 minutes and occurrences of multiple individuals observed in a video frame on nearly all videos (Figure 3-15).

3.4 Comparison of eDNA and Baited Remote Underwater Video (BRUV)

There are some considerations to note when comparing eDNA metabarcoding detections of fish as ASVs to BRUV data. First, some ASVs are the same for different taxa (e.g., "Red_White_or_Spotted_Hake"). In richness comparisons, for instance, if all of these hake species were identified in a BRUV survey, taxonomic richness would equal three, whereas the eDNA data would record richness as one taxon. Additionally, some ASVs are redundant because they are 'compound' ASVs (e.g., belong to more than one taxon). For instance, while the "Atl_menhaden_LS17" sequence is 100% identical to menhaden, "Atl_menhadenLS16_or_river_herring" is 100% identical to several species of river herring (including blueback herring) and menhaden. The comparison of taxonomic lists between catches and eDNA detections is best viewed in terms of commonalities and omissions, rather than overall richness numbers. Of the 51 total taxa in the 2024 Empire Wind Lease Area BRUV/eDNA study, 15 taxa were detected by both eDNA and BRUV methodologies, 30 taxa were detected by eDNA only, and six taxa were observed in BRUV only (Table 3-5).

Table 3-1. Number of taxa detected using eDNA and BRUV sampling methods in all 2024 sampling events. Frequencies represent number of unique taxa for teleosts, skates and rays, and sharks.

Taxa	**Sampling Method**	
	eDNA	**BRUV**
Teleosts	33	18
Skates and Rays	9	3
Sharks	4	4

Table 3-2. Metadata summary of video footage collected by BRUV systems in March, June, September, and December 2024. Presented values represent frequency counts whereas values in parentheses are percentages for a given variable by survey.

	Frequency (Percent)			
	March	**June**	**September**	**December**
Video Files Present				
Yes	64 (100)	64 (100)	64 (100)	64 (100)
No	0	0	0	0
Video Health				
Healthy	64 (100)	64 (100)	59 (92.2)	64 (100)
Corrupted	0	0	5 (7.8)	0
Video Quality				
0 – Unusable	18 (28.1)	0	0	0
0.5 – Very Poor	22 (34.4)	0	8 (12.5)	0
1 – Poor	18 (28.1)	0	2 (3.1)	0
2 – Good	6 (9.4)	24 (37.5)	50 (78.1)	64 (100)
3 – Excellent	0 (0)	40 (62.5)	4 (6.3)	0

Table 3-3. Occurrence frequency of taxa observed from videos collected in March, June, September, and December 2024. Occurrence frequency identifies how many of the eight stations yielded observations of a given taxon for that sampling event. Frequency values were not provided if a taxon was not identified at any station for a sampling event.

Common Name	Scientific Name	Mar	Jun	Sep	Dec
American lobster	*Homarus americanus*				1
Atlantic menhaden	*Brevoortia tyrannus*	1			
Barndoor skate	*Dipturus laevis*				1
Black sea bass	*Centropristis striata*		4	3	5
Bluefish	*Pomatomus saltatrix*			1	
Butterfish	*Peprilus triacanthus*	2	2	1	3
Cancer crab	*Cancer* sp.	1	8	7	7
Dogfish sp.		8	1	5	8
Fish		5	6	2	
Flatfish sp.			2	2	
Haddock	*Melanogrammus aeglefinus*		3		
Hake sp.		2	1		1
Herring sp.				1	1
Little/winter skate	*Leucoraja erinacea / Leucoraja ocellata*	2	8	7	8
Longfin squid	*Doryteuthis pealeii*			1	
Monkfish	*Lophius americanus.*		1		
Northern sea robin	*Prionotus carolinus*		5	3	
Red hake	*Urophycis chuss*		6		
Scup	*Stenotomus chrysops*			1	5
Sea robin sp.			2	1	
Shark sp.			1		
Silver hake	*Merluccius bilinearis*		1		
Skate sp.		5	1		4
Smooth dogfish	*Mustelus canis*		1	1	3
Spiny dogfish	*Squalus acanthias*	5	2	2	8
Spotted hake	*Merluccius bilinearis*		1	2	
Squid sp.		2	1	2	5
Striped sea robin	*Prionotus evolans*			5	1
Summer flounder	*Paralichthys dentatus*	1	1	2	1
Unknown invertebrate		1			
Total Taxa		**12**	**21**	**19**	**16**

Table 3-4. Presence/absence of fish/invertebrate taxa in videos at the deep and shallow stations across all four sampling events in 2024. Unique station IDs are located under the Deep and Shallow groupings and the presence of specific taxa in BRUV videos is represented using an "X" in the table.

		Deep				Shallow			
Common Name	**Scientific Name**	**C22**	**F27**	**H21**	**L25**	**B17**	**C20**	**D03**	**D14**
American lobster	*Homarus americanus*			x					
Atlantic menhaden	*Brevoortia tyrannus*								x
Barndoor skate	*Dipturus laevis*						x		
Black sea bass	*Centropristis striata*	x	x	x	x	x	x	x	x
Bluefish	*Pomatomus saltatrix*							x	
Butterfish	*Peprilus triacanthus*		x	x	x	x		x	
Cancer crab	*Cancer* sp.	x	x	x	x	x	x	x	x
Dogfish sp.		x	x	x	x	x	x	x	x
Fish		x		x	x	x	x	x	x
Flatfish sp.						x	x	x	x
Haddock	*Melanogrammus aeglefinus*	x			x		x		
Hake sp.			x		x	x	x		
Herring sp								x	
Little/winter skate	*Leucoraja erinacea / Leucoraja ocellata*	x	x	x	x	x	x	x	x
Longfin squid	*Doryteuthis pealeii*					x			
Monkfish	*Lophius americanus.*					x			
Northern sea robin	*Prionotus carolinus*			x		x	x	x	x
Red hake	*Urophycis chuss*	x	x	x	x	x	x		
Scup	*Stenotomus chrysops*	x				x	x	x	x
Sea robin sp.							x	x	x
Shark sp.							x		
Silver hake	*Merluccius bilinearis*		x						
Skate sp.		x		x	x	x	x	x	x
Smooth dogfish	*Mustelus canis*		x			x	x	x	
Spiny dogfish	*Squalus acanthias*	x	x	x	x	x	x	x	x
Spotted hake	*Merluccius bilinearis*	x	x						x
Squid sp.		x	x	x	x		x	x	
Striped sea robin	*Prionotus evolans*	x	x			x	x	x	x
Summer flounder	*Paralichthys dentatus*		x				x	x	x
Unknown invertebrate			x						
Total Taxa		**13**	**15**	**12**	**12**	**17**	**20**	**18**	**15**

Table 3-5. Taxa detected using eDNA and BRUV methods across all sampling events in 2024. Shaded cells indicate the ASV corresponds to more than one species .Taxa identified using BRUV, eDNA, or both methods are represented with an "X" in the table.

Common Name	Scientific name	BRUV	eDNA
American lobster	*Homarus americanus*	x	
Atlantic chub mackerel	*Scomber colias*		x
Atlantic cod	*Gadus morhua*		x
Atlantic croaker	*Micropogonias undulatus*		x
Atlantic salmon	*Salmo salar*		x
Barndoor skate	*Dipturus laevis*	x	x
Black sea bass	*Centropristis striata*	x	x
Blueback herring	*Alosa aestivalis*		x
Bluefish	*Pomatomus saltatrix*	x	x
Bluntnose stingray	*Hyanus say*		x
Brazilian cownose ray	*Rhinoptera brasiliensis*		x
Bullnose ray	*Myliobatis freminvillei*		x
Butterfish	*Peprilus triacanthus*	x	x
Cancer crab	*Cancer* sp.	x	
Clearnose skate	*Raja eglanteria*		x
Cownose ray	*Rhinoptera bonasus*		x
Cunner	*Tautogolabrus adspersus*		x
Flatfish sp.		x	
Four-spot flounder	*Paralichthys oblongus*		x
Gulf stream flounder	*Citharichthys arctifrons*		x
Haddock	*Melanogrammus aeglefinus*	x	
Little/Winter skate	*Leucoraja erinacea/L. ocellata*	x	x
Longfin Squid	*Doryteuthis pealeii*	x	
Mackerel	*Scomber scombrus*		x
Menhaden	*Brevoortia tyrannus*	x	x
Monkfish	*Lophius americanus*	x	x
Northern sand lance/Atlantic sand lance	*Ammodytes dubius/A. americanus*		x
Northern sea robin	*Prionotus carolinus*	x	x
Northern sennet	*Sphyraena borealis*		x
Red, Spotted, White hake	*Urophycis chuss/U. regia/U. tenuis*	x	x
Roughtail stingray	*Bathytoshia centroura*		x
Sandbar shark	*Carcharhinus plumbeus*		x
Scup	*Stenotomus chrysops*	x	x
Shark sp.		x	
Silver carp/Grass carp	*Hypophthalmichthys molitrix/Ctenopharyngodon idella*		x
Silver hake	*Merluccius bilinearis*	x	x
Smallmouth flounder	*Etropus microstomus*		x
Smooth dogfish	*Mustelus canis*	x	x
Spiny butterfly ray	*Gymnura altavela*		x
Spiny dogfish	*Squalus acanthias*	x	x
Spot/Black drum	*Leiostomus xanthurus/Pogonias cromis*		x
Striped bass	*Morone saxatilis*		x
Striped sea robin	*Prionotus evolans*	x	x
Sturgeon	*Acipenser spp.*		x
Summer flounder	*Paralichthys dentatus*	x	x
Tautog	*Tautoga onitis*		x
Thread herring	*Opisthonema oglinum*		x
Thresher shark	*Alopias vulpinus*		x
Weakfish	*Cynoscion regalis*		x
Windowpane flounder	*Scophthalmus aquosus*		x
Winter flounder/Yellowtail	*Pseudopleuronectes americanus/Limanda ferruginea*		x

4.0 DISCUSSION

The Year 2 – 2024 BRUV/eDNA survey successfully sampled all distance bins and stations in every sampling period, yielding pre-construction visual and genetic data on seasonal fish/invertebrate communities at the Empire Wind Lease Area. Environmental conditions changed between the sampling events, with well-defined thermal stratification of decreasing temperatures with increasing depth present in June and September and well-mixed conditions throughout the water column in March and December. Thermal stratification is common in the summer in the Mid-Atlantic Bight (MAB), dissipating in the late fall and winter to a well-mixed condition that coincides with phytoplankton blooms (Schofield et al. 2008). The thermal stratification in the MAB, also known as the Cold Pool, extends from George's Bank off of Cape Cod, Massachusetts to Cape Hatteras, North Carolina (Houghton et al. 1982) and strongly influences the ecosystem dynamics such as phytoplankton production, behavior and recruitment of pelagic and demersal fish, recreational and commercial fisheries, and highly migratory species (Brown et al. 2023; Horwitz et al. 2023). The Cold Pool first appears when vernal (springtime) warming creates stratification of the surface water throughout the summer until the thermocline is deepened as the water column overturns and mixes by fall (Houghton et al. 1982). The thermal stratification observed in June and September and the well-mixed conditions present in March and December reflect this phenomenon. Recent studies have found significant and rapid warming of the Cold Pool due to climate change (Friedland et al. 2022) and there is additional concern that offshore wind farms will affect ocean mixing and therefore seasonal stratification, although currently there is little relevant empirical information on this topic (Horwitz et al. 2023). Continued water column profile sampling in the Empire Wind Lease Area during construction and operation time periods will be a valuable contribution to understanding potential offshore wind farm impacts on thermal stratification.

The time to first arrival metric recorded in BRUV analyses provided interesting results when compared across sampling events. This metric is associated with local abundances (McGeady et al. 2023) and is influenced by environmental factors such as current speed (e.g., Martinez et al. 2011). At the Empire Wind Lease Area, cancer crab was commonly observed within the first 10 to 20 minutes of video footage in June and September but arrived later in December when the spiny dogfish (Figure 3-16), a voracious predator, dominated the first few minutes of video footage at all sampling locations. Time to first arrival results were similar to those of other BRUV studies that found that species with shorter times had higher occurrence rates (Currey-Randall et al. 2020). The dominance of dogfish in the winter when they are seasonally abundant shows that apex predators can be overemphasized by BRUV monitoring, thus inclusion of eDNA methods provides information on more cryptic/cautious species (Jeunen et al. 2021).

MaxN is a conservative estimate for total number of individuals from a species observed within a single video frame (Cappo et al. 2004; Whitmarsh et al. 2017) and is designed to eliminate double counting and overestimating abundance (Sherman et al. 2018). Cancer crab (Figure 3-17) was the most common species observed in groups of two or more individuals (n=50 videos), followed by dogfish sp. and spiny dogfish (n=32 videos), and little/winter skate (n=20). The largest aggregations (MaxN values) were observed for dogfish sp., averaging 10.7 individuals and a maximum of 24 dogfish in one video frame.

BRUV and eDNA monitoring techniques detected a diversity of fish, elasmobranch, and invertebrate species in the Empire Wind Lease Area, revealing that use of both sampling methods provided a more complete characterization of this community (Table 3-5). Similar to other studies that used BRUV (or video) and eDNA to assess fish communities, the eDNA method detected more taxa than were observed through BRUV (Jeunen et al. 2021; Mercaldo-Allen et al. 2021; Mirimin et al. 2021; Cole et al. 2022; Clark et al. 2024). One exception is a study conducted in seagrass and reef habitats with high visibility in western Australia that yielded similar taxa counts between the two methodologies (Stat et al. 2019). A recently published study used BRUV and a BAG design to monitor fish at Scottish wind farms (Bicknell et al. 2025). Haddock and flatfish biomass was higher at the wind farms compared to a reference site, however a spatial gradient in fish biomass relevant to the turbines was not observed, which may have been because shelter-seeking taxa were not commonly observed.

BRUV surveys have primarily occurred in tropical and subtropical marine ecosystems (Whitmarsh et al. 2017) but are becoming more prevalent in temperate (e.g., Unsworth et al. 2014; Harrison and Rousseau 2020; Jones et al. 2021; Nyce et al. 2022) and Arctic/sub-Arctic ecosystems (King et al. 2025). Unfortunately, differences in biological and environmental parameters between geographic areas may not allow a universal set of monitoring guidelines and standardized workflows, potentially impeding comparisons between regional and multi-year studies (Langlois et al. 2020; Jones et al. 2021). For instance, ambient light and visibility conditions in shallow tropical ecosystems are often suitable for the identification and enumeration of fish species using BRUV systems. Low ambient light and visibility conditions at depth within the Empire Wind Lease Area, however, prompted the addition of underwater lighting setups, which permitted diurnal sampling and improved video quality and species identification. Although underwater lighting is known to attract and influence species identified in BRUV surveys (e.g., Harvey et al. 2012; Fitzpatrick et al. 2013; Unsworth et al. 2014), the use of underwater lights in the present effort provided a conservative estimate of fish diversity and abundance in the Empire Wind Lease Area and standardized results for subsequent sampling events. The success of the 2024 BRUV/eDNA monitoring survey provides strong documentation of seasonal baseline conditions in the Lease Area to which data collected during construction and operation time periods can be compared.

5.0 SUMMARY

The current report presents methodologies and results pertaining to the use of non-extractive sampling techniques to gather baseline fish/elasmobranch/invertebrate community composition and relative abundance data in the Empire Wind Lease Area prior to construction activities. These results include the following:

- Four sampling events were conducted in the Empire Wind Lease Area in March, June, September, and December 2024. Water column profile, eDNA, and BRUV data were collected at eight stations located at proposed WTG locations. BRUV data were collected at four distances, 0 m, 50 m, 100 m, and 200 m, from each of the eight proposed WTG turbine stations.
    - Water column profiles were collected at each station during each sampling event, resulting in 32 sets of salinity and temperature profiles.
    - eDNA water samples were collected at each station during each sampling event, resulting in 32 water samples for analysis.
    - BRUV systems collected 1-hour video clips at four distances from each station during each sampling event, resulting in 128 deployments and 256 video camera recordings for analysis (i.e., two video cameras per system).
- For water column profiles, there was little variation in salinity throughout the water column within any sampling period, with the most variation in June when salinity ranged from approximately 29 psu at the surface to 31 psu at the bottom. Average salinity at each station was lowest in June and highest in December, but this difference was only approximately 3 psu. The range in water temperature throughout the water column was minimal in March (6.3 to 6.9°C) and December (10.6 to 12.4°C), whereas there was substantial thermal stratification in June and September, with temperatures declining up to 12°C from the surface to the bottom. The thermal stratification was consistent with the Cold Pool that appears in the Mid-Atlantic Bight from the spring to the fall.
- Eight eDNA samples were collected 100 m from each WTG station during each of the four sampling events, resulting in 32 water samples.
    - A total of 13 elasmobranch and 33 teleost taxa were identified using eDNA methods. Elasmobranch taxonomic richness detected by eDNA was highest in September (n=11) and teleost taxa richness was greatest in December (n=22). Combined elasmobranch and teleost taxa richness was highest in December. The elasmobranchs little/winter skate and barndoor skate were detected during all sampling events. Atlantic menhaden, butterfish, Atlantic menhaden/river herrings, silver hake, red/spotted/white hake, black sea bass, Atlantic/northern

sand lance, and windowpane flounder were the teleost taxa detected in all sampling events.

- Overall, 98% (n=251) of the 256 video camera recordings from the four sampling events were uncorrupted. Of the 256 videos, 7% (n=18) were assigned a visibility score of “Unusable,” 12% (n=30) were “Very Poor,” 8% (n=20) were “Poor,” 56% (n=144) were “Good,” and 17% (n=44) were “Excellent.”

    - In total, 30 taxa, including teleosts (n=18), elasmobranchs (n=7), and cephalopods (n=5), were identified at the four sampling events. Taxa observed during all four sampling events included butterfish, cancer crab, dogfish sp., little/winter skate, spiny dogfish, squid sp., and summer flounder. The number of taxa observed across all stations was lowest in March (n=12) when fewer videos were suitable for analysis, higher in June (n=21) and September (n =19), and lower in December (n=16).

    - In March, the timing of first arrival was generally shortest for butterfish, occurring within the first ten minutes of the video analysis. Other early arrivers were dogfish sp., little/winter skate, and spiny dogfish. In June and September, cancer crab and flatfish sp. were again among the early arrivers. In December, there was an overwhelming occurrence of dogfish sp. and spiny dogfish as the first arrivers, with spiny dogfish arriving within the first few minutes at every video system deployment.

    - MaxN values (that considered only more than one individual) ranged from two to 24 individuals in a video frame for a given taxon. Dogfish sp. and cancer crab occurred in the largest single-species aggregations, with a maximum MaxN for dogfish sp. of 24 individuals in December. There were MaxN estimates of 15 or more dogfish in eight videos recorded at three shallow stations (D03, D14, and C20) in December. Cancer crab aggregations occurred in all months except March and at both depth strata and ranged from two to seven individuals. Butterfish aggregations were most common in March and ranged from two to 12 individuals.

    - Time to MaxN in March was shortest for little/winter skate (~ 10 minutes) and longest time for spiny dogfish (~ 50 minutes). In June and September, the time to MaxN approximated 30 to 35 minutes for the taxa examined. MaxN times in December were varied, with dogfish sp. and spiny dogfish times to MaxN generally under 30 minutes.

