Environmental Monitoring of Yunlin Offshore Wind Farm

Construction and Operational Phase
Environmental Monitoring Report
(March 2025 – May 2025)

Final Draft

Developer	:	Yunneng Wind Power Co., Ltd.
Monitored By	:	Sinotech Engineering Services, Ltd.
Submission Date	:	July 2025

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Preface

I. Regulatory

The environment monitoring project is in accordance with the environmental monitoring plan in the finalized version of the "Yunlin Offshore Wind Farm Development Project Environmental Impact Statement" approved by Environment Protection Administration (EPA) on 21 June 2018 (#official letter 1070046931), the "Yunlin Offshore Wind Farm Development Project Comparison Table of Content Changed (Changing Monitoring Plan)" approved on 11th December 2018 (#official letter 1070100406) and "Yunlin Offshore Wind Farm Development Project Environmental Impact Statement- 1st Differential Analysis Report" (Variation on earthwork handling plan) approved on 3rd January 2020.

The "Yunlin Offshore Wind Farm Development Project" (the Project) actively participates in the Directions for Allocating Installed Capacity of Offshore Wind Potential Zones promulgated by BOE on January18, 2018, and plans to begin offshore construction in March 2020 in response to the offshore wind power energy policy of 520MW in 2020 and 5.5GW in 2025. On May 17, 2018, BOE notified via official letter #10704602861 that Yunlin wind farm has been awarded a place in the 2020-completion grid connection plan.

According to the pre-construction monitoring plan added after the preliminary meeting of the EPA task force during review of EIA on 27^{th} July 2017, the bird ecological radar monitoring survey must begin 2 years prior to offshore construction. Therefore, the bird ecological radar monitoring survey for this project began in March 2017. It is stated in the change of monitoring plan in December 2018 that monitoring schedule is decided depending on starting date of offshore construction. Offshore environmental monitoring in pre-construction 2 years before construction has been completed in February 2020. The project will continue to conduct monitoring surveys during construction phase in compliance with the EIA approved monitoring plan. As some of the turbines have obtained electricity enterprise license since July 2023, the project has officially entered construction and operation phase. The project will continue to conduct monitoring surveys during operation phase in compliance with the EIA approved monitoring plan.

In addition, marine bat recording surveys at pre-construction, construction and operation phases of Yunlin Offshore Windfarm are planned following "Yunlin Offshore Windfarm Bird and Bat Survey Protocol" in accordance with Environmental and Social Action Plan item number 20 and IFC standards.

II. Monitoring Duration

Following the matters written in the EIA documentation of the "Yunlin Offshore Wind Farm Development Project" and the environmental monitoring required in review resolutions, Yunneng Wind Power Co., Ltd. started the environmental monitoring surveys of the began in January 2019; the environmental monitoring surveys for offshore construction in March 2020. The Project entered construction and operation phase since July 2023. The monitoring during operation phase is conducted from August 2023.

This report is the Environmental Monitoring Report for the Construction and Operation Phases (March 2025 – May 2025).

III. Monitoring Unit

This monitoring project is compiled by Sinotech Engineering Services, Ltd., which is also responsible for the writing of monitoring report, and the management and coordination of certified institutes, academic researchers and experts to carry out the environmental monitoring works. The units for each monitoring item in this quarter are listed as follows:

i. Marine Water Quality, Electromagnetic Field: SGS Co., Ltd.

ii. Bird Ecology, Marine Ecology (Intertidal Ecology, Plankton, Benthic organisms, Underwater filming): Formosa Natural History Information Ltd.

iii. Marine Ecology (Fish larva and Fish egg, Fish Species, Fishery resources): Formosa Natural History Information Ltd.

iv. Cetacean Ecology (Cetacean Visual Survey): Formosa Natural History Information Ltd.

v. Cetacean Ecology (Underwater Acoustic), Underwater Noise Monitoring: SGS Co., Ltd.

Chapter 1 Monitoring Overview

1.1 Construction Progress

This report presents the results of the Environmental Monitoring Report for the Construction and Operation Phases, with a summary compiled as shown in Table 1.2-1.

I. Onshore Construction

i. Onshore Substations

The civil engineering construction of Taixi and Sihu substations have been completed in June 2020; operation license of Sihu substations was obtained in July 2020, and operation license of Taixi substation was obtained in November 2022.

ii. Onshore Cable

Civil construction of the cable between Taixi substation and Taixi substation, and between Sihu substation and Sihu substation have been completed in June 2020.

iii. Output Cable Connecting to the Substation

Construction on connection conduits for subsea cables at Taixi substation and Sihu substation have been completed in June 2020.

iv. On-site Restoration Works

In March 2024, both Taixi and Sihu completed on-site restoration works. The onshore project has officially been completed and has entered the operational phase.

II. Offshore Construction

A total of 80 turbines are planned in this Project. Pilings of wind turbine foundations started in November 2020. The underwater piling of the foundations of 80 turbines were completed by end of July 2024 as shown in Table 1.1-1.

1.2 Monitoring Status

This report presents the results of the Environmental Monitoring Report for the Construction and Operation Phases (March 2025 – May 2025), covering the offshore construction and operation phases as well as the onshore operation phase.

The results are summarized and compiled in Table 1.2-1

Table 1.1-1 Piling Schedule of the Turbine Foundation (1/3)

NO.	Foundation No.	Piling Date (Month)
1.	YUN53	2020 November
2.	YUN80	2021 February
3.	YUN38	2021 February
4.	YUN76	2021 March
5.	YUN51	2021 April- May
6.	YUN52	2021 May
7.	YUN64	2021 June
8.	YUN79	2021 June
9.	YUN42	2021 June
10.	YUN78	2021 June
11.	YUN37	2021 July
12.	YUN43	2021 September
13.	YUN49	2021 September
14.	YUN57	2021 September
15.	YUN45	2021 October
16.	YUN63	2022 July
17.	YUN50	2022 August
18.	YUN73	2022 August
19.	YUN74	2022 August
20.	YUN72	2022 August
21.	YUN71	2022 September
22.	YUN77	2022 October
23.	YUN13	2023 April
24.	YUN21	2023 May
25.	YUN20	2023 May
26.	YUN62	2023 May
27.	YUN12	2023 May
28.	YUN11	2023 May

Table 1.1-1 Piling Schedule of the Turbine Foundation (2/3)

NO.	Foundation No.	Piling Date (Month)
29.	YUN70	2023 June
30.	YUN61	2023 June
31.	YUN68	2023 June
32.	YUN69	2023 June
33.	YUN66	2023 July
34.	YUN32	2023 July
35.	YUN65	2023 July
36.	YUN58	2023 July
37.	YUN30	2023 August
38.	YUN39	2023 August
39.	YUN28	2023 August
40.	YUN27	2023 August
41.	YUN23	2023 September
42.	YUN19	2023 September
43.	YUN06A	2023 September
44.	YUN35	2023 September
45.	YUN34	2023 September
46.	YUN41	2024 March
47.	YUN48	2024 March
48.	YUN36	2024 April
49.	YUN05	2024 April
50.	YUN22	2024 April
51.	YUN07	2024 April
52.	YUN10	2024 April
53.	YUN18	2024 April
54.	YUN75	2024 April
55.	YUN26	2024 May
56	YUN40	113.05

Table 1.1-1 Piling Schedule of the Turbine Foundation (3/3)

NO.	Foundation No.	Piling Date (Month)
56	YUN40	2024 May
57.	YUN31	2024 May
58.	YUN02	2024 May
59.	YUN47	2024 May
60.	YUN04	2024 May
61.	YUN17	2024 May
62.	YUN03	2024 May
63.	YUN56A	2024 May
64.	YUN16	2024 May
65.	YUN29	2024 June
66.	YUN33	2024 June
67.	YUN09	2024 June
68.	YUN01	2024 June
69.	YUN25	2024 June
70.	YUN14	2024 June
71.	YUN15	2024 June
72.	YUN60	2024 June
73.	YUN55	2024 June
74.	YUN59	2024 June
75.	YUN44	2024 June
76.	YUN54	2024 July
77.	YUN24	2024 July
78.	YUN46	2024 July
79.	YUN08	2024 July

Table 1.2-1 Environmental Monitoring Results (1/4)

Phase	Category	Monitoring Items	Summary of Monitoring Results	Response Action
Offshore Construction & Operation phase	Marine Water Quality	Water Temperature, pH Value, BOD, Salinity, Dissolved Oxygen, Ammonia- N, Nutrients, Suspended Solid, Chlorophyll A, Coliform Group	The marine water quality monitoring results for this quarter season show that all the measured values at the specific locations complied with the standard values for Class A classification of Marine Environmental Quality Standards.	No abnormal issues were found.
	Bird Ecology	Species, amount, habiting and flying activities, flying route, seasonal flock change etc. (including shore bird and water bird)	1. Offshore bird: A total of 225 individual seabirds were recorded this quarter, representing 13 species across 5 families and 5 orders. Two protected species were observed: the rare and valuable bridled tern and the greater crested tern. Most birds were observed flying in the air. The average seabird density for this quarter was 2.472 individuals per square kilometer. 2. Coastal bird survey: A total of 113 coastal bird species were recorded this quarter, belonging to 37 families and 13 orders. Within the designated subsea cable landing coastline (impact zone), 93 species from 35 families and 12 orders were observed, while the non-designated landing coastline (control zone) recorded 81 species from 27 families and 9 orders. In terms of endemic species, one Taiwan endemic species—the light-vented bulbul—and ten Taiwan endemic subspecies were recorded, including the Oriental turtle dove, house swift, slaty-breasted rail, black drongo, black-naped monarch, plain prinia, golden-headed cisticola, light-vented bulbul, black bulbul, and vinous-throated parrotbill. Regarding protected species, a total of 14 species were recorded this quarter, including one Category I (endangered) species—the black-faced spoonbill; seven Category II (rare and valuable) species—Saunders's gull, little tern, greater crested tern, Chinese egret, osprey, black-winged kite, and yellow bunting; and six Category III (other species needing conservation) species—far Eastern curlew, Eurasian curlew, great knot, red knot, brown shrike, and chestnut munia.	No abnormal issues were found.

Table 1.2-1 Environmental Monitoring Results (2/4)

Phase	Category	Monitoring Items	Summary of Monitoring Results	Response Action
Offshore Construction & Operation phase	Marine Ecology	Intertidal Ecology	1. Sessile Marine Algae The substrate at all stations consists mostly of sand, which lacks solid surfaces, such as reefs or large rocks, for sessile marine algae to attach to. Consequently, no large sessile marine algae were observed this quarter season. 2. Intertidal Benthic Organism A total of 21 orders, 31 families, and 43 species were recorded. The number of species per sampling station ranged from 10 to 18 species, and abundance ranged from 31 to 233 individuals. The highest species richness was found at stations C2 and C3, while the highest abundance was recorded at station C3. The most abundant species was *Amphibalanus reticulatus* with 278 individuals, accounting for 42.90% of the total. This was followed by the Portuguese oyster, with 100 individuals (15.43%), *Mictyris brevidactylus* with 86 individuals (13.27%), and *Thais clavigera*, with 42 individuals (6.48%).	No abnormal issues were found.
		Plankton, Zooplankton Juvenile Fish Egg and Fish Larva, Benthic Organism	1.Phytoplankton A total of 5 phyla, 64 genera, and 178 species of algae were recorded. The number of algal species per station and water layer ranged from 32 to 60 species, with abundances ranging from 30,900 to 166,800 Cells/L. The highest species richness was found in the bottom water layer of station S3, while the highest abundance was recorded in the 10-meter water layer of station S5. This season, the most abundant species was the Skeletonema spp., with a cell density of 434,880 Cells/L, accounting for 25.85% of the total abundance. This was followed by Thalassiosira sp. with 243,900 Cells/L (14.50%), *Chaetoceros curvisetus* with 184,740 Cells/L (10.98%), and *Chaetoceros socialis* with 98,880 Cells/L (5.88%). 2.Zooplankton A total of 8 phyla and 25 taxonomic groups were recorded. The number of groups per station ranged from 19 to 22, with abundances ranging from 370,812 to 1,706,239 individuals/1,000 m^3. The highest group diversity was observed at stations S3 and S4, while the highest abundance was recorded at station S4. This season, the most abundant group was Calanoida with 1,572,858 inds./1,000 m^3, accounting for 44.72% of the total. This was followed by Urodela with 654,033 inds./1,000 m^3 (18.60%), Chaetognatha with 332,655 inds./1,000 m^3 (9.46%), Cyclops with 182,718 inds./1,000 m^3 (5.20%), and Decapoda larvae with 177,058 inds./1,000 m^3 (5.03%). 3.Marine Benthic Organism A total of 7 orders, 10 families, and 13 species were recorded. The number of species per station ranged from 1 to 8 species, and the number of individuals ranged from 1 to 25. Station S1 recorded both the highest species richness and the highest abundance. The most dominant species this time was the *Nassarius livescens*, with 23 individuals (42.59%), followed by *Moerella rutile* with 28 individuals (14.81%), the *Corbula fortisulcata* with 7 individuals (12.96%), and *Atypopenaeus stenodactylus* with 3 individuals (5.56%).	No abnormal issues were found.

Table 1.2-1 Environmental Monitoring Results (3/4)

Phase	Category	Monitoring Items	Summary of Monitoring Results	Response Action
Offshore Construction & Operation phase	Marine Ecology	Plankton, Zooplankton Juvenile Fish Egg and Fish Larva, Benthic Organism	4.Fish Larva and Fish Egg This season, a total of 24 fish eggs and 31 larval and juvenile fish were collected. In terms of composition: Fish eggs were identified into 5 families and 5 groups, with the majority belonging to the Lutjanidae (snapper family), followed by Scombridae (mackerel family) and Carangidae (jack family). Larval and juvenile fish were identified into 10 families and 14 groups, with the most dominant species being the blue mackerel (*Scomber australasicus*), followed by *Ostorhinchus novemfasciatus*, Carangidae, grass puffer (*Takifugu niphobles*), Myctophidae (lanternfishes), Parupeneus spp. (goatfishes), Japanese anchovy (*Engraulis japonicus*), Bramidae family (pomfrets), and Cynoglossus spp. (tongue fishes). All other species were present at densities of fewer than 43 individuals per 100 m³.	No abnormal issues were found
	Cetacean Ecology	Fish	This season, a total of 7 individual fish, weighing 5.112 kg, were collected, representing 4 species from 4 families. No fish were captured at station T2. In terms of abundance, the most common species was the Kuhl's maskray (*Neotrygon kuhlii*), with 4 individuals, accounting for 57.14% of the total number of fish.	No abnormal issues were found.
		Underwater Filming	Underwater photography was conducted this season on March 2, March 11–12, March 25, April 9, and May 16, 2025. Surveys of the mid-water and bottom layers were completed for 22 wind turbines, including YUN04, YUN07, YUN08, YUN10, YUN14, YUN31, YUN33, YUN36, YUN40, YUN44, YUN46, YUN47, YUN54, YUN55, YUN56, YUN58, YUN59, YUN60, YUN65, YUN66, YUN67, and YUN75. The condition of biofouling on the bases or foundations of each wind turbine varied. Notably, coral colonization was observed on the monopile of YUN36, along with a high abundance of fish actively swimming nearby. YUN14, YUN33, and 10 other turbines also recorded the presence of various marine organisms.	No abnormal issues were found.
		Underwater Acoustic Survey	The underwater acoustic measurements at locations YW-1, YW-2, YW-3, YW-4 and YW-5 were recorded from April 17 to April 18, of 2025 for this quarter season. The total measurement time is 1 day (24 hours). 1. Whistle Detection During the measurement period at each site, cetacean whistle signals were detected at YW-1, YW-3, and YW-5. At YW-1, 197 whistle detections were recorded over 3 hours, with a contact rate of 65.7 detections per hour. At YW-3, 5 whistle detections were recorded over 1 hour, with a detection rate of 5 times per hour. At YW-5, 73 whistle detections were recorded over 3 hours, resulting in a detection rate of 24.3 times per hour. 2. Clicks Detection During the measured period at each site, no click sounds were detected at any of the locations (YW-1 to YW-5) during the survey period.	No abnormal issues were found.

Table 1.2-1 Environmental Monitoring Results (4/4)

Phase	Category	Monitoring Items	Summary of Monitoring Results	Response Action
Offshore Construction& Operation phase	Cetacean Ecology	Visual Monitoring	This quarter, a total of 12 offshore surveys were conducted, covering a transect distance of 718.6 kilometers and a transect time of 54.82 hours. During this quarter's surveys within the wind farm area, one cetacean sighting was recorded within the wind farm area during the surveys. The sighting rate per survey was 0.08, and the sighting rate per distance was 0.14 sightings per 100 kilometers.	No abnormal issues were found.
	Underwater Noise	Underwater noise 20 Hz-20kHz. Spectrogram, 1-Hz band, 1/3 Octave band analysis	This season, underwater noise monitoring was conducted at two points, YW-3 and YW-5. The main sources of significant noise contributions were the periodic fluid noise caused by tidal movements and vessel noise. The noise from tidal activity was predominantly at frequencies below approximately 100 Hz. In addition, croaker fish vocalizations (Sciaenidae family) were detected at both monitoring sites, characterized by sound frequencies mainly in the range of 500 Hz to 2 kHz.	No abnormal issues were found.
Onshore Operation	Electromagnetic Field	Magnetic Field (mG), Electronic Field	No magnetic field surveys were conducted this season.	-

1.3 Summary of Monitoring Project

Monitoring items, locations, frequency and schedule are listed in Table 1.3-1 to Table 1.3-3. Monitoring methodologies of the environmental monitoring are shown in Table 1.3-4.

Table 1.3-1 Table of Offshore Construction and Operation Phase Environmental Monitoring (1/2)

Category	Monitoring Item	Location	Frequency	Conducted Time
Marine Water Quality	Water Temperature, pH Value, BOD, Salinity, Dissolved Oxygen, Ammonia-N, Nutrients, Suspended Solid, Chlorophyll A, Coliform Group	5 points in wind farm area	Once per quarter	2025. 04.18
Bird Ecology	Species, amount, habiting and flying activities, flying route, seasonal flock change etc. (including shore bird and water bird)	Wind farm area and coastal area near the landing points.	Seasonally in winter (Dec.-Feb.); monthly in migration season during spring (Mar.-May), summer (Jun.-Aug.), fall (Sep.-Nov.)	**Offshore** 2025.03.01 2025.04.09 2025.05.15 **Coastal** 2025.03.13~14 2025.04.11&14 2025.05.15~16
Marine Ecology	Intertidal Ecology	50 m of 2 sides of landing point	Once per quarter	2025.04.08~10
	Plankton, Fish larva and fish egg, Benthic Organism	5 points in the wind farm area	Once per quarter	2025.03.25
	Fish	3 survey lines	Once per quarter	2025.03.24
	Underwater Filming	Turbine foundation and periphery	Once after the piling is completed	2025.03.02 2025.03.11~12 2025.03.25 2025.04.09 2025.05.16
Cetacean Ecology	Underwater Acoustic Survey	5 underwater acoustic monitoring stations in total.	Once per quarter (may be stopped if construction is stopped in winter)	2025.04.17~18

Table 1.3-1 Table of Offshore Construction and Operation Phase Environmental Monitoring (2/2)

Category	Monitoring Item	Location	Frequency	Conducted Time
Cetacean Ecology	Visual Monitoring	Wind Farm Area	30 trips in one year before offshore construction.	2025.01.31 2025.02.01 2025.03.01 2025.03.02 2025.03.03 2025.03.11 2025.03.12 2025.03.13 2025.04.08 2025.04.10 2025.05.14 2025.05.15 2025.05.16 2025.05.17
Underwater Noise	Underwater noise 20 Hz-20 kHz. Spectrogram, 1-Hz band, 1/3 Octave band analysis	2 stations at the boundary of turbines (data can be selected from underwater cetacean acoustic sampling stations.)	Once per quarter (may be stopped if construction is stopped in winter)	Collected data is from the underwater cetacean acoustic sampling stations YW-3 & YW-5 (2025.04.17~18)

Table 1.3-2 Table of Onshore Construction and Operation Phase Environmental Monitoring

Category	Monitoring Item	Monitoring Location	Monitoring Frequency	Conducted Time
Electromagnetic Field	Magnetic Field (mG)	1 station near the landing point	Once per year	No magnetic field surveys were done this season.

Table 1.3-3 Monitoring Method (1/4)

Category	Monitoring Item	Survey Methods
Marine Water Quality	Water Temperature	NIEA W217
	pH Value	NIEA W424
	BOD	NIEA W510
	Salinity	NIEA W447
	Dissolved Oxygen	NIEA W455
	Ammonia-N	NIEA W437
	Nitrate	NIEA W436
	Nitrite	NIEA W436
	Orthophosphate	NIEA W436
	Suspended Solid	NIEA W210
	Chlorophyll A	NIEA E509
	Coliform Group	NIEA E202
Bird Ecology	Species, amount, habiting and flying activities, flying route, seasonal flock change etc. (including shore bird and water bird)	1. Offshore Bird Survey Offshore bird visual survey is conducted with line transect method (Camphuysen et al. 2004). Survey area includes the wind farm and 1 km around its periphery. The survey region is marked with horizontally parallel transect lines (with corresponding gaps 2.5 km wide). On the transect lines, vessels will sail at an even speed (about 10 knots). To ensure an equitable survey, vessels will depart from opposite ends of the transect lines in different surveys. 2. Coastal Bird Survey Counting method during high tides (Sutherland, 1996) is applied. Shore birds will scatter around the muddy plain of intertidal area for foraging during low tides, which makes counting task difficult. On the other hand, during high tides, shore birds will gather on bank or neighboring inlands for resting. Therefore, survey dates are scheduled to coincide with the times of moderate and high tides, selecting clear weather days within a few days before and after these tides. Surveys are conducted within 3 hours before and after high tide.

Table 1.3-3 Monitoring Method (2/4)

Category	Monitoring Item	Survey Methods
Marine Ecology	Intertidal Ecology	Implemented according to the Ministry of Environment's issued "Standard Methods for Sampling Epibenthic Organisms in Hard Substrate Marine Areas" (NIEA E104.20C) and "Standard Methods for Sampling Benthic Organisms in Soft Substrate Marine Areas" (NIEA E103.20C).
	Plankton, Fish Egg and Fish Larva, Benthic Organism	1. Phytoplankton Implemented according to the Ministry of Environment's announced "Methods for Sampling Phytoplankton - Water Collection Method" (NIEA E505.50C). During sampling, a standard water sampler is used, and water samples are collected from different water layers based on the depths specified in the Marine Ecological Assessment Technical Specifications (EPA Comprehensive Letter No. 0960058664A). 2. Zooplankton Survey will be conducted by referring to “Sampling method for Phytoplankton— water sampling” （NIEA E701.20C） issued by MOENV. NORPAC net (mesh: 0.33 mm × 0.33 mm, length: 180 cm, diameter: 45 cm) will be applied in the survey. Implemented according to the MOENV's published "Methods for Marine Zooplankton Detection" (NIEA E701.20C). Sampling at each station was conducted using the North Pacific Standard Plankton Net (NORPAC net; mesh size 0.33 mm × 0.33 mm, net length 180 cm, net mouth diameter 45 cm), with a flow meter (HYDRO- BIOS mechanical German made flow meter) will be attached on its mouth to measure the volume quantity of filtered water. 3. Fish Egg and Fish Larva NORPAC net (mesh: 0.33 mm × 0.33 mm, length: 180 cm, diameter: 100 cm) will be applied in the survey. Flow meter will be attached on its mouth to measure quantity of filtered water. 4. Benthic Organism Implemented according to the MOENV's issued "Standard Methods for Sampling Benthic Organisms in Soft Substrate Marine Areas" (NIEA E103.20C). Each station was sampled using a Naturalist’s rectangular dredge with a mesh size of 5×5 mm, a net mouth width of 45 cm, and a net mouth height of 18 cm, at a vessel speed of less than 2 knots.

Table 1.3-3 Monitoring Method (3/4)

Category	Monitoring Item	Survey Methods
Marine Ecology	Fish	In this project, the primary sampling method is gillnetting, which involves placing a bottom gillnet at each station, roughly parallel to the coastline. The operational vessel will use satellite positioning (GPS) to locate the designated netting site along the survey line, where the net will be set, and sampling will be conducted for approximately 1 hour per station. After sampling, fish specimens will be refrigerated and quickly transported to the laboratory for species identification and the recording of total length, quantity, and weight.
	Underwater Filming	Lightweight observation-class remotely operated underwater vehicles (ROVs) equipped with high-resolution cameras were selected for environmental imaging at each station. These ROVs were deployed to designated locations and remained at mid-layer and bottom-layer depths for 15 minutes each, continuously recording the substrate conditions, fish species, and their quantities. Any special phenomena (such as artificial structures or large marine debris) were also recorded. After filming, the ROVs were controlled to surface at the ship's stern platform for manual retrieval, and the footage was brought back to the laboratory for identification and analysis.
Cetacean Ecology	Underwater Acoustic Survey	Underwater acoustic surveys were conducted using a bottom-anchored monitoring system. The hydrophone used was the Ocean Instruments Soundtrap 600 HF, with a sampling frequency of 384 kHz, and continuous monitoring was performed for 24 hours.

Table 1.3-3 Monitoring Method (4/4)

Category	Monitoring Item	Survey Methods
Cetacean Ecology	Visual Monitoring	Each survey is conducted by a research team of at least 3 observers, who rotate observation locations every 20 minutes. When a cetacean is observed, the observers record the initial sighting location, the relative direction of the cetacean, its distance from the vessel, and the angle relative to the vessel's heading. The research team then approaches the cetacean group gradually, as conditions allow, while recording the coordinates of the approach point. During this process, they estimate the number of individuals in the group, document their behavior, and collect relevant environmental data. Upon closer proximity, the vessel moves slowly to record the precise coordinates of the cetacean group, refine the estimation of group size, observe behavioral patterns in greater detail, and gather additional environmental factors.
Underwater Noise	Underwater noise 20 Hz-20kHz. Spectrogram, 1- Hz band, 1/3 Octave band analysis	The underwater noise analysis for this monitoring project was conducted using data from 5 cetacean ecological acoustic survey stations. Acoustic data analysis was performed at two stations located at the perimeter of the wind turbine positions.
Electromagnetic Field	Magnetic Field (mG)	Measured in accordance with the "Methods for Measuring Extremely Low Frequency Electric and Magnetic Fields in the Environment" (NIEA P202) that the Ministry of Environment stated. The extremely low frequency (ELF) electric and magnetic fields generated at any point and moment near 60 Hz power transmission and distribution lines were tested for their root mean square (RMS) strength.

1.4 Monitoring Locations

The locations of environmental monitoring are shown as in Figure 1.4-1 to Figure 1.4-9.

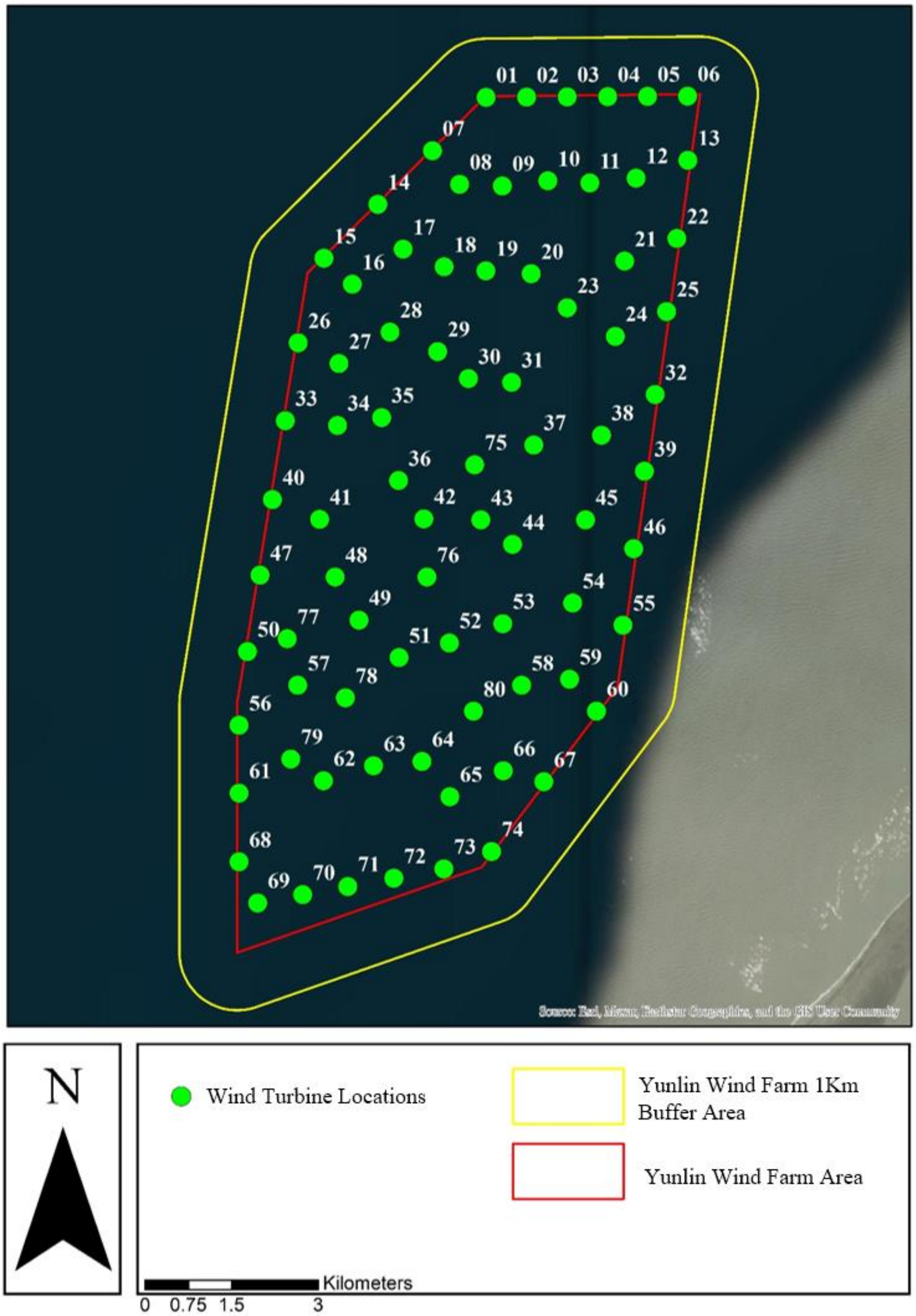


Figure 1.4-1 Map of Wind Turbine Locations in Yunlin Wind Farm

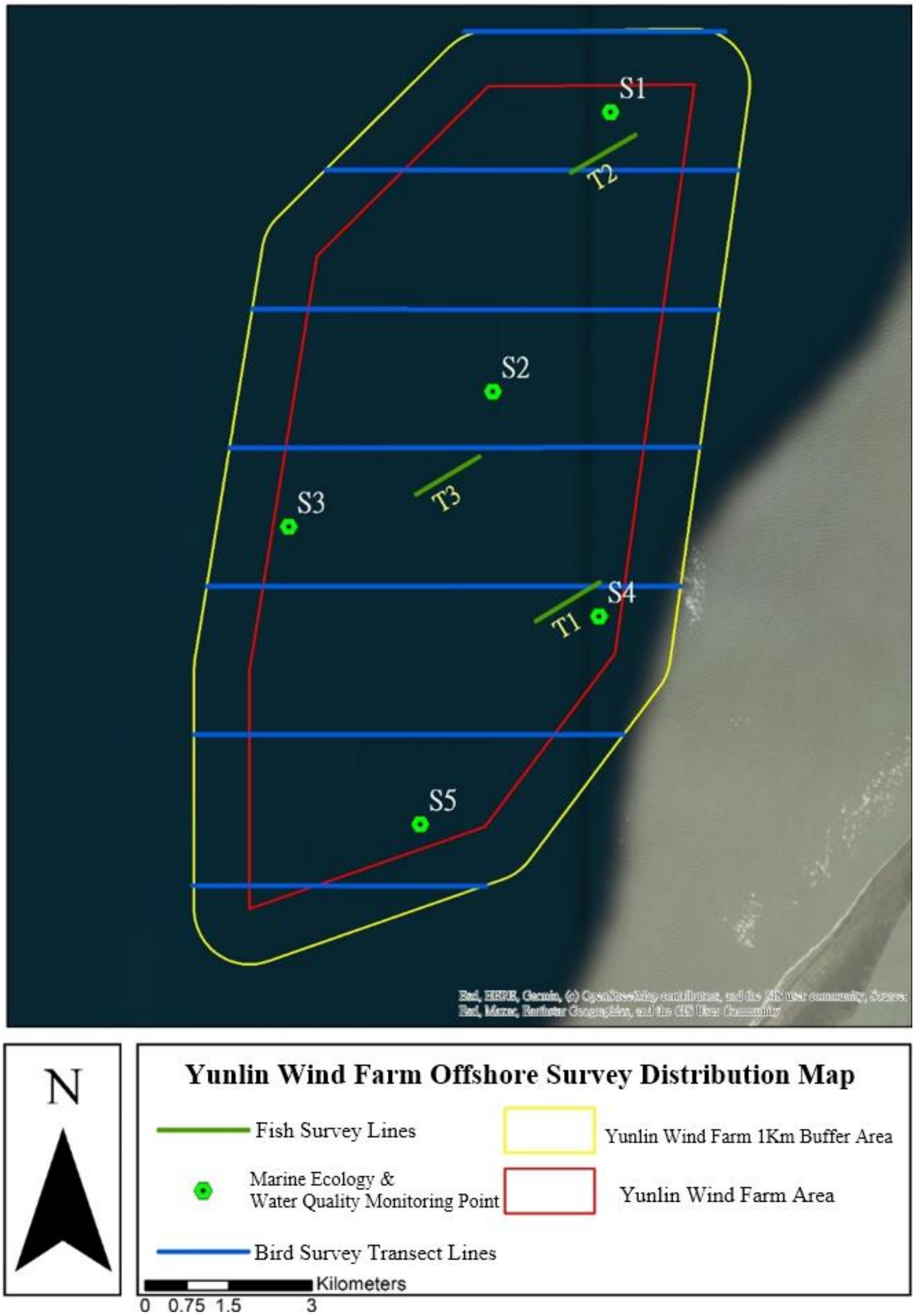


Figure 1.4-2 Location Map of Offshore Bird Ecology, Marine Ecology, Fish and Marine Water Quality Monitoring

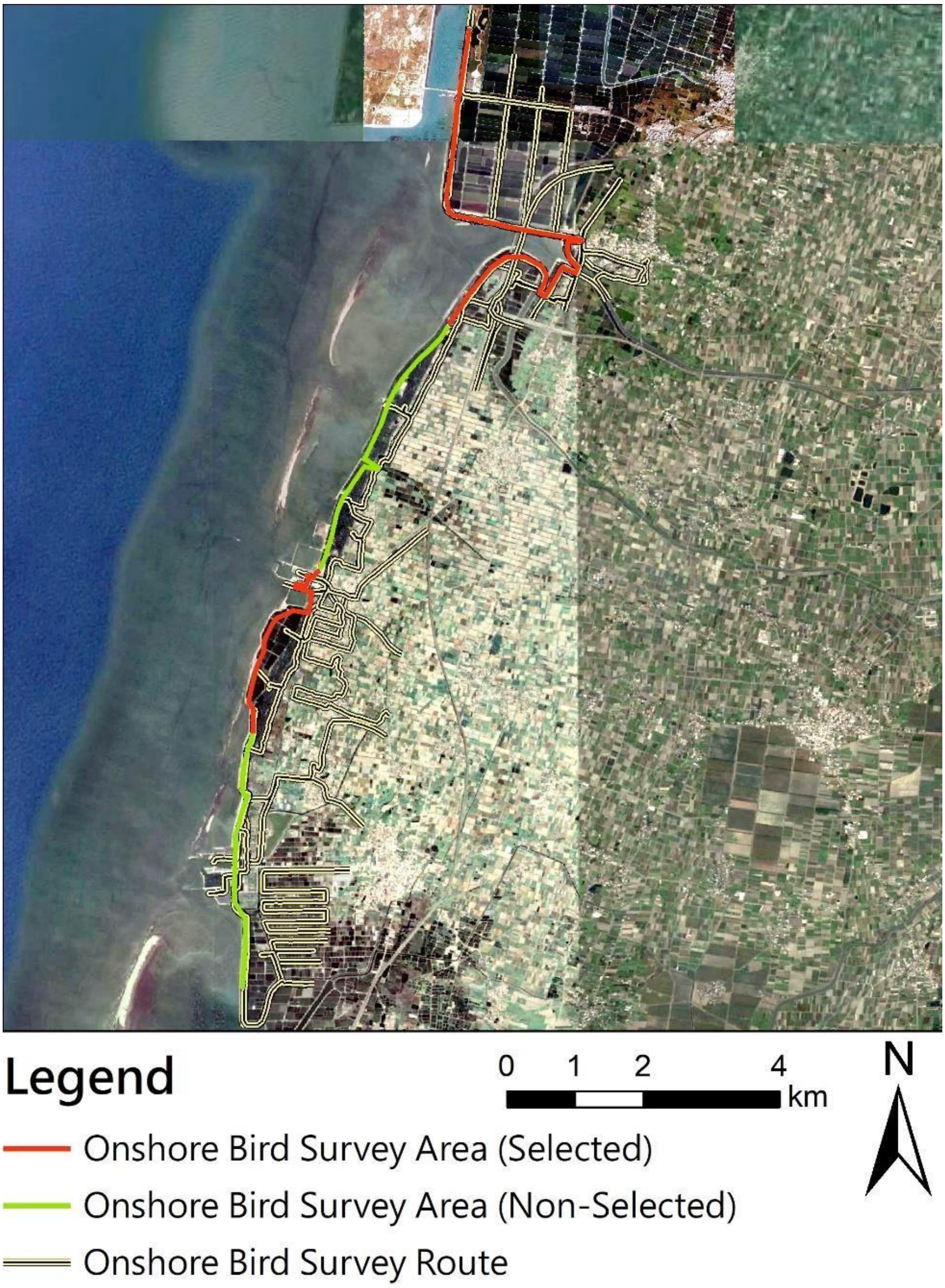
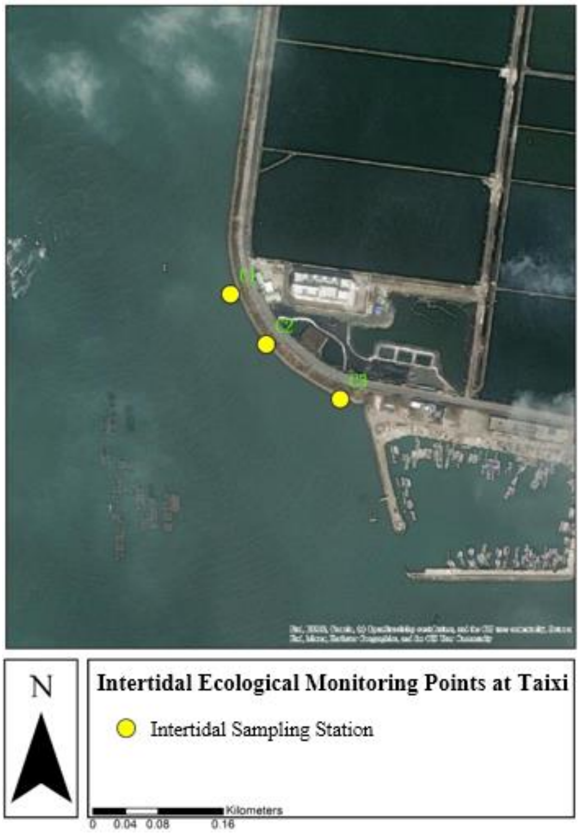


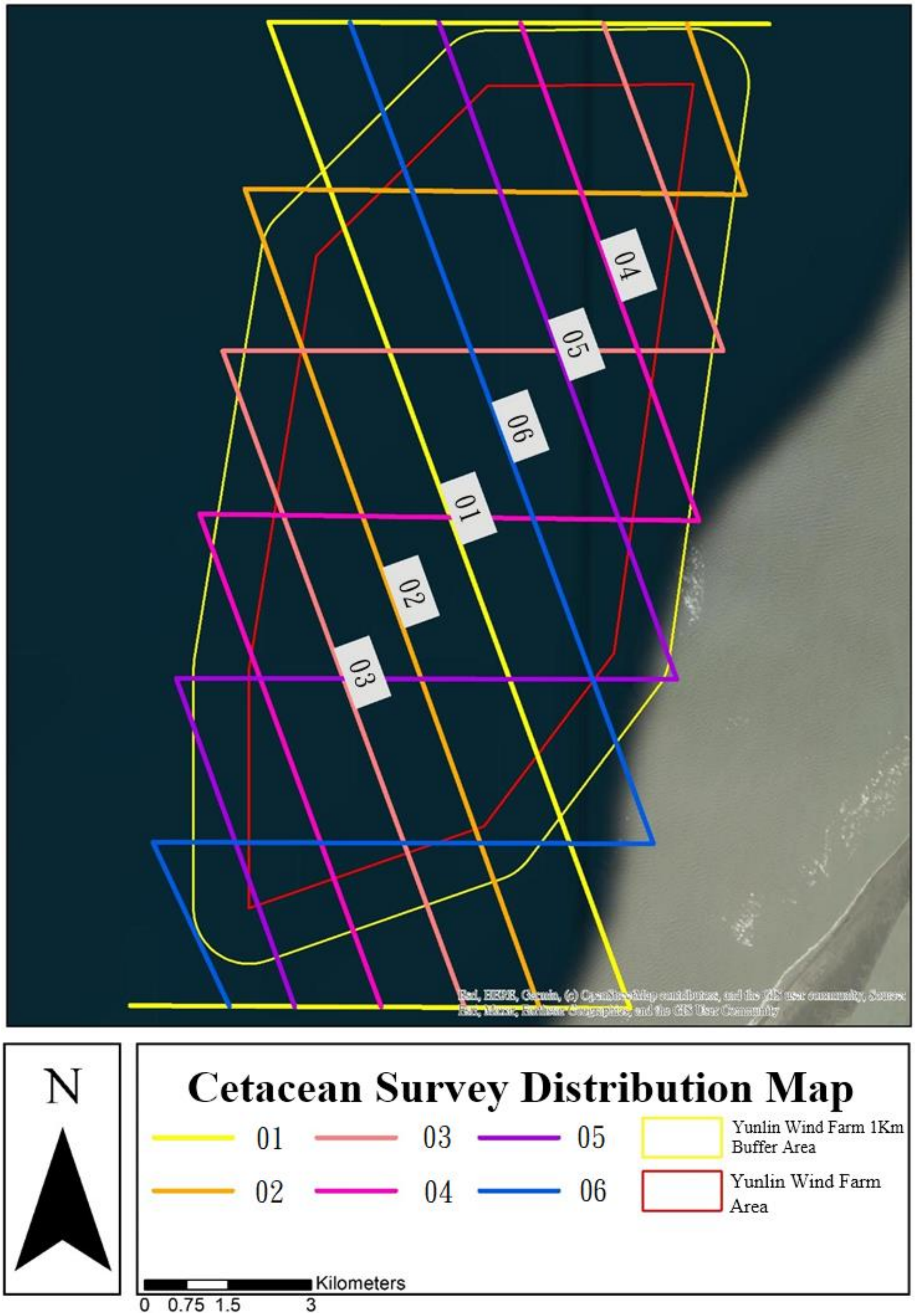
Figure 1.4-3 Location Map of Coastal Bird Survey



(1) **Landing Point (Taixi)**

(2) **Landing Point (Sihu)**

Figure 1.4-4 Location Map of Intertidal Ecological Monitoring



Remarks: Numbers indicate transect line conde of this survey.

Figure 1.4-5 Transect Lines of Cetacean Visual Survey

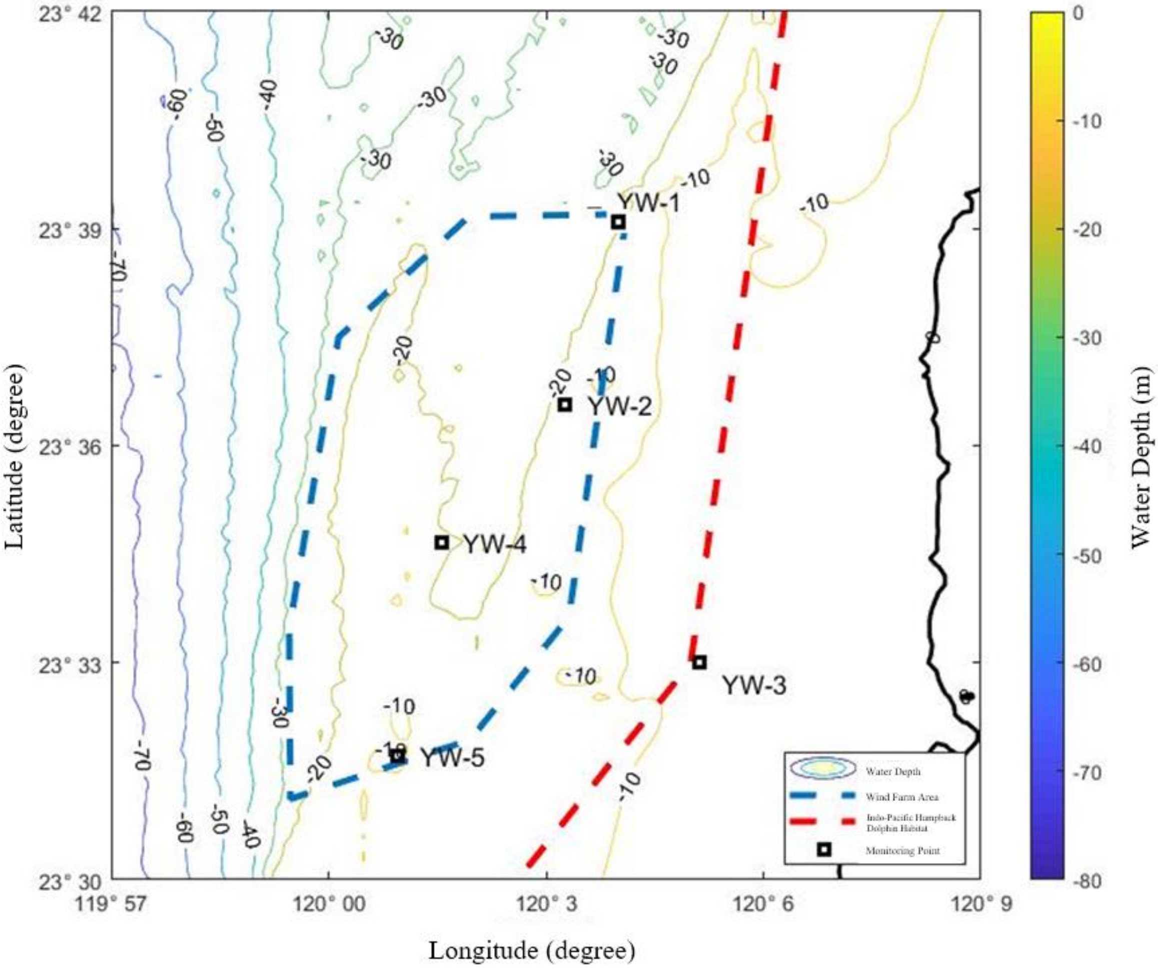


Figure 1.4-6 Schematic Diagram of Underwater Acoustic Measurement

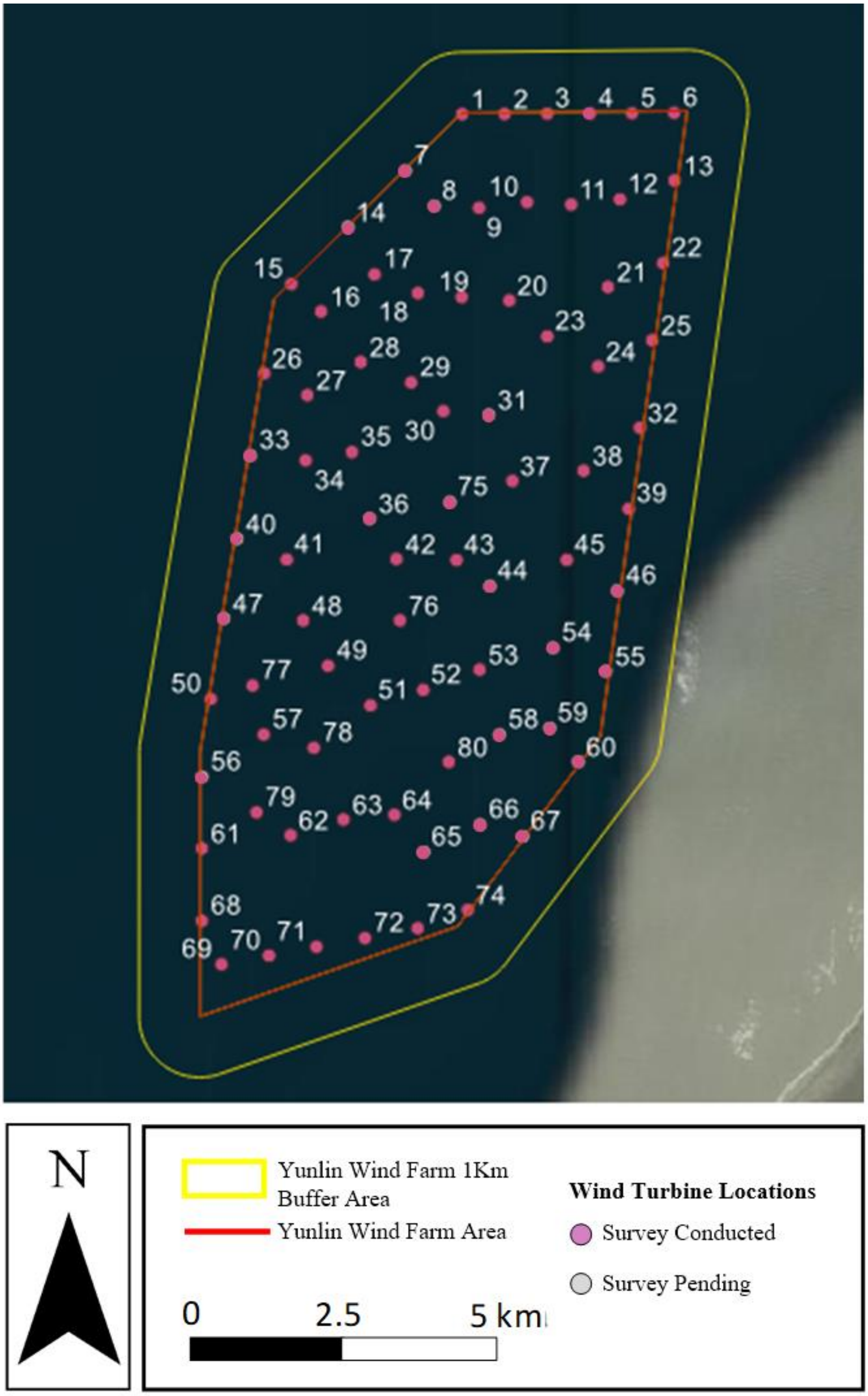


Figure 1.4-7 Wind Farm Area and Location for Underwater Filming

Figure 1.4-8 Location Map of Electromagnetic Field Monitoring

1.5 Quality Assurance/ Quality Control Operation Measures

1.5.1 Quality Assurance / Quality Control of In Situ Sampling

To ensure sample integrity, the number of transfers shall be kept to a minimum during sampling and delivery processes. Sampling personnel shall record detailed information in the sampling log and oversee the checking, packing, and delivery of the entire batch of samples. Sample bottles shall be stored in a thermostatic container and delivered as a complete batch, accompanied by the sampling log, to the designated laboratory. The samples will be accepted by the sample custodian. Procedures and notices during the sampling and delivery processes are outlined in Table 1.5.1-1 to Table 1.5.1-2.

When the samples are received by the sample custodian, it shall be verified that they are properly sealed. The sample bottles shall be examined to ensure they are not damaged and that water samples have not leaked. After examination, the custodian shall sign to acknowledge responsibility. The samples shall then be stored in designated refrigerators, with the date and time of storage recorded. The monitoring chain log shall be completed for further management and tracking of the sampling process.

Table 1.5.1-1 Procedures and Notices for Processes from Sampling to Delivering-Water Sampling

Sampling Procedure	Objective	Notice
Cleaning of Sampling Equipment	Clean the water sampler to collect sample that is big enough to represent the water layer.	Wash the sampler with distilled water.
Sampling	Ensure to reduce interruption from chemicals to the least when collecting samples from the water channel.	Prevent bubbles when sampling for items that have higher sensitivity to air (e.g. dissolved oxygen).
Filter/Storage	Water shall be filtered before measuring dissolved materials. This process shall be conducted as soon as possible after the water sample is collected. This step is also deemed as a way to store the sample. Storing of the sample is applied to prevent water sample from deterioration (e.g. volatilization, reaction, adsorption, photolysis) before analysis.	Add proper storing reagent and use clean container to store the samples.
In-Situ Measurement	To ensure that collected sample is integrity, some of the index shall be analyzed as soon as possible after sampling, e.g. pH value, conductivity and water temperature.	Conductivity, pH value and water temperature shall be analyzed on site.
Storage/ Deliver	Avoid degradation of quality due to lengthy storage duration or improper delivery.	Deliver and preserve according to regulated preserving method by MOENV; pay attention to the completeness when sealing.

Reference Data: Guidance of Environmental Sampling and Preservation (NIEA-PA102) issued by MOENV, Executive Yuan (Official Letter 0930072069B) on 4th October 2004.

Table 1.5.1-2 Procedures and Notices from Sampling to Delivering Electromagnetic Field

Sampling Procedure	Objective	Notice
Inventory of Equipment	Ensure the integrity of equipment.	Fill in equipment logbook.
Determine the validity of the calibration	Ensure the traceability of monitoring data standards.	Check equipment calibration data.
In Situ Erection	Complete the erection of equipment.	1. Monitoring is conducted at selected sampling points, it is erected according to regulated guidelines. 2. The measurement points are typically positioned at a height of 1 m above the ground or floor, with a maximum height not exceeding 2 m.
Electrical Calibration	Ensure the stability of equipment.	Use built-in electrical signal of NBF-550/EHP50F/ EFA-300, read reaction value by internal data acquisition system.
Equipment Setting	Set data output mode according to project requirements.	Measurements are conducted using a 3-axis probe for omnidirectional measurements, with monitoring data automatically stored, and a sampling interval not exceeding 10 seconds.

Reference Data: Guidance of Environmental Sampling and Preservation (NIEA-PA102) issued by MOENV, Executive Yuan (Official Letter 0930072069B) on 4th October 2004.

1.5.2 Quality Assurance/ Quality Control of Analysis

I. Testing personnel shall conduct analysis in strict accordance with the standard procedures of the testing method.

II. Quality management samples (e.g., blanks, duplicates, check samples, spiked standards) shall be analyzed per standards, and testing data recorded in the personal log using the standard format.

III. When test data meets quality control requirements and falls within specified limits, testing personnel shall submit records to quality control for review.

IV. During testing, only the necessary amount of water sample shall be removed from the refrigerator. The remaining samples must be promptly returned for use by others, and sample logs must be accurately completed.

1.5.3 Calibration Items and Frequency of Instrument

I. Instrument calibration in the environmental laboratory , as required by environmental testing, is divided into external and internal calibration. External calibration shall be assigned to calibration agencies that have obtained ISO/IEC 17025 (CNS 17025) certification; Internal calibration shall be performed by laboratories that have obtained ISO/IEC 17025 (CNS 17025) certification. As for Instrument maintenance shall be assigned to Original Equipment Manufacturer (OEM), authorized distributor, or qualified maintenance provider. The maintenance period and related regulations of environmental testing instrument are listed as Table 1.5.3-1. Calibration and maintenance guidelines of environmental testing instrument shall refer to NIEA PA108 PA108.

II. According to the general frequency of calibration and the frequency listed in Table 1.5.3-1, the instrument is assumed to be in good condition with appropriate maintenance and stability during the shortest or longest frequency of calibration or maintenance periods. The laboratory is qualified to use and check the instrument. When the instrument is under unfavorable conditions, the calibration and maintenance frequency shall be shortened. If the instrument is suspected to have a problem, calibration and maintenance shall be conducted promptly. The accuracy of some equipment, such as precision balances, may be affected after maintenance or moving; in such cases, re-examination or recalibration shall be performed.

III. The laboratory shall create a calibration and maintenance plan (table) and checklist for the annual calibration and maintenance of instruments or mechanisms with similar functions to conduct calibration or re-calibration.

IV. Calibration or maintenance of instruments shall be recorded and filed, including dates, results, and other findings.

V. All procedures for instrument calibration/maintenance shall refer to the manual of each instrument. Procedures shall be in line with the regulations of calibration agencies that have obtained ISO/IEC 17025 (CNS 17025) certification.

Table 1.5.3-1 Schedule of Equipment Calibration and Maintenance (1/3)

Equipment	Testing Items	Frequency	Notice	Records	Tolerable Error
pH meter	Calibration: Correctness	Every 3 Months	Temperature probe calibration (same method as working thermometer calibration)	Internal Calibration Record	±0.5 ℃
		Before & after use	First, calibrate with the first standard buffer solution (pH7) and use the second standard buffer solution (pH4 or pH10) to correct its slope. Measure the deviation, zero point potential and slope with the range covering prescribed 2 solutions; the values shall fall within acceptance range.	Internal Calibration Record	Deviation: ±0.05 Zero point potential: -25-25Mv Slope: -61--56mV/pH
	Maintenance: Clearance	Before & after use	Wash the glass electrode	—	—
Water Purification	Check: Resistivity	Everyday	Check resistivity presented on the panel	Record	General regulation: ≧16MΩ-cm(25℃) NIEA W313 regulation: ≧18MΩ-cm(25℃)
	Confirm: Resistivity	Every 6 Months	Test the resistivity of water to ensure that the value meets the requirement	Record	General regulation: ≦0.06μs/cm NIEA W313 regulation: ≦0.05μs/cm
	Maintenance: Clearance	Update according to device condition	Change filter/resin	Record	—
BOD Bottle	Calibration: Volume	Before 1st use	Calibration of all	Internal Calibration Record	According to CALP-PQ-008 requirement
		Per Annum	Calibration of 10%	Internal Calibration Record	

Table 1.5.3-1 Schedule of Equipment Calibration and Maintenance (2/3)

Equipment	Testing Items	Frequency	Notice	Records	Tolerable Error
Oven	Calibration: Temperature	Before 1st use	Check temperature changes in calibration and measurement laboratory	External Calibration Record	±1°C
		Per Annum	Use thermal couple to check temperature changes in the used location in the oven in calibration and measurement laboratory	External Calibration Record	±1°C
	Maintenance: Temperature	When using	Check temperature with thermometer and record the temperature	Record	±1°C
Referencing Thermometer	Calibration: Temperature	Per Annum	Send to calibration laboratory	External Calibration Record	-20°C±3°C 0-50°C±0.5 °C 50-100°C±1 °C 100-200°C±2 °C
	Calibration: Temperature	Every 6 Months	Freezing point inspection	Internal Calibration Record	
Working Thermometer	Calibration: Temperature	Before 1st use	Calibration on multiple temperature	Internal Calibration Record	
		Every 6 Months	Freezing point/single point calibration by referencing thermometer	Internal Calibration Record	
Dissolved Oxygen Meter	Calibration: Correctness	Before using	Single point inspection	Internal Calibration Record	3%
	Calibration: Correctness		Electrode inspection	Record	—
Dissolved Oxygen Meter	Confirm: Atmospheric pressure	Before using it	Compare with standard atmospheric pressure meter	Internal Calibration Record	< 1%
	Calibration: Saturated dissolved oxygen		Full point calibration using saturated-water vapor air	Internal Calibration Record	Slope: 0.7-1.25 % Saturation between 100±3%
	Confirm: Zero dissolved oxygen	Per Month	Zero point calibration/confirm with zero dissolved oxygen solution.	Internal Calibration Record	< 0.1 mg/L
	Confirm: Correctness		Check with aerated-to-saturation water, whose dissolved oxygen is testified through iodometry	Internal Calibration Record	<0.2 mg/L
	Confirm: Temperature	Every 3 Months	Compare with standard thermometer	Internal Calibration Record	0-50°C±0.2°C

Table 1.5.3-1 Schedule of Equipment Calibration and Maintenance (3/3)

Equipment	Testing Items	Frequency	Notice	Records	Tolerable Error
Conductivity Meter	Calibration: Correctness	Before using	Single point inspection (calibrate with 0.01N KCl)	Internal Calibration Record	±10 μmho/cm
	Calibration: Temperature	Per Annum	Calibration with thermo probe (same method as working thermometer)	Internal Calibration Record	±0.5℃
	Calibration: Correctness	Per Annum	Full scale inspection (0.1, 0.01, 0.001N)	Internal Calibration Record	0.1N: ±2% 0.01N: : ±2% 0.001N: ±5%
	Maintenance: clearance	Before & after use	Wash electrode	—	—
BOD Incubator	Confirm Maintenance: Temperature	Everyday	Record max/min temperature with high/low	Record	±1 ℃
Spectrophotometer	Calibration: Correctness Stability Reproducibility	Before using	Prepare calibration curve (referring to	Record	According to SOP requirement
		Every 3 Months	Calibration of accuracy of wavelength, absorbance, linearity, stray light, matching of cells	Internal Calibration Record	
		Per Annum	External calibration by manufacturer	External Calibration Record	
	Maintenance: Clearance	Before using	Clean fouling inside the tank	—	
Atomic Absorption Spectrometer	Calibration: Stability	Before using	Check the signal value through middle point of As or Hg's calibration curve	Internal Calibration Record	±20%
		Quarterly	Check absorbance with 5ppm Cu standard solution	External Calibration Record	Absorbance ≧ 0.55ABS
Electromagnetic Measurement Device	Calibration: Correctness	Every 2 years	Calibrate in the calibration lab	External Calibration Record	±10%

1.5.4 Testing Methods of Analysis Items

To ensure data quality of monitoring analysis, quality control goals for relevant monitoring analysis data are listed in Table 1.5.4-1

Table 1.5.4-1 Quality Control Objectives of Sample Testing Data

Category	Items	Testing Method	Instrument Detection Limit
Marine Water Quality	Temperature	NIEA W217	---
	pH value	NIEA W424	---
	BOD	NIEA W510	<1.0 mg/L
	Salinity	NIEA W447	---
	Dissolved Oxygen	NIEA W455	---
	Ammonia-N	NIEA W437	0.01 mg/L
	Nitrite	NIEA W436	0.001 mg/L
	Nitrate	NIEA W436	0.01 mg/L
	Orthophosphate	NIEA W427	0.003 mg/L
	Suspended Solid	NIEA W210	1.0 mg/L
	Chlorophyll a	NIEA E509	0.02 μg/L
	Coliform group	NIEA E202	10 CFU/100 mL
Electromagnetic field	Magnetic field	NIEA P202	0.0001 mT

1.5.5 Data Processing Principles

Calculations of raw data and testing logbook are indicated in significant figure and it is carried over based on regulations.

I. Significant Figures

In physics and chemistry measurements, the difference between measured and actual values is called error. The maximum error is called uncertainty or absolute uncertainty. For easier calculations, uncertainty is omitted. The observed value is shown using the significant figure method, which includes a correct and an unconfirmed figure.

The four fundamental operations of arithmetic are adopted by laboratory, the examples are listed as follows:

i Rounding: Round down if the last digit is less than 5, and round to the nearest even number if it's 5.

e.g.: 0.455 → 0.46

0.443 → 0.44

ii Estimated values are considered significant figures.

e.g.: 0.0025 → 2 significant figures (sig. figs)

13.20 → 4 sig. figs

iii Use scientific notation to avoid issues with "0".

e.g.: 130000 → ? sig. figs 1.30×105 → 3 sig. figss

1.3 ×105 → 2 sig. figs

iv For addition and subtraction, use the least number of decimal places.

e.g.: 120.05 + 10.1 + 56.323 = 186.473 →186.5

v For multiplication and division, use the least number of significant figures.

e.g.: 2.4×0.452/100.0 = 0.0108 = 0.011 → 2 sig. figs

vi For addition and multiplication, use the least number of significant figures.

e.g.: (1256×12.2) + 125 = 1.53×10^4 + 125 = 1.54×10^4

II. Data Processing and Confirmation

After the inspector completes the inspection, they shall fill out the inspection record form and submit it along with the work log to the quality assurance personnel. Once the quality assurance personnel have verified the data, they will compile it into a draft inspection report and hand it over to the administrative personnel to create the official inspection report.

The administrative personnel will then submit the inspection report, along with the inspection record form and the draft inspection report, to the laboratory director. After the laboratory director reviews and approves it, the report will be stamped, completing the official inspection report. The report number will be the same as the sample number.

1.5.6 Bird Ecology

I. Offshore Visual Survey

The offshore bird survey uses the ship transect counting method. The survey is conducted on days when the sea state is below level 4, wave height is under 1 meter, and visibility is above 500 meters. The vessel travels at a speed of 7-10 knots (nautical miles per hour) along the predetermined transect lines. Each ship has at least two trained surveyors equipped with GPS, binoculars, and a monocular digital camera, observing in all directions throughout the survey. When bird activity is detected, the bird data is immediately recorded. Since seabirds are often far away and fly quickly, making it difficult to identify species in real-time, long-lens monocular cameras are used to photograph all observed birds for further species identification.

i. Offshore bird visual survey is conducted with line transect method (Camphuysen et al. 2004). Survey area includes the wind farm and 1 km around its periphery. Horizontally parallel transect lines (with parallel gaps that are 2.5 km wide) are set in the survey area. Vessels will sail with even speed (about 10 knot) on the transect lines. To make an even survey, vessels will depart from opposite end of the transect lines in different surveys.

ii. Sailing tracks will be recorded with GPS devices in each survey. Sailing information and sea states during the surveys will be recorded in record sheets.

iii. At least 2 observers will be onboard, equipped with binocular and digital camera with at least 500mm equivalent focal length. Observers will conduct visual survey at the left and right sides of the vessel respectively. Distance of the visual survey is 300m from the sailing track (as shown in Figure 1.5.6-1).

iv. When observing bird activities, observers should record the species, number, relative ages, feather (plumage & moult), behaviors, spotting time, distance (vertical distance from the sailing track), flying direction and flying altitude depending on in-site condition, as much as possible. Record forms and items refer to recording sheets used in German StUK4 technical directions (Aumüller et al., 2013). Distance of resting birds is indicated by levels. 5 levels are classified, including 0-50m, 50-100m, 100-200m, 200-300m, and above 300m. Altitude of flying birds is indicated by 7 levels, including 0-5m, 5-

10m, 10-20m, 20-50m, 50- 100m, 100-200m, and above 200m. Taking bird ecological features at the Taiwan marine area into consideration, counting intervals suggested by StUK4 technical induction as well as method that counts all observed birds will be adopted for number recording.

v. Surveyed area will be calculated with the length of GPS tracks after each survey to estimate the bird density within the survey area.

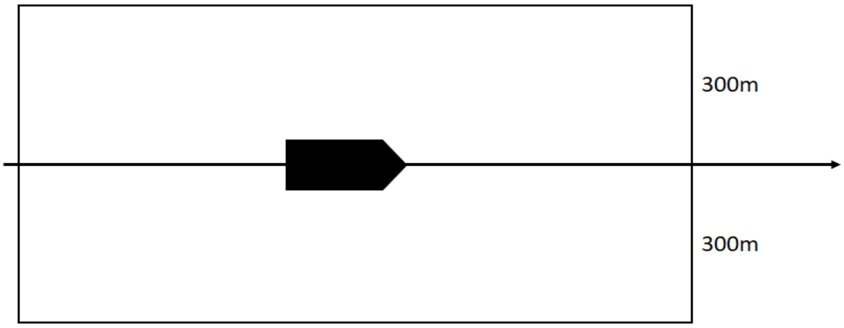


Figure 1.5.6-1 Sailing Tracks of Vessels of Line Transect Method

II. Coastal Bird Visual Survey

i. Counting method during high tides, the high-tide roost count method (Sutherland, 1996) is applied. Since shore birds will scatter around the muddy plain of intertidal area for foraging during low tides, which makes counting task difficult. On the other hand, during high tides, shore birds will gather in bank or neighboring inlands for resting. Records and calculation will be easier and more precise in this period.

ii. Surveyor will walk with binoculars at a slow walking speed along the established road or path in the survey area and record the bird species witnessed or heard along the way. Besides recording bird species and calculate abundance, bird behaviors and habitats will be recorded as well.

1.5.7 Marine Ecology

Survey items in marine ecology include Phytoplankton, Zooplankton, Benthic organism, Fish Egg and Fish Larva. Survey items and methods are described as follows:

I. Intertidal Ecology

Sampling complied with the "Guidelines for Sampling Epibenthic Organisms in Hard-bottom Marine Areas" (NIEA E104.20C) and "Guidelines for Sampling Benthic Organisms in Soft-bottom Marine Areas" (NIEA E103.20C) issued by the Ministry of the Environment.

Transect lines are used to survey for benthic species with high mobility, such prawns and crabs. A fixed-length line with a 1-meter range on both sides is placed from the high tide zone to the low tide zone in order to survey epibenthic shrimp and crabs. There are records of the species that are active in this range. The organisms are refrigerated for later identification in the lab after being photographed to document their traits if instant identification is not feasible.

The quadrat method is applied to benthic species that are less mobile, such snails and shellfish. A predetermined number of 1-meter x 1-meter sample frames are positioned along the line between the high tide and low tide zones; the number of sampling frames is modified based on the local conditions. These frames are used to view and gather epibenthic snails and shellfish. Using a shovel, dig 30 centimeters to gather subsurface snails and shellfish. Before being released, captured species are promptly identified and tallied. The organisms are refrigerated for later identification in the lab after being photographed to document their traits if instant identification is not feasible.

II. Phytoplankton

Implemented according to the Ministry of the Environment's "Phytoplankton Sampling Methods - Water Sampling" (NIEA E505.50C). Standard water samplers are used for sampling, and water samples from different depths are collected according to the Marine Ecological Assessment Technical Specification (EPA No. 0960058664A). For example, at a depth of 30 meters, samples are taken from the surface, 3 meters below the surface, 10 meters below the surface, and 27 meters (bottom). Each layer collects 1 liter of water in PE wide-mouth plastic bottles, immediately adding a final concentration of 5% neutral formalin for preservation, kept in the dark, and stored on ice. Samples are then brought back to the laboratory for species identification and counting.

Species identification primarily refers to the "Marine Plankton of Japan" (Yamaguchi, 1983).

i Species Composition and Abundance

Survey conducted in accordance with “Sampling Method of Phytoplankton – Water Extraction” (NIEA E505.50C) announced by MOENV. A standard water extraction equipment was used during sampling and the task was performed at specific sampling points and depths for the extraction of water samples at different water layer (as shown in Table 1.5.7-1), as regulated by the

Technical Specification for Marine Ecology Assessment (Environment Protection Administration Document No. 0960058664A) 1 L of water sample was gathered from each layer and placed in a PE plastic bottle and was instantly stabilized by adding neutral formalin with 5% final concentration. It is then kept away from sunlight and stored in ice, waiting to be taken back to the laboratory for species determination and counting.

ii Chlorophyll A

Survey conducted in accordance with “Determination of Chlorophylls a in Algae by Ethanol” (NIEA E508.00B) issued by MOENV. Regulated water sampler is applied for the sampling. Sampling water are taken in different layers according to technical regulation of marine ecology (MOENV official letter #0960058664A), as shown in Table 4.3.2-2. 1 L of water is taken from each layer and is contained in PE wide-mouth bottle. Water sample will be stored temporarily in ice bucket or refrigerator (4 ℃). It will then be concentrated and filtered onto the filter plate in 24 hours.

III. Zooplankton

Survey will be conducted in accordance with “Sampling method for Phytoplankton— water sampling” （NIEA E701.20C） issued by MOENV. NORPAC net (mesh: 0.33 mm × 0.33 mm, length: 180 cm, diameter: 45cm) will be applied in the survey. Flow meter (HYDRO-BIOS mechanical German made flow meter) will be attached on its mouth to measure quantity of filtered water.

Survay of Zooplankton is divided into facial horizontal and vertical sampling. Main survey method is vertical sampling; when water depth is under 7 m, horizontal sampling is adopted. For vertical sampling, NORPAC net, with weight attached at its bottom, will be sunk to 1m from the seabed. It will later be pulled up slowly (no faster than 3m/s) to the sea surface. For horizontal sampling, trawling will be conducted at area where water depth is under 7 m and vessel speed is under 3Nm. Mouth of the net is always kept under water surface.

After sampling, use wash bottle to filter the sea water and to wash zooplankton into the sampling bottle attached at the bottom of the net. Add 5% Formalin liquid into the bottle. Refrigerate the sampling bottle for following processing and analyzing in the laboratory.

IV. Fish Egg and Fish Larva

NORPAC net (mesh: 0.33 mm × 0.33 mm, length: 180 cm, diameter: 100cm) will be applied in the survey. Flow meter will be attached on its mouth to measure quantity of filtered water. Flow meter (HYDRO-BIOS mechanical German made flow meter) will be attached on its mouth to measure quantity of filtered water. For horizontal sampling, trawling will be conducted with vessel speed under 3Nm. Mouth of the net is always kept under water surface (about 2 m under water surface). After sampling, use wash bottle to filter the sea water and to wash zooplankton into the sampling bottle attached at the bottom of the net. Add 95% alcohol into the bottle. Refrigerate the sampling bottle for following processing and analyzing in the laboratory

V. Benthic Organism

Survey will be conducted in accordance with "Sampling of Benthic Organism in Softground Sea Area Act" （NIEA E103.20C） issued by MOENV. In each sampling station, vessel speed is lower than 2 Nm. Bottom trawling will be conducted with benthic organism sampler (Naturalist's rectangular dredge, mesh: 5 mm× 5 mm, mouth width 45cm, mouth height: 18cm). After retrieving the net, wash off the mud with sifting screen, identify and record captured samples and place them back. For species cannot be identified, it will be taken photo, stored in 5% Formalin liquid and refrigerated for identification once arrive at laboratory.

VI. Fish

Main sampling method of this project is gillnetting. Bottom gillnet is placed at each sampling station, with its direction generally parallel to the coastline. Coordinate of the correct sampling spots will be located by GPS. Then, nets will be deployed along the survey line for fixed spot sampling operation. Later, the nets will be retrieved 3 hours after deployment. Samples will be frozen or refrigerated for storing. They will be brought back to laboratory for species identification, quantity and weight record.

VII. Underwater Filming

A lighter observation class underwater vehicle (remotely operated underwater vehicles, hereinafter referred to as ROV) with a high-resolution camera will be used to photo the environment at the sample station. It will stay at two depths (the middle and bottom) for 15 minutes to observe the substrate conditions, fish species and quantity. In case of special phenomena (artificial structures or large marine debris, etc.), additional records will be made. After recording, the ROV will ascend to the stern platform, and personnel will retrieve the ROV. The images recorded will be brought back to the laboratory for identification and analysis.

1.5.8 Cetacean Ecology

I. Underwater Acoustic Survey

i Recording Instrument

The monitoring equipment used in this project, apart from the anchoring system (bottom anchors, main ropes, and buoys), includes the Soundtrap 600 HF model from New Zealand's Ocean Instruments. The specifications are detailed in Table 1.5.8-1 and Figure 1.5.8-1.

The Soundtrap 600 HF underwater recorder is suitable for long-term underwater noise monitoring and can perform continuous recording for approximately 160 days. The raw recording file format is WAV. The self-noise level is below 37 dB above 2k Hz (reference sound pressure 1 μPa), with a maximum sampling rate of up to 384k Hz. For underwater noise monitoring, it meets the analysis frequency range of 20 Hz to 20k Hz. For the acoustic requirements of dolphins, the sampling rate must reach at least 96k Hz; for species that emit higher frequency sounds, such as the echolocation sounds of the Vaquita or Pygmy Sperm Whale, the sampling rate must reach at least 288k Hz. The Soundtrap 600 HF meets the specifications for cetacean acoustic monitoring.

Table 1.5.8-1 Acoustic Instrument Specifications

Soundtrap 600 HF	
Sampling Frequency	384k Hz max
Resolution	16 bit
Memory Storage	2 TB
Internal Battery	160 days
Maximum Depth	500 m

Figure 1.5.8-1 Deployment of the Device

ii Cetacean Sound Detection

Cetacean sounds include whistles, which are used for communication and social behavior between groups or individuals, and clicks, which are used for environmental geomorphology detection and locating prey, as shown in Figure 1.5.8-2. Whistles have a narrow bandwidth and a certain duration, while clicks have a wider bandwidth and are impulsive sounds with very short duration. Additionally, cetaceans have different kinds of whistles, which can be identified from recordings. Clicks have a wider bandwidth and higher frequency (usually higher than 10 kHz). Cetaceans emit a sequence of clicks to detect the distance to other objects via echoes.

The recording device covers frequencies from 20 Hz to 20 kHz. A 1/3 octave band filter will be used for analysis in this project. The specific range of cetacean sounds (2.5 kHz to 10 kHz) will be analyzed via spectrum and signal filter. As shown in Figure 1.5.8-2, the features of sounds between 2.5 kHz and 10 kHz are relatively distinct. Therefore, 2.5 kHz to 10 kHz is selected from the overall frequency spectrum (20 Hz to 20 kHz) for the identification of marine animal sounds (cetacean or fish), and the nature of ambient noise in the wind farm can be analyzed.

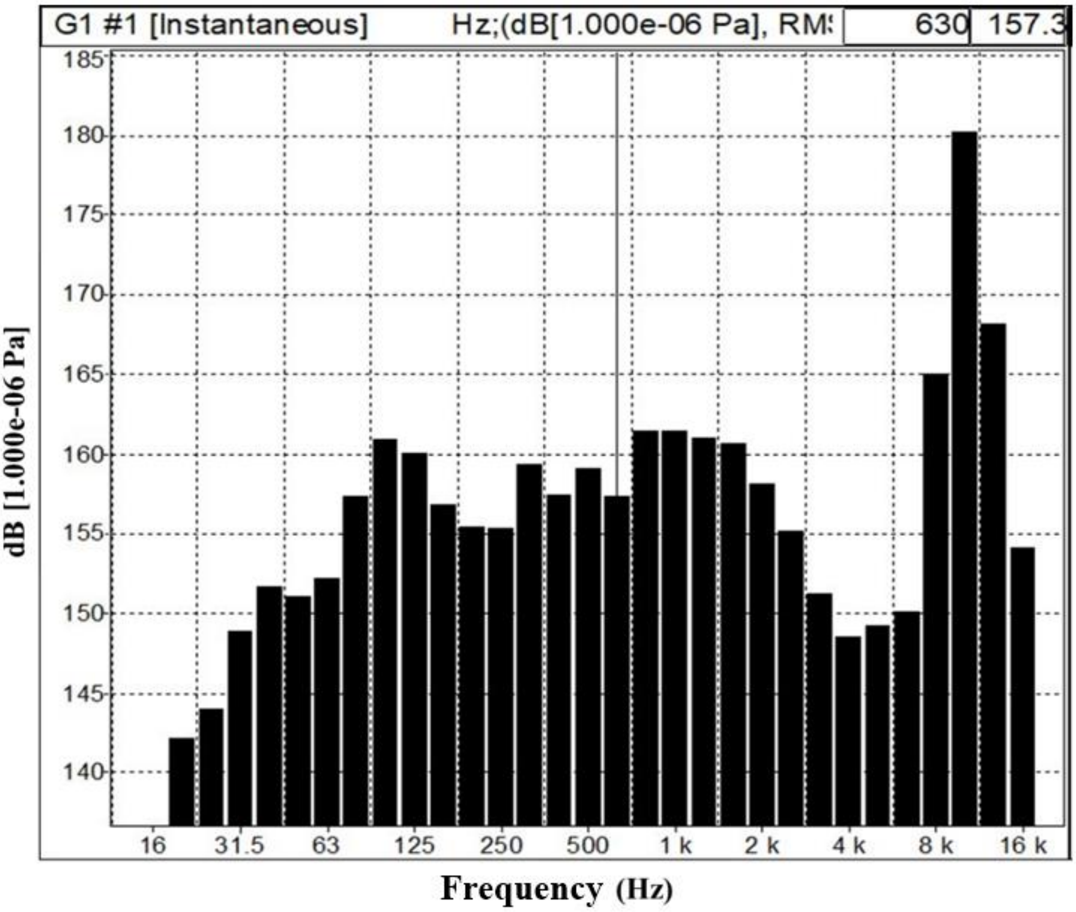


Figure 1.5.8-2 Cetacean Whistles and Clicks

1. Detection of Whistles

   Whistles have narrow bandwidth and certain time length. Its frequency might vary over time and the sound varies widely (Van Parijs & Corkeron, 2001; Sims et al., 2012; Lin, 2013). Therefore, whistle detection codes of this project included: signal analysis, noise removal, and selection of energy and bandwidth.

