

Final annual report

September 15, 2026

An assessment of the presence, persistence, and movements of highly migratory pelagic fishes (HMS) in the southern New England wind energy area in relation to construction and operations activity occurring from 2020 to 2024

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Abbreviations:

ACT: Atlantic Cooperative Telemetry Network

BW: Beacon Wind

DSA: data sharing addendum

FL: fork length

HMS: highly migratory species

MACEC: Massachusetts Clean Energy Center

MADMF: Massachusetts Division of Marine Fisheries

MATOS: Mid-Atlantic Acoustic Telemetry Observation System

MFW: Mayflower Wind/SouthCoast Wind

NMFS: National Marine Fisheries Service

NOAA: National Oceanic and Atmospheric Administration

OCS: outer continental shelf

REV: Revolution Wind

RI: residency index

ROSA: Responsible Offshore Science Alliance

RWSC: Regional Wildlife Science Collaborative

SF: South Fork

SMAST: University of Massachusetts Dartmouth School for Marine Science and Technology

SNE: southern New England

SRW: Sunrise Wind

SST: sea surface temperature

WEA: Wind Energy Area

501: Vineyard Wind 1

522: Vineyard Northeast (Vineyard Wind 2)

534: New England Wind

Suggested citation

Kneebone, J., Lowndes, R., Kim, E., Gervelis, B., 2026. An assessment of the presence, persistence, and movements of highly migratory pelagic fishes (HMS) in the southern New England wind energy area in relation to construction and operations activity occurring from 2020 to 2024. New England Aquarium, Anderson Cabot Center for Ocean Life, Boston, MA, Annual report. September 15, 2026, 145 p.

Acknowledgements

We would like to thank the members of the commercial, charter, and recreational fishing industries that assisted in the completion of this project, in particular Captains Mark Leach (F/V Sea Holly III), Sean Leach (F/V Jessica Beth), Mohawk Bolin (F/V Rock & Roll), and Greg Mataronas (F/V Cailyn and Maren) for assisting in the deployment and retrieval of the acoustic receivers; Captains Rob Taylor (F/V Reel EZ), Mike Littlefield (F/V ArchAngel), Tyler Macallister (F/V Bottom Line), Willy Hatch (F/V Machaca), and Dr. Diego Bernal (F/V Toro) for assisting with the tagging of animals and for providing valuable advice and insight throughout the project. Detection data presented for acoustic transmitters not deployed by this project were provided through participation in the Atlantic Cooperative Telemetry (ACT) Network and were generated by: Acadia University, Atlantic Shark Institute, Atlantic White Shark Conservancy, Beneath the Waves, Commercial Fisheries Research Foundation, Coastal Carolina University, Connecticut Department of Energy and Environmental Protection, Dalhousie University, Delaware Division of Fish and Wildlife, Delaware State University, Department of Fisheries and Oceans Canada, Florida Atlantic University, Florida International University, Georgia Aquarium, Jacksonville University, Massachusetts Division of Marine Fisheries, Maine Department of Marine Resources, Maryland Department of Natural Resources, Ministère de l'Environnement, de la Lutte contre les changements climatiques, de la Faune et des Parcs, Québec, Canada, Monmouth University, New England Aquarium, NOAA, North Carolina Aquarium, New York Department of Environmental Conservation, O'Seas Foundation, Rhode Island Department of Environmental Management, Rutgers University, South Carolina Department of Natural Resources, Smithsonian Environmental Research Center, Stanford University, Stony Brook University, Texas A&M University, University of Massachusetts Dartmouth School for Marine Science and Technology, University of Delaware, University of Maryland, University of New England, U.S. Fish and Wildlife Service, Virginia Commonwealth University, Virginia Institute of Marine Science, and the Wildlife Conservation Society.

Table of Contents

List of Tables.....	5
List of Figures	9
Executive summary.....	12
Background and justification	13
Objectives	13
Methods.....	14
Acoustic monitoring (Objective 1)	14
Environmental monitoring	15
Acoustic receiver detection range testing	15
Acoustic tagging (Objective 2)	16
Internal tagging	16
External tagging	17
Data analysis (Objective 3).....	17
Presence and persistence (residency).....	17
Movement patterns (network analysis).....	18
Depth distribution	19
Environmental conditions	20
Impact of offshore wind construction activities (Objective 4)	20
Presence and persistence (residency).....	22
Movement patterns (network analysis).....	23
Depth distribution	23
Environmental conditions	24
Data sharing (Objective 5)	24
Results.....	24
Range testing.....	25
Acoustic tagging in 2024 (Objective 2)	25
Data analysis (Objective 3).....	25
Residency index (RI)	26
Movements – Network analysis.....	27
Depth distribution	28

Environmental conditions	28
Effects of offshore wind construction activity on presence and movements (Objective 4).....	28
Residence duration	29
Residency index	29
Movements - Network analysis	31
Depth distribution	31
Environmental conditions	32
Other transmitter data collected (Objective 5).....	32
Synthesis and conclusions.....	32
Annual trends	33
Effect of offshore wind construction and environmental conditions	34
Depth distribution	37
Receiver detection range.....	37
Technical considerations	38
Next steps.....	39
Literature cited	39

List of Tables

Table 1 – Metadata for acoustic receivers deployed in 2024.....	47
Table 2 – Results of acoustic receiver range tests performed at stations 501_02 and REV_18 in 2023 and 534_01 in 2024.....	49
Table 3 – Metadata from the 364 highly migratory species (HMS) that were tagged from 2020 to 2024.....	50
Table 4 – Timing of the first and last detection events by species from 2022 to 2024.....	51
Table 5 – Summary of the number and duration of residences documented for each species in each year of the study.....	52
Table 6 – Matrix of the number of transmitters deployed each year by species and the number of those transmitters that were detected in subsequent years.....	53
Table 7a – Summary of blue shark annual residency index (RI) scores for receiver stations that were deployed consistently from 2022 to 2024.....	54
Table 7b – Summary of blue shark annual residency index (RI) scores for receiver stations that were deployed consistently from 2022 to 2024.....	55
Table 7c – Summary of bluefin tuna annual residency index (RI) scores for receiver stations that were deployed consistently from 2022 to 2024.....	56
Table 7d – Summary of bluefin tuna annual residency index (RI) scores for receiver stations that were deployed consistently from 2022 to 2024.....	57
Table 7e – Summary of shortfin mako annual residency index (RI) scores for receiver stations that were deployed consistently from 2022 to 2024.....	58
Table 7f – Summary of shortfin mako annual residency index (RI) scores for receiver stations that were deployed consistently from 2022 to 2024.....	59
Table 7g – Summary of common thresher shark annual residency index (RI) scores for receiver stations that were deployed consistently from 2023 to 2024.....	60
Table 7h – Summary of common thresher shark annual residency index (RI) scores for receiver stations that were deployed consistently from 2022 to 2024.....	61

Table 7i – Summary of dusky shark annual residency index (RI) scores for receiver stations that were deployed consistently from 2022 to 2024.....	62
Table 7j – Summary of dusky shark annual residency index (RI) scores for receiver stations that were deployed consistently from 2022 to 2024.....	63
Table 7k – Summary of white marlin annual residency index (RI) scores for receiver stations that were deployed consistently from 2022 to 2024.....	64
Table 7l – Summary of yellowfin tuna annual residency index (RI) scores for receiver stations that were deployed consistently from 2022 to 2024.....	65
Table 7m – Summary of yellowfin tuna annual residency index (RI) scores for receiver stations that were deployed consistently from 2022 to 2024.....	66
Table 8 – Network density by species and year.....	67
Table 9a – Blue shark annual degree scores by receiver station from 2022 to 2024 generated from individual networks.....	68
Table 9b – Bluefin tuna annual degree scores by receiver station from 2022 to 2024 generated from individual networks.....	70
Table 9c – Shortfin mako annual degree scores by receiver station from 2022 to 2024 generated from individual networks.....	72
Table 10a – Blue shark annual strength scores by receiver station from 2022 to 2024 generated from individual networks.....	74
Table 10b – Bluefin tuna annual strength scores by receiver station from 2022 to 2024 generated from individual networks.....	76
Table 10c – Shortfin mako annual strength scores by receiver station from 2022 to 2024 generated from individual networks.....	78
Table 11 – Environmental conditions in which tagged species were detected/observed during the study period.....	80
Table 12 – Summary of the acoustic receiver stations that were impacted by offshore wind construction activity at each impact radius.....	81

Table 13 – Results of Welch’s t-test examining differences in residence duration (minutes) between the pre- and post-construction periods across all impacted receivers by impact radius.....	82
Table 14a – Summary of residences and residence duration (minutes) at 22 receiver stations impacted at a 3 km radius (from monopiles) by species between the pre- and post-construction periods.....	83
Table 14b – Summary of residences and residence duration (minutes) at 25 receiver stations impacted at a 5 km radius (from monopiles) by species between the pre- and post-construction periods.....	84
Table 14c – Summary of residences and residence duration (minutes) at 28 receiver stations impacted at an 8 km radius (from monopiles) by species between the pre- and post-construction periods.....	85
Table 15 – Results (p-values) of zero-inflated Wilcoxon Rank-Sum tests performed on residency index (RI) scores aggregated across all impacted receivers during the pre- and post-construction periods.....	86
Table 16a – Summary of residency index (RI) scores by receiver station and species at the 3 km impact radius.....	87
Table 16b – Summary of residency index (RI) scores by receiver station and species at the 5 km impact radius.....	88
Table 16c – Summary of residency index (RI) scores by receiver station and species at the 8 km impact radius.....	89
Table 17 – Summary of the percent of available individuals that were detected for each species during the pre- and post-construction period at each impact radius.....	90
Table 18 – Results (p-values) of zero-inflated Wilcoxon Rank-Sum tests run on residency index (RI) scores generated across individuals of each species at each impacted receiver station during the pre- and post-construction periods.....	91
Table 19 – Results (p-values) of zero-inflated Wilcoxon Rank-Sum tests run on network analysis degree and strength scores generated across all individuals of each species tracked during the pre- and post-construction periods.....	92

Table 20 – Results (p-values) of zero-inflated Wilcoxon Rank-Sum tests run on network analysis degree and strength scores generated across individuals of each species at each node/station during the pre- and post-construction periods.....	93
Table 21 – Network density by species for the pre- and post-construction periods.....	95
Table 22a – Blue shark degree and strength scores by receiver station during the pre- and post-construction period.....	96
Table 22b – Bluefin tuna degree and strength scores by receiver station during the pre- and post-construction period.....	98
Table 22c – Shortfin mako degree and strength scores by receiver station during the pre- and post-construction period.....	100
Table 23a – Summary of environmental conditions evident at receivers impacted at the 3 km impact radius during the pre- and post-construction periods.....	102
Table 23b – Summary of environmental conditions evident at receivers impacted at the 5 km impact radius during the pre- and post-construction periods.....	103
Table 23c – Summary of environmental conditions evident at receivers impacted at the 5 km impact radius during the pre- and post-construction periods.....	104
Table 24a – The percent of days on which suitable sea surface temperature (SST), bottom temperature (BT), and chlorophyll a (Chl) concentrations existed for each species at receivers impacted at the 3 km radius during the pre- and post-construction periods.....	105
Table 24b – The percent of days on which suitable sea surface temperature (SST), bottom temperature (BT), and chlorophyll a (Chl) concentrations existed for each species at receivers impacted at the 5 km radius during the pre- and post-construction periods.....	106
Table 24c – The percent of days on which suitable sea surface temperature (SST), bottom temperature (BT), and chlorophyll a (Chl) concentrations existed for each species at receivers impacted at the 8 km radius during the pre- and post-construction periods.....	107
Table 25 – Summary of detection data collected by the acoustic receiver array from animals that were tagged by other researchers as part of separate studies.....	108

List of Figures

Figure 1 - Map showing the locations of 70 acoustic receiver stations (colored triangles) deployed in the MA/RI wind energy area in 2024.....	105
Figure 2 – Recoverable and reusable mooring configurations used to deploy VEMCO VR2AR acoustic receivers.....	106
Figure 3 – Example of the approach used to classify individual acoustic receivers as being ‘impacted’ by offshore wind construction activity across three impact radii.....	107
Figure 4 – The relationship between construction impact distance (radius) and the percentage of monopiles that impacted a given number of receivers.....	108
Figure 5 – Locations of tagging relative to the lease areas for the 364 individuals tagged from 2020 to 2024.	
Figure 6 – Detection histories for 130 individuals that were monitored in 2024.....	110
Figure 7 – Detection histories of each species on each receiver station in 2024.....	111
Figure 8a – Map of annual blue shark residency index (RI) scores for individual receiver stations from 2022 to 2024.....	112
Figure 8b – Map of annual bluefin tuna residency index (RI) scores for individual receiver stations from 2022 to 2024.....	113
Figure 8c – Map of annual shortfin mako residency index (RI) scores for individual receiver stations from 2022 to 2024.....	114
Figure 8d – Map of annual dusky shark residency index (RI) scores for individual receiver stations from 2022 to 2024.....	115
Figure 8e – Map of annual common thresher shark residency index (RI) scores for individual receiver stations from 2023 to 2024.....	116
Figure 8f – Map of annual white marlin residency index (RI) scores for individual receiver stations from 2023 to 2024.....	117
Figure 8g – Map of annual yellowfin tuna residency index (RI) scores for individual receiver stations from 2022 to 2023.....	118
Figure 9a – Map of blue shark networks by year.....	119
Figure 9b – Map of bluefin tuna networks by year.....	120
Figure 9c – Map of shortfin mako networks by year.....	121

Figure 10a – Maps of blue shark node degree values derived from annual species-level networks.....	122
Figure 10b – Maps of bluefin tuna node degree values derived from annual species-level networks.....	123
Figure 10c – Maps of shortfin mako node degree values derived from annual species-level networks.....	124
Figure 11a – Maps of blue shark node standardized strength values derived from annual species-level networks.....	125
Figure 11b – Maps of bluefin tuna node standardized strength values derived from annual species-level networks.....	126
Figure 11c – Maps of shortfin mako node standardized strength values derived from annual species-level networks.....	127
Figure 12 – The proportion of detections obtained at 2-meter (m) depth intervals for each species that was tagged with V16P (pressure sensing) acoustic transmitters.....	128
Figure 13 – Kernel density plots demonstrating the range of environmental conditions in which each species was detected/observed from 2022 to 2024.....	129
Figure 14 – Bottom water temperature measured hourly at each VR2AR and VR2Tx receiver station in each year of the study.....	130
Figure 15 – Thermal stratification calculated hourly at each VR2AR and VR2Tx receiver station in each year of the study.....	131
Figure 16 – Hourly average ambient noise (in 69 kHz) recorded at each VR2AR and VR2Tx receiver station in each year of the study.	
Figure 17 – Boxplots of blue shark, bluefin tuna, and shortfin mako residence event duration across all impacted receiver stations and impact radii during the pre- and post-construction periods.....	133
Figure 18 – Boxplots of monthly residence event duration across all impacted receiver stations in relation to the cumulative number of monopiles installed across Revolution Wind, South Fork Wind, and Vineyard Wind 1.....	134
Figure 19 – Boxplots of blue shark, bluefin tuna, and shortfin mako non-zero residence index (RI) scores across all impacted receiver stations at each impact radii during the pre- and post-construction periods.....	135

Figure 20a – Map of blue shark, bluefin tuna, and shortfin mako residency index (RI) scores at receiver stations impacted at the 3 km radius during the pre- and post-construction periods.....	136
Figure 20b – Map of blue shark, bluefin tuna, and shortfin mako residency index (RI) scores at receiver stations impacted at the 5 km radius during the pre- and post-construction periods.....	137
Figure 20c – Map of blue shark, bluefin tuna, and shortfin mako residency index (RI) scores at receiver stations impacted at the 8 km radius during the pre- and post-construction periods.....	138
Figure 21a – Blue shark movement networks during the pre- and post-construction periods....	139
Figure 21b – Bluefin tuna movement networks during the pre- and post-construction periods.....	140
Figure 21c – Shortfin mako movement networks during the pre- and post-construction periods.....	141
Figure 22a – Histogram of the proportion of detections in the pre- and post-construction periods.....	142
Figure 22b – Histogram of the proportion of detections in the pre- and post-construction periods.....	143
Figure 22c – Histogram of the proportion of detections in the pre- and post-construction periods.....	144
Figure 23 – Boxplots of environmental conditions evident at all impacted receiver stations and impact radii during the pre- and post-construction periods.....	145

Executive summary

Spatiotemporal use of the SNE WEA by HMS was studied with passive acoustic telemetry via an array of acoustic receivers deployed in 2022 (n = 75 receivers), 2023 (n = 73 receivers), and 2024 (n = 70 receivers). A total of 364 acoustic transmitters were deployed on 11 species, including blue shark (n = 108), bluefin tuna (n = 122), common thresher shark (n = 11), dusky shark (n = 14), little tunny (n = 1), sandbar shark (n = 3), shortfin mako (n = 67), smooth hammerhead (n = 1), spinner shark (n = 2), white marlin (n = 4), and yellowfin tuna (n = 31) in and around the WEA during summer 2020 (n = 29), 2021 (n = 69), 2022 (n = 70), 2023 (n = 91), and 2024 (n = 105). From 2022 through 2024, 244 of the 364 total tagged individuals were detected by the receiver array, including 222 of the 304 individuals tagged by developer-funded efforts and 20 of the 60 individuals (4 blue sharks, 10 bluefin tuna, 5 shortfin mako, and 1 smooth hammerhead) tagged in 2020 and 2021 during a pilot study funded by the MACEC.

In 2024, HMS were present in the SNE WEA from May to December and were detected by all 69 recovered acoustic receivers; one receiver could not be recovered and was presumed lost. A total of 2,349 residence events were documented (130 transmitters detected) of duration from 1 to 2,283 minutes, with bluefin tuna, blue shark, and shortfin mako having the longest individual residences and mean residence durations of around 60 minutes. Residency index and network analysis revealed extensive movements, with presence at specific receiver stations varying within and among species. From 2022 to 2024 individuals were first detected by the acoustic array from 0.7 to 128.1 days after release during the year in which they were tagged, but some individuals were not detected by the array until 1 to 2 years after tagging. Rates of return to the SNE WEA acoustic receiver array varied annually and across species, with common thresher shark and dusky shark having the highest mean rate of return from 2021 to 2024 (~50%). The perpetual, prolonged use of the SNE WEA indicates the region's importance to multiple HMS.

The effects of offshore wind construction and wind farm operation on HMS spatial ecology were examined by comparing several metrics between the pre- (i.e., before the commencement of pile driving activity) and post- (i.e., after the commencement of pile driving activity and inclusive of operating turbines) construction periods. To assign acoustic detection data to a period, concentric circles with radii of 3, 5, and 8 km were drawn around the coordinates of each installed monopile, and individual acoustic receivers were designated as “impacted” if their location fell within the bounds of a given impact radius. Once a receiver was considered impacted at a given radius, it remained in that state indefinitely, and analyses were run to compare trends in residency and movements using the data it, as well as other impacted receivers, collected during each period. Overall, there were inconsistent trends in metrics between the pre- and post-construction periods, with some metrics indicating potential positive impacts (e.g., increased residency, longer residence duration, increased movement through a station/node in post-construction) and others suggesting adverse (e.g., decreased residency, shorter residence duration, decreased movement through a station/node in post-construction) or no impacts (i.e., similar results for each period). Impacts also varied by species as well as across the impact radii. The available data suggest that blue shark may have been adversely impacted, shortfin mako positively impacted, and bluefin tuna neutrally impacted, although these trends should be considered preliminary given the high degree of inter-annual variability in species' presence in the SNE region, which are likely modulated by environmental conditions more than localized offshore wind development activity. This project is ongoing and additional data collected in, at least, 2025 and 2026 will be added and analyzed in the next report. Conclusions presented herein should therefore be considered preliminary.

Background and justification

The offshore waters of southern New England (SNE) have long supported populations of highly migratory fish species (HMS; e.g., tunas, billfish, sharks) and many fisheries that target them. In addition to serving as a migratory corridor for numerous HMS (Galuardi and Lutcavage, 2012; Vaudo et al., 2016; Kohler and Turner, 2019), SNE is ecologically-important and contains essential fish habitat (i.e., the waters and substrate necessary for spawning, feeding, and growth to maturity) for at least 14 HMS, including albacore (*Thunnus alalunga*), bluefin tuna (*Thunnus thynnus*), skipjack tuna (*Katsuwonus pelamis*), yellowfin tuna (*Thunnus albacares*), basking shark (*Cetorhinus maximus*), blue shark (*Prionace glauca*), shortfin mako (*Isurus oxyrinchus*), common thresher shark (*Alopias vulpinus*), porbeagle (*Lamna nasus*), white shark (*Carcharodon carcharias*), dusky shark (*Carcharhinus obscurus*), sandbar shark (*Carcharhinus plumbeus*), tiger shark (*Galeocerdo cuvier*), and sand tiger shark (*Carcharias taurus*) (NMFS, 2015). SNE also contains historical fishing grounds for iconic species such as swordfish (*Xiphias gladius*), bluefin tuna, white marlin (*Kajikia albida*), and shortfin mako, supporting an extensive contemporary recreational fishery for HMS in which hundreds of vessels participate each year. Of interest, a proportion of this recreational fishing effort for HMS occurs within popular fishing areas that have been leased for offshore wind development (Kneebone and Capizzano, 2020).

Given the ecological importance of SNE to HMS and the economic value of HMS in SNE, there is a need to monitor the potential impacts of offshore wind development on these species as well as any associated impacts on the large, directed recreational fishery they support within the Rhode Island/Massachusetts and Massachusetts Wind Energy Area (WEA; Figure 1). At present, there is an incomplete understanding of how offshore wind development may impact recreational fishing activities (i.e., fishing methods, fishing locations, target species), including the extent to which fishing effort may be disrupted due to the displacement of target species or fishing vessels from popular areas that fall within the WEA (MADMF Research Priorities White Paper, November 2018). There is also an incomplete understanding of how offshore wind activities may affect species presence, persistence (i.e., residency), and movement/migration through the WEA. The goal of this study was to use acoustic telemetry to monitor the spatial ecology characteristics of tagged HMS within each lease area of the WEA and evaluate the impacts of turbine construction and operation on animal presence and movements within and throughout the area.

Objectives

The main objective of this project is to use passive acoustic telemetry to monitor the presence, persistence (residency), and movements of HMS in the WEA and to assess whether metrics quantifying these parameters change in response to offshore wind construction and operation activities. To accomplish the main objective, our specific objectives are to:

- (1) Work cooperatively with commercial fishermen to deploy and maintain an array of acoustic receivers to monitor the presence and persistence of tagged HMS within the WEA,

- (2) Conduct at-sea sampling trips with for-hire recreational charter fishermen and aboard research vessels to deploy acoustic transmitters on HMS that are captured or targeted by the recreational fishery in SNE, with particular focus on blue shark, bluefin tuna, and shortfin mako,
- (3) Analyze acoustic receiver “detection” data to investigate annual patterns in animal presence, persistence (residency), and movements in relation to (a) season and year and (b) environmental conditions,
- (4) Analyze acoustic receiver “detection” data to investigate patterns in animal presence, persistence (residency), and movements in relation to offshore wind construction and operations activity, and
- (5) Opportunistically monitor the presence of other acoustically tagged marine species within the acoustic receiver array and share data through the Atlantic Cooperative Telemetry (ACT) Network’s Mid-Atlantic Acoustic Telemetry Observation System (MATOS).

Methods

Acoustic monitoring (Objective 1)

VEMCO acoustic receivers (INNOVASEA Systems Inc., Halifax, Nova Scotia, Canada) were deployed to continuously monitor for the presence of tagged HMS at specific locations from 2020 through 2024. In 2020 and 2021, receivers ($n = 15$) were deployed at and near popular recreational fishing spots as part of a pilot study funded by the Massachusetts Clean Energy Center (MACEC) (see Gervelis and Kneebone, 2022 for details on deployment locations and deployment methods). Beginning in 2022, the project was expanded to include receiver deployments across the entire MA/RI WEA and included 75 total receivers in 2022, 73 total receivers in 2023, and 70 total receivers in 2024 (Table 1; Figure 1) deployed across Revolution Wind (OCS-A 0486), South Fork Wind (OCS-A 0517), Sunrise Wind (OCS-A 0487), Bay State Wind (OCS-A 0500), Vineyard Wind 1 (OCS-A 0501), New England Wind (OCS-A 0534, OCS-A 0561), Beacon Wind (OCS-A 0520), SouthCoast Wind (formerly Mayflower Wind; OCS-A 0521), and Vineyard Northeast (OCS-A 0522; also known as Vineyard Wind 2) (Figure 1). Receivers at stations REV_05, REV_07, REV_08, REV_10, REV_15, REV_16, and REV_17 were carried over from the MACEC pilot project (Gervelis and Kneebone, 2022) and therefore have been monitored annually from 2020 to 2024. Acoustic receiver deployment and maintenance occurred in two separate manners: (A) in cooperation with commercial fishing vessels from 2022 to 2024 and (B) in cooperation with the University of Massachusetts Dartmouth School for Marine Science and Technology (SMAST) from 2022 to 2023. Due to perpetual loss, receivers were not deployed at stations BW_01 and SRW_13 in 2023 or 2024, nor at stations MFW_01, 522_05, and 522_07 in 2024. Because of their inconsistent deployment and the need for consistent monitoring over multiple years to conduct meaningful analyses, no detection data were analyzed from any of these receivers prior to their removal from the array.

In (A), VEMCO VR2AR acoustic release receivers were deployed on the seafloor using a custom-designed pop-up mooring system (Mooring Systems, Inc., Bourne, MA) that could be reassembled and redeployed after being summoned to the surface (Figure 2). On-demand receivers with no vertical lines were used to avoid interactions with protected species and to minimize the potential

for interaction with developer activities (e.g., surveying and cable laying). Individual VR2AR receiver locations were selected to minimize potential interaction with commercial fishing gear, particularly mobile fishing gear, and to maximize the monitoring coverage of popular recreational fishing areas. Previously in 2020 and 2021, most receivers were placed on LORAN TD lines ending in “0” or “5” according to a longstanding, informal agreement within the fishing industry designed to minimize interaction between fixed and mobile fishing gear. Based on extensive receiver loss incurred in 2021 (which was assumed to be due to mobile gear interactions), input was sought from the commercial fishing fleet to identify specific areas where there was a lower probability of interaction with mobile fishing gear (i.e., “dragger hangs”). Where necessary, receivers were subsequently relocated to specific “hangs” in 2022 and deployed in those locations consistently for the duration of the project. Due to extensive corrosion of metal components, all receivers in Revolution Wind, South Fork Wind, and Sunrise Wind were hauled in early May 2023, outfitted with new hardware, and redeployed later in the month.

Receiver deployment intervals varied by lease. For Vineyard Wind 1, New England Wind, Beacon Wind, SouthCoast Wind, and Vineyard Northeast, receivers were deployed from roughly May/June to December each year and were hauled at the end of each season to prevent loss throughout the winter. For Revolution Wind, South Fork Wind, Sunrise Wind, and Bay State Wind, monitoring occurred year-round beginning in May/June 2022 due to collaboration on an Atlantic cod (*Gadus morhua*) study being conducted by SMAST. At each service, receivers were cleaned, downloaded, and installed with new batteries as needed. The locations of some acoustic receivers were adjusted slightly throughout the project period due to requests from the developers or prior interactions with commercial fishing gear and other offshore wind monitoring equipment. These relocations all occurred within the assumed detection range (~500 m) of the acoustic receiver’s initial deployment location and, thus, did not represent a significant disruption to the ability to monitor tagged HMS at the spatial scale necessary to achieve the monitoring objectives.

In (B), VR2W and VR2Tx acoustic receivers were deployed by SMAST in the Revolution Wind, South Fork Wind, and Sunrise Wind leases for the aforementioned Atlantic cod study. Upon removal of these SMAST receivers in early 2023, three VR2AR stations originally deployed in 2022 (REV_18, SF_01, and SRW_10) were relocated to maintain coverage at the stations vacated by the SMAST receivers (see Kneebone et al., 2025). Continuing to monitor at the vacated SMAST stations was deemed a higher priority than monitoring at the station in which the receiver was originally deployed in 2022. Detection data from SMAST receivers deployed at these three stations in 2022 were used for analyses.

Environmental monitoring

In addition to logging “detections” from acoustic transmitters, VR2AR and VR2Tx acoustic receivers recorded average ambient noise (mV at 69 kHz), water temperature (°C), tilt angle (degrees), and depth (m; VR2AR only) every hour throughout their deployment. For VR2Tx acoustic receivers, local depth was estimated using the ETOPO 2022 15 Arc-Second Global Relief Model database (NOAA National Centers for Environmental Information, 2022) queried via the R package *marmap* (Pante and Simon-Bouhet, 2013).

Acoustic receiver detection range testing

Acoustic receiver range testing was conducted at stations 501_02 (7/17/2023), REV_18 (10/25/2023), and 534_01 (9/27/2024) to estimate the radial distance from the receiver at which V16 transmitters could be detected. During range testing, two V16-4H transmitters [fixed nominal delay = 60 seconds (s)] were secured to a vertical line that was anchored to the bottom, with one transmitter positioned around 6 meters (m) off the bottom and the other around 6 m from the surface. This configuration was used to evaluate detection range both below and above the thermocline, respectively. The mooring line with attached transmitters was deployed at a series of fixed distances from the receiver (501_02: 250, 500, 750, 1000 m; REV_18 and 534_01: 100, 250, 500, 750 m) and left in place for a period of up to one hour at each distance. The time of deployment and removal was noted at each distance. Upon receiver download, the number of detections logged independently by both the surface and bottom transmitters during the deployment period was divided by the total number of possible detections during the period (e.g., 1-hour deployment = 60 transmissions) to calculate the percentage of detections logged at each distance interval and respective position in the water column. The percentage of detections logged at each distance was then plotted and “detection range” was interpolated at the distance at which 50% of the possible detections were received.

Acoustic tagging (Objective 2)

VEMCO acoustic transmitters (INNOVASEA Systems Inc., Halifax, Nova Scotia, Canada) were deployed on individual HMS during for-hire trips aboard charter sportfishing vessels and during dedicated trips on research vessels in July to August of 2020 and 2021 and June to October of 2022, 2023, and 2024. Sixty of these transmitters were deployed (during 2020 and 2021) as part of a pilot study funded by the MACEC (Gervelis and Kneebone, 2022). The location of fishing/sampling during each trip was selected based on the target species and fishing method, and efforts were made to tag individuals with transmitters within or as close to the WEA as possible. HMS were captured on hook-and-line (rod-and-reel) fishing gear using standard recreational sportfishing techniques or tagged while free swimming. All capture and tagging activities were approved by the New England Aquarium’s Institutional Animal Care and Use Committee (protocol #2020-07 and 2023-04) and scientific research permits (SRP) HMS-SRP-21-33 (2021), HMS-SRP-22-34 (2022), HMS-SRP-23-31 (2023), and HMS-SRP-24-26 (2024) issued by the NOAA HMS Management Division.

Internal tagging

Acoustic transmitters [models V16-4H: 16 mm diameter; nominal transmission delay = 60 – 120 s and 80 – 160 s; expected longevity = 1,975 – 2,435 days (d); and V16P-4H: 16 mm diameter; nominal transmission delay = 40 – 80 s; expected longevity = 1,222 – 1,266 d; maximum depth = 204 m; accuracy = ± 10 m; resolution = 0.9 m] were surgically implanted into tunas and sharks using standard techniques. Pressure sensing (V16P) transmitters encoded the swimming depth of the tagged animal at the time of the acoustic transmission, thereby permitting the monitoring of depth distribution and vertical movements. Tunas were brought aboard the vessel using a knotless, rubber dip net and placed on their side on a cool, wet, rubber mat. A wet towel was also placed over the eyes to calm the fish during the procedure. The vessel’s raw seawater deck hose was then positioned anterior to the mouth or above the gill arch opening to deliver ambient seawater to the gills during surgery. Upon retrieval to the side of the vessel, sharks that could safely be handled were tail roped and secured by applying pressure to the tail rope and leader on which they were caught. The sharks were then placed in tonic immobility alongside the vessel, with the head and

gills always remaining in the water. Once the animals were secured, a local anesthetic (lidocaine; dose = 2 mg kg⁻¹) was administered subcutaneously and allowed to react 1 minute before incising. Using a fresh scalpel, an initial incision was made traversing only the dermis, and a 15-mm trocar was used to penetrate the body cavity. The acoustic transmitter was then inserted, and the wound was closed with one to three interrupted, monofilament, absorbable sutures. For tunas, the fork length (FL) was measured (cm) from the tip of the snout to the fork in the tail over the body prior to the animal being released. For sharks, the FL was estimated, and sex determinations were made via the presence/absence of claspers (male). All surgical tools and acoustic transmitters were disinfected and rinsed with freshwater prior to surgery/implantation.

External tagging

Acoustic transmitters (model V16-4H; 16 mm diameter; nominal transmission delay = 40 – 80 and 80 – 160 s; expected longevity = 1,365 – 2,435 d) were externally attached to larger tunas, sharks, and marlin. External V16-4H transmitters were encapsulated in a polyvinyl chloride “shark” case and were rigged with multi-strand stainless cable covered in heat shrink tubing and a titanium anchor (Jepsen et al., 2015). The overall length of the tether ranged from 8 to 15 cm and was scaled based on the size of the animal to be tagged. During tagging, fish were brought alongside the vessel, and the tag was applied in the dorsal musculature using a tagging pole equipped with a stainless-steel applicator needle. Following tagging, the FL of the fish was estimated, the sex was noted for sharks, and the hook was either removed or cut in half using bolt cutters. Blue sharks, shortfin mako, and white marlin were also tagged while they were free swimming next to the tagging vessel; FL was estimated for each of these individuals, and sex was assessed via visual observation of claspers when possible (sharks only).

Data analysis (Objective 3)

Raw acoustic detections and archived environmental data downloaded from acoustic receivers were compiled into a database for analysis. Due to high mobility of HMS and the relatively large distance between individual acoustic receivers, single detection events were considered valid and retained for analysis. All analyses were performed in R (version 4.5.1; R Core Team, 2025), primarily with base *stats* and *tidyverse* packages (Wickham et al., 2019). All maps were created using the *sf* (Pebesma, 2018) package. Statistical significance was accepted at $p < 0.05$.

Presence and persistence (residency)

To evaluate the presence and persistence of tagged HMS at each acoustic receiver station, detection histories were compiled for each transmitter and then plotted to visually demonstrate the presence of each individual, and all tagged species, over time and in relation to acoustic receiver stations. Detection histories were then partitioned into residence events, which represent instances when an individual was detected at least once at a given receiver station. Residence events ended when the individual was not detected (i.e., absent from that receiver) for at least 24 hours or if that individual was detected on another receiver, whichever occurred first. To examine the amount of time individuals were detected during a residence event, the duration of each residence was calculated as the time between the first and last detection. The total number and duration of residence events were summarized by species for each year.

To examine the overall period of detection in each year, the dates of first and last observation (detection) were noted for each species. Since all acoustic transmitters had battery lives exceeding 3.5 years, annual rates of return to the SNE WEA were calculated for all species for which individuals were detected in years after tagging. In each year and for each species, detection data were isolated for only returning fish, and return rate was calculated by dividing the total number of detected animals by the cumulative number of active transmitters (i.e., with non-expired batteries) that were deployed on that species across the previous years of the study (i.e., since 2020) minus any transmitters that were known to no longer be at large due to tag shedding, recapture (and harvest), or post-release mortality.

Patterns in residence at each receiver station in the WEA during June 1 through November 30 (i.e., the peak period of HMS activity in SNE) of 2022 to 2024 were assessed by species using an annual residency index (RI). For the period of June 1 to November 30 in each year, an annual RI score was calculated at each station for all available individuals, where availability is defined as detection on any station in the array during that period. The following equation was used where i is the unique detected individual, r is the unique receiver station, y is the year, f is the calendar date i was first detected at any receiver station in the array in y , and l is the calendar date i 's species was last detected at any receiver station in the array in y :

$$RI_{station} = \frac{\text{\# of calendar days } i \text{ detected on } r \text{ from } f \text{ to } l \text{ in } y}{\text{\# of calendar days } r \text{ deployed from } f \text{ to } l \text{ in } y}$$

To mitigate inflation of the annual RI score by individuals that visited the receiver array for brief periods near the end of their species' seasonal presence in the SNE region, individuals that were first detected within 30 days of the end of the deployment of r within f to l were excluded from annual RI calculations. Similarly, individuals were also excluded if their availability for detection based on the deployment of r within f to l was truncated to fewer than 30 days due to tag shedding or mortality. When a species' last detection occurred after November 30, l was assigned as November 30. RI values were multiplied by 100 to prevent comparison of small decimal values and thus could range from 0 (i not detected by r in y) to 100 (i detected by r every day r was deployed in y). Individual RI scores were averaged to generate species-specific scores for each receiver station in each year; the maximum and mean RI score and standard deviation (SD) were also calculated for each station. To examine the relative number of individuals detected by each receiver station from 2022 to 2024, the total number of tagged individuals detected (D) at r was also determined along with the total number of individuals that were available for detection (A) when r was deployed. Individuals were considered available for detection if they were detected by any receivers throughout the entire array during the time when r was deployed. To maintain consistency with the RI calculations, individuals were removed from counts of both D and A if they were available for detection for less than 30 days in y . The ratio of D to A was also calculated to assess the percentage of available fish that were detected. Spatial maps of mean annual RI and D/A (%) were created to graphically display patterns across all years and species.

Movement patterns (network analysis)

Network analysis was employed to describe occupancy and connectivity of tagged HMS among acoustic receiver stations (hereafter also referred to as "nodes") throughout the WEA and to assess shifts in transit and activity centers over time (annually) and in relation to the onset of construction

activity. Movement networks were created with the *igraph* package in R (v2.3.1, Csardi and Nepusz, 2006) using detection data obtained during the period of June 1 to November 30 for the three species with the greatest number of tagged individuals and amount of detection data (blue shark, bluefin tuna, and shortfin mako). To maximize effective comparison of networks, data were only used from stations that were present for the entire deployment period from 2022 to 2024 (n = 67). In each year, individual networks were created for each detected animal, and species-level networks were created using detection data aggregated across all detected individuals of a species.

For all networks, “edges” between nodes were created when sequential detections at two different receiver stations occurred within 72 hours. This time step was selected based on the duration of residence events documented by this study as well as the anticipated movement rates of the tagged species and the overall area of the acoustic receiver array (Gervelis and Kneebone, 2022). Edges were then weighted to reflect the number of unique transmitters that traveled between nodes (species-level networks) or the number of times an animal used that edge (individual networks) to highlight areas of high traffic in the network. In addition to creating network overviews of movement, network metrics of density, degree, and strength were calculated for each species using functions within the *igraph* package and in base R (v4.5.1).

Network density was calculated by dividing the total number of existing edges between nodes by the number of possible edges (i.e., if all nodes with detections were connected to all other nodes with detections, excluding self-connections). The resulting proportion is a measure of network utilization, with lower densities associated with more localized movements and higher densities associated with broader use of the potential network (Farine and Whitehead, 2015). Strength was calculated for each node as the sum of the weights of immediate (i.e., directly connected) inbound edges and is a measure of connectivity with adjacent nodes (Farine and Whitehead, 2015). To account for differences in the number of transmitters that formed species-level networks in each year, strength values at each node were standardized by dividing by the total number of transmitters that formed edges to each node, defined as “standardized strength.” Strength values were not standardized for individual networks as edges were formed only by the movements of the individual in question. Degree is the total number of direct inbound connections that a node has to other nodes in the network without factoring in edge weight. Well-connected nodes will have higher degree values and may act as a hub for movement in the network or possibly function as an area of greater general activity (Farine and Whitehead, 2015). Together, degree and strength can indicate centers of travel or activity within a network.

To qualitatively compare movements of each species through each node, the maximum, mean, and SD of degree and strength values were calculated across all individual networks. The results of species-level networks were then mapped to visually assess general trends or shifts in node usage between years for each species.

Depth distribution

The distribution of swimming depth at the time of detection was examined for each species tagged with V16P transmitters. Histograms were constructed to describe the proportions of detections logged within 2 m depth bins from the surface (0 m) to the maximum swimming depth (78 m) observed over all tagged species. The percentage of total detections that occurred at specific depth intervals was qualitatively compared to examine trends.

Environmental conditions

To establish the environmental conditions under which HMS were present in the study area, bottom water temperature (°C), sea surface temperature (SST, °C), and surface chlorophyll-a concentration (mg/m³) were identified or estimated at the time and location of each acoustic detection. Bottom water temperature data were sourced from the hourly water temperature data measured and logged by each VR2AR or VR2Tx acoustic receiver. Each detection was assigned a bottom temperature that was measured at the nearest hour interval by the detecting receiver. Daily Multi-scale Ultra-high Resolution (MUR) SST Analysis fv04.1 data (jplMURSST41) at 0.01° (decimal degrees) resolution provided by NASA JPL under support from NASA MEaSUREs program were downloaded using the *rerddap* package (Chamberlain, 2021), and an SST was assigned to each detection based on the SST interpolated at the location of the detecting receiver on that calendar date. To examine animal presence in relation to thermal stratification, the difference between the bottom water temperature and SST was calculated (ΔT) at the time of each detection. Chlorophyll a data were obtained from the NOAA NESDIS Ocean Color Science Team and the NOAA CoastWatch program (noaacwNPPN20S3ASCIDINEOF2kmDaily gap filled at 2 km resolution; <https://coastwatch.noaa.gov>) accessed via *rerddap*. Kernel density plots were created using the *geom_density* function in package *ggplot2* (Wickham, 2016) to describe the range of environmental conditions in which each species was detected over the study period. Hourly data for bottom water temperature, thermal stratification, and ambient noise were also plotted across the deployment period(s) of each receiver to demonstrate the complete range of environmental conditions encountered in the WEA throughout each year.

Impact of offshore wind construction activities (Objective 4)

To begin to assess the effect of offshore wind construction and operations activities on HMS presence and movements, data were obtained from relevant developers detailing the timeline of construction activities that occurred from 2022 to 2024. For each turbine/monopile, requested information included the latitude and longitude coordinates (decimal degrees), timestamps of the start and end of scour setting, timestamps of the start and end of monopile pile driving, and the date of turbine completion (i.e., the date when no further construction occurred and the turbine was operationalized). During 2023 and 2024, construction occurred in Revolution Wind, South Fork Wind, and Vineyard Wind 1, with South Fork Wind being fully operational in 2024 while active construction occurred in the other lease areas. Because of the proximity of South Fork Wind and Revolution Wind, it is possible that active construction in Revolution Wind influenced animal presence in (the already operationalized) South Fork Wind. Thus, it was not practical to conduct analyses to examine pre-construction (baseline), during construction, and post-construction periods at a regional level. Furthermore, preliminary analyses aimed at investigating short-term impacts of active piledriving on HMS presence revealed the existence of very limited detection data collected during or immediately prior to or after (i.e., hours) individual piledriving events, and therefore a very limited capacity to adequately investigate trends. In light of these collective issues, analyses in this report were constructed to compare only between two time periods, “pre-construction”, which is prior to the occurrence of any pile driving activity, and “post-construction”, which is inclusive of times of both active construction and the existence of operationalized turbines. Accordingly, acoustic detection data were assigned as being collected during the pre- or post-construction period based on when they were collected relative to the time the detecting receiver became “impacted” by construction activities.

It should be noted that geophysical (e.g., sonar mapping) and geotechnical (e.g., sediment coring) surveying as well as scour laying were not considered when designating impact status and the establishment of the pre- and post-construction periods. Geo-survey techniques vary in design and spatiotemporal scope (i.e., some surveys focus on small areas for long durations whereas others survey broad areas with mobile vessels), thus, it would have been difficult to track the occurrence of such activities let alone determine at what distance they may impact HMS. Furthermore, scour setting is a brief activity usually accomplished in a few hours that can be performed using multiple techniques and may be performed either before or after pile driving. Taken together, since geo-surveying and scour setting activities occurred intermittently and did not result in the creation of structures that would typically be encountered by pelagic fishes (i.e., pelagic fishes typically don't spend prolonged periods on the bottom), accounting for their effects would have been difficult, especially considering the amount of acoustic detection data available for analysis. In contrast, pile driving was conducted in a similar manner across all lease areas and resulted in the establishment of a fixed structure that spanned throughout the water column (i.e., where HMS typically occur), which together created a more appropriate and consistent framework by which to assess impacts on HMS. Lastly, an evaluation of the impacts of geo-surveying would have necessitated the commencement of monitoring years before this project began to permit the documentation of HMS presence and persistence before the onset of any form of offshore wind development activity.

There is a dearth of information on the spatiotemporal effects of offshore wind development on HMS movements (McCandless et al., 2023). For example, the distance at which individuals of a species become impacted by a stimulus emanating from offshore wind construction, which could include pile driving, localized construction activities (e.g., vessel noise), electromagnetic fields, or the physical existence of a turbine monopile, is unknown and likely varies across species. In the absence of empirically derived (finite) distances at which to measure impacts, analyses were constructed to 1) determine if impact distances could be identified using telemetry data and 2) evaluate if residency patterns changed coincident with offshore wind construction activities at fixed impact distances. For both 1 and 2, raw detection data for blue shark, bluefin tuna, and shortfin mako (i.e., the species for which the most detection data were available) from each receiver dating back to its initial deployment were first classified as either pre-construction or post-construction based on where and when they occurred in relation to construction activities. Note that for nine receiver stations (REV_05, REV_07, REV_08, REV_10, REV_15, REV_16, REV_17, REV_18, SF_01), detection data from 2020 to 2024 were used; data from 2022 to 2024 were used for all other receivers. To examine impact distance, concentric circles with radii ranging from 1 to 10 km were drawn at 1 km intervals around the coordinates of each installed monopile to create 10 distinct impact zones. Next, individual acoustic receiver locations were plotted relative to the spatial extent of each impact zone, and a receiver was assigned as being impacted if its deployment location fell within the bounds of a given impact zone (e.g., Figure 3). For impacted receivers (i.e., those that were impacted at some point during their deployment history from 2020 to 2024), the period of impact was considered to have commenced at the date and time of the first pile driving event. Once a receiver was considered impacted at a given radius, it remained in that state indefinitely (i.e., all subsequent detections were assigned as post-construction). Pre-construction data included all data accrued up to the date and time when the receiver was designated as being impacted.

Preliminary analyses revealed a positive relationship between impact zone radius (hereafter “impact radius”) and the number of receivers that were impacted per monopile installation event

(Figure 4). Both the 1 and 2 km impact radii yielded data from only 1 to 2 receivers (median ~1) per monopile installation event, which was deemed insufficient to execute a robust, statistical comparison between pre-construction (unimpacted) and post-construction (impacted) periods. Accordingly, to assess potential impacts of construction activity across a gradient of distances, impact radii of 3, 5, and 8 km were selected based on the amount of data available for analysis at each increment; 3 km was the smallest impact radius at which >25% of monopiles impacted two or more receivers, 5 km was the smallest impact radius at which individual monopile installation activity impacted five or more receivers, and 8 km was the smallest impact radius at which >10 receivers were impacted by individual monopile installation activity (Figure 4).

Presence and persistence (residency)

To investigate differences in residence event duration between the pre- and post-construction periods at each impact radius, individual blue shark, bluefin tuna, and shortfin mako residence events occurring at impacted receivers were assigned to a specific period of occurrence. All residence events that ended prior to the date and time when a receiver station was first impacted were classified as pre-construction while all residence events occurring on or after the time of first impact were classified as post-construction. For each species and at each impact radius, summary statistics of residence duration were calculated across all impacted receivers as well as individually for each impacted receiver for both the pre- and post-construction periods. Welch's t-tests were then used to test for differences between pre- and post-construction residence durations for individual receivers that had three or more residence events in both periods. To examine cumulative impacts of monopile installation on residence duration, monthly boxplots of residence event duration were plotted in relation to the cumulative number of monopiles (i.e., turbines and sub-stations) installed by month over the period of June 2022 to December 2024 across Revolution Wind, South Fork Wind, and Vineyard Wind 1.

For each impact radius, an RI score was calculated for each individual that was available for detection by an impacted receiver station during the pre- and post-construction periods using a similar approach as was used to calculate annual RI. The following equation was used where r is the unique receiver, i is the unique individual that was available for detection >30 days in p , and p is the phase of construction (pre or post):

$$RI_{station} = \frac{\text{\# of calendar days } i \text{ detected on } r \text{ during } p}{\text{\# of calendar days } r \text{ deployed while } i \text{ was available for detection during } p}$$

In instances when r was monitored during both pre- and post-construction periods in a given year, calendar dates of first detection of i in the array were established separately for each period to account for the possibility that commencement of construction influenced the presence (and therefore availability) of tagged individuals in the area. The calendar date of last detection of i 's species in the array remained as the last overall detection date of that species from June 1 to November 30 in the given year regardless of impact designation; in instances in which the last detection occurred after the end of the pre-construction period (i.e., during the post-construction period), the availability of i extended until the last day of the pre-construction period. Results were reported for only those stations with both pre- and post-construction periods in their deployments; however, detections from all stations (i.e., including stations with only pre-construction periods in

their deployments) were used to determine availability and were incorporated into calculations of the first and last detection dates.

Zero-inflated Wilcoxon Rank-Sum tests were applied to aggregated individual RI scores across all impacted receivers as well as for each individual impacted receiver station to test differences between the pre- and post-construction periods. Separate tests were run for each species and at each impact radius using the *ZIR* package (Wang and Chen, 2015) in R. To further compare pre- and post-construction RI scores at each station and across all impacted stations, their mean, maximum, and SD were calculated across all available individuals. The number of tagged individuals detected at an impacted receiver station (D), the total number of individuals that were available for detection when the station was deployed (A), and the ratio of D to A was also calculated for each receiver station. For each species and at each impact radius, Welch's t-tests were used to investigate whether the ratio of D to A significantly differed across all impacted receivers between the pre- and post-construction periods.

Movement patterns (network analysis)

To investigate differences in movement networks coincident with the onset of construction activity, multiple networks were created for the pre- and post-construction periods by partitioning raw detection data based on the time of their occurrence relative to when construction began (see previous paragraphs). However, unlike the residence events and RI analyses (in which impacted status was determined at the receiver level), the post-construction network commenced when the first station/node was impacted by construction on June 6, 2023. All detection data obtained after this date were therefore included in the "impacted" network. This classification scheme was necessary since network analysis describes the interaction across all nodes; thus, once one node is impacted, the entire network is influenced by that change in status.

To evaluate differences in HMS movements between the periods, two types of networks were created. First, species-level networks were constructed for blue shark, bluefin tuna, and shortfin mako for both the pre- and post-construction period wherein the movements of all individuals of a species within each period were analyzed in aggregate. Species-level networks were subsequently compared to examine general trends between the periods, particularly network density. Second, individual networks were created for all individuals of a species that were tracked during each period. Individual networks yielded degree and strength scores for all 67 nodes in the network, which were then aggregated by period to examine trends. Once individual network metrics of degree and strength were calculated for each node, a series of tests were run to examine the distribution of the metric data (excluding network density because it is a singular value) for each species by impact period using boxplots and the Shapiro-Wilks test. The Brown-Forsythe test was then used to assess significant differences between each metric's distributions of variance between impact periods. Because stations were not all paired between periods (i.e., not all stations had detections for a given species each period), and distributions and variance for all but a few metrics were non-normal, a two-tailed zero-inflated Wilcoxon Rank-Sum test was used to compare the distribution of metric values and determine if a significant difference occurred between impact periods for each species.

Depth distribution

The swimming depth data from blue sharks, bluefin tuna, and shortfin mako tagged with V16P transmitters were separated into pre- and post-construction periods for each of the 3 km, 5 km, and 8 km impact radii and binned at the same 2 m depths to construct histograms of the proportions of detections at each depth interval within each impact period. Like the RI analysis, only data from stations that were deployed during both the pre- and post-construction periods were utilized. The resulting distributions were qualitatively assessed to determine any trends and/or shifts in swimming depth throughout the water column between the pre- and post-construction periods for each species.

Environmental conditions

To investigate whether environmental conditions in the SNE WEA may have influenced blue shark, bluefin tuna, and shortfin mako presence and persistence during the pre- and post-construction periods, the conditions evident at each impacted receiver station were compiled for each calendar date that a receiver was deployed. For each impacted receiver, a sea surface temperature and chlorophyll a concentration were assigned to each day of monitoring, while hourly bottom temperature and average noise data collected by each receiver were compiled across all days of monitoring from June 1 to November 30 of each year. For each condition metric, data were then aggregated into the pre- and post-construction periods based on the date when each receiver was first impacted at each impact radius, and summary statistics (i.e., minimum, maximum, median, mean, and SD) were calculated for each period. Summary statistics were then compared qualitatively to assess differences in habitat suitability between the periods. In addition, habitat suitability for each species at each receiver station in each period was assessed by calculating the percentage of calendar days in each period during which SST, bottom temperature, and chlorophyll a concentrations were “suitable” for each species. Suitability was defined as the range (i.e., minimum to maximum) of conditions in which each species was observed throughout the duration of the study (i.e., range of conditions linked to each detection collected for each species from 2020 to 2024; see Table 11). Percentages were calculated as the cumulative number of days in which suitable conditions existed divided by the cumulative number of days the receiver was deployed in each period. Percentages were then compared between the pre- and post-construction periods to assess whether differences in habitat suitability may have influenced apparent trends in residency (i.e., RI, residence duration) and movement data.

Data sharing (Objective 5)

Metadata from deployed acoustic receivers and raw acoustic detection data downloaded from receivers were uploaded to the ACT Network’s MATOS data sharing portal periodically as permitted by data sharing agreements signed by individual developers. Detection data generated from the WEA acoustic receiver array for transmitters not deployed by this project were linked to their owners, and the species to which the transmitter was affixed was determined when possible. The total number of transmitters detected as well as the total number of detections was then tabulated for each detected species.

Results

Results in this section are largely reported relative to the 2024 monitoring season. Detailed results from 2022 and 2023 can be found in Kneebone et al. (2025), which may vary compared to the

methodology and results outlined in the present report (e.g., formulation of the RI calculation). In some sections, results from 2022, 2023, and 2024 are presented to describe and compare general patterns across species and years. Results relative to impacts of offshore wind construction activity are presented in a distinct sub-section. Due to the low number of individuals that were tagged/monitored throughout the study, data from little tunny, sandbar shark, smooth hammerhead, and spinner shark were not analyzed.

Acoustic receiver deployments and maintenance in 2024 (Objective 1)

In 2024, VR2AR receivers at 69 of the 70 stations were recovered and downloaded (Table 1). The receiver at REV_14 was unable to be recovered during the April download trip, and a replacement receiver was deployed on site at that time. One receiver at 522_02 was not present during the December recovery trip and presumed lost.

Range testing

Results of range testing at station 534_01 indicated that detection range (i.e., the radial distance at which there is 50% probability of detection) was larger for the transmitter positioned near the bottom (>750 m) than for the transmitter positioned at the surface (~500 m), a trend opposite to what was evident in two previous range tests conducted at stations 501_02 and REV_18 (Table 2). Detection range at station 534_01 at both the surface and bottom was also considerably larger than what was evident at stations 501_02 and REV_18. During range tests, thermoclines were respectively strong and moderate at stations 501_02 (11.2 °C difference between surface and bottom temperatures) and 534_01 (4.0 °C difference between surface and bottom temperatures), while the water column was well mixed at REV_18 (0.7 °C difference between surface and bottom temperatures). Noise levels were also comparable at 501_02 and REV_18 during testing but were lower at 534_01.

Acoustic tagging in 2024 (Objective 2)

A total of 105 acoustic transmitters were deployed on blue sharks (n = 22), bluefin tuna (n = 52), common thresher sharks (n = 8), dusky sharks (n = 2), shortfin mako (n = 17), and white marlin (n = 4) during 2024 (Figure 5). A summary of metadata for all 364 transmitter deployments from 2020 to 2024, including those deployed for the MACEC project, can be found in Table 3. A bluefin tuna tagged in 2024 was caught and kept by an angler 11 days after tagging on August 15, 2024; detection data from this fish prior to its recapture were included in analyses when appropriate.

Data analysis (Objective 3)

Tagged HMS were detected by all recovered receivers in 2024 (n = 69). In the 2024 monitoring season, bluefin tuna were detected between May 22 and January 2 (2025), blue shark between June 10 and October 27, common thresher shark between July 7 and December 10, dusky shark between June 30 and September 22, shortfin mako between June 9 and November 30, white marlin between August 14 and October 7, and yellowfin tuna between September 1 and September 12 (Table 4; Figures 6 & 7). A total of 2,349 residence events were documented (130 transmitters detected) of duration from 1 to 2,283 minutes (Table 5). Bluefin tuna, blue shark, and shortfin mako yielded the longest maximum residence durations, with comparable mean residence times; dusky sharks and yellowfin tuna exhibited the longest and shortest mean residence durations,

respectively. Sandbar shark, smooth hammerhead, spinner shark, and little tunny tagged by this project in previous years were not detected in 2024.

Of the 364 HMS tagged from 2020 to 2024, 244 (67%) individuals were detected by the receiver array (52,711 total detections) including 87 individuals in 2022 (16,873 detections), 102 individuals in 2023 (14,821 detections), and 130 individuals in 2024 (21,017 detections) when the full regional receiver array was deployed. Of the 118 HMS transmitters that were not detected from 2022 through 2024 (accounting for the single common thresher shark that experienced post-release mortality in 2022), 65 (55%; including 28 blue sharks, 26 bluefin tuna, 1 dusky shark, 2 sandbar sharks, 6 shortfin mako, and 2 yellowfin tuna) were detected either by the pilot MACEC study in 2020 or 2021 ($n = 39$) or by acoustic receivers in the ACT Network whose data were shared from 2020 to 2025 ($n = 26$). Forty-eight transmitters (13%) were not detected at any point in time (5 blue sharks, 22 bluefin tuna, 1 dusky shark, 8 shortfin mako, 11 yellowfin tuna, and 1 white marlin). A large percentage of transmitters were detected in the year they were deployed, including 56 of 70 (80%) deployed in 2022, 69 of 91 (76%) deployed in 2023, and 78 of 105 (74%) deployed in 2024.

Individuals tagged from 2022 to 2024 were first detected from 0.7 to 128.1 (median = 2.9, mean $\pm$ SD: 14.1 ± 18.6) days after release during the year in which they were tagged, with numerous individuals not detected for 1 to 2 years after tagging. For example, two yellowfin tuna tagged in 2022 were not detected until 2023, 343 and 359 d after tagging. Thirty-six individuals representing 22 bluefin tuna, 1 common thresher shark, 2 dusky sharks, 10 shortfin mako, and 1 yellowfin tuna tagged in 2023 were not detected until 2024 after being at large for 284 to 485 d. A single blue shark tagged in 2022 was not detected until 2024, 669 d post-tagging. Accounting for known incidences of recapture ($n = 1$ yellowfin tuna; 1 bluefin tuna) and/or tag shedding or mortality ($n = 1$ blue shark, $n = 1$ shortfin mako, $n = 1$ common thresher shark), annual rates of return to the SNE WEA receiver array varied by species and year with the common thresher shark having the highest mean rate of return across all years (50%; albeit based on only one year of monitoring) followed by dusky shark (mean $\pm$ SD: $47.2 \pm 4.8\%$), bluefin tuna ($27.8 \pm 11.4\%$), shortfin mako ($22.2 \pm 9.9\%$), blue shark ($19.1 \pm 10.4\%$), and yellowfin tuna ($18.3 \pm 21.2\%$) (Table 6).

Residency index (RI)

From 2022 to 2024, annual RI values varied widely both within and among species, with individual receiver stations detecting from 0 to 100% of the tagged individuals of a species that were available for detection in a given year (Tables 7a-m; Figures 8a-g). Due to the nature in which annual RI was calculated for each species (i.e., when the species was available/present in the region), intra-specific comparisons of annual RI are more appropriate than inter-specific comparisons. Thus, results are presented only on inter-annual trends specific to each species.

Blue sharks exhibited somewhat consistent patterns of space use across years, with residence events occurring at nearly all receiver stations in each year (Tables 7a, 7b; Figure 8a). The highest RI scores occurred at receivers in Vineyard Wind 1 in 2022 and 2023 but not in 2024, when RI scores were highest in Revolution Wind. A similar pattern was also evident in the percentage of available blue sharks that were detected at each station. Bluefin tuna were generally distributed throughout the entire WEA in each year but were present at considerably more receiver stations in 2023 and 2024 compared to 2022 (Tables 7c, 7d; Figure 8b). In 2022, the magnitude of bluefin tuna RI scores were somewhat evenly distributed across receiver stations, but the highest RI scores

and percentages of available transmitters detected occurred at receivers south and east of Revolution Wind. In 2023 and 2024, bluefin tuna residences occurred at every receiver station with slightly higher RI scores and greater percentages of available fish detected in Sunrise Wind, South Fork Wind, and Revolution Wind in 2023, and in Vineyard Wind 1, New England Wind, Beacon Wind, and SouthCoast Wind in 2024. Shortfin mako were detected at nearly all receiver stations in each year (Tables 7e, 7f; Figure 8c). In general, annual RI scores and percentages of available transmitters detected were highest in Revolution Wind and Sunrise Wind in each year. For common thresher sharks, both the number of stations visited and RI scores increased from 2023 to 2024 (likely due to a greater number of tag deployments in 2024), with higher RI scores occurring at receiver stations in Revolution Wind in 2024 (Tables 7g, 7h; Figure 8e). Dusky sharks were detected by most receivers in the array from 2022 to 2024, with RI scores and the percentage of available individuals detected consistently highest at more easterly lease areas in each year (Tables 7i, 7j; Figure 8d). White marlin, which were tagged for the first time in 2024, were detected sporadically across the array with the highest activity occurring along the northeastern-most portions of Vineyard Wind 1, Beacon Wind, and Vineyard Northeast (Table 7k; Figure 8f). Yellowfin tuna were observed infrequently during 2022 and 2024 but were more widespread in 2023 (Table 7l, 7m; Figure 8g). The highest RI scores and percentages of detected individuals occurred in SouthCoast Wind and Vineyard Northeast.

Movements – Network analysis

Tagged HMS exhibited extensive movements throughout the WEA, both from release locations into the receiver array and between individual stations within the receiver array. In many instances, individuals were first detected by receivers that were closest to the tagging location. However, some individuals were first detected on more distant receivers (on the opposite side of the array) weeks to months (and, in some cases, years) after release, indicating that they moved through the array undetected or traversed around the periphery of the array before arriving at the receiver.

The blue shark species-level network in 2024 was comprised of 25 individuals and included 65 of 67 receiver stations and had a network density (0.06) which was less than in 2022 (0.12), but comparable to 2023 (0.05). (Table 8, Figure 9a). Node degree and standardized strength scores indicated that activity was generally higher within Ørsted leases (i.e., Revolution Wind, South Fork Wind, and Sunrise Wind) compared to other lease areas, with the highest degree (4) and strength (5) values across individual networks both occurring at SRW_09 (Tables 9a, 10a; Figure 10a, 11a). In contrast, the highest degree and strength values in both 2022 and 2023 across individual networks occurred at station 501_04.

In 2024, the bluefin tuna species-level network involved extensive movement from 53 individuals across all 67 nodes (Table 8; Figure 9b). While activity was more widespread than in 2023 and 2022, concentrations of movement were present within Revolution Wind, Beacon Wind, and SouthCoast Wind (Tables 9b, 10b; Figure 10b, 11b). Across all individual networks, the highest degree value (7) occurred at BW_09, MFW_08, and MFW_09, while the highest strength value (9) was observed at BW_02. These results are consistent with the 2023 network structure and high-use areas, whereas receiver stations with the highest degree and strength values in 2022 also occurred in New England Wind.

Shortfin mako maintained a large but low-density (0.06) species-level network in 2024, with 27 individuals detected at 65 of 67 nodes (Figure 9c). The network and network density was nearly

identical to that evident in 2023 but included more nodes than were used in 2022 (Table 8). In 2024, movements were concentrated in Revolution Wind, South Fork Wind, and Sunrise Wind, which was consistent with the 2023 network and reflected in degree and strength values compiled across all individual networks (Tables 9c, 10c; Figure 10c, 11c). In 2024, the highest degree (4) score was observed at REV_01, while the highest strength (4) occurred at REV_01, REV_17, and SRW_01.

Depth distribution

Swimming depth was characterized based on detection data obtained for blue shark (n = 6 individuals), bluefin tuna (n = 52), dusky shark (n = 1), shortfin mako (n = 3), and yellowfin tuna (n = 9). Tagged individuals across all species were detected when swimming at depths of 0 (the surface) down to 78 m, with 79.6% of all depth observations occurring shallower than 30 m (Figure 12). Bluefin tuna (22.9% of all detections), yellowfin tuna (18.4% of all detections), shortfin mako (41.6% of all detections), and blue shark (15.3% of all detections) were monitored most frequently when swimming at depths of <2 m. The single detected dusky shark was detected most frequently between the depths of 10 to 12 m (20.4% of all detections).

Environmental conditions

Tagged HMS were detected over a range of environmental conditions that are typically evident in SNE during the summer and fall (Table 11). Since the depth of the animal (in the water column) could not be determined at the time of acoustic detection for those not tagged with pressure sensing transmitters, it was not possible to assign an exact temperature to each record. Thus, bottom and sea surface temperatures place bounds on the conditions in which HMS were observed in the study area. Density plots (Figure 13) revealed that HMS were typically observed in bottom temperatures from 9 to 17 °C. These species were also observed most frequently in waters with SSTs ranging from 15 to 25 °C and chlorophyll a concentrations ranging from 0.3 to 2.1 mg ml⁻¹. Most species were observed frequently in heavily stratified waters (surface warmer than the bottom) except for common thresher sharks, which were most common in thermally uniform waters.

Bottom water temperature recorded hourly at each receiver station demonstrated typical seasonal trends evident in SNE (Figure 14). The highest bottom temperatures in each year occurred from the beginning of September to the end of November. Thermal stratification was highest in mid-summer and was positive (i.e., surface water warmer than the bottom) at nearly all leases until the end of September, after which reverse stratification (i.e., bottom warmer than the surface) became evident in several leases (Figure 15). Average noise (mV) was variable by lease throughout each year of the study but appeared to show consistent elevated values from June through September in 2022, August through October in 2023, and July through October in 2024 (Figure 16).

Effects of offshore wind construction activity on presence and movements (Objective 4)

The construction activity across South Fork Wind, Revolution Wind, and Vineyard Wind 1 in 2023 and 2024 impacted 22 total receivers at the 3 km (impact) radius, 25 receivers at the 5 km radius, and 28 receivers at the 8 km radius (Table 12; Figure 3). The date on which individual receivers became impacted at each radius as well as the total number of calendar days across which detection data were compiled during the pre- and post-construction periods are reported in Table 12. Across

impacted receivers and at each impact radius, the number of calendar days over which detection data were compiled in the pre- and post-construction periods varied, with more post-construction days available for the earliest impacted receivers. On average, there were more days of pre- than post-construction monitoring across the impacted receivers. However, because a greater number of receivers become impacted earlier as the (impact) radius around individual monopiles becomes larger, fewer pre-construction days and more post-construction days were evident with each successive increase in impact radius. The mean number of days included in the pre- and post-construction periods at each impact radius were as follows: 3 km: pre – 449 d, post – 221 d; 5 km: pre – 433 d, post – 244 d; 8 km: pre – 404 d, post – 271 d).

Residence duration

At each impact radius, the number and duration of residence events during the pre- and post-construction periods were highly variable within species (Figure 17); however, there was no significant difference between the duration of residence events at impacted receivers during the pre- and post-construction periods at any impact radius for any species (Table 13). Median overall blue shark, bluefin tuna, and shortfin mako residence duration times were similar at each impact radius during the pre- and post-construction periods, while mean residence duration was generally longer in the pre-construction period for blue shark and bluefin tuna and longer in the post-construction period for shortfin mako. At the 8 km impact radius (i.e., the radius that yielded the most impacted receivers) from 2022 to 2024, there was no obvious trend (i.e., increasing or decreasing) between the duration of blue shark, bluefin tuna, and shortfin mako residence events and the cumulative number of monopiles installed across the WEA during this same period (Figure 18). Across individual receivers for which three or more residence events occurred during both the pre- and post-construction periods, there were few significant differences in residence duration between the periods (Tables 14a, 14b, 14c). Blue shark residence duration was significantly longer in the pre-construction period at station 501_02 (Vineyard Wind 1) at the 3, 5, and 8 km impact radii and at REV_15 (Revolution Wind) at the 5 and 8 km impact radii. Shortfin mako residence duration during the post-construction period was significantly higher at REV_16 (Revolution Wind) at the 8 km impact radius. No significant differences in bluefin tuna residence duration were found at any station between the pre- and post-construction periods.

Residency index

3 km impact radius

RI scores varied greatly within species for the 22 impacted receiver stations (Tables 15, 16a; Figures 19, 20a). Across all impacted receivers, zero-inflated Wilcoxon Rank Sum tests revealed that blue shark post-construction RI scores were significantly lower than pre-construction RI scores, with maximum and mean pre-construction RI scores roughly two times higher than post-construction RI scores (Table 15). In contrast, bluefin tuna RI scores were not significantly different between the pre- and post-construction periods. Shortfin mako RI scores across all impacted receivers were generally higher in the post-construction period, but no significant difference existed between the periods. The percentage of available transmitters that were detected (i.e., D/A%) across all impacted stations was significantly lower in the post-construction period for blue sharks but not significantly different between the two periods for bluefin tuna and shortfin mako (Table 17; D/A percentages by station are found in Table 16a). Regardless, mean and median

D/A percentages were higher in the pre-construction period for bluefin tuna and higher in the post-construction period for shortfin mako.

Zero-inflated Wilcoxon Rank Sum tests revealed significantly higher RI scores for blue shark in the pre-construction period at three receiver stations in Vineyard Wind 1 and two stations in Revolution Wind (Tables 16a, 18). For bluefin tuna, there were significantly higher RI scores in the post-construction period at four stations (two in Vineyard Wind 1, one in Revolution Wind, and one in South Fork Wind) and significantly higher RI scores in the pre-construction period at one station in Revolution Wind. Significantly higher post-construction RI scores were evident for shortfin mako at five stations (one in Vineyard Wind 1, three in Revolution Wind, and one in South Fork Wind), while significantly higher pre-construction RI scores were evident at one station in Revolution Wind. For each species, RI scores and the percentage of available individuals that were detected varied across receivers, but there was no systemic trend in the relative magnitudes of these metrics between the pre- and post-construction periods.

5 km impact radius

RI scores across all 25 impacted stations were significantly higher in the pre-construction period for blue shark and significantly higher in the post-construction period for shortfin mako, but no significant difference existed between the periods for bluefin tuna (Table 15; Figures 19, 20b). For blue shark, the mean and maximum post-construction RI scores were roughly half of those evident in the pre-construction period, while mean and maximum shortfin mako post-construction RI scores were roughly two and five times larger than pre-construction values, respectively. Maximum and mean bluefin tuna RI scores were similar between the periods. Welch's t-tests revealed significantly higher percentages of available blue shark transmitters were detected in the pre-construction period, with the opposite true for shortfin mako (Table 17; D/A percentages by station are found in Table 16b). Mean and median percentages of D/A were higher in the pre-construction period for bluefin tuna, but no significant difference existed between the periods.

Comparisons of at each station revealed significantly higher RI scores for blue shark in the pre-construction period at four stations (three in Vineyard Wind 1 and one in New England Wind) (Tables 16b, 18). Significantly higher bluefin tuna RI scores were evident in the post-construction period at three stations (one in Vineyard Wind 1, one in Beacon Wind, and one in South Fork Wind), while significantly higher pre-construction RI scores occurred at two stations in Revolution Wind. For shortfin mako, significantly higher post-construction RI scores were evident at six stations (one in Vineyard Wind 1, four in Revolution Wind, and one in South Fork Wind). For each species, RI scores and the percentages of available individuals that were detected varied across receivers, but there was no systemic trend between the pre- and post-construction periods.

8 km impact radius

Across 28 impacted stations, blue shark RI scores and the percentages of available transmitters detected were significantly higher in the pre-construction period, while the opposite trend of significantly higher scores and percentages in the post-construction period was observed for shortfin mako (Tables 15, 16c, 17; Figures 19, 20c). No significant differences existed between pre- and post-construction bluefin tuna RI scores or the percentages of available transmitters that were detected, with nearly identical mean and median values for each metric in each period.

Comparisons between RI scores at each station revealed significantly higher RI scores for blue shark in the pre-construction period at five stations (three in Vineyard Wind 1, one in New England Wind, and one in Revolution Wind) (Tables 16c, 18). Significantly higher bluefin tuna RI scores were evident in the post-construction period at five stations (one in Vineyard Wind 1, one in Beacon Wind, two in Revolution Wind, and one in South Fork Wind), while significantly higher pre-construction RI scores occurred at one station (in Sunrise Wind). For shortfin mako, significantly higher post-construction RI scores were evident at four stations (one in Vineyard Wind 1, two in Revolution Wind, and one in South Fork Wind). For each species, RI scores varied across receivers, but there was no systemic trend between the pre- and post-construction periods.