    - Dogfish swarms prevalent in December highlight the bias of apex predator monitoring during BRUV surveys when these species are seasonally abundant. Additional sampling with eDNA methods provides valuable insights regarding less aggressive taxa in the area.

- Of the 51 total taxa in the BRUV/eDNA study, 15 taxa were detected by both eDNA and BRUV methodologies, 30 taxa were detected by eDNA only, and six taxa were observed in BRUV only.

Overall, BRUV and eDNA monitoring methods characterized a diverse fish/elasmobranch/invertebrate community at the Empire Wind Lease Area that varied seasonally. These baseline results will be compared to comparable data collected during construction and operation time periods to assess potential wind farm effects on this community.

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Empire Wind 2024 Baited Remote Underwater Video (BRUV) and Environmental DNA (eDNA) Monitoring Survey

Annual Report

FIGURES

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LIST OF FIGURES

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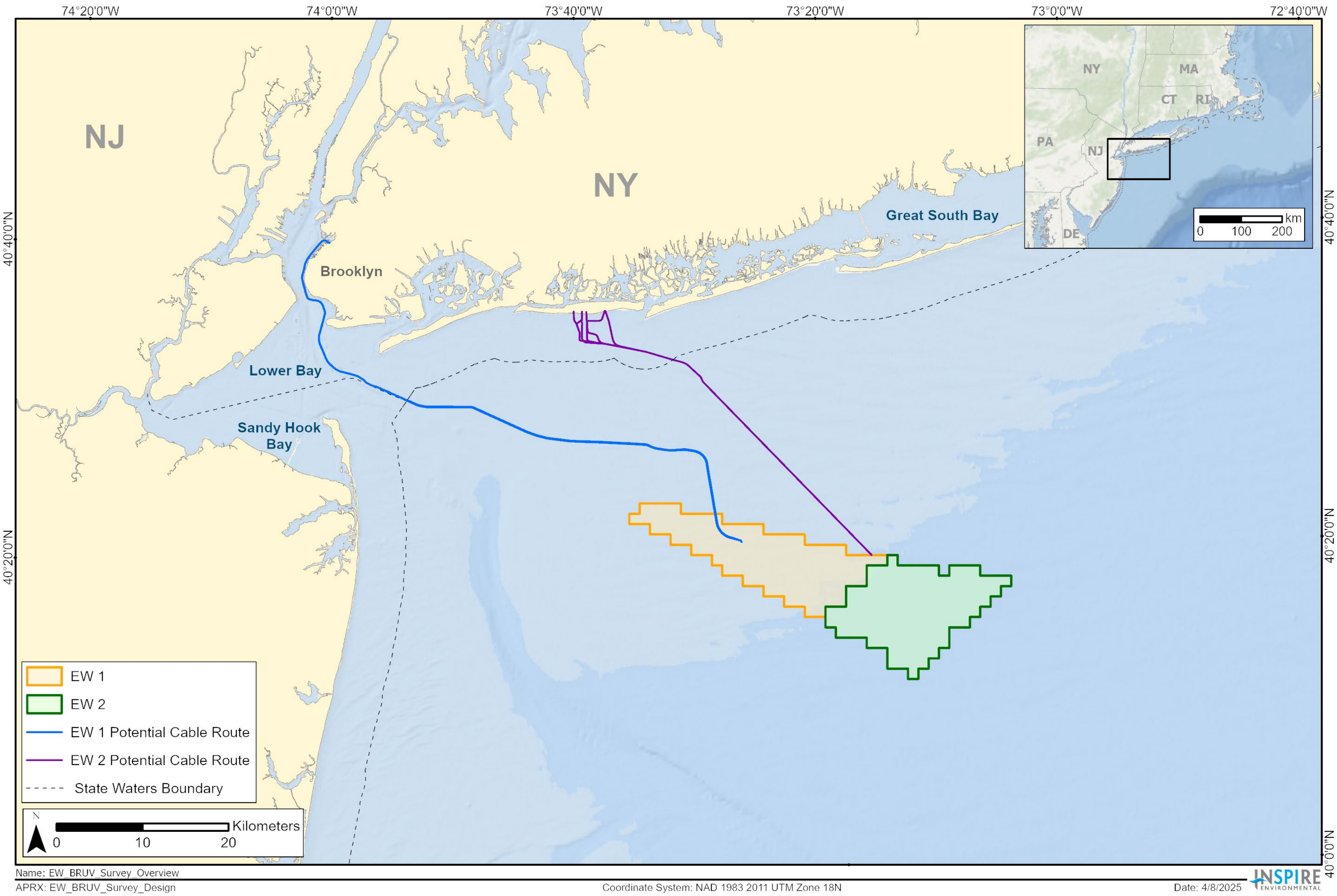


Figure 1-1. Empire Wind Lease Area and Export Cable Route overview map

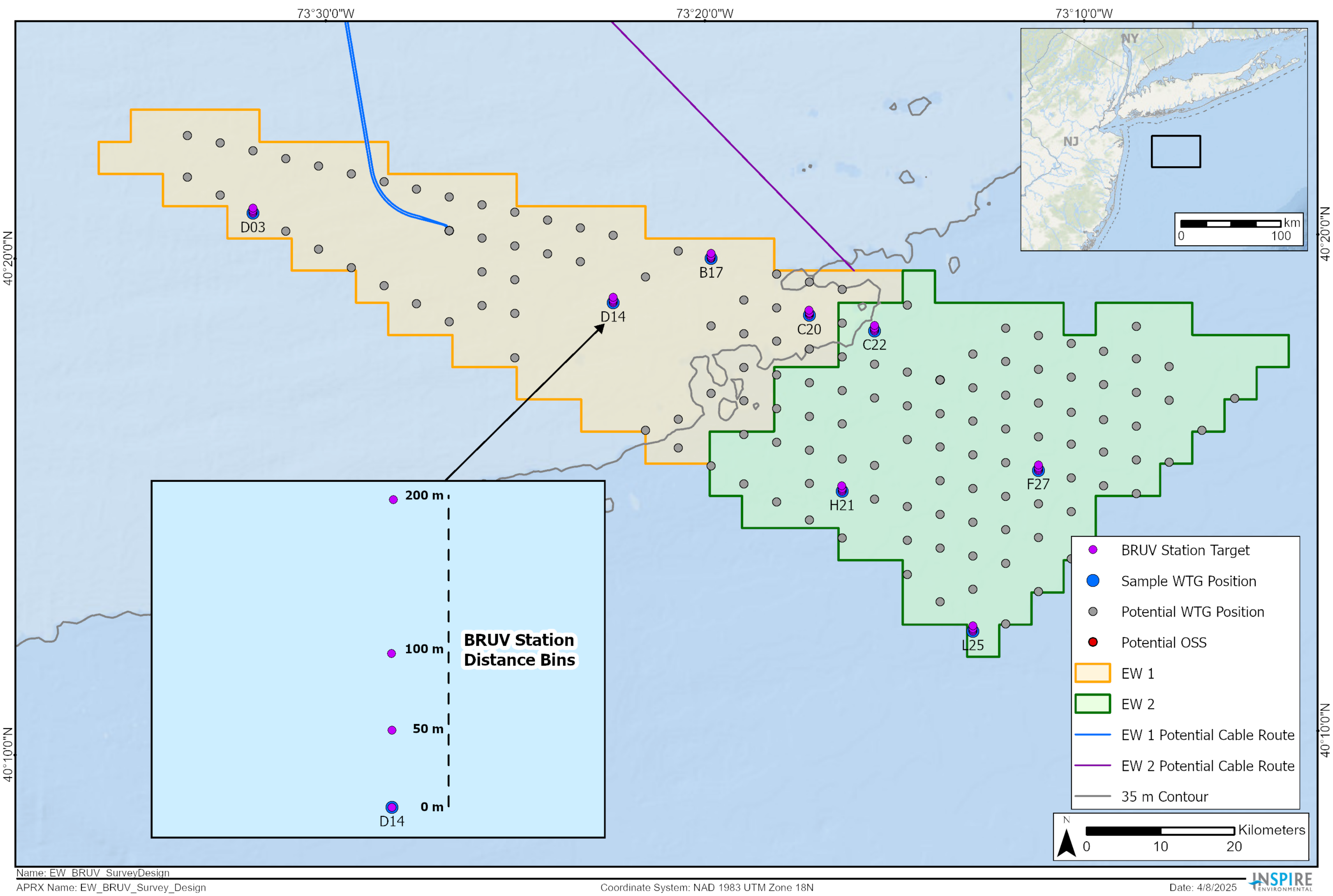


Figure 2-1. Empire Wind Lease Area and wind turbine generator (WTG) sampling stations

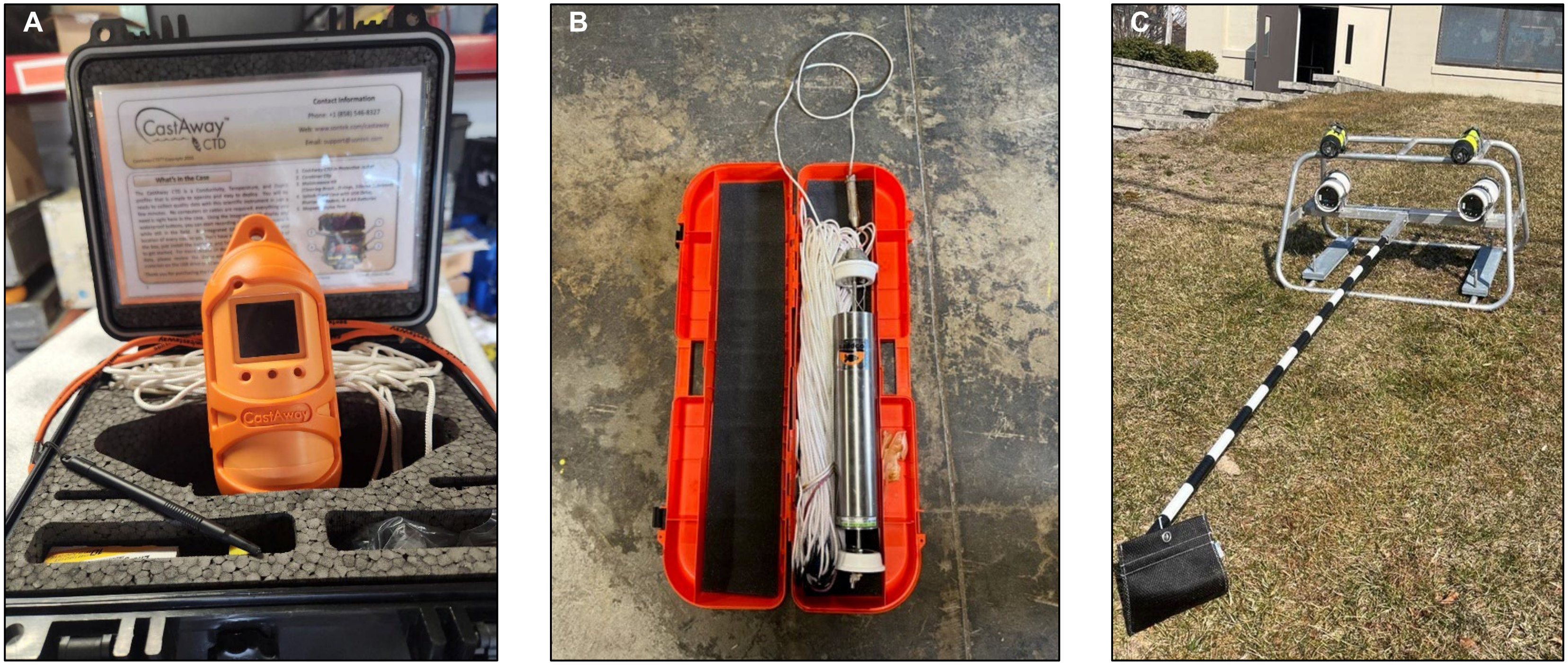


Figure 2-2. **Primary field sampling equipment; (A) CastAway conductivity, temperature, and depth (CTD) sensor; (B) Kemmerer sampling bottle for Environmental DNA (eDNA) collection; (C) stereo Baited Remote Underwater Video (BRUV) system. Each stereo BRUV system includes a subsea lighting setup, two GoPro HERO11 video cameras with SeaGIS camera housings, weights, a bait arm, and a bait bag.**

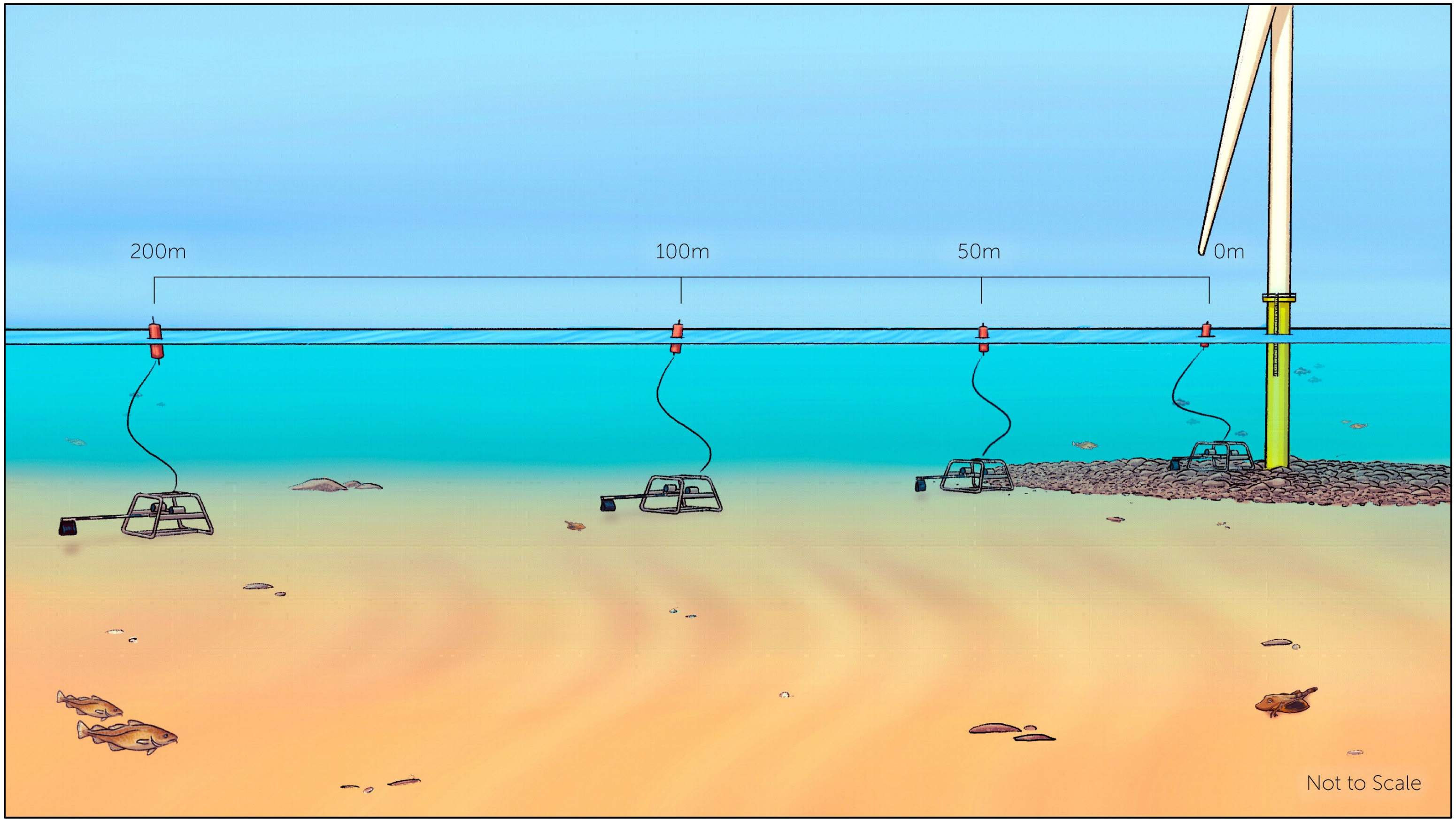


Figure 2-3. BRUV deployments at four distance bins from sampled WTG stations

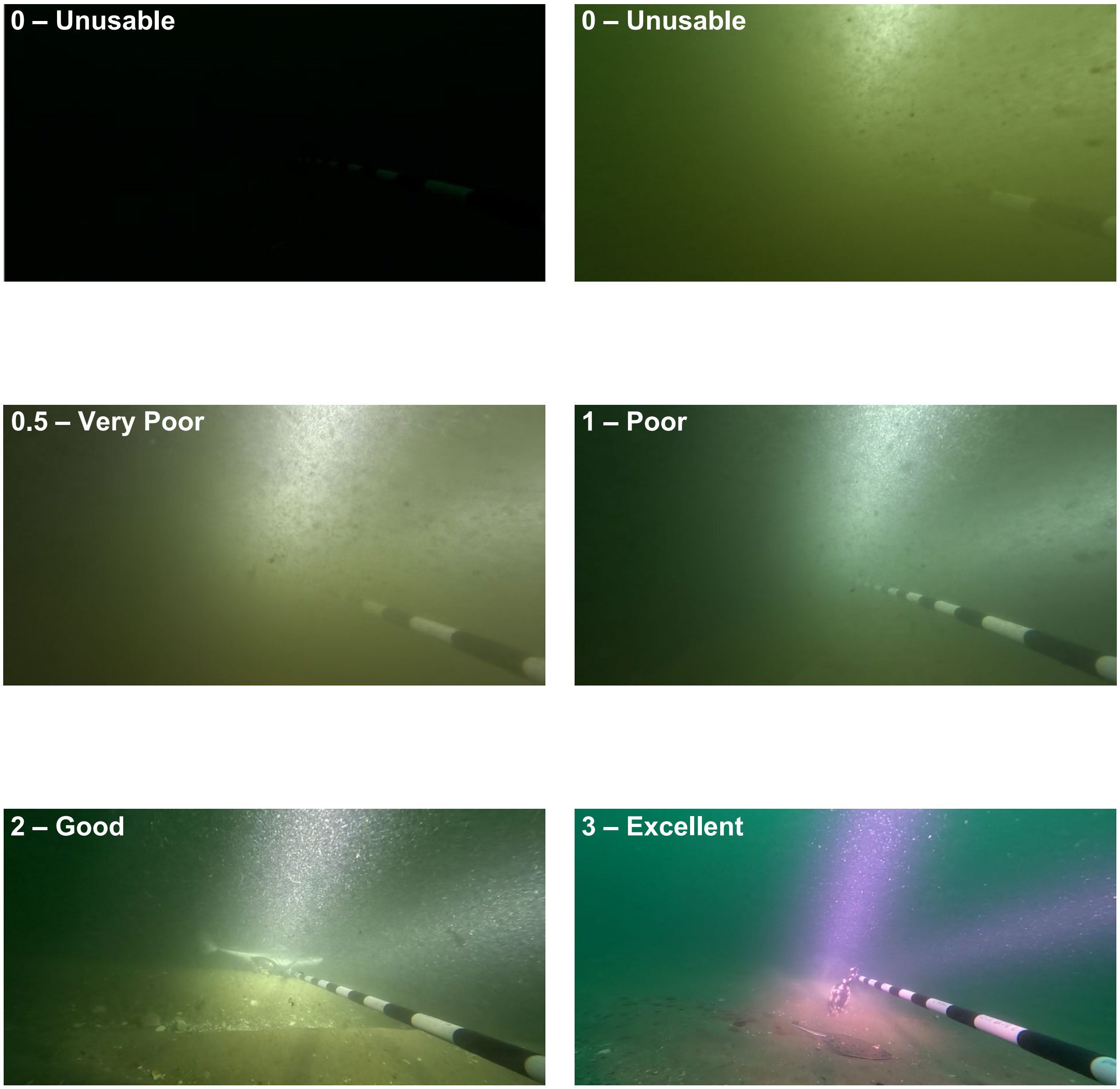
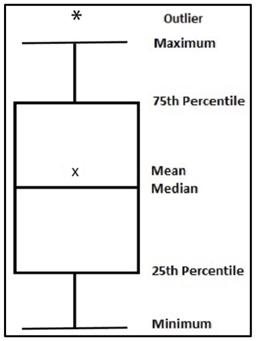