   With respect to signal analysis, Window function of Hamming is used via Short Time Fourier Transform (STFT) to obtain spectrogram as in Figure 1.5.8-2. After background noise signals are removed, potential whistles are filtered according to energy variance. The filtering is done through interpreting the spectrum. First, signals indicating detected sounds on the spectrum will be marked as black dots. Later, connect the black dots into a line and compare its frequency (height) and duration (length) with the setting value. If it meets the setting value, it will be identified as whistles. This algorithm does not require specific sound plate to detect sound with whistle characteristics. It is a non-specific automatic detector.

Sounds of dolphins frequently seen in the western sea area of Taiwan are in the middle-frequency, which range between 3k -9k Hz. For example, Chinese white dolphin or Indo-Pacific hump-backed dolphin and bottlenose dolphin. Therefore, the range 2.5k- 10k Hz were adopted as the range of analysis. Figure 1.5.8-5 shows the detection result for an hour. If there is no whistle, presented figure will be blank; if whistle is detected within that hour, the location shall be marked as blue dots and personnel could inspect time and frequency of blue dots in the spectrogram to confirm whether they are dolphin whistles or not and filter out non-whistle noises.

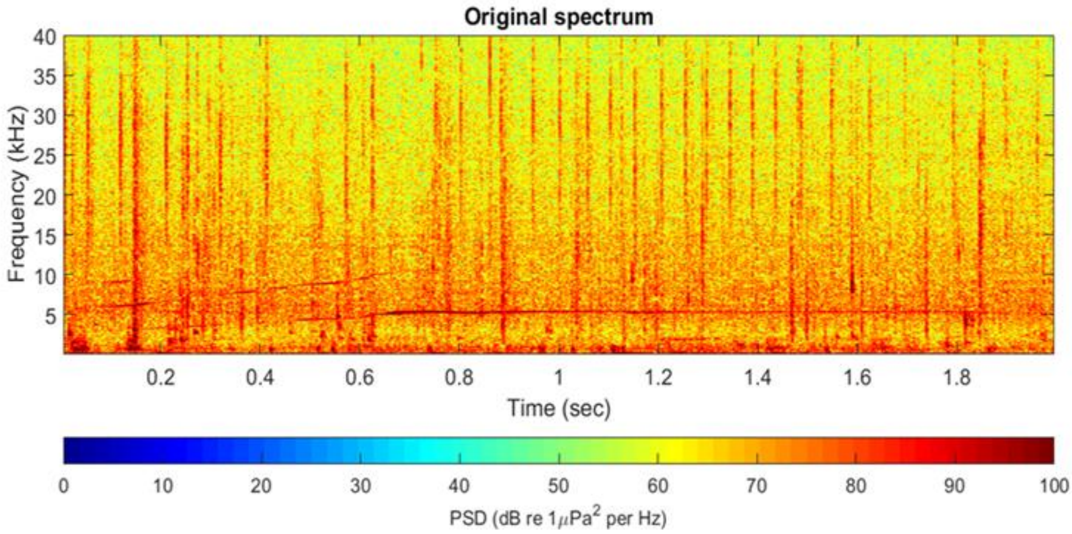


Figure 1.5.8-3 Spectrogram Obtained Via STFT

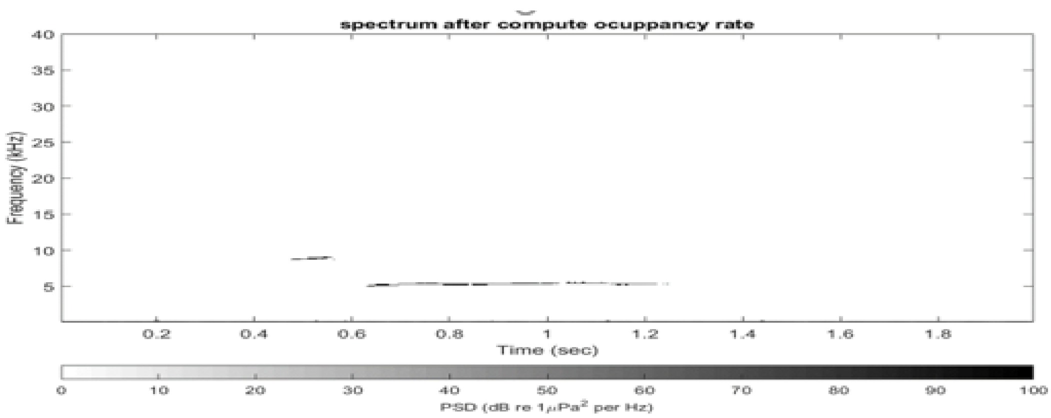


Figure 1.5.8-4 Black Dots Distribution (Hamming Window Function)

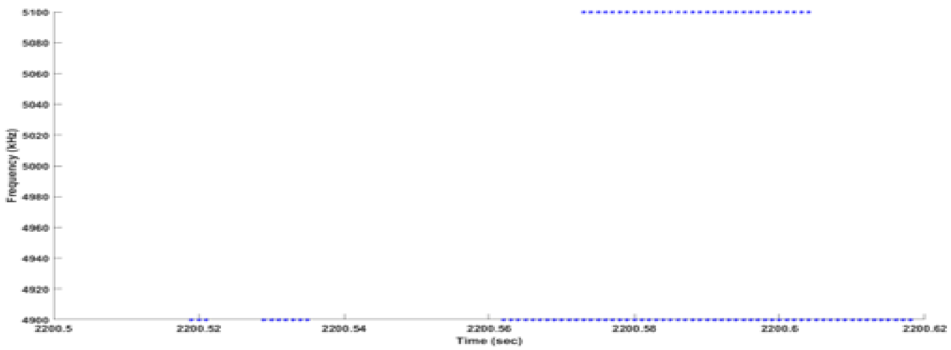


Figure 1.5.8-5 Schematic Diagram of Detection Program Results (Detection Range is 3k to 9k Hz

2. Detection of Click

Click Train。As click is impulse sounds with wider bandwidth, it's called Click Train (Figure 1.5.8-6). The interval of pulses is defined as ICI (Inter-Click Interval). The ratio of ICI1 and ICI2 in Figure 1.5.8-6 is ICI ratio (=ICI2/ICI1); if the ratio is smaller than 1/2 or greater than 2, it is considered a different Click Train. The method of click detection in this project is to identify potential Click Train by energy, then select Click Trains with ICI >1ms and contain only 6-500 pulses.

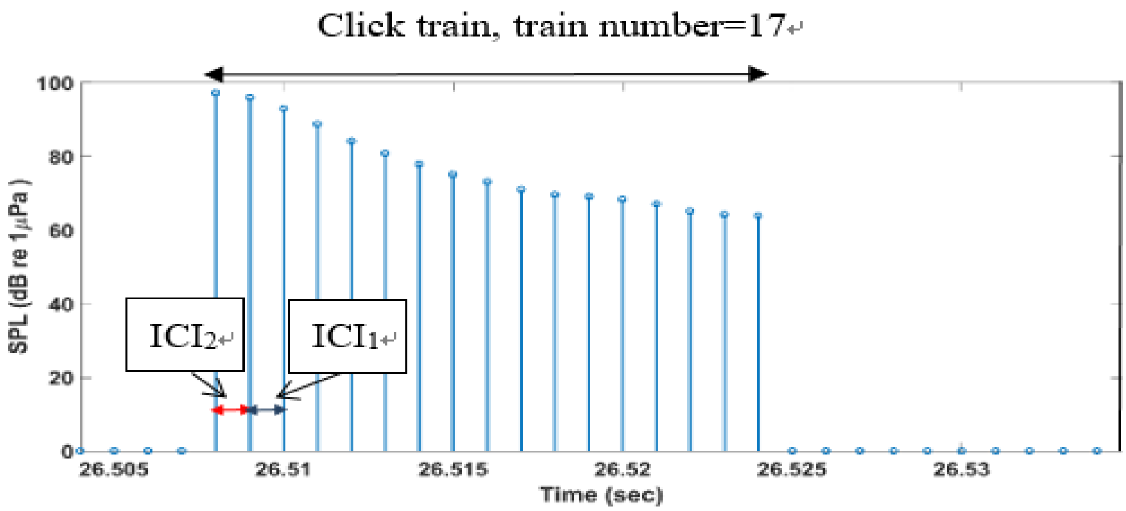


Figure 1.5.8-6 Schematic Diagram of Click

II. Visual Survey

Before each survey, two transect lines and their survey sequence are selected. The outbound and return directions of the two transect lines differ. During the survey, a handheld GPS is used to locate and record the navigation route.

Each survey involves at least three observers, covering the front, left, and right sides of the vessel, with regular rotation to prevent fatigue. Observers use binoculars to watch for cetaceans. When cetaceans are detected, their data is recorded immediately. Observers switch positions approximately every 20 minutes to avoid psychological fatigue from observing the same area. After rotating through two different positions, each observer rests for about 20 minutes to maintain their stamina and physical strength.

During the survey, when the vessel is on the designed transect line with wave levels below 4 and visibility over 500 meters, it is considered "on-effort." When the vessel is traveling between the port and the transect line, during poor weather conditions, or while observing cetacean groups, it is considered "off-effort." Although off-effort data is not included in the standardized sighting rate analysis, any cetacean sightings are still valuable data. The total navigation time, from departure to return, includes both effective and ineffective effort. The vessel's speed during the survey is maintained at 7-10 knots.

When cetaceans are observed, the initial location, angle, distance from the vessel, and vessel's angle are recorded. The vessel then slowly approaches the cetacean group, recording the coordinates of the approach point, estimating the group size, and observing cetacean behavior. Additionally, cameras or video cameras are used to capture images of the cetacean for individual identification records.

i. Survey Methodology Transect Selection: Before each survey trip, two transect lines and their survey sequence are selected. The outbound and return directions of the two transect lines are different. During the sea voyage, a handheld GPSmap 64ST (Garmin Corp., Taiwan) is used to locate and record the navigation route.

3. Observer Team: Each survey involves at least three observers/researchers, led by an experienced lead observer with years of marine cetacean survey experience. All observers must undergo relevant training, such as internal cetacean survey seminars or the four-hour marine researcher safety training course by the Fisheries Agency of the Council of Agriculture.

4. Observation Positions: The first two observers are responsible for searching the left and right sides of the sea surface using the naked eye and binoculars, while the third observer records water quality, sea conditions, and GPS coordinates. Observers switch positions

approximately every 20 minutes to avoid fatigue from observing the same area. After rotating through two different observation positions, each observer rotates to the water quality recording position for about 20 minutes to rest.

5. On-effort and Off-effort: During the survey, when the vessel is on the designed transect line, with wave levels below 4 and visibility over 500 meters, it is considered "on-effort." When the vessel is traveling between the port and the transect line, during poor weather conditions, or while observing dolphin groups, it is considered "off-effort." Although off-effort data is not included in the standardized sighting rate analysis, any cetacean sightings are still valuable data. The total navigation time includes both effective and ineffective effort. The vessel's speed during the survey is maintained at 6-9 knots. Every 10 minutes, the vessel stops, and surface seawater is collected using a YSI 30 salinity-temperature meter to measure surface temperature and salinity, recording environmental factors (depth, surface temperature, salinity, waves, visibility).

6. Cetacean Observed: When cetacean are encountered, the initial location, angle, distance from the vessel, and vessel's angle are recorded. The vessel then slowly approaches the cetacean group, recording the coordinates of the approach point, estimating the group size, observing cetacean behavior, and collecting relevant environmental data. Observers fill out the cetacean sighting record form. Additionally, cameras or video cameras are used to capture images of the cetaceans group for individual identification. If the cetaceans do not show obvious avoidance behavior, the vessel continues to follow and record the group's behavior and location. If the tracked dolphins disappear from view and are not sighted again within 10 minutes, the vessel returns to the transect line to continue searching for the next group.

ii. Data Analysis

1. Survey result is obtained by analyzing sighting rate, spatial distribution, environmental factors and herd structure of all cetaceans and Chinese White Dolphin or Indo-Pacific hump-backed dolphin. There are 3 types of sighting rate calculations: (1) mileage

sighting rate (2) hour sighting rate (3) trip sighting rate. The former 2 types are calculated by dividing on-effort observed number of cetacean herds by on- effort mileage/on-effort hour to standardize sighting rate (number of cetacean herds/ 100km, number of cetacean herds/10 hours). Trip sighting rate is from dividing number of trips with cetacean observation by number of all trips.

2. According to the coordinates of sightings, Spatial distribution positioning is conducted using Geographic Information Systems (GIS). Based on the distance between wind farm perimeter and the survey vessel, software ArcGIS10 helps to understand the relationship between different distance intervals and the spatial distribution of cetaceans.
3. Water surface behaviors of dolphins are divided into four genres: "Travelling, Foraging, Socializing, and Milling."
4. Definitions from Parra (2006) are as followed:
   A. "Travelling" herds have a consistent and almost fixed swimming direction. They dive with regular gaps and smaller angles.

   B. "Foraging" herds may present scattering and inconsistent swimming directions. Dolphins will have big diving angle and raise their tails; no regulation shown in travelling is found. In addition, sudden speeding up or behaviors that indicate foraging (slapping water surface with tail, biting fish with mouth, diving, etc.) are frequently observed.

   C. "Socializing" herds have a difficult-to-predict diving mode. Physical contacts or even bumps are frequently seen between individuals. A considerable number of activities beyond water surface are observed.

   D. "Milling" herds have slower activities on water surface and moves only in a small sea area. Individuals are close with each other, yet without obvious physical contacts. They have a more regular diving mode with smaller angle. The group stays near the surface of water most of the time. The behavior is similar to resting.

   E. Observed behaviors cannot be classified into prescribed genres will be marked as "Others," with possible inference on the behaviors.

1.5.9 Underwater Noise

Underwater noise data from two stations located at the perimeter of the wind turbine area, selected from five stations in the cetacean underwater acoustic survey, are analyzed. The overall background noise includes identifiable noise sources (e.g., tidal changes, ocean currents, vessel noise, biological activities, etc.). To understand the distribution of underwater noise, the percentile sound pressure level (unit: dB) is used: this shows the Leq,T noise value that is greater than or equal to the percentile level for x% of the measurement period. For example, L90 represents the value exceeded by 90% of the total measurement period (representing background noise); L50 represents the value exceeded by 50% of the total measurement period (representing median noise); and L5 represents the value exceeded by 5% of the total measurement period (representing high noise sources).

The sound frequency being measured is set at above 51.2k, with software performing a Fast Fourier Transform (FFT) to calculate the frequency range (20 Hz to 20 kHz) with a bandwidth of approximately 1 Hz. Since the octave band level is the sum of the energy within a frequency band, the sound pressure level of the 1/3 octave band will be much higher than that of the 1 Hz bandwidth used in underwater acoustics.

This measurement uses an underwater noise measurement system compliant with the International Organization for Standardization (ISO) 18406 and a data processing system using octave band filters compliant with the International Electrotechnical Commission (IEC) standard 61260-1. The analysis includes underwater noise, as shown in Table 1.5.9-1 for the center frequency of the 1/3 octave filters.

1.5.10 Fishery Resource Survey

Information on the fishing season, fishing grounds, type of harvests, and the operation status fishing vessels in the Yunlin County will be compiled. These data will be analyzed and collected in the report along with the onsite survey data, annual fishery reports and local fishing harvests.

Table 1.5.9-1 Center Frequency of the 1/3-Octave Bands Filter

Frequency(Hz)		
1/3 Octave		
Lower Band Limit	Center Frequency	Upper Band Limit
14.1	16.0	17.8
17.8	20.0	22.4
22.4	25.0	28.2
28.2	31.5	35.5
35.5	40.0	44.7
44.7	50.0	56.2
56.2	63.0	70.8
70.8	80.0	89.2
89.2	100.0	112.0
112.0	125.0	141.0
141.0	160.0	178.0
178.0	200.0	224.0
224.0	250.0	282.0
282.0	315.0	355.0
355.0	400.0	447.0
447.0	500.0	562.0
562.0	630.0	708.0
708.0	800.0	891.0
891.0	1,000.0	1,122.0
1,122.0	1,250.0	1,413.0
1,413.0	1,600.0	1,778.0
1,778.0	2,000.0	2,239.0
2,239.0	2,500.0	2,818.0
2,818.0	3,150.0	3,548.0
3,548.0	4,000.0	4,467.0
4,467.0	5,000.0	5,623.0
5,623.0	6,300.0	7,079.0
7,079.0	8,000.0	8,913.0
8,913.0	10,000.0	11,220.0
11,220.0	12,500.0	14,130.0
14,130.0	16,000.0	17,780.0
17,780.0	20,000.0	22,390.0

Chapter 2 Analysis of Monitoring Results

2.1 Offshore Construction Phase Monitoring

2.1.1 Marine Water Quality

This season's survey on April 18, 2025, conducted water quality monitoring within the Yunlin wind farm area. Samples were collected from three layers (surface, middle, and bottom) at five stations (S1 to S5). The analysis included 10 monitoring items in marine quality including, Water Temperature, pH value, Biochemical Oxygen Demand, Salinity, Dissolved Oxygen, Ammonia Nitrogen, Nutrients (Nitrate Nitrogen, Nitrite Nitrogen, Orthophosphate), Suspended Solids, Chlorophyll-a, and Escherichia Coli. The monitoring results are summarized in Table 2.1.1-1. Detailed raw monitoring data results are provided in Appendix 4.1, and the station locations are shown in Figure 1.4-1.

According to the revised "Marine Environment Classification and Marine Environmental Quality Standards" (Marine Protection No. 1130004128) announced by the Ocean Affairs Council on April 25, 2024, the wind farm area in this project falls under Class A marine waters. The monitoring results are compared with the Class A marine environmental quality standards as follows.

I. Water Temperature

The monitoring results for water temperature at each station this season ranged between 25.4 and 26.4℃.

II. pH Value

The pH monitoring results at each station this season were ranged between 8.2 and 8.3, complying with the Class A marine environmental quality standards (7.6–8.5).

III. BOD

The monitoring results for biochemical oxygen demand at each station this season were all <1.0 mg/L, which comply with the Class A marine environmental quality standards (<2.0 mg/L).

IV. Salinity

The monitoring results for salinity at each station this season ranged between 33.0 and 33.2 psu.

V. Dissolved Oxygen

The monitoring results for dissolved oxygen at each station this season ranged between 6.6 and 6.9 mg/L, all of which comply with the Class A marine environmental quality standards (>5.0 mg/L).

VI. Ammonia Nitrogen

The monitoring results for ammonia nitrogen at each station this season ranged from ND (Not Detected) to less than 0.05 mg/L, all of which meet the Class A marine environmental quality standard (<0.3 mg/L).

Table 2.1.1-1 Marine Water Quality Monitoring Result of this Quarter

Monitoring Date		2024.4.18															Class A Marine Environmental Quality Standards
Station		S1			S2			S3			S4			S5			
Item	Unit	Surface	Middle	Bottom	Surface	Middle	Bottom	Surface	Middle	Bottom	Surface	Middle	Bottom	Surface	Middle	Bottom	
Coliform Group	CFU/100mL	<10	<10	<10	<10	<10	<10	<10	<10	10	<10	<10	<10	<10	<10	<10	< 1,000
Suspended Solids	mg/L	3.4	4.5	3.2	4.8	5.0	5.7	28.8	34.2	34.3	13.3	12.0	11.6	3.4	3.4	2.4	—
Water Temperature	℃	25.9	25.7	25.5	26.4	26.1	25.8	25.9	25.7	25.5	26.3	26.1	25.7	25.9	25.7	25.4	—
pH value	-	8.2	8.2	8.2	8.2	8.2	8.2	8.3	8.3	8.3	8.2	8.2	8.2	8.2	8.2	8.2	7.6~8.5
Orthophosphate	mg/L	0.026	0.025	0.018	0.026	0.019	0.025	0.037	0.040	0.037	0.023	0.022	0.024	0.019	<0.015	0.016	—
Nitrate Nitrogen	mg/L	ND	<0.05	<0.05	<0.05	ND	<0.05	<0.05	<0.05	ND	ND	<0.05	ND	ND	<0.05	ND	—
Nitrite Nitrogen	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	—
Ammonia-N	mg/L	ND	<0.05	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	<0.3
Dissolved Oxygen	mg/L	6.8	6.8	6.9	6.6	6.7	6.7	6.8	6.9	6.7	6.7	6.7	6.8	6.8	6.9	6.9	>5.0
BOD	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0
Chlorophyll-a	μg/L	0.9	0.9	0.9	0.3	1.2	0.9	2.1	1.8	1.8	0.9	1.2	1.2	1.5	1.5	1.5	—
Salinity	psu	33.1	33.1	33.1	33.1	33.1	33.1	33.0	33.0	33.0	33.2	33.2	33.2	33.1	33.1	33.1	—

Remark 1：「＜」indicates the value is lower than limit of quantification;「ND」indicates the value is lower than limit of device detection.
Remark 2：「*」indicates exceeding the Class A Marine Environmental Quality Standards.

VII. Nutrients

i Nitrate Nitrogen

The monitoring results for nitrate nitrogen at each station this season were all <0.05 mg/L.

ii Nitrite Nitrogen

The monitoring results for nitrite nitrogen at each station this season were all < 0.01 mg/L.

iii Orthophosphate

The monitoring results for orthophosphate at each station this season ranged between < 0.015 to 0.040 mg/L.

VIII. Suspended Solid

The monitoring results for suspended solids at each station this season ranged between 2.4 and 34.3 mg/L.

IX. Chlorophyll A

The monitoring results for chlorophyll-a at each station this season ranged between 0.3 and 2.1 μg/L.

X. Coliform group

The monitoring results for Coliform groups at each station this season ranged between <10 and 10 CFU/100 mL, all of which comply with the Class A marine environmental quality standards (1,000 CFU/100 mL).

In summary, the water quality monitoring results at each station this season comply with the standard values for the Class A Marine Environmental Quality Standards.

2.1.2 Bird Ecology

The offshore bird survey within the wind farm area and the coastal bird survey at the coast near the subsea cable landing point are conducted every month in this quarter season (March 2025-May 2025). Survey area is shown as Figure 1.4-1 and 1.4-2. Survey records are explained as follows:

I. Offshore Bird Visual Survey

i. Recorded Species

A total of 13 bird species from 5 orders and 5 families were recorded in this season, with a total of 225 individual sightings. The observed species included: rock pigeon (*Columba livia*) with 94 individuals; black-tailed gull (*Larus crassirostris*), 1 individual; European herring gull *(Larus argentatus*), 1 individual; lesser black-backed gull (*Larus fuscus*), 1 individual; unidentified Laridae, large gulls, 13 individuals; bridled tern (*Onychoprion anaethetus*), 4 individuals; Sternidae spp., 燕鷗), 2 individuals; crested tern (*Thalasseus bergii*), 9 individuals; unidentified Sternidae spp., terns, 8 individuals; cormorant (*Phalacrocorax carbo*), 2 individuals; Eastern cattle egret (*Bubulcus ibis*), 58 individuals; unidentified herons from Ardeidae family, 21 individuals; and barn swallow (*Hirundo rustica*), 11 individuals. The species list and their respective months of occurrence are detailed in Table 2.1.2-1. May is the peak migration period for both terns (Sternidae spp.) and herons (Ardeidae spp). in this area, leading to higher bird diversity and abundance during this month. Notably, two protected bird species were recorded this season: bridled tern (*Onychoprion anaethetus*) and crested tern (Thalasseus bergii), both classified as Category II – Rare and Valuable Protected Wildlife. The white-fronted tern was observed in May, while the crested tern was recorded in both April and May. Their respective sighting locations are illustrated in Figure 2.1.2-1.

Table 2.1.2-1 Resource Table of Offshore Bird Survey

Order	Family	Chinese Name	Scientific Name	Protected Level[1]	Migratory Habit in Taiwan[2]	Spring			Total
						May	April	May	
Columbiformes	Columbidae	野鴿	*Columba livia*		Introduced, Common	0	0	94	94
Charadriiformes	Laridae	黑尾鷗	*Larus crassirostris*		Winter, Uncommon	1	0	0	1
Charadriiformes	Laridae	銀鷗	*Larus argentatus*		Winter, Rare	1	0	0	1
Charadriiformes	Laridae	小黑背鷗	*Larus fuscus*		Winter, Rare	1	0	0	1
Charadriiformes	Laridae	未知大鷗	-			13	0	0	13
Charadriiformes	Laridae	白眉燕鷗	*Onychoprion anaethetus*	II	Winter, Uncommon	0	0	4	4
Charadriiformes	Laridae	燕鷗	*Sterna hirundo*		Passage, Common	0	0	2	2
Charadriiformes	Laridae	鳳頭燕鷗	*Thalasseus bergii*	II	Summer, Uncommon	0	2	7	9
Charadriiformes	Laridae	未知燕鷗	-			0	0	8	8
Suliformes	Phalacrocoracidae	鸕鷀	*Phalacrocorax carbo*		Winter, Common	0	2	0	2
Pelecaniformes	Ardeidae	黃頭鷺	*Bubulcus ibis*		Resident, Uncommon, Winter/Summer/Passage Common,	0	0	58	58
Pelecaniformes	Ardeidae	未知鷺科	-			0	0	21	21
Passeriformes	Hirundinidae	家燕	*Hirundo rustica*		Summer/Winter/Passage, Common	7	4	0	11
Total (Individual)						23	8	194	225

Note 1: Protected Level "II" means rare and valuable wildlife.
Note 2: Migratory Habits: "Resident" indicates resident bird, "Winter" means winter migrants, "Summer" means summer migrants, and "Sea" means seabirds

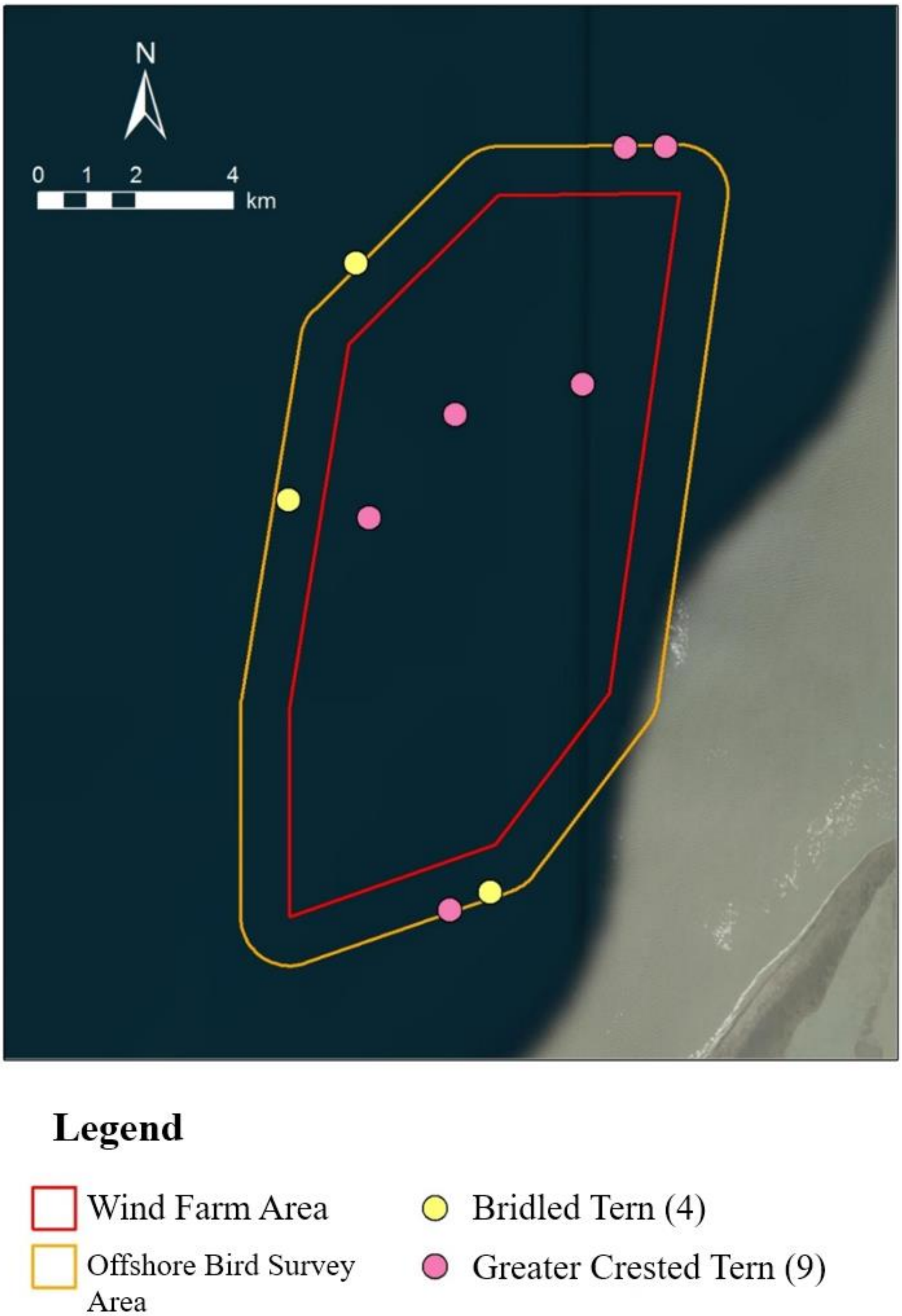
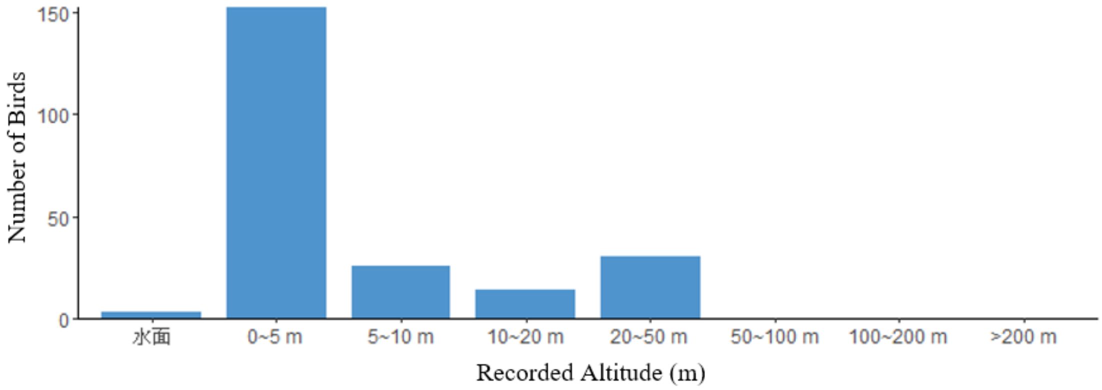


Figure 2.1.2-1 Distribution Map of Protected Offshore Bird Species Sightings

ii Recorded Flight Altitude

Most of the bird species recorded this season were observed in flight, with flying altitudes ranging from 1 to 50 meters. The majority were flying at low altitudes, particularly within the 0–5 meter range, mainly comprising rock pigeon (*Columba livia*) and Ardeidae species. Some

Ardeidae spp. such as *Bubulcus coromandus*, were also observed flying at higher altitudes between 20 and 50 meters. The distribution of bird flight altitudes is detailed in Table 2.1.2-2 and illustrated in Figure 2.1.2-2.



Note: The upper limit is also included.

Figure 2.1.2-2 Altitude Distribution of Birds in Offshore Survey

Table 2.1.2-2 Flying Altitude of Birds recorded in Offshore Survey

Order	Family	Chinese Name	Activity Height[N]							
			Water Surface	0~5 m	5~10 m	10~20 m	20~50 m	50~100 m	100~200 m	>200 m
Columbiformes	Columbidae	野鴿	0	88	0	6	0	0	0	0
Charadriiformes	Laridae	黑尾鷗	0	1	0	0	0	0	0	0
Charadriiformes	Laridae	銀鷗	0	0	1	0	0	0	0	0
Charadriiformes	Laridae	小黑背鷗	0	0	1	0	0	0	0	0
Charadriiformes	Laridae	未知大鷗	0	5	7	1	0	0	0	0
Charadriiformes	Laridae	白眉燕鷗	0	1	3	0	0	0	0	0
Charadriiformes	Laridae	燕鷗	0	1	1	0	0	0	0	0
Charadriiformes	Laridae	鳳頭燕鷗	0	0	5	4	0	0	0	0
Charadriiformes	Laridae	未知燕鷗	1	0	7	0	0	0	0	0
Suliformes	Phalacrocoracidae	鸕鷀	2	0	0	0	0	0	0	0
Pelecaniformes	Ardeidae	黃頭鷺	0	27	0	2	29	0	0	0
Pelecaniformes	Ardeidae	未知鷺科	0	19	0	1	1	0	0	0
Passeriformes	Hirundinidae	家燕	0	10	1	0	0	0	0	0
Total (individual)			3	152	26	14	30	0	0	0

Note: The classification of activity altitude follows the principle of excluding the lower bound while including the upper bound.

iii Bird Density Derived from Visual Bird Survey

In this project, each visual bird survey covered a transect length of approximately 50.58 km^2, with an effective visual coverage area of 30.35 km^2. Therefore, the average density of seabirds recorded during this season's visual surveys was 2.472 individuals per square kilometer. Details are provided in Table 2.1.2-3.

Table 2.1.2-3 Density of Birds in Offshore Visual Survey

Order	Family	Chinese Name	Spring			Average Density[note]
			3月	4月	5月	
Columbiformes	Columbidae	野鴿	0.000	0.000	3.097	1.032
Charadriiformes	Laridae	黑尾鷗	0.033	0.000	0.000	0.011
Charadriiformes	Laridae	銀鷗	0.033	0.000	0.000	0.011
Charadriiformes	Laridae	小黑背鷗	0.033	0.000	0.000	0.011
Charadriiformes	Laridae	未知大鷗	0.428	0.000	0.000	0.143
Charadriiformes	Laridae	白眉燕鷗	0.000	0.000	0.132	0.044
Charadriiformes	Laridae	燕鷗	0.000	0.000	0.066	0.022
Charadriiformes	Laridae	鳳頭燕鷗	0.000	0.066	0.231	0.099
Charadriiformes	Laridae	未知燕鷗	0.000	0.000	0.264	0.088
Suliformes	Phalacrocoracidae	鸕鷀	0.000	0.066	0.000	0.022
Pelecaniformes	Ardeidae	黃頭鷺	0.000	0.000	1.911	0.637
Pelecaniformes	Ardeidae	未知鷺科	0.000	0.000	0.692	0.231
Passeriformes	Hirundinidae	家燕	0.231	0.132	0.000	0.121
Total (Individual/km^2)			0.758	0.264	6.393	2.472

Remark: Density: individual numbers recorded/ visual area.

II. Coastal Bird Survey

i Species Composition

This season's coastal bird survey recorded 108 species across 13 orders and 37 families. Among them, surveys at selected coastal subsea cable landing sites recorded 93 species across 12 orders and 35 families, while surveys at non-selected sites (control area) recorded 81 species across 9 orders and 27 families. For the species list, please refer to Table 2.1.2-4.

ii Endemics and Protected Species

This season, one endemic species of Taiwan, Taiwan scimitar babbler *Pomatorhinus musicus* and ten endemic subspecies were recorded, including the oriental turtle dove (*Streptopelia orientalis*), house swift (*Apus nipalensis*), slaty-breasted rail (*Gallirallus striatus*), black drongo (*Dicrurus macrocercus*), black-naped monarch (*Hypothymis azurea*), plain prinia (*Prinia inornata*), golden-headed cisticola (*Cisticola exilis*), light-vented bulbul (*Pycnonotus sinensis*), black bulbul (*Hypsipetes leucocephalus*), and the vinous-throated parrotbill

(*Sinosuthora webbiana*). Endemic species accounted for 1.01% of the total number of species observed this season, while endemic (sub)species made up 10.19%. A total of 14 protected bird species were observed this season, including one Class I – Critically Endangered species, black-faced spoonbill (*Platalea minor*); seven Class II – Rare and Valuable species: Saunders's gull (*Saundersilarus saundersi*), little tern (*Sternula albifrons*), greater crested tern (*Thalasseus bergii*), Chinese egret (*Egretta eulophotes*), osprey (*Pandion haliaetus*), black-winged kite (*Elanus caeruleus*), and yellow bunting (*Emberiza sulphurata*); as well as six Class III – Other Protected species: Far Eastern curlew (*Numenius madagascariensis*), Eurasian curlew (*Numenius arquata*), great knot (*Calidris tenuirostris*), red knot (*Calidris canutus*), brown shrike (*Lanius cristatus*) and chestnut munia (*Lonchura atricapilla*). (Figure 2.1.2-3).

In the selected offshore cable landing site (impact area), a total of one Taiwan endemic species—Taiwan scimitar babbler *Pomatorhinus musicus*—and nine endemic subspecies were recorded this season, including house swift (*Apus nipalensis*), slaty-breasted rail (*Gallirallus striatus*), black drongo (*Dicrurus macrocercus*), (black-naped monarch (*Hypothymis azurea*), plain prinia (*Prinia inornata*), golden-headed cisticola (*Cisticola exilis*), light-vented bulbul (*Pycnonotus sinensis*), black bulbul (*Hypsipetes leucocephalus*), and the vinous-throated parrotbill (*Sinosuthora webbiana*). These endemic (sub)species accounted for 10.75% of all recorded bird species in the area. Additionally, 13 protected bird species were observed, including one Class I Critically Endangered species— black-faced spoonbill (*Platalea minor*); six Class II Rare and Valuable species— Saunders's gull (*Saundersilarus saundersi*), little tern (*Sternula albifrons*), greater crested tern (*Thalasseus bergii*), Chinese egret (*Egretta eulophotes*), black-winged kite (*Elanus caeruleus*), and yellow bunting (*Emberiza sulphurata*); and six Class III Other Protected species—Far Eastern curlew (*Numenius madagascariensis*), Eurasian curlew (*Numenius arquata*), great knot (*Calidris tenuirostris*), red knot (*Calidris canutus*), brown shrike (*Lanius cristatus*), and chestnut munia (*Lonchura atricapilla*).

Table 2.1.2-4 Resource Table of Coastal Bird Survey (1/6)

Order	Family	Chinere Name	Scientific Name	Migratory Habit[2]	Endemism[4]	Protected Level[3]	EIS[7] Spring	2025/03				2025/04				2025/05				Total
								Selected (Impact Area)		Non-Selected (Control Area)		Selected (Impact Area)		Non-Selected (Control Area)		Selected (Impact Area)		Non-Selected (Control Area)		
							201603-201605	Taixi	Sihu	Taixi	Sihu	Taixi	Sihu	Taixi	Sihu	Taixi	Sihu	Taixi	Sihu	
Anseriformes	Anatidae	琵嘴鴨	*Spatula clypeata*	Winter, Common				76												76
Anseriformes	Anatidae	綠頭鴨	*Anas platyrhynchos*	Winter, Rare/Introduced, Uncommon			*													0
Anseriformes	Anatidae	尖尾鴨	*Anas acuta*	Winter, Common							3									3
Anseriformes	Anatidae	小水鴨	*Anas crecca*	Winter, Common				10												10
Anseriformes	Anatidae	紅頭潛鴨	*Aythya ferina*	Winter, Rare							10									10
Anseriformes	Anatidae	鳳頭潛鴨	*Aythya fuligula*	Winter, Common							316									316
Podicipediformes	Podicipedidae	小鸊鷉	*Tachybaptus ruficollis*	Resident/Winter, Common			*	24	3	7	16	5	7	5	18	18	11		18	132
Columbiformes	Columbidae	野鴿	*Columba livia*	Introduced, Common				18		3		40		6		21		2	3	93
Columbiformes	Columbidae	金背鳩	*Streptopelia orientalis*	Resident, Common/Passge, Rare	Es													1		1
Columbiformes	Columbidae	紅鳩	*Streptopelia tranquebarica*	Resident, Common				31	4	40	7	16	22	26	7	24	35	45	21	278
Columbiformes	Columbidae	珠頸斑鳩	*Spilopelia chinensis*	Resident, Common				7	14	13	5	10	22	23	23	8	51	29	24	229
Cuculiformes	Cuculidae	番鵑	*Centropus bengalensis*	Resident, Common															1	1
Apodiformes	Apodidae	小雨燕	*Apus nipalensis*	Resident, Common	Es							2								2
Gruiformes	Rallidae	灰胸秧雞	*Lewinia striata*	Resident, Uncommon	Es			1							1					2
Gruiformes	Rallidae	紅冠水雞	*Gallinula chloropus*	Resident, Common			*	1		4	5	4		1	4	3	3	3	8	36
Gruiformes	Rallidae	白冠雞	*Fulica atra*	Winter, Uncommon							11									11
Gruiformes	Rallidae	白腹秧雞	*Amaurornis phoenicurus*	Resident, Common			*		1			1		3			5	2		12
Charadriiformes	Recurvirostridae	高蹺鴴	*Himantopus himantopus*	Resident/Winter, Common			*	49	2	11	25	68	63	7	36	184	23	17	35	520
Charadriiformes	Recurvirostridae	反嘴鴴	*Recurvirostra avosetta*	Winter, Common				20				3	8			4		2		37
Charadriiformes	Charadriidae	灰斑鴴	*Pluvialis squatarola*	Winter, Common			*													0
Charadriiformes	Charadriidae	太平洋金斑鴴	*Pluvialis fulva*	Winter, Common			*	31		8		2	2	73				8		124
Charadriiformes	Recurvirostridae	蒙古鴴	*Charadrius mongolus*	Winter, Uncommon/Passage, Common			*				6	11	2		19	8			3	49

Table 2.1.2-4 Resource Table of Coastal Bird Survey (2/6)

Order	Family	Chinere Name	Scientific Name	Migratory Habit[2]	Endemism[4]	Protected Level[3]	EIS[7] Spring	2025/03				2025/04				2025/05				Total
								Selected (Impact Area)		Non-Selected (Control Area)		Selected (Impact Area)		Non-Selected (Control Area)		Selected (Impact Area)		Non-Selected (Control Area)		
							201603-201605	Taixi	Sihu	Taixi	Sihu	Taixi	Sihu	Taixi	Sihu	Taixi	Sihu	Taixi	Sihu	
Charadriiformes	Charadriidae	鐵嘴鴴	*Charadrius leschenaultii*	Winter, Uncommon/Passage, Common			*	1		6	9	252	6	170	197	3			2	646
Charadriiformes	Recurvirostridae	東方環頸鴴	*Charadrius alexandrinus*	Winter, Common/Passage, Uncommon			*	52	20	174	286	43	26	43	30	22	36	33	77	842
Charadriiformes	Charadriidae	小環頸鴴	*Charadrius dubius*	Winter, Common/Passage, Uncommon										4			2	2		8
Charadriiformes	Scolopacidae	中杓鷸	*Numenius phaeopus*	Winter, Uncommon/Passage Common										2		1				3
Charadriiformes	Scolopacidae	小杓鷸	*Numenius minutus*	Passage, Uncommon									1							1
Charadriiformes	Scolopacidae	黦鷸	*Numenius madagascariensis*	Winter, Rare/Passage, Uncommon		III		3								1				4
Charadriiformes	Scolopacidae	大杓鷸	*Numenius arquata*	Winter, Uncommon		III	*	24				2				1				27
Charadriiformes	Scolopacidae	翻石鷸	*Arenaria interpres*	Winter/Passage, Common			*	1			1	1	1		22			2	11	39
Charadriiformes	Scolopacidae	大濱鷸	*Calidris tenuirostris*	Winter, Rare/Passage, Uncommon		III						312		38						350
Charadriiformes	Scolopacidae	紅腹濱鷸	*Calidris canutus*	Winter, Rare/Passage, Uncommon		III						5								5
Charadriiformes	Scolopacidae	寬嘴鷸	*Calidris falcinellus*	Passage, Uncommon			*													0
Charadriiformes	Scolopacidae	尖尾濱鷸	*Calidris acuminata*	Passage, Common								2			1	6			1	10
Charadriiformes	Scolopacidae	彎嘴濱鷸	*Calidris ferruginea*	Winter, Rare/Passage, Common			*					390	117		75					582
Charadriiformes	Scolopacidae	長趾濱鷸	*Calidris subminuta*	Winter, uncommon									9							9
Charadriiformes	Scolopacidae	紅胸濱鷸	*Calidris ruficollis*	Winter, Common			*			3	3	439	797	13	81	1				1337
Charadriiformes	Scolopacidae	黑腹濱鷸	*Calidris alpina*	Winter, Common			*	31		48	169	28	1	57	42					376
Charadriiformes	Scolopacidae	反嘴鷸	*Xenus cinereus*	Passage, Uncommon								3			55				2	60
Charadriiformes	Scolopacidae	磯鷸	*Actitis hypoleucos*	Winter, Common			*	1	4	2	7	6	3		2	3				28
Charadriiformes	Scolopacidae	黃足鷸	*Tringa brevipes*	Passage, Common											1	58	9	1	27	96
Charadriiformes	Scolopacidae	青足鷸	*Tringa nebularia*	Winter, Common			*	15	7		13	41	1	42	47	4	1		2	173

Table 2.1.2-4 Resource Table of Coastal Bird Survey (3/6)

Order	Family	Chinere Name	Scientific Name	Migratory Habit[2]	Endemism[4]	Protected Level[3]	EIS[7] Spring	2025/03				2025/04				2025/05				Total
								Selected (Impact Area)		Non-Selected (Control Area)		Selected (Impact Area)		Non-Selected (Control Area)		Selected (Impact Area)		Non-Selected (Control Area)		
							201603-201605	Taixi	Sihu	Taixi	Sihu	Taixi	Sihu	Taixi	Sihu	Taixi	Sihu	Taixi	Sihu	
Charadriiformes	Scolopacidae	小青足鷸	*Tringa stagnatilis*	Winter, Uncommon/Passage, Common			*	23	1			49	14			1				88
Charadriiformes	Scolopacidae	鷹斑鷸	*Tringa glareola*	Winter /Passage, Common			*		2	1	2	7	3	1	3					19
Charadriiformes	Scolopacidae	赤足鷸	*Tringa totanus*	Winter, Common			*	8	3		3	4		8	3					29
Charadriiformes	Laridae	黑嘴鷗	*Saundersilarus saundersi*	Winter, Uncommon		II		1												1
Charadriiformes	Laridae	紅嘴鷗	*Chroicocephalus ridibundus*	Winter, Common				135	2		1									138
Charadriiformes	Laridae	銀鷗	*Larus argentatus*	Winter, Rare					1											1
Charadriiformes	Laridae	小黑背鷗	*Larus fuscus*	Winter, Rare						1										1
Charadriiformes	Laridae	未知大鷗	*Larus* sp.	-	-	-			1	22		1								24
Charadriiformes	Laridae	小燕鷗	*Sternula albifrons*	Passage/Summer, Uncommon		II	*			10	2	95	35	23	99	125	36	802	196	1423
Charadriiformes	Laridae	裏海燕鷗	*Hydroprogne caspia*	Winter, Unommon			*	3			4							2		9
Charadriiformes	Laridae	白翅黑燕鷗	*Chlidonias leucopterus*	Winter, Rare/Passage, Common												3				3
Charadriiformes	Laridae	黑腹燕鷗	*Chlidonias hybrida*	Winter/Passage, Common			*	81	25	3	8	125	17		6	5			5	275
Charadriiformes	Laridae	鳳頭燕鷗	*Thalasseus bergii*	Summer, Uncommon		II	*							5		11		146	3	165
Suliformes	Phalacrocoracidae	鸕鷀	*Phalacrocorax carbo*	Winter, Common				34	2	14	11									61
Pelecaniformes	Ardeidae	黃小鷺	*Ixobrychus sinensis*	Passage/Summer, Uncommon															1	1
Pelecaniformes	Ardeidae	蒼鷺	*Ardea cinerea*	Winter, Common			*	9		3	7		1	6	1					27
Pelecaniformes	Ardeidae	大白鷺	*Ardea alba*	Passage/Summer, Uncommon, Winter, Common			*	104	5	30	14	188	3	23	11	11	9	8	34	440
Pelecaniformes	Ardeidae	中白鷺	*Ardea intermedia*	Summer, Rare/Winter, Common			*			1	1	4	1	1	4				9	21
Pelecaniformes	Ardeidae	唐白鷺	*Egretta eulophotes*	Winter, Rare/Passage, Uncommon		II					1		2	2				2	3	10

Table 2.1.2-4 Resource Table of Coastal Bird Survey (4/6)

Order	Family	Chinere Name	Scientific Name	Migratory Habit[2]	Endemism[4]	Protected Level[3]	EIS[7] Spring	2025/03				2025/04				2025/05				Total
								Selected (Impact Area)		Non-Selected (Control Area)		Selected (Impact Area)		Non-Selected (Control Area)		Selected (Impact Area)		Non-Selected (Control Area)		
							201603-201605	Taixi	Sihu	Taixi	Sihu	Taixi	Sihu	Taixi	Sihu	Taixi	Sihu	Taixi	Sihu	
Pelecaniformes	Ardeidae	小白鷺	*Egretta garzetta*	Resident, Uncommon/Summer/Winter/ Passage, Common			*	83	9	9	34	59	8	9	14	56	8	10	170	469
Pelecaniformes	Ardeidae	黃頭鷺	*Bubulcus ibis*	Resident,Uncommon/Summer/Winter/Passage, Common			*			9	2			61				20	2	94
Pelecaniformes	Ardeidae	綠簑鷺	*Butorides striata*	Resident, Uncommon/Passage, Rare							1		1		1	3	1	1	1	9
Pelecaniformes	Ardeidae	夜鷺	*Nycticorax nycticorax*	Resident, Common/Winter/Passage, Rare			*	6				5	4		1	6	5	2	4	33
Pelecaniformes	Threskiornithidae	埃及聖䴉	*Threskiornis aethiopicus*	Introduced, Uncommon			*													0
Pelecaniformes	Threskiornithidae	黑面琵鷺	*Platalea minor*	Winter, Uncommon, Passage, Rare		I		4				18			1				1	24
Accipitriformes	Pandionidae	魚鷹	*Pandion haliaetus*	Winter, Uncommon		II	*				1								1	2
Accipitriformes	Accipitridae	黑翅鳶	*Elanus caeruleus*	Resident, Common		II	*	3			1	1				2				7
Coraciiformes	Alcedinidae	翠鳥	*Alcedo atthis*	Resident, Common/Passage, Uncommon			*	6	5	3	9	5	2	3	9	5	4	4	7	62
Piciformes	Picidae	小啄木	*Yungipicus canicapillus*	Resident, Common				2		1			3	1			4	2	1	14
Passeriformes	Dicruridae	大卷尾	*Dicrurus macrocercus*	Resident, Common/ Passage, Rare	Es			3		7	2	4		5	4	1	5	5	4	40
Passeriformes	Monarchidae	黑枕藍鶲	*Hypothymis azurea*	Resident, Common	Es			2	2	1		4	2	6	2	1	7	4	1	32
Passeriformes	Laniidae	紅尾伯勞	*Lanius cristatus*	Winter/Passage, Common		III		1	1	3	1	4	3	4	1			1	1	20
Passeriformes	Laniidae	棕背伯勞	*Lanius schach*	Resident, Common				3				1								4
Passeriformes	Alaudidae	小雲雀	*Alauda gulgula*	Resident, Common				10				4			1	5			3	23
Passeriformes	Cisticolidae	灰頭鷦鶯	*Prinia flaviventris*	Resident, Common				46	16	11	24	47	36	40	54	62	39	66	64	505
Passeriformes	Cisticolidae	褐頭鷦鶯	*Prinia inornata*	Resident, Common	Es			39	8	21	36	79	29	41	60	57	28	50	71	519
Passeriformes	Cisticolidae	棕扇尾鶯	*Cisticola juncidis*	Passage, Common				1	1	5		3	1	8	2	5	2	10		38

Table 2.1.2-4 Resource Table of Coastal Bird Survey (5/6)

Order	Family	Chinere Name	Scientific Name	Migratory Habit[2]	Endemism[4]	Protected Level[3]	EIS[7] Spring	2025/03				2025/04				2025/05				Total
								Selected (Impact Area)		Non-Selected (Control Area)		Selected (Impact Area)		Non-Selected (Control Area)		Selected (Impact Area)		Non-Selected (Control Area)		
							201603-201605	Taixi	Sihu	Taixi	Sihu	Taixi	Sihu	Taixi	Sihu	Taixi	Sihu	Taixi	Sihu	
Passeriformes	Cisticolidae	黃頭扇尾鶯	*Cisticola exilis*	Resident, Uncommon	Es						1	5		3	4	3	1	15	6	38
Passeriformes	Acrocephalidae	東方大葦鶯	*Acrocephalus orientalis*	Winter, Common												1				1
Passeriformes	Hirundinidae	棕沙燕	*Riparia chinensis*	Resident, Common				1	1						2	21	10		27	62
Passeriformes	Hirundinidae	家燕	*Hirundo rustica*	Summer/Winter/Passage, Common				59	26	4	55	24	15	5	36	59	10	14	12	319
Passeriformes	Hirundinidae	洋燕	*Hirundo tahitica*	Resident, Common				9	1	2	1	8	3	2	3	5	10	6	14	64
Passeriformes	Hirundinidae	赤腰燕	*Cecropis striolata*	Resident, Common				1								1	3			5
Passeriformes	Pycnonotidae	白頭翁	*Pycnonotus sinensis*	Resident, Common	Es			117	65	106	49	127	93	113	60	97	124	184	119	1254
Passeriformes	Pycnonotidae	紅嘴黑鵯	*Hypsipetes leucocephalus*	Resident, Common	Es			2										1		3
Passeriformes	Pycnonotidae	棕耳鵯	*Hypsipetes amaurotis*	Passage, Rare				3												3
Passeriformes	Phylloscopidae	黃眉柳鶯	*Phylloscopus inornatus*	Winter, Common						1				1			1			3
Passeriformes	Phylloscopidae	極北柳鶯	*Phylloscopus borealis*	Winter, Common					1	1				1						3
Passeriformes	Cettiidae	遠東樹鶯	*Horornis canturians*	Winter, Common				3		2										5
Passeriformes	Sylviidae	粉紅鸚嘴	*Sinosuthora webbiana*	Resident, Common	Es			4	4		2	4		2		2	4	8	2	32
Passeriformes	Zosteropidae	斯氏繡眼	*Zosterops simplex*	Resident, Common				44	12	36	10	48	62	71	30	35	46	125	52	571
Passeriformes	Timaliidae	小彎嘴	*Pomatorhinus musicus*	Resident, Common	E				1								1			2
Passeriformes	Sturnidae	亞洲輝椋鳥	*Aplonis panayensis*	Introduced, Common													3			3
Passeriformes	Sturnidae	黑領椋鳥	*Gracupica nigricollis*	Introduced, Common						1								1		2
Passeriformes	Sturnidae	灰頭椋鳥	*Sturnia malabarica*	Introduced, Uncommon				16	9	15		5		8	4	10	7	5	12	91

Table 2.1.2-4 Resource Table of Coastal Bird Survey (6/6)

Order	Family	Chinere Name	Scientific Name	Migratory Habit[2]	Endemism[4]	Protected Level[3]	EIS[7] Spring	2025/03				2025/04				2025/05				Total
								Selected (Impact Area)		Non-Selected (Control Area)		Selected (Impact Area)		Non-Selected (Control Area)		Selected (Impact Area)		Non-Selected (Control Area)		
							201603-201605	Taixi	Sihu	Taixi	Sihu	Taixi	Sihu	Taixi	Sihu	Taixi	Sihu	Taixi	Sihu	
Passeriformes	Sturnidae	家八哥	*Acridotheres tristis*	Introduced, Common				8	6	11	4	4		12	3	4	22	17	9	100
Passeriformes	Sturnidae	白尾八哥	*Acridotheres javanicus*	Introduced, Common				80	17	51	14	38	24	38	19	44	60	42	38	465
Passeriformes	Turdidae	白腹鶇	*Turdus pallidus*	Winter, Common								1								1
Passeriformes	鶲科	鵲鴝	*Copsychus saularis*	Introduced, Common				15	6	9	5	12	9	15	6	6	20	18	10	131
Passeriformes	鶲科	白腰鵲鴝	*Copsychus malabaricus*	Introduced, Common						3				2						5
Passeriformes	鶲科	野鴝	*Calliope calliope*	Winter/Passage, Common				6	1	1	2	7	1		1					19
Passeriformes	鶲科	藍磯鶇	*Monticola solitarius*	Resident, Rare/Winter, Common															1	1
Passeriformes	梅花雀科	白喉文鳥	*Euodice malabarica*	Introduced, Uncommon														1	4	5
Passeriformes	梅花雀科	斑文鳥	*Lonchura punctulata*	Resident, Common				10	4	10	10	6	18	18	26	6	22	10	77	217
Passeriformes	梅花雀科	黑頭文鳥	*Lonchura atricapilla*	Resident, Rare/Introduced, Uncommon		III				2				16			9	2		29
Passeriformes	麻雀科	麻雀	*Passer montanus*	Resident, Common				96	51	45	45	82	96	71	63	143	99	133	131	1055
Passeriformes	鶺鴒科	東方黃鶺鴒	*Motacilla tschutschensis*	Winter/Passage Common				1	2	4				2	1					10
Passeriformes	鶺鴒科	白鶺鴒	*Motacilla alba*	Resident/Winter, Common				1									1			2
Passeriformes	鶺鴒科	赤喉鷚	*Anthus cervinus*	Winter, Uncommon						1										1
Passeriformes	鵐科	野鵐	*Emberiza sulphurata*	Passage, Rare		II						1								1
Passeriformes	鵐科	灰頭黑臉鵐	*Emberiza spodocephala*	Winter, Common						1		2	1	5						9
Total（Individual）								1479	346	780	1255	2767	1575	1145	1196	1166	777	1864	1331	15681
Diversity Index（*H'*）								3.38	2.94	2.94	2.57	2.96	2.15	3.21	3.14	2.99	3.03	2.29	3.00	-
Evenness Index（*J'*）								0.82	0.80	0.75	0.66	0.72	0.56	0.81	0.80	0.76	0.82	0.60	0.76	-

Note 1: Classification, frequency, migratory habits, and endemic categories are based on the 2023 edition of the Taiwan Bird List published by the Chinese Wild Bird Federation.
Note 2: Migratory Habits: "Resident" means resident birds, "Winter" means winter migrants, "Summer" means summer migrants, "Passage" means transit bird, and "Introduced" means introduced species.
Note 3: Conservation status is based on the "List of Terrestrial Protected Wildlife" announced by the Ministry of Agriculture on January 9, 2019; I: First-class critically endangered species, II: Second-class precious and rare species, III: Third-class other protected species.
Note 4: Explanation of endemic category codes. "Es": Endemic subspecies; "E": Endemic species.
Note 5: "Unknown Snipes" refers to snipe species whose appearance is extremely similar and difficult to identify in the wild. If key features are not observed, they cannot be identified to species.

Figure 2.1.2-3 Distribution of Protected Offshore Bird Species (Numbers Indicate the Counted Individuals)

During the survey, the black-faced Spoonbill (黑面琵鷺, Platalea minor) was observed flying northward outside the seawall of the reclaimed land in Taixi and foraging at the old Huwei River mouth. The Saunders's gull (*Chroicocephalus saundersi*) was found roosting on high tidal flats outside the western seawall of Taixi Fishing Port. The little tern (*Sternula albifrons*) was widely distributed throughout the area, with the highest concentration on outer tidal flats; they also foraged in inner fishponds and rested on pond dikes or dried pond beds. The greater crested tern (*Thalasseus bergii*) was observed flying over the sea or resting near tidal flats outside the seawall. The Chinese egret (*Egretta eulophotes*) was foraging in dried ponds or exposed intertidal zones. The black-winged kite (*Elanus caeruleus*) was seen in inland grasslands, marshes, or forested areas. The yellow bunting (*Emberiza sulphurata*) was found in inland shrubland habitats. The Far Eastern curlew (*Numenius madagascariensis*) was foraging on tidal flats at the old Huwei River mouth, while the Eurasian curlew (*Numenius arquata*) was also observed foraging in the same area. The great knot (*Calidris tenuirostris*) was foraging or resting on outer exposed flats and inner dried fishponds. The red knot (*Calidris canutus*) was found foraging or resting in dried fishponds. The brown shrike (*Lanius cristatus*) was widely distributed across various habitats, and the chestnut munia (*Lonchura atricapilla*) was observed inhabiting inland grasslands, shrublands, or wooded environments.

iii Migratory Habit

Based on the bird species surveyed this season, 26 species (24.07% of the total recorded species) are resident birds. Migratory birds (including passage migrants) account for 56 species (51.85%). There are 9 introduced species (8.33%). Additionally, 16 species exhibit characteristics of both resident and migratory birds (including passage migrants), representing 14.81% and 1 species displayed both resident and introduced traits (0.93%).

iv Dominant Species

A total number of 15,681 coastal birds were recorded this season. The most abundant species was the little tern (*Sternula albifrons*) with 1,423 individuals (9.07%), followed by the red-necked stint (*Calidris ruficollis*) with 1,337 individuals (8.53%), light-vented bulbul (*Pycnonotus sinensis*) with 1,254 individuals (8.00%), Eurasian tree sparrow (*Passer montanus*) with 1,055 individuals (6.73%), and kentish plover (*Charadrius alexandrinus*) with 842 individuals (5.37%).

In the selected offshore subsea cable landing site (impact area), a total of 8,110 birds were recorded. The dominant species was the red-necked stint (*Calidris ruficollis*) with 1,237 individuals (15.25%), followed by the light-vented bulbul (*Pycnonotus sinensis*) with 623 individuals (7.68%), Eurasian tree sparrow (*Passer montanus*) with 567 individuals (6.99%), and curlew sandpiper (Calidris ferruginea) with 507 individuals (6.25%).

In the non-selected offshore subsea cable landing site (control area), a total of 7,571 birds were recorded. The most common species was the little tern (*Sternula albifrons*) with 1,132 individuals (14.95%), followed by the Kentish plover (*Charadrius alexandrines)* with 643 individuals (8.49%), light-vented bulbul (*Pycnonotus sinensis*) with 631 individuals (8.33%), Eurasian tree sparrow (*Passer montanus*) with 488 individuals (6.45%), and the greater sand plover (*Charadrius leschenaultii*) with 384 individuals (5.07%).

v Analysis of Indexes

In the selected offshore subsea cable landing site (impact area), Shannon-Wiener biodiversity index H′ ranged from 2.15 to 3.38, and the Evenness index J′ ranged from 0.56 to 0.82. In the non-selected site (control area), the diversity index H’ ranged from 2.29 to 3.21, and evenness J′from 0.60 to 0.81. Both areas showed rich species composition, but due to the dominance of certain species, the distribution of individuals was relatively uneven, resulting in moderately high diversity levels. The survey areas mainly consisted of coastal zones, fishponds, intertidal flats, windbreak forests, dry farmland, and bare land. During the survey period, fishpond activities (e.g., pond draining) attracted large numbers of migratory birds. Additionally, the intertidal sandflats remained partially exposed during high tide, providing roosting habitats for waterbirds. The high-tide sandbanks outside the dikes were especially important aggregation areas for little terns (*Sternula albifrons*) and crested terns (*Thalasseus bergii*).

2.1.3 Marine Ecology

During this season, an intertidal ecological survey was conducted from April 8 to April 10, 2025 within a 50-meter range on both sides of the northern and southern offshore cable landing sections (stations C1–C6). On March 25, 2025, plankton, fish larvae and eggs, and benthic organisms were surveyed at five stations (S1–S5) within the wind farm area. On March 24, 2025, fish surveys were carried out along three transects (T1–T3) in the wind farm zone. Underwater video surveys were conducted on March 2, March 11–12, March 25, April 9, and May 16, covering a total of 22 wind turbine foundations. The survey areas are shown in Figures 1.4-1 to 1.4-3 and Figure 1.4-8, and the recorded results are described as follows:

I. Intertidal Ecology Survey

i. Sessile Marine Algae

In this project case, the substrate at various intertidal stations was predominantly sandy. The area lacked fixed points such as reefs and large rocks that would allow attachment of sessile marine algae. Consequently, no sessile marine algae were recorded this season.

ii. Intertidal Benthic Organism

1. Species Composition

(1) High Tide Zone

A total of 135 individuals belonging to 27 species, 22 families, 15 orders, and 6 classes of benthic organisms were recorded in the high tide zone during this season. The number of species per sampling site ranged from 6 to 13, and abundance ranged from 16 to 32 individuals. The majority of the recorded species were mollusks. In addition, various crustaceans from the phylum Arthropoda were observed, including one species from Diogenidae family (hermit crabs), perplexing fiddler crab (*Austruca perplexa*), *Scopimera bitympana*, sand hopper (*Platorchestia*), *Mictyris brevidactylus* (*Ocypode stimpsoni*), ghost crab (Ocypode cordimanus, sea roach (*Ligia exotica*), and *Nanosesarma minutum*. Cirripeds were also recorded, including striped barnacle (*Amphibalanus Amphitrite)*, *Chthamalus challengeri*, and myoga (*Zingiber mioga*). Additionally, one species from Triacanthidae family was recorded: short-nosed tripod fish, *Triacanthus biaculeatus*. Detailed information is provided in Table 2.1.3-1.

(2) Low Tide Zone

In the low tide zone during this season, a total of 513 individuals belonging to 31 species, 22 families, 14 orders, and 6 classes of benthic organisms were recorded. The number of species per sampling site ranged from 4 to 14, with abundance ranging from 12 to 211 individuals. Most of the recorded species were mollusks. Additionally, species from other phyla were observed, including the range-striped green sea anemone (*Haliplanella luciae*), a species of *Neanthes*, an annelid worm (*Neanthes* sp.), and various arthropods such as the striped barnacle (*Amphibalanus Amphitrite*), reticulated barnacle (*Amphibalanus reticulatus*), and several crustaceans including *Diogenes penicillatus* (hairy-handed hermit crab), *Diogenes rectimanus*, an unidentified species of a species of Diogenidae (hermit crabs), *Mictyris brevidactylus* (*Pyrhila pisum)*, bean-shaped sesarmid crab (*Parasesarma pictum*), *Austruca perplexa*, and a small species of *Nanosesarma minutum*. Detailed information is shown in Table 2.1.3-2.

(3) Combined High Tide and Low Tide Zone

In total, 648 individuals of benthic organisms were recorded in the high and low tide zones combined during this season, representing 43 species, 31 families, 21 orders, and 8 classes. The number of species per sampling site ranged from 10 to 18, with abundance ranging from 31 to 233 individuals. The majority of the recorded species were mollusks. In addition, species from other phyla were documented, including the the range-striped green sea anemone (*Haliplanella luciae*), a species of Neanthes, an annelid worm (Neanthes sp.）, and an unidentified species of a species of Diogenidae (hermit crabs), , *Diogenes penicillatus*, *Austruca perplexa*, *Scopimera bitympana*, *Platorchestia japonica*, Clistocoeloma sinensis, *Mictyris brevidactylus*, *Pyrhila pisum*, bean-shaped sesarmid crab, *Parasesarma pictum*, *Ocypode stimpsoni*, *Ligia exotica*, and a small species of *Nanosesarma minutum*, small Chiromantes crab, Chiromantes sp., Barnacles from the class Thecostraca were also recorded, including *Amphibalanus amphitrite*, *Amphibalanus reticulatus*, reticulated barnacle, *Chthamalus challengeri*, and myoga (*Zingiber mioga)*. Additionally, one species *Triacanthus biaculeatus* from the Triacanthidae family was observed: For detailed information, please refer to Table 2.1.3-3.

2. Protected Species, Endemic Species, and Introduced Species

(1) High Tide Zone

In this quarter season's survey, no protected species, endemic species, or introduced species were recorded in the Taixi and Sihu survey areas.

(2) Low Tide Zone

Similarly, in this quarter season's survey, no protected species, endemic species, or introduced species were recorded in the Taixi and Sihu survey areas.

3. Dominant Species

(1) High Tide Zone

Species with a percentage greater than 5% are defined as dominant species for the season. In the analysis of this season's dominant species in the high tidal zone, the Portuguese oyster (*Magallana angulata*) from the Ostreidae family was the most dominant species, accounting for 25.93%. This was followed by *Mictyris brevidactylus* from the family Mictyridae (9.63%), *Monodonta labio* from the family Balanidae (7.41%), *Reishia clavigera* from the family Muricidae (6.67%), and the eastern acorn barnacle oriental acorn barnacle, *Chthamalus challenger* from the family Chthamalidae (5.19%) (as shown in Table 2.1.3-1).

(2) Low Tide Zone

Dominant species for the season are defined as those comprising more than 5% of the total. In the low tide zone, the most dominant species was the reticulated barnacle, *Amphibalanus reticulatus* from the family Balanidae, accounting for 54.19%. This was followed by *Mictyris brevidactylus* from the family Mictyridae (14.23%), the Portuguese oyster, *Crassostrea angulata* from the family Ostreidae (12.67%), and *Reishia clavigera* from the family Muricidae (6.43%) (as shown in Table 2.1.3-2).

(3) Combined High and Low Tide Zones

Dominant species for the season are defined as those comprising more than 5% of the total. In the combined high and low tide zones, the most dominant species was the reticulated barnacle, *Amphibalanus reticulatus* from the family Balanidae, accounting for 42.90%. This was followed by the Portuguese oyster, *Crassostrea angulata* from the family Ostreidae (15.43%), the short-fingered mud crab, *Mictyris* *brevidactylus* from the family Mictyridae (13.27%), and *Reishia clavigera* from the family Muricidae (6.48%). As shown in Table 2.1.3-3.

4. Diversity Index

(1) High Tide Zone

In this season's biodiversity analysis, the Shannon diversity index (H') in the high tide zone ranged from 1.22 to 2.22, with the highest biodiversity observed at sampling station C4. Evenness (J') ranged from 0.63 to 0.93, with the highest evenness at station C2 (see Table 2.1.3-1).

(2) Low Tide Zone

In the low tide zone, the Shannon diversity index ranged from 0.77 to 1.65, with the highest biodiversity at station C2a. Evenness ranged from 0.37 to 0.71, with the highest value at station C1a (see Table 2.1.3-2).

(3) Combined High Tide and Low Tide Zones:

Overall, the diversity index for the combined high tide and low tide zones ranges from 1.32 to 2.02, with the highest biodiversity observed at stations C2 & C2a. Evenness ranged from 0.46 to 0.77, with the highest evenness at stations C1 & C1a (see Table 2.1.3-3).