Movements - Network analysis

Analysis of individual movement networks revealed significant differences in degree and strength scores across all nodes between the pre-construction and post-construction periods for blue shark, bluefin tuna, and shortfin mako (Tables 19, 20). For blue sharks, maximum and mean degree and strength scores derived from individual networks were generally higher in the pre-construction period; however, the opposite was true for bluefin tuna and shortfin mako wherein maximum and mean degree and strength scores were generally higher in the post-construction period. Overall network densities from the species-level networks were also different between the pre- and post-construction periods, with higher density evident in the pre-construction period for blue sharks and in the post-construction period for both bluefin tuna and shortfin mako (Table 21, Figures 21a-c). Notably, there were inequities in the number of animals of each species that were tracked in pre- and post-construction periods, with eight more blue sharks tracked in the pre-construction network, 54 more bluefin tuna tracked in the post-construction network, and 30 more shortfin mako tracked in the post-construction network.

There were significant differences in blue shark, bluefin tuna, and shortfin mako individual network degree and strength scores between the pre- and post-construction periods at several of the 67 nodes included in movement network (Tables 22a, 22b, 22c). For blue sharks, significant differences existed at nine nodes: three stations impacted at each of the 3, 5, and 8 km impact radii, one station impacted only at the 5 and 8 km impact radii, and five stations not considered to be impacted by construction or operations activity. In all nine instances, both degree and strength scores were significantly higher in the pre-construction period. Significantly higher degree and strength scores were evident for bluefin tuna during the post-construction period at 32 and 31 nodes, respectively. For each metric, 13 nodes were impacted at the 3, 5, and 8 km radii, one was impacted at the 5 and 8 km radii, and two were impacted at the 8 km radius. The remaining 16 nodes for degree and 15 nodes for strength were not impacted. Significant differences existed for shortfin mako degree and strength scores between the pre- and post-construction periods at 10 and 11 nodes, respectively. Of the 10 nodes for degree, five were impacted at the 3, 5, and 8 km radii, one was impacted at only 8 km, and four were not impacted. Significantly higher degree scores were evident in the pre-construction period at four nodes, with significantly higher post-construction degree scores evident at six nodes. Of the 11 nodes for which significant differences existed between the periods for strength, six were impacted at the 3, 5, and 8 km radii, one was impacted at only 8 km, and four were not impacted. Significantly higher strength scores were evident in the pre-construction period at four nodes, with significantly higher post-construction strength scores evident at seven nodes.

Depth distribution

Comparisons of swimming depths between pre- and post-construction periods were made for blue shark, bluefin tuna, and shortfin mako for all three impact radii (Figures 22a-c). Sample sizes of detected transmitters were generally low across impact radii and construction periods for blue shark and shortfin mako ($n \leq 6$) but were much higher for bluefin tuna ($n = 15$ to 16 across all pre-construction periods, $n = 38$ to 42 across all post-construction periods). Bluefin tuna and shortfin mako displayed similar trends in depth use, with post-construction detections occurring most frequently in the shallowest interval of <2 m ($20.6 - 22.4\%$ of detections for bluefin tuna, $45.1 - 62.5\%$ of detections for shortfin mako) and most pre-construction detections occurring more uniformly in the upper water column to approximately 12 m ($46.0 - 47.7\%$ of detections for bluefin tuna, 69.2% of detections for shortfin mako). Across impact radii, blue sharks showed the opposite pattern, wherein most detections occurred at the shallowest interval of <2 m in the pre-construction periods ($24.9 - 31.4\%$ of detections) compared to 12 to 14 m in the post-construction periods ($14.3 - 16.6\%$ of detections). However, at the 8 km impact radius, blue sharks were monitored more frequently at <2 m (9.9% of detections) than at the 3 km and 5 km radii ($2.0 - 3.9\%$ of detections).

Environmental conditions

A wide range of environmental conditions were evident at each impacted receiver station within the pre- and post-construction periods (Tables 23a-c). In general, SST, bottom temperature, and average noise at impacted receivers across all three radii were comparable between the pre- and post-construction periods; however, chlorophyll a concentration was generally higher in the post-construction period (Figure 23). For each species (i.e., blue shark, bluefin tuna, shortfin mako), the percentage of days on which suitable ambient SST and bottom temperatures existed was relatively similar between the pre- and post-construction periods, with no systemic trend evident (e.g., consistently higher percentage of days with suitable habitat in one period or the other) (Tables 24a-c). However, the percentage of monitoring days on which suitable chlorophyll a concentrations existed was lower during the post-construction period for all species, with this trend observed across all impacted stations at each radius.

Other transmitter data collected (Objective 5)

In 2024, 506,910 detections were obtained from 796 transmitters not deployed by this project. From 2022 to 2024, over one million detections were obtained for 1,387 transmitters not deployed by this project. A breakdown of the species that were detected in each year, including the number of unique individuals and total detections, is presented in Table 25.

Synthesis and conclusions

This report summarizes the spatiotemporal distributions and movements of HMS (blue shark, bluefin tuna, common thresher shark, dusky shark, shortfin mako, white marlin, and yellowfin tuna) tagged and/or monitored during 2024 and assesses differences occurring annually from 2022 to 2024 as well as before (pre-construction) and during/after (post-construction) the commencement of offshore wind construction activity in the SNE region. For analyses investigating annual or construction-linked differences in residency, movements, and space use, focus was placed on blue shark, bluefin tuna, and shortfin mako, as these species comprised the greatest number of individuals tagged and monitored and, consequently, the greatest amount of

data with which to conduct statistical analyses. Work on this project is ongoing; thus, all results, conclusions, and interpretations should be considered preliminary.

Annual trends

Seasonal distributions of HMS in 2024 were similar to what was observed in both 2022 and 2023 and corroborate the anticipated habitation of the WEA in warmer months (June to October) and the gradual departure of animals with progression towards cooler months (November to January). In 2024, bluefin tuna were the first to arrive in late May, followed by blue sharks and shortfin mako in early June, and then by dusky sharks and common thresher sharks near the beginning of July. Arrival times for blue shark and shortfin mako in 2024 were similar to what had been observed in both 2022 and 2023, but bluefin tuna arrived earlier in 2024 than in both 2022 and 2023. Yellowfin tuna were largely absent in 2024 with the exception of a single individual that was present in the WEA for two days in September. Emigration dates (i.e., dates of last detection) of HMS in 2024 were similar to what was observed in 2022 and 2023, with common thresher sharks and bluefin tuna being present the latest into the fall/winter. As in previous years, the receiver array was greatly reduced for the entirety of the 2023–2024 winter, but the scarcity of detections at receivers that remained deployed during the winter (in Ørsted leases) substantiates universal emigration from the region and reimmigration the following spring/summer.

Consistent with past years, numerous previously tagged individuals returned to the WEA in 2024, including blue shark, bluefin tuna, and shortfin mako that were tagged as far back as 2021. Across species, 2024 return rates varied but were generally comparable to previous years' rates, apart from blue shark and yellowfin tuna, which exhibited the lowest return rate of the 2021 to 2024 time series. In contrast, the bluefin tuna return rate in 2024 was the highest evident during the time series. No analyses were conducted to correlate return rates with environmental conditions (e.g., water mass movement, SST) or species' life history (e.g., migration patterns, life stage). However, it is important to note that several of the species monitored (e.g., bluefin tuna, yellowfin tuna, shortfin mako, blue shark) occupy vast regions of the Atlantic Ocean and undertake broad-scale, or even trans-oceanic, seasonal migrations driven in part by life history and environmental conditions (Vaudo et al., 2017; Kohler and Turner, 2019). Indeed, multiple bluefin tuna tagged by this project have been detected off Europe, and one yellowfin tuna was recaptured off Senegal, Africa in August 2025, demonstrating the extensive movement capacity of HMS and the ability of individuals to move to different ocean basins on an annual basis. Regardless, considering that additional losses of tagged animals (beyond those known and accounted for) due to external tag shedding, natural mortality, and fishing mortality are likely to have occurred throughout the study duration, the consistent and frequent annual return of numerous individuals to SNE exemplifies the importance of this region to HMS.

Tagged HMS collectively ranged across all monitored lease areas in 2022, 2023, and 2024, and movement networks created for blue shark, bluefin tuna, and shortfin mako revealed patterns in species-specific use of the WEA. Tagging events often necessarily occurred outside of the WEA/acoustic receiver array due to the availability of the target species at the time of the sampling trip. However, many fish tagged outside the confines of the WEA were detected (in the WEA) hours, days, or months post-release, highlighting their ability to travel large distances at varying rates as well as the overall connectivity of areas both inside and outside of the WEA in the SNE region. Interannual differences in species' networks were also highly influenced by the number of individuals monitored in each year, as exemplified by the large difference in network density for

bluefin tuna between 2022 and 2023. Efforts were made to evenly distribute transmitters across species in each year, but the availability of specific species varied, sometimes greatly, between years. For example, in 2022, extensive sampling efforts resulted in the tagging of only five bluefin tuna, two of which were tagged east of Cape Cod, and sparse networks due to the lack of activity in the WEA. In contrast, 35 and 52 bluefin tuna were tagged in 2023 and 2024, respectively, which resulted in more extensive and denser annual networks. Similarly, blue sharks were prevalent during 2022 and 2024, but few individuals were encountered during tagging trips in 2023. The inherently dynamic characteristics of offshore bodies of water connotes possibilities for ephemeral, fine-scale differences in species' presence and abundance within the SNE region, including areas as small as individual offshore wind leases, which could very well explain any interannual variability seen in the distribution and movements of tagged HMS in the WEA. Such inherent variability exemplifies the need for protracted pre- and post-construction monitoring periods to ensure that annual fluctuations in species presence can be distinguished from avoidance of an area because of offshore wind activity (see Next Steps).

Although residence durations were often brief (averaging 72 minutes across all species), HMS undoubtedly spent longer periods of time in the lease area than were documented by acoustic receivers. During peak periods of monitoring when all acoustic receivers were deployed in the array, monitoring for active transmitters covered only ~2% of the total area of the WEA, assuming an average receiver detection range of 500 m (0.5 km) based on range testing. Accordingly, the duration of residence events reported herein should be viewed as minimums, with actual residence durations of individual HMS in the WEA likely far greater than what was monitored by acoustic receivers. In 2025, funding was received through the New Jersey Offshore Wind Research and Monitoring Initiative to assess the effectiveness of fixed acoustic receivers to detect the presence of HMS when they are present in the WEA. The project, which will be conducted in 2026 and 2027, will simultaneously track individual HMS with acoustic and satellite transmitters, the latter of which provide information on animal location irrespective of the location of acoustic receivers. Comparison of movement tracks and residence durations derived from acoustic and satellite transmitters will therefore provide insights into the general effectiveness of each technology for monitoring HMS in relation to offshore wind infrastructure.

Effect of offshore wind construction and environmental conditions

Multiple analyses were conducted to assess impacts of offshore wind construction and operations activities on HMS presence, residency, and movements in SNE, each of which largely focused on comparing data collected during the pre- and post-construction periods. Overall, there were inconsistent trends in metrics tracked across the onset of construction and operations activities, with some metrics indicating positive impacts (e.g., increased residency, longer residence duration, increased movement through a station/node) and others suggesting adverse (e.g., decreased residency, shorter residence duration, decreased movement through a station/node) or no impacts (i.e., similar results for each period). Impacts also varied by species as well as across the assumed impact radii (i.e., 3, 5, 8 km). Similarly, the range of environmental conditions evident at impacted receivers during the pre- and post-construction periods were variable, but apart from chlorophyll a, generally indicated comparably suitable habitats between the periods. Here we first discuss preliminary results relative to blue shark, bluefin tuna, and shortfin mako and then provide a synthesis of trends across all species.

With the available data, multiple metrics suggested that blue shark presence, residency, and movements in the SNE WEA may have been adversely impacted by offshore wind construction and operation activity. Residence duration, RI scores, the percentage of available individuals that were detected, and network analysis degree and strength node scores were all generally lower/shorter during the post-construction period at impacted receivers, indicative of potential avoidance of, or at least reduced occurrence in or near, lease areas that were under construction or in operation. Curiously, the return rate of tagged blue sharks also decreased markedly in 2023 and 2024 (i.e., when construction was occurring), perhaps indicative of general avoidance of the SNE region. However, aside from chlorophyll a, SST and bottom temperatures evident at impacted receivers, including those at which blue shark presence was most reduced during the post-construction period (i.e., all four receivers in Vineyard Wind 1), were similar between the pre- and post-construction periods, with a similar percentage of days with suitable habitat evident in each period. This finding suggests that lower residency in the post-construction period may not be greatly influenced by water temperatures evident in the SNE WEA. In contrast, the higher chlorophyll a concentrations evident in the post-construction period may explain the reduced presence of blue sharks during the post-construction period given that the species' presence has been shown to be positively correlated with more oligotrophic (i.e., lower chlorophyll) water masses (Druon et al., 2022; Vidal et al., 2023). It is also possible that reduced occurrence in the SNE region is a consequence of a shift in blue shark population abundance to another geographic region and otherwise unrelated to localized offshore wind development in SNE. Furthermore, lower rates of return may stem from the low number of individuals tagged in 2023 ($n = 4$), which coincided with a general lack of blue sharks encountered during tagging trips, or the shedding of external tags, which were primarily used when monitoring blue sharks. Additional data from the post-construction period and a more thorough investigation of the effects of environmental conditions on blue shark presence in SNE are required to reconcile the impacts of offshore wind activity on blue sharks.

Impacts of offshore wind activity on bluefin tuna were difficult to resolve given the high degree of variability evident across results for various movement and residency metrics and the wide range of environmental conditions in which the species occurred. For example, there were no significant differences in either RI scores or residence duration between the pre- and post-construction periods. However, mean residence duration was ~15 to 20 minutes shorter during the post-construction period, and mean RI scores were slightly lower during the post-construction period. Similarly, although percentages of available tagged bluefin tuna detected at impacted receivers were comparable in both the pre- and post-construction periods at each impact radius, mean and median percentages were slightly lower in the post-construction period. Together, these findings suggest that bluefin tuna presence in the SNE region may have been negatively affected by offshore wind development activity. However, notably and in contrast, the rate of return of previously tagged bluefin tuna to the SNE region was highest in 2024, the year in which the greatest amount of offshore wind construction and operation activities occurred. Furthermore, the network metrics of degree and strength were significantly higher in the post-construction period, although the low sample size of individuals monitored in the pre-construction network impaired the ability of the network analysis to thoroughly investigate the impacts of offshore wind activity, particularly since few bluefin tuna were tagged in 2022 (i.e., the only year included in the pre-construction network).

In the absence of strong differences in environmental conditions at impacted receivers between the pre- and post-construction periods, including the percentage of monitoring days with suitable

bluefin tuna habitat, it stands to reason that bluefin tuna presence in the SNE region should not have differed dramatically based on environmental conditions alone. Overall, SST, bottom temperature, and chlorophyll a concentration evident at impacted receivers during both the pre- and post-construction periods were well within the species range (Druon et al. 2016), which suggests that the systemic pattern of lower chlorophyll a habitat suitability may have had little impact on the species' presence. However, anecdotal observations of trends in annual bluefin tuna presence and abundance in the SNE WEA from 2020 to 2024 indicates a high degree of inter-annual variability in the species' activity in the region and suggests that presence may be driven by other factors not considered in this analysis (e.g., prey distribution and abundance; migratory patterns). For example, prior to the onset of pile driving activities, bluefin tuna availability in the SNE WEA was high in 2021 but then low in 2022, thereby demonstrating potential for highly variable levels of presence between years. In 2022, there was also an abundance of sand lance (*Ammodytes spp.*) in portions of the SNE WEA (Authors, personal observations), yet large aggregations of bluefin tuna were not coincidentally present. Accordingly, the effects of offshore wind development on bluefin tuna in SNE, if they exist, can only be ascertained with longer-term monitoring than was accomplished to date by this study and a more thorough assessment of the impacts of environmental conditions on the species' presence in the region.

Preliminary data suggest that shortfin mako did not experience adverse impacts from offshore wind development but instead were observed more frequently during the post-construction period. Although mean and median residence durations at impacted receivers were comparable between the pre- and post-construction periods, RI scores were higher overall, and significantly higher at the 5 and 8 km impact radii, during the post-construction period, indicative of greater residency in areas near to ongoing or completed construction activities. Greater percentages of available tagged individuals were also detected at impacted receivers in the post-construction period across all three impact radii, and significantly higher degree and strength scores were also evident during the post-construction period across individual movement networks. However, it should be noted that the pre-construction shortfin mako movement networks included three times fewer individuals than the post-construction networks, which may have yielded less thorough monitoring of animal movement prior to the onset of construction activities. When considered with the relative stability of environmental conditions between the pre- and post-construction periods, there is evidence that shortfin mako presence and persistence in the SNE WEA has not been adversely impacted by offshore wind activity. The causality behind the increase in the species' presence during the post-construction period, however, requires further investigation.

The lack of a consistent trend in the directionality of impacts of offshore wind activity on blue shark, bluefin tuna, and shortfin mako poses the question of whether the results evident in the preliminary analyses are indicative of species-specific responses to offshore wind activity or are influenced by the high degree of interannual variability that seemingly exists with these species' presence in the SNE region. For example, in 2022 (i.e., the only year for which data were available to construct the pre-construction network), bluefin tuna were anecdotally scarce in the SNE region but were present in relative abundance in 2021, 2023, and 2024. Similarly, in 2023, few blue sharks were encountered during tagging trips despite concerted efforts to locate them, with larger numbers of individuals encountered in both 2022 and 2024. In these circumstances, the lack of bluefin tuna activity in 2022 (the pre-construction period) and blue shark activity in 2023 (the beginning of the post-construction period) may have influenced the preliminary results reached by our analyses as they relate to the effects of offshore wind. Additional data obtained through subsequent years of monitoring and further analyses, particularly those that better account for the influence of

environmental/oceanographic conditions on species presence, are therefore required to reconcile the true impacts of offshore wind activity on HMS ecology. Regardless, at present there is no strong evidence of general displacement or avoidance of HMS from offshore wind lease areas that were under construction or in operation (i.e., South Fork Wind, Revolution Wind, Vineyard Wind 1) during 2023 to 2024.

Attempts to determine the distance at which HMS are impacted by offshore wind activity were inconclusive due to the lack of strong trends in results produced for the 3, 5, and 8 km assumed impact radii. For some receiver stations, significant differences were evident in metrics only at the 3 km radius, which may be expected if impacts are greatest nearest to the source of the potential stressor (i.e., monopile). However, at numerous receiver stations, significant differences between metrics were evident at the 5 and 8 km impact radii, suggesting that impacts may be apparent beyond these distances. As more data are collected and incorporated into the analyses presented herein, an investigation of impacts at a higher spatial and temporal resolution should be better accomplished.

Depth distribution

Visual examination of the overall depth distributions indicated that blue sharks, bluefin tuna, shortfin mako, and yellowfin tuna largely frequent the surface of the water column, with the sole detected dusky shark occupying slightly deeper levels. Comparisons by construction period, however, showed diverging patterns wherein some species (i.e., bluefin tuna and shortfin mako) appeared at the surface more often in the post-construction period, while others (i.e., blue shark) appeared at the surface more often in the pre-construction period. If these behavioral changes provide auditory refuge or are otherwise evasive mechanisms to pile driving, ongoing construction, and/or turbine operation, such transitions in vertical movements throughout the water column may represent species-specific escapement strategies by certain HMS in response to offshore wind activity. These effects may also manifest in differences observed among the impact radii. For example, there is some limited evidence, based on the greater detections of blue sharks at the surface for the 8 km impact radii, that suggests a partial return to baseline (i.e., pre-construction) behavior with increasing distance from the source of activity. It should be noted, however, that the inclusion of only stations within both impact periods for the construction analysis severely restricted the sample sizes of detections compared to the overall analysis and was particularly detrimental for species for which there were already low numbers of both detected tags and detections (i.e., dusky shark, shortfin mako, and yellowfin tuna). With the accrual of additional stations into the analysis as construction begins adjacent to previously unimpacted stations, more data will become available for both pre- and post-construction periods and provide more detailed depth distribution results.

Receiver detection range

Acoustic receiver range testing at three stations (501_02, REV_18, 534_01) revealed variable distances of 50% detection range (i.e., ~200 to >750 m). The upper end of the apparent 50% detection range is consistent with what has been documented for V16H transmitters in similar oceanic environments with comparable depths (e.g., 500 – 800 m range; Huveneers et al., 2016; Secor et al., 2020), but only one of the three receiver stations exhibited detection efficiency of the expected magnitude. Contracted 50% detection ranges were also evident in range tests conducted at receiver stations within or in proximity of two active construction activities; the test at 501_02

occurred after construction had commenced in the Vineyard Wind 1 lease, and the test at REV_18 occurred when construction was underway in South Fork roughly 6 km to the south. Notably, noise levels were generally higher at the two stations located in proximity to construction activity, but it is unknown if such noise was evident due to construction activity (e.g., vessel noise) or natural, ambient conditions evident at the time and place of range testing. Further range tests are necessary to evaluate the impact of construction activity on receiver detection range/efficiency, particularly longer-term tests that encompass extended periods (i.e., days) before, during, and after construction activity.

An inconsistent pattern of detection range was also evident with respect to the position of transmitters in the water column, with detection range being greater above the thermocline (i.e., near the surface) at two stations (501_02 and REV_18) and greater below the thermocline (i.e., near the bottom) at one station (534_01). Previous studies have demonstrated that thermal stratification reduces detection range, with more severe reductions evident with increasing strength and depth of stratification (Huveneers et al., 2016). However, our range tests revealed no clear pattern/relationship between thermocline strength and detection range. Detection efficiency has also been shown to be greater when acoustic transmissions propagate on the same side of the thermocline as the receiver (O'Brien and Secor, 2021). Contrary to this, the opposite scenario was evident in two of three range tests, with detection efficiency being greater between the surface-positioned test transmitter and the bottom-mounted receiver. It is unknown why detection range was greater for transmitters placed above rather than below the thermocline, but it is possible that the identification numbers of range test transmitters were accidentally reversed in our field notes (i.e., the transmitter positioned at the surface was deployed at the bottom and vice versa). Additional testing is required to determine if this pattern persists at additional locations and to better understand the overall dynamics of acoustic receiver performance in the WEA.

The effect of receiver detection range coincident with the onset of construction activity was not directly assessed in this study, but differences in receiver performance between the pre- and post-construction periods, including during active pile driving, may confound some of the results presented herein. For most analyses, data were aggregated across protracted time periods with large variations in detection range expected to have occurred both between receivers and at individual receivers over time irrespective of offshore wind construction activities (e.g., Huveneers et al., 2016). Although it was not possible to estimate detection range/efficiency across all receivers during the time in which they were deployed, it was assumed that such efficiency was similar between the pre- and post-construction periods. However, future testing is required to evaluate the appropriateness of this assumption.

Technical considerations

The placement of receivers at specific locations (i.e., hangs) in the array was necessary to minimize the probability of interactions with commercial fishing gear but resulted in an uneven distribution of stations throughout the WEA. In some leases, such as Revolution Wind and South Fork Wind, coverage was largely maintained throughout the spatial extent of the lease boundaries and at relatively equidistant intervals that permitted mostly comprehensive monitoring of these areas. However, in other leases, such as Vineyard Wind 1, stations were positioned in close proximity to each other and/or near lease boundaries in a manner that resulted in sizable, unmonitored gaps in the array through which tagged animals could travel undetected. In these situations, detections on closely neighboring stations are not likely to be completely independent, resulting in biases such

as artificially boosted edge weights in network analysis while potentially leaving critical areas of habitat usage and/or transit unidentified compared to a receiver array in which the stations are more equally spaced apart.

Receiver loss also adversely impacted movement networks, especially when lost receivers were well-connected to others or frequently visited by target species. For example, the receiver at SRW_11 experienced a malfunction in 2022 that resulted in the complete loss of detection data that year, and SRW_11 was not included in either the 2023 or 2024 networks to maintain a consistent comparison between years. However, when SRW_11 was included in exploratory network analyses, the station was found to be an important node for bluefin tuna, blue sharks, and shortfin mako, which was corroborated by its RI score for these species in 2023 and 2024. Furthermore, although physical receiver loss due to fishery interaction was minimal in 2024, sustained losses over time (despite relocation of stations to the present configuration of the array) have nonetheless interrupted some interannual comparisons and are more pronounced in leases in the southeastern portion of the WEA where mobile commercial fishing activity is concentrated. Perpetual receiver loss necessitated the permanent removal of several stations (e.g., BW_01, MFW_01, 522_05, 522_07) to protect against further equipment loss; gathering data at such stations was also of diminished value given the aforementioned problems associated with gaps in detection time series. The loss of data associated with removal of these stations (and potentially in the future with additional receiver displacements) likely yields results of lower resolution to some degree for the network analysis and the various analyses performed in this report and may also be more impactful for those species that display preferential exploitation of these areas of the WEA.

Next steps

Data from acoustic monitoring performed in 2025 will be compiled, analyzed in accordance with the methods outlined in this report, and synthesized into a forthcoming report that will follow the format presented herein. In addition to updating existing analyses with new data, additional analyses will be explored to expand our assessment of the impacts of offshore wind construction and operation on HMS, particularly with an emphasis towards understanding (1) the localized and short-term effects of pile driving and (2) the influence of environmental conditions on the localized presence of each species in the SNE region. Analyses conducted as part of (2) will be developed as part of a project supported by the Responsible Offshore Science Alliance (ROSA) with the aim of [disentangling the effects of environmental conditions and offshore wind construction activities through advanced spatial modeling techniques \(e.g., species distribution models\)](#). Lastly, given the large number of transmitters and species that were detected by the receiver array (but not actively monitored by this project), there is great potential to expand the scope of our analyses to include a broader range of taxa. Such collaborations align with the recommendations of ROSA and the Regional Wildlife Science Collaborative (RWSC) and should be further pursued.

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Table 1 – Metadata for acoustic receivers deployed in 2024. Dashes denote that the receiver was missing or unable to be recovered. REV = Revolution Wind, SF = South Fork Wind, SRW = Sunrise Wind, BW = Beacon Wind, MFW = Mayflower (SouthCoast) Wind, 501 = Vineyard Wind 1, 522 = Vineyard Northeast, 534 = New England Wind.

Station	Latitude	Longitude	Depth (m)	Receiver type	Deploy start	Deploy end	Days deployed
REV_01	41.28	-71.13	38	VR2AR	1/1/24	12/31/24	365
REV_02	41.22	-71.15	36	VR2AR	1/1/24	12/31/24	365
REV_03	41.21	-71.12	40	VR2AR	1/1/24	12/31/24	365
REV_04	41.21	-71.07	35	VR2AR	1/1/24	12/31/24	365
REV_05	41.20	-71.20	40	VR2AR	1/1/24	12/31/24	365
REV_06	41.19	-71.15	39	VR2AR	1/1/24	12/31/24	365
REV_07	41.16	-71.24	42	VR2AR	1/1/24	12/31/24	365
REV_08	41.16	-71.17	39	VR2AR	1/1/24	12/31/24	365
REV_09	41.16	-71.12	37	VR2AR	1/1/24	12/31/24	365
REV_10	41.11	-71.25	35	VR2AR	1/1/24	12/31/24	365
REV_11	41.10	-71.20	36	VR2AR	1/1/24	12/31/24	365
REV_12	41.16	-71.00	34	VR2AR	1/1/24	12/31/24	365
REV_13	41.12	-71.04	34	VR2AR	1/1/24	12/31/24	365
REV_14	41.13	-70.97	30	VR2AR	1/1/24	-	-
	41.13	-70.97	30	VR2AR	4/23/24	12/31/24	253
REV_15	41.12	-70.89	37	VR2AR	1/1/24	12/31/24	365
REV_16	41.08	-71.02	37	VR2AR	1/1/24	12/31/24	365
REV_17	41.09	-70.96	37	VR2AR	1/1/24	12/31/24	365
REV_18	41.13	-71.11	31	VR2AR	1/1/24	12/31/24	365
SF_01	41.09	-71.18	34	VR2AR	1/1/24	12/31/24	365
SF_02	41.09	-71.09	35	VR2AR	1/1/24	12/31/24	365
SRW_01	40.96	-71.26	53	VR2AR	1/1/24	12/31/24	365
SRW_02	40.98	-71.18	53	VR2AR	1/1/24	12/31/24	365
SRW_03	40.97	-71.13	48	VR2AR	1/1/24	12/31/24	365
SRW_04	41.00	-71.00	46	VR2AR	1/1/24	12/31/24	365
SRW_05	41.01	-70.94	45	VR2AR	1/1/24	12/31/24	365
SRW_06	40.99	-70.91	51	VR2AR	1/1/24	12/31/24	365
SRW_07	41.00	-70.87	48	VR2AR	1/1/24	12/31/24	365
SRW_08	41.00	-70.82	49	VR2AR	1/1/24	12/31/24	365
SRW_09	40.94	-70.96	50	VR2AR	1/1/24	12/31/24	365
SRW_10	41.03	-71.22	48	VR2AR	1/1/24	12/31/24	365
SRW_11	40.89	-71.01	58	VR2AR	1/1/24	12/31/24	365
SRW_12	40.91	-70.91	51	VR2AR	1/1/24	12/31/24	365
501_01	41.12	-70.50	37	VR2AR	5/2/24	12/14/24	227

501_02	41.09	-70.50	40	VR2AR	5/2/24	12/14/24	227
501_03	41.01	-70.40	40	VR2AR	5/2/24	12/14/24	227
501_04	41.00	-70.45	42	VR2AR	5/2/24	12/14/24	227
534_01	40.98	-70.60	48	VR2AR	5/2/24	12/14/24	227
534_02	40.91	-70.63	50	VR2AR	5/2/24	12/14/24	227
534_03	40.85	-70.80	53	VR2AR	5/2/24	12/14/24	227
534_04	40.91	-70.56	49	VR2AR	5/2/24	12/14/24	227
534_05	40.86	-70.62	52	VR2AR	5/2/24	12/14/24	227
534_06	40.85	-70.67	54	VR2AR	5/2/24	12/14/24	227
BW_02	40.93	-70.43	44	VR2AR	5/2/24	12/14/24	227
BW_03	40.79	-70.59	55	VR2AR	5/2/24	12/14/24	227
BW_04	40.76	-70.66	58	VR2AR	5/2/24	12/14/24	227
BW_05	40.67	-70.66	60	VR2AR	5/2/24	12/14/24	227
BW_06	40.74	-70.58	54	VR2AR	5/2/24	12/14/24	227
BW_07	40.79	-70.52	52	VR2AR	5/2/24	12/14/24	227
BW_08	40.83	-70.49	53	VR2AR	5/2/24	12/14/24	227
BW_09	40.81	-70.45	53	VR2AR	5/2/24	12/14/24	227
BW_10	40.89	-70.41	47	VR2AR	5/2/24	12/14/24	227
MFW_02	40.84	-70.35	48	VR2AR	5/21/24	12/3/24	197
MFW_03	40.82	-70.42	49	VR2AR	5/21/24	12/3/24	197
MFW_04	40.79	-70.43	50	VR2AR	5/21/24	12/3/24	197
MFW_05	40.70	-70.51	55	VR2AR	5/21/24	12/3/24	197
MFW_06	40.63	-70.57	60	VR2AR	5/21/24	12/3/24	197
MFW_07	40.65	-70.47	58	VR2AR	5/21/24	12/3/24	197
MFW_08	40.70	-70.40	49	VR2AR	5/21/24	12/3/24	197
MFW_09	40.74	-70.33	48	VR2AR	5/21/24	12/3/24	197
MFW_10	40.79	-70.27	43	VR2AR	5/21/24	12/3/24	197
522_01	40.78	-70.22	42	VR2AR	5/21/24	12/3/24	197
522_02	40.72	-70.29	47	VR2AR	5/21/24	-	-
522_03	40.73	-70.21	43	VR2AR	5/21/24	12/3/24	197
522_04	40.72	-70.11	41	VR2AR	5/21/24	12/3/24	197
522_06	40.66	-70.05	48	VR2AR	5/21/24	12/3/24	197
522_08	40.66	-70.22	47	VR2AR	5/21/24	12/3/24	197
522_09	40.66	-70.28	49	VR2AR	5/21/24	12/3/24	197
522_10	40.69	-70.37	51	VR2AR	5/21/24	12/3/24	197
522_11	40.61	-70.42	60	VR2AR	5/21/24	12/3/24	197
522_12	40.61	-70.32	57	VR2AR	5/21/24	12/3/24	197

Table 2 – Results of acoustic receiver range tests performed at stations 501_02 and REV_18 in 2023 and 534_01 in 2024. Transmitters with a fixed, 60 second nominal delay were moored at varying distances from the receiver and left in place for 1 hour (60 minutes). Transmitters were deployed approximately 6 meters from the surface and 6 meters off the bottom to examine detection range above and below the thermocline. Percentages represent the number of detections that were logged relative to the 60 total transmissions that each transmitter emitted over the 60 minutes it was deployed at each distance. The water depth at each station is provided next to the station name. Water temperatures at the surface (estimated from sea surface temperature imagery) and bottom (measured by the receiver) during the tests are presented in parentheses, and ΔT represents the absolute difference between the surface and bottom temperatures (i.e., an indication of thermal stratification in the water column). Noise is provided as average hourly values in millivolts at 69 kHz measured by the receiver during each test.

Distance (m)	501_02 (41 m)				REV_18 (30 m)				534_01 (47 m)			
	Surface (22.3 °C)	Bottom (11.2 °C)	ΔT °C	Noise (mv)	Surface (15.9 °C)	Bottom (15.2 °C)	ΔT °C	Noise (mv)	Surface (19.3 °C)	Bottom (15.3 °C)	ΔT °C	Noise (mv)
100	-	-	-	-	58.3%	65.0%	0.7	250	91.7%	91.7%	4.0	175
250	41.7%	36.7%	11.1	158	61.7%	63.3%	0.7	317	90.0%	91.7%	4.0	209
500	38.3%	33.3%	11.1	398	43.3%	20.0%	0.7	332	83.3%	91.7%	4.0	180
750	33.3%	5.0%	11.1	261	0.0%	0.0%	0.7	350	53.3%	83.3%	4.0	178
1000	0.0%	0.0%	11.1	294	-	-	-	-	-	-	-	-

Table 3 – Metadata from the 364 highly migratory species (HMS) that were tagged from 2020 to 2024. Number in parenthesis represents the number of pressure sensing transmitters deployed on that species. FL = fork length.

Species	# Tagged	Sex			Size	Tag placement	
		Male	Female	Unknown	FL (cm)	External	Internal
Blue shark	108	102	6	0	120 - 259	100	8 (6)
Bluefin tuna	122	-	-	122	60 - 299	4	118 (78)
Common thresher shark	11	6	5	0	121 - 182	11	0
Dusky shark	14	4	9	1	100 - 182	11	3 (1)
Little tunny	1	-	-	1	72	0	1
Sandbar shark	3	2	1	0	121 - 152	3	0
Shortfin mako	67	16	26	25	85 - 243	53	14 (3)
Smooth hammerhead	1	0	1	0	182	1	0
Spinner shark	2	2	0	0	167	2	0
White marlin	4	-	-	4	137 - 167	4	0
Yellowfin tuna	31	-	-	31	71 - 120	0	31 (12)

Table 4 – Timing of the first and last detection events by species from 2022 to 2024. Asterisks denote the date when that species was first tagged for the project.

Species	2022		2023		2024	
	First	Last	First	Last	First	Last
Blue shark	6/3/22	11/1/22	6/11/23	10/27/23	6/10/24	10/27/24
Bluefin tuna	6/29/22	1/9/23	6/15/23	12/16/23	5/22/24	1/2/25
Common thresher			8/29/23*	11/19/23	7/7/24	12/10/24
Dusky shark	7/19/22	10/3/22	7/26/23	9/22/23	6/30/24	9/22/24
Shortfin mako	6/15/22	11/8/22	6/6/23	11/13/23	6/9/24	11/30/24
White marlin					8/14/24*	10/7/24
Yellowfin tuna	8/14/22*	9/25/22	7/22/23	9/13/23	9/1/24	9/12/24

Table 5 – Summary of the number and duration of residences documented for each species in each year of the study. Tx = unique transmitters detected.

Species	Tx	Residences	Duration (minutes)			
			Minimum	Maximum	Mean	Standard deviation
2022						
Blue shark	45	928	1	2,952	95	289
Bluefin tuna	11	99	2	1,432	65	210
Common thresher shark	0	-	-	-	-	-
Dusky shark	8	121	1	1,101	65	152
Sandbar shark	1	32	2	809	68	148
Shortfin mako	13	134	1	1,258	48	145
Smooth hammerhead	1	3	2	5	4	2
Spinner shark	2	17	2	37	14	10
White marlin	0	-	-	-	-	-
Yellowfin tuna	7	13	2	359	88	148
2023						
Blue shark	16	200	1	1,931	77	246
Bluefin tuna	39	1,031	1	1,795	58	204
Common thresher shark	2	50	1	841	54	151
Dusky shark	7	92	1	1,252	43	139
Little tunny	1	2	2	2	2	-
Sandbar shark	0	-	-	-	-	-
Shortfin mako	26	239	1	1,487	70	207
Smooth hammerhead	0	-	-	-	-	-
Spinner shark	0	-	-	-	-	-
White marlin	0	-	-	-	-	-
Yellowfin tuna	12	116	1	2,994	86	322
2024						
Blue shark	26	273	1	2,186	66	226
Bluefin tuna	57	1,412	1	2,195	57	207
Common thresher shark	9	200	1	1,561	70	221
Dusky shark	7	90	1	1,767	98	279
Little tunny	0	-	-	-	-	-
Sandbar shark	0	-	-	-	-	-
Shortfin mako	27	342	1	2,283	60	211
Smooth hammerhead	0	-	-	-	-	-
Spinner shark	0	-	-	-	-	-
White marlin	3	25	1	136	21	33
Yellowfin tuna	1	7	6	19	12	4

Table 6 – Matrix of the number of transmitters deployed each year by species and the number of those transmitters that were detected in subsequent years. The cumulative number of tagged animals (# at large) and the total number of fish of an annual cohort that were detected (# detected) were used to estimate the annual rate of return during each year of monitoring. Asterisks in the # at large column denote numbers adjusted for known tag shedding or recapture/removal events.

	Tagging year	# tagged	Detection year (# detected)					# at large	# returns detected	Return rate (%)
			2020	2021	2022	2023	2024			
Blue shark	2020	13	9	3	2	1	0	-	-	-
	2021	36		26	13	1	1	13	3	23%
	2022	33			30	10	5	48*	15	31%
	2023	4				4	0	81*	12	15%
	2024	22					20	85*	6	7%
Bluefin tuna	2020	8	4	3	1	1	0	-	-	-
	2021	22		19	8	8	5	8	5	13%
	2022	5			2	1	1	30	9	30%
	2023	35				29	22	35	10	29%
	2024	52					29	70	28	40%
Shortfin mako	2020	8	4	3	1	1	0	-	-	-
	2021	6		5	4	1	1	8	1	13%
	2022	8			7	2	0	14	5	36%
	2023	28				23	10	22	4	18%
	2024	17					16	49*	11	22%
Common thresher shark	2020	0	-	-	-	-	-	-	-	-
	2021	0		-	-	-	-	-	-	-
	2022	0			-	-	-	-	-	-
	2023	2				2	1	-	-	-
	2024	8					8	2	1	50%
Dusky shark	2020	0	-	-	-	-	-	-	-	-
	2021	2		2	1	1	0	-	-	-
	2022	8			7	4	3	2	1	50%
	2023	2				2	2	10	5	50%
	2024	2					2	12	5	42%
Yellowfin tuna	2020	0	-	-	-	-	-	-	-	-
	2021	0		-	-	-	-	-	-	-
	2022	12			7	4	0	-	-	-
	2023	19				8	1	12	4	33%
	2024	0					0	30*	1	3%

Table 7a – Summary of blue shark annual residency index (RI) scores for receiver stations that were deployed consistently from 2022 to 2024. For each station, the number of individuals it detected (D) and the total number of individuals detected across all stations while that receiver was deployed (A) are presented along with the proportion of D to A (%). The cumulative number of calendar days all individuals of a species were detected at a given station is presented as Σdd . Asterisk denotes that the receiver was lost. BW = Beacon Wind, MFW = Mayflower (SouthCoast) Wind, 501 = Vineyard Wind 1, 522 = Vineyard Northeast, 534 = New England Wind, SD = standard deviation.

Station	2022			2023			2024		
	D/A (%)	Σdd	RI	D/A (%)	Σdd	RI	D/A (%)	Σdd	RI
			Max (Mean $\pm$ SD)			Max (Mean $\pm$ SD)			Max (Mean $\pm$ SD)
501_01	15/45 (33)	27	4.44 (0.62 $\pm$ 1.1)	4/15 (27)	11	4.07 (0.66 $\pm$ 1.3)	4/25 (16)	4	0.95 (0.14 $\pm$ 0.32)
501_02	16/45 (36)	33	4.42 (0.66 $\pm$ 1.07)	2/15 (13)	8	4.07 (0.45 $\pm$ 1.21)	4/25 (16)	4	1.06 (0.15 $\pm$ 0.35)
501_03	21/45 (47)	69	9.89 (1.47 $\pm$ 2.5)	5/15 (33)	10	4.88 (0.57 $\pm$ 1.27)	4/25 (16)	8	4.07 (0.27 $\pm$ 0.84)
501_04	21/45 (47)	73	8.33 (1.59 $\pm$ 2.44)	4/15 (27)	16	10.57 (0.95 $\pm$ 2.72)	3/25 (12)	4	2.13 (0.15 $\pm$ 0.46)
522_01	10/45 (22)	14	4.17 (0.28 $\pm$ 0.71)	2/15 (13)	3	1.69 (0.17 $\pm$ 0.47)	7/25 (28)	7	1.06 (0.26 $\pm$ 0.43)
522_03	9/45 (20)	21	3.54 (0.4 $\pm$ 0.91)	2/15 (13)	2	0.83 (0.11 $\pm$ 0.29)	5/25 (20)	5	0.95 (0.17 $\pm$ 0.34)
522_04	12/45 (27)	15	2.65 (0.32 $\pm$ 0.59)	4/15 (27)	5	1.69 (0.28 $\pm$ 0.52)	5/25 (20)	5	0.92 (0.17 $\pm$ 0.35)
522_06	7/45 (16)	8	1.67 (0.15 $\pm$ 0.38)	2/15 (13)	3	1.54 (0.16 $\pm$ 0.44)	0/25 (0)	0	0 (0 $\pm$ 0)
522_08	7/45 (16)	10	2.22 (0.2 $\pm$ 0.51)	3/15 (20)	3	0.85 (0.16 $\pm$ 0.34)	4/25 (16)	6	2.44 (0.2 $\pm$ 0.54)
522_09	8/45 (18)	10	1.57 (0.19 $\pm$ 0.43)	2/15 (13)	2	0.85 (0.11 $\pm$ 0.29)	2/25 (8)	2	1.02 (0.08 $\pm$ 0.26)
522_10	8/45 (18)	15	5.71 (0.35 $\pm$ 0.99)	0/15 (0)	0	0 (0 $\pm$ 0)	1/25 (4)	1	0.81 (0.03 $\pm$ 0.16)
522_11	7/45 (16)	9	2.22 (0.2 $\pm$ 0.51)	0/15 (0)	0	0 (0 $\pm$ 0)	4/25 (16)	5	1.71 (0.18 $\pm$ 0.44)
522_12	6/45 (13)	7	1.67 (0.14 $\pm$ 0.38)	1/15 (7)	1	0.72 (0.05 $\pm$ 0.19)	1/25 (4)	1	0.83 (0.03 $\pm$ 0.17)
534_01	20/45 (44)	26	3.33 (0.55 $\pm$ 0.74)	2/15 (13)	2	1.89 (0.19 $\pm$ 0.52)	4/25 (16)	7	3.19 (0.26 $\pm$ 0.71)
534_02	11/45 (24)	17	3.33 (0.35 $\pm$ 0.74)	3/15 (20)	4	1.57 (0.22 $\pm$ 0.48)	4/25 (16)	5	2.13 (0.19 $\pm$ 0.5)
534_03	5/45 (11)	7	2.25 (0.13 $\pm$ 0.43)	1/15 (7)	1	0.85 (0.06 $\pm$ 0.22)	4/25 (16)	5	1.71 (0.17 $\pm$ 0.42)
534_04	15/45 (33)	20	3.33 (0.44 $\pm$ 0.75)	2/15 (13)	2	1.89 (0.18 $\pm$ 0.52)	2/25 (8)	4	2.13 (0.14 $\pm$ 0.5)
534_05	9/45 (20)	12	2.25 (0.26 $\pm$ 0.58)	3/15 (20)	3	0.88 (0.17 $\pm$ 0.34)	5/25 (20)	8	2.44 (0.29 $\pm$ 0.67)
534_06	7/45 (16)	10	2.25 (0.23 $\pm$ 0.59)	1/15 (7)	1	0.74 (0.05 $\pm$ 0.19)	5/25 (20)	6	2.13 (0.22 $\pm$ 0.51)
BW_02	12/45 (27)	27	5 (0.54 $\pm$ 1.13)	5/15 (33)	6	1.89 (0.43 $\pm$ 0.68)	6/25 (24)	8	2.13 (0.31 $\pm$ 0.61)
BW_03	6/45 (13)	7	1.44 (0.14 $\pm$ 0.38)	3/15 (20)	3	1.89 (0.24 $\pm$ 0.54)	2/25 (8)	3	1.63 (0.09 $\pm$ 0.35)
BW_04	5/45 (11)	5	1.14 (0.09 $\pm$ 0.27)	0/15 (0)	0	0 (0 $\pm$ 0)	4/25 (16)	4	1.06 (0.14 $\pm$ 0.33)
BW_05	5/45 (11)	5	1.12 (0.1 $\pm$ 0.29)	0/15 (0)	0	0 (0 $\pm$ 0)	2/25 (8)	3	1.44 (0.1 $\pm$ 0.34)
BW_06	2/41 (5)	3	2.22 (0.07 $\pm$ 0.37)	1/15 (7)	2	1.63 (0.11 $\pm$ 0.42)	4/25 (16)	4	1.08 (0.15 $\pm$ 0.36)
BW_07	9/45 (20)	10	1.77 (0.21 $\pm$ 0.46)	0/15 (0)	0	0 (0 $\pm$ 0)	2/25 (8)	2	1.06 (0.08 $\pm$ 0.26)
BW_08	13/45 (29)	15	1.77 (0.31 $\pm$ 0.52)	3/15 (20)	3	1.27 (0.2 $\pm$ 0.42)	4/25 (16)	6	2.44 (0.2 $\pm$ 0.55)
BW_09	10/45 (22)	10	1.16 (0.21 $\pm$ 0.41)	4/15 (27)	5	1.63 (0.3 $\pm$ 0.55)	1/25 (4)	1	0.71 (0.03 $\pm$ 0.14)
BW_10	11/45 (24)	25	7.5 (0.52 $\pm$ 1.35)	1/15 (7)	2	1.63 (0.11 $\pm$ 0.42)	3/25 (12)	4	2.15 (0.15 $\pm$ 0.48)
MFW_02		*		1/15 (7)	3	2.44 (0.16 $\pm$ 0.63)	3/25 (12)	4	1.63 (0.14 $\pm$ 0.4)
MFW_03	9/45 (20)	17	2.75 (0.34 $\pm$ 0.76)	2/15 (13)	3	1.63 (0.16 $\pm$ 0.46)	2/25 (8)	2	1.06 (0.07 $\pm$ 0.25)
MFW_04	5/45 (11)	7	2.25 (0.14 $\pm$ 0.46)	3/15 (20)	4	2.53 (0.28 $\pm$ 0.68)	4/25 (16)	4	1.08 (0.14 $\pm$ 0.33)
MFW_05	6/45 (13)	7	2.38 (0.15 $\pm$ 0.45)	1/15 (7)	1	0.81 (0.05 $\pm$ 0.21)	1/25 (4)	1	0.85 (0.03 $\pm$ 0.17)
MFW_06	4/45 (9)	4	1.19 (0.09 $\pm$ 0.29)	0/15 (0)	0	0 (0 $\pm$ 0)	2/25 (8)	2	1 (0.07 $\pm$ 0.24)
MFW_07	6/45 (13)	9	2.5 (0.19 $\pm$ 0.53)	1/15 (7)	1	0.89 (0.06 $\pm$ 0.23)	1/25 (4)	1	0.72 (0.03 $\pm$ 0.14)
MFW_08	7/45 (16)	10	2.5 (0.19 $\pm$ 0.5)	1/15 (7)	1	0.74 (0.05 $\pm$ 0.19)	0/25 (0)	0	0 (0 $\pm$ 0)
MFW_09	6/45 (13)	9	1.77 (0.18 $\pm$ 0.48)	3/15 (20)	3	1.27 (0.19 $\pm$ 0.41)	1/25 (4)	1	1.02 (0.04 $\pm$ 0.2)
MFW_10	14/45 (31)	17	2.22 (0.36 $\pm$ 0.6)	0/15 (0)	0	0 (0 $\pm$ 0)	2/25 (8)	2	1.06 (0.07 $\pm$ 0.25)

Table 7b – Summary of blue shark annual residency index (RI) scores for receiver stations that were deployed consistently from 2022 to 2024. For each station, the number of individuals it detected (D) and the total number of individuals detected across all stations while that receiver was deployed (A) are presented along with the proportion of D to A (%). The cumulative number of calendar days all individuals of a species were detected at a given station is presented as Σdd . Asterisk denotes that the receiver malfunctioned. REV = Revolution Wind, SF = South Fork Wind, SRW = Sunrise Wind, SD = standard deviation.

Station	2022				2023				2024			
	D/A (%)	Σdd	RI		D/A (%)	Σdd	RI		D/A (%)	Σdd	RI	
			Max (Mean ± SD)				Max (Mean ± SD)				Max (Mean ± SD)	
REV_01	5/45 (11)	9	3.03 (0.2 ± 0.64)		1/15 (7)	2	1.47 (0.1 ± 0.38)		4/25 (16)	7	3.54 (0.24 ± 0.74)	
REV_02	7/45 (16)	10	2.8 (0.18 ± 0.5)		1/15 (7)	1	0.74 (0.05 ± 0.19)		4/25 (16)	6	1.9 (0.22 ± 0.55)	
REV_03	11/45 (24)	15	2.8 (0.26 ± 0.56)		1/15 (7)	3	2.63 (0.18 ± 0.68)		2/25 (8)	4	1.9 (0.14 ± 0.47)	
REV_04	7/45 (16)	10	1.97 (0.18 ± 0.46)		1/15 (7)	1	0.8 (0.05 ± 0.21)		4/25 (16)	6	2.86 (0.21 ± 0.61)	
REV_05	8/45 (18)	20	4.5 (0.41 ± 1.03)		2/15 (13)	2	0.88 (0.11 ± 0.3)		4/25 (16)	12	4.41 (0.4 ± 1.15)	
REV_06	5/45 (11)	10	1.97 (0.17 ± 0.51)		1/15 (7)	1	0.74 (0.05 ± 0.19)		3/25 (12)	6	2.94 (0.2 ± 0.63)	
REV_07	10/45 (22)	16	3.15 (0.29 ± 0.69)		2/15 (13)	3	1.47 (0.15 ± 0.42)		2/25 (8)	3	1.47 (0.1 ± 0.34)	
REV_08	6/45 (13)	12	9.09 (0.36 ± 1.42)		1/15 (7)	1	0.74 (0.05 ± 0.19)		5/25 (20)	5	0.95 (0.18 ± 0.37)	
REV_09	7/45 (16)	13	3.54 (0.24 ± 0.67)		1/15 (7)	1	0.74 (0.05 ± 0.19)		2/25 (8)	4	2.21 (0.13 ± 0.47)	
REV_10	3/45 (7)	4	6.06 (0.17 ± 0.91)		3/15 (20)	8	2.94 (0.41 ± 0.9)		4/25 (16)	4	0.95 (0.14 ± 0.32)	
REV_11	4/45 (9)	5	1.8 (0.1 ± 0.36)		2/15 (13)	6	2.94 (0.3 ± 0.84)		2/25 (8)	2	0.86 (0.07 ± 0.24)	
REV_12	5/45 (11)	12	4.61 (0.25 ± 0.85)		4/15 (27)	4	0.88 (0.21 ± 0.37)		1/25 (4)	4	2.94 (0.12 ± 0.59)	
REV_13	5/45 (11)	7	3.03 (0.17 ± 0.57)		1/15 (7)	1	0.81 (0.05 ± 0.21)		7/25 (28)	9	1.71 (0.32 ± 0.54)	
REV_14	7/45 (16)	12	2.63 (0.22 ± 0.56)		3/15 (20)	3	0.88 (0.16 ± 0.33)		3/25 (12)	6	2.94 (0.19 ± 0.63)	
REV_15	10/45 (22)	14	3.01 (0.27 ± 0.61)		1/15 (7)	1	0.74 (0.05 ± 0.19)		3/25 (12)	3	1.08 (0.11 ± 0.31)	
REV_16	12/45 (27)	15	3.03 (0.34 ± 0.67)		2/15 (13)	5	3.51 (0.29 ± 0.92)		2/25 (8)	2	0.96 (0.07 ± 0.25)	
REV_17	7/45 (16)	10	3.03 (0.24 ± 0.64)		2/15 (13)	2	0.88 (0.11 ± 0.29)		5/25 (20)	6	1.92 (0.22 ± 0.49)	
REV_18	4/45 (9)	4	1.11 (0.08 ± 0.26)		1/15 (7)	1	0.8 (0.05 ± 0.21)		5/25 (20)	6	1.47 (0.2 ± 0.42)	
SF_01	7/45 (16)	9	3.03 (0.22 ± 0.6)		2/15 (13)	2	0.93 (0.12 ± 0.31)		3/25 (12)	5	2.86 (0.18 ± 0.61)	
SF_02	4/45 (9)	5	1.77 (0.09 ± 0.32)		0/15 (0)	0	0 (0 ± 0)		3/25 (12)	3	1 (0.11 ± 0.3)	
SRW_01	6/45 (13)	7	2.25 (0.17 ± 0.47)		0/15 (0)	0	0 (0 ± 0)		3/25 (12)	3	1.08 (0.11 ± 0.32)	
SRW_02	5/45 (11)	6	2.25 (0.12 ± 0.4)		0/15 (0)	0	0 (0 ± 0)		3/25 (12)	5	1.65 (0.17 ± 0.48)	
SRW_03	3/45 (7)	6	4.49 (0.15 ± 0.71)		1/15 (7)	2	2.53 (0.17 ± 0.65)		5/25 (20)	8	3.25 (0.27 ± 0.7)	
SRW_04	10/45 (22)	12	3.03 (0.31 ± 0.69)		1/15 (7)	1	1.27 (0.08 ± 0.33)		1/25 (4)	1	0.81 (0.03 ± 0.16)	
SRW_05	11/45 (24)	14	5.56 (0.34 ± 0.9)		2/15 (13)	3	2.53 (0.22 ± 0.67)		2/25 (8)	2	0.95 (0.07 ± 0.25)	
SRW_06	5/45 (11)	9	2.25 (0.19 ± 0.56)		2/15 (13)	3	2.53 (0.23 ± 0.67)		3/25 (12)	4	1.63 (0.14 ± 0.4)	
SRW_07	9/45 (20)	14	3.37 (0.3 ± 0.71)		4/15 (27)	6	3.8 (0.41 ± 0.99)		2/25 (8)	3	1.47 (0.09 ± 0.33)	
SRW_08	13/45 (29)	20	3.41 (0.44 ± 0.8)		4/15 (27)	5	3.77 (0.44 ± 1.01)		2/25 (8)	2	1.08 (0.08 ± 0.27)	
SRW_09	9/45 (20)	12	2.33 (0.27 ± 0.61)		3/15 (20)	7	6.33 (0.53 ± 1.63)		1/25 (4)	5	4.07 (0.16 ± 0.81)	
SRW_10	4/45 (9)	5	3.03 (0.16 ± 0.59)		1/15 (7)	1	0.83 (0.06 ± 0.22)		2/25 (8)	3	1.74 (0.11 ± 0.39)	
SRW_11			*		2/15 (13)	2	0.85 (0.11 ± 0.3)		2/25 (8)	3	1.63 (0.11 ± 0.38)	
SRW_12	8/45 (18)	11	3.37 (0.25 ± 0.66)		3/15 (20)	5	2.53 (0.33 ± 0.74)		3/25 (12)	4	1.63 (0.13 ± 0.38)	

Table 7c – Summary of bluefin tuna annual residency index (RI) scores for receiver stations that were deployed consistently from 2022 to 2024. For each station, the number of individuals it detected (D) and the total number of individuals detected across all stations while that receiver was deployed (A) are presented along with the proportion of D to A (%). The cumulative number of calendar days all individuals of a species were detected at a given station is presented as Σdd . Asterisk denotes that the receiver was lost. BW = Beacon Wind, MFW = Mayflower (SouthCoast) Wind, 501 = Vineyard Wind 1, 522 = Vineyard Northeast, 534 = New England Wind, SD = standard deviation.

Station	2022			2023			2024		
	D/A (%)	Σdd	RI	D/A (%)	Σdd	RI	D/A (%)	Σdd	RI
			Max (Mean $\pm$ SD)			Max (Mean $\pm$ SD)			Max (Mean $\pm$ SD)
501_01	0/6 (0)	0	0 (0 $\pm$ 0)	7/36 (19)	9	3.64 (0.28 $\pm$ 0.73)	9/55 (16)	14	2.56 (0.21 $\pm$ 0.55)
501_02	0/6 (0)	0	0 (0 $\pm$ 0)	5/36 (14)	7	1.37 (0.14 $\pm$ 0.37)	11/55 (20)	15	1.89 (0.2 $\pm$ 0.46)
501_03	0/6 (0)	0	0 (0 $\pm$ 0)	5/36 (14)	6	1.2 (0.11 $\pm$ 0.29)	12/55 (22)	22	4.27 (0.32 $\pm$ 0.8)
501_04	0/6 (0)	0	0 (0 $\pm$ 0)	11/36 (31)	15	4 (0.38 $\pm$ 0.82)	14/55 (25)	29	5.04 (0.42 $\pm$ 0.94)
522_01	1/6 (17)	1	1.32 (0.22 $\pm$ 0.54)	10/36 (28)	17	4.08 (0.38 $\pm$ 0.82)	15/55 (27)	20	2.46 (0.28 $\pm$ 0.53)
522_03	0/6 (0)	0	0 (0 $\pm$ 0)	11/36 (31)	19	3.49 (0.47 $\pm$ 0.9)	15/55 (27)	27	4.1 (0.37 $\pm$ 0.81)
522_04	1/6 (17)	1	0.78 (0.13 $\pm$ 0.32)	9/36 (25)	11	2 (0.26 $\pm$ 0.51)	18/55 (33)	26	2.54 (0.36 $\pm$ 0.61)
522_06	3/6 (50)	4	2.63 (0.68 $\pm$ 1.02)	10/36 (28)	13	2.33 (0.28 $\pm$ 0.54)	15/55 (27)	21	2.27 (0.31 $\pm$ 0.57)
522_08	2/6 (33)	2	1.32 (0.34 $\pm$ 0.56)	11/36 (31)	17	4.65 (0.42 $\pm$ 0.91)	16/55 (29)	20	2.29 (0.27 $\pm$ 0.49)
522_09	0/6 (0)	0	0 (0 $\pm$ 0)	9/36 (25)	12	2.04 (0.25 $\pm$ 0.5)	9/55 (16)	15	2.29 (0.21 $\pm$ 0.52)
522_10	1/5 (20)	1	3.13 (0.63 $\pm$ 1.4)	5/36 (14)	7	3.06 (0.18 $\pm$ 0.56)	17/55 (31)	29	4.1 (0.42 $\pm$ 0.84)
522_11	2/6 (33)	2	1.61 (0.49 $\pm$ 0.76)	6/36 (17)	7	1.24 (0.13 $\pm$ 0.32)	11/55 (20)	18	4.55 (0.31 $\pm$ 0.81)
522_12	0/6 (0)	0	0 (0 $\pm$ 0)	8/36 (22)	12	1.8 (0.23 $\pm$ 0.47)	17/55 (31)	19	1.9 (0.28 $\pm$ 0.47)
534_01	1/6 (17)	1	0.65 (0.11 $\pm$ 0.26)	6/36 (17)	12	2.05 (0.25 $\pm$ 0.62)	16/55 (29)	29	3.97 (0.41 $\pm$ 0.85)
534_02	2/6 (33)	2	0.7 (0.22 $\pm$ 0.35)	4/36 (11)	4	0.68 (0.07 $\pm$ 0.2)	19/55 (35)	32	3.42 (0.49 $\pm$ 0.84)
534_03	1/6 (17)	2	1.29 (0.22 $\pm$ 0.53)	12/36 (33)	15	1.43 (0.29 $\pm$ 0.44)	12/55 (22)	16	3.36 (0.22 $\pm$ 0.55)
534_04	0/6 (0)	0	0 (0 $\pm$ 0)	10/36 (28)	14	4 (0.36 $\pm$ 0.83)	17/55 (31)	32	4.1 (0.46 $\pm$ 0.88)
534_05	1/6 (17)	1	0.7 (0.12 $\pm$ 0.29)	9/36 (25)	12	2.04 (0.26 $\pm$ 0.54)	15/55 (27)	21	2.34 (0.31 $\pm$ 0.56)
534_06	2/6 (33)	6	2.63 (0.87 $\pm$ 1.35)	6/36 (17)	10	2.72 (0.2 $\pm$ 0.54)	14/55 (25)	17	1.95 (0.25 $\pm$ 0.48)
BW_02	0/6 (0)	0	0 (0 $\pm$ 0)	7/36 (19)	9	1.48 (0.18 $\pm$ 0.4)	14/55 (25)	34	7.69 (0.51 $\pm$ 1.28)
BW_03	1/6 (17)	1	1.32 (0.22 $\pm$ 0.54)	8/36 (22)	11	1.36 (0.22 $\pm$ 0.44)	17/55 (31)	28	2.56 (0.4 $\pm$ 0.67)
BW_04	1/6 (17)	1	0.65 (0.11 $\pm$ 0.26)	7/36 (19)	8	1.41 (0.19 $\pm$ 0.4)	21/55 (38)	27	4.2 (0.41 $\pm$ 0.71)
BW_05	1/6 (17)	1	1.32 (0.22 $\pm$ 0.54)	10/36 (28)	14	2.72 (0.28 $\pm$ 0.56)	11/55 (20)	12	1.71 (0.19 $\pm$ 0.4)
BW_06	1/6 (17)	4	5.26 (0.88 $\pm$ 2.15)	9/36 (25)	11	2.14 (0.27 $\pm$ 0.55)	13/55 (24)	20	2.52 (0.29 $\pm$ 0.61)
BW_07	2/6 (33)	3	2.63 (0.56 $\pm$ 1.06)	9/36 (25)	10	2 (0.24 $\pm$ 0.48)	21/55 (38)	41	4.92 (0.58 $\pm$ 1.04)
BW_08	0/6 (0)	0	0 (0 $\pm$ 0)	7/36 (19)	9	1.72 (0.2 $\pm$ 0.44)	14/55 (25)	22	3.28 (0.32 $\pm$ 0.68)
BW_09	2/6 (33)	3	2.63 (0.55 $\pm$ 1.05)	14/36 (39)	18	2.04 (0.44 $\pm$ 0.67)	18/55 (33)	29	5.13 (0.42 $\pm$ 0.86)
BW_10	1/6 (17)	1	1.32 (0.22 $\pm$ 0.54)	10/36 (28)	13	2.74 (0.35 $\pm$ 0.67)	21/55 (38)	35	5.98 (0.53 $\pm$ 1.04)
MFW_02			*	9/36 (25)	12	2.05 (0.25 $\pm$ 0.51)	18/55 (33)	33	3.36 (0.49 $\pm$ 0.85)
MFW_03	2/6 (33)	2	1.32 (0.33 $\pm$ 0.55)	11/36 (31)	15	3.06 (0.42 $\pm$ 0.77)	17/55 (31)	35	4.27 (0.52 $\pm$ 1.04)
MFW_04	2/6 (33)	2	1.32 (0.33 $\pm$ 0.55)	12/36 (33)	15	2 (0.33 $\pm$ 0.54)	23/55 (42)	42	4.27 (0.63 $\pm$ 1.03)
MFW_05	1/6 (17)	1	1.32 (0.22 $\pm$ 0.54)	11/36 (31)	15	2.33 (0.4 $\pm$ 0.68)	17/55 (31)	29	4.1 (0.44 $\pm$ 0.84)
MFW_06	2/6 (33)	2	1.32 (0.35 $\pm$ 0.57)	8/36 (22)	11	2.14 (0.26 $\pm$ 0.56)	10/55 (18)	20	7.58 (0.36 $\pm$ 1.2)
MFW_07	1/6 (17)	1	1.32 (0.22 $\pm$ 0.54)	10/36 (28)	13	2.14 (0.31 $\pm$ 0.61)	13/55 (24)	24	6.06 (0.38 $\pm$ 1.06)
MFW_08	1/6 (17)	2	2.63 (0.44 $\pm$ 1.07)	7/36 (19)	9	1.72 (0.19 $\pm$ 0.43)	22/55 (40)	41	6.84 (0.59 $\pm$ 1.16)
MFW_09	0/6 (0)	0	0 (0 $\pm$ 0)	12/36 (33)	25	5.48 (0.55 $\pm$ 1.15)	17/55 (31)	39	6.78 (0.56 $\pm$ 1.18)
MFW_10	1/6 (17)	1	1.32 (0.22 $\pm$ 0.54)	7/36 (19)	11	2.04 (0.24 $\pm$ 0.54)	17/55 (31)	29	3.13 (0.4 $\pm$ 0.73)

Table 7d – Summary of bluefin tuna annual residency index (RI) scores for receiver stations that were deployed consistently from 2022 to 2024. For each station, the number of individuals it detected (D) and the total number of individuals detected across all stations while that receiver was deployed (A) are presented along with the proportion of D to A (%). The cumulative number of calendar days all individuals of a species were detected at a given station is presented as Σdd . Asterisk denotes that the receiver malfunctioned. REV = Revolution Wind, SF = South Fork Wind, SRW = Sunrise Wind, SD = standard deviation.

Station	2022				2023				2024			
	D/A (%)	Σdd	RI		D/A (%)	Σdd	RI		D/A (%)	Σdd	RI	
			Max (Mean ± SD)				Max (Mean ± SD)				Max (Mean ± SD)	
REV_01	0/6 (0)	0	0 (0 ± 0)		7/36 (19)	13	5.45 (0.38 ± 1.04)		5/55 (9)	13	3.17 (0.17 ± 0.63)	
REV_02	0/6 (0)	0	0 (0 ± 0)		11/36 (31)	17	2.59 (0.37 ± 0.67)		10/55 (18)	19	2.83 (0.27 ± 0.66)	
REV_03	0/6 (0)	0	0 (0 ± 0)		10/36 (28)	19	2.59 (0.39 ± 0.7)		7/55 (13)	17	3.42 (0.25 ± 0.73)	
REV_04	0/6 (0)	0	0 (0 ± 0)		10/36 (28)	30	5.45 (0.7 ± 1.4)		10/55 (18)	23	4.27 (0.33 ± 0.89)	
REV_05	1/6 (17)	1	0.65 (0.11 ± 0.26)		7/36 (19)	8	1.82 (0.2 ± 0.45)		8/55 (15)	17	3.07 (0.24 ± 0.65)	
REV_06	0/6 (0)	0	0 (0 ± 0)		11/36 (31)	13	1.82 (0.3 ± 0.52)		9/55 (16)	20	3.17 (0.27 ± 0.73)	
REV_07	1/6 (17)	1	0.65 (0.11 ± 0.26)		8/36 (22)	10	1.82 (0.24 ± 0.5)		9/55 (16)	17	2.56 (0.25 ± 0.61)	
REV_08	0/6 (0)	0	0 (0 ± 0)		7/36 (19)	8	1.82 (0.19 ± 0.44)		8/55 (15)	12	1.71 (0.17 ± 0.46)	
REV_09	0/6 (0)	0	0 (0 ± 0)		9/36 (25)	14	3.2 (0.29 ± 0.64)		10/55 (18)	15	2.94 (0.21 ± 0.54)	
REV_10	1/6 (17)	1	0.65 (0.11 ± 0.26)		9/36 (25)	12	2.59 (0.28 ± 0.59)		4/55 (7)	4	0.98 (0.06 ± 0.23)	
REV_11	1/6 (17)	2	1.29 (0.22 ± 0.53)		6/36 (17)	8	1.6 (0.17 ± 0.4)		9/55 (16)	10	1.64 (0.16 ± 0.39)	
REV_12	0/6 (0)	0	0 (0 ± 0)		11/36 (31)	22	2.63 (0.43 ± 0.75)		8/55 (15)	8	0.94 (0.12 ± 0.29)	
REV_13	1/6 (17)	1	0.65 (0.11 ± 0.26)		11/36 (31)	19	2.14 (0.37 ± 0.65)		7/55 (13)	11	2.75 (0.15 ± 0.48)	
REV_14	0/6 (0)	0	0 (0 ± 0)		7/36 (19)	9	2.22 (0.23 ± 0.55)		7/55 (13)	8	1.89 (0.14 ± 0.39)	
REV_15	0/6 (0)	0	0 (0 ± 0)		7/36 (19)	10	2.14 (0.22 ± 0.52)		10/55 (18)	13	1.71 (0.18 ± 0.42)	
REV_16	2/6 (33)	2	1.32 (0.36 ± 0.58)		13/36 (36)	41	3.7 (0.86 ± 1.26)		10/55 (18)	13	3.17 (0.19 ± 0.51)	
REV_17	0/6 (0)	0	0 (0 ± 0)		15/36 (42)	24	2.86 (0.48 ± 0.73)		10/54 (19)	16	3.45 (0.26 ± 0.65)	
REV_18	1/6 (17)	1	0.65 (0.11 ± 0.26)		9/36 (25)	11	1.6 (0.23 ± 0.43)		6/55 (11)	12	3.42 (0.18 ± 0.63)	
SF_01	1/6 (17)	1	0.68 (0.11 ± 0.28)		6/36 (17)	9	2.05 (0.18 ± 0.47)		10/55 (18)	16	2.56 (0.23 ± 0.58)	
SF_02	0/6 (0)	0	0 (0 ± 0)		13/36 (36)	25	3.2 (0.52 ± 0.86)		10/55 (18)	15	2.56 (0.23 ± 0.56)	
SRW_01	0/6 (0)	0	0 (0 ± 0)		13/36 (36)	18	1.9 (0.4 ± 0.6)		6/55 (11)	6	1.14 (0.09 ± 0.27)	
SRW_02	3/6 (50)	4	1.32 (0.58 ± 0.65)		13/36 (36)	19	2.04 (0.38 ± 0.58)		9/55 (16)	9	3.13 (0.18 ± 0.5)	
SRW_03	2/6 (33)	3	1.32 (0.43 ± 0.67)		8/36 (22)	13	2.4 (0.29 ± 0.62)		8/55 (15)	12	2.46 (0.17 ± 0.46)	
SRW_04	0/6 (0)	0	0 (0 ± 0)		15/36 (42)	31	3.2 (0.7 ± 0.95)		9/55 (16)	18	3.36 (0.27 ± 0.73)	
SRW_05	0/6 (0)	0	0 (0 ± 0)		17/36 (47)	28	2.4 (0.57 ± 0.71)		8/55 (15)	13	1.71 (0.18 ± 0.47)	
SRW_06	1/6 (17)	1	0.65 (0.11 ± 0.26)		10/36 (28)	14	2.38 (0.33 ± 0.62)		14/55 (25)	21	3.36 (0.31 ± 0.68)	
SRW_07	0/6 (0)	0	0 (0 ± 0)		15/36 (42)	25	5.17 (0.61 ± 1.09)		11/55 (20)	16	2.56 (0.24 ± 0.54)	
SRW_08	1/6 (17)	1	0.7 (0.12 ± 0.29)		6/36 (17)	8	1.97 (0.16 ± 0.42)		19/55 (35)	25	2.34 (0.36 ± 0.58)	
SRW_09	1/6 (17)	1	0.65 (0.11 ± 0.26)		15/36 (42)	29	3.17 (0.62 ± 0.87)		10/55 (18)	13	2.21 (0.19 ± 0.46)	
SRW_10	1/6 (17)	2	1.37 (0.23 ± 0.56)		9/36 (25)	12	1.36 (0.23 ± 0.44)		8/55 (15)	8	3.13 (0.16 ± 0.48)	
SRW_11			*		15/36 (42)	39	4.08 (0.91 ± 1.22)		8/55 (15)	10	1.96 (0.18 ± 0.47)	
SRW_12	2/6 (33)	2	0.85 (0.25 ± 0.39)		11/36 (31)	17	2.14 (0.36 ± 0.61)		7/55 (13)	10	2.21 (0.14 ± 0.43)	

Table 7e – Summary of shortfin mako annual residency index (RI) scores for receiver stations that were deployed consistently from 2022 to 2024. For each station, the number of individuals it detected (D) and the total number of individuals detected across all stations while that receiver was deployed (A) are presented along with the proportion of D to A (%). The cumulative number of calendar days all individuals of a species were detected at a given station is presented as Σdd . Asterisk denotes that the receiver was lost. BW = Beacon Wind, MFW = Mayflower (SouthCoast) Wind, 501 = Vineyard Wind 1, 522 = Vineyard Northeast, 534 = New England Wind, SD = standard deviation.