Figure 2-4. Examples of BRUV video footage and visibility scores: 0 – Unusable, 0.5 – Very Poor, 1 – Poor, 2 – Good, 3 – Excellent



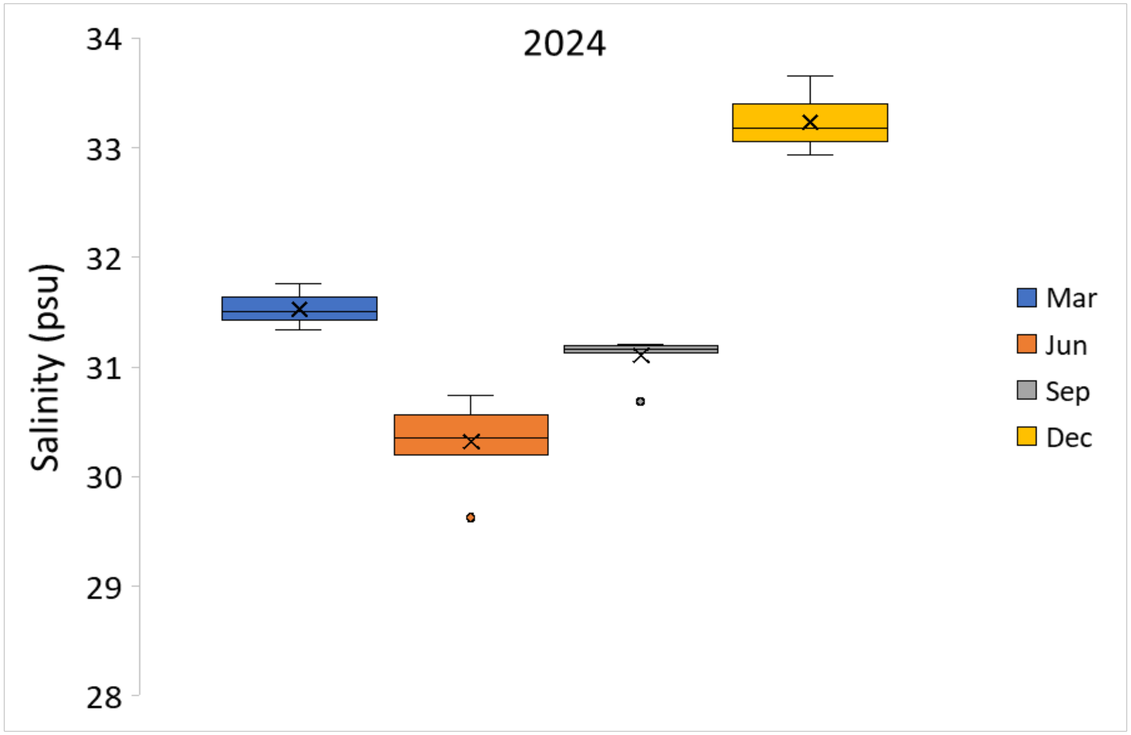


Figure 3-1. Average salinity (psu) at each station depicted by box plots for each sampling event

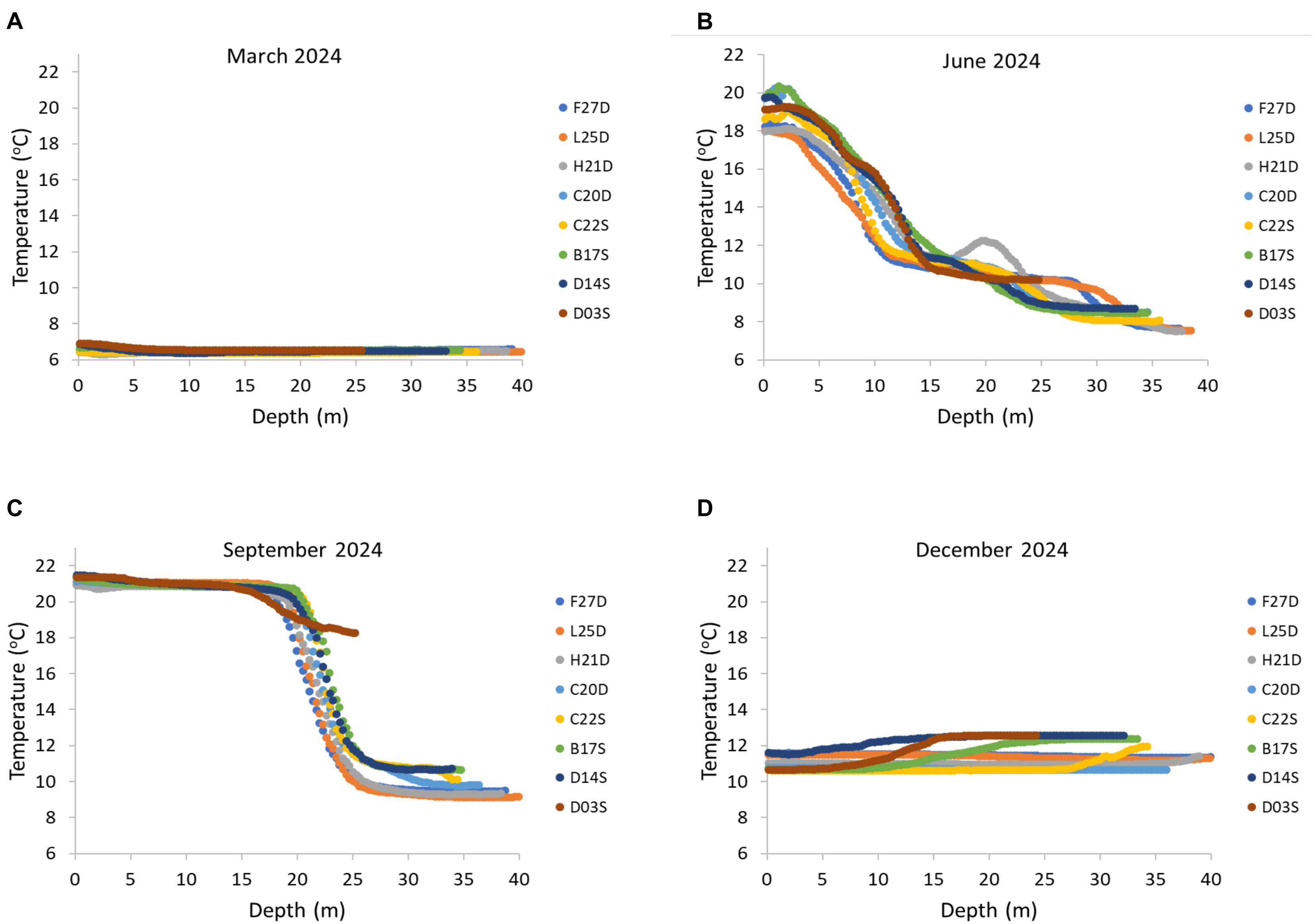


Figure 3-2. **Water temperature (recorded by CTD) by depth at each station for each sampling event (A) March; (B) June; (C) September; and (D) December**

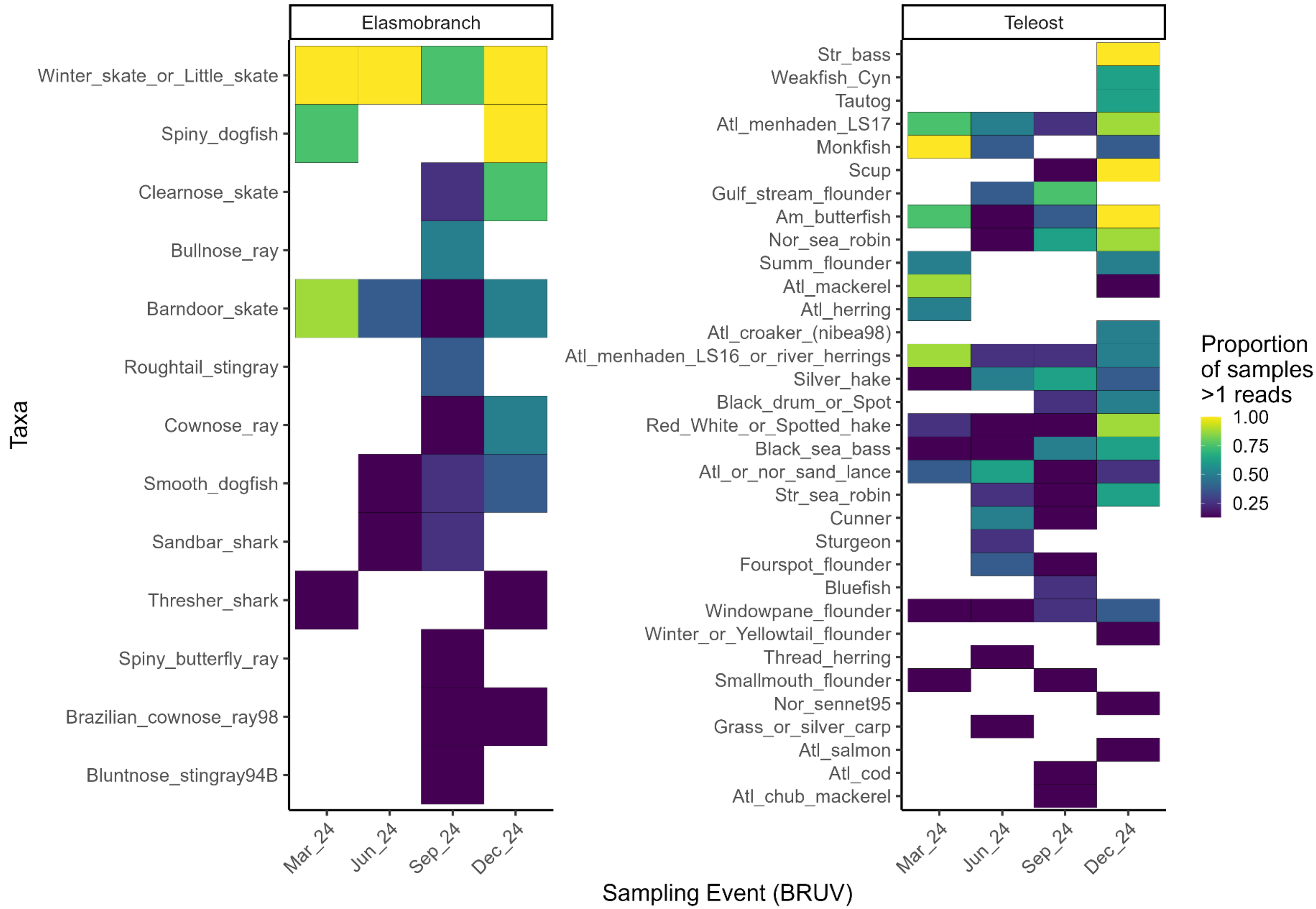


Figure 3-3. Elasmobranch and teleost taxa detected by eDNA methods for each sampling event

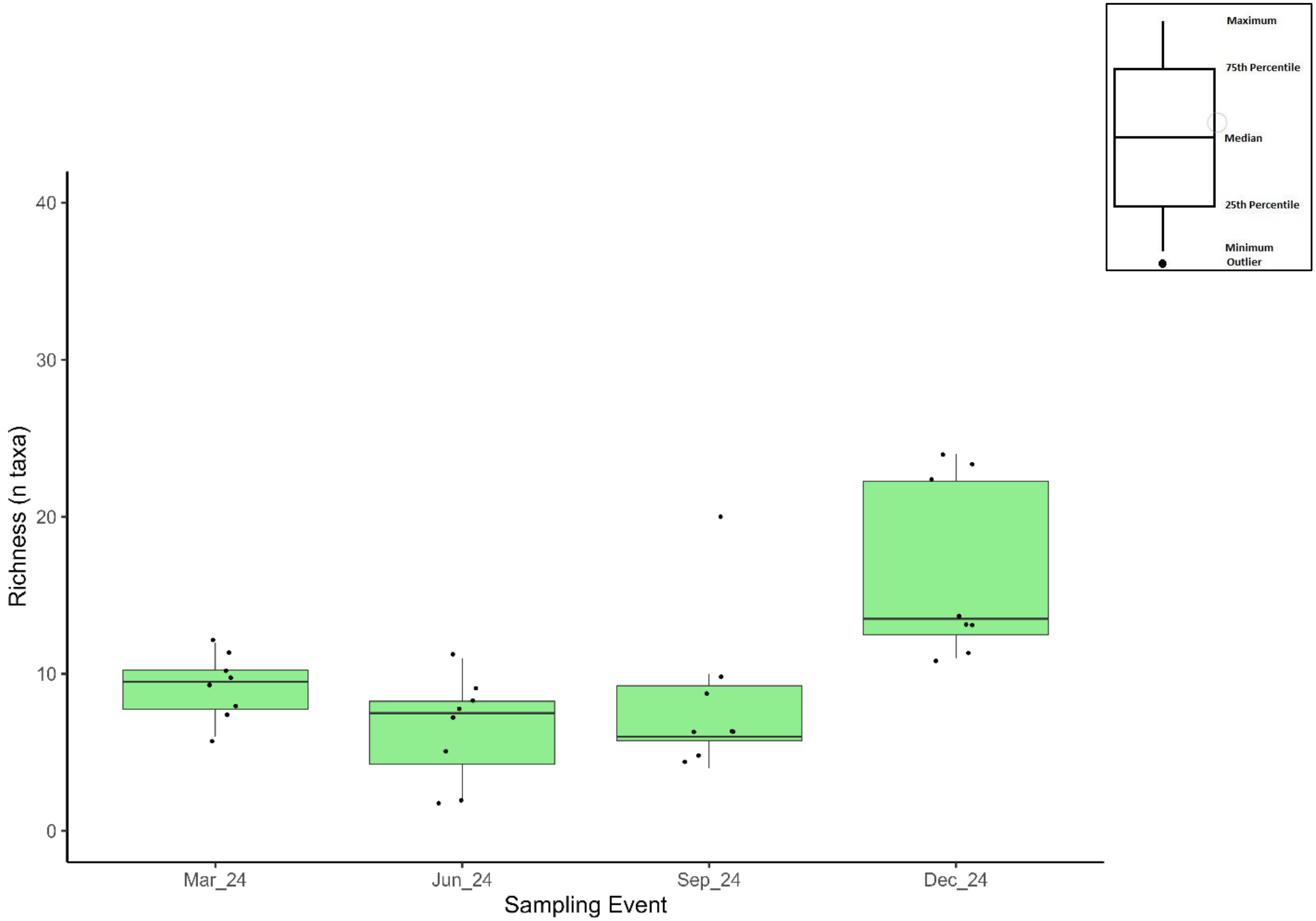


Figure 3-4. Elasmobranch and teleost taxa sample richness identified with eDNA methods by sampling event

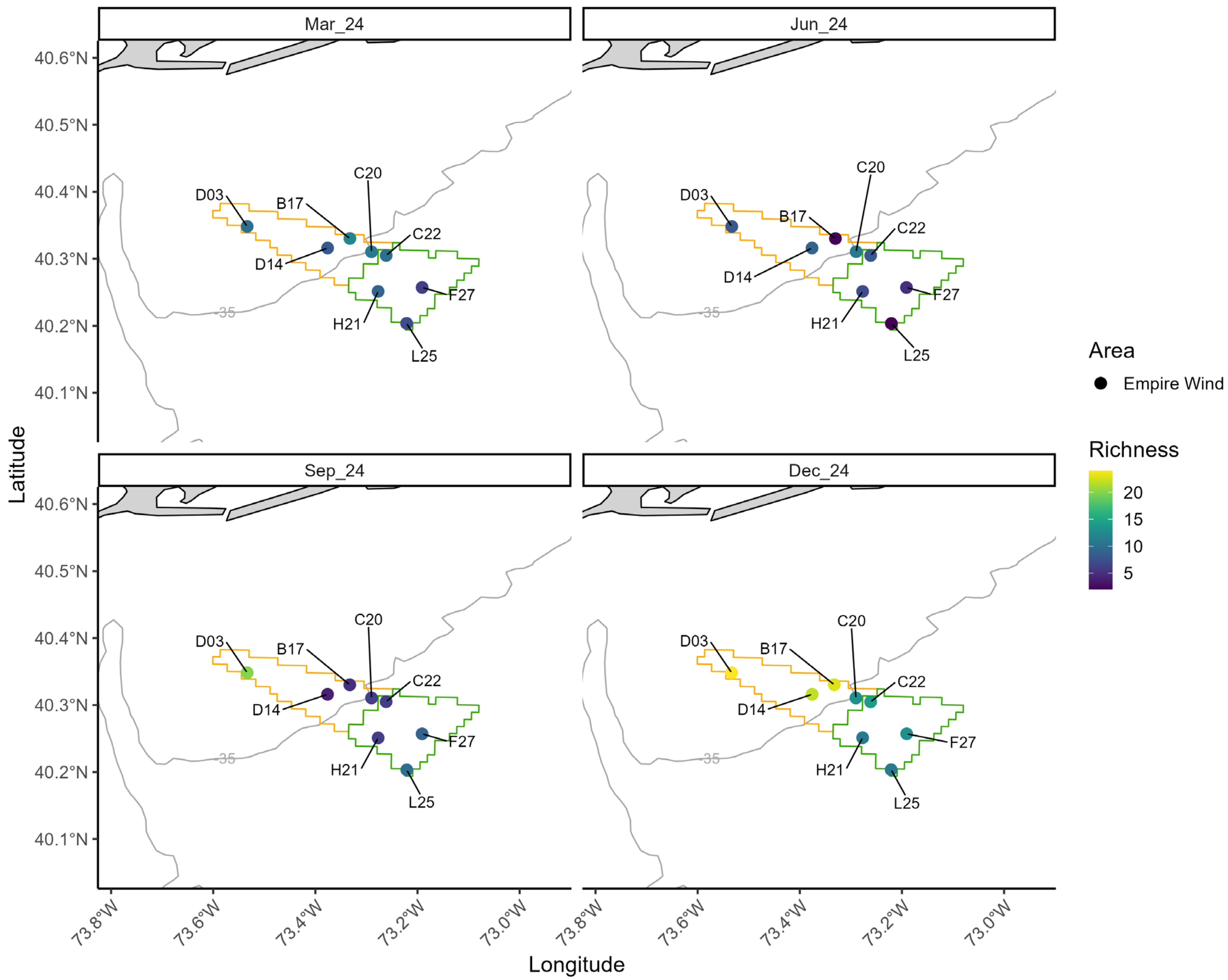


Figure 3-5. Spatial representation of eDNA sample taxonomic richness at each station in the Empire Wind Lease Area for each sampling event