Table 2.1.3-1 Resource Table of Intertidal Benthic Organism (High Tide Zone) (1/2)

Order	Family	Chinese Name	Scientific Name	Endemism Protected Level	EIA	2025.04						TOTAL	RA(%)	OR(%)
					2016.03	C1	C2	C3	C4	C5	C6			
Arcida	Arcidae	血蚶	*Tegillarca granosa*						1		2	3	2.22	0.33
Mytilida	Mytilidae	綠殼菜蛤	*Perna viridis*		*							-	-	-
Ostreoida	Ostreidae	葡萄牙牡蠣	*Magallana angulata*			1		2	10	14	8	35	25.93	0.83
Ostreoida	Ostreidae	黑齒牡蠣	*Saccostrea mordax*		*							-	-	-
Pectinoida	Placunidae	雲母蛤	*Placuna placenta*						2			2	1.48	0.17
Venerida	Mactridae	方形馬珂蛤	*Mactra quadrangularis*						4	1	1	6	4.44	0.50
Venerida	Mesodesmatidae	中華尖峰蛤	*Coecella chinensis*						3	2	1	6	4.44	0.50
Venerida	Veneridae	環文蛤	*Cyclina sinensis*					1			1	2	1.48	0.33
Venerida	Veneridae	花蛤	*Macridiscus aequilatera*						1	1	2	4	2.96	0.50
Venerida	Veneridae	台灣文蛤	*Meretrix taiwanica*						1		2	3	2.22	0.33
Venerida	Veneridae	小眼花簾蛤	*Venerupis aspera*						1			1	0.74	0.17
Sepiida	Sepiidae	真烏賊	*Acanthosepion esculentum*						1	1	1	3	2.22	0.50
Cycloneritimorpha	Neritidae	漁舟蜑螺	*Nerita albicilla*		*		3	1				4	2.96	0.33
Cycloneritimorpha	Neritidae	玉女蜑螺	*Nerita polita*		*							-	-	-
Cycloneritimorpha	Neritidae	平頂蜑螺	*Nerita planospira*		*							-	-	-
Neogastropoda	Muricidae	粗肋結螺	*Ergalatax contracta*				3					3	2.22	0.17
Neogastropoda	Muricidae	蚵岩螺	*Reishia clavigera*			1	7	1				9	6.67	0.50
Patellogastropoda	Lottiidae	花青螺	*Nipponacmea schrenckii*				1					1	0.74	0.17
Patellogastropoda	Lottiidae	高青螺	*Notoacmea concinna*		*							-	-	-
Trochoidea	Trochidae	草蓆鐘螺	*Monodonta labio*		*	3	4	3				10	7.41	0.50
Archaeogastropoda	Patellidae	花笠螺	*Cellana toreuma*		*							-	-	-
Littorinimorpha	Littorinidae	細粒玉黍螺	*Littorina exigua*		*							-	-	-
Littorinimorpha	Littorinidae	顆粒玉黍螺	*Littorina pyramidalis*		*							-	-	-
Littorinimorpha	Littorinidae	粗紋玉黍螺	*Littoraria scabra*		*							-	-	-
Neogastropoda	Muricidae	蚵岩螺	*Reishia clavigera*		*							-	-	-
Amphipoda	Talitridae	扁跳蝦	*Platorchestia platensis*							1		1	0.74	0.17
Decapoda	Diogenidae	活額寄居蟹之一種	Diogenidae sp.					3				3	2.22	0.17
Decapoda	Dotillidae	雙扇股窗蟹	*Scopimera bitympana*			1				1	1	3	2.22	0.50
Decapoda	Mictyridae	短指和尚蟹	*Mictyris brevidactylus*			3	3	7				13	9.63	0.50
Decapoda	Ocypodidae	糾結南方招潮蟹	*Austruca perplexa*					4				4	2.96	0.17

Table 2.1.3-1 Resource Table of Intertidal Benthic Organism (High Tide Zone) (2/2)

Order	Family Name	Chinese Name	Scientific Name	Endemism Pretected Level	EIA 2016.03	2025.04 C1	C2	C3	C4	C5	C6	TOTAL	RA(%)	OR(%)
Decapoda	Ocypodidae	斯氏沙蟹	*Ocypode stimpsoni*						3			3	2.22	0.17
Decapoda	Sesarmidae	小型小相手蟹	*Nanosesarma minutum*				1					1	0.74	0.17
Decapoda	Grapsidae	斑點擬相手蟹	*Parasesarma pictum*		*							-	-	-
Isopoda	Ligiidae	奇異海蟑螂	*Ligia exotica*				3					3	2.22	0.17
Tetraodontiformes	Triacanthidae	雙棘三刺魨	*Triacanthus biaculeatus*						1			1	0.74	0.17
Balanomorpha	Balanidae	紋藤壺	*Amphibalanus amphitrite*		*				1			1	0.74	0.17
Balanomorpha	Chthamalidae	東方小藤壺	*Chthamalus challengeri*			7						7	5.19	0.17
Scalpelliformes	Zingiberaceae	茗荷	*Lepas anatifera*						3			3	2.22	0.17
Total (individuals)						16	25	22	32	21	19	135		
Number of Species						6	8	8	13	7	9	27		
Diversity Index (H')						1.51	1.93	1.86	2.22	1.22	1.85			
Evenness Index (J')						0.84	0.93	0.89	0.87	0.63	0.84			

Remark 1: "*" indicates the species was recorded in the EIS stage (August 2016).
Remark 2: RA refers to Relative Abundance (%), OR refers to Occurrence Rate (%).
Remark 3: "-" indicates the value is incalculable

Table 2.1.3-2 Resource Table of Intertidal Benthic Organism (Low Tide Zone) (1/2)

Order	Family Name	Chinese Name	Scientific Name	Endemism	Pretected Level	EIA 2016.03	2025.04 C1	C2	C3	C4	C5	C6	TOTAL	RA(%)	OR(%)
Adapedonta	Pharidae	蟶蟶	*Sinonovacula constricta*							1			1	0.19	16.67
Mytilida	Mytilidae	紫殼菜蛤	*Mytilus edulis*						1				1	0.19	0.17
Mytilida	Mytilidae	綠殼菜蛤	*Perna viridis*			*		1					1	0.19	0.17
Ostreoida	Ostreidae	葡萄牙牡蠣	*Magallana angulata*					15	14	19	8	9	65	12.67	0.83
Ostreoida	Ostreidae	黑齒牡蠣	Saccostrea mordax			*							-	-	-
Pectinoida	Placunidae	雲母蛤	*Placuna placenta*									1	1	0.19	0.17
Venerida	Mactridae	方形馬珂蛤	*Mactra quadrangularis*					2	3				5	0.97	0.33
Venerida	Mesodesmatidae	中華尖峰蛤	*Coecella chinensis*								1		1	0.19	0.17
Venerida	Veneridae	環文蛤	*Cyclina sinensis*					2	3			1	6	1.17	0.50
Venerida	Veneridae	花蛤	*Macridiscus aequilatera*							1			1	0.19	0.17
Venerida	Veneridae	台灣文蛤	*Meretrix taiwanica*							2			2	0.39	0.17
Caenogastropoda	Batillariidae	燒酒海蜷	*Batillaria zonalis*						1				1	0.19	0.17
Cycloneritimorpha	Neritidae	漁舟蜑螺	*Nerita albicilla*			*	1						1	0.19	0.17
Cycloneritimorpha	Neritidae	玉女蜑螺	*Nerita polita*			*							-	-	-
Cycloneritimorpha	Neritidae	平頂蜑螺	*Nerita planospira*			*							-	-	-
Archaeogastropoda	Patellidae	花笠螺	*Cellana toreuma*			*							-	-	-
Littorinimorpha	Naticidae	豹斑玉螺	*Paratectonatica tigrina*					2					2	0.39	0.17
Littorinimorpha	Naticidae	細紋玉螺	*Tanea lineata*									1	1	0.19	0.17
Littorinimorpha	Littorinidae	細粒玉黍螺	*Littorina exigua*			*							-	-	-
Littorinimorpha	Littorinidae	顆粒玉黍螺	*Littorina pyramidalis*			*							-	-	-
Littorinimorpha	Littorinidae	粗紋玉黍螺	*Littoraria scabra*			*							-	-	-
Neogastropoda	Columbellidae	似長麥螺	*Mitrella martensi*					1					1	0.19	0.17
Neogastropoda	Muricidae	粗肋結螺	*Ergalatax contracta*					1	1				2	0.39	0.33
Neogastropoda	Muricidae	蚵岩螺	*Reishia clavigera*			*	16	9	4	3	1		33	6.43	0.83
Neogastropoda	Nassariidae	正織紋螺	*Nassarius livescens*						1		1		2	0.39	0.33
Neogastropoda	Nassariidae	蟹螯織紋螺	*Nassarius pullus*						1		1		2	0.39	0.33
Patellogastropoda	Lottiidae	高青螺	*Notoacmea concinna*			*							-	-	-
Trochida	Trochoidea	草蓆鐘螺	*Monodonta labio*			*	1						1	0.19	0.17
Actiniaria	Diadumenidae	縱條磯海葵	*Diadumene lineata*					1					1	0.19	0.17
Decapoda	Diogenidae	毛掌活額寄居蟹	*Diogenes penicillatus*					1					1	0.19	0.17

Table 2.1.3-2 Resource Table of Intertidal Benthic Organism (Low Tide Zone) (2/2)

Order	Family Name	Chinese Name	Scientific Name	Endemism	Pretected Level	EIA 2016.03	2025.04 C1	C2	C3	C4	C5	C6	TOTAL	RA(%)	OR(%)
Decapoda	Diogenidae	直螯活額寄居蟹	*Diogenes rectimanus*					1	1				2	0.39	0.33
Decapoda	Diogenidae	活額寄居蟹之一種	*Diogenes* sp.					11	5	3			19	3.70	0.50
Decapoda	Leucosiidae	豆形拳蟹	*Pyrhila pisum*						1				1	0.19	0.17
Decapoda	Mictyris	短指和尚蟹	*Mictyris brevidactylus*				12	47	14				73	14.23	0.50
Decapoda	Ocypodidae	糾結南方招潮蟹	*Austruca perplexa*				5						5	0.97	0.17
Decapoda	Sesarmidae	小型小相手蟹	*Nanosesarma minutum*				1						1	0.19	0.17
Decapoda	Grapsidae	斑點擬相手蟹	*Parasesarma pictum*			*							-	-	-
Phyllodocida	Nereididae	刺沙蠶之一種	*Neanthes* sp.				1						1	0.19	0.17
Balanomorpha	Balanidae	紋藤壺	*Amphibalanus amphitrite*			*				1			1	0.19	0.17
Balanomorpha	Balanidae	網紋藤壺	*Amphibalanus reticulatus*						161	117			278	54.19	0.33
Total (individuals)							37	94	211	147	12	12	513		
Number of Species							7	13	14	8	5	4	31		
Diversity Index (H')							1.39	1.65	1.03	0.77	1.10	0.84			
Evenness Index (J')							0.71	0.64	0.39	0.37	0.68	0.60			

Remark 1: "*" indicates the species was recorded in the EIS stage (August 2016).
Remark 2: RA refers to Relative Abundance (%), OR refers to Occurrence Rate (%).
Remark 3: "-" indicates the value is incalculable

Table 2.1.3-3 Resource Table of Intertidal Benthic Organism (High Tide + Low Tide Zone) (1/2)

Order	Family Name	Chinese Name	Scientific Name	Endemism Pretected Level	EIA	2025.04						TOTAL	RA(%)	OR(%)
					2016.03	C1	C2	C3	C4	C5	C6			
Adapedonta	Pharidae	蟶蟶	*Sinonovacula constricta*						1			1	0.15	16.67
Arcida	Arcidae	血蚶	*Tegillarca granosa*						1		2	3	0.46	33.33
Mytilida	Mytilidae	紫殼菜蛤	*Mytilus edulis*					1				1	0.15	16.67
Mytilida	Mytilidae	綠殼菜蛤	*Perna viridis*		*		1					1	0.15	16.67
Ostreoida	Ostreidae	葡萄牙牡蠣	*Magallana angulata*			1	15	16	29	22	17	100	15.43	100.00
Ostreoida	Ostreidae	黑齒牡蠣	*Saccostrea mordax*		*							-	-	-
Pectinoida	Placunidae	雲母蛤	*Placuna placenta*						2		1	3	0.46	33.33
Venerida	Mactridae	方形馬珂蛤	*Mactra quadrangularis*				2	3	4	1	1	11	1.70	83.33
Venerida	Mesodesmatidae	中華尖峰蛤	*Coecella chinensis*						3	3	1	7	1.08	50.00
Venerida	Veneridae	環文蛤	*Cyclina sinensis*				2	4			2	8	1.23	50.00
Venerida	Veneridae	花蛤	*Macridiscus aequilatera*						2	1	2	5	0.77	50.00
Venerida	Veneridae	台灣文蛤	*Meretrix taiwanica*						3		2	5	0.77	33.33
Venerida	Veneridae	小眼花簾蛤	*Venerupis aspera*						1			1	0.15	16.67
Sepiida	Sepiidae	真烏賊	*Acanthosepion esculentum*						1	1	1	3	0.46	50.00
Caenogastropoda	Batillariidae	燒酒海蜷	*Batillaria zonalis*					1				1	0.15	16.67
Cycloneritimorpha	Neritidae	漁舟蜑螺	*Nerita albicilla*		*	1	3	1				5	0.77	50.00
Cycloneritimorpha	Neritidae	玉女蜑螺	*Nerita polita*		*							-	-	-
Cycloneritimorpha	Neritidae	平頂蜑螺	*Nerita planospira*		*							-	-	-
Archaeogastropoda	Patellidae	花笠螺	*Cellana toreuma*		*							-	-	-
Littorinimorpha	Littorinidae	豹斑玉螺	*Paratectonatica tigrina*				2					2	0.31	16.67
Littorinimorpha	Littorinidae	細紋玉螺	*Tanea lineata*								1	1	0.15	16.67
Neogastropoda	Columbellidae	似長麥螺	*Mitrella martensi*				1					1	0.15	16.67
Littorinimorpha	Littorinidae	細粒玉黍螺	*Littorina exigua*		*							-	-	-
Littorinimorpha	Littorinidae	顆粒玉黍螺	*Littorina pyramidalis*		*							-	-	-
Littorinimorpha	Littorinidae	粗紋玉黍螺	*Littoraria scabra*		*							-	-	-
Neogastropoda	Muricidae	粗肋結螺	*Ergalatax contracta*				4	1				5	0.77	33.33
Neogastropoda	Muricidae	蚵岩螺	*Reishia clavigera*		*	17	16	5	3	1		42	6.48	83.33
Neogastropoda	Nassariidae	正織紋螺	*Nassarius livescens*					1		1		2	0.31	33.33
Neogastropoda	Nassariidae	蟹螯織紋螺	*Nassarius pullus*					1		1		2	0.31	33.33
Patellogastropoda	Lottiidae	花青螺	*Nipponacmea schrenckii*				1					1	0.15	16.67

Table 2.1.3-3 Resource Table of Intertidal Benthic Organism (High Tide + Low Tide Zone) (2/2)

Order	Family Name	Chinese Name	Scientific Name	Endemism Pretected Level	EIA	2025.04						TOTAL	RA(%)	OR(%)
					2016.03	C1	C2	C3	C4	C5	C6			
Patellogastropoda	Lottiidae	高青螺	*Notoacmea concinna*		*							-	-	-
Trochoidea	Trochoidea	草蓆鐘螺	*Monodonta labio*		*	4	4	3				11	1.70	50.00
Actiniaria	Diadumenidae	縱條磯海葵	*Diadumene lineata*				1					1	0.15	16.67
Amphipoda	Talitridae	扁跳蝦	*Platorchestia platensis*							1		1	0.15	16.67
Decapoda	Diogenidae	毛掌活額寄居蟹	*Diogenes penicillatus*				1					1	0.15	16.67
Decapoda	Diogenidae	直螯活額寄居蟹	*Diogenes rectimanus*				1	1				2	0.31	33.33
Decapoda	Diogenidae	活額寄居蟹之一種	*Diogenes* sp.				11	5	3			19	2.93	50.00
Decapoda	Diogenidae	活額寄居蟹之一種	Diogenidae sp.					3				3	0.46	16.67
Decapoda	Dotillidae	雙扇股窗蟹	*Scopimera bitympana*			1				1	1	3	0.46	50.00
Decapoda	Leucosiidae	豆形拳蟹	*Pyrhila pisum*					1				1	0.15	16.67
Decapoda	Mictyridae	短指和尚蟹	*Mictyris brevidactylus*			15	50	21				86	13.27	50.00
Decapoda	Ocypodidae	糾結南方招潮蟹	*Austruca perplexa*			5		4				9	1.39	33.33
Decapoda	Ocypodidae	斯氏沙蟹	*Ocypode stimpsoni*						3			3	0.46	16.67
Decapoda	Sesarmidae	小型小相手蟹	*Nanosesarma minutum*			1	1					2	0.31	33.33
Decapoda	Grapsidae	斑點擬相手蟹	*Parasesarma pictum*		*							-	-	-
Isopoda	Ligiidae	奇異海蟑螂	*Ligia exotica*				3					3	0.46	16.67
Phyllodocida	Ocypodidae	刺沙蠶之一種	*Neanthes* sp.			1						1	0.15	16.67
Tetraodontiformes	Triacanthidae	雙棘三刺魨	*Triacanthus biaculeatus*						1			1	0.15	16.67
Balanomorpha	Balanidae	紋藤壺	*Amphibalanus amphitrite*		*				2			2	0.31	16.67
Balanomorpha	Balanidae	網紋藤壺	*Amphibalanus reticulatus*					161	117			278	42.90	33.33
Balanomorpha	Coronulidae	東方小藤壺	*Chthamalus challengeri*			7						7	1.08	16.67
Scalpelliformes	Zingiberaceae	茗荷	*Lepas anatifera*						3			3	0.46	16.67
Total (individuals)						53	119	233	179	33	31	648		
Number of Species						10	18	18	17	10	11	43		
Diversity Index (H')						1.78	2.02	1.32	1.36	1.34	1.70			
Evenness Index (J')						0.77	0.70	0.46	0.48	0.58	0.71			

Remark 1: "*" indicates the species was recorded in the EIS stage (August 2016).
Remark 2: RA refers to Relative Abundance (%), OR refers to Occurrence Rate (%).
Remark 3: "-" indicates the value is incalculable

II. Phytoplankton

i. Species Composition

A total of 5 phyla, 64 genera, and 178 species of phytoplankton were recorded. The species list is detailed in Table 2.1.3-4. The number of algal species at each station and water layer ranged from 32 to 60 species, with abundances ranging from 30,900 to 166,800 Cells/L. The highest number of recorded species was at station S3, bottom water layer, and the highest abundance was observed at station S5, 10-meter water layer.

ii. Dominant Species

A total of 1,682,160 cells/L were recorded this season. The most abundant species was *Skeletonema* spp. with 434,880 cells/L, accounting for 25.85% of the total. This was followed by *Thalassiosira transparenta* with 243,900 cells/L (14.50%), *Chaetoceros lorenzianus* with 184,740 cells/L (10.98%), and *Chaetoceros socialis* with 98,880 cells/L (5.88%). Among them, *Coscinodiscus radiatus*, *Thalassiosira transparenta*, *Thalassiosira* spp., and *Bacteriastrum furcatum* were recorded across all stations and depths, making them common species for the season.

iii. Analysis of Indexes

The Shannon diversity index (H') ranged from 0.82 to 1.34 across all stations and depths, with the highest values recorded at 3 meters in Station S1 and at the bottom layer in Station S3, and the lowest at 0 meters in Station S5. The evenness index ranged from 0.52 to 0.81, with the highest evenness at 0 meters in Station S1 and the lowest at 0 meters in Station S5. Overall, the diversity varied significantly across stations and depths, with certain layers showing noticeably higher diversity. Similarly, evenness varied, indicating dominance by particular species at some stations and depths.

III. Zooplankton

i. Species Composition

A total of 25 zooplankton groups across 8 phyla were recorded in this season. The species list is detailed in Table 2.1.3-5. The number of groups recorded at each station ranged from 19 to 22, with abundances ranging from 370,812 to 1,706,239 individuals per 1,000 m^3. The highest group richness was found at Stations S3 and S4, while the highest abundance was recorded at Station S4.

ii. Dominant Species

A total of 3,517,076 individuals per 1,000 m^3 were recorded this season. Among them, calanoid copepods (Order: Calanoida) were the most abundant, with 1,572,858 inds./1,000 m^3, accounting for 44.72% of the total. This was followed by Appendicularians (Class: Appendicularia, 654,033 inds./1,000 m^3, 18.60%), Chaetognaths (Phylum: Chaetognatha, 332,655 inds./1,000 m^3, 9.46%), cyclopoid copepods (Order: Cyclopoida, 182,718 inds./1,000 m^3, 5.20%), and decapod larvae (Order: Decapoda, 177,058 inds./1,000 m^3, 5.03%), indicating that copepods were the dominant zooplankton group during this survey.

Among the various zooplankton groups, foraminiferans (Phylum: Foraminifera), radiolarians (Phylum: Radiolaria), other cnidarian larvae (Phylum: Cnidaria), hydromedusae (Class: Hydrozoa), amphipods (Order: Amphipoda), calanoid copepods (Order: Calanoida), cyclopoid copepods (Order: Cyclopoida), decapod larvae (Order: Decapoda), euphausiids (Order: Euphausiacea), mysids (Order: Mysida), ostracods (Class: Ostracoda), polychaetes (Class: Polychaeta), pteropods (Order: Thecosomata), chaetognaths (Phylum: Chaetognatha), appendicularians (Class: Appendicularia), and others were all observed at a 100% occurrence frequency, indicating that these 16 groups were the most common zooplankton taxa in the surveyed waters this season.

iii. Analysis of Indexes

The Shannon-Wiener diversity index ranged from 0.73 to 0.95, while the evenness index ranged from 0.55 to 0.72. Both indices were highest at Station S1, indicating a higher zooplankton diversity and less dominance by any single group. In contrast, Station S4 had the lowest diversity and evenness indices, suggesting that it had the lowest biodiversity and was dominated by a few taxa.

IV. Marine Benthic Organisms

i. Species Composition

During this quarter season, a total of 13 species from 10 families and 7 orders were recorded, comprising 54 individuals in total (see Table 2.1.3-6). The number of species recorded per sampling station ranged from 1 to 8, with the number of individuals ranging from 1 to 25. Station S1 had both the highest species richness and the greatest number of individuals.

ii. Dominant Species

Analysis of dominant species for the season showed that the most dominant was *Nassarius livescens*, from the Nassariidae family, accounting for 42.59% of all individuals recorded. This was followed by *Moerella rutile,* from Tellinidae Family at 14.81%, *Corbula fortisulcata,* family: Corbulidae at 12.96%, and, *Atypopenaeus stenodactylus* from Penaeidae family at 5.56% (see Table 2.1.3-6).

iii. Analysis of Indexes

The Shannon-Wiener diversity index for this season ranged from 0 to 1.58, while the evenness index ranged from 0 to 0.88. Overall, Station S4 exhibited the highest species diversity, followed by Station S2. In terms of evenness, Station S2 showed the most balanced species distribution, followed by Station S1. As shown in Table 2.1.3-6.

Table 2.1.3-4 Resource Table of Marine Phytoplankton (1/6)

Phylum	Genus	Chinese Name	Scientific Name	EIA 2016.03	2025.03 S1 0M	S1 3M	S1 10M	S1 B	S2 0M	S2 3M	S2 10M	S2 B	S3 0M	S3 3M	S3 B	S4 0M	S4 3M	S4 B	S5 0M	S5 3M	S5 10M	S5 B	Total	RA（%）[2]	OR（%）
Cyanobacteriota	Chroococcales	色球藻	*Chroococcis* sp.	*																			-	-	-
	Trichodesmium	紅海束毛藻	*Trichodesmium erythraeum*		600																		-	-	-
		束毛藻	*Trichodesmium* sp.						840														-	-	-
Dinoflagellata	Amphisolenia	雙管藻	*Amphisolenia palmata*											60									60	0.00	5.56
		叉角藻	*Ceratium furca*	*																					
		小角藻	*Ceratium kofoidii*					120					60										180	0.01	11.11
		圓柱角藻	*Ceratium teres*																120				-	-	-
		三叉角藻	*Ceratium trichoceros*					120															-	-	-
		角藻	*Ceratium* sp.	*																			-	-	-
	Prorocentrum	細齒原甲藻	*Prorocentrum dentatum*	*																			-	-	-
	Prorocentrum	海洋原甲藻	*Prorocentrum micans*	*				120								240		240					600	0.04	16.67
	Peridinium	多甲藻	*Protoperidinium* spp.	*			120						60										-	-	-
	Phalacroma	禿頂藻	*Phalacroma* sp.	*																			-	-	-
Haptophyte	Umbilicosphaera	臍球藻	*Umbilicosphaera* sp.	*																			-	-	-
Bacillariophyta	Achnanthes	短柄曲殼藻	*Achnanthes brevipes*	*									240	60									-	-	-
		短小曲殼藻	*Achnanthes exigua*		480	1,320	1,560	480	480	840	1,080		180	60	420		120	240					7,260	0.46	66.67
		爪哇曲殼藻	*Achnanthes javanica*		240	120	1,800		120		240	240		60		720	360	1,920		960	240	240	7,260	0.46	72.22
		線形曲殼藻	*Achnanthes linearis*			600	240				240		120		120		480	120	120				2,040	0.13	44.44
		曲殼藻	*Achnanthes* sp.	*																			-	-	-
	Actinocyclus	愛氏輻環藻	*Actinocyclus ehrenbergi*	*					120														120	0.01	5.56
	Actinoptychus	輻裥藻	*Actinoptychus* sp.	*																			-	-	-
	Amphiprora	翼繭形藻	*Amphiprora alata*	*		120	120						60	60									360	0.02	22.22
	Amphora	雙凸雙眉藻	*Amphora bigibba*																		120		120	0.01	5.56
		咖啡形雙眉藻	*Amphora coffeaeformis*					120				240											360	0.02	11.11
		卵形雙眉藻	*Amphora ovalis*			120																	120	0.01	5.56
		雙眉藻	*Amphora* spp.	*				120															120	0.01	5.56
	Asterionella	日本星桿藻	*Asterionella japonica*	*		7,680															5,760		13,440	0.84	11.11
	Asterolampra	星紋藻	*Asterolampra* sp.	*																			-	-	-
	Asteromphalus	長卵面星臍藻	*Asteromphalus cleveanus*								120				60								180	0.01	11.11
		星臍藻	*Asteromphalus sarcophagus*		120	120	600	360	120	240	120	240	60	300	120	120	120			120			2,760	0.17	77.78
		星臍藻	*Asteromphalus* sp.	*																			-	-	-
	Aulacoseira	顆粒溝絲藻	*Aulacoseira granulata*					240	240														480	0.03	11.11

Table 2.1.3-4 Resource Table of Marine Phytoplankton (2/6)

Phylum	Genus	Chinese Name	Scientific Name	EIA	2025.03																		Total	RA（%）²	OR（%）
					S1				S2				S3			S4			S5						
				2016.03	0M	3M	10M	B	0M	3M	10M	B	0M	3M	B	0M	3M	B	0M	3M	10M	B			
	Auricula	昆蟲耳形藻	*Auricula insecta*				120					240					120	120					600	0.04	22.22
	Bacillaria	奇異棍形藻	*Bacillaria paradoxa*				120						1,500				120		480				2,220	0.14	22.22
	Bacteriastrum	叢毛輻桿藻	*Bacteriastrum cosmosum*							840			300	240	180							960	-	-	-
		優美輻桿藻	*Bacteriastrum delicatulum*		480		240	720	840			4,800	120	240	600	360							8,400	0.53	50.00
		透明輻桿藻	*Bacteriastrum hyalinum*				720		1,920	3,000									1,920			4,560	12,120	0.76	27.78
		變異輻桿藻	*Bacteriastrum varians*		3,000	1,800	5,880	1,200	5,760	600	5,760	240	3,360	2,820	3,000	960	720	2,520	600	4,080	1,440	6,000	49,740	3.12	100.00
		輻桿藻	*Bacteriastrum* sp.	*											2,100					1,440			3,540	0.22	11.11
	Biddulphiaceae	長耳盒形藻	*Biddulphia aurita*		240		2,400	240			2,280	2,880			540	1,200	4,800	4,080		1,320	1,440	5,760	-	-	-
		顆粒盒形藻	*Biddulphia granulata*				120					240											360	0.02	11.11
		長角盒形藻	*Biddulphia longicruris*	*																			-	-	-
		活動盒形藻	*Biddulphia mobiliensis*	*				120			120										120		360	0.02	16.67
		中國盒形藻	*Biddulphia sinensis*	*																			-	-	-
		盒形藻	*Biddulphia* spp.	*																			-	-	-
	Campylosira	鞍鏈藻	*Campylosira cymbelliformis*	*																			-	-	-
	Cerataulina	柏古角管藻	*Cerataulina bergonii*																			480	480	0.03	5.56
		緊密角管藻	*Cerataulina compacta*		240		360																600	0.04	11.11
	Chaetoceros	窄隙角刺藻	*Chaetoceros affine*		360		480	2,400	360		480		120		180	1,200	1,200	240	360		960		8,340	0.52	66.67
		大西洋角刺藻	*Chaetoceros atlanticum*								360												360	0.02	5.56
		大西洋角刺藻那不勒斯變種	*Chaetoceros atlanticum* var. *neapolitanum*										900								240		1,140	0.07	11.11
		北方角刺藻	*Chaetoceros boreale*					240					120	60								480	-	-	-
		扁面角刺藻	*Chaetoceros compressum*			240	360	960	1,440	3,000			3,360	660	600		2,760	1,800	960	2,160	2,400	3,360	24,060	1.51	77.78
		旋鏈角刺藻	*Chaetoceros curvisetus*	*	5,520	1,800	7,680	9,000	14,760	12,480	8,880		2,820	3,120	2,520	2,040	6,720	3,360	14,520	25,680	36,240	27,600	184,740	11.59	94.44
		並基角刺藻	*Chaetoceros decipiens*		1,320	360	3,000	360															5,040	0.32	22.22
		雙突角刺藻	*Chaetoceros didymum*							960	2,160							960	720	720			5,520	0.35	27.78
		雙突角刺藻 英國變種	*Chaetoceros didymium* var. *anglica*			1,800	480			1,200													3,480	0.22	16.67
		遠距角刺藻	*Chaetoceros distans*															840	840				1,680	0.11	11.11
		異角角刺藻	*Chaetoceros diversum*						360										480				840	0.05	11.11
		平滑角刺藻	*Chaetoceros laeve*				360							180	360								900	0.06	16.67
		羅氏角刺藻	*Chaetoceros lauderi*			360																	360	0.02	5.56
		洛氏角刺藻	*Chaetoceros lorenzianum*		840	720	2,040	3,960	2,160	3,840	1,560		180	1,200	1,140	3,240	2,760	3,240	2,160	2,160	1,800	7,200	40,200	2.52	94.44
		短刺角刺藻	*Chaetoceros messanense*										780	840	480				1,680		600		4,380	0.27	27.78
		奇異角刺藻	*Chaetoceros paradoxum*							360													360	0.02	5.56

Table 2.1.3-4 Resource Table of Marine Phytoplankton (3/6)

Phylum	Genus	Chinese Name	Scientific Name	EIA	2025.03 S1				S2				S3			S4			S5				Total	RA (％)[2]	OR (％)
				2016.03	0M	3M	10M	B	0M	3M	10M	B	0M	3M	B	0M	3M	B	0M	3M	10M	B			
		海洋角刺藻	*Chaetoceros pelagicum*			360								1,080							600		2,040	0.13	16.67
		角刺藻	*Chaetoceros pendulum*			120														120			240	0.02	11.11
		祕魯角刺藻	*Chaetoceros peruvianum*		120			120		240				60	60		120				120		840	0.05	38.89
		角刺藻	*Chaetoceros pseudodichaeta*																	4,560			4,560	0.29	5.56
		聚生角刺藻	*Chaetoceros sociale*		1,440	4,560	8,160	6,240	4,560	13,320	5,400		900	1,620	720	7,320	7,560	3,360	5,640	6,360	4,440	17,280	98,880	6.20	94.44
		角刺藻	*Chaetoceros* spp.	*	3,720	3,120	5,400	4,920	1,800	4,080	9,000		1,740	3,960	2,100	3,840	3,840	6,120	3,840	2,040	5,160	9,600	74,280	4.66	94.44
	Climacodium	雙凹梯形藻	*Climacodium biconcavum*							240			60		480		120						-	-	-
	Cocconeis	近岸卵形藻	*Cocconeis sublittoralis*			120					240			60	60								480	0.03	22.22
	Corethron	小環毛藻	*Corethron hystrix*	*		240		120	120	240	120								120	360	360		1,680	0.11	44.44
		環毛藻	*Corethron pelagicum*								120					120				120			360	0.02	16.67
		環毛藻	*Corethron pelagicum*				120																120	0.01	5.56
	Coscinodiscus	畸形圓篩藻	*Coscinodiscus deformatus*												60								60	0.00	5.56
		離心列圓篩藻	*Coscinodiscus eccentricus*															240					240	0.02	5.56
		寬邊圓篩藻	*Coscinodiscus marginatus*		120									60									180	0.01	11.11
		光亮圓篩藻	*Coscinodiscus nitidus*		120																		120	0.01	5.56
		圓篩藻	*Coscinodiscus* spp.	*				120			120	480				120	240	240					1,320	0.08	33.33
	Cyclotella	小環藻	*Cyclotella* sp.		360							240											600	0.04	11.11
	Cymbella	橋灣藻	*Cymbella* sp.	*																			-	-	-
	Diploneis	雙壁藻	*Diploneis bombus*	*																			-	-	-
		淡褐雙壁藻	*Diploneis fusca*				120																-	-	-
		雙壁藻	*Diploneis* sp.	*				120							60								180	0.01	11.11
	Ditylum	布氏雙尾藻	*Ditylum brightwellii*	*	240		360			120	240					120	240	120	240	480		960	3,120	0.20	55.56
		太陽雙尾藻	*Ditylum sol*			120	480	240	240	240	240	240				120	120		600	720	360		3,720	0.23	66.67
	Eucampia	長角彎角藻	*Eucampia cornuta*	*	240	240		1,320		840	1,800			120							240		4,800	0.30	38.89
		短角彎角藻	*Eucampia zoodiacus*	*				120		1,080	960												2,160	0.14	16.67
	Eunotia	短縫藻	*Eunotia* spp.							120													120	0.01	5.56
	Fragilaria	脆桿藻	*Fragilaria* sp.	*					360				120	180	360				720	720	360		2,820	0.18	38.89
	Gomphonema	異極藻	*Gomphonema* spp.	*				480	120		840				300								1,740	0.11	22.22
	Guinardia	幾內亞藻	*Guinardis* sp.	*																			-	-	-
	Hemiaulus	霍克半管藻	*Hemiaulus hauckii*							120		720					240						1,080	0.07	16.67
		中華半管藻	*Hemiaulus sinensis*												240						120		360	0.02	11.11
		半管藻	*Hemiaulus* sp.	*																			-	-	-
	Lauderia	北方勞德藻	*Lauderia borealis*		1,080	480	3,480	1,800	1,200	6,240	2,280	4,320	60	180	780			240			1,320	1,920	-	-	-
		勞德藻	*Lauderia glacialis*													1,200			960				2,160	0.14	11.11

Table 2.1.3-4 Resource Table of Marine Phytoplankton (4/6)

Phylum	Genus	Chinese Name	Scientific Name	EIA	2025.03																			Total	RA (%) [2]	OR (%)
					S1				S2				S3			S4			S5							
				2016.03	0M	3M	10M	B	0M	3M	10M	B	0M	3M	B	0M	3M	B	0M	3M	10M	B				
		勞德藻	*Lauderia* sp.	*																				-	-	-
	Leptocylindrus	丹麥細柱藻	*Leptocylindrus danicus*		3,120			600		1,560	840					3,000		960	2,400		1,080			13,560	0.85	44.44
		地中海細柱藻	*Leptocylindrus mediterraneus*						600															600	0.04	5.56
	Mastogloia	扁中節胸隔藻	*Mastogloia brauni*						120				60		60						240			480	0.03	22.22
	Melosira	變異直鏈藻	*Melosira varians*	*																				-	-	-
	Navicula	方格舟形藻	*Navicula cancellata*									480												480	0.03	5.56
		掌狀放射舟形藻	*Navicula digito-radiata*												60									60	0.00	5.56
		直舟形藻	*Navicula directa*							120	240	480			60		120	120						1,140	0.07	33.33
		豪納舟形藻	*Navicula howeana*		120																			120	0.01	5.56
		膜狀舟形藻	*Navicula membranacea*			360	720	120		120	360	480		60	120	360	240	360	120			240		3,660	0.23	72.22
		串珠舟形藻	*Navicula monilifera*														120							120	0.01	5.56
		截端舟形藻	*Navicula mutica*								120													120	0.01	5.56
		帕維舟形藻	*Navicula pavillardi*								120	240			240			120		120	120			960	0.06	33.33
		侏儒舟形藻	*Navicula pygmaea*																	120				120	0.01	5.56
		舟形藻	*Navicula* spp.	*			240	480	240	240		960	60		60		360	480						3,120	0.20	50.00
	Nitzschia	尖錐菱形藻	*Nitzschia acuminata*			120	240		120		120	480		120	60				120	120	120			1,620	0.10	55.56
		柔弱菱形藻	*Nitzschia delicatissima*		240	3,720	2,280	3,000	3,360	2,160	2,280	4,560	840	240	840		1,440	120		2,400				-	-	-
		分散菱形藻	*Nitzschia dissipata*		120		240	480	600	240	1,080	480	300	360	240		120	240		120	360	480		5,460	0.34	83.33
		顆粒菱形藻	*Nitzschia granulata*			120																		120	0.01	5.56
		長菱形藻	*Nitzschia longissima*			120	480	840	120	360	480	960	120	60	360	360	1,560	1,080		120	120	480		7,620	0.48	88.89
		太平洋菱形藻	*Nitzschia pacifica*			600	120	4,080	1,440	1,320		720	300		240	3,600	3,000	1,800		840	4,680	960		23,700	1.49	77.78
		琴式菱形藻	*Nitzschia panduriformis*								120													120	0.01	5.56
		成列菱形藻	*Nitzschia seriata*			2,640	840	960	120	1,560	960	960				360			2,280	1,800	2,880	4,320		19,680	1.23	66.67
		彎菱形藻	*Nitzschia sigma*				240	120			240				60									660	0.04	22.22
		透明菱形藻	*Nitzschia vitrea*			120	120			120	120	960	360	240	180			120		120	120	240		2,820	0.18	66.67
		菱形藻	*Nitzschia* spp.	*	240	480		240			120				360			240	240	120	120	240		2,400	0.15	55.56
	Melosira	具槽直鏈藻	*Paralia sulcata*	*													240	240						480	0.03	11.11
	Pinnularia	羽紋藻	*Pinnularia* spp.	*	120																			120	0.01	5.56
	Planktoniella	漂流藻	*Planktoniella blanda*					240			240	240				120	240	120						1,200	0.08	33.33
		漂流藻	*Planktoniella* sp.	*																				-	-	-
	Pleurosigma	艾希斜紋藻	*Pleurosigma aestuarii*			120																		120	0.01	5.56
		長斜紋藻	*Pleurosigma elongatum*												60		120							180	0.01	11.11
		諾馬斜紋藻	*Pleurosigma normani*		360	120	480	120	120			480						120						1,800	0.11	38.89
		直邊斜紋藻	*Pleurosigma rectum*			240																		240	0.02	5.56

Table 2.1.3-4 Resource Table of Marine Phytoplankton (5/6)

Phylum	Genus	Chinese Name	Scientific Name	EIA	2025.03 S1				S2				S3			S4			S5				Total	RA (%)[2]	OR (%)
				2016.03	0M	3M	10M	B	0M	3M	10M	B	0M	3M	B	0M	3M	B	0M	3M	10M	B			
		斜紋藻	*Pleurosigma* spp.	*	120	240	120		120		360	960	60	60	60	120	360	240			240	240	3,300	0.21	77.78
	Rhaphoneis	雙角縫舟藻	*Rhaphoneis amphiceros*	*																			-	-	-
		縫舟藻	*Rhaphoneis* sp.						120														120	0.01	5.56
	Rhizosolenia	尖根管藻	*Rhizosolenia acuminata*										60										60	0.00	5.56
		異根管藻	*Rhizosolenia alata*			120	120		240	240	120			240	240	480	120		120	120	120	480	2,760	0.17	72.22
		異根管藻纖細變型	*Rhizosolenia alata* f. *gracillima*											120									120	0.01	5.56
		柏戈根管藻	*Rhizosolenia bergonii*											60							120		180	0.01	11.11
		距端根管藻	*Rhizosolenia calcar-avis*		120			120							120					240			600	0.04	22.22
		圓柱根管藻	*Rhizosolenia cylindrus*									240							120				360	0.02	11.11
		柔弱根管藻	*Rhizosolenia delicatula*				360		600						960								1,920	0.12	16.67
		脆根管藻	*Rhizosolenia fragilissima*					840		120						480	240	480					2,160	0.14	27.78
		鈍棘根管藻半刺變種	*Rhizosolenia hebetata* f. *semispina*			120	360		120			240		120	180			120	120			240	1,620	0.10	50.00
		覆瓦根管藻	*Rhizosolenia imbricata*							960													960	0.06	5.56
		印度根管藻	*Rhizosolenia indica*		240																		240	0.02	5.56
		粗根管藻	*Rhizosolenia robusta*																		120		120	0.01	5.56
		剛毛根管藻	*Rhizosolenia setigera*							240	120	240			360	120					120		1,200	0.08	33.33
		斯托根管藻	*Rhizosolenia stolterfothii*				1,800				1,200	3,360	360		240	720	120			600		720	9,120	0.57	50.00
		筆尖形根管藻	*Rhizosolenia styliformis*		480		120	120	720		120		960	360	60				120	120	360	240	3,780	0.24	66.67
		根管藻	*Rhizosolenia* sp.	*									60	180						120		480	840	0.05	22.22
	Skeletonema	骨條藻	*Skeletonema costatum*		1,920	3,720	20,520	23,280	5,880	16,440	36,240	71,280	4,020	4,080	1,380	3,360	20,880	10,200	86,880	51,120	73,680		434,880	27.29	94.44
	Stephanopyxis	冠蓋藻	*Stephanopyxis* sp.			120																	120	0.01	5.56
	Striatellaceae	條紋藻	*Striatella* sp.			240				120					60								420	0.03	16.67
	Synedra	肘狀針桿藻	*Synedra ulna*	*			120				240	240							240		120		960	0.06	27.78
		針桿藻	*Synedra* sp.	*																			-	-	-
	Tabellaria	平板藻	*Tabellaris* sp.			480																	480	0.03	5.56
	Thalassionema	海線藻	*Thalassionema frauenfeldii*	*																			-	-	-
		菱形海線藻	*Thalassionema nitzschioides*	*	1,560	120	1,560	7,080	120	2,880	240	1,200	360	240	1,020	480		1,200	240				18,300	1.15	77.78
		海線藻	*Thalassionema* sp.	*																			-	-	-
	Thalassiosira	密連海鏈藻	*Thalassiosira condensata*		2,280																		2,280	0.14	5.56
		離心海鏈藻	*Thalassiosira eccentricus*			240	240	240	120					60									900	0.06	27.78
		海鏈藻	*Thalassiosira gravida*					840		240										480			-	-	-
		透明海鏈藻	*Thalassiosira hyalina*		5,280	6,600	20,640	20,040	12,360	9,360	7,680	14,400	4,020	7,860	10,260	23,160	21,600	17,520	6,600	7,320	14,640	34,560	243,900	15.30	100.00

Table 2.1.3-4 Resource Table of Marine Phytoplankton (6/6)

Phylum	Genus	Chinese Name	Scientific Name	EIA	2025.03																		Total	RA（%）2	OR（%）
					S1				S2				S3			S4			S5						
				2016.03	0M	3M	10M	B	0M	3M	10M	B	0M	3M	B	0M	3M	B	0M	3M	10M	B			
		圓篩海鏈藻	*Thalassiosira leptopus*		120	360	240	120		120	120		240	60	60		480	840					2,760	0.17	61.11
		諾登海鏈藻	*Thalassiosira nordenskioldi*			480																	480	0.03	5.56
		細弱海鏈藻	*Thalassiosira subtilis*							1,440									4,800			13,920	20,160	1.26	16.67
		海鏈藻	*Thalassiosira* spp.	*	3,120	1,680	4,560	7,320	2,640	4,200	2,160	8,880	780	540	1,320	360	8,640	9,120	14,760	1,440	2,400	8,400	82,320	5.16	100.00
	Thalassiothrix	伏恩海毛藻	*Thalassiothrix frauenfeldii*		960	1,440	2,760	4,320	1,560	1,800	1,440	14,640	480	1,140	1,500	840	2,520	5,880	1,800	840	120	4,080	48,120	3.02	100.00
		長海毛藻	*Thalassiothrix longissima*	*				120	120	240	360				60						120		1,020	0.06	33.33
		海毛藻	*Thalassiothrix mediterranea var. pacifica*		120						240		60										420	0.03	16.67
	Trachyneis	粗紋藻	*Trachyneis aspera*				120																-	-	-
	Ptychodiscus	卵形褶盤藻	*Tryblioptychus cocconeiformis*												60								60	0.00	5.56
Ochrophyte	Chaetoceros	小等刺矽鞭藻	*Dictyocha fibula*	*		240	360	120	120	120	240	720	180	120		120		120		120			2,580	0.16	66.67
	Bacillariophyceae	六異刺矽鞭藻	*Distephanus speculum*	*																			-	-	-
		六異刺矽鞭藻變種	*Distephanus speculum* var. *octomarius*			120	600	960	360	360	480	480		120	60	720	720	960	120	600	360	720	7,740	0.49	88.89
	Ebriidae	艾鞭藻	*Ebria* sp.												60								60	0.00	5.56
Total (individuals)					41,520	51,600	107,520	113,280	69,960	100,920	103,560	144,480	30,900	33,720	38,700	61,680	96,000	82,800	158,160	123,120	166,800	157,440	1,682,160		
Number of Species					40	51	56	55	46	49	56	40	43	46	60	34	41	44	37	40	45	32	178		
Diversity Index (H')					1.30	1.34	1.26	1.23	1.21	1.28	1.16	0.89	1.27	1.19	1.34	1.06	1.10	1.23	0.82	0.94	0.87	1.11	1.23		
Evenness Index (J')					0.81	0.78	0.72	0.71	0.73	0.76	0.66	0.56	0.78	0.72	0.76	0.69	0.69	0.75	0.52	0.59	0.53	0.74	0.57		

Remark 1: "*" indicates the species was recorded in the EIS stage (August 2016).

Remark 2: RA refers to Relative Abundance (%), OR refers to Occurrence Rate (%).

Remark 3: "-" indicates the value is incalculable

Remark 4: "B" indicates Bottom.

Table 2.1.3-5 Resources Table of Marine Zooplankton

Phylum	Chinese Name	Species Group	EIA[1] 2016.03	2025.03 S1	S2	S3	S4	S5	Total	RA（%）[2]	OR（%）
	有孔蟲	*Foraminifera*	*	3,026	5,442	13,537	6,622	8,987	37,615	1.07	100
Protozoa	夜光蟲	*Noctiluca*	*						-	-	-
	放射蟲	*Radiolaria*	*	2,594	640	1,327	3,311	4,279	12,152	0.35	100
Cnidaria	其他刺絲胞動物幼生	*Other Cnidaria larvae*	*	12,106	8,644	4,247	47,457	4,921	77,375	2.20	100
	管水母	*Siphonophora*	*	12,106	9,284	13,537	20,969	6,205	62,102	1.77	100
Arthropod	端腳類	*Amphipoda*	*	432	320	796	5,518	428	7,495	0.21	100
	藤壺幼生	*Barnacle larvae*	*				2,207		2,207	0.06	20
	哲水蚤	*Calanoida*	*	143,975	250,991	145,193	882,918	149,781	1,572,858	44.72	100
	枝角類	*Cladocera*	*			265		642	907	0.03	40
	橈足類幼生	*Copepoda nauplius*	*	1,729			3,311		5,040	0.14	40
	劍水蚤	*Cyclopoida*	*	44,100	21,129	24,951	66,219	26,319	182,718	5.20	100
	十足類幼生	*Decapoda larvae*	*	70,042	14,086	20,438	47,457	25,035	177,058	5.03	100
	磷蝦類	*Euphausiacea*	*	1,297			2,207		3,504	0.10	40
	猛水蚤	*Harpacticoida*	*		320	531		642	1,493	0.04	60
	螢蝦類	*Luciferidae*	*	30,697	4,482	14,068	14,347	11,555	75,149	2.14	100
	糠蝦類	*Mysidacea*	*	12,106	6,723	3,185	24,280	4,279	50,574	1.44	100
	介形類	*Ostracoda*	*	11,674	33,615	6,636	6,622	7,061	65,607	1.87	100
Annelid	多毛類	*Polychaeta*	*	6,485	3,522	2,920	15,451	1,712	30,090	0.86	100
	異足類	*Heteropoda*	*						-	-	-
Mollusca	其他軟體動物	*Other Mollusca*	*						-	-	-
	翼足類	*Pteropoda*	*	5,188	3,522	531	6,622	1,070	16,932	0.48	100
Chaetognatha	毛顎類	*Chaetognatha*	*	41,939	42,579	33,445	184,309	30,384	332,655	9.46	100
Echinoderm	棘皮幼生	*Echinodermata larvae*	*	4,756	640	265	4,415		10,076	0.29	80
	有尾類	*Appendicularia*	*	131,436	84,518	35,834	306,814	95,432	654,033	18.60	100
	魚卵	*Fish eggs*	*	1,729	320	1,858			3,908	0.11	60
Chordate	仔稚魚	*Fish larvae*	*	2,594	1,281	265	3,311		7,451	0.21	80
	海樽類	*Thaliacea*	*		5,763	7,432	20,969	3,852	38,016	1.08	80
Others	其他	*Others*		5,621	11,205	39,550	30,902	2,782	90,059	2.56	100
Total (inds./1,000 m^3)				545,634	509,026	370,812	1,706,239	385,364	3,517,076		
Diversity Index (H’)				0.95	0.78	0.93	0.73	0.83			
Evenness Index (J’)				0.72	0.59	0.69	0.55	0.65			

Remark 1: “*” indicates the species was recorded in the EIS stage (August 2016).

Remark 2: RA refers to Relative Abundance (%), OR refers to Occurrence Rate (%).

Remark 3: “-” indicates the value is incalculable

Table 2.1.3-6 Resources Table of Marine Benthic Organisms

Orde	Family	Chinese Name	Scientific Name	Endemism	Protected Level	EIA 2016.03	S1	S2	S3	S4	S5	Total	RA(%)	OR(%)
Cardiida	Tellinidae	花瓣櫻蛤	*Jitlada culter*					2		4	2	8	14.81	60.00
Cardiida	Tellinidae	箱形櫻蛤	*Serratina capsoides*					1				1	1.85	20.00
Myoida	Corbulidae	臺灣抱蛤	*Corbula fortisulcata*				1			6		7	12.96	40.00
Venerida	Veneridae	紫碟文蛤	*Sunetta menstrualis*				1	1				2	3.70	40.00
Spatangoida	Dendrasteridae	馬氏扣海膽	*Sinaechinocyamus mai*							2		2	3.70	20.00
Littorinimorpha	Eulimidae	白瓷螺	*Melanella grandis*							1		1	1.85	20.00
Littorinimorpha	Naticidae	大玉螺	*Neverita didyma*				1		1			2	3.70	40.00
Littorinimorpha	Naticidae	細紋玉螺	*Tanea lineata*					1		1		2	3.70	40.00
Neogastropoda	Nassariidae	正織紋螺	*Nassarius livescens*				16	5		2		23	42.59	60.00
Neogastropoda	Raphitomidae	月桂捲管螺之一種	*Daphnella* sp.				1					1	1.85	20.00
Decapoda	Diogenidae	活額寄居蟹之一種	Diogenidae sp1.				1					1	1.85	20.00
Decapoda	Penaeidae	細指異對蝦	*Atypopenaeus stenodactylus*				3					3	5.56	20.00
Decapoda	Penaeidae	雕刻仿對蝦	*Mierspenaeopsis sculptilis*				1					1	1.85	20.00
Total (individuals)							25	10	1	16	2	54		
Number of Species							8	5	1	6	1	13		
Diversity Index (H’)							1.31	1.36	0	1.58	0			
Evenness Index (J’)							0.63	0.84	-	0.88	-			

Remark 1: “*” indicates the species was recorded in the EIS stage (August 2016).

Remark 2: RA refers to Relative Abundance (%), OR refers to Occurrence Rate (%).

Remark 3: “-” indicates the value is incalculable.

V. Fish Egg and Larva

i. Species Composition

A total of 24 fish eggs were collected this quarter season. These were identified as belonging to 5 families across 5 groups. The most abundant were from Lutjanidae family, followed by Scombridae species family and eggs from Carangidae family. All other types were recorded at less than 138 eggs/100 m³ (see Table 2.1.3-7).

This season also recorded 31 fish larvae and juveniles, belonging to 10 families and 14 groups. The most dominant species was the Pacific mackerel (*Scomber australasicus*, Family: Scombridae), followed by *Ostorhinchus novemfasciatu*s (Family: Apogonidae), the common jack species from the family Carangidae, *Takifugu niphobles* (Family: Tetraodontidae), the lanternfish family Myctophidae, goatfish species from Parupeneus genus, Family: Mullidae, the Japanese anchovy (Engraulis japonicus, Family: Engraulidae), the cutlassfish family Trichiuridae, and the tonguefish genus Cynoglossus (Family: Cynoglossidae). All remaining species were recorded at fewer than 43 individuals/100 m³ (see Table 2.1.3-8).

Table 2.1.3-7 Fish Egg Composition and Abundance Collected in Q2

Taxa\Station	Chinese Name	st.1	st.2	st.3	st.4	st.5	Total
Synodontidae							
Synodontidae sp.	合齒魚科			27			27
Carangidae							
Carangidae sp.	鰺科		32	106			138
Labridae							
Labridae sp.	隆頭魚科					21	21
Lutjanidae							
Lutjanidae sp.	笛鯛科	130		80			209
Scombridae							
Scombridae sp.	鯖科					150	150
Abundance Ind/100m^3		**130**	**32**	**212**	**0**	**171**	**545**
No. Of Families		1	1	3	0	2	5
No. of Classified Taxa		1	1	3	0	2	5
Actual No. of Collected Fish Eggs		**6**	**2**	**8**	**0**	**8**	**24**

ii. Index Analysis

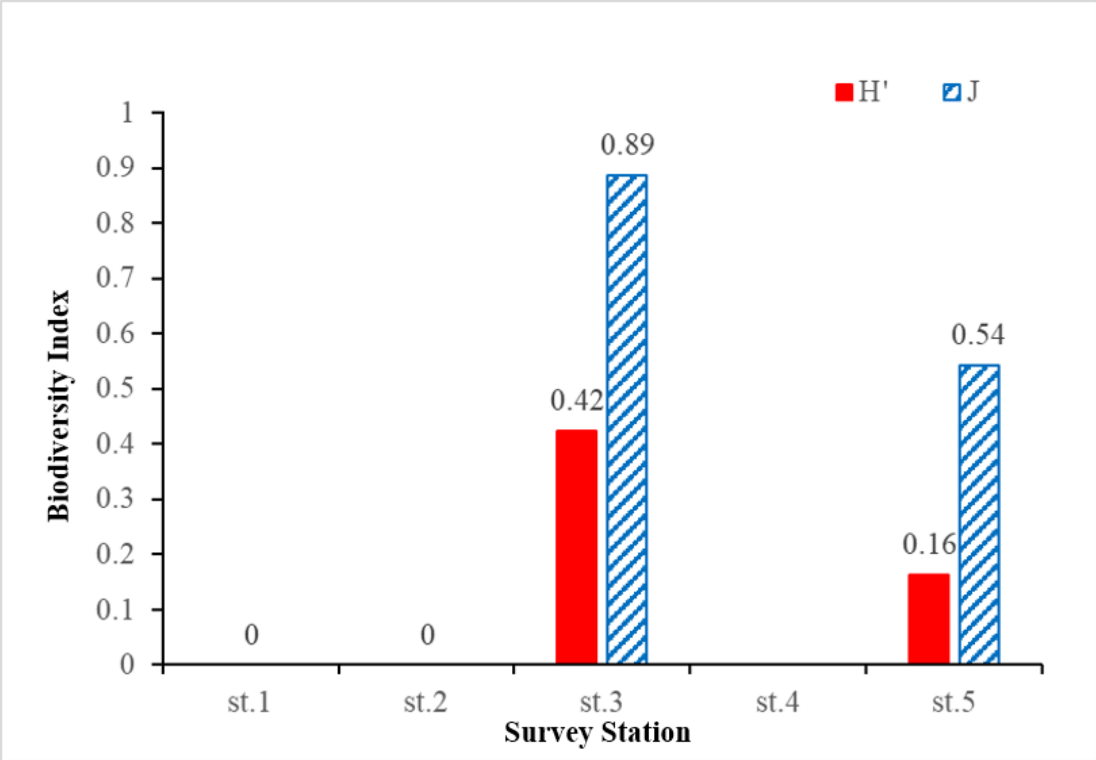
The Shannon-Wiener diversity index (H') and Pielou’s evenness index (J') were used to analyze the biodiversity and evenness of fish eggs and larvae at each sampling station (see Figure 2.1.3-1). The Shannon-Wiener diversity index (H’) reflects both the number of species and their relative abundances in a community — the higher the value, the greater the ecological stability. The Pielou’s evenness index (J’) measures how evenly individuals are distributed across species within the community (ranging from 0 to 1, with values closer to 1 indicating higher evenness).

For fish eggs, diversity index values ranged from 0.16 to 0.42, and evenness index values ranged from 0.54 to 0.89. Station St.4 had no fish eggs recorded, so diversity and evenness could not be calculated. Stations St.1 and St.2 each recorded only one unidentified egg, resulting in a diversity index of 0, and evenness was also not calculable.

For fish larvae and juveniles, Stations St.3 and St.5 recorded only one species each, resulting in a diversity index of 0 and uncalculable evenness. At the remaining stations, the diversity index ranged from 0.69 to 0.82, and evenness index ranged from 0.88 to 0.97. The highest diversity index was observed at Station St.2 (H’ = 0.82), while the lowest was at Station St.4 (H’ = 0.67).

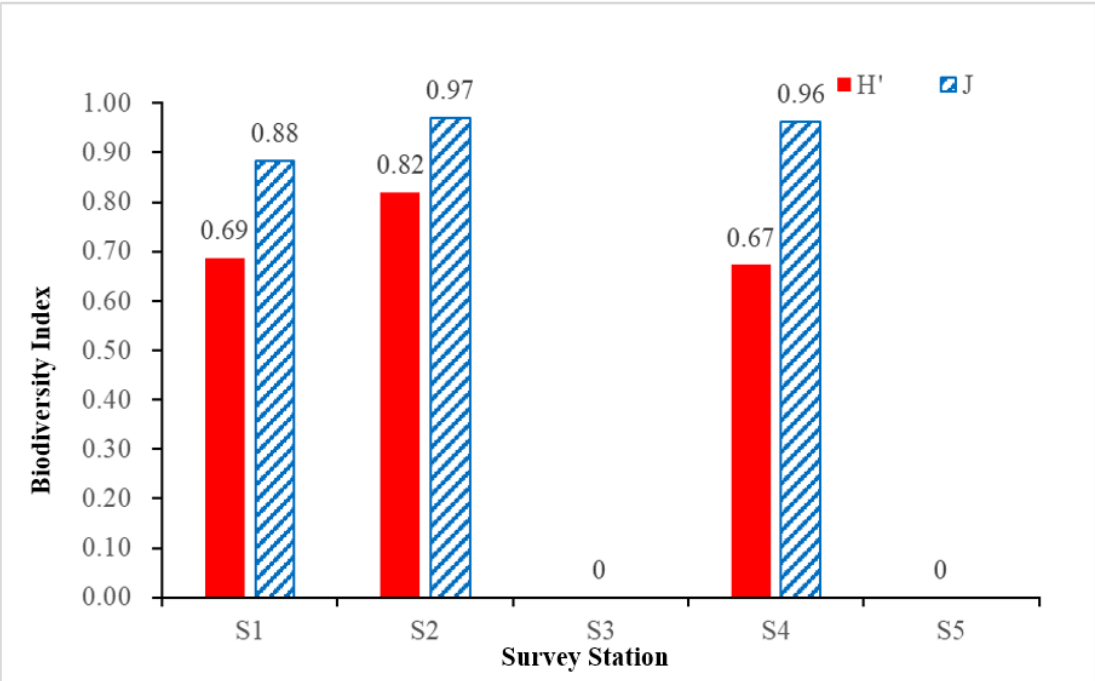
Table 2.1.3-8 Fish Larva Composition and Abundance Collected in Q2

Taxa\Station	Chinese Name	st.1	st.2	st.3	st.4	st.5	Total
Carangidae							
Carangidae sp.	鰺科	108					108
Engraulidae							
Engraulis japonicus	日本鯷				55		55
Apogonidae							
Apogonidae sp.	天竺鯛科		16				16
Ostorhinchus novemfasciatus	九帶天竺鯛				110		110
Myctophidae							
Myctophidae sp.	燈籠魚科	22		27		43	91
Lampanyctus sp.	珍燈魚屬		16				16
Platycephalidae							
Platycephalidae sp.	牛尾魚科		16				16
Cynoglossidae							
Cynoglossus sp.	舌鰨屬	43					43
Cynoglossus joyneri	焦氏舌鰨	22					22
Bramidae							
Bramidae sp.	烏魴科				55		55
Scombridae							
Scombridae sp.	鯖科		32				32
Scomber australasicus	澳洲花鯖		16		110		126
Mullidae							
Parupeneus sp.	海緋鯉屬	43	32				75
Tetraodontidae							
Takifugu niphobles	黑點多紀魨	22	16		55		93
Abundance (ind/100m^3)		**259**	**144**	**27**	**386**	**43**	**859**
No. of Familes		5	6	1	5	1	10
No. of Classified Taxa		6	7	1	5	1	14
Actual No. of Collected Fish Eggs		**12**	**9**	**1**	**7**	**2**	**31**



(a) Fish Egg

Figure 2.1.3-1 Diversity Index (H’) and Evenness Index (J’) of Fish Egg and Fish Larva in each Sampling Station (1/2)



(b) Fish Larva

Figure 2.1.3-1 Diversity Index (H’) and Evenness Index (J’) of Fish Egg and Fish Larva in each Sampling Station (2/2)

VI. Fish

i. Species Composition

A total of 7 individual fish were captured this season from 3 sampling stations, belonging to 4 species across 4 families, with a total weight of 5.112 kg (see Table 2.1.3-9).

At Station T1, 5 individuals from 3 species and 3 families were caught, weighing a total of 3.495 kg. The most abundant species was the Bluespotted stingray (*Neotrygon kuhlii*, Family: Dasyatidae), with 3 individuals. One individual each of the many-scaled fourfinger threadfin (*Eleutheronema rhadinum*, Family: Polynemidae) and Reeve's croaker (*Chrysochir aureus*, Family: Mugilidae) were also recorded. Station T2 recorded no fish this season. At Station T3, 2 individuals from 2 species and 2 families were captured, with a total weight of 1.616 kg, including the saddle grunt (*Pomadasys maculatus*, Family: Siganidae) and the Bluespotted stingray (*Neotrygon kuhlii*).

ii. Dominant Species

Across the three sampling stations, *Trachurus japonicus* was the most dominant species, with 3 individuals, accounting for 30.00% of the total catch. This was followed by *Neotrygon kuhlii* with 2 individuals (20.00%). Other species, including *Pomadasys maculatus*, *Eleutheronema rhadinum*, and *Polydactylus sexfilis*, each had 1 individual (10.00%). Across all three sampling stations, the most dominant species in terms of individual count was the Bluespotted stingray (*Neotrygon kuhlii*, Family: Dasyatidae), with 4 individuals, accounting for 57.14% of the total. The remaining species—saddle grunt (*Pomadasys maculatus*, Family: Siganidae), many-scaled fourfinger threadfin (*Eleutheronema rhadinum*, Family: Polynemidae), and Reeve's croaker (*Chrysochir aureus*, Family: Mugilidae)—each accounted for 1 individual or 14.29%.

Table 2.1.3-9 Composition of Fish Captured at Sampling Stations in Q2

(Total Length (TL): cm, Body Weight (BW): g, Number (No.))

Sampling Date				2025.03.24			2025.03.24			2025.03.24			
Station				Bottom Gillnet T1			Bottom Gillnet T2			Bottom Gillnet T3			
Family	Scientific Name	Chinese Name	Habitat	No.	TL	BW	No.	TL	BW	No.	TL	BW	總計
Haemulidae	*Pomadasys maculatus*	斑雞魚	Reef, Sand							1	40.9	998.40	1
Polynemidae	*Eleutheronema rhadinum*	多鱗四絲馬鮁	Reef, Sand	1	27.3	277.20							1
Sciaenidae	*Chrysochir aureus*	黃金鰭鰔	Sand	1	35.8	439.8							1
Dasyatidae	*Neotrygon orientalis*	古氏新魟	Reef, Sand	3	55.7-60.7	2778.4				1	54.5	618	4
Weight (g)						3495.4						1616.4	5111.8
No. of Species				3			0			2			4
No. of Individuals				5			0			2			7
Diversity Index (*H′*)				0.41			-			0.15			
Evenness Index (*J*)				0.86			-			0.50			

Note: No. indicates individual; TL indicates total length (cm); BW indicates weight (g)

iii. Analysis of Indexes

At Station T1, the Shannon-Wiener diversity index (H') was 0.41, and the evenness index (J') was 0.86. At Station T2, no species were recorded, so diversity and evenness indices could not be calculated. At Station T3, H' was 0.15, and J' was 0.50.Overall, Station T1 showed higher biodiversity and evenness, while Station T3 had the lowest values. This indicates that Station T1 had higher species diversity and less dominance by a single species, although total fish catch across stations remained low.

iv. Comprehensive Discussion

Among the four species recorded this season, three—*Pomadasys maculatus*, many-scaled fourfinger threadfin (*Eleutheronema rhadinum*), and Reeve's croaker—are considered to have high economic value. Although the blue-spotted stingray (*Neotrygon kuhlii*) also has edible value, it is less favored in the market and is often sold as low-value fish or used as raw material for processed seafood. From a species-count perspective, 75% of the species caught are of high economic value. From an individual-count perspective, these high-value species make up 43% of the total catch. From an environmental perspective, all fish species recorded this season are known to prefer sandy or sandy-rocky seabeds. Species preferring muddy-sandy substrates accounted for 100% of the species and 100% of the total individuals caught. These results suggest that the fish species composition is highly consistent with the geographical and benthic conditions of the Yunlin coastal waters.

VII. Underwater Filming

The underwater photography for this quarter season were conducted on March 2, March 11–12, March 25, April 9, and May 16, 2025. A total of 22 wind turbines were surveyed at the middle and bottom layers, including YUN04, YUN07, YUN08, YUN10, YUN14, YUN31, YUN33, YUN36, YUN40, YUN44, YUN46, YUN47, YUN54, YUN55, YUN56, YUN58, YUN59, YUN60, YUN65, YUN66, YUN67, and YUN75 (see Table 2.1.3-10 and Figure 2.1.3-2).

Since the underwater components of the turbines have been in place for some time, the seabed has developed into a mixed substrate of rock and sand, influenced by the monopile foundations and scour protection (rock dumping). This season, various degrees of biological fouling were observed on the monopile bases or seabed stones of the 22 turbines. At YUN07, YUN08, YUN14, YUN31, YUN46, YUN55, YUN59, and YUN67, no significant biological colonization was yet observed on the seabed. Notably, YUN04 and YUN10 showed active bristle worms (Family: Eunicidae) among the algae. Other turbines had varying degrees of fouling by barnacles (Order: Sessilia), seaweeds, or hydroids (Class: Hydrozoa). Of particular interest is YUN36, where coral growth was documented. For the middle sections of the monopiles, most turbines exhibited some degree of fouling; YUN08, YUN31, YUN33, and YUN58 recorded notable biological activity.

As for fauna, YUN14 recorded one stockfish (*Katsuwonus pelamis*) foraging near the pile. YUN33, YUN40, YUN47, and YUN65 recorded *Plectorhinchus cinctus* near the seabed. YUN44 documented one grouper species (Family: Sebastidae). YUN54 and YUN59 recorded Orange-spotted grouper (*Epinephelus coioides*). YUN58 recorded a Syngnathidae sp. and a *Charybdis orientalis*. YUN66 recorded one fourfinger threadfin (*Eleutheronema rhadinum*). At YUN40, five unidentified fish were seen schooling near the monopile midsection. YUN46 recorded four unidentified small fish feeding among rocks. Among all sites, YUN36 had the highest species diversity: four *Tylosurus crocodilus crocodilus* were observed schooling in the midsection; one ray-finned fish (Family: Caesionidae) was active near the monopile; and two groupers (Family: Serranidae) and one grunt (Family: Haemulidae) were active near the bottom.

Table 2.1.3-10 Underwater Filming Sampling Locations

Turbine No.	Coordinates[Note]		Water Depth(m)
	Latitude	Longitude	
YUN04	23°39.170'N	120°3.176'E	28.0
YUN07	23°38.652' N	120°1.396'E	28.0
YUN08	23°38.339' N	120°1.677' E	30.0
YUN10	23°38.377' N	120°2.575' E	30.0
YUN14	23°38.145' N	120°0.846' E	18.2
YUN31	23°36.484' N	120°2.219' E	19.0
YUN33	23°36.109' N	119°59.918' E	27.3
YUN36	23°35.555' N	120°1.074' E	16.9
YUN40	23°35.368' N	119°59.793' E	25.2
YUN44	23°34.962' N	120°2.240' E	23.7
YUN46	23°34.930' N	120°3.471' E	13.3
YUN47	23°34.658' N	119°59.672' E	25.8
YUN54	23°34.417' N	120°2.854' E	13.0
YUN55	23°34.212' N	120°3.368' E	11.4
YUN56	23°33.248' N	119°59.471' E	27.8
YUN58	23°33.642' N	120°2.342' E	11.4
YUN59	23°33.702' N	120°2.828' E	16.0
YUN60	23°33.404' N	120°3.106' E	12.3
YUN65	23°32.593' N	120°1.618' E	23.1
YUN66	23°32.840' N	120°2.161' E	14.1
YUN67	23°32.739' N	120°2.574' E	18.0
YUN75	23°35.708' N	120°1.848' E	23.0

Note: The coordinate system used is WGS84

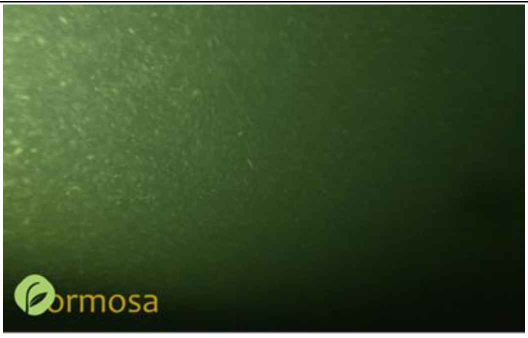
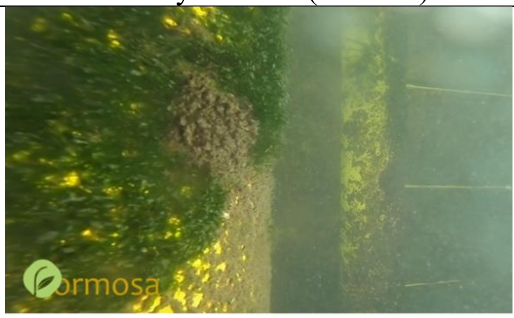
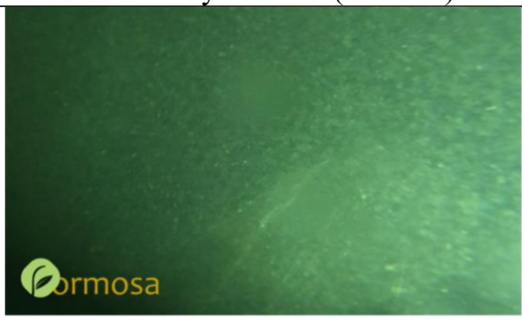
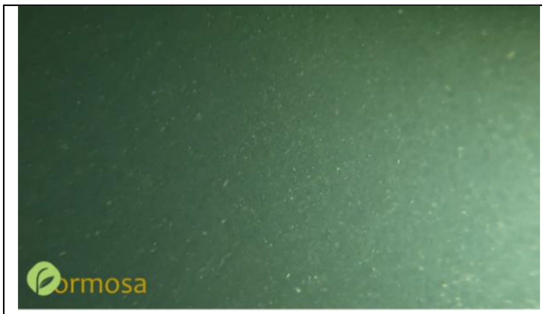
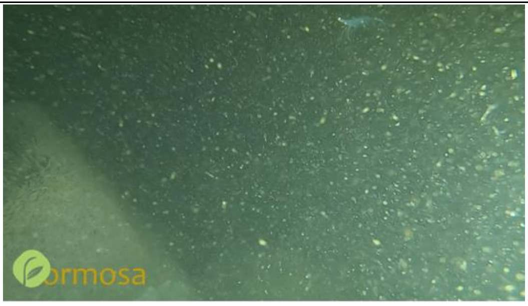
	
Mid-layer Photo (YUN4)	Bottom-layer Photo (YUN4)
	
Mid-layer Photo (YUN07)	Bottom-layer Photo (YUN07)
	
Mid-layer Photo (YUN08)	Bottom-layer Photo (YUN08)

Figure 2.1.3-2 Underwater Filming Survey Environment Photos (1/6)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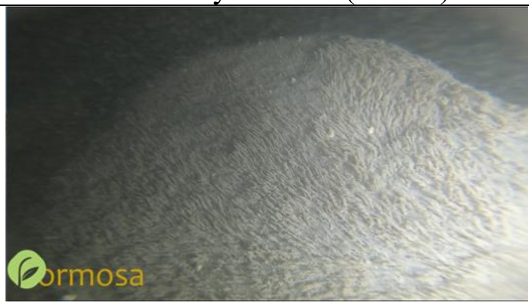
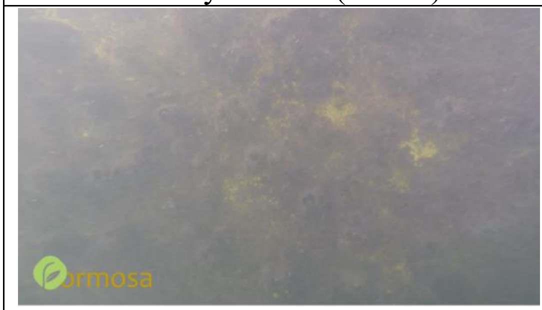
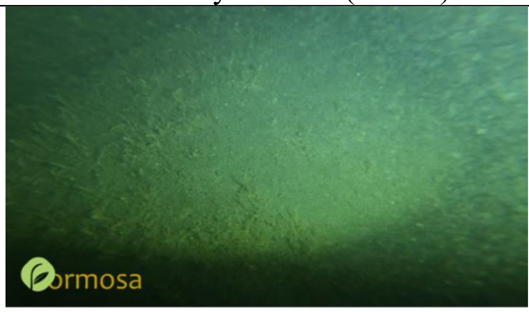
	
Mid-layer Photo (YUN9)	Bottom-layer Photo (YUN9)
	
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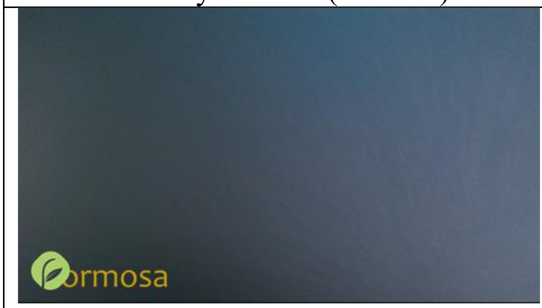
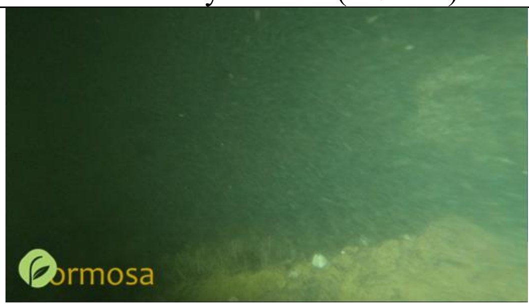
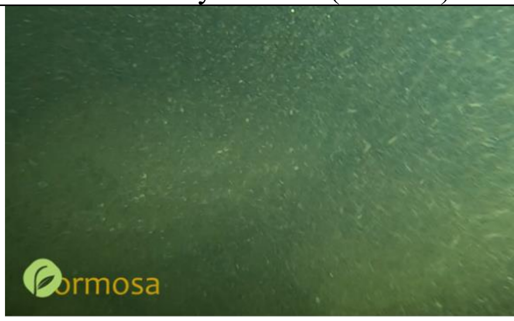
	
Mid-layer Photo (YUN15)	Bottom-layer Photo (YUN15)

	
Mid-layer Photo (YUN10)	Bottom-layer Photo (YUN10)
	
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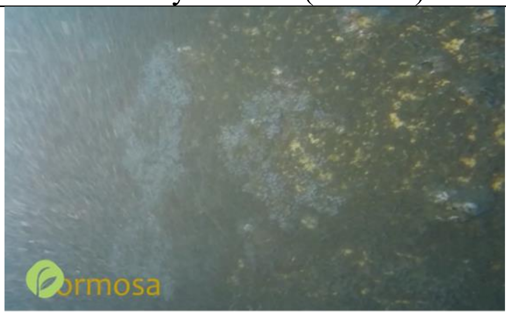
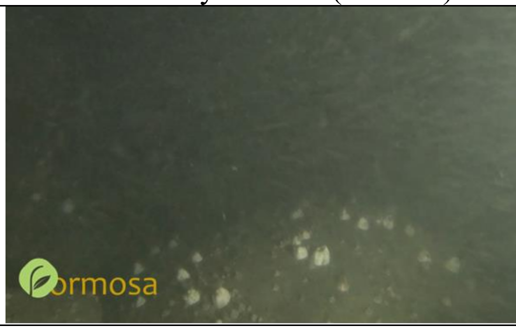
	
Mid-layer Photo (YUN33)	Bottom-layer Photo (YUN33)

Figure 2.1.3-2 Underwater Filming Survey Environment Photos (2/6)

	
Mid-layer Photo (YUN36)	Bottom-layer Photo (YUN36)
	
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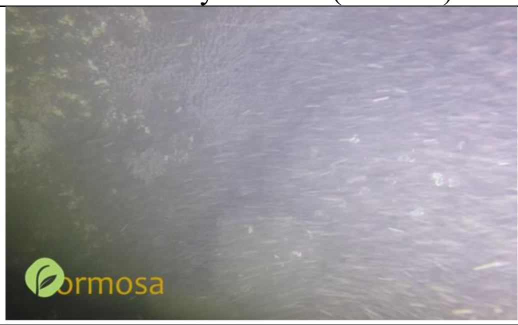
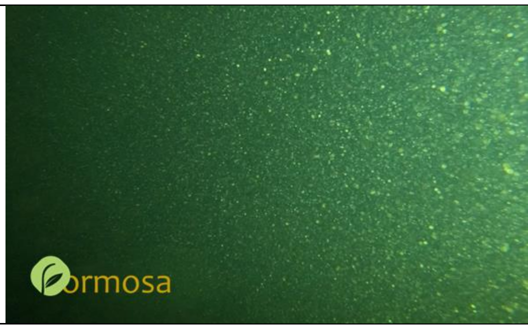
	
Mid-layer Photo (YUN44)	Bottom-layer Photo (YUN44)
	
Mid-layer Photo (YUN46)	Bottom-layer Photo (YUN46)

Figure 2.1.3-2 Underwater Filming Survey Environment Photos (3/6)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	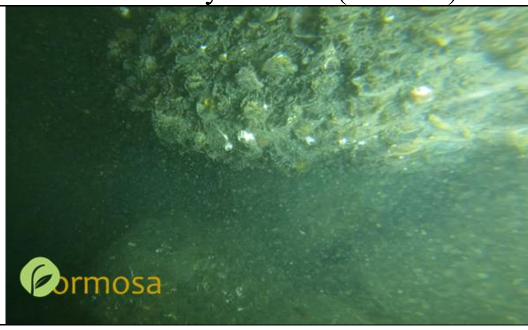
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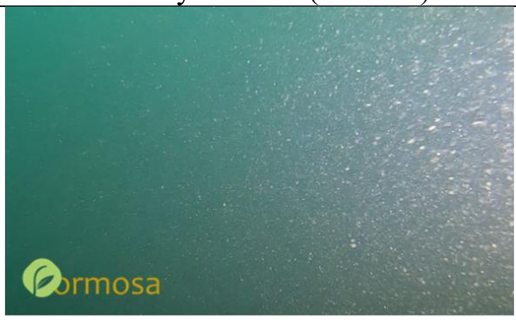	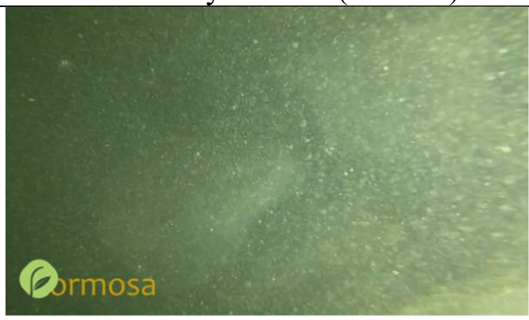
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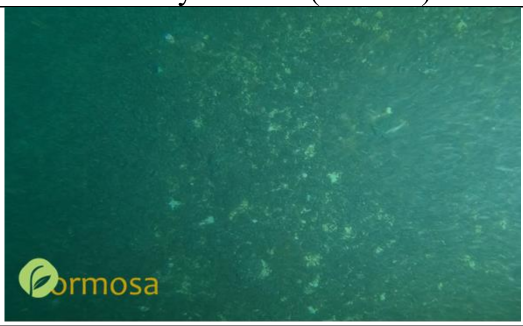
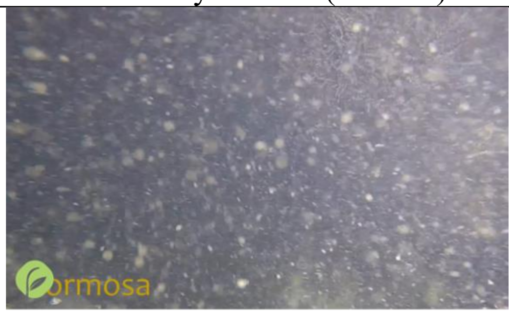
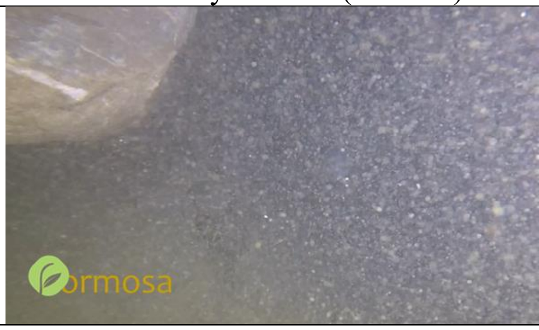
	
Mid-layer Photo (YUN56)	Bottom-layer Photo (YUN56)

Figure 2.1.3-2 Underwater Filming Survey Environment Photos (4/6)

	
Mid-layer Photo (YUN58)	Bottom-layer Photo (YUN58)
	
Mid-layer Photo (YUN59)	Bottom-layer Photo (YUN59)
	
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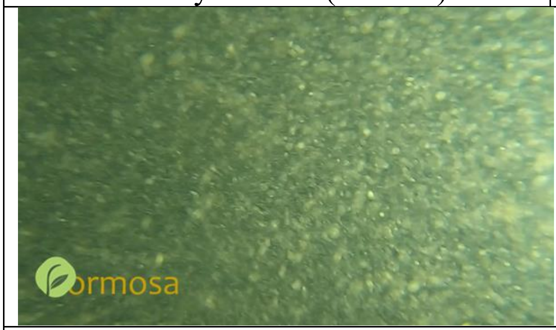	
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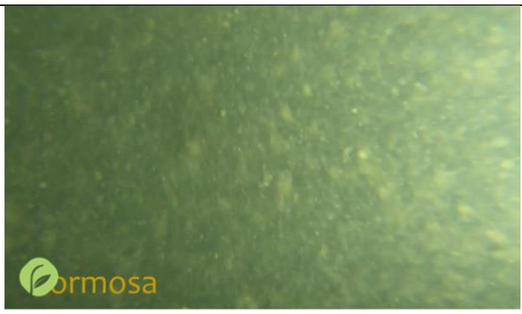
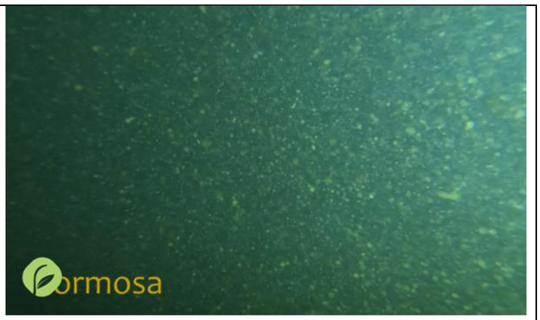
Figure 2.1.3-2 Underwater Filming Survey Environment Photos (5/6)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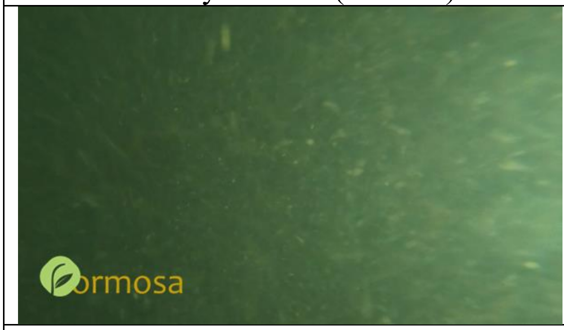	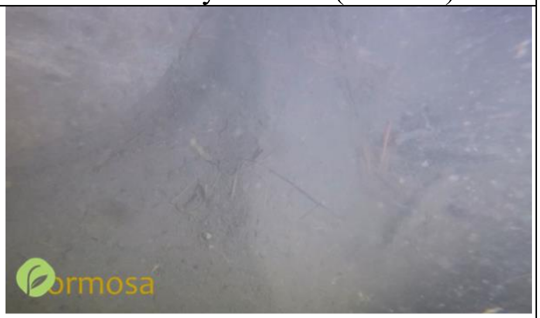
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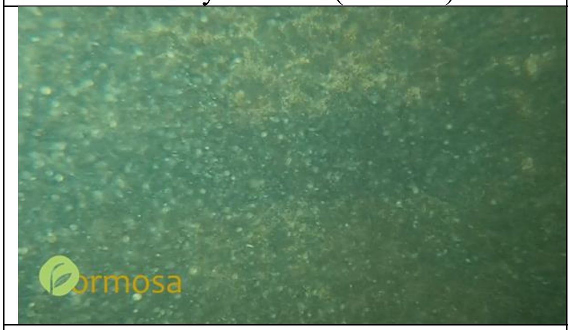
	
Mid-layer Photo (YUN75)	Bottom-layer Photo (YUN75)

Figure 2.1.3-2 Underwater Filming Survey Environment Photos (6/6)

s are detailed in Table 2.1.3-11.