Station	2022			2023			2024		
	D/A (%)	Σdd	RI	D/A (%)	Σdd	RI	D/A (%)	Σdd	RI
			Max (Mean $\pm$ SD)			Max (Mean $\pm$ SD)			Max (Mean $\pm$ SD)
501_01	0/13 (0)	0	0 (0 $\pm$ 0)	0/25 (0)	0	0 (0 $\pm$ 0)	6/27 (22)	6	1.05 (0.17 $\pm$ 0.32)
501_02	1/13 (8)	1	0.91 (0.07 $\pm$ 0.25)	1/25 (4)	1	0.85 (0.03 $\pm$ 0.17)	5/27 (19)	7	2.11 (0.21 $\pm$ 0.52)
501_03	0/13 (0)	0	0 (0 $\pm$ 0)	1/25 (4)	1	0.62 (0.02 $\pm$ 0.12)	3/27 (11)	3	1.05 (0.09 $\pm$ 0.27)
501_04	2/13 (15)	2	1.06 (0.13 $\pm$ 0.34)	1/25 (4)	1	0.94 (0.04 $\pm$ 0.19)	3/27 (11)	6	2.88 (0.17 $\pm$ 0.59)
522_01	4/13 (31)	7	2.35 (0.47 $\pm$ 0.83)	1/25 (4)	1	0.94 (0.04 $\pm$ 0.19)	3/27 (11)	3	1.18 (0.09 $\pm$ 0.28)
522_03	2/13 (15)	2	0.96 (0.14 $\pm$ 0.35)	2/25 (8)	2	0.94 (0.07 $\pm$ 0.26)	1/27 (4)	1	0.67 (0.02 $\pm$ 0.13)
522_04	2/13 (15)	2	0.79 (0.11 $\pm$ 0.28)	1/25 (4)	1	0.87 (0.03 $\pm$ 0.17)	1/27 (4)	1	0.61 (0.02 $\pm$ 0.12)
522_06	2/13 (15)	2	1.18 (0.15 $\pm$ 0.38)	4/25 (16)	6	1.8 (0.21 $\pm$ 0.53)	1/27 (4)	1	0.73 (0.03 $\pm$ 0.14)
522_08	3/13 (23)	4	2.35 (0.31 $\pm$ 0.69)	1/25 (4)	1	0.9 (0.04 $\pm$ 0.18)	1/27 (4)	1	0.73 (0.03 $\pm$ 0.14)
522_09	1/13 (8)	1	0.83 (0.06 $\pm$ 0.23)	3/25 (12)	3	0.9 (0.09 $\pm$ 0.26)	1/27 (4)	1	0.66 (0.02 $\pm$ 0.13)
522_10	1/13 (8)	1	1.59 (0.12 $\pm$ 0.44)	2/25 (8)	2	1.14 (0.08 $\pm$ 0.28)	1/27 (4)	1	0.57 (0.02 $\pm$ 0.11)
522_11	1/13 (8)	1	0.9 (0.07 $\pm$ 0.25)	1/25 (4)	1	0.62 (0.02 $\pm$ 0.12)	1/27 (4)	1	0.67 (0.02 $\pm$ 0.13)
522_12	2/13 (15)	2	0.9 (0.13 $\pm$ 0.32)	0/25 (0)	0	0 (0 $\pm$ 0)	3/27 (11)	3	1.18 (0.1 $\pm$ 0.29)
534_01	1/13 (8)	1	0.9 (0.07 $\pm$ 0.25)	1/25 (4)	1	0.85 (0.03 $\pm$ 0.17)	1/27 (4)	1	0.78 (0.03 $\pm$ 0.15)
534_02	2/13 (15)	2	1.18 (0.15 $\pm$ 0.38)	4/25 (16)	6	1.86 (0.2 $\pm$ 0.5)	1/27 (4)	1	0.57 (0.02 $\pm$ 0.11)
534_03	3/13 (23)	3	1.06 (0.21 $\pm$ 0.4)	6/25 (24)	6	1.22 (0.22 $\pm$ 0.4)	2/27 (7)	3	1.34 (0.08 $\pm$ 0.29)
534_04	1/13 (8)	1	1.18 (0.09 $\pm$ 0.33)	3/25 (12)	3	1.43 (0.13 $\pm$ 0.38)	1/27 (4)	1	0.73 (0.03 $\pm$ 0.14)
534_05	1/13 (8)	3	3.53 (0.27 $\pm$ 0.98)	3/25 (12)	3	0.94 (0.1 $\pm$ 0.29)	4/27 (15)	4	1.05 (0.11 $\pm$ 0.28)
534_06	2/13 (15)	2	1.18 (0.15 $\pm$ 0.38)	1/25 (4)	1	0.98 (0.04 $\pm$ 0.2)	2/27 (7)	2	1.33 (0.08 $\pm$ 0.29)
BW_02	1/13 (8)	1	1.06 (0.08 $\pm$ 0.3)	3/25 (12)	3	0.94 (0.11 $\pm$ 0.29)	2/27 (7)	2	0.72 (0.05 $\pm$ 0.17)
BW_03	2/13 (15)	3	2.35 (0.24 $\pm$ 0.67)	2/25 (8)	2	0.87 (0.06 $\pm$ 0.21)	2/27 (7)	2	0.72 (0.05 $\pm$ 0.17)
BW_04	3/13 (23)	5	3.53 (0.4 $\pm$ 0.99)	1/25 (4)	1	0.85 (0.03 $\pm$ 0.17)	3/27 (11)	4	1.56 (0.12 $\pm$ 0.37)
BW_05	1/13 (8)	1	0.83 (0.06 $\pm$ 0.23)	1/25 (4)	2	1.71 (0.07 $\pm$ 0.34)	1/27 (4)	1	0.66 (0.02 $\pm$ 0.13)
BW_06	0/13 (0)	0	0 (0 $\pm$ 0)	2/25 (8)	2	0.85 (0.06 $\pm$ 0.21)	1/27 (4)	1	0.57 (0.02 $\pm$ 0.11)
BW_07	2/13 (15)	3	2.35 (0.25 $\pm$ 0.68)	1/25 (4)	1	0.62 (0.02 $\pm$ 0.12)	2/27 (7)	2	0.72 (0.05 $\pm$ 0.19)
BW_08	1/13 (8)	2	2.35 (0.18 $\pm$ 0.65)	0/25 (0)	0	0 (0 $\pm$ 0)	2/27 (7)	2	0.78 (0.05 $\pm$ 0.19)
BW_09	1/13 (8)	2	2.35 (0.18 $\pm$ 0.65)	3/25 (12)	3	1.14 (0.11 $\pm$ 0.3)	1/27 (4)	1	0.57 (0.02 $\pm$ 0.11)
BW_10	1/13 (8)	2	1.36 (0.1 $\pm$ 0.38)	1/25 (4)	2	1.24 (0.05 $\pm$ 0.25)	0/27 (0)	0	0 (0 $\pm$ 0)
MFW_02			*	3/25 (12)	3	0.87 (0.09 $\pm$ 0.26)	0/27 (0)	0	0 (0 $\pm$ 0)
MFW_03	0/13 (0)	0	0 (0 $\pm$ 0)	1/25 (4)	1	0.85 (0.03 $\pm$ 0.17)	0/27 (0)	0	0 (0 $\pm$ 0)
MFW_04	1/13 (8)	2	2.35 (0.18 $\pm$ 0.65)	4/25 (16)	4	1.43 (0.16 $\pm$ 0.4)	1/27 (4)	1	0.72 (0.03 $\pm$ 0.14)
MFW_05	0/13 (0)	0	0 (0 $\pm$ 0)	0/25 (0)	0	0 (0 $\pm$ 0)	3/27 (11)	4	1.14 (0.09 $\pm$ 0.27)
MFW_06	1/13 (8)	1	0.83 (0.06 $\pm$ 0.23)	1/25 (4)	1	0.87 (0.03 $\pm$ 0.17)	2/27 (7)	3	1.16 (0.07 $\pm$ 0.26)
MFW_07	1/13 (8)	1	0.9 (0.07 $\pm$ 0.25)	1/25 (4)	1	0.62 (0.02 $\pm$ 0.12)	1/27 (4)	1	0.78 (0.03 $\pm$ 0.15)
MFW_08	1/13 (8)	1	0.9 (0.07 $\pm$ 0.25)	3/25 (12)	3	1.14 (0.11 $\pm$ 0.3)	2/27 (7)	2	0.66 (0.05 $\pm$ 0.17)
MFW_09	2/13 (15)	2	1.18 (0.16 $\pm$ 0.39)	1/25 (4)	1	0.87 (0.03 $\pm$ 0.17)	1/27 (4)	1	0.72 (0.03 $\pm$ 0.14)
MFW_10	3/13 (23)	5	2.35 (0.37 $\pm$ 0.78)	2/25 (8)	3	1.24 (0.09 $\pm$ 0.31)	1/27 (4)	1	0.57 (0.02 $\pm$ 0.11)

Table 7f – Summary of shortfin mako annual residency index (RI) scores for receiver stations that were deployed consistently from 2022 to 2024. For each station, the number of individuals it detected (D) and the total number of individuals detected across all stations while that receiver was deployed (A) are presented along with the proportion of D to A (%). The cumulative number of calendar days all individuals of a species were detected at a given station is presented as Σdd . Asterisk denotes that the receiver malfunctioned. REV = Revolution Wind, SF = South Fork Wind, SRW = Sunrise Wind, SD = standard deviation.

Station	2022				2023				2024			
	D/A (%)	Σdd	RI		D/A (%)	Σdd	RI		D/A (%)	Σdd	RI	
			Max (Mean ± SD)				Max (Mean ± SD)				Max (Mean ± SD)	
REV_01	0/13 (0)	0	0 (0 ± 0)		2/25 (8)	4	2.52 (0.15 ± 0.55)		5/27 (19)	10	3.03 (0.31 ± 0.75)	
REV_02	1/13 (8)	1	1.69 (0.13 ± 0.47)		3/25 (12)	3	1.22 (0.11 ± 0.31)		6/27 (22)	9	2.67 (0.34 ± 0.75)	
REV_03	2/13 (15)	2	1.69 (0.21 ± 0.53)		0/25 (0)	0	0 (0 ± 0)		10/27 (37)	14	1.37 (0.38 ± 0.53)	
REV_04	0/13 (0)	0	0 (0 ± 0)		2/25 (8)	2	0.87 (0.07 ± 0.23)		3/27 (11)	5	1.21 (0.11 ± 0.34)	
REV_05	1/13 (8)	1	0.68 (0.05 ± 0.19)		2/25 (8)	3	2.44 (0.13 ± 0.51)		11/27 (41)	14	2.5 (0.46 ± 0.7)	
REV_06	1/13 (8)	1	0.68 (0.05 ± 0.19)		2/25 (8)	3	2.44 (0.13 ± 0.51)		5/27 (19)	6	1.33 (0.14 ± 0.33)	
REV_07	3/13 (23)	3	1.69 (0.25 ± 0.53)		3/25 (12)	3	0.94 (0.1 ± 0.28)		10/27 (37)	15	4 (0.5 ± 0.93)	
REV_08	0/13 (0)	0	0 (0 ± 0)		2/25 (8)	3	2.44 (0.12 ± 0.5)		8/27 (30)	14	4 (0.43 ± 0.87)	
REV_09	1/13 (8)	1	0.68 (0.05 ± 0.19)		4/25 (16)	4	0.98 (0.14 ± 0.33)		5/27 (19)	8	1.74 (0.19 ± 0.45)	
REV_10	2/13 (15)	3	2.13 (0.23 ± 0.62)		2/25 (8)	3	5.13 (0.24 ± 1.04)		9/27 (33)	11	1.33 (0.29 ± 0.45)	
REV_11	1/13 (8)	1	1.06 (0.08 ± 0.3)		1/25 (4)	1	0.68 (0.03 ± 0.14)		6/27 (22)	7	1.33 (0.17 ± 0.34)	
REV_12	4/13 (31)	5	1.69 (0.39 ± 0.63)		4/25 (16)	5	2.67 (0.23 ± 0.61)		6/27 (22)	7	1.21 (0.18 ± 0.36)	
REV_13	2/13 (15)	2	1.06 (0.15 ± 0.37)		3/25 (12)	6	3.23 (0.2 ± 0.68)		4/27 (15)	5	1.21 (0.12 ± 0.3)	
REV_14	2/13 (15)	2	1.69 (0.2 ± 0.51)		5/25 (20)	9	2.52 (0.34 ± 0.72)		8/27 (30)	8	0.73 (0.19 ± 0.3)	
REV_15	3/13 (23)	5	2.04 (0.33 ± 0.66)		3/25 (12)	4	1.68 (0.13 ± 0.38)		4/27 (15)	7	1.82 (0.18 ± 0.47)	
REV_16	3/13 (23)	3	1.06 (0.21 ± 0.41)		4/25 (16)	8	2.94 (0.28 ± 0.76)		4/27 (15)	7	1.97 (0.17 ± 0.47)	
REV_17	1/13 (8)	1	0.79 (0.06 ± 0.22)		7/25 (28)	11	2.44 (0.41 ± 0.73)		9/27 (33)	15	2.21 (0.41 ± 0.69)	
REV_18	0/13 (0)	0	0 (0 ± 0)		4/25 (16)	7	2.94 (0.3 ± 0.78)		8/27 (30)	10	2.5 (0.35 ± 0.63)	
SF_01	0/13 (0)	0	0 (0 ± 0)		2/25 (8)	4	7.69 (0.34 ± 1.54)		9/27 (33)	13	2.5 (0.4 ± 0.7)	
SF_02	1/13 (8)	1	0.79 (0.06 ± 0.22)		5/25 (20)	7	2.94 (0.27 ± 0.67)		6/27 (22)	6	1.33 (0.18 ± 0.35)	
SRW_01	2/13 (15)	2	1.69 (0.18 ± 0.49)		6/25 (24)	10	6.1 (0.42 ± 1.23)		3/27 (11)	6	5.33 (0.25 ± 1.03)	
SRW_02	1/13 (8)	1	0.79 (0.06 ± 0.22)		2/25 (8)	3	5.13 (0.24 ± 1.03)		8/27 (30)	11	7.5 (0.52 ± 1.5)	
SRW_03	2/13 (15)	2	1.06 (0.15 ± 0.37)		3/25 (12)	3	2.56 (0.17 ± 0.55)		9/27 (33)	15	2.5 (0.46 ± 0.74)	
SRW_04	1/13 (8)	2	2.13 (0.16 ± 0.59)		7/25 (28)	7	2.56 (0.3 ± 0.6)		6/27 (22)	7	5 (0.33 ± 0.99)	
SRW_05	4/13 (31)	5	2.13 (0.35 ± 0.64)		5/25 (20)	7	2.56 (0.31 ± 0.69)		8/27 (30)	11	1.44 (0.28 ± 0.48)	
SRW_06	2/13 (15)	3	2.13 (0.23 ± 0.61)		7/25 (28)	11	2.44 (0.4 ± 0.71)		7/27 (26)	8	1.14 (0.18 ± 0.33)	
SRW_07	3/13 (23)	5	3.19 (0.37 ± 0.9)		6/25 (24)	9	3.66 (0.33 ± 0.8)		6/27 (22)	6	0.72 (0.14 ± 0.27)	
SRW_08	1/13 (8)	1	0.83 (0.06 ± 0.23)		5/25 (20)	8	4.88 (0.32 ± 0.99)		1/27 (4)	1	0.72 (0.03 ± 0.14)	
SRW_09	2/13 (15)	5	2.48 (0.35 ± 0.87)		6/25 (24)	8	2.44 (0.29 ± 0.61)		4/27 (15)	5	1.14 (0.13 ± 0.33)	
SRW_10	1/13 (8)	1	1.69 (0.13 ± 0.47)		2/25 (8)	4	7.69 (0.36 ± 1.55)		9/27 (33)	17	15 (0.92 ± 3)	
SRW_11			*		1/25 (4)	3	1.86 (0.07 ± 0.37)		3/27 (11)	3	2.5 (0.16 ± 0.53)	
SRW_12	2/13 (15)	4	2.48 (0.27 ± 0.73)		3/25 (12)	3	1.22 (0.12 ± 0.33)		1/27 (4)	1	0.57 (0.02 ± 0.11)	

Table 7g – Summary of common thresher shark annual residency index (RI) scores for receiver stations that were deployed consistently from 2023 to 2024. No common thresher sharks were monitored in 2022. For each station, the number of individuals it detected (D) and the total number of individuals detected across all stations while that receiver was deployed (A) are presented along with the proportion of D to A (%). The cumulative number of calendar days all individuals of a species were detected at a given station is presented as $\sum dd$. BW = Beacon Wind, MFW = Mayflower (SouthCoast) Wind, 501 = Vineyard Wind 1, 522 = Vineyard Northeast, 534 = New England Wind, SD = standard deviation.

Station	2023			2024		
	D/A (%)	$\sum dd$	RI	D/A (%)	$\sum dd$	RI
			Max (Mean $\pm$ SD)			Max (Mean $\pm$ SD)
501_01	2/2 (100)	6	6.02 (3.62 $\pm$ 3.4)	1/9 (11)	2	4 (0.44 $\pm$ 1.33)
501_02	1/2 (50)	3	3.61 (1.81 $\pm$ 2.56)	2/9 (22)	2	1.79 (0.27 $\pm$ 0.61)
501_03	1/2 (50)	1	1.2 (0.6 $\pm$ 0.85)	1/9 (11)	1	0.68 (0.08 $\pm$ 0.23)
501_04	1/2 (50)	2	2.41 (1.2 $\pm$ 1.7)	2/9 (22)	2	1.79 (0.4 $\pm$ 0.79)
522_01	0/2 (0)	0	0 (0 $\pm$ 0)	1/9 (11)	1	1.79 (0.2 $\pm$ 0.6)
522_03	1/2 (50)	1	1.2 (0.6 $\pm$ 0.85)	0/9 (0)	0	0 (0 $\pm$ 0)
522_04	0/2 (0)	0	0 (0 $\pm$ 0)	0/9 (0)	0	0 (0 $\pm$ 0)
522_06	0/2 (0)	0	0 (0 $\pm$ 0)	0/9 (0)	0	0 (0 $\pm$ 0)
522_08	1/2 (50)	1	1.2 (0.6 $\pm$ 0.85)	0/9 (0)	0	0 (0 $\pm$ 0)
522_09	1/2 (50)	1	1.2 (0.6 $\pm$ 0.85)	0/9 (0)	0	0 (0 $\pm$ 0)
522_10	0/2 (0)	0	0 (0 $\pm$ 0)	0/9 (0)	0	0 (0 $\pm$ 0)
522_11	0/2 (0)	0	0 (0 $\pm$ 0)	0/9 (0)	0	0 (0 $\pm$ 0)
522_12	0/2 (0)	0	0 (0 $\pm$ 0)	0/9 (0)	0	0 (0 $\pm$ 0)
534_01	0/2 (0)	0	0 (0 $\pm$ 0)	2/9 (22)	4	2.04 (0.42 $\pm$ 0.84)
534_02	0/2 (0)	0	0 (0 $\pm$ 0)	3/9 (33)	3	2 (0.5 $\pm$ 0.82)
534_03	0/2 (0)	0	0 (0 $\pm$ 0)	1/9 (11)	1	1.75 (0.19 $\pm$ 0.58)
534_04	1/2 (50)	1	1.2 (0.6 $\pm$ 0.85)	1/9 (11)	2	3.57 (0.4 $\pm$ 1.19)
534_05	1/2 (50)	2	2.41 (1.2 $\pm$ 1.7)	0/9 (0)	0	0 (0 $\pm$ 0)
534_06	0/2 (0)	0	0 (0 $\pm$ 0)	1/9 (11)	1	0.68 (0.08 $\pm$ 0.23)
BW_02	1/2 (50)	1	1.2 (0.6 $\pm$ 0.85)	3/9 (33)	4	3.57 (0.67 $\pm$ 1.24)
BW_03	0/2 (0)	0	0 (0 $\pm$ 0)	2/9 (22)	2	2 (0.42 $\pm$ 0.83)
BW_04	0/2 (0)	0	0 (0 $\pm$ 0)	0/9 (0)	0	0 (0 $\pm$ 0)
BW_05	1/2 (50)	2	2.44 (1.22 $\pm$ 1.72)	0/9 (0)	0	0 (0 $\pm$ 0)
BW_06	2/2 (100)	2	1.22 (1.21 $\pm$ 0.01)	2/9 (22)	2	2 (0.42 $\pm$ 0.83)
BW_07	0/2 (0)	0	0 (0 $\pm$ 0)	2/9 (22)	4	4 (0.83 $\pm$ 1.66)
BW_08	1/2 (50)	1	1.22 (0.61 $\pm$ 0.86)	5/9 (56)	5	2.13 (0.9 $\pm$ 0.94)
BW_09	1/2 (50)	1	1.22 (0.61 $\pm$ 0.86)	4/9 (44)	6	5.26 (1.12 $\pm$ 1.78)
BW_10	1/2 (50)	1	1.2 (0.6 $\pm$ 0.85)	1/9 (11)	1	1.79 (0.2 $\pm$ 0.6)
MFW_02	1/2 (50)	1	1.2 (0.6 $\pm$ 0.85)	0/9 (0)	0	0 (0 $\pm$ 0)
MFW_03	0/2 (0)	0	0 (0 $\pm$ 0)	2/9 (22)	2	1.79 (0.39 $\pm$ 0.78)
MFW_04	0/2 (0)	0	0 (0 $\pm$ 0)	1/9 (11)	2	4 (0.44 $\pm$ 1.33)
MFW_05	0/2 (0)	0	0 (0 $\pm$ 0)	1/9 (11)	1	1.75 (0.19 $\pm$ 0.58)
MFW_06	1/2 (50)	1	1.22 (0.61 $\pm$ 0.86)	0/9 (0)	0	0 (0 $\pm$ 0)
MFW_07	0/2 (0)	0	0 (0 $\pm$ 0)	0/9 (0)	0	0 (0 $\pm$ 0)
MFW_08	0/2 (0)	0	0 (0 $\pm$ 0)	1/9 (11)	1	2 (0.22 $\pm$ 0.67)
MFW_09	0/2 (0)	0	0 (0 $\pm$ 0)	2/9 (22)	2	2.13 (0.43 $\pm$ 0.86)
MFW_10	0/2 (0)	0	0 (0 $\pm$ 0)	1/9 (11)	1	1.79 (0.2 $\pm$ 0.6)

Table 7h – Summary of common thresher shark annual residency index (RI) scores for receiver stations that were deployed consistently from 2022 to 2024. No common thresher sharks were monitored in 2022. For each station, the number of individuals it detected (D) and the total number of individuals detected across all stations while that receiver was deployed (A) are presented along with the proportion of D to A (%). The cumulative number of calendar days all individuals of a species were detected at a given station is presented as Σdd . REV = Revolution Wind, SF = South Fork Wind, SRW = Sunrise Wind, SD = standard deviation.

Station	2023				2024			
	D/A (%)	Σdd	RI		D/A (%)	Σdd	RI	
			Max (Mean ± SD)				Max (Mean ± SD)	
REV_01	0/2 (0)	0	0 (0 ± 0)		4/9 (44)	8	3.51 (1.09 ± 1.39)	
REV_02	1/2 (50)	1	1.22 (0.61 ± 0.86)		4/9 (44)	13	12.28 (2.22 ± 3.99)	
REV_03	1/2 (50)	1	1.22 (0.61 ± 0.86)		4/9 (44)	7	3.51 (1.02 ± 1.31)	
REV_04	1/2 (50)	1	1.2 (0.6 ± 0.85)		5/9 (56)	16	8.77 (2.43 ± 3.09)	
REV_05	0/2 (0)	0	0 (0 ± 0)		3/9 (33)	9	12.28 (1.64 ± 4.04)	
REV_06	0/2 (0)	0	0 (0 ± 0)		6/9 (67)	11	5.26 (1.96 ± 1.87)	
REV_07	0/2 (0)	0	0 (0 ± 0)		3/9 (33)	5	5.26 (0.86 ± 1.76)	
REV_08	1/2 (50)	1	1.22 (0.61 ± 0.86)		5/9 (56)	12	3.64 (1.76 ± 1.76)	
REV_09	0/2 (0)	0	0 (0 ± 0)		3/9 (33)	11	7.02 (1.79 ± 3.04)	
REV_10	0/2 (0)	0	0 (0 ± 0)		3/9 (33)	3	1.75 (0.47 ± 0.76)	
REV_11	0/2 (0)	0	0 (0 ± 0)		0/9 (0)	0	0 (0 ± 0)	
REV_12	0/2 (0)	0	0 (0 ± 0)		3/9 (33)	5	3.51 (0.75 ± 1.26)	
REV_13	1/2 (50)	1	1.22 (0.61 ± 0.86)		2/9 (22)	4	3.51 (0.54 ± 1.2)	
REV_14	0/2 (0)	0	0 (0 ± 0)		3/9 (33)	5	4.26 (1.1 ± 1.78)	
REV_15	2/2 (100)	2	1.22 (1.21 ± 0.01)		1/9 (11)	1	1.79 (0.2 ± 0.6)	
REV_16	1/2 (50)	1	1.2 (0.6 ± 0.85)		2/9 (22)	2	1.75 (0.27 ± 0.6)	
REV_17	1/2 (50)	1	1.2 (0.6 ± 0.85)		1/9 (11)	1	2.38 (0.26 ± 0.79)	
REV_18	0/2 (0)	0	0 (0 ± 0)		1/9 (11)	1	1.75 (0.19 ± 0.58)	
SF_01	0/2 (0)	0	0 (0 ± 0)		2/9 (22)	2	1.82 (0.4 ± 0.79)	
SF_02	0/2 (0)	0	0 (0 ± 0)		1/9 (11)	1	0.68 (0.08 ± 0.23)	
SRW_01	0/2 (0)	0	0 (0 ± 0)		1/9 (11)	1	1.75 (0.19 ± 0.58)	
SRW_02	0/2 (0)	0	0 (0 ± 0)		1/9 (11)	1	1.82 (0.2 ± 0.61)	
SRW_03	0/2 (0)	0	0 (0 ± 0)		2/9 (22)	4	5.36 (0.79 ± 1.81)	
SRW_04	0/2 (0)	0	0 (0 ± 0)		1/9 (11)	2	4 (0.44 ± 1.33)	
SRW_05	2/2 (100)	2	1.22 (1.21 ± 0.01)		2/9 (22)	2	2 (0.42 ± 0.84)	
SRW_06	2/2 (100)	4	3.61 (2.42 ± 1.69)		1/9 (11)	4	8 (0.89 ± 2.67)	
SRW_07	1/2 (50)	1	1.2 (0.6 ± 0.85)		2/9 (22)	3	4 (0.64 ± 1.39)	
SRW_08	1/2 (50)	1	1.22 (0.61 ± 0.86)		3/9 (33)	5	3.51 (0.76 ± 1.27)	
SRW_09	1/2 (50)	2	2.41 (1.2 ± 1.7)		2/9 (22)	5	6 (0.82 ± 1.99)	
SRW_10	1/2 (50)	1	1.2 (0.6 ± 0.85)		1/9 (11)	2	3.57 (0.4 ± 1.19)	
SRW_11	2/2 (100)	2	1.22 (1.21 ± 0.01)		0/9 (0)	0	0 (0 ± 0)	
SRW_12	0/2 (0)	0	0 (0 ± 0)		1/9 (11)	1	0.68 (0.08 ± 0.23)	

Table 7i – Summary of dusky shark annual residency index (RI) scores for receiver stations that were deployed consistently from 2022 to 2024. For each station, the number of individuals it detected (D) and the total number of individuals detected across all stations while that receiver was deployed (A) are presented along with the proportion of D to A (%). The cumulative number of calendar days all individuals of a species were detected at a given station is presented as Σdd . Asterisk denotes that the receiver was lost. BW = Beacon Wind, MFW = Mayflower (SouthCoast) Wind, 501 = Vineyard Wind 1, 522 = Vineyard Northeast, 534 = New England Wind, SD = standard deviation.

Station	2022				2023				2024			
	D/A (%)	Σdd	RI		D/A (%)	Σdd	RI		D/A (%)	Σdd	RI	
			Max (Mean $\pm$ SD)				Max (Mean $\pm$ SD)				Max (Mean $\pm$ SD)	
501_01	1/7 (14)	1	2 (0.29 $\pm$ 0.76)		0/7 (0)	0	0 (0 $\pm$ 0)		1/7 (14)	1	1.41 (0.2 $\pm$ 0.53)	
501_02	2/7 (29)	3	2.6 (0.59 $\pm$ 1.06)		1/7 (14)	1	1.96 (0.28 $\pm$ 0.74)		1/7 (14)	1	1.22 (0.17 $\pm$ 0.46)	
501_03	3/7 (43)	3	2.04 (0.7 $\pm$ 0.9)		3/7 (43)	6	10 (2.53 $\pm$ 3.91)		1/7 (14)	2	2.44 (0.35 $\pm$ 0.92)	
501_04	0/7 (0)	0	0 (0 $\pm$ 0)		4/7 (57)	4	3.33 (1.5 $\pm$ 1.47)		0/7 (0)	0	0 (0 $\pm$ 0)	
522_01	4/7 (57)	5	2.6 (1.18 $\pm$ 1.14)		0/7 (0)	0	0 (0 $\pm$ 0)		0/7 (0)	0	0 (0 $\pm$ 0)	
522_03	3/7 (43)	6	6 (1.63 $\pm$ 2.44)		0/7 (0)	0	0 (0 $\pm$ 0)		2/7 (29)	2	1.75 (0.45 $\pm$ 0.78)	
522_04	3/7 (43)	3	2.04 (0.8 $\pm$ 1.01)		1/7 (14)	1	2.38 (0.34 $\pm$ 0.9)		2/7 (29)	3	2.82 (0.64 $\pm$ 1.15)	
522_06	3/7 (43)	3	3.13 (0.96 $\pm$ 1.29)		1/7 (14)	1	1.96 (0.28 $\pm$ 0.74)		1/7 (14)	4	5.63 (0.8 $\pm$ 2.13)	
522_08	1/7 (14)	1	1.3 (0.19 $\pm$ 0.49)		0/7 (0)	0	0 (0 $\pm$ 0)		1/7 (14)	3	4.23 (0.6 $\pm$ 1.6)	
522_09	1/7 (14)	1	1.3 (0.19 $\pm$ 0.49)		1/7 (14)	1	2.38 (0.34 $\pm$ 0.9)		1/7 (14)	1	1.75 (0.25 $\pm$ 0.66)	
522_10	2/7 (29)	2	2.04 (0.48 $\pm$ 0.84)		1/7 (14)	1	2.38 (0.34 $\pm$ 0.9)		2/7 (29)	2	2.7 (0.59 $\pm$ 1.07)	
522_11	0/7 (0)	0	0 (0 $\pm$ 0)		1/7 (14)	1	2.38 (0.34 $\pm$ 0.9)		0/7 (0)	0	0 (0 $\pm$ 0)	
522_12	1/7 (14)	1	2.04 (0.29 $\pm$ 0.77)		1/7 (14)	2	4.76 (0.68 $\pm$ 1.8)		0/7 (0)	0	0 (0 $\pm$ 0)	
534_01	2/7 (29)	2	2 (0.51 $\pm$ 0.88)		1/7 (14)	2	4.76 (0.68 $\pm$ 1.8)		1/7 (14)	1	1.75 (0.25 $\pm$ 0.66)	
534_02	0/7 (0)	0	0 (0 $\pm$ 0)		1/7 (14)	1	3.33 (0.48 $\pm$ 1.26)		2/7 (29)	3	3.51 (0.7 $\pm$ 1.34)	
534_03	2/7 (29)	2	1.59 (0.45 $\pm$ 0.77)		0/7 (0)	0	0 (0 $\pm$ 0)		1/7 (14)	1	1.22 (0.17 $\pm$ 0.46)	
534_04	0/7 (0)	0	0 (0 $\pm$ 0)		2/7 (29)	3	5.71 (1.29 $\pm$ 2.31)		1/7 (14)	1	1.22 (0.17 $\pm$ 0.46)	
534_05	2/7 (29)	2	2 (0.47 $\pm$ 0.83)		1/7 (14)	1	2.38 (0.34 $\pm$ 0.9)		0/7 (0)	0	0 (0 $\pm$ 0)	
534_06	1/7 (14)	1	1.56 (0.22 $\pm$ 0.59)		1/7 (14)	1	2.38 (0.34 $\pm$ 0.9)		0/7 (0)	0	0 (0 $\pm$ 0)	
BW_02	2/7 (29)	2	3.13 (0.63 $\pm$ 1.2)		3/7 (43)	4	5.71 (1.44 $\pm$ 2.15)		4/7 (57)	4	2.7 (1.08 $\pm$ 1.09)	
BW_03	0/7 (0)	0	0 (0 $\pm$ 0)		1/7 (14)	1	1.96 (0.28 $\pm$ 0.74)		4/7 (57)	4	3.23 (1.27 $\pm$ 1.35)	
BW_04	1/7 (14)	1	2.04 (0.29 $\pm$ 0.77)		0/7 (0)	0	0 (0 $\pm$ 0)		2/7 (29)	3	5.41 (0.97 $\pm$ 2.02)	
BW_05	1/7 (14)	1	2 (0.29 $\pm$ 0.76)		0/7 (0)	0	0 (0 $\pm$ 0)		3/7 (43)	5	5.41 (1.58 $\pm$ 2.16)	
BW_06	1/7 (14)	2	3.17 (0.45 $\pm$ 1.2)		0/7 (0)	0	0 (0 $\pm$ 0)		1/7 (14)	1	2.7 (0.39 $\pm$ 1.02)	
BW_07	0/7 (0)	0	0 (0 $\pm$ 0)		2/7 (29)	3	5.71 (1.16 $\pm$ 2.2)		2/7 (29)	3	3.23 (0.8 $\pm$ 1.38)	
BW_08	2/7 (29)	3	4 (1.02 $\pm$ 1.76)		3/7 (43)	3	3.33 (1.22 $\pm$ 1.55)		3/7 (43)	3	2.7 (0.76 $\pm$ 1.06)	
BW_09	2/7 (29)	2	2.04 (0.58 $\pm$ 0.99)		1/7 (14)	1	2.86 (0.41 $\pm$ 1.08)		2/7 (29)	3	2.82 (0.79 $\pm$ 1.35)	
BW_10	3/7 (43)	4	3.13 (1.04 $\pm$ 1.38)		4/7 (57)	7	7.14 (2.56 $\pm$ 2.94)		3/7 (43)	3	1.69 (0.61 $\pm$ 0.78)	
MFW_02			*		3/7 (43)	4	5.71 (1.63 $\pm$ 2.26)		3/7 (43)	3	3.23 (0.88 $\pm$ 1.26)	
MFW_03	1/7 (14)	2	4 (0.57 $\pm$ 1.51)		1/7 (14)	1	2.38 (0.34 $\pm$ 0.9)		2/7 (29)	2	2.7 (0.59 $\pm$ 1.07)	
MFW_04	2/7 (29)	2	2.04 (0.58 $\pm$ 0.99)		1/7 (14)	1	2.38 (0.34 $\pm$ 0.9)		1/7 (14)	1	2.7 (0.39 $\pm$ 1.02)	
MFW_05	1/7 (14)	1	2 (0.29 $\pm$ 0.76)		1/7 (14)	1	2.38 (0.34 $\pm$ 0.9)		2/7 (29)	3	6.45 (1.12 $\pm$ 2.41)	
MFW_06	1/7 (14)	1	2.04 (0.29 $\pm$ 0.77)		1/7 (14)	1	3.33 (0.48 $\pm$ 1.26)		2/7 (29)	2	3.23 (0.64 $\pm$ 1.23)	
MFW_07	2/7 (29)	2	3.13 (0.63 $\pm$ 1.2)		1/7 (14)	1	2.86 (0.41 $\pm$ 1.08)		0/7 (0)	0	0 (0 $\pm$ 0)	
MFW_08	1/7 (14)	1	1.3 (0.19 $\pm$ 0.49)		1/7 (14)	3	7.14 (1.02 $\pm$ 2.7)		1/7 (14)	2	3.51 (0.5 $\pm$ 1.33)	
MFW_09	3/7 (43)	6	5.19 (1.32 $\pm$ 1.96)		2/7 (29)	3	4.76 (1.09 $\pm$ 1.94)		3/7 (43)	4	2.35 (0.71 $\pm$ 0.95)	
MFW_10	4/7 (57)	6	4 (1.68 $\pm$ 1.68)		0/7 (0)	0	0 (0 $\pm$ 0)		2/7 (29)	3	2.82 (0.57 $\pm$ 1.08)	

Table 7j – Summary of dusky shark annual residency index (RI) scores for receiver stations that were deployed consistently from 2022 to 2024. For each station, the number of individuals it detected (D) and the total number of individuals detected across all stations while that receiver was deployed (A) are presented along with the proportion of D to A (%). The cumulative number of calendar days all individuals of a species were detected at a given station is presented as Σdd . Asterisk denotes that the receiver malfunctioned. REV = Revolution Wind, SF = South Fork Wind, SRW = Sunrise Wind, SD = standard deviation.

Station	2022			2023			2024		
	D/A (%)	Σdd	RI	D/A (%)	Σdd	RI	D/A (%)	Σdd	RI
			Max (Mean $\pm$ SD)			Max (Mean $\pm$ SD)			Max (Mean $\pm$ SD)
REV_01	0/7 (0)	0	0 (0 $\pm$ 0)	1/7 (14)	1	1.72 (0.25 $\pm$ 0.65)	0/7 (0)	0	0 (0 $\pm$ 0)
REV_02	0/7 (0)	0	0 (0 $\pm$ 0)	1/7 (14)	1	1.69 (0.24 $\pm$ 0.64)	0/7 (0)	0	0 (0 $\pm$ 0)
REV_03	1/7 (14)	2	3.45 (0.49 $\pm$ 1.3)	1/7 (14)	1	3.03 (0.43 $\pm$ 1.15)	0/7 (0)	0	0 (0 $\pm$ 0)
REV_04	1/7 (14)	3	5.17 (0.74 $\pm$ 1.95)	3/7 (43)	6	6.06 (1.88 $\pm$ 2.66)	0/7 (0)	0	0 (0 $\pm$ 0)
REV_05	0/7 (0)	0	0 (0 $\pm$ 0)	1/7 (14)	1	1.69 (0.24 $\pm$ 0.64)	0/7 (0)	0	0 (0 $\pm$ 0)
REV_06	1/7 (14)	1	1.72 (0.25 $\pm$ 0.65)	0/7 (0)	0	0 (0 $\pm$ 0)	1/7 (14)	1	1.18 (0.17 $\pm$ 0.44)
REV_07	0/7 (0)	0	0 (0 $\pm$ 0)	0/7 (0)	0	0 (0 $\pm$ 0)	1/7 (14)	2	2.35 (0.34 $\pm$ 0.89)
REV_08	0/7 (0)	0	0 (0 $\pm$ 0)	0/7 (0)	0	0 (0 $\pm$ 0)	1/7 (14)	3	3.53 (0.5 $\pm$ 1.33)
REV_09	1/7 (14)	1	1.72 (0.25 $\pm$ 0.65)	0/7 (0)	0	0 (0 $\pm$ 0)	0/7 (0)	0	0 (0 $\pm$ 0)
REV_10	0/7 (0)	0	0 (0 $\pm$ 0)	0/7 (0)	0	0 (0 $\pm$ 0)	1/7 (14)	1	1.18 (0.17 $\pm$ 0.44)
REV_11	0/7 (0)	0	0 (0 $\pm$ 0)	0/7 (0)	0	0 (0 $\pm$ 0)	0/7 (0)	0	0 (0 $\pm$ 0)
REV_12	1/7 (14)	1	1.72 (0.25 $\pm$ 0.65)	1/7 (14)	1	1.72 (0.25 $\pm$ 0.65)	0/7 (0)	0	0 (0 $\pm$ 0)
REV_13	2/7 (29)	2	1.72 (0.47 $\pm$ 0.8)	0/7 (0)	0	0 (0 $\pm$ 0)	0/7 (0)	0	0 (0 $\pm$ 0)
REV_14	2/7 (29)	2	1.59 (0.45 $\pm$ 0.77)	3/7 (43)	4	3.45 (1.33 $\pm$ 1.67)	1/7 (14)	1	1.69 (0.24 $\pm$ 0.64)
REV_15	3/7 (43)	3	1.59 (0.64 $\pm$ 0.8)	2/7 (29)	2	3.03 (0.68 $\pm$ 1.22)	2/7 (29)	2	1.69 (0.41 $\pm$ 0.72)
REV_16	3/7 (43)	3	1.72 (0.66 $\pm$ 0.83)	0/7 (0)	0	0 (0 $\pm$ 0)	0/7 (0)	0	0 (0 $\pm$ 0)
REV_17	3/7 (43)	4	3.13 (0.92 $\pm$ 1.25)	0/7 (0)	0	0 (0 $\pm$ 0)	1/7 (14)	1	1.18 (0.17 $\pm$ 0.44)
REV_18	0/7 (0)	0	0 (0 $\pm$ 0)	0/7 (0)	0	0 (0 $\pm$ 0)	0/7 (0)	0	0 (0 $\pm$ 0)
SF_01	1/7 (14)	1	1.56 (0.22 $\pm$ 0.59)	0/3 (0)	0	0 (0 $\pm$ 0)	0/7 (0)	0	0 (0 $\pm$ 0)
SF_02	1/7 (14)	2	3.45 (0.49 $\pm$ 1.3)	0/7 (0)	0	0 (0 $\pm$ 0)	0/7 (0)	0	0 (0 $\pm$ 0)
SRW_01	1/7 (14)	1	1.56 (0.22 $\pm$ 0.59)	0/7 (0)	0	0 (0 $\pm$ 0)	0/7 (0)	0	0 (0 $\pm$ 0)
SRW_02	1/7 (14)	1	1.72 (0.25 $\pm$ 0.65)	0/7 (0)	0	0 (0 $\pm$ 0)	0/7 (0)	0	0 (0 $\pm$ 0)
SRW_03	0/7 (0)	0	0 (0 $\pm$ 0)	0/7 (0)	0	0 (0 $\pm$ 0)	0/7 (0)	0	0 (0 $\pm$ 0)
SRW_04	2/7 (29)	4	3.45 (0.94 $\pm$ 1.61)	0/7 (0)	0	0 (0 $\pm$ 0)	2/7 (29)	2	1.22 (0.34 $\pm$ 0.58)
SRW_05	2/7 (29)	2	1.72 (0.47 $\pm$ 0.81)	0/7 (0)	0	0 (0 $\pm$ 0)	1/7 (14)	1	1.18 (0.17 $\pm$ 0.44)
SRW_06	0/7 (0)	0	0 (0 $\pm$ 0)	3/7 (43)	4	3.45 (1.25 $\pm$ 1.63)	1/7 (14)	1	1.69 (0.24 $\pm$ 0.64)
SRW_07	2/7 (29)	2	1.72 (0.47 $\pm$ 0.81)	3/7 (43)	3	3.33 (1.16 $\pm$ 1.51)	0/7 (0)	0	0 (0 $\pm$ 0)
SRW_08	1/7 (14)	1	1.56 (0.22 $\pm$ 0.59)	3/7 (43)	3	2.86 (0.99 $\pm$ 1.28)	0/7 (0)	0	0 (0 $\pm$ 0)
SRW_09	2/7 (29)	2	1.72 (0.47 $\pm$ 0.8)	1/7 (14)	1	1.96 (0.28 $\pm$ 0.74)	1/7 (14)	2	2.44 (0.35 $\pm$ 0.92)
SRW_10	0/7 (0)	0	0 (0 $\pm$ 0)	0/7 (0)	0	0 (0 $\pm$ 0)	2/7 (29)	2	1.22 (0.34 $\pm$ 0.58)
SRW_11			*	1/7 (14)	1	1.96 (0.28 $\pm$ 0.74)	0/7 (0)	0	0 (0 $\pm$ 0)
SRW_12	1/7 (14)	1	1.56 (0.22 $\pm$ 0.59)	1/7 (14)	1	1.96 (0.28 $\pm$ 0.74)	2/7 (29)	3	2.44 (0.52 $\pm$ 0.95)

Table 7k – Summary of white marlin annual residency index (RI) scores for receiver stations that were deployed consistently from 2022 to 2024. No individuals were monitored in 2022 or 2023. For each station, the number of individuals it detected (D) and the total number of individuals detected across all stations while that receiver was deployed (A) are presented along with the proportion of D to A (%). The cumulative number of calendar days all individuals of a species were detected at a given station is presented as Σdd . BW = Beacon Wind, MFW = Mayflower (SouthCoast) Wind, 501 = Vineyard Wind 1, 522 = Vineyard Northeast, 534 = New England Wind, SD = standard deviation.

Station	2024		
	D/A (%)	Σdd	RI
			Max (Mean $\pm$ SD)
501_01	2/3 (67)	3	3.7 (1.84 $\pm$ 1.85)
501_02	1/3 (33)	3	5.56 (1.85 $\pm$ 3.21)
501_03	1/3 (33)	1	1.85 (0.62 $\pm$ 1.07)
501_04	0/3 (0)	0	0 (0 $\pm$ 0)
522_01	2/3 (67)	3	3.64 (1.84 $\pm$ 1.82)
522_03	0/3 (0)	0	0 (0 $\pm$ 0)
522_04	2/3 (67)	2	1.89 (1.23 $\pm$ 1.07)
522_06	0/3 (0)	0	0 (0 $\pm$ 0)
522_08	0/3 (0)	0	0 (0 $\pm$ 0)
522_09	1/3 (33)	1	1.82 (0.61 $\pm$ 1.05)
522_10	0/3 (0)	0	0 (0 $\pm$ 0)
522_11	1/3 (33)	1	1.82 (0.61 $\pm$ 1.05)
522_12	0/3 (0)	0	0 (0 $\pm$ 0)
534_01	0/3 (0)	0	0 (0 $\pm$ 0)
534_02	1/3 (33)	1	1.85 (0.62 $\pm$ 1.07)
534_03	0/3 (0)	0	0 (0 $\pm$ 0)
534_04	0/3 (0)	0	0 (0 $\pm$ 0)
534_05	1/3 (33)	1	1.89 (0.63 $\pm$ 1.09)
534_06	0/3 (0)	0	0 (0 $\pm$ 0)
BW_02	2/3 (67)	2	1.89 (1.25 $\pm$ 1.08)
BW_03	0/3 (0)	0	0 (0 $\pm$ 0)
BW_04	0/3 (0)	0	0 (0 $\pm$ 0)
BW_05	0/3 (0)	0	0 (0 $\pm$ 0)
BW_06	1/3 (33)	1	1.85 (0.62 $\pm$ 1.07)
BW_07	0/3 (0)	0	0 (0 $\pm$ 0)
BW_08	0/3 (0)	0	0 (0 $\pm$ 0)
BW_09	0/3 (0)	0	0 (0 $\pm$ 0)
BW_10	0/3 (0)	0	0 (0 $\pm$ 0)
MFW_02	1/3 (33)	1	1.85 (0.62 $\pm$ 1.07)
MFW_03	0/3 (0)	0	0 (0 $\pm$ 0)
MFW_04	0/3 (0)	0	0 (0 $\pm$ 0)
MFW_05	0/3 (0)	0	0 (0 $\pm$ 0)
MFW_06	0/3 (0)	0	0 (0 $\pm$ 0)
MFW_07	0/3 (0)	0	0 (0 $\pm$ 0)
MFW_08	0/3 (0)	0	0 (0 $\pm$ 0)
MFW_09	0/3 (0)	0	0 (0 $\pm$ 0)
MFW_10	1/3 (33)	1	1.82 (0.61 $\pm$ 1.05)

Station	2024		
	D/A (%)	Σdd	RI
			Max (Mean $\pm$ SD)
REV_01	0/3 (0)	0	0 (0 $\pm$ 0)
REV_02	0/3 (0)	0	0 (0 $\pm$ 0)
REV_03	0/3 (0)	0	0 (0 $\pm$ 0)
REV_04	0/3 (0)	0	0 (0 $\pm$ 0)
REV_05	0/3 (0)	0	0 (0 $\pm$ 0)
REV_06	0/3 (0)	0	0 (0 $\pm$ 0)
REV_07	0/3 (0)	0	0 (0 $\pm$ 0)
REV_08	0/3 (0)	0	0 (0 $\pm$ 0)
REV_09	0/3 (0)	0	0 (0 $\pm$ 0)
REV_10	0/3 (0)	0	0 (0 $\pm$ 0)
REV_11	0/3 (0)	0	0 (0 $\pm$ 0)
REV_12	1/3 (33)	1	1.85 (0.62 $\pm$ 1.07)
REV_13	0/3 (0)	0	0 (0 $\pm$ 0)
REV_14	0/3 (0)	0	0 (0 $\pm$ 0)
REV_15	0/3 (0)	0	0 (0 $\pm$ 0)
REV_16	0/3 (0)	0	0 (0 $\pm$ 0)
REV_17	0/3 (0)	0	0 (0 $\pm$ 0)
REV_18	0/3 (0)	0	0 (0 $\pm$ 0)
SF_01	0/3 (0)	0	0 (0 $\pm$ 0)
SF_02	1/3 (33)	1	1.85 (0.62 $\pm$ 1.07)
SRW_01	0/3 (0)	0	0 (0 $\pm$ 0)
SRW_02	1/3 (33)	1	1.89 (0.63 $\pm$ 1.09)
SRW_03	0/3 (0)	0	0 (0 $\pm$ 0)
SRW_04	0/3 (0)	0	0 (0 $\pm$ 0)
SRW_05	0/3 (0)	0	0 (0 $\pm$ 0)
SRW_06	0/3 (0)	0	0 (0 $\pm$ 0)
SRW_07	0/3 (0)	0	0 (0 $\pm$ 0)
SRW_08	1/3 (33)	1	1.85 (0.62 $\pm$ 1.07)
SRW_09	0/3 (0)	0	0 (0 $\pm$ 0)
SRW_10	0/3 (0)	0	0 (0 $\pm$ 0)
SRW_11	0/3 (0)	0	0 (0 $\pm$ 0)
SRW_12	0/3 (0)	0	0 (0 $\pm$ 0)

Table 71 – Summary of yellowfin tuna annual residency index (RI) scores for receiver stations that were deployed consistently from 2022 to 2024. No individuals available for at least 30 days were detected in 2024. For each station, the number of individuals it detected (D) and the total number of individuals detected across all stations while that receiver was deployed (A) are presented along with the proportion of D to A (%). The cumulative number of calendar days all individuals of a species were detected at a given station is presented as $\sum dd$. Asterisk denotes that the receiver was lost. BW = Beacon Wind, MFW = Mayflower (SouthCoast) Wind, 501 = Vineyard Wind 1, 522 = Vineyard Northeast, 534 = New England Wind, SD = standard deviation.

Station	2022			2023		
	D/A (%)	$\sum dd$	RI	D/A (%)	$\sum dd$	RI
			Max (Mean $\pm$ SD)			Max (Mean $\pm$ SD)
501_01	0/3 (0)	0	0 (0 $\pm$ 0)	0/8 (0)	0	0 (0 $\pm$ 0)
501_02	0/3 (0)	0	0 (0 $\pm$ 0)	0/8 (0)	0	0 (0 $\pm$ 0)
501_03	0/3 (0)	0	0 (0 $\pm$ 0)	1/8 (13)	2	6.25 (0.78 $\pm$ 2.21)
501_04	0/3 (0)	0	0 (0 $\pm$ 0)	1/8 (13)	3	9.38 (1.17 $\pm$ 3.31)
522_01	0/3 (0)	0	0 (0 $\pm$ 0)	1/8 (13)	1	3.13 (0.39 $\pm$ 1.1)
522_03	0/3 (0)	0	0 (0 $\pm$ 0)	2/8 (25)	3	6.25 (1.17 $\pm$ 2.33)
522_04	0/3 (0)	0	0 (0 $\pm$ 0)	0/8 (0)	0	0 (0 $\pm$ 0)
522_06	0/3 (0)	0	0 (0 $\pm$ 0)	0/8 (0)	0	0 (0 $\pm$ 0)
522_08	0/3 (0)	0	0 (0 $\pm$ 0)	1/8 (13)	2	6.25 (0.78 $\pm$ 2.21)
522_09	0/3 (0)	0	0 (0 $\pm$ 0)	1/8 (13)	1	3.13 (0.39 $\pm$ 1.1)
522_10	2/3 (67)	2	2.33 (1.55 $\pm$ 1.34)	0/8 (0)	0	0 (0 $\pm$ 0)
522_11	0/3 (0)	0	0 (0 $\pm$ 0)	2/8 (25)	3	3.7 (0.85 $\pm$ 1.59)
522_12	1/3 (33)	1	2.33 (0.78 $\pm$ 1.34)	1/8 (13)	1	3.13 (0.39 $\pm$ 1.1)
534_01	0/3 (0)	0	0 (0 $\pm$ 0)	1/8 (13)	1	2.04 (0.26 $\pm$ 0.72)
534_02	0/3 (0)	0	0 (0 $\pm$ 0)	2/8 (25)	2	2.04 (0.49 $\pm$ 0.9)
534_03	0/3 (0)	0	0 (0 $\pm$ 0)	1/8 (13)	2	3.7 (0.46 $\pm$ 1.31)
534_04	0/3 (0)	0	0 (0 $\pm$ 0)	0/8 (0)	0	0 (0 $\pm$ 0)
534_05	0/3 (0)	0	0 (0 $\pm$ 0)	2/8 (25)	2	3.13 (0.65 $\pm$ 1.23)
534_06	0/3 (0)	0	0 (0 $\pm$ 0)	2/8 (25)	2	3.13 (0.66 $\pm$ 1.24)
BW_02	0/3 (0)	0	0 (0 $\pm$ 0)	0/8 (0)	0	0 (0 $\pm$ 0)
BW_03	0/3 (0)	0	0 (0 $\pm$ 0)	5/8 (63)	7	6.25 (2.16 $\pm$ 2.21)
BW_04	0/3 (0)	0	0 (0 $\pm$ 0)	2/8 (25)	4	6.38 (1.19 $\pm$ 2.37)
BW_05	0/3 (0)	0	0 (0 $\pm$ 0)	2/8 (25)	2	2.13 (0.5 $\pm$ 0.92)
BW_06	0/3 (0)	0	0 (0 $\pm$ 0)	2/8 (25)	6	7.41 (1.71 $\pm$ 3.18)
BW_07	0/3 (0)	0	0 (0 $\pm$ 0)	3/8 (38)	7	9.26 (1.88 $\pm$ 3.26)
BW_08	1/3 (33)	1	2.78 (0.93 $\pm$ 1.6)	3/8 (38)	6	6.25 (1.8 $\pm$ 2.69)
BW_09	0/3 (0)	0	0 (0 $\pm$ 0)	3/8 (38)	5	9.38 (1.67 $\pm$ 3.24)
BW_10	0/3 (0)	0	0 (0 $\pm$ 0)	0/8 (0)	0	0 (0 $\pm$ 0)
MFW_02			*	2/8 (25)	2	3.13 (0.62 $\pm$ 1.2)
MFW_03	0/3 (0)	0	0 (0 $\pm$ 0)	2/8 (25)	4	5.56 (1.09 $\pm$ 2.11)
MFW_04	0/3 (0)	0	0 (0 $\pm$ 0)	2/8 (25)	4	6.25 (1.24 $\pm$ 2.4)
MFW_05	0/3 (0)	0	0 (0 $\pm$ 0)	3/8 (38)	5	6.25 (1.57 $\pm$ 2.39)
MFW_06	0/3 (0)	0	0 (0 $\pm$ 0)	3/8 (38)	5	5.56 (1.41 $\pm$ 2.12)
MFW_07	0/3 (0)	0	0 (0 $\pm$ 0)	2/8 (25)	3	3.7 (0.85 $\pm$ 1.59)
MFW_08	0/3 (0)	0	0 (0 $\pm$ 0)	2/8 (25)	3	3.7 (0.85 $\pm$ 1.59)
MFW_09	1/3 (33)	1	2.33 (0.78 $\pm$ 1.34)	2/8 (25)	2	3.13 (0.78 $\pm$ 1.45)
MFW_10	0/3 (0)	0	0 (0 $\pm$ 0)	1/8 (13)	1	1.85 (0.23 $\pm$ 0.65)

Table 7m – Summary of yellowfin tuna annual residency index (RI) scores for receiver stations that were deployed consistently from 2022 to 2024. No individuals available for at least 30 days were detected in 2024. For each station, the number of individuals it detected (D) and the total number of individuals detected across all stations while that receiver was deployed (A) are presented along with the proportion of D to A (%). The cumulative number of calendar days all individuals of a species were detected at a given station is presented as $\sum dd$. Asterisk denotes that the receiver malfunctioned. REV = Revolution Wind, SF = South Fork Wind, SRW = Sunrise Wind, SD = standard deviation.

Station	2022			2023		
	D/A (%)	$\sum dd$	RI	D/A (%)	$\sum dd$	RI
			Max (Mean $\pm$ SD)			Max (Mean $\pm$ SD)
REV_01	0/3 (0)	0	0 (0 $\pm$ 0)	0/8 (0)	0	0 (0 $\pm$ 0)
REV_02	0/3 (0)	0	0 (0 $\pm$ 0)	0/8 (0)	0	0 (0 $\pm$ 0)
REV_03	0/3 (0)	0	0 (0 $\pm$ 0)	0/8 (0)	0	0 (0 $\pm$ 0)
REV_04	0/3 (0)	0	0 (0 $\pm$ 0)	0/8 (0)	0	0 (0 $\pm$ 0)
REV_05	0/3 (0)	0	0 (0 $\pm$ 0)	0/8 (0)	0	0 (0 $\pm$ 0)
REV_06	0/3 (0)	0	0 (0 $\pm$ 0)	0/8 (0)	0	0 (0 $\pm$ 0)
REV_07	0/3 (0)	0	0 (0 $\pm$ 0)	1/8 (13)	1	2.22 (0.28 $\pm$ 0.79)
REV_08	0/3 (0)	0	0 (0 $\pm$ 0)	0/8 (0)	0	0 (0 $\pm$ 0)
REV_09	0/3 (0)	0	0 (0 $\pm$ 0)	0/8 (0)	0	0 (0 $\pm$ 0)
REV_10	0/3 (0)	0	0 (0 $\pm$ 0)	1/8 (13)	1	2.04 (0.26 $\pm$ 0.72)
REV_11	0/3 (0)	0	0 (0 $\pm$ 0)	1/8 (13)	1	2.22 (0.28 $\pm$ 0.79)
REV_12	0/3 (0)	0	0 (0 $\pm$ 0)	0/8 (0)	0	0 (0 $\pm$ 0)
REV_13	0/3 (0)	0	0 (0 $\pm$ 0)	0/8 (0)	0	0 (0 $\pm$ 0)
REV_14	0/3 (0)	0	0 (0 $\pm$ 0)	0/8 (0)	0	0 (0 $\pm$ 0)
REV_15	0/3 (0)	0	0 (0 $\pm$ 0)	0/8 (0)	0	0 (0 $\pm$ 0)
REV_16	0/3 (0)	0	0 (0 $\pm$ 0)	0/8 (0)	0	0 (0 $\pm$ 0)
REV_17	0/3 (0)	0	0 (0 $\pm$ 0)	0/8 (0)	0	0 (0 $\pm$ 0)
REV_18	0/3 (0)	0	0 (0 $\pm$ 0)	0/8 (0)	0	0 (0 $\pm$ 0)
SF_01	0/3 (0)	0	0 (0 $\pm$ 0)	0/5 (0)	0	0 (0 $\pm$ 0)
SF_02	0/3 (0)	0	0 (0 $\pm$ 0)	0/8 (0)	0	0 (0 $\pm$ 0)
SRW_01	0/3 (0)	0	0 (0 $\pm$ 0)	1/8 (13)	1	2.22 (0.28 $\pm$ 0.79)
SRW_02	0/3 (0)	0	0 (0 $\pm$ 0)	0/8 (0)	0	0 (0 $\pm$ 0)
SRW_03	0/3 (0)	0	0 (0 $\pm$ 0)	0/8 (0)	0	0 (0 $\pm$ 0)
SRW_04	0/3 (0)	0	0 (0 $\pm$ 0)	0/8 (0)	0	0 (0 $\pm$ 0)
SRW_05	0/3 (0)	0	0 (0 $\pm$ 0)	0/8 (0)	0	0 (0 $\pm$ 0)
SRW_06	0/3 (0)	0	0 (0 $\pm$ 0)	0/8 (0)	0	0 (0 $\pm$ 0)
SRW_07	0/3 (0)	0	0 (0 $\pm$ 0)	0/8 (0)	0	0 (0 $\pm$ 0)
SRW_08	0/3 (0)	0	0 (0 $\pm$ 0)	0/8 (0)	0	0 (0 $\pm$ 0)
SRW_09	0/3 (0)	0	0 (0 $\pm$ 0)	0/8 (0)	0	0 (0 $\pm$ 0)
SRW_10	0/3 (0)	0	0 (0 $\pm$ 0)	1/8 (13)	1	2.04 (0.26 $\pm$ 0.72)
SRW_11			*	1/8 (13)	1	2.94 (0.37 $\pm$ 1.04)
SRW_12	0/3 (0)	0	0 (0 $\pm$ 0)	2/8 (25)	3	6.25 (1.01 $\pm$ 2.21)

Table 8 – Network density by species and year. Tx = total number of individuals comprising the network for a given year, n = total number of nodes (stations) visited within the network, Density = proportion of connections (edges) between nodes to all possible connections (excluding self-connections) between nodes.

Species	2022			2023			2024		
	Tx	n	Density	Tx	n	Density	Tx	n	Density
Blue shark	45	67	0.12	16	58	0.05	25	65	0.06
Bluefin tuna	10	44	0.05	37	67	0.14	53	67	0.18
Shortfin mako	13	57	0.04	26	61	0.06	27	65	0.06

Table 9a – Blue shark annual degree scores by receiver station from 2022 to 2024 generated from individual networks. Dashes denote that no metric data exist due to the lack of detections. Grey shading denotes years when networks included data from receivers that were impacted at the 3, 5, and 8 km impact radius (lightest), 5 and 8 km impact radius (medium), and only 8 km impact radius (darkest). REV = Revolution Wind, SF = South Fork Wind, SRW = Sunrise Wind, BW = Beacon Wind, MFW = Mayflower (SouthCoast) Wind; Tx = total unique transmitters detected.

Station	2022		2023		2024	
	Tx	Max (Mean $\pm$ SD)	Tx	Max (Mean $\pm$ SD)	Tx	Max (Mean $\pm$ SD)
501_01	15	4 (1.47 $\pm$ 0.92)	4	3 (2.25 $\pm$ 0.96)	4	1 (1.00 $\pm$ 0.00)
501_02	16	4 (1.56 $\pm$ 0.81)	2	4 (3.50 $\pm$ 0.71)	3	1 (1.00 $\pm$ 0.00)
501_03	21	5 (1.71 $\pm$ 1.15)	5	2 (1.20 $\pm$ 0.45)	4	3 (1.50 $\pm$ 1.00)
501_04	21	5 (2.29 $\pm$ 1.31)	4	5 (2.00 $\pm$ 2.00)	3	2 (1.33 $\pm$ 0.58)
522_01	10	5 (1.40 $\pm$ 1.26)	2	2 (1.50 $\pm$ 0.71)	7	1 (1.00 $\pm$ 0.00)
522_03	9	3 (2.00 $\pm$ 0.87)	2	1 (1.00 $\pm$ 0.00)	5	1 (1.00 $\pm$ 0.00)
522_04	12	2 (1.17 $\pm$ 0.39)	4	2 (1.25 $\pm$ 0.50)	5	1 (1.00 $\pm$ 0.00)
522_06	7	1 (1.00 $\pm$ 0.00)	2	1 (1.00 $\pm$ 0.00)	-	-
522_08	7	2 (1.29 $\pm$ 0.49)	3	1 (1.00 $\pm$ 0.00)	4	2 (1.25 $\pm$ 0.50)
522_09	7	2 (1.29 $\pm$ 0.49)	2	1 (1.00 $\pm$ 0.00)	2	1 (1.00 $\pm$ 0.00)
522_10	8	4 (1.50 $\pm$ 1.07)	-	-	1	1 (1.00 $\pm$ NA)
522_11	7	2 (1.29 $\pm$ 0.49)	-	-	5	2 (1.20 $\pm$ 0.45)
522_12	6	1 (1.00 $\pm$ 0.00)	1	1 (1.00 $\pm$ NA)	1	1 (1.00 $\pm$ NA)
534_01	20	3 (1.15 $\pm$ 0.49)	2	1 (1.00 $\pm$ 0.00)	4	3 (1.50 $\pm$ 1.00)
534_02	11	2 (1.36 $\pm$ 0.50)	3	1 (1.00 $\pm$ 0.00)	4	2 (1.25 $\pm$ 0.50)
534_03	5	2 (1.20 $\pm$ 0.45)	1	1 (1.00 $\pm$ NA)	4	1 (1.00 $\pm$ 0.00)
534_04	15	4 (1.47 $\pm$ 0.83)	2	1 (1.00 $\pm$ 0.00)	2	2 (2.00 $\pm$ 0.00)
534_05	9	2 (1.22 $\pm$ 0.44)	3	1 (1.00 $\pm$ 0.00)	5	3 (1.60 $\pm$ 0.89)
534_06	7	2 (1.29 $\pm$ 0.49)	1	1 (1.00 $\pm$ NA)	4	1 (1.00 $\pm$ 0.00)
BW_02	12	4 (1.83 $\pm$ 0.94)	5	1 (1.00 $\pm$ 0.00)	6	2 (1.33 $\pm$ 0.52)
BW_03	6	2 (1.17 $\pm$ 0.41)	3	1 (1.00 $\pm$ 0.00)	2	2 (1.50 $\pm$ 0.71)
BW_04	5	1 (1.00 $\pm$ 0.00)	-	-	3	1 (1.00 $\pm$ 0.00)
BW_05	5	1 (1.00 $\pm$ 0.00)	-	-	2	2 (1.50 $\pm$ 0.71)
BW_06	2	2 (1.50 $\pm$ 0.71)	1	2 (2.00 $\pm$ NA)	4	1 (1.00 $\pm$ 0.00)
BW_07	9	2 (1.11 $\pm$ 0.33)	-	-	2	1 (1.00 $\pm$ 0.00)
BW_08	13	2 (1.15 $\pm$ 0.38)	3	1 (1.00 $\pm$ 0.00)	4	3 (1.50 $\pm$ 1.00)
BW_09	10	1 (1.00 $\pm$ 0.00)	4	1 (1.00 $\pm$ 0.00)	1	1 (1.00 $\pm$ NA)
BW_10	11	5 (1.82 $\pm$ 1.33)	1	2 (2.00 $\pm$ NA)	3	1 (1.00 $\pm$ 0.00)
MFW_03	9	3 (1.56 $\pm$ 0.73)	2	2 (1.50 $\pm$ 0.71)	3	1 (1.00 $\pm$ 0.00)
MFW_04	5	2 (1.20 $\pm$ 0.45)	3	2 (1.33 $\pm$ 0.58)	4	1 (1.00 $\pm$ 0.00)
MFW_05	6	2 (1.17 $\pm$ 0.41)	1	1 (1.00 $\pm$ NA)	1	1 (1.00 $\pm$ NA)
MFW_06	4	1 (1.00 $\pm$ 0.00)	-	-	2	1 (1.00 $\pm$ 0.00)

MFW_07	6	3 (1.50 ± 0.84)	1	1 (1.00 ± NA)	1	1 (1.00 ± NA)
MFW_08	7	2 (1.29 ± 0.49)	1	1 (1.00 ± NA)	-	-
MFW_09	6	2 (1.50 ± 0.55)	3	1 (1.00 ± 0.00)	1	1 (1.00 ± NA)
MFW_10	14	2 (1.21 ± 0.43)	-	-	2	1 (1.00 ± 0.00)
REV_01	5	2 (1.40 ± 0.55)	1	1 (1.00 ± NA)	4	2 (1.25 ± 0.50)
REV_02	7	3 (1.29 ± 0.76)	1	1 (1.00 ± NA)	4	2 (1.25 ± 0.50)
REV_03	11	4 (1.45 ± 0.93)	1	3 (3.00 ± NA)	2	1 (1.00 ± 0.00)
REV_04	7	2 (1.29 ± 0.49)	1	1 (1.00 ± NA)	4	3 (1.50 ± 1.00)
REV_05	8	4 (1.88 ± 1.13)	2	1 (1.00 ± 0.00)	4	3 (2.00 ± 1.15)
REV_06	5	2 (1.80 ± 0.45)	1	1 (1.00 ± NA)	3	3 (1.67 ± 1.15)
REV_07	10	3 (1.40 ± 0.70)	3	2 (1.33 ± 0.58)	2	2 (1.50 ± 0.71)
REV_08	6	3 (1.67 ± 0.82)	2	1 (1.00 ± 0.00)	5	1 (1.00 ± 0.00)
REV_09	7	3 (1.71 ± 0.76)	1	1 (1.00 ± NA)	2	3 (2.00 ± 1.41)
REV_10	3	2 (1.33 ± 0.58)	3	3 (2.33 ± 0.58)	4	1 (1.00 ± 0.00)
REV_11	4	2 (1.25 ± 0.50)	2	3 (2.50 ± 0.71)	2	1 (1.00 ± 0.00)
REV_12	5	6 (2.20 ± 2.17)	4	1 (1.00 ± 0.00)	1	2 (2.00 ± NA)
REV_13	5	2 (1.20 ± 0.45)	1	1 (1.00 ± NA)	7	2 (1.14 ± 0.38)
REV_14	7	4 (1.71 ± 1.11)	3	1 (1.00 ± 0.00)	3	3 (1.67 ± 1.15)
REV_15	10	4 (1.40 ± 0.97)	1	1 (1.00 ± NA)	3	1 (1.00 ± 0.00)
REV_16	12	2 (1.17 ± 0.39)	2	2 (1.50 ± 0.71)	2	1 (1.00 ± 0.00)
REV_17	7	2 (1.29 ± 0.49)	2	1 (1.00 ± 0.00)	5	2 (1.20 ± 0.45)
REV_18	4	1 (1.00 ± 0.00)	1	1 (1.00 ± NA)	5	2 (1.20 ± 0.45)
SF_01	7	2 (1.29 ± 0.49)	2	1 (1.00 ± 0.00)	3	2 (1.33 ± 0.58)
SF_02	4	2 (1.25 ± 0.50)	1	1 (1.00 ± NA)	3	1 (1.00 ± 0.00)
SRW_01	6	2 (1.17 ± 0.41)	-	-	3	1 (1.00 ± 0.00)
SRW_02	5	2 (1.20 ± 0.45)	-	-	3	1 (1.00 ± 0.00)
SRW_03	3	3 (1.67 ± 1.15)	1	1 (1.00 ± NA)	5	3 (1.40 ± 0.89)
SRW_04	10	2 (1.20 ± 0.42)	1	1 (1.00 ± NA)	1	1 (1.00 ± NA)
SRW_05	11	3 (1.18 ± 0.60)	2	2 (1.50 ± 0.71)	2	1 (1.00 ± 0.00)
SRW_06	5	2 (1.20 ± 0.45)	2	2 (1.50 ± 0.71)	3	2 (1.33 ± 0.58)
SRW_07	9	2 (1.33 ± 0.50)	4	3 (1.50 ± 1.00)	2	1 (1.00 ± 0.00)
SRW_08	13	3 (1.46 ± 0.66)	4	1 (1.00 ± 0.00)	2	1 (1.00 ± 0.00)
SRW_09	9	2 (1.33 ± 0.50)	4	3 (1.50 ± 1.00)	1	4 (4.00 ± NA)
SRW_10	4	2 (1.25 ± 0.50)	1	1 (1.00 ± NA)	2	2 (1.50 ± 0.71)
SRW_12	8	2 (1.13 ± 0.35)	4	2 (1.50 ± 0.58)	3	2 (1.33 ± 0.58)

Table 9b – Bluefin tuna annual degree scores by receiver station from 2022 to 2024 generated from individual networks. Dashes denote that no metric data exist due to the lack of detections. Grey shading denotes years when networks included data from receivers that were impacted at the 3, 5, and 8 km impact radius (lightest), 5 and 8 km impact radius (medium), and only 8 km impact radius (darkest). REV = Revolution Wind, SF = South Fork Wind, SRW = Sunrise Wind, BW = Beacon Wind, MFW = Mayflower (SouthCoast) Wind; Tx = total unique transmitters detected.