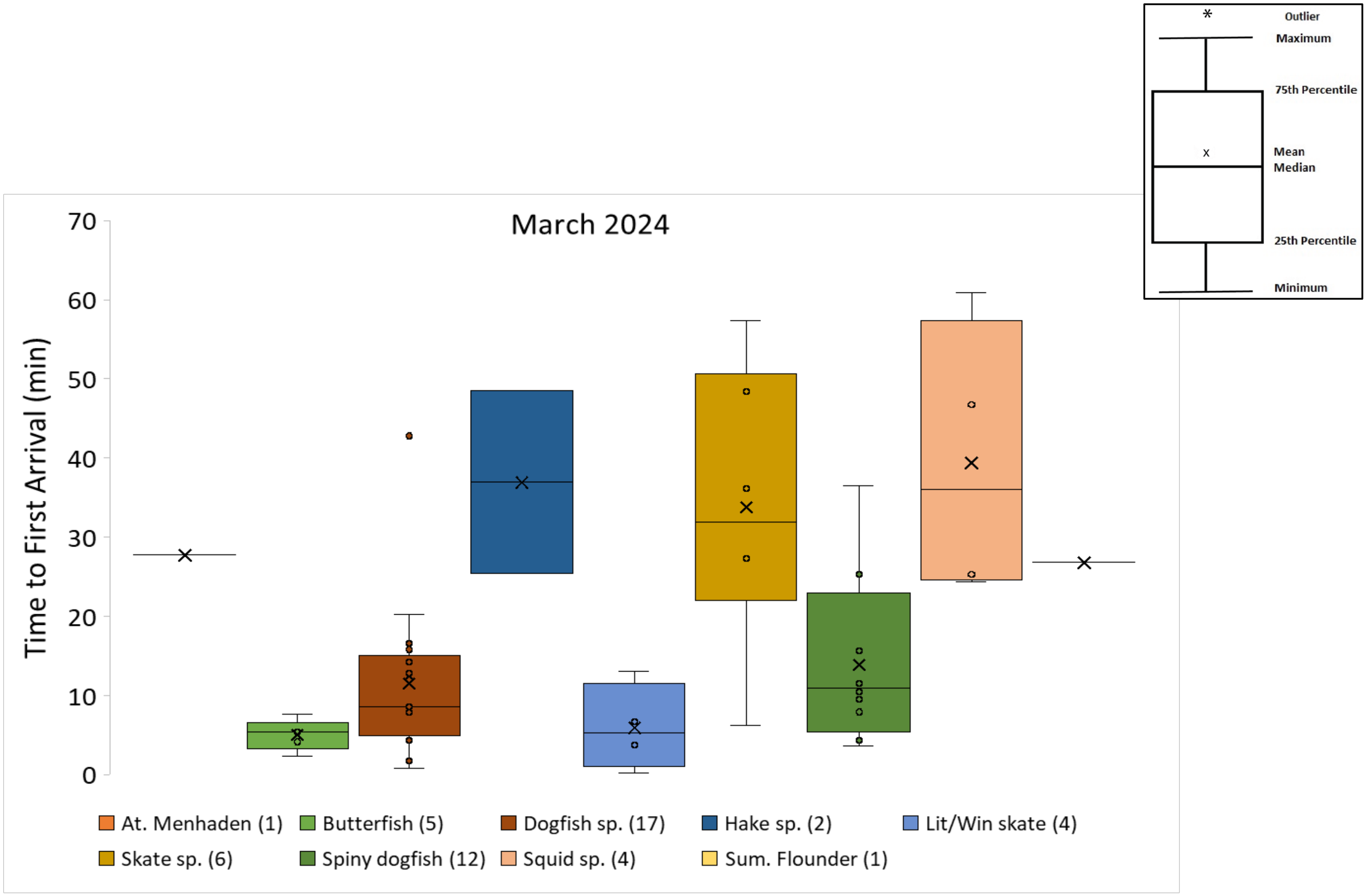


Figure 3-6. Time to first arrival (minutes [min]) observed in videos for fish and invertebrates in March 2024. The number of videos from which data were taken for each species is given in parentheses.

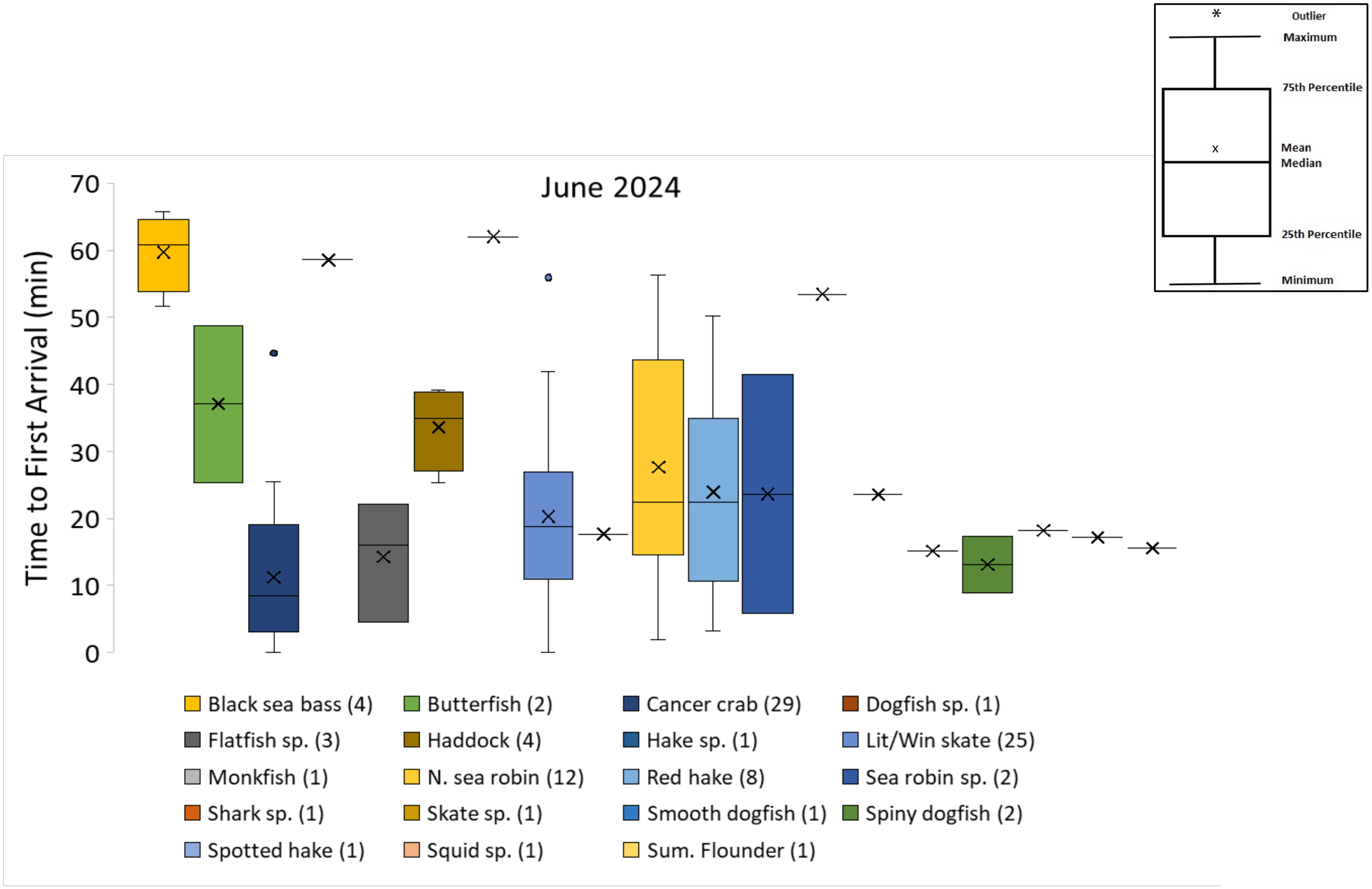
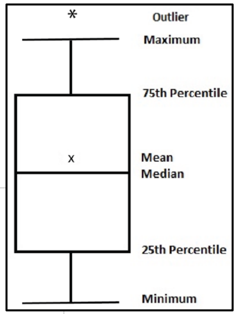


Figure 3-7. Time to first arrival (min) observed in videos for fish and invertebrates in June 2024. The number of videos from which data were taken for each species is given in parentheses.



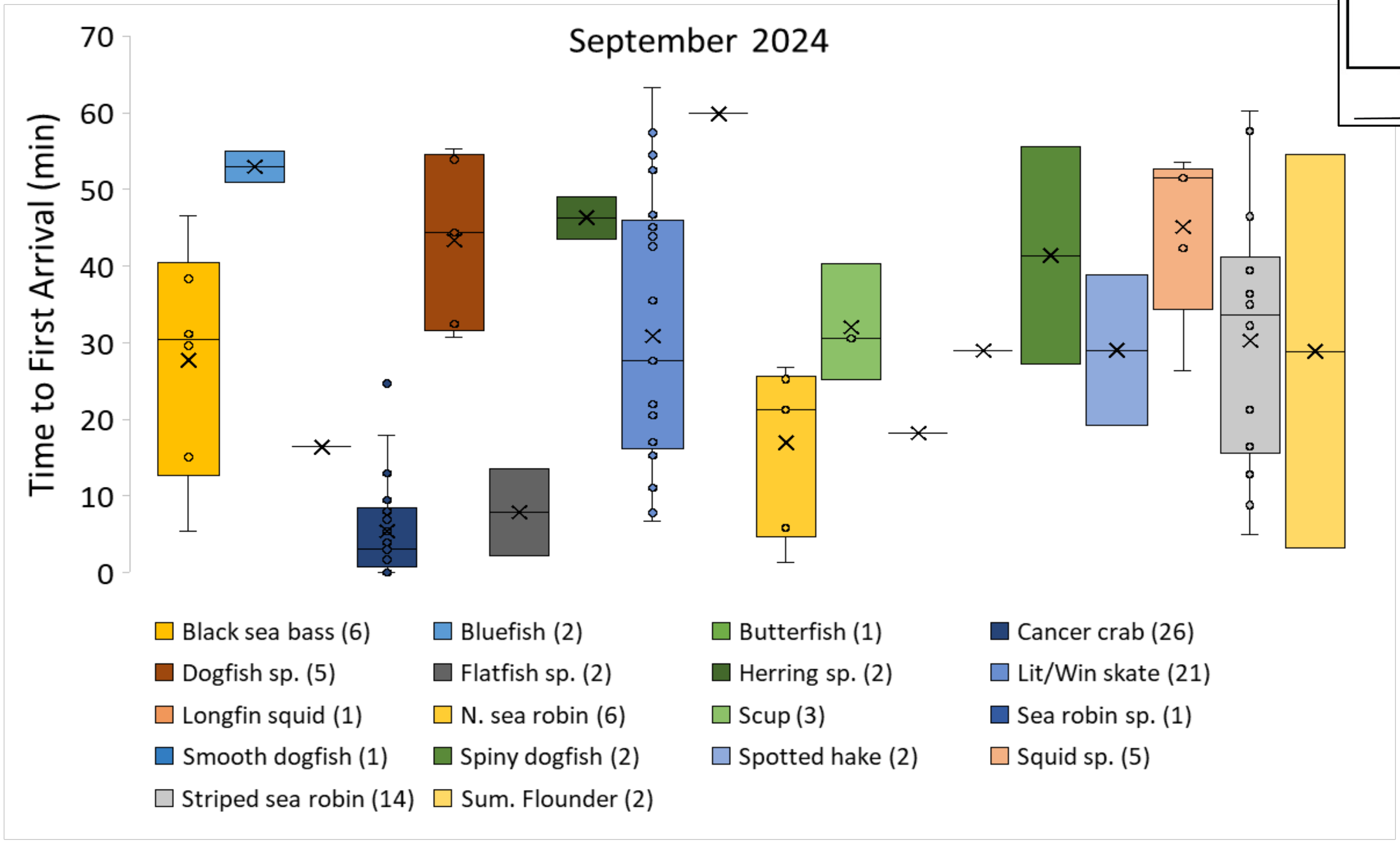


Figure 3-8. Time to first arrival (min) observed in videos for fish and invertebrates in September 2024. The number of videos from which data were taken for each species is given in parentheses.

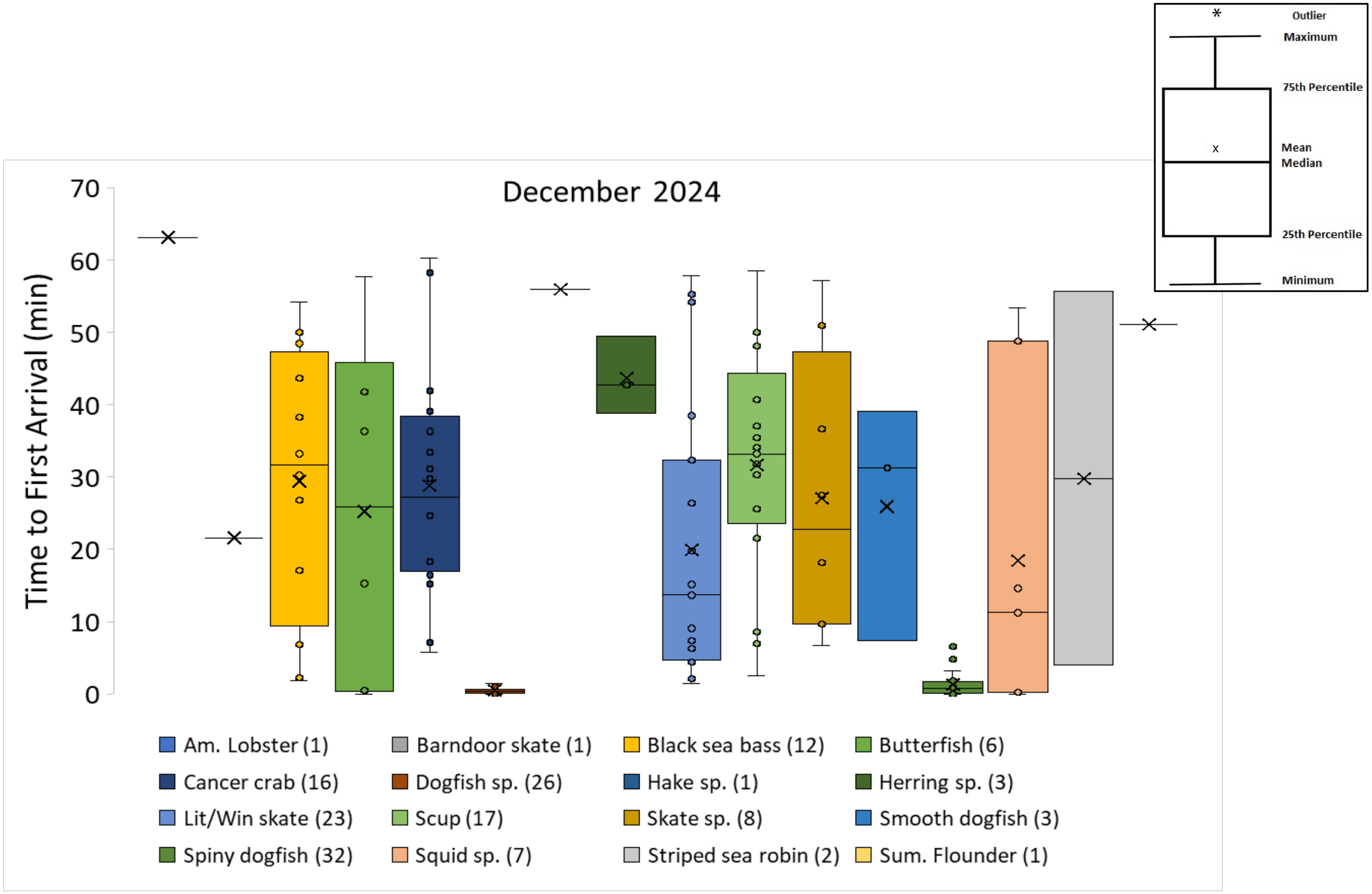


Figure 3-9. Time to first arrival (min) observed in videos for fish and invertebrates in December 2024. The number of videos from which data were taken for each species is given in parentheses.