Table 2.1.3-11 Q2 Underwater Filming Survey Results (1/3)

Order	Family	Chinese Name	Scientific Name	4		7		8		10		14		31		33	
				Middle	Bottom	Middle	Bottom	Middle	Bottom	Middle	Bottom	Middle	Bottom	Middle	Bottom	Middle	Bottom
Beloniformes	Belonidae	鱷形叉尾鶴鱵	*Tylosurus crocodilus crocodilus*														
Centrarchiformes	Kyphosidae	柴魚	*Microcanthus strigatus*										1				
Perciformes	Haemulidae	石鱸科	Haemulidae sp.														
Perciformes	Haemulidae	花尾胡椒鯛	*Plectorhinchus cinctus*														2
Perciformes	Caesionidae	烏尾鮗科	Caesionidae sp.														
Perciformes	Polynemidae	多鱗四指馬鮁	*Eleutheronema rhadinum*														
Perciformes	Serranidae	鮨科	Serranidae sp.														
Perciformes	Serranidae	點帶石斑魚	*Epinephelus coioides*														
Thalattosauria	Syngnathidae	海龍科	Syngnathidae sp.														
		未知															
Total				0	0	0	0	0	0	0	0	0	1	0	0	0	2

Table 2.1.3-11 Q2 Underwater Underwater Filming Survey Results (2/3)

Order	Family	Chinese Name	Scientific Name	36		40		44		46		47		54		55	
				Middle	Bottom	Middle	Bottom	Middle	Bottom	Middle	Bottom	Middle	Bottom	Middle	Bottom	Middle	Bottom
Beloniformes	Belonidae	鱷形叉尾鶴鱵	*Tylosurus crocodilus crocodilus*	4													
Centrarchiformes	Kyphosidae	柴魚	*Microcanthus strigatus*														
Perciformes	Haemulidae	石鱸科	Haemulidae sp.		1				1								
Perciformes	Haemulidae	花尾胡椒鯛	*Plectorhinchus cinctus*				1						1				
Perciformes	Caesionidae	烏尾鮗科	Caesionidae sp.	1													
Perciformes	Polynemidae	多鱗四指馬鮁	*Eleutheronema rhadinum*														
Perciformes	Serranidae	鮨科	Serranidae sp.		2												
Perciformes	Serranidae	點帶石斑魚	*Epinephelus coioides*								1				1		
Thalattosauria	Syngnathidae	海龍科	Syngnathidae sp.														
		未知				5					4						
Total				5	3	5	1	0	1	0	4	0	1	0	1	0	0

Table 2.1.3-11 Q2 Underwater Filming Survey Results (3/3)

Order	Family	Chinese Name	Scientific Name	56		58		59		60		65		66		67		75	
				Middle	Bottom	Middle	Bottom	Middle	Bottom	Middle	Bottom	Middle	Bottom	Middle	Bottom	Middle	Bottom	Middle	Bottom
Beloniformes	Belonidae	鱷形叉尾鶴鱵	*Tylosurus crocodilus crocodilus*																
Centrarchiformes	Kyphosidae	柴魚	*Microcanthus strigatus*																
Perciformes	Haemulidae	石鱸科	Haemulidae sp.																
Perciformes	Haemulidae	花尾胡椒鯛	*Plectorhinchus cinctus*										1						
Perciformes	Caesionidae	烏尾鮗科	Caesionidae sp.																
Perciformes	Polynemidae	多鱗四指馬鮁	*Eleutheronema rhadinum*												1				
Perciformes	Serranidae	鮨科	Serranidae sp.																
Perciformes	Serranidae	點帶石斑魚	*Epinephelus coioides*						1										
Thalattosauria	Syngnathidae	海龍科	Syngnathidae sp.				1												
		未知																	
Total				0	0	0	0	0	1	0	0	0	1	0	1	0	0	0	0

2.1.4 Underwater Acoustic Survey of Cetacean Ecology

This monitoring consists of five measurement points, YW-1 to YW-5, and analyzes their effective measurement data. The underwater acoustic surveys for this quarter was conducted from April 17 to February April 18, 2025 (Minguo Year 114). Each measurement point is monitored for a total of one day (24 hours). The time interval for data analysis is detailed in Table 2.1.4-1, and the analysis results are described below. The deployment locations are shown in Figure 1.4-5.

Table 2.1.4-1 Q1 Duration of Analyzed Underwater Acoustic Data

Measuring Location	Data Analysis Time
YW-1	April 17, 2025, 09:30:00 – April 18, 2025, 09:30:00
YW-2	April 17, 2025, 09:00:00 – April 18, 2025, 09:00:00
YW-3	April 17, 2025, 10:30:00 – April 18, 2025, 10:30:00
YW-4	April 17, 2025, 09:00:00 – April 18, 2025, 09:00:00
YW-5	April 17, 2025, 08:30:00 – April 18, 2025, 08:30:00

Cetacean vocalizations include whistles, which are used for individual or group communication and social interactions, and clicks, which are used for echolocation to detect surroundings and locate prey. These sounds were further analyzed through spectral analysis and audio filtering to interpret cetacean activity. The results are presented below.

I. Whistle Detection

During this quarter season, continuous 24-hour acoustic monitoring was conducted at five measurement points (YW-1 to YW-5). Each point’s second-by-second data was analyzed through spectral and audio filtering (2.5 kHz to 10 kHz). The results are summarized in Table 2.1.4-2. Among the five monitoring sites, YW-1, YW-4, and YW-5 detected whistle signals, indicating cetacean presence. YW-1 detected 197 whistle events across 3 hours of recording, with an encounter rate of 65.7 whistles per hour. YW-3 recorded 5 whistles over 1 hour, with an encounter rate of 5 whistles per hour. YW-5 recorded 73 whistles over 3 hours, with an encounter rate of 24.3 whistles per hour. Observing the time of occurrence, whistles at YW-1 occurred mainly during daytime, while those at YW-3 and YW-5 occurred primarily during nighttime, as shown in Figures 2.1.4-1 to 2.1.4-2.

In terms of tidal phase, the time axis uses 0 to represent high tide, -1 as one hour before high tide, +1 as one hour after, and so on. This season, whistle detections were more frequent within three hours before and after high tide, suggesting a potential correlation between cetacean vocal activity and tidal cycles.

II. Click Detection

This season, measurements were conducted continuously for 24 hours at five locations (YW-1 to YW-5). The data collected at each point per second was analyzed using spectrum and audio filtering (10kHz–20kHz) to confirm the results (as shown in Table 2.1.4-3). During the monitoring period, no click sounds were detected at any of the sites from YW-1 to YW-5, as detailed in Figures 2.1.4-3 to 2.1.4-4.

When observing the distribution of detected click sounds in relation to the tidal cycle (with high tide represented as 0, one hour before high tide as -1, and one hour after as 1, and so on), no click sounds were detected at any of the monitoring stations YW-1 to YW-5 during this season.

III. Detection of Sounds from Other Biological Sources

In this quarter season Q2, vocalizations of Sciaenidae sp. (croaker fish) were detected at monitoring points YW-3 and YW-5, including both individual and group calls. Through acoustic file analysis and detection, the characteristic time-frequency spectrograms of croaker fish calls are shown in Figures 2.1.4-5 and 2.1.4-6. This season, vocalizations of Sciaenidae (croaker fish) were detected at monitoring points YW-3 and YW-5, including both individual and group calls. Through acoustic file analysis and detection, the characteristic time-frequency spectrograms of croaker fish calls are shown in Figures 2.1.4-5 and 2.1.4-6.

Table 2.1.4-2 Results of Whistle Detection at Each Measurement Point

Measuring Station	Detection Days	Detection Times	Recording Hours	Recording Time Ratio	Contact Rate (Times/hr)
YW-1	1	197	3	0.125	65.7
YW-2		0	0	0	0.0
YW-3		5	1	0.04	5
YW-4		0	0	0	0.0
YW-5		73	3	0.125	24.3

Remark 1：「Recording Hours」refers to the number of hours in which whistles were detected.
Remark 2：「Recording Time Ratio」is the number of hours in which whistles were detected divided by 24 hours.
Remark 3：「Contact Rate」is the number of detections per hour in which whistles were detected.

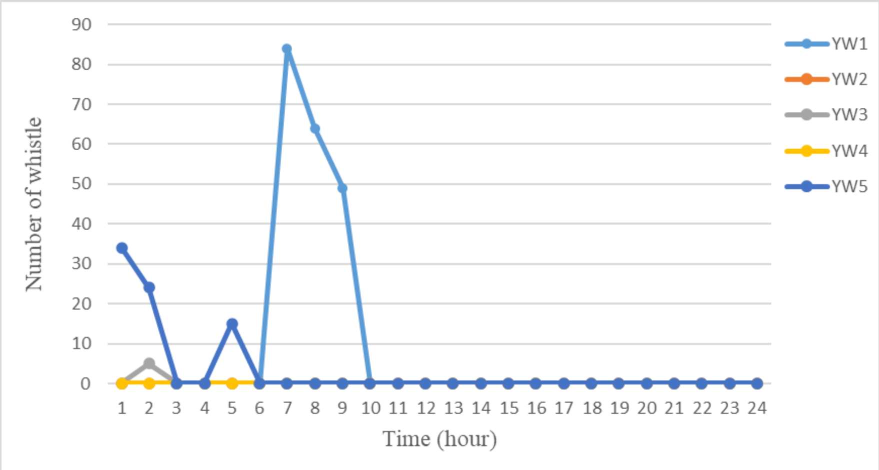
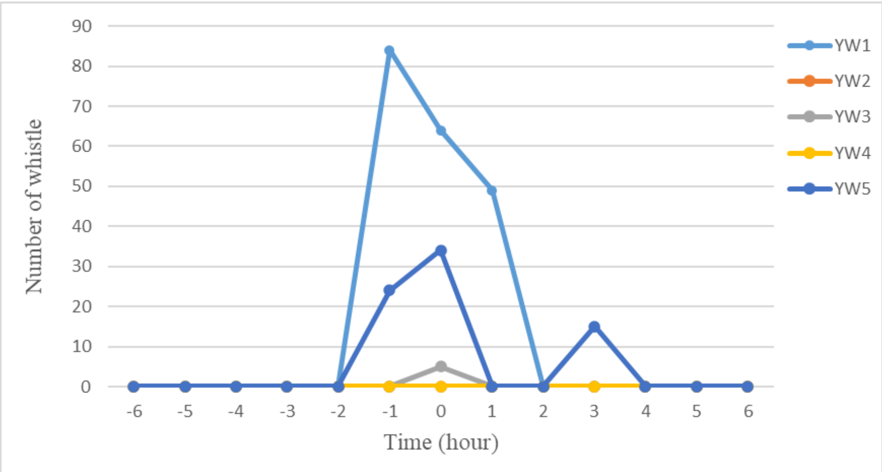


Figure 2.1.4-1 Whistle Detection Distribution at Each Location



Remarks: High tide is presented as 0, 1 hour before high tide as -1, 1 hour after high tide as +1, and so on.

Figure 2.1.4-2 Whistle Detection Distribution at Each Location (Tidal Periods)

Table 2.1.4-3 Results of Click Detection at Each Measurement Point

Measuring Station	Detection Days	Detection Times	Recording Hours[1]	Recording Time Ratio[2]	Contact Rate[3] (times/hour)
YW-1	1	0	0	0	0.00
YW-2		0	0	0	0.00
YW-3		0	0	0	0.00
YW-4		0	0	0	0.00
YW-5		0	0	0	0.00

Remark 1：「Recording Hours」refers to the number of hours in which whistles were detected.
Remark 2：「Recording Time Ratio」is the number of hours in which whistles were detected divided by 24 hours.
Remark 3：「Contact Rate」is the number of detections per hour in which whistles were detected.

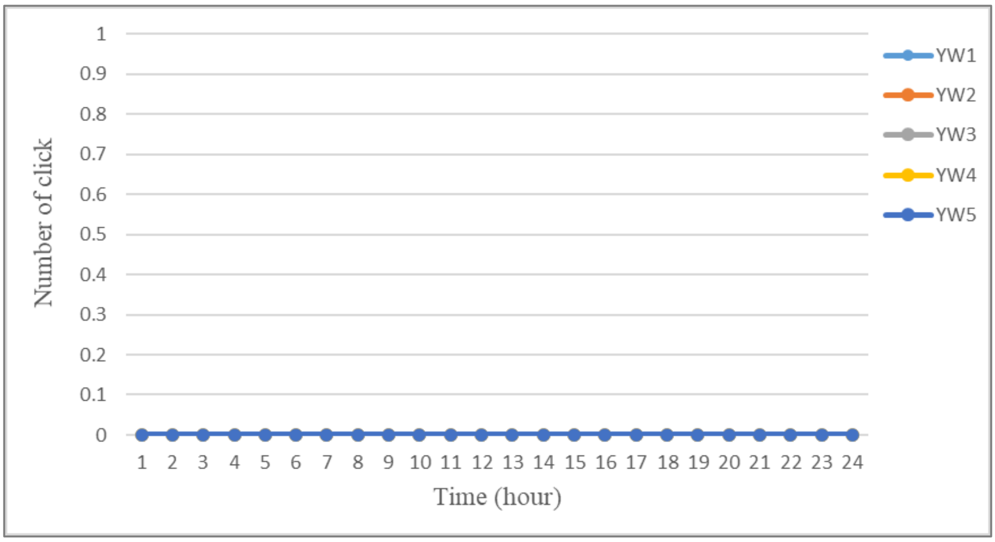
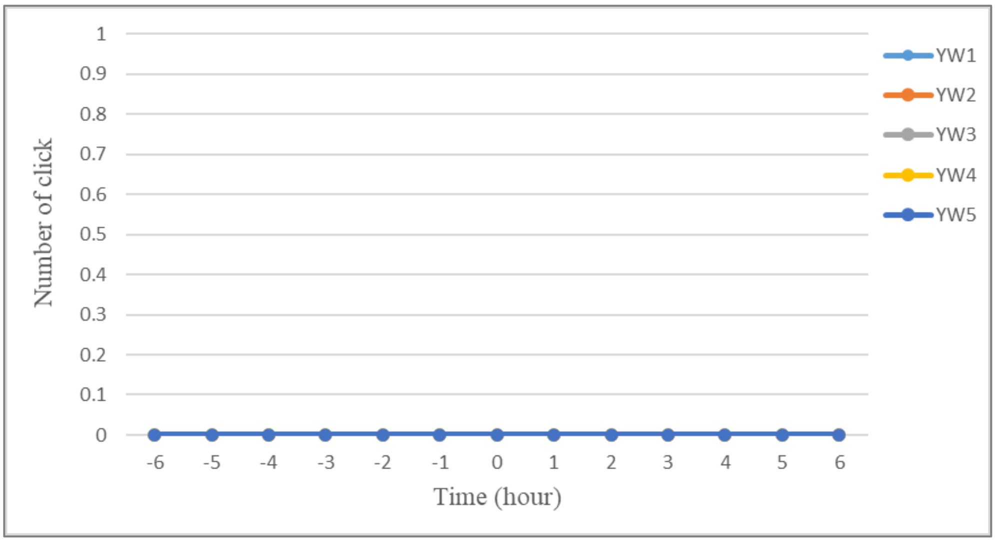


Figure 2.1.4-3 Click Detection Distribution by Day and Night at Each Location



Remarks: High tide is presented as 0, 1 hour before high tide as -1, 1 hour after high tide as +1, and so on.

Figure 2.1.4-4 Click Detection Distribution at Each Location (Tidal Periods)

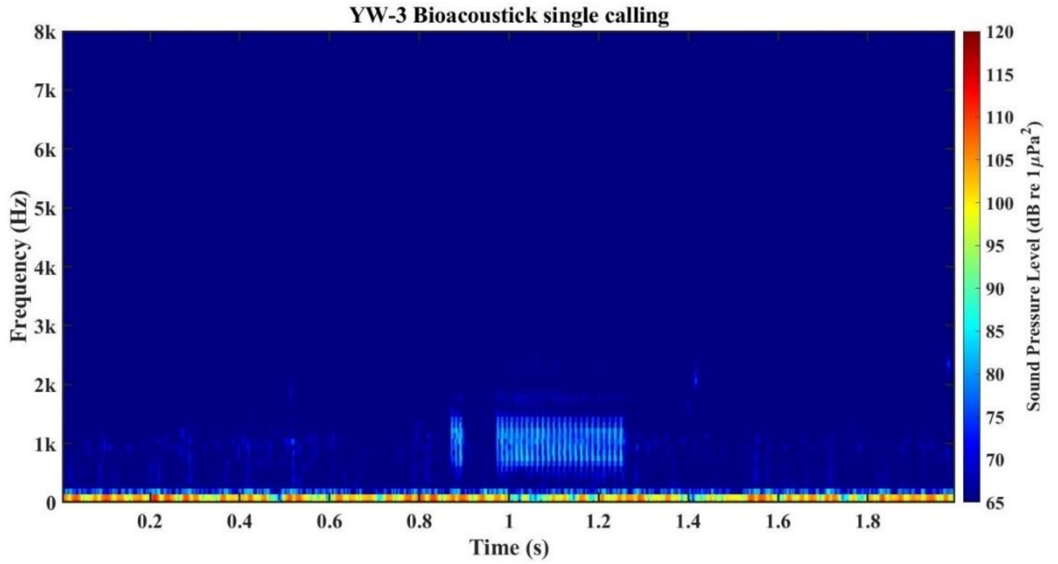


Figure 2.1.4-5 Time-Frequency Spectrogram of Sciaenid (Croaker) Calls at Monitoring Point YW-3

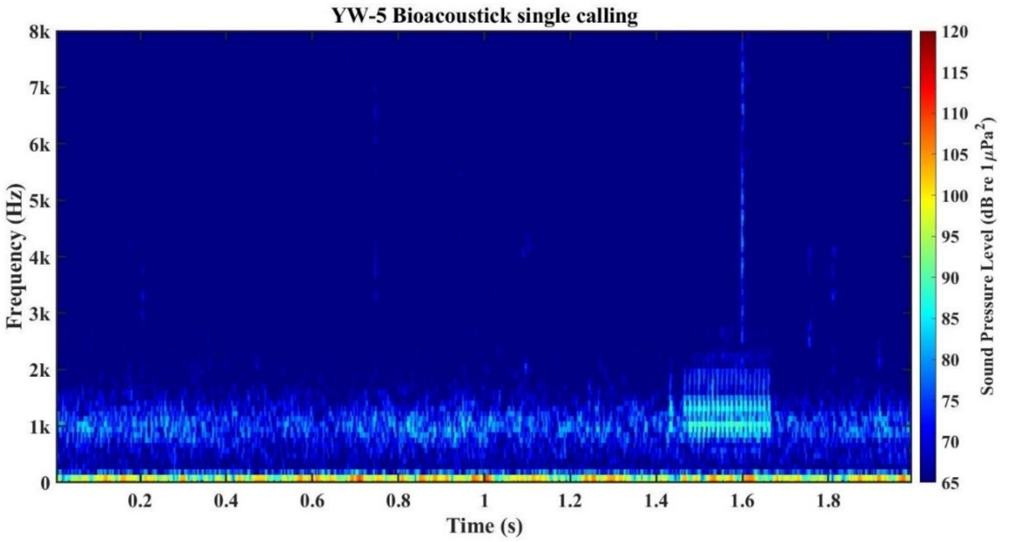


Figure 2.1.4-6 Time-Frequency Spectrogram of Sciaenid (Croaker) Calls at Monitoring Point YW-5

2.1.5 Visual Monitoring of Cetacean Ecology

During this quarter season (March to May, 2025), a total of 12 survey trips were completed—6 in March, 2 in April, and 4 in May—amounting to a total survey duration of 147.48 hours and a total distance of 1,581.2 kilometers. Of these, 54.82 hours and 718.6 kilometers were spent on transect lines (see Table 2.1.5-1).

During the survey period, one cetacean sighting was recorded within the wind farm area, resulting in a trip-based sighting rate of 0.08 and a distance-based sighting rate of 0.14 sightings per 100 kilometers. The species observed was the bottlenose dolphin (Tursiops truncatus), with one group of four individuals sighted on March 11. The group was seen at the southwestern corner of the wind farm, approximately 500 meters from the survey vessel, swimming northwest. The sighting location is shown in Figure 2.1.5-1.

Table 2.1.5-1 Table of Cetacean Visual Survey of this Quarter

Trips	Survey Date	Transect Line		Total Hours (hour)	Total Mileage (km)	On-Effort Hours (hours)	On-Effort Mileage (km)	Sighting Rate (herd (individual))
		Departure	Return					
1	3月01日	1	2	11.68	138.9	5.48	65.3	0
2	3月02日	4	3	11.69	78.8	4.52	55.0	0
3	3月03日	6	5	11.72	148.7	4.52	55.1	0
4	3月11日	1	6	11.91	85.0	5.45	66.2	1(4)
5	3月12日	5	4	11.90	86.1	3.87	56.6	0
6	3月13日	3	2	11.95	144.5	4.48	57.2	0
7	4月08日	1	6	12.39	164.4	4.57	66.4	0
8	4月10日	2	3	12.36	154.4	5.03	61.1	0
9	5月14日	4	5	12.07	156.4	3.98	56.7	0
10	5月15日	6	2	13.23	142.1	3.85	56.4	0
11	5月16日	3	1	13.29	119.4	4.92	65.7	0
12	5月17日	2	3	13.31	162.4	4.15	56.9	0
Total	12 Trips	--		147.48	1,581.2	54.82	718.6	1(4)

Remark1: Number of transect line (departure and return) indicates the numbered planned cetacean transect line survey route

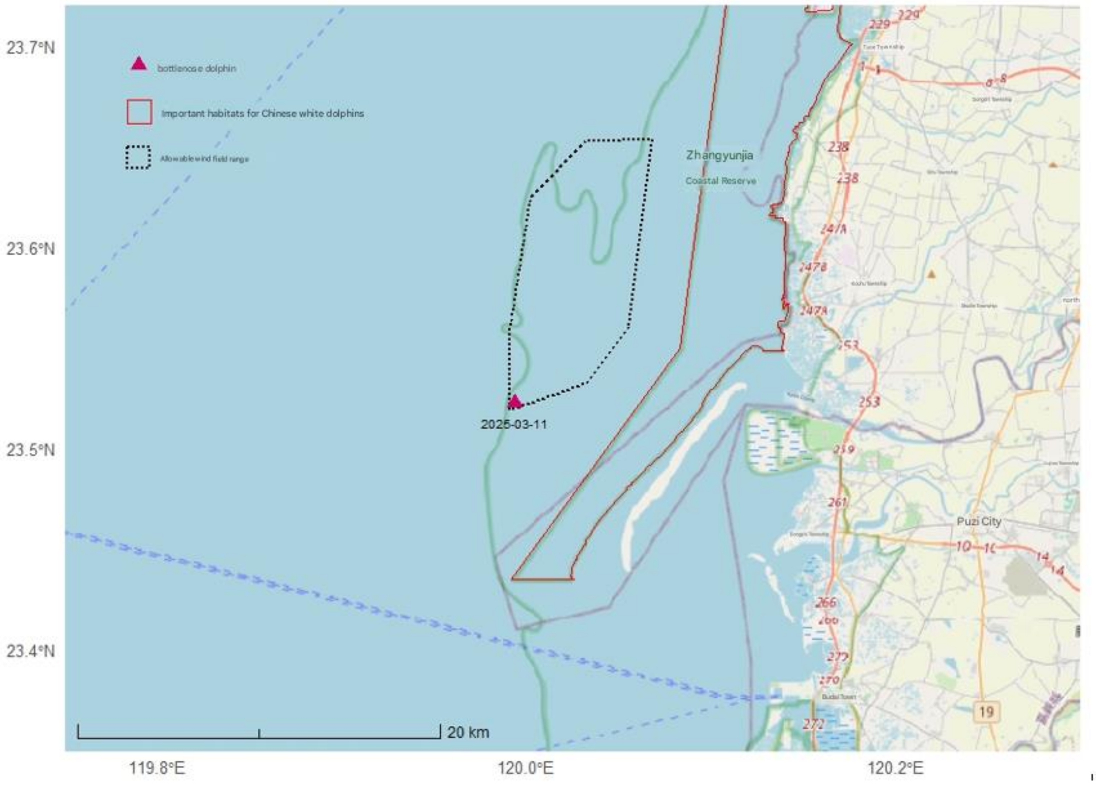


Figure 2.1.5-1 Cetacean Sighting Location for This Quarter

2.1.6 Underwater Noise

2 sampling stations for cetacean acoustic survey (YW-3 and YW-5) are selected for underwater noise analysis. The duration of the data analyzed in this quarter is shown as Table 2.1.6-1. Items of analysis include spectrogram of underwater noise time frequency between 20Hz-20kHz; 1-Hz band; 1/3 octave band. The description of results are as follows:

Table 2.1.6-1 Q1 Duration of Analyzed Underwater Noise Data

Measuring Points	Duration of Data Analyzed
YW-3	April 17, 2025, 10:30:00 – April 18, 2025, 10:30:00
YW-5	April 17, 2025, 08:30:00 – April 17, 2025, 08:30:00

I. Underwater Ambient Noise Analysis

Underwater acoustic instruments can record variations in the ambient noise of the marine environment, such as natural environmental sounds (waves, tides, etc.) or biological activity sounds (cetaceans, fish, etc.). During the measurement period, intermittent unidentified high-noise sources, such as vessel noise or noise from human activities, can also be recorded by underwater acoustic instruments. The Wav sound data files recorded by the acoustic instruments are processed using Fast Fourier Transform (FFT) software, presenting measurement results in frequency bands above 1 Hz and 1/3 Octave bands. This data is used to analyze underwater environmental noise levels by examining time-domain and time-frequency spectrum plots, as well as environmental noise percentile sound pressure level distribution graphs. Through spectrogram analysis and cumulative probability distribution diagrams, the characteristics and volume fluctuations of underwater ambient noise within the wind farm project area are further understood.

i. Time Frequency Analysis

The spectrogram of time frequency analysis for ambient noise at YW-3 and YW-5 are shown in Figures 2.1.6-1 and 2.1.6-2. The horizontal axis represents time, the vertical axis represents frequency, and the color distribution of the corresponding color bar indicates the sound pressure level value. The time-frequency spectrum shows that both monitoring points have significant periodic noise generated by tidal currents. This noise lasts for about 4 hours, primarily caused by fluid noise generated during tidal rise and fall when seawater flows rapidly. The main impact is observed at frequencies below 100 Hz. During high tide or low tide, the sea current speed is lowest, resulting in lower sound pressure levels observed at these times.

In addition to fluid noise caused by tidal phenomena, monitoring station YW-3 is located within the Indo-Pacific humpback dolphin (Sousa chinensis) critical habitat conservation area, where their prey—Sciaenidae species (croakers)—are frequently present. According to the spectrogram in Figure 2.1.6-1 and audio recordings reviewed this season, characteristic acoustic signals of croakers were detected at YW-3, typically occurring between 6:00 PM and 2:00 AM. Similarly, croaker vocalizations were also detected at monitoring station YW-5, with activity observed from approximately 7:00 PM to 2:00 AM, as shown in Figure 2.1.6-2. Additionally, intermittent vessel noise from fishing boats was recorded during this monitoring period. Ship-generated noise includes low-frequency engine and generator sounds, cavitation noise from propellers, and low-frequency sonar pulses. These noises exhibit different frequency characteristics depending on the sound source, as illustrated in Figure 2.1.6-3.

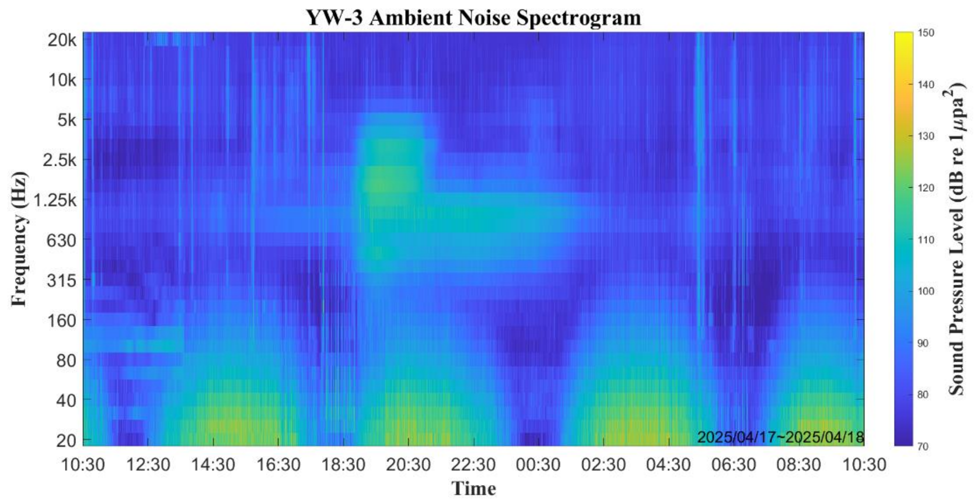


Figure 2.1.6-1 Time-Frequency Spectrum of Underwater Ambient Noise Diagram (YW-3)

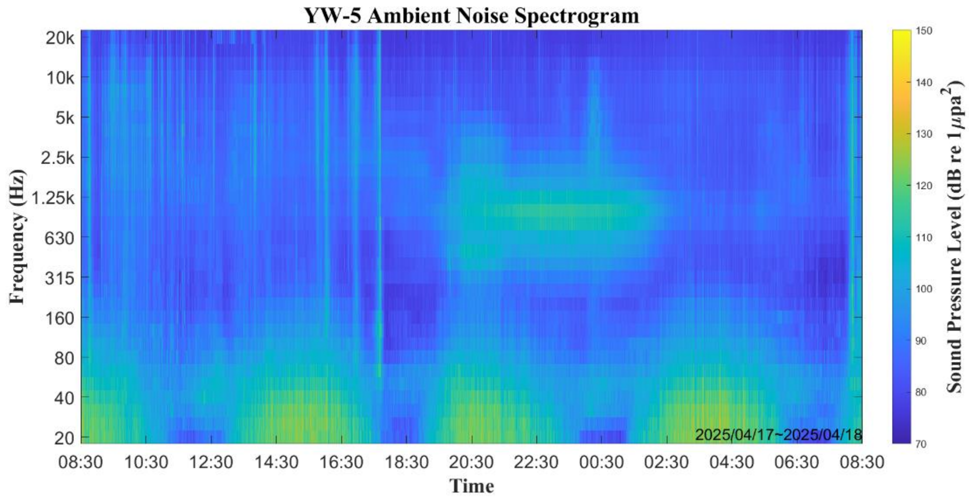


Figure 2.1.6-2 Time-Frequency Spectrum of Underwater Ambient Noise Diagram (YW-5)

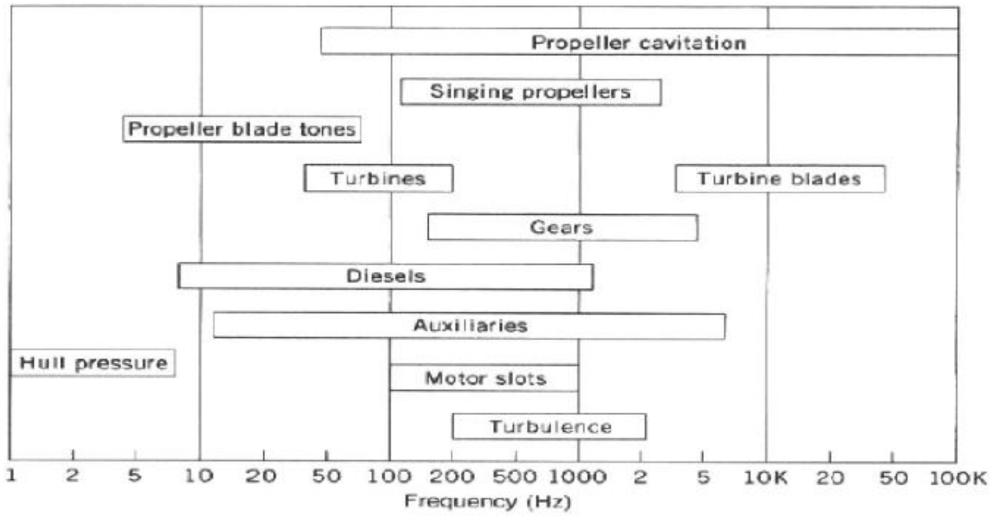


Figure 2.1.6-3 Sources and Frequency Distribution of Vessel Noise

ii. Hz Band and 1/3 Octave band Analysis

The underwater ambient noise is presented using cumulative probability distribution, quantifying the sound pressure level variation ranges at YW-3 and YW-5. The 24-hour noise data is calculated based on L5, L50, L90, and Leq values, where L5 represents the measurement value that exceeds 5% of the total monitoring period, L50 is the median of all measured data, and L90 represents the measurement value that exceeds 90% of the total monitoring period—this indicator is commonly used to represent background noise levels in ambient noise studies. Leq represents the equivalent continuous sound level for the entire measurement period. L5 and L90 are used as the upper and lower limits of the underwater ambient noise level variation range. The results of the 1 Hz band and 1/3 octave band analyses are described as follows:

1. 1 Hz Band Analysis

The 1 Hz band analysis revealed that at both YW-3 and YW-5 monitoring stations, the greatest variation in ambient underwater noise levels occurred at the 20 Hz frequency. At YW-3, the sound pressure levels were L5 at 122.8 dB, L50 at 106.1 dB, and L90 at 74.1 dB, resulting in a total variation of 48.7 dB. This large fluctuation is primarily attributed to vessel noise, while additional variation below 63 Hz is largely due to tidal current activity—higher flow rates during rising and falling tides elevated the sound pressure levels, whereas periods of slack tide brought them down. Occasional vessel activity further contributed to this variability. YW-3 also recorded the vocalizations of croaker fish (Family: Sciaenidae), with dominant acoustic frequencies ranging from 500 Hz to 2 kHz.

The YW-5 station also exhibited the highest variation in sound pressure levels at 20 Hz. The values recorded were L5 at 119.7 dB, L50 at 104.3 dB, and L90 at 77.2 dB, resulting in a total variation of 42.5 dB. The difference between L5 and L50 was 15.4 dB, and between L50 and L90 was 27.1 dB. This frequency band was also predominantly influenced by noise from tidal flow. Additionally, croaker fish vocalizations were detected at this location as well, occurring within the 500 Hz to 2 kHz frequency range.

The frequency fluctuation trends at both YW-3 and YW-5 were similar and closely matched the characteristics of Wenz curves, indicating that the primary contributions to underwater noise originated from low-frequency sources. The variability in the low-frequency band was particularly pronounced. The presence of croaker fish vocalizations at both sites contributed significantly to the mid-to-high frequency range (500 Hz to 2 kHz). High-frequency noise levels showed relatively minor variation due to the absence of prominent sources aside from occasional vessel sonar. Additionally, the short wavelengths of high-frequency sounds result in limited transmission distance, further contributing to the lower level of variation in this range.

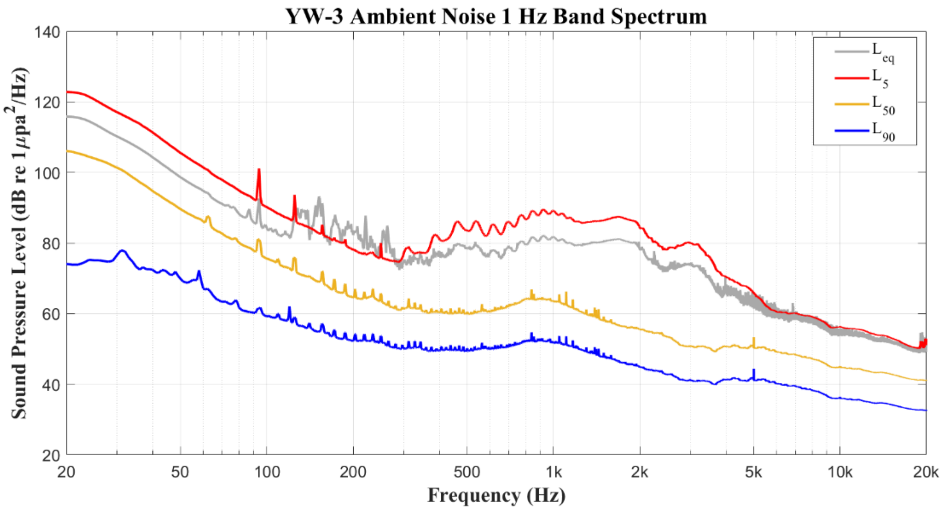


Figure 2.1.6-4 YW-3 Ambient Noise 1 Hz Band Cumulative Probability Distribution

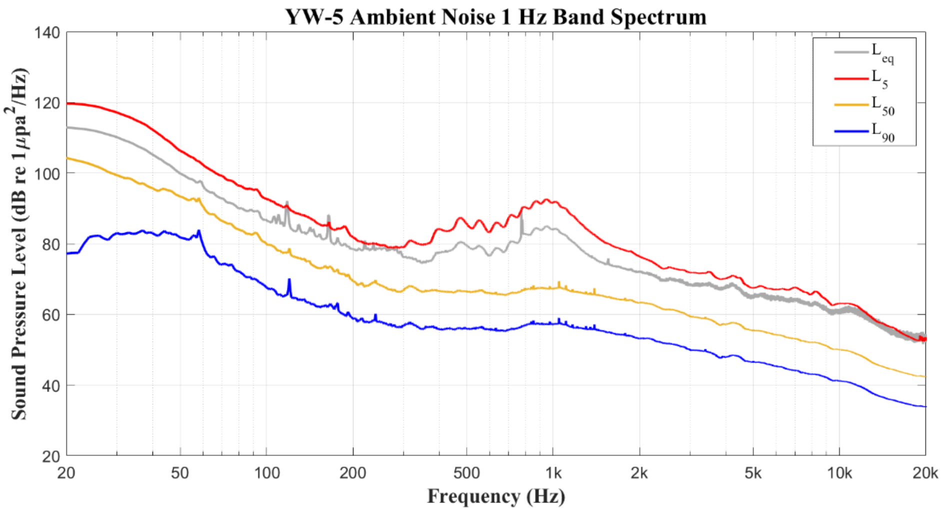


Figure 2.1.6-5 YW-5 Ambient Noise 1 Hz Band Cumulative Probability Distribution

Table 2.1.6-2 SPL of Noise in YW-3 in this Quarter

Unit: 1Hz SPL (dB re 1μPa)

Frequency (Hz)	20	100	500	1k	5k	10k	16k	20k
L_{eq}	115.8	84.2	78.4	81.7	62.4	55.1	51.2	52.3
L_5	122.8	90.2	83.5	89.1	65.9	56.2	52.4	52.8
L_{50}	106.1	75.6	60.5	63.5	52.2	44.8	42.3	41.1
L_{90}	74.1	59.2	50.2	51.8	43.3	36.0	33.7	32.5

Table 2.1.6-3 SPL of Noise in YW-5 in this Quarter

Unit: 1Hz SPL (dB re 1μPa)

Frequency (Hz)	20	100	500	1k	5k	10k	16k	20k
L_{eq}	112.9	86.6	79.5	84.0	65.3	61.1	54.5	53.7
L_5	119.7	92.7	85.6	91.7	67.5	63.1	55.4	53.4
L_{50}	104.3	79.9	66.5	67.2	55.6	50.0	44.0	42.5
L_{90}	77.2	67.7	56.0	57.2	46.6	41.2	35.4	33.8

2. 1/3 Octave bandAnalysis

The results of the 1/3 octave band analysis, as shown in Figures 2.1.6-6 to 2.1.6-7 and Tables 2.1.6-4 and 2.1.6-5, include cumulative probability distributions and equivalent continuous sound levels (Leq) calculated for 31 center frequencies ranging from 20 Hz to 20 kHz. The results indicate that findings from the 1 Hz band and 1/3 octave band analyses were similar at both monitoring points this season. The primary sources of underwater environmental noise were identified as low-frequency tidal noise and mid-to-high frequency vocalizations from croaker fish. The 1/3 octave band clearly showed the highest sound contribution occurring at 20 Hz, with YW-3 registering an L5 sound pressure level of 127.1 dB and YW-5 at 124.3 dB. Within the frequency range of 500 Hz to 2 kHz, corresponding to croaker fish calls, the L5 sound pressure levels ranged from 103.7 dB to 113.9 dB at YW-3, and from 101.9 dB to 113.1 dB at YW-5.

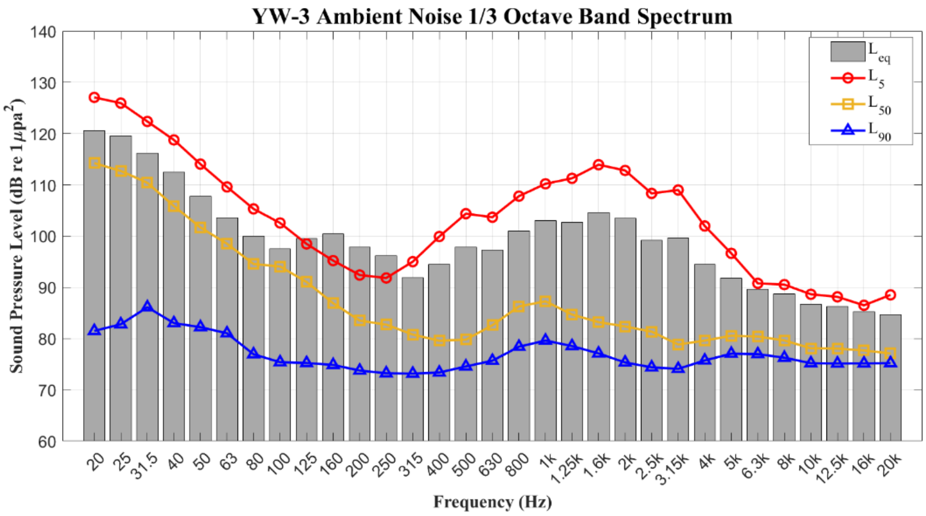


Figure 2.1.6-6 Spectral Analysis of Ambient Noise (1/3 Octave band Spectrum of YW-3)

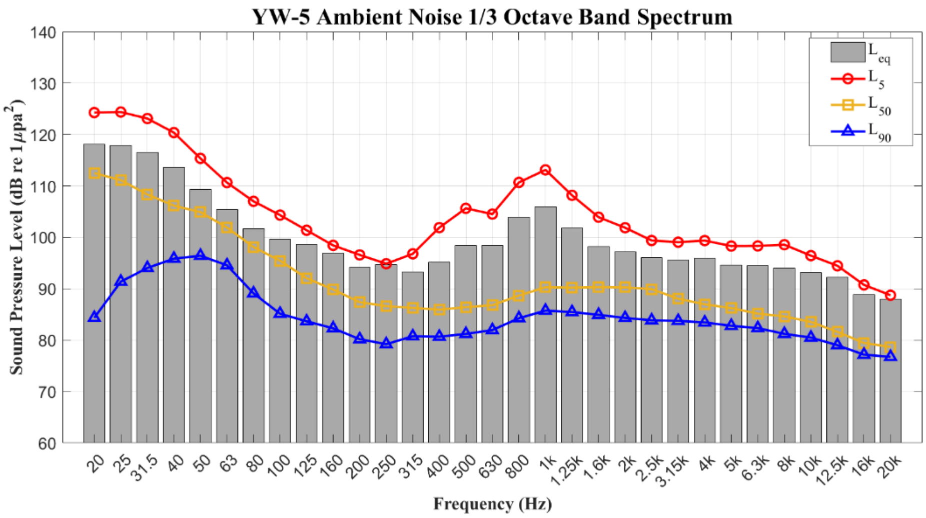


Figure 2.1.6-7 Spectral Analysis of Ambient Noise (1/3 Octave band Spectrum of YW-5)

Table 2.1.6-4 1/3 Octave Band of YW-3 in this Quarter

Unit: dB re 1μPa

Frequency(Hz)	20	25	31.5	40	50	63	80	100
L_{eq}	120.6	119.5	116.2	112.5	107.8	103.6	100.0	97.5
L_5	127.1	126.0	122.4	118.8	114.1	109.6	105.3	102.6
L_{50}	114.2	112.7	110.4	105.9	101.7	98.5	94.6	94.1
L_{90}	81.5	82.8	86.1	83.0	82.2	81.0	77.0	75.4
Frequency(Hz)	125	160	200	250	315	400	500	630
L_{eq}	99.6	100.4	97.9	96.1	91.9	94.5	97.8	97.3
L_5	98.5	95.2	92.4	91.8	95.0	99.9	104.4	103.7
L_{50}	91.1	86.9	83.5	82.7	80.8	79.6	79.8	82.6
L_{90}	75.3	74.9	73.8	73.2	73.2	73.4	74.6	75.7
Frequency(Hz)	800	1k	1.25k	1.6k	2k	2.5k	3.15k	4k
L_{eq}	101.0	103.0	102.6	104.6	103.5	99.2	99.7	94.5
L_5	107.8	110.2	111.3	113.9	112.8	108.3	109.0	102.0
L_{50}	86.3	87.3	84.7	83.2	82.4	81.4	78.9	79.6
L_{90}	78.4	79.6	78.6	77.1	75.4	74.4	74.1	75.7
Frequency(Hz)	5k	6.3k	8k	10k	12.5k	16k	20k	
L_{eq}	91.8	89.6	88.7	86.7	86.2	85.3	84.7	
L_5	96.6	90.8	90.5	88.7	88.2	86.5	88.5	
L_{50}	80.6	80.4	79.7	78.1	78.1	77.7	77.1	
L_{90}	77.1	77.0	76.3	75.2	75.2	75.2	75.2	

Table 2.1.6-5 1/3 Octave Band of YW-5 in this Quarter

Unit: dB re 1μPa

Frequency(Hz)	20	25	31.5	40	50	63	80	100
L_{eq}	118.1	117.9	116.5	113.6	109.3	105.4	101.7	99.6
L_5	124.3	124.4	123.1	120.4	115.4	110.7	107.0	104.3
L_{50}	112.5	111.1	108.3	106.2	104.9	101.9	98.1	95.4
L_{90}	84.3	91.4	94.0	95.9	96.4	94.6	89.1	85.1
Frequency(Hz)	125	160	200	250	315	400	500	630
L_{eq}	98.7	96.9	94.2	94.7	93.2	95.2	98.5	98.4
L_5	101.4	98.4	96.6	94.9	96.8	101.9	105.6	104.5
L_{50}	92.0	89.8	87.4	86.6	86.3	85.9	86.4	86.8
L_{90}	83.7	82.3	80.2	79.2	80.8	80.7	81.2	82.0
Frequency(Hz)	800	1k	1.25k	1.6k	2k	2.5k	3.15k	4k
L_{eq}	104.0	105.9	101.8	98.2	97.2	96.0	95.6	95.9
L_5	110.7	113.1	108.2	103.9	101.9	99.4	99.1	99.4
L_{50}	88.7	90.3	90.2	90.3	90.3	89.9	88.1	87.0
L_{90}	84.3	85.7	85.5	84.9	84.3	83.9	83.8	83.4
Frequency(Hz)	5k	6.3k	8k	10k	12.5k	16k	20k	
L_{eq}	94.6	94.4	94.0	93.2	92.3	88.9	88.0	
L_5	98.3	98.3	98.6	96.4	94.5	90.8	88.7	
L_{50}	86.2	85.2	84.6	83.5	81.6	79.4	78.7	
L_{90}	82.8	82.3	81.2	80.5	79.0	77.2	76.7	

iii. Comprehensive Noise Analysis

This quarter season, the complete 24-hour acoustic data collected at YW-3 and YW-5 were used to calculate the total sound pressure levels across the frequency range of 20 Hz to 20 kHz. Cumulative probability distributions and equivalent continuous sound levels (Leq) were also computed for this range. The overall variation trends in total acoustic energy were illustrated using box plots, with the analysis results presented in Table 2.1.6-6 and Figure 2.1.6-8. The data showed that the total noise levels at both monitoring points were similar across all percentile indicators, indicating comparable environmental noise levels and dominant noise sources at the two locations.

Table 2.1.6-6 SPL in this Quarter (20 Hz to 20 kHz)

Unit: dB re 1μPa

Monitoring Location	L_{eq}	L_5	L_{50}	L_{90}
YW-3	124.7	130.5	119.4	102.0
YW-5	123.5	129.5	118.5	105.5

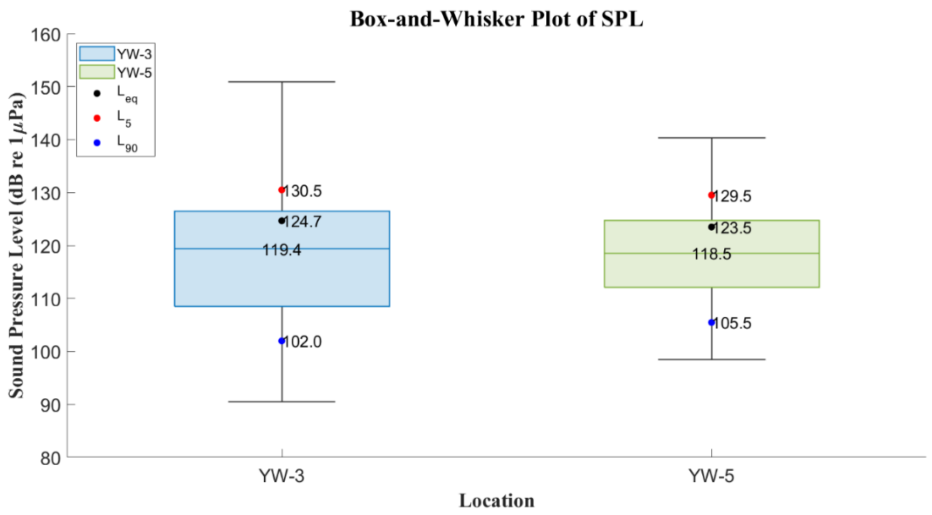


Figure 2.1.6-8 Box and Whisker Plot of SPL for this Quarter (20 Hz to 20 kHz)

In addition to the 20 Hz to 20 kHz frequency range, total acoustic energy calculations were also performed for the 2.5 kHz to 10 kHz frequency band to analyze the soundscape characteristics at the monitoring sites. Following the same methodology, cumulative probability and equivalent continuous sound levels (Leq) were determined. The results are presented in Table 2.1.6-7 and Figure 2.1.6-9. Compared with the total noise levels from 20 Hz to 20 kHz, the underwater noise variation in the 2.5 kHz to 10 kHz range at YW-3 was significantly greater than at YW-5. The variation at YW-3 was approximately 27.1 dB, while YW-5 showed a variation of around 14.7 dB. This indicates that YW-3 experienced greater fluctuations in high-volume acoustic events within this frequency range, mainly attributed to the vocalizations of Sciaenidae (croaker) species.

Table 2.1.6-7 SPL in this Quarter (2.5 kHz to 10 kHz)

Unit: dB re 1μPa

Monitoring Location	L_{eq}	L_5	L_{50}	L_{90}
YW-3	103.8	112.5	88.8	85.4
YW-5	103.4	107.1	95.4	92.3

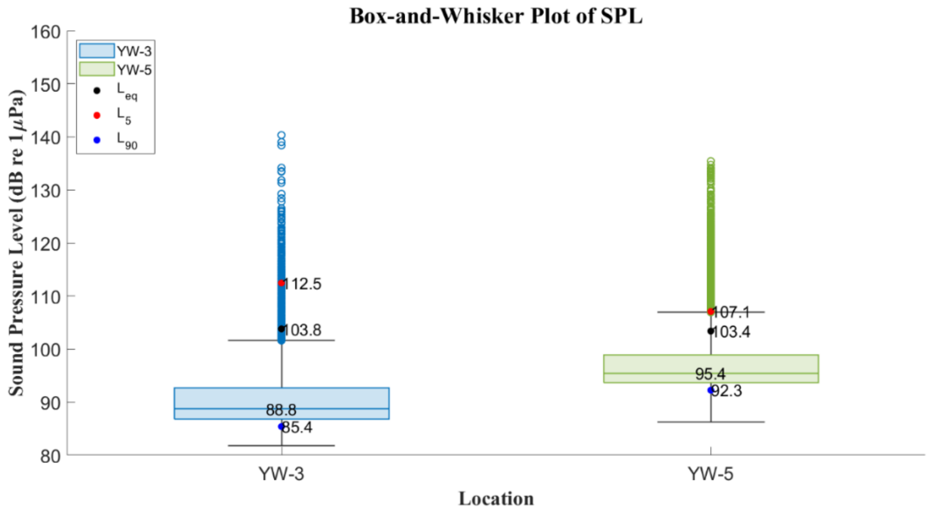


Figure 2.1.6-9 Box and Whisker Plot of SPL for This Quarter (2.5 kHz to 10 kHz)

iv. Comprehensive Discussion and Conclusion

In this quarter, the main contributors to underwater noise at monitoring sites YW-3 and YW-5 were identified as periodic hydrodynamic sounds caused by tidal movements, with dominant frequencies below approximately 100 Hz. Both sites also recorded the presence of croaker fish (Family: Sciaenidae), particularly active between 6 p.m. and 2 a.m., during which time their vocalizations became the primary sound source. These calls occurred mainly in the frequency range of 500 Hz to 2 kHz, with sound pressure levels ranging from approximately 100 to 110 dB.

Analysis using both 1 Hz band and 1/3 octave band methods revealed similar trends in noise frequency curves at both locations, closely matching the Wenz curves. The main underwater noise contribution remained in the low-frequency range, showing high variability. However, in the mid-to-high frequency range of 500 Hz to 2 kHz, distinct noise events were observed, indicating notable underwater acoustic activity associated with croaker vocalizations during the night.

In terms of total noise levels across the 20 Hz to 20 kHz frequency band, both YW-3 and YW-5 showed similar results across all percentile indicators, suggesting comparable ambient noise levels and dominant noise sources. However, within the 2.5 kHz to 10 kHz frequency band, YW-3 exhibited significantly greater variability in underwater noise (approx. 27.1 dB) compared to YW-5 (approx. 14.7 dB), indicating more intense high-volume acoustic events at YW-3, primarily due to croaker vocalizations.

2.1.7 Electromagnetic Field

This project has two shore landing points, Sihu and Taixi. According to the environmental monitoring plan for the operation phase, one monitoring station near the shore landing point will be selected to conduct electromagnetic field monitoring at the shore landing point where the wind turbines are officially connected to the grid. The monitoring frequency is once a year, and there was no monitoring this season. In July 2023, the project obtained the first batch of power generation licenses for wind turbines, and in April 2024, it obtained the second batch of licenses, both of which have shore landing points at Sihu.

In July 2024, the project obtained the third batch of power generation licenses, with some shore landing points at Taixi. Therefore, electromagnetic field monitoring began at the Sihu landing point—Sihu substation in 2023 and at the Taixi landing point—Taixi booster station in 2024. The monitoring results are shown in Table 2.1.7-1. The magnetic field at the Sihu substation is 0.01 mG, and at the Taixi substation, it is 3.68 mG, which complies with the recommended value of 833 mG (60Hz magnetic field) for the exposure guidelines for time-varying electric, magnetic, and electromagnetic fields.

Table 2.1.7-1 Monitoring Result of Electromagnetic Field

Station Location	Sihu Substation	Taixi Substation
	Magnetic Field (mG)	Magnetic Field (mG)
2023.08.28	0.294	-
2024.08.13	0.01	3.68
Suggested Value	833	

Note: Refer to Induction for Limiting Exposure of Time-varying electronic field, Magnetic Field and Electromagnetic Field, 2020.01.21. Amendment is made under Official No. 1090004463 , which comes into effect 6 months after its issuance.

Chapter 3 Review and Recommendations

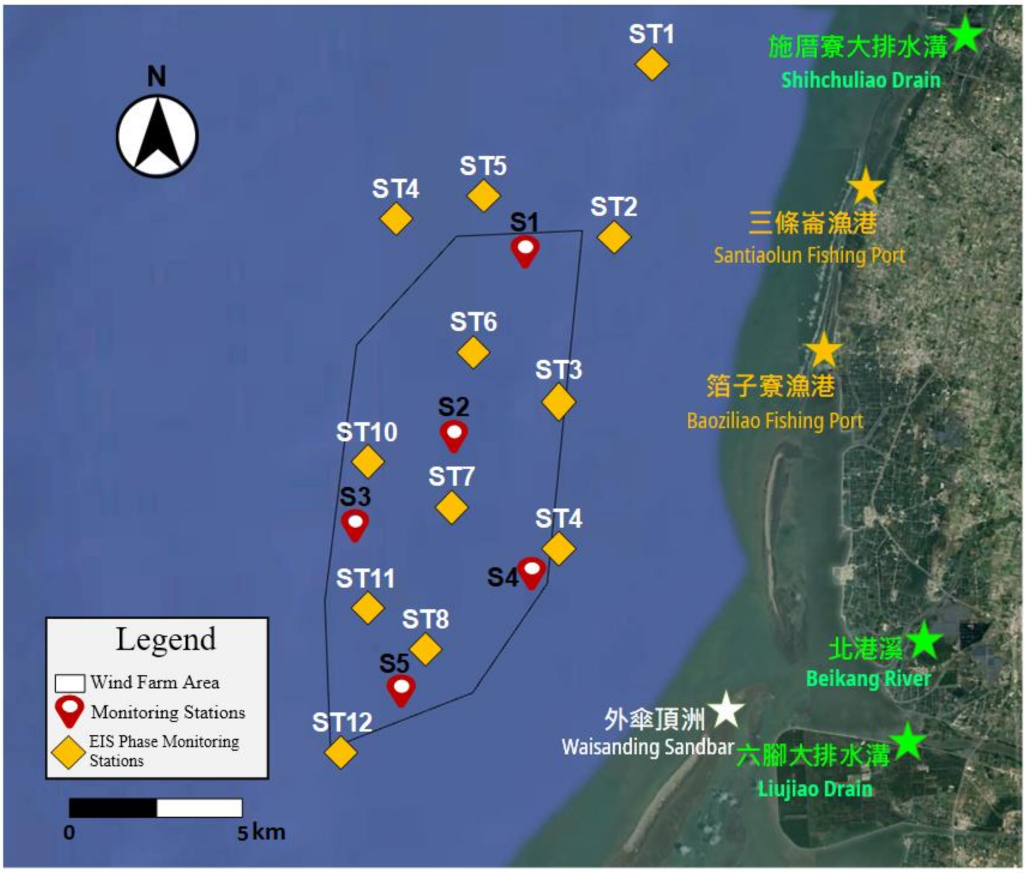
3.1 Review of Monitoring Results and Response Plan

3.1.1 Comprehensive Review and Analysis of Monitoring Results

I. Marine Water Quality

During the EIA period (July 2016), there were 12 sampling stations for marine water quality surveys. As the wind farm range was adjusted and reduced during the EIA review period, the original sampling station locations no longer adhered to the principle of uniform sampling within the final approved wind farm range. Therefore, the marine water quality monitoring points were re-planned with 5 stations according to the environmental monitoring plan. The previous marine water quality monitoring results can only be compared with the values from sampling stations with similar locations during the EIA period, as shown in Figures 3.1.1-1 and 3.1.1-2 and Table 3.1.1-1. The marine water quality survey results during the EIA period all comply with the Class A Marine Environmental Quality Standards.

The previous marine water quality monitoring results show that Escherichia coli (E. coli) exceeded the Class A Marine Environmental Quality Standards at S2 (surface layer, sampled on May 25, 2022) during Q1 2022, and at S5 (middle layer, sampled on April 30, 2020) during Q1 2020. Additionally, ammonia nitrogen exceeded the Class A Marine Environmental Quality Standards at S4 (middle layer, sampled on April 19, 2024) during Q1 2024, and at S1 (surface and middle layers, sampled on August 4, 2024) during Q2 2024. Other measured parameters met the standards. Regarding historical exceedances, the Q1 2020 monitoring occurred before piling operations began, and Q1 2022 had no piling activities. It is possible that Yunlin's thriving livestock industry, along with sedimentation in the coastal waters from Boziliao Fishing Harbor to Waisanding Sandbar, caused poor water exchange. Nearshore marine water quality is directly affected by weather conditions, ocean currents, topography, and some human-related pollution, resulting in variations across monitoring data. These factors may have contributed to localized increases in E. coli levels. Similarly, the ammonia nitrogen exceedances in Q1 and Q2 2024 may have been influenced by these conditions. A comparison with data from the Environmental Monitoring during the Yunlin Offshore Industrial Zone Development Project in Q1 and Q2 2024 also shows a rising trend in ammonia nitrogen levels.



Note: The exceedance of *E. coli* was observed on April 30 2020 and May 25 2022.

Figure 3.1.1-1 Monitoring Locations for Marine Water Quality in the EIA stage and Current Stage

The Q1 2025 marine water quality monitoring results, along with historical comparisons, are detailed in Table 3.1.1-1, showing that all station measurements for this season comply with the Class A Marine Environmental Quality Standards.

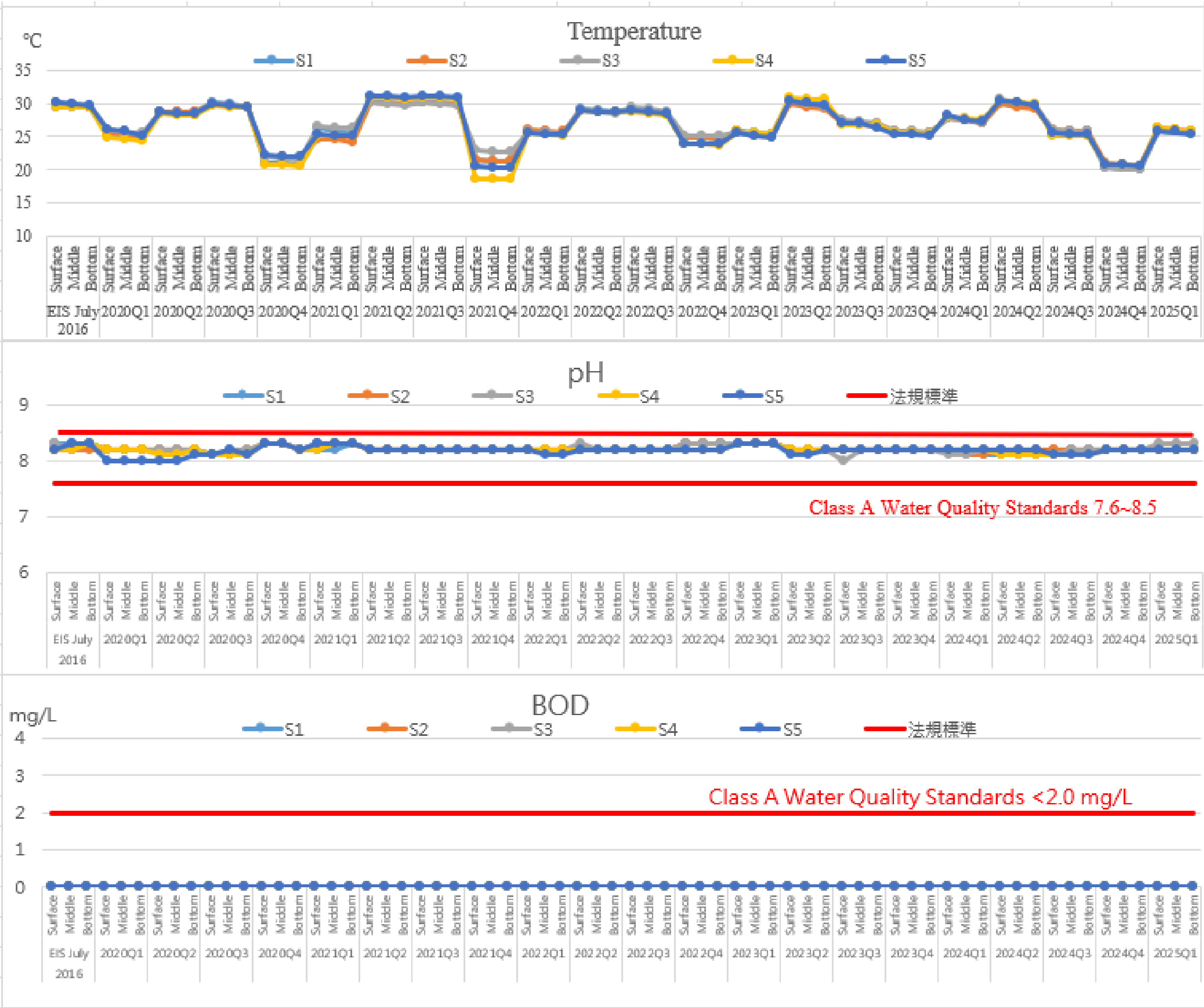


Figure 3.1.1-2 Trend Chart of Previous Marine Water Quality Monitoring Results (1/4)

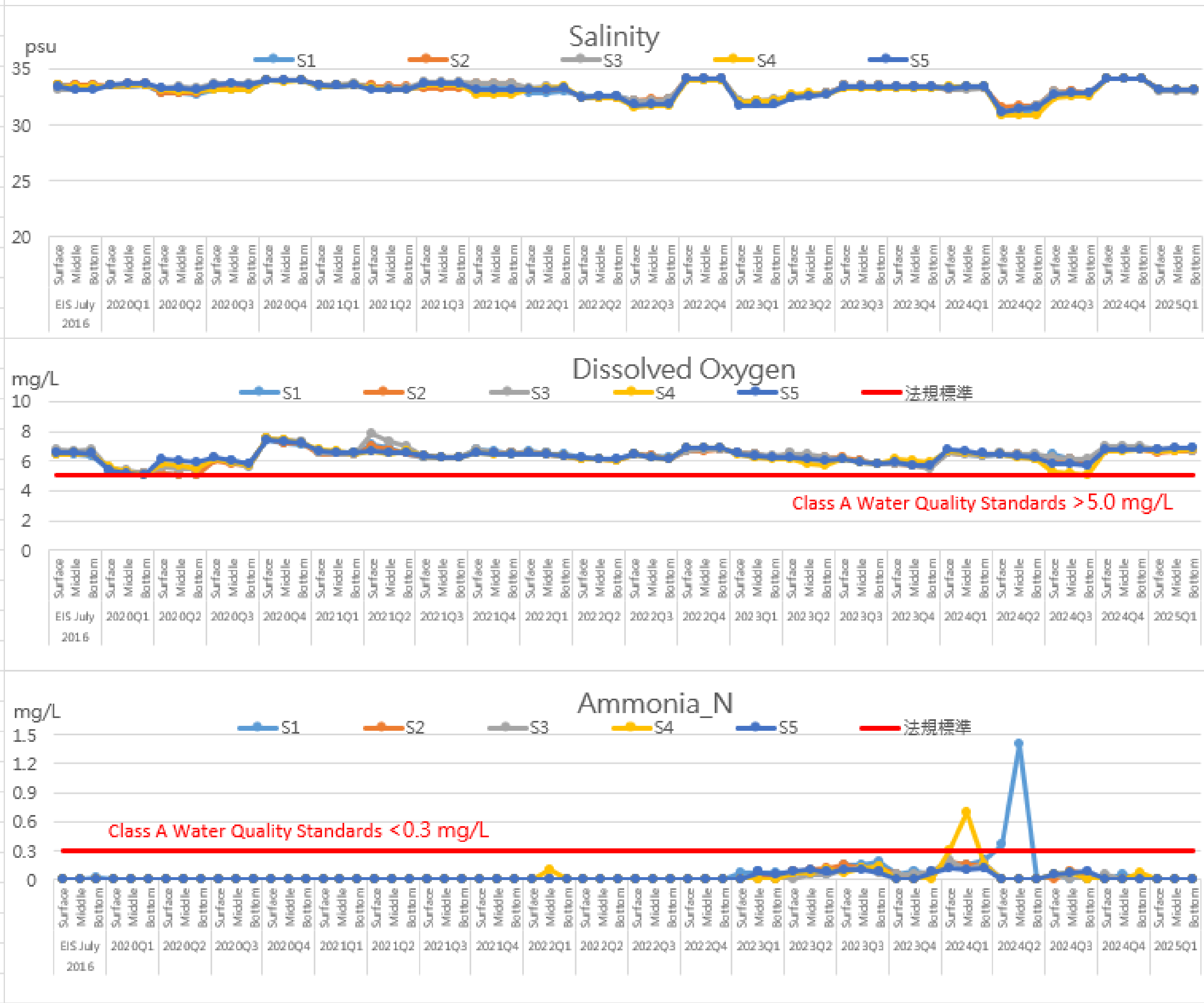


Figure 3.1.1-2 Trend Chart of Previous Marine Water Quality Monitoring Results (2/4)

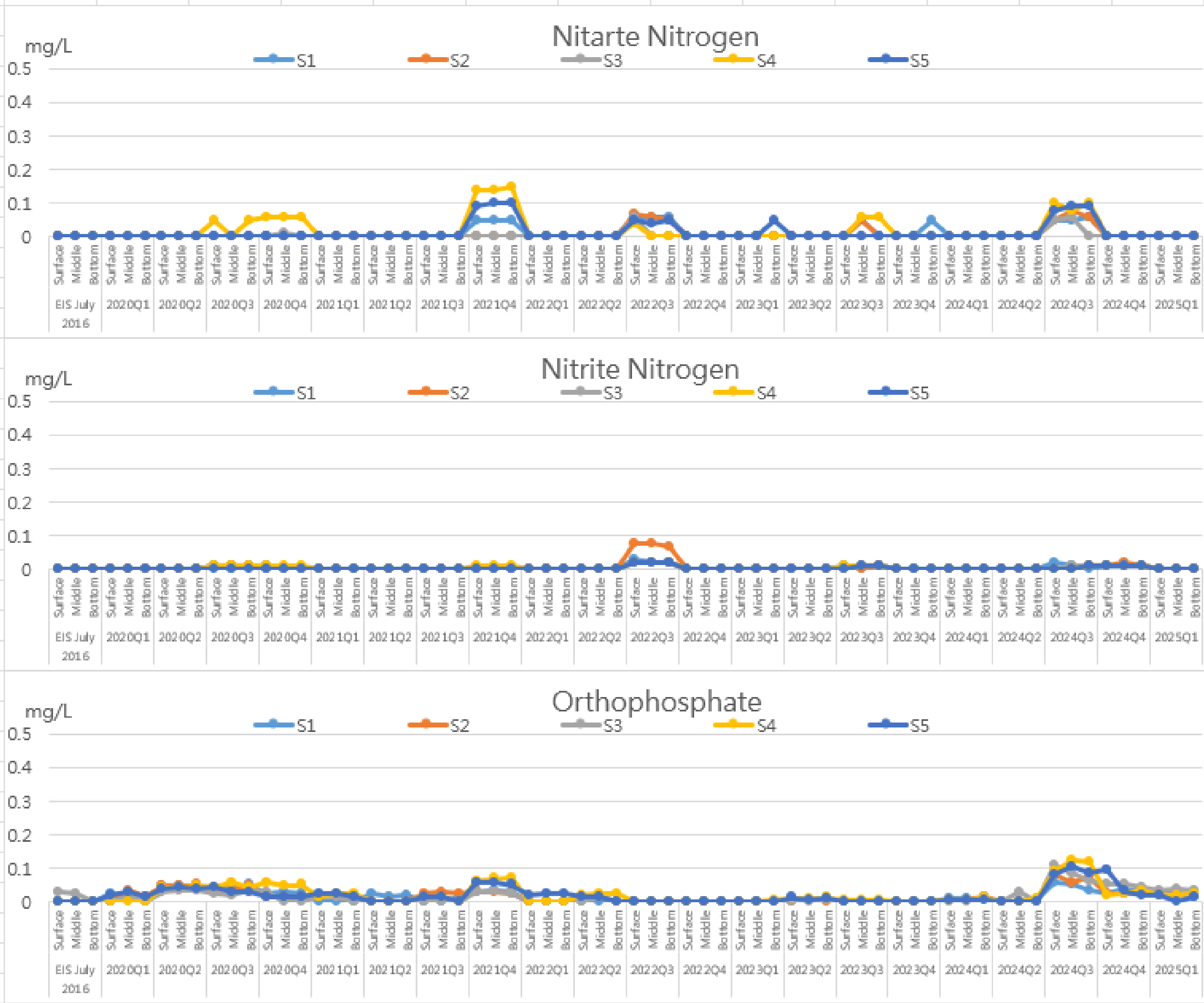


Figure 3.1.1-2 Trend Chart of Previous Marine Water Quality Monitoring Results (3/4)

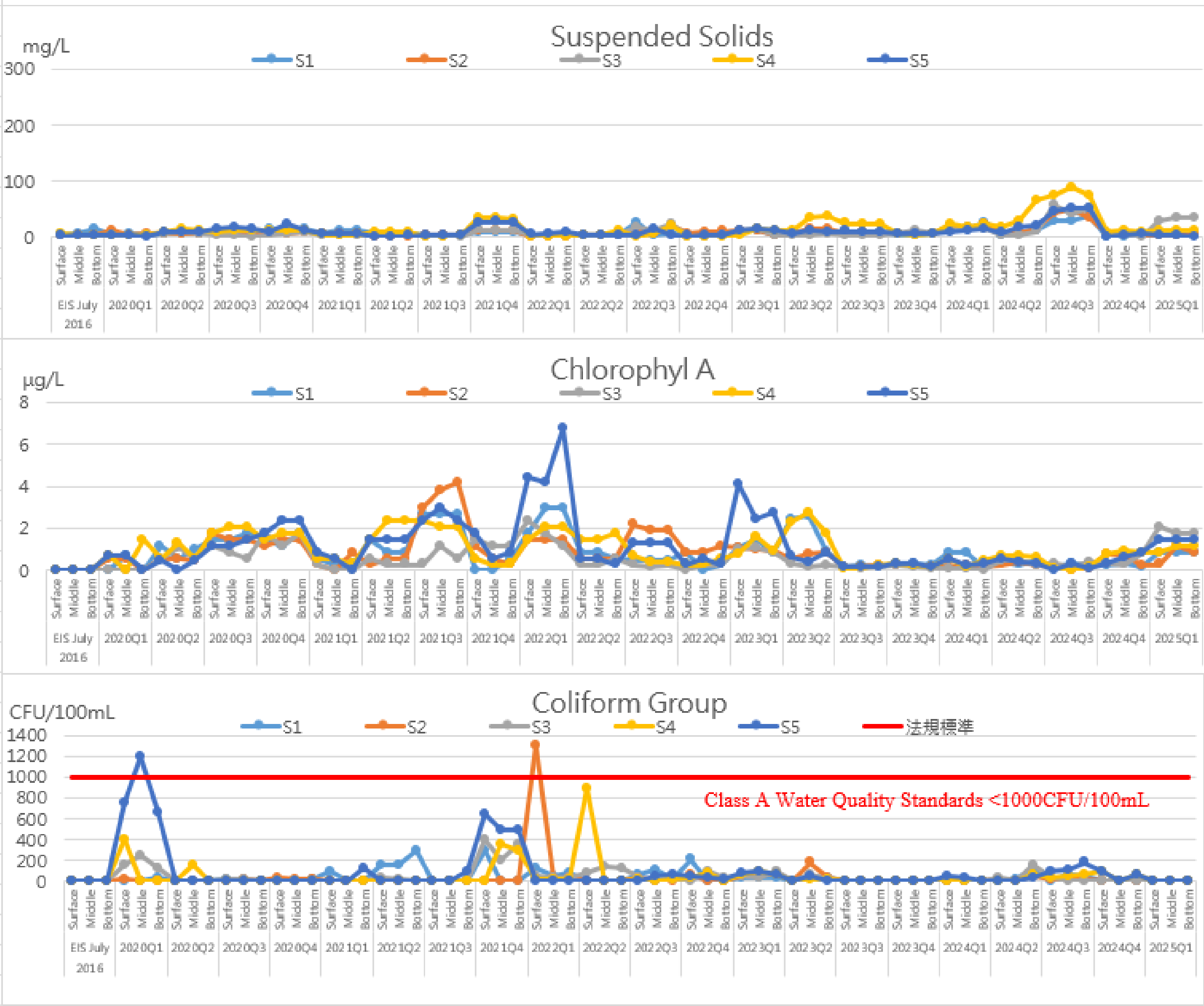


Figure 3.1.1-2 Trend Chart of Previous Marine Water Quality Monitoring Results (4/4)

Table 3.1.1-1 Analysis of Previous Marine Water Quality Monitoring (1/25)

Monitoring Spot	Monitoring Date	Item	Water Temperature	pH	BOD	Salinity	Dissolved Oxygen	Ammonia-N	Nitrite Nitrogen	Nitrite Nitrogen	Orthophosphate	Suspended Solid	Chlorophyll A	Coliform Group
		Unit	℃	—	mg/L	psu	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	μg/L	CFU/100mL
ST2	EIA 2016 July (ST2)	Surface	29.5	8.3	0.8	33.6	6.4	ND	—	—	ND	5.1	—	<10
		Middle	29.3	8.3	0.8	33.5	6.4	ND	—	—	ND	8.3	—	<10
		Bottom	29.3	8.3	0.8	33.5	6.3	0.02	—	—	ND	16.5	—	<10
S1	2020 Q1 (2020.03-05)	Surface	25.4	8.2	<1.0	33.5	5.4	ND	ND	ND	0.028	4.2	<0.1	<10
		Middle	25.1	8.2	<1.0	33.5	5.3	ND	ND	ND	0.015	6.4	0.7	<10
		Bottom	24.9	8.2	<1.0	33.6	5.2	ND	ND	<0.01	<0.015	4.2	<0.1	35
	2020 Q2 (2020.06-08)	Surface	28.8	8.2	<1.0	32.8	5.2	<0.05	<0.05	<0.01	0.049	6.6	1.2	<10
		Middle	28.7	8.2	<1.0	32.8	5.1	<0.05	<0.05	<0.01	0.049	6.4	0.6	<10
		Bottom	28.6	8.2	<1.0	32.7	5.1	<0.05	<0.05	<0.01	0.046	6.5	1.0	<10
	2020 Q3 (2020.09-11)	Surface	30.1	8.1	<1.0	33.1	6.1	<0.05	<0.05	0.01	0.043	6.4	1.5	25
		Middle	29.8	8.1	<1.0	33.1	6.0	ND	<0.05	0.01	0.046	6.7	1.5	<10
		Bottom	29.5	8.1	<1.0	33.2	5.8	<0.05	<0.05	0.01	0.052	6.3	1.8	<10
	2020 Q4 (2020.12-2021.02)	Surface	21.1	8.3	<1.0	34.0	7.4	ND	<0.05	0.01	0.028	16.2	1.5	15
		Middle	21.0	8.3	<1.0	34.0	7.2	ND	<0.05	<0.01	0.031	16.4	1.2	10
		Bottom	20.8	8.2	<1.0	34.0	7.1	ND	<0.05	<0.01	0.028	15.4	1.8	25

Table 3.1.1-1 Analysis of Previous Marine Water Quality Monitoring (2/25)

Monitoring Spot	Monitoring Date	Item	Water Temperature	pH	BOD	Salinity	Dissolved Oxygen	Ammonia-N	Nitrite Nitrogen	Nitrite Nitrogen	Orthophosphate	Suspended Solid	Chlorophyll A	Coliform Group
		Unit	℃	—	mg/L	psu	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	μg/L	CFU/100mL
S1	2021 Q1 (2020.03-2021.05)	Surface	26.2	8.2	<1.0	33.4	6.7	ND	ND	<0.01	<0.015	7.6	0.6	100
		Middle	25.8	8.2	<1.0	33.5	6.6	ND	<0.05	<0.01	<0.015	11.5	0.3	<10
		Bottom	25.4	8.3	<1.0	33.6	6.6	ND	<0.05	<0.01	<0.015	11.4	0.3	<10
	2021 Q2 (2020.06-2021.08)	Surface	30.2	8.2	<1.0	33.4	7.1	ND	<0.05	<0.01	0.025	7.8	1.5	150
		Middle	30.1	8.2	<1.0	33.3	6.9	ND	<0.05	<0.01	0.018	6.2	0.9	150
		Bottom	29.9	8.2	<1.0	33.3	6.5	ND	<0.05	<0.01	0.021	7.7	0.9	300
	2021 Q3 (2020.09-2021.11)	Surface	30.2	8.2	<1.0	33.5	6.2	ND	<0.05	<0.01	<0.015	3.7	2.7	<10
		Middle	30.1	8.2	<1.0	33.5	6.2	ND	<0.05	<0.01	<0.015	3.8	2.7	<10
		Bottom	29.9	8.2	<1.0	33.6	6.2	ND	<0.05	<0.01	0.018	4.0	2.7	<10
	2021 Q4 (2021.12-2022.02)	Surface	21.4	8.2	<1.0	33.6	6.8	ND	0.05	<0.01	0.029	9.0	<0.1	300
		Middle	21.3	8.2	<1.0	33.6	6.7	ND	0.05	<0.01	0.034	10.0	<0.1	<10
		Bottom	21.2	8.2	<1.0	33.6	6.5	ND	0.05	<0.01	0.031	9.6	0.6	<10

Remark 1: "＜" indicates the value is lower than limit of quantification; "ND" indicates the value is lower than limit of device detection.
Remark 2: "*" indicates the value exceeds Water Quality Standard of Marine Waterbody (Class A).