Station	2022		2023		2024	
	Tx	Max (Mean $\pm$ SD)	Tx	Max (Mean $\pm$ SD)	Tx	Max (Mean $\pm$ SD)
501_01	1	2 (2.00 $\pm$ NA)	7	2 (1.14 $\pm$ 0.38)	9	3 (1.56 $\pm$ 0.88)
501_02	-	-	5	2 (1.20 $\pm$ 0.45)	11	2 (1.36 $\pm$ 0.50)
501_03	1	1 (1.00 $\pm$ NA)	5	2 (1.20 $\pm$ 0.45)	12	4 (1.50 $\pm$ 1.00)
501_04	1	1 (1.00 $\pm$ NA)	11	4 (1.27 $\pm$ 0.90)	14	6 (1.86 $\pm$ 1.46)
522_01	2	1 (1.00 $\pm$ 0.00)	10	4 (1.70 $\pm$ 1.06)	15	3 (1.33 $\pm$ 0.62)
522_03	-	-	11	3 (1.36 $\pm$ 0.67)	15	4 (1.67 $\pm$ 0.98)
522_04	1	1 (1.00 $\pm$ NA)	10	2 (1.10 $\pm$ 0.32)	19	3 (1.42 $\pm$ 0.69)
522_06	4	1 (1.00 $\pm$ 0.00)	10	2 (1.10 $\pm$ 0.32)	14	3 (1.36 $\pm$ 0.63)
522_08	2	1 (1.00 $\pm$ 0.00)	11	3 (1.45 $\pm$ 0.69)	16	2 (1.06 $\pm$ 0.25)
522_09	-	-	9	2 (1.22 $\pm$ 0.44)	9	2 (1.33 $\pm$ 0.50)
522_10	1	1 (1.00 $\pm$ NA)	5	3 (1.40 $\pm$ 0.89)	17	4 (1.53 $\pm$ 0.87)
522_11	3	1 (1.00 $\pm$ 0.00)	6	2 (1.17 $\pm$ 0.41)	11	3 (1.36 $\pm$ 0.67)
522_12	-	-	8	2 (1.25 $\pm$ 0.46)	17	2 (1.12 $\pm$ 0.33)
534_01	2	1 (1.00 $\pm$ 0.00)	6	2 (1.33 $\pm$ 0.52)	16	4 (1.63 $\pm$ 0.89)
534_02	3	1 (1.00 $\pm$ 0.00)	4	1 (1.00 $\pm$ 0.00)	19	4 (1.63 $\pm$ 0.83)
534_03	1	2 (2.00 $\pm$ NA)	11	2 (1.09 $\pm$ 0.30)	11	3 (1.18 $\pm$ 0.60)
534_04	1	1 (1.00 $\pm$ NA)	10	3 (1.30 $\pm$ 0.67)	17	5 (1.82 $\pm$ 1.19)
534_05	1	1 (1.00 $\pm$ NA)	9	3 (1.33 $\pm$ 0.71)	14	3 (1.43 $\pm$ 0.65)
534_06	2	3 (2.00 $\pm$ 1.41)	6	3 (1.50 $\pm$ 0.84)	14	3 (1.21 $\pm$ 0.58)
BW_02	-	-	7	2 (1.29 $\pm$ 0.49)	14	6 (2.07 $\pm$ 1.49)
BW_03	1	1 (1.00 $\pm$ NA)	8	2 (1.38 $\pm$ 0.52)	17	3 (1.53 $\pm$ 0.72)
BW_04	2	2 (1.50 $\pm$ 0.71)	7	2 (1.14 $\pm$ 0.38)	21	5 (1.24 $\pm$ 0.89)
BW_05	-	-	10	3 (1.30 $\pm$ 0.67)	10	1 (1.00 $\pm$ 0.00)
BW_06	1	3 (3.00 $\pm$ NA)	9	3 (1.22 $\pm$ 0.67)	13	3 (1.54 $\pm$ 0.66)
BW_07	2	2 (1.50 $\pm$ 0.71)	9	2 (1.22 $\pm$ 0.44)	21	6 (1.86 $\pm$ 1.39)
BW_08	-	-	7	2 (1.14 $\pm$ 0.38)	14	4 (1.57 $\pm$ 0.94)
BW_09	2	2 (1.50 $\pm$ 0.71)	14	2 (1.21 $\pm$ 0.43)	18	7 (1.50 $\pm$ 1.42)
BW_10	1	1 (1.00 $\pm$ NA)	10	4 (1.30 $\pm$ 0.95)	21	5 (1.48 $\pm$ 1.03)
MFW_03	2	1 (1.00 $\pm$ 0.00)	11	2 (1.27 $\pm$ 0.47)	17	5 (2.06 $\pm$ 1.34)
MFW_04	2	2 (1.50 $\pm$ 0.71)	12	2 (1.33 $\pm$ 0.49)	23	4 (1.57 $\pm$ 0.99)
MFW_05	2	1 (1.00 $\pm$ 0.00)	11	2 (1.18 $\pm$ 0.40)	17	3 (1.53 $\pm$ 0.80)
MFW_06	4	1 (1.00 $\pm$ 0.00)	8	3 (1.25 $\pm$ 0.71)	10	3 (1.70 $\pm$ 0.95)

MFW_07	1	1 (1.00 ± NA)	10	2 (1.10 ± 0.32)	12	4 (1.50 ± 0.90)
MFW_08	1	1 (1.00 ± NA)	7	2 (1.29 ± 0.49)	22	7 (1.64 ± 1.43)
MFW_09	1	1 (1.00 ± NA)	12	4 (1.33 ± 0.89)	17	7 (2.06 ± 1.60)
MFW_10	1	1 (1.00 ± NA)	7	2 (1.43 ± 0.53)	17	4 (1.65 ± 0.93)
REV_01	-	-	7	3 (1.43 ± 0.79)	6	4 (2.00 ± 1.26)
REV_02	-	-	11	3 (1.55 ± 0.69)	10	3 (1.50 ± 0.71)
REV_03	-	-	10	3 (2.00 ± 0.82)	7	4 (2.29 ± 1.11)
REV_04	-	-	10	5 (2.70 ± 1.42)	11	4 (2.00 ± 1.18)
REV_05	1	1 (1.00 ± NA)	7	2 (1.14 ± 0.38)	8	5 (2.00 ± 1.41)
REV_06	-	-	11	2 (1.18 ± 0.40)	9	6 (2.67 ± 1.73)
REV_07	1	1 (1.00 ± NA)	8	1 (1.00 ± 0.00)	9	3 (1.89 ± 0.78)
REV_08	-	-	7	2 (1.14 ± 0.38)	8	2 (1.25 ± 0.46)
REV_09	-	-	9	4 (1.44 ± 1.01)	10	2 (1.30 ± 0.48)
REV_10	1	1 (1.00 ± NA)	9	3 (1.33 ± 0.71)	4	1 (1.00 ± 0.00)
REV_11	1	2 (2.00 ± NA)	6	2 (1.33 ± 0.52)	9	2 (1.11 ± 0.33)
REV_12	-	-	11	4 (1.91 ± 0.94)	8	1 (1.00 ± 0.00)
REV_13	1	1 (1.00 ± NA)	11	3 (1.82 ± 0.60)	7	3 (1.43 ± 0.79)
REV_14	-	-	7	3 (1.29 ± 0.76)	7	2 (1.14 ± 0.38)
REV_15	-	-	7	3 (1.43 ± 0.79)	10	2 (1.30 ± 0.48)
REV_16	2	1 (1.00 ± 0.00)	13	5 (2.69 ± 1.11)	10	4 (1.30 ± 0.95)
REV_17	-	-	15	3 (1.53 ± 0.74)	10	4 (1.50 ± 0.97)
REV_18	1	1 (1.00 ± NA)	9	2 (1.33 ± 0.50)	6	3 (1.67 ± 1.03)
SF_01	1	1 (1.00 ± NA)	6	3 (1.50 ± 0.84)	10	3 (1.40 ± 0.70)
SF_02	-	-	13	4 (1.92 ± 1.12)	10	3 (1.50 ± 0.85)
SRW_01	-	-	13	2 (1.15 ± 0.38)	6	1 (1.00 ± 0.00)
SRW_02	3	2 (1.33 ± 0.58)	13	3 (1.31 ± 0.63)	9	1 (1.00 ± 0.00)
SRW_03	2	2 (1.50 ± 0.71)	8	4 (1.63 ± 1.19)	8	3 (1.25 ± 0.71)
SRW_04	-	-	15	4 (1.93 ± 0.88)	9	3 (1.78 ± 0.83)
SRW_05	-	-	17	3 (1.59 ± 0.62)	8	2 (1.25 ± 0.46)
SRW_06	1	1 (1.00 ± NA)	10	3 (1.30 ± 0.67)	14	4 (1.50 ± 0.94)
SRW_07	-	-	15	5 (1.53 ± 1.13)	12	2 (1.17 ± 0.39)
SRW_08	1	1 (1.00 ± NA)	6	2 (1.17 ± 0.41)	19	2 (1.16 ± 0.37)
SRW_09	1	1 (1.00 ± NA)	15	4 (1.80 ± 0.94)	10	2 (1.20 ± 0.42)
SRW_10	1	2 (2.00 ± NA)	9	2 (1.22 ± 0.44)	8	1 (1.00 ± 0.00)
SRW_12	2	1 (1.00 ± 0.00)	11	3 (1.45 ± 0.69)	7	3 (1.43 ± 0.79)

Table 9c – Shortfin mako annual degree scores by receiver station from 2022 to 2024 generated from individual networks. Dashes denote that no metric data exist due to the lack of detections. Grey shading denotes years when networks included data from receivers that were impacted at the 3, 5, and 8 km impact radius (lightest), 5 and 8 km impact radius (medium), and only 8 km impact radius (darkest). REV = Revolution Wind, SF = South Fork Wind, SRW = Sunrise Wind, BW = Beacon Wind, MFW = Mayflower (SouthCoast) Wind; Tx = total unique transmitters detected.

Station	2022		2023		2024	
	Tx	Max (Mean $\pm$ SD)	Tx	Max (Mean $\pm$ SD)	Tx	Max (Mean $\pm$ SD)
501_01	-	-	-	-	6	1 (1.00 $\pm$ 0.00)
501_02	1	1 (1.00 $\pm$ NA)	1	1 (1.00 $\pm$ NA)	5	2 (1.40 $\pm$ 0.55)
501_03	-	-	1	1 (1.00 $\pm$ NA)	3	1 (1.00 $\pm$ 0.00)
501_04	2	1 (1.00 $\pm$ 0.00)	1	1 (1.00 $\pm$ NA)	3	1 (1.00 $\pm$ 0.00)
522_01	4	2 (1.50 $\pm$ 0.58)	1	1 (1.00 $\pm$ NA)	3	1 (1.00 $\pm$ 0.00)
522_03	2	1 (1.00 $\pm$ 0.00)	2	1 (1.00 $\pm$ 0.00)	1	1 (1.00 $\pm$ NA)
522_04	2	1 (1.00 $\pm$ 0.00)	1	1 (1.00 $\pm$ NA)	1	1 (1.00 $\pm$ NA)
522_06	2	1 (1.00 $\pm$ 0.00)	4	2 (1.50 $\pm$ 0.58)	1	1 (1.00 $\pm$ NA)
522_08	3	1 (1.00 $\pm$ 0.00)	1	1 (1.00 $\pm$ NA)	1	1 (1.00 $\pm$ NA)
522_09	1	1 (1.00 $\pm$ NA)	3	1 (1.00 $\pm$ 0.00)	1	1 (1.00 $\pm$ NA)
522_10	1	1 (1.00 $\pm$ NA)	3	1 (1.00 $\pm$ 0.00)	1	1 (1.00 $\pm$ NA)
522_11	1	1 (1.00 $\pm$ NA)	1	1 (1.00 $\pm$ NA)	1	1 (1.00 $\pm$ NA)
522_12	2	1 (1.00 $\pm$ 0.00)	-	-	3	1 (1.00 $\pm$ 0.00)
534_01	1	1 (1.00 $\pm$ NA)	1	1 (1.00 $\pm$ NA)	1	1 (1.00 $\pm$ NA)
534_02	2	1 (1.00 $\pm$ 0.00)	4	2 (1.25 $\pm$ 0.50)	1	1 (1.00 $\pm$ NA)
534_03	3	1 (1.00 $\pm$ 0.00)	5	1 (1.00 $\pm$ 0.00)	2	1 (1.00 $\pm$ 0.00)
534_04	1	1 (1.00 $\pm$ NA)	3	1 (1.00 $\pm$ 0.00)	1	1 (1.00 $\pm$ NA)
534_05	1	1 (1.00 $\pm$ NA)	3	1 (1.00 $\pm$ 0.00)	4	1 (1.00 $\pm$ 0.00)
534_06	2	1 (1.00 $\pm$ 0.00)	-	-	2	1 (1.00 $\pm$ 0.00)
BW_02	1	1 (1.00 $\pm$ NA)	3	1 (1.00 $\pm$ 0.00)	2	1 (1.00 $\pm$ 0.00)
BW_03	2	2 (1.50 $\pm$ 0.71)	2	1 (1.00 $\pm$ 0.00)	2	1 (1.00 $\pm$ 0.00)
BW_04	3	1 (1.00 $\pm$ 0.00)	1	1 (1.00 $\pm$ NA)	3	2 (1.33 $\pm$ 0.58)
BW_05	1	1 (1.00 $\pm$ NA)	1	2 (2.00 $\pm$ NA)	1	1 (1.00 $\pm$ NA)
BW_06	-	-	2	1 (1.00 $\pm$ 0.00)	1	1 (1.00 $\pm$ NA)
BW_07	2	2 (1.50 $\pm$ 0.71)	1	1 (1.00 $\pm$ NA)	2	1 (1.00 $\pm$ 0.00)
BW_08	1	2 (2.00 $\pm$ NA)	-	-	2	1 (1.00 $\pm$ 0.00)
BW_09	1	2 (2.00 $\pm$ NA)	3	1 (1.00 $\pm$ 0.00)	1	1 (1.00 $\pm$ NA)
BW_10	1	1 (1.00 $\pm$ NA)	1	2 (2.00 $\pm$ NA)	-	-
MFW_03	-	-	2	1 (1.00 $\pm$ 0.00)	-	-
MFW_04	1	1 (1.00 $\pm$ NA)	5	1 (1.00 $\pm$ 0.00)	1	1 (1.00 $\pm$ NA)
MFW_05	-	-	-	-	3	1 (1.00 $\pm$ 0.00)
MFW_06	1	1 (1.00 $\pm$ NA)	1	1 (1.00 $\pm$ NA)	2	2 (1.50 $\pm$ 0.71)

MFW_07	1	1 (1.00 ± NA)	2	1 (1.00 ± 0.00)	1	1 (1.00 ± NA)
MFW_08	1	1 (1.00 ± NA)	3	1 (1.00 ± 0.00)	2	1 (1.00 ± 0.00)
MFW_09	2	1 (1.00 ± 0.00)	1	1 (1.00 ± NA)	1	1 (1.00 ± NA)
MFW_10	3	2 (1.33 ± 0.58)	2	2 (1.50 ± 0.71)	1	1 (1.00 ± NA)
REV_01	-	-	2	2 (1.50 ± 0.71)	5	4 (1.60 ± 1.34)
REV_02	1	1 (1.00 ± NA)	3	1 (1.00 ± 0.00)	6	2 (1.33 ± 0.52)
REV_03	2	1 (1.00 ± 0.00)	-	-	10	2 (1.30 ± 0.48)
REV_04	-	-	2	1 (1.00 ± 0.00)	3	2 (1.33 ± 0.58)
REV_05	1	1 (1.00 ± NA)	2	1 (1.00 ± 0.00)	11	1 (1.00 ± 0.00)
REV_06	1	1 (1.00 ± NA)	2	2 (1.50 ± 0.71)	5	2 (1.20 ± 0.45)
REV_07	3	1 (1.00 ± 0.00)	3	1 (1.00 ± 0.00)	10	3 (1.50 ± 0.85)
REV_08	-	-	2	1 (1.00 ± 0.00)	8	3 (1.63 ± 0.74)
REV_09	1	1 (1.00 ± NA)	4	1 (1.00 ± 0.00)	5	3 (1.60 ± 0.89)
REV_10	2	1 (1.00 ± 0.00)	2	2 (1.50 ± 0.71)	9	2 (1.22 ± 0.44)
REV_11	1	1 (1.00 ± NA)	1	1 (1.00 ± NA)	6	2 (1.17 ± 0.41)
REV_12	4	2 (1.25 ± 0.50)	4	1 (1.00 ± 0.00)	6	2 (1.17 ± 0.41)
REV_13	2	1 (1.00 ± 0.00)	3	3 (1.67 ± 1.15)	4	2 (1.25 ± 0.50)
REV_14	2	1 (1.00 ± 0.00)	5	2 (1.40 ± 0.55)	8	1 (1.00 ± 0.00)
REV_15	3	1 (1.00 ± 0.00)	3	1 (1.00 ± 0.00)	4	3 (1.50 ± 1.00)
REV_16	3	1 (1.00 ± 0.00)	4	2 (1.25 ± 0.50)	4	3 (1.75 ± 0.96)
REV_17	1	1 (1.00 ± NA)	7	2 (1.57 ± 0.53)	9	3 (1.56 ± 0.88)
REV_18	-	-	4	3 (1.75 ± 0.96)	8	2 (1.25 ± 0.46)
SF_01	-	-	2	3 (2.00 ± 1.41)	9	2 (1.22 ± 0.44)
SF_02	1	1 (1.00 ± NA)	5	3 (1.40 ± 0.89)	6	1 (1.00 ± 0.00)
SRW_01	2	1 (1.00 ± 0.00)	6	2 (1.17 ± 0.41)	3	3 (1.67 ± 1.15)
SRW_02	1	1 (1.00 ± NA)	2	2 (1.50 ± 0.71)	8	2 (1.25 ± 0.46)
SRW_03	2	1 (1.00 ± 0.00)	3	1 (1.00 ± 0.00)	9	2 (1.33 ± 0.50)
SRW_04	1	2 (2.00 ± NA)	7	1 (1.00 ± 0.00)	6	1 (1.00 ± 0.00)
SRW_05	4	2 (1.25 ± 0.50)	5	2 (1.20 ± 0.45)	8	2 (1.25 ± 0.46)
SRW_06	2	2 (1.50 ± 0.71)	7	2 (1.29 ± 0.49)	7	2 (1.14 ± 0.38)
SRW_07	3	3 (1.67 ± 1.15)	6	3 (1.50 ± 0.84)	6	1 (1.00 ± 0.00)
SRW_08	1	1 (1.00 ± NA)	5	4 (1.60 ± 1.34)	1	1 (1.00 ± NA)
SRW_09	2	3 (2.50 ± 0.71)	6	1 (1.00 ± 0.00)	4	2 (1.25 ± 0.50)
SRW_10	1	1 (1.00 ± NA)	2	3 (2.00 ± 1.41)	9	2 (1.22 ± 0.44)
SRW_12	2	2 (1.50 ± 0.71)	3	1 (1.00 ± 0.00)	1	1 (1.00 ± NA)

Table 10a – Blue shark annual strength scores by receiver station from 2022 to 2024 generated from individual networks. Dashes denote that no metric data exist due to the lack of detections. Grey shading denotes years when networks included data from receivers that were impacted at the 3, 5, and 8 km impact radius (lightest), 5 and 8 km impact radius (medium), and only 8 km impact radius (darkest). REV = Revolution Wind, SF = South Fork Wind, SRW = Sunrise Wind, BW = Beacon Wind, MFW = Mayflower (SouthCoast) Wind; Tx = total unique transmitters detected.

Station	2022		2023		2024	
	Tx	Max (Mean $\pm$ SD)	Tx	Max (Mean $\pm$ SD)	Tx	Max (Mean $\pm$ SD)
501_01	15	5 (1.73 $\pm$ 1.22)	4	4 (2.50 $\pm$ 1.29)	4	1 (1.00 $\pm$ 0.00)
501_02	16	5 (1.88 $\pm$ 1.20)	2	5 (4.00 $\pm$ 1.41)	3	1 (1.00 $\pm$ 0.00)
501_03	21	6 (2.48 $\pm$ 1.91)	5	5 (1.80 $\pm$ 1.79)	4	3 (1.50 $\pm$ 1.00)
501_04	21	7 (3.05 $\pm$ 2.25)	4	10 (3.25 $\pm$ 4.50)	3	2 (1.33 $\pm$ 0.58)
522_01	10	5 (1.40 $\pm$ 1.26)	2	2 (1.50 $\pm$ 0.71)	7	1 (1.00 $\pm$ 0.00)
522_03	9	4 (2.22 $\pm$ 1.09)	2	1 (1.00 $\pm$ 0.00)	5	1 (1.00 $\pm$ 0.00)
522_04	12	3 (1.25 $\pm$ 0.62)	4	2 (1.25 $\pm$ 0.50)	5	1 (1.00 $\pm$ 0.00)
522_06	7	2 (1.14 $\pm$ 0.38)	2	1 (1.00 $\pm$ 0.00)	-	-
522_08	7	2 (1.43 $\pm$ 0.53)	3	1 (1.00 $\pm$ 0.00)	4	2 (1.25 $\pm$ 0.50)
522_09	7	2 (1.29 $\pm$ 0.49)	2	1 (1.00 $\pm$ 0.00)	2	1 (1.00 $\pm$ 0.00)
522_10	8	5 (1.63 $\pm$ 1.41)	-	-	1	1 (1.00 $\pm$ NA)
522_11	7	2 (1.29 $\pm$ 0.49)	-	-	5	2 (1.20 $\pm$ 0.45)
522_12	6	1 (1.00 $\pm$ 0.00)	1	1 (1.00 $\pm$ NA)	1	1 (1.00 $\pm$ NA)
534_01	20	3 (1.20 $\pm$ 0.52)	2	1 (1.00 $\pm$ 0.00)	4	3 (1.50 $\pm$ 1.00)
534_02	11	2 (1.36 $\pm$ 0.50)	3	1 (1.00 $\pm$ 0.00)	4	2 (1.25 $\pm$ 0.50)
534_03	5	2 (1.20 $\pm$ 0.45)	1	1 (1.00 $\pm$ NA)	4	1 (1.00 $\pm$ 0.00)
534_04	15	4 (1.47 $\pm$ 0.83)	2	1 (1.00 $\pm$ 0.00)	2	2 (2.00 $\pm$ 0.00)
534_05	9	2 (1.33 $\pm$ 0.50)	3	1 (1.00 $\pm$ 0.00)	5	3 (1.60 $\pm$ 0.89)
534_06	7	2 (1.29 $\pm$ 0.49)	1	1 (1.00 $\pm$ NA)	4	1 (1.00 $\pm$ 0.00)
BW_02	12	6 (2.08 $\pm$ 1.51)	5	2 (1.20 $\pm$ 0.45)	6	2 (1.33 $\pm$ 0.52)
BW_03	6	2 (1.17 $\pm$ 0.41)	3	1 (1.00 $\pm$ 0.00)	2	2 (1.50 $\pm$ 0.71)
BW_04	5	1 (1.00 $\pm$ 0.00)	-	-	3	1 (1.00 $\pm$ 0.00)
BW_05	5	1 (1.00 $\pm$ 0.00)	-	-	2	2 (1.50 $\pm$ 0.71)
BW_06	2	2 (1.50 $\pm$ 0.71)	1	2 (2.00 $\pm$ NA)	4	1 (1.00 $\pm$ 0.00)
BW_07	9	2 (1.11 $\pm$ 0.33)	-	-	2	1 (1.00 $\pm$ 0.00)
BW_08	13	2 (1.15 $\pm$ 0.38)	3	1 (1.00 $\pm$ 0.00)	4	3 (1.50 $\pm$ 1.00)
BW_09	10	1 (1.00 $\pm$ 0.00)	4	1 (1.00 $\pm$ 0.00)	1	1 (1.00 $\pm$ NA)
BW_10	11	7 (2.09 $\pm$ 1.92)	1	2 (2.00 $\pm$ NA)	3	1 (1.00 $\pm$ 0.00)
MFW_03	9	3 (1.56 $\pm$ 0.73)	2	2 (1.50 $\pm$ 0.71)	3	1 (1.00 $\pm$ 0.00)
MFW_04	5	2 (1.20 $\pm$ 0.45)	3	2 (1.33 $\pm$ 0.58)	4	1 (1.00 $\pm$ 0.00)
MFW_05	6	2 (1.17 $\pm$ 0.41)	1	1 (1.00 $\pm$ NA)	1	1 (1.00 $\pm$ NA)
MFW_06	4	1 (1.00 $\pm$ 0.00)	-	-	2	1 (1.00 $\pm$ 0.00)

MFW_07	6	3 (1.50 ± 0.84)	1	1 (1.00 ± NA)	1	1 (1.00 ± NA)
MFW_08	7	3 (1.43 ± 0.79)	1	1 (1.00 ± NA)	-	-
MFW_09	6	2 (1.50 ± 0.55)	3	1 (1.00 ± 0.00)	1	1 (1.00 ± NA)
MFW_10	14	2 (1.21 ± 0.43)	-	-	2	1 (1.00 ± 0.00)
REV_01	5	2 (1.40 ± 0.55)	1	1 (1.00 ± NA)	4	2 (1.25 ± 0.50)
REV_02	7	3 (1.29 ± 0.76)	1	1 (1.00 ± NA)	4	2 (1.50 ± 0.58)
REV_03	11	4 (1.55 ± 1.04)	1	3 (3.00 ± NA)	2	2 (1.50 ± 0.71)
REV_04	7	3 (1.43 ± 0.79)	1	1 (1.00 ± NA)	4	3 (1.50 ± 1.00)
REV_05	8	5 (2.13 ± 1.55)	2	1 (1.00 ± 0.00)	4	5 (2.75 ± 2.06)
REV_06	5	3 (2.00 ± 0.71)	1	1 (1.00 ± NA)	3	4 (2.00 ± 1.73)
REV_07	10	3 (1.50 ± 0.85)	3	2 (1.33 ± 0.58)	2	2 (1.50 ± 0.71)
REV_08	6	3 (1.83 ± 0.75)	2	1 (1.00 ± 0.00)	5	1 (1.00 ± 0.00)
REV_09	7	3 (1.71 ± 0.76)	1	1 (1.00 ± NA)	2	3 (2.00 ± 1.41)
REV_10	3	2 (1.33 ± 0.58)	3	3 (2.33 ± 0.58)	4	1 (1.00 ± 0.00)
REV_11	4	2 (1.25 ± 0.50)	2	3 (2.50 ± 0.71)	2	1 (1.00 ± 0.00)
REV_12	5	6 (2.20 ± 2.17)	4	1 (1.00 ± 0.00)	1	2 (2.00 ± NA)
REV_13	5	2 (1.20 ± 0.45)	1	1 (1.00 ± NA)	7	2 (1.14 ± 0.38)
REV_14	7	4 (1.71 ± 1.11)	3	1 (1.00 ± 0.00)	3	3 (1.67 ± 1.15)
REV_15	10	4 (1.40 ± 0.97)	1	1 (1.00 ± NA)	3	1 (1.00 ± 0.00)
REV_16	12	2 (1.17 ± 0.39)	2	2 (1.50 ± 0.71)	2	1 (1.00 ± 0.00)
REV_17	7	3 (1.43 ± 0.79)	2	1 (1.00 ± 0.00)	5	2 (1.20 ± 0.45)
REV_18	4	1 (1.00 ± 0.00)	1	1 (1.00 ± NA)	5	2 (1.20 ± 0.45)
SF_01	7	2 (1.29 ± 0.49)	2	1 (1.00 ± 0.00)	3	2 (1.33 ± 0.58)
SF_02	4	2 (1.25 ± 0.50)	1	1 (1.00 ± NA)	3	1 (1.00 ± 0.00)
SRW_01	6	4 (1.67 ± 1.21)	-	-	3	1 (1.00 ± 0.00)
SRW_02	5	2 (1.20 ± 0.45)	-	-	3	1 (1.00 ± 0.00)
SRW_03	3	4 (2.00 ± 1.73)	1	2 (2.00 ± NA)	5	4 (1.60 ± 1.34)
SRW_04	10	2 (1.20 ± 0.42)	1	1 (1.00 ± NA)	1	1 (1.00 ± NA)
SRW_05	11	3 (1.18 ± 0.60)	2	2 (1.50 ± 0.71)	2	1 (1.00 ± 0.00)
SRW_06	5	2 (1.20 ± 0.45)	2	2 (1.50 ± 0.71)	3	2 (1.33 ± 0.58)
SRW_07	9	2 (1.33 ± 0.50)	4	3 (1.50 ± 1.00)	2	1 (1.00 ± 0.00)
SRW_08	13	3 (1.54 ± 0.66)	4	1 (1.00 ± 0.00)	2	1 (1.00 ± 0.00)
SRW_09	9	2 (1.33 ± 0.50)	4	3 (1.50 ± 1.00)	1	5 (5.00 ± NA)
SRW_10	4	4 (2.00 ± 1.41)	1	1 (1.00 ± NA)	2	2 (1.50 ± 0.71)
SRW_12	8	2 (1.13 ± 0.35)	4	2 (1.50 ± 0.58)	3	2 (1.33 ± 0.58)

Table 10b – Bluefin tuna annual strength scores by receiver station from 2022 to 2024 generated from individual networks. Dashes denote that no metric data exist due to the lack of detections. Grey shading denotes years when networks included data from receivers that were impacted at the 3, 5, and 8 km impact radius (lightest), 5 and 8 km impact radius (medium), and only 8 km impact radius (darkest). REV = Revolution Wind, SF = South Fork Wind, SRW = Sunrise Wind, BW = Beacon Wind, MFW = Mayflower (SouthCoast) Wind; Tx = total unique transmitters detected.

Station	2022		2023		2024	
	Tx	Max (Mean $\pm$ SD)	Tx	Max (Mean $\pm$ SD)	Tx	Max (Mean $\pm$ SD)
501_01	1	2 (2.00 $\pm$ NA)	7	2 (1.14 $\pm$ 0.38)	9	3 (1.56 $\pm$ 0.88)
501_02	-	-	5	2 (1.20 $\pm$ 0.45)	11	2 (1.36 $\pm$ 0.50)
501_03	1	1 (1.00 $\pm$ NA)	5	2 (1.20 $\pm$ 0.45)	12	5 (1.75 $\pm$ 1.29)
501_04	1	1 (1.00 $\pm$ NA)	11	4 (1.27 $\pm$ 0.90)	14	6 (1.93 $\pm$ 1.44)
522_01	2	1 (1.00 $\pm$ 0.00)	10	4 (1.70 $\pm$ 1.06)	15	3 (1.33 $\pm$ 0.62)
522_03	-	-	11	3 (1.64 $\pm$ 0.81)	15	4 (1.73 $\pm$ 1.10)
522_04	1	1 (1.00 $\pm$ NA)	10	2 (1.10 $\pm$ 0.32)	19	3 (1.42 $\pm$ 0.69)
522_06	4	1 (1.00 $\pm$ 0.00)	10	2 (1.10 $\pm$ 0.32)	14	3 (1.36 $\pm$ 0.63)
522_08	2	1 (1.00 $\pm$ 0.00)	11	3 (1.45 $\pm$ 0.69)	16	3 (1.19 $\pm$ 0.54)
522_09	-	-	9	2 (1.33 $\pm$ 0.50)	9	3 (1.44 $\pm$ 0.73)
522_10	1	1 (1.00 $\pm$ NA)	5	3 (1.40 $\pm$ 0.89)	17	4 (1.71 $\pm$ 1.10)
522_11	3	1 (1.00 $\pm$ 0.00)	6	2 (1.17 $\pm$ 0.41)	11	3 (1.64 $\pm$ 0.81)
522_12	-	-	8	2 (1.25 $\pm$ 0.46)	17	2 (1.12 $\pm$ 0.33)
534_01	2	1 (1.00 $\pm$ 0.00)	6	2 (1.50 $\pm$ 0.55)	16	4 (1.69 $\pm$ 1.01)
534_02	3	1 (1.00 $\pm$ 0.00)	4	1 (1.00 $\pm$ 0.00)	19	4 (1.63 $\pm$ 0.83)
534_03	1	2 (2.00 $\pm$ NA)	11	2 (1.27 $\pm$ 0.47)	11	3 (1.18 $\pm$ 0.60)
534_04	1	1 (1.00 $\pm$ NA)	10	3 (1.30 $\pm$ 0.67)	17	5 (1.82 $\pm$ 1.19)
534_05	1	1 (1.00 $\pm$ NA)	9	3 (1.33 $\pm$ 0.71)	14	3 (1.43 $\pm$ 0.65)
534_06	2	3 (2.50 $\pm$ 0.71)	6	3 (1.50 $\pm$ 0.84)	14	3 (1.21 $\pm$ 0.58)
BW_02	-	-	7	2 (1.29 $\pm$ 0.49)	14	9 (2.36 $\pm$ 2.17)
BW_03	1	1 (1.00 $\pm$ NA)	8	2 (1.38 $\pm$ 0.52)	17	3 (1.53 $\pm$ 0.72)
BW_04	2	2 (1.50 $\pm$ 0.71)	7	2 (1.14 $\pm$ 0.38)	21	5 (1.24 $\pm$ 0.89)
BW_05	-	-	10	3 (1.30 $\pm$ 0.67)	10	1 (1.00 $\pm$ 0.00)
BW_06	1	3 (3.00 $\pm$ NA)	9	3 (1.22 $\pm$ 0.67)	13	3 (1.54 $\pm$ 0.66)
BW_07	2	2 (1.50 $\pm$ 0.71)	9	2 (1.22 $\pm$ 0.44)	21	7 (2.00 $\pm$ 1.61)
BW_08	-	-	7	2 (1.29 $\pm$ 0.49)	14	4 (1.57 $\pm$ 0.94)
BW_09	2	2 (1.50 $\pm$ 0.71)	14	2 (1.29 $\pm$ 0.47)	18	7 (1.56 $\pm$ 1.42)
BW_10	1	1 (1.00 $\pm$ NA)	10	4 (1.30 $\pm$ 0.95)	21	6 (1.57 $\pm$ 1.29)
MFW_03	2	1 (1.00 $\pm$ 0.00)	11	2 (1.27 $\pm$ 0.47)	17	5 (2.06 $\pm$ 1.34)
MFW_04	2	2 (1.50 $\pm$ 0.71)	12	2 (1.33 $\pm$ 0.49)	23	5 (1.70 $\pm$ 1.22)
MFW_05	2	1 (1.00 $\pm$ 0.00)	11	2 (1.18 $\pm$ 0.40)	17	4 (1.59 $\pm$ 0.94)
MFW_06	4	1 (1.00 $\pm$ 0.00)	8	3 (1.25 $\pm$ 0.71)	10	3 (1.70 $\pm$ 0.95)

MFW_07	1	1 (1.00 ± NA)	10	3 (1.20 ± 0.63)	12	5 (1.67 ± 1.15)
MFW_08	1	2 (2.00 ± NA)	7	2 (1.29 ± 0.49)	22	7 (1.77 ± 1.51)
MFW_09	1	1 (1.00 ± NA)	12	5 (1.42 ± 1.16)	17	8 (2.24 ± 1.75)
MFW_10	1	1 (1.00 ± NA)	7	2 (1.43 ± 0.53)	17	4 (1.71 ± 1.05)
REV_01	-	-	7	3 (1.57 ± 0.79)	6	5 (2.17 ± 1.60)
REV_02	-	-	11	3 (1.64 ± 0.81)	10	3 (1.80 ± 0.92)
REV_03	-	-	10	3 (2.00 ± 0.82)	7	4 (2.43 ± 1.27)
REV_04	-	-	10	6 (2.80 ± 1.62)	11	5 (2.18 ± 1.54)
REV_05	1	1 (1.00 ± NA)	7	2 (1.14 ± 0.38)	8	5 (2.00 ± 1.41)
REV_06	-	-	11	2 (1.18 ± 0.40)	9	6 (2.67 ± 1.73)
REV_07	1	1 (1.00 ± NA)	8	2 (1.13 ± 0.35)	9	3 (1.89 ± 0.78)
REV_08	-	-	7	2 (1.14 ± 0.38)	8	2 (1.50 ± 0.53)
REV_09	-	-	9	4 (1.44 ± 1.01)	10	3 (1.40 ± 0.70)
REV_10	1	1 (1.00 ± NA)	9	3 (1.33 ± 0.71)	4	1 (1.00 ± 0.00)
REV_11	1	2 (2.00 ± NA)	6	2 (1.33 ± 0.52)	9	2 (1.11 ± 0.33)
REV_12	-	-	11	4 (2.00 ± 1.00)	8	1 (1.00 ± 0.00)
REV_13	1	1 (1.00 ± NA)	11	3 (1.91 ± 0.70)	7	3 (1.43 ± 0.79)
REV_14	-	-	7	3 (1.29 ± 0.76)	7	2 (1.14 ± 0.38)
REV_15	-	-	7	3 (1.43 ± 0.79)	10	2 (1.30 ± 0.48)
REV_16	2	1 (1.00 ± 0.00)	13	5 (2.92 ± 1.12)	10	4 (1.30 ± 0.95)
REV_17	-	-	15	4 (1.60 ± 0.91)	10	4 (1.60 ± 0.97)
REV_18	1	1 (1.00 ± NA)	9	2 (1.33 ± 0.50)	6	4 (2.00 ± 1.55)
SF_01	1	1 (1.00 ± NA)	6	3 (1.50 ± 0.84)	10	3 (1.50 ± 0.85)
SF_02	-	-	13	4 (2.00 ± 1.08)	10	3 (1.50 ± 0.85)
SRW_01	-	-	13	2 (1.23 ± 0.44)	6	1 (1.00 ± 0.00)
SRW_02	3	2 (1.33 ± 0.58)	13	3 (1.38 ± 0.65)	9	1 (1.00 ± 0.00)
SRW_03	2	2 (1.50 ± 0.71)	8	4 (1.75 ± 1.16)	8	3 (1.38 ± 0.74)
SRW_04	-	-	15	4 (2.00 ± 0.85)	9	3 (1.78 ± 0.83)
SRW_05	-	-	17	3 (1.71 ± 0.77)	8	2 (1.25 ± 0.46)
SRW_06	1	1 (1.00 ± NA)	10	3 (1.40 ± 0.70)	14	4 (1.50 ± 0.94)
SRW_07	-	-	15	5 (1.53 ± 1.13)	12	2 (1.25 ± 0.45)
SRW_08	1	1 (1.00 ± NA)	6	2 (1.17 ± 0.41)	19	2 (1.16 ± 0.37)
SRW_09	1	1 (1.00 ± NA)	15	4 (1.87 ± 0.92)	10	2 (1.20 ± 0.42)
SRW_10	1	2 (2.00 ± NA)	9	2 (1.33 ± 0.50)	8	1 (1.00 ± 0.00)
SRW_12	2	1 (1.00 ± 0.00)	11	3 (1.55 ± 0.82)	7	3 (1.43 ± 0.79)

Table 10c – Shortfin mako annual strength scores by receiver station from 2022 to 2024 generated from individual networks. Dashes denote that no metric data exist due to the lack of detections. Grey shading denotes years when networks included data from receivers that were impacted at the 3, 5, and 8 km impact radius (lightest), 5 and 8 km impact radius (medium), and only 8 km impact radius (darkest). REV = Revolution Wind, SF = South Fork Wind, SRW = Sunrise Wind, BW = Beacon Wind, MFW = Mayflower (SouthCoast) Wind; Tx = total unique transmitters detected.

Station	2022		2023		2024	
	Tx	Max (Mean $\pm$ SD)	Tx	Max (Mean $\pm$ SD)	Tx	Max (Mean $\pm$ SD)
501_01	-	-	-	-	6	1 (1.00 $\pm$ 0.00)
501_02	1	1 (1.00 $\pm$ NA)	1	1 (1.00 $\pm$ NA)	5	2 (1.40 $\pm$ 0.55)
501_03	-	-	1	1 (1.00 $\pm$ NA)	3	1 (1.00 $\pm$ 0.00)
501_04	2	1 (1.00 $\pm$ 0.00)	1	1 (1.00 $\pm$ NA)	3	2 (1.33 $\pm$ 0.58)
522_01	4	3 (1.75 $\pm$ 0.96)	1	1 (1.00 $\pm$ NA)	3	1 (1.00 $\pm$ 0.00)
522_03	2	1 (1.00 $\pm$ 0.00)	2	1 (1.00 $\pm$ 0.00)	1	1 (1.00 $\pm$ NA)
522_04	2	1 (1.00 $\pm$ 0.00)	1	1 (1.00 $\pm$ NA)	1	1 (1.00 $\pm$ NA)
522_06	2	1 (1.00 $\pm$ 0.00)	4	2 (1.50 $\pm$ 0.58)	1	1 (1.00 $\pm$ NA)
522_08	3	1 (1.00 $\pm$ 0.00)	1	1 (1.00 $\pm$ NA)	1	1 (1.00 $\pm$ NA)
522_09	1	1 (1.00 $\pm$ NA)	3	1 (1.00 $\pm$ 0.00)	1	1 (1.00 $\pm$ NA)
522_10	1	1 (1.00 $\pm$ NA)	3	1 (1.00 $\pm$ 0.00)	1	1 (1.00 $\pm$ NA)
522_11	1	1 (1.00 $\pm$ NA)	1	1 (1.00 $\pm$ NA)	1	1 (1.00 $\pm$ NA)
522_12	2	1 (1.00 $\pm$ 0.00)	-	-	3	1 (1.00 $\pm$ 0.00)
534_01	1	1 (1.00 $\pm$ NA)	1	1 (1.00 $\pm$ NA)	1	1 (1.00 $\pm$ NA)
534_02	2	1 (1.00 $\pm$ 0.00)	4	2 (1.25 $\pm$ 0.50)	1	1 (1.00 $\pm$ NA)
534_03	3	1 (1.00 $\pm$ 0.00)	5	1 (1.00 $\pm$ 0.00)	2	1 (1.00 $\pm$ 0.00)
534_04	1	1 (1.00 $\pm$ NA)	3	1 (1.00 $\pm$ 0.00)	1	1 (1.00 $\pm$ NA)
534_05	1	2 (2.00 $\pm$ NA)	3	1 (1.00 $\pm$ 0.00)	4	1 (1.00 $\pm$ 0.00)
534_06	2	1 (1.00 $\pm$ 0.00)	-	-	2	1 (1.00 $\pm$ 0.00)
BW_02	1	1 (1.00 $\pm$ NA)	3	1 (1.00 $\pm$ 0.00)	2	1 (1.00 $\pm$ 0.00)
BW_03	2	2 (1.50 $\pm$ 0.71)	2	1 (1.00 $\pm$ 0.00)	2	1 (1.00 $\pm$ 0.00)
BW_04	3	1 (1.00 $\pm$ 0.00)	1	1 (1.00 $\pm$ NA)	3	2 (1.33 $\pm$ 0.58)
BW_05	1	1 (1.00 $\pm$ NA)	1	2 (2.00 $\pm$ NA)	1	1 (1.00 $\pm$ NA)
BW_06	-	-	2	1 (1.00 $\pm$ 0.00)	1	1 (1.00 $\pm$ NA)
BW_07	2	2 (1.50 $\pm$ 0.71)	1	1 (1.00 $\pm$ NA)	2	1 (1.00 $\pm$ 0.00)
BW_08	1	2 (2.00 $\pm$ NA)	-	-	2	1 (1.00 $\pm$ 0.00)
BW_09	1	2 (2.00 $\pm$ NA)	3	1 (1.00 $\pm$ 0.00)	1	1 (1.00 $\pm$ NA)
BW_10	1	1 (1.00 $\pm$ NA)	1	2 (2.00 $\pm$ NA)	-	-
MFW_03	-	-	2	1 (1.00 $\pm$ 0.00)	-	-
MFW_04	1	1 (1.00 $\pm$ NA)	5	1 (1.00 $\pm$ 0.00)	1	1 (1.00 $\pm$ NA)
MFW_05	-	-	-	-	3	1 (1.00 $\pm$ 0.00)
MFW_06	1	1 (1.00 $\pm$ NA)	1	1 (1.00 $\pm$ NA)	2	2 (1.50 $\pm$ 0.71)

MFW_07	1	1 (1.00 ± NA)	2	1 (1.00 ± 0.00)	1	1 (1.00 ± NA)
MFW_08	1	1 (1.00 ± NA)	3	1 (1.00 ± 0.00)	2	1 (1.00 ± 0.00)
MFW_09	2	1 (1.00 ± 0.00)	1	1 (1.00 ± NA)	1	1 (1.00 ± NA)
MFW_10	3	2 (1.33 ± 0.58)	2	2 (1.50 ± 0.71)	1	1 (1.00 ± NA)
REV_01	-	-	2	2 (1.50 ± 0.71)	5	4 (1.60 ± 1.34)
REV_02	1	1 (1.00 ± NA)	3	1 (1.00 ± 0.00)	6	2 (1.33 ± 0.52)
REV_03	2	1 (1.00 ± 0.00)	-	-	10	2 (1.40 ± 0.52)
REV_04	-	-	2	1 (1.00 ± 0.00)	3	2 (1.67 ± 0.58)
REV_05	1	1 (1.00 ± NA)	2	2 (1.50 ± 0.71)	11	2 (1.18 ± 0.40)
REV_06	1	1 (1.00 ± NA)	2	2 (1.50 ± 0.71)	5	2 (1.20 ± 0.45)
REV_07	3	1 (1.00 ± 0.00)	3	1 (1.00 ± 0.00)	10	3 (1.50 ± 0.85)
REV_08	-	-	2	2 (1.50 ± 0.71)	8	3 (1.63 ± 0.74)
REV_09	1	1 (1.00 ± NA)	4	1 (1.00 ± 0.00)	5	3 (1.60 ± 0.89)
REV_10	2	1 (1.00 ± 0.00)	2	2 (1.50 ± 0.71)	9	2 (1.22 ± 0.44)
REV_11	1	1 (1.00 ± NA)	1	1 (1.00 ± NA)	6	2 (1.17 ± 0.41)
REV_12	4	2 (1.25 ± 0.50)	4	1 (1.00 ± 0.00)	6	2 (1.17 ± 0.41)
REV_13	2	1 (1.00 ± 0.00)	3	3 (1.67 ± 1.15)	4	2 (1.25 ± 0.50)
REV_14	2	1 (1.00 ± 0.00)	5	3 (1.60 ± 0.89)	8	1 (1.00 ± 0.00)
REV_15	3	2 (1.33 ± 0.58)	3	2 (1.33 ± 0.58)	4	3 (1.50 ± 1.00)
REV_16	3	1 (1.00 ± 0.00)	4	3 (1.75 ± 0.96)	4	3 (1.75 ± 0.96)
REV_17	1	1 (1.00 ± NA)	7	2 (1.57 ± 0.53)	9	4 (1.67 ± 1.12)
REV_18	-	-	4	3 (1.75 ± 0.96)	8	2 (1.25 ± 0.46)
SF_01	-	-	2	3 (2.00 ± 1.41)	9	2 (1.22 ± 0.44)
SF_02	1	1 (1.00 ± NA)	5	3 (1.40 ± 0.89)	6	1 (1.00 ± 0.00)
SRW_01	2	1 (1.00 ± 0.00)	6	2 (1.17 ± 0.41)	3	4 (2.00 ± 1.73)
SRW_02	1	1 (1.00 ± NA)	2	2 (1.50 ± 0.71)	8	3 (1.38 ± 0.74)
SRW_03	2	1 (1.00 ± 0.00)	3	1 (1.00 ± 0.00)	9	2 (1.33 ± 0.50)
SRW_04	1	2 (2.00 ± NA)	7	1 (1.00 ± 0.00)	6	1 (1.00 ± 0.00)
SRW_05	4	2 (1.25 ± 0.50)	5	2 (1.20 ± 0.45)	8	2 (1.25 ± 0.46)
SRW_06	2	2 (1.50 ± 0.71)	7	2 (1.43 ± 0.53)	7	2 (1.14 ± 0.38)
SRW_07	3	3 (1.67 ± 1.15)	6	3 (1.50 ± 0.84)	6	1 (1.00 ± 0.00)
SRW_08	1	1 (1.00 ± NA)	5	4 (1.60 ± 1.34)	1	1 (1.00 ± NA)
SRW_09	2	3 (2.50 ± 0.71)	6	1 (1.00 ± 0.00)	4	2 (1.25 ± 0.50)
SRW_10	1	1 (1.00 ± NA)	2	3 (2.00 ± 1.41)	9	3 (1.44 ± 0.88)
SRW_12	2	3 (2.00 ± 1.41)	3	1 (1.00 ± 0.00)	1	1 (1.00 ± NA)

Table 11 – Environmental conditions in which tagged species were detected/observed during the study period. SST = sea surface temperature, T = temperature, ΔT = SST – bottom T, Chl a = chlorophyll a.

Species	SST (°C)	Bottom T (°C)	ΔT (°C)	Chl a (mg/m³)
Blue shark	14.7 - 25.2	7.1 - 19.1	-1.2 - 16.3	0.24 - 2.33
Bluefin tuna	7.8 - 24.9	6.9 - 21.9	-4.8 - 16.8	0.23 - 3.32
Common thresher shark	13.3 - 22.9	8.1 - 20.4	-3.5 - 13.9	0.65 - 4.01
Dusky shark	17.5 - 25.4	7.8 - 19.4	0.6 - 15.9	0.31 - 1.33
Shortfin mako	13.1 - 24.7	7.0 - 19.0	-1.3 - 16.2	0.29 - 3.20
White marlin	17.9 - 22.5	9.6 - 16.9	1.0 - 12.4	0.39 - 1.10
Yellowfin tuna	15.1 - 24.7	9.3 - 18.2	-2.2 - 15.4	0.27 - 2.03

Table 12 – Summary of the acoustic receiver stations that were impacted by offshore wind construction activity at each impact radius. For each station, the date that it was impacted by construction activity is presented along with the total number of days (d) in which it was deployed (and monitored for transmitters) during the pre- and post- construction periods. Note that stations REV_05, REV_07, REV_08, REV_15, REV_16, REV_17, REV_18, and SF_01 had data from 2020 to 2024 while all other receivers used data from 2022 to 2024 (since they were first deployed in 2022). NA entries denote stations that were not impacted at that radius. BW = Beacon Wind, REV = Revolution Wind, SF = South Fork Wind, SRW = Sunrise Wind.

Station	3 km impact radius			5 km impact radius			8 km impact radius		
	Impact date	Pre (d)	Post (d)	Impact date	Pre (d)	Post (d)	Impact date	Pre (d)	Post (d)
501_01	2023-07-15	225	322	2023-06-17	197	350	2023-06-17	197	350
501_02	2023-06-17	197	350	2023-06-17	197	350	2023-06-17	197	350
501_03	2023-06-06	186	361	2023-06-06	186	361	2023-06-06	186	361
501_04	2023-06-09	189	358	2023-06-06	186	361	2023-06-06	186	361
534_01	NA	NA	NA	2023-12-15	364	183	2023-12-15	364	183
BW_02	NA	NA	NA	2023-07-09	402	328	2023-06-26	389	341
REV_01	NA	NA	NA	NA	NA	NA	2024-05-14	366	183
REV_02	2024-05-24	366	183	2024-05-24	366	183	2024-05-14	366	183
REV_03	2024-06-28	393	156	2024-05-18	366	183	2024-05-14	366	183
REV_04	2024-05-14	366	183	2024-05-14	366	183	2024-05-14	366	183
REV_05	2024-06-02	697	182	2024-05-24	696	183	2024-05-24	696	183
REV_06	2024-06-02	367	182	2024-05-24	366	183	2024-05-18	366	183
REV_07	2024-05-29	696	183	2024-05-29	696	183	2023-07-31	573	306
REV_08	2024-07-27	752	127	2024-06-02	697	182	2023-07-06	548	331
REV_09	2024-07-30	425	124	2024-07-01	396	153	2023-07-08	220	329
REV_10	NA	NA	NA	NA	NA	NA	2023-06-19	531	348
REV_11	2023-08-04	247	302	2023-06-19	201	348	2023-06-19	201	348
REV_12	2024-07-05	400	149	2024-05-10	366	183	2024-05-10	366	183
REV_13	2024-07-13	398	151	2024-05-13	366	183	2023-07-08	220	329
REV_14	2024-08-16	432	107	2024-06-04	359	180	2024-05-10	356	183
REV_15	2024-07-16	741	138	2024-06-15	710	169	2024-06-04	699	180
REV_16	2024-06-13	708	171	2024-06-13	708	171	2023-07-23	565	314
REV_17	2024-06-04	699	170	2024-06-04	699	170	2024-06-04	699	170
REV_18	2023-08-07	616	299	2023-07-08	586	329	2023-07-06	584	331
SF_01	2023-06-19	558	333	2023-06-19	558	333	2023-06-19	558	333
SF_02	2023-07-08	220	329	2023-07-08	220	329	2023-06-19	201	348
SRW_05	NA	NA	NA	NA	NA	NA	2024-06-18	383	166
SRW_10	NA	NA	NA	2023-07-02	571	335	2023-06-19	558	348

Table 13 – Results of Welch’s t-test examining differences in residence duration (minutes) between the pre- and post-construction periods across all impacted receivers by impact radius. Summary statistics of residence duration are provided across impact radii for each species. The number of detected transmitters (Tx) and of residence events (n) documented in each period is also provided. SD – standard deviation, df = degrees of freedom

Species	Impact radius	Pre-construction			Post-construction			t	df	p
		Tx	n	Range (Median, Mean $\pm$ SD)	Tx	n	Range (Median, Mean $\pm$ SD)			
Blue shark	3	58	489	1–2952 (20, 109 $\pm$ 324)	24	125	1–1377 (16, 67 $\pm$ 213)	1.75	289	0.081
	5	57	524	1–2952 (20, 107 $\pm$ 316)	26	175	1–2186 (17, 74 $\pm$ 249)	1.4	375	0.162
	8	56	550	1–2952 (19, 108 $\pm$ 326)	27	202	1–2186 (18, 71 $\pm$ 234)	1.72	496	0.086
Bluefin tuna	3	32	322	1–1468 (6, 63 $\pm$ 211)	49	442	1–1876 (6, 47 $\pm$ 172)	1.11	603	0.267
	5	34	340	1–1468 (6, 67 $\pm$ 223)	53	538	1–1876 (5, 48 $\pm$ 171)	1.37	588	0.171
	8	33	301	1–1468 (6, 67 $\pm$ 214)	54	671	1–1876 (5, 51 $\pm$ 187)	1.11	515	0.268
Shortfin mako	3	30	155	1–1069 (15, 61 $\pm$ 154)	30	170	1–2283 (14, 77 $\pm$ 264)	-0.68	276	0.498
	5	22	126	1–1069 (17, 66 $\pm$ 162)	34	228	1–2283 (14, 72 $\pm$ 237)	-0.28	337	0.779
	8	23	123	1–1487 (16, 73 $\pm$ 214)	35	284	1–2283 (15, 71 $\pm$ 224)	0.09	242	0.929

Table 14a – Summary of residences and residence duration (minutes) at 22 receiver stations impacted at a 3 km radius (from monopiles) by species between the pre- and post-construction periods. ^A statistically different from post-construction period based on Welch’s t-test

Station	Blue shark						Bluefin tuna						Shortfin mako					
	Pre-construction			Post-construction			Pre-construction			Post-construction			Pre-construction			Post-construction		
	Tx	n	Range (Mean ± SD)	Tx	n	Range (Mean ± SD)	Tx	n	Range (Mean ± SD)	Tx	n	Range (Mean ± SD)	Tx	n	Range (Mean ± SD)	Tx	n	Range (Mean ± SD)
501_01	16	32	1–931 (50 ± 162)	7	9	6–747 (107 ± 243)	1	2	185–1432 (808 ± 882)	14	22	1–777 (56 ± 169)	0	0	0–0 (0 ± 0)	6	6	7–28 (19 ± 9)
501_02	16	32	1–137 (27 ± 30) ^A	6	12	1–49 (11 ± 13)	0	0	0–0 (0 ± 0)	15	22	1–15 (5 ± 5)	1	1	6–6 (6 ± 0)	6	8	1–25 (14 ± 8)
501_03	21	60	1–2952 (236 ± 594)	8	15	1–1273 (137 ± 332)	1	1	21–21 (21 ± 0)	16	27	1–1876 (105 ± 380)	0	0	0–0 (0 ± 0)	4	4	5–35 (18 ± 13)
501_04	21	66	1–1713 (197 ± 384)	6	19	1–1286 (98 ± 290)	1	2	1–8 (5 ± 5)	23	41	1–1145 (76 ± 234)	2	2	11–591 (301 ± 410)	4	5	15–2283 (471 ± 1013)
REV_02	8	10	1–875 (112 ± 270)	4	6	1–37 (15 ± 16)	11	18	1–122 (21 ± 36)	10	18	1–67 (12 ± 17)	4	4	1–24 (8 ± 11)	6	9	1–37 (16 ± 12)
REV_03	13	22	1–845 (64 ± 182)	1	2	24–76 (50 ± 36)	10	20	1–790 (64 ± 175)	7	17	1–1076 (82 ± 259)	6	8	1–24 (10 ± 8)	7	8	1–878 (116 ± 308)
REV_04	8	11	1–391 (58 ± 112)	4	6	1–29 (10 ± 11)	10	29	1–1468 (190 ± 402)	11	24	1–522 (65 ± 137)	2	2	11–27 (19 ± 11)	3	5	4–26 (11 ± 8)
REV_05	15	35	1–937 (77 ± 174)	4	11	1–1377 (187 ± 401)	12	20	1–375 (37 ± 84)	8	16	1–798 (105 ± 220)	5	7	2–74 (22 ± 24)	11	13	2–642 (95 ± 178)
REV_06	6	11	1–103 (27 ± 29)	3	6	1–45 (10 ± 18)	11	13	1–474 (49 ± 130)	9	24	1–464 (27 ± 93)	3	4	1–15 (8 ± 7)	5	6	1–39 (17 ± 15)
REV_07	18	29	1–1229 (93 ± 253)	2	3	1–53 (24 ± 26)	13	29	1–1115 (95 ± 266)	9	17	3–485 (39 ± 115)	8	8	1–379 (59 ± 129)	10	15	1–120 (20 ± 32)
REV_08	16	24	1–478 (43 ± 99)	1	1	8–8 (8 ± 0)	13	15	1–413 (32 ± 106)	7	11	1–472 (56 ± 140)	7	14	2–241 (52 ± 71)	4	6	1–84 (41 ± 37)
REV_09	10	18	8–222 (38 ± 48)	0	0	0–0 (0 ± 0)	10	14	1–430 (39 ± 114)	9	14	1–144 (20 ± 37)	10	13	1–50 (14 ± 14)	0	0	0–0 (0 ± 0)
REV_11	6	10	2–54 (28 ± 16)	2	2	8–60 (34 ± 37)	1	2	5–8 (6 ± 2)	14	18	1–253 (24 ± 62)	2	2	7–28 (17 ± 15)	6	7	7–584 (94 ± 216)
REV_12	10	16	1–2186 (298 ± 648)	1	1	7–7 (7 ± 0)	11	22	1–454 (31 ± 98)	8	8	7–9 (5 ± 3)	10	12	1–185 (26 ± 51)	3	4	1–17 (11 ± 7)
REV_13	6	8	12–187 (46 ± 59)	7	7	1–28 (15 ± 9)	13	24	1–238 (25 ± 55)	5	8	1–290 (43 ± 100)	6	9	8–405 (64 ± 128)	3	4	1–16 (11 ± 7)
REV_14	13	20	1–716 (72 ± 186)	0	0	0–0 (0 ± 0)	7	9	1–30 (9 ± 10)	7	8	1–29 (7 ± 9)	13	18	1–23 (11 ± 6)	1	1	19–19 (19 ± 0)
REV_15	12	20	1–201 (38 ± 56)	1	1	1–1 (1 ± 0)	10	14	1–280 (30 ± 73)	9	12	1–48 (11 ± 14)	11	17	1–1069 (174 ± 317)	2	3	1–26 (12 ± 12)
REV_16	18	22	1–1931 (157 ± 467)	2	2	17–28 (23 ± 8)	20	47	1–1436 (78 ± 270)	9	12	1–80 (15 ± 23)	10	15	3–570 (114 ± 203)	4	7	12–371 (71 ± 132)
REV_17	11	16	1–368 (50 ± 92)	5	6	17–161 (55 ± 56)	17	27	1–316 (22 ± 62)	10	16	1–20 (7 ± 5)	10	14	8–153 (37 ± 40)	9	15	1–1302 (142 ± 341)
REV_18	11	13	1–647 (91 ± 199)	5	6	1–15 (7 ± 6)	2	3	1–11 (7 ± 6)	15	24	1–172 (18 ± 35)	3	3	20–683 (241 ± 382)	10	16	1–628 (78 ± 168)
SF_01	7	9	1–35 (18 ± 11)	5	6	7–143 (42 ± 51)	3	3	1–247 (83 ± 142)	16	24	1–858 (80 ± 186)	1	1	25–25 (25 ± 0)	11	15	6–1795 (147 ± 457)
SF_02	4	5	11–29 (19 ± 8)	4	4	20–46 (30 ± 12)	0	0	0–0 (0 ± 0)	21	41	1–1325 (52 ± 211)	1	1	8–8 (8 ± 0)	11	13	1–200 (38 ± 65)

Table 14b – Summary of residences and residence duration (minutes) at 25 receiver stations impacted at a 5 km radius (from monopiles) by species between the pre- and post-construction periods. ^A statistically different from post-construction period based on Welch's t-test

Station	Blue shark						Bluefin tuna						Shortfin mako					
	Pre-construction			Post-construction			Pre-construction			Post-construction			Pre-construction			Post-construction		
	Tx	n	Range (Mean ± SD)	Tx	n	Range (Mean ± SD)	Tx	n	Range (Mean ± SD)	Tx	n	Range (Mean ± SD)	Tx	n	Range (Mean ± SD)	Tx	n	Range (Mean ± SD)
501_01	15	27	1-931 (56 ± 176)	8	14	1-747 (75 ± 196)	1	2	185-1432 (808 ± 882)	14	22	1-777 (56 ± 169)	0	0	0-0 (0 ± 0)	6	6	7-28 (19 ± 9)
501_02	16	32	1-137 (27 ± 30) ^A	6	12	1-49 (11 ± 13)	0	0	0-0 (0 ± 0)	15	22	1-15 (5 ± 5)	1	1	6-6 (6 ± 0)	6	8	1-25 (14 ± 8)
501_03	21	60	1-2952 (236 ± 594)	8	15	1-1273 (137 ± 332)	1	1	21-21 (21 ± 0)	16	27	1-1876 (105 ± 380)	0	0	0-0 (0 ± 0)	4	4	5-35 (18 ± 13)
501_04	21	66	1-1713 (197 ± 384)	6	19	1-1286 (98 ± 290)	1	2	1-8 (5 ± 5)	23	41	1-1145 (76 ± 234)	2	2	11-591 (301 ± 410)	4	5	15-2283 (471 ± 1013)
534_01	21	26	1-1219 (63 ± 236)	4	6	1-71 (22 ± 28)	8	12	1-1185 (207 ± 456)	16	28	1-912 (62 ± 197)	2	2	5-69 (37 ± 45)	1	1	10-10 (10 ± 0)
BW_02	12	26	1-1057 (107 ± 234)	10	14	1-119 (31 ± 40)	0	0	0-0 (0 ± 0)	19	42	1-1012 (65 ± 199)	1	1	28-28 (28 ± 0)	6	6	1-54 (23 ± 20)
REV_02	8	10	1-875 (112 ± 270)	4	6	1-37 (15 ± 16)	11	18	1-122 (21 ± 36)	10	18	1-67 (12 ± 17)	4	4	1-24 (8 ± 11)	6	9	1-37 (16 ± 12)
REV_03	12	20	1-845 (69 ± 191)	2	4	9-76 (29 ± 32)	10	20	1-790 (64 ± 175)	7	17	1-1076 (82 ± 259)	2	2	1-6 (3 ± 3)	10	14	1-878 (71 ± 232)
REV_04	8	11	1-391 (58 ± 112)	4	6	1-29 (10 ± 11)	10	29	1-1468 (190 ± 402)	11	24	1-522 (65 ± 137)	2	2	11-27 (19 ± 11)	3	5	4-26 (11 ± 8)
REV_05	15	35	1-937 (77 ± 174)	4	11	1-1377 (187 ± 401)	12	20	1-375 (37 ± 84)	8	16	1-798 (105 ± 220)	5	7	2-74 (22 ± 24)	11	13	2-642 (95 ± 178)
REV_06	6	11	1-103 (27 ± 29)	3	6	1-45 (10 ± 18)	11	13	1-474 (49 ± 130)	9	24	1-464 (27 ± 93)	3	4	1-15 (8 ± 7)	5	6	1-39 (17 ± 15)
REV_07	18	29	1-1229 (93 ± 253)	2	3	1-53 (24 ± 26)	13	29	1-1115 (95 ± 266)	9	17	3-485 (39 ± 115)	8	8	1-379 (59 ± 129)	10	15	1-120 (20 ± 32)
REV_08	12	20	1-478 (47 ± 108)	5	5	1-49 (19 ± 18)	13	15	1-413 (32 ± 106)	7	11	1-472 (56 ± 140)	3	7	4-139 (42 ± 52)	8	13	1-241 (53 ± 68)
REV_09	9	15	8-222 (37 ± 53)	2	3	34-48 (41 ± 7)	10	14	1-430 (39 ± 114)	9	14	1-144 (20 ± 37)	6	8	1-50 (19 ± 16)	4	5	1-15 (6 ± 6)
REV_11	5	6	2-54 (25 ± 20)	4	6	8-60 (32 ± 18)	1	2	5-8 (6 ± 2)	14	18	1-253 (24 ± 62)	1	1	28-28 (28 ± 0)	7	8	7-584 (83 ± 203)
REV_12	9	15	1-1623 (173 ± 422)	1	2	7-2186 (1097 ± 1541)	11	22	1-454 (31 ± 98)	8	8	1-9 (5 ± 3)	7	9	1-185 (33 ± 58)	6	7	1-17 (9 ± 6)
REV_13	5	7	12-187 (48 ± 63)	7	8	1-28 (16 ± 9)	12	22	1-238 (26 ± 57)	7	10	1-290 (36 ± 89)	5	8	8-405 (70 ± 136)	4	5	1-16 (12 ± 6)
REV_14	10	15	2-33 (14 ± 9)	3	5	1-716 (246 ± 336)	7	9	1-30 (9 ± 10)	7	8	1-29 (7 ± 9)	7	11	1-19 (12 ± 6)	8	8	1-23 (11 ± 7)
REV_15	11	18	1-201 (41 ± 58) ^A	3	3	1-12 (6 ± 6)	10	13	1-280 (32 ± 76)	10	13	1-48 (10 ± 14)	9	14	1-1069 (169 ± 328)	4	6	1-574 (106 ± 229)
REV_16	18	22	1-1931 (157 ± 467)	2	2	17-28 (23 ± 8)	20	47	1-1436 (78 ± 270)	9	12	1-80 (15 ± 23)	10	15	3-570 (114 ± 203)	4	7	12-371 (71 ± 132)
REV_17	11	16	1-368 (50 ± 92)	5	6	17-161 (55 ± 56)	17	27	1-316 (22 ± 62)	10	16	1-20 (7 ± 5)	10	14	8-153 (37 ± 40)	9	15	1-1302 (142 ± 341)
REV_18	11	13	1-647 (91 ± 199)	5	6	1-15 (7 ± 6)	2	3	1-11 (7 ± 6)	15	24	1-172 (18 ± 35)	2	2	20-683 (352 ± 469)	11	17	1-628 (75 ± 163)
SF_01	7	9	1-35 (18 ± 11)	5	6	7-143 (42 ± 51)	3	3	1-247 (83 ± 142)	16	24	1-858 (80 ± 186)	1	1	25-25 (25 ± 0)	11	15	6-1795 (147 ± 457)
SF_02	4	5	11-29 (19 ± 8)	4	4	20-46 (30 ± 12)	0	0	0-0 (0 ± 0)	21	41	1-1325 (52 ± 211)	1	1	8-8 (8 ± 0)	11	13	1-200 (38 ± 65)
SRW_10	8	10	1-1836 (197 ± 576)	2	3	19-44 (27 ± 14)	7	8	1-8 (3 ± 2)	16	20	1-116 (16 ± 33)	2	2	15-16 (16 ± 1)	10	17	1-582 (110 ± 184)

Table 14c – Summary of residences and residence duration (minutes) at 28 receiver stations impacted at an 8 km radius (from monopiles) by species between the pre- and post-construction periods. ^A statistically different from post-construction period based on Welch’s t-test; ^B statistically different from pre-construction period based on Welch’s t-test

Station	Blue shark						Bluefin tuna						Shortfin mako					
	Pre-construction			Post-construction			Pre-construction			Post-construction			Pre-construction			Post-construction		
	Tx	n	Range (Mean ± SD)	Tx	n	Range (Mean ± SD)	Tx	n	Range (Mean ± SD)	Tx	n	Range (Mean ± SD)	Tx	n	Range (Mean ± SD)	Tx	n	Range (Mean ± SD)
501_01	15	27	1–931 (56 ± 176)	8	14	1–747 (75 ± 196)	1	2	185–1432 (808 ± 882)	14	22	1–777 (56 ± 169)	0	0	0–0 (0 ± 0)	6	6	7–28 (19 ± 9)
501_02	16	32	1–137 (27 ± 30) ^A	6	12	1–49 (11 ± 13)	0	0	0–0 (0 ± 0)	15	22	1–15 (5 ± 5)	1	1	6–6 (6 ± 0)	6	8	1–25 (14 ± 8)
501_03	21	60	1–2952 (236 ± 594)	8	15	1–1273 (137 ± 332)	1	1	21–21 (21 ± 0)	16	27	1–1876 (105 ± 380)	0	0	0–0 (0 ± 0)	4	4	5–35 (18 ± 13)
501_04	21	66	1–1713 (197 ± 384)	6	19	1–1286 (98 ± 290)	1	2	1–8 (5 ± 5)	23	41	1–1145 (76 ± 234)	2	2	11–591 (301 ± 410)	4	5	15–2283 (471 ± 1013)
534_01	21	26	1–1219 (63 ± 236)	4	6	1–71 (22 ± 28)	8	12	1–1185 (207 ± 456)	16	28	1–912 (62 ± 197)	2	2	5–69 (37 ± 45)	1	1	10–10 (10 ± 0)
BW_02	12	26	1–1057 (107 ± 234)	10	14	1–119 (31 ± 40)	0	0	0–0 (0 ± 0)	19	42	1–1012 (65 ± 199)	1	1	28–28 (28 ± 0)	6	6	1–54 (23 ± 20)
REV_01	6	10	1–2430 (267 ± 761)	4	7	1–39 (14 ± 15)	7	11	1–979 (156 ± 305)	6	14	1–204 (25 ± 55)	2	3	20–1487 (512 ± 844)	5	10	9–91 (25 ± 24)
REV_02	8	10	1–875 (112 ± 270)	4	6	1–37 (15 ± 16)	11	18	1–122 (21 ± 36)	10	18	1–67 (12 ± 17)	4	4	1–24 (8 ± 11)	6	9	1–37 (16 ± 12)
REV_03	12	20	1–845 (69 ± 191)	2	4	9–76 (29 ± 32)	10	20	1–790 (64 ± 175)	7	17	1–1076 (82 ± 259)	2	2	1–6 (3 ± 3)	10	14	1–878 (71 ± 232)
REV_04	8	11	1–391 (58 ± 112)	4	6	1–29 (10 ± 11)	10	29	1–1468 (190 ± 402)	11	24	1–522 (65 ± 137)	2	2	11–27 (19 ± 11)	3	5	4–26 (11 ± 8)
REV_05	15	35	1–937 (77 ± 174)	4	11	1–1377 (187 ± 401)	12	20	1–375 (37 ± 84)	8	16	1–798 (105 ± 220)	5	7	2–74 (22 ± 24)	11	13	2–642 (95 ± 178)
REV_06	6	11	1–103 (27 ± 29)	3	6	1–45 (10 ± 18)	11	13	1–474 (49 ± 130)	9	24	1–464 (27 ± 93)	3	4	1–15 (8 ± 7)	5	6	1–39 (17 ± 15)
REV_07	17	28	1–1229 (96 ± 257)	3	4	1–53 (20 ± 23)	7	21	1–940 (76 ± 209)	14	25	1–1115 (72 ± 237)	6	6	9–379 (76 ± 149)	12	17	1–120 (19 ± 30)
REV_08	10	18	1–478 (50 ± 114)	7	7	1–49 (18 ± 17)	5	6	1–413 (75 ± 166)	14	20	1–472 (32 ± 105)	3	5	4–139 (47 ± 62)	8	15	1–241 (49 ± 64)
REV_09	8	14	8–54 (24 ± 12)	2	4	34–222 (86 ± 91)	1	1	7–7 (7 ± 0)	18	27	1–430 (30 ± 85)	1	1	50–50 (50 ± 0)	9	12	1–31 (11 ± 10)
REV_10	4	6	7–36 (23 ± 12)	7	12	6–430 (78 ± 122)	7	13	2–748 (80 ± 205)	12	16	1–47 (8 ± 11)	4	5	2–12 (9 ± 4)	10	14	3–197 (29 ± 49)
REV_11	5	6	2–54 (25 ± 20)	4	6	8–60 (32 ± 18)	1	2	5–8 (6 ± 2)	14	18	1–253 (24 ± 62)	1	1	28–28 (28 ± 0)	7	8	7–584 (83 ± 203)
REV_12	9	15	1–1623 (173 ± 422)	1	2	7–2186 (1097 ± 1541)	11	22	1–454 (31 ± 98)	8	8	1–9 (5 ± 3)	7	9	1–185 (33 ± 58)	6	7	1–17 (9 ± 6)
REV_13	5	6	12–187 (47 ± 69)	8	9	1–57 (21 ± 16)	1	1	6–6 (6 ± 0)	16	31	1–290 (30 ± 68)	2	2	8–17 (13 ± 6)	6	11	1–405 (54 ± 117)
REV_14	10	15	2–33 (14 ± 9)	3	5	1–716 (246 ± 336)	7	9	1–30 (9 ± 10)	7	8	1–29 (7 ± 9)	7	11	1–19 (12 ± 6)	8	8	1–23 (11 ± 7)
REV_15	11	18	1–201 (41 ± 58) ^A	3	3	1–12 (6 ± 6)	10	13	1–280 (32 ± 76)	10	13	1–48 (10 ± 14)	9	14	1–1069 (169 ± 328)	4	6	1–574 (106 ± 229)
REV_16	18	22	1–1931 (157 ± 467)	2	2	17–28 (23 ± 8)	8	8	1–285 (48 ± 98)	21	51	1–1436 (68 ± 258)	6	8	3–44 (15 ± 13)	7	14	9–570 (149 ± 215) ^B
REV_17	11	16	1–368 (50 ± 92)	5	6	17–161 (55 ± 56)	17	27	1–316 (22 ± 62)	10	16	1–20 (7 ± 5)	10	14	8–153 (37 ± 40)	9	15	1–1302 (142 ± 341)
REV_18	11	13	1–647 (91 ± 199)	5	6	1–15 (7 ± 6)	2	3	1–11 (7 ± 6)	15	24	1–172 (18 ± 35)	2	2	20–683 (352 ± 469)	11	17	1–628 (75 ± 163)
SF_01	7	9	1–35 (18 ± 11)	5	6	7–143 (42 ± 51)	3	3	1–247 (83 ± 142)	16	24	1–858 (80 ± 186)	1	1	25–25 (25 ± 0)	11	15	6–1795 (147 ± 457)
SF_02	4	5	11–29 (19 ± 8)	4	4	20–46 (30 ± 12)	0	0	0–0 (0 ± 0)	21	41	1–1325 (52 ± 211)	1	1	8–8 (8 ± 0)	11	13	1–200 (38 ± 65)
SRW_05	13	16	1–784 (73 ± 193)	2	2	30–40 (35 ± 8)	17	29	1–88 (6 ± 16)	8	10	1–1639 (255 ± 531)	10	13	1–1063 (114 ± 287)	7	8	1–817 (119 ± 283)
SRW_10	7	9	1–1836 (216 ± 608)	3	4	19–44 (27 ± 11)	7	8	1–8 (3 ± 2)	16	20	1–116 (16 ± 33)	2	2	15–16 (16 ± 1)	10	17	1–582 (110 ± 184)

Table 15 – Results (p-values) of zero-inflated Wilcoxon Rank-Sum tests performed on residency index (RI) scores aggregated across all impacted receivers during the pre- and post-construction periods. The maximum (max) RI score and mean and standard deviation (SD) of the RI scores calculated for individual fish that were available for detection at least 30 days in a period are provided for each species at each impact radius. The total number of transmitters detected in each period (Detected tx) at each impact radius is presented (i.e., transmitters that had a non-zero RI score), which includes the number of transmitters that were detected in that period (i.e., pre- or post) and the number of unique transmitters that were detected in both periods (number in parentheses). The total number of transmitters for which an RI score was calculated (Total Tx; i.e., could have a zero or non-zero RI score) is also presented; summary statistics were calculated from these individuals. $\sum dd$ = cumulative days detected; SD = standard deviation.