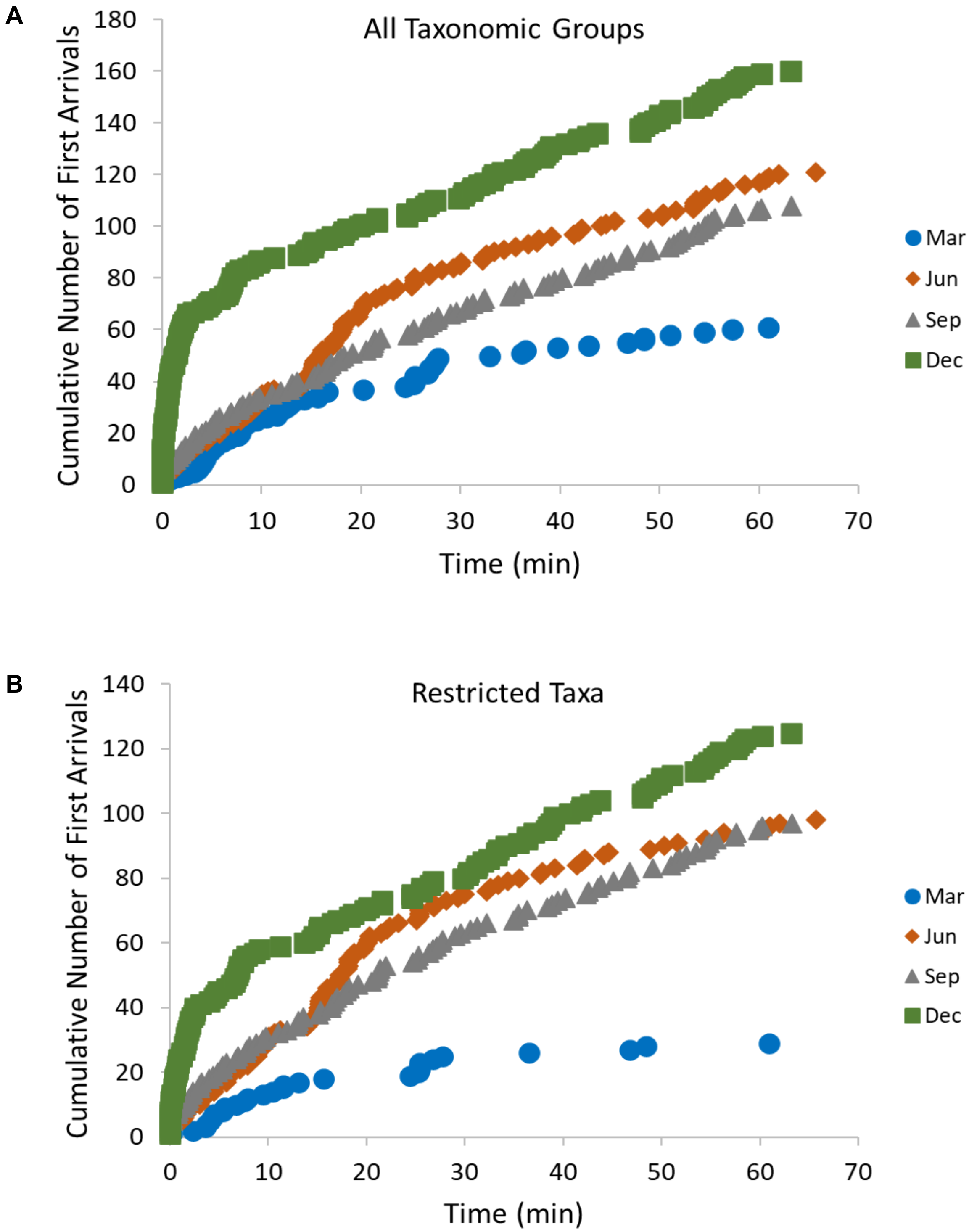
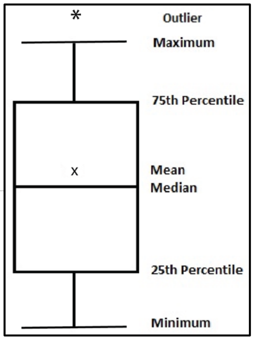


Figure 3-10. Taxa accumulation curves depicting (A) all taxomonic groups and (B) only taxa identified to the species level



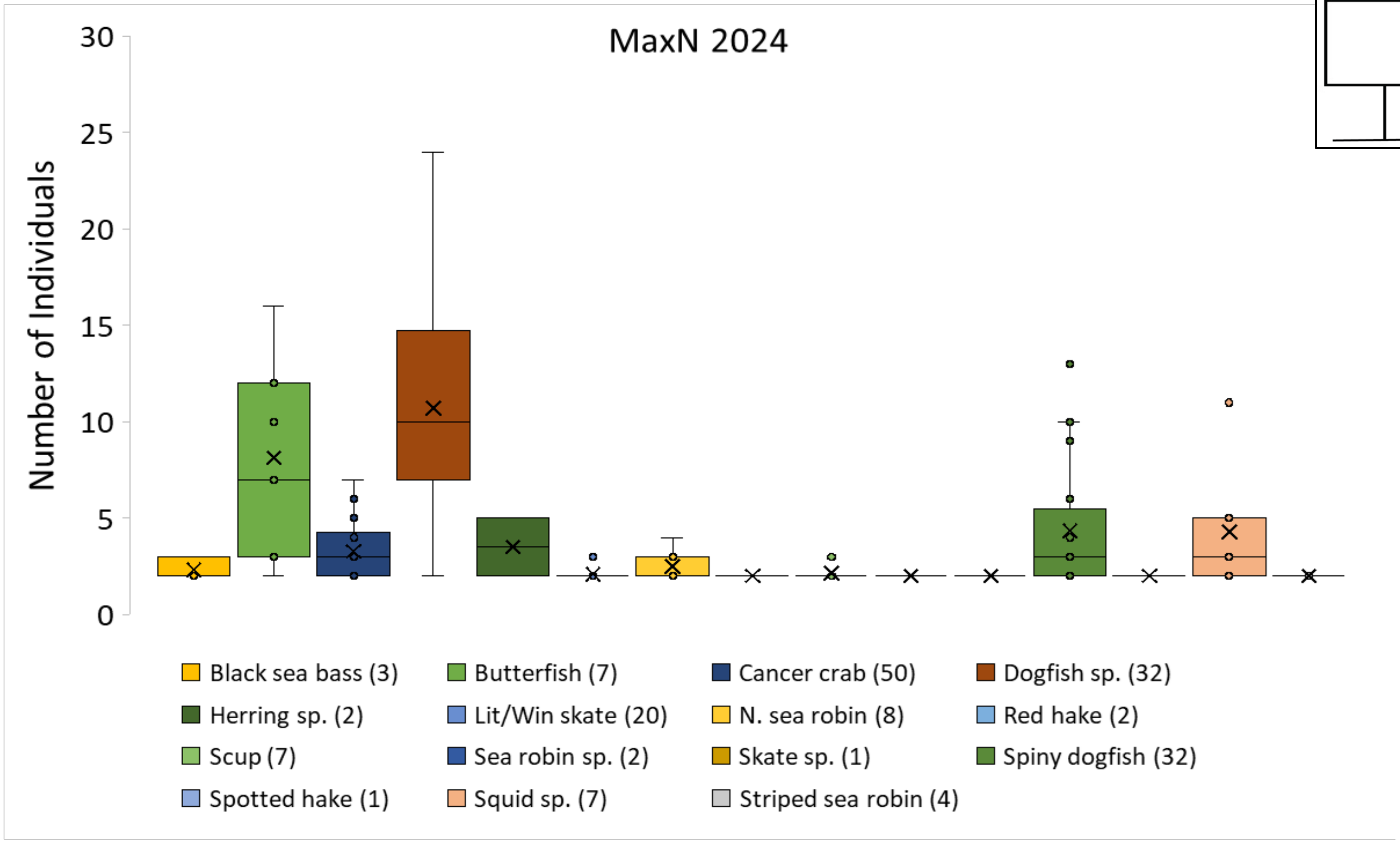
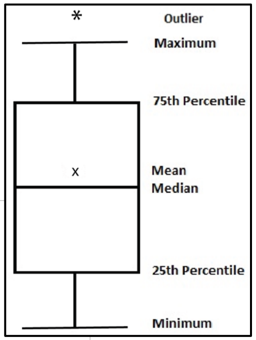


Figure 3-11. Number of individuals in MaxN counts of multiple individuals of the same species in a single video frame. The number of videos from which data were taken for each species is given in parentheses.



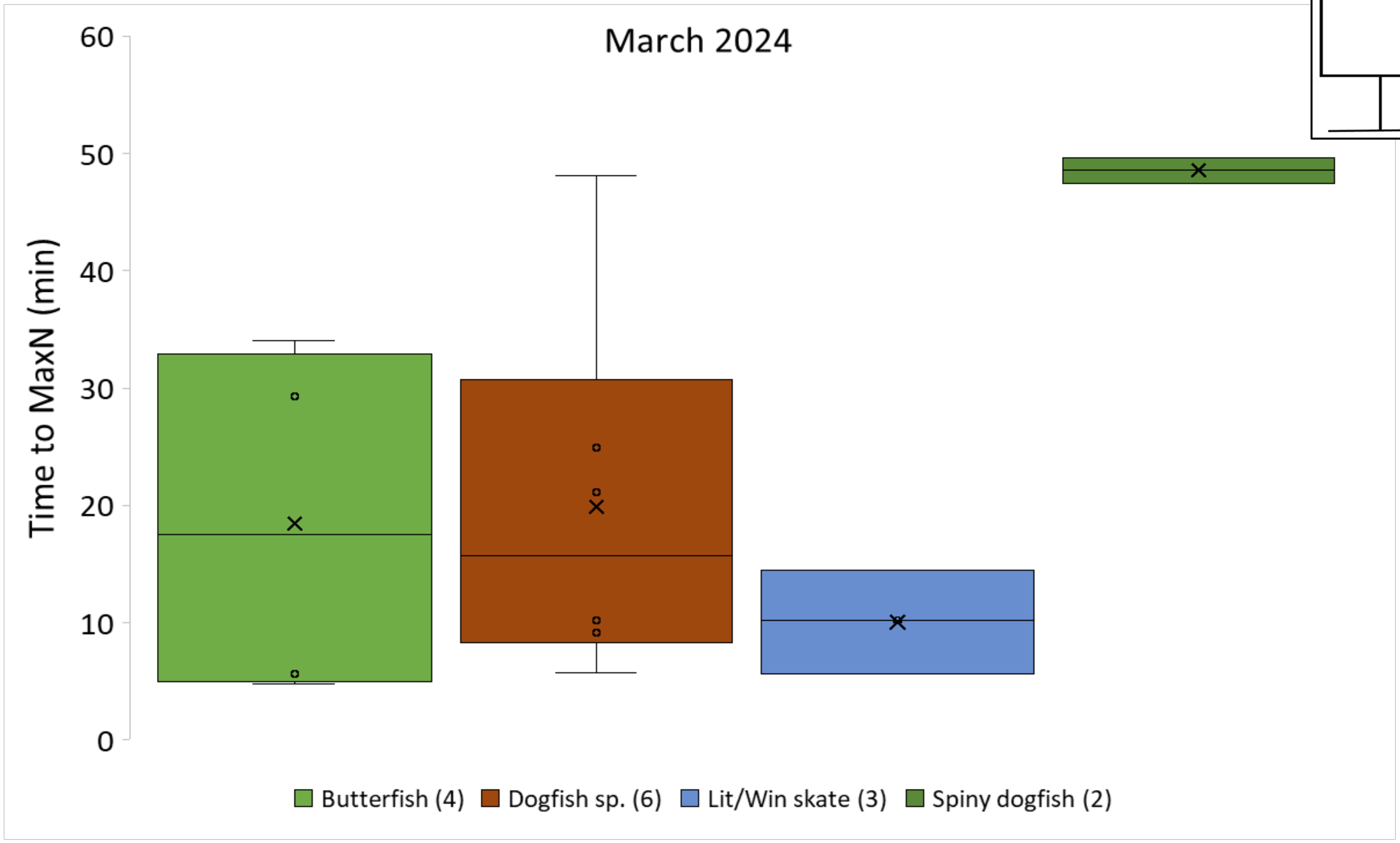


Figure 3-12. Time to MaxN (min) observed in videos for fish and invertebrates in March 2024. The number of videos from which data were taken for each species is given in parentheses.

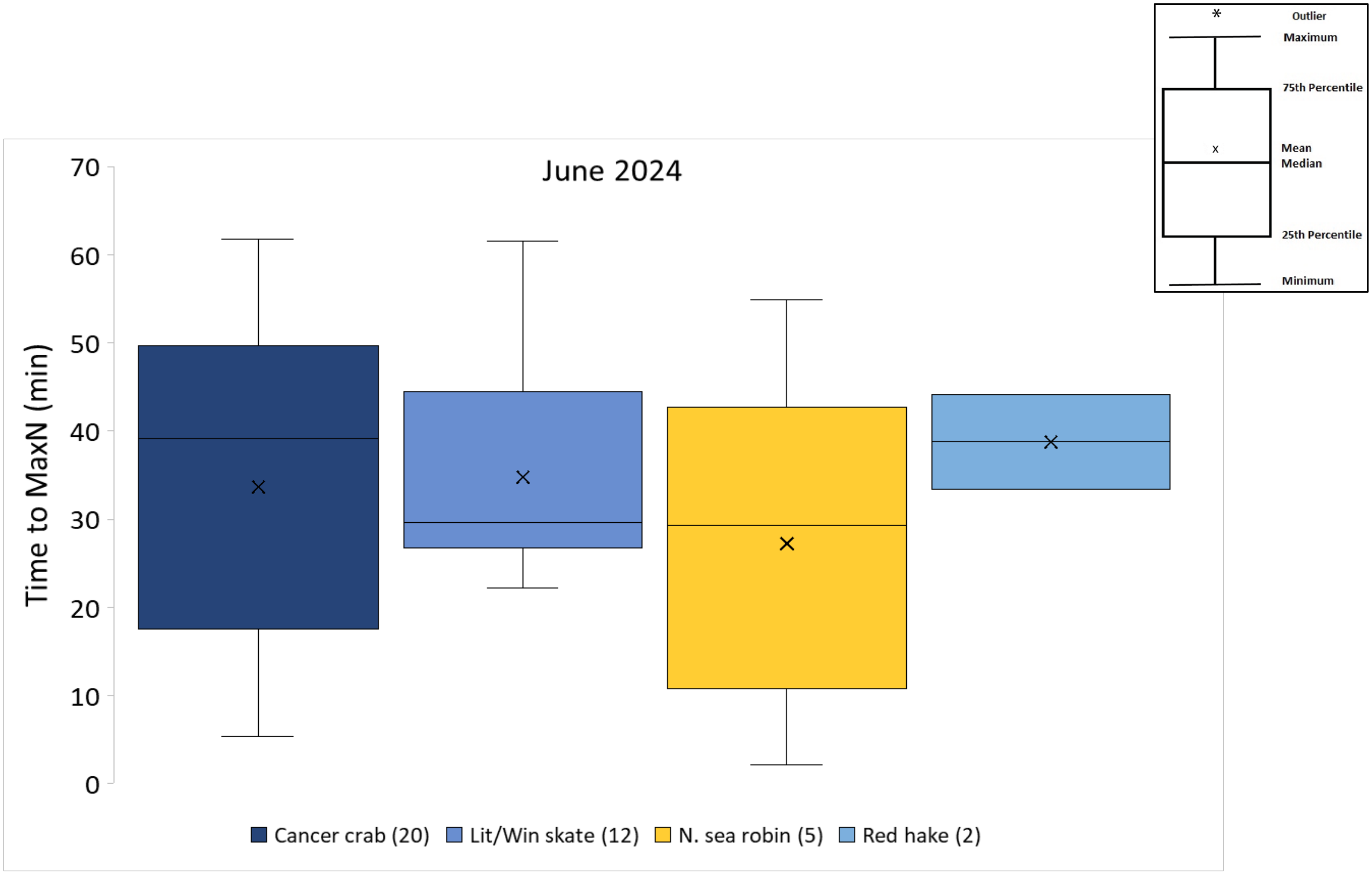


Figure 3-13. Time to MaxN (min) observed in videos for fish and invertebrates in June 2024. The number of videos from which data were taken for each species is given in parentheses.

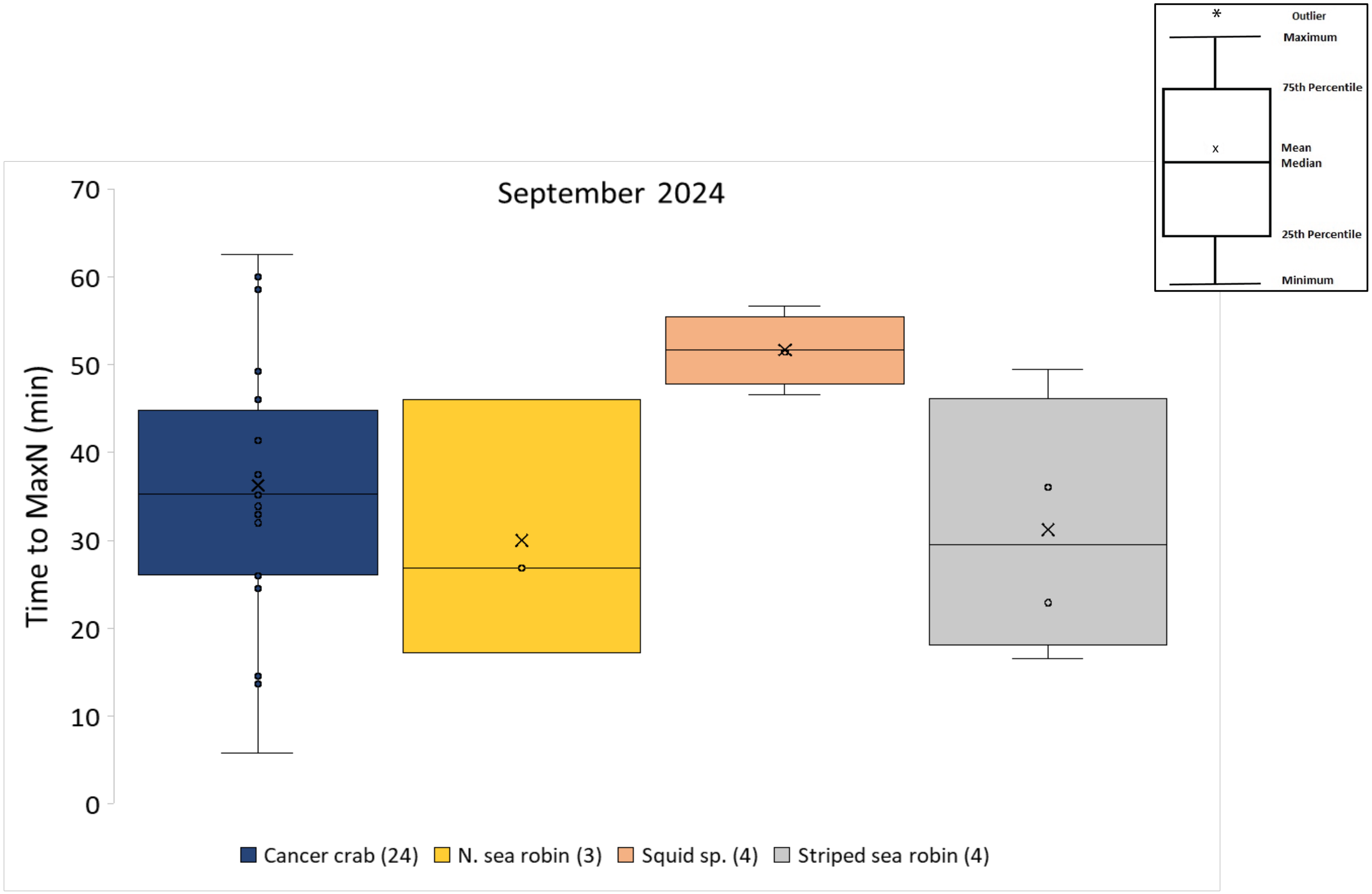


Figure 3-14. Time to MaxN (min) observed in videos for fish and invertebrates in September 2024. The number of videos from which data were taken for each species is given in parentheses.