Table 3.1.1-1 Analysis of Previous Marine Water Quality Monitoring (3/25)

Monitoring Spot	Monitoring Date	Item	Water Temperature	pH	BOD	Salinity	Dissolved Oxygen	Ammonia-N	Nitrite Nitrogen	Nitrite Nitrogen	Orthophosphate	Suspended Solid	Chlorophyll A	Coliform Group
		Unit	℃	—	mg/L	psu	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	μg/L	CFU/100mL
S1	2022 Q1 (2022.03-2022.05)	Surface	25.9	8.2	<1.0	32.9	6.7	<0.10	<0.04	ND	<0.015	3.4	1.8	130
		Middle	25.7	8.2	<1.0	32.9	6.5	<0.10	<0.04	ND	<0.015	4.4	3.0	50
		Bottom	25.5	8.2	<1.0	33.0	6.4	<0.10	<0.04	ND	<0.015	2.7	3.0	85
	2022 Q2 (2022.06-08)	Surface	29.1	8.2	<1.0	32.6	6.2	<0.10	<0.04	ND	<0.015	4.5	0.9	<10
		Middle	28.9	8.2	<1.0	32.6	6.1	ND	<0.04	ND	<0.015	4.6	0.9	<10
		Bottom	28.8	8.2	<1.0	32.6	6.1	<0.10	<0.04	ND	<0.015	4.4	0.6	<10
	2022 Q3 (2022.09-11)	Surface	28.9	8.2	<1.0	32.1	6.4	<0.10	0.06	0.03	ND	27.0	0.5	70
		Middle	28.7	8.2	<1.0	32.2	6.3	<0.10	0.06	0.02	ND	3.4	0.5	110
		Bottom	28.4	8.2	<1.0	32.3	6.2	<0.10	0.06	0.02	<0.015	7.6	0.5	25
	2022 Q4 (2022.11-2023.02)	Surface	24.8	8.3	<1.0	34.0	6.8	<0.10	<0.04	<0.01	<0.015	4.6	0.9	210
		Middle	24.8	8.3	<1.0	34.0	6.8	<0.10	<0.04	<0.01	<0.015	4.6	<0.1	<10
		Bottom	24.7	8.3	<1.0	34.0	6.8	<0.10	<0.04	<0.01	<0.015	3.0	0.3	<10

Remark 1: "＜" indicates the value is lower than limit of quantification; "ND" indicates the value is lower than limit of device detection.

Remark 2: "*" indicates the value exceeds Water Quality Standard of Marine Waterbody (Class A) Class A marine environmental quality standards

Table 3.1.1-1 Analysis of Previous Marine Water Quality Monitoring (4/25)

Monitoring Spot	Monitoring Date	Item	Water Temperature	pH	BOD	Salinity	Dissolved Oxygen	Ammonia-N	Nitrite Nitrogen	Nitrite Nitrogen	Orthophosphate	Suspended Solid	Chlorophyll A	Coliform Group
		Unit	℃	—	mg/L	psu	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	μg/L	CFU/100mL
S1	2023 Q1 (2023.03-05)	Surface	25.9	8.3	<1.0	32.1	6.6	0.07	<0.05	ND	<0.005	13.9	1.11	35
		Middle	25.6	8.3	<1.0	32.1	6.4	0.08	<0.05	ND	<0.005	11.8	1.46	40
		Bottom	25.3	8.3	<1.0	32.2	6.2	0.07	<0.05	ND	ND	4.8	0.87	35
	2023 Q2 (2023.06-08)	Surface	30.5	8.2	<1.0	32.5	6.4	0.08	<0.05	ND	0.007	7.0	2.44	10
		Middle	30.2	8.2	<1.0	32.6	6.2	0.06	<0.05	ND	0.007	13.3	2.63	50
		Bottom	29.8	8.2	<1.0	32.8	6.1	0.06	<0.05	ND	0.006	11.0	0.98	30
	2023 Q3 (2023.09-11)	Surface	26.9	8.2	<1.0	33.5	6.1	0.15	<0.05	0.01	<0.005	11.3	0.18	<10
		Middle	26.9	8.2	<1.0	33.5	6.0	0.15	0.05	ND	<0.005	10.3	0.25	<10
		Bottom	26.7	8.2	<1.0	33.5	5.8	0.19	<0.05	0.01	<0.005	10.0	0.19	<10
	2023 Q4 (2023.12-2024.02)	Surface	25.5	8.2	<1.0	33.3	5.8	0.05	<0.05	<0.01	<0.005	5.6	0.33	<10
		Middle	25.5	8.2	<1.0	33.3	5.8	0.09	<0.05	ND	<0.005	5.4	0.34	<10
		Bottom	25.4	8.2	<1.0	33.3	5.6	0.05	0.05	<0.01	<0.005	6.2	0.23	<10
	2024 Q1 (2024.03-05)	Surface	27.8	8.2	<1.0	33.3	6.6	0.17	<0.05	ND	0.011	22.1	0.87	<10
		Middle	27.4	8.2	<1.0	33.4	6.5	0.15	<0.05	ND	0.011	16.8	0.88	<10
		Bottom	27.1	8.1	<1.0	33.4	6.3	0.21	<0.05	ND	0.014	26.3	0.09	<10

Remark 1: "＜" indicates the value is lower than limit of quantification; "ND" indicates the value is lower than limit of device detection.
Remark 2: "*" indicates the value exceeds Water Quality Standard of Marine Waterbody (Class A)

Table 3.1.1-1 Analysis of Previous Marine Water Quality Monitoring (5/25)

Monitoring Spot	Monitoring Date	Item	Water Temperature	pH	BOD	Salinity	Dissolved Oxygen	Ammonia-N	Nitrite Nitrogen	Nitrite Nitrogen	Orthophosphate	Suspended Solid	Chlorophyll A	Coliform Group
		Unit	℃	—	mg/L	psu	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	μg/L	CFU/100mL
S1	2024 Q2 (2024.06-08)	Surface	30.2	8.1	<1.0	31.1	6.4	0.36*	<0.05	ND	ND	4.5	0.42	<10
		Middle	29.9	8.1	<1.0	31.2	6.3	1.41*	<0.05	<0.01	<0.005	8.4	0.3	25
		Bottom	29.4	8.1	<1.0	31.3	6.1	ND	<0.05	ND	0.006	12.9	0.47	120
	2024 Q3 (2024.09-11)	Surface	25.9	8.2	<1.0	32.9	6.4	0.06	0.05	0.02	0.057	29.8	0.20	10
		Middle	25.8	8.2	<1.0	33.0	6.1	<0.05	0.05	<0.05	0.056	30.0	0.34	60
		Bottom	25.7	8.2	<1.0	32.9	5.7	<0.05	0.06	<0.05	0.034	37.6	0.30	50
	2024 Q4 (2024.12-2025.02)	Surface	20.4	8.2	<1.0	34.1	6.8	<0.05	<0.05	0.01	0.025	<1.0	0.23	<10
		Middle	20.2	8.2	<1.0	34.1	6.9	0.05	<0.05	0.01	0.041	<1.0	0.38	<10
		Bottom	20.1	8.2	<1.0	34.1	6.9	<0.05	<0.05	0.01	0.033	4.0	0.22	<10
	2025 Q1 (2025.03-2025.05)	Surface	25.9	8.2	<1.0	33.1	6.8	ND	ND	<0.01	0.026	3.4	0.9	<10
		Middle	25.7	8.2	<1.0	33.1	6.8	<0.05	<0.05	<0.01	0.025	4.5	0.9	<10
		Bottom	25.5	8.2	<1.0	33.1	6.9	ND	<0.05	<0.01	0.018	3.2	0.9	<10
Class A Marine Water Quality Standards			—	7.6~8.5	<2.0	—	>5.0	<0.3	—	—	—	—	—	< 1,000

Remark 1: "＜" indicates the value is lower than limit of quantification; "ND" indicates the value is lower than limit of device detection. Remark 2: "*" indicates the value exceeds Water Quality Standard of Marine Waterbody (Class A).
Remark 3: Due to the slightly different spatial distribution of survey points between EIS and environmental monitoring stages, the results of the EIS point ST8 were compared with those of the closer environmental monitoring point S5.
Remark 4: The pH standard for Class A marine areas in marine environmental quality is set between 7.6 and 8.5, effective from April 25th, 2024.

Table 3.1.1-1 Analysis of Previous Marine Water Quality Monitoring (6/25)

Monitoring Spot	Monitoring Date	Item	Water Temperature	pH	BOD	Salinity	Dissolved Oxygen	Ammonia-N	Nitrite Nitrogen	Nitrite Nitrogen	Orthophosphate	Suspended Solid	Chlorophyll A	Coliform Group
		Unit	℃	—	mg/L	psu	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	μg/L	CFU/100mL
S2	EIA 2016 July (ST6)	Surface	29.9	8.2	0.6	33.5	6.6	ND	—	—	ND	2.9	—	<10
		Middle	29.7	8.2	0.6	33.6	6.5	ND	—	—	ND	2.7	—	<10
		Bottom	29.5	8.2	0.5	33.6	6.5	ND	—	—	ND	3.5	—	<10
	2020 Q1 (2020.03-05)	Surface	25.6	8.2	<1.0	33.5	5.5	ND	ND	<0.01	<0.015	11.4	0.6	25
		Middle	25.3	8.2	<1.0	33.7	5.3	ND	ND	ND	0.034	3.4	0.6	<10
		Bottom	25.0	8.2	<1.0	33.7	5.2	ND	ND	<0.01	0.015	7.3	<0.1	<10
	2020 Q2 (2020.06-08)	Surface	28.7	8.2	<1.0	32.8	5.2	<0.05	<0.05	<0.01	0.049	6.4	0.6	<10
		Middle	28.7	8.2	<1.0	32.9	5.1	<0.05	<0.05	<0.01	0.049	6.4	0.6	<10
		Bottom	28.6	8.2	<1.0	32.9	5.0	<0.05	<0.05	<0.01	0.052	7.6	0.5	<10
	2020 Q3 (2020.09-11)	Surface	29.9	8.1	<1.0	33.4	6.0	ND	<0.05	0.01	0.034	10.0	1.8	<10
		Middle	29.6	8.1	<1.0	33.3	5.8	ND	<0.05	0.01	0.037	12.1	1.5	15
		Bottom	29.4	8.2	<1.0	33.4	5.7	ND	<0.05	0.01	0.049	5.2	1.5	<10
	2020 Q4 (2020.12-2021.02)	Surface	22.1	8.3	<1.0	34.0	7.5	ND	<0.05	ND	0.015	7.6	1.2	40
		Middle	22.0	8.3	<1.0	34.0	7.2	ND	<0.05	ND	0.018	7.4	1.5	25
		Bottom	21.8	8.2	<1.0	34.0	7.2	ND	<0.05	ND	0.018	10.0	1.5	15

Table 3.1.1-1 Analysis of Previous Marine Water Quality Monitoring (7/25)

Monitoring Spot	Monitoring Date	Item	Water Temperature	pH	BOD	Salinity	Dissolved Oxygen	Ammonia-N	Nitrite Nitrogen	Nitrite Nitrogen	Orthophosphate	Suspended Solid	Chlorophyll A	Coliform Group
		Unit	℃	—	mg/L	psu	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	μg/L	CFU/100mL
S2	2021 Q1 (2020.03-2021.05)	Surface	24.7	8.3	<1.0	33.6	6.5	ND	<0.05	<0.01	0.018	7.6	0.3	<10
		Middle	24.6	8.3	<1.0	33.6	6.5	ND	<0.05	<0.01	0.021	7.1	<0.1	<10
		Bottom	24.2	8.3	<1.0	33.6	6.4	ND	<0.05	<0.01	0.018	7.0	0.9	<10
	2021 Q2 (2020.06-2021.08)	Surface	30.1	8.2	<1.0	33.5	7.0	ND	ND	<0.01	<0.015	2.6	0.3	<10
		Middle	30.0	8.2	<1.0	33.4	6.8	ND	ND	<0.01	<0.015	2.6	0.6	<10
		Bottom	29.9	8.2	<1.0	33.4	6.5	ND	<0.05	<0.01	<0.015	2.6	0.6	<10
	2021 Q3 (2020.09-2021.11)	Surface	30.1	8.2	<1.0	33.3	6.3	<0.05	<0.05	<0.01	0.028	4.9	3.0	<10
		Middle	30.0	8.2	<1.0	33.3	6.2	ND	<0.05	<0.01	0.031	4.6	3.8	<10
		Bottom	29.9	8.2	<1.0	33.3	6.2	ND	<0.05	<0.01	0.028	5.0	4.2	<10
	2021 Q4 (2021.12-2022.02)	Surface	21.4	8.2	<1.0	33.7	6.7	ND	<0.05	<0.01	0.033	13.4	1.2	<10
		Middle	21.3	8.2	<1.0	33.7	6.6	ND	<0.05	<0.01	0.030	12.2	0.6	<10
		Bottom	21.2	8.2	<1.0	33.7	6.5	ND	<0.05	<0.01	0.026	12.6	0.3	<10

Remark 1: "＜" indicates the value is lower than limit of quantification; "ND" indicates the value is lower than limit of device detection.
Remark 2: "*" indicates the value exceeds Water Quality Standard of Marine Waterbody (Class A).

Table 3.1.1-1 Analysis of Previous Marine Water Quality Monitoring (8/25)

Monitoring Spot	Monitoring Date	Item	Water Temperature	pH	BOD	Salinity	Dissolved Oxygen	Ammonia-N	Nitrite Nitrogen	Nitrite Nitrogen	Orthophosphate	Suspended Solid	Chlorophyll A	Coliform Group
		Unit	℃	—	mg/L	psu	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	μg/L	CFU/100mL
S2	2022 Q1 (2022.03-2022.05)	Surface	26.1	8.2	<1.0	33.2	6.6	<0.10	ND	ND	ND	2.6	1.5	1,300*
		Middle	25.9	8.2	<1.0	33.2	6.4	<0.10	ND	ND	ND	2.6	1.5	30
		Bottom	25.7	8.2	<1.0	33.3	6.3	<0.10	ND	ND	<0.015	2.6	1.5	30
	2022 Q2 (2022.06-08)	Surface	29.0	8.2	<1.0	32.5	6.1	ND	ND	ND	0.016	4.2	0.6	<10
		Middle	28.8	8.2	<1.0	32.5	6.1	ND	<0.04	ND	0.017	4.4	0.6	<10
		Bottom	28.6	8.2	<1.0	32.5	6.0	ND	ND	ND	<0.015	3.7	0.6	<10
	2022 Q3 (2022.09-11)	Surface	29.0	8.2	<1.0	32.2	6.4	<0.10	0.07	0.08	<0.015	16.8	2.2	30
		Middle	28.7	8.2	<1.0	32.3	6.3	<0.10	0.06	0.08	<0.015	6.6	1.9	10
		Bottom	28.5	8.2	<1.0	32.3	6.1	<0.10	0.05	0.07	<0.015	20.4	1.9	<10
	2022 Q4 (2022.11-2023.02)	Surface	24.8	8.3	<1.0	34.1	6.7	ND	<0.04	<0.01	<0.015	6.6	0.9	65
		Middle	24.8	8.3	<1.0	34.1	6.7	<0.10	<0.04	<0.01	<0.015	11.1	0.9	<10
		Bottom	24.7	8.3	<1.0	34.1	6.8	<0.10	<0.04	<0.01	<0.015	11.3	1.2	<10

Remark 1: "＜" indicates the value is lower than limit of quantification; "ND" indicates the value is lower than limit of device detection.
Remark 2: "*" indicates the value exceeds Water Quality Standard of Marine Waterbody (Class A).

Table 3.1.1-1 Analysis of Previous Marine Water Quality Monitoring (9/25)

Monitoring Spot	Monitoring Date	Item	Water Temperature	pH	BOD	Salinity	Dissolved Oxygen	Ammonia-N	Nitrite Nitrogen	Nitrite Nitrogen	Orthophosphate	Suspended Solid	Chlorophyll A	Coliform Group
		Unit	℃	—	mg/L	psu	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	μg/L	CFU/100mL
S2	2023 Q1 (2023.03-2023.05)	Surface	25.8	8.3	<1.0	32.0	6.6	<0.05	<0.05	ND	<0.005	13.6	1.13	45
		Middle	25.3	8.3	<1.0	32.1	6.4	0.05	<0.05	ND	<0.005	11.9	1.02	45
		Bottom	25.0	8.3	<1.0	32.2	6.2	<0.05	<0.05	ND	ND	4.7	0.97	80
	2023 Q2 (2023.06-2023.08)	Surface	29.8	8.2	<1.0	32.6	6.4	0.08	<0.05	ND	<0.005	8.3	0.57	<10
		Middle	29.5	8.2	<1.0	32.7	6.3	0.11	<0.05	ND	0.006	16.8	0.78	180
		Bottom	29.2	8.2	<1.0	32.9	6.2	0.12	<0.05	ND	<0.005	14.6	0.90	35
	2023 Q3 (2023.09-11)	Surface	26.9	8.2	<1.0	33.5	6.2	0.15	<0.05	ND	<0.005	6.6	0.22	<10
		Middle	26.8	8.2	<1.0	33.5	6.0	0.12	0.05	ND	<0.005	9.0	0.18	<10
		Bottom	26.6	8.2	<1.0	33.5	5.8	0.12	<0.05	0.01	<0.005	8.2	0.26	<10
	2023 Q4 (2023.12-2024.02)	Surface	25.7	8.2	<1.0	33.4	5.8	0.05	<0.05	ND	<0.005	6.9	0.28	<10
		Middle	25.7	8.2	<1.0	33.4	5.7	<0.05	<0.05	ND	<0.005	6.7	0.26	<10
		Bottom	25.5	8.2	<1.0	33.4	5.6	0.05	<0.05	<0.01	<0.005	7.2	0.17	<10
	2024 Q1 (2024.03-05)	Surface	27.8	8.2	<1.0	33.2	6.6	0.19	<0.05	ND	0.007	21.3	0.20	<10
		Middle	27.5	8.1	<1.0	33.3	6.5	0.16	<0.05	ND	0.007	16.7	0.24	<10
		Bottom	27.1	8.1	<1.0	33.3	6.4	0.15	<0.05	ND	0.015	22.9	0.16	<10

Table 3.1.1-1 Analysis of Previous Marine Water Quality Monitoring (10/25)

Monitoring Spot	Monitoring Date	Item	Water Temperature	pH	BOD	Salinity	Dissolved Oxygen	Ammonia-N	Nitrite Nitrogen	Nitrite Nitrogen	Orthophosphate	Suspended Solid	Chlorophyll A	Coliform Group
		Unit	℃	—	mg/L	psu	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	μg/L	CFU/ 100mL
S2	2024 Q2 (2024.06-08)	Surface	29.8	8.2	<1.0	31.6	6.4	ND	<0.05	ND	ND	7.0	0.3	25
		Middle	29.5	8.2	<1.0	31.7	6.4	ND	<0.05	ND	ND	7.2	0.43	<10
		Bottom	29.1	8.2	<1.0	31.7	6.3	ND	<0.05	ND	0.007	16.6	0.29	45
	2024 Q3 (2024.09-11)	Surface	26.0	8.2	<1.0	33.0	6.1	<0.05	0.05	<0.01	0.084	44.4	0.22	20
		Middle	25.9	8.2	<1.0	33.0	6.1	0.09	0.08	<0.01	0.061	50.3	<0.02	15
		Bottom	25.8	8.2	<1.0	32.9	5.9	0.06	0.06	0.01	0.073	35.3	0.08	25
	2024 Q4 (2024.12-2025.02)	Surface	21.0	8.2	<1.0	34.2	6.7	<0.05	<0.05	0.01	0.026	6.8	0.76	<10
		Middle	20.8	8.2	<1.0	34.2	6.8	ND	<0.05	0.02	0.025	7.0	0.74	<10
		Bottom	20.6	8.2	<1.0	34.2	6.8	<0.05	<0.05	0.01	0.024	4.4	0.28	<10
	2025 Q1 (2024.03-2025.05	Surface	26.4	8.2	<1.0	33.1	6.6	ND	<0.05	<0.01	0.026	4.8	0.3	<10
		Middle	26.1	8.2	<1.0	33.1	6.7	ND	ND	<0.01	0.019	5.0	1.2	<10
		Bottom	25.8	8.2	<1.0	33.1	6.7	ND	<0.05	<0.01	0.025	5.7	0.9	<10
Class A Marine Water Quality Standards			—	7.6~8.5	<2.0	—	>5.0	<0.3	—	—	—	—	—	< 1,000

Remark 1: "＜" indicates the value is lower than limit of quantification; "ND" indicates the value is lower than limit of devicedetection.
Remark 2: "*" indicates the value exceeds Water Quality Standard of Marine Waterbody (Class A).
Remark 3: Due to the slightly different spatial distribution of survey points between EIS and environmental monitoring stages, the results of the EIS point ST8 were compared with those of the closer environmental monitoring point S5.
Remark 4: The pH standard for Class A marine areas in marine environmental quality is set between 7.6 and 8.5, effective from April 25th, 2024.

Table 3.1.1-1 Analysis of Previous Marine Water Quality Monitoring (11/25)

Monitoring Spot	Monitoring Date	Item	Water Temperature	pH	BOD	Salinity	Dissolved Oxygen	Ammonia-N	Nitrite Nitrogen	Nitrite Nitrogen	Orthophosphate	Suspended Solid	Chlorophyll A	Coliform Group
		Unit	°C	—	mg/L	psu	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	μg/L	CFU/100mL
S3	EIA 2016 July (ST11)	Surface	30.1	8.3	0.6	33.2	6.8	ND	—	—	0.030	4.3	—	<10
		Middle	29.8	8.2	0.7	33.2	6.7	ND	—	—	0.025	2.8	—	<10
		Bottom	29.7	8.3	0.6	33.4	6.8	ND	—	—	ND	4.0	—	<10
	2020 Q1 (2020.03-05)	Surface	26.1	8.2	<1.0	33.5	5.5	ND	ND	ND	<0.015	3.1	<0.1	160
		Middle	25.7	8.2	<1.0	33.5	5.4	ND	ND	ND	0.018	4.2	<0.1	250
		Bottom	25.5	8.2	<1.0	33.6	5.2	ND	ND	ND	<0.015	3.0	<0.1	130
	2020 Q2 (2020.06-08)	Surface	28.5	8.2	<1.0	33.3	5.6	<0.05	<0.05	<0.05	0.031	7.8	0.6	<10
		Middle	28.4	8.2	<1.0	33.4	5.5	<0.05	<0.05	<0.05	0.034	9.2	1.1	<10
		Bottom	28.3	8.2	<1.0	33.3	5.5	<0.05	<0.05	<0.05	0.034	6.2	0.6	<10
	2020 Q3 (2020.09-11)	Surface	29.8	8.1	<1.0	33.7	6.2	ND	<0.05	0.01	0.025	4.2	1.2	15
		Middle	29.6	8.2	<1.0	33.7	5.9	ND	<0.05	<0.01	0.021	4.8	0.9	25
		Bottom	29.3	8.2	<1.0	33.7	5.6	ND	<0.05	0.01	0.034	1.8	0.6	<10
	2020 Q4 (2020.12-2021.02)	Surface	22.0	8.3	<1.0	34.0	7.5	ND	ND	ND	0.031	5.6	1.8	<10
		Middle	21.8	8.3	<1.0	34.0	7.4	ND	0.01	ND	<0.015	7.2	1.2	<10
		Bottom	21.5	8.2	<1.0	34.0	7.3	ND	<0.05	ND	<0.015	9.6	1.8	<10

Table 3.1.1-1 Analysis of Previous Marine Water Quality Monitoring (12/25)

Monitoring Spot	Monitoring Date	Item	Water Temperature	pH	BOD	Salinity	Dissolved Oxygen	Ammonia- N	Nitrite Nitrogen	Nitrite Nitrogen	Orthophosphate	Suspended Solid	Chlorophyll A	Coliform Group
		Unit	℃	—	mg/L	psu	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	μg/L	CFU/100mL
S3	2021 Q1 (2020.03-2021.05)	Surface	26.6	8.3	<1.0	33.6	6.6	ND	ND	<0.01	0.015	4.4	0.3	<10
		Middle	26.4	8.3	<1.0	33.6	6.5	ND	ND	<0.01	0.018	3.9	<0.1	<10
		Bottom	26.2	8.3	<1.0	33.7	6.4	<0.05	ND	<0.01	<0.015	4.0	<0.1	<10
	2021 Q2 (2020.06-2021.08)	Surface	30.1	8.2	<1.0	33.3	7.8	ND	<0.05	<0.01	<0.015	2.8	0.6	35
		Middle	29.9	8.2	<1.0	33.3	7.3	<0.05	<0.05	<0.01	<0.015	3.0	0.3	15
		Bottom	29.7	8.2	<1.0	33.3	7.0	<0.05	<0.05	<0.01	<0.015	2.9	0.3	10
	2021 Q3 (2020.09-2021.11)	Surface	30.1	8.2	<1.0	33.8	6.2	ND	<0.05	<0.01	<0.015	2.1	0.3	<10
		Middle	29.9	8.2	<1.0	33.8	6.2	ND	<0.05	<0.01	<0.015	2.4	1.2	<10
		Bottom	29.7	8.2	<1.0	33.9	6.2	ND	<0.05	<0.01	<0.015	2.4	0.6	<10
	2021 Q4 (2021.12-2022.02)	Surface	23.0	8.2	<1.0	33.7	6.8	ND	<0.05	<0.01	0.030	14.2	1.5	400
		Middle	22.8	8.2	<1.0	33.7	6.6	ND	<0.05	<0.01	0.033	13.1	1.2	200
		Bottom	22.8	8.2	<1.0	33.7	6.5	ND	<0.05	<0.01	0.025	14.0	1.2	350

Remark 1: "＜" indicates the value is lower than limit of quantification; "ND" indicates the value is lower than limit of device detection.
Remark 2: "*" indicates the value exceeds Water Quality Standard of Marine Waterbody (Class A).

Table 3.1.1-1 Analysis of Previous Marine Water Quality Monitoring (13/25)

Monitoring Spot	Monitoring Date	Item	Water Temperature	pH	BOD	Salinity	Dissolved Oxygen	Ammonia- N	Nitrite Nitrogen	Nitrite Nitrogen	Orthophosphate	Suspended Solid	Chlorophyll A	Coliform Group
		Unit	°C	—	mg/L	psu	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	μg/L	CFU/100mL
S3	2022 Q1 (2022.03-2022.05)	Surface	25.7	8.2	<1.0	33.3	6.6	<0.10	ND	ND	<0.015	3.5	2.4	45
		Middle	25.5	8.2	<1.0	33.4	6.5	<0.10	ND	ND	ND	4.4	1.8	40
		Bottom	25.3	8.2	<1.0	33.3	6.3	<0.10	ND	ND	ND	2.8	1.2	30
	2022 Q2 (2022.06-08)	Surface	29.0	8.3	<1.0	32.5	6.1	ND	ND	ND	<0.015	4.4	0.3	75
		Middle	28.7	8.2	<1.0	32.5	6.1	<0.10	ND	ND	0.016	4.8	0.3	140
		Bottom	28.5	8.2	<1.0	32.6	6.0	ND	ND	ND	<0.015	4.6	0.6	130
	2022 Q3 (2022.09-11)	Surface	29.4	8.2	<1.0	32.1	6.4	ND	0.06	0.02	ND	19.6	0.3	35
		Middle	29.1	8.2	<1.0	32.2	6.2	ND	<0.04	0.02	ND	13.6	0.2	<10
		Bottom	28.8	8.2	<1.0	32.3	6.1	<0.10	<0.04	0.02	ND	25.1	0.3	20
	2022 Q4 (2022.11-2023.02)	Surface	25.1	8.3	<1.0	34.1	6.7	<0.10	ND	ND	<0.015	<1.0	<0.1	<10
		Middle	25.1	8.3	<1.0	34.1	6.8	<0.10	ND	ND	<0.015	2.6	0.3	95
		Bottom	25.0	8.3	<1.0	34.1	6.8	<0.10	ND	ND	<0.015	3.4	0.3	35

Remark 1: "＜" indicates the value is lower than limit of quantification; "ND" indicates the value is lower than limit of device detection.

Remark 2: "*" indicates the value exceeds Water Quality Standard of Marine Waterbody (Class A)

Table 3.1.1-1 Analysis of Previous Marine Water Quality Monitoring (14/25)

Monitoring Spot	Monitoring Date	Item	Water Temperature	pH	BOD	Salinity	Dissolved Oxygen	Ammonia- N	Nitrite Nitrogen	Nitrite Nitrogen	Orthophosphate	Suspended Solid	Chlorophyll A	Coliform Group
		Unit	°C	—	mg/L	psu	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	μg/L	CFU/100mL
S3	2023 Q1 (2023.03-2023.05)	Surface	25.6	8.3	<1.0	32.2	6.6	<0.05	<0.05	ND	ND	14.0	1.04	55
		Middle	25.2	8.3	<1.0	32.2	6.4	<0.05	<0.05	ND	<0.005	14.6	1.08	40
		Bottom	24.8	8.3	<1.0	32.3	6.3	ND	<0.05	ND	<0.005	5.1	0.85	90
	2023 Q2 (2023.06-2023.08)	Surface	30.5	8.2	<1.0	32.5	6.5	<0.05	<0.05	ND	<0.005	3.2	0.34	<10
		Middle	29.9	8.2	<1.0	32.6	6.4	0.05	<0.05	ND	<0.005	3.6	0.16	65
		Bottom	29.5	8.2	<1.0	32.8	6.2	0.06	<0.05	ND	0.006	7.2	0.29	15
	2023 Q3 (2023.09-11)	Surface	27.4	8.0	<1.0	33.5	6.1	0.11	<0.05	ND	ND	5.1	0.19	<10
		Middle	27.3	8.2	<1.0	33.5	5.9	0.12	<0.05	0.01	ND	4.6	0.09	<10
		Bottom	27.0	8.2	<1.0	33.5	5.8	0.07	<0.05	0.01	<0.005	4.8	0.21	<10
	2023 Q4 (2023.12-2024.02)	Surface	25.8	8.2	<1.0	33.4	5.8	0.06	<0.05	ND	<0.005	8.1	0.23	<10
		Middle	25.8	8.2	<1.0	33.4	5.7	0.05	<0.05	ND	<0.005	11.5	0.17	<10
		Bottom	25.6	8.2	<1.0	33.4	5.5	0.09	<0.05	ND	<0.005	7.7	0.14	<10
	2024 Q1 (2024.03-05)	Surface	27.7	8.1	<1.0	33.1	6.6	0.20	<0.05	ND	<0.005	13.6	0.12	<10
		Middle	27.4	8.1	<1.0	33.2	6.4	0.10	<0.05	ND	<0.005	17.4	0.14	<10
		Bottom	27.1	8.2	<1.0	33.3	6.3	0.17	<0.05	ND	0.01	15.6	0.07	<10

Remark 1: "＜" indicates the value is lower than limit of quantification; "ND" indicates the value is lower than limit of device detection.
Remark 2: "*" indicates the value exceeds Water Quality Standard of Marine Waterbody (Class A)

Table 3.1.1-1 Analysis of Previous Marine Water Quality Monitoring (15/25)

Monitoring Spot	Monitoring Date	Item	Water Temperature	pH	BOD	Salinity	Dissolved Oxygen	Ammonia-N	Nitrite Nitrogen	Nitrite Nitrogen	Orthophosphate	Suspended Solid	Chlorophyll A	Coliform Group
		Unit	℃	—	mg/L	psu	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	μg/L	CFU/100mL
S3	2024 Q2 (2024.06-08)	Surface	30.6	8.2	<1.0	31.2	6.5	ND	<0.05	ND	ND	4.4	0.47	35
		Middle	30.2	8.1	<1.0	31.5	6.4	ND	<0.05	ND	0.031	4.7	0.48	<10
		Bottom	29.7	8.1	<1.0	31.7	6.4	ND	<0.05	ND	ND	11.2	0.27	160
	2024 Q3 (2024.09-11)	Surface	26.1	8.1	<1.0	33.0	6.2	0.05	0.05	ND	0.111	57.2	0.32	40
		Middle	25.8	8.2	<1.0	32.9	6.1	<0.05	0.06	0.01	0.089	42.6	0.22	<10
		Bottom	25.7	8.2	<1.0	32.9	6.1	<0.05	<0.05	0.01	0.063	53.0	0.44	<10
	2024 Q4 (2024.12-2025.02)	Surface	20.3	8.2	<1.0	34.1	7.0	0.05	<0.05	0.01	0.053	4.0	0.36	<10
		Middle	20.2	8.2	<1.0	34.1	7.0	<0.05	<0.05	0.01	0.053	3.8	0.30	<10
		Bottom	20.0	8.2	<1.0	34.1	7.0	<0.05	<0.05	0.01	0.043	<1.0	0.83	10
	2025 Q1 (2024.03-2025.05	Surface	25.9	8.3	<1.0	33.0	6.8	ND	<0.05	<0.01	0.037	28.8	2.1	<10
		Middle	25.7	8.3	<1.0	33.0	6.9	ND	<0.05	<0.01	0.040	34.2	1.8	<10
		Bottom	25.5	8.3	<1.0	33.0	6.7	ND	ND	<0.01	0.037	34.3	1.8	<10
Class A Marine Water Quality Standards			—	7.6~8.5	<2.0	—	>5.0	<0.3	—	—	—	—	—	< 1,000

Remark 1: "＜" indicates the value is lower than limit of quantification; "ND" indicates the value is lower than limit of device detection.
Remark 2: "*" indicates the value exceeds Water Quality Standard of Marine Waterbody (Class A).
Remark 3: Due to the slightly different spatial distribution of survey points between EIS and environmental monitoring stages, the results of the EIS point ST8 were compared with those of the closer environmental monitoring point S5.
Remark 4: The pH standard for Class A marine areas in marine environmental quality is set between 7.6 and 8.5, effective from April 25th, 2024.

Table 3.1.1-1 Analysis of Previous Marine Water Quality Monitoring (16/25)

Monitoring Spot	Monitoring Date	Item	Water Temperature	pH	BOD	Salinity	Dissolved Oxygen	Ammonia-N	Nitrite Nitrogen	Nitrite Nitrogen	Orthophosphate	Suspended Solid	Chlorophyll A	Coliform Group
		Unit	℃	—	mg/L	psu	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	μg/L	CFU/100mL
ST4	EIA 2016 July (ST4)	Surface	29.4	8.2	0.8	33.5	6.4	ND	—	—	ND	7.4	—	<10
		Middle	29.3	8.2	0.7	33.4	6.5	ND	—	—	ND	4.5	—	<10
		Bottom	29.3	8.3	0.7	33.4	6.5	ND	—	—	ND	4.8	—	<10
S4	2020 Q1 (2020.03-05)	Surface	24.9	8.2	<1.0	33.5	5.6	ND	ND	ND	<0.015	5.1	0.7	400
		Middle	24.7	8.2	<1.0	33.6	5.3	ND	ND	ND	<0.015	4.0	<0.1	<10
		Bottom	24.4	8.2	<1.0	33.6	5.1	ND	ND	ND	<0.015	4.4	1.5	<10
	2020 Q2 (2020.06-08)	Surface	28.4	8.1	<1.0	33.1	5.8	<0.05	<0.01	<0.05	0.043	9.4	0.6	<10
		Middle	28.3	8.1	<1.0	33.0	5.7	<0.05	<0.01	<0.05	0.046	14.6	1.3	150
		Bottom	28.3	8.2	<1.0	33.0	5.5	<0.05	<0.01	<0.05	0.049	11.6	0.6	<10
	2020 Q3 (2020.09-11)	Surface	29.7	8.1	<1.0	33.2	6.1	ND	0.05	0.01	0.046	10.2	1.8	<10
		Middle	29.5	8.1	<1.0	33.2	5.9	ND	<0.05	0.01	0.061	13.6	2.1	<10
		Bottom	29.4	8.1	<1.0	33.1	5.7	ND	0.05	0.01	0.046	12.2	2.1	<10
	2020 Q4 (2020.12-2021.02)	Surface	20.9	8.3	<1.0	34.0	7.5	ND	0.06	0.01	0.061	12.2	1.5	<10
		Middle	20.7	8.3	<1.0	33.9	7.4	ND	0.06	0.01	0.049	12.4	1.8	<10
		Bottom	20.6	8.2	<1.0	34.0	7.2	ND	0.06	0.01	0.052	13.0	1.8	<10

Table 3.1.1-1 Analysis of Previous Marine Water Quality Monitoring (17/25)

Monitoring Spot	Monitoring Date	Item	Water Temperature	pH	BOD	Salinity	Dissolved Oxygen	Ammonia-N	Nitrite Nitrogen	Nitrite Nitrogen	Orthophosphate	Suspended Solid	Chlorophyll A	Coliform Group
		Unit	°C	—	mg/L	psu	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	μg/L	CFU/100mL
S4	2021 Q1 (2020.03-2021.05)	Surface	25.2	8.2	<1.0	33.5	6.8	<0.05	ND	<0.01	0.018	5.6	0.6	<10
		Middle	25.2	8.3	<1.0	33.5	6.7	<0.05	<0.05	<0.01	0.025	5.4	0.6	<10
		Bottom	25.0	8.3	<1.0	33.6	6.5	ND	<0.05	<0.01	0.025	5.6	0.3	<10
	2021 Q2 (2020.06-2021.08)	Surface	30.8	8.2	<1.0	33.3	6.7	<0.05	ND	<0.01	<0.015	9.3	1.5	<10
		Middle	30.9	8.2	<1.0	33.2	6.5	ND	ND	<0.01	<0.015	9.0	2.4	<10
		Bottom	30.7	8.2	<1.0	33.2	6.7	ND	ND	<0.01	<0.015	9.8	2.4	<10
	2021 Q3 (2020.09-2021.11)	Surface	30.8	8.2	<1.0	33.6	6.3	ND	<0.05	<0.01	0.018	2.6	2.4	<10
		Middle	30.9	8.2	<1.0	33.6	6.2	ND	<0.05	<0.01	0.015	2.2	2.1	<10
		Bottom	30.7	8.2	<1.0	33.6	6.2	<0.05	<0.05	<0.01	<0.015	3.4	2.1	<10
	2021 Q4 (2021.12-2022.02)	Surface	18.6	8.2	<1.0	32.7	6.6	ND	0.14	0.01	0.065	34.3	0.6	<10
		Middle	18.6	8.2	<1.0	32.7	6.4	ND	0.14	0.01	0.071	34.9	0.3	350
		Bottom	18.6	8.2	<1.0	32.7	6.4	ND	0.15	0.01	0.075	33.9	0.3	300

Remark 1: "＜" indicates the value is lower than limit of quantification; "ND" indicates the value is lower than limit of device detection.
Remark 2: "*" indicates the value exceeds Water Quality Standard of Marine Waterbody (Class A).

Table 3.1.1-1 Analysis of Previous Marine Water Quality Monitoring (18/25)

Monitoring Spot	Monitoring Date	Item	Water Temperature	pH	BOD	Salinity	Dissolved Oxygen	Ammonia- N	Nitrite Nitrogen	Nitrite Nitrogen	Orthophosphate	Suspended Solid	Chlorophyll A	Coliform Group
		Unit	°C	—	mg/L	psu	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	μg/L	CFU/100mL
S4	2022 Q1 (2022.03-2022.05)	Surface	25.5	8.2	<1.0	33.2	6.5	<0.10	ND	ND	ND	1.8	1.5	25
		Middle	25.3	8.2	<1.0	33.3	6.4	0.11	<0.04	ND	ND	2.6	2.1	25
		Bottom	25.0	8.2	<1.0	33.4	6.3	<0.10	<0.04	<0.01	<0.015	2.2	2.1	25
	2022 Q2 (2022.06-08)	Surface	28.9	8.2	<1.0	32.5	6.1	ND	<0.04	ND	0.021	4.6	1.5	900
		Middle	28.8	8.2	<1.0	32.5	6.1	ND	<0.04	ND	0.024	4.3	1.5	<10
		Bottom	28.6	8.2	<1.0	32.5	6.0	ND	ND	ND	0.027	11.5	1.8	<10
	2022 Q3 (2022.09-11)	Surface	28.6	8.2	<1.0	31.6	6.4	ND	0.04	0.02	ND	2.2	0.7	25
		Middle	28.4	8.2	<1.0	31.7	6.2	ND	<0.04	0.02	ND	8.2	0.4	<10
		Bottom	28.2	8.2	<1.0	31.7	6.1	ND	<0.04	0.02	ND	20.2	0.4	20
	2022 Q4 (2022.11-2023.02)	Surface	23.8	8.2	<1.0	34.0	6.9	<0.10	<0.04	ND	<0.015	2.6	0.3	40
		Middle	23.8	8.2	<1.0	34.0	6.9	<0.10	<0.04	ND	<0.015	<1.0	0.3	75
		Bottom	23.7	8.2	<1.0	34.0	6.9	<0.10	ND	ND	<0.015	1.7	0.6	<10

Remark 1: "＜" indicates the value is lower than limit of quantification; "ND" indicates the value is lower than limit of device detection.
Remark 2: "*" indicates the value exceeds Water Quality Standard of Marine Waterbody (Class A).

Table 3.1.1-1 Analysis of Previous Marine Water Quality Monitoring (19/25)

Monitoring Spot	Monitoring Date	Item	Water Temperature	pH	BOD	Salinity	Dissolved Oxygen	Ammonia- N	Nitrite Nitrogen	Nitrite Nitrogen	Orthophosphate	Suspended Solid	Chlorophyll A	Coliform Group
		Unit	℃	—	mg/L	psu	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	μg/L	CFU/100mL
S4	2023 Q1 (2023.03-2023.05)	Surface	25.7	8.3	<1.0	32.0	6.4	<0.05	<0.05	ND	<0.005	4.8	0.76	70
		Middle	25.5	8.3	<1.0	32.1	6.2	ND	<0.05	ND	<0.005	14.4	1.63	90
		Bottom	25.3	8.3	<1.0	32.1	6.1	<0.05	<0.05	ND	0.006	12.2	0.93	70
	2023 Q2 (2023.06-2023.08)	Surface	30.9	8.2	<1.0	32.7	6.1	0.07	<0.05	ND	0.011	13.1	2.30	<10
		Middle	30.7	8.2	<1.0	32.8	5.8	0.07	<0.05	ND	0.013	36.3	2.77	15
		Bottom	30.5	8.2	<1.0	32.7	5.7	0.10	<0.05	ND	0.014	38.4	1.75	15
	2023 Q3 (2023.09-11)	Surface	26.8	8.2	<1.0	33.3	6.1	0.07	<0.05	0.01	0.007	25.4	0.09	<10
		Middle	26.8	8.2	<1.0	33.3	5.9	0.12	0.06	0.01	0.007	22.8	0.15	<10
		Bottom	26.7	8.2	<1.0	33.3	5.8	0.14	0.06	0.01	0.007	25.0	0.24	<10
	2023 Q4 (2023.12-2024.02)	Surface	25.5	8.2	<1.0	33.3	6.1	<0.05	<0.05	ND	<0.005	6.1	0.34	<10
		Middle	25.5	8.2	<1.0	33.3	6.0	ND	<0.05	ND	<0.005	5.4	0.23	<10
		Bottom	25.7	8.3	<1.0	32.0	6.4	<0.05	<0.05	ND	<0.005	4.8	0.76	70
	2024 Q1 (2024.03-05)	Surface	28.0	8.2	<1.0	33.4	6.7	0.30	<0.05	ND	0.008	22.9	0.58	<10
		Middle	27.7	8.2	<1.0	33.4	6.6	0.70*	<0.05	ND	0.007	18.2	0.22	10
		Bottom	27.4	8.2	<1.0	33.4	6.4	0.15	<0.05	ND	0.014	23.8	0.48	<10

Table 3.1.1-1 Analysis of Previous Marine Water Quality Monitoring (20/25)

Monitoring Spot	Monitoring Date	Item	Water Temperature	pH	BOD	Salinity	Dissolved Oxygen	Ammonia-N	Nitrite Nitrogen	Nitrite Nitrogen	Orthophosphate	Suspended Solid	Chloroph yll A	Coliform Group
		Unit	℃	—	mg/L	psu	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	μg/L	CFU/ 100mL
S4	2024 Q2 (2024.06-08)	Surface	30.3	8.1	<1.0	30.8	6.4	ND	<0.05	<0.01	<0.005	19.2	0.69	<10
		Middle	30.1	8.1	<1.0	30.8	6.2	ND	<0.05	<0.01	<0.005	29.5	0.74	<10
		Bottom	29.8	8.1	<1.0	30.9	6.1	ND	<0.05	<0.01	0.010	66.2	0.61	65
	2024 Q3 (2024.06-08)	Surface	25.2	8.1	<1.0	32.4	5.3	0.06	0.10	ND	0.091	75.6	0.11	40
		Middle	25.1	8.1	<1.0	32.6	5.2	0.07	0.08	ND	0.124	89.0	0.02	50
		Bottom	25.1	8.1	<1.0	32.6	5.1	<0.05	0.10	0.01	0.122	76.3	0.16	65
	2024 Q4 (2024.12-2025.02)	Surface	20.8	8.2	<1.0	34.2	6.7	<0.05	<0.05	0.01	0.021	9.0	0.76	<10
		Middle	20.7	8.2	<1.0	34.2	6.7	<0.05	<0.05	0.01	0.027	13.9	0.92	<10
		Bottom	20.5	8.2	<1.0	34.2	6.8	0.07	<0.05	0.01	0.034	9.0	0.90	<10
	2025 Q1 (2024.03-2025.05	Surface	26.3	8.2	<1.0	33.2	6.7	ND	ND	<0.01	0.023	13.3	0.9	<10
		Middle	26.1	8.2	<1.0	33.2	6.7	ND	<0.05	<0.01	0.022	12.0	1.2	<10
		Bottom	25.7	8.2	<1.0	33.2	6.8	ND	ND	<0.01	0.024	11.6	1.2	<10
Class A Marine Water Quality Standards			—	7.6~8.5	<2.0	—	>5.0	<0.3	—	—	—	—	—	< 1,000

Remark 1: "＜" indicates the value is lower than limit of quantification; "ND" indicates the value is lower than limit of device detection.
Remark 2: "*" indicates the value exceeds Water Quality Standard of Marine Waterbody (Class A).
Remark 3: Due to the slightly different spatial distribution of survey points between EIS and environmental monitoring stages, the results of the EIS point ST8 were compared with those of the closer environmental monitoring point S5.
Remark 4: The pH standard for Class A marine areas in marine environmental quality is set between 7.6 and 8.5, effective from April 25th, 2024.

Table 3.1.1-1 Analysis of Previous Marine Water Quality Monitoring (21/25)

Monitoring Spot	Monitoring Date	Item	Water Temperature	pH	BOD	Salinity	Dissolved Oxygen	Ammonia-N	Nitrite Nitrogen	Nitrite Nitrogen	Orthophosphate	Suspended Solid	Chlorophyll A	Coliform Group
		Unit	℃	—	mg/L	psu	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	μg/L	CFU/100mL
ST8	EIA 2016 July	Surface	30.1	8.2	0.6	33.4	6.6	ND	—	—	ND	2.8	—	<10
		Middle	29.8	8.3	0.6	33.2	6.6	ND	—	—	ND	3.0	—	<10
		Bottom	29.7	8.3	0.6	33.2	6.5	ND	—	—	ND	4.4	—	<10
S5	2020 Q1 (2020.03-05)	Surface	26.1	8.0	<1.0	33.6	5.4	ND	ND	ND	0.021	3.2	0.7	750
		Middle	25.8	8.0	<1.0	33.7	5.2	ND	ND	ND	0.031	4.6	0.7	1,200*
		Bottom	25.2	8.0	<1.0	33.7	5.1	ND	ND	ND	0.018	2.6	<0.1	670
	2020 Q2 (2020.06-08)	Surface	28.6	8.0	<1.0	33.3	6.1	<0.05	<0.01	<0.05	0.040	9.8	0.5	<10
		Middle	28.5	8.0	<1.0	33.3	6.0	<0.05	<0.01	<0.05	0.043	9.0	<0.1	<10
		Bottom	28.5	8.1	<1.0	33.2	5.9	<0.05	<0.01	<0.05	0.040	9.8	0.5	<10
	2020 Q3 (2020.09-11)	Surface	29.9	8.1	<1.0	33.6	6.2	ND	<0.05	<0.01	0.043	14.4	1.2	10
		Middle	29.7	8.2	<1.0	33.7	6.0	ND	<0.05	<0.01	0.031	18.4	1.2	<10
		Bottom	29.4	8.1	<1.0	33.6	5.8	ND	<0.05	<0.01	0.031	15.2	1.5	10
	2020 Q4 (2020.12-2021.02)	Surface	22.3	8.3	<1.0	34.0	7.4	ND	<0.05	<0.01	0.018	11.0	1.8	<10
		Middle	22.1	8.3	<1.0	34.0	7.3	ND	<0.05	<0.01	0.018	24.6	2.4	<10
		Bottom	21.9	8.2	<1.0	34.0	7.2	ND	<0.05	<0.01	0.018	14.0	2.4	<10

Table 3.1.1-1 Analysis of Previous Marine Water Quality Monitoring (22/25)

Monitoring Spot	Monitoring Date	Item	Water Temperature	pH	BOD	Salinity	Dissolved Oxygen	Ammonia-N	Nitrite Nitrogen	Nitrite Nitrogen	Orthophosphate	Suspended Solid	Chlorophyll A	Coliform Group
		Unit	°C	—	mg/L	psu	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	μg/L	CFU/100mL
S5	2021 Q1 (2020.03-2021.05)	Surface	25.4	8.3	<1.0	33.6	6.7	ND	<0.05	<0.01	0.025	8.2	0.9	<10
		Middle	25.2	8.3	<1.0	33.5	6.6	ND	<0.05	<0.01	0.025	8.0	0.6	<10
		Bottom	25.0	8.3	<1.0	33.6	6.6	ND	<0.05	<0.01	0.018	7.4	<0.1	130
	2021 Q2 (2020.06-2021.08)	Surface	31.0	8.2	<1.0	33.2	6.7	ND	ND	<0.01	<0.015	2.6	1.5	<10
		Middle	31.0	8.2	<1.0	33.2	6.6	ND	ND	<0.01	<0.015	2.6	1.5	<10
		Bottom	30.8	8.2	<1.0	33.2	6.6	ND	ND	<0.01	<0.015	2.7	1.5	<10
	2021 Q3 (2020.09-2021.11)	Surface	31.0	8.2	<1.0	33.7	6.3	ND	<0.05	<0.01	0.015	3.6	2.4	10
		Middle	31.0	8.2	<1.0	33.7	6.2	ND	<0.05	<0.01	0.015	3.0	3.0	<10
		Bottom	30.8	8.2	<1.0	33.7	6.2	ND	<0.05	<0.01	<0.015	3.1	2.4	100
	2021 Q4 (2021.12-2022.02)	Surface	20.5	8.2	<1.0	33.2	6.6	ND	0.09	<0.01	0.058	27.0	1.8	650
		Middle	20.4	8.2	<1.0	33.2	6.5	ND	0.10	<0.01	0.057	28.3	0.6	500
		Bottom	20.4	8.2	<1.0	33.2	6.4	ND	0.10	<0.01	0.052	26.0	0.9	500

Remark 1: "＜" indicates the value is lower than limit of quantification; "ND" indicates the value is lower than limit of device detection.
Remark 2: "*" indicates the value exceeds Water Quality Standard of Marine Waterbody (Class A).

Table 3.1.1-1 Analysis of Previous Marine Water Quality Monitoring (23/25)

Monitoring Spot	Monitoring Date	Item	Water Temperature	pH	BOD	Salinity	Dissolved Oxygen	Ammonia- N	Nitrite Nitrogen	Nitrite Nitrogen	Orthophosphate	Suspended Solid	Chlorophyll A	Coliform Group
		Unit	°C	—	mg/L	psu	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	μg/L	CFU/100mL
S5	2022 Q1 (2022.03-2022.05)	Surface	25.5	8.2	<1.0	33.2	6.5	<0.10	ND	ND	0.022	5.6	4.4	<10
		Middle	25.4	8.1	<1.0	33.2	6.4	<0.10	<0.04	<0.01	0.026	8.2	4.2	<10
		Bottom	25.3	8.1	<1.0	33.3	6.3	<0.10	<0.04	<0.01	0.026	8.6	6.8	<10
	2022 Q2 (2022.06-08)	Surface	28.9	8.2	<1.0	32.5	6.2	ND	<0.04	ND	0.016	4.5	0.6	<10
		Middle	28.7	8.2	<1.0	32.6	6.1	<0.10	<0.04	ND	0.017	4.8	0.6	<10
		Bottom	28.6	8.2	<1.0	32.6	6.1	<0.10	<0.04	ND	<0.015	4.7	0.3	<10
	2022 Q3 (2022.09-11)	Surface	29.0	8.2	<1.0	31.8	6.4	<0.10	0.05	0.02	<0.015	4.6	1.3	<10
		Middle	28.7	8.2	<1.0	31.9	6.2	<0.10	0.04	0.02	<0.015	14.6	1.3	45
		Bottom	28.5	8.2	<1.0	31.9	6.1	<0.10	0.05	0.02	<0.015	5.4	1.3	60
	2022 Q4 (2022.11-2023.02)	Surface	23.9	8.2	<1.0	34.1	6.9	<0.10	<0.04	<0.01	<0.015	2.8	0.3	50
		Middle	23.9	8.2	<1.0	34.1	6.9	<0.10	<0.04	<0.01	<0.015	3.0	0.6	30
		Bottom	23.8	8.2	<1.0	34.1	6.9	<0.10	<0.04	<0.01	<0.015	3.0	0.3	15

Remark 1: “＜” indicates the value is lower than limit of quantification; “ND” indicates the value is lower than limit of device detection.

Remark 2: “*” indicates the value exceeds Water Quality Standard of Marine Waterbody (Class A).

Table 3.1.1-1 Analysis of Previous Marine Water Quality Monitoring (24/25)

Monitoring Spot	Monitoring Date	Item	Water Temperature	pH	BOD	Salinity	Dissolved Oxygen	Ammonia-N	Nitrite Nitrogen	Nitrite Nitrogen	Orthophosphate	Suspended Solid	Chlorophyll A	Coliform Group
		Unit	°C	—	mg/L	psu	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	μg/L	CFU/100mL
S5	2023 Q1 (2023.03-2023.05)	Surface	25.5	8.3	<1.0	31.7	6.5	<0.05	<0.05	ND	<0.005	13.9	4.11	85
		Middle	25.2	8.3	<1.0	31.8	6.3	0.08	<0.05	ND	<0.005	15.8	2.45	95
		Bottom	24.9	8.3	<1.0	31.8	6.2	0.05	0.05	ND	<0.005	13.2	2.80	70
	2023 Q2 (2023.06-2023.08)	Surface	30.4	8.1	<1.0	32.5	6.2	0.09	<0.05	ND	0.014	6.6	0.68	<10
		Middle	30	8.1	<1.0	32.6	6.1	0.11	<0.05	ND	0.008	12.9	0.43	45
		Bottom	29.7	8.2	<1.0	32.7	6	0.08	<0.05	ND	0.012	10.8	0.88	<10
	2023 Q3 (2023.09-11)	Surface	26.9	8.2	<1.0	33.4	6.1	0.10	<0.05	ND	<0.005	11.2	0.20	<10
		Middle	26.9	8.2	<1.0	33.4	5.9	0.10	<0.05	0.01	<0.005	10.2	0.18	<10
		Bottom	26.4	8.2	<1.0	33.4	5.8	0.08	<0.05	0.01	<0.005	9.9	0.22	<10
	2023 Q4 (2023.12-2024.02)	Surface	25.4	8.2	<1.0	33.4	5.9	<0.05	<0.05	ND	<0.005	8.2	0.34	<10
		Middle	25.4	8.2	<1.0	33.4	5.7	<0.05	<0.05	ND	<0.005	7.0	0.33	<10
		Bottom	25.2	8.2	<1.0	33.4	5.7	0.08	<0.05	ND	<0.005	7.2	0.20	<10
	2024 Q1 (2024.03~05)	Surface	28.2	8.2	<1.0	33.3	6.8	0.12	<0.05	ND	0.006	9.0	0.56	50
		Middle	27.6	8.2	<1.0	33.4	6.7	0.10	<0.05	ND	0.006	13.7	0.27	40
		Bottom	27.2	8.2	<1.0	33.4	6.5	0.12	<0.05	ND	0.008	16.0	0.31	<10

Table 3.1.1-1 Analysis of Previous Marine Water Quality Monitoring (25/25)

Monitoring Spot	Monitoring Date	Item	Water Temperature	pH	BOD	Salinity	Dissolved Oxygen	Ammonia-N	Nitrite Nitrogen	Nitrite Nitrogen	Orthophosphate	Suspended Solid	Chlorophyll A	Coliform Group
		Unit	℃	—	mg/L	psu	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	μg/L	CFU/ 100mL
S5	2024 Q2 (2024.06~08)	Surface	30.4	8.2	<1.0	31.2	6.4	ND	<0.05	ND	<0.005	8.4	0.59	<10
		Middle	30.1	8.2	<1.0	31.4	6.3	ND	<0.05	ND	<0.005	17.8	0.43	<10
		Bottom	29.7	8.2	<1.0	31.6	6.2	ND	<0.05	ND	<0.005	21.8	0.35	40
	2024 Q3 (2024.09~11)	Surface	25.5	8.1	<1.0	32.7	5.8	0.06	0.08	ND	0.083	47.6	0.04	100
		Middle	25.4	8.1	<1.0	32.8	5.8	0.07	0.09	ND	0.104	53.8	0.33	110
		Bottom	25.4	8.1	<1.0	32.8	5.7	0.09	0.09	0.01	0.089	53.0	0.11	25.5
	2024 Q4 (2024.12-2025.02)	Surface	20.8	8.2	<1.0	34.2	6.7	<0.05	<0.05	0.01	0.021	9.0	0.76	<10
		Middle	20.7	8.2	<1.0	34.2	6.7	<0.05	<0.05	0.01	0.027	13.9	0.92	<10
		Bottom	20.5	8.2	<1.0	34.2	6.8	0.07	<0.05	0.01	0.034	9.0	0.90	<10
	2025 Q1 (2024.03-2025.05	Surface	25.9	8.2	<1.0	33.1	6.8	ND	ND	<0.01	0.019	3.4	1.5	<10
		Middle	25.7	8.2	<1.0	33.1	6.9	ND	<0.05	<0.01	<0.015	3.4	1.5	<10
		Bottom	25.4	8.2	<1.0	33.1	6.9	ND	ND	<0.01	0.016	2.4	1.5	<10
Class A Marine Water Quality Standards			—	7.6~8.5	<2.0	—	>5.0	<0.3	—	—	—	—	—	< 1,000

Remark 1: "＜" indicates the value is lower than limit of quantification; "ND" indicates the value is lower than limit of device detection. Remark 2: "*" indicates exceeding the Class A Marine Water Quality Standards.

Remark 3: Due to the slight differences in the spatial distribution of survey points between EIS and environmental monitoring stages, the results of the EIS point ST8 were compared with those of the closer environmental monitoring point S5.

Remark 4: The pH standard for Class A Marine Water Quality is 7.6–8.5, effective from April 25, 2024, as per the standard regulations.

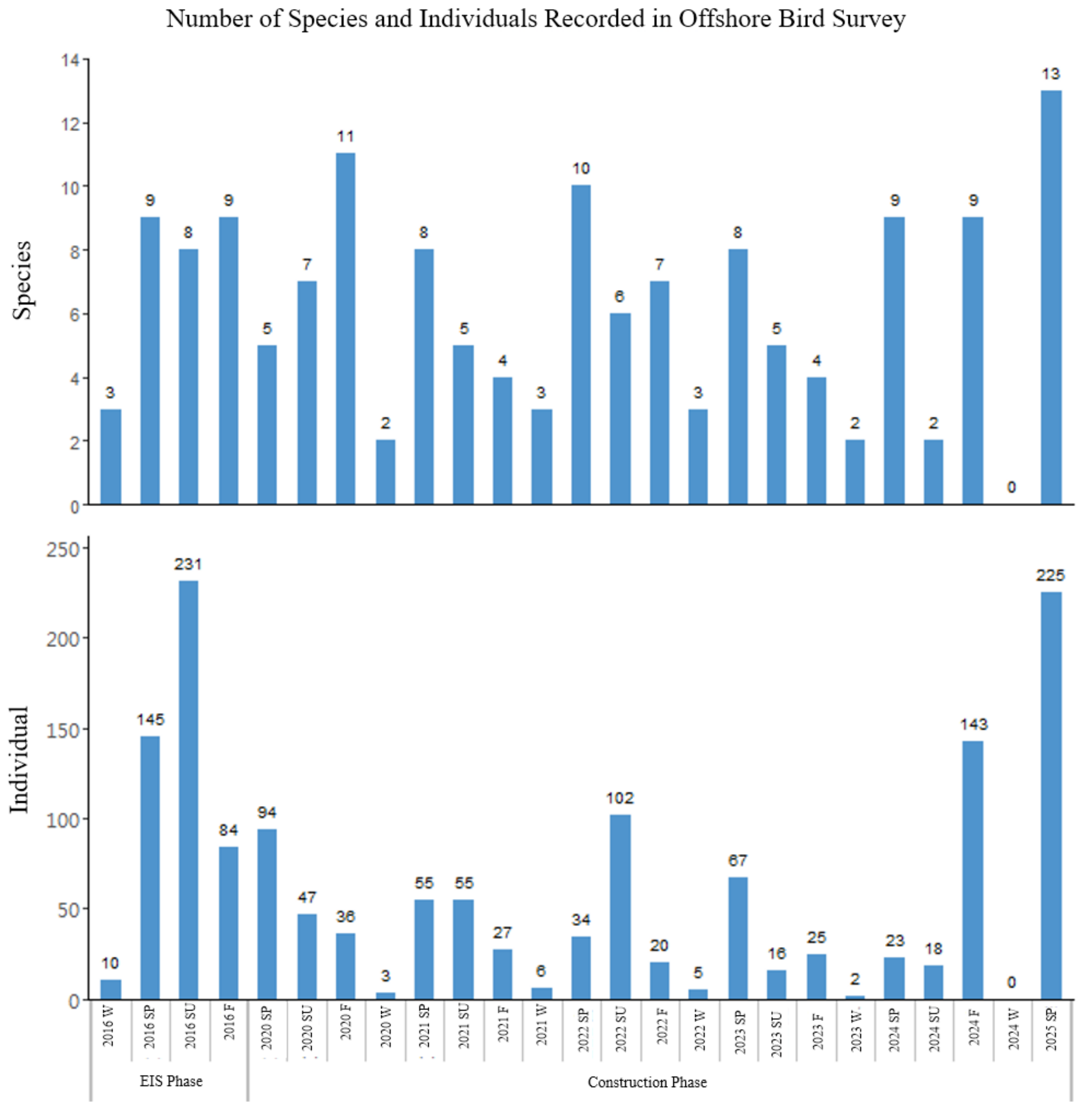
II. Bird Ecology

i. Offshore Bird Ecology

During the same season of the EIA period (March, April, and May of 2016), excluding feral pigeons, a total of 11 bird species across 3 orders and 5 families were recorded. Compared to the same season in the EIA period, several species were not observed this season, including the Red-necked Phalarope (*Phalaropus lobatus*), Pomarine Jaeger *(Stercorarius pomarinus*), Whiskered tern (*Chlidonias hybrida*), and some Bulwer's petrel seabirds. Conversely, this season recorded species not previously noted during the EIA period, such as the Black-tailed Gull *(Larus crassirostris*), European herring gull *(Larus argentatus*), various terns (Sterna spp.), the Great Cormorant (*Phalacrocorax carbo*), and the Eastern cattle egret (*Bubulcus coromandus*). These differences in species composition are attributed to the spring migration season, during which species presence and abundance can fluctuate significantly from day to day.

During the construction and operation monitoring phases of the project, the number of seabird species recorded per season has ranged from 0 to 13, primarily composed of migratory birds. The number of individuals recorded ranged from 0 to 225. In 2020, the highest numbers were recorded in spring; in 2021, the peak was in both spring and summer; in 2022, in summer; in 2023, in spring; and in 2024, in autumn. Due to strong winds and low temperatures across the Taiwan Strait in winter, all years have shown the lowest bird counts during winter. Changes in seabird species numbers and abundance over the years are shown in Figure 3.1.1-3 and Table 3.1.1-2.

Additionally, flocks of feral pigeons—likely racing pigeons—were observed in the winter of 2015, spring of 2016, spring and autumn of 2020, spring of 2021, spring of 2023, and spring of 2025. After excluding feral pigeon data, the number of seabird species recorded in past surveys ranged from 0 to 12 species, with individual counts ranging from 0 to 143. Variations in species number and abundance after excluding feral pigeons are illustrated in Figure 3.1.1-4 and Table 3.1.1-3.



Note: In the EIA and construction stage, 1 survey was carried out in winter, and 3 in spring, summer, and fall.

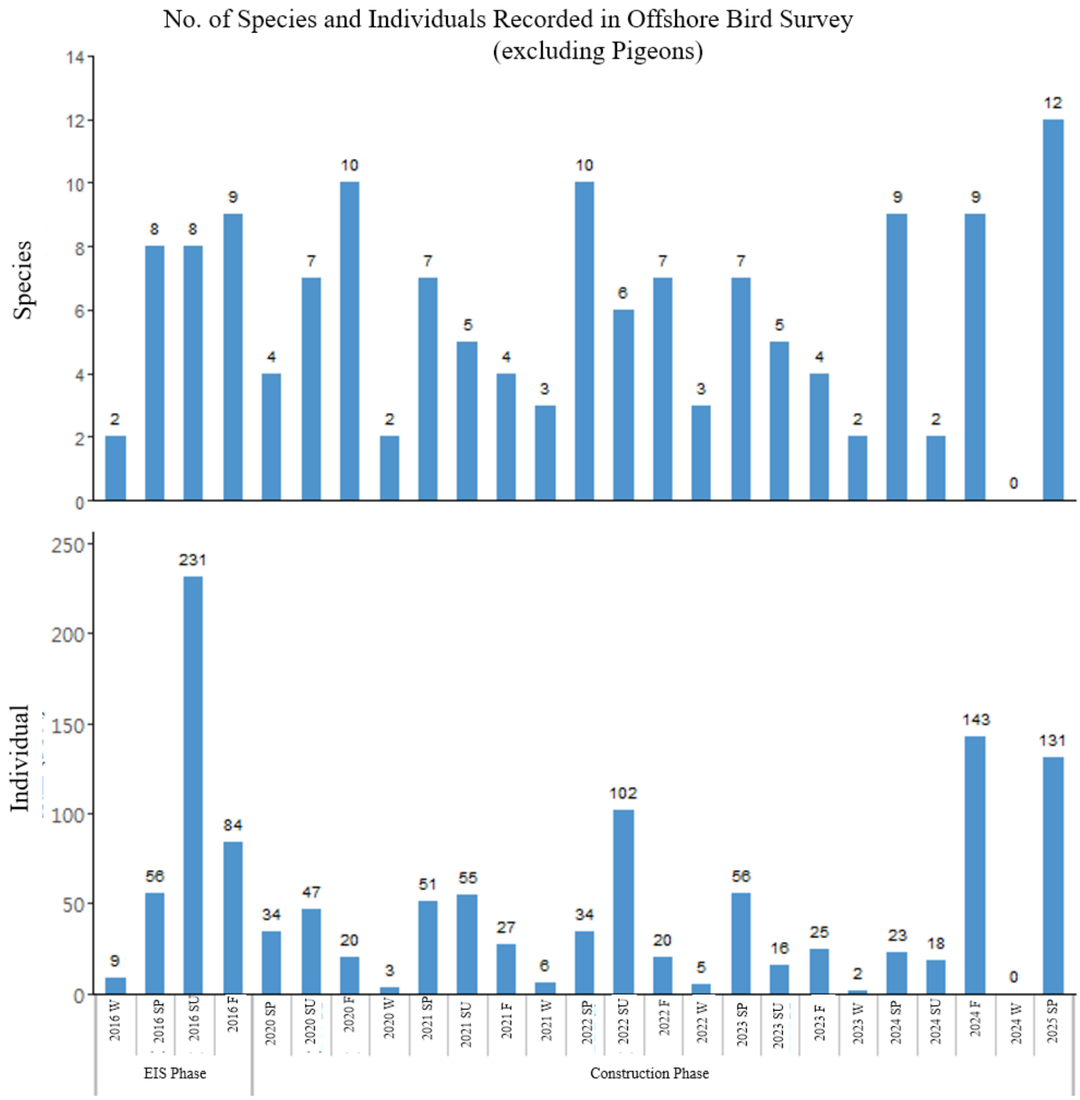
Figure 3.1.1-3 Species and Number of Offshore Birds Recorded

Table 3.1.1-2 Species and Number of Offshore Birds

Quarter		Species	Individual	Density[N]
EIA Phase	2016 Winter	3	10	-
	2016 Spring	9	145	
	2016 Summer	8	231	
	2016 Fall	9	84	
Construction Phase	2020 Spring	5	94	1.033
	2020 Summer	7	47	0.516
	2020 Fall	11	36	0.791
	2020 Winter	2	3	0.099
	2021 Spring	8	55	0.604
	2021 Summer	5	55	0.604
	2021 Fall	4	27	0.297
	2021 Winter	3	6	0.198
	2022 Spring	10	34	0.373
	2022 Summer	6	102	1.120
	2022 Fall	7	20	0.220
	2022 Winter	3	5	0.165
	2023 Spring	8	67	0.736
Construction and Operational Phase	2023 Summer	5	16	0.176
	2023 Fall	4	25	0.275
	2023 Winter	2	2	0.066
	2024 Spring	9	23	0.253
	2024 Summer	2	18	0.198
	2024 Fall	9	143	1.571
	2024 Winter	0	0	0.000
	2025 Spring	13	225	2.472

Note: Offshore bird density is one of the analyses in the construction phase monitoring.

Moreover, during the winters of 2015, springs of 2016, springs and autumns of 2020, spring of 2021, and spring of 2023, groups of rock pigeons, presumed to be racing pigeons, were recorded. After excluding the species and numbers of wild pigeons from the seasonal surveys, the number of coastal bird species ranged from 0 to 10, and the number of individuals ranged from 0 to 143. The variations in the number of coastal bird species and individuals over the years, excluding rock pigeons, are shown in Figure 3.1.1-4 and Table 3.1.1-3.



Note: In the EIS and construction stage, 1 survey was carried out in winter, and 3 in spring, summer, and fall.

Figure 3.1.1-4 Species and Number of Offshore Birds Recorded in the Historical Surveys (Rock Pigeons were Excluded)

Table 3.1.1-3 Species and Number of Offshore Birds (Rock Pigeons Excluded)

Quarter		Species	Individual	Density[N]
EIS Phase	2015 Winter	2	9	-
	2016 Spring	8	56	
	2016 Summer	8	231	
	2016 Fall	9	84	
Construction Phase	2020 Spring	4	34	0.923
	2020 Summer	7	47	0.373
	2020 Fall	10	20	0.527
	2020 Winter	2	3	0.099
	2021 Spring	7	51	0.560
	2021 Summer	5	55	0.604
	2021 Fall	4	27	0.297
	2021 Winter	3	6	0.198
	2022 Spring	10	34	0.373
	2022 Summer	6	102	1.120
	2022 Fall	7	20	0.220
	2022 Winter	3	5	0.165
	2023 Spring	7	56	0.736
Construction and Operation Phase	2023 Summer	5	16	0.176
	2023 Fall	4	25	0.275
	2023 Winter	2	2	0.066
	2024 Spring	9	23	0.253
	2024 Summer	2	18	0.198
	2024 Fall	9	143	1.571
	2024 Winter	0	0	0.000
	2025 Spring	12	131	1.439

Note: Offshore bird density is one of the analyses in the construction phase monitoring.

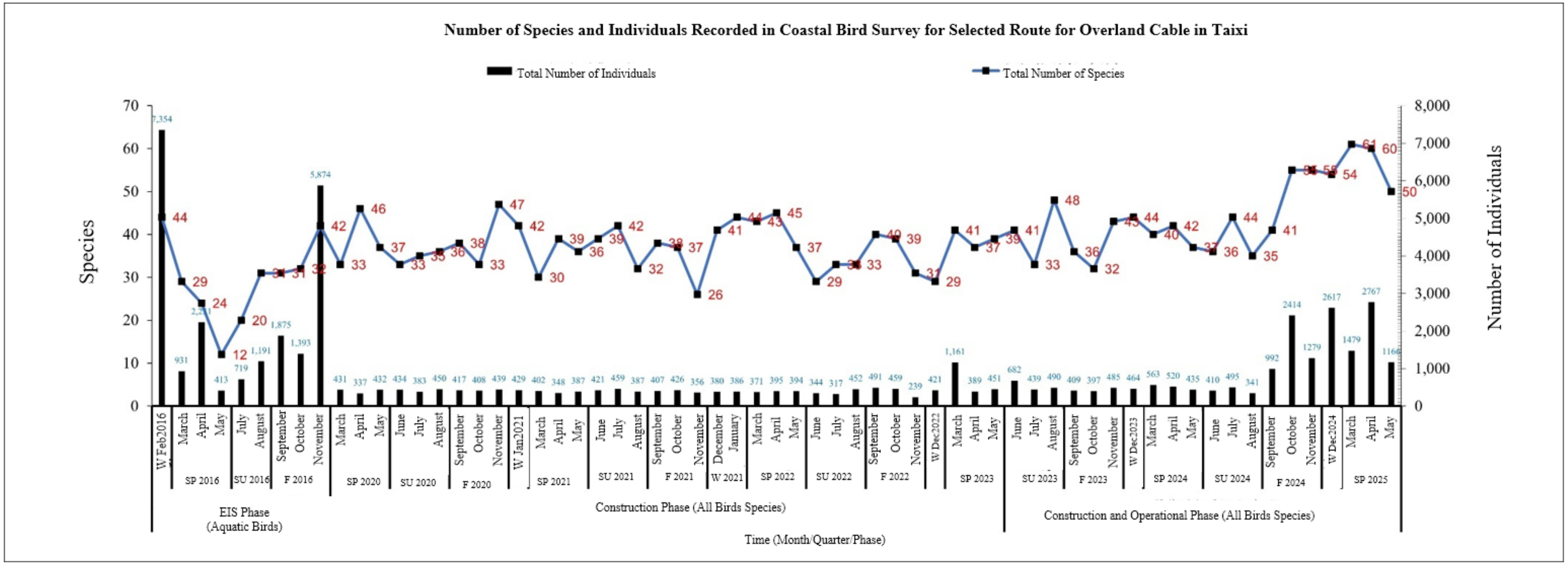
ii. Onshore Bird Ecology

During the EIA period, the submarine cable landfall site had not yet been determined, so surveys were conducted along the broader Yunlin County coastline. This differs significantly from the current environmental monitoring program, which focuses specifically on the designated submarine cable landfall areas. Additionally, the EIA surveys primarily targeted waterbirds, with incidental records of protected terrestrial birds and exotic species. In contrast, the current environmental monitoring program documents all bird species observed.

During the same season of the EIA period (March–May of 2016), a total of 35 species across 7 orders and 2 families were recorded. Compared to the same period, this season newly recorded 78 species including: Northern Shoveler (*Spatula clypeata*), Northern Pintail (*Anas acuta*), Eurasian Teal (*Anas crecca*), Common Pochard (*Aythya ferina*), Tufted Duck (*Aythya fuligula*), Rock Pigeon (*Columba livia*,), Oriental Turtle Dove (*Streptopelia orientalis*), Red Collared Dove (*Streptopelia tranquebarica*), Spotted Dove (*Spilopelia chinensis*), Lesser coucal (*Centropus bengalensis*), House Swift (*Apus nipalensis*), Slaty-breasted rail (*Gallirallus striatus*), Eurasian coot (*Fulica atra*), Pied Avocet (*Recurvirostra avosetta*), Little Ringed Plover (*Charadrius dubius*), Eurasian whimbrel (*Numenius phaeopus*), Great knot (*Calidris tenuirostris*), and many others. Meanwhile, four species previously recorded in the EIA period—Mallard (*Anas platyrhynchos*), Grey Plover (*Pluvialis squatarola*), Broad-billed Sandpiper (*Limicola falcinellus*), and African sacred ibis (*Threskiornis aethiopicus*)—were not observed this season. The main differences in species between periods are largely due to the shift in survey scope and objectives, with the current focus encompassing all bird species, especially terrestrial ones.

During the construction and operation phases of this project, the number of coastal bird species recorded per season ranged from 52 to 108, with individual counts ranging from 1,183 to 15,681. For the designated cable landing site in Taixi (impact zone), monthly species counts ranged from 26 to 61, with individual numbers between 239 and 2,767. For the designated landing site in Sihu, species counts ranged from 24 to 46, with individual numbers from 183 to 1,575. In the non-designated (control) area of Taixi, species counts ranged from 24 to 53, and individual numbers from 225 to 1,864. In the Sihu control zone, species counts ranged from 29 to 52, and numbers from 227 to 1,587.

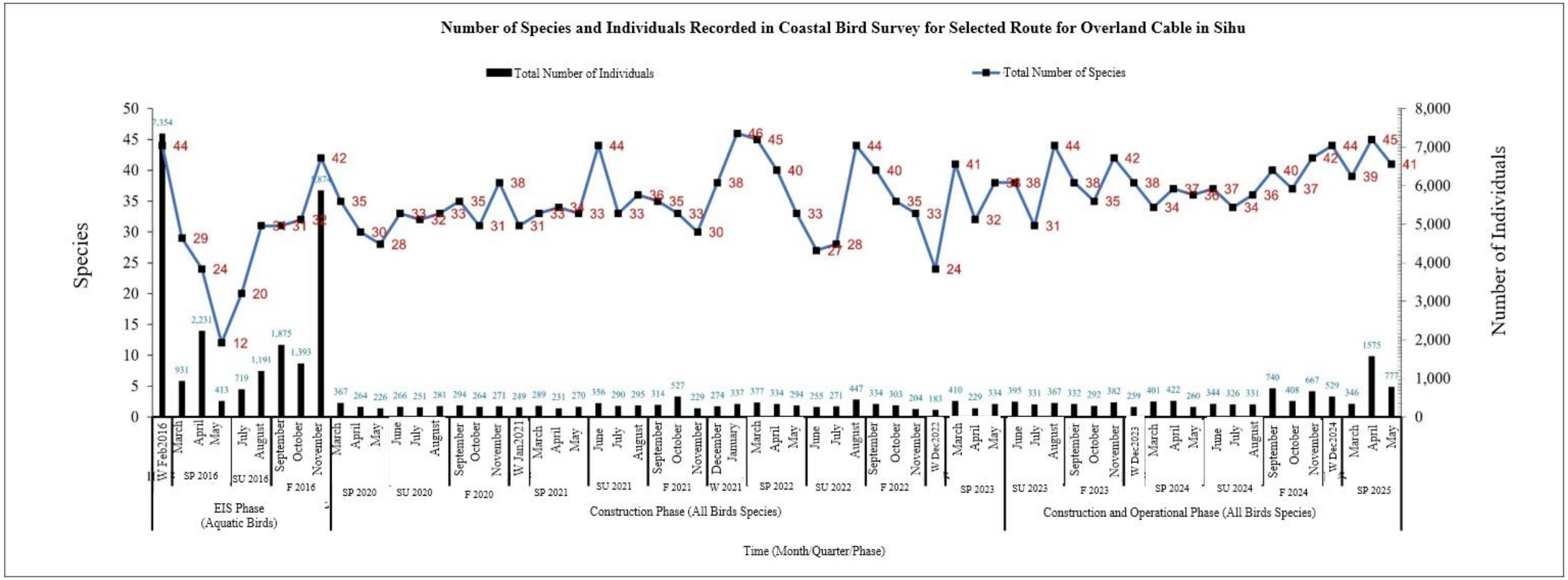
Among all coastal zones, the highest number of birds in the designated Taixi landing area was recorded in April of 2025. After September of 2024, both species richness and abundance in this area generally increased compared to earlier surveys, though no clear seasonal trend was observed in other months. In Sihu's designated landing area, the highest bird count was also in April 2025, but overall seasonal variation was minor. For the Taixi control area, species richness was highest in November and December of 2024, with abundance peaking in November. Post-September 2024 data show an overall increase in species and individuals compared to earlier surveys. In the Sihu control area, species numbers peaked in April and May 2025, while abundance was highest in November 2024. Overall, seasonal differences in the other periods were relatively small. Trends in species numbers and abundance over the years are illustrated in Figure 3.1.1-5 and detailed in Table 3.1.1-4.



Note 1: In the EIS stage (mainly targeting aquatic birds), 1 survey was carried out in winter, 3 in spring, 2 in summer, and 3 in fall. In the construction phase, 3 surveys were carried out respectively in spring, summer and fall; 1 survey was carried out in winter. Selected/non- selected route is not identified in the EIA stage.