Species	Impact radius (km)	Pre-construction				Post-construction				<i>p</i>
		Detected Tx	Total Tx	$\sum dd$	Max, Mean $\pm$ SD	Detected Tx	Total Tx	$\sum dd$	Max, Mean $\pm$ SD	
Blue shark	3	53 (9)	84	499	9.89, 0.38 $\pm$ 1.10	23 (9)	36	131	5.69, 0.19 $\pm$ 0.59	<0.001
	5	55 (8)	68	547	9.89, 0.37 $\pm$ 1.05	25 (8)	36	187	5.69, 0.20 $\pm$ 0.60	<0.001
	8	55 (9)	68	573	9.89, 0.36 $\pm$ 1.03	26 (9)	36	212	5.69, 0.19 $\pm$ 0.58	<0.001
Bluefin tuna	3	29 (20)	52	305	5.45, 0.28 $\pm$ 0.66	48 (20)	65	426	5.04, 0.25 $\pm$ 0.61	0.592
	5	31 (22)	52	325	5.45, 0.28 $\pm$ 0.65	52 (22)	65	521	7.69, 0.25 $\pm$ 0.64	0.452
	8	32 (22)	52	287	7.08, 0.27 $\pm$ 0.68	53 (22)	65	655	7.69, 0.25 $\pm$ 0.63	0.790
Shortfin mako	3	25 (15)	50	136	3.23, 0.16 $\pm$ 0.45	30 (15)	42	176	4.00, 0.22 $\pm$ 0.54	0.102
	5	22 (12)	39	125	3.23, 0.14 $\pm$ 0.42	33 (12)	42	238	15.00, 0.22 $\pm$ 0.73	0.008
	8	22 (13)	39	125	2.68, 0.15 $\pm$ 0.42	34 (13)	42	296	15.00, 0.22 $\pm$ 0.68	0.012

Table 16a – Summary of residency index (RI) scores by receiver station and species at the 3 km impact radius. The number of tagged individuals detected at a receiver station (D), the total number of individuals that were available for detection while that receiver was deployed (A), and the ratio of D/A (%) is presented along with the cumulative number of days in which individuals were detected (Σ dd). The range of non-zero RI scores along with the global mean and standard deviation (SD) of the distribution of individual RI scores by species are also presented for each station. ^A significantly higher than the post-construction period based on Wilcoxon Rank Sum test; ^B significantly higher than the pre-construction period based on zero-inflated Wilcoxon Rank Sum test

Station	Blue shark						Bluefin tuna						Shortfin mako					
	Pre-construction			Post-construction			Pre-construction			Post-construction			Pre-construction			Post-construction		
	D/A (%)	Σ dd	RI Range (Mean $\pm$ SD)	D/A (%)	Σ dd	RI Range (Mean $\pm$ SD)	D/A (%)	Σ dd	RI Range (Mean $\pm$ SD)	D/A (%)	Σ dd	RI Range (Mean $\pm$ SD)	D/A (%)	Σ dd	RI Range (Mean $\pm$ SD)	D/A (%)	Σ dd	RI Range (Mean $\pm$ SD)
501_01	15/45 (33)	28	0.62–4.44 (0.62 $\pm$ 1.11)	7/29 (24)	9	0.72–2.53 (0.27 $\pm$ 0.57)	0/7 (0)	0	0.00–0.00 (0.00 $\pm$ 0.00)	14/62 (23)	23	0.34–2.56 (0.21 $\pm$ 0.48) ^B	0/13 (0)	0	0.00–0.00 (0.00 $\pm$ 0.00)	6/39 (15)	6	0.34–1.05 (0.09 $\pm$ 0.24) ^B
501_02	16/45 (36)	33	0.83–4.42 (0.66 $\pm$ 1.07) ^A	6/35 (17)	12	0.83–2.63 (0.24 $\pm$ 0.61)	0/6 (0)	0	0.00–0.00 (0.00 $\pm$ 0.00)	15/65 (23)	22	0.33–1.68 (0.18 $\pm$ 0.39)	1/13 (8)	1	0.91–0.91 (0.07 $\pm$ 0.25)	6/42 (14)	8	0.34–2.11 (0.13 $\pm$ 0.41)
501_03	21/45 (47)	69	0.68–9.89 (1.47 $\pm$ 2.50) ^A	8/36 (22)	18	0.39–4.47 (0.29 $\pm$ 0.80)	0/6 (0)	0	0.00–0.00 (0.00 $\pm$ 0.00)	16/65 (25)	28	0.31–4.27 (0.25 $\pm$ 0.67)	0/13 (0)	0	0.00–0.00 (0.00 $\pm$ 0.00)	4/42 (10)	4	0.62–1.05 (0.07 $\pm$ 0.23)
501_04	21/45 (47)	73	0.68–8.33 (1.59 $\pm$ 2.44) ^A	6/36 (17)	20	0.40–5.69 (0.33 $\pm$ 1.05)	0/6 (0)	0	0.00–0.00 (0.00 $\pm$ 0.00)	23/65 (35)	44	0.30–5.04 (0.40 $\pm$ 0.82) ^B	2/13 (15)	2	0.68–1.06 (0.13 $\pm$ 0.34)	4/42 (10)	7	0.78–2.88 (0.13 $\pm$ 0.50)
REV_02	8/48 (17)	11	0.44–2.80 (0.15 $\pm$ 0.46)	4/25 (16)	6	0.96–1.90 (0.22 $\pm$ 0.55)	11/39 (28)	17	0.41–2.59 (0.33 $\pm$ 0.65)	10/55 (18)	19	0.55–2.83 (0.27 $\pm$ 0.66)	4/35 (11)	4	0.37–1.69 (0.10 $\pm$ 0.33)	6/27 (22)	9	0.67–2.67 (0.34 $\pm$ 0.75)
REV_03	12/48 (25)	18	0.40–2.80 (0.26 $\pm$ 0.56) ^A	1/24 (4)	2	1.90–1.90 (0.08 $\pm$ 0.39)	10/39 (26)	19	0.41–2.59 (0.35 $\pm$ 0.68)	7/51 (14)	17	0.82–3.42 (0.28 $\pm$ 0.77)	2/35 (6)	2	0.57–1.69 (0.06 $\pm$ 0.30)	7/27 (26)	8	0.66–1.37 (0.26 $\pm$ 0.47) ^B
REV_04	8/48 (17)	11	0.40–1.97 (0.15 $\pm$ 0.39)	4/25 (16)	6	0.74–2.86 (0.21 $\pm$ 0.61)	10/39 (26)	30	0.68–5.45 (0.60 $\pm$ 1.29)	10/55 (18)	23	0.56–4.27 (0.33 $\pm$ 0.89)	2/35 (6)	2	0.81–0.87 (0.05 $\pm$ 0.20)	3/27 (11)	5	0.72–1.21 (0.11 $\pm$ 0.34)
REV_05	15/68 (22)	37	0.49–7.50 (0.53 $\pm$ 1.35)	4/25 (16)	12	0.86–4.41 (0.40 $\pm$ 1.15)	12/52 (23)	20	0.26–2.98 (0.22 $\pm$ 0.52)	8/55 (15)	17	0.79–3.07 (0.24 $\pm$ 0.65)	5/39 (13)	7	0.37–1.19 (0.10 $\pm$ 0.28)	11/27 (41)	14	0.57–2.50 (0.46 $\pm$ 0.70) ^B
REV_06	6/48 (13)	11	0.45–1.97 (0.17 $\pm$ 0.50)	3/25 (12)	6	0.96–2.94 (0.20 $\pm$ 0.63)	11/39 (28)	13	0.41–1.82 (0.27 $\pm$ 0.50)	9/55 (16)	20	0.56–3.17 (0.27 $\pm$ 0.73)	3/35 (9)	4	0.68–1.14 (0.07 $\pm$ 0.25)	5/27 (19)	6	0.57–1.33 (0.14 $\pm$ 0.33)
REV_07	17/68 (25)	28	0.38–5.00 (0.36 $\pm$ 0.87)	2/25 (8)	3	0.95–1.47 (0.10 $\pm$ 0.34)	13/52 (25)	29	0.51–4.76 (0.33 $\pm$ 0.79)	9/55 (16)	17	0.66–2.56 (0.25 $\pm$ 0.61)	8/39 (21)	8	0.37–1.69 (0.16 $\pm$ 0.37)	10/27 (37)	15	0.66–4.00 (0.50 $\pm$ 0.93)
REV_08	11/69 (16)	20	0.38–9.09 (0.41 $\pm$ 1.39)	1/12 (8)	1	1.08–1.08 (0.09 $\pm$ 0.31)	13/52 (25)	15	0.20–1.43 (0.16 $\pm$ 0.31)	7/45 (16)	11	0.81–1.71 (0.20 $\pm$ 0.50)	5/40 (13)	11	0.37–1.98 (0.14 $\pm$ 0.42)	4/13 (31)	7	0.79–4.00 (0.58 $\pm$ 1.16)
REV_09	9/52 (17)	17	0.42–6.52 (0.30 $\pm$ 1.05) ^A	0/11 (0)	0	0.00–0.00 (0.00 $\pm$ 0.00)	10/39 (26)	15	0.26–3.20 (0.26 $\pm$ 0.60)	9/44 (20)	14	0.81–3.28 (0.27 $\pm$ 0.64)	6/36 (17)	8	0.60–1.81 (0.15 $\pm$ 0.39) ^A	0/13 (0)	0	0.00–0.00 (0.00 $\pm$ 0.00)
REV_11	6/46 (13)	11	0.66–2.88 (0.19 $\pm$ 0.55)	2/29 (7)	2	0.86–0.86 (0.06 $\pm$ 0.22)	1/15 (7)	2	0.99–0.99 (0.07 $\pm$ 0.25)	14/61 (23)	18	0.35–1.75 (0.21 $\pm$ 0.44)	2/13 (15)	2	0.60–1.06 (0.13 $\pm$ 0.33)	6/34 (18)	7	0.36–1.33 (0.13 $\pm$ 0.30)
REV_12	9/48 (19)	16	0.40–4.61 (0.26 $\pm$ 0.82)	1/20 (5)	1	0.87–0.87 (0.04 $\pm$ 0.19)	11/39 (28)	22	0.41–2.63 (0.37 $\pm$ 0.70)	8/51 (16)	8	0.74–0.94 (0.13 $\pm$ 0.30)	7/35 (20)	10	0.85–2.67 (0.27 $\pm$ 0.62)	3/26 (12)	4	0.68–1.40 (0.12 $\pm$ 0.36)
REV_13	5/48 (10)	8	0.40–3.03 (0.15 $\pm$ 0.54)	7/21 (33)	8	0.87–1.71 (0.35 $\pm$ 0.53)	12/39 (31)	20	0.28–2.14 (0.32 $\pm$ 0.59)	5/51 (10)	9	0.85–2.75 (0.15 $\pm$ 0.51)	2/13 (15)	8	0.57–3.23 (0.19 $\pm$ 0.59)	3/27 (11)	4	0.67–1.40 (0.10 $\pm$ 0.31)
REV_14	13/64 (20)	21	0.37–6.35 (0.35 $\pm$ 1.01)	0/3 (0)	0	0.00–0.00 (0.00 $\pm$ 0.00)	7/39 (18)	9	0.53–2.22 (0.18 $\pm$ 0.47)	7/40 (18)	8	0.93–1.89 (0.21 $\pm$ 0.48)	13/46 (28)	18	0.54–2.52 (0.36 $\pm$ 0.68)	1/10 (10)	1	0.95–0.95 (0.10 $\pm$ 0.30)
REV_15	11/69 (16)	18	0.26–2.22 (0.17 $\pm$ 0.45)	1/13 (8)	1	1.08–1.08 (0.08 $\pm$ 0.30)	10/52 (19)	13	0.21–2.14 (0.14 $\pm$ 0.37)	9/47 (19)	12	0.78–1.71 (0.21 $\pm$ 0.47)	10/40 (25)	16	0.37–2.68 (0.28 $\pm$ 0.59)	2/18 (11)	3	1.05–1.45 (0.14 $\pm$ 0.41)
REV_16	18/68 (26)	25	0.43–3.03 (0.33 $\pm$ 0.67)	2/24 (8)	2	0.86–0.96 (0.08 $\pm$ 0.26)	19/52 (37)	48	0.26–3.70 (0.62 $\pm$ 1.03) ^A	9/52 (17)	12	0.58–3.17 (0.19 $\pm$ 0.52)	10/39 (26)	16	0.37–2.94 (0.31 $\pm$ 0.68)	4/27 (15)	7	0.61–1.97 (0.17 $\pm$ 0.47)
REV_17	11/68 (16)	16	0.26–3.03 (0.21 $\pm$ 0.62)	5/25 (20)	6	0.74–1.92 (0.22 $\pm$ 0.49)	17/52 (33)	27	0.23–2.86 (0.34 $\pm$ 0.64)	10/52 (19)	16	0.60–3.45 (0.27 $\pm$ 0.66)	10/39 (26)	14	0.51–1.71 (0.28 $\pm$ 0.52)	9/27 (33)	15	0.61–2.21 (0.41 $\pm$ 0.69)
REV_18	11/67 (16)	14	0.33–5.41 (0.28 $\pm$ 0.89)	5/29 (17)	6	0.85–1.47 (0.17 $\pm$ 0.40)	2/37 (5)	3	0.61–0.88 (0.04 $\pm$ 0.17)	15/61 (25)	23	0.35–3.42 (0.25 $\pm$ 0.64) ^B	2/19 (11)	2	0.37–0.88 (0.07 $\pm$ 0.21)	10/34 (29)	16	0.66–3.26 (0.43 $\pm$ 0.81) ^B
SF_01	7/65 (11)	9	0.46–3.03 (0.14 $\pm$ 0.51)	5/35 (14)	7	0.43–2.86 (0.16 $\pm$ 0.52)	3/24 (13)	3	0.38–1.08 (0.09 $\pm$ 0.26)	16/65 (25)	25	0.34–2.56 (0.25 $\pm$ 0.53)	0/17 (0)	0	0.00–0.00 (0.00 $\pm$ 0.00)	11/42 (26)	17	0.36–2.50 (0.24 $\pm$ 0.53) ^B
SF_02	4/45 (9)	5	0.66–1.77 (0.09 $\pm$ 0.32)	3/33 (9)	3	0.74–1.00 (0.08 $\pm$ 0.26)	0/6 (0)	0	0.00–0.00 (0.00 $\pm$ 0.00)	21/62 (34)	40	0.33–3.20 (0.37 $\pm$ 0.68) ^B	1/13 (8)	1	0.79–0.79 (0.06 $\pm$ 0.22)	11/42 (26)	13	0.34–2.94 (0.23 $\pm$ 0.53)

Table 16b – Summary of residency index (RI) scores by receiver station and species at the 5 km impact radius. The number of tagged individuals detected at a receiver station (D), the total number of individuals that were available for detection while that receiver was deployed (A), and the ratio of D/A (%) is presented along with the cumulative number of days in which individuals were detected (Σ dd). The range of non-zero RI scores along with the global mean and standard deviation (SD) of the distribution of individual RI scores by species are also presented for each station. ^A significantly higher than the post-construction period based on Wilcoxon Rank Sum test; ^B significantly higher than the pre-construction period based on zero-inflated Wilcoxon Rank Sum test

Station	Blue shark						Bluefin tuna						Shortfin mako					
	Pre-construction			Post-construction			Pre-construction			Post-construction			Pre-construction			Post-construction		
	D/A (%)		RI	D/A (%)		RI	D/A (%)		RI	D/A (%)		RI	D/A (%)		RI	D/A (%)		RI
	Σ dd	Range (Mean $\pm$ SD)	Σ dd	Range (Mean $\pm$ SD)	Σ dd	Range (Mean $\pm$ SD)	Σ dd	Range (Mean $\pm$ SD)	Σ dd	Range (Mean $\pm$ SD)	Σ dd	Range (Mean $\pm$ SD)	Σ dd	Range (Mean $\pm$ SD)	Σ dd	Range (Mean $\pm$ SD)	Σ dd	Range (Mean $\pm$ SD)
501_01	15/45 (33)	27	0.79–4.44 (0.62 $\pm$ 1.10)	8/35 (23)	15	0.40–2.63 (0.31 $\pm$ 0.71)	0/6 (0)	0	0.00–0.00 (0.00 $\pm$ 0.00)	14/65 (22)	23	0.33–2.56 (0.20 $\pm$ 0.47)	0/13 (0)	0	0.00–0.00 (0.00 $\pm$ 0.00)	6/42 (14)	6	0.34–1.05 (0.09 $\pm$ 0.23) ^B
501_02	16/45 (36)	33	0.83–4.42 (0.66 $\pm$ 1.07) ^A	6/35 (17)	12	0.83–2.63 (0.24 $\pm$ 0.61)	0/6 (0)	0	0.00–0.00 (0.00 $\pm$ 0.00)	15/65 (23)	22	0.33–1.68 (0.18 $\pm$ 0.39)	1/13 (8)	1	0.91–0.91 (0.07 $\pm$ 0.25)	6/42 (14)	8	0.34–2.11 (0.13 $\pm$ 0.41)
501_03	21/45 (47)	69	0.68–9.89 (1.47 $\pm$ 2.50) ^A	8/36 (22)	18	0.39–4.47 (0.29 $\pm$ 0.80)	0/6 (0)	0	0.00–0.00 (0.00 $\pm$ 0.00)	16/65 (25)	28	0.31–4.27 (0.25 $\pm$ 0.67)	0/13 (0)	0	0.00–0.00 (0.00 $\pm$ 0.00)	4/42 (10)	4	0.62–1.05 (0.07 $\pm$ 0.23)
501_04	21/45 (47)	73	0.68–8.33 (1.59 $\pm$ 2.44) ^A	6/36 (17)	20	0.40–5.69 (0.33 $\pm$ 1.05)	0/6 (0)	0	0.00–0.00 (0.00 $\pm$ 0.00)	23/65 (35)	44	0.30–5.04 (0.40 $\pm$ 0.82) ^B	2/13 (15)	2	0.68–1.06 (0.13 $\pm$ 0.34)	4/42 (10)	7	0.78–2.88 (0.13 $\pm$ 0.50)
534_01	21/48 (44)	28	0.38–1.89 (0.45 $\pm$ 0.59) ^A	4/25 (16)	7	0.85–3.19 (0.26 $\pm$ 0.71)	7/39 (18)	13	0.31–2.05 (0.24 $\pm$ 0.59)	16/55 (29)	29	0.56–3.97 (0.41 $\pm$ 0.85)	2/35 (6)	2	0.37–0.85 (0.03 $\pm$ 0.15)	1/27 (4)	1	0.78–0.78 (0.03 $\pm$ 0.15)
BW_02	12/60 (20)	27	0.52–3.49 (0.34 $\pm$ 0.82)	10/32 (31)	14	0.91–2.13 (0.40 $\pm$ 0.65)	0/22 (0)	0	0.00–0.00 (0.00 $\pm$ 0.00)	19/62 (31)	43	0.31–7.69 (0.46 $\pm$ 1.18) ^B	1/16 (6)	1	0.58–0.58 (0.04 $\pm$ 0.15)	5/41 (12)	5	0.34–0.94 (0.08 $\pm$ 0.23)
REV_02	8/48 (17)	11	0.44–2.80 (0.15 $\pm$ 0.46)	4/25 (16)	6	0.96–1.90 (0.22 $\pm$ 0.55)	11/39 (28)	17	0.41–2.59 (0.33 $\pm$ 0.65)	10/55 (18)	19	0.55–2.83 (0.27 $\pm$ 0.66)	4/35 (11)	4	0.37–1.69 (0.10 $\pm$ 0.33)	6/27 (22)	9	0.67–2.67 (0.34 $\pm$ 0.75)
REV_03	12/48 (25)	18	0.40–2.80 (0.26 $\pm$ 0.56)	2/25 (8)	4	1.47–1.90 (0.14 $\pm$ 0.47)	10/39 (26)	19	0.41–2.59 (0.35 $\pm$ 0.68)	7/55 (13)	17	0.82–3.42 (0.25 $\pm$ 0.73)	2/35 (6)	2	0.57–1.69 (0.06 $\pm$ 0.30)	10/27 (37)	14	0.57–1.37 (0.38 $\pm$ 0.53) ^B
REV_04	8/48 (17)	11	0.40–1.97 (0.15 $\pm$ 0.39)	4/25 (16)	6	0.74–2.86 (0.21 $\pm$ 0.61)	10/39 (26)	30	0.68–5.45 (0.60 $\pm$ 1.29)	10/55 (18)	23	0.56–4.27 (0.33 $\pm$ 0.89)	2/35 (6)	2	0.81–0.87 (0.05 $\pm$ 0.20)	3/27 (11)	5	0.72–1.21 (0.11 $\pm$ 0.34)
REV_05	15/68 (22)	37	0.49–7.50 (0.53 $\pm$ 1.35)	4/25 (16)	12	0.86–4.41 (0.40 $\pm$ 1.15)	12/52 (23)	20	0.26–2.98 (0.22 $\pm$ 0.52)	8/55 (15)	17	0.79–3.07 (0.24 $\pm$ 0.65)	5/39 (13)	7	0.37–1.19 (0.10 $\pm$ 0.28)	11/27 (41)	14	0.57–2.50 (0.46 $\pm$ 0.70) ^B
REV_06	6/48 (13)	11	0.45–1.97 (0.17 $\pm$ 0.50)	3/25 (12)	6	0.96–2.94 (0.20 $\pm$ 0.63)	11/39 (28)	13	0.41–1.82 (0.27 $\pm$ 0.50)	9/55 (16)	20	0.56–3.17 (0.27 $\pm$ 0.73)	3/35 (9)	4	0.68–1.14 (0.07 $\pm$ 0.25)	5/27 (19)	6	0.57–1.33 (0.14 $\pm$ 0.33)
REV_07	17/68 (25)	28	0.38–5.00 (0.36 $\pm$ 0.87)	2/25 (8)	3	0.95–1.47 (0.10 $\pm$ 0.34)	13/52 (25)	29	0.51–4.76 (0.33 $\pm$ 0.79)	9/55 (16)	17	0.66–2.56 (0.25 $\pm$ 0.61)	8/39 (21)	8	0.37–1.69 (0.16 $\pm$ 0.37)	10/27 (37)	15	0.66–4.00 (0.50 $\pm$ 0.93) ^B
REV_08	11/68 (16)	20	0.38–9.09 (0.42 $\pm$ 1.40)	5/25 (20)	5	0.85–0.95 (0.18 $\pm$ 0.37)	12/52 (23)	14	0.41–1.43 (0.16 $\pm$ 0.31)	7/55 (13)	11	0.61–1.71 (0.16 $\pm$ 0.46)	3/39 (8)	7	0.37–1.98 (0.08 $\pm$ 0.35)	8/27 (30)	14	0.65–4.00 (0.43 $\pm$ 0.87) ^B
REV_09	8/48 (17)	14	0.42–3.54 (0.19 $\pm$ 0.59)	2/23 (9)	3	0.96–1.74 (0.12 $\pm$ 0.41)	10/39 (26)	15	0.28–3.20 (0.27 $\pm$ 0.62)	9/51 (18)	14	0.75–2.94 (0.23 $\pm$ 0.57)	5/35 (14)	5	0.68–0.98 (0.12 $\pm$ 0.30)	4/27 (15)	5	0.66–1.33 (0.12 $\pm$ 0.32)
REV_11	4/45 (9)	5	0.88–1.80 (0.10 $\pm$ 0.36)	4/35 (11)	7	0.86–1.60 (0.13 $\pm$ 0.38)	1/6 (17)	2	1.29–1.29 (0.22 $\pm$ 0.53)	14/65 (22)	18	0.32–1.64 (0.19 $\pm$ 0.41)	1/13 (8)	1	1.06–1.06 (0.08 $\pm$ 0.30)	7/42 (17)	8	0.34–1.33 (0.10 $\pm$ 0.27)
REV_12	9/48 (19)	16	0.40–4.61 (0.26 $\pm$ 0.82)	1/25 (4)	4	2.94–2.94 (0.12 $\pm$ 0.59)	11/39 (28)	22	0.41–2.63 (0.37 $\pm$ 0.70) ^A	8/55 (15)	8	0.74–0.94 (0.12 $\pm$ 0.29)	7/35 (20)	10	0.85–2.67 (0.27 $\pm$ 0.62)	6/27 (22)	7	0.57–1.21 (0.18 $\pm$ 0.36)
REV_13	5/48 (10)	8	0.40–3.03 (0.15 $\pm$ 0.54)	7/25 (28)	9	0.87–1.71 (0.32 $\pm$ 0.54)	12/39 (31)	20	0.31–2.14 (0.33 $\pm$ 0.59)	7/55 (12)	11	0.55–2.75 (0.15 $\pm$ 0.48)	5/35 (14)	8	0.57–3.23 (0.19 $\pm$ 0.59)	4/27 (15)	5	0.57–1.21 (0.12 $\pm$ 0.30)
REV_14	10/48 (21)	15	0.45–2.63 (0.21 $\pm$ 0.51)	3/25 (12)	6	0.92–2.94 (0.19 $\pm$ 0.63)	7/39 (18)	9	0.70–2.22 (0.21 $\pm$ 0.54)	7/53 (13)	8	0.57–1.89 (0.14 $\pm$ 0.40)	7/35 (20)	11	0.57–2.52 (0.30 $\pm$ 0.66)	8/27 (30)	8	0.57–0.73 (0.19 $\pm$ 0.30)
REV_15	11/68 (16)	18	0.26–2.22 (0.17 $\pm$ 0.46)	3/24 (13)	3	0.85–1.08 (0.12 $\pm$ 0.32)	10/52 (19)	13	0.23–2.14 (0.14 $\pm$ 0.37)	10/52 (19)	13	0.61–1.71 (0.20 $\pm$ 0.45)	9/39 (23)	15	0.37–2.68 (0.27 $\pm$ 0.59)	4/27 (15)	7	0.60–1.82 (0.18 $\pm$ 0.47)
REV_16	18/68 (26)	25	0.43–3.03 (0.33 $\pm$ 0.67)	2/24 (8)	2	0.86–0.96 (0.08 $\pm$ 0.26)	19/52 (37)	48	0.26–3.70 (0.62 $\pm$ 1.03) ^A	9/52 (17)	12	0.58–3.17 (0.19 $\pm$ 0.52)	10/39 (26)	16	0.37–2.94 (0.31 $\pm$ 0.68)	4/27 (15)	7	0.61–1.97 (0.17 $\pm$ 0.47)
REV_17	11/68 (16)	16	0.26–3.03 (0.21 $\pm$ 0.62)	5/25 (20)	6	0.74–1.92 (0.22 $\pm$ 0.49)	17/52 (33)	27	0.23–2.86 (0.34 $\pm$ 0.64)	10/52 (19)	16	0.60–3.45 (0.27 $\pm$ 0.66)	10/39 (26)	14	0.51–1.71 (0.28 $\pm$ 0.52)	9/27 (33)	15	0.61–2.21 (0.41 $\pm$ 0.69)
REV_18	10/65 (15)	13	0.33–5.41 (0.28 $\pm$ 0.90)	5/33 (15)	6	0.85–1.47 (0.15 $\pm$ 0.38)	2/24 (8)	3	0.73–0.88 (0.07 $\pm$ 0.23)	15/62 (24)	23	0.31–3.42 (0.24 $\pm$ 0.62)	2/17 (12)	2	0.37–0.88 (0.07 $\pm$ 0.23)	11/42 (26)	17	0.35–2.94 (0.32 $\pm$ 0.70)
SF_01	7/65 (11)	9	0.46–3.03 (0.14 $\pm$ 0.51)	5/35 (14)	7	0.43–2.86 (0.16 $\pm$ 0.52)	3/24 (13)	3	0.38–1.08 (0.09 $\pm$ 0.26)	16/65 (25)	25	0.34–2.56 (0.25 $\pm$ 0.53)	0/17 (0)	0	0.00–0.00 (0.00 $\pm$ 0.00)	11/42 (26)	17	0.36–2.50 (0.24 $\pm$ 0.53) ^B
SF_02	4/45 (9)	5	0.66–1.77 (0.09 $\pm$ 0.32)	3/33 (9)	3	0.74–1.00 (0.08 $\pm$ 0.26)	0/6 (0)	0	0.00–0.00 (0.00 $\pm$ 0.00)	21/62 (34)	40	0.33–3.20 (0.37 $\pm$ 0.68) ^B	1/13 (8)	1	0.79–0.79 (0.06 $\pm$ 0.22)	11/42 (26)	13	0.34–2.94 (0.23 $\pm$ 0.53)
SRW_10	7/65 (11)	10	0.88–7.32 (0.31 $\pm$ 1.11)	2/34 (6)	3	0.95–1.74 (0.08 $\pm$ 0.34)	7/24 (29)	8	0.34–0.75 (0.18 $\pm$ 0.29)	16/63 (25)	20	0.33–3.13 (0.21 $\pm$ 0.48)	2/17 (12)	2	0.37–1.69 (0.12 $\pm$ 0.42)	10/42 (24)	21	0.35–15.00 (0.57 $\pm$ 2.35)

Table 16c – Summary of residency index (RI) scores by receiver station and species at the 8 km impact radius. The number of tagged individuals detected at a receiver station (D), the total number of individuals that were available for detection while that receiver was deployed (A), and the ratio of D/A (%) is presented along with the cumulative number of days in which individuals were detected (Σ dd). The range of non-zero RI scores along with the global mean and standard deviation (SD) of the distribution of individual RI scores by species are also presented for each station. ^A significantly higher than the post-construction period based on Wilcoxon Rank Sum test; ^B significantly higher than the pre-construction period based on zero-inflated Wilcoxon Rank Sum test

Station	Blue shark						Bluefin tuna						Shortfin mako					
	Pre-construction			Post-construction			Pre-construction			Post-construction			Pre-construction			Post-construction		
	D/A (%)	Σ dd	RI	D/A (%)	Σ dd	RI	D/A (%)	Σ dd	RI	D/A (%)	Σ dd	RI	D/A (%)	Σ dd	RI	D/A (%)	Σ dd	RI
			Range (Mean $\pm$ SD)			Range (Mean $\pm$ SD)			Range (Mean $\pm$ SD)			Range (Mean $\pm$ SD)			Range (Mean $\pm$ SD)			Range (Mean $\pm$ SD)
501_01	15/45 (33)	27	0.79–4.44 (0.62 $\pm$ 1.10)	8/35 (23)	15	0.40–2.63 (0.31 $\pm$ 0.71)	0/6 (0)	0	0.00–0.00 (0.00 $\pm$ 0.00)	14/65 (22)	23	0.33–2.56 (0.20 $\pm$ 0.47)	0/13 (0)	0	0.00–0.00 (0.00 $\pm$ 0.00)	6/42 (14)	6	0.34–1.05 (0.09 $\pm$ 0.23) ^B
501_02	16/45 (36)	33	0.83–4.42 (0.66 $\pm$ 1.07) ^A	6/35 (17)	12	0.83–2.63 (0.24 $\pm$ 0.61)	0/6 (0)	0	0.00–0.00 (0.00 $\pm$ 0.00)	15/65 (23)	22	0.33–1.68 (0.18 $\pm$ 0.39)	1/13 (8)	1	0.91–0.91 (0.07 $\pm$ 0.25)	6/42 (14)	8	0.34–2.11 (0.13 $\pm$ 0.41)
501_03	21/45 (47)	69	0.68–9.89 (1.47 $\pm$ 2.50) ^A	8/36 (22)	18	0.39–4.47 (0.29 $\pm$ 0.80)	0/6 (0)	0	0.00–0.00 (0.00 $\pm$ 0.00)	16/65 (25)	28	0.31–4.27 (0.25 $\pm$ 0.67)	0/13 (0)	0	0.00–0.00 (0.00 $\pm$ 0.00)	4/42 (10)	4	0.62–1.05 (0.07 $\pm$ 0.23)
501_04	21/45 (47)	73	0.68–8.33 (1.59 $\pm$ 2.44) ^A	6/36 (17)	20	0.40–5.69 (0.33 $\pm$ 1.05)	0/6 (0)	0	0.00–0.00 (0.00 $\pm$ 0.00)	23/65 (35)	44	0.30–5.04 (0.40 $\pm$ 0.82) ^B	2/13 (15)	2	0.68–1.06 (0.13 $\pm$ 0.34)	4/42 (10)	7	0.78–2.88 (0.13 $\pm$ 0.50)
534_01	21/48 (44)	28	0.38–1.89 (0.45 $\pm$ 0.59) ^A	4/25 (16)	7	0.85–3.19 (0.26 $\pm$ 0.71)	7/39 (18)	13	0.31–2.05 (0.24 $\pm$ 0.59)	16/55 (29)	29	0.56–3.97 (0.41 $\pm$ 0.85)	2/35 (6)	2	0.37–0.85 (0.03 $\pm$ 0.15)	1/27 (4)	1	0.78–0.78 (0.03 $\pm$ 0.15)
BW_02	12/60 (20)	27	0.52–3.49 (0.34 $\pm$ 0.82)	10/35 (29)	14	0.81–2.13 (0.36 $\pm$ 0.63)	0/22 (0)	0	0.00–0.00 (0.00 $\pm$ 0.00)	19/64 (30)	43	0.31–7.69 (0.44 $\pm$ 1.16) ^B	1/16 (6)	1	0.58–0.58 (0.04 $\pm$ 0.15)	5/42 (12)	5	0.34–0.94 (0.08 $\pm$ 0.23)
REV_01	6/48 (13)	11	0.86–3.03 (0.20 $\pm$ 0.63)	4/25 (16)	7	0.74–3.54 (0.24 $\pm$ 0.74)	7/39 (18)	13	0.41–5.45 (0.34 $\pm$ 1.00)	5/55 (9)	13	0.82–3.17 (0.17 $\pm$ 0.63)	2/35 (6)	4	0.57–2.52 (0.09 $\pm$ 0.43)	5/27 (19)	10	0.67–3.03 (0.31 $\pm$ 0.75)
REV_02	8/48 (17)	11	0.44–2.80 (0.15 $\pm$ 0.46)	4/25 (16)	6	0.96–1.90 (0.22 $\pm$ 0.55)	11/39 (28)	17	0.41–2.59 (0.33 $\pm$ 0.65)	10/55 (18)	19	0.55–2.83 (0.27 $\pm$ 0.66)	4/35 (11)	4	0.37–1.69 (0.10 $\pm$ 0.33)	6/27 (22)	9	0.67–2.67 (0.34 $\pm$ 0.75)
REV_03	12/48 (25)	18	0.40–2.80 (0.26 $\pm$ 0.56)	2/25 (8)	4	1.47–1.90 (0.14 $\pm$ 0.47)	10/39 (26)	19	0.41–2.59 (0.35 $\pm$ 0.68)	7/55 (13)	17	0.82–3.42 (0.25 $\pm$ 0.73)	2/35 (6)	2	0.57–1.69 (0.06 $\pm$ 0.30)	10/27 (37)	14	0.57–1.37 (0.38 $\pm$ 0.53) ^B
REV_04	8/48 (17)	11	0.40–1.97 (0.15 $\pm$ 0.39)	4/25 (16)	6	0.74–2.86 (0.21 $\pm$ 0.61)	10/39 (26)	30	0.68–5.45 (0.60 $\pm$ 1.29)	10/55 (18)	23	0.56–4.27 (0.33 $\pm$ 0.89)	2/35 (6)	2	0.81–0.87 (0.05 $\pm$ 0.20)	3/27 (11)	5	0.72–1.21 (0.11 $\pm$ 0.34)
REV_05	15/68 (22)	37	0.49–7.50 (0.53 $\pm$ 1.35)	4/25 (16)	12	0.86–4.41 (0.40 $\pm$ 1.15)	12/52 (23)	20	0.26–2.98 (0.22 $\pm$ 0.52)	8/55 (15)	17	0.79–3.07 (0.24 $\pm$ 0.65)	5/39 (13)	7	0.37–1.19 (0.10 $\pm$ 0.28)	11/27 (41)	14	0.57–2.50 (0.46 $\pm$ 0.70) ^B
REV_06	6/48 (13)	11	0.45–1.97 (0.17 $\pm$ 0.50)	3/25 (12)	6	0.96–2.94 (0.20 $\pm$ 0.63)	11/39 (28)	13	0.41–1.82 (0.27 $\pm$ 0.50)	9/55 (16)	20	0.56–3.17 (0.27 $\pm$ 0.73)	3/35 (9)	4	0.68–1.14 (0.07 $\pm$ 0.25)	5/27 (19)	6	0.57–1.33 (0.14 $\pm$ 0.33)
REV_07	17/66 (26)	28	0.46–5.00 (0.42 $\pm$ 0.94) ^A	2/29 (7)	3	0.95–1.47 (0.08 $\pm$ 0.32)	6/28 (21)	19	0.75–7.08 (0.47 $\pm$ 1.39)	14/61 (23)	26	0.37–2.56 (0.28 $\pm$ 0.61)	6/17 (35)	6	0.37–1.69 (0.27 $\pm$ 0.46)	12/35 (34)	17	0.66–2.50 (0.36 $\pm$ 0.60)
REV_08	10/65 (15)	19	0.68–9.09 (0.45 $\pm$ 1.44)	6/34 (18)	6	0.43–0.95 (0.14 $\pm$ 0.33)	5/24 (21)	6	0.64–0.90 (0.16 $\pm$ 0.32)	14/62 (23)	20	0.33–1.71 (0.19 $\pm$ 0.43)	3/17 (18)	5	0.71–1.75 (0.20 $\pm$ 0.48)	8/42 (19)	16	0.52–3.18 (0.22 $\pm$ 0.57)
REV_09	7/45 (16)	13	0.68–3.54 (0.24 $\pm$ 0.67)	2/33 (6)	4	0.96–2.21 (0.10 $\pm$ 0.41)	0/6 (0)	0	0.00–0.00 (0.00 $\pm$ 0.00)	18/62 (29)	28	0.32–3.20 (0.28 $\pm$ 0.63) ^B	1/13 (8)	1	0.68–0.68 (0.05 $\pm$ 0.19)	9/42 (21)	12	0.34–1.33 (0.16 $\pm$ 0.34)
REV_10	4/65 (6)	6	0.52–6.06 (0.15 $\pm$ 0.80)	7/35 (20)	12	0.74–1.61 (0.21 $\pm$ 0.46)	7/24 (29)	14	0.60–4.42 (0.39 $\pm$ 0.94)	12/65 (18)	16	0.31–2.59 (0.13 $\pm$ 0.40)	4/17 (24)	6	0.37–1.75 (0.21 $\pm$ 0.47)	10/42 (24)	14	0.34–1.56 (0.19 $\pm$ 0.39)
REV_11	4/45 (9)	5	0.88–1.80 (0.10 $\pm$ 0.36)	4/35 (11)	7	0.86–1.60 (0.13 $\pm$ 0.38)	1/6 (17)	2	1.29–1.29 (0.22 $\pm$ 0.53)	14/65 (22)	18	0.32–1.64 (0.19 $\pm$ 0.41)	1/13 (8)	1	1.06–1.06 (0.08 $\pm$ 0.30)	7/42 (17)	8	0.34–1.33 (0.10 $\pm$ 0.27)
REV_12	9/48 (19)	16	0.40–4.61 (0.26 $\pm$ 0.82)	1/25 (4)	4	2.94–2.94 (0.12 $\pm$ 0.59)	11/39 (28)	22	0.41–2.63 (0.37 $\pm$ 0.70)	8/55 (15)	8	0.74–0.94 (0.12 $\pm$ 0.29) ^B	7/35 (20)	10	0.85–2.67 (0.27 $\pm$ 0.62)	6/27 (22)	7	0.57–1.21 (0.18 $\pm$ 0.36)
REV_13	5/45 (11)	7	0.70–3.03 (0.17 $\pm$ 0.57)	8/33 (24)	10	0.43–1.71 (0.25 $\pm$ 0.49)	1/6 (17)	1	0.65–0.65 (0.11 $\pm$ 0.26)	16/62 (26)	30	0.31–2.75 (0.25 $\pm$ 0.53)	2/13 (15)	2	0.91–1.06 (0.15 $\pm$ 0.37)	6/42 (14)	11	0.37–2.08 (0.13 $\pm$ 0.39)
REV_14	10/48 (21)	15	0.45–2.63 (0.21 $\pm$ 0.51)	3/25 (12)	6	0.92–2.94 (0.19 $\pm$ 0.63)	7/39 (18)	9	0.70–2.22 (0.21 $\pm$ 0.54)	7/55 (13)	8	0.55–1.89 (0.14 $\pm$ 0.39)	7/35 (20)	11	0.57–2.52 (0.30 $\pm$ 0.66)	8/27 (30)	8	0.57–0.73 (0.19 $\pm$ 0.30)
REV_15	11/68 (16)	18	0.26–2.22 (0.17 $\pm$ 0.46)	3/25 (12)	3	0.85–1.08 (0.11 $\pm$ 0.31)	10/52 (19)	13	0.23–2.14 (0.14 $\pm$ 0.37)	10/53 (19)	13	0.57–1.71 (0.19 $\pm$ 0.43)	9/39 (23)	15	0.37–2.68 (0.27 $\pm$ 0.59)	4/27 (15)	7	0.58–1.82 (0.18 $\pm$ 0.47)
REV_16	16/66 (24)	20	0.52–3.03 (0.33 $\pm$ 0.68) ^A	2/29 (7)	2	0.86–0.96 (0.06 $\pm$ 0.24)	7/25 (28)	7	0.33–1.08 (0.20 $\pm$ 0.35)	21/62 (34)	53	0.46–3.17 (0.42 $\pm$ 0.70)	6/17 (35)	8	0.37–1.79 (0.31 $\pm$ 0.51)	7/38 (18)	15	0.35–2.94 (0.21 $\pm$ 0.58)
REV_17	11/68 (16)	16	0.26–3.03 (0.21 $\pm$ 0.62)	5/25 (20)	6	0.74–1.92 (0.22 $\pm$ 0.49)	17/52 (33)	27	0.23–2.86 (0.34 $\pm$ 0.64)	10/52 (19)	16	0.60–3.45 (0.27 $\pm$ 0.66)	10/39 (26)	14	0.51–1.71 (0.28 $\pm$ 0.52)	9/27 (33)	15	0.61–2.21 (0.41 $\pm$ 0.69)
REV_18	10/65 (15)	13	0.33–5.41 (0.28 $\pm$ 0.90)	5/34 (15)	6	0.85–1.47 (0.15 $\pm$ 0.37)	2/24 (8)	3	0.73–0.88 (0.07 $\pm$ 0.23)	15/62 (24)	23	0.31–3.42 (0.23 $\pm$ 0.62)	2/17 (12)	2	0.37–0.88 (0.07 $\pm$ 0.23)	11/42 (26)	17	0.35–2.94 (0.32 $\pm$ 0.70)
SF_01	7/65 (11)	9	0.46–3.03 (0.14 $\pm$ 0.51)	5/35 (14)	7	0.43–2.86 (0.16 $\pm$ 0.52)	3/24 (13)	3	0.38–1.08 (0.09 $\pm$ 0.26)	16/65 (25)	25	0.34–2.56 (0.25 $\pm$ 0.53)	0/17 (0)	0	0.00–0.00 (0.00 $\pm$ 0.00)	11/42 (26)	17	0.36–2.50 (0.24 $\pm$ 0.53) ^B
SF_02	4/45 (9)	5	0.66–1.77 (0.09 $\pm$ 0.32)	3/35 (9)	3	0.74–1.00 (0.08 $\pm$ 0.26)	0/6 (0)	0	0.00–0.00 (0.00 $\pm$ 0.00)	21/65 (32)	40	0.33–3.20 (0.35 $\pm$ 0.67) ^B	1/13 (8)	1	0.79–0.79 (0.06 $\pm$ 0.22)	11/42 (26)	13	0.34–2.94 (0.23 $\pm$ 0.53)
SRW_05	13/48 (27)	17	0.45–5.56 (0.33 $\pm$ 0.86)	2/24 (8)	2	0.88–0.95 (0.08 $\pm$ 0.26)	17/39 (44)	28	0.31–2.40 (0.51 $\pm$ 0.70) ^A	8/51 (16)	13	0.61–1.71 (0.20 $\pm$ 0.49)	8/35 (23)	12	0.37–2.56 (0.30 $\pm$ 0.64)	7/27 (26)	9	0.60–1.44 (0.24 $\pm$ 0.45)
SRW_10	7/65 (11)	10	0.88–7.32 (0.31 $\pm$ 1.11)	3/35 (9)	4	0.83–1.74 (0.10 $\pm$ 0.35)	7/24 (29)	8	0.34–0.75 (0.18 $\pm$ 0.29)	16/65 (25)	20	0.30–3.13 (0.20 $\pm$ 0.48)	2/17 (12)	2	0.37–1.69 (0.12 $\pm$ 0.42)	10/42 (24)	21	0.35–15.00 (0.57 $\pm$ 2.35)

Table 17 – Summary of the percent of available individuals that were detected for each species during the pre- and post-construction period at each impact radius. Results of Welch’s t-tests are also reported with ^A representing instances where the percent was significantly higher in the pre-construction period and ^B representing instances where the percent was significantly higher in the post-construction period. Lack of a superscript denotes no significant difference at the $p < 0.05$ level. SD: standard deviation

Species	Period	Range (Median, Mean $\pm$ SD)		
		3 km	5 km	8 km
Blue shark	Pre	9–47 (17, 21 $\pm$ 11) ^A	9–47 (17, 22 $\pm$ 11) ^A	6–47 (17, 21 $\pm$ 11) ^A
	Post	4–33 (15, 14 $\pm$ 7)	4–31 (15, 15 $\pm$ 7)	4–29 (15, 14 $\pm$ 6)
Bluefin tuna	Pre	5–37 (26, 23 $\pm$ 9)	8–37 (26, 24 $\pm$ 7)	8–44 (23, 23 $\pm$ 8)
	Post	10–35 (19, 20 $\pm$ 6)	13–35 (19, 21 $\pm$ 7)	9–35 (22, 22 $\pm$ 7)
Shortfin mako	Pre	6–28 (14, 15 $\pm$ 7)	6–26 (12, 13 $\pm$ 7)	6–35 (12, 15 $\pm$ 9)
	Post	10–41 (18, 20 $\pm$ 10)	4–41 (19, 21 $\pm$ 10) ^B	4–41 (20, 21 $\pm$ 9) ^B

Table 18 – Results (p-values) of zero-inflated Wilcoxon Rank-Sum tests run on residency index (RI) scores generated across individuals of each species at each impacted receiver station during the pre- and post-construction periods. Dashes denote stations that were not impacted at any point at the given radius. *statistically significant at $p < 0.05$

Station	Blue shark			Bluefin tuna			Shortfin mako		
	3km	5km	8km	3km	5km	8km	3km	5km	8km
501_01	0.205	0.144	0.144	0.012*	0.093	0.093	0.028*	0.030*	0.030*
501_02	0.027*	0.027*	0.027*	0.091	0.091	0.091	0.651	0.651	0.651
501_03	0.002*	0.002*	0.002*	0.092	0.092	0.092	0.111	0.111	0.111
501_04	0.001*	0.001*	0.001*	0.015*	0.015*	0.015*	0.840	0.840	0.840
534_01	-	0.046*	0.046*	-	0.348	0.348	-	0.609	0.609
BW_02	-	0.538	0.782	-	<0.001*	<0.001*	-	0.460	0.473
REV_01	-	-	0.936	-	-	0.308	-	-	0.150
REV_02	0.399	0.399	0.399	0.570	0.570	0.570	0.114	0.114	0.114
REV_03	0.050	0.255	0.255	0.522	0.402	0.402	0.039*	0.002*	0.002*
REV_04	0.906	0.906	0.906	0.284	0.284	0.284	0.353	0.353	0.353
REV_05	0.494	0.494	0.494	0.978	0.978	0.978	0.008*	0.008*	0.008*
REV_06	0.877	0.877	0.877	0.534	0.534	0.534	0.735	0.735	0.735
REV_07	0.133	0.133	0.040*	0.683	0.683	0.649	0.080	0.080	0.322
REV_08	0.401	0.883	0.383	0.547	0.887	0.919	0.203	0.021*	0.773
REV_09	0.025*	0.652	0.264	0.632	0.980	0.013*	0.033*	0.641	0.230
REV_10	-	-	0.090	-	-	0.119	-	-	0.968
REV_11	0.186	0.974	0.974	0.314	0.680	0.680	0.940	0.799	0.799
REV_12	0.155	0.101	0.101	0.092	0.042*	0.042*	0.349	0.467	0.467
REV_13	0.050	0.088	0.241	0.055	0.065	0.425	0.577	0.724	0.625
REV_14	0.069	0.832	0.832	0.496	0.701	0.681	0.207	0.662	0.662
REV_15	0.715	0.560	0.566	0.211	0.327	0.474	0.479	0.654	0.654
REV_16	0.055	0.055	0.021*	0.009*	0.009*	0.183	0.368	0.368	0.295
REV_17	0.552	0.552	0.552	0.511	0.511	0.511	0.649	0.649	0.649
REV_18	0.746	0.749	0.718	0.015*	0.125	0.126	0.037*	0.183	0.183
SF_01	0.900	0.900	0.900	0.138	0.138	0.138	0.003*	0.003*	0.003*
SF_02	0.718	0.718	0.720	0.013*	0.013*	0.014*	0.290	0.290	0.290
SRW_05	-	-	0.100	-	-	0.018*	-	-	0.664
SRW_10	-	0.231	0.257	-	0.727	0.832	-	0.298	0.298

Table 19 – Results (p-values) of zero-inflated Wilcoxon Rank-Sum tests run on network analysis degree and strength scores generated across all individuals of each species tracked during the pre- and post-construction periods. Asterisk indicates statistical significance at $p < 0.05$. Tx = number of transmitters; Max = maximum; SD = standard deviation

Species	Pre-Construction			Post-Construction			Degree <i>p</i>	Strength <i>p</i>
	Degree		Strength	Degree		Strength		
	Tx	Max, Mean $\pm$ SD	Max, Mean $\pm$ SD	Tx	Max, Mean $\pm$ SD	Max, Mean $\pm$ SD		
Blue shark	45	6, 0.26 $\pm$ 0.64	7, 0.28 $\pm$ 0.75	37	6, 0.17 $\pm$ 0.50	11, 0.17 $\pm$ 0.57	<0.001*	<0.001*
Bluefin tuna	10	3, 0.12 $\pm$ 0.39	3, 0.13 $\pm$ 0.40	64	7, 0.49 $\pm$ 0.90	9, 0.52 $\pm$ 0.96	<0.001*	<0.001*
Shortfin mako	13	3, 0.13 $\pm$ 0.40	3, 0.14 $\pm$ 0.42	43	5, 0.18 $\pm$ 0.51	6, 0.19 $\pm$ 0.54	0.013*	0.014*

Table 20 – Results (p-values) of zero-inflated Wilcoxon Rank-Sum tests run on network analysis degree and strength scores generated across individuals of each species at each node/station during the pre- and post-construction periods. Grey shading denotes receivers/nodes that were impacted at the 3, 5, and 8 km impact radius (lightest), 5 and 8 km impact radius (medium), and only 8 km impact radius (darkest). Asterisk indicates statistical significance at $p < 0.05$.

Station	Blue shark		Bluefin tuna		Shortfin mako	
	Degree	Strength	Degree	Strength	Degree	Strength
501_01	0.456	0.329	0.615	0.615	0.024*	0.024*
501_02	0.042*	0.036*	0.022*	0.022*	0.307	0.307
501_03	0.011*	0.009*	0.236	0.231	0.234	0.234
501_04	0.002*	0.002*	0.025*	0.025*	0.693	0.734
522_01	0.841	0.841	0.129	0.129	0.012*	0.012*
522_03	0.285	0.258	0.004*	0.004*	0.325	0.325
522_04	0.759	0.759	0.018*	0.018*	0.035*	0.035*
522_06	0.072	0.072	0.875	0.875	0.840	0.840
522_08	0.781	0.947	0.279	0.251	0.258	0.258
522_09	0.321	0.321	0.025*	0.023*	0.580	0.580
522_10	0.008*	0.008*	0.081	0.079	0.581	0.581
522_11	0.695	0.695	0.840	0.728	0.573	0.573
522_12	0.129	0.129	0.004*	0.004*	0.333	0.333
534_01	0.009*	0.011*	0.254	0.250	0.576	0.576
534_02	0.396	0.396	0.292	0.292	0.720	0.720
534_03	0.776	0.776	0.302	0.275	0.484	0.484
534_04	0.040*	0.040*	0.023*	0.023*	0.578	0.578
534_05	0.834	0.943	0.070	0.070	0.337	0.742
534_06	0.549	0.549	0.903	0.757	0.039*	0.039*
BW_02	0.476	0.476	0.004*	0.004*	0.311	0.311
BW_03	0.925	0.925	0.024*	0.022*	0.312	0.312
BW_04	0.458	0.458	0.300	0.300	0.244	0.244
BW_05	0.532	0.532	0.003*	0.003*	0.716	0.716
BW_06	0.175	0.175	0.438	0.438	0.134	0.134
BW_07	0.050	0.050	0.231	0.222	0.316	0.316
BW_08	0.279	0.279	0.004*	0.004*	0.579	0.579
BW_09	0.263	0.263	0.306	0.253	0.572	0.572
BW_10	0.077	0.077	0.018*	0.018*	0.816	0.816
MFW_03	0.327	0.327	0.086	0.086	0.051	0.051
MFW_04	0.324	0.324	0.082	0.079	0.322	0.322
MFW_05	0.133	0.133	0.095	0.095	0.131	0.131
MFW_06	0.394	0.394	0.618	0.618	0.665	0.665

MFW_07	0.114	0.114	0.069	0.076	0.567	0.567
MFW_08	0.022*	0.022*	0.020*	0.071	0.316	0.316
MFW_09	0.433	0.433	0.018*	0.017*	0.032*	0.032*
MFW_10	0.001*	0.001*	0.061	0.060	0.229	0.229
REV_01	0.891	0.891	0.019*	0.021*	0.023*	0.023*
REV_02	0.755	0.970	0.003*	0.003*	0.285	0.285
REV_03	0.065	0.105	0.003*	0.003*	0.270	0.295
REV_04	0.782	0.747	0.005*	0.005*	0.189	0.127
REV_05	0.688	0.720	0.247	0.247	0.060	0.046*
REV_06	0.681	0.686	0.003*	0.003*	0.315	0.315
REV_07	0.411	0.380	0.218	0.210	0.425	0.425
REV_08	0.986	0.835	0.016*	0.017*	0.008*	0.008*
REV_09	0.277	0.277	0.003*	0.003*	0.114	0.114
REV_10	0.069	0.069	0.264	0.303	0.351	0.351
REV_11	0.483	0.483	0.698	0.698	0.247	0.247
REV_12	0.903	0.903	0.003*	0.003*	0.501	0.501
REV_13	0.226	0.226	0.187	0.182	0.709	0.709
REV_14	0.757	0.757	0.017*	0.017*	0.188	0.188
REV_15	0.105	0.105	0.024*	0.024*	0.480	0.464
REV_16	0.076	0.076	0.182	0.175	0.833	0.873
REV_17	0.775	0.840	0.001*	<0.001*	0.032*	0.034*
REV_18	0.285	0.285	0.231	0.231	0.010*	0.010*
SF_01	0.710	0.710	0.240	0.228	0.008*	0.008*
SF_02	0.759	0.759	0.004*	0.005*	0.127	0.127
SRW_01	0.282	0.269	0.002*	0.002*	0.742	0.742
SRW_02	0.459	0.459	0.647	0.813	0.101	0.101
SRW_03	0.221	0.215	0.858	0.928	0.181	0.181
SRW_04	0.022*	0.022*	0.001*	<0.001*	0.422	0.422
SRW_05	0.152	0.152	0.001*	0.001*	0.831	0.831
SRW_06	0.516	0.516	0.069	0.071	0.357	0.272
SRW_07	0.660	0.660	0.001*	0.001*	0.786	0.786
SRW_08	0.069	0.056	0.028*	0.028*	0.337	0.337
SRW_09	0.757	0.757	0.019*	0.018*	0.583	0.583
SRW_10	0.776	0.731	0.840	0.840	0.102	0.102
SRW_12	0.411	0.411	0.567	0.542	0.317	0.317

Table 21 – Network density by species for the pre- and post-construction periods. Tx = total number of individuals comprising the network for a given period, n = total number of nodes (stations) within the network, Density = proportion of connections (edges) between nodes to all possible connections (excluding self-connections) between nodes.

Species	Pre-Construction			Post-Construction		
	Tx	n	Density	Tx	n	Density
Blue shark	45	67	0.121	37	67	0.079
Bluefin tuna	10	44	0.055	64	67	0.251
Shortfin mako	13	57	0.041	43	67	0.085

Table 22a – Blue shark degree and strength scores by receiver station during the pre- and post-construction period. Grey shading denotes receivers/nodes that were impacted at the 3, 5, and 8 km impact radius (lightest), 5 and 8 km impact radius (medium), and only 8 km impact radius (darkest). Tx = total unique transmitters detected; ^A significantly higher than the post-construction period based on zero-inflated Wilcoxon Rank Sum test; ^B significantly higher than the pre-construction period based on zero-inflated Wilcoxon Rank Sum test

Station	Pre-Construction			Post-Construction		
	Tx	Degree Max (Mean ± SD)	Strength Max (Mean ± SD)	Tx	Degree Max (Mean ± SD)	Strength Max (Mean ± SD)
501_01	15	4 (0.49 ± 0.87)	5 (0.58 ± 1.08)	8	3 (0.35 ± 0.79)	4 (0.38 ± 0.89)
501_02	16	4 (0.56 ± 0.89) ^A	5 (0.67 ± 1.15) ^A	5	4 (0.27 ± 0.84)	5 (0.30 ± 0.97)
501_03	21	5 (0.80 ± 1.16) ^A	6 (1.16 ± 1.80) ^A	8	5 (0.32 ± 0.88)	8 (0.41 ± 1.34)
501_04	21	5 (1.07 ± 1.45) ^A	7 (1.42 ± 2.16) ^A	6	6 (0.32 ± 1.06)	11 (0.46 ± 1.83)
522_01	10	5 (0.31 ± 0.82)	5 (0.31 ± 0.82)	9	2 (0.27 ± 0.51)	2 (0.27 ± 0.51)
522_03	9	3 (0.40 ± 0.89)	4 (0.44 ± 1.01)	6	2 (0.19 ± 0.46)	2 (0.19 ± 0.46)
522_04	12	2 (0.31 ± 0.56)	3 (0.33 ± 0.64)	9	2 (0.27 ± 0.51)	2 (0.27 ± 0.51)
522_06	7	1 (0.16 ± 0.37)	2 (0.18 ± 0.44)	2	1 (0.05 ± 0.23)	1 (0.05 ± 0.23)
522_08	7	2 (0.20 ± 0.50)	2 (0.22 ± 0.56)	7	2 (0.22 ± 0.48)	2 (0.22 ± 0.48)
522_09	7	2 (0.20 ± 0.50)	2 (0.20 ± 0.50)	4	1 (0.11 ± 0.31)	1 (0.11 ± 0.31)
522_10	8	4 (0.27 ± 0.72) ^A	5 (0.29 ± 0.84) ^A	1	1 (0.03 ± 0.16)	1 (0.03 ± 0.16)
522_11	7	2 (0.20 ± 0.50)	2 (0.20 ± 0.50)	5	2 (0.16 ± 0.44)	2 (0.16 ± 0.44)
522_12	6	1 (0.13 ± 0.34)	1 (0.13 ± 0.34)	2	1 (0.05 ± 0.23)	1 (0.05 ± 0.23)
534_01	20	3 (0.51 ± 0.66) ^A	3 (0.53 ± 0.69) ^A	5	3 (0.22 ± 0.63)	3 (0.22 ± 0.63)
534_02	11	2 (0.33 ± 0.64)	2 (0.33 ± 0.64)	7	2 (0.22 ± 0.48)	2 (0.22 ± 0.48)
534_03	5	2 (0.13 ± 0.40)	2 (0.13 ± 0.40)	5	1 (0.14 ± 0.35)	1 (0.14 ± 0.35)
534_04	15	4 (0.49 ± 0.84) ^A	4 (0.49 ± 0.84) ^A	4	2 (0.16 ± 0.50)	2 (0.16 ± 0.50)
534_05	9	2 (0.24 ± 0.53)	2 (0.27 ± 0.58)	7	4 (0.30 ± 0.78)	4 (0.30 ± 0.78)
534_06	7	2 (0.20 ± 0.50)	2 (0.20 ± 0.50)	5	1 (0.14 ± 0.35)	1 (0.14 ± 0.35)
BW_02	12	4 (0.49 ± 0.94)	6 (0.56 ± 1.20)	10	3 (0.35 ± 0.68)	4 (0.38 ± 0.79)
BW_03	6	2 (0.16 ± 0.42)	2 (0.16 ± 0.42)	3	3 (0.16 ± 0.60)	3 (0.16 ± 0.60)
BW_04	5	1 (0.11 ± 0.32)	1 (0.11 ± 0.32)	3	1 (0.08 ± 0.28)	1 (0.08 ± 0.28)
BW_05	5	1 (0.11 ± 0.32)	1 (0.11 ± 0.32)	2	2 (0.08 ± 0.36)	2 (0.08 ± 0.36)
BW_06	2	2 (0.07 ± 0.33)	2 (0.07 ± 0.33)	5	2 (0.16 ± 0.44)	2 (0.16 ± 0.44)
BW_07	9	2 (0.22 ± 0.47)	2 (0.22 ± 0.47)	2	1 (0.05 ± 0.23)	1 (0.05 ± 0.23)
BW_08	13	2 (0.33 ± 0.56)	2 (0.33 ± 0.56)	7	3 (0.24 ± 0.60)	3 (0.24 ± 0.60)
BW_09	10	1 (0.22 ± 0.42)	1 (0.22 ± 0.42)	5	1 (0.14 ± 0.35)	1 (0.14 ± 0.35)
BW_10	11	5 (0.44 ± 1.01)	7 (0.51 ± 1.29)	4	2 (0.14 ± 0.42)	2 (0.14 ± 0.42)
MFW_03	9	3 (0.31 ± 0.70)	3 (0.31 ± 0.70)	5	2 (0.16 ± 0.44)	2 (0.16 ± 0.44)
MFW_04	5	2 (0.13 ± 0.40)	2 (0.13 ± 0.40)	7	2 (0.22 ± 0.48)	2 (0.22 ± 0.48)
MFW_05	6	2 (0.16 ± 0.42)	2 (0.16 ± 0.42)	2	1 (0.05 ± 0.23)	1 (0.05 ± 0.23)
MFW_06	4	1 (0.09 ± 0.29)	1 (0.09 ± 0.29)	2	1 (0.05 ± 0.23)	1 (0.05 ± 0.23)
MFW_07	6	3 (0.20 ± 0.59)	3 (0.20 ± 0.59)	1	2 (0.05 ± 0.33)	2 (0.05 ± 0.33)

MFW_08	7	2 (0.20 ± 0.50) ^A	3 (0.22 ± 0.60) ^A	1	1 (0.03 ± 0.16)	1 (0.03 ± 0.16)
MFW_09	6	2 (0.20 ± 0.55)	2 (0.20 ± 0.55)	4	1 (0.11 ± 0.31)	1 (0.11 ± 0.31)
MFW_10	14	2 (0.38 ± 0.61) ^A	2 (0.38 ± 0.61) ^A	2	1 (0.05 ± 0.23)	1 (0.05 ± 0.23)
REV_01	5	2 (0.16 ± 0.47)	2 (0.16 ± 0.47)	5	2 (0.16 ± 0.44)	2 (0.16 ± 0.44)
REV_02	7	3 (0.20 ± 0.55)	3 (0.20 ± 0.55)	5	2 (0.16 ± 0.44)	2 (0.19 ± 0.52)
REV_03	11	4 (0.36 ± 0.77)	4 (0.38 ± 0.83)	3	3 (0.14 ± 0.54)	3 (0.16 ± 0.60)
REV_04	7	2 (0.20 ± 0.50)	3 (0.22 ± 0.60)	5	3 (0.19 ± 0.57)	3 (0.19 ± 0.57)
REV_05	8	4 (0.33 ± 0.85)	5 (0.38 ± 1.03)	6	3 (0.27 ± 0.73)	5 (0.35 ± 1.06)
REV_06	5	2 (0.20 ± 0.59)	3 (0.22 ± 0.67)	4	3 (0.16 ± 0.55)	4 (0.19 ± 0.70)
REV_07	10	3 (0.31 ± 0.67)	3 (0.33 ± 0.74)	5	2 (0.19 ± 0.52)	2 (0.19 ± 0.52)
REV_08	6	3 (0.22 ± 0.64)	3 (0.24 ± 0.68)	7	1 (0.19 ± 0.40)	1 (0.19 ± 0.40)
REV_09	7	3 (0.27 ± 0.69)	3 (0.27 ± 0.69)	3	3 (0.14 ± 0.54)	3 (0.14 ± 0.54)
REV_10	3	2 (0.09 ± 0.36)	2 (0.09 ± 0.36)	7	3 (0.30 ± 0.70)	3 (0.30 ± 0.70)
REV_11	4	2 (0.11 ± 0.38)	2 (0.11 ± 0.38)	4	3 (0.19 ± 0.62)	3 (0.19 ± 0.62)
REV_12	5	6 (0.24 ± 0.96)	6 (0.24 ± 0.96)	5	2 (0.16 ± 0.44)	2 (0.16 ± 0.44)
REV_13	5	2 (0.13 ± 0.40)	2 (0.13 ± 0.40)	8	2 (0.24 ± 0.49)	2 (0.24 ± 0.49)
REV_14	7	4 (0.27 ± 0.75)	4 (0.27 ± 0.75)	6	3 (0.22 ± 0.58)	3 (0.22 ± 0.58)
REV_15	10	4 (0.31 ± 0.73)	4 (0.31 ± 0.73)	3	2 (0.11 ± 0.39)	2 (0.11 ± 0.39)
REV_16	12	2 (0.31 ± 0.56)	2 (0.31 ± 0.56)	4	2 (0.14 ± 0.42)	2 (0.14 ± 0.42)
REV_17	7	2 (0.20 ± 0.50)	3 (0.22 ± 0.60)	7	2 (0.22 ± 0.48)	2 (0.22 ± 0.48)
REV_18	4	1 (0.09 ± 0.29)	1 (0.09 ± 0.29)	6	2 (0.19 ± 0.46)	2 (0.19 ± 0.46)
SF_01	7	2 (0.20 ± 0.50)	2 (0.20 ± 0.50)	5	2 (0.16 ± 0.44)	2 (0.16 ± 0.44)
SF_02	4	2 (0.11 ± 0.38)	2 (0.11 ± 0.38)	4	1 (0.11 ± 0.31)	1 (0.11 ± 0.31)
SRW_01	6	2 (0.16 ± 0.42)	4 (0.22 ± 0.70)	3	1 (0.08 ± 0.28)	1 (0.08 ± 0.28)
SRW_02	5	2 (0.13 ± 0.40)	2 (0.13 ± 0.40)	3	1 (0.08 ± 0.28)	1 (0.08 ± 0.28)
SRW_03	3	3 (0.11 ± 0.49)	4 (0.13 ± 0.63)	6	3 (0.22 ± 0.58)	4 (0.27 ± 0.77)
SRW_04	10	2 (0.27 ± 0.54) ^A	2 (0.27 ± 0.54) ^A	2	1 (0.05 ± 0.23)	1 (0.05 ± 0.23)
SRW_05	11	3 (0.29 ± 0.59)	3 (0.29 ± 0.59)	4	2 (0.14 ± 0.42)	2 (0.14 ± 0.42)
SRW_06	5	2 (0.13 ± 0.40)	2 (0.13 ± 0.40)	5	2 (0.19 ± 0.52)	2 (0.19 ± 0.52)
SRW_07	9	2 (0.27 ± 0.58)	2 (0.27 ± 0.58)	6	3 (0.22 ± 0.58)	3 (0.22 ± 0.58)
SRW_08	13	3 (0.42 ± 0.75)	3 (0.44 ± 0.78)	6	1 (0.16 ± 0.37)	1 (0.16 ± 0.37)
SRW_09	9	2 (0.27 ± 0.58)	2 (0.27 ± 0.58)	5	4 (0.27 ± 0.84)	5 (0.30 ± 0.97)
SRW_10	4	2 (0.11 ± 0.38)	4 (0.18 ± 0.68)	3	2 (0.11 ± 0.39)	2 (0.11 ± 0.39)
SRW_12	8	2 (0.20 ± 0.46)	2 (0.20 ± 0.46)	7	2 (0.27 ± 0.61)	2 (0.27 ± 0.61)

Table 22b – Bluefin tuna degree and strength scores by receiver station during the pre- and post-construction period. Grey shading denotes receivers/nodes that were impacted at the 3, 5, and 8 km impact radius (lightest), 5 and 8 km impact radius (medium), and only 8 km impact radius (darkest). Tx = total unique transmitters detected; ^A significantly higher than the post-construction period based on zero-inflated Wilcoxon Rank Sum test; ^B significantly higher than the pre-construction period based on zero-inflated Wilcoxon Rank Sum test