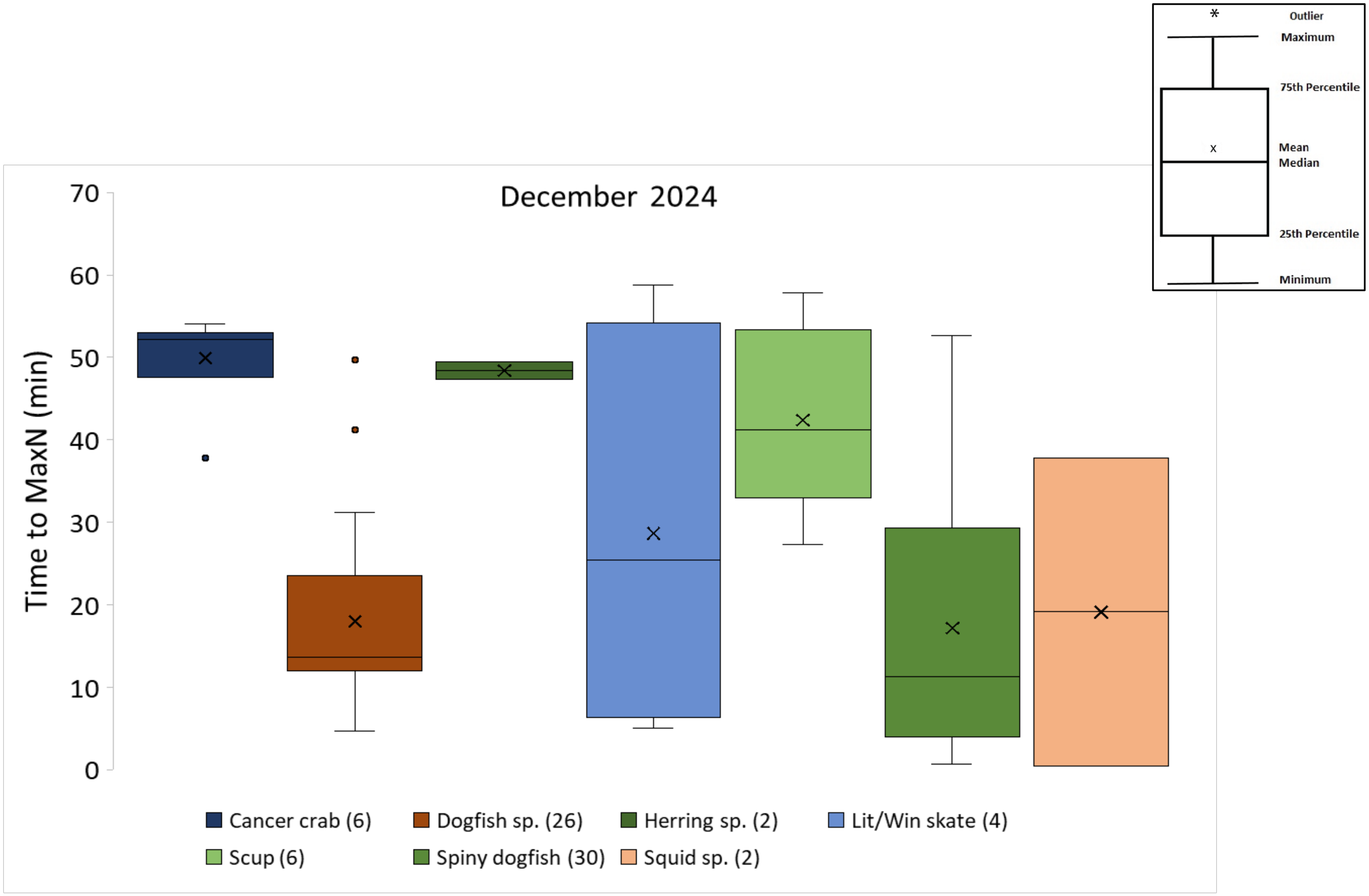


Figure 3-15. Time to MaxN (min) observed in videos for fish and invertebrates in December 2024. The number of videos from which data were taken for each species is given in parentheses.

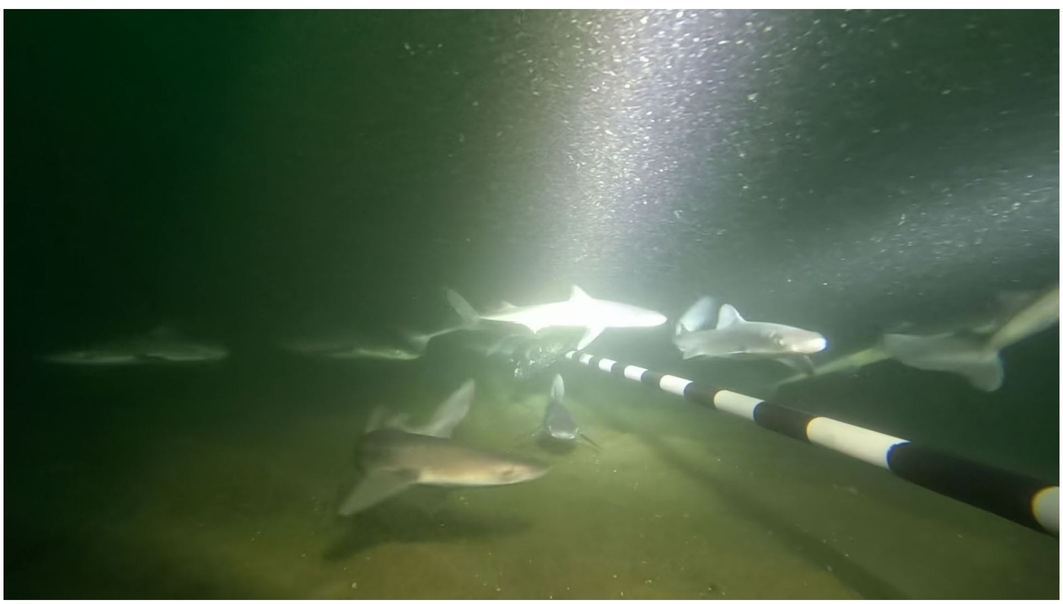


Figure 3-16. BRUV images of dogfish sp. attracted to the bait bag at Stations D03 and B17 in December 2024

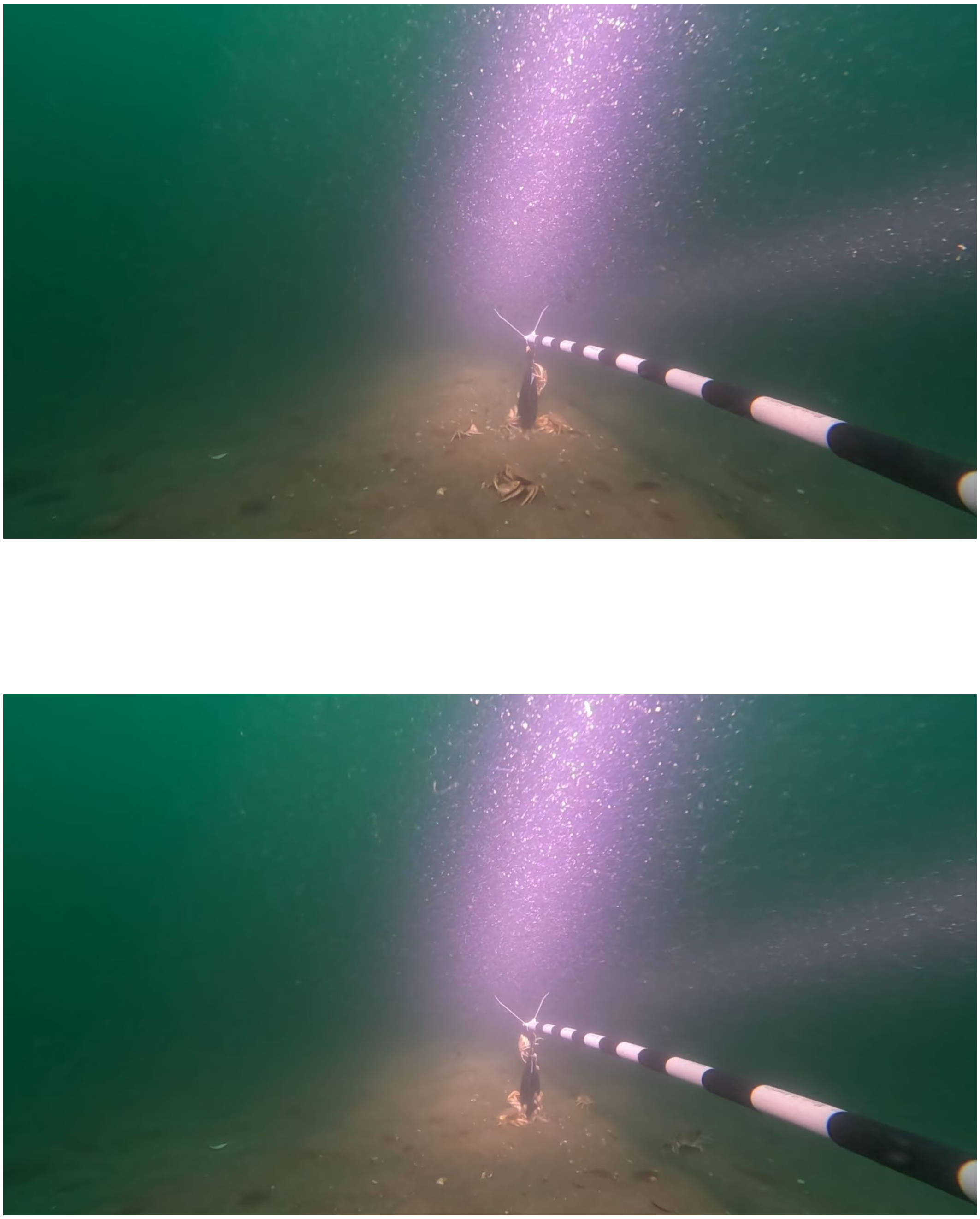


Figure 3-17. BRUV images of cancer crabs attracted to the bait bag at Station D14 in September 2024

Empire Wind 2024 Baited Remote Underwater Video (BRUV) and Environmental DNA (eDNA) Monitoring Survey

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APPENDICES

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LIST OF APPENDICES

Appendix A – PCR Amplification of Fish Sequences from eDNA Samples

Appendix A - PCR Amplification of Fish Sequences from eDNA Samples

- Primers used for amplification are from Riaz Nucl Acids Res 2011 39: e145, modified to include Illumina adapters (bold) for subsequent sequencing
  - For Teleost fishes:
    - Forward: 5’- **TCG TCG GCA GCG TCA GAT GTG TAT AAG AGA CAG** ACT GGG ATT AGA TAC CCC -3’
    - Reverse: 5’- **GTC TCG TGG GCT CGG AGA TGT GTA TAA GAG ACA G**TA GAA CAG GCT CCT CTA G -3’
  - For Elasmobranch fishes
    - Forward_elasmo: 5’- **TCG TCG GCA GCG TCA GAT GTG TAT AAG AGA CAG** ACT GGG ATT AGA TAC CCT -3’
    - Same as Teleosts
  - 25 microliter reaction volume (5 microliter template DNA) with Takara High Yield PCR EcoDry Premix for mastermix with the following thermocycler protocol
    - 95°C x 5 min
    - 40 cycles: 95°C x 20s, 58°C x 30s, 73°C x 20s
    - 72°C x 1 min
    - Hold at 4°C

Appendix B – Physical Data (Bottom Temperature, Salinity, and Depth) and Teleost/Elasmobranch Taxa No. of Reads by Survey and Station

Sample ID	Sampling Period	Date	Station ID	Bottom Salinity (psu)	Bottom Temperature (°C)	Bottom Depth (m)	ASV Common Name	ASV Reads (#)
emp_Mar_24_B17	March 2024	3/1/2024	B17	31.57009315	6.520691988	34.12430191	Monkfish	2582
emp_Mar_24_B17	March 2024	3/1/2024	B17	31.57009315	6.520691988	34.12430191	Am_butterfish	783
emp_Mar_24_B17	March 2024	3/1/2024	B17	31.57009315	6.520691988	34.12430191	Atl_herring	415
emp_Mar_24_B17	March 2024	3/1/2024	B17	31.57009315	6.520691988	34.12430191	Atl_mackerel	5689
emp_Mar_24_B17	March 2024	3/1/2024	B17	31.57009315	6.520691988	34.12430191	Atl_menhaden_LS16_or_river_herrings	34405
emp_Mar_24_B17	March 2024	3/1/2024	B17	31.57009315	6.520691988	34.12430191	Atl_menhaden_LS17	38816
emp_Mar_24_B17	March 2024	3/1/2024	B17	31.57009315	6.520691988	34.12430191	Black_sea_bass	545
emp_Mar_24_B17	March 2024	3/1/2024	B17	31.57009315	6.520691988	34.12430191	Red_White_or_Spotted_hake	4290
emp_Mar_24_B17	March 2024	3/1/2024	B17	31.57009315	6.520691988	34.12430191	Summ_flounder	1134
emp_Mar_24_B17	March 2024	3/1/2024	B17	31.57009315	6.520691988	34.12430191	Barndoor_skate	28052
emp_Mar_24_B17	March 2024	3/1/2024	B17	31.57009315	6.520691988	34.12430191	Spiny_dogfish	4584
emp_Mar_24_B17	March 2024	3/1/2024	B17	31.57009315	6.520691988	34.12430191	Winter_skate_or_Little_skate	210587
emp_Mar_24_C20	March 2024	3/1/2024	C20	31.61923489	6.484727102	34.89063644	Monkfish	991
emp_Mar_24_C20	March 2024	3/1/2024	C20	31.61923489	6.484727102	34.89063644	Am_butterfish	855
emp_Mar_24_C20	March 2024	3/1/2024	C20	31.61923489	6.484727102	34.89063644	Atl_mackerel	1427
emp_Mar_24_C20	March 2024	3/1/2024	C20	31.61923489	6.484727102	34.89063644	Atl_menhaden_LS16_or_river_herrings	20316
emp_Mar_24_C20	March 2024	3/1/2024	C20	31.61923489	6.484727102	34.89063644	Atl_menhaden_LS17	23262
emp_Mar_24_C20	March 2024	3/1/2024	C20	31.61923489	6.484727102	34.89063644	Atl_or_nor_sand_lance	644
emp_Mar_24_C20	March 2024	3/1/2024	C20	31.61923489	6.484727102	34.89063644	Summ_flounder	612
emp_Mar_24_C20	March 2024	3/1/2024	C20	31.61923489	6.484727102	34.89063644	Barndoor_skate	15153
emp_Mar_24_C20	March 2024	3/1/2024	C20	31.61923489	6.484727102	34.89063644	Spiny_dogfish	6440
emp_Mar_24_C20	March 2024	3/1/2024	C20	31.61923489	6.484727102	34.89063644	Thresher_shark	1477
emp_Mar_24_C20	March 2024	3/1/2024	C20	31.61923489	6.484727102	34.89063644	Winter_skate_or_Little_skate	77697
emp_Mar_24_C22	March 2024	3/1/2024	C22	31.58832291	6.442765635	35.40063477	Monkfish	202
emp_Mar_24_C22	March 2024	3/1/2024	C22	31.58832291	6.442765635	35.40063477	Am_butterfish	1598
emp_Mar_24_C22	March 2024	3/1/2024	C22	31.58832291	6.442765635	35.40063477	Atl_mackerel	1968
emp_Mar_24_C22	March 2024	3/1/2024	C22	31.58832291	6.442765635	35.40063477	Atl_menhaden_LS16_or_river_herrings	32748
emp_Mar_24_C22	March 2024	3/1/2024	C22	31.58832291	6.442765635	35.40063477	Atl_menhaden_LS17	29593
emp_Mar_24_C22	March 2024	3/1/2024	C22	31.58832291	6.442765635	35.40063477	Atl_or_nor_sand_lance	1153
emp_Mar_24_C22	March 2024	3/1/2024	C22	31.58832291	6.442765635	35.40063477	Silver_hake	273
emp_Mar_24_C22	March 2024	3/1/2024	C22	31.58832291	6.442765635	35.40063477	Summ_flounder	1555
emp_Mar_24_C22	March 2024	3/1/2024	C22	31.58832291	6.442765635	35.40063477	Spiny_dogfish	1635
emp_Mar_24_C22	March 2024	3/1/2024	C22	31.58832291	6.442765635	35.40063477	Winter_skate_or_Little_skate	186358
emp_Mar_24_D03	March 2024	3/1/2024	D03	31.35089316	6.522829927	25.77255058	Monkfish	1857
emp_Mar_24_D03	March 2024	3/1/2024	D03	31.35089316	6.522829927	25.77255058	Atl_herring	9013
emp_Mar_24_D03	March 2024	3/1/2024	D03	31.35089316	6.522829927	25.77255058	Atl_mackerel	19796
emp_Mar_24_D03	March 2024	3/1/2024	D03	31.35089316	6.522829927	25.77255058	Atl_menhaden_LS16_or_river_herrings	15006
emp_Mar_24_D03	March 2024	3/1/2024	D03	31.35089316	6.522829927	25.77255058	Atl_menhaden_LS17	16842
emp_Mar_24_D03	March 2024	3/1/2024	D03	31.35089316	6.522829927	25.77255058	Atl_or_nor_sand_lance	1877
emp_Mar_24_D03	March 2024	3/1/2024	D03	31.35089316	6.522829927	25.77255058	Windowpane_flounder	4024

Sample ID	Sampling Period	Date	Station ID	Bottom Salinity (psu)	Bottom Temperature (°C)	Bottom Depth (m)	ASV Common Name	ASV Reads (#)
emp_Mar_24_D03	March 2024	3/1/2024	D03	31.35089316	6.522829927	25.77255058	Barndoor_skate	1409
emp_Mar_24_D03	March 2024	3/1/2024	D03	31.35089316	6.522829927	25.77255058	Spiny_dogfish	1244
emp_Mar_24_D03	March 2024	3/1/2024	D03	31.35089316	6.522829927	25.77255058	Winter_skate_or_Little_skate	41775
emp_Mar_24_D14	March 2024	3/1/2024	D14	31.61603377	6.483656919	33.64430237	Monkfish	1335
emp_Mar_24_D14	March 2024	3/1/2024	D14	31.61603377	6.483656919	33.64430237	Am_butterfish	2069
emp_Mar_24_D14	March 2024	3/1/2024	D14	31.61603377	6.483656919	33.64430237	Atl_menhaden_LS16_or_river_herrings	27103
emp_Mar_24_D14	March 2024	3/1/2024	D14	31.61603377	6.483656919	33.64430237	Atl_menhaden_LS17	41949
emp_Mar_24_D14	March 2024	3/1/2024	D14	31.61603377	6.483656919	33.64430237	Red_White_or_Spotted_hake	1995
emp_Mar_24_D14	March 2024	3/1/2024	D14	31.61603377	6.483656919	33.64430237	Barndoor_skate	37707
emp_Mar_24_D14	March 2024	3/1/2024	D14	31.61603377	6.483656919	33.64430237	Spiny_dogfish	9685
emp_Mar_24_D14	March 2024	3/1/2024	D14	31.61603377	6.483656919	33.64430237	Winter_skate_or_Little_skate	25946
emp_Mar_24_F27	March 2024	3/1/2024	F27	31.44353027	6.558264869	39.88783646	Monkfish	4696
emp_Mar_24_F27	March 2024	3/1/2024	F27	31.44353027	6.558264869	39.88783646	Atl_herring	2003
emp_Mar_24_F27	March 2024	3/1/2024	F27	31.44353027	6.558264869	39.88783646	Atl_mackerel	33696
emp_Mar_24_F27	March 2024	3/1/2024	F27	31.44353027	6.558264869	39.88783646	Barndoor_skate	16374
emp_Mar_24_F27	March 2024	3/1/2024	F27	31.44353027	6.558264869	39.88783646	Spiny_dogfish	2950
emp_Mar_24_F27	March 2024	3/1/2024	F27	31.44353027	6.558264869	39.88783646	Winter_skate_or_Little_skate	61928
emp_Mar_24_H21	March 2024	3/1/2024	H21	31.76671559	6.499860689	38.4691391	Monkfish	3699
emp_Mar_24_H21	March 2024	3/1/2024	H21	31.76671559	6.499860689	38.4691391	Am_butterfish	1504
emp_Mar_24_H21	March 2024	3/1/2024	H21	31.76671559	6.499860689	38.4691391	Atl_herring	638
emp_Mar_24_H21	March 2024	3/1/2024	H21	31.76671559	6.499860689	38.4691391	Atl_mackerel	11431
emp_Mar_24_H21	March 2024	3/1/2024	H21	31.76671559	6.499860689	38.4691391	Atl_menhaden_LS16_or_river_herrings	27735
emp_Mar_24_H21	March 2024	3/1/2024	H21	31.76671559	6.499860689	38.4691391	Atl_menhaden_LS17	32724
emp_Mar_24_H21	March 2024	3/1/2024	H21	31.76671559	6.499860689	38.4691391	Smallmouth_flounder	3121
emp_Mar_24_H21	March 2024	3/1/2024	H21	31.76671559	6.499860689	38.4691391	Barndoor_skate	95442
emp_Mar_24_H21	March 2024	3/1/2024	H21	31.76671559	6.499860689	38.4691391	Winter_skate_or_Little_skate	121636
emp_Mar_24_L25	March 2024	3/1/2024	L25	31.78240743	6.454819315	40.86913681	Monkfish	12871
emp_Mar_24_L25	March 2024	3/1/2024	L25	31.78240743	6.454819315	40.86913681	Am_butterfish	9085
emp_Mar_24_L25	March 2024	3/1/2024	L25	31.78240743	6.454819315	40.86913681	Atl_mackerel	10681
emp_Mar_24_L25	March 2024	3/1/2024	L25	31.78240743	6.454819315	40.86913681	Atl_menhaden_LS16_or_river_herrings	2163
emp_Mar_24_L25	March 2024	3/1/2024	L25	31.78240743	6.454819315	40.86913681	Summ_flounder	1525
emp_Mar_24_L25	March 2024	3/1/2024	L25	31.78240743	6.454819315	40.86913681	Barndoor_skate	141834
emp_Mar_24_L25	March 2024	3/1/2024	L25	31.78240743	6.454819315	40.86913681	Winter_skate_or_Little_skate	177397
emp_Jun_24_B17	June 2024	6/12/2024	B17	31.07477692	8.478601262	34.12430191	Grass_or_silver_carp	11617
emp_Jun_24_B17	June 2024	6/12/2024	B17	31.07477692	8.478601262	34.12430191	Winter_skate_or_Little_skate	179
emp_Jun_24_C20	June 2024	6/12/2024	C20	31.15693834	8.505095087	34.89063644	Monkfish	63
emp_Jun_24_C20	June 2024	6/12/2024	C20	31.15693834	8.505095087	34.89063644	Atl_menhaden_LS17	2800
emp_Jun_24_C20	June 2024	6/12/2024	C20	31.15693834	8.505095087	34.89063644	Atl_or_nor_sand_lance	20639
emp_Jun_24_C20	June 2024	6/12/2024	C20	31.15693834	8.505095087	34.89063644	Cunner	3626
emp_Jun_24_C20	June 2024	6/12/2024	C20	31.15693834	8.505095087	34.89063644	Gulf_stream_flounder	10059