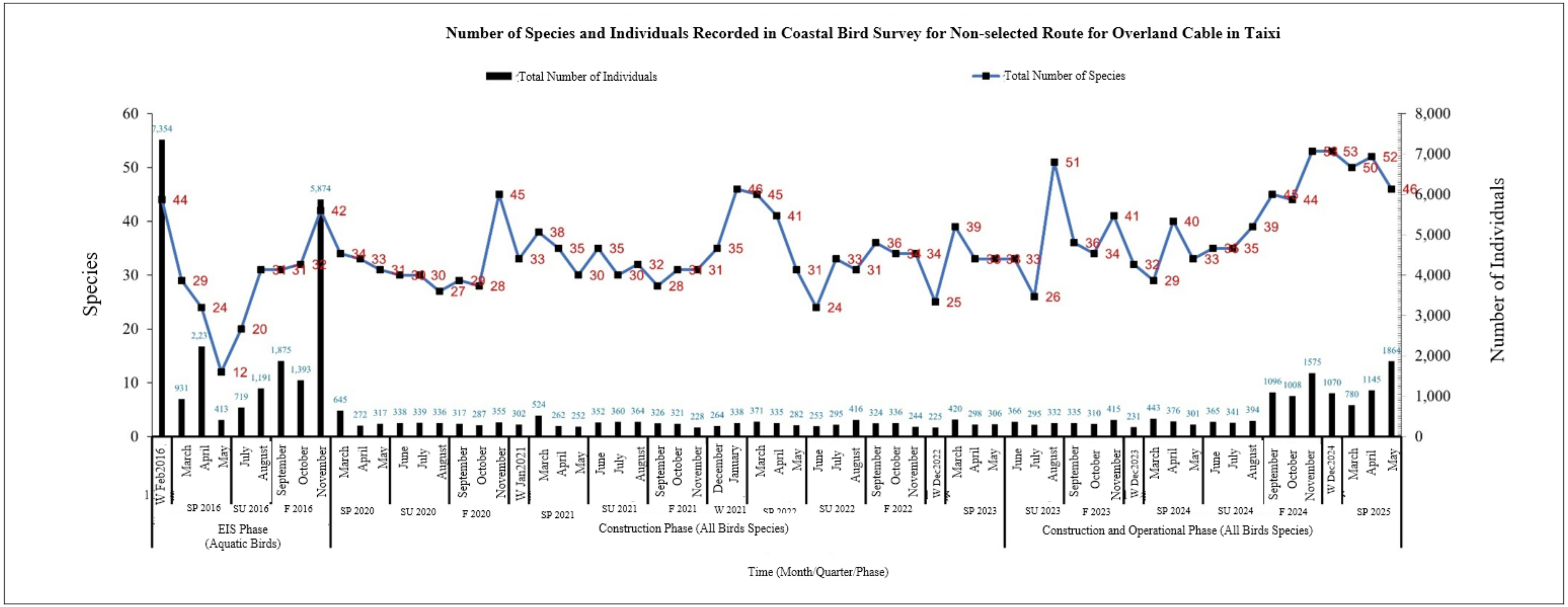
Note 2: SP: spring, SU: summer, F: fall, W: winter.

Figure 3.1.1-5 Species and Number of Coastal Birds Recorded in the Selected Landing Section (Impact Area) in Taixi (1/4)



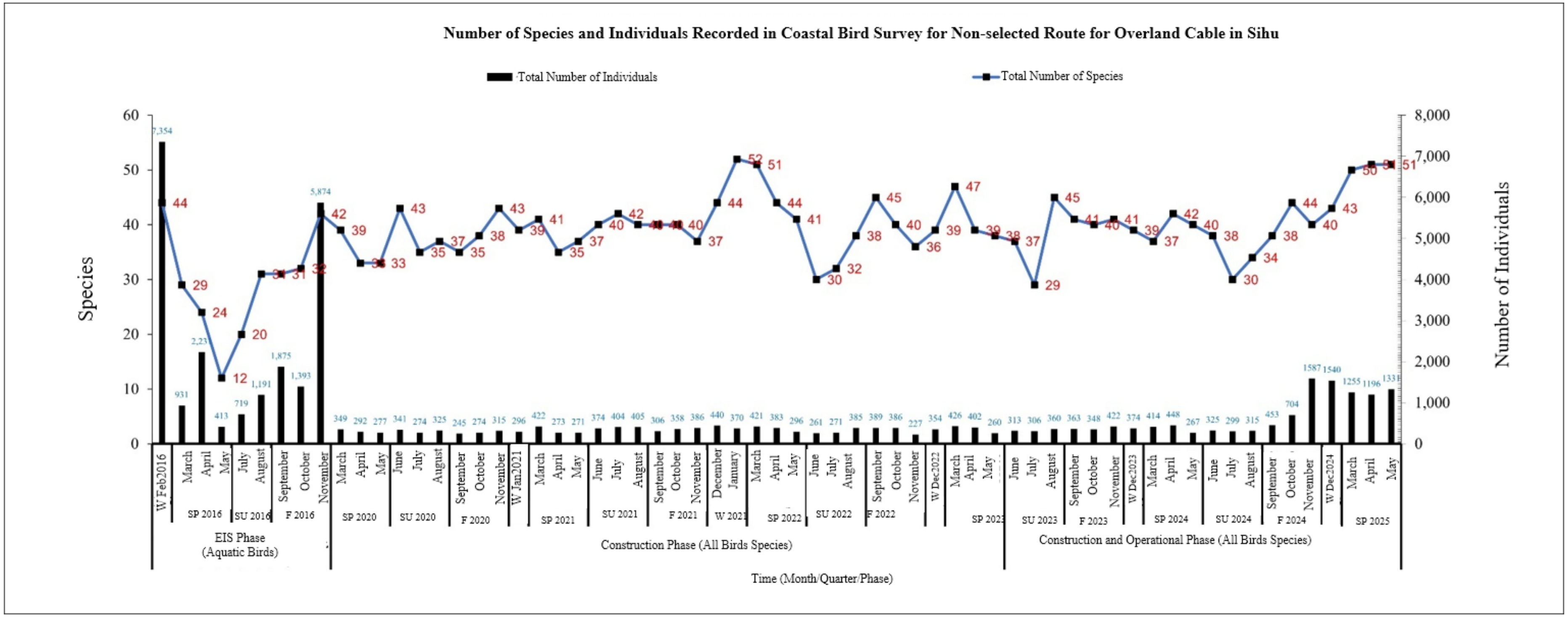
Note 1: In the EIS stage (mainly targeting aquatic birds), 1 survey was carried out in winter, 3 in spring, 2 in summer, and 3 in fall. In the construction phase, 3 surveys were carried out respectively in spring, summer and fall; 1 survey was carried out in winter. Selected/non- selected route is not identified in the EIA stage.
Note 2: SP: spring, SU: summer, F: fall, W: winter.

Figure 3.1.1-5 Species and Number of Coastal Birds Recorded in the Selected Landing Section (Impact Area) in Sihu(2/4)



Note 1: In the EIS stage (mainly targeting aquatic birds), 1 survey was carried out in winter, 3 in spring, 2 in summer, and 3 in fall. In the construction phase, 3 surveys were carried out respectively in spring, summer and fall; 1 survey was carried out in winter. Selected/non- selected route is not identified in the EIA stage.
Note 2: SP: spring, SU: summer, F: fall, W: winter.

Figure 3.1.1-5 Species and Number of Coastal Birds Recorded in the Non-Selected Landing Section (Control Area) in Taixi (3/4)



Note 1: In the EIS stage (mainly targeting aquatic birds), 1 survey was carried out in winter, 3 in spring, 2 in summer, and 3 in fall. In the construction phase, 3 surveys were carried out respectively in spring, summer and fall; 1 survey was carried out in winter. Selected/non- selected route is not identified in the EIA stage.
Note 2: SP: spring, SU: summer, F: fall, W: winter.

Figure 3.1.1-5 Species and Number of Coastal Birds Recorded in the Non-Selected Landing Section (Control Area) in Sihu (4/4)

Table 3.1.1-4 Coastal Bird Count Selected Route Impact Area (1/2)

Survey Quarter			Taixi		Sihu	
			Species Count (#)	Individual Count (#)	Species Count (#)	Individual Count (#)
EIS Phase (Aquatic Birds)	2016 W	201602	44	7,354	44	7,354
	2016 SP	201603	29	931	29	931
		201604	24	2,231	24	2,231
		201605	12	413	12	413
	2016 SU	201607	20	719	20	719
		201608	31	1,191	31	1,191
	2016 F	201609	31	1,875	31	1,875
		201610	32	1,393	32	1,393
		201611	42	5,874	42	5,874
Construction Phase (All Birds Species)	2020 SP	202003	52	799	35	367
		202004	53	605	30	264
		202005	41	649	28	226
	2020 SU	202006	38	700	33	266
		202007	38	634	32	251
		202008	42	731	33	281
	2020 F	202009	38	417	35	294
		202010	33	408	31	264
		202011	47	439	38	271
	2020 W	202101	42	429	31	249
	2021 SP	202103	30	402	33	289
		202104	39	348	34	231
		202105	36	387	33	270
	2021 SU	202106	39	421	44	356
		202107	42	459	33	290
		202108	32	387	36	295
	2021 F	202109	38	407	35	314
		202110	37	426	33	527
		202111	26	356	30	229
	2021 W	202112	41	380	38	274
		202201	44	386	46	337
	2022 SP	202203	43	371	45	377
		202204	45	395	40	334

Survey Quarter			Taixi		Sihu	
			Species Count (#)	Individual Count (#)	Species Count (#)	Individual Count (#)
		202205	37	394	33	294
	2022 SU	202206	29	344	27	255
		202207	33	317	28	271
		202208	33	452	44	447
	2022 F	202209	40	491	40	334
		202210	39	459	35	303
		202211	31	239	33	204
	2022 W	202212	29	421	24	183
	2023 SP	202303	41	1,161	41	410
		202304	37	389	32	229
		202305	39	451	38	334
Construction and Operational Phase	2023 SU	202306	41	682	38	395
		202307	33	439	31	331
		202308	48	490	44	367
	2023 F	202309	36	409	38	332
		202310	32	397	35	292
		202311	43	485	42	382
	2023 W	202312	44	464	38	259
	2024 SP	202403	40	563	34	401
		202404	42	520	37	422
		202405	37	435	36	260
	2024 SU	202406	36	410	37	344
		202407	44	495	34	326
		202408	35	341	36	331
	2024 F	202409	41	992	40	740
		202410	55	2414	37	408
		202411	55	1279	42	667
	2024 W	202412	54	2,617	44	529
	2025 SP	202503	61	1,479	39	346
		202504	60	2,767	45	1,575
		202505	50	1,166	41	777

Table 3.1.1-4 Coastal Bird Count Non-Selected Route Control Area (2/2)

Survey Quarter			Taixi		Sihu	
			Species Count (#)	Individual Count (#)	Species Count (#)	Individual Count (#)
EIS Phase (Aquatic birds)	2016 W	201602	44	7,354	44	7,354
	2016 SP	201603	29	931	29	931
		201604	24	2,231	24	2,231
		201605	12	413	12	413
	2016 SU	201607	20	719	20	719
		201608	31	1,191	31	1,191
	2016 F	201609	31	1,875	31	1,875
		201610	32	1,393	32	1,393
		201611	42	5,874	42	5,874
Construction Phase (All Birds Species)	2020 SP	202003	34	645	39	349
		202004	33	272	33	292
		202005	31	317	33	277
	2020 SU	202006	30	338	43	341
		202007	30	339	35	274
		202008	27	336	37	325
	2020 F	202009	29	317	35	245
		202010	28	287	38	274
		202011	45	355	43	315
	2020 W	202101	33	302	39	296
	2021 SP	202103	38	524	41	422
		202104	35	262	35	273
		202105	30	252	37	271
	2021 SU	202106	35	352	40	374
		202107	30	360	42	404
		202108	32	364	40	405
	2021 F	202109	28	326	40	306
		202110	31	321	40	358
		202111	31	228	37	386
	2021 W	202112	35	264	44	440
		202201	46	338	52	370
	2022	202203	45	371	51	421

Survey Quarter			Taixi		Sihu	
			Species Count (#)	Individual Count (#)	Species Count (#)	Individual Count (#)
	SP	202204	41	335	44	383
		202205	31	282	41	296
	2022 SU	202206	24	253	30	261
		202207	33	295	32	271
		202208	31	416	38	385
	2022 F	202209	36	324	45	389
		202210	34	336	40	386
		202211	34	244	36	227
	2022 W	202212	25	225	39	354
	2023 SP	202303	39	420	47	426
		202304	33	298	39	402
		202305	33	306	38	260
Construction and Operational Phase (All Birds Species)	2023 SU	202306	33	366	37	313
		202307	26	295	29	306
		202308	51	332	45	360
	2023 F	202309	36	335	41	363
		202310	34	310	40	348
		202311	41	415	41	422
	2023 W	202312	32	231	39	374
	2024 SP	202403	29	443	37	414
		202404	40	376	42	448
		202405	33	301	40	267
	2024 SU	202406	35	365	38	325
		202407	35	341	30	299
		202408	39	394	34	315
	2024 F	202409	45	1096	38	453
		202410	44	1008	44	704
		202411	53	1575	40	1587
	2024 W	202412	53	1070	43	1540
	2025 SP	202503	50	780	50	1,255
		202504	52	1,145	51	1,196
		202505	46	1,864	51	1,331

This area comprises coastal intertidal zones, fishponds, farmlands, grassy wetlands, and windbreak forests. In particular, fishponds—due to fishery management practices such as pond drying (see Photos 1–4)—and farmlands—due to agricultural activities like plowing—can temporarily attract large congregations of birds. In addition to inland fishponds and bare ground that offer roosting sites for waterbirds during high tide, the intertidal flats in this region are not entirely submerged at high tide, leaving elevated tidal flats seaward of the levee available for bird roosting (see Photos 5–8). Since September 2024, surveys have recorded an increase in both species richness and bird abundance compared to previous seasons. This upward trend may be attributed to differences in survey teams, the extent of human disturbance during survey periods, or seasonal variations. Given the high proportion of fishpond and intertidal habitats and the irregular occurrence of anthropogenic disturbances (e.g., pond drying, land preparation), combined with the inherently strong seasonality of bird populations—such as distinct peaks in migratory activity during spring and autumn—the number of species and individuals in this area is expected to fluctuate seasonally. For instance, during spring surveys, wintering species such as the Kentish Plover (*Charadrius alexandrinus*) and Dunlin (*Calidris alpina*) are mostly absent, while passage migrants such as Curlew Sandpipers (*Calidris ferruginea*) and Dunlins appear in large but brief waves. Spring also marks the beginning of the seasonal aggregation of Little Terns (*Sternula albifrons*) and Crested Terns (Thalasseus spp.,) on the elevated tidal flats beyond the seawall, as illustrated in Figure 3.1.1-6.

	
Photo 1. Drained fishpond and flock of waterbirds at the selected cable landing area in Taixi	Photo 2. Drained fishpond and flock of waterbirds at the selected cable landing area in Taixi
	
Photo 3. Drained fishpond and flock of waterbirds at the selected cable landing area in Sihu	Photo 4. Drained fishpond and flock of waterbirds at the selected cable landing area in Sihu
	
Photo 5. Elevated tidal flat outside the seawall with a flock of Little Terns (*Sternula albifrons*)	Photo 6. Elevated tidal flat outside the seawall with a flock of Crested Terns (Thalasseus spp.)
	
Photo 7. Unsubmerged tidal flat outside the seawall with a flock of waterbirds	Photo 8. Unsubmerged tidal flat outside the seawall with foraging Great Egrets *(Ardea alba*)

Figure 3.1.1-6 Coastal Bird Habitat Utilization

iii. Difference in Coastal Birds and Offshore Birds

Based on the monitoring results from the offshore construction and operation phases (March 2020 to May 2025, 21 quarter seasons), a cumulative total of 148 coastal bird species from 14 orders and 43 families, and 30 offshore bird species from 6 orders and 11 families (excluding rock pigeons) were recorded. The summary is as follows:

1. Coastal Birds

   The survey route covers fish ponds, farmlands, grasslands and forests that shelter a variety of non-water bird species. Therefore, besides waterbirds, a significant number of Passerine birds were also recorded.

2. Bird Species Only Documented in the Offshore Surveys

   No bird species were recorded offshore this season. In this quarter season, three species—Bridled tern (*Onychoprion anaethetus*), Black-tailed Gull (Larus crassirostris), and terns Sternidae sp. (unspecified)—were recorded exclusively at sea.

3. Bird Species Documented in Both Coastal and Offshore Surveys

   No bird species were recorded offshore this season. A total of 7 species—Lesser Black-backed Gull (*Larus fuscus*), Barn Swallow (*Hirundo rustica*), Rock Pigeon (*Columba livia*), Cattle Egret (*Bubulcus ibis*), Herring Gull *(Larus argentatus*), Crested Tern (Thalasseus spp.), and Great Cormorant (*Phalacrocorax carbo*)—were observed in both coastal and offshore surveys, suggesting these species may transit across or utilize the wind farm area.

III. Marine Ecology

During the EIA phase, the location for the offshore cable landing site was not yet determined. Therefore, the intertidal zone survey points were widely distributed along the coast of Yunlin County. This differs from the current environmental monitoring plan, which specifies monitoring locations within a 50-meter range on both sides of the offshore cable landing section. During the EIA, there were 12 sampling stations for the marine ecosystem survey. However, as the wind farm boundaries were adjusted during the EIA review period, the original sampling station locations no longer met the principle of uniform sampling within the final approved wind farm area. Therefore, the marine ecosystem monitoring points were replanned according to the environmental monitoring plan, and 5 new sampling stations were established, with their locations matching those of the marine water quality monitoring stations (as shown in Figure 3.1.1-1). Consequently, the results of marine ecology survey can only be compared with the EIA period's sampling results at similar locations. Therefore, results from successive marine ecological monitoring efforts can only be compared with sampling results from survey stations that are geographically close to those from the EIA period.

i. Intertidal Ecology

The intertidal zone benthic fauna survey data for this season recorded a total of 648 individuals from 43 species across 31 families and 21orders. Overall biomass was relatively low, with mollusks and crustaceans comprising the majority of the benthic community. The dominant species was *Amphibalanus reticulatus* (Family: Balanidae), with 278 individuals recorded. Comparing data from the same season during the five previous years of the construction period: 33 species from 19 families and 11 orders were recorded in 2020, 28 species from 15 families and 8 orders in 2021, 27 species from 17 families and 9 orders in 2022, 26 species from 18 families and 10 orders in 2023, and 29 species from 18 families and 11 orders in 2024. In each of these surveys, the dominant species was consistently *Amphibalanus amphitrite* (Family: Balanidae), an encrusting barnacle, indicating that sessile species in the Balanidae family have remained dominant in the local environment during the same seasonal period.

Economically valuable mollusks recorded this season include *Crassostrea angulata* (Family: Ostreidae), *Tegillarca granosa* (Family: Arcidae), and several large species of the Family: Veneridae such as *Meretrix taiwanica*, *Gomphina veneriformis*, *Ruditapes variegata*, and *Cyclina sinensis*. Some edible but less economically valuable mollusks were also recorded, including *Sepia esculenta* (Family: Loliginidae), *Nerita albicilla* (Family: Nassariidae), *Perna viridis* and *Mytilus edulis* (Order: Mytilida), *Batillaria zonalis* (Family: Potamididae), *Natica lineata* (Family: Babyloniidae), *Thais clavigera* (Family: Muricidae), and *Monodonta labio* (Family: Trochidae). However, due to their unstable yield, low meat content, or low market popularity, these species are of limited commercial interest. In particular, Babylonia lutosa has been reported in literature to contain tetrodotoxin in the visceral mass of some individuals, making it unsuitable for consumption. Most of the mollusk specimens found in this survey area were shell remains, suggesting that economically valuable species are not resident in this zone.

Crustacean species recorded this season in the intertidal survey included members of the families: Diogenidae, Ocypodidae, Macrophthalmidae, Matutidae, Ocypode, and Grapsidae. None of these are considered economically valuable or high-value ornamental species. Other invertebrates recorded, such as *Amphibalanus amphitrite*, *Amphibalanus reticulatus*, and members of the family Lepadidae, also lack significant economic or ornamental value. As for fish, only a single beached specimen of *Triacanthus biaculeatus* (Family: Triacanthodidae) was recorded, representing a low occurrence. In conclusion, if water quality degradation and large-scale geomorphological changes caused by construction activities can be effectively mitigated, impacts on nearshore fisheries or aquaculture operations are expected to be minimal. Trends in species richness and abundance of intertidal benthic organisms over the years are illustrated in Figure 3.1.1-7 and summarized in Table 3.1.1-5.

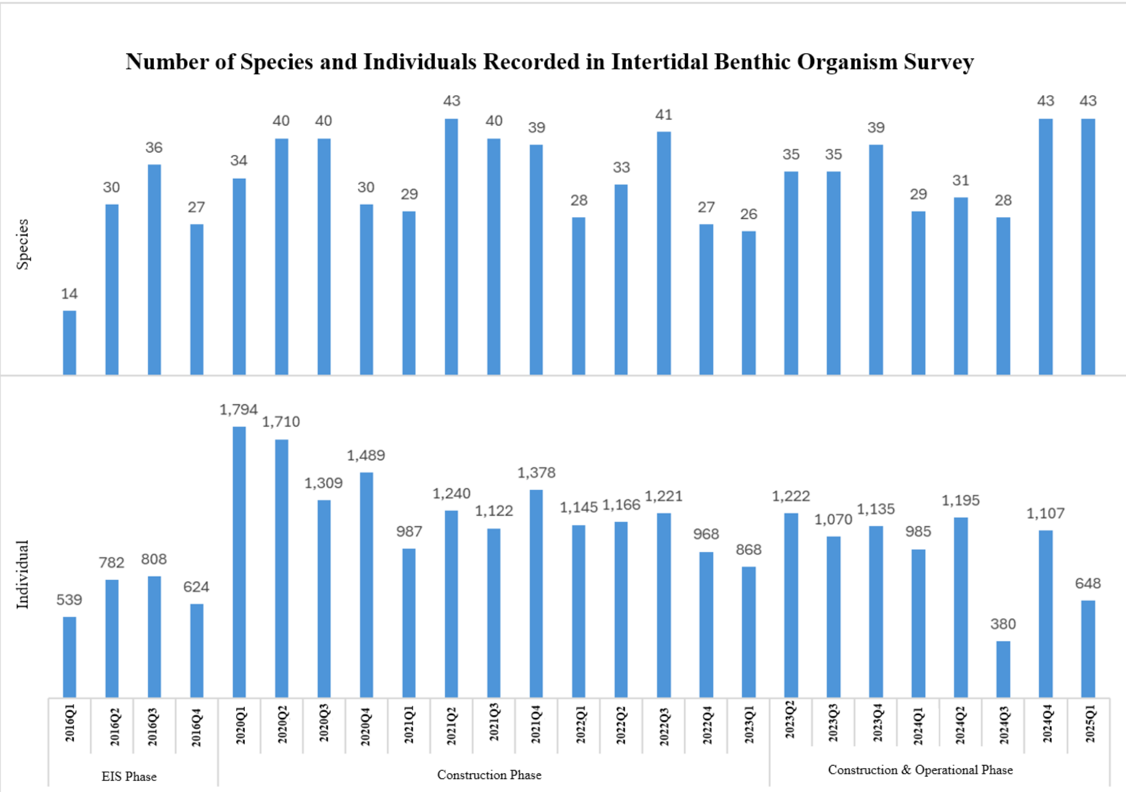


Figure 3.1.1-7 Species and Number of Intertidal Ecology Recorded in the Historical Surveys

Table 3.1.1-5 Species and Number of Intertidal Benthic Organism

Survey Quarter		Species	Number
EIA Phase	2016 Q1	14	539
	2016 Q2	30	782
	2016 Q3	36	808
	2016 Q4	27	624
Construction Phase	2020 Q1	34	1,794
	2020 Q2	40	1,710
	2020 Q3	40	1,309
	2020 Q4	30	1,489
	2021 Q1	29	987
	2021 Q2	43	1,240
	2021 Q3	40	1,122
	2021 Q4	39	1,378
	2022 Q1	28	1,145
	2022 Q2	33	1,166
	2022 Q3	41	1,221
	2022 Q4	27	968
	2023 Q1	25	847
Construction & Operational Phase	2023 Q2	35	1,222
	2023 Q3	35	1,070
	2023 Q4	39	1,135
	2024 Q1	29	985
	2024 Q2	31	1,195
	2024 Q3	28	380
	2024 Q4	28	949
	2025 Q1	43	648

ii. Phytoplankton

During the same season of the EIA period (March 2016), a total of 56 species from 44 genera across 5 phyla of marine phytoplankton were recorded. The abundance in various stations and water layers ranged from 14,917 to 59,760 Cells/L. The dominant species at the time were *Skeletonema costatum* (形圓篩藻, Family: Skeletonemataceae), Ceratium furca (角刺藻, Family: Ceratiaceae), and Rhizosolenia styliformis (菱形藻, Family: Rhizosoleniaceae).

In contrast, the current season's survey recorded 151 species from 54 genera across 4 phyla, with station-wise and water-layer abundance ranging from 30,900 to 166,800 Cells/L—higher than that recorded during the EIA period in both abundance and species richness. The dominant species also changed, now including Chaetoceros lorenzianus (骨條藻, Family: Chaetocerotaceae), Thalassiosira transparenta (透明海鏈藻, Family: Thalassiosiraceae), Ceratium tripos (旋鏈角刺藻, Family: Ceratiaceae), and Ceratium fusus (聚生角刺藻, Family: Ceratiaceae), indicating a shift in dominant taxa compared to the baseline.

During the construction and operation phases of this offshore wind farm project, the recorded phytoplankton species numbers ranged from 84 to 192, with abundances from 62,108 to 1,814,240 Cells/L. Species richness peaked in Q4 of 2022, while the lowest was observed in Q4 of 2021. The highest abundance occurred in Q1 of 2024, and the lowest in Q3 of 2020.

Being located in a subtropical region, the marine phytoplankton community is influenced by various environmental factors such as seasonality, ocean currents, and precipitation, leading to substantial variability in species composition and abundance. The results from this season remain within the range of historical fluctuations, with no indications of impacts from construction activities. Trends in major phytoplankton groups and their abundance over the years are shown in Figure 3.1.1-8 and summarized in Table 3.1.1-6.

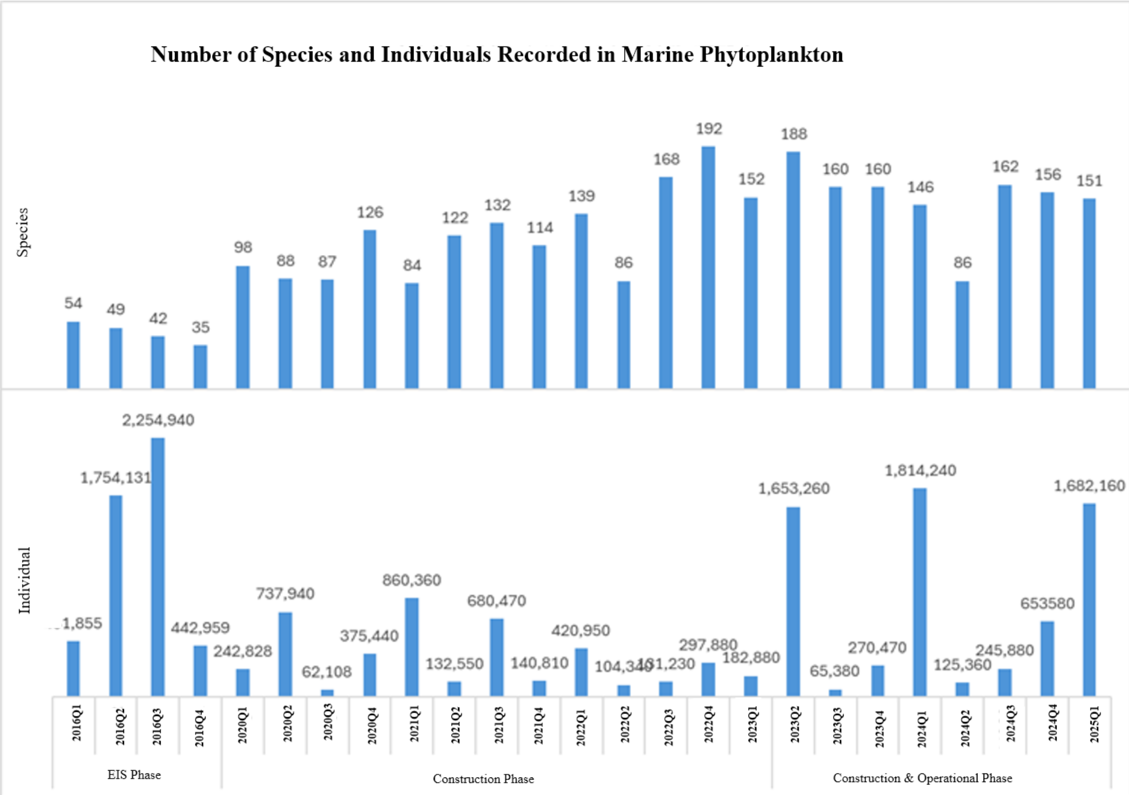


Figure 3.1.1-8 Species and Number of Phytoplankton Recorded in the Historical Surveys

Table 3.1.1-6 Species and Number of Phytoplankton in the Marine Area

Survey Quarter		Species	Number
EIA Phase	2016 Q1	54	481,855
	2016 Q2	49	1,754,131
	2016 Q3	42	2,254,940
	2016 Q4	35	442,959
Construction Phase	2020 Q1	98	242,828
	2020 Q2	88	737,940
	2020 Q3	87	62,108
	2020 Q4	126	375,440
	2021 Q1	84	860,360
	2021 Q2	122	132,550
	2021 Q3	132	680,470
	2021 Q4	114	140,810
	2022 Q1	139	420,950
	2022 Q2	86	104,340
	2022 Q3	168	131,230
	2022 Q4	192	297,880
	2023 Q1	152	182,880
Construction & Operation Phase	2023 Q2	188	1,653,260
	2023 Q3	160	65,380
	2023 Q4	160	270,470
	2024 Q1	146	1,814,240
	2024 Q2	86	125,360
	2024 Q3	162	245,880
	2024 Q4	156	653,580
	2025Q1	151	1,682,160

iii. Zooplankton

During the construction and operation phases of this project, the number of zooplankton taxa recorded in the offshore survey area has ranged from 12 to 36 major groups, with abundances between 130,645 and 12,920,105 inds./1,000 m^3.

Compared with the same season during the EIA period, this season's survey newly recorded four groups: other cnidarian larvae, euphausiids, phoronid larvae, and thaliaceans. Three groups recorded during the EIA period were not observed this season: cladocerans, cyclopoid copepods, and other mollusks. In both seasons, calanoid copepods were the dominant group.

The highest abundance during the monitoring period was recorded in Q2 of 2020, while the lowest was recorded in Q3 of 2023. Trends in major zooplankton groups and their abundance over the years are shown in Figure 3.1.1-9 and summarized in Table 3.1.1-7.

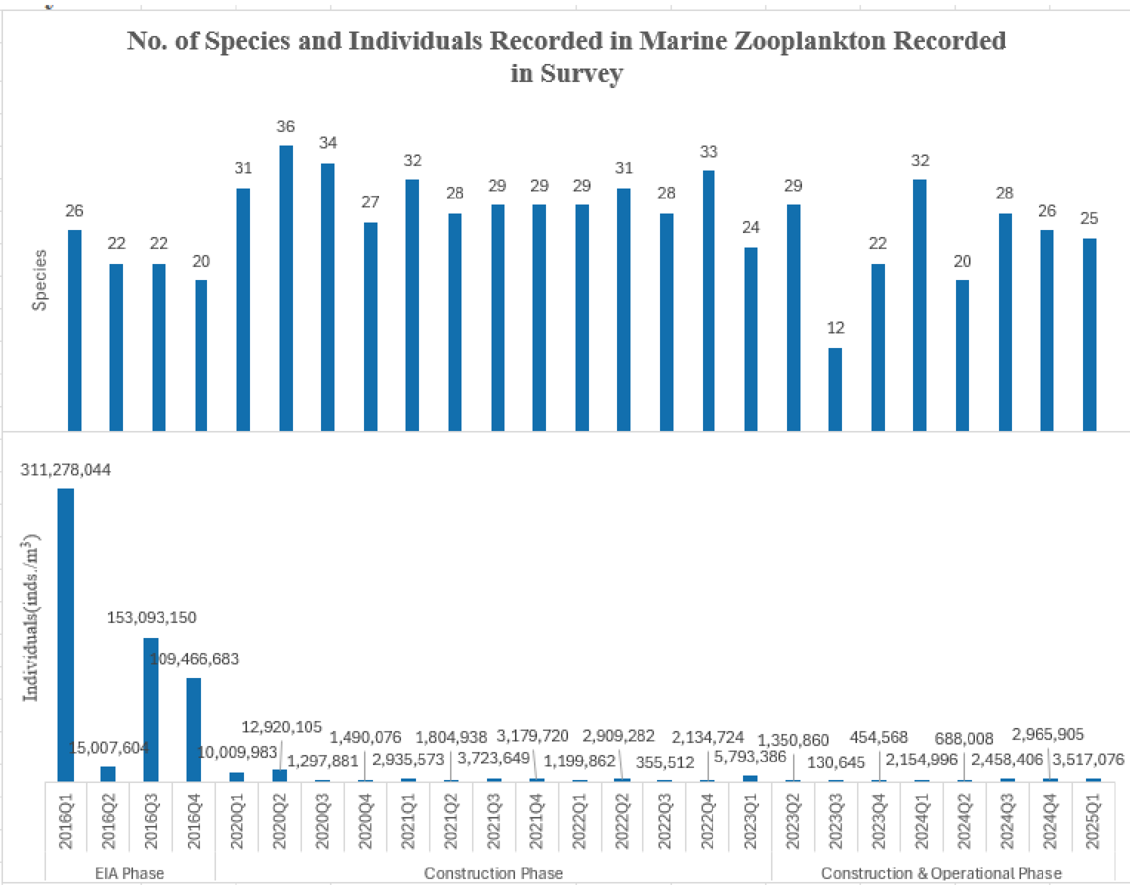


Figure 3.1.1-9 Species and Number of Zooplankton Recorded in Historical Surveys

Table 3.1.1-7 Species and Number of Zooplankton in the Marine Area

Survey Season		Species Count (Groups)	Abundance (Inds./1,000m^3)
EIA Phase	2016 Q1	26	311,278,044
	2016 Q2	22	15,007,604
	2016 Q3	22	153,093,150
	2016 Q4	20	109,466,683
Construction Phase	2020 Q1	31	10,009,983
	2020 Q2	36	12,920,105
	2020 Q3	34	1,297,881
	2020 Q4	27	1,490,076
	2021 Q1	32	2,935,573
	2021 Q2	28	1,804,938
	2021 Q3	29	3,723,649
	2021 Q4	29	3,179,720
	2022 Q1	29	1,199,862
	2022 Q2	31	2,909,282
	2022 Q3	28	355,512
	2022 Q4	33	2,134,724
	2023 Q1	24	5,793,386
Construction & Operational Phase	2023 Q2	29	1,350,860
	2023 Q3	12	130,645
	2023 Q4	22	454,568
	2024 Q1	32	2,154,996
	2024 Q2	20	688,008
	2024 Q3	28	2,458,406
	2024Q4	26	2,965,905
	2025Q1	25	3,517,076

iv. Benthic Organism in the Marine Fauna

During the same season of the EIA period (March 2016), the benthic organisms survey recorded 44 individuals, comprising 10 species from 10 families and 7 orders. In the early years of the construction period, the same season surveys conducted in April 2022, April 2023, and April 2024 using a rectangular dredge recorded 23 individuals (8 species, 7 families, 2 orders), 40 individuals (11 species, 9 families, 4 orders), and 52 individuals (10 species, 9 families, 6 orders), respectively.

This season's survey recorded 54 individuals, comprising 13 species from 10 families and 7 orders. Although both abundance and species richness increased markedly, it is possible that sampling sites located near shallow seabed channels caused disturbance during dredging, bringing up shell remains buried in the sediment along with live organisms. This may explain the substantial differences from previous results, indicating the need for continued monitoring to determine whether construction activities significantly affect local benthic species composition and abundance.

A comparison with last year's results shows that only species from the family Veneridae and the family Diogenidae were consistently recorded in both surveys, while species from the family Tellinidae were absent only in the 2023 same season survey but otherwise present in recent years. Most other recorded species were inconsistent with earlier surveys. In addition, the survey found that the majority of specimens were shell remains, with only a few slow-moving organisms observed crawling along the seabed.

In the previous three years same-season surveys, the dominant species were *Parapenaeus fissurus* (Family: Penaeidae), Tellinidae sp., and Mysidacea sp. In this season, the most dominant live species was *Nassarius livescens* (Family: Nassariidae), while the most dominant dead shell remains were from *Moerella rutila* (Family: Tellinidae).

No protected species were recorded in the subtidal benthic zone during this season's survey. Trends in benthic species richness and abundance over the years are presented in Figure 3.1.1-10 and summarized in Table 3.1.1-8.

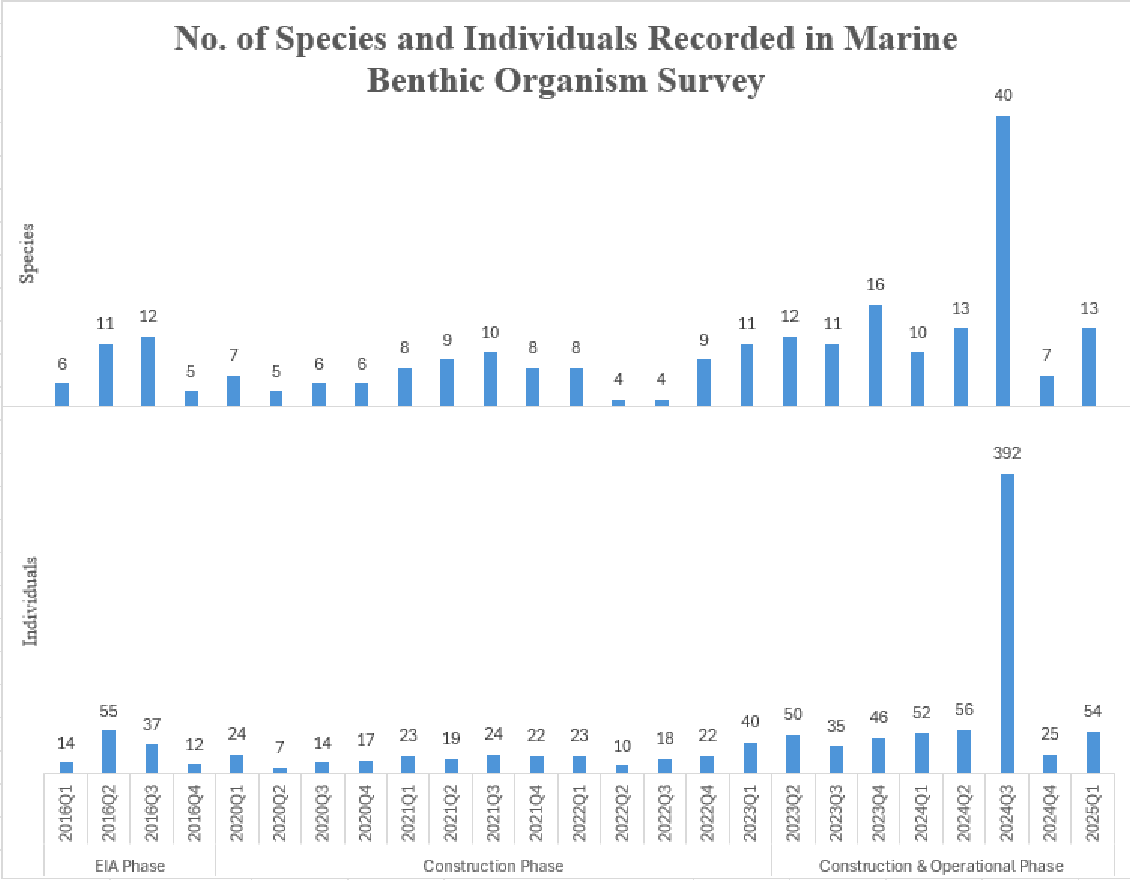


Figure 3.1.1-10 Species and Number of Benthic Organism Recorded in the Historical Surveys

Table 3.1.1-8 Species and Number of Benthic Organism in the Marine Area

Quarter Survey		Species	Number
EIA Phase	2016 Q1	6	14
	2016 Q2	11	55
	2016 Q3	12	37
	2016 Q4	5	12
Construction Phase	2020 Q1	7	24
	2020 Q2	5	7
	2020 Q3	6	14
	2020 Q4	6	17
	2021 Q1	8	23
	2021 Q2	9	19
	2021 Q3	10	24
	2021 Q4	8	22
	2022 Q1	8	23
	2022 Q2	4	10
	2022 Q3	4	18
	2022 Q4	9	22
	2023 Q1	11	40
Construction & Operational Phase	2023 Q2	12	50
	2023 Q3	11	35
	2023 Q4	16	46
	2024 Q1	10	52
	2024 Q2	13	56
	2024 Q3	40	392
	2024 Q4	23	211
	2025 Q1	13	54

v. Fish

1. Adult Fish

During the EIA period and the subsequent monitoring period, the positions of sampling stations differed in order to avoid the designated “Indo-Pacific Humpback Dolphin Important Wildlife Habitat” (as shown in Figure 3.1.1-11). In addition, due to safety distance requirements between survey vessels, construction vessels, and turbine foundations during the offshore wind farm construction, both the length of the nets and the net soaking time were modified—from a net length of 1,200 m and a soaking time of 3 hours during the EIA period to a net length of 300 m and a soaking time of 1 hour during the construction period. Water depths at deployment also changed: in 2016, stations T1, T2, and T3 had depths of 19 m, 18 m, and 23 m respectively, whereas in 2020, depths were 18 m, 22 m, and 15 m, respectively. These differences in sampling conditions contributed to variations in results between the EIA and construction phases.

Compared to the same season in previous years, aside from the 225 fish caught in 2016 before the changes in net specifications and soaking time, seasonal catches between 2020 and 2025 ranged from 7 to 58 individuals, with this season recording the lowest number of individuals. In terms of species richness, winter catches since 2016 have ranged from 4 to 15 species, with this season’s total of 4 species representing the lowest on record. One species, the Saddle grunt (*Pomadasys maculatus*), was newly recorded for this season compared to the same season in previous years. In contrast, species such as the Spotted sea catfish (*Arius maculatus*), the Croaker (*Johnius distinctus*), and the Big-head pennah croaker (*Pennahia macrocephalus*), which were previously common during the same season, were not recorded this time. Species caught this season that have been regularly recorded in most seasons include the Bluespotted stingray (*Neotrygon kuhlii*) and the Fourfinger Threadfin (*Eleutheronema tetradactylum*).

Overall, the species recorded this season are all common along Taiwan’s west coast and include several of high economic value. Long-term monitoring results have not indicated any clear impact from wind farm construction. Continued observation is necessary to determine whether wind farm construction and operation will affect this area in the future.

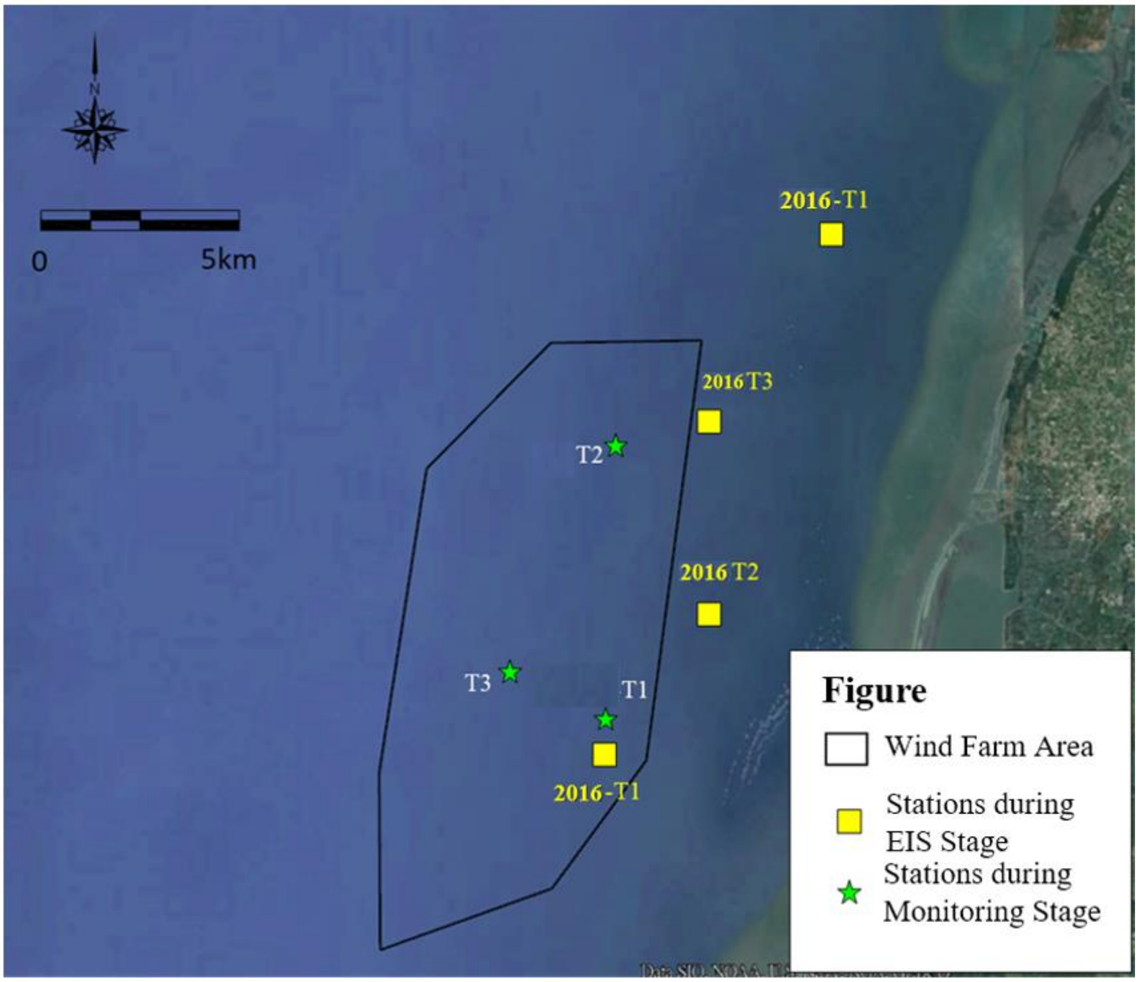


Figure 3.1.1-11 Sampling Stations of Fish Survey in the EIS stage and the Construction phase

Table 3.1.1-9 Historical Surveys on Adult Fish (Spring Season) (1/2)

Year			2016	2020	2021	2022	2023	2024	2025
Sampling Date			2016.3.4	2020.5.7	2021.3.11	2022.3.10	2023.3.9	2024.3.16	2025.3.24
Family Name	Scientific Name	Chinese Name	No.	No.	No.	No.	No.	No.	No.
Hemiscylliidae	*Chiloscyllium plagiosum*	條紋狗鯊					1		
Carcharhinidae	*Scoliodon laticaudus*	寬尾斜齒鯊		1					
Narcinidae	*Narcine lingula*	舌形雙鰭電鱝				1			
Rhynchobatidae	*Rhynchobatus immaculatus*	無斑龍紋鱝					1		
Rhinobatidae	*Rhinobatos hynnicephalus*	斑紋琵琶鱝		2					
Rhinobatidae	*Rhinobatos schlegelii*	薛氏琵琶鱝					1		
Platyrhinidae	*Platyrhina tangi*	湯氏黃點鯆		2			3		
Dasyatidae	*Hemitrygon bennettii*	黃魟				1			
Dasyatidae	*Neotrygon kuhlii*	古氏新魟		3			2		4
Dasyatidae	*Telatrygon zugei*	尖嘴魟		3					
Pristigasteridae	*Ilisha elongata*	長鰳	1						
Pristigasteridae	*Ilisha melastoma*	黑口鰳		1		1		5	
Engraulidae	*Thryssa hamiltonii*	漢氏稜鯷				20		1	
Clupeidae	*Nematalosa japonica*	日本海鰶			1				
Ariidae	*Arius maculatus*	斑海鯰		1	4	2	1	1	
Synodontidae	*Saurida elongata*	長體蛇鯔					10		
Synodontidae	*Saurida wanieso*	鱷蛇鯔		3					
Triglidae	*Chelidonichthys kumu*	黑角魚				1			
Platycephalidae	*Cociella crocodilus*	點斑鱷牛尾魚					1		
Platycephalidae	*Grammoplites scaber*	橫帶棘線牛尾魚		2			2		
Carangidae	*Carangoides hedlandensis*	海蘭德若鰺				1			
Carangidae	*Megalaspis cordyla*	大甲鰺	9						
Carangidae	*Scomberoides commersonnianus*	大口逆鉤鰺				1			
Haemulidae	*Pomadasys kaakan*	星雞魚					4	6	
Haemulidae	*Pomadasys maculatus*	斑雞魚							1
Sparidae	*Acanthopagrus pacificus*	太平洋棘鯛						3	
Polynemidae	*Eleutheronema rhadinum*	多鱗四指馬鮁				5		8	1
Polynemidae	*Polydactylus sextarius*	六指多指馬鮁	34						
Sciaenidae	*Atrobucca nibe*	黑鰔	22						
Sciaenidae	*Chrysochir aureus*	黃金鰭鰔	2				1		1
Sciaenidae	*Johnius distinctus*	鱗鰭叫姑魚	132			1	3	18	
Sciaenidae	*Pennahia macrocephalus*	大頭白姑魚	20	1	2	16		8	
Sciaenidae	*Pennahia pawak*	斑鰭白姑魚		16					
Uranoscopidae	*Ichthyscopus lebeck*	披肩騰		3					
Ephippidae	*Ephippus orbis*	圓白鯧		20					

Table 3.1.1-9 Historical Surveys on Adult Fish (Spring Season) (2/2)

Year			2016	2020	2021	2022	2023	2024	2025
Sampling Date			2016.3.4	2020.5.7	2021.3.11	2022.3.10	2023.3.9	2024.3.16	2025.3.24
Family Name	Scientific Name	Chinese Name	No.	No.	No.	No.	No.	No.	No.
Nomeidae	*Psenes cyanophrys*	玻璃玉鯧			1				
Stromateidae	*Pampus cinereus*	灰鯧				2		9	
Paralichthyidae	*Pseudorhombus oligodon*	少牙斑鮃					1		
Soleidae	*Zebrias zebra*	條鰨					1		
Cynoglossidae	*Cynoglossus arel*	大鱗舌鰨				1			
Cynoglossidae	*Cynoglossus bilineatus*	雙線舌鰨					3		
Triacanthidae	*Triacanthus biaculeatus*	雙棘三棘魨				1			
Tetraodontidae	*Takifugu niphobles*	黑點多紀魨	5						
Individuals			225	58	8	54	35	59	7
Species			8	13	4	14	15	9	4

2. Fish Egg and Fish Larva

The autumn survey results, conducted during the offshore construction and operation phases, are compared to the spring survey carried out during the EIS stage. It's important to note that while the EIS stage included 12 survey stations, this autumn survey was limited to only 5 stations, resulting in a significant difference in sampling frequency between the two surveys. Therefore, only the species with higher abundance were compared, as shown in Table 3.1.1-10 and Table 3.1.1-11. A detailed explanation of the survey results comparing the EIA period and the ongoing construction period is provided below.

In March 2016 (EIA period, spring). A total of 608 fish eggs and 27 larvae/juveniles were collected. Fish eggs were identified into 14 groups from 10 families plus one unidentified group (total abundance: 813 eggs/100 m^3), with the most dominant species being *Acanthopagrus berda*, followed by *Harpadon nehereus*, *Engraulis japonicus, Thryssa hamiltonii*, and *Paraplagusia blochii*. Larvae/juveniles were identified into 9 groups from 8 families (total abundance: 39 ind./100 m^3), with *Acanthopagrus pacificus* as the most dominant, followed by Clupeidae sp., showing a relatively high dominance index.

In April 2020, a total of 15 fish eggs and 92 larvae/juveniles were collected during the spring season. Fish eggs were identified into 5 groups from 5 families (total abundance: 55 eggs/100 m³), with *Secutor ruconius* as the most dominant, followed by *Epinephelus coioides* and *Harpadon nehereus*, with clear species dominance. Larvae/juveniles were identified into 24 groups from 18 families plus one unidentified group (total abundance: 423 ind./100 m³), with *Scomberoides tol* as the most dominant, followed by *Upeneus japonicus*, *Terapon jarbua*, and members of the genus Benthosema.

In May 2021, a total of 62 fish eggs and 3 larvae/juveniles were collected during the spring season. Fish eggs were identified into 8 groups from 7 families (total abundance: 44 eggs/100 m³), with *Mene maculata* as the most dominant, followed by *Euthynnus affinis*. Larvae/juveniles were identified into 3 groups from 3 families (total abundance: 3 ind./100 m³), namely *Alepes djedaba*, *Gempylus serpens*, and *Upeneus japonicus*.

In April 2022, a total of 63 fish eggs and 75 larvae/juveniles were collected during the spring season. Fish eggs were identified into 4 groups from 4 families plus one unidentified group (total abundance: 57 eggs/100 m³), with *Paraplagusia blochii* as the most dominant, followed by *Cociella crocodila*. Larvae/juveniles were identified into 16 groups from 15 families (total abundance: 80 ind./100 m³), including *Gerres macracanthus*, *Planiliza macrolepis*, and Gobiidae sp..

In April 2023, a total of 32 fish eggs and 4 larvae/juveniles were collected during the spring season. Fish eggs were identified into 5 groups from 5 families plus one unidentified group (total abundance: 28 eggs/100 m³), with *Thryssa dussumieri* as the most dominant, followed by *Epinephelus coioides*. Larvae/juveniles were identified into 2 groups from 2 families (total abundance: 4 ind./100 m³), namely *Planiliza macrolepis* and Sillago sp.

In April 2024, a total of 194 fish eggs and 130 larvae/juveniles were collected during the spring season. Fish eggs were identified into 11 groups from 10 families (total abundance: 270 eggs/100 m³), with *Pomadasys kaakan* as the most dominant, followed by *Moolgarda perusii* and *Kumococius rodericensis*. Larvae/juveniles were identified into 8 groups from 7 families (total abundance: 163 ind./100 m³), with

Gerres limbatus as the most dominant, followed by *Sardinella gibbosa* and Sillago sp.

In March 2025, a total of 24 fish eggs and 31 larvae/juveniles were collected during the spring season. Fish eggs were identified into 5 groups from 5 families (total abundance: 545 eggs/100 m^3), with Lutjanidae sp. as the most dominant, followed by Scombridae sp. and Carangidae sp. Larvae/juveniles were identified into 14 groups from 10 families (total abundance: 859 ind./100 m^3), with dominant species including *Rastrelliger kanagurt*, *Ostorhinchus novemfasciatus*, Carangidae sp., *Takifugu niphobles*, Myctophidae sp., Parupeneus sp., *Engraulis japonicus,* Bramidae sp. and Cynoglossus sp..

This season's survey recorded the highest abundance of fish eggs among all same-season surveys to date, and the abundance of fish larvae/juveniles was also the highest on record. However, in terms of species richness, both fish eggs and larvae/juveniles ranked in the medium range compared with previous seasons. Factors influencing these results may include differences in sampling months, a reduction in the number of sampling stations, or sampling errors. Since fish eggs and larvae/juveniles lack swimming ability, their distribution—similar to that of zooplankton—tends to be patchy, resulting in large fluctuations in catch volumes. Changes in the community structure and spatial distribution of fish larvae can also be affected by short-term influences such as local current shifts, upwelling, or unstable ocean currents. Given that only four years of data have been accumulated so far, these patterns may represent short-term variations, and longer-term monitoring is still required to confirm the trends. When comparing the EIA-period winter results with those from the current construction period, several species common in the past—such as *Thryssa kammalensi*, *Chelon affinis*, and Trichiurus sp.—were not found this season. Conversely, this survey recorded large numbers of milkfish, *Chanos chanos*, a species not previously observed. A similar pattern was found in larvae/juveniles: species like *Upeneus japonicus* and *Sillago sihama*, which were common in previous years, were absent this season, while large numbers of Carangidae sp., rarely recorded before, were observed. Overall, continued long-term monitoring is necessary to clarify the status of fish eggs and larvae/juveniles in this area.

Table 3.1.1-10 Historical Surveys on Fish Eggs Composition and Abundance (Spring Season) (1/2)

Taxa\Station	Chinese Name	2016/05	2020/04	2021/05	2022/04	2023/04	2024/04	2025/03
Ammodytidae								
Ammodytidae sp.	玉筋魚科			1				
Carangidae								
Megalaspis cordyla	大甲鰺			3				
Scomberoides tol	托爾逆鉤鰺			1			9	
Carangidae sp.	鰺科							138
Clupeidae								
Dussumieria elopsoides	黃帶圓腹鯡	7						
Nematalosa japonica	日本海鰶	2						
Sardinella gibbosa	隆背小沙丁魚	18						
Coryphaenidae								
Coryphaena hippurus	鬼頭刀			3		1		
Cynoglossidae								
Paraplagusia blochii	布氏鬚鰨	29			26			
Engraulidae								
Engraulis japonicus	日本鯷	98						
Stolephorus commersonnii	康氏側帶小公魚						32	
Thryssa dussumieri	杜氏稜鯷					13		
Thryssa hamiltonii	漢氏稜鯷	31	4					
Thryssa kammalensis	赤鼻稜鯷	3						
Haemulidae								
Pomadasys kaakan	星雞魚	29					94	
Pomadasys maculatus	斑雞魚				5			
Labridae								
Labridae sp.	隆頭魚科							21
Leiognathidae								
Secutor ruconius	仰口鰏		21					
Lutjanidae								
Lutjanidae sp.	笛鯛科							209
Menidae								
Mene maculata	眼眶魚			18			30	
Mugilidae								
Chelon macrolepis	大鱗龜鮻				2		11	
Liza haematocheila	龜鮻	1						
Moolgarda perusii	佩氏莫鯔						44	
Moolgarda sp.	莫鯔屬			1				

Table 3.1.1-10 Historical Surveys on Fish Eggs Composition and Abundance (Spring Season) (2/2)

Taxa\Station	Chinese Name	2016/05	2020/04	2021/05	2022/04	2023/04	2024/04	2025/03
Muraenidae								
Gymnothorax sp.	裸胸鯙屬		4					
Muraenidae sp.	鯙科			1				
Echidna polyzona	多環蝮鯙						2	
Ophichthidae								
Brachysomophis cirrocheilos	鬚唇短體蛇鰻	2						
Platycephalidae								
Cociella crocodila	點斑鱷牛尾魚				23			
Kumococius rodericensis	凹鰭牛尾魚						41	
Platycephalus indicus	印度牛尾魚	4						
Psettodidae								
Psettodes erumei	大口鰜						2	
Scombridae								
Euthynnus affinis	巴鰹			16				
Sarda orientalis	東方齒鰆					2		
Scombridae sp.	鯖科							150
Serranidae								
Epinephelus coioides	點帶石斑魚		18			11		
Diploprion bifasciatum	雙帶鱸						2	
Sparidae								
Acanthopagrus berda	灰鰭棘鯛	395						
Synodontidae								
Harpadon nehereus	印度鐮齒魚	162	8					
Trachinocephalus myops	準大頭狗母魚						3	
Synodontidae sp.	合齒魚科							27
Trichiuridae								
Trichiurus lepturus	白帶魚	8						
Trichiurus sp.	帶魚屬					1		
unknown								
unknown	unknown	24			1			
Total Abundance（Ind./100m^3）		**813**	**55**	**44**	**57**	**28**	**270**	**545**
No. of Families		9	5	7	4	5	10	5
No. of Groups		14	5	8	4	5	11	5
Actual No. of Fish Eggs collected		**551**	**15**	**62**	**63**	**32**	**194**	**24**

Table 3.1.1-11 Historical Surveys on Fish Larva Composition and Abundance (Spring Season) (1/2)

Taxa\Station	Chinese Name	2016/05	2020/04	2021/05	2022/04	2023/04	2024/04	2025/03
Acanthuridae								
Prionurus scalprum	鋸尾鯛		4					
Apogonidae								
Ostorhinchus fasciatus	寬條鸚天竺鯛		4					
Ostorhinchus novemfasciatus	九帶鸚天竺鯛				6			110
Apogonidae sp.	天竺鯛科							16
Belonidae								
Tylosurus crocodilus crocodilus	鱷形叉尾鶴鱵	1			1			
Blenniidae								
Omobranchus sp.	肩鰓鳚屬	2						
Parablennius yatabei	八部副鳚				5			
Petroscirtes breviceps	短頭跳岩鳚						6	
Bramidae								
Bramidae sp.	烏魴科							55
Carangidae								
Decapterus russelli	羅氏圓鰺		4					
Alepes djedaba	吉打副葉鰺			1	4			
Carangoides armatus	甲若鰺		4					
Decapterus macarellus	頜圓鰺		2					
Decapterus macrosoma	長身圓鰺		3					
Scomberoides tol	托爾逆鉤鰺	2	245					
Seriola dumerili	杜氏鰤						7	
Carangidae sp.	鰺科							108
Ceratiidae								
Ceratias sp.	角鮟鱇屬	2						
Chanidae								
Chanos chanos	虱目魚	2	8		2			
Cirrhitidae								
Cirrhitidae sp.	魚翁科		6					
Clupeidae								
Sardinella gibbosa	隆背小沙丁魚						20	
Engraulidae								
Engraulis japonicus	日本鯷							55
Cynoglossidae								
Cynoglossus sp.	舌鰨屬							43
Cynoglossus joyneri	焦氏舌鰨							22
Gempylidae								
Gempylus serpens	帶鰆		10	1	2			
Gerreidae								
Gerres limbatus	緣邊鑽嘴魚	7					106	
Gerres macracanthus	大棘鑽嘴魚	2	4		20		2	
Gobiidae								
Gobiidae sp.	鰕虎科	2	4		9			
Holocentridae								
Sargocentron punctatissimum	斑紋棘鱗魚				1			
Menidae								
Mene maculata	眼眶魚		12					
Mugilidae								

Table 3.1.1-11 Historical Surveys on Fish Larva Composition and Abundance (Spring Season) (2/2)

Taxa\Station	Chinese Name	2016/05	2020/04	2021/05	2022/04	2023/04	2024/04	2025/03
Chelon macrolepis	大鱗龜鮻		2		15	3		
Mullidae								
Upeneus japonicus	日本緋鯉	3	34	1				
Parupeneus sp.	海緋鯉屬							75
Myctophidae								
Benthosema sp.	底燈魚屬		16					
Lampanyctus sp.	珍燈魚屬							16
Myctophidae sp.	燈籠魚科		6					91
Pempheridae								
Pempheris sp.	擬金眼鯛屬		7					
Platycephalidae								
Platycephalidae sp.	牛尾魚科							16
Pomacentridae								
Neopomacentrus cyanomos	藍黑新雀鯛	2	4		3			
Pomacentridae sp.	雀鯛科		11					
Sciaenidae								
Johnius sp.	叫姑魚屬		7					
Scombridae								
Auxis rochei rochei	圓花鰹				4			
Scomber australasicus	澳洲花鯖							126
Scombridae sp.	鯖科							32
Scorpaenidae								
Parascorpaena sp.	圓鱗鮋屬						4	
Serranidae								
Pseudanthias squamipinnis	絲鰭擬花鮨		2					
Sillaginidae								
Sillago sp.	沙鮻屬	9			2	1	11	
Sparidae								
Acanthopagrus berda	灰鰭棘鯛				2			
Acanthopagrus taiwanensis	臺灣棘鯛				2			
Terapontidae								
Pelates quadrilineatus	四帶牙鯻						7	
Terapon jarbua	花身鯻	5	18		2			
Terapontidae sp.	鯻科	3						
Tetraodontidae								
Takifugu niphobles	黑點多紀魨		2					93
Trichiuridae								
Trichiurus lepturus	白帶魚	2						
unknown								
unknown	unknown		4					
Total Abundance(Ind./100m^3)		**44**	**423**	**3**	**80**	**4**	**163**	**859**
No. of Families		8	18	3	15	2	7	10
No. of Groups		9	24	3	16	2	8	14
Actual No. of Larval Fish Collected		**27**	**92**	**3**	**75**	**4**	**130**	**31**

vi. Underwater filming

Underwater filming was conducted via ROV since May 2022. Up to now, a total of 4 survey batches have been conducted. The foundation piles and rock dumping around wind turbines may increase benthic biodiversity. However, the first survey was possibly limited by ongoing or recent rock dumping, and the third survey was affected by poor wave conditions, resulting in only sporadic photographic records. Detailed seasonal survey results are shown in Table 3.1.1-12, with the analysis described as follows:

In the first batch survey (May 10-12 2022, for 9 WT), a total of 2 orders, 12 families and 16 species were recorded. The species resource table is shown as Table 3.1.1-12. A group of butterfish swam (Stromateidae family) by in the first survey, therefore YUN64 recorded the most Stromateidae. In the first survey, no species were recorded in YUN38, 1-9 species were recorded in the rest of the locations. YUN37 and YUN53 recorded the most species.

In the second batch survey (August 17-18 2022, for 6 WT), a total of 2 orders, 2 families and 2 species were recorded. The species resource table is shown as Table 3.1.1-12. No species were recorded in YUN49, YUN57, YUN78 and YUN79, 1 species were recorded in the rest of the locations.

In the third batch survey (February 12-13 2023, for 5 WT). A total of 2 orders, 2 families and 2 species were recorded. The species resource table is shown as Table 3.1.1-12. No species were recorded in YUN50, YUN71, YUN 73 and YUN77. 2 species were recorded at the bottom layer of YUN63.

In the fourth batch survey (September 19-20 2023, for 5 WT), a total of 1 orders, 4 families and 4 species were recorded. The species resource table is shown as Table 3.1.1-12. 1 *Plectorhinchus cinctus*, 6 *Abudefduf vaigiensis*, 8 *Pterocaesio digramma* were observed in the middle layer and 1 Apogonidae were observed in the bottom layer of YUN20; 7 *Pterocaesio digramma* were observed in the middle layer of YUN62. No species were recorded in YUN12, YUN21 and YUN74.

In the fifth batch survey (June 8-9 2024, for 8 WT), a total of 1 order, 4 families and 4 species were recorded. The species resource table is shown as Table 3.1.1-12. 2 Pennant bannerfish and 1 silverflash spinecheek (*Scolopsis vosmeri*) were observed in the bottom layer of YUN69. 1 silverflash spinecheek, 1 Gobiidae family and 1 rifle cardinal (*Ostorhinchus kiensis*) were observed in the bottom layer of YUN70. No species were recorded in YUN11, YUN32, YUN39, YUN61, YUN68 and YUN72.

In the sixth batch survey (February 1, 2025, and February 10–11, 2025), a total of 25 wind turbines were examined. Regarding fish species, 3 species from 2 orders and three families were recorded: *Eleutheronema rhadinum* at YUN25, *Epinephelus fasciatus* (Orange-spotted grouper) at YUN22, and an unidentified species from the *Carangidae* family at YUN26. For other marine organisms, YUN2 documented the presence of *Ctenophores* (comb jellies) and *Sepiolida* sp. (bobtail squid). YUN6 revealed a seabed rich in small shrimp species, suggesting a potentially thriving benthic community. YUN17 captured images of dense populations of *Amphibalanus reticulatus* (netted barnacles), indicating a well-established sessile invertebrate presence. At YUN19, several organisms were recorded, including *Acropora* sp. (stony corals), *Aglaopheniidae* sp. (hydrozoans), one *Drupella cornus* (sea snail), two *Thais armigera* (rock snails), and two *Portunidae* sp. (swimming crabs). YUN41 also recorded images of both *Acropora* sp. (stony corals) and *Reishia clavigera* (a type of rock snail). Notably, the presence of *Drupella cornus* (a coral-feeding sea snail) suggests early ecological interactions at the base of the wind turbine structures. This species is known for feeding on stony corals (*Scleractinia* sp.), with a particular preference for *Acropora* sp. Its presence indicates that a rudimentary ecosystem may have already formed around these structures, providing an environment suitable for coral predators. Additionally, observations across multiple survey stations revealed significant activity of *Caprella* sp. (skeleton shrimp) within seabed algae. These small, sessile crustaceans attach themselves to seaweed or seagrass and play a crucial role in the marine food web by serving as a vital food source for juvenile fish and shrimp. These findings suggest an increasing diversity of marine life around the wind turbine bases, highlighting the potential for artificial structures to foster ecological communities over time.

In the seventh batch survey (March 2, 2025) at YUN4 and YUN10 also recorded bristle worms within bottom algae, highlighting their role as prey for juvenile marine life.

In the eigth batch survey (March 11-12, 2025) at 7 turbines documented one stockfish foraging near the YUN14 monopile, indicating early reef formation effects. YUN65 and YUN66 recorded one *Plectorhinchus cinctus* and one fourfinger threadfin (*E. tetradactylum*) respectively, while YUN75 had abundant fouling growth at the base.

In the ninth batch survey (March 25, 2025) at 4 turbines recorded one orange-spotted grouper (E. coioides) each at YUN54 and YUN59, with varying degrees of fouling at both middle and bottom sections.

In the tenth batch survey (April 9, 2025) at 4 turbines recorded *P. cinctus* at the bottom of YUN33, YUN40, and YUN47. Additionally, a group of five unidentified fish was observed near the foundation at mid-depth at YUN40.

In the eleventh batch survey (May 16, 2025) at 5 turbines recorded the richest fish diversity at YUN36, with 4 crocodile needlefish (*Tylosurus crocodilus crocodilus*, schooling near the midsection, 1 Caesionidae species near the base, and 2 Serranidae sp. And 1 Haemulidae grunt sp. species at the bottom. YUN44 recorded 1 Haemulidae species, YUN46 had 4 unidentified small fish feeding on rocks, and YUN58 recorded 1 Syngnathidae species and 1 *Charybdis natato*r.

Conclusion: All 80 turbines in the wind farm are now complete. The monopile foundations and scour protection rocks have created sheltered and attachable reef-like habitats. Many turbines exhibited algae and barnacle fouling on monopiles or seabed rocks, and bristle worms were frequently observed in algae as prey for juvenile fish and shrimp. Some turbines, notably YUN19, also recorded coral growth and coral-predating gastropods (D. fragum), indicating the early development of an ecological community. Fish records were dominated by Haemulidae species and orange-spotted groupers, both adaptable to reef and sandy environments, with reef-preferential species such as skipjack tuna also present. This suggests an emerging fish aggregation effect, warranting continued long-term monitoring to further assess ecological impacts.

Table 3.1.1-12 Fish Species Composition in the Historical Underwater Filming Surveys (1/10)

Foundation Number				YUN37		YUN38		YUN42		YUN51		YUN52		YUN53		YUN64		YUN76		YUN80		YUN43		YUN45		YUN49		YUN57		YUN78		YUN79	
Foundation Completed on				2021.07		2021.02		2021.06		2021.05		2021.05		2020.11		2021.06		2021.03		2021110.02		2021.09		2021.10		2021.09		2021.09		2021.06		2021.06	
Underwater Filming Conducted on				2022.05.10~12																		2022.08.17~18											
Order	Family	Chinese Name	Scientific Name	Middle	Bottom	Middle	Bottom	Middle	Bottom	Middle	Bottom	Middle	Bottom	Middle	Bottom	Middle	Bottom	Middle	Bottom	Middle	Bottom	Middle	Bottom	Middle	Bottom	Middle	Bottom	Middle	Bottom	Middle	Bottom	Middle	Bottom
Decapoda	Penaeidae	對蝦科	*Gen.* sp. (Penaeidae)																		5												
Perciformes	Haemulidae	石鱸科	*Gen.* sp. (Haemulidae)		1				1		2	2			2																		
		花尾胡椒鯛	*Plectorhinchus cinctus*		1																												
		密點少棘胡椒鯛	*Diagramma pictum*		7																				1								
	Sphyraenidae	金梭魚科	*Gen.* sp. (Sphyraenidae)		5										1				2														
	Nemipteridae	伏氏眶棘鱸	*Scolopsis vosmeri*		2								1		1																		
	Siganidae	褐臭肚魚	*Siganus fuscescens*		2																												
	Lutjanidae	勒氏笛鯛	*Lutjanus russellii*		1																												
	Pomacentridae	藍黑新雀鯛	*Neopomacentrus cyanomos*												1																		
	Labridae	裂唇魚	*Labroides dimidiatus*												3																		
		藍豬齒魚	*Choerodon azurio*									2			1																		

Table 3.1.1-12 Fish Species Composition in the Historical Underwater Filming Surveys (2/10)

Foundation Number				YUN37		YUN38		YUN42		YUN51		YUN52		YUN53		YUN64		YUN76		YUN80		YUN43		YUN45		YUN49		YUN57		YUN78		YUN79	
Foundation Completed on				2021.07		2021.02		2021.06		2021.05		2021.05		2020.11		2021.06		2021.03		2021.02		2021.09		2021.10		2021.09		2021.09		2021.06		2021.06	
Underwater Filming Conducted on				2022.05.10~12																		2022.08.17~18											
Order	Fimily	Chinese Name	Scientific Name	Middle	Bottom	Middle	Bottom	Middle	Bottom	Middle	Bottom	Middle	Bottom	Middle	Bottom	Middle	Bottom	Middle	Bottom	Middle	Bottom	Middle	Bottom	Middle	Bottom	Middle	Bottom	Middle	Bottom	Middle	Bottom	Middle	Bottom
Perciformes	Serranidae	鮨科	*Gen.* sp. (Serranidae)						1						1																		
		點帶石斑魚	*Epinephelus coioides*		1				2						2																		
	Stromateidae	鯧科	*Gen.* sp. (Stromateidae)													6	10																
Myliobatiformes	Blenniidae	鳚科	*Gen.* sp. (Blenniidae)		1																												
	Gobiidae	鰕虎科	*Gen.* sp. (Gobiidae)										4		2																		
	Dasyatidae	魟科	*Hemitrygon* sp.																				1										
		Total		0	21	0	0	0	4	0	2	4	5	0	14	6	10	0	2	0	5	0	1	0	1	0	0	0	0	0	0	0	0

Table 3.1.1-12 Fish Species Composition in the Historical Underwater Filming Surveys (3/10)

Foundation Number				YUN50		YUN63		YUN71		YUN73		YUN77	
Foundation Completed on				2022.08.08		2022.07.02		2022. 09.18		2022.08.16		2022.10.03	
Underwater Filming Conducted on				2023.02.12-13									
Order	Family	Chinese Name	Scientific Name	Middle	Bottom	Middle	Bottom	Middle	Bottom	Middle	Bottom	Middle	Bottom
Perciformes	Haemulidae	花尾胡椒鯛	*Plectorhinchus cinctus*				2						
	Oplegnathidae	條石鯛	*Oplegnathus fasciatus*				1						
Total				0	0	0	3	0	0	0	0	0	0

Table 3.1.1-12 Fish Species Composition in the Historical Underwater Filming Surveys (4/10)

Foundation Number				YUN12		YUN20		YUN21		YUN62		YUN74	
Foundation Completed on				2023.05.22		2023.05.14		2023.05.05		2023.05.18		2022.08.23	
Underwater Filming Conducted on				112.09.19~20									
Order	Family	Chinese Name	Scientific Name	Middle	Bottom	Middle	Bottom	Middle	Bottom	Middle	Bottom	Middle	Bottom
Perciformes	Haemulidae	花尾胡椒鯛	*Plectorhinchus cinctus*			1							
	Pomacentridae	條紋豆娘魚	*Abudefduf vaigiensis*			6							
	Caesionidae	雙帶鱗鰭烏尾鮗	*Pterocaesio digramma*			8				7			
	Apogonidae	天竺鯛科	*Gen.* sp. (Apogonidae)				1						
Total						15	1			7			

Table 3.1.1-12 Fish Species Composition in the Historical Underwater Filming Surveys (5/10)

Foundation Number				YUN11		YUN32		YUN39		YUN61		YUN68		YUN69		YUN70		YUN72	
Foundation Completed on				2023.05		2023.07		2023.08		2023.06		2023.06		2023.06		2023.06		2022.08	
Underwater Filming Conducted on				2024.06.08~09															
Order	Family	Chinese Name	Scientific Name	Middle	Bottom	Middle	Bottom	Middle	Bottom	Middle	Bottom	Middle	Bottom	Middle	Bottom	Middle	Bottom	Middle	Bottom
Perciformes	Nemipteridae	伏氏眶棘鱸	*Scolopsis vosmeri*												1		1		
	Gobiidae	蝦虎科	*Gen.* sp. (Gobiidae)														1		
	Apogonidae	中線鸚天竺鯛	*Ostorhinchus kiensis*														1		
	Chaetodontidae	白吻雙帶立旗鯛	*Heniochus acuminatus*												3				
Total															4		3		

Table 3.1.1-12 Fish Species Composition in the Historical Underwater Filming Surveys (6/10)

Foundation Number				YUN06		YUN01		YUN02		YUN03		YUN05		YUN09		YUN15		YUN16		YUN17	
Foundation Completed on				2024.05		2024.06		2024.05		2024.05		2024.04		2024.06		2024.06		2024.05		2024.05	
Underwater Filming Conducted on				2025.02.01		2025.02.10~11															
Order	Family	Chinese Name	Scientific Name	Middle	Bottom	Middle	Bottom	Middle	Bottom	Middle	Bottom	Middle	Bottom	Middle	Bottom	Middle	Bottom	Middle	Bottom	Middle	Bottom
Total				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 3.1.1-12 Fish Species Composition in the Historical Underwater Filming Surveys (7/10)

Foundation Number				YUN18		YUN19		YUN23		YUN24		YUN25		YUN26		YUN27		YUN28		YUN29	
Foundation Completed on				2024.04		2023.09		2023.09		2024.07		2024.06		2024.05		2023.08		2023.08		2024.06	
Underwater Filming Conducted on				2025.02.10~11																	
Order	Family	Chinese Name	Scientific Name	Middle	Bottom	Middle	Bottom	Middle	Bottom	Middle	Bottom	Middle	Bottom	Middle	Bottom	Middle	Bottom	Middle	Bottom	Middle	Bottom
Carangiformes	Carangidae	鰺科	Carangidae sp.												1						
Perciformes	Polynemidae	多鱗四指馬鮁	*Eleutheronema rhadinum*										1								
Total				0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0

Table 3.1.1-12 Fish Species Composition in the Historical Underwater Filming Surveys (8/10)

Foundation Number				YUN30		YUN34		YUN35		YUN41		YUN48		YUN13		YUN22	
Foundation Completed on				2023.08		2023.09		2023.09		2024.03		2024.03		2023.04		2024.04	
Underwater Filming Conducted on				2025.02.10~11													
Order	Family	Chinese Name	Scientific Name	Middle	Bottom	Middle	Bottom	Middle	Bottom	Middle	Bottom	Middle	Bottom	Middle	Bottom	Middle	Bottom
Perciformes	Serranidae	點帶石斑魚	*Epinephelus coioides*														1
Total				0	0	0	0	0	0	0	0	0	0	0	0	0	1

Table 3.1.1-12 Fish Species Composition in the Historical Underwater Filming Surveys (9/10)

Foundation Number				YUN07		YUN14		YUN31		YUN65		YUN66		YUN67		TUN75		YUN54		YUN55		YUN59		YUN60	
Foundation Completed on				2024.04		2024.06		2024.05		2023.07		2023.07		2024.07		2024.04		2024.07		2024.06		2024.06		2024.06	
Underwater Filming Conducted on				2025.03.11~12														2025.03.25							
Order	Family	Chinese Name	Scientific Name	Middle	Bottom	Middle	Bottom	Middle	Bottom	Middle	Bottom	Middle	Bottom	Middle	Bottom	Middle	Bottom	Middle	Bottom	Middle	Bottom	Middle	Bottom	Middle	Bottom
日鱸目	舵魚科	柴魚	*Microcanthus strigatus*				1																		
鱸形目	石鱸科	花尾胡椒鯛	*Plectorhinchus cinctus*								1														
鱸形目	馬鮁科	多鱗四指馬鮁	*Eleutheronema rhadinum*										1						1				1		
鱸形目	鮨科	點帶石斑魚	*Epinephelus coioides*																						
Total				0	0	0	1	0	0	0	1	0	1	0	0	0	0	0	1	0	0	0	1	0	0

Table 3.1.1-12 Fish Species Composition in the Historical Underwater Filming Surveys (10/10)

Foundation Number				YUN33		YUN40		YUN47		YUN56		YUN08		YUN36		YUN44		YUN46		YUN58	
Foundation Completed on				2024.06		2024.05		2024.05		2024.05		2024.07		2024.04		2024.06		2024.07		2023.07	
Underwater Filming Conducted on				2025.04.09								2025.05.16									
Order	Family	Chinese Name	Scientific Name	Middle	Bottom	Middle	Bottom	Middle	Bottom	Middle	Bottom	Middle	Bottom	Middle	Bottom	Middle	Bottom	Middle	Bottom	Middle	Bottom
鱸形目	石鱸科	花尾胡椒鯛	*Plectorhinchus cinctus*		2		1		1												
鶴鱵目	鶴鱵科	鱷形叉尾鶴鱵	*Tylosurus rocodilus crocodilus*																		
鱸形目	石鱸科	石鱸科	Haemulidae *sp.*											4							
鱸形目	烏尾鮗科	烏尾鮗科	Caesionidae *sp.*												1		1				
鱸形目	鮨科	鮨科	Serranidae *sp.*											1							
海龍目	海龍科	海龍科	Syngnathidae *sp.*												2						1
		未知				5													4		
Total				0	2	5	1	0	1	0	0	0	0	5	3	0	1	0	4	0	1

IV. Underwater Acoustic Survey of Cetacean Ecology

The underwater acoustic survey was conducted from March 2019 to February 2020, and the survey was completed in all seasons of the year before the offshore construction in March 2020. The Project has entered the construction and operation phases in July 2023. Survey result in every quarter is shown as Table 3.1.1-13 to Table 3.1.1-14 and Figure 3.1.1-12. Day/night distribution of the detections is shown as Figure 3.1.1-13 and Figure 3.1.1-14. The analysis is as follows:

i. Statistics of Detected Quantities at Each Station/Quarter

1. Whistles

In terms of the overall annual analysis in 2019, Q2 (June to August) had more detections, followed by Q1 (March to May) and Q4 (December to February), while Q3 (September to November) had relatively fewer whistle detections. It is inferred that cetacean activities are relatively higher in summer, followed by spring and winter.