Station	Pre-Construction			Post-Construction		
	Tx	Degree Max (Mean ± SD)	Strength Max (Mean ± SD)	Tx	Degree Max (Mean ± SD)	Strength Max (Mean ± SD)
501_01	1	2 (0.20 ± 0.63)	2 (0.20 ± 0.63)	14	3 (0.34 ± 0.74)	3 (0.34 ± 0.74)
501_02	0	0 (0.00 ± 0.00)	0 (0.00 ± 0.00)	15	3 (0.33 ± 0.67) ^B	3 (0.33 ± 0.67) ^B
501_03	1	1 (0.10 ± 0.32)	1 (0.10 ± 0.32)	16	4 (0.38 ± 0.79)	5 (0.42 ± 0.92)
501_04	1	1 (0.10 ± 0.32)	1 (0.10 ± 0.32)	23	6 (0.63 ± 1.18) ^B	6 (0.64 ± 1.19) ^B
522_01	2	1 (0.20 ± 0.42)	1 (0.20 ± 0.42)	23	5 (0.58 ± 0.97)	5 (0.58 ± 0.97)
522_03	0	0 (0.00 ± 0.00)	0 (0.00 ± 0.00)	22	4 (0.59 ± 1.02) ^B	4 (0.69 ± 1.19) ^B
522_04	1	1 (0.10 ± 0.32)	1 (0.10 ± 0.32)	27	3 (0.58 ± 0.79) ^B	3 (0.59 ± 0.83) ^B
522_06	4	1 (0.40 ± 0.52)	1 (0.40 ± 0.52)	23	3 (0.47 ± 0.71)	3 (0.47 ± 0.71)
522_08	2	1 (0.20 ± 0.42)	1 (0.20 ± 0.42)	22	3 (0.52 ± 0.85)	4 (0.55 ± 0.92)
522_09	0	0 (0.00 ± 0.00)	0 (0.00 ± 0.00)	16	3 (0.36 ± 0.70) ^B	3 (0.39 ± 0.77) ^B
522_10	1	1 (0.10 ± 0.32)	1 (0.10 ± 0.32)	18	4 (0.52 ± 0.98)	4 (0.56 ± 1.08)
522_11	3	1 (0.30 ± 0.48)	1 (0.30 ± 0.48)	17	3 (0.34 ± 0.65)	3 (0.39 ± 0.75)
522_12	0	0 (0.00 ± 0.00)	0 (0.00 ± 0.00)	21	3 (0.45 ± 0.75) ^B	3 (0.45 ± 0.75) ^B
534_01	2	1 (0.20 ± 0.42)	1 (0.20 ± 0.42)	21	4 (0.53 ± 0.94)	4 (0.56 ± 1.01)
534_02	3	1 (0.30 ± 0.48)	1 (0.30 ± 0.48)	23	4 (0.55 ± 0.87)	4 (0.55 ± 0.87)
534_03	1	2 (0.20 ± 0.63)	2 (0.20 ± 0.63)	18	3 (0.39 ± 0.70)	3 (0.42 ± 0.77)
534_04	1	1 (0.10 ± 0.32)	1 (0.10 ± 0.32)	23	5 (0.69 ± 1.13) ^B	5 (0.69 ± 1.13) ^B
534_05	1	1 (0.10 ± 0.32)	1 (0.10 ± 0.32)	22	3 (0.50 ± 0.82)	3 (0.50 ± 0.82)
534_06	2	3 (0.40 ± 0.97)	3 (0.50 ± 1.08)	20	3 (0.41 ± 0.71)	3 (0.41 ± 0.71)
BW_02	0	0 (0.00 ± 0.00)	0 (0.00 ± 0.00)	19	6 (0.59 ± 1.18) ^B	9 (0.66 ± 1.45) ^B
BW_03	1	1 (0.10 ± 0.32)	1 (0.10 ± 0.32)	24	3 (0.56 ± 0.85) ^B	4 (0.58 ± 0.91) ^B
BW_04	2	2 (0.30 ± 0.67)	2 (0.30 ± 0.67)	26	5 (0.53 ± 0.85)	5 (0.53 ± 0.85)
BW_05	0	0 (0.00 ± 0.00)	0 (0.00 ± 0.00)	20	3 (0.36 ± 0.60) ^B	3 (0.36 ± 0.60) ^B
BW_06	1	3 (0.30 ± 0.95)	3 (0.30 ± 0.95)	20	4 (0.47 ± 0.84)	5 (0.48 ± 0.91)
BW_07	2	2 (0.30 ± 0.67)	2 (0.30 ± 0.67)	26	6 (0.75 ± 1.30)	7 (0.83 ± 1.49)
BW_08	0	0 (0.00 ± 0.00)	0 (0.00 ± 0.00)	20	4 (0.45 ± 0.82) ^B	4 (0.48 ± 0.85) ^B
BW_09	2	2 (0.30 ± 0.67)	2 (0.30 ± 0.67)	28	7 (0.67 ± 1.11)	7 (0.72 ± 1.16)
BW_10	1	1 (0.10 ± 0.32)	1 (0.10 ± 0.32)	27	5 (0.69 ± 1.10) ^B	6 (0.72 ± 1.20) ^B
MFW_03	2	1 (0.20 ± 0.42)	1 (0.20 ± 0.42)	26	5 (0.77 ± 1.19)	5 (0.77 ± 1.19)
MFW_04	2	2 (0.30 ± 0.67)	2 (0.30 ± 0.67)	33	5 (0.81 ± 1.07)	5 (0.86 ± 1.18)
MFW_05	2	1 (0.20 ± 0.42)	1 (0.20 ± 0.42)	27	3 (0.61 ± 0.85)	4 (0.63 ± 0.90)
MFW_06	4	1 (0.40 ± 0.52)	1 (0.40 ± 0.52)	15	3 (0.41 ± 0.87)	4 (0.42 ± 0.92)
MFW_07	1	1 (0.10 ± 0.32)	1 (0.10 ± 0.32)	20	4 (0.45 ± 0.80)	5 (0.50 ± 0.93)

MFW_08	1	1 (0.10 ± 0.32)	2 (0.20 ± 0.63)	25	7 (0.70 ± 1.24) ^B	7 (0.75 ± 1.31)
MFW_09	1	1 (0.10 ± 0.32)	1 (0.10 ± 0.32)	25	7 (0.78 ± 1.35) ^B	8 (0.86 ± 1.51) ^B
MFW_10	1	1 (0.10 ± 0.32)	1 (0.10 ± 0.32)	21	4 (0.59 ± 1.02)	5 (0.61 ± 1.08)
REV_01	0	0 (0.00 ± 0.00)	0 (0.00 ± 0.00)	13	4 (0.34 ± 0.82) ^B	5 (0.38 ± 0.92) ^B
REV_02	0	0 (0.00 ± 0.00)	0 (0.00 ± 0.00)	19	3 (0.50 ± 0.85) ^B	3 (0.56 ± 0.97) ^B
REV_03	0	0 (0.00 ± 0.00)	0 (0.00 ± 0.00)	17	4 (0.56 ± 1.05) ^B	4 (0.58 ± 1.10) ^B
REV_04	0	0 (0.00 ± 0.00)	0 (0.00 ± 0.00)	20	6 (0.77 ± 1.43) ^B	6 (0.81 ± 1.56) ^B
REV_05	1	1 (0.10 ± 0.32)	1 (0.10 ± 0.32)	14	5 (0.38 ± 0.90)	5 (0.38 ± 0.90)
REV_06	0	0 (0.00 ± 0.00)	0 (0.00 ± 0.00)	19	6 (0.58 ± 1.17) ^B	6 (0.58 ± 1.17) ^B
REV_07	1	1 (0.10 ± 0.32)	1 (0.10 ± 0.32)	15	3 (0.38 ± 0.79)	3 (0.41 ± 0.83)
REV_08	0	0 (0.00 ± 0.00)	0 (0.00 ± 0.00)	14	2 (0.28 ± 0.58) ^B	2 (0.31 ± 0.64) ^B
REV_09	0	0 (0.00 ± 0.00)	0 (0.00 ± 0.00)	19	4 (0.41 ± 0.75) ^B	4 (0.42 ± 0.79) ^B
REV_10	1	1 (0.10 ± 0.32)	1 (0.10 ± 0.32)	12	3 (0.23 ± 0.56)	3 (0.25 ± 0.59)
REV_11	1	2 (0.20 ± 0.63)	2 (0.20 ± 0.63)	14	2 (0.28 ± 0.58)	2 (0.28 ± 0.58)
REV_12	0	0 (0.00 ± 0.00)	0 (0.00 ± 0.00)	19	4 (0.45 ± 0.83) ^B	4 (0.47 ± 0.87) ^B
REV_13	1	1 (0.10 ± 0.32)	1 (0.10 ± 0.32)	16	4 (0.47 ± 0.93)	4 (0.48 ± 0.96)
REV_14	0	0 (0.00 ± 0.00)	0 (0.00 ± 0.00)	13	3 (0.27 ± 0.62) ^B	3 (0.27 ± 0.62) ^B
REV_15	0	0 (0.00 ± 0.00)	0 (0.00 ± 0.00)	15	3 (0.36 ± 0.72) ^B	3 (0.36 ± 0.72) ^B
REV_16	2	1 (0.20 ± 0.42)	1 (0.20 ± 0.42)	21	5 (0.75 ± 1.31)	5 (0.80 ± 1.38)
REV_17	0	0 (0.00 ± 0.00)	0 (0.00 ± 0.00)	25	4 (0.59 ± 0.90) ^B	4 (0.63 ± 0.97) ^B
REV_18	1	1 (0.10 ± 0.32)	1 (0.10 ± 0.32)	15	3 (0.34 ± 0.72)	4 (0.38 ± 0.85)
SF_01	1	1 (0.10 ± 0.32)	1 (0.10 ± 0.32)	16	3 (0.36 ± 0.72)	3 (0.38 ± 0.77)
SF_02	0	0 (0.00 ± 0.00)	0 (0.00 ± 0.00)	21	4 (0.61 ± 1.05) ^B	4 (0.64 ± 1.07) ^B
SRW_01	0	0 (0.00 ± 0.00)	0 (0.00 ± 0.00)	19	2 (0.33 ± 0.54) ^B	2 (0.34 ± 0.57) ^B
SRW_02	3	2 (0.40 ± 0.70)	2 (0.40 ± 0.70)	22	3 (0.41 ± 0.64)	3 (0.42 ± 0.66)
SRW_03	2	2 (0.30 ± 0.67)	2 (0.30 ± 0.67)	16	4 (0.36 ± 0.78)	4 (0.39 ± 0.83)
SRW_04	0	0 (0.00 ± 0.00)	0 (0.00 ± 0.00)	24	4 (0.70 ± 1.05) ^B	4 (0.72 ± 1.06) ^B
SRW_05	0	0 (0.00 ± 0.00)	0 (0.00 ± 0.00)	24	3 (0.58 ± 0.83) ^B	3 (0.61 ± 0.90) ^B
SRW_06	1	1 (0.10 ± 0.32)	1 (0.10 ± 0.32)	22	4 (0.53 ± 0.89)	4 (0.55 ± 0.91)
SRW_07	0	0 (0.00 ± 0.00)	0 (0.00 ± 0.00)	26	5 (0.58 ± 0.91) ^B	5 (0.59 ± 0.92) ^B
SRW_08	1	1 (0.10 ± 0.32)	1 (0.10 ± 0.32)	24	2 (0.45 ± 0.64) ^B	2 (0.45 ± 0.64) ^B
SRW_09	1	1 (0.10 ± 0.32)	1 (0.10 ± 0.32)	25	4 (0.61 ± 0.92) ^B	4 (0.63 ± 0.93) ^B
SRW_10	1	2 (0.20 ± 0.63)	2 (0.20 ± 0.63)	16	2 (0.30 ± 0.55)	3 (0.31 ± 0.61)
SRW_12	2	1 (0.20 ± 0.42)	1 (0.20 ± 0.42)	16	3 (0.41 ± 0.79)	3 (0.42 ± 0.83)

Table 22c – Shortfin mako degree and strength scores by receiver station during the pre- and post-construction period. Grey shading denotes receivers/nodes that were impacted at the 3, 5, and 8 km impact radius (lightest), 5 and 8 km impact radius (medium), and only 8 km impact radius (darkest). Tx = total unique transmitters detected; ^A significantly higher than the post-construction period based on zero-inflated Wilcoxon Rank Sum test; ^B significantly higher than the pre-construction period based on zero-inflated Wilcoxon Rank Sum test

Station	Pre-Construction			Post-Construction		
	Tx	Degree Max (Mean ± SD)	Strength Max (Mean ± SD)	Tx	Degree Max (Mean ± SD)	Strength Max (Mean ± SD)
501_01	0	0 (0.00 ± 0.00)	0 (0.00 ± 0.00)	6	1 (0.14 ± 0.35) ^B	1 (0.14 ± 0.35) ^B
501_02	1	1 (0.08 ± 0.28)	1 (0.08 ± 0.28)	6	2 (0.19 ± 0.50)	2 (0.19 ± 0.50)
501_03	0	0 (0.00 ± 0.00)	0 (0.00 ± 0.00)	4	1 (0.09 ± 0.29)	1 (0.09 ± 0.29)
501_04	2	1 (0.15 ± 0.38)	1 (0.15 ± 0.38)	4	1 (0.09 ± 0.29)	2 (0.12 ± 0.39)
522_01	4	2 (0.46 ± 0.78) ^A	3 (0.54 ± 0.97) ^A	4	1 (0.09 ± 0.29)	1 (0.09 ± 0.29)
522_03	2	1 (0.15 ± 0.38)	1 (0.15 ± 0.38)	3	1 (0.07 ± 0.26)	1 (0.07 ± 0.26)
522_04	2	1 (0.15 ± 0.38) ^A	1 (0.15 ± 0.38) ^A	2	1 (0.05 ± 0.21)	1 (0.05 ± 0.21)
522_06	2	1 (0.15 ± 0.38)	1 (0.15 ± 0.38)	5	2 (0.16 ± 0.48)	2 (0.16 ± 0.48)
522_08	3	1 (0.23 ± 0.44)	1 (0.23 ± 0.44)	2	1 (0.05 ± 0.21)	1 (0.05 ± 0.21)
522_09	1	1 (0.08 ± 0.28)	1 (0.08 ± 0.28)	4	1 (0.09 ± 0.29)	1 (0.09 ± 0.29)
522_10	1	1 (0.08 ± 0.28)	1 (0.08 ± 0.28)	4	1 (0.09 ± 0.29)	1 (0.09 ± 0.29)
522_11	1	1 (0.08 ± 0.28)	1 (0.08 ± 0.28)	2	1 (0.05 ± 0.21)	1 (0.05 ± 0.21)
522_12	2	1 (0.15 ± 0.38)	1 (0.15 ± 0.38)	3	1 (0.07 ± 0.26)	1 (0.07 ± 0.26)
534_01	1	1 (0.08 ± 0.28)	1 (0.08 ± 0.28)	2	1 (0.05 ± 0.21)	1 (0.05 ± 0.21)
534_02	2	1 (0.15 ± 0.38)	1 (0.15 ± 0.38)	5	2 (0.14 ± 0.41)	2 (0.14 ± 0.41)
534_03	3	1 (0.23 ± 0.44)	1 (0.23 ± 0.44)	6	2 (0.16 ± 0.43)	2 (0.16 ± 0.43)
534_04	1	1 (0.08 ± 0.28)	1 (0.08 ± 0.28)	4	1 (0.09 ± 0.29)	1 (0.09 ± 0.29)
534_05	1	1 (0.08 ± 0.28)	2 (0.15 ± 0.55)	6	2 (0.16 ± 0.43)	2 (0.16 ± 0.43)
534_06	2	1 (0.15 ± 0.38) ^A	1 (0.15 ± 0.38) ^A	2	1 (0.05 ± 0.21)	1 (0.05 ± 0.21)
BW_02	1	1 (0.08 ± 0.28)	1 (0.08 ± 0.28)	5	1 (0.12 ± 0.32)	1 (0.12 ± 0.32)
BW_03	2	2 (0.23 ± 0.60)	2 (0.23 ± 0.60)	4	1 (0.09 ± 0.29)	1 (0.09 ± 0.29)
BW_04	3	1 (0.23 ± 0.44)	1 (0.23 ± 0.44)	4	2 (0.12 ± 0.39)	2 (0.12 ± 0.39)
BW_05	1	1 (0.08 ± 0.28)	1 (0.08 ± 0.28)	2	2 (0.07 ± 0.34)	2 (0.07 ± 0.34)
BW_06	0	0 (0.00 ± 0.00)	0 (0.00 ± 0.00)	3	1 (0.07 ± 0.26)	1 (0.07 ± 0.26)
BW_07	2	2 (0.23 ± 0.60)	2 (0.23 ± 0.60)	3	1 (0.07 ± 0.26)	1 (0.07 ± 0.26)
BW_08	1	2 (0.15 ± 0.55)	2 (0.15 ± 0.55)	2	1 (0.05 ± 0.21)	1 (0.05 ± 0.21)
BW_09	1	2 (0.15 ± 0.55)	2 (0.15 ± 0.55)	4	1 (0.09 ± 0.29)	1 (0.09 ± 0.29)
BW_10	1	1 (0.08 ± 0.28)	1 (0.08 ± 0.28)	1	2 (0.05 ± 0.30)	2 (0.05 ± 0.30)
MFW_03	0	0 (0.00 ± 0.00)	0 (0.00 ± 0.00)	2	1 (0.05 ± 0.21)	1 (0.05 ± 0.21)
MFW_04	1	1 (0.08 ± 0.28)	1 (0.08 ± 0.28)	6	1 (0.14 ± 0.35)	1 (0.14 ± 0.35)
MFW_05	0	0 (0.00 ± 0.00)	0 (0.00 ± 0.00)	3	1 (0.07 ± 0.26)	1 (0.07 ± 0.26)
MFW_06	1	1 (0.08 ± 0.28)	1 (0.08 ± 0.28)	3	2 (0.09 ± 0.37)	2 (0.09 ± 0.37)
MFW_07	1	1 (0.08 ± 0.28)	1 (0.08 ± 0.28)	3	1 (0.07 ± 0.26)	1 (0.07 ± 0.26)

MFW_08	1	1 (0.08 ± 0.28)	1 (0.08 ± 0.28)	5	1 (0.12 ± 0.32)	1 (0.12 ± 0.32)
MFW_09	2	1 (0.15 ± 0.38) ^A	1 (0.15 ± 0.38) ^A	2	1 (0.05 ± 0.21)	1 (0.05 ± 0.21)
MFW_10	3	2 (0.31 ± 0.63)	2 (0.31 ± 0.63)	3	2 (0.09 ± 0.37)	2 (0.09 ± 0.37)
REV_01	0	0 (0.00 ± 0.00)	0 (0.00 ± 0.00)	6	4 (0.26 ± 0.76) ^B	4 (0.26 ± 0.76) ^B
REV_02	1	1 (0.08 ± 0.28)	1 (0.08 ± 0.28)	7	3 (0.26 ± 0.66)	3 (0.26 ± 0.66)
REV_03	2	1 (0.15 ± 0.38)	1 (0.15 ± 0.38)	10	2 (0.30 ± 0.60)	2 (0.33 ± 0.64)
REV_04	0	0 (0.00 ± 0.00)	0 (0.00 ± 0.00)	4	2 (0.14 ± 0.47)	3 (0.16 ± 0.57)
REV_05	1	1 (0.08 ± 0.28)	1 (0.08 ± 0.28)	12	1 (0.28 ± 0.45)	3 (0.37 ± 0.69) ^B
REV_06	1	1 (0.08 ± 0.28)	1 (0.08 ± 0.28)	7	2 (0.21 ± 0.51)	2 (0.21 ± 0.51)
REV_07	3	1 (0.23 ± 0.44)	1 (0.23 ± 0.44)	13	3 (0.42 ± 0.76)	3 (0.42 ± 0.76)
REV_08	0	0 (0.00 ± 0.00)	0 (0.00 ± 0.00)	9	3 (0.33 ± 0.71) ^B	5 (0.37 ± 0.93) ^B
REV_09	1	1 (0.08 ± 0.28)	1 (0.08 ± 0.28)	9	3 (0.28 ± 0.63)	3 (0.28 ± 0.63)
REV_10	2	1 (0.15 ± 0.38)	1 (0.15 ± 0.38)	10	3 (0.33 ± 0.68)	3 (0.33 ± 0.68)
REV_11	1	1 (0.08 ± 0.28)	1 (0.08 ± 0.28)	7	2 (0.19 ± 0.45)	2 (0.19 ± 0.45)
REV_12	4	2 (0.38 ± 0.65)	2 (0.38 ± 0.65)	10	2 (0.26 ± 0.49)	2 (0.26 ± 0.49)
REV_13	2	1 (0.15 ± 0.38)	1 (0.15 ± 0.38)	6	5 (0.23 ± 0.81)	5 (0.23 ± 0.81)
REV_14	2	1 (0.15 ± 0.38)	1 (0.15 ± 0.38)	12	2 (0.35 ± 0.61)	3 (0.37 ± 0.69)
REV_15	3	1 (0.23 ± 0.44)	2 (0.31 ± 0.63)	6	4 (0.21 ± 0.67)	4 (0.23 ± 0.72)
REV_16	3	1 (0.23 ± 0.44)	1 (0.23 ± 0.44)	7	3 (0.28 ± 0.70)	4 (0.33 ± 0.87)
REV_17	1	1 (0.08 ± 0.28)	1 (0.08 ± 0.28)	12	3 (0.56 ± 1.01) ^B	4 (0.60 ± 1.12) ^B
REV_18	0	0 (0.00 ± 0.00)	0 (0.00 ± 0.00)	11	3 (0.40 ± 0.79) ^B	3 (0.40 ± 0.79) ^B
SF_01	0	0 (0.00 ± 0.00)	0 (0.00 ± 0.00)	11	3 (0.35 ± 0.69) ^B	3 (0.35 ± 0.69) ^B
SF_02	1	1 (0.08 ± 0.28)	1 (0.08 ± 0.28)	11	3 (0.30 ± 0.60)	3 (0.30 ± 0.60)
SRW_01	2	1 (0.15 ± 0.38)	1 (0.15 ± 0.38)	8	4 (0.26 ± 0.69)	6 (0.30 ± 0.96)
SRW_02	1	1 (0.08 ± 0.28)	1 (0.08 ± 0.28)	10	2 (0.30 ± 0.60)	3 (0.33 ± 0.68)
SRW_03	2	1 (0.15 ± 0.38)	1 (0.15 ± 0.38)	12	2 (0.35 ± 0.61)	2 (0.35 ± 0.61)
SRW_04	1	2 (0.15 ± 0.55)	2 (0.15 ± 0.55)	11	2 (0.30 ± 0.56)	2 (0.30 ± 0.56)
SRW_05	4	2 (0.38 ± 0.65)	2 (0.38 ± 0.65)	11	2 (0.37 ± 0.69)	2 (0.37 ± 0.69)
SRW_06	2	2 (0.23 ± 0.60)	2 (0.23 ± 0.60)	12	2 (0.40 ± 0.69)	2 (0.42 ± 0.73)
SRW_07	3	3 (0.38 ± 0.87)	3 (0.38 ± 0.87)	11	3 (0.35 ± 0.72)	3 (0.35 ± 0.72)
SRW_08	1	1 (0.08 ± 0.28)	1 (0.08 ± 0.28)	6	4 (0.21 ± 0.67)	4 (0.21 ± 0.67)
SRW_09	2	3 (0.38 ± 0.96)	3 (0.38 ± 0.96)	10	2 (0.26 ± 0.49)	2 (0.26 ± 0.49)
SRW_10	1	1 (0.08 ± 0.28)	1 (0.08 ± 0.28)	10	3 (0.35 ± 0.75)	4 (0.40 ± 0.90)
SRW_12	2	2 (0.23 ± 0.60)	3 (0.31 ± 0.85)	4	1 (0.09 ± 0.29)	1 (0.09 ± 0.29)

Table 23a – Summary of environmental conditions evident at receivers impacted at the 3 km impact radius during the pre- and post-construction periods. Values represent the range (minimum to maximum) followed by the median, mean, and standard deviation inside parentheses. SST: sea surface temperature

Station	# of days		SST (°C)		Bottom temperature (°C)		Chlorophyll a (mg/m ³)		Average noise (mV)	
	Pre-	Post-	Pre-construction	Post-construction	Pre-construction	Post-construction	Pre-construction	Post-construction	Pre-construction	Post-construction
501_01	225	322	12.2–24.5 (18.5, 18.5 ± 3.1)	11.2–23.7 (18.3, 18.2 ± 3)	8.7–17 (13.1, 13 ± 2.1)	8.2–16.5 (13.1, 13 ± 2.1)	0.25–2.19 (1.11, 1.14 ± 0.43)	0.44–3.06 (1.21, 1.36 ± 0.51)	146–834 (195, 207 ± 72)	146–797 (220, 240 ± 86)
501_02	197	350	12.3–24.6 (18.5, 18.5 ± 3.2)	11.2–23.8 (18.3, 18.3 ± 3)	8.7–16.7 (13.4, 13.1 ± 2.2)	8.4–16.6 (12.6, 12.8 ± 2.1)	0.24–2.14 (0.98, 1.07 ± 0.41)	0.44–3.04 (1.16, 1.3 ± 0.52)	152–806 (201, 208 ± 57)	152–946 (208, 218 ± 62)
501_03	186	361	12.5–24.5 (18.6, 18.6 ± 3.2)	10.7–23.9 (18, 18 ± 3)	8.8–16.7 (13.7, 13.4 ± 2.1)	8.3–17.3 (12.7, 12.8 ± 2.2)	0.35–2.23 (0.85, 0.98 ± 0.39)	0.44–2.95 (1.17, 1.28 ± 0.5)	152–601 (200, 204 ± 42)	152–847 (202, 211 ± 54)
501_04	189	358	12.3–24.6 (18.7, 18.6 ± 3.3)	10.8–24 (18.1, 18.2 ± 3)	9.3–17 (13.9, 13.7 ± 2.1)	8.7–17.6 (13, 13.1 ± 2.3)	0.35–2.08 (0.82, 0.92 ± 0.38)	0.41–2.75 (1.1, 1.2 ± 0.5)	151–542 (199, 203 ± 41)	149–954 (200, 208 ± 50)
REV_02	366	183	11.7–24.4 (19.1, 18.8 ± 3.2)	12.1–23.6 (19.2, 19 ± 2.9)	9.9–20 (14.3, 14.1 ± 2)	9.1–18.1 (12.5, 13.2 ± 2.8)	0.32–2.08 (0.98, 1.02 ± 0.34)	0.39–3.76 (1.28, 1.35 ± 0.63)	152–786 (224, 231 ± 64)	150–834 (229, 243 ± 78)
REV_03	393	156	11.7–24.4 (19, 18.7 ± 3.1)	12.1–23.7 (19.8, 19.2 ± 3)	9–19.8 (13.9, 13.7 ± 2.2)	9.4–18.1 (13, 13.7 ± 2.5)	0.37–2.24 (1, 1.03 ± 0.34)	0.4–3.83 (1.37, 1.43 ± 0.71)	148–985 (196, 203 ± 55)	148–807 (214, 238 ± 91)
REV_04	366	183	11.6–24.4 (19.1, 18.7 ± 3.2)	12–23.8 (19, 18.9 ± 2.9)	8.6–19.3 (13.3, 13.3 ± 2)	8.2–17.3 (12.1, 12.5 ± 2.6)	0.4–2.59 (1.05, 1.08 ± 0.36)	0.43–3.92 (1.32, 1.41 ± 0.68)	151–705 (202, 208 ± 52)	167–726 (223, 233 ± 53)
REV_05	697	183	11.7–25.2 (20, 19.2 ± 3.1)	12.1–23.8 (19.2, 19 ± 2.9)	6.5–18 (13.1, 12.9 ± 2.4)	7.8–17.3 (11.2, 11.9 ± 3)	0.29–2.07 (0.91, 0.95 ± 0.31)	0.37–3.29 (1.2, 1.28 ± 0.56)	151–696 (204, 210 ± 49)	150–703 (207, 215 ± 52)
REV_06	367	182	11.7–24.4 (19.1, 18.8 ± 3.2)	12.1–23.7 (19.3, 19 ± 2.9)	9.2–19.5 (13.9, 13.8 ± 2)	9.1–17.9 (12.3, 13 ± 2.7)	0.35–2.16 (0.98, 1.02 ± 0.35)	0.38–3.76 (1.3, 1.34 ± 0.65)	158–785 (215, 222 ± 55)	156–798 (228, 243 ± 74)
REV_07	696	183	11.7–25.1 (19.9, 19.3 ± 3.1)	12.2–24 (19.2, 19.1 ± 2.9)	8–18.9 (13.8, 13.6 ± 2.5)	8–17.9 (11.8, 12.4 ± 3.1)	0.3–2.2 (0.89, 0.92 ± 0.31)	0.35–2.74 (1.1, 1.15 ± 0.47)	147–926 (200, 213 ± 73)	152–775 (204, 216 ± 65)
REV_08	752	127	11.8–25.1 (20, 19.3 ± 3)	12.2–24 (18.2, 18.6 ± 2.9)	7.9–18.8 (13.5, 13.5 ± 2.5)	10.6–18.1 (14.8, 14.5 ± 2.3)	0.34–2.1 (0.91, 0.94 ± 0.31)	0.37–3.32 (1.24, 1.29 ± 0.64)	148–808 (201, 209 ± 51)	154–579 (218, 223 ± 46)
REV_09	425	124	11.7–24.6 (19.3, 18.9 ± 3.2)	12.2–23.7 (18.1, 18.4 ± 2.8)	9–20.3 (13.4, 13.4 ± 2.2)	10.8–17.8 (14.7, 14.6 ± 2.1)	0.38–2.22 (0.98, 1.01 ± 0.35)	0.39–3.52 (1.28, 1.35 ± 0.68)	149–738 (198, 209 ± 61)	155–783 (219, 249 ± 98)
REV_11	247	302	12.6–24.3 (19.4, 19.3 ± 3.3)	11.8–24 (18.6, 18.6 ± 3)	9.8–18 (12.9, 13.4 ± 2.2)	9–18.3 (14, 13.9 ± 2.4)	0.34–2.19 (0.87, 0.88 ± 0.37)	0.34–2.31 (1.03, 1.06 ± 0.36)	151–787 (213, 222 ± 62)	149–765 (220, 230 ± 63)
REV_12	400	149	11.6–24.3 (19, 18.6 ± 3.1)	12.1–23.7 (19.3, 19 ± 3.1)	8.5–20.7 (13.3, 13.2 ± 2.2)	10.5–17.5 (13.6, 13.8 ± 1.9)	0.4–2.88 (1.07, 1.1 ± 0.39)	0.47–3.43 (1.38, 1.43 ± 0.6)	152–700 (201, 210 ± 51)	160–865 (223, 254 ± 103)
REV_13	398	151	11.7–24.4 (19, 18.6 ± 3.1)	12.3–23.7 (19.4, 19.1 ± 3.1)	8.3–18.7 (13, 12.8 ± 2.2)	9.9–17.4 (13.2, 13.5 ± 2.3)	0.36–2.33 (0.99, 1.02 ± 0.37)	0.41–2.98 (1.2, 1.28 ± 0.56)	150–750 (205, 214 ± 56)	158–753 (229, 249 ± 86)
REV_14	432	107	11.5–24.4 (19.3, 18.9 ± 3.2)	12.2–21.8 (17.4, 17.5 ± 2.5)	8.1–20.9 (13, 13 ± 2.2)	10.6–17.5 (14.9, 14.7 ± 1.6)	0.36–2.77 (1.1, 1.12 ± 0.4)	0.52–3.22 (1.31, 1.42 ± 0.62)	155–860 (224, 235 ± 64)	180–697 (250, 257 ± 50)
REV_15	741	138	11.2–24.1 (19.5, 18.9 ± 3)	12.2–23.8 (18.9, 18.6 ± 3)	8.6–19.3 (13.9, 14 ± 2.4)	9.8–18.2 (14.5, 14.3 ± 2.3)	0.33–2.61 (1.01, 1.06 ± 0.39)	0.58–3.22 (1.31, 1.42 ± 0.54)	150–741 (201, 207 ± 46)	155–714 (223, 236 ± 65)
REV_16	708	171	11.7–24.4 (19.5, 19 ± 3.1)	12.4–23.8 (19.3, 19.1 ± 2.9)	8–19.4 (13.4, 13.6 ± 2.5)	8.8–17.9 (12.7, 13 ± 2.7)	0.34–2.27 (0.9, 0.93 ± 0.34)	0.36–2.46 (1.05, 1.15 ± 0.46)	153–817 (213, 228 ± 75)	156–754 (226, 239 ± 65)
REV_17	699	170	11.5–24.7 (19.5, 19 ± 3.1)	12.3–23.7 (19, 18.9 ± 2.9)	8.4–18.6 (13.5, 13.5 ± 2.3)	8.6–18.2 (12.6, 13 ± 2.8)	0.34–2.41 (0.95, 0.99 ± 0.37)	0.53–3.02 (1.11, 1.24 ± 0.5)	149–756 (208, 222 ± 70)	149–672 (216, 230 ± 62)
REV_18	616	299	12.4–24.8 (20.1, 19.4 ± 3)	11.7–23.7 (18.5, 18.4 ± 3)	9.1–22.4 (12.6, 13.7 ± 3)	8.1–17.3 (13.2, 13.1 ± 2.3)	0.38–2.52 (0.88, 0.92 ± 0.34)	0.39–3.32 (1.08, 1.17 ± 0.47)	159–754 (231, 240 ± 63)	163–756 (249, 265 ± 74)
SF_01	558	333	12.5–24.9 (19.8, 19.3 ± 3)	11.9–24.3 (19.2, 18.9 ± 3.1)	2.8–23.4 (15.3, 14.3 ± 3)	8.1–17.8 (12.6, 12.8 ± 2.4)	0.35–2.59 (0.84, 0.87 ± 0.34)	0.35–2.5 (1, 1.08 ± 0.41)	154–657 (212, 221 ± 56)	155–797 (225, 242 ± 78)
SF_02	220	329	12.4–24.4 (19, 18.8 ± 3.2)	11.7–24 (19.1, 18.8 ± 3.1)	10.5–18.7 (14.4, 14.3 ± 2.2)	9.9–19.5 (14.3, 14.5 ± 2.3)	0.36–2.29 (0.95, 0.95 ± 0.42)	0.38–2.7 (1.04, 1.1 ± 0.39)	171–701 (232, 240 ± 58)	155–718 (227, 239 ± 67)

Table 23b – Summary of environmental conditions evident at receivers impacted at the 5 km impact radius during the pre- and post-construction periods. Values represent the range (minimum to maximum) followed by the median, mean, and standard deviation inside parentheses. SST: sea surface temperature

Station	#of days		SST (°C)		Bottom temperature (°C)		Chlorophyll a (mg/m ³)		Average noise (mV)	
	Pre-	Post-	Pre-construction	Post-construction	Pre-construction	Post-construction	Pre-construction	Post-construction	Pre-construction	Post-construction
501_01	197	350	12.2–24.5 (18.4, 18.4 ± 3.1)	11.2–23.7 (18.3, 18.2 ± 2.9)	8.7–17 (13.5, 13.2 ± 2.2)	8.2–16.5 (12.8, 12.8 ± 2.1)	0.25–2.19 (1.11, 1.13 ± 0.42)	0.44–3.06 (1.21, 1.34 ± 0.51)	146–834 (198, 209 ± 73)	146–797 (217, 236 ± 86)
501_02	197	350	12.3–24.6 (18.5, 18.5 ± 3.2)	11.2–23.8 (18.3, 18.3 ± 3)	8.7–16.7 (13.4, 13.1 ± 2.2)	8.4–16.6 (12.6, 12.8 ± 2.1)	0.24–2.14 (0.98, 1.07 ± 0.41)	0.44–3.04 (1.16, 1.3 ± 0.52)	152–806 (201, 208 ± 57)	152–946 (208, 218 ± 62)
501_03	186	361	12.5–24.5 (18.6, 18.6 ± 3.2)	10.7–23.9 (18, 18 ± 3)	8.8–16.7 (13.7, 13.4 ± 2.1)	8.3–17.3 (12.7, 12.8 ± 2.2)	0.35–2.23 (0.85, 0.98 ± 0.39)	0.44–2.95 (1.17, 1.28 ± 0.5)	152–601 (200, 204 ± 42)	152–847 (202, 211 ± 54)
501_04	186	361	12.6–24.6 (18.8, 18.7 ± 3.2)	10.8–24 (18, 18.2 ± 3.1)	9.3–17 (14, 13.7 ± 2.1)	8.7–17.6 (13, 13 ± 2.3)	0.35–2.08 (0.81, 0.92 ± 0.38)	0.41–2.75 (1.12, 1.21 ± 0.5)	151–542 (200, 204 ± 41)	149–954 (200, 208 ± 50)
534_01	364	183	11.7–25 (18.4, 18.5 ± 3.3)	12.6–24 (18.8, 18.7 ± 3)	9.1–16.3 (13, 12.9 ± 2.1)	8.3–19.9 (12.2, 12.3 ± 3.3)	0.27–2.39 (0.97, 0.98 ± 0.42)	0.45–2.29 (0.8, 1.05 ± 0.48)	152–532 (190, 196 ± 34)	160–456 (209, 212 ± 28)
BW_02	402	328	12–24.8 (18.6, 18.5 ± 3.3)	11.3–23.9 (18.5, 18.3 ± 3.1)	8.1–15.7 (12.6, 12.3 ± 2.2)	7.5–16.7 (12, 12.1 ± 2.5)	0.36–2 (0.87, 0.93 ± 0.42)	0.42–2.4 (1.01, 1.1 ± 0.46)	149–818 (187, 193 ± 40)	150–513 (193, 197 ± 34)
REV_02	366	183	11.7–24.4 (19.1, 18.8 ± 3.2)	12.1–23.6 (19.2, 19 ± 2.9)	9.9–20 (14.3, 14.1 ± 2)	9.1–18.1 (12.5, 13.2 ± 2.8)	0.32–2.08 (0.98, 1.02 ± 0.34)	0.39–3.76 (1.28, 1.35 ± 0.63)	152–786 (224, 231 ± 64)	150–834 (229, 243 ± 78)
REV_03	366	183	11.7–24.4 (19.2, 18.7 ± 3.2)	12.1–23.7 (19.1, 18.9 ± 2.9)	9.7–19.8 (14.1, 14 ± 2)	9–18.1 (12.4, 13.1 ± 2.7)	0.37–2.24 (1, 1.03 ± 0.35)	0.4–3.83 (1.3, 1.37 ± 0.66)	149–985 (198, 205 ± 55)	148–807 (205, 230 ± 87)
REV_04	366	183	11.6–24.4 (19.1, 18.7 ± 3.2)	12–23.8 (19, 18.9 ± 2.9)	8.6–19.3 (13.3, 13.3 ± 2)	8.2–17.3 (12.1, 12.5 ± 2.6)	0.4–2.59 (1.05, 1.08 ± 0.36)	0.43–3.92 (1.32, 1.41 ± 0.68)	151–705 (202, 208 ± 52)	167–726 (223, 233 ± 53)
REV_05	696	183	11.7–25.2 (20, 19.2 ± 3.1)	12.1–23.8 (19.2, 19 ± 2.9)	6.5–18 (13.1, 12.9 ± 2.4)	7.8–17.3 (11.2, 11.9 ± 3)	0.29–2.07 (0.91, 0.95 ± 0.31)	0.37–3.29 (1.2, 1.28 ± 0.56)	151–696 (204, 210 ± 49)	150–703 (207, 215 ± 52)
REV_06	366	183	11.7–24.4 (19.1, 18.8 ± 3.2)	12.1–23.7 (19.2, 19 ± 2.9)	9.6–19.5 (13.9, 13.8 ± 2)	9.1–17.9 (12.3, 13 ± 2.7)	0.35–2.16 (0.98, 1.02 ± 0.35)	0.38–3.76 (1.3, 1.34 ± 0.65)	158–785 (215, 222 ± 55)	156–798 (227, 243 ± 74)
REV_07	696	183	11.7–25.1 (19.9, 19.3 ± 3.1)	12.2–24 (19.2, 19.1 ± 2.9)	8–18.9 (13.8, 13.6 ± 2.5)	8–17.9 (11.8, 12.4 ± 3.1)	0.3–2.2 (0.89, 0.92 ± 0.31)	0.35–2.74 (1.1, 1.15 ± 0.47)	147–926 (200, 213 ± 73)	152–775 (204, 216 ± 65)
REV_08	697	182	11.8–25.1 (19.9, 19.2 ± 3.1)	12.2–24 (19.2, 19.1 ± 2.9)	7.9–18.8 (14, 13.8 ± 2.4)	9–18.1 (12.4, 13.1 ± 2.9)	0.34–2.1 (0.9, 0.93 ± 0.32)	0.37–3.32 (1.13, 1.23 ± 0.57)	148–808 (202, 210 ± 52)	154–748 (206, 214 ± 47)
REV_09	396	153	11.7–24.6 (19, 18.7 ± 3.2)	12.2–23.7 (19.6, 19.2 ± 3)	9–20.3 (13.7, 13.5 ± 2.3)	9.7–17.8 (13.4, 14 ± 2.3)	0.38–2.22 (0.98, 1.01 ± 0.35)	0.39–3.52 (1.28, 1.35 ± 0.65)	149–730 (198, 207 ± 56)	151–783 (216, 247 ± 101)
REV_11	201	348	12.6–24.3 (19, 18.9 ± 3.3)	11.8–24.3 (19.2, 18.9 ± 3.1)	9.8–18 (14.1, 13.7 ± 2.3)	9–18.3 (13.5, 13.7 ± 2.3)	0.34–1.83 (0.9, 0.84 ± 0.31)	0.34–2.31 (1, 1.06 ± 0.39)	151–787 (217, 222 ± 54)	149–765 (218, 229 ± 67)
REV_12	366	183	11.6–24.3 (19, 18.6 ± 3.2)	12.1–23.7 (19, 18.8 ± 2.9)	8.8–20.7 (13.6, 13.5 ± 2)	8.5–17.5 (13.1, 13 ± 2.4)	0.4–2.88 (1.08, 1.11 ± 0.4)	0.47–3.43 (1.22, 1.35 ± 0.56)	154–700 (203, 212 ± 52)	152–865 (213, 242 ± 97)
REV_13	366	183	11.7–24.4 (19.1, 18.7 ± 3.2)	12.3–23.7 (19, 18.9 ± 2.9)	8.8–18.7 (13.2, 13.2 ± 2)	8.3–17.4 (12.4, 12.7 ± 2.7)	0.36–2.33 (1, 1.02 ± 0.38)	0.41–2.98 (1.07, 1.21 ± 0.52)	154–750 (207, 215 ± 58)	150–753 (220, 239 ± 82)
REV_14	359	180	11.5–24.4 (18.8, 18.6 ± 3.2)	12.2–23.7 (19, 18.8 ± 2.9)	8.1–20.9 (13.6, 13.5 ± 2)	8.1–17.5 (13, 12.9 ± 2.4)	0.36–2.77 (1.1, 1.12 ± 0.42)	0.52–3.22 (1.24, 1.33 ± 0.54)	155–741 (225, 235 ± 62)	163–860 (238, 248 ± 60)
REV_15	710	169	11.2–24.1 (19.3, 18.9 ± 3)	12.2–23.8 (19.4, 18.9 ± 2.9)	8.6–19.3 (14, 14.1 ± 2.4)	9.6–18.2 (13.3, 13.6 ± 2.5)	0.33–2.61 (1.02, 1.07 ± 0.39)	0.58–3.22 (1.26, 1.36 ± 0.53)	150–741 (201, 208 ± 46)	152–714 (214, 229 ± 64)
REV_16	708	171	11.7–24.4 (19.5, 19 ± 3.1)	12.4–23.8 (19.3, 19.1 ± 2.9)	8–19.4 (13.4, 13.6 ± 2.5)	8.8–17.9 (12.7, 13 ± 2.7)	0.34–2.27 (0.9, 0.93 ± 0.34)	0.36–2.46 (1.05, 1.15 ± 0.46)	153–817 (213, 228 ± 75)	156–754 (226, 239 ± 65)
REV_17	699	170	11.5–24.7 (19.5, 19 ± 3.1)	12.3–23.7 (19, 18.9 ± 2.9)	8.4–18.6 (13.5, 13.5 ± 2.3)	8.6–18.2 (12.6, 13 ± 2.8)	0.34–2.41 (0.95, 0.99 ± 0.37)	0.53–3.02 (1.11, 1.24 ± 0.5)	149–756 (208, 222 ± 70)	149–672 (216, 230 ± 62)
REV_18	586	329	12.4–24.8 (19.7, 19.2 ± 2.9)	11.7–24 (19.3, 18.8 ± 3.1)	9.1–22.4 (13.9, 13.9 ± 3.1)	8.1–17.3 (13, 13 ± 2.2)	0.38–2.52 (0.87, 0.92 ± 0.35)	0.39–3.32 (1.04, 1.14 ± 0.46)	159–754 (230, 239 ± 64)	163–756 (248, 264 ± 72)
SF_01	558	333	12.5–24.9 (19.8, 19.3 ± 3)	11.9–24.3 (19.2, 18.9 ± 3.1)	2.8–23.4 (15.3, 14.3 ± 3)	8.1–17.8 (12.6, 12.8 ± 2.4)	0.35–2.59 (0.84, 0.87 ± 0.34)	0.35–2.5 (1, 1.08 ± 0.41)	154–657 (212, 221 ± 56)	155–797 (225, 242 ± 78)
SF_02	220	329	12.4–24.4 (19, 18.8 ± 3.2)	11.7–24 (19.1, 18.8 ± 3.1)	10.5–18.7 (14.4, 14.3 ± 2.2)	9.9–19.5 (14.3, 14.5 ± 2.3)	0.36–2.29 (0.95, 0.95 ± 0.42)	0.38–2.7 (1.04, 1.1 ± 0.39)	171–701 (232, 240 ± 58)	155–718 (227, 239 ± 67)
SRW_10	571	335	12.4–24.8 (19.8, 19.3 ± 3)	11.7–24.3 (19.4, 19.1 ± 3.2)	2.8–20.6 (13.2, 12.6 ± 2.5)	7.5–18.7 (12.2, 12.6 ± 2.9)	0.32–2.32 (0.78, 0.83 ± 0.36)	0.29–2.03 (0.9, 0.92 ± 0.3)	153–800 (215, 229 ± 77)	159–571 (210, 215 ± 37)

Table 23c – Summary of environmental conditions evident at receivers impacted at the 5 km impact radius during the pre- and post-construction periods. Values represent the range (minimum to maximum) followed by the median, mean, and standard deviation inside parentheses. SST: sea surface temperature

Station	# of days		SST (°C)		Bottom temperature (°C)		Chlorophyll a (mg/m ³)		Average noise (mV)	
	Pre-	Post-	Pre-construction	Post-construction	Pre-construction	Post-construction	Pre-construction	Post-construction	Pre-construction	Post-construction
501_01	197	350	12.2–24.5 (18.4, 18.4 ± 3.1)	11.2–23.7 (18.3, 18.2 ± 2.9)	8.7–17 (13.5, 13.2 ± 2.2)	8.2–16.5 (12.8, 12.8 ± 2.1)	0.25–2.19 (1.11, 1.13 ± 0.42)	0.44–3.06 (1.21, 1.34 ± 0.51)	146–834 (198, 209 ± 73)	146–797 (217, 236 ± 86)
501_02	197	350	12.3–24.6 (18.5, 18.5 ± 3.2)	11.2–23.8 (18.3, 18.3 ± 3)	8.7–16.7 (13.4, 13.1 ± 2.2)	8.4–16.6 (12.6, 12.8 ± 2.1)	0.24–2.14 (0.98, 1.07 ± 0.41)	0.44–3.04 (1.16, 1.3 ± 0.52)	152–806 (201, 208 ± 57)	152–946 (208, 218 ± 62)
501_03	186	361	12.5–24.5 (18.6, 18.6 ± 3.2)	10.7–23.9 (18, 18 ± 3)	8.8–16.7 (13.7, 13.4 ± 2.1)	8.3–17.3 (12.7, 12.8 ± 2.2)	0.35–2.23 (0.85, 0.98 ± 0.39)	0.44–2.95 (1.17, 1.28 ± 0.5)	152–601 (200, 204 ± 42)	152–847 (202, 211 ± 54)
501_04	186	361	12.6–24.6 (18.8, 18.7 ± 3.2)	10.8–24 (18, 18.2 ± 3.1)	9.3–17 (14, 13.7 ± 2.1)	8.7–17.6 (13, 13 ± 2.3)	0.35–2.08 (0.81, 0.92 ± 0.38)	0.41–2.75 (1.12, 1.21 ± 0.5)	151–542 (200, 204 ± 41)	149–954 (200, 208 ± 50)
534_01	364	183	11.7–25 (18.4, 18.5 ± 3.3)	12.6–24 (18.8, 18.7 ± 3)	9.1–16.3 (13, 12.9 ± 2.1)	8.3–19.9 (12.2, 12.3 ± 3.3)	0.27–2.39 (0.97, 0.98 ± 0.42)	0.45–2.29 (0.8, 1.05 ± 0.48)	152–532 (190, 196 ± 34)	160–456 (209, 212 ± 28)
BW_02	389	341	12–24.8 (18.1, 18.4 ± 3.3)	11.3–23.9 (18.7, 18.4 ± 3.1)	8.1–15.7 (12.7, 12.4 ± 2.2)	7.5–16.7 (11.9, 12 ± 2.5)	0.36–2 (0.87, 0.93 ± 0.41)	0.39–2.4 (0.99, 1.09 ± 0.46)	149–818 (189, 194 ± 40)	150–513 (192, 196 ± 34)
REV_01	366	183	11.5–24.2 (19.1, 18.7 ± 3.2)	11.9–23.7 (19.1, 18.8 ± 2.9)	9.8–20.4 (14.1, 14.1 ± 1.9)	9–17.9 (12.5, 13.1 ± 2.7)	0.32–2.23 (1.15, 1.18 ± 0.34)	0.46–4.24 (1.42, 1.53 ± 0.72)	152–672 (202, 205 ± 37)	153–498 (200, 204 ± 34)
REV_02	366	183	11.7–24.4 (19.1, 18.8 ± 3.2)	12.1–23.6 (19.2, 19 ± 2.9)	9.9–20 (14.3, 14.1 ± 2)	9.1–18.1 (12.5, 13.2 ± 2.8)	0.32–2.08 (0.98, 1.02 ± 0.34)	0.39–3.76 (1.28, 1.35 ± 0.63)	152–786 (224, 231 ± 64)	150–834 (229, 243 ± 78)
REV_03	366	183	11.7–24.4 (19.2, 18.7 ± 3.2)	12.1–23.7 (19.1, 18.9 ± 2.9)	9.7–19.8 (14.1, 14 ± 2)	9–18.1 (12.4, 13.1 ± 2.7)	0.37–2.24 (1, 1.03 ± 0.35)	0.4–3.83 (1.3, 1.37 ± 0.66)	149–985 (198, 205 ± 55)	148–807 (205, 230 ± 87)
REV_04	366	183	11.6–24.4 (19.1, 18.7 ± 3.2)	12–23.8 (19, 18.9 ± 2.9)	8.6–19.3 (13.3, 13.3 ± 2)	8.2–17.3 (12.1, 12.5 ± 2.6)	0.4–2.59 (1.05, 1.08 ± 0.36)	0.43–3.92 (1.32, 1.41 ± 0.68)	151–705 (202, 208 ± 52)	167–726 (223, 233 ± 53)
REV_05	696	183	11.7–25.2 (20, 19.2 ± 3.1)	12.1–23.8 (19.2, 19 ± 2.9)	6.5–18 (13.1, 12.9 ± 2.4)	7.8–17.3 (11.2, 11.9 ± 3)	0.29–2.07 (0.91, 0.95 ± 0.31)	0.37–3.29 (1.2, 1.28 ± 0.56)	151–696 (204, 210 ± 49)	150–703 (207, 215 ± 52)
REV_06	366	183	11.7–24.4 (19.1, 18.8 ± 3.2)	12.1–23.7 (19.2, 19 ± 2.9)	9.6–19.5 (13.9, 13.8 ± 2)	9.1–17.9 (12.3, 13 ± 2.7)	0.35–2.16 (0.98, 1.02 ± 0.35)	0.38–3.76 (1.3, 1.34 ± 0.65)	158–785 (215, 222 ± 55)	156–798 (227, 243 ± 74)
REV_07	573	306	12.5–25.1 (20.4, 19.6 ± 3)	11.7–24 (18.7, 18.6 ± 3)	8–18.9 (13.8, 13.6 ± 2.6)	8–17.9 (13.1, 13.1 ± 2.6)	0.3–2 (0.84, 0.88 ± 0.3)	0.35–2.74 (1.07, 1.13 ± 0.4)	147–926 (197, 209 ± 69)	152–823 (208, 223 ± 75)
REV_08	548	331	12.4–25.1 (19.9, 19.4 ± 2.9)	11.8–24.4 (19.2, 18.9 ± 3.1)	7.9–18.8 (13.9, 13.7 ± 2.6)	9–18.1 (13.5, 13.5 ± 2.4)	0.34–2.1 (0.88, 0.9 ± 0.31)	0.37–3.32 (1.06, 1.14 ± 0.46)	148–808 (199, 206 ± 48)	152–748 (210, 219 ± 55)
REV_09	220	329	12.4–24.6 (19.1, 18.8 ± 3.2)	11.7–24 (19.2, 18.8 ± 3.1)	9.5–20.3 (13.7, 13.7 ± 2.4)	9–17.8 (13.6, 13.6 ± 2.2)	0.38–2.22 (0.95, 0.95 ± 0.38)	0.39–3.52 (1.09, 1.18 ± 0.48)	151–652 (195, 202 ± 47)	149–783 (207, 228 ± 84)
REV_10	531	348	12.6–24.8 (20.1, 19.4 ± 3)	11.8–24.4 (19.2, 19 ± 3.1)	8.4–20.4 (13.6, 13.5 ± 2.7)	6.9–17.4 (12.2, 12.4 ± 2.4)	0.34–1.58 (0.82, 0.85 ± 0.27)	0.35–2.18 (1.03, 1.06 ± 0.37)	146–642 (191, 201 ± 44)	165–706 (230, 236 ± 53)
REV_11	201	348	12.6–24.3 (19, 18.9 ± 3.3)	11.8–24.3 (19.2, 18.9 ± 3.1)	9.8–18 (14.1, 13.7 ± 2.3)	9–18.3 (13.5, 13.7 ± 2.3)	0.34–1.83 (0.9, 0.84 ± 0.31)	0.34–2.31 (1, 1.06 ± 0.39)	151–787 (217, 222 ± 54)	149–765 (218, 229 ± 67)
REV_12	366	183	11.6–24.3 (19, 18.6 ± 3.2)	12.1–23.7 (19, 18.8 ± 2.9)	8.8–20.7 (13.6, 13.5 ± 2)	8.5–17.5 (13.1, 13 ± 2.4)	0.4–2.88 (1.08, 1.11 ± 0.4)	0.47–3.43 (1.22, 1.35 ± 0.56)	154–700 (203, 212 ± 52)	152–865 (213, 242 ± 97)
REV_13	220	329	12.4–24.4 (19.1, 18.8 ± 3.1)	11.7–23.9 (19.1, 18.7 ± 3.1)	8.8–18.7 (13.1, 13 ± 2.3)	8.3–17.4 (13, 13 ± 2.2)	0.36–2.33 (0.95, 0.97 ± 0.41)	0.41–2.98 (1.06, 1.16 ± 0.43)	154–679 (201, 210 ± 54)	150–753 (217, 232 ± 74)
REV_14	356	183	11.5–24.4 (18.9, 18.6 ± 3.2)	12.2–23.7 (18.9, 18.8 ± 2.9)	8.9–20.9 (13.6, 13.5 ± 2)	8.1–17.5 (12.8, 12.9 ± 2.5)	0.36–2.77 (1.1, 1.12 ± 0.42)	0.52–3.22 (1.22, 1.33 ± 0.53)	155–741 (225, 236 ± 62)	161–860 (237, 247 ± 61)
REV_15	699	180	11.2–24.1 (19.5, 18.9 ± 3.1)	12.2–23.8 (19.1, 18.8 ± 2.9)	8.6–19.3 (14.1, 14.2 ± 2.3)	8.8–18.2 (13.1, 13.4 ± 2.6)	0.33–2.61 (1.01, 1.07 ± 0.39)	0.58–3.22 (1.19, 1.34 ± 0.52)	150–741 (202, 208 ± 46)	152–714 (210, 226 ± 63)
REV_16	565	314	12.4–24.4 (20, 19.3 ± 3)	11.7–23.9 (18.8, 18.5 ± 3.1)	8.9–19.4 (13.5, 13.7 ± 2.6)	8–17.9 (13, 13.1 ± 2.4)	0.34–2.27 (0.84, 0.89 ± 0.34)	0.36–2.46 (1.06, 1.12 ± 0.38)	153–817 (210, 223 ± 69)	156–787 (227, 243 ± 78)
REV_17	699	170	11.5–24.7 (19.5, 19 ± 3.1)	12.3–23.7 (19, 18.9 ± 2.9)	8.4–18.6 (13.5, 13.5 ± 2.3)	8.6–18.2 (12.6, 13 ± 2.8)	0.34–2.41 (0.95, 0.99 ± 0.37)	0.53–3.02 (1.11, 1.24 ± 0.5)	149–756 (208, 222 ± 70)	149–672 (216, 230 ± 62)
REV_18	584	331	12.4–24.8 (19.7, 19.2 ± 3)	11.7–24 (19.3, 18.8 ± 3.1)	9.1–22.4 (14, 14 ± 3.1)	8.1–17.3 (13, 13 ± 2.2)	0.38–2.52 (0.87, 0.92 ± 0.35)	0.39–3.32 (1.04, 1.14 ± 0.46)	159–754 (230, 239 ± 64)	163–756 (248, 264 ± 72)
SF_01	558	333	12.5–24.9 (19.8, 19.3 ± 3)	11.9–24.3 (19.2, 18.9 ± 3.1)	2.8–23.4 (15.3, 14.3 ± 3)	8.1–17.8 (12.6, 12.8 ± 2.4)	0.35–2.59 (0.84, 0.87 ± 0.34)	0.35–2.5 (1, 1.08 ± 0.41)	154–657 (212, 221 ± 56)	155–797 (225, 242 ± 78)
SF_02	201	348	12.4–24.4 (18.9, 18.8 ± 3.3)	11.7–24 (19.1, 18.8 ± 3.1)	10.5–18.7 (14.8, 14.4 ± 2.3)	9.9–19.5 (14.2, 14.4 ± 2.3)	0.36–2.21 (0.92, 0.9 ± 0.34)	0.38–2.7 (1.05, 1.12 ± 0.42)	171–691 (234, 242 ± 58)	155–718 (226, 238 ± 67)
SRW_05	383	166	11.7–24.9 (18.4, 18.6 ± 3.3)	12.6–24 (19.7, 19.2 ± 2.9)	8.1–17.3 (12.8, 12.8 ± 2.3)	8.6–20.1 (11.5, 12.8 ± 3.5)	0.25–2.25 (0.89, 0.91 ± 0.36)	0.33–2.19 (0.92, 0.97 ± 0.36)	145–753 (197, 205 ± 54)	147–517 (202, 206 ± 40)
SRW_10	558	348	12.4–24.8 (20.1, 19.4 ± 3.1)	11.7–24.3 (19.3, 19 ± 3.1)	2.8–20.6 (13.4, 12.8 ± 2.5)	7.5–18.7 (12.1, 12.5 ± 2.9)	0.32–2.3 (0.77, 0.8 ± 0.32)	0.29–2.32 (0.93, 0.96 ± 0.36)	153–800 (217, 231 ± 78)	159–571 (209, 214 ± 37)

Table 24a – The percent of days on which suitable sea surface temperature (SST), bottom temperature (BT), and chlorophyll a (Chl) concentrations existed for each species at receivers impacted at the 3 km radius during the pre- and post-construction periods.

Station	Blue shark						Bluefin tuna						Shortfin mako					
	Pre SST	Post SST	Pre BT	Post BT	Pre Chl	Post Chl	Pre SST	Post SST	Pre BT	Post BT	Pre Chl	Post Chl	Pre SST	Post SST	Pre BT	Post BT	Pre Chl	Post Chl
501_01	92%	87%	100%	100%	100%	84%	100%	100%	100%	100%	100%	88%	96%	95%	100%	100%	99%	88%
501_02	88%	88%	100%	100%	99%	86%	99%	100%	100%	100%	99%	89%	97%	96%	100%	100%	98%	89%
501_03	89%	86%	100%	100%	99%	88%	99%	100%	100%	100%	99%	89%	97%	96%	100%	100%	99%	89%
501_04	88%	87%	100%	100%	99%	88%	99%	100%	100%	100%	99%	89%	96%	97%	100%	100%	99%	89%
REV_02	89%	94%	100%	100%	100%	74%	100%	100%	100%	100%	100%	78%	96%	98%	100%	100%	100%	78%
REV_03	90%	92%	100%	100%	99%	68%	100%	100%	100%	100%	99%	75%	96%	98%	100%	100%	99%	74%
REV_04	89%	92%	100%	100%	99%	72%	100%	100%	100%	100%	100%	78%	96%	98%	100%	100%	100%	77%
REV_05	85%	95%	100%	100%	93%	74%	92%	100%	100%	100%	93%	79%	89%	98%	100%	100%	92%	79%
REV_06	89%	94%	100%	100%	100%	73%	100%	100%	100%	100%	100%	78%	95%	99%	100%	100%	100%	78%
REV_07	84%	95%	100%	100%	93%	76%	92%	100%	100%	100%	93%	79%	90%	99%	100%	100%	93%	79%
REV_08	86%	92%	100%	100%	90%	79%	93%	100%	100%	100%	90%	86%	90%	98%	100%	100%	90%	84%
REV_09	91%	90%	100%	100%	95%	78%	100%	100%	100%	100%	95%	84%	96%	98%	100%	100%	95%	84%
REV_11	92%	89%	100%	100%	100%	87%	100%	100%	100%	100%	100%	87%	96%	97%	100%	100%	100%	87%
REV_12	90%	89%	100%	100%	98%	72%	100%	100%	100%	100%	99%	77%	96%	97%	100%	100%	99%	77%
REV_13	89%	89%	100%	100%	99%	74%	100%	100%	100%	100%	99%	77%	95%	97%	100%	100%	99%	77%
REV_14	90%	85%	100%	100%	93%	82%	100%	100%	100%	100%	94%	90%	96%	95%	100%	100%	94%	88%
REV_15	83%	88%	100%	100%	91%	78%	93%	100%	100%	100%	91%	84%	90%	97%	100%	100%	91%	83%
REV_16	83%	92%	100%	100%	93%	77%	93%	100%	100%	100%	93%	78%	90%	97%	100%	100%	93%	78%
REV_17	83%	92%	100%	100%	92%	76%	93%	100%	100%	100%	93%	79%	89%	97%	100%	100%	93%	79%
REV_18	86%	88%	99%	100%	91%	85%	92%	100%	100%	100%	92%	87%	89%	97%	99%	100%	92%	87%
SF_01	83%	91%	100%	100%	91%	89%	91%	100%	100%	100%	91%	89%	89%	98%	100%	100%	91%	89%
SF_02	91%	88%	100%	100%	100%	87%	100%	100%	100%	100%	100%	88%	97%	98%	100%	100%	100%	88%

Table 24b – The percent of days on which suitable sea surface temperature (SST), bottom temperature (BT), and chlorophyll a (Chl) concentrations existed for each species at receivers impacted at the 5 km radius during the pre- and post-construction periods.

Station	Blue shark						Bluefin tuna						Shortfin mako					
	Pre SST	Post SST	Pre BT	Post BT	Pre Chl	Post Chl	Pre SST	Post SST	Pre BT	Post BT	Pre Chl	Post Chl	Pre SST	Post SST	Pre BT	Post BT	Pre Chl	Post Chl
501_01	90%	88%	100%	100%	99%	85%	99%	100%	100%	100%	99%	89%	96%	95%	100%	100%	99%	89%
501_02	88%	88%	100%	100%	99%	86%	99%	100%	100%	100%	99%	89%	97%	96%	100%	100%	98%	89%
501_03	89%	86%	100%	100%	99%	88%	99%	100%	100%	100%	99%	89%	97%	96%	100%	100%	99%	89%
501_04	89%	86%	100%	100%	99%	88%	99%	100%	100%	100%	99%	89%	97%	97%	100%	100%	99%	89%
534_01	86%	91%	100%	100%	99%	79%	99%	100%	100%	100%	99%	79%	97%	99%	100%	100%	99%	79%
BW_02	88%	85%	100%	100%	99%	88%	100%	100%	100%	100%	99%	88%	96%	98%	100%	100%	99%	88%
REV_02	89%	94%	100%	100%	100%	74%	100%	100%	100%	100%	100%	78%	96%	98%	100%	100%	100%	78%
REV_03	89%	93%	100%	100%	100%	72%	100%	100%	100%	100%	100%	78%	96%	98%	100%	100%	100%	77%
REV_04	89%	92%	100%	100%	99%	72%	100%	100%	100%	100%	100%	78%	96%	98%	100%	100%	100%	77%
REV_05	84%	95%	100%	100%	93%	74%	92%	100%	100%	100%	93%	79%	89%	98%	100%	100%	92%	79%
REV_06	89%	94%	100%	100%	100%	73%	100%	100%	100%	100%	100%	78%	95%	99%	100%	100%	100%	78%
REV_07	84%	95%	100%	100%	93%	76%	92%	100%	100%	100%	93%	79%	90%	99%	100%	100%	93%	79%
REV_08	84%	95%	100%	100%	93%	74%	92%	100%	100%	100%	93%	79%	90%	99%	100%	100%	93%	78%
REV_09	90%	92%	100%	100%	99%	70%	100%	100%	100%	100%	99%	75%	95%	99%	100%	100%	99%	75%
REV_11	90%	91%	100%	100%	100%	89%	100%	100%	100%	100%	100%	89%	95%	98%	100%	100%	100%	89%
REV_12	89%	91%	99%	100%	99%	75%	100%	100%	100%	100%	100%	78%	96%	97%	99%	100%	100%	78%
REV_13	89%	91%	100%	100%	100%	77%	100%	100%	100%	100%	100%	79%	95%	98%	100%	100%	100%	79%
REV_14	89%	91%	100%	100%	99%	74%	100%	100%	100%	100%	100%	79%	95%	97%	100%	100%	100%	78%
REV_15	83%	91%	100%	100%	92%	73%	93%	100%	100%	100%	93%	78%	90%	98%	100%	100%	93%	77%
REV_16	83%	92%	100%	100%	93%	77%	93%	100%	100%	100%	93%	78%	90%	97%	100%	100%	93%	78%
REV_17	83%	92%	100%	100%	92%	76%	93%	100%	100%	100%	93%	79%	89%	97%	100%	100%	93%	79%
REV_18	85%	89%	99%	100%	91%	86%	91%	100%	100%	100%	91%	88%	89%	97%	99%	100%	91%	88%
SF_01	83%	91%	100%	100%	91%	89%	91%	100%	100%	100%	91%	89%	89%	98%	100%	100%	91%	89%
SF_02	91%	88%	100%	100%	100%	87%	100%	100%	100%	100%	100%	88%	97%	98%	100%	100%	100%	88%
SRW_10	83%	91%	100%	100%	91%	89%	91%	100%	100%	100%	91%	89%	89%	98%	100%	100%	91%	88%

Table 24c – The percent of days on which suitable sea surface temperature (SST), bottom temperature (BT), and chlorophyll a (Chl) concentrations existed for each species at receivers impacted at the 8 km radius during the pre- and post-construction periods.

Station	Blue shark						Bluefin tuna						Shortfin mako					
	Pre SST	Post SST	Pre BT	Post BT	Pre Chl	Post Chl	Pre SST	Post SST	Pre BT	Post BT	Pre Chl	Post Chl	Pre SST	Post SST	Pre BT	Post BT	Pre Chl	Post Chl
501_01	90%	88%	100%	100%	99%	85%	99%	100%	100%	100%	99%	89%	96%	95%	100%	100%	99%	89%
501_02	88%	88%	100%	100%	99%	86%	99%	100%	100%	100%	99%	89%	97%	96%	100%	100%	98%	89%
501_03	89%	86%	100%	100%	99%	88%	99%	100%	100%	100%	99%	89%	97%	96%	100%	100%	99%	89%
501_04	89%	86%	100%	100%	99%	88%	99%	100%	100%	100%	99%	89%	97%	97%	100%	100%	99%	89%
534_01	86%	91%	100%	100%	99%	79%	99%	100%	100%	100%	99%	79%	97%	99%	100%	100%	99%	79%
BW_02	88%	86%	100%	100%	99%	88%	100%	100%	100%	100%	99%	89%	96%	98%	100%	100%	99%	89%
REV_01	89%	91%	100%	100%	100%	72%	100%	100%	100%	100%	100%	77%	96%	98%	100%	100%	100%	76%
REV_02	89%	94%	100%	100%	100%	74%	100%	100%	100%	100%	100%	78%	96%	98%	100%	100%	100%	78%
REV_03	89%	93%	100%	100%	100%	72%	100%	100%	100%	100%	100%	78%	96%	98%	100%	100%	100%	77%
REV_04	89%	92%	100%	100%	99%	72%	100%	100%	100%	100%	100%	78%	96%	98%	100%	100%	100%	77%
REV_05	84%	95%	100%	100%	93%	74%	92%	100%	100%	100%	93%	79%	89%	98%	100%	100%	92%	79%
REV_06	89%	94%	100%	100%	100%	73%	100%	100%	100%	100%	100%	78%	95%	99%	100%	100%	100%	78%
REV_07	85%	89%	100%	100%	91%	86%	91%	100%	100%	100%	91%	88%	89%	97%	100%	100%	91%	88%
REV_08	84%	90%	100%	100%	91%	86%	90%	100%	100%	100%	91%	89%	88%	97%	100%	100%	91%	88%
REV_09	92%	89%	100%	100%	100%	86%	100%	100%	100%	100%	100%	88%	95%	97%	100%	100%	100%	88%
REV_10	83%	91%	100%	100%	90%	89%	90%	100%	100%	100%	90%	89%	88%	98%	100%	100%	90%	89%
REV_11	90%	91%	100%	100%	100%	89%	100%	100%	100%	100%	100%	89%	95%	98%	100%	100%	100%	89%
REV_12	89%	91%	99%	100%	99%	75%	100%	100%	100%	100%	100%	78%	96%	97%	99%	100%	100%	78%
REV_13	91%	88%	100%	100%	100%	87%	100%	100%	100%	100%	100%	88%	95%	96%	100%	100%	100%	88%
REV_14	89%	91%	100%	100%	99%	75%	100%	100%	100%	100%	100%	79%	95%	97%	100%	100%	100%	78%
REV_15	82%	91%	100%	100%	92%	74%	93%	100%	100%	100%	93%	79%	90%	98%	100%	100%	93%	78%
REV_16	83%	88%	100%	100%	91%	87%	91%	100%	100%	100%	91%	88%	89%	96%	100%	100%	91%	88%
REV_17	83%	92%	100%	100%	92%	76%	93%	100%	100%	100%	93%	79%	89%	97%	100%	100%	93%	79%
REV_18	85%	89%	99%	100%	91%	86%	91%	100%	100%	100%	91%	89%	89%	97%	99%	100%	91%	88%
SF_01	83%	91%	100%	100%	91%	89%	91%	100%	100%	100%	91%	89%	89%	98%	100%	100%	91%	89%
SF_02	90%	89%	100%	100%	100%	88%	100%	100%	100%	100%	100%	89%	97%	98%	100%	100%	100%	89%
SRW_05	89%	92%	100%	100%	100%	77%	100%	100%	100%	100%	100%	77%	96%	99%	100%	100%	99%	77%
SRW_10	83%	92%	100%	100%	91%	89%	91%	100%	100%	100%	91%	89%	89%	98%	100%	100%	91%	89%

Table 25 – Summary of detection data collected by the acoustic receiver array from animals that were tagged by other researchers as part of separate studies. The number of transmitters detected (Tx) and the total number of detections (Dtx) is reported for each species in the year in which detection occurred. Species identities were determined through participation in the Atlantic Cooperative Telemetry Network.

Species	2022		2023		2024	
	Tx	Dtx	Tx	Dtx	Tx	Dtx
Alewife	2	9	13	119	54	400
American Lobster	-	-	-	-	2	310
American Shad	1	28	1	13	-	-
Atlantic Cod	26	4,723	15	410,870	7	455,349
Atlantic Sturgeon	10	133	14	168	18	312
Black Sea Bass	1	35	4	5,399	10	824
Blacktip Shark	2	249	2	39	2	89
Blue Shark	5	17,068	5	7,641	2	9,533
Blueback Herring	-	-	4	192	89	1,468
Bluefin Tuna	10	426	9	485	12	592
Bluefish	1	14	23	551	24	217
Common Thresher	5	1,482	3	495	4	521
Dusky Shark	25	2,107	19	712	35	1,029
Grey Seal	-	-	1	75	2	180
Harbor Seal	-	-	-	-	3	264
Kemp's Ridley	-	-	-	-	3	44
Leatherback	2	201	2	39	-	-
Little Skate	-	-	-	-	1	59
Little Tunny	31	450	63	751	21	627
Loggerhead	3	17	2	39	-	-
Ocean Sunfish	-	-	-	-	1	218
Porbeagle	-	-	3	134	4	84
Rock Crab	-	-	-	-	1	4,016
Sand Tiger Shark	2	52	14	377	8	104
Sandbar Shark	81	7,817	106	6,136	166	12,720
Scalloped Hammerhead	-	-	-	-	1	20
Scup	-	-	1	20	-	-
Shortfin Mako	13	1,086	14	1,436	11	1,707
Smooth Dogfish	14	166	31	1,380	22	657
Smooth Hammerhead	-	-	-	-	2	15
Spinner Shark	1	7	1	29	1	40
Spiny Dogfish	3	77	11	988	1	85
Striped Bass	6	108	7	67	6	11
Summer Flounder	-	-	1	1	3	128
Tautog	-	-	-	-	2	49
Tiger Shark	2	8	-	-	1	29
Unknown	78	2,873	123	2,252	116	11,421
Weakfish	7	320	4	546	2	45
White Shark	121	1,843	126	1,126	126	2,085
Winter Flounder	1	9	5	9,510	9	1,199
Winter Skate	14	329	2	41	5	282

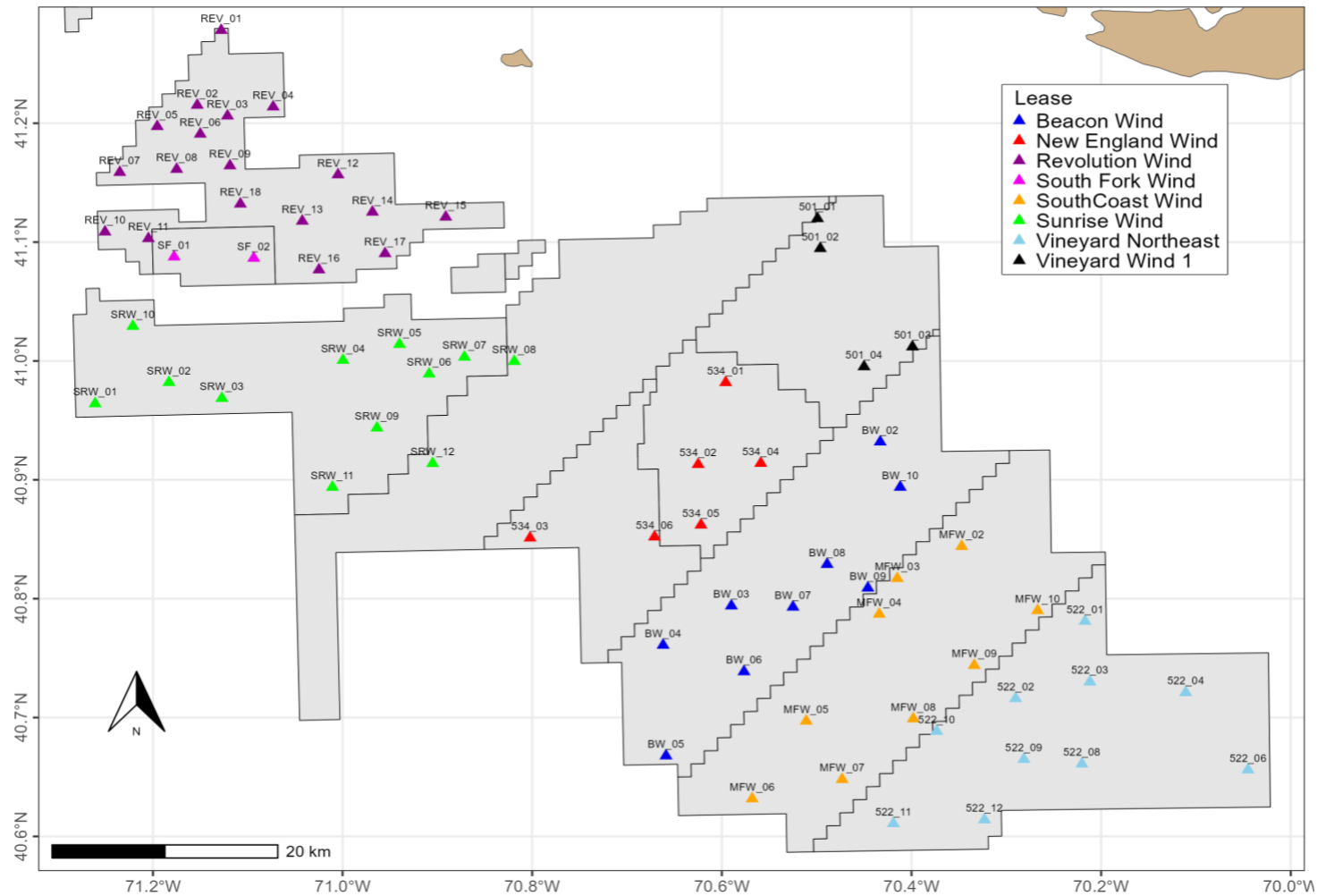


Figure 1 - Map showing the locations of 70 acoustic receiver stations (colored triangles) deployed in the MA/RI wind energy area in 2024. Abbreviations for each station are indicated above each triangle. Station 522_02 was not present during the December download trip and presumed lost.