Sample ID	Sampling Period	Date	Station ID	Bottom Salinity (psu)	Bottom Temperature (°C)	Bottom Depth (m)	ASV Common Name	ASV Reads (#)
emp_Jun_24_C20	June 2024	6/12/2024	C20	31.15693834	8.505095087	34.89063644	Silver_hake	5027
emp_Jun_24_C20	June 2024	6/12/2024	C20	31.15693834	8.505095087	34.89063644	Str_sea_robin	3610
emp_Jun_24_C20	June 2024	6/12/2024	C20	31.15693834	8.505095087	34.89063644	Barndoor_skate	1497
emp_Jun_24_C20	June 2024	6/12/2024	C20	31.15693834	8.505095087	34.89063644	Sandbar_shark	718
emp_Jun_24_C20	June 2024	6/12/2024	C20	31.15693834	8.505095087	34.89063644	Smooth_dogfish	547
emp_Jun_24_C20	June 2024	6/12/2024	C20	31.15693834	8.505095087	34.89063644	Winter_skate_or_Little_skate	6294
emp_Jun_24_C22	June 2024	6/12/2024	C22	31.19557693	8.050354471	35.40063477	Atl_or_nor_sand_lance	42283
emp_Jun_24_C22	June 2024	6/12/2024	C22	31.19557693	8.050354471	35.40063477	Cunner	50540
emp_Jun_24_C22	June 2024	6/12/2024	C22	31.19557693	8.050354471	35.40063477	Fourspot_flounder	6676
emp_Jun_24_C22	June 2024	6/12/2024	C22	31.19557693	8.050354471	35.40063477	Gulf_stream_flounder	1494
emp_Jun_24_C22	June 2024	6/12/2024	C22	31.19557693	8.050354471	35.40063477	Silver_hake	2219
emp_Jun_24_C22	June 2024	6/12/2024	C22	31.19557693	8.050354471	35.40063477	Sturgeon	1463
emp_Jun_24_C22	June 2024	6/12/2024	C22	31.19557693	8.050354471	35.40063477	Barndoor_skate	584
emp_Jun_24_C22	June 2024	6/12/2024	C22	31.19557693	8.050354471	35.40063477	Winter_skate_or_Little_skate	16349
emp_Jun_24_D03	June 2024	6/12/2024	D03	30.49627684	10.22447754	25.77255058	Atl_menhaden_LS16_or_river_herrings	28264
emp_Jun_24_D03	June 2024	6/12/2024	D03	30.49627684	10.22447754	25.77255058	Atl_menhaden_LS17	25036
emp_Jun_24_D03	June 2024	6/12/2024	D03	30.49627684	10.22447754	25.77255058	Black_sea_bass	404
emp_Jun_24_D03	June 2024	6/12/2024	D03	30.49627684	10.22447754	25.77255058	Fourspot_flounder	1608
emp_Jun_24_D03	June 2024	6/12/2024	D03	30.49627684	10.22447754	25.77255058	Nor_sea_robin	4359
emp_Jun_24_D03	June 2024	6/12/2024	D03	30.49627684	10.22447754	25.77255058	Str_sea_robin	1289
emp_Jun_24_D03	June 2024	6/12/2024	D03	30.49627684	10.22447754	25.77255058	Thread_herring	1076
emp_Jun_24_D03	June 2024	6/12/2024	D03	30.49627684	10.22447754	25.77255058	Winter_skate_or_Little_skate	213
emp_Jun_24_D14	June 2024	6/12/2024	D14	31.05018146	8.713038922	33.64430237	Monkfish	15
emp_Jun_24_D14	June 2024	6/12/2024	D14	31.05018146	8.713038922	33.64430237	Am_butterfish	3636
emp_Jun_24_D14	June 2024	6/12/2024	D14	31.05018146	8.713038922	33.64430237	Atl_menhaden_LS16_or_river_herrings	3066
emp_Jun_24_D14	June 2024	6/12/2024	D14	31.05018146	8.713038922	33.64430237	Atl_menhaden_LS17	8515
emp_Jun_24_D14	June 2024	6/12/2024	D14	31.05018146	8.713038922	33.64430237	Fourspot_flounder	3280
emp_Jun_24_D14	June 2024	6/12/2024	D14	31.05018146	8.713038922	33.64430237	Gulf_stream_flounder	14513
emp_Jun_24_D14	June 2024	6/12/2024	D14	31.05018146	8.713038922	33.64430237	Sturgeon	375
emp_Jun_24_D14	June 2024	6/12/2024	D14	31.05018146	8.713038922	33.64430237	Windowpane_flounder	2567
emp_Jun_24_D14	June 2024	6/12/2024	D14	31.05018146	8.713038922	33.64430237	Winter_skate_or_Little_skate	28535
emp_Jun_24_F27	June 2024	6/12/2024	F27	31.38071956	7.748364671	39.88783646	Monkfish	1236
emp_Jun_24_F27	June 2024	6/12/2024	F27	31.38071956	7.748364671	39.88783646	Atl_or_nor_sand_lance	5364
emp_Jun_24_F27	June 2024	6/12/2024	F27	31.38071956	7.748364671	39.88783646	Cunner	668
emp_Jun_24_F27	June 2024	6/12/2024	F27	31.38071956	7.748364671	39.88783646	Silver_hake	424
emp_Jun_24_F27	June 2024	6/12/2024	F27	31.38071956	7.748364671	39.88783646	Winter_skate_or_Little_skate	2169
emp_Jun_24_H21	June 2024	6/12/2024	H21	31.31359429	7.761244004	38.4691391	Atl_menhaden_LS17	402
emp_Jun_24_H21	June 2024	6/12/2024	H21	31.31359429	7.761244004	38.4691391	Atl_or_nor_sand_lance	9599
emp_Jun_24_H21	June 2024	6/12/2024	H21	31.31359429	7.761244004	38.4691391	Cunner	680
emp_Jun_24_H21	June 2024	6/12/2024	H21	31.31359429	7.761244004	38.4691391	Red_White_or_Spotted_hake	307

Sample ID	Sampling Period	Date	Station ID	Bottom Salinity (psu)	Bottom Temperature (°C)	Bottom Depth (m)	ASV Common Name	ASV Reads (#)
emp_Jun_24_H21	June 2024	6/12/2024	H21	31.31359429	7.761244004	38.4691391	Silver_hake	1153
emp_Jun_24_H21	June 2024	6/12/2024	H21	31.31359429	7.761244004	38.4691391	Barndoor_skate	15
emp_Jun_24_H21	June 2024	6/12/2024	H21	31.31359429	7.761244004	38.4691391	Winter_skate_or_Little_skate	1609
emp_Jun_24_L25	June 2024	6/12/2024	L25	31.47654218	7.724918687	40.86913681	Atl_or_nor_sand_lance	62699
emp_Jun_24_L25	June 2024	6/12/2024	L25	31.47654218	7.724918687	40.86913681	Winter_skate_or_Little_skate	627
emp_Sep_24_B17	September 2024	9/11/2024	B17	31.46180299	10.68169998	34.12430191	Brazilian_cownose_ray98	953
emp_Sep_24_B17	September 2024	9/11/2024	B17	31.46180299	10.68169998	34.12430191	Smooth_dogfish	6
emp_Sep_24_B17	September 2024	9/11/2024	B17	31.46180299	10.68169998	34.12430191	Winter_skate_or_Little_skate	4541
emp_Sep_24_B17	September 2024	9/11/2024	B17	31.46180299	10.68169998	34.12430191	Gulf_stream_flounder	2746
emp_Sep_24_B17	September 2024	9/11/2024	B17	31.46180299	10.68169998	34.12430191	Nor_sea_robin	48151
emp_Sep_24_C20	September 2024	9/11/2024	C20	31.34847595	10.59918137	34.89063644	Bluntnose_stingray94B	4
emp_Sep_24_C20	September 2024	9/11/2024	C20	31.34847595	10.59918137	34.89063644	Bullnose_ray	4524
emp_Sep_24_C20	September 2024	9/11/2024	C20	31.34847595	10.59918137	34.89063644	Smooth_dogfish	9
emp_Sep_24_C20	September 2024	9/11/2024	C20	31.34847595	10.59918137	34.89063644	Black_sea_bass	7403
emp_Sep_24_C20	September 2024	9/11/2024	C20	31.34847595	10.59918137	34.89063644	Gulf_stream_flounder	6586
emp_Sep_24_C20	September 2024	9/11/2024	C20	31.34847595	10.59918137	34.89063644	Nor_sea_robin	6745
emp_Sep_24_C22	September 2024	9/11/2024	C22	31.45494332	9.827846966	35.40063477	Clearnose_skate	1823
emp_Sep_24_C22	September 2024	9/11/2024	C22	31.45494332	9.827846966	35.40063477	Sandbar_shark	5218
emp_Sep_24_C22	September 2024	9/11/2024	C22	31.45494332	9.827846966	35.40063477	Winter_skate_or_Little_skate	13203
emp_Sep_24_C22	September 2024	9/11/2024	C22	31.45494332	9.827846966	35.40063477	Am_butterfish	2050
emp_Sep_24_C22	September 2024	9/11/2024	C22	31.45494332	9.827846966	35.40063477	Silver_hake	1198
emp_Sep_24_C22	September 2024	9/11/2024	C22	31.45494332	9.827846966	35.40063477	Windowpane_flounder	3
emp_Sep_24_D03	September 2024	9/11/2024	D03	30.77444607	18.5683085	25.77255058	Bullnose_ray	38924
emp_Sep_24_D03	September 2024	9/11/2024	D03	30.77444607	18.5683085	25.77255058	Clearnose_skate	9935
emp_Sep_24_D03	September 2024	9/11/2024	D03	30.77444607	18.5683085	25.77255058	Cownose_ray	27790
emp_Sep_24_D03	September 2024	9/11/2024	D03	30.77444607	18.5683085	25.77255058	Roughtail_stingray	470
emp_Sep_24_D03	September 2024	9/11/2024	D03	30.77444607	18.5683085	25.77255058	Sandbar_shark	398
emp_Sep_24_D03	September 2024	9/11/2024	D03	30.77444607	18.5683085	25.77255058	Spiny_butterfly_ray	277
emp_Sep_24_D03	September 2024	9/11/2024	D03	30.77444607	18.5683085	25.77255058	Winter_skate_or_Little_skate	1160
emp_Sep_24_D03	September 2024	9/11/2024	D03	30.77444607	18.5683085	25.77255058	Atl_chub_mackerel	716
emp_Sep_24_D03	September 2024	9/11/2024	D03	30.77444607	18.5683085	25.77255058	Atl_menhaden_LS16_or_river_herrings	4693
emp_Sep_24_D03	September 2024	9/11/2024	D03	30.77444607	18.5683085	25.77255058	Atl_menhaden_LS17	6417
emp_Sep_24_D03	September 2024	9/11/2024	D03	30.77444607	18.5683085	25.77255058	Black_drum_or_Spot	39690
emp_Sep_24_D03	September 2024	9/11/2024	D03	30.77444607	18.5683085	25.77255058	Black_sea_bass	2933
emp_Sep_24_D03	September 2024	9/11/2024	D03	30.77444607	18.5683085	25.77255058	Bluefish	9980
emp_Sep_24_D03	September 2024	9/11/2024	D03	30.77444607	18.5683085	25.77255058	Fourspot_flounder	91
emp_Sep_24_D03	September 2024	9/11/2024	D03	30.77444607	18.5683085	25.77255058	Gulf_stream_flounder	288
emp_Sep_24_D03	September 2024	9/11/2024	D03	30.77444607	18.5683085	25.77255058	Nor_sea_robin	10159
emp_Sep_24_D03	September 2024	9/11/2024	D03	30.77444607	18.5683085	25.77255058	Scup	13730
emp_Sep_24_D03	September 2024	9/11/2024	D03	30.77444607	18.5683085	25.77255058	Smallmouth_flounder	329

Sample ID	Sampling Period	Date	Station ID	Bottom Salinity (psu)	Bottom Temperature (°C)	Bottom Depth (m)	ASV Common Name	ASV Reads (#)
emp_Sep_24_D03	September 2024	9/11/2024	D03	30.77444607	18.5683085	25.77255058	Str_sea_robin	139
emp_Sep_24_D03	September 2024	9/11/2024	D03	30.77444607	18.5683085	25.77255058	Windowpane_flounder	284
emp_Sep_24_D14	September 2024	9/11/2024	D14	31.41973466	10.6769874	33.64430237	Winter_skate_or_Little_skate	1831
emp_Sep_24_D14	September 2024	9/11/2024	D14	31.41973466	10.6769874	33.64430237	Gulf_stream_flounder	1577
emp_Sep_24_D14	September 2024	9/11/2024	D14	31.41973466	10.6769874	33.64430237	Nor_sea_robin	25967
emp_Sep_24_D14	September 2024	9/11/2024	D14	31.41973466	10.6769874	33.64430237	Silver_hake	519
emp_Sep_24_F27	September 2024	9/11/2024	F27	31.4728716	9.480550226	39.88783646	Bullnose_ray	1318
emp_Sep_24_F27	September 2024	9/11/2024	F27	31.4728716	9.480550226	39.88783646	Roughtail_stingray	3193
emp_Sep_24_F27	September 2024	9/11/2024	F27	31.4728716	9.480550226	39.88783646	Winter_skate_or_Little_skate	5408
emp_Sep_24_F27	September 2024	9/11/2024	F27	31.4728716	9.480550226	39.88783646	Atl_menhaden_LS17	4341
emp_Sep_24_F27	September 2024	9/11/2024	F27	31.4728716	9.480550226	39.88783646	Black_drum_or_Spot	4278
emp_Sep_24_F27	September 2024	9/11/2024	F27	31.4728716	9.480550226	39.88783646	Cunner	8307
emp_Sep_24_F27	September 2024	9/11/2024	F27	31.4728716	9.480550226	39.88783646	Gulf_stream_flounder	8734
emp_Sep_24_F27	September 2024	9/11/2024	F27	31.4728716	9.480550226	39.88783646	Nor_sea_robin	5257
emp_Sep_24_F27	September 2024	9/11/2024	F27	31.4728716	9.480550226	39.88783646	Silver_hake	4504
emp_Sep_24_H21	September 2024	9/11/2024	H21	31.47556774	9.304111771	38.4691391	Bullnose_ray	4564
emp_Sep_24_H21	September 2024	9/11/2024	H21	31.47556774	9.304111771	38.4691391	Am_butterfish	4998
emp_Sep_24_H21	September 2024	9/11/2024	H21	31.47556774	9.304111771	38.4691391	Black_sea_bass	1666
emp_Sep_24_H21	September 2024	9/11/2024	H21	31.47556774	9.304111771	38.4691391	Bluefish	4165
emp_Sep_24_H21	September 2024	9/11/2024	H21	31.47556774	9.304111771	38.4691391	Gulf_stream_flounder	4056
emp_Sep_24_H21	September 2024	9/11/2024	H21	31.47556774	9.304111771	38.4691391	Silver_hake	681
emp_Sep_24_L25	September 2024	9/11/2024	L25	31.51074504	9.124866137	40.86913681	Barndoor_skate	426
emp_Sep_24_L25	September 2024	9/11/2024	L25	31.51074504	9.124866137	40.86913681	Roughtail_stingray	1571
emp_Sep_24_L25	September 2024	9/11/2024	L25	31.51074504	9.124866137	40.86913681	Winter_skate_or_Little_skate	16598
emp_Sep_24_L25	September 2024	9/11/2024	L25	31.51074504	9.124866137	40.86913681	Am_butterfish	1015
emp_Sep_24_L25	September 2024	9/11/2024	L25	31.51074504	9.124866137	40.86913681	Atl_cod	1160
emp_Sep_24_L25	September 2024	9/11/2024	L25	31.51074504	9.124866137	40.86913681	Atl_menhaden_LS16_or_river_herrings	1526
emp_Sep_24_L25	September 2024	9/11/2024	L25	31.51074504	9.124866137	40.86913681	Atl_or_nor_sand_lance	3336
emp_Sep_24_L25	September 2024	9/11/2024	L25	31.51074504	9.124866137	40.86913681	Black_sea_bass	2262
emp_Sep_24_L25	September 2024	9/11/2024	L25	31.51074504	9.124866137	40.86913681	Red_White_or_Spotted_hake	948
emp_Sep_24_L25	September 2024	9/11/2024	L25	31.51074504	9.124866137	40.86913681	Silver_hake	1351
emp_Dec_24_B17	December 2024	12/10/2024	B17	33.7022318	12.3771527	34.12430191	Barndoor_skate	9410
emp_Dec_24_B17	December 2024	12/10/2024	B17	33.7022318	12.3771527	34.12430191	Clearnose_skate	11718
emp_Dec_24_B17	December 2024	12/10/2024	B17	33.7022318	12.3771527	34.12430191	Smooth_dogfish	13266
emp_Dec_24_B17	December 2024	12/10/2024	B17	33.7022318	12.3771527	34.12430191	Spiny_dogfish	45380
emp_Dec_24_B17	December 2024	12/10/2024	B17	33.7022318	12.3771527	34.12430191	Winter_skate_or_Little_skate	72286
emp_Dec_24_B17	December 2024	12/10/2024	B17	33.7022318	12.3771527	34.12430191	Monkfish	88
emp_Dec_24_B17	December 2024	12/10/2024	B17	33.7022318	12.3771527	34.12430191	Am_butterfish	39826
emp_Dec_24_B17	December 2024	12/10/2024	B17	33.7022318	12.3771527	34.12430191	Atl_croaker_(nibea98)	1773
emp_Dec_24_B17	December 2024	12/10/2024	B17	33.7022318	12.3771527	34.12430191	Atl_mackerel	5478