If we compare the whistles at each location in 2019, YW-1, YW-2, and YW-3 have more whistles, while YW-4 and YW-5 have the least whistles, indicating that there are more cetaceans in the north than in the south, and more near shore than far shore.

In terms of the overall annual analysis in 2020, Q2 (June to August) had more detections, followed by Q1 (March to May) and Q4 (December to February), while Q3 (September to November) had relatively fewer whistle detections. It is inferred that cetacean activities are relatively higher in summer, followed by spring and winter.

If we compare the whistles at each location in 2020, YW-1, YW-2, and YW-3 have more whistles, while YW-4 and YW-5 have the least whistles This indicates that Cetacean activity is more frequent in the northern part of the sea area and closer to the shore compared to offshore.

In the overall annual analysis for 2021, Q4 (December to February) recorded the highest number of detections, followed by Q3 (September to November). No whistle detections were recorded in Q1 (March to May) or Q2 (June to August). Based on this data, cetacean activity in this area appears to be most frequent in winter, followed by fall.

Table 3.1.1-13 Whistle Detection in Each Quarter (1/4)

Quarter		Station	Detected Days	Detected Times	Hours Recorded/ per Day Ratio note 1	Contact Rate note2 (time/hour)
1 Year Before Offshore Construction	2019 Q1	YW-1	14.00	8,045	6.208	54.00
		YW-2		1,675	3.208	21.76
		YW-3		7,064	9.792	30.06
		YW-4		116	0.792	6.10
		YW-5		2,652	4.583	24.11
	2019 Q2	YW-1	14.00	19,974	8.625	96.49
		YW-2	8.71	11,828	3.625	135.95
		YW-3	14.00	14,776	9.958	61.83
		YW-4	7.96	5,873	3.875	63.15
		YW-5	14.00	14,685	7.708	79.38
	2019 Q3	YW-1	14.00	2,011	8.708	9.62
		YW-2	10.08	1,594	5.458	12.17
		YW-3	14.00	5,431	9.000	25.14
		YW-4	7.67	1,716	1.583	45.17
		YW-5	14.00	516	2.125	10.12
	2019 Q4	YW-1	15.00	2,418	8.625	11.68
		YW-2		13,560	14.208	39.77
		YW-3		8,369	3.458	100.84
		YW-4		1,739	6.083	11.91
		YW-5		3,538	3.708	39.76
Offshore Construction	2020 Q1	YW-1	14.00	3,569	3.583	41.50
		YW-2		1,600	4.917	13.56
		YW-3		854	3.000	11.86
		YW-4		1,044	3.458	12.58
		YW-5		2,089	3.875	22.46

Note 1: “Hours recorded/ per day Ratio” refers to hours with whistles detected/24 hours.
Note 2: “Contact rate” refers to whistles detected/ hours with whistles detected.

Table 3.1.1-13 Whistle Detection in Each Quarter (2/4)

Quarter		Station	Detected Days	Detected Times	Hours Recorded/ per Day Ratio note 1	Contact Rate note2 (time/hour)
Offshore Construction	2020 Q2	YW-1	14.00	1,931	6.790	11.85
		YW-2		1,951	8.130	10.00
		YW-3		1,010	5.920	7.11
		YW-4		1,144	6.330	7.53
		YW-5		1,249	6.040	8.62
	2020 Q3	YW-1	1.00	6	0.125	2.00
		YW-2		5	0.083	2.50
		YW-3		5	0.167	1.25
		YW-4		8	0.250	1.33
		YW-5		6	0.167	1.50
	2020 Q4	YW-1	1.00	74	0.167	18.50
		YW-2		30	0.458	2.73
		YW-3		10	0.292	1.43
		YW-4		5	0.125	1.67
		YW-5	6.79	752	1.625	19.28
	2021 Q1	YW-1	1.00	0	0.000	0.00
		YW-2		0	0.000	0.00
		YW-3		0	0.000	0.00
		YW-4		0	0.000	0.00
		YW-5		0	0.000	0.00
	2021Q2	YW-1	1.00	0	0.000	0.00
		YW-2		0	0.000	0.00
		YW-3		0	0.000	0.00
		YW-4		0	0.000	0.00
		YW-5		0	0.000	0.00
	2021Q3	YW-1	1.00	0	0.000	0.00
		YW-2		0	0.000	0.00
		YW-3		51	0.042	50.60
		YW-4		0	0.000	0.00
		YW-5		0	0.000	0.00

Note 1: “Hours recorded/ per day Ratio” refers to hours with whistles detected/24 hours.
Note 2: “Contact rate” refers to whistles detected/ hours with whistles detected.

Table 3.1.1-13 Whistle Detection in Each Quarter (3/4)

Quarter		Station	Detected Days	Detected Times	Hours Recorded/ per Day Ratio note 1	Contact Rate note2 (time/hour)
Offshore Construction	2021 Q4	YW-1	1.00	42	0.042	41.67
		YW-2		20	0.042	19.84
		YW-3		4	0.042	3.97
		YW-4		283	0.042	280.75
		YW-5		0	0.000	0.00
	2022 Q1	YW-1	1.00	0	0.000	0.00
		YW-2		0	0.000	0.00
		YW-3		27	0.042	27.00
		YW-4		5322	0.125	1,774.00
		YW-5		0	0.000	0.00
	2022 Q2	YW-1	1.00	0	0.000	0.00
		YW-2		0	0.000	0.00
		YW-3		9	0.042	9.00
		YW-4		0	0.000	0.00
		YW-5		0	0.000	0.00
	2022 Q3	YW-1	1.00	0	0.000	0.00
		YW-2		0	0.000	0.00
		YW-3		0	0.000	0.00
		YW-4		0	0.000	0.00
		YW-5		0	0.000	0.00
	2022 Q4	YW-1	1.00	488	0.458	44.36
		YW-2		50	0.125	16.67
		YW-3		141	0.208	28.20
		YW-4		123	0.250	20.50
		YW-5		871	0.167	217.75
	2023 Q1	YW-1	1.00	0	0.000	0.00
		YW-2		0	0.000	0.00
		YW-3		0	0.000	0.00
		YW-4		0	0.000	0.00
		YW-5		0	0.000	0.00
	2023 Q2	YW-1	1.00	539	0.208	107.80
		YW-2		0	0.000	0.00
		YW-3		0	0.000	0.00
		YW-4		0	0.000	0.00
		YW-5		0	0.000	0.00

Note 1: "Hours recorded/ per day Ratio" refers to hours with whistles detected/24 hours.
Note 2: "Contact rate" refers to whistles detected/ hours with whistles detected.

Table 3.1.1-13 Whistle Detection in Each Quarter (4/4)

Quarter		Station	Detected Days	Detected Times	Hours Recorded/ per Day Ratio note 1	Contact Rate note2 (time/hour)
Offshore Construction and Operation Phases	2023 Q3	YW-1	1.00	0	0.000	0.00
		YW-2		0	0.000	0.00
		YW-3		0	0.000	0.00
		YW-4		0	0.000	0.00
		YW-5		1	1.000	0.04
	2023 Q4	YW-1	1.00	3,419	0.292	488.43
		YW-2		5,698	0.458	518.00
		YW-3		98	0.250	16.33
		YW-4		4,697	0.375	521.89
		YW-5		174	0.500	14.50
	2024 Q1	YW-1	1.00	274	0.083	137.00
		YW-2		719	0.125	239.67
		YW-3		1,455	0.625	97.00
		YW-4		1,077	0.167	269.25
		YW-5		354	0.375	39.33
	2024 Q2	YW-1	1.00	0	0.000	0.00
		YW-2		0	0.000	0.00
		YW-3		0	0.000	0.00
		YW-4		0	0.000	0.00
		YW-5		0	0.000	0.00
	2024 Q3	YW-1	1.00	0	0.000	0.00
		YW-2		0	0.000	0.00
		YW-3		0	0.000	0.00
		YW-4		0	0.000	0.00
		YW-5		0	0.000	0.00
	2024Q4	YW-1	1.00	373	0.330	46.60
		YW-2		0	0.000	0.00
		YW-3		0	0.000	0.00
		YW-4		348	0.250	58.00
		YW-5		170	0.290	24.30
	2025Q1	YW-1	1.00	197	0.125	65.70
		YW-2		0	0.000	0.00
		YW-3		5	0.040	5.00
		YW-4		0	0.000	0.00
		YW-5		73	0.125	24.30

Note 1: “Hours recorded/ per day Ratio” refers to hours with whistles detected/24 hours.
Note 2: “Contact rate” refers to whistles detected/ hours with whistles detected.

Table 3.1.1-14 Click Detection in Each Quarter (1/4)

Quarter		Station	Detected Days	Detected Times	Hours Recorded/ per Day Ratio note 1	Contact Ratenote2 (times/hour)
1 Year Before Offshore Construction	2019 Q1	YW-1	14.00	2,447	10.500	9.71
		YW-2		3,122	2.000	65.04
		YW-3		6,235	10.208	25.45
		YW-4		357	4.167	3.57
		YW-5		7,456	12.958	23.97
	2019 Q2	YW-1	14.00	366	4.667	3.27
		YW-2	8.71	236	2.875	3.41
		YW-3	14.00	3,770	9.833	15.98
		YW-4	7.96	35	0.875	1.66
		YW-5	14.00	69	1.750	1.64
	2019 Q3	YW-1	14.00	1,108	7.042	6.56
		YW-2	10.08	121	1.958	2.57
		YW-3	14.00	1,445	8.625	6.98
		YW-4	7.67	237	0.917	10.77
		YW-5	14.00	434	3.667	4.93
	2019 Q4	YW-1	15.00	620	1.333	19.38
		YW-2		3,940	9.417	17.43
		YW-3		17,053	5.208	136.43
		YW-4		1,099	2.708	16.91
		YW-5		8,241	12.167	28.22
Offshore Construction	2020 Q1	YW-1	14.00	123	2.625	1.95
		YW-2		2,927	9.792	12.46
		YW-3		524	4.417	4.94
		YW-4		121	2.330	2.16
		YW-5		0	0.000	0.00
	2020 Q2	YW-1	14.00	77	1.670	1.92
		YW-2		44	1.170	1.57
		YW-3		101	1.500	2.81
		YW-4		51	0.670	3.17
		YW-5		273	2.630	4.33
	2020 Q3	YW-1	1.00	0	0.000	0.00
		YW-2		4	0.083	2.00
		YW-3		0	0.000	0.00
		YW-4		6	0.130	2.00
		YW-5		0	0.000	0.00
	2020 Q4	YW-1	1.00	32	0.042	32.00
		YW-2		12	0.042	12.00
		YW-3		0	0.000	0.00
		YW-4		0	0.000	0.00
		YW-5	6.79	886	0.292	126.43

Note 1: “Hours recorded/ per day Ratio” refers to hours with whistles detected/24 hours.
Note 2: “Contact rate” refers to whistles detected/ hours with whistles detected

Table 3.1.1-14 Click Detection in Each Quarter (2/4)

Quarter		Station	Detected Days	Detected Times	Hours recorded/ per Day Ratio note 1	Contact Ratenote2 (times/hour)
Offshore Construction	2021 Q1	YW-1	1.00	0	0.000	0.00
		YW-2		0	0.000	0.00
		YW-3		0	0.000	0.00
		YW-4		0	0.000	0.00
		YW-5		0	0.000	0.00
	2021 Q2	YW-1	1.00	0	0.000	0.00
		YW-2		0	0.000	0.00
		YW-3		0	0.000	0.00
		YW-4		180	0.083	7.50
		YW-5		165	0.083	6.88
	2021 Q3	YW-1	1.00	0	0.000	0.00
		YW-2		0	0.000	0.00
		YW-3		109	0.042	108.13
		YW-4		0	0.000	0.00
		YW-5		0	0.000	0.00
	2021 Q4	YW-1	1.00	12	0.042	12.0
		YW-2		0	0.000	0.00
		YW-3		0	0.000	0.00
		YW-4		348	0.042	348.0
		YW-5		0	0.000	0.00
	2022 Q1	YW-1	1.00	0	0.000	0.00
		YW-2		0	0.000	0.00
		YW-3		23	0.042	23
		YW-4		93	0.042	93
		YW-5		0	0.000	0.00
	2022 Q2	YW-1	1.00	0	0.000	0.00
		YW-2		0	0.000	0.00
		YW-3		259	0.042	259
		YW-4		0	0.000	0.00
		YW-5		0	0.000	0.00
	2022 Q3	YW-1	1.00	0	0.000	0.00
		YW-2		0	0.000	0.00
		YW-3		0	0.000	0.00
		YW-4		0	0.000	0.00
		YW-5		0	0.000	0.00

Note 1: "Hours recorded/ per day Ratio" refers to hours with whistles detected/24 hours.
Note 2: "Contact rate" refers to whistles detected/ hours with whistles detected

Table 3.1.1-14 Click Detection in Each Quarter (3/4)

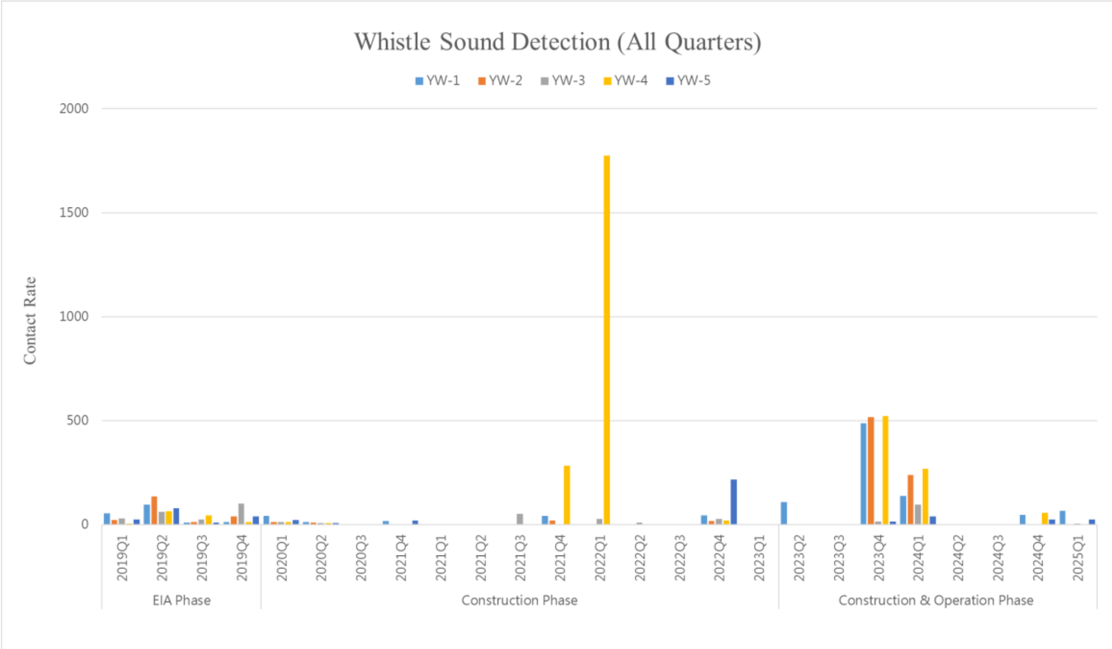
Quarter		Station	Detected Days	Detected Times	Hours Recorded/ per Day Rationote 1	Contact Ratenote2 (times/hour)
Offshore Construction	2022 Q4	YW-1	1.00	69	0.083	34.50
		YW-2		236	0.042	236.00
		YW-3		93	0.042	93.00
		YW-4		326	0.125	108.67
		YW-5		297	0.083	148.50
	2023 Q1	YW-1	1.00	0	0.000	0.00
		YW-2		0	0.000	0.00
		YW-3		0	0.000	0.00
		YW-4		0	0.000	0.00
		YW-5		0	0.000	0.00
Offshore Construction and Operation Phases	2023 Q2	YW-1	1.00	0	0.000	0.00
		YW-2		0	0.000	0.00
		YW-3		0	0.000	0.00
		YW-4		0	0.000	0.00
		YW-5		0	0.000	0.00
	2023 Q3	YW-1	1.00	0	0.000	0.00
		YW-2		0	0.000	0.00
		YW-3		0	0.000	0.00
		YW-4		0	0.000	0.00
		YW-5		1	0.042	1.00
	2023 Q4	YW-1	1.00	0	0.000	0.00
		YW-2		0	0.000	0.00
		YW-3		0	0.000	0.00
		YW-4		68	0.125	22.67
		YW-5		209	0.042	209.00
	2024 Q1	YW-1	1.00	0	0.000	0.00
		YW-2		0	0.000	0.00
		YW-3		386	0.042	386.00
		YW-4		0	0.000	0.00
		YW-5		0	0.000	0.00

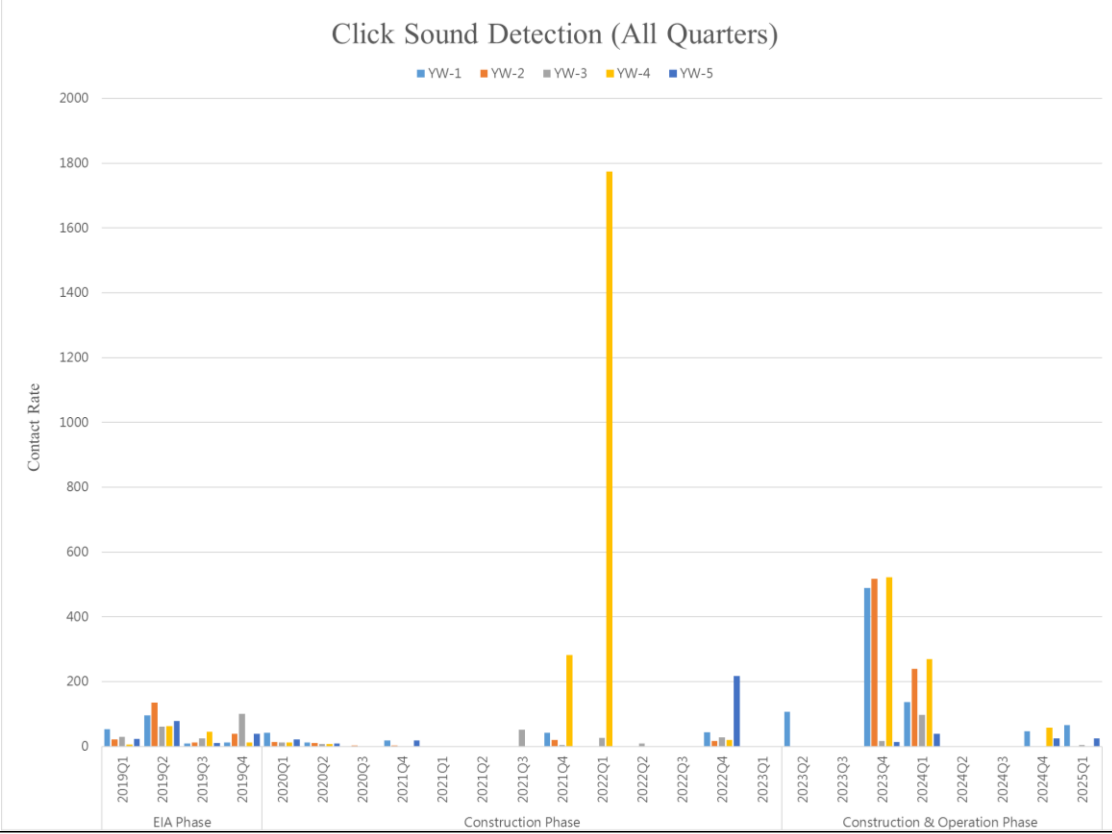
Note 1: “Hours recorded/ per day Ratio” refers to hours with whistles detected/24 hours.
Note 2: “Contact rate” refers to whistles detected/ hours with whistles detected

Table 3.1.1-14 Click Detection in Each Quarter (4/4)

Quarter		Station	Detected Days	Detected Times	Hours Recorded/ per Day Rationote 1	Contact Ratenote2 (times/hour)
Offshore Construction and Operation Phases	2024 Q2	YW-1	1.00	0	0.000	0.00
		YW-2		0	0.000	0.00
		YW-3		0	0.000	0.00
		YW-4		0	0.000	0.00
		YW-5		0	0.000	0.00
	2024 Q3	YW-1	1.00	0	0.000	0.00
		YW-2		0	0.000	0.00
		YW-3		0	0.000	0.00
		YW-4		0	0.000	0.00
		YW-5		0	0.000	0.00
	2024 Q4	YW-1	1.00	0	0.000	0.00
		YW-2		0	0.000	0.00
		YW-3		0	0.000	0.00
		YW-4		0	0.000	0.00
		YW-5		0	0.000	0.00
	2025Q1	YW-1	1.00	0	0.000	0.00
		YW-2		0	0.000	0.00
		YW-3		0	0.000	0.00
		YW-4		0	0.000	0.00
		YW-5		0	0.000	0.00

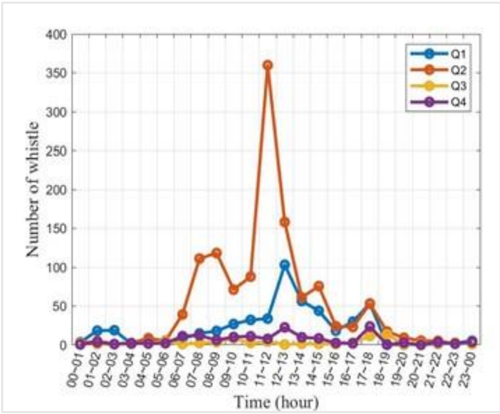
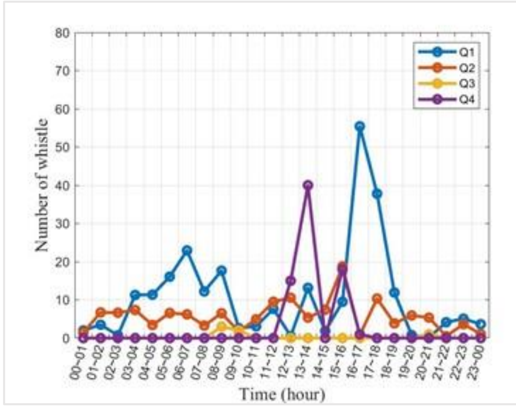
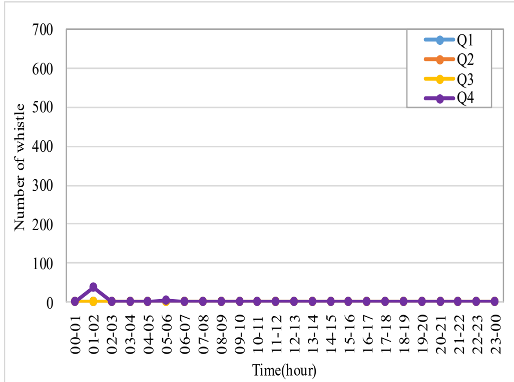
Note 1: “Hours recorded/ per day Ratio” refers to hours with whistles detected/24 hours.
Note 2: “Contact rate” refers to whistles detected/ hours with whistles detected





Note:“Contact rate” indicates total detection times/ (valid days×24 hours)

Figure 3.1.1-12 Statics of Whistles and Clicks in Historical Surveys

<table>
<tr><th colspan="4">Whistles</th></tr>
<tr><th></th><th>2019</th><th>2020</th><th>2021</th></tr>
<tr><td rowspan="4">YW-1</td><td>
</td><td>
</td><td>
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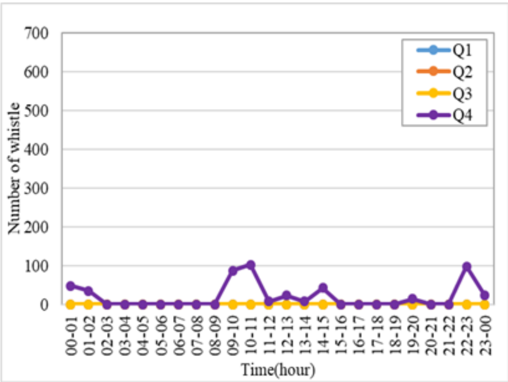
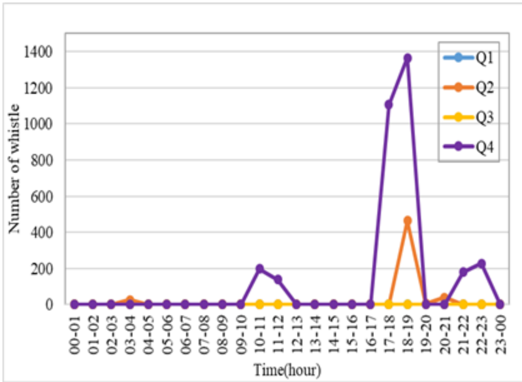
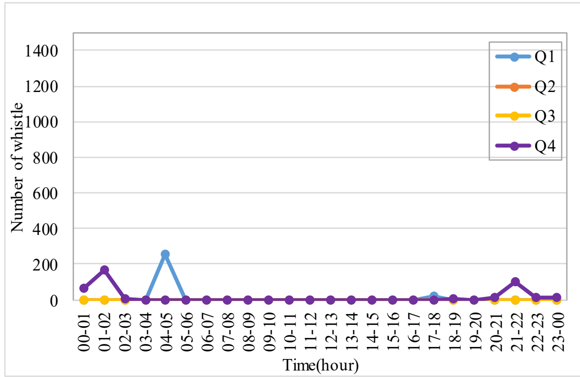
<tr><td>
</td><td>
</td><td>
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Figure 3.1.1-13 Hourly Distribution of clicks Detections in Historical Surveys(1/10)

Whistles			
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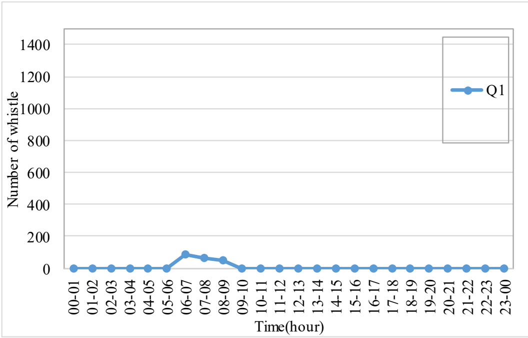
YW-1			

Figure 3.1.1-13 Hourly Distribution of clicks Detections in Historical Surveys(2/10)

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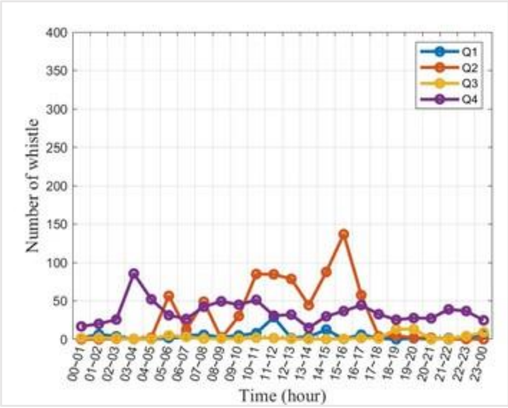
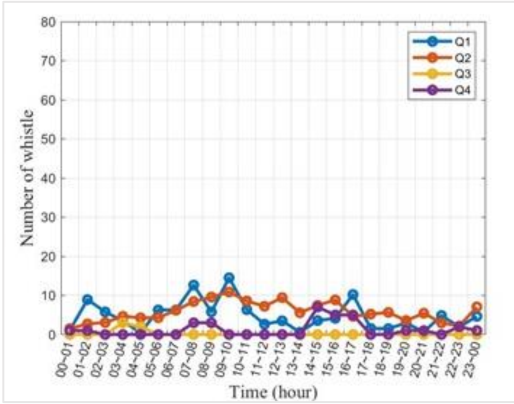
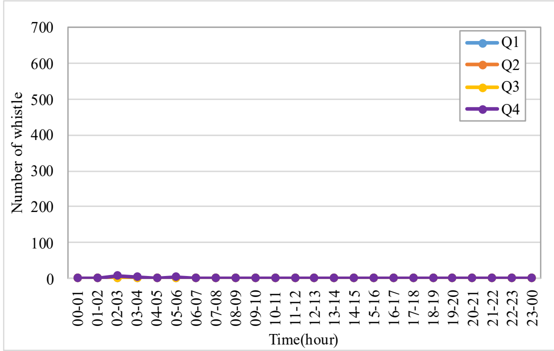
<tr><td rowspan="4">YW-2</td><td>
</td><td>
</td><td>
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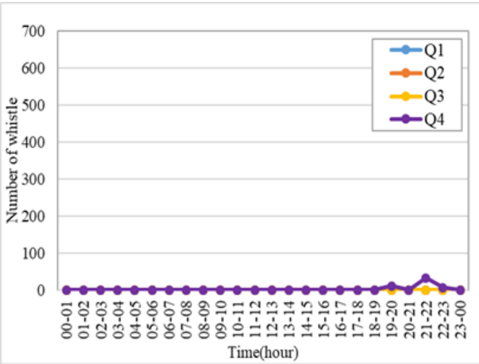
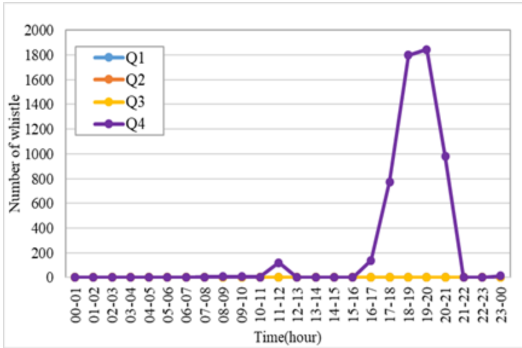
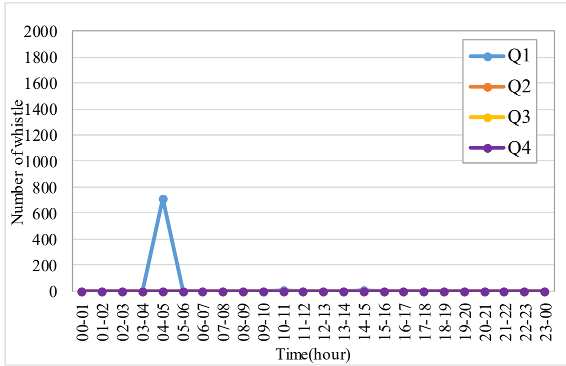
<tr><td>2022</td><td>2023</td><td>2024</td></tr>
<tr><td>
</td><td>
</td><td>
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Figure 3.1.1-13 Hourly Distribution of Whistle Detections in Historical Surveys (3/10)

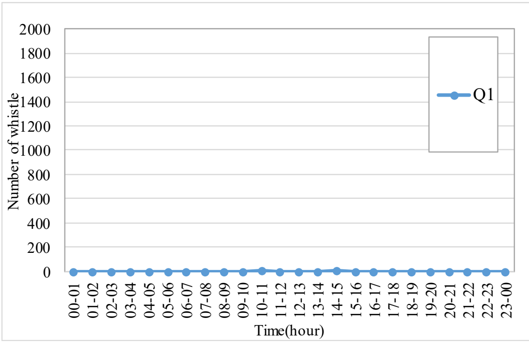
Whistles			
	2025		
YW-2			

Figure 3.1.1-13 Hourly Distribution of Whistle Detections in Historical Surveys (4/10)

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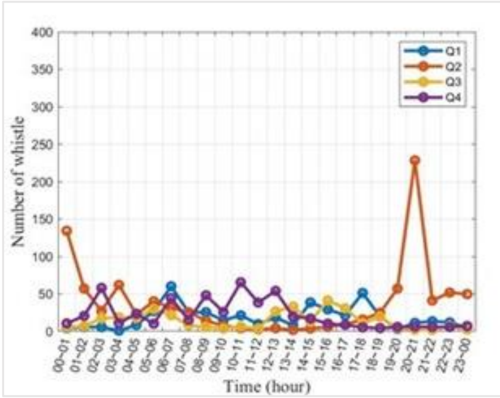
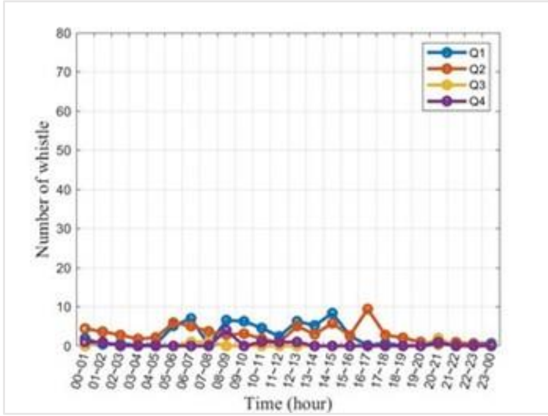
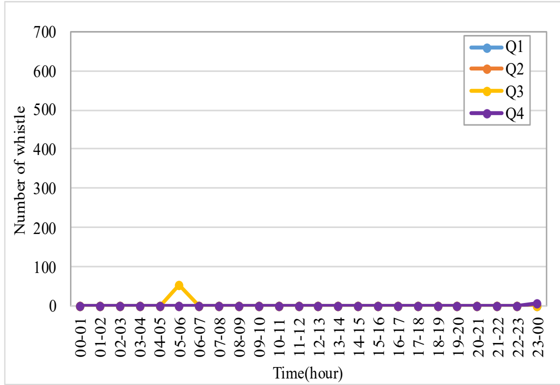
<tr><td rowspan="4">YW-3</td><td></td><td></td><td></td></tr>
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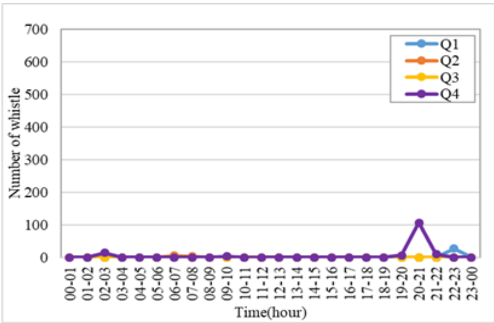
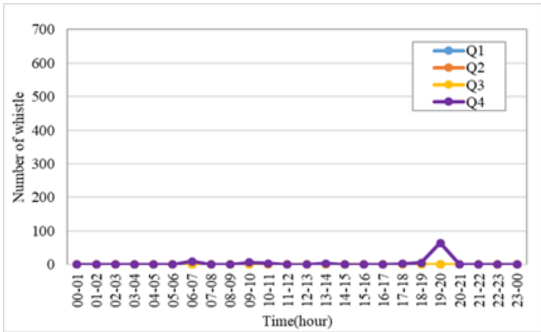
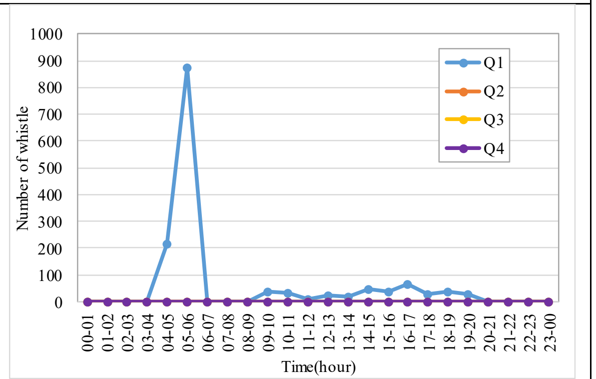
<tr><td></td><td></td><td></td></tr>
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Figure 3.1.1-13 Hourly Distribution of Whistle Detections in Historical Surveys (5/10)

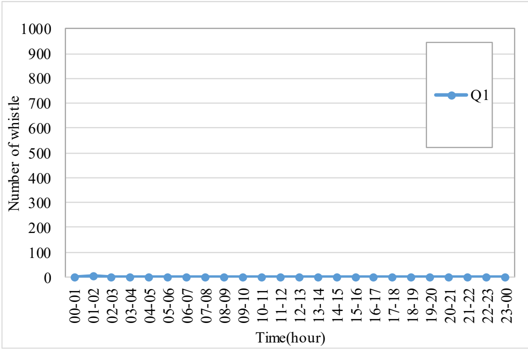
Whisyle			
	2025		
YW-3			

Figure 3.1.1-13 Hourly Distribution of Whistle Detections in Historical Surveys (6/10)

<table>
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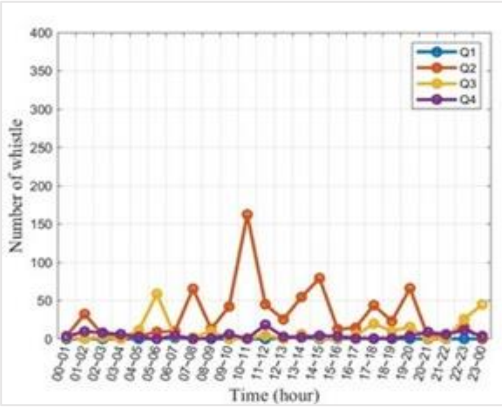
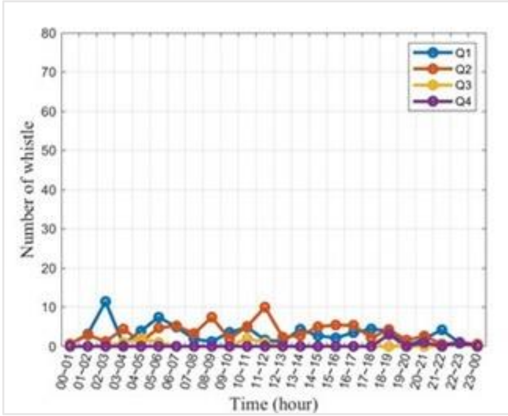
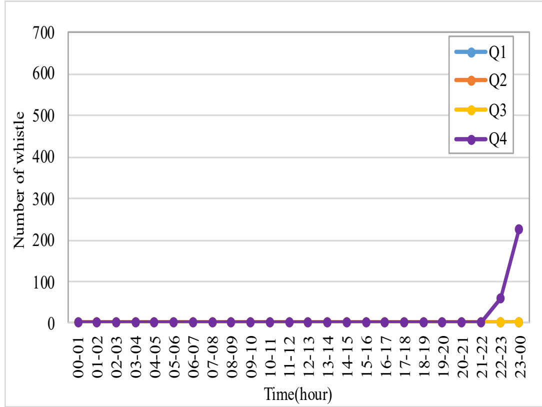
<tr><td rowspan="4">YW-4</td><td>
</td><td>
</td><td>
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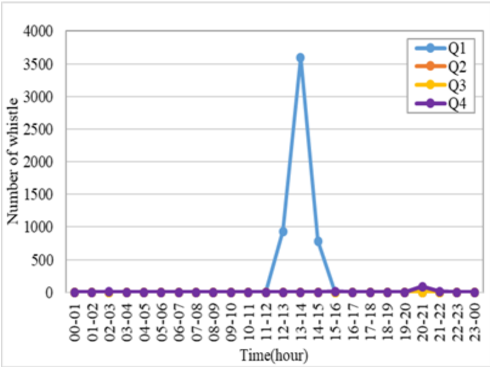
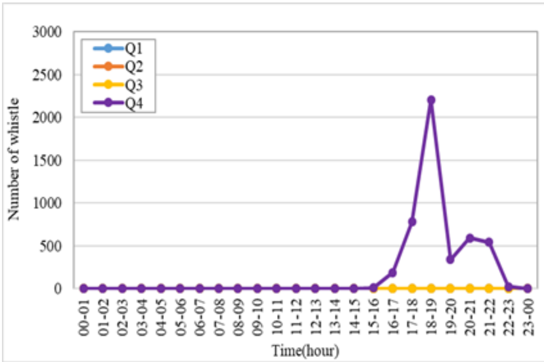
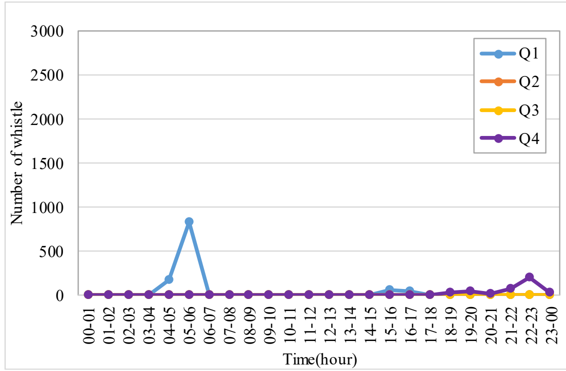
<tr><td>
</td><td>
</td><td>
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Figure 3.1.1-13 Hourly Distribution of Whistle Detections in Historical Surveys (7/10)

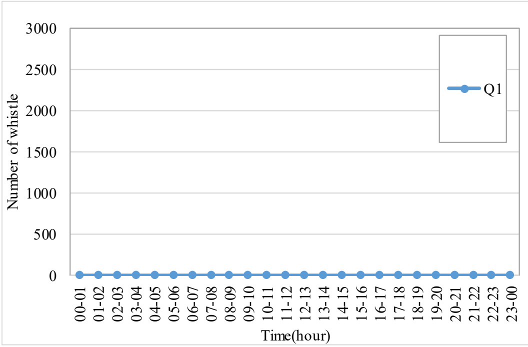
Whistle			
	2025		
YW-4			

Figure 3.1.1-13 Hourly Distribution of Whistle Detections in Historical Surveys (8/10)

<table>
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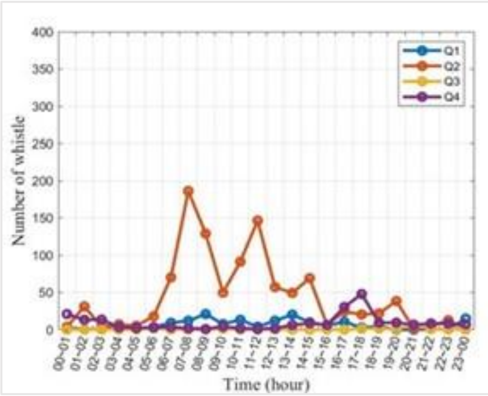
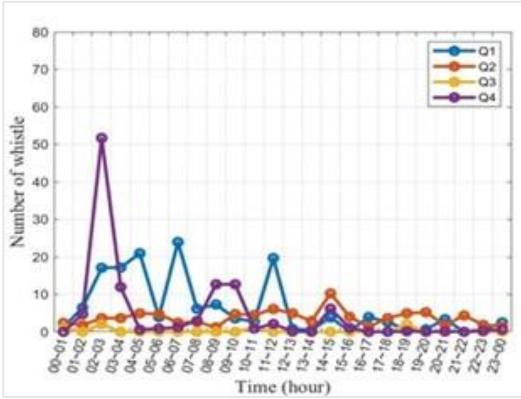
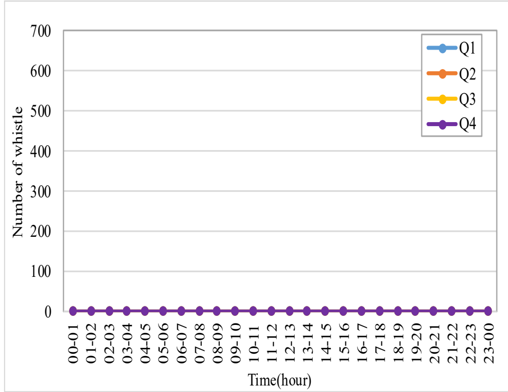
<tr><td></td><td>2019</td><td>2020</td><td>2021</td></tr>
<tr><td rowspan="4">YW-5</td><td>
</td><td>
</td><td>
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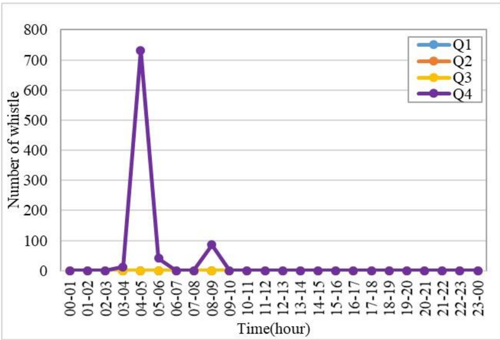
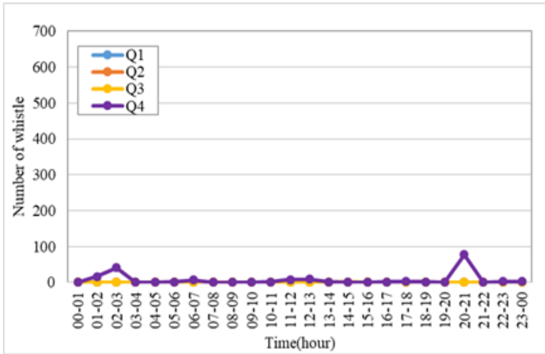
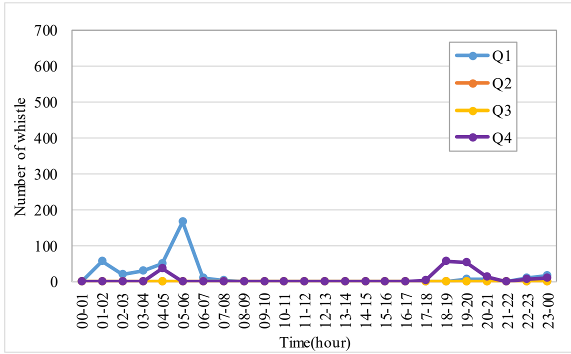
<tr><td>
</td><td>
</td><td>
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Figure 3.1.1-13 Hourly Distribution of Whistle Detections in Historical Surveys (9/10)

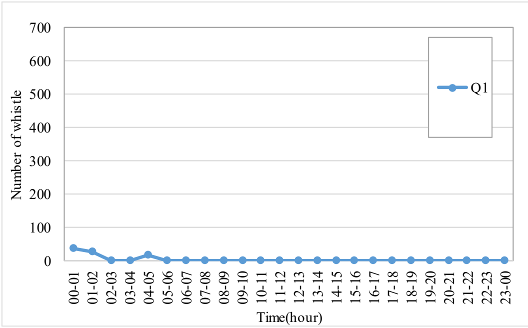
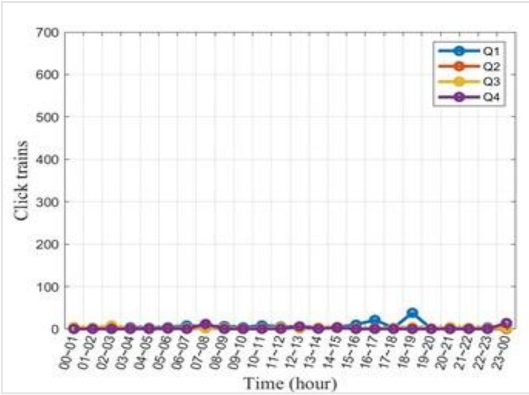
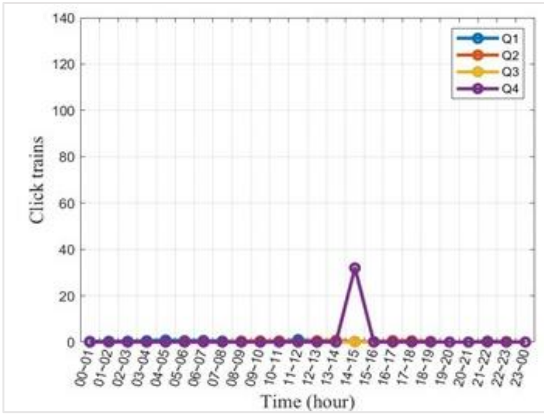
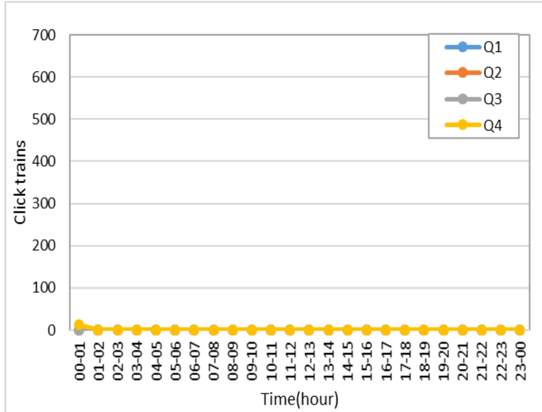
Whistles			
	2025		
YW-5			

Figure 3.1.1-13 Hourly Distribution of Whistle Detections in Historical Surveys (10/10)

<table>
<tr><th colspan="4">Clicks</th></tr>
<tr><td></td><td>2019</td><td>2020</td><td>2021</td></tr>
<tr><td rowspan="3">YW-1</td><td>
</td><td>
</td><td>
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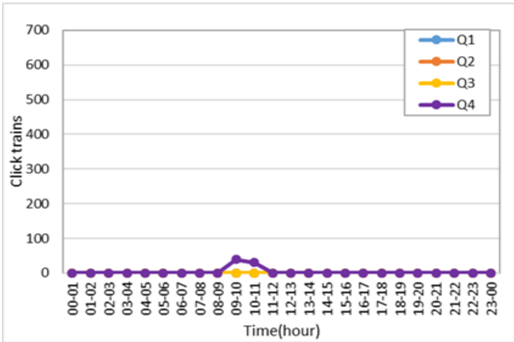
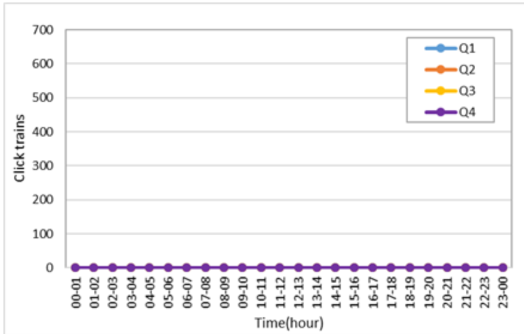
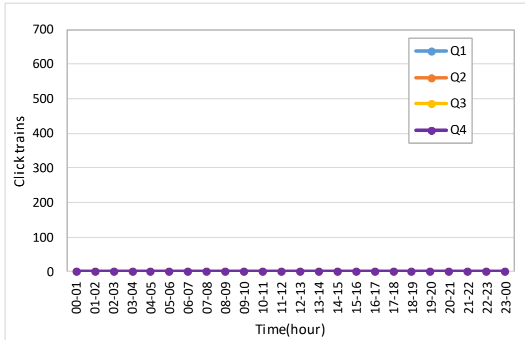
<tr><td>2022</td><td>2023</td><td>2024</td></tr>
<tr><td>
</td><td>
</td><td>
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Figure 3.1.1-14 Hourly Distribution of Clicks Detections in Historical Surveys (1/10)

<table>
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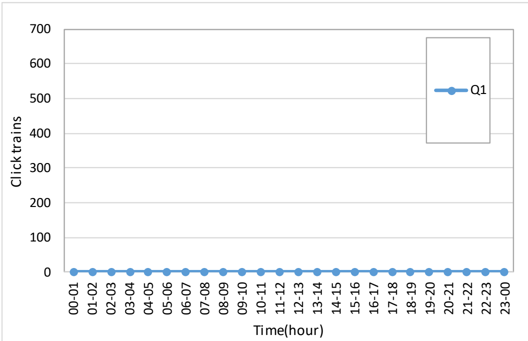
<tr><td rowspan="3">YW-1</td><td>
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Figure 3.1.1-14 Hourly Distribution of Clicks Detections in Historical Surveys (2/10)

<table>
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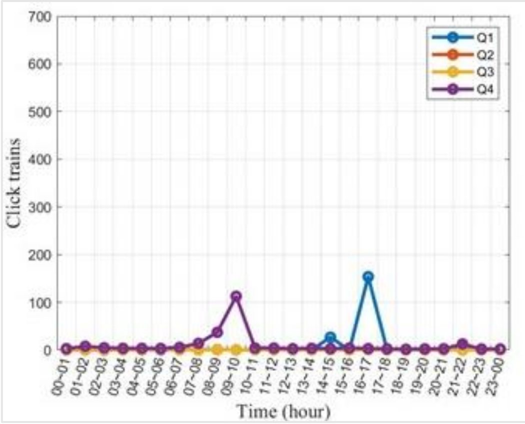
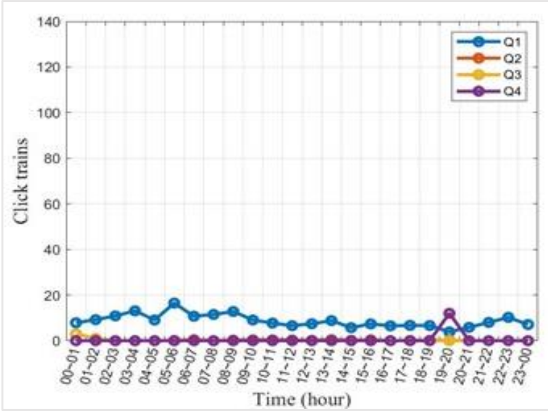
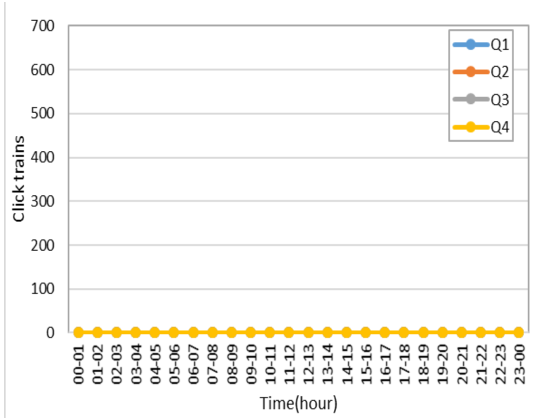
<tr><td rowspan="3">YW-2</td><td>
</td><td>
</td><td>
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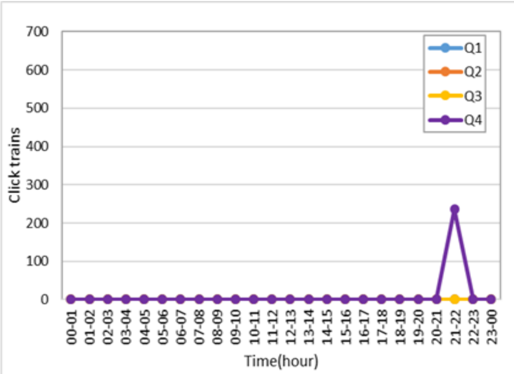
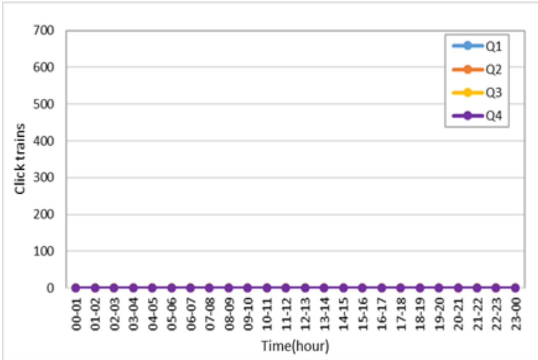
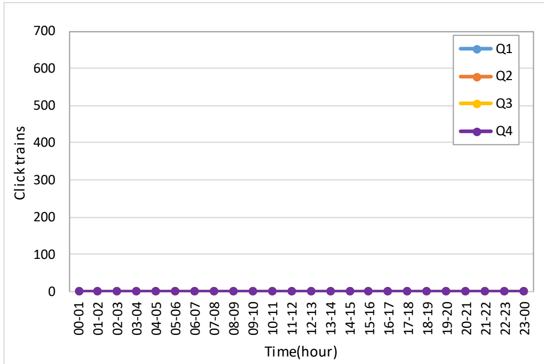
<tr><td>2022</td><td>2023</td><td>2024</td></tr>
<tr><td>
</td><td>
</td><td>
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Figure 3.1.1-14 Hourly Distribution of Clicks Detections in Historical Surveys (3/10)

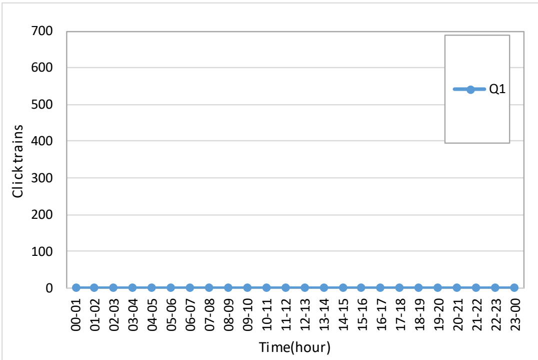
	Clicks		
	2025		
YW-2			
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Figure 3.1.1-14 Hourly Distribution of Clicks Detections in Historical Surveys (4/10)

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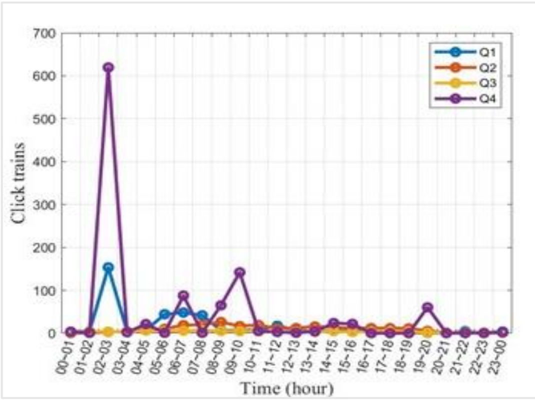
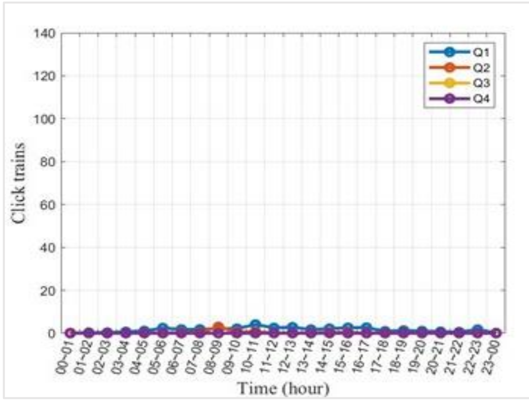
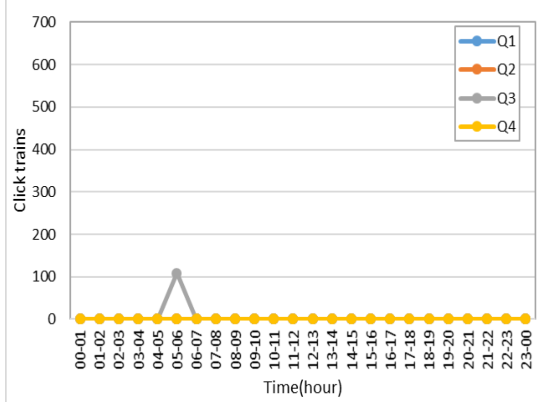
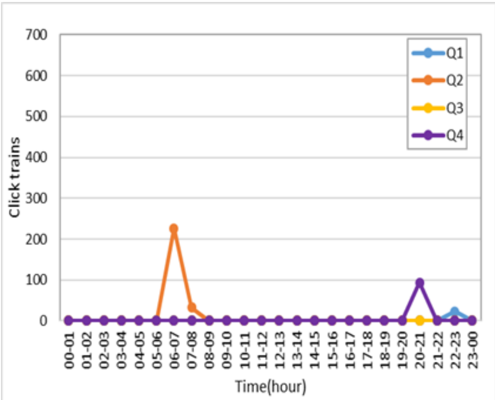
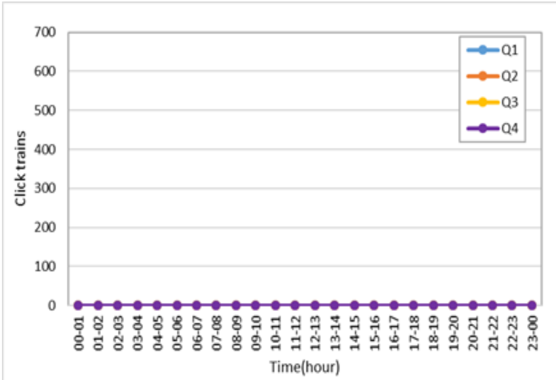
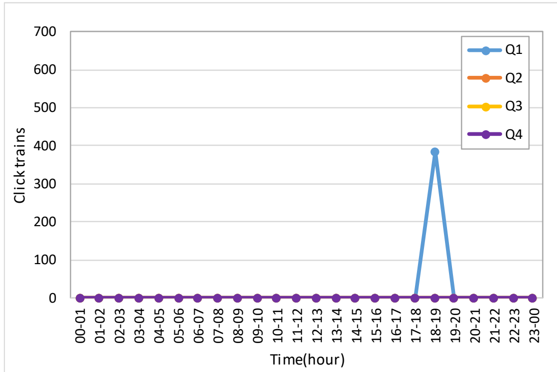
<tr><th></th><th>2019</th><th>2020</th><th>2021</th></tr>
<tr><td rowspan="4">YW-3</td><td>
</td><td>
</td><td>
</td></tr>
<tr><td>2022</td><td>2023</td><td>2024</td></tr>
<tr><td>
</td><td>
</td><td>
</td></tr>
</table>

Figure 3.1.1-14 Hourly Distribution of Clicks Detections in Historical Surveys (5/10)

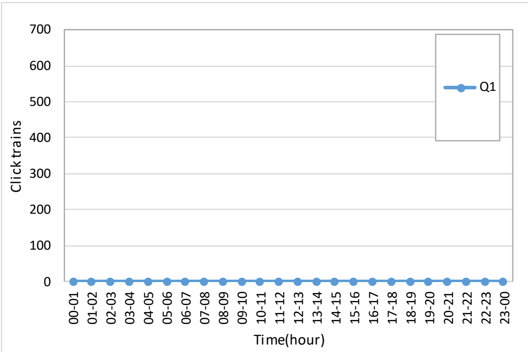
Clicks			
	2025		
YW-3			

Figure 3.1.1-14 Hourly Distribution of Clicks Detections in Historical Surveys (6/10)

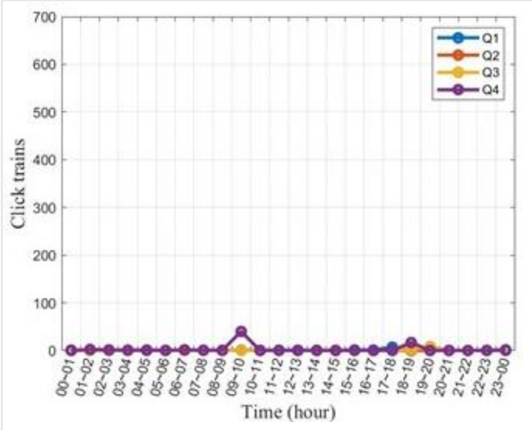
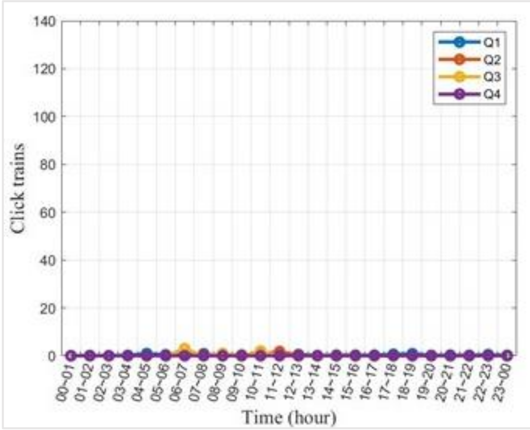
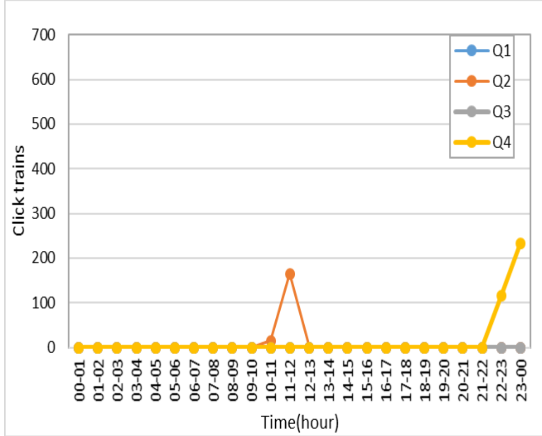
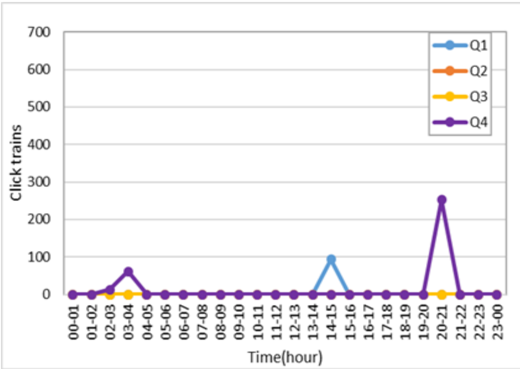
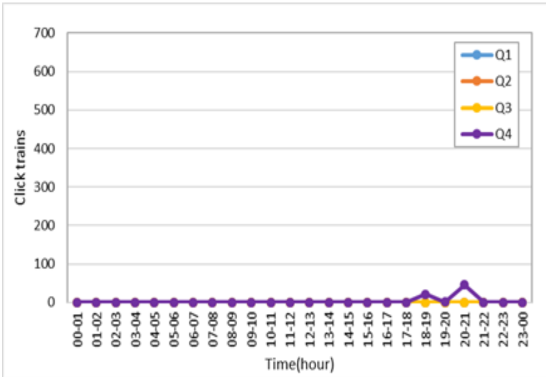
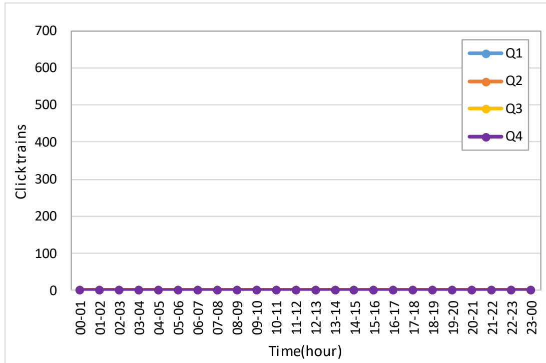
<table>
<tr><th colspan="4">Clicks</th></tr>
<tr><td></td><td>2019</td><td>2020</td><td>2021</td></tr>
<tr><td rowspan="4">YW-4</td><td>
</td><td>
</td><td>
</td></tr>
<tr><td>2022</td><td>2023</td><td>2024</td></tr>
<tr><td>
</td><td>
</td><td>
</td></tr>
</table>

Figure 3.1.1-14 Hourly Distribution of Clicks Detections in Historical Surveys (7/10)

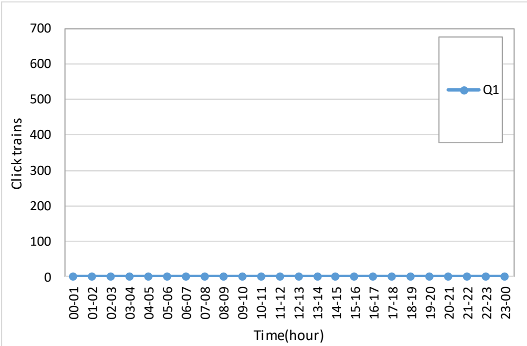
Clicks			
	2025		
YW-4			

Figure 3.1.1-14 Hourly Distribution of Clicks Detections in Historical Surveys (8/10)

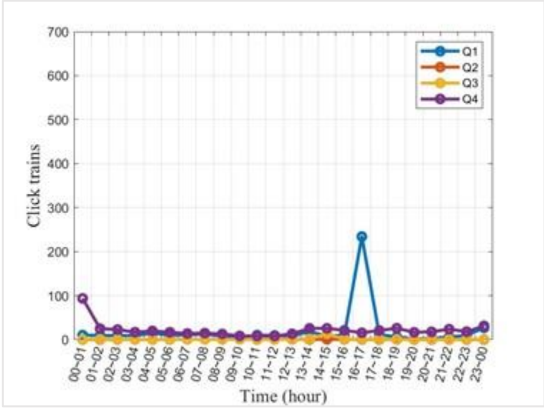
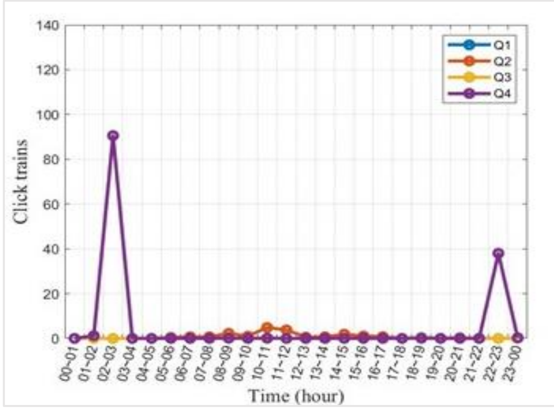
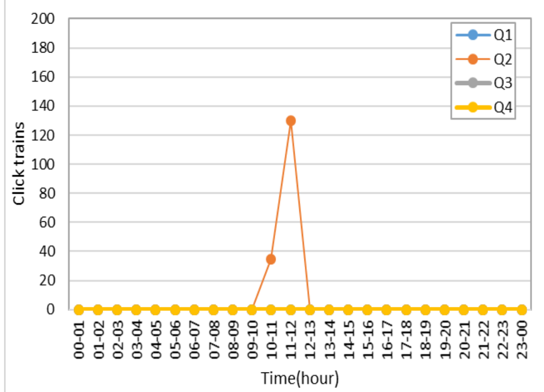
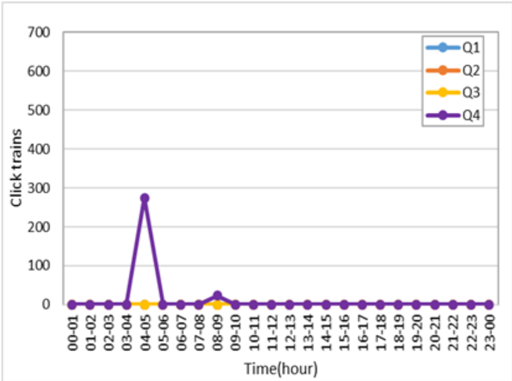
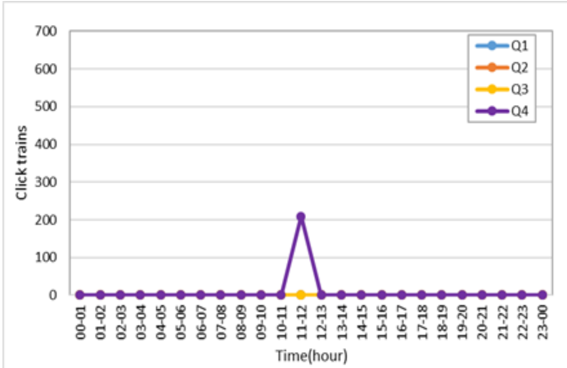
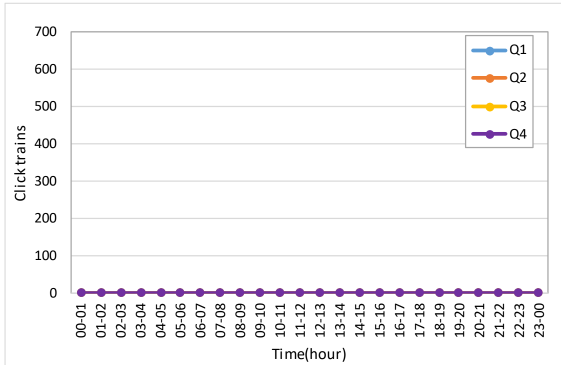
Clicks			
	2019	2020	2021
YW-5			
	2022	2023	2024
			

Figure 3.1.1-14 Hourly Distribution of Clicks Detections in Historical Surveys (9/10)

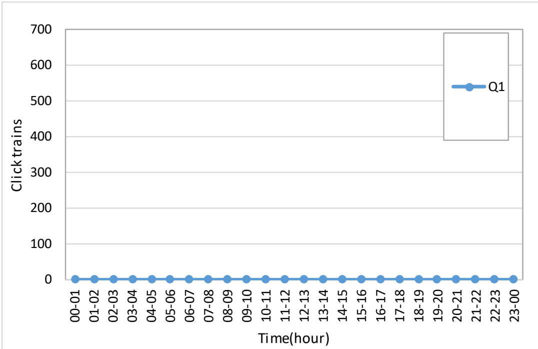
Clicks			
	2025		
YW-5			

Figure 3.1.1-14 Hourly Distribution of Clicks Detections in Historical Surveys (10/10)

If we compare the whistles at each location in 2021, YW-4 recorded the highest number of whistle detections, followed by YW-3 and YW-1, while YW-2 had relatively fewer detections. This indicates that cetacean activity is concentrated in the northern and central survey areas, with more occurrences in offshore regions compared to nearshore areas.

In terms of the overall annual analysis in 2022, Q4 (December-February of the following year) had the highest number of detections, followed by the first season (March-May) and the second season (June-August). There were no detections of whistle sounds in the third season (September-November). Based on these detection data, it is speculated that the activity of Cetacean in this sea area is highest in winter.

If we compare the whistles at each location in 2022, YW-4 and YW-5 recorded the highest number of whistle detections, YW-3 had relatively fewer detections. This suggests that cetacean activity is concentrated in the central survey area, with more occurrences in offshore regions compared to nearshore areas.

In terms of the overall annual analysis in 2023, No cetacean whistles were detected in Q1 (March to May). In Q2 (June to August), whistle detections were recorded at YW-1, while YW-2 to YW-5 had no detections. In Q3 (September to November), YW-5 recorded whistle detections, while YW-1 to YW-4 had none. In Q4 (December to February), all survey stations (YW-1 to YW-5) recorded relatively higher detection frequencies. Based on the overall analysis, cetacean activity in this area appears to be most frequent in winter.

If we compare the whistles at each location in 2023, YW-1, YW-2, and YW-4 recorded the highest number of whistle detections, while YW-3 had relatively fewer detections. This suggests that cetacean activity is concentrated in the central survey area, with more occurrences in offshore regions compared to nearshore areas.

In terms of the overall annual analysis in 2024, In Q1 (March to May), cetacean whistle detections were recorded at all stations (YW-1 to YW-5). In Q2 (June to August) and Q3 (September to November), no whistle detections were recorded at any station. In Q4 (December to February), YW-1, YW-4, and YW-5 recorded relatively higher detection frequencies. Based on the overall analysis, cetacean activity in this area appears to be most frequent in winter.

In 2024, comparison across monitoring sites showed that only YW-1, YW-4, and YW-5 recorded higher numbers of whistles in Q4, while YW-3 recorded relatively few. This suggests that cetacean activity was concentrated in the central portion of the overall survey area and was more frequent offshore than nearshore.

In terms of the overall analysis results in Q1 of 2025 (March–May, Year 114), whistle signals were detected at YW-1, YW-3, and YW-5. Except for YW-1, where whistles occurred during the day, detections at YW-3 and YW-5 were mainly at night.

2. Clicks

In terms of the overall analysis results in 2019, Q4 (December to February) had more detections, followed by Q1 (March to May), while Q2 and Q3 (June to November) had fewer detections of clicks. From the detection data, it seems that the cetaceans are mainly foraging or surveying the environment in these waters in winter. If we compare the surveying points, YW-3 has the most clicks and YW-4 has the least clicks.

In terms of the overall analysis results in 2020, Q4 (December to February) had more detections, followed by Q1 (March to May), while Q2 and Q3 (June to November) had fewer detections of clicks. From the detection data, it seems that the cetaceans are mainly foraging or surveying the environment in these waters in winter. If we compare the surveying points, YW-3 has the most clicks and YW-4 has the least clicks.In terms of the overall analysis results in 2021, Q4 (December to February) had more detections, followed by Q2 (June to August) and Q3 (September to November), while Q1(March to May) had fewer detections of clicks. From the detection data, it seems that the cetaceans are mainly foraging or surveying the environment in these waters in winter, followed by summer. If we compare the surveying points, YW-4 has the most clicks, followed by YW-5, YW-3, while YW-1 has the least clicks.

In terms of the overall analysis results in 2022, Q4 (December to February) had more detections, followed by Q2 (June to August), while Q3 (September to November) had fewer detections of clicks. From the detection data, it seems that the cetaceans are mainly foraging or surveying the environment in these waters in winter, followed by summer. If we compare the surveying points, YW-4 has the most clicks, while YW-1 has the least clicks. This indicates that winter may have the highest cetacean activities, including foraging and environmental detection.

In terms of the overall analysis results in 2023, in Q1 (March to May) and Q2 (June to August), no clicking sounds were detected at any survey stations (YW-1 to YW-5). In Q3 (September to November), clicking sounds were recorded only at YW-5. In Q4 (December to February), YW-1 to YW-5 recorded relatively higher detection frequencies. Based on seasonal detection data, YW-5 recorded the most clicking sounds, followed by YW-4. These findings suggest that cetaceans primarily engage in foraging or environmental exploration in this area during winter.

In terms of the overall analysis results in 2024, In Q1 (March to May), clicking sounds were detected only at YW-3. In Q2 (June to August), Q3 (September to November), and Q4 (December to February), no clicking sounds were recorded at any survey stations (YW-1 to YW-5).

In terms of the overall analysis results in Q1 of 2025 (March–May, Year 114), no cetacean click sounds were detected at monitoring stations YW-1 to YW-5.

ii. Day/Night Distribution in Each Station/Quarter

1. Whistles

In terms of the overall annual analysis in 2019, at station YW-1 in 2019, whistle sounds were mainly detected during the daytime across all seasons. At station YW-2, the number of whistle sounds detected was significantly higher during the daytime in Q1 and Q2, with no obvious day-night distribution in Q3 and Q4. At stations YW-3, YW-4, and YW-5, there was no obvious day-night distribution of whistle sounds.