Figure 2 – Recoverable and reusable mooring configurations used to deploy VEMCO VR2AR acoustic receivers.

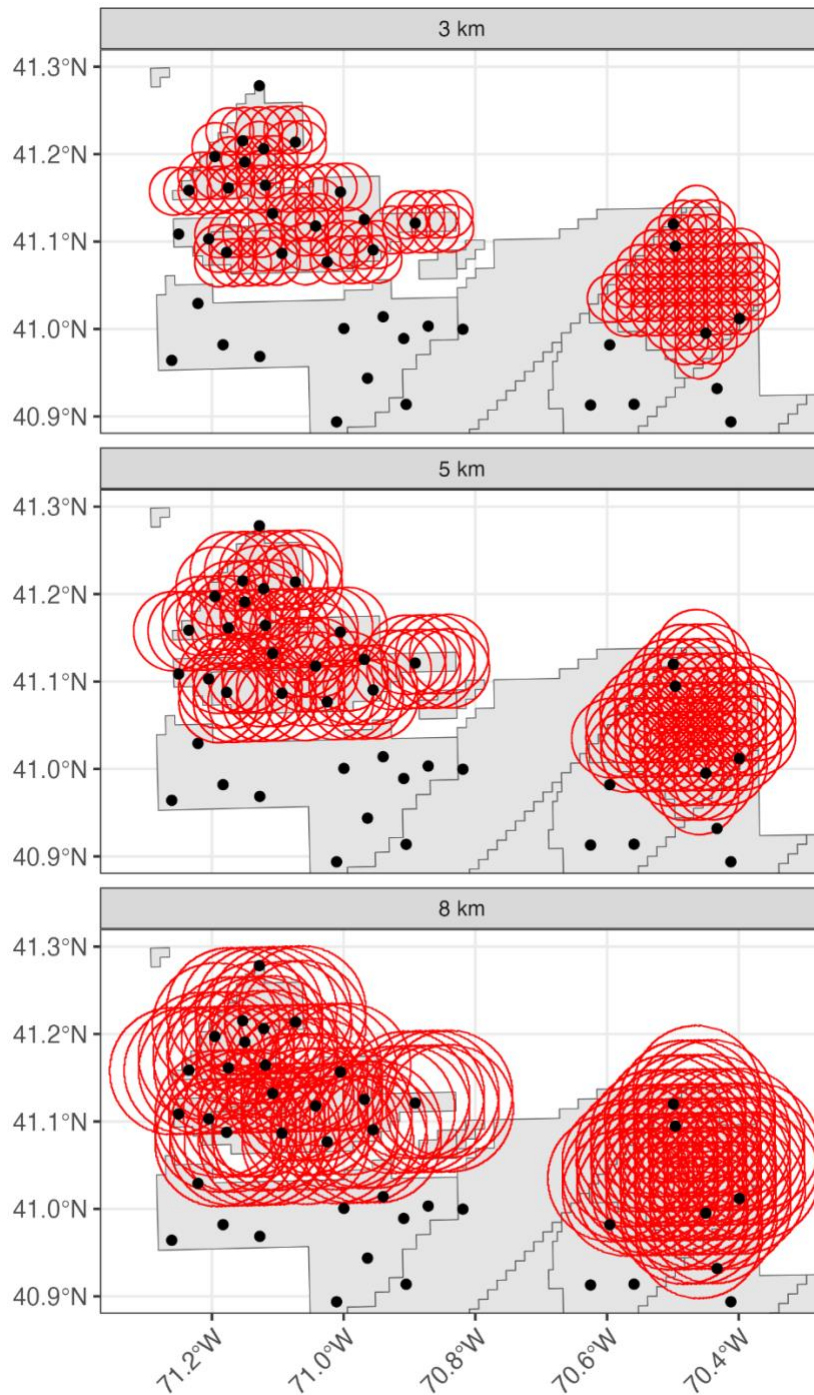


Figure 3 – Example of the approach used to classify individual acoustic receivers as being ‘impacted’ by offshore wind construction activity across three impact radii. Red circles are centered on individual monopiles and are sized based on the corresponding impact radius. Acoustic receiver stations (black circles) that fell within the impact zones (red circles) were considered impacted by the installation of the monopile from which the circle originated.

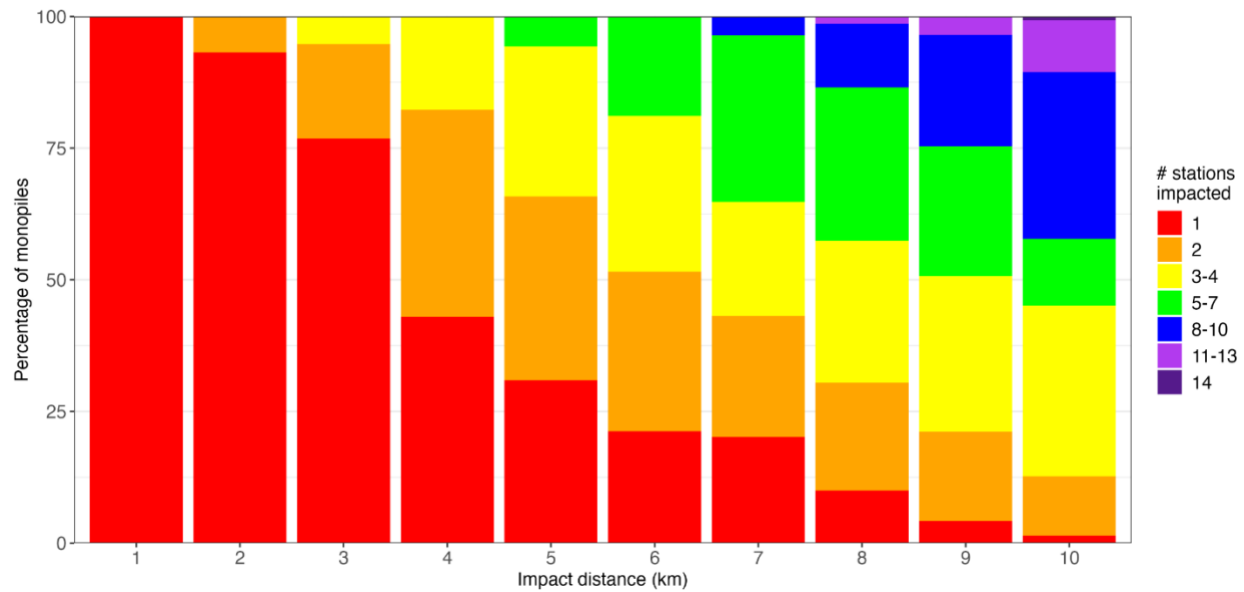


Figure 4 – The relationship between construction impact distance (radius) and the percentage of monopiles that impacted a given number of receivers. As the impact radius increased more receivers fell within the circle (see Figure 3) and were classified as impacted. Impact radii of 3, 5, and 8 km were selected because 3 km was the smallest distance at which >25% of monopiles impacted two or more receivers, 5 km was the smallest distance at which individual monopile installation impacted five or more receivers, and 8 km was the smallest distance at which >10 receivers were impacted by individual monopile installation activity.

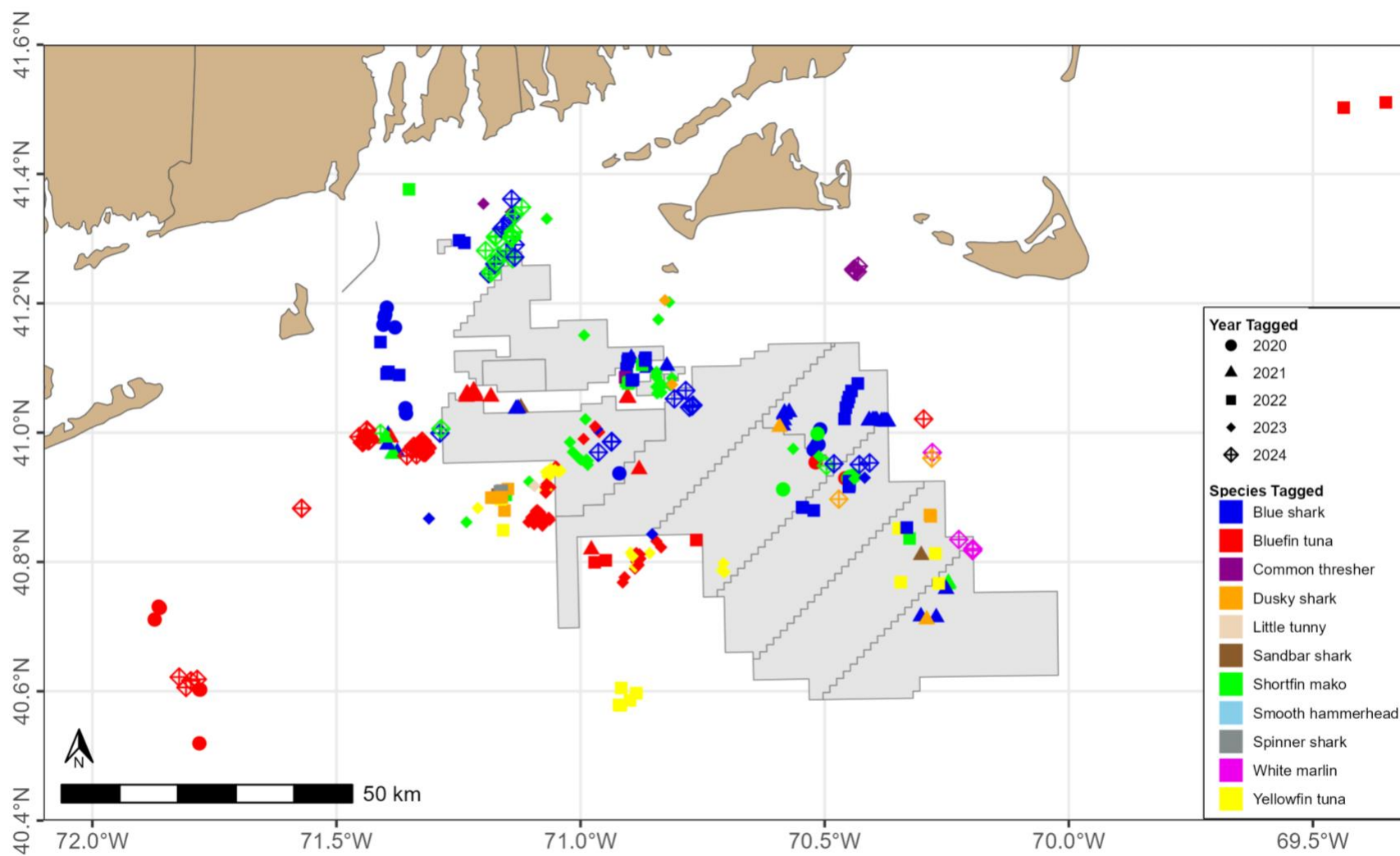


Figure 5 – Locations of tagging relative to the lease areas for the 364 individuals tagged from 2020 to 2024.



Figure 6 – Detection histories for 130 individuals that were monitored in 2024. Each dot represents a detection on one of the acoustic receivers. Colored 'X's represent the time of tagging for each individual. Detected individuals that were tagged in previous years have no 'X' in their detection history. Dashed lines separate fish tagged and detected in 2024 (n = 78; top), fish tagged but not detected in 2024 (n = 27; middle), and returning fish tagged in previous years (n = 52; bottom).

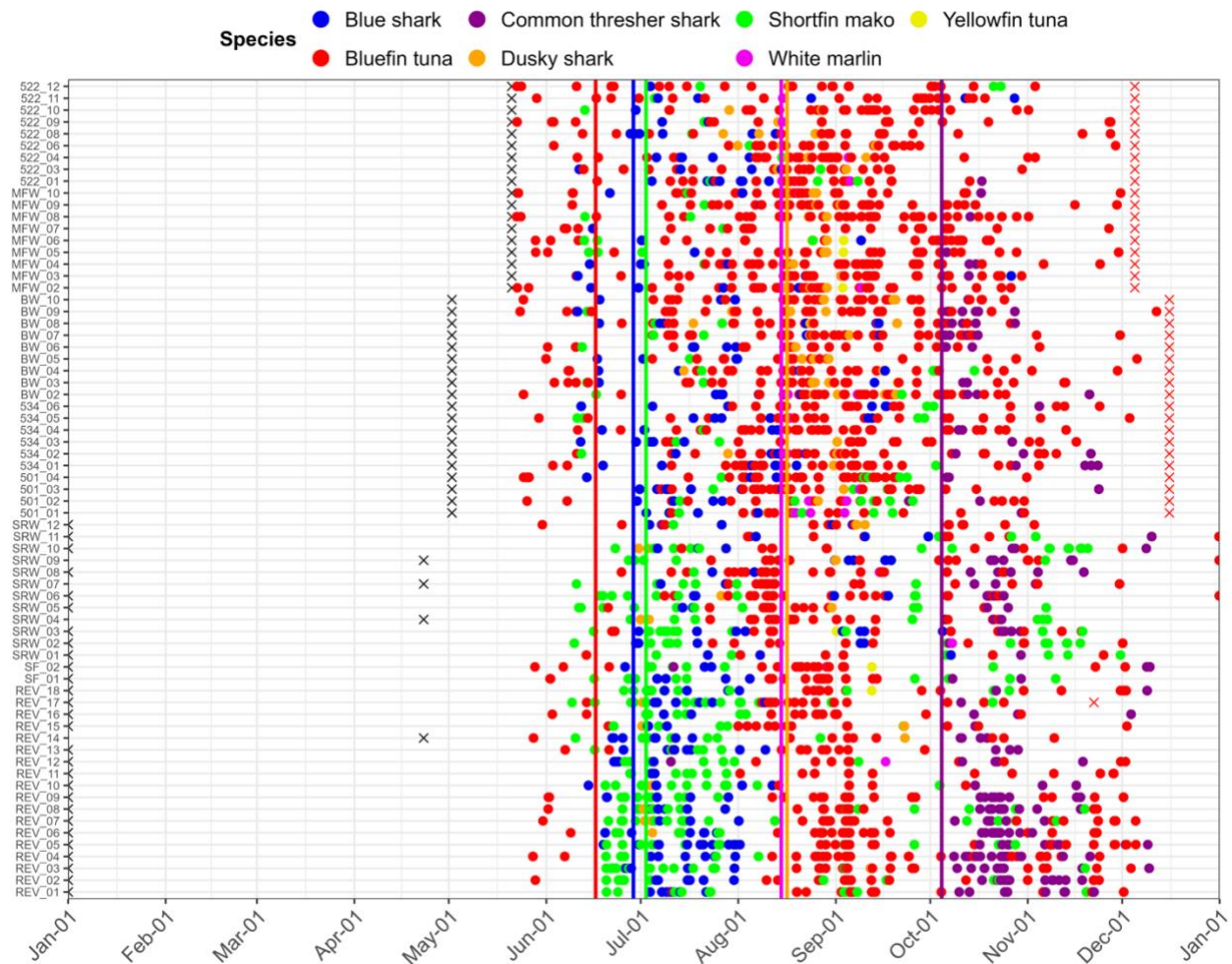


Figure 7 – Detection histories of each species on each receiver station in 2024. Colored circles indicate when that species was observed at a given station. Colored vertical lines represent the time individuals of each species were first tagged in 2024. Black 'Xs' represent the time when the receiver was deployed, and red 'Xs' represent the time it was removed or caught via interaction with fishing gear. Note that the receiver at 522_02 was lost during the field season.

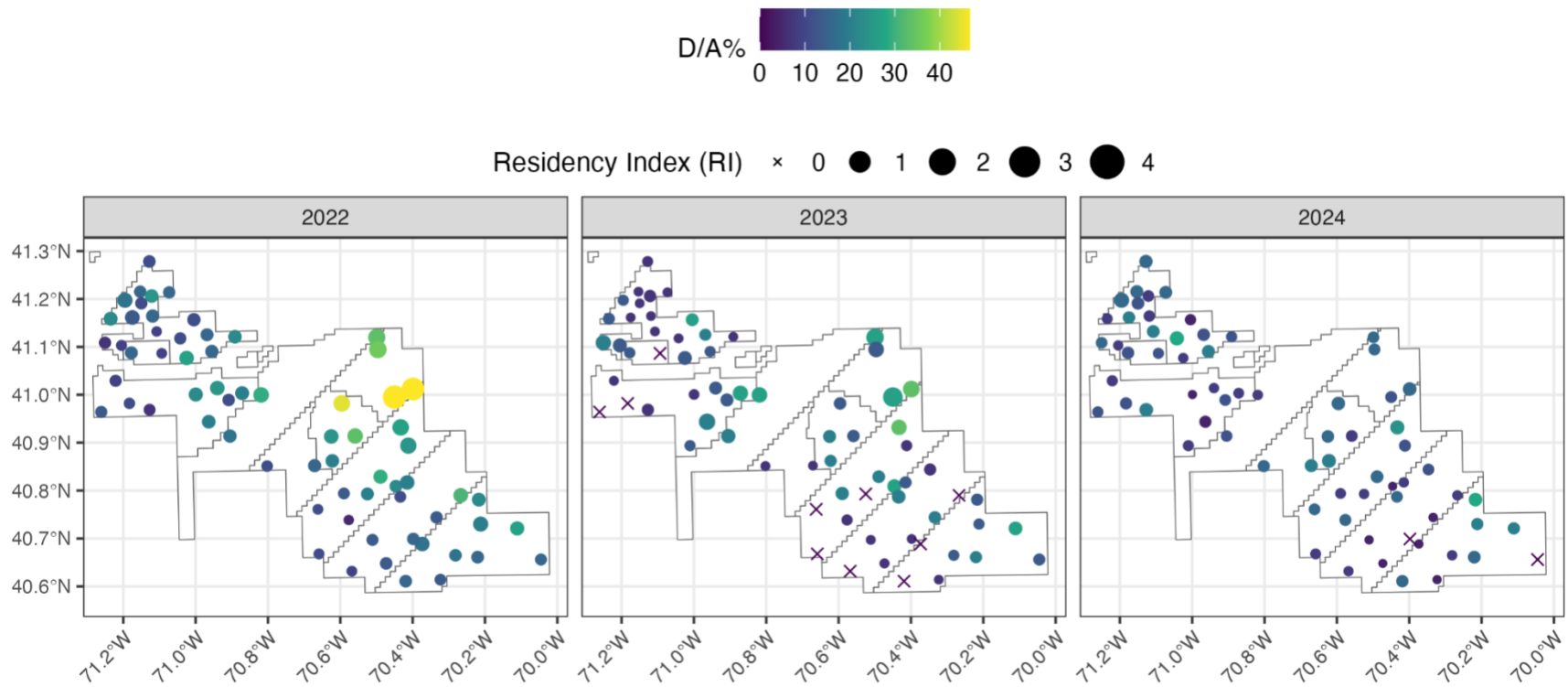


Figure 8a – Map of annual blue shark residency index (RI) scores for individual receiver stations from 2022 to 2024. Circles are sized based on the value of RI and colored based on the percentage of available tagged individuals that were detected at that receiver.

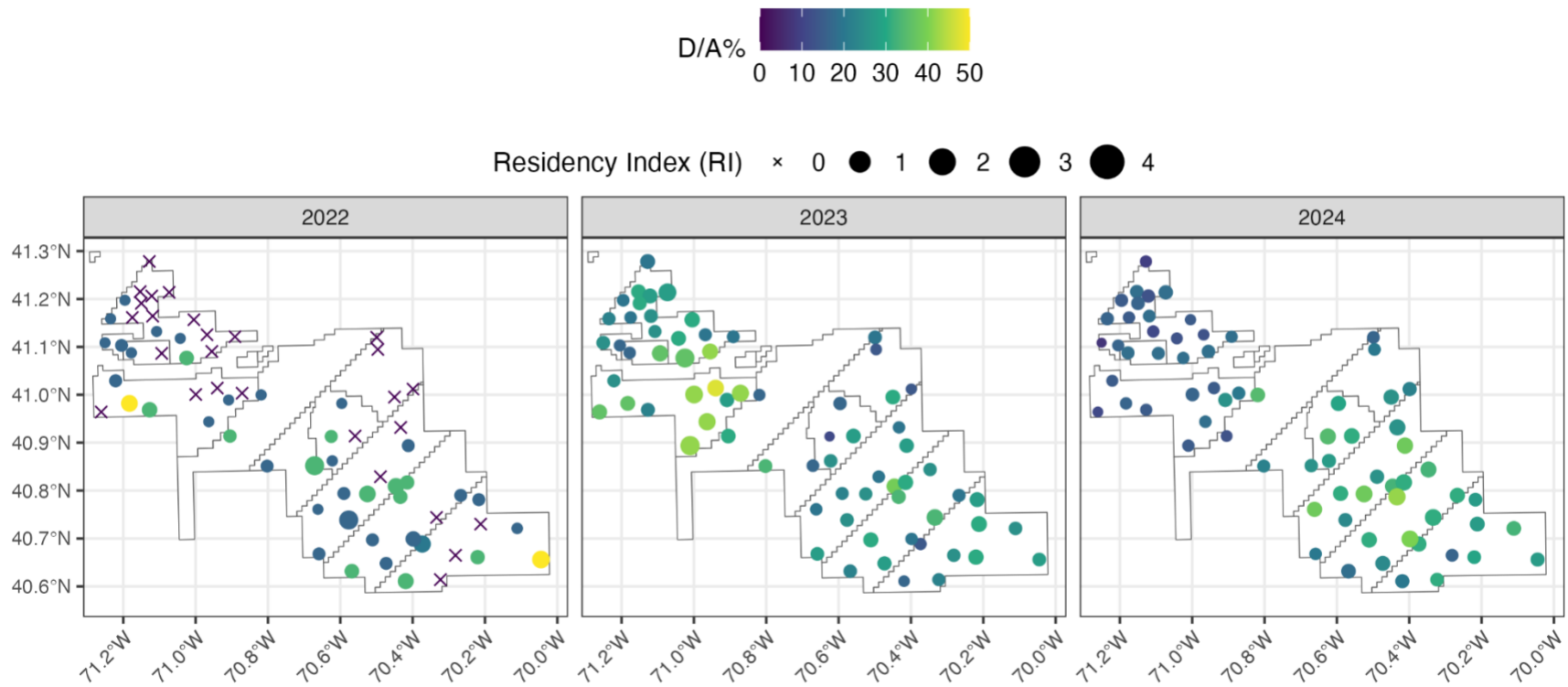


Figure 8b – Map of annual bluefin tuna residency index (RI) scores for individual receiver stations from 2022 to 2024. Circles are sized based on the value of RI and colored based on the percentage of available tagged individuals that were detected at that receiver.

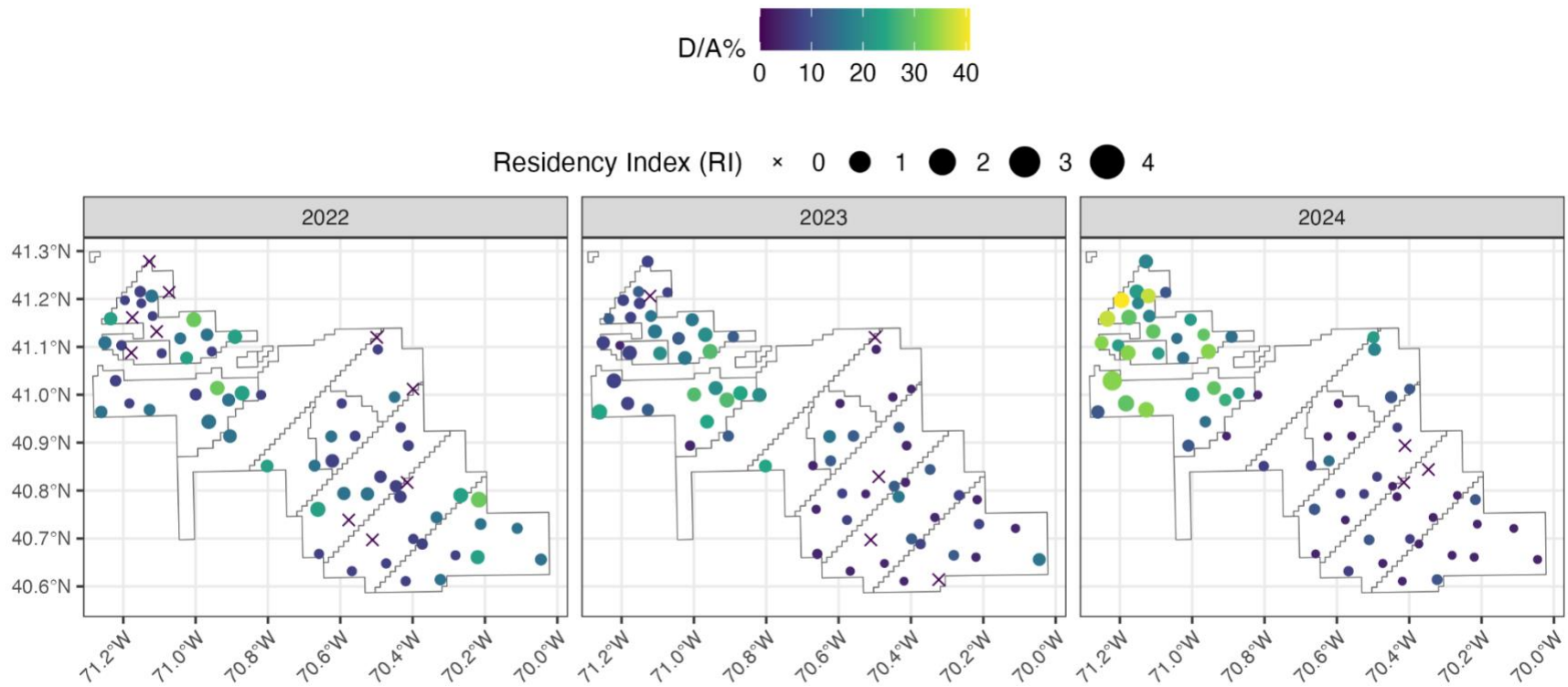


Figure 8c – Map of annual shortfin mako residency index (RI) scores for individual receiver stations from 2022 to 2024. Circles are sized based on the value of RI and colored based on the percentage of available tagged individuals that were detected at that receiver.

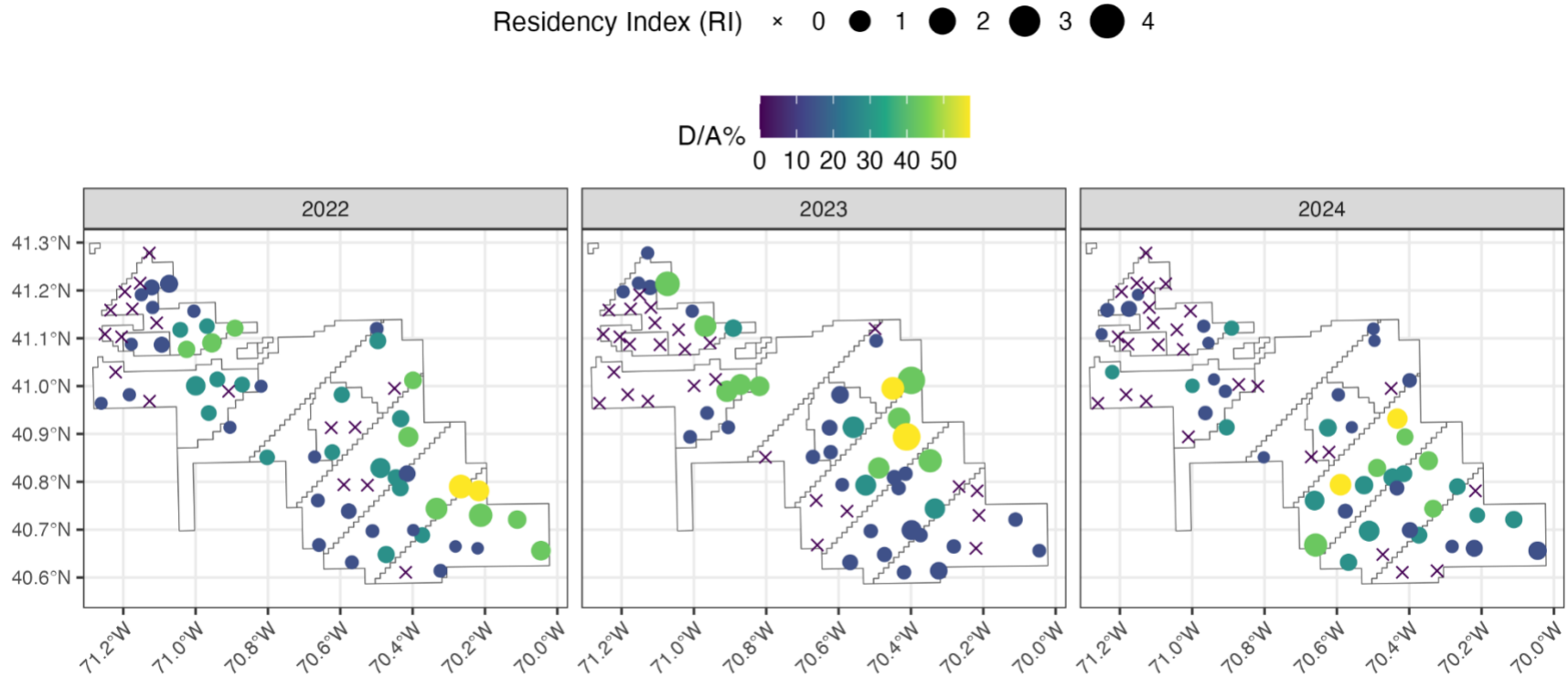


Figure 8d – Map of annual dusky shark residency index (RI) scores for individual receiver stations from 2022 to 2024. Circles are sized based on the value of RI and colored based on the percentage of available tagged individuals that were detected at that receiver.

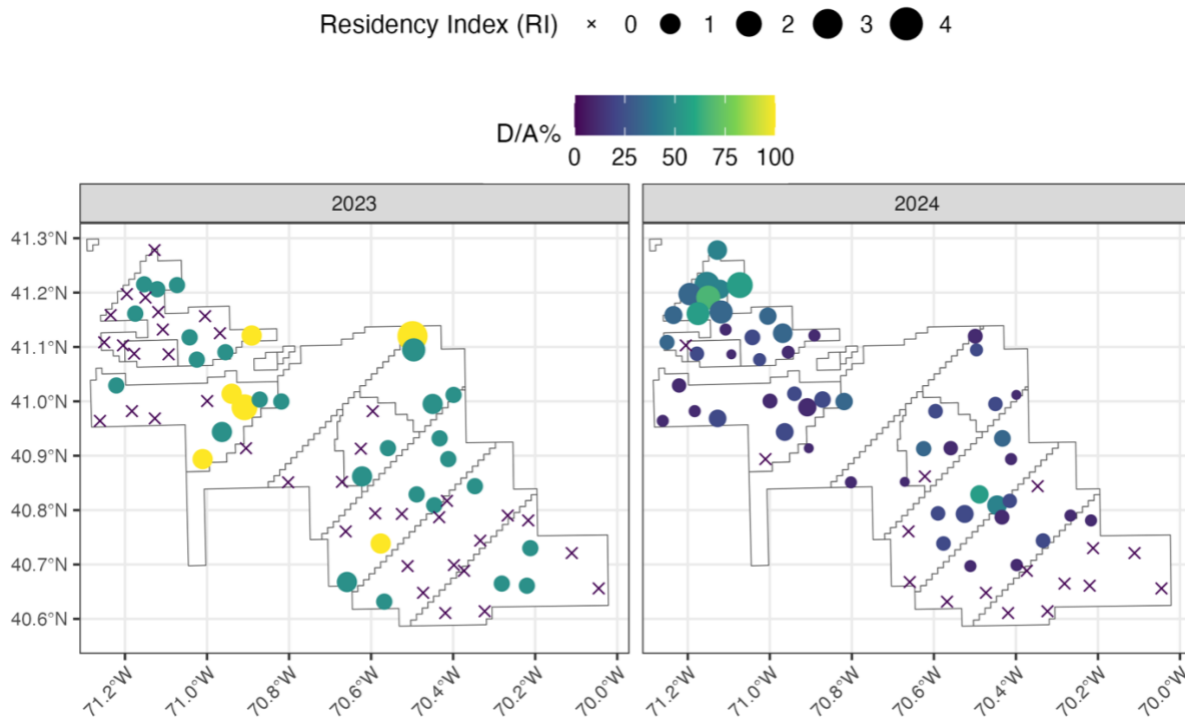


Figure 8e – Map of annual common thresher shark residency index (RI) scores for individual receiver stations from 2023 to 2024. Circles are sized based on the value of RI and colored based on the percentage of available tagged individuals that were detected at that receiver. No individuals were tracked in 2022.

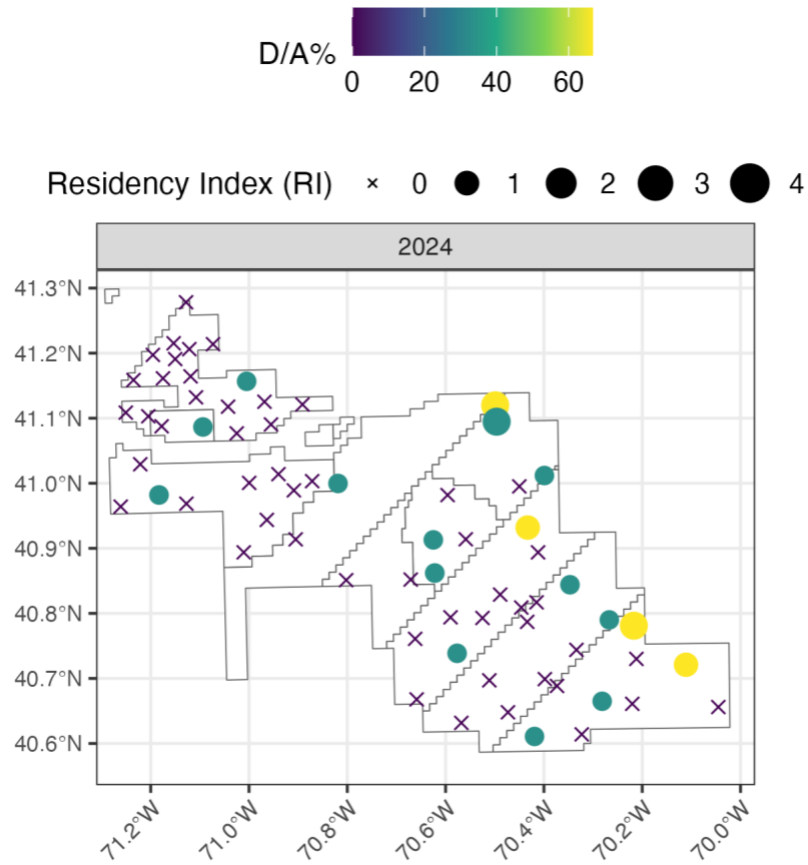


Figure 8f – Map of annual white marlin residency index (RI) scores for individual receiver stations from 2023 to 2024. Circles are sized based on the value of RI and colored based on the percentage of available tagged individuals that were detected at that receiver. No individuals were tracked in 2022 or 2023.

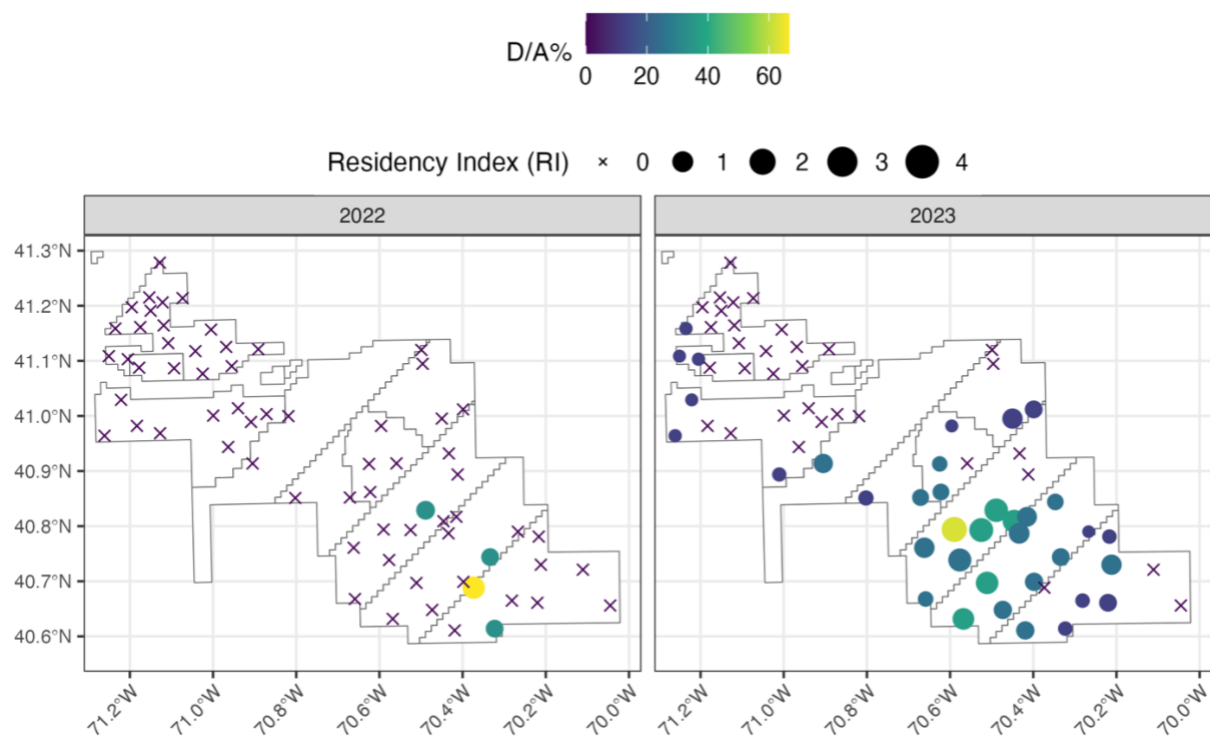


Figure 8g – Map of annual yellowfin tuna residency index (RI) scores for individual receiver stations from 2022 to 2023. Circles are sized based on the value of RI and colored based on the percentage of available tagged individuals that were detected at that receiver. No individuals that were available for detection longer than 30 days were tracked in 2024.

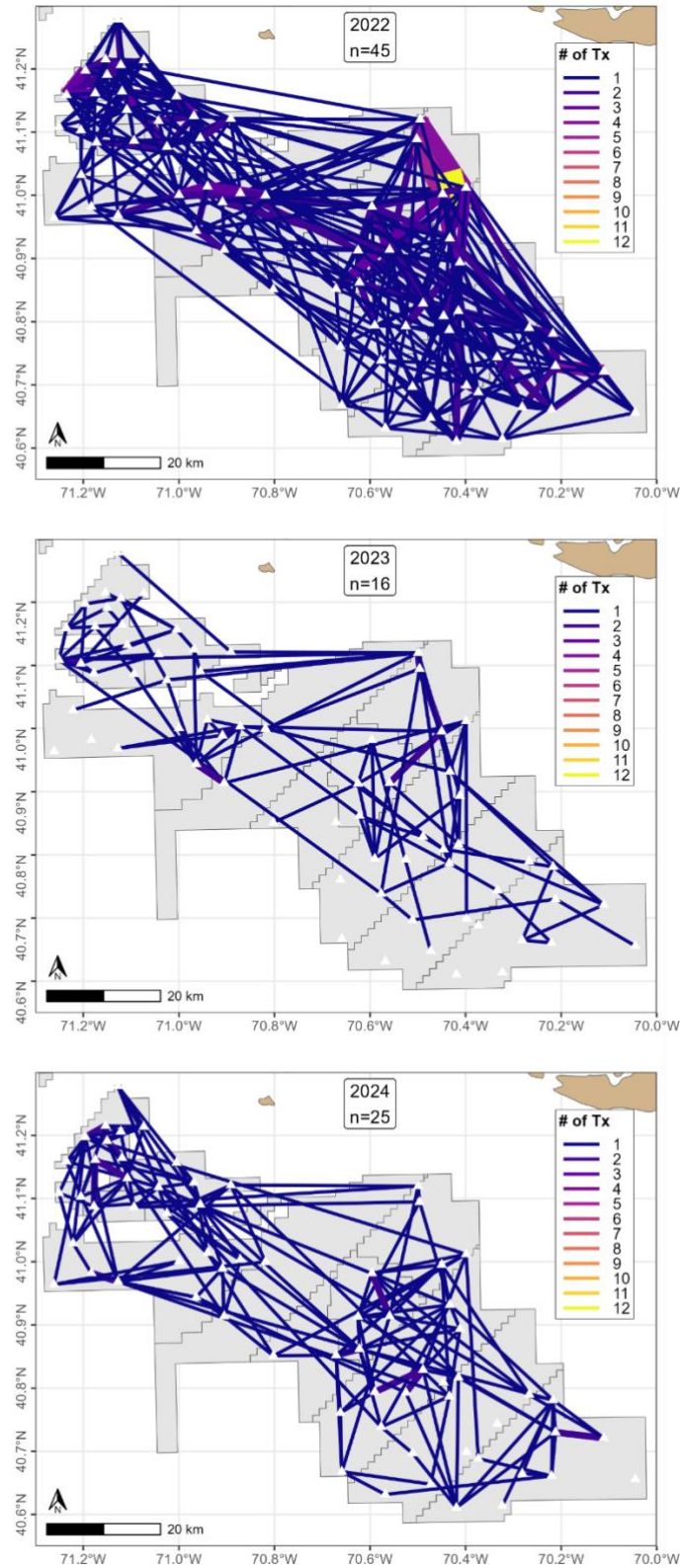


Figure 9a – Map of blue shark networks by year. Edges are color coded by the number of unique transmitters (Tx) that moved between the nodes in that year. The number of individuals included in each annual network is provided under the year label.

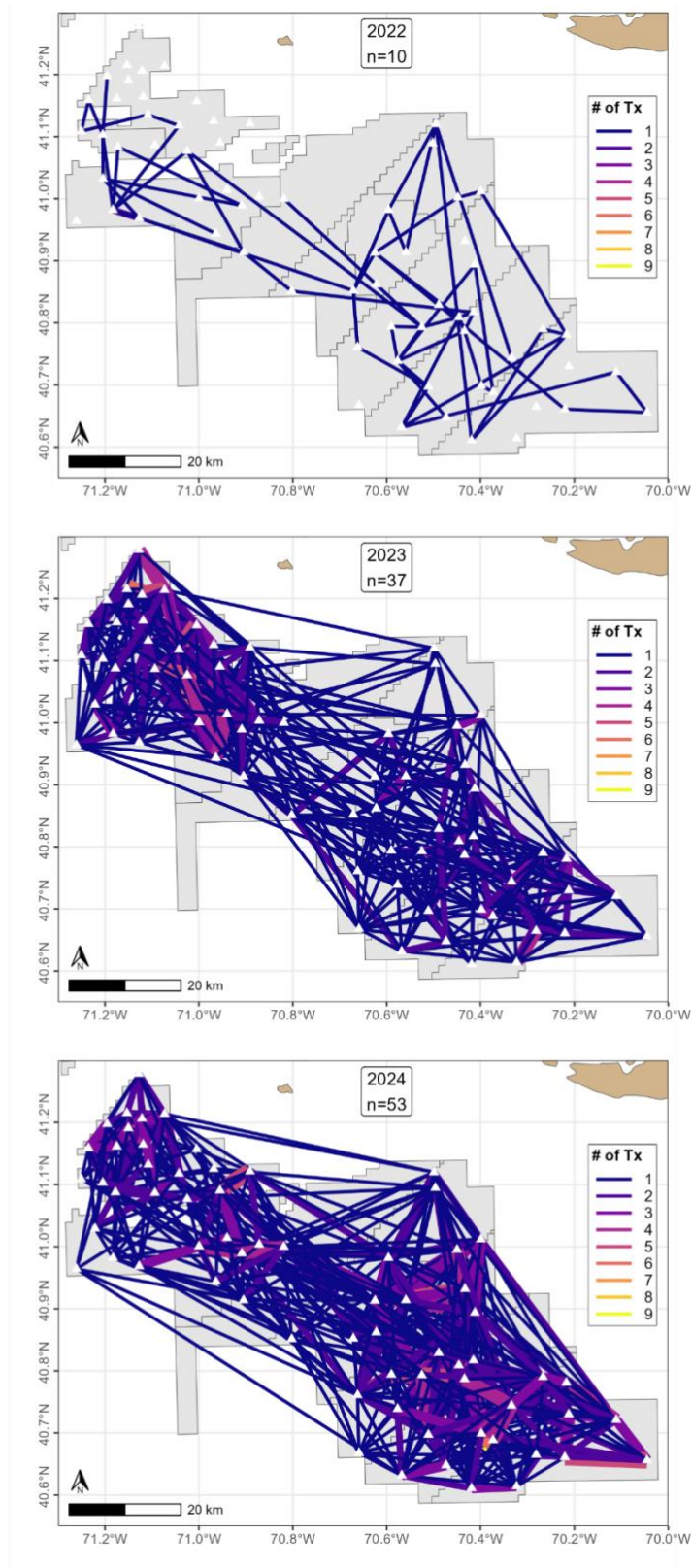


Figure 9b – Map of bluefin tuna networks by year. Edges are color coded by the number of unique transmitters (Tx) that moved between the nodes in that year. The number of individuals included in each annual network is provided under the year label.

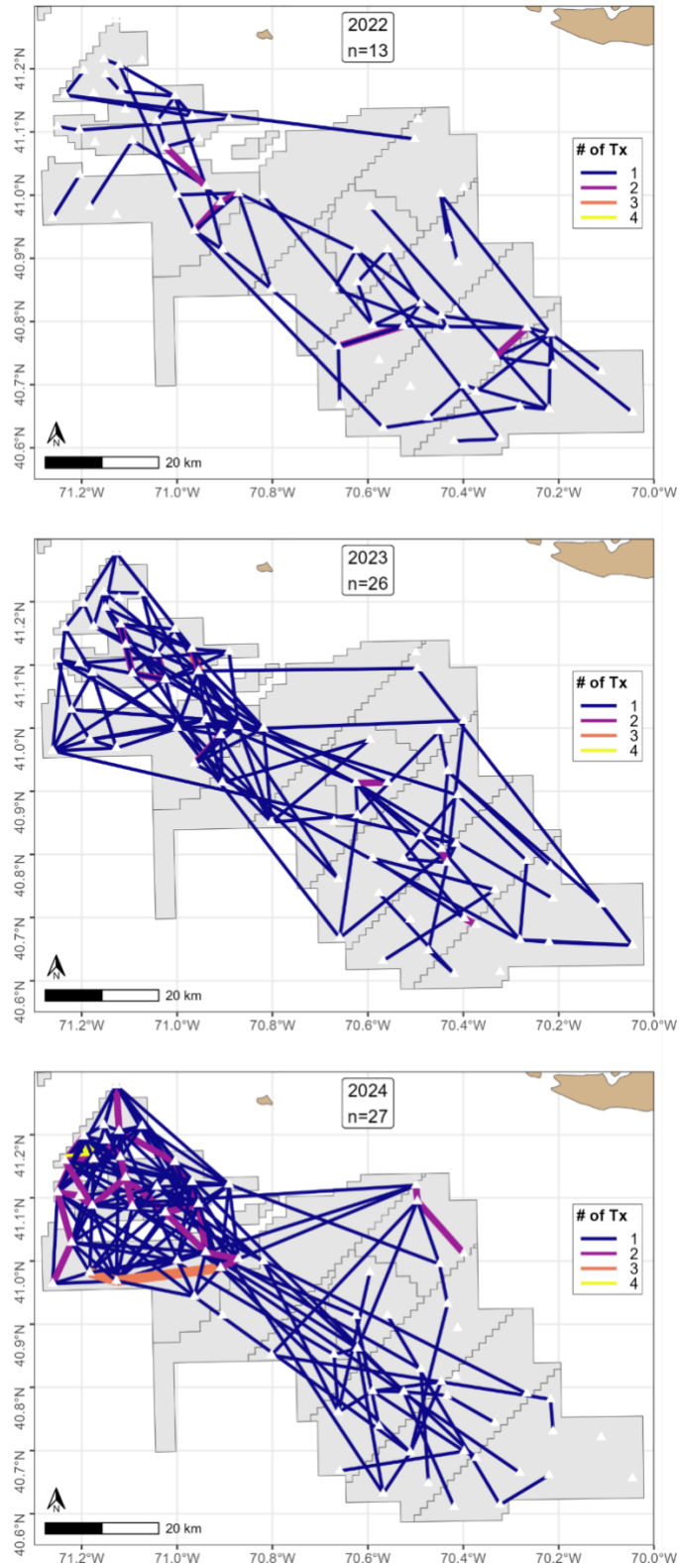


Figure 9c – Map of shortfin mako networks by year. Edges are color coded by the number of unique transmitters (Tx) that moved between the nodes in that year. The number of individuals included in each annual network is provided under the year label.

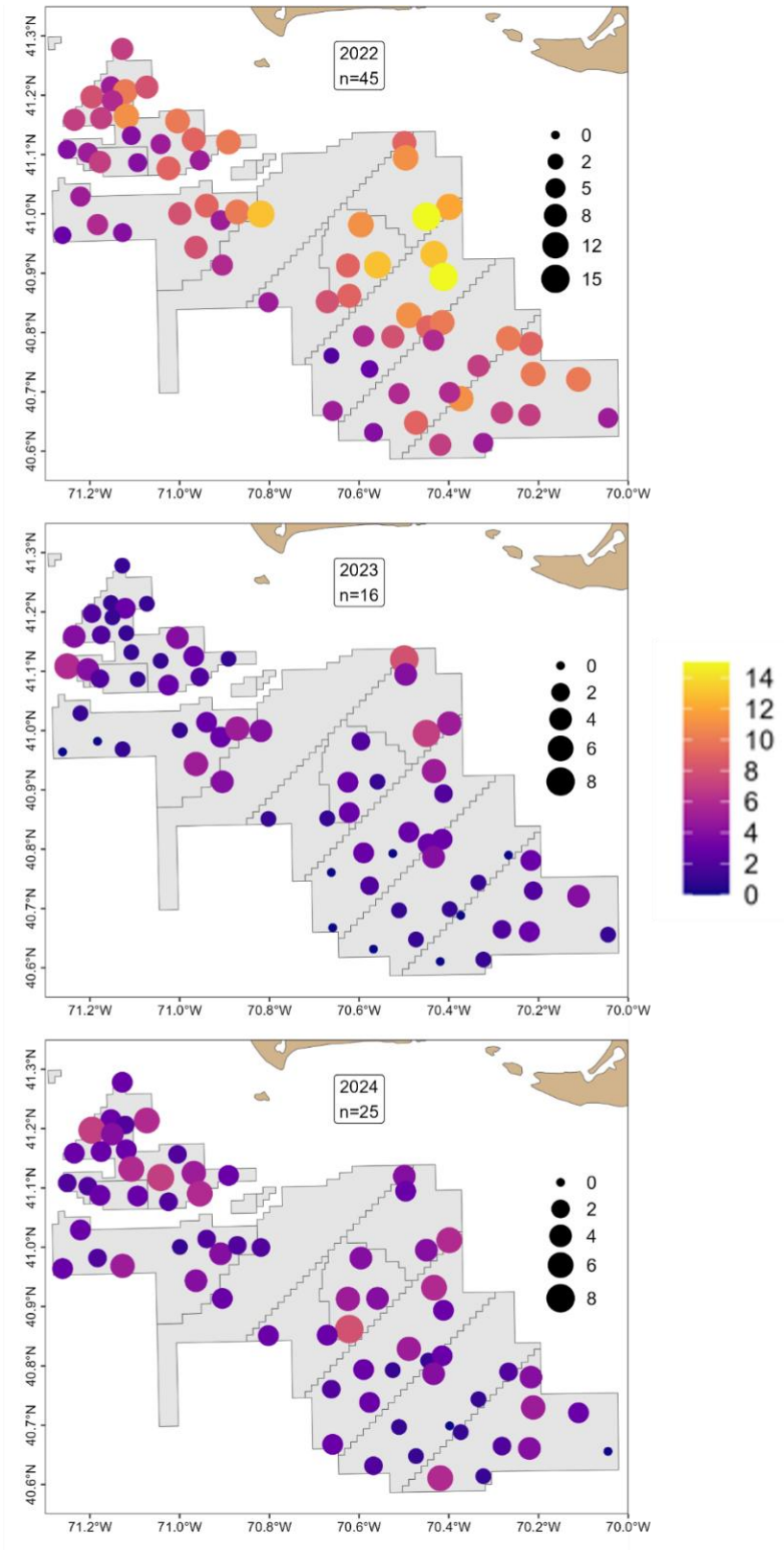


Figure 10a – Maps of blue shark node degree values derived from annual species-level networks. Symbols on each node are scaled by size to permit within year comparisons and color coded to permit comparison of the magnitude of values across all years.

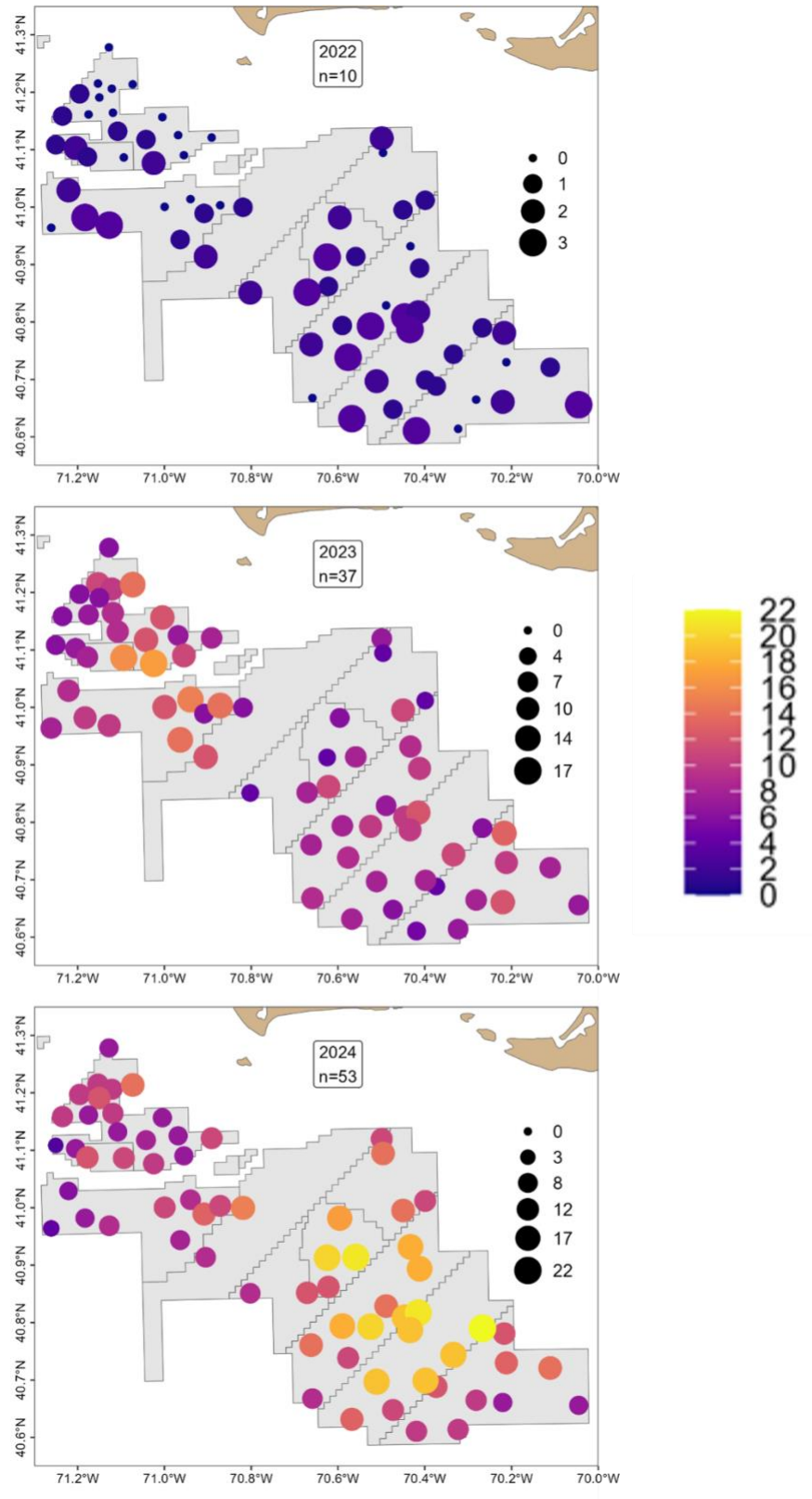


Figure 10b – Maps of bluefin tuna node degree values derived from annual species-level networks. Symbols on each node are scaled by size to permit within year comparisons and color coded to permit comparison of the magnitude of values across all years.

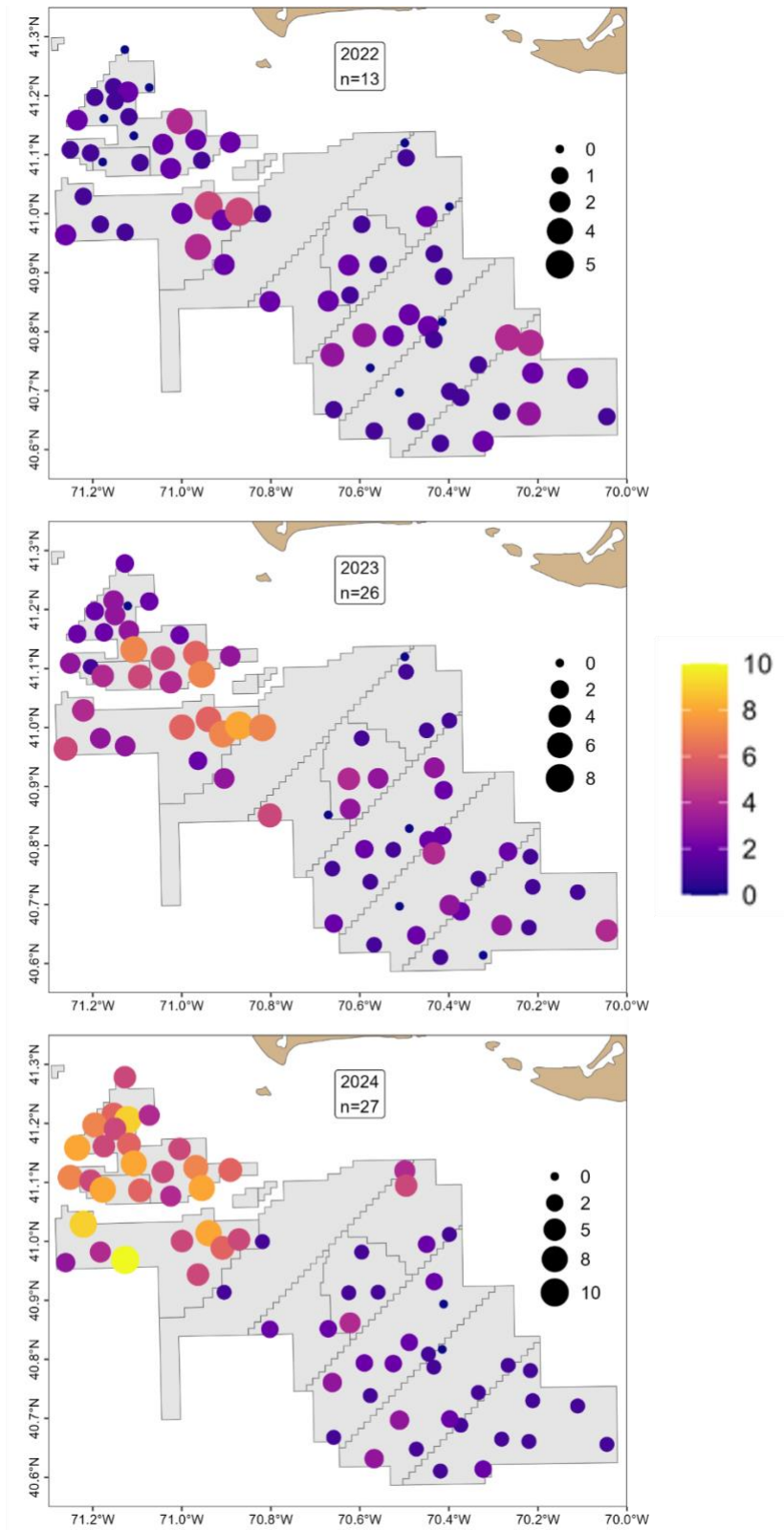


Figure 10c – Maps of shortfin mako node degree values derived from annual species-level networks. Symbols on each node are scaled by size to permit within year comparisons and color coded to permit comparison of the magnitude of values across all years.

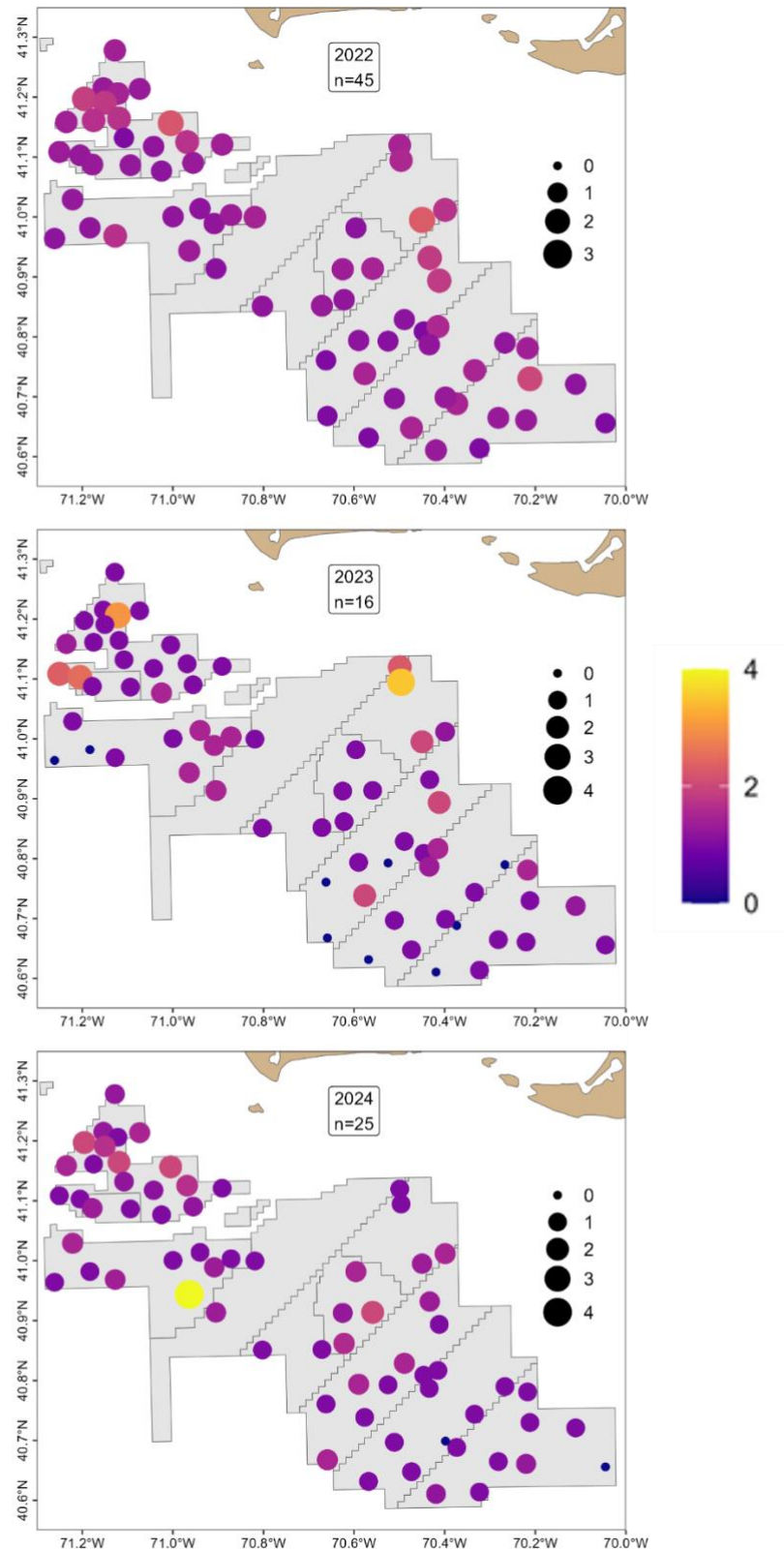


Figure 11a – Maps of blue shark node standardized strength values derived from annual species-level networks. Symbols on each node are scaled by size to permit within year comparisons and color coded to permit comparison of the magnitude of values across all years.

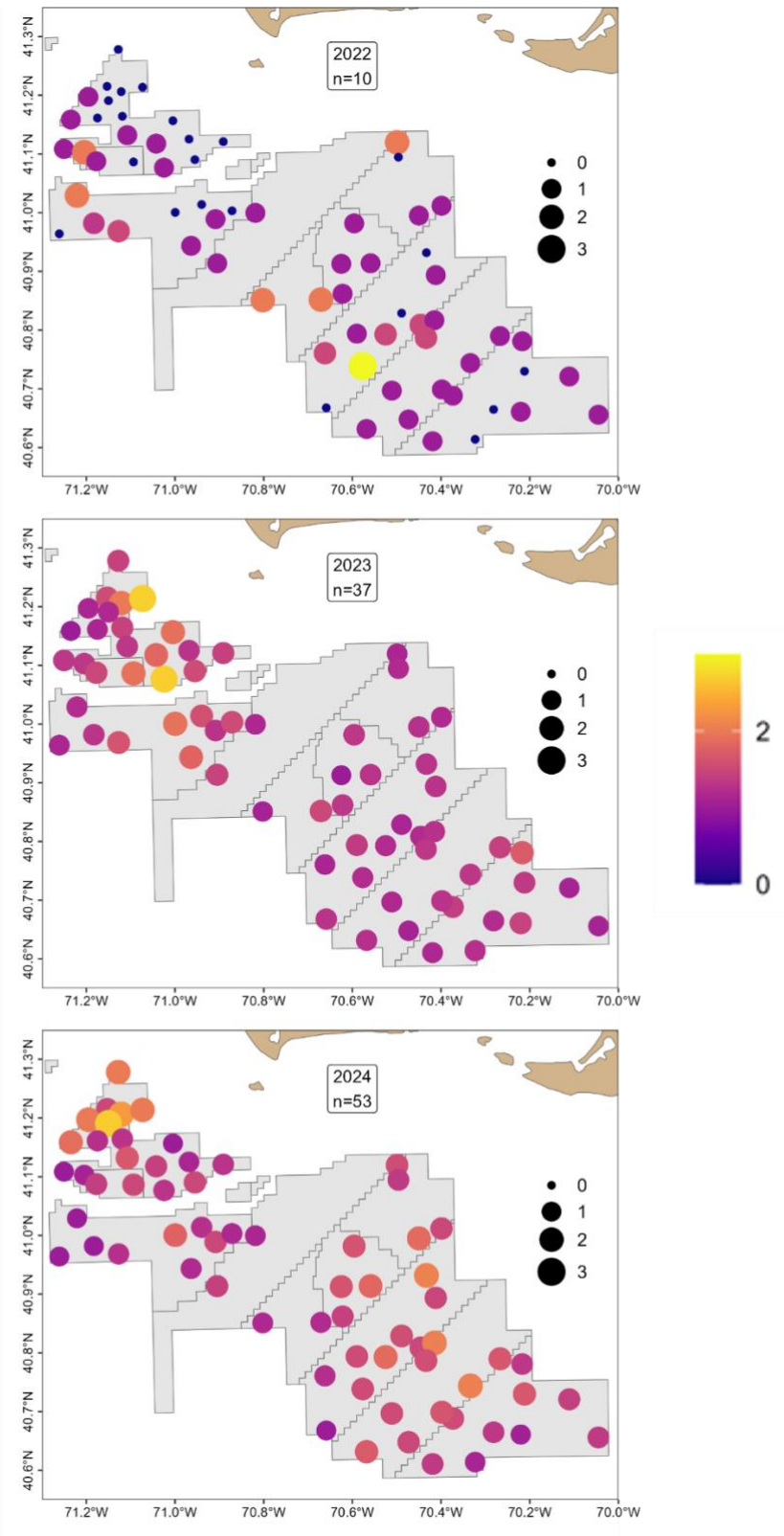


Figure 11b – Maps of bluefin tuna node standardized strength values derived from annual species-level networks. Symbols on each node are scaled by size to permit within year comparisons and color coded to permit comparison of the magnitude of values across all years.

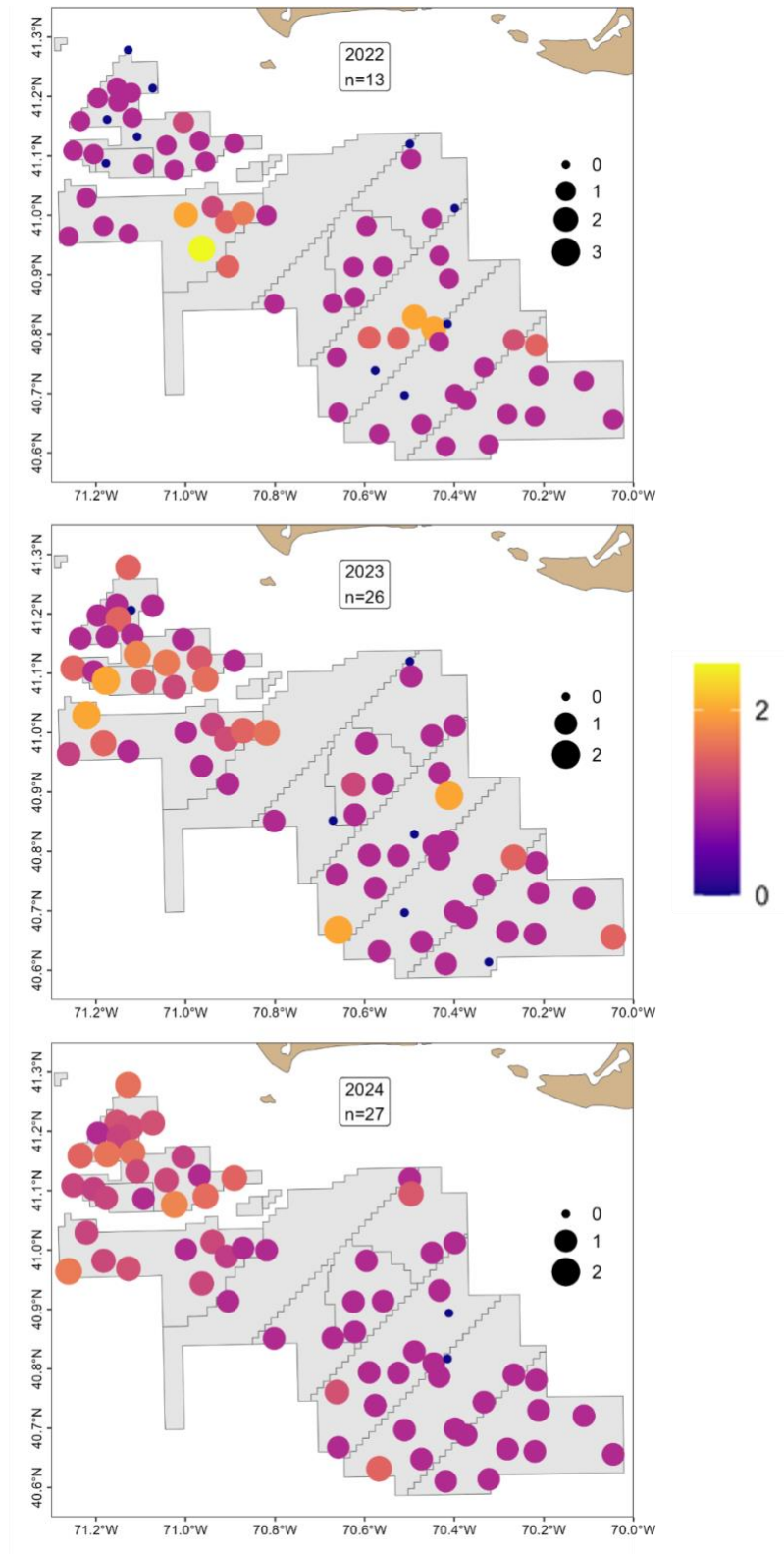


Figure 11c – Maps of shortfin mako node standardized strength values derived from annual species-level networks. Symbols on each node are scaled by size to permit within year comparisons and color coded to permit comparison of the magnitude of values across all years.