Sample ID	Sampling Period	Date	Station ID	Bottom Salinity (psu)	Bottom Temperature (°C)	Bottom Depth (m)	ASV Common Name	ASV Reads (#)
emp_Dec_24_B17	December 2024	12/10/2024	B17	33.7022318	12.3771527	34.12430191	Atl_menhaden_LS16_or_river_herrings	886
emp_Dec_24_B17	December 2024	12/10/2024	B17	33.7022318	12.3771527	34.12430191	Atl_menhaden_LS17	3708
emp_Dec_24_B17	December 2024	12/10/2024	B17	33.7022318	12.3771527	34.12430191	Black_drum_or_Spot	7508
emp_Dec_24_B17	December 2024	12/10/2024	B17	33.7022318	12.3771527	34.12430191	Black_sea_bass	8239
emp_Dec_24_B17	December 2024	12/10/2024	B17	33.7022318	12.3771527	34.12430191	Nor_sea_robin	8067
emp_Dec_24_B17	December 2024	12/10/2024	B17	33.7022318	12.3771527	34.12430191	Red_White_or_Spotted_hake	5572
emp_Dec_24_B17	December 2024	12/10/2024	B17	33.7022318	12.3771527	34.12430191	Scup	98692
emp_Dec_24_B17	December 2024	12/10/2024	B17	33.7022318	12.3771527	34.12430191	Silver_hake	1136
emp_Dec_24_B17	December 2024	12/10/2024	B17	33.7022318	12.3771527	34.12430191	Str_bass	135046
emp_Dec_24_B17	December 2024	12/10/2024	B17	33.7022318	12.3771527	34.12430191	Str_sea_robin	1836
emp_Dec_24_B17	December 2024	12/10/2024	B17	33.7022318	12.3771527	34.12430191	Summ_flounder	15
emp_Dec_24_B17	December 2024	12/10/2024	B17	33.7022318	12.3771527	34.12430191	Tautog	12232
emp_Dec_24_B17	December 2024	12/10/2024	B17	33.7022318	12.3771527	34.12430191	Weakfish_Cyn	17151
emp_Dec_24_B17	December 2024	12/10/2024	B17	33.7022318	12.3771527	34.12430191	Windowpane_flounder	3862
emp_Dec_24_C20	December 2024	12/10/2024	C20	33.58116049	11.55440382	34.89063644	Spiny_dogfish	16027
emp_Dec_24_C20	December 2024	12/10/2024	C20	33.58116049	11.55440382	34.89063644	Winter_skate_or_Little_skate	26677
emp_Dec_24_C20	December 2024	12/10/2024	C20	33.58116049	11.55440382	34.89063644	Am_butterfish	22332
emp_Dec_24_C20	December 2024	12/10/2024	C20	33.58116049	11.55440382	34.89063644	Atl_menhaden_LS16_or_river_herrings	9100
emp_Dec_24_C20	December 2024	12/10/2024	C20	33.58116049	11.55440382	34.89063644	Atl_menhaden_LS17	107353
emp_Dec_24_C20	December 2024	12/10/2024	C20	33.58116049	11.55440382	34.89063644	Black_drum_or_Spot	6615
emp_Dec_24_C20	December 2024	12/10/2024	C20	33.58116049	11.55440382	34.89063644	Nor_sea_robin	7460
emp_Dec_24_C20	December 2024	12/10/2024	C20	33.58116049	11.55440382	34.89063644	Red_White_or_Spotted_hake	36875
emp_Dec_24_C20	December 2024	12/10/2024	C20	33.58116049	11.55440382	34.89063644	Scup	100486
emp_Dec_24_C20	December 2024	12/10/2024	C20	33.58116049	11.55440382	34.89063644	Str_bass	26547
emp_Dec_24_C20	December 2024	12/10/2024	C20	33.58116049	11.55440382	34.89063644	Str_sea_robin	5792
emp_Dec_24_C20	December 2024	12/10/2024	C20	33.58116049	11.55440382	34.89063644	Summ_flounder	9232
emp_Dec_24_C20	December 2024	12/10/2024	C20	33.58116049	11.55440382	34.89063644	Weakfish_Cyn	4078
emp_Dec_24_C22	December 2024	12/10/2024	C22	32.96972844	10.66624506	35.40063477	Clearnose_skate	5
emp_Dec_24_C22	December 2024	12/10/2024	C22	32.96972844	10.66624506	35.40063477	Cownose_ray	10
emp_Dec_24_C22	December 2024	12/10/2024	C22	32.96972844	10.66624506	35.40063477	Spiny_dogfish	28
emp_Dec_24_C22	December 2024	12/10/2024	C22	32.96972844	10.66624506	35.40063477	Winter_skate_or_Little_skate	107
emp_Dec_24_C22	December 2024	12/10/2024	C22	32.96972844	10.66624506	35.40063477	Am_butterfish	38460
emp_Dec_24_C22	December 2024	12/10/2024	C22	32.96972844	10.66624506	35.40063477	Atl_croaker_(nibea98)	2199
emp_Dec_24_C22	December 2024	12/10/2024	C22	32.96972844	10.66624506	35.40063477	Atl_menhaden_LS17	2960
emp_Dec_24_C22	December 2024	12/10/2024	C22	32.96972844	10.66624506	35.40063477	Black_sea_bass	7765
emp_Dec_24_C22	December 2024	12/10/2024	C22	32.96972844	10.66624506	35.40063477	Nor_sea_robin	21811
emp_Dec_24_C22	December 2024	12/10/2024	C22	32.96972844	10.66624506	35.40063477	Scup	59482
emp_Dec_24_C22	December 2024	12/10/2024	C22	32.96972844	10.66624506	35.40063477	Str_bass	42146
emp_Dec_24_C22	December 2024	12/10/2024	C22	32.96972844	10.66624506	35.40063477	Str_sea_robin	4310
emp_Dec_24_C22	December 2024	12/10/2024	C22	32.96972844	10.66624506	35.40063477	Weakfish_Cyn	23886

Sample ID	Sampling Period	Date	Station ID	Bottom Salinity (psu)	Bottom Temperature (°C)	Bottom Depth (m)	ASV Common Name	ASV Reads (#)
emp_Dec_24_C22	December 2024	12/10/2024	C22	32.96972844	10.66624506	35.40063477	Windowpane_flounder	5664
emp_Dec_24_D03	December 2024	12/10/2024	D03	33.7311163	12.57641416	25.77255058	Barndoor_skate	4400
emp_Dec_24_D03	December 2024	12/10/2024	D03	33.7311163	12.57641416	25.77255058	Brazilian_cownose_ray98	4245
emp_Dec_24_D03	December 2024	12/10/2024	D03	33.7311163	12.57641416	25.77255058	Clearnose_skate	34922
emp_Dec_24_D03	December 2024	12/10/2024	D03	33.7311163	12.57641416	25.77255058	Cownose_ray	28
emp_Dec_24_D03	December 2024	12/10/2024	D03	33.7311163	12.57641416	25.77255058	Smooth_dogfish	99
emp_Dec_24_D03	December 2024	12/10/2024	D03	33.7311163	12.57641416	25.77255058	Spiny_dogfish	9242
emp_Dec_24_D03	December 2024	12/10/2024	D03	33.7311163	12.57641416	25.77255058	Thresher_shark	2830
emp_Dec_24_D03	December 2024	12/10/2024	D03	33.7311163	12.57641416	25.77255058	Winter_skate_or_Little_skate	88073
emp_Dec_24_D03	December 2024	12/10/2024	D03	33.7311163	12.57641416	25.77255058	Monkfish	469
emp_Dec_24_D03	December 2024	12/10/2024	D03	33.7311163	12.57641416	25.77255058	Am_butterfish	48736
emp_Dec_24_D03	December 2024	12/10/2024	D03	33.7311163	12.57641416	25.77255058	Atl_croaker_(nibea98)	4157
emp_Dec_24_D03	December 2024	12/10/2024	D03	33.7311163	12.57641416	25.77255058	Atl_menhaden_LS17	2315
emp_Dec_24_D03	December 2024	12/10/2024	D03	33.7311163	12.57641416	25.77255058	Atl_or_nor_sand_lance	3457
emp_Dec_24_D03	December 2024	12/10/2024	D03	33.7311163	12.57641416	25.77255058	Black_drum_or_Spot	1224
emp_Dec_24_D03	December 2024	12/10/2024	D03	33.7311163	12.57641416	25.77255058	Black_sea_bass	6237
emp_Dec_24_D03	December 2024	12/10/2024	D03	33.7311163	12.57641416	25.77255058	Nor_sea_robin	17127
emp_Dec_24_D03	December 2024	12/10/2024	D03	33.7311163	12.57641416	25.77255058	Red_White_or_Spotted_hake	205
emp_Dec_24_D03	December 2024	12/10/2024	D03	33.7311163	12.57641416	25.77255058	Scup	69514
emp_Dec_24_D03	December 2024	12/10/2024	D03	33.7311163	12.57641416	25.77255058	Silver_hake	218
emp_Dec_24_D03	December 2024	12/10/2024	D03	33.7311163	12.57641416	25.77255058	Str_bass	122651
emp_Dec_24_D03	December 2024	12/10/2024	D03	33.7311163	12.57641416	25.77255058	Str_sea_robin	4384
emp_Dec_24_D03	December 2024	12/10/2024	D03	33.7311163	12.57641416	25.77255058	Tautog	6124
emp_Dec_24_D03	December 2024	12/10/2024	D03	33.7311163	12.57641416	25.77255058	Weakfish_Cyn	7886
emp_Dec_24_D03	December 2024	12/10/2024	D03	33.7311163	12.57641416	25.77255058	Winter_or_Yellowtail_flounder	1391
emp_Dec_24_D14	December 2024	12/10/2024	D14	33.71064224	12.56889731	33.64430237	Barndoor_skate	10175
emp_Dec_24_D14	December 2024	12/10/2024	D14	33.71064224	12.56889731	33.64430237	Clearnose_skate	12587
emp_Dec_24_D14	December 2024	12/10/2024	D14	33.71064224	12.56889731	33.64430237	Cownose_ray	1525
emp_Dec_24_D14	December 2024	12/10/2024	D14	33.71064224	12.56889731	33.64430237	Spiny_dogfish	32117
emp_Dec_24_D14	December 2024	12/10/2024	D14	33.71064224	12.56889731	33.64430237	Winter_skate_or_Little_skate	79369
emp_Dec_24_D14	December 2024	12/10/2024	D14	33.71064224	12.56889731	33.64430237	Monkfish	91
emp_Dec_24_D14	December 2024	12/10/2024	D14	33.71064224	12.56889731	33.64430237	Am_butterfish	65503
emp_Dec_24_D14	December 2024	12/10/2024	D14	33.71064224	12.56889731	33.64430237	Atl_menhaden_LS16_or_river_herrings	1227
emp_Dec_24_D14	December 2024	12/10/2024	D14	33.71064224	12.56889731	33.64430237	Atl_menhaden_LS17	4275
emp_Dec_24_D14	December 2024	12/10/2024	D14	33.71064224	12.56889731	33.64430237	Atl_or_nor_sand_lance	4285
emp_Dec_24_D14	December 2024	12/10/2024	D14	33.71064224	12.56889731	33.64430237	Atl_salmon	1018
emp_Dec_24_D14	December 2024	12/10/2024	D14	33.71064224	12.56889731	33.64430237	Black_drum_or_Spot	1471
emp_Dec_24_D14	December 2024	12/10/2024	D14	33.71064224	12.56889731	33.64430237	Black_sea_bass	1689
emp_Dec_24_D14	December 2024	12/10/2024	D14	33.71064224	12.56889731	33.64430237	Nor_sea_robin	5164
emp_Dec_24_D14	December 2024	12/10/2024	D14	33.71064224	12.56889731	33.64430237	Red_White_or_Spotted_hake	1443

Sample ID	Sampling Period	Date	Station ID	Bottom Salinity (psu)	Bottom Temperature (°C)	Bottom Depth (m)	ASV Common Name	ASV Reads (#)
emp_Dec_24_D14	December 2024	12/10/2024	D14	33.71064224	12.56889731	33.64430237	Scup	88651
emp_Dec_24_D14	December 2024	12/10/2024	D14	33.71064224	12.56889731	33.64430237	Str_bass	48445
emp_Dec_24_D14	December 2024	12/10/2024	D14	33.71064224	12.56889731	33.64430237	Str_sea_robin	1871
emp_Dec_24_D14	December 2024	12/10/2024	D14	33.71064224	12.56889731	33.64430237	Summ_flounder	12990
emp_Dec_24_D14	December 2024	12/10/2024	D14	33.71064224	12.56889731	33.64430237	Tautog	6323
emp_Dec_24_D14	December 2024	12/10/2024	D14	33.71064224	12.56889731	33.64430237	Weakfish_Cyn	20794
emp_Dec_24_D14	December 2024	12/10/2024	D14	33.71064224	12.56889731	33.64430237	Windowpane_flounder	3827
emp_Dec_24_F27	December 2024	12/10/2024	F27	33.1915282	11.35317443	39.88783646	Cownose_ray	8756
emp_Dec_24_F27	December 2024	12/10/2024	F27	33.1915282	11.35317443	39.88783646	Smooth_dogfish	8166
emp_Dec_24_F27	December 2024	12/10/2024	F27	33.1915282	11.35317443	39.88783646	Spiny_dogfish	42797
emp_Dec_24_F27	December 2024	12/10/2024	F27	33.1915282	11.35317443	39.88783646	Winter_skate_or_Little_skate	123212
emp_Dec_24_F27	December 2024	12/10/2024	F27	33.1915282	11.35317443	39.88783646	Am_butterfish	48415
emp_Dec_24_F27	December 2024	12/10/2024	F27	33.1915282	11.35317443	39.88783646	Atl_croaker_(nibea98)	18476
emp_Dec_24_F27	December 2024	12/10/2024	F27	33.1915282	11.35317443	39.88783646	Atl_menhaden_LS17	14257
emp_Dec_24_F27	December 2024	12/10/2024	F27	33.1915282	11.35317443	39.88783646	Nor_sea_robin	6037
emp_Dec_24_F27	December 2024	12/10/2024	F27	33.1915282	11.35317443	39.88783646	Nor_sennet95	10108
emp_Dec_24_F27	December 2024	12/10/2024	F27	33.1915282	11.35317443	39.88783646	Red_White_or_Spotted_hake	19591
emp_Dec_24_F27	December 2024	12/10/2024	F27	33.1915282	11.35317443	39.88783646	Scup	74606
emp_Dec_24_F27	December 2024	12/10/2024	F27	33.1915282	11.35317443	39.88783646	Silver_hake	2817
emp_Dec_24_F27	December 2024	12/10/2024	F27	33.1915282	11.35317443	39.88783646	Str_bass	47853
emp_Dec_24_H21	December 2024	12/10/2024	H21	33.23553002	11.13314521	38.4691391	Clearnose_skate	12472
emp_Dec_24_H21	December 2024	12/10/2024	H21	33.23553002	11.13314521	38.4691391	Spiny_dogfish	82831
emp_Dec_24_H21	December 2024	12/10/2024	H21	33.23553002	11.13314521	38.4691391	Winter_skate_or_Little_skate	42909
emp_Dec_24_H21	December 2024	12/10/2024	H21	33.23553002	11.13314521	38.4691391	Am_butterfish	20226
emp_Dec_24_H21	December 2024	12/10/2024	H21	33.23553002	11.13314521	38.4691391	Atl_menhaden_LS16_or_river_herrings	14387
emp_Dec_24_H21	December 2024	12/10/2024	H21	33.23553002	11.13314521	38.4691391	Atl_menhaden_LS17	18323
emp_Dec_24_H21	December 2024	12/10/2024	H21	33.23553002	11.13314521	38.4691391	Nor_sea_robin	16370
emp_Dec_24_H21	December 2024	12/10/2024	H21	33.23553002	11.13314521	38.4691391	Red_White_or_Spotted_hake	22754
emp_Dec_24_H21	December 2024	12/10/2024	H21	33.23553002	11.13314521	38.4691391	Scup	136659
emp_Dec_24_H21	December 2024	12/10/2024	H21	33.23553002	11.13314521	38.4691391	Str_bass	55156
emp_Dec_24_H21	December 2024	12/10/2024	H21	33.23553002	11.13314521	38.4691391	Tautog	7135
emp_Dec_24_L25	December 2024	12/10/2024	L25	33.26463939	11.25961834	40.86913681	Barndoor_skate	4919
emp_Dec_24_L25	December 2024	12/10/2024	L25	33.26463939	11.25961834	40.86913681	Clearnose_skate	4030
emp_Dec_24_L25	December 2024	12/10/2024	L25	33.26463939	11.25961834	40.86913681	Spiny_dogfish	11956
emp_Dec_24_L25	December 2024	12/10/2024	L25	33.26463939	11.25961834	40.86913681	Winter_skate_or_Little_skate	113247
emp_Dec_24_L25	December 2024	12/10/2024	L25	33.26463939	11.25961834	40.86913681	Am_butterfish	18827
emp_Dec_24_L25	December 2024	12/10/2024	L25	33.26463939	11.25961834	40.86913681	Black_sea_bass	6484
emp_Dec_24_L25	December 2024	12/10/2024	L25	33.26463939	11.25961834	40.86913681	Red_White_or_Spotted_hake	2864
emp_Dec_24_L25	December 2024	12/10/2024	L25	33.26463939	11.25961834	40.86913681	Scup	8738
emp_Dec_24_L25	December 2024	12/10/2024	L25	33.26463939	11.25961834	40.86913681	Str_bass	249982

Sample ID	Sampling Period	Date	Station ID	Bottom Salinity (psu)	Bottom Temperature (°C)	Bottom Depth (m)	ASV Common Name	ASV Reads (#)
emp_Dec_24_L25	December 2024	12/10/2024	L25	33.26463939	11.25961834	40.86913681	Summ_flounder	1817
emp_Dec_24_L25	December 2024	12/10/2024	L25	33.26463939	11.25961834	40.86913681	Tautog	5331