In terms of the overall analysis results in 2020, for YW-1 in Q1 and Q2, no obvious day and night difference is found for whistle distribution and the whistles mainly distributed in the daytime in Q3 and Q4. No obvious difference in daytime/nighttime was found in YW-2, YW-4 and YW-5. Whistles detected in YW-3 were mostly in daytime.

In terms of the overall analysis results in 2021, Q1 and Q2, there was no obvious day-night distribution. In Q3, whistle sounds were detected at station YW-3, mainly during the nighttime. In Q4, whistle sounds were detected at stations YW-1 to YW-4, primarily during the nighttime. Overall, there was no significant day-night distribution difference.

In terms of the overall analysis results in 2022, Q2 to Q3, there was no obvious day-night distribution. In Q1, whistle sounds were detected at station YW-4, mainly during the daytime. In Q4, whistle sounds were detected at all stations, primarily during the nighttime. Overall, there was no significant day-night distribution difference.

In terms of the overall analysis results in 2023, Q1 no whistle sounds were detected at any station, and there was no significant day-night distribution difference. In Q2, whistle sounds were detected at station YW-1, mainly during the nighttime. The remaining stations YW-2 to YW-5 did not detect any whistle sounds. In Q3, whistle sounds were detected during the daytime at station YW-5, while no whistle sounds were detected at stations YW-1 to YW-4. In Q4, whistle sounds were detected at all stations. Whistle sounds at stations YW-1, YW-2, YW-4, and YW-5 were mainly distributed during the evening and nighttime, with secondary distribution around noon at stations YW-1 and YW-2.

In terms of the overall analysis results in 2024, Q1, cetacean whistles were detected at YW-1 to YW-5, which were primarily recorded during daytime. In Q2 and Q3, no cetacean whistle detections were recorded at any station. In Q4 cetacean whistle detections were recorded at YW-1, YW-4, and YW-5, mainly during evening and nighttime hours.

In terms of the overall analysis results in 2025, Q1, cetacean whistle signals were detected at monitoring stations YW-1, YW-3, and YW-5, mainly occurring during the evening and nighttime periods.

2. Clicks

In 2019, for YW-1, 3, 4, 5, no obvious difference in day and night distribution was observed; clicks in YW-2 mainly distributed in the daytime. The number of detections in the rest of the season is low, no obvious difference in day and night distribution is observed.

In 2020, YW-1 to YW-5 did not observe obvious difference in day and night distribution.

In 2021, no click is detected in YW-1 to YW-5 in Q1. In Q2, no obvious daytime/nighttime distribution is found from YW-1 to YW-3, and clicks in YW-4 and YW-5 mostly distributed in daytime. In Q3 2021, clicks were detected in YW-3 but not in YW-1, YW-2, YW-4 and YW-5. No obvious daytime/nighttime distribution is found.

In 2022 Q3, no click was detected in all stations. In Q4, clicks were detected in all stations and mostly in nighttime. No obvious daytime/nighttime distribution is found.

In 2023 Q1 (March-May), no click was detected. In Q2 (June-August), no clicks were detected in all stations, with no differences in day/night distribution. In Q3 (September-November), clicks at the YW-5 station were primarily recorded during daytime. In Q4, clicks at YW-4 and YW-5 were mainly detected during the evening and nighttime. In addition, the YW-4 and YW-5 stations recorded clicking sounds 6 hours before high tide. This season, the overall trend for cetaceans shows that their activity is mainly distributed 2 to 4 hours before high tide and 3 to 6 hours after high tide.

In 2024 Q1, clicks were only detected at YW-3, which were primarily recorded during daytime. In Q2, no cetacean click sounds were detected at YW-1 to YW-5. In Q3, no cetacean click sounds were detected at YW-1 to YW-5. In Q4, no cetacean click sounds were detected at YW-1 to YW-5.

In 2025 Q1, no cetacean click sounds were detected at stations YW-1 to YW-5.

Integrating underwater acoustic data of cetaceans over the years, YW-3 is inferred to be an area where cetaceans have a relatively longer activity time or more foraging compared to other points. In contrast, YW-4 is the area with the least occurrence. The data shows that the general swimming activity (whistles) of cetaceans is mainly in the spring and summer seasons, while foraging (clicking sounds) is more frequent in the winter. Cetacean activity is mainly during the day, with no significant difference observed in the tidal cycle impact.

V. Underwater Noise

Underwater noise analysis was conducted using data from two underwater acoustic monitoring stations, YW-3 and YW-5, selected from the cetacean ecological monitoring stations. YW-3 is located near the important habitat of the Indo-Pacific humpback dolphin, with a water depth of approximately 8 meters. YW-5 is situated at the southern boundary of the wind farm, with a water depth of approximately 18 meters. In 2020, the project completed underwater noise analysis for all four quarters seasons in 2020, 2021, 2022, and 2023. The same seasonal analyses were conducted in 2021. In 2022, only the fourth-quarter analysis was completed, while in 2023, all four quarters were analyzed. In 2024, a total of four quarters of underwater noise analyses were completed, while in 2025, Q1 of underwater noise analysis was completed. The survey periods for each site by quarter are shown in Table 3.1.1-15.

Table 3.1.1-15 Duration of Underwater Noise Analysis in Each Quarter (1/2)

Item	Location	Survey Duration
2020 Q1	YW-3	2020.4.21-2020.5.4
	YW-5	2020.4.21-2020.5.4
2020 Q2	YW-3	2020.7.1-2020.7.14
	YW-5	2020.7.1-2020.7.14
2020 Q3	YW-3	2020.11.19-2020.11.20
	YW-5	2020.11.19-2020.11.20
2020 Q4	YW-3	2021.2.21-2021.2.22
	YW-5	2021.2.21-2021.2.28
2021 Q1	YW-3	2021.5.23-2021.5.24
	YW-5	2021.5.24-2021.5.25
2021 Q2	YW-3	2021.8.25-2021.8.26
	YW-5	2021.8.26-2021.8.27
2021 Q3	YW-3	2021.11.05-2021.11.06
	YW-5	2021.11.05-2021.11.06
2021 Q4	YW-3	2022.02.27-2022.02.28
	YW-5	2022.02.27-2022.02.28
2022 Q1	YW-3	2022.05.11-2022.05.12
	YW-5	2022.05.11-2022.05.12
2022 Q2	YW-3	2022.08.17-2022.08.18
	YW-5	2022.08.17-2022.08.18
2022 Q3	YW-3	2022.09.15-2022.09.16
	YW-5	2022.09.15-2022.09.16
2022 Q4	YW-3	2023.02.12-2023.02.13
	YW-5	2023.02.17-2023.02.18

Table 3.1.1-15 Duration of Underwater Noise Analysis in Each Quarter (2/2)

Item	Location	Survey Duration
2023 Q1	YW-3	2023.05.06-2023.05.07
	YW-5	2023.05.06-2023.05.07
2023 Q2	YW-3	2023.07.19-2023.07.20
	YW-5	2023.07.19-2023.07.20
2023 Q3	YW-3	2023.09.19-2023.09.20
	YW-5	2023.09.19-2023.09.20
2023 Q4	YW-3	2024.02.14~2024.02.15
	YW-5	2024.01.31~2024.02.01
2024 Q1	YW-3	2024.05.11-2024.05.12
	YW-5	2024.05.11-2024.05.12
2024 Q2	YW-3	2024.06.08-2024.06.09
	YW-5	2024.06.08-2024.06.09
2024 Q3	YW-3	2024.11.14~2024.11.15
	YW-5	2024.11.14~2024.11.15
2024 Q4	YW-3	2025.02.10~2025.02.11
	YW-5	2025.02.10~2025.02.11
2025 Q1	YW-3	114.04.17~114.04.18
	YW-5	114.04.17~114.04.18

i. Ambient Noise Analysis

In 2020, the average noise level of YW-3 and YW-5 was 109.4 dB and 110.5dB in Q1, 124.1 dB and 125.7 dB in Q2, 139.1dB and 127.6 dB in Q3, 126.9 dB and138.0dB in Q4.

In 2021, the average noise level of YW-3 and YW-5 was 148.0 dB and 146.7 dB in Q1, 132.7 dB and 136.9dB in Q2, 134.0 dB and 152.1 dB in Q3 and 132.0dB and 128.4dB in Q4. The noise peaks were mainly dominated by the low frequency band below 1 kHz. (Table 3.1.1-16).

In 2022, the average noise level of YW-3 and YW-5were 137.9 dB and 126.1dB in Q1. The average noise level of YW-3 was 135.4 dB and 126.0dB in YW-5 in Q2. The average noise level of YW-3 was 130.6 dB and 138.7dB in YW-5 in Q3. The average noise level of YW-3 was 130.4 dB and138.5dB in YW-5 in Q4.

In 2023, the average noise level of YW-3 and YW-5 were 116.0 dB and 130.0dB in Q1, 133.2 dB and 125.5dB in Q2, 129.8dB and 125.6dB in Q3, 145.9 dB and 157.2dB in Q4.

In 2024, the average noise level of YW-3 and YW-5 were 157.6 dB and 153.4 dB in Q1. The average noise level of YW-3 and YW-5 were 103.7 dB and 105.4 dB respectively in Q2. In Q3, YW-3 point average noise level: 151.0 dB, YW-5 point average noise level: 138.3 dB. In Q4, YW-3 point average noise level: 119.2 dB, YW-5 point average noise level: 119.7 dB.

In 2025, the average noise level at station YW-3 was 124.7 dB, while at station YW-5 it was 123.5 dB in Q1.

Table 3.1.1-16 Frequency Band of the Ambient Noise in Each Quarter (dB re 1μPa) (1/4)

Year	Site	Frequency Band	Mean	L_{90}	L_{50}	L_5
2020 Q1	YW-3	20-20000 Hz	109.4	101.7	108.2	123.4
		3000-9000 Hz	90.4	82.9	90.9	99.9
	YW-5	20-20000 Hz	110.5	104.3	110.4	121.3
		3000-9000 Hz	90.7	83.8	90.9	99.2
2020 Q2	YW-3	20-20000 Hz	124.1	113.4	125.5	134.6
		3000-9000 Hz	97.6	90.3	97.7	107.0
	YW-5	20-20000 Hz	125.7	114.0	127.0	136.5
		3000-9000 Hz	98.7	90.3	98.7	109.9
2020 Q3	YW-3	20-20000 Hz	139.1	121.8	142.5	150.2
		3000-9000 Hz	103.9	96.6	103.9	111.1
	YW-5	20-20000 Hz	127.6	116.1	130.2	142.9
		3000-9000 Hz	102.8	93.5	102.8	111.6
2020 Q4	YW-3	20-20000 Hz	126.9	123.1	127.1	131.8
		3000-9000 Hz	113.1	107.7	114.0	118.9
	YW-5	20-20000 Hz	138.0	128.7	138.4	147.0
		3000-9000 Hz	112.9	107.9	112.8	118.7
2021 Q1	YW-3	20-20000 Hz	148.0	129.3	150.4	157.9
		3000-9000 Hz	138.2	133.0	136.1	142.1
	YW-5	20-20000 Hz	146.7	123.3	144.6	151.4
		3000-9000 Hz	140.7	131.8	134.7	148.5
2021 Q2	YW-3	20-20000 Hz	132.7	115.2	127.8	138.5
		3000-9000 Hz	110.1	92.4	100.7	116.8
	YW-5	20-20000 Hz	136.9	120.2	130.6	143.1
		3000-9000 Hz	109.3	92.4	103.9	114.7
2021 Q3	YW-3	20-20000 Hz	134.0	108.6	126.6	134.6
		3000-9000 Hz	102.4	82.4	90.3	108.6
	YW-5	20-20000 Hz	152.1	114.1	132.9	154.9
		3000-9000 Hz	113.1	89.5	98.3	110.4

Note: Piling operations were carried out on 2020.11.19 -2021.02.21, which overlap with the underwater noise survey period in 2020 Q3 and Q4.

Table 3.1.1-16 Frequency Band of the Ambient Noise in Each Quarter (dB re 1μPa) (2/4)

Year	Site	Frequency Band	Mean	L_{90}	L_{50}	L_5
2021 Q4	YW-3	20-20000 Hz	132.0	107.8	122.0	138.4
2021 Q4	YW-3	2500-10000 Hz	100.2	89.1	94.7	104.9
2021 Q4	YW-5	20-20000 Hz	128.4	112.9	123.4	130.8
2021 Q4	YW-5	2500-10000 Hz	106.5	88.6	93.8	111.1
2022 Q1	YW-3	20-20000 Hz	137.9	110.2	119.8	136.6
2022 Q1	YW-3	2500-10000 Hz	104.4	86.2	92.4	112.0
2022 Q1	YW-5	20-20000 Hz	126.1	106.2	118.4	133.3
2022 Q1	YW-5	2500-10000 Hz	106.5	88.6	93.8	111.1
2022 Q2	YW-3	20-20000 Hz	135.4	106.9	124.3	137.9
2022 Q2	YW-3	2500-10000 Hz	130.2	89.8	116.1	134.3
2022 Q2	YW-5	20-20000 Hz	126.0	111.8	124.7	131.2
2022 Q2	YW-5	2500-10000 Hz	106.5	88.6	93.8	111.1
2022 Q3	YW-3	20-20000 Hz	130.6	114.9	124.8	136.5
2022 Q3	YW-3	2500-10000 Hz	115.5	97.3	104.6	122.4
2022 Q3	YW-5	20-20000 Hz	138.7	134.5	138.7	140.8
2022 Q3	YW-5	2500-10000 Hz	124.5	120.9	123.9	127.1
2022 Q4	YW-3	20-20000 Hz	130.4	107.8	115.0	125.8
2022 Q4	YW-3	2500-10000 Hz	105.7	80.9	86.7	106.5
2022 Q4	YW-5	20-20000 Hz	138.	106.7	120.4	142.1
2022 Q4	YW-5	2500-10000 Hz	99.6	91.6	95.6	103.1
2023 Q1	YW-3	20-20000 Hz	116.0	102.5	111.4	121.6
2023 Q1	YW-3	2500-10000 Hz	93.7	86.4	90.6	96.8
2023 Q1	YW-5	20-20000 Hz	130.0	123.1	129	133.8
2023 Q1	YW-5	2500-10000 Hz	115.3	105.9	112.1	119.6

Note: Piling operations were carried out on 2020.11.19 -2021.02.21, which overlap with the underwater noise survey period in 2020 Q3 and Q4.

Table 3.1.1-16 Frequency Band of the Ambient Noise in Each Quarter (dB re 1μPa) (3/4)

Year	Site	Frequency Band	Mean	L_{90}	L_{50}	L_5
2023 Q2	YW-3	20-20000 Hz	133.2	119.3	126.1	138.1
		2500-10000 Hz	114.4	92.8	99.1	122.6
	YW-5	20-20000 Hz	125.5	106.5	119.2	132.2
		2500-10000 Hz	111.2	88.0	95.1	120.1
2023 Q3	YW-3	20-20000 Hz	129.8	101.2	119.8	137.4
		2500-10000 Hz	115.2	89.7	94.6	123.5
	YW-5	20-20000 Hz	125.6	109.9	117.4	128.2
		2500-10000 Hz	103.9	91.1	96.6	109.2
2023 Q4	YW-3	20-20000 Hz	145.9	137.6	143.1	150.7
		2500-10000 Hz	127.1	121.4	122.9	130.7
	YW-5	20-20000 Hz	157.2	137.2	153.4	163.1
		2500-10000 Hz	131.9	122.9	127.9	136.5
2024 Q1	YW-3	20-20000 Hz	157.6	133.8	144.6	162.6
		2500-10000 Hz	139.5	123.3	132.0	141.0
	YW-5	20-20000 Hz	153.4	145.0	149.2	158.1
		2500-10000 Hz	131.9	122.9	127.9	136.5
2024 Q2	YW-3	20-20000 Hz	104.4	109.0	116.5	113.7
		2500-10000 Hz	92.6	97.7	104.7	102.3
	YW-5	20-20000 Hz	115.9	126.5	135.4	130.0
		2500-10000 Hz	95.8	100.4	107.6	104.7
2024 Q3	YW-3	20~20000 Hz	151.0	105.2	143.1	156.4
		2500~10000 Hz	105.7	89.7	101.0	111.3
	YW-5	20~20000 Hz	138.3	115.0	131.1	144.8
		2500~10000 Hz	109.3	92.2	96.8	111.8
2024 Q4	YW-3	20~20000 Hz	119.2	98.8	112.7	125.1
		2500~10000 Hz	93.6	79.8	88.8	96.0
	YW-5	20~20000 Hz	119.7	109.0	114.6	124.7
		2500~10000 Hz	102.7	87.4	93.7	106.7

Note: Piling operations were carried out on 2020.11.19 -2021.02.21, which overlap with the underwater noise survey period in 2020 Q3 and Q4.

Table 3.1.1-16 Frequency Band of the Ambient Noise in Each Quarter (dB re 1μPa) (4/4)

Year	Site	Frequency Band	Mean	L_{90}	L_{50}	L_5
2025 Q1	YW-3	20-20000 Hz	124.7	102.0	119.4	130.5
		2500-10000 Hz	103.8	85.4	88.8	112.5
	YW-5	20-20000 Hz	123.5	105.5	118.5	129.5
		2500-10000 Hz	103.4	92.3	95.4	107.1

Note: Piling operations were carried out on 2020.11.19 -2021.02.21, which overlap with the underwater noise survey period in 2020 Q3 and Q4.

ii. 1/3 Octave Band Analysis

The 1/3 Octave band level of each season at the two locations varied from 5% to 95% of the total sound pressure level is shown as Table 3.1.1-17 and Figure 3.1.1-15.

The results indicate that in 2020, the total sound pressure level, SPL (20~20k Hz) increased from 110 dB in Q2 to over 130 dB in Q4. In 2021, the SPL(20~20k Hz) rose from 127 dB to over 140 dB, which is speculated to be caused by the construction activities of surrounding construction vessels near the Yunlin wind farm.

In Q1 of 2022, the SPL (20~20k Hz) at YW-3 ranged from 110.2 to 136.6 dB, and at YW-5, it ranged from 106.2 to 133.3 dB. From Q1 to Q4 of 2023, the total sound pressure level (20~20k Hz) at YW-3 ranged from 116 dB to 145.9 dB, and at YW-5, it ranged from 125.5 dB to 157.2 dB. In Q1 of 2024, the total SPL(20~20k Hz) at YW-3 ranged from 133.8 dB to 162.6 dB, and at YW-5, it ranged from 145 dB to 158.1 dB. In Q2 of 2024, the SPL at YW-3 ranged from 104.4 dB to 116.5 dB, and at YW-5, it ranged from 115.9 dB to 135.4 dB. In Q3, SPL at YW-3 ranged from 105.2 dB to 156.4 dB, and at YW-5, it ranged from 115.0 dB to 144.8 dB. In Q4, the SPL at station YW-3 ranged from 98.8 dB to 125.1 dB, while at station YW-5 it ranged from 109.0 dB to 124.7 dB.

Regarding underwater ambient noise, the time-frequency variation of underwater sound signals is quite complex. Environmental noise, vessel noise, and biological noise all exhibit temporal and geographical variations with broad ranges of signal lengths and frequency ranges. Detailed background noise variations still require long-term monitoring and analysis.

Table 3.1.1-17 Annual Total SPL Statistics for Yunlin Wind Farm (20~20k Hz) (1/2)

Quarter	Location	L_{90}	L_{50}	L_{5}
2020 Q1	YW-3	101.7	108.2	123.4
	YW-5	104.3	110.4	121.3
2020 Q2	YW-3	113.4	125.5	134.6
	YW-5	114.0	127.0	136.5
2020 Q3	YW-3	121.8	142.5	150.2
	YW-5	116.1	130.2	142.9
2020 Q4	YW-3	123.1	127.1	131.8
	YW-5	128.7	138.4	147.0
2021 Q1	YW-3	129.3	150.4	157.9
	YW-5	123.3	144.6	151.4
2021 Q2	YW-3	115.2	127.8	138.5
	YW-5	120.2	130.6	143.1
2021 Q3	YW-3	108.6	126.6	134.6
	YW-5	114.1	132.9	154.9
2021 Q4	YW-3	107.8	122.0	138.4
	YW-5	112.9	123.4	130.8
2022 Q1	YW-3	110.2	119.8	136.6
	YW-5	106.2	118.4	133.3
2022 Q2	YW-3	106.9	124.3	137.9
	YW-5	111.8	124.7	131.2
2022 Q3	YW-3	114.9	124.8	136.5
	YW-5	134.5	138.7	140.8
2022 Q4	YW-3	107.8	115.0	125.8
	YW-5	106.7	120.4	142.1

Table 3.1.1-17 Annual Total SPL Statistics for Yunlin Wind Farm (20~20k Hz) (2/2)

Quarter	Location	L_{90}	L_{50}	L_5
2023 Q1	YW-3	102.5	111.4	121.6
	YW-5	123.1	129.0	133.8
2023 Q2	YW-3	119.3	126.1	138.1
	YW-5	106.5	119.2	132.2
2023 Q3	YW-3	101.2	119.8	137.4
	YW-5	109.9	117.4	128.2
2023 Q4	YW-3	137.6	143.1	150.7
	YW-5	137.2	153.4	163.1
2024 Q1	YW-3	133.8	144.6	162.6
	YW-5	145.0	149.2	158.1
2024 Q2	YW-3	104.4	109.0	116.5
	YW-5	115.9	126.5	135.4
2024 Q3	YW-3	105.2	143.1	156.4
	YW-5	115.0	131.1	144.8
2024 Q4	YW-3	98.8	112.7	125.1
	YW-5	109.0	114.6	124.7
2025 Q1	YW-3	102.0	119.4	130.5
	YW-5	105.5	118.5	129.5

Note 1: Unit: dB re 1μPa
Note 2: The underwater noise measurements during 2020 Q3 and Q4 and 2024 Q1 and Q2 coincided with piling operations on 2020.11.19, 2021.02.21, 2024.05.11, and 2024.06.08, respectively.

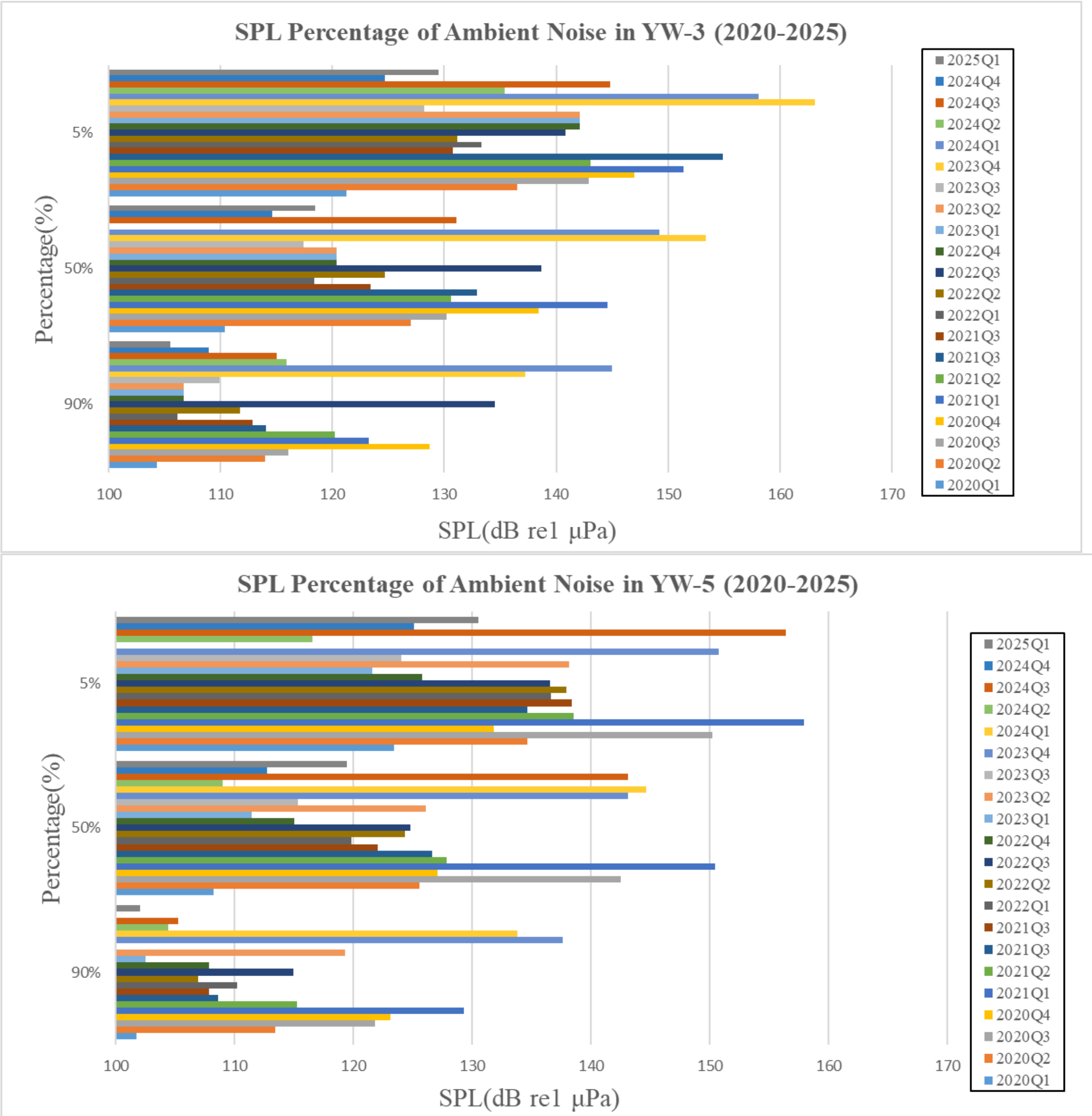


Figure 3.1.1-15 Historical Survey of the Percentage of SPL of the Ambient Noise in Yunneng OWF

VI. Visual Monitoring of Cetacean Ecology

30 surveys were conducted between March 2016 and March 2017. A total of 7 herds of cetacean were monitored (Figure 3.1.1-16), including 2 herds of Indo-Pacific humpback dolphin or Chinese-white dolphins (Sousa chinensis), 3 herds of finless porpoises, 1 herd of bottle-nosed dolphins and 1 individual of unknown cetacean. The sighting rate is 0.30herds/100km, 0.43 herds/10 hrs. and 0.23 herds/survey.

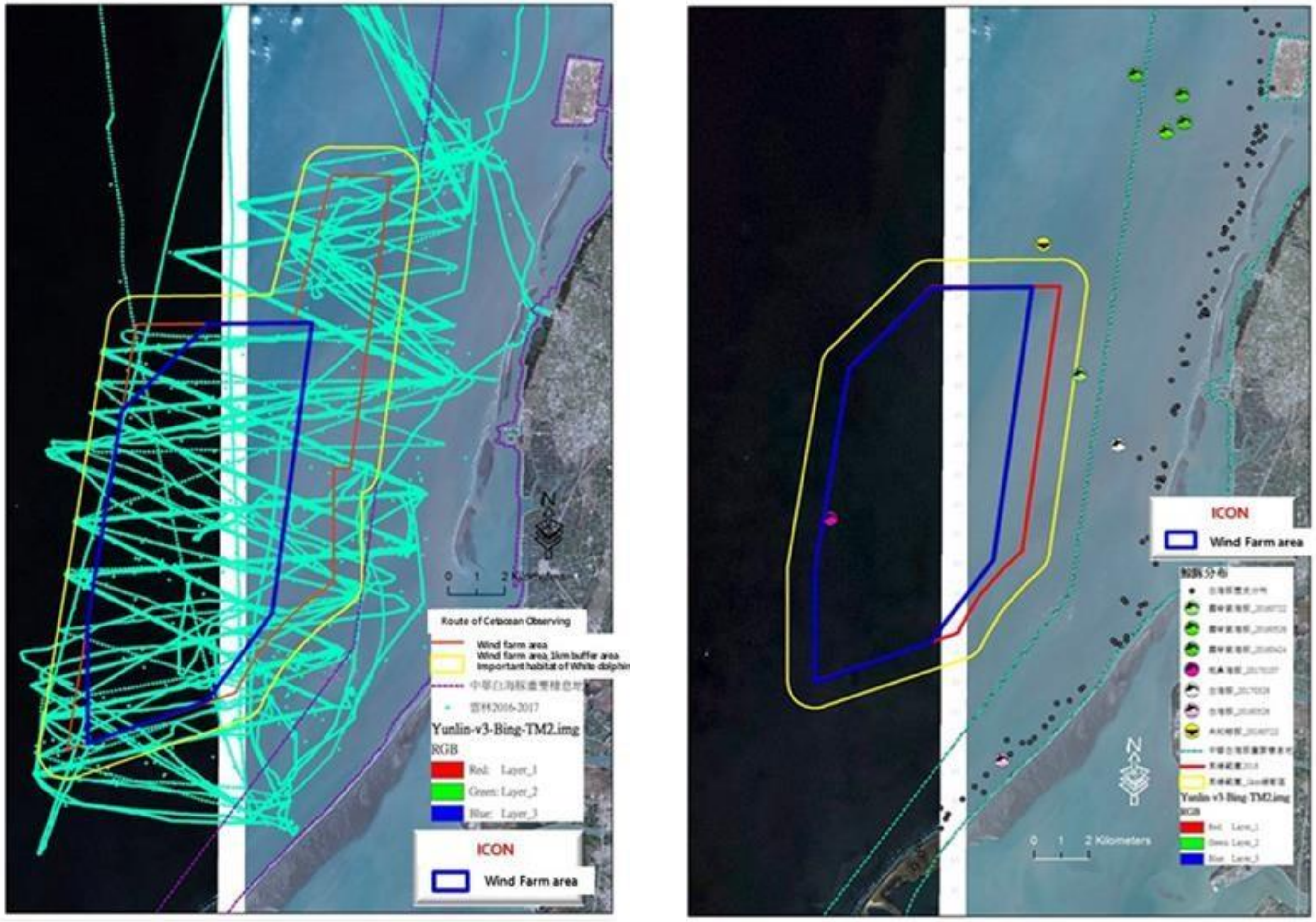


Figure 3.1.1-16 Transect Lines and Results of Cetacean Surveys during EIS Stage (March 2016 to March 2017)

Visual monitoring of cetacean ecology started from March 2019, 30 survey trips annually were conducted until February 2020, with 175.84 total survey hours, covering a distance of 3,496.2 km in total mileage. The on-transect survey duration was 111.43 on-effort hours, covering a distance of 1,773.7 km in on-effort mileage, as shown in Table 3.1.1-18.

In addition, visual monitoring of cetacean ecology during the offshore construction has started since March 2020, the results are detailed in Table 3.1.1-18. The annual survey efforts are as follows:

1. From March 2020 to the end of February 2021: A total of 30 surveys were completed, with a total survey duration of 172.67 hours, covering a distance of 3,475 kilometers. The on-transect survey duration was 116.73 hours, covering a distance of 1,624.5 kilometers.
2. From March 2021 to the end of February 2022: A total of 30 surveys were completed, with a total survey duration of 170.22 hours, covering a distance of 3,565 kilometers. The on-transect survey duration was 107.54 hours, covering a distance of 1,554.0 kilometers.
3. From March 2022 to the end of February 2023: A total of 30 surveys were completed, with a total survey duration of 175.57 hours, covering a distance of 3,539.0 kilometers. The on-transect survey duration was 116.65 hours, covering a distance of 1,712.0 kilometers.
4. From March 2023 to the end of February 2024: A total of 30 surveys were completed, with a total survey duration of 170.34 hours, covering a distance of 3,448.0 kilometers. The on-transect survey duration was 108.31 hours, covering a distance of 1,630.0 kilometers.
5. From March 2024 to the end of February 2025: A total of 30 survey trips were completed, with a cumulative survey duration of 116.95 hours and a total distance of 3,380.7 kilometers. The on-transect survey duration was 198.90 hours, covering a distance of 1,592.2 kilometers.

6. From March 2025 to the end of May 2025, 12 out of the on effort planned 30 survey trips for the year were completed, totaling 147.48 hours and 1,581.2 km, with transect line surveys accounting for 54.82 hours and 718.6 km.

From the pre-construction phase through the construction and operation phases, a cumulative total of 192 marine mammal visual monitoring surveys were conducted. Cetaceans were sighted during transect surveys on 10 occasions, totaling 12 groups: 3 groups of finless porpoises (*Neophocaena sunameri*), 5 groups of bottlenose dolphins (Tursiops spp.), and 4 groups of unidentified cetaceans (unidentifiable due to the brief duration of the sightings). The environmental parameters at the cetacean sighting locations are shown in Table 3.1.1-19, and the locations and movement tracks of the sightings are illustrated in Figures 3.1.1-17 to 3.1.1-21, as detailed below.

Table 3.1.1-18 Previous Cetacean Visual Survey (1/7)

Trips		Survey Date	Transect[R1] Line		Total Hours (hour)	Total Mileage (km)	On-Effort Hours (hours)	On-Effort Mileage (km)	Sighting Rate (herd)
			Departure	Return					
2019 Q1	1	April 25th	6	5	6.08	108.0	4.38	58.4	1
	2	May14th	1	2	5.98	116.0	4.55	67.3	0
	3	May15th	4	3	4.95	107.0	3.80	58.1	0
	4	May 25th	6	5	6.08	110.0	4.33	57.9	1
	subtotal	4 trips	--	--	23.09	441.0	17.06	241.7	2
2019 Q2	1	June 25th	2	3	5.11	105.0	3.42	56.1	0
	2	June 26th [R2]	3	4	4.40	90.9	1.76	28.2	0
	3	July 15th	3	4	5.04	105.0	3.62	57.5	0
	4	July 16th	5	3	4.94	106.0	3.51	57.0	0
	5	July 23rd	3	1	6.06	119.0	4.20	66.7	0
	6	July 24th	6	4	4.74	107.0	3.46	57.3	0
	7	July 25th	3	5	5.11	105.0	3.63	57.1	0
	8	July 26th	6	2	5.20	2,020.0	3.72	57.3	0
	9	August 22nd	1	2	5.60	116.0	4.08	67.3	0
	10	August 23rd	3	4	5.04	104.0	3.53	57.7	0
	11	August 27th	5	6	5.07	106.0	3.44	57.3	0
	12	August 28th	1	4	6.40	108.0	4.05	66.0	0
	subtotal	12 trips	--	--	62.70	1,280.9	42.41	685.5	--
2019 Q3	1	September 9th	2	5	5.38	119.0	3.16	55.5	1
	2	September 10th	3	6	4.82	2,020.0	3.25	56.4	0
	3	September 11th	1	2	6.06	122.0	4.18	65.7	0
	4	October 2nd	5	6	5.68	111.0	3.54	57.5	0
	5	October 3rd	4	3	5.00	103.0	3.66	57.4	0
	6	October 4th	1	2	5.82	115.0	4.37	66.6	0
	7	October 5th	5	6	6.73	2,020.0	3.74	57.2	0
	subtotal	7 trips	--	--	39.49	788.0	25.90	416.3	1
2019 Q4	1	December 10th	4	1	6.44	136.0	3.83	68.8	0
	2	December 16th	2	1	9.60	188.3	3.60	66.7	0
	3	December 14th	6	1	9.83	209.0	4.06	66.9	0
	4	December 29th	5	6	6.89	117.0	3.33	55.7	0
	5	January 3rd	4	3	6.39	117.0	3.31	56.8	1
	6	February 25th	4	5	5.50	108.0	3.80	57.7	0
	7	February 26th	2	5	5.90	111.0	4.12	57.6	0
	Subtotal	7 trips	--	--	50.55	986.3	26.05	430.2	1
Total		30 trips	--	--	175.84	3,496.2	111.43	1,773.7	4

Remark1: Number of transect line (departure and return) indicates the numbered planned cetacean transect line survey route as shown in Figure 1.4-2.

Remark2" Due to a weather change on 26th June, strengthening wind and wave resulted in combers that covered more than 50% of the visible range of sea surface; it also affected sailing safety. Therefore, the sailing ended in advance. Besides, on-effort mileage (28.2 km) has reached half of the scheduled value (57 km), and is therefore included in the calculation of standard siting rate.

Table 3.1.1-18 Previous Cetacean Visual Survey (2/7)

Trips		Survey Date	Transect[R1] Line		Total Hours (hour)	Total Mileage (km)	On-Effort Hours (hours)	On-Effort Mileage (km)	On-effort Sighting (herd (individual))	Off-effort Sighting (herd (individual))
			Departure	Return						
2020 Q1	1	April 17	1	2	5.89	116.0	4.69	66.7	0	0
	2	May 1	2	5	5.57	109.0	4.18	57.5	0	0
	3	May 2	4	3	5.47	103.0	4.16	57.2	0	0
	4	May 5	3	1	6.07	120.0	4.77	67.8	0	0
	5	May 8	6	4	5.68	114.0	3.93	57.0	0	1(3)
	6	May 9	5	6	5.47	109.0	4.21	57.8	0	0
	Subtotal	6 trips	--	--	34.15	671.0	25.94	364.0	--	1
2020 Q2	1	June 01	4	5	5.94	106.0	4.31	57.4	0	0
	2	June 02	3	6	5.55	108.0	4.08	56.5	0	0
	3	June 11	1	2	6.41	116.0	5.00	66.6	0	0
	4	June 12	2	3	6.07	112.0	4.38	57.2	0	0
	5	July 21	6	1	6.17	125.0	4.60	65.6	0	0
	6	July 22	5	4	5.57	109.0	4.14	56.5	0	0
	7	July 29	1	6	6.58	125.0	4.89	65.9	0	0
	8	July 30	5	1	6.21	123.0	4.56	66.1	0	0
	9	August 17	2	5	5.57	114.0	3.99	56.7	0	0
	10	August 18	4	3	5.37	111.0	4.05	57.2	0	0
	Subtotal	10 trips	--	--	59.44	1,149.0	44.00	605.7	--	--
2020 Q3	1	September 7	6	4	5.87	111.0	4.36	56.9	0	0
	2	September 8	3	2	5.48	108.0	3.92	56.7	0	0
	3	November 17	5	6	5.28	112.0	3.58	50.9	0	0
	4	November 18	3	1	6.85	126.0	4.53	61.3	0	0
	5	November 19	1	4	5.80	125.0	4.05	59.6	0	0
	6	November 20	6	5	5.14	117.0	3.05	44.9	0	0
	Subtotal	6 trips	--	--	34.42	699.0	23.49	330.3	--	--
2020 Q4	1	Jan 13	2	3	4.87	101.0	1.56	22.4	0	0
	2	Jan 14	4	2	5.72	119.0	3.09	42.4	0	0
	3	Jan 15	5	6	5.99	119.0	3.33	47.5	0	0
	4	Jan 31	2	5	4.91	124.0	2.22	32.1	0	0
	5	Feb 1	4	3	5.70	115.0	3.69	52.0	0	0
	6	Feb 5	3	2	5.86	129.0	2.79	39.2	2(1, 1)	0
	7	Feb 6	1	4	6.17	131.0	3.49	46.2	0	0
	8	Feb 21	6	3	5.44	118.0	3.13	42.7	0	1(1)
	Subtotal	8 trips	--	--	44.66	956.0	23.30	324.5	2	1
Total(2020)		30 trips	--	--	172.67	3,475.0	116.73	1,624.5	2	2

Remark1: Number of transect line (departure and return) indicates the numbered planned cetacean transect line survey route as shown in Figure 1.4-2.

Remark 2: A group of three white dolphins was spotted outside the survey area (near Budai Port).

Table 3.1.1-18 Previous Cetacean Visual Survey (3/7)

<table>
<tr><th colspan="2" rowspan="2">Trips</th><th rowspan="2">Survey Date</th><th colspan="2">Transect Line R1</th><th rowspan="2">Total Hours (hour)</th><th rowspan="2">Total Mileage (km)</th><th rowspan="2">On-Effort Hours (hours)</th><th rowspan="2">On-Effort Mileage (km)</th><th rowspan="2">On-effort Sighting (herd (individual)</th><th rowspan="2">Off-effort Sighting (herd (individual)</th></tr>
<tr><th>Departure</th><th>Return</th></tr>
<tr><td rowspan="11">2021 Q1</td><td>1</td><td>March 15</td><td>5</td><td>2</td><td>6.12</td><td>130.0</td><td>3.35</td><td>46.6</td><td>1(3)</td><td>0</td></tr>
<tr><td>2</td><td>March 16</td><td>1</td><td>4</td><td>6.10</td><td>130.0</td><td>3.81</td><td>52.8</td><td>0</td><td>0</td></tr>
<tr><td>3</td><td>March 29</td><td>6</td><td>1</td><td>5.74</td><td>135.0</td><td>3.59</td><td>50.9</td><td>0</td><td>0</td></tr>
<tr><td>4</td><td>March 30</td><td>3</td><td>6</td><td>5.28</td><td>114.0</td><td>3.42</td><td>50.0</td><td>0</td><td>0</td></tr>
<tr><td>5</td><td>April 12</td><td>2</td><td>5</td><td>5.20</td><td>121.0</td><td>3.11</td><td>45.3</td><td>0</td><td>0</td></tr>
<tr><td>6</td><td>April 13</td><td>4</td><td>3</td><td>5.41</td><td>115.0</td><td>3.80</td><td>52.8</td><td>0</td><td>0</td></tr>
<tr><td>7</td><td>April 28</td><td>5</td><td>4</td><td>5.49</td><td>118.0</td><td>3.20</td><td>43.8</td><td>0</td><td>0</td></tr>
<tr><td>8</td><td>May 13</td><td>1</td><td>5</td><td>5.95</td><td>131.0</td><td>3.66</td><td>51.3</td><td>0</td><td>0</td></tr>
<tr><td>9</td><td>May 28</td><td>2</td><td>6</td><td>5.55</td><td>122.0</td><td>3.23</td><td>44.5</td><td>0</td><td>0</td></tr>
<tr><td>10</td><td>May 29</td><td>4</td><td>3</td><td>5.95</td><td>118.0</td><td>3.61</td><td>48.7</td><td>0</td><td>0</td></tr>
<tr><td>Subtotal</td><td>10 trips</td><td>--</td><td>--</td><td>56.71</td><td>1,234.0</td><td>34.78</td><td>486.7</td><td>1</td><td>--</td></tr>
<tr><td rowspan="11">2021 Q2</td><td>1</td><td>June 10</td><td>3</td><td>1</td><td>5.95</td><td>132.0</td><td>3.90</td><td>55.0</td><td>0</td><td>0</td></tr>
<tr><td>2</td><td>June 11</td><td>6</td><td>2</td><td>5.14</td><td>121.0</td><td>3.16</td><td>44.3</td><td>0</td><td>0</td></tr>
<tr><td>3</td><td>July 5</td><td>1</td><td>5</td><td>6.26</td><td>126.0</td><td>4.46</td><td>62.9</td><td>0</td><td>0</td></tr>
<tr><td>4</td><td>July 12</td><td>5</td><td>2</td><td>5.22</td><td>120.0</td><td>3.12</td><td>44.3</td><td>0</td><td>0</td></tr>
<tr><td>5</td><td>July 13</td><td>6</td><td>1</td><td>6.04</td><td>128.0</td><td>4.24</td><td>59.7</td><td>0</td><td>0</td></tr>
<tr><td>6</td><td>July 14</td><td>3</td><td>4</td><td>5.55</td><td>115.0</td><td>3.80</td><td>51.8</td><td>0</td><td>0</td></tr>
<tr><td>7</td><td>August 17</td><td>4</td><td>3</td><td>6.65</td><td>105.0</td><td>3.27</td><td>48.2</td><td>0</td><td>0</td></tr>
<tr><td>8</td><td>August 18</td><td>2</td><td>6</td><td>5.33</td><td>118.0</td><td>3.30</td><td>50.0</td><td>0</td><td>0</td></tr>
<tr><td>9</td><td>August 27</td><td>5</td><td>3</td><td>4.85</td><td>121.0</td><td>2.76</td><td>39.0</td><td>0</td><td>0</td></tr>
<tr><td>10</td><td>August 28</td><td>2</td><td>5</td><td>5.24</td><td>115.0</td><td>3.69</td><td>54.7</td><td>0</td><td>0</td></tr>
<tr><td>Subtotal</td><td>10 trips</td><td>--</td><td>--</td><td>56.23</td><td>1,201.0</td><td>35.70</td><td>509.9</td><td>--</td><td>--</td></tr>
<tr><td rowspan="7">2021 Q3</td><td>1</td><td>September 6</td><td>3</td><td>4</td><td>5.17</td><td>112.0</td><td>3.35</td><td>49.9</td><td>0</td><td>0</td></tr>
<tr><td>2</td><td>September 7</td><td>6</td><td>2</td><td>5.76</td><td>120.0</td><td>3.44</td><td>48.5</td><td>0</td><td>0</td></tr>
<tr><td>3</td><td>September 22</td><td>4</td><td>1</td><td>5.67</td><td>125.0</td><td>3.65</td><td>53.8</td><td>0</td><td>0</td></tr>
<tr><td>4</td><td>September 23</td><td>1</td><td>6</td><td>5.62</td><td>127.0</td><td>3.67</td><td>55.5</td><td>0</td><td>0</td></tr>
<tr><td>5</td><td>November 5</td><td>4</td><td>5</td><td>5.55</td><td>111.0</td><td>3.72</td><td>54.2</td><td>0</td><td>0</td></tr>
<tr><td>6</td><td>November 6</td><td>5</td><td>4</td><td>5.16</td><td>112.0</td><td>3.48</td><td>50.5</td><td>0</td><td>0</td></tr>
<tr><td>Subtotal</td><td>6 trips</td><td>--</td><td>--</td><td>32.93</td><td>707.0</td><td>21.31</td><td>312.4</td><td>--</td><td>--</td></tr>
<tr><td rowspan="5">2021 Q4</td><td>1</td><td>December 16</td><td>1</td><td>6</td><td>6.03</td><td>128.0</td><td>4.42</td><td>65.9</td><td>0</td><td>0</td></tr>
<tr><td>2</td><td>February 26</td><td>6</td><td>2</td><td>6.82</td><td>113.0</td><td>3.62</td><td>56.9</td><td>0</td><td>0</td></tr>
<tr><td>3</td><td>February 28</td><td>2</td><td>3</td><td rowspan="2">11.49</td><td rowspan="2">182.0</td><td>3.41</td><td>56.9</td><td>0</td><td>0</td></tr>
<tr><td>4</td><td>February 28</td><td>3</td><td>1</td><td>4.30</td><td>65.3</td><td>0</td><td>0</td></tr>
<tr><td>Subtotal</td><td>4 trips</td><td>--</td><td>--</td><td>24.34</td><td>423.0</td><td>15.75</td><td>245</td><td>--</td><td>--</td></tr>
<tr><td colspan="2">Total(2021)</td><td>30 trips</td><td>--</td><td>--</td><td>170.22</td><td>3,565.0</td><td>107.54</td><td>1,544.0</td><td>1</td><td>--</td></tr>
</table>

Remark 1: The numbers on the crossing lines (outbound and return) represent the route numbers planned for the cetacean crossing line survey in this project, as detailed in Figure 1.4-2.

Remark 2: On March 15th, an unidentified group of cetaceans was spotted on the crossing line. Due to the short observation time, their species could not be identified.

Table 3.1.1-18 Previous Cetacean Visual Survey (4/7)

Trips		Survey Date	Transect Line R1		Total Hours (hour)	Total Mileage (km)	On-Effort Hours (hours)	On-Effort Mileage (km)	On-effort Sighting (herd (individual)	Off-effort Sighting (herd (individual)
			Departure	Return						
2022 Q1	1	March 01	3	6	5.51	117.0	3.77	55.1	0	0
	2	March 17	2	5	5.51	117.0	3.81	57.2	0	0
	3	March 25	4	2	5.79	112.0	3.87	56.7	0	0
	4	April 21	6	3	6.64	120.0	4.36	58.1	0	0
	5	April 27	5	1	5.88	125.0	4.45	65.6	0	0
	6	May 11	1	4	5.92	123.0	4.10	60.2	0	0
	7	May 12	4	5	5.50	114.0	3.73	55.0	0	0
	Subtotal	7 trips	--	--	40.55	828.0	28.09	407.9	--	--
2022 Q2	1	June 03	2	4	5.38	116.0	3.85	57.3	0	0
	2	June 04	6	3	5.61	118.0	3.94	58.6	0	0
	3	June 12	3	1	5.67	119.0	4.27	65.7	0	0
	4	June 13	5	2	6.58	121.0	4.18	57.9	0	0
	5	June 14	1	6	6.34	128.0	4.36	65.7	0	0
	6	June 23	5	3	5.18	115.0	3.54	53.5	0	0
	7	June 24	1	5	5.69	121.0	3.66	56.5	0	0
	8	July 09	4	6	5.57	121.0	3.17	47.5	0	0
	9	July 10	3	1	6.07	124.0	4.30	64.8	0	0
	10	July 13	2	4	5.44	116.0	3.65	57.0	0	0
	11	July 30	6	2	6.09	120.0	3.69	50.2	0	0
	12	August 16	3	5	5.51	112.0	3.63	52.2	0	0
	13	August 17	4	1	6.26	121.0	4.29	63.9	0	0
	14	August 18	6	4	5.78	111.0	3.99	56.6	0	0
	15	August 21	5	6	5.73	107.0	3.75	53.4	0	0
	16	August 22	1	2	5.75	120.0	3.65	54.7	0	0
	Subtotal	16 trips	--	--	92.65	2,718.0	61.92	915.5	--	--
2022 Q3	1	September 15	2	3	5.09	113.0	2.84	42.1	0	0
	2	September 19	4	1	7.01	120.0	4.30	63.6	0	0
	3	October 02	6	2	5.57	114.0	3.63	51.9	0	0
	Subtotal	3 trips	--	--	17.67	347.0	10.77	157.6	--	--
2022 Q4	1	January 12	5	3	5.53	111.0	3.79	56.6	0	0
	2	January 13	3	6	5.81	118.0	3.67	53.6	0	0
	3	January 14	1	4	7.57	131.0	4.52	64.2	3(14)	0
	4	February 1	2	5	5.80	114.0	3.91	56.6	0	0
	Subtotal	4 trips	--	--	15.88	474.0	15.89	231.0	3	0
Total		30 trips	--	--	166.75	4,367.0	116.67	1,712.0	6	--

Remark1: Number of transect line (departure and return) indicates the numbered planned cetacean transect line survey route as shown in Figure 1.4-2

Table 3.1.1-18 Previous Cetacean Visual Survey (5/7)

Trips		Survey Date	Transect Line R1		Total Hours (hour)	Total Mileage (km)	On-Effort Hours (hours)	On-Effort Mileage (km)	On-effort Sighting (herd (individual)	Off-effort Sighting (herd (individual)
			Departure	Return						
2023 Q1	1	March 8	3	5	5.10	108.0	3.16	47.3	0	0
	2	March 21	4	2	5.50	116.0	3.55	54.7	0	0
	3	March 23	6	3	5.80	117.0	3.62	49.7	0	0
	4	April 18	5	2	5.17	116.0	3.22	50.2	0	0
	5	May 4	5	1	5.68	122.0	4.03	63.2	0	0
	6	May 6	2	4	5.39	112.0	3.54	45.8	0	0
	7	May 17	1	4	5.44	122.0	2.40	58.1	0	0
	8	May 26	2	6	5.53	120.0	2.40	52.1	0	0
	Subtotal	8 trips	--	--	43.61	933.0	25.92	421.1	--	--
2023 Q2	1	June 7	3	6	5.99	121.0	3.76	54.0	0	0
	2	June 26	2	1	6.34	123.0	4.37	64.1	0	0
	3	June 27	6	2	5.15	116.0	3.17	48.4	0	0
	4	June 28	4	3	5.45	110.0	3.62	54.4	0	0
	5	July 11	1	6	6.41	126.0	4.13	59.6	0	1(1)
	6	July 12	5	6	5.08	109.0	3.19	49.7	0	0
	7	July 13	4	5	5.54	109.0	3.31	51.2	0	0
	8	July 20	3	4	6.03	111.0	3.22	46.5	0	1(6)
	9	August 22	6	1	6.11	124.0	3.85	58.6	0	0
	10	August 23	5	6	5.22	109.0	2.88	43.4	0	0
	11	August 24	2	1	5.72	117.0	3.79	58.9	0	0
	12	August 29	6	4	5.29	108.0	3.23	50.1	0	0
	Subtotal	12 trips	--	--	68.33	1,383	42.53	638.9	--	--
2023 Q3	1	September 18	6	3	5.42	108.0	3.44	53.7	0	0
	2	September 19	1	4	5.74	119.0	3.87	60.5	0	0
	3	September 20	1	5	5.94	120.0	3.65	56.6	1(1)	0
	4	September 21	3	1	5.65	118.0	3.71	58.0	0	0
	5	October 19	4	2	5.34	110.0	3.42	52.7	0	1(2)
	6	October 20	3	5	5.63	107.0	3.68	56.5	0	0
	Subtotal	6 trips	--	--	33.73	682.0	21.77	338.0	--	--
2023 Q4	1	December 9	1	2	5.78	118.0	4.15	64.8	0	0
	2	December 15	5	3	5.46	107.0	3.49	55.2	0	0
	3	February 1	4	5	6.28	110.0	4.01	55.2	0	0
	4	February 14	2	3	7.16	115.0	4.07	56.3	0	2(7,8)
	Subtotal	4trips	--	--	24.68	450.0	15.72	231.5	--	--
Total		30 trips	--	--	170.34	3,448.0	108.31	1,630.0	1(1)	0

Remark1: Number of transect line (departure and return) indicates the numbered planned cetacean transect line survey route as shown in Figure 1.4-2

Table 3.1.1-18 Previous Cetacean Visual Survey (6/7)

Trips		Survey Date	Transect Line R1		Total Hours (hour)	Total Mileage (km)	On-Effort Hours (hours)	On-Effort Mileage (km)	On-effort Sighting (herd (individual)	Off-effort Sighting (herd (individual)
			Departure	Return						
2024 Q1	1	March 16	3	5	6.11	109.0	4.23	55.0	0	0
	2	March 22	4	2	5.38	111.0	3.10	42.8	0	0
	3	April 16	6	3	5.64	108.0	4.00	54.8	0	0
	4	April 17	5	2	5.72	111.0	3.42	46.5	0	0
	5	May 24	2	4	5.11	102.0	3.14	41.9	0	0
	6	May 25	4	6	5.12	105.0	3.04	42.2	0	0
	7	May 26	5	4	5.32	99.3	3.48	47.3	0	0
	8	May 27	1	2	6.19	115.0	4.24	57.8	0	0
	Subtotal	8 trips	--	--	44.59	860.3	28.65	388.3	--	--
2024 Q2	1	June 5	3	6	5.03	104.0	3.18	45.0	0	0
	2	June 6	5	1	5.89	113.0	4.10	56.5	0	0
	3	June 8	4	3	5.13	101.0	3.38	45.3	0	0
	4	June 18	6	2	5.72	108.0	3.88	52.1	0	0
	5	June 19	1	6	6.91	122.0	4.82	65.7	0	0
	6	June 26	5	6	5.54	103.0	3.93	52.7	0	0
	7	June 27	2	5	5.44	104.0	3.83	52.7	0	0
	8	July 4	3	4	5.18	100.0	3.72	52.1	0	0
	9	July 5	6	3	5.27	107.0	2.98	41.5	0	0
	10	July 6	1	6	5.88	121.0	3.93	55.3	0	0
	11	July 7	2	1	6.31	117.0	4.07	56.6	0	0
	12	July 14	6	4	5.23	106.0	3.45	48.0	0	0
	13	July 18	6	1	6.00	121.0	3.94	56.5	0	0
	14	July 19	1	4	5.95	116.0	4.09	57.8	0	0
	15	August 5	1	5	6.11	118.0	4.42	63.0	0	0
	16	August 6	3	1	5.89	114.0	4.35	62.0	0	0
	17	August 7	4	2	5.19	103.0	3.66	52.3	0	0
	Subtotal	17 trips	-	96.67	1,878	65.73	915.1	0	--	--

Remark1: Number of transect line (departure and return) indicates the numbered planned cetacean transect line survey route as shown in Figure 1.4-2

Table 3.1.1-18 Previous Cetacean Visual Survey (6/7)

Trips		Survey Date	Transect Line R1		Total Hours (hour)	Total Mileage (km)	On-Effort Hours (hours)	On-Effort Mileage (km)	On-effort Sighting (herd (individual)	Off-effort Sighting (herd (individual)
			Departure	Return						
2024 Q3	1	September 26	2	3	12.03	168.1	3.94	57.4	0	0
	2	September 27	4	5	11.93	165.8	4.25	58.9	0	0
	3	October 18	6	1	11.55	84.4	5.38	65.8	0	0
	Subtotal	3 trips	--	--	35.51	418.3	13.57	182.1	--	--
2024 Q4	1	January 31	2	3	11.08	118.1	4.63	55.4	0	0
	2	February 1	4	5	11.05	106.0	4.37	51.3	0	0
	Subtotal	2 trips	--	--	22.13	224.1	9.00	106.7	--	--
2024 Total		30 trips	--	--	198.90	3,380.7	116.95	1,592.2	0	0
2025 Q1	1	March 1	1	2	11.68	138.9	5.48	65.3	0	0
	2	March 2	4	3	11.69	78.8	4.52	55.0	0	0
	3	March 3	6	5	11.72	148.7	4.52	55.1	0	0
	4	March 11	1	6	11.91	85.0	5.45	66.2	1(4)	0
	5	March 12	5	4	11.90	86.1	3.87	56.6	0	0
	6	March 13	3	2	11.95	144.5	4.48	57.2	0	0
	7	April 8	1	6	12.39	164.4	4.57	66.4	0	0
	8	April 10	2	3	12.36	154.4	5.03	61.1	0	0
	9	May 14	4	5	12.07	156.4	3.98	56.7	0	0
	10	May 15	6	2	13.23	142.1	3.85	56.4	0	0

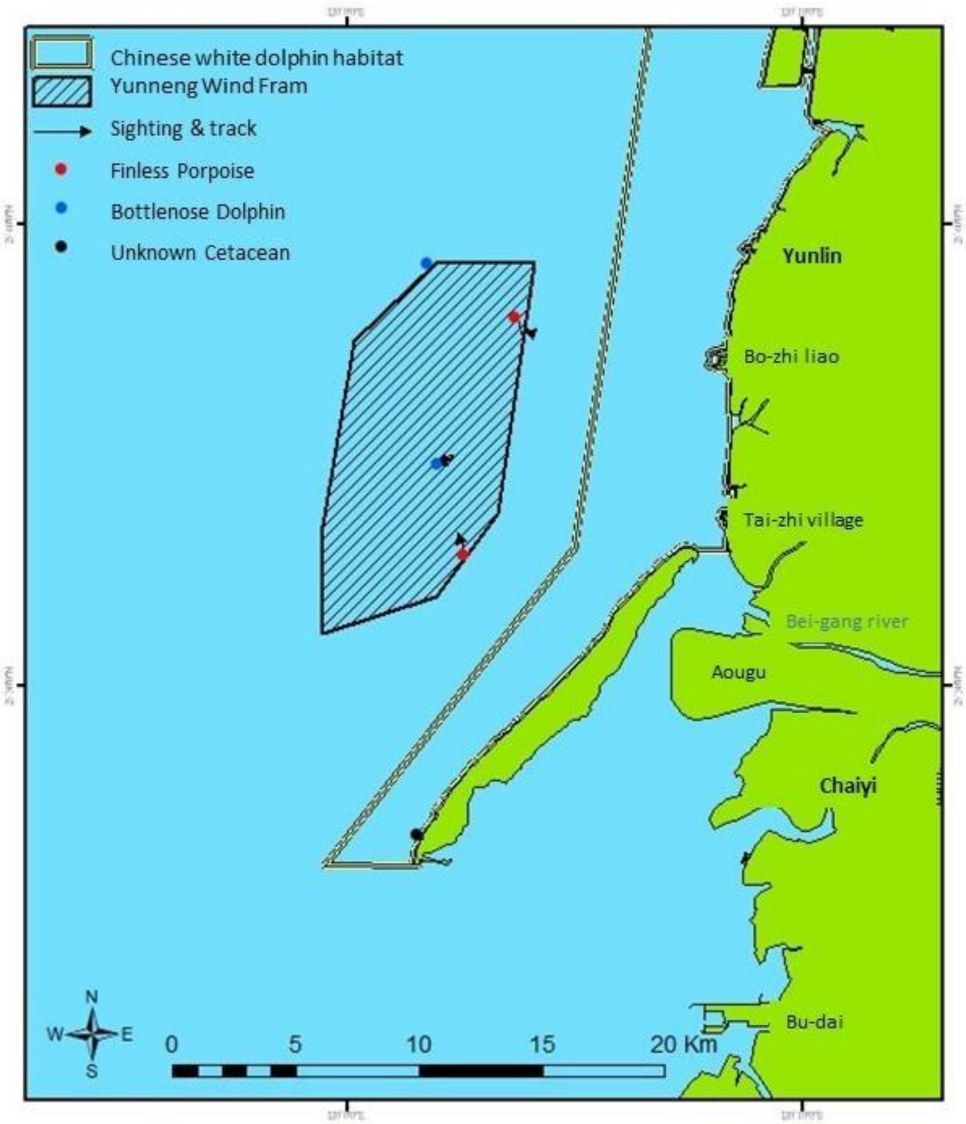
Remark1: Number of transect line (departure and return) indicates the numbered planned cetacean transect line survey route as shown in Figure 1.4-2

Table 3.1.1-19 Previous Cetacean Visual Survey (7/7)

On effort sighting				
Survey date	Cetacean Species	Water Depth(m)	Water Temperature(℃)	Cetacean Behavior
2019.04.25	Bottlenose Dolphin	27.5	27.5	--[1]
2019.05.25	Yangtze Finless Porpoise	14.8	27.3	Foraging
2019.09.09	Yangtze Finless Porpoise	8.4	--	Foraging
2020.01.03	Bottlenose Dolphin	22.4	20.0	Travelling
2020.02.05	Unknown cetacean	27.4	19.2	Travelling
2020.02.05	Bottlenose Dolphin	22.1	20.0	Foraging
2021.03.15	Unknown cetacean	27.4	19.2	Travelling
2023.01.14	Unknown cetacean[3]	--	--	Travelling
2023.01.14	Unknown cetacean[3]	23.8	23.0	Travelling
2023.01.14	Bottlenose Dolphin	24.9	22.6	Travelling
2023.09.20	Yangtze Finless Porpoise	12.3	28.8	Travelling
2025.03.11	Bottlenose Dolphin	24.3	24.4	Travelling
Off effort sighting				
Survey date	Cetacean Species	Water Depth(m)	Water Temperature(℃)	Cetacean Behavior
2020.05.08	Indo-Pacific hump-backed dolphin	7.9	28.5	Foraging
2021.02.21	Indo-Pacific hump-backed dolphin	5.9	19.5	Travelling
2023.07.11	Indo-Pacific hump-backed dolphin	8.3	30.6	Travelling
2023.07.20	Indo-Pacific hump-backed dolphin	8.1	31.5	Travelling
2023.10.19	Indo-Pacific hump-backed dolphin	6.5	26.6	Travelling
2024.02.14	Indo-Pacific hump-backed dolphin	6.0	19.4	Milling
2024.02.14	Indo-Pacific hump-backed dolphin	7.5	19.4	Foraging and Socializing

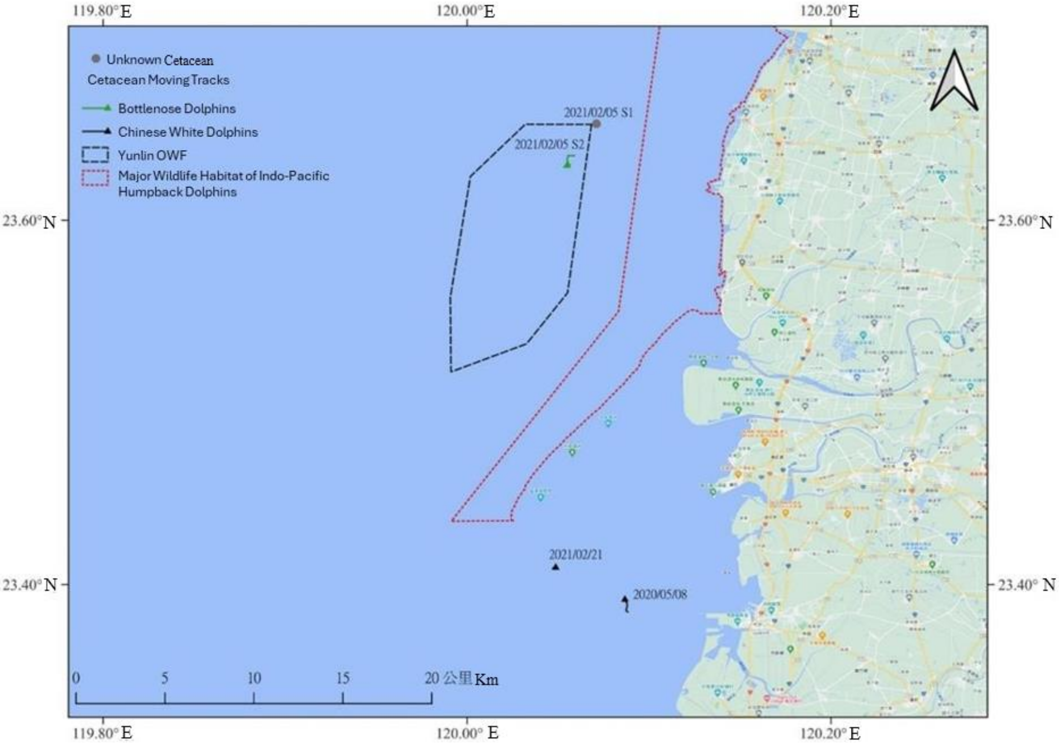
Remark 1: Due to the short sighting, no further information was provided in identifying their species and behaviors.
Remark 2: Device for water quality was out of order on 9/9, therefore only water depth was recorded.
Remark 3: Species cannot be identified as the sighting is too short.
Remark 4: On February 14, the salinity data could not be successfully measured due to a sudden malfunction of the water quality instrument.
Remark 5: Indo-Pacific hump-backed dolphin also named Chinese white dolphin.

A total of 175 surveys were conducted for the cumulative visual monitoring of cetacean ecology from the pre-construction to the construction and operation phases. Within these surveys, 9 surveys recorded observations of 11 groups of cetaceans. The sightings included 3 groups of finless porpoises, 4 groups of bottlenose dolphins, and 4 groups of unidentified cetaceans, which could not be identified due to the short observation time. Environmental factors at the cetacean sighting locations are detailed in Table 3.1.1-19, and the sighting locations and movement tracks of the cetaceans are illustrated in Figures 3.1.1-16 to 3.1.1-20.



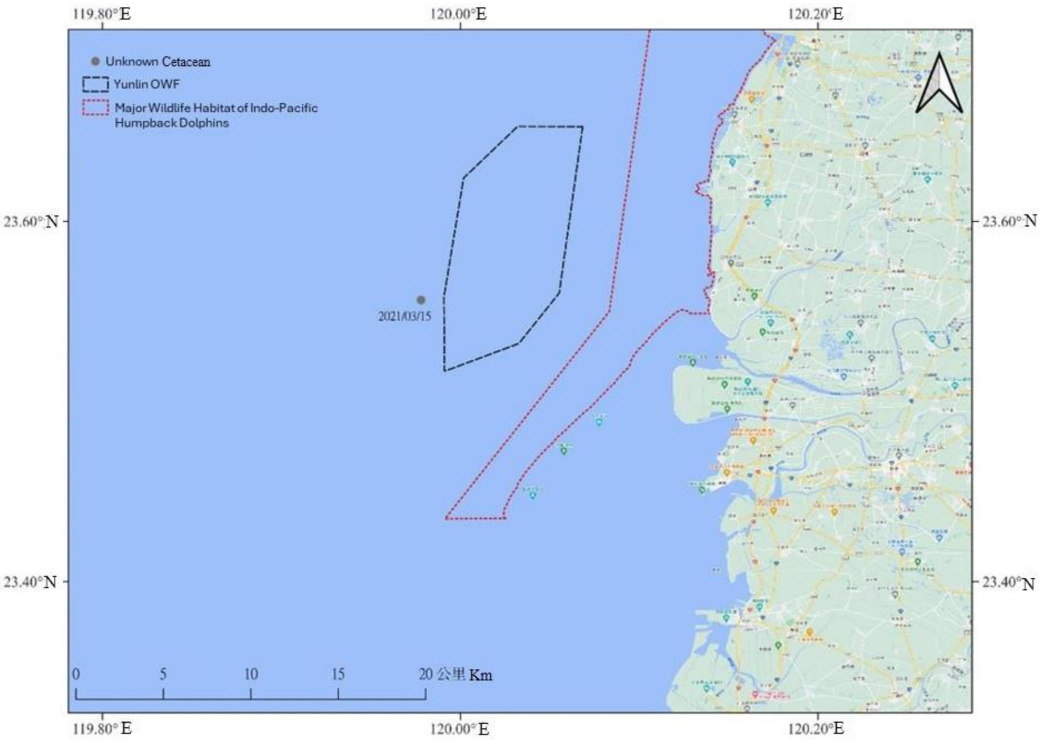
Note: A herd of 2 dolphins (bottle nose dolphin) are spotted at the north boundary of wind farm on April 25, 2019. A herd of 4 Yangtze Finless Porpoise at the southeast boundary of wind farm on May 25, 2020. A herd of 4 Yangtze Finless Porpoise at the Northeast boundary of wind farm on September 9. A herd of 8 bottle nose dolphins are spotted in the wind farm area on January 3, 2020.

Figure 3.1.1-17 The Spotted Location of The Cetacean from Visual Survey and its Moving Tracks in 2019



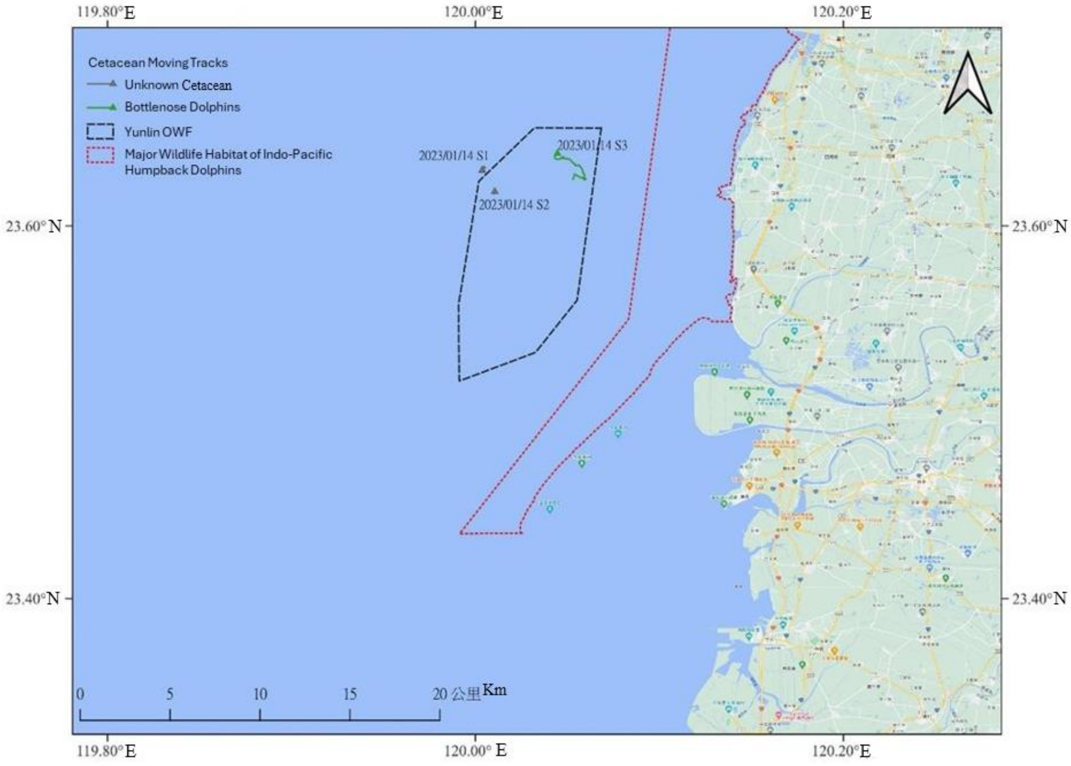
Note 1: On May 8, 2020, a group of approximately three Indo-Pacific humpback dolphins was observed off the coast of Budai Harbor during a non-crossing line survey.
Note 2: Due to the short sighting, no further track information was provided..

Figure 3.1.1-18 Locations and Movement Tracks of Cetaceans Observed During the 2020 Marine Cetacean Survey



Note: Due to the short sighting, no further track information was provided.

Figure 3.1.1-19 Locations and Movement Tracks of Cetaceans Observed During the 2021 Marine Cetacean Survey



Note: Due to the short sighting, no further track information was provided.

Figure 3.1.1-20 Locations and Movement Tracks of Cetaceans Observed During the 2022 Marine Cetacean Survey

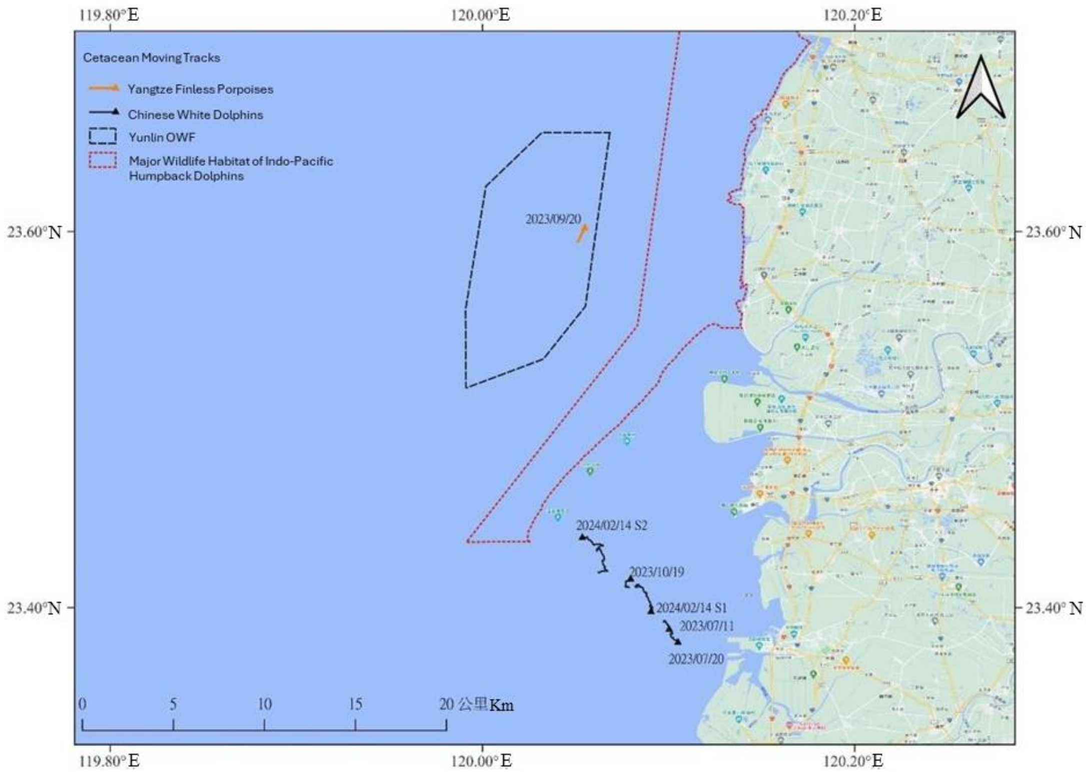


Figure 3.1.1-21 Locations and Movement Tracks of Cetaceans Observed During the 2023 Marine Cetacean Survey

i. On Effort Sighting

1. First Sighting (2019.04.25)

2 individuals of bottlenose dolphins as a herd were spotted at the north boundary of the wind farm on 25th April. (They were listed as unknown cetaceans at first, yet after several discussions with NTU Cetacean Laboratory, they are considered as bottlenose dolphins with a high possibility and is therefore explained in this report) They disappeared once being spotted. Due to the short sighting, no further information was provided in identifying their species and behaviors. Environmental factors on the location of the vessel when the cetaceans were observed were listed as followed: water depth: 27.5 m, water temperature 27.5℃, salinity 34.6 %, pH =8.22.

2. Second Sighting (2019.05.25)

4 Yangtze Finless Porpoise (judging through their appearance) were spotted around the south-east boundary of the wind farm on May 25. The herd did not jump very high from the surface and disappeared immediately. Their activities indicated that they were foraging. Environmental factors on the location of the vessel when the cetaceans were observed were listed as followed: water depth: 14.8 m, water temperature 27.3℃, salinity 33.4 %, pH =8.18.

3. Third Sighting (2019.09.09)

A group of 4 Yangtze Finless Porpoise were spotted in the survey on September 9 at Northeast boundary of the wind farm. It is inferred that they were foraging. Device for water quality was out of order on the day, therefore only water depth was recorded during the sighting event. Water depth of the vessel location when cetaceans were sighted is 8.4 m. Tracks of the cetaceans were lost immediately in both trips, resulting in difficulties in collecting further information and records.

4. Fourth Sighting (2020.01.03)

8 bottlenose dolphins were spotted within wind farm area on January 3. Their behaviors suggested they are foraging. Environmental factors of the vessel location are as followed: water depth: 22.4 m, water temperature 20 ℃, salinity: 33.3 %, pH value pH 8.49.

5. Fifth Sighting (2021.02.05)

1 cetacean were spotted within wind farm area on February 5. The

species cannot be identified as the cetacean disappeared once it is spotted. It is inferred that it was travelling. Environmental factors of the vessel location are as followed: water depth: 27.4 m, water temperature 19.2 ℃, salinity: 34.0 ‰, pH value pH 8.15.

6. Sixth Sighting (2021.02.05)

1 bottlenose dolphins were spotted within wind farm area on February 5. Their behaviors suggested they are foraging. Environmental factors of the vessel location are as followed: water depth: 22.1 m, water temperature 20.0℃, salinity: 34.1 ‰, pH value pH 8.16.

7. Seventh Sighting (2021.03.15)

3 unknown cetacean were spotted within wind farm area on March 15. The species cannot be identified as the cetacean disappeared once spotted. It is inferred that they were travelling. Environmental factors of the vessel location are as followed: water depth: 27.4 m, water temperature 19.2℃, salinity: 34.0 psu, pH value pH 8.2.

8. Eighth Sighting (2023.01.14)

3 herds of dolphins were sighted on January 14 in this quarter. Details are as follows:

1st sighting: On the transect line at 8:36, a dorsal fin of cetacean was sighted about 700m to the left of the bow. The cetacean species cannot be confirmed as the sighting was brief and no distinctive features were identified.

2nd sighting: At 8:53, a dorsal fin of cetacean was sighted about 500m to the left of the bow. The vessel stopped to search the cetacean. The surveyors sighted the cetacean on the left stern, which then dived and disappeared. The cetacean species cannot be confirmed as the sighting was brief.

3rd sighting: At 10:30, dorsal fins of cetaceans were sighted on the left of the bow. The cetaceans were confirmed to be bottlenose dolphins after a closer check. The herd composed of 11-20 individuals, with 2 mother-child pairs. The young individuals jumped out of the water. Their diving period were identical with short intervals, and the swimming direction was northward. After 20 minutes of observation, the diving periods lengthened, and some individuals were not sighted after diving. After confirming that photos, sighting records, disappearing spot of cetacean were properly taken, the vessel left the cetacean and resumed the transect line survey. Environmental factors of the vessel location are as followed: water depth: 27.4 m, water temperature 19.2 ℃, salinity: 34.0 psu, pH value pH 8.2

9. Ninth Sighting (2023.09.20)

On September 20, at around 8:55 a.m., one black dorsal finless cetacean was spotted in the water about 200 meters away from the vessel along the wind farm transect line, and was identified as a Yangtze Finless Porpoise. The vessel proceeded in the direction of the cetacean, and it was not observed for 10 minutes.

10. Tenth Sighting (2025.03.11)

On March 11 at approximately around 2:41pm, during a transect survey within the wind farm, four bottlenose dolphins (Tursiops spp.) were sighted about 500 meters from the vessel, swimming northwest.

ii. Off Effort Sighting (Non-Selected Trace Lines)