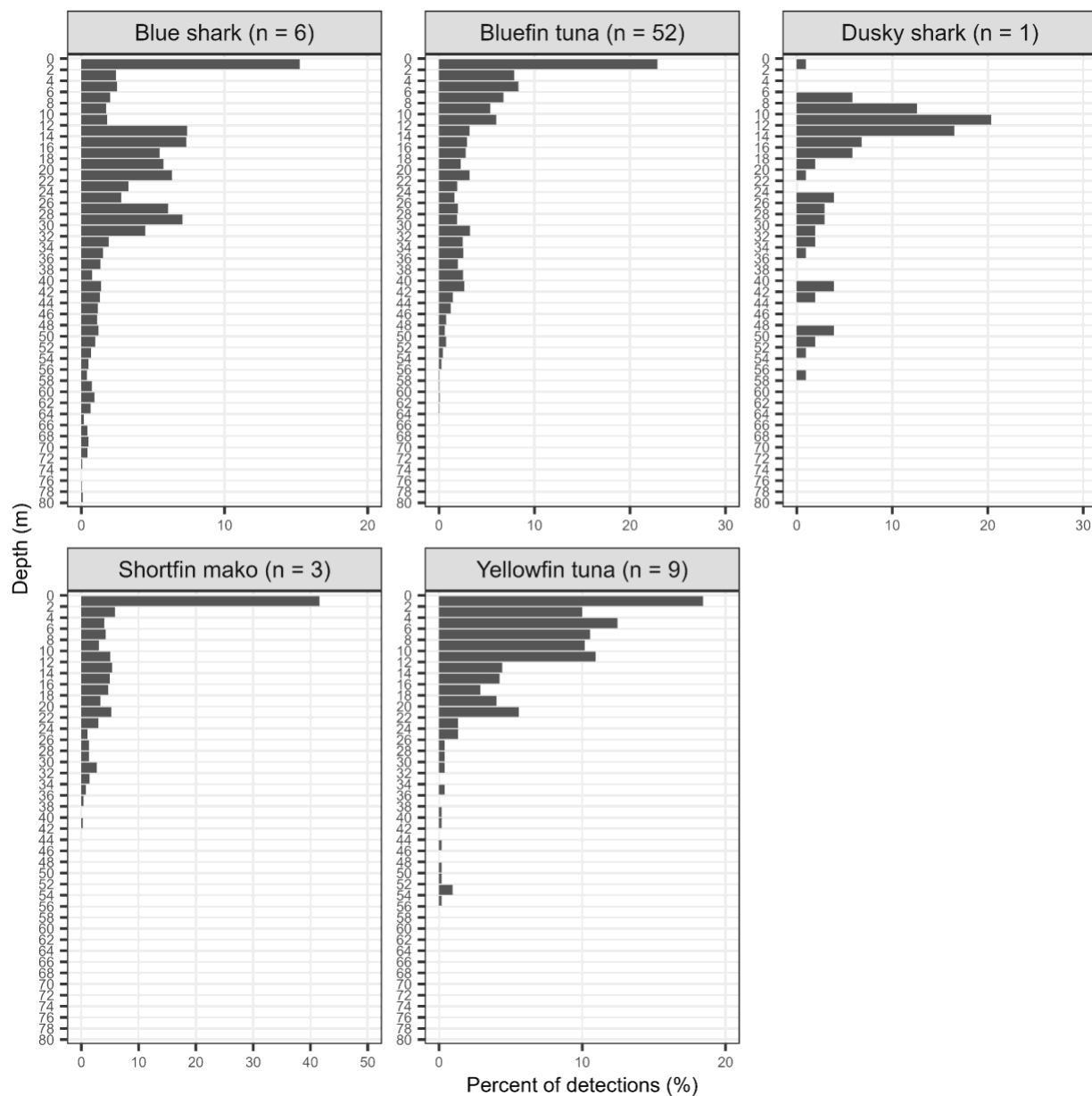


Figure 12 – The proportion of detections obtained at 2-meter (m) depth intervals for each species that was tagged with V16P (pressure sensing) acoustic transmitters. The sample size of detected individuals is indicated next to the species name. Note that the x-axis scaling varies by each plot.

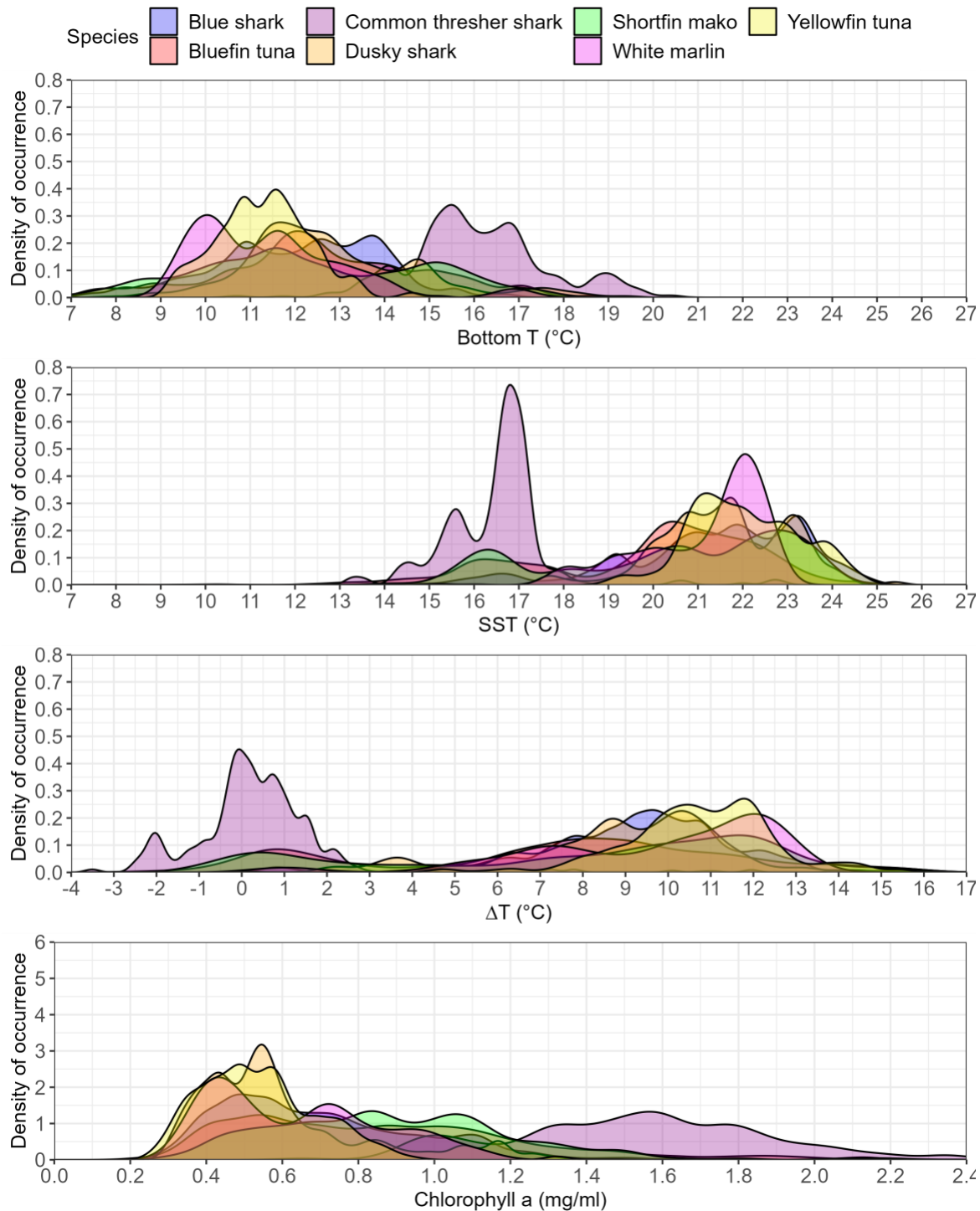


Figure 13 – Kernel density plots demonstrating the range of environmental conditions in which each species was detected/observed from 2022 to 2024. Higher density values correspond to increased numbers of observations in those conditions. Bottom T = bottom temperature, SST = sea surface temperature, ΔT = SST – Bottom T.

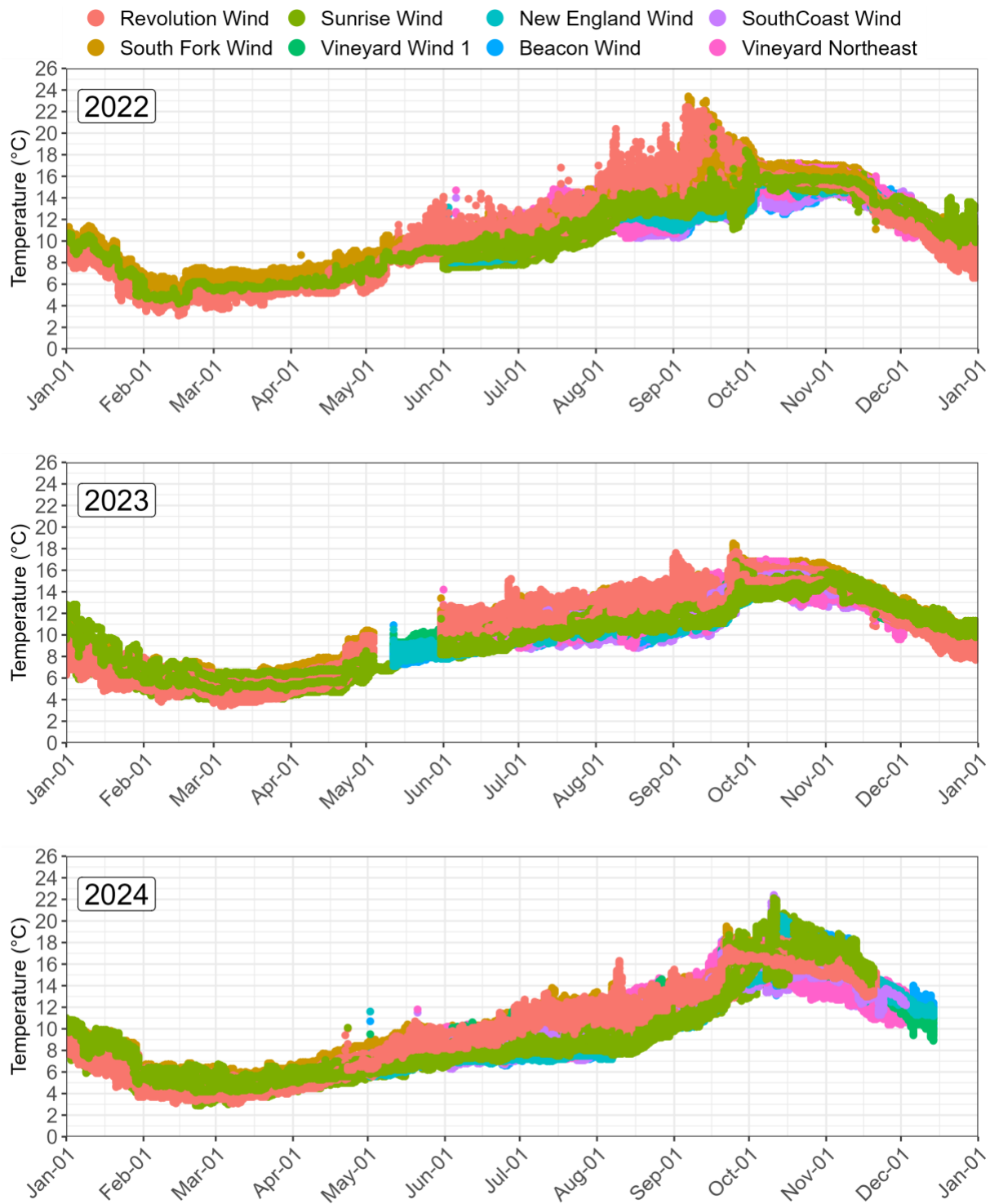


Figure 14 – Bottom water temperature measured hourly at each VR2AR and VR2Tx receiver station in each year of the study. Extreme outliers were identified visually and excluded in finalized plots.

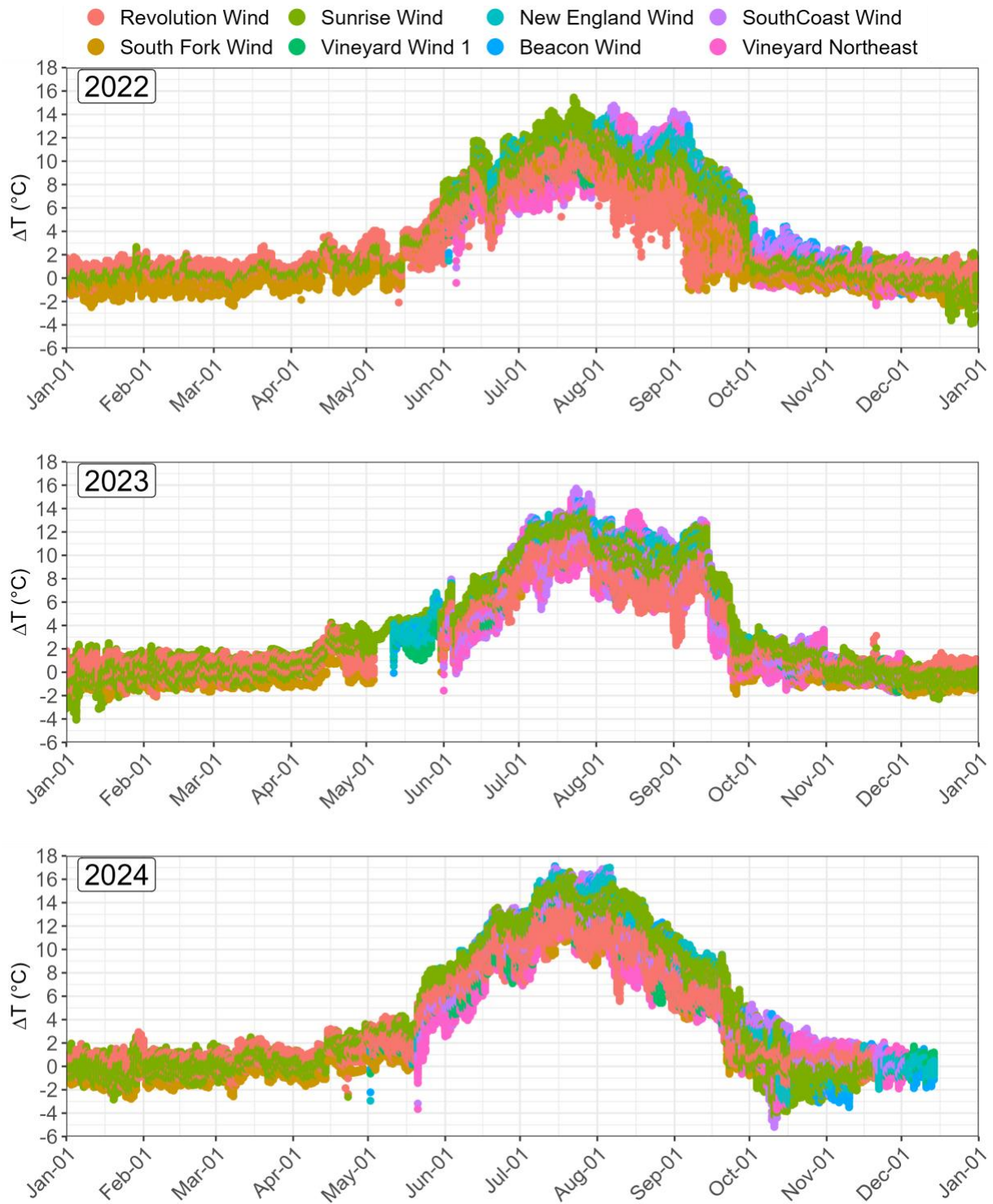


Figure 15 – Thermal stratification calculated hourly at each VR2AR and VR2Tx receiver station in each year of the study.

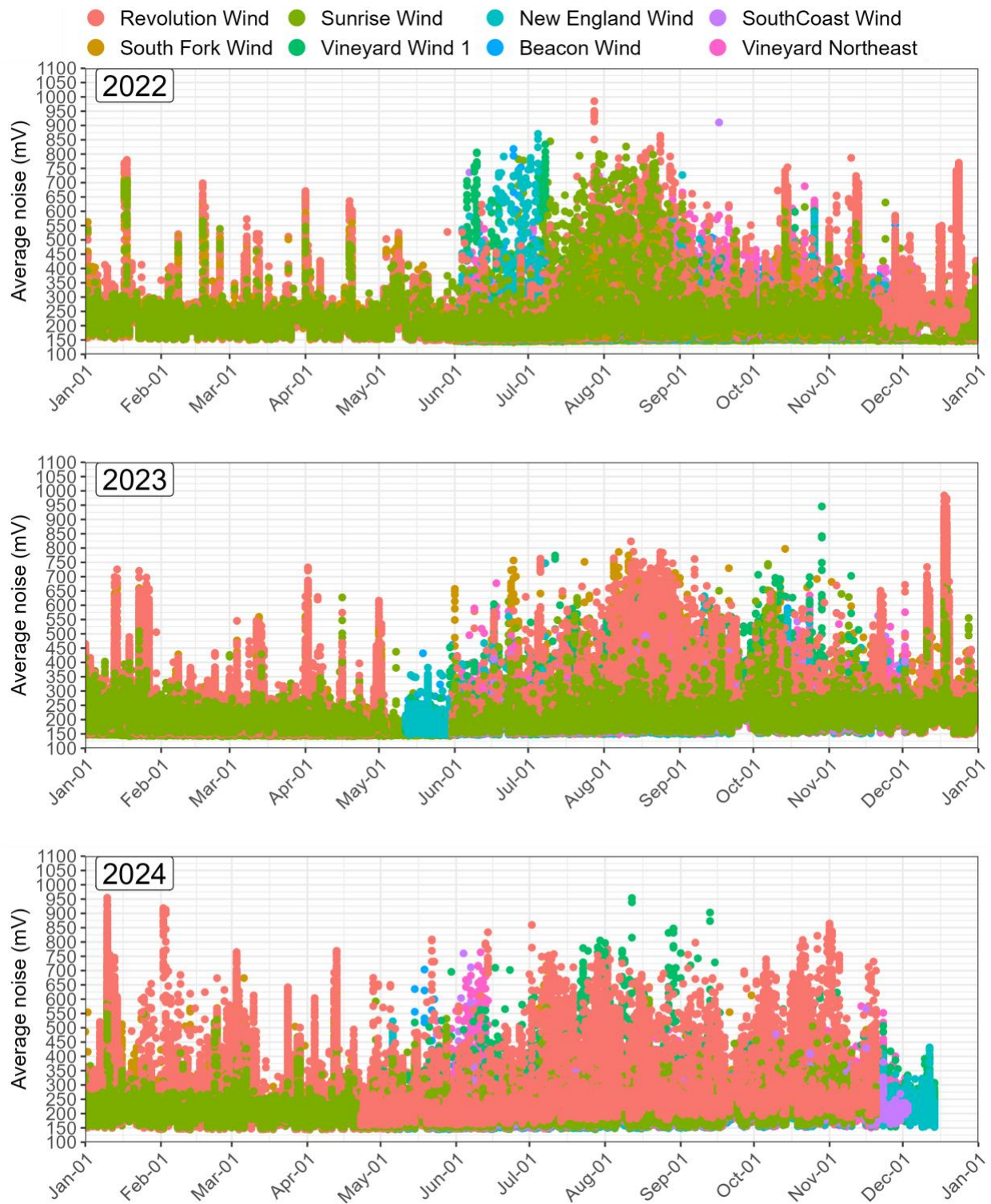


Figure 16 – Hourly average ambient noise (in 69 kHz) recorded at each VR2AR and VR2Tx receiver station in each year of the study.

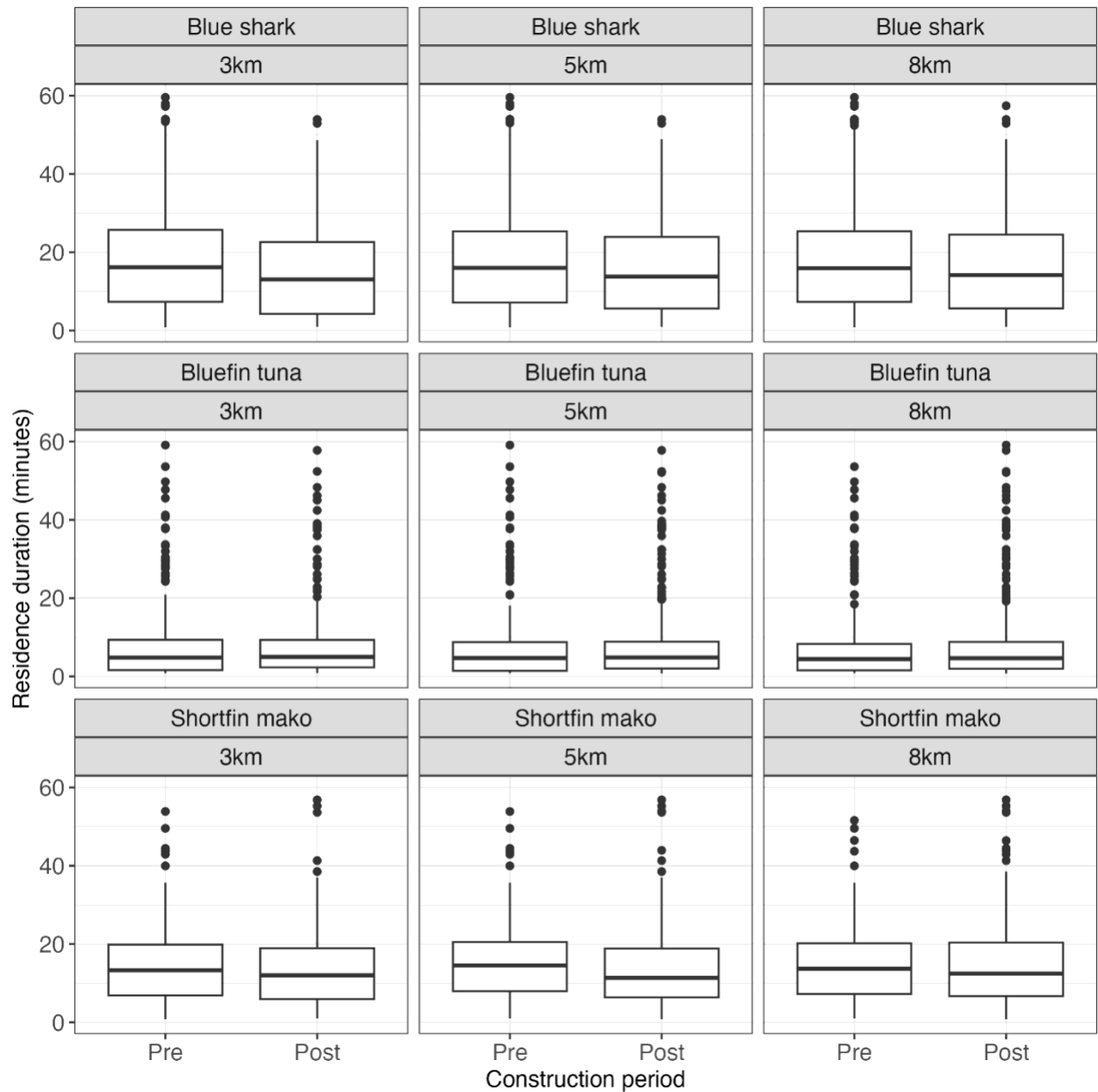


Figure 17 – Boxplots of blue shark, bluefin tuna, and shortfin mako residence event duration across all impacted receiver stations and impact radii during the pre- and post-construction periods. The upper and lower limits of each box represent the 25th and 75th percentiles, and the horizontal black line is the median. The whiskers that extend beyond each box correspond to 1.5 times the interquartile range, and the black circles represent values outside this range. Note that the upper limit of the y-axis was fixed to permit easier comparison of the boxes, but that outliers existed out to 2,283 minutes.

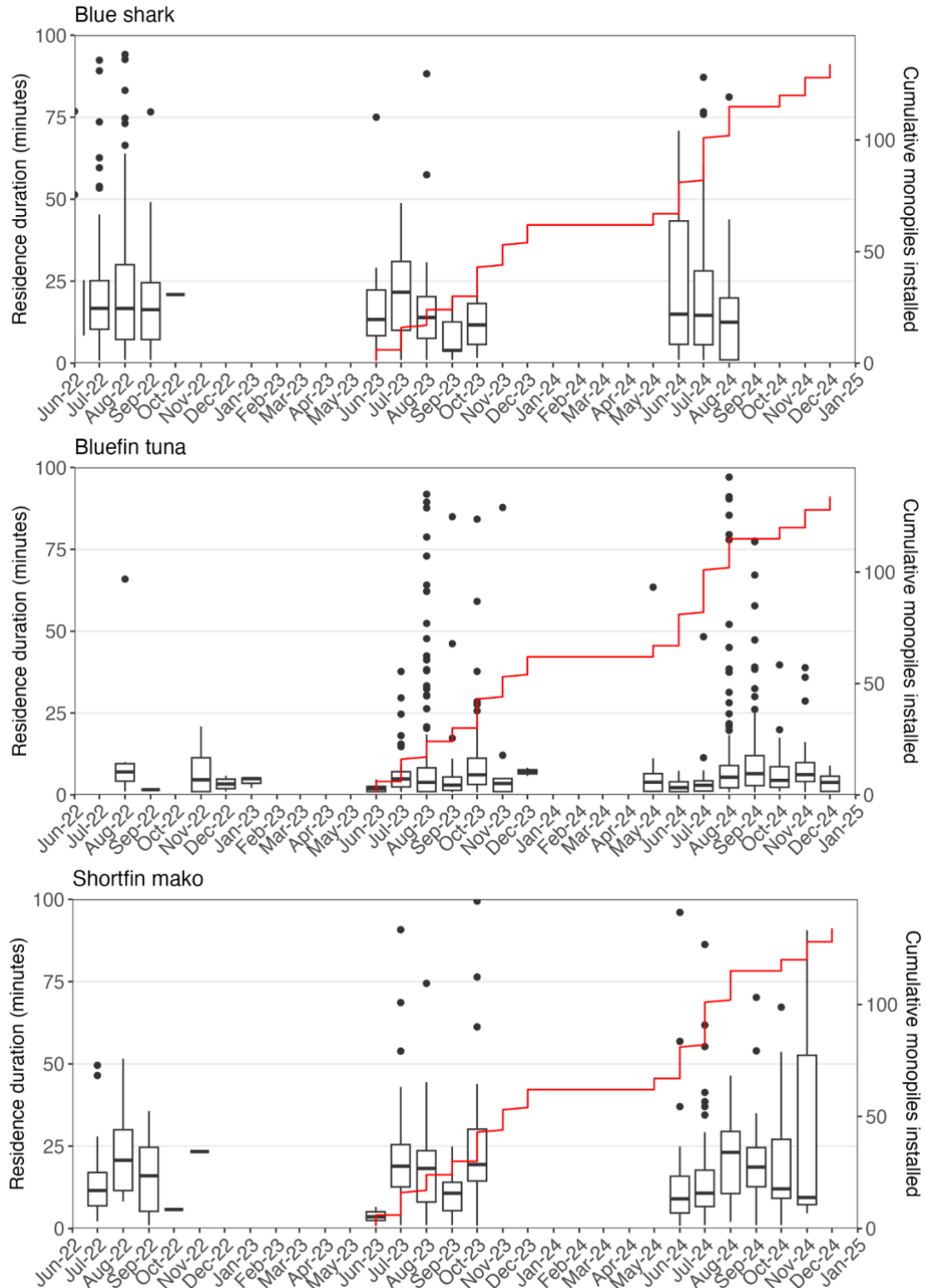


Figure 18 – Boxplots of monthly residence event duration across all impacted receiver stations in relation to the cumulative number of monopiles installed across Revolution Wind, South Fork Wind, and Vineyard Wind 1. Note that the upper limit of the y-axis was fixed to permit easier comparison of the boxes, but that outliers existed for each species.

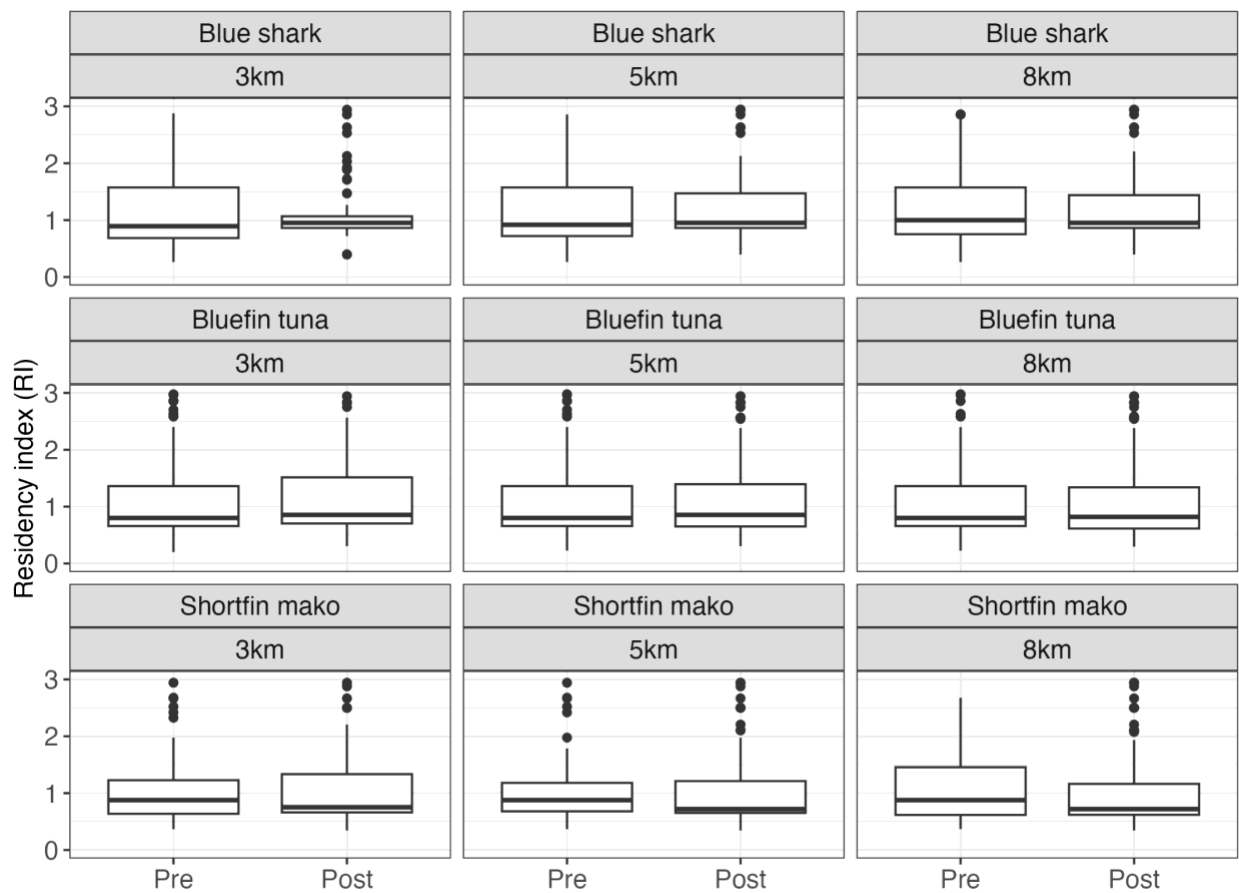


Figure 19 – Boxplots of blue shark, bluefin tuna, and shortfin mako non-zero residence index (RI) scores across all impacted receiver stations at each impact radii during the pre- and post-construction periods. Non-zero RI scores are presented to illustrate the relative magnitude of residence when individuals are present in the receiver array. The upper and lower limits of each box represent the 25th and 75th percentiles, and the horizontal black line is the median. The whiskers that extend beyond each box correspond to 1.5 times the interquartile range, and the black circles represent values outside this range. Note that the upper limit of the y-axis was fixed to permit easier comparison of the boxes, but that outliers existed out to an RI score of 15.

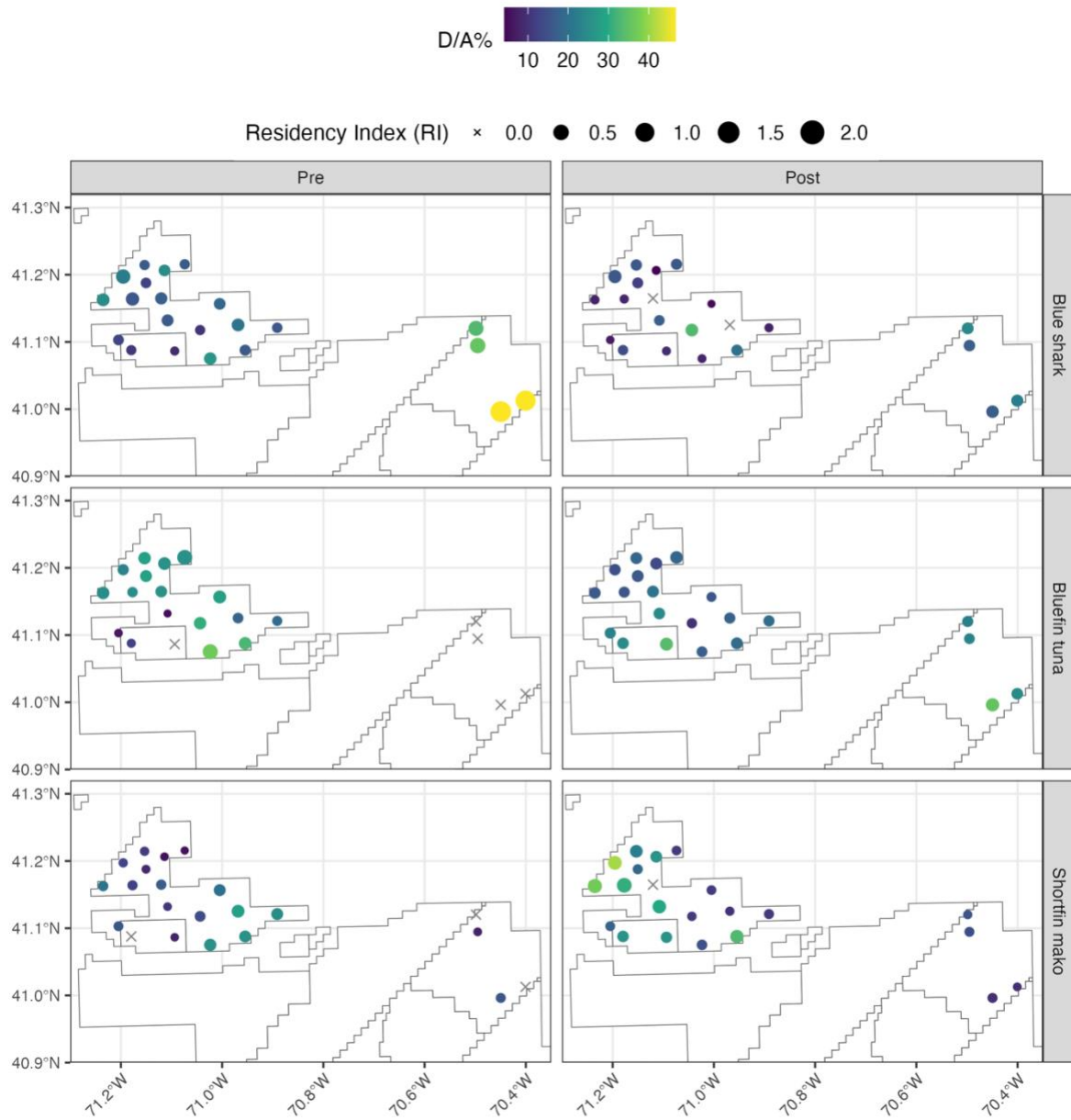


Figure 20a – Map of blue shark, bluefin tuna, and shortfin mako residency index (RI) scores at receiver stations impacted at the 3 km radius during the pre- and post-construction periods. Circles are sized based on the value of RI and colored based on the percentage of available individuals of each species that were detected at each receiver. Receiver stations where no RI scores occurred are indicated by an ‘X’.

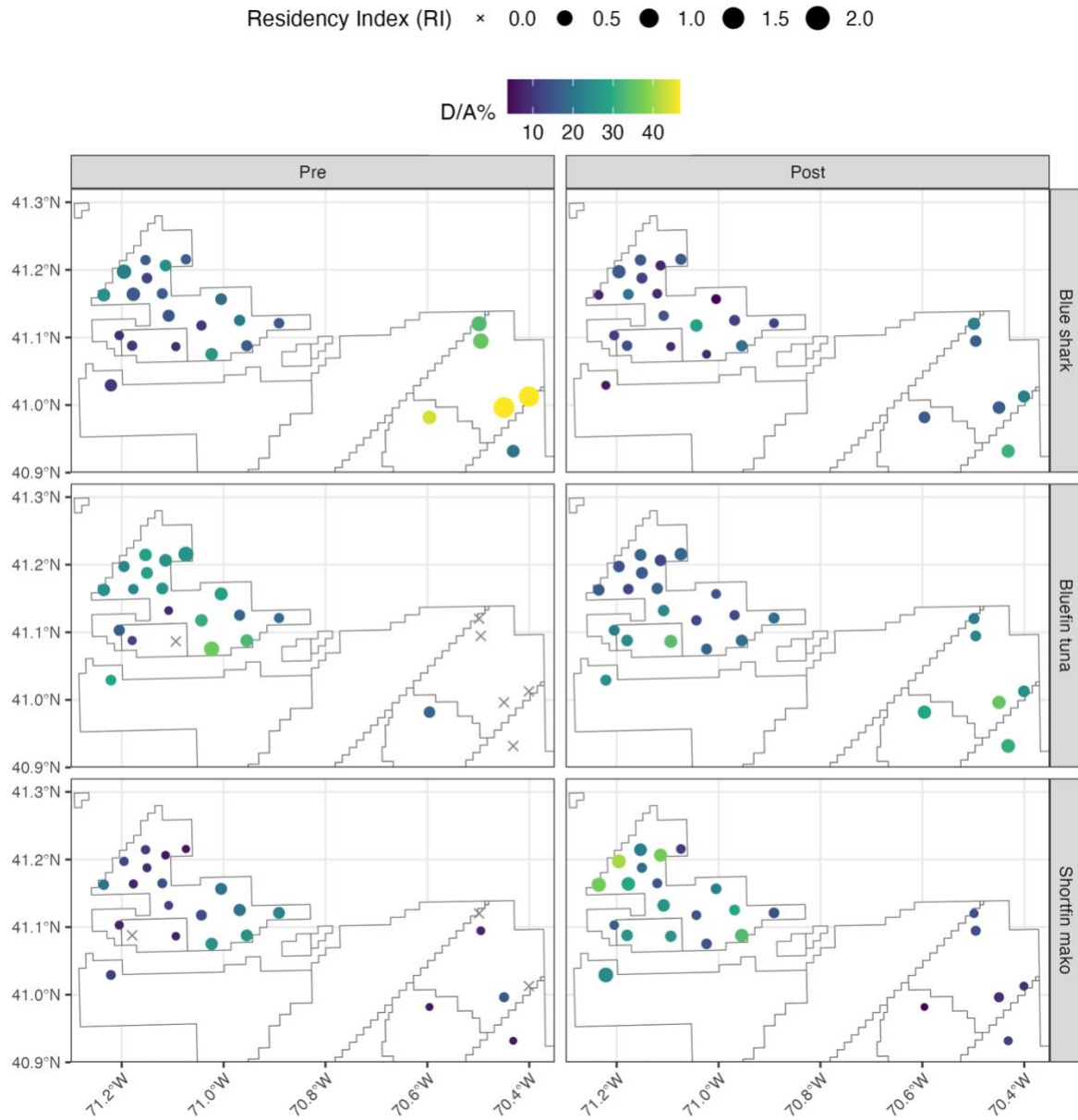


Figure 20b – Map of blue shark, bluefin tuna, and shortfin mako residency index (RI) scores at receiver stations impacted at the 5 km radius during the pre- and post-construction periods. Circles are sized based on the value of RI and colored based on the percentage of available individuals of each species that were detected at each receiver. Receiver stations where no RI scores occurred are indicated by an ‘X’.

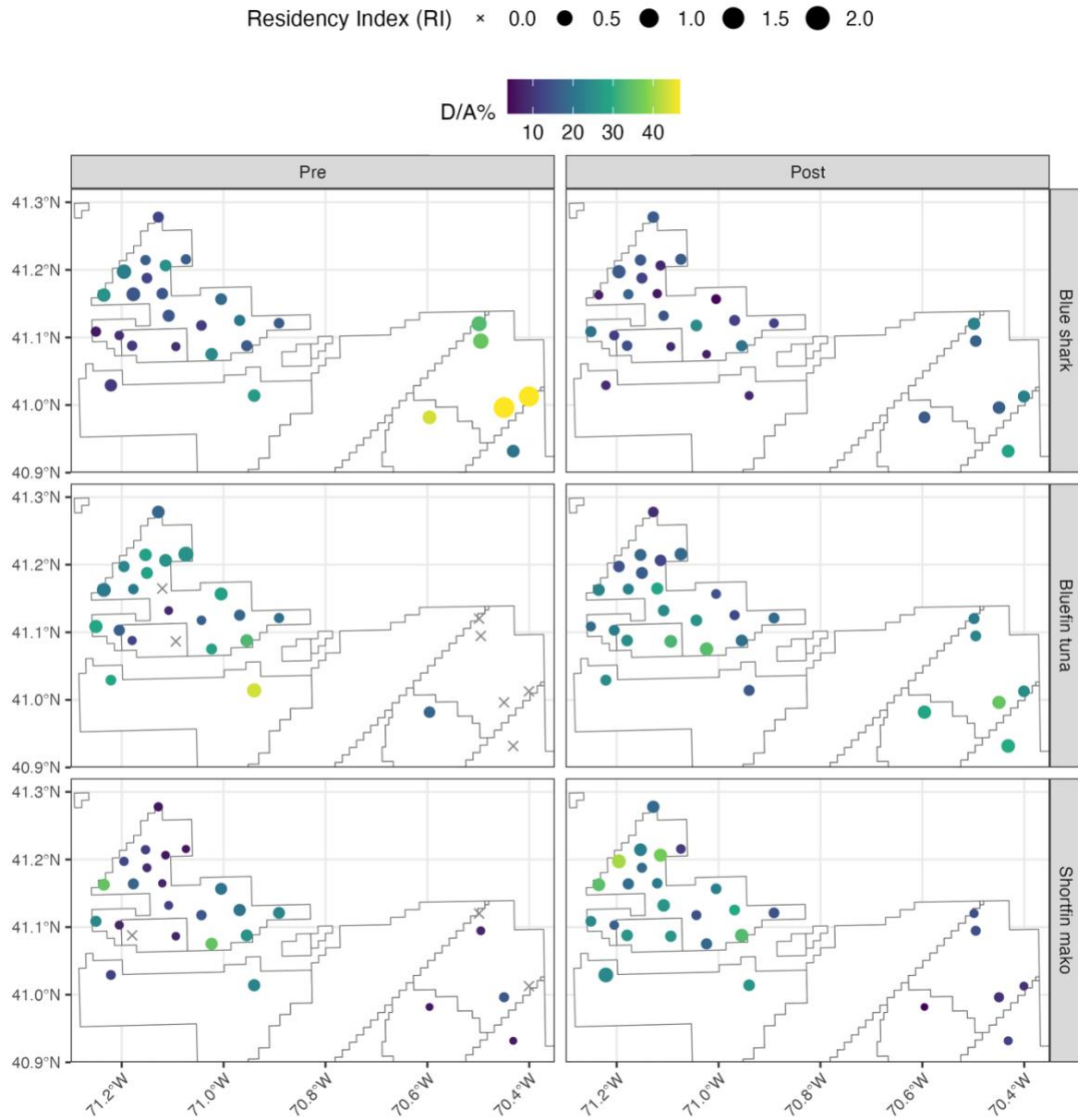
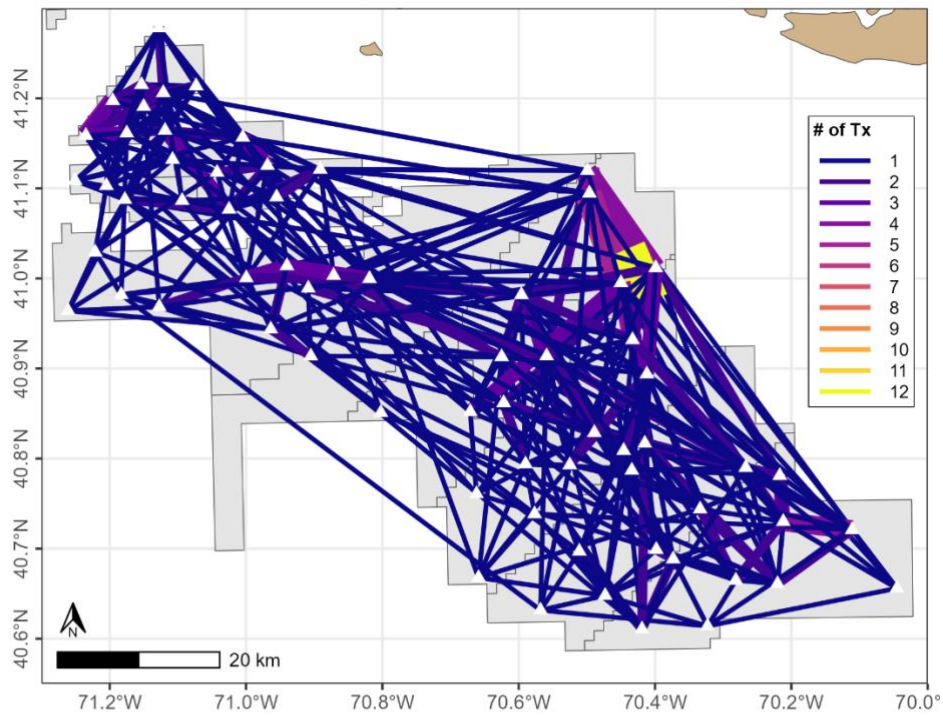


Figure 20c – Map of blue shark, bluefin tuna, and shortfin mako residency index (RI) scores at receiver stations impacted at the 8 km radius during the pre- and post-construction periods. Circles are sized based on the value of RI and colored based on the percentage of available individuals of each species that were detected at each receiver. Receiver stations where no RI scores occurred are indicated by an ‘X’.

Pre-Construction (n = 45)



Post-Construction (n = 37)

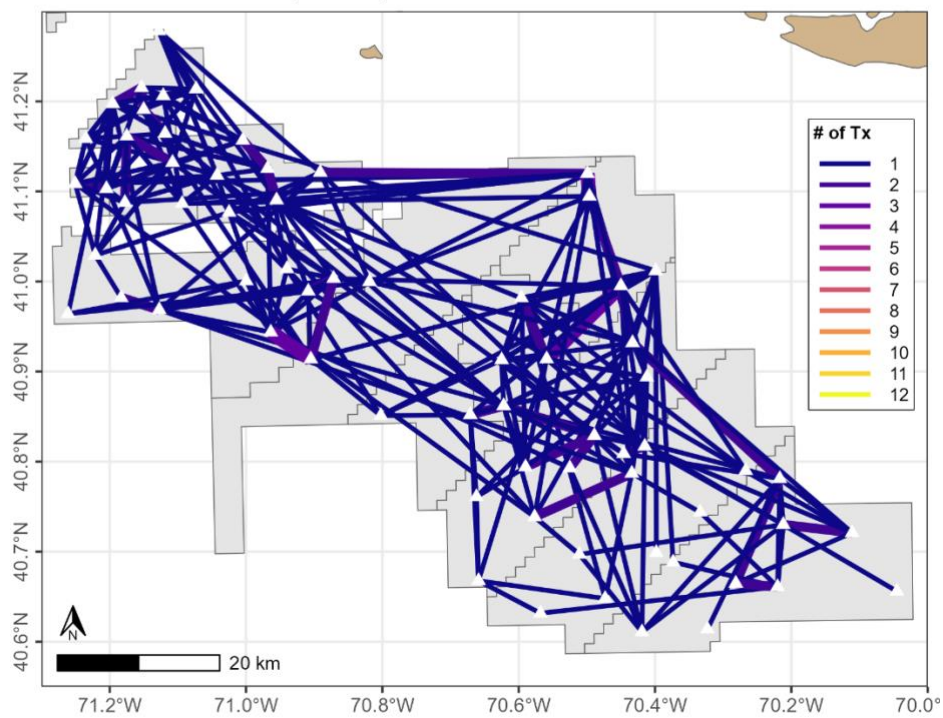


Figure 21a – Blue shark movement networks during the pre- and post-construction periods. Edges are color coded by the number of unique transmitters (Tx) that moved between the nodes. The total number of individuals included in the network is presented next to the panel label.

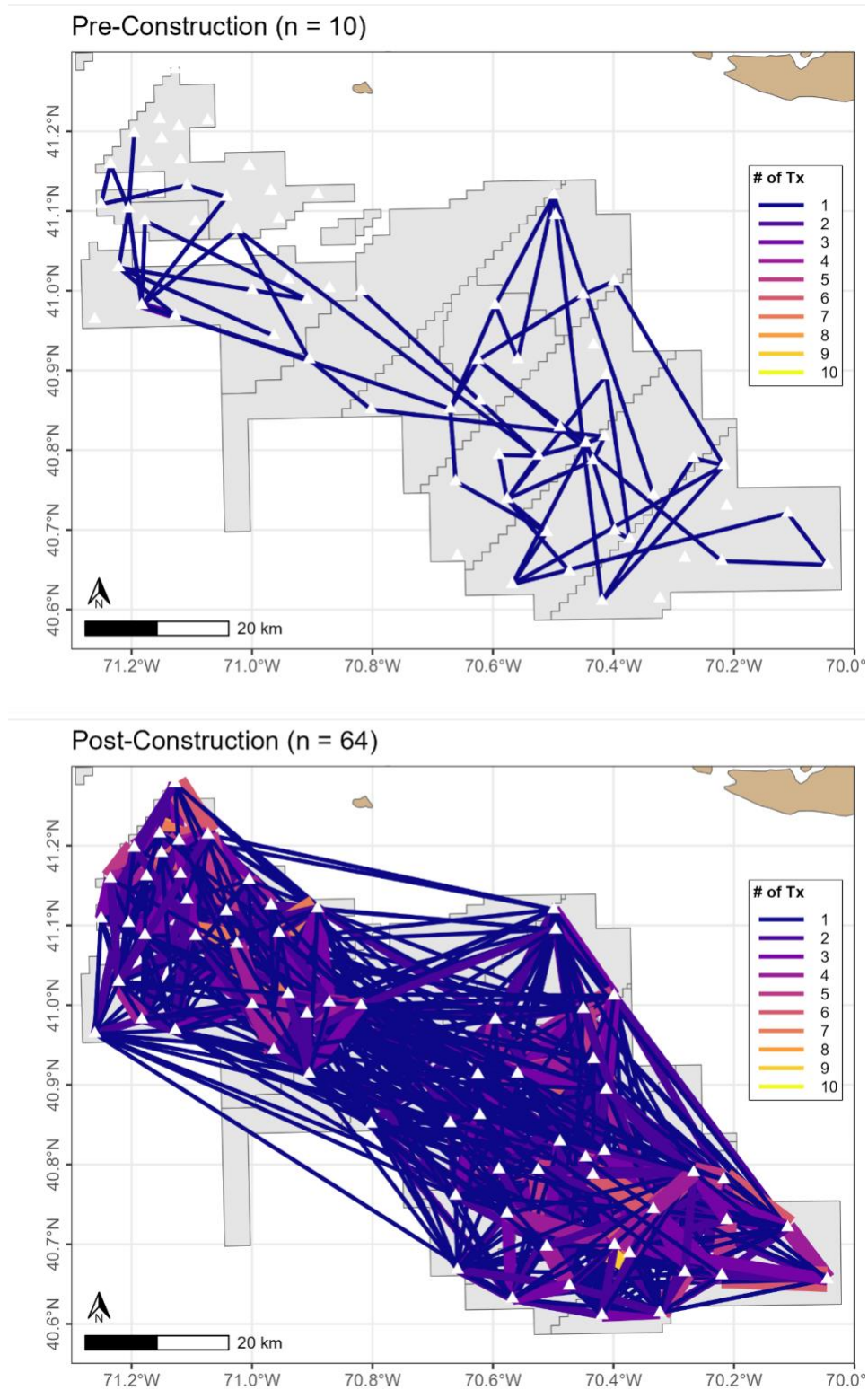
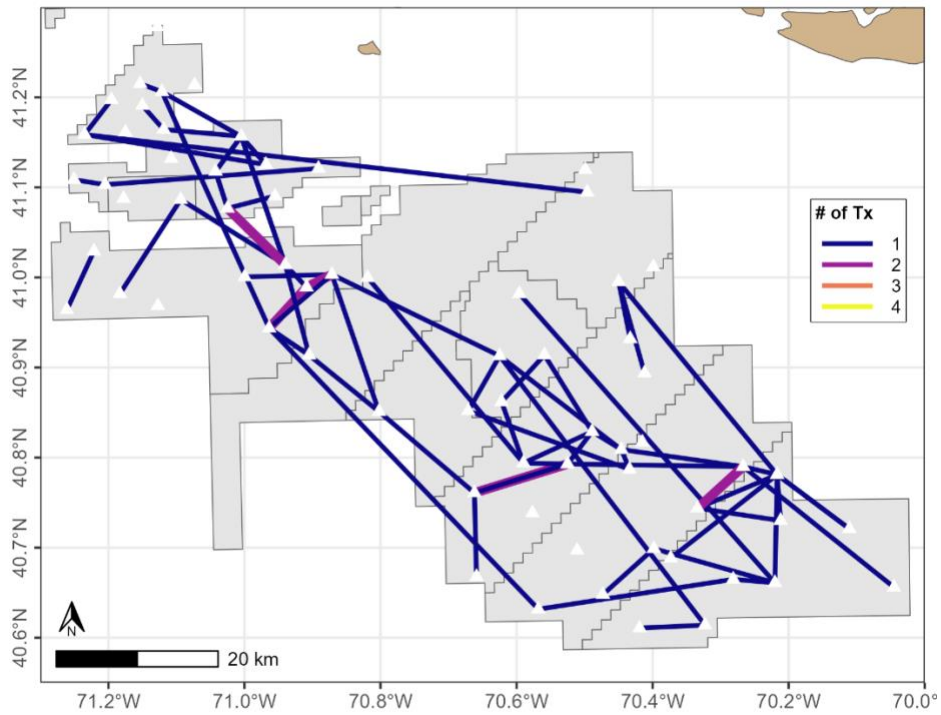


Figure 21b – Bluefin tuna movement networks during the pre- and post-construction periods. Edges are color coded by the number of unique transmitters (Tx) that moved between the nodes. The total number of individuals included in the network is presented next to the panel label.

Pre-Construction (n = 13)



Post-Construction (n = 43)

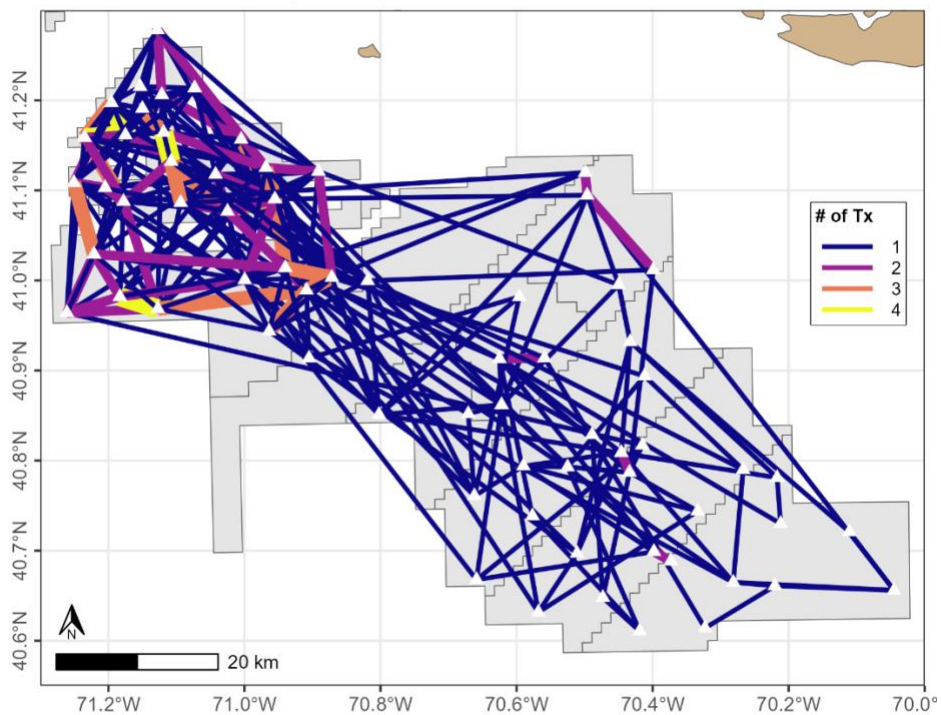


Figure 21c – Shortfin mako movement networks during the pre- and post-construction periods. Edges are color coded by the number of unique transmitters (Tx) that moved between the nodes. The total number of individuals included in the network is presented next to the panel label.

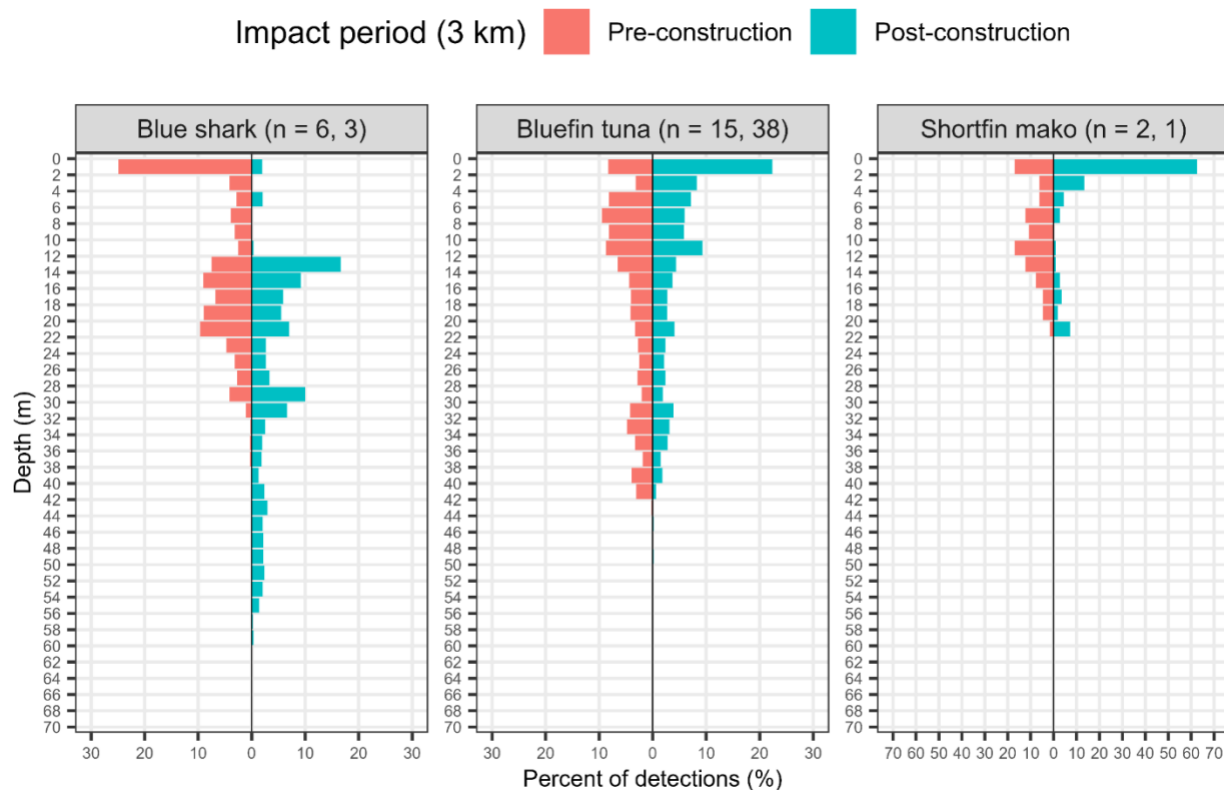


Figure 22a – Histogram of the proportion of detections in the pre- and post-construction periods, assuming a 3-kilometer (km) impact radius, obtained at 2-meter (m) depth intervals for blue shark, bluefin tuna, and shortfin mako tagged with V16P (pressure-sensing) acoustic transmitters. The sample sizes of detected individuals in the pre- and post-construction periods are indicated sequentially by the numbers next to the species name. Note that the x-axis scaling varies by each plot.

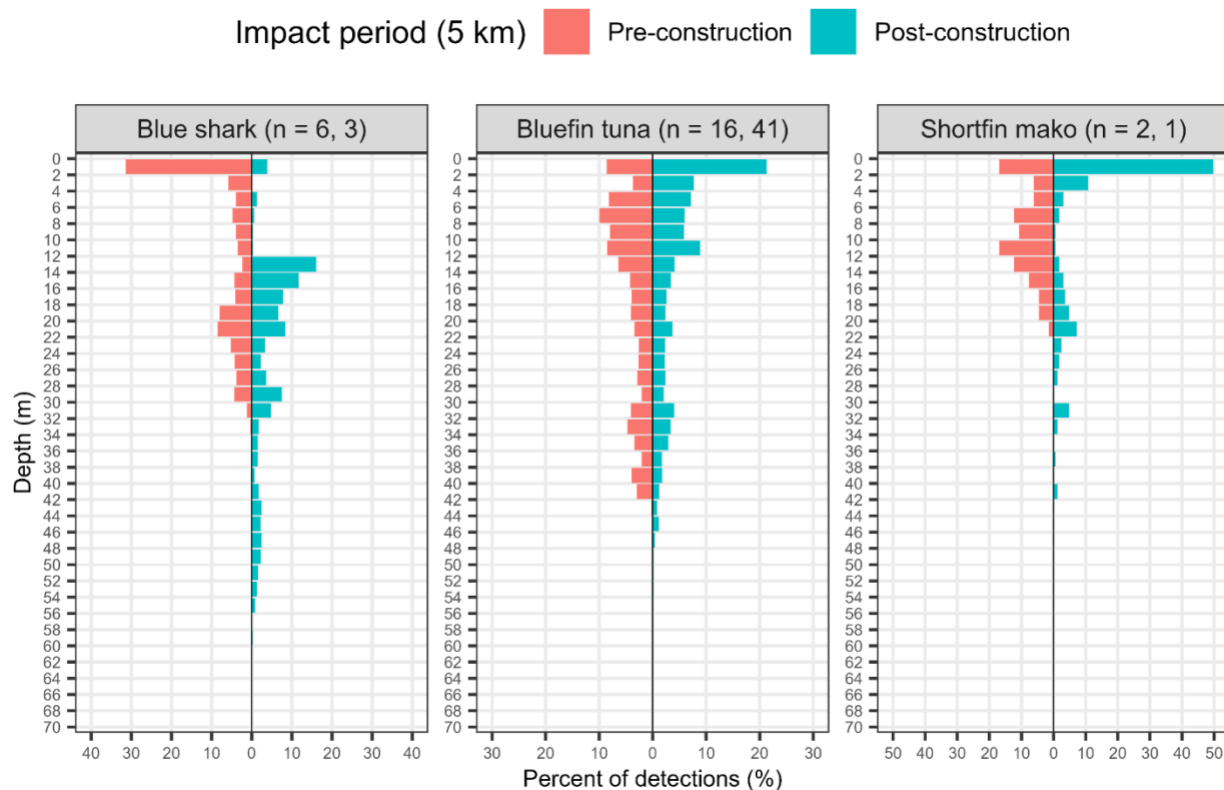


Figure 22b – Histogram of the proportion of detections in the pre- and post-construction periods, assuming a 5-kilometer (km) impact radius, obtained at 2-meter (m) depth intervals for blue shark, bluefin tuna, and shortfin mako tagged with V16P (pressure-sensing) acoustic transmitters. The sample sizes of detected individuals in the pre- and post-construction periods are indicated sequentially by the numbers next to the species name. Note that the x-axis scaling varies by each plot.

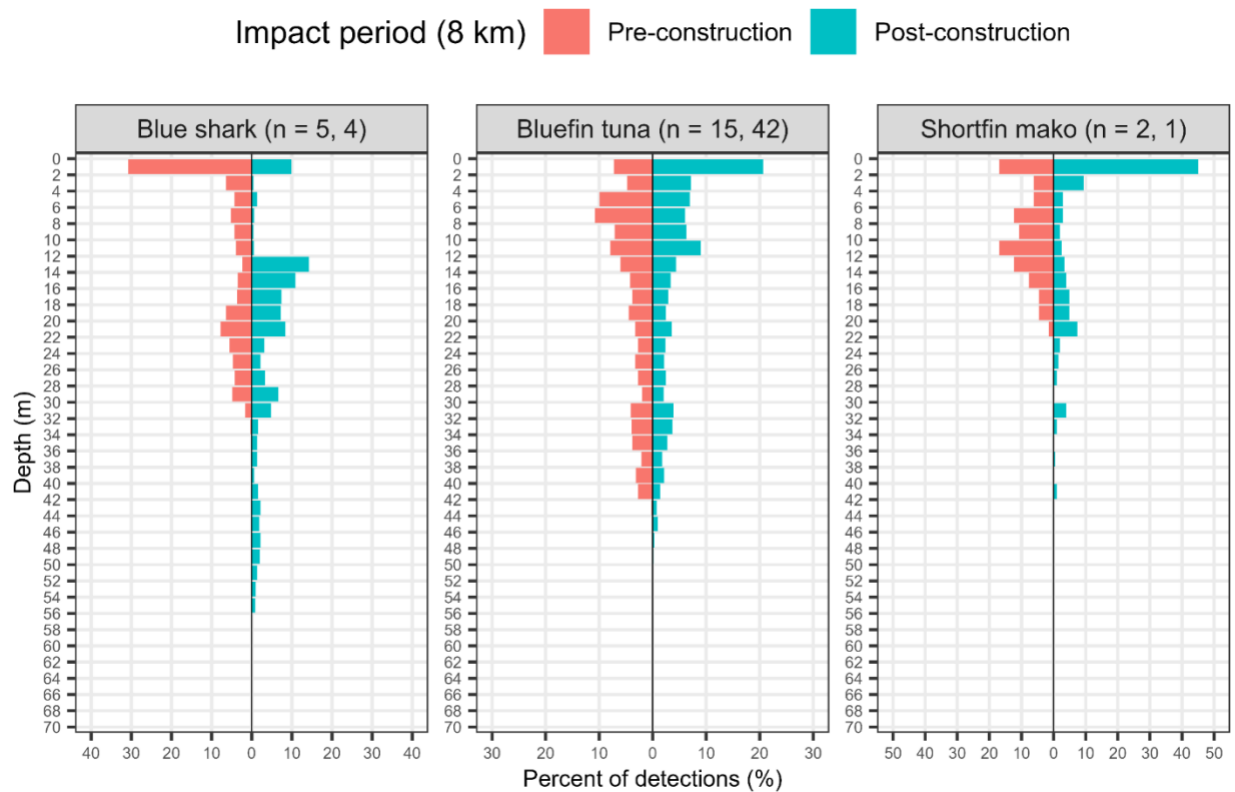


Figure 22c – Histogram of the proportion of detections in the pre- and post-construction periods, assuming an 8-kilometer (km) impact radius, obtained at 2-meter (m) depth intervals for blue shark, bluefin tuna, and shortfin mako tagged with V16P (pressure-sensing) acoustic transmitters. The sample sizes of detected individuals in the pre- and post-construction periods are indicated sequentially by the numbers next to the species name. Note that the x-axis scaling varies by each plot.

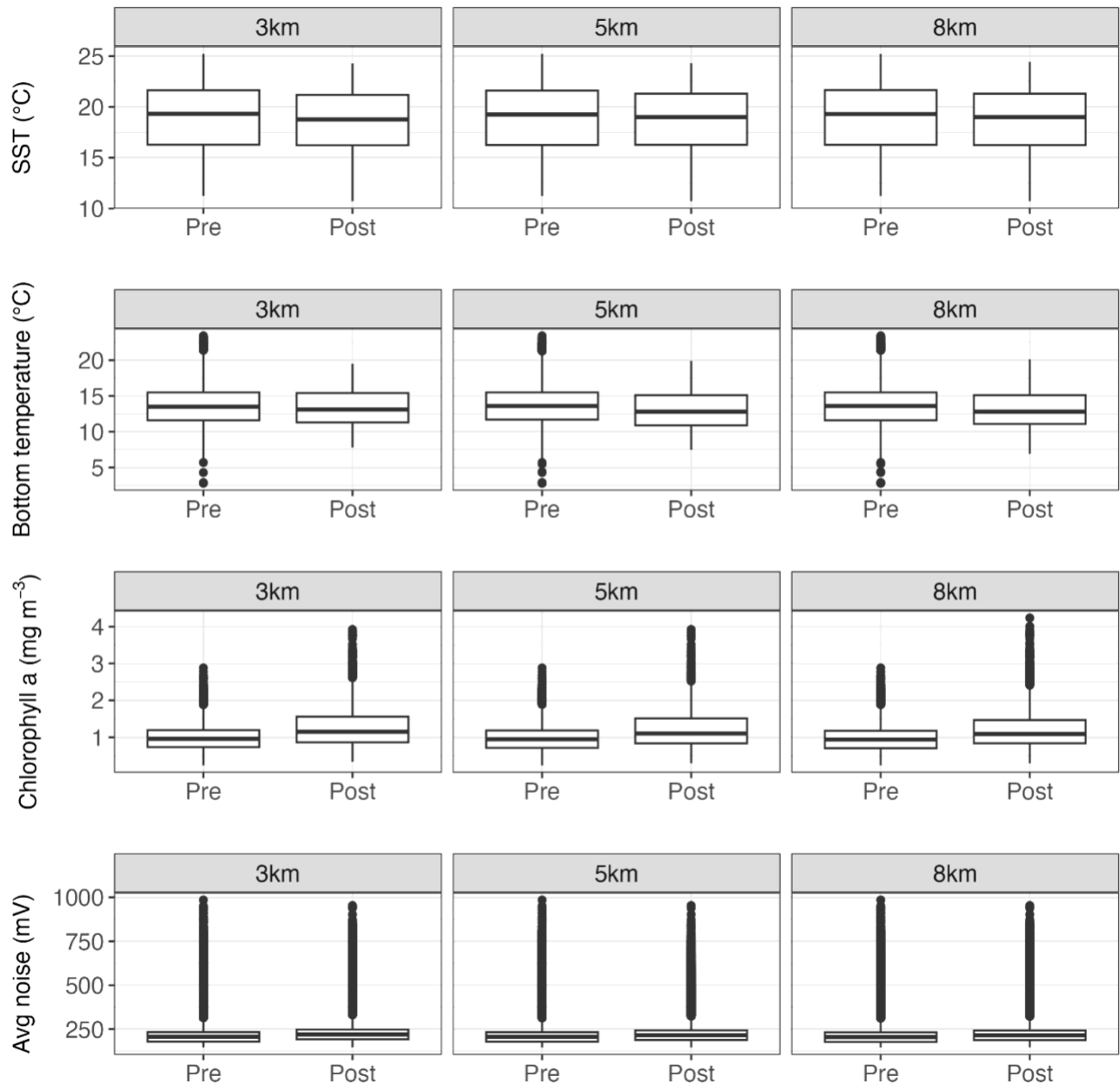


Figure 23 – Boxplots of environmental conditions evident at all impacted receiver stations and impact radii during the pre- and post-construction periods. The upper and lower limits of each box represent the 25th and 75th percentiles, and the horizontal black line is the median. The whiskers that extend beyond each box correspond to 1.5 times the interquartile range, and the black circles represent values outside this range. SST – sea surface temperature; Avg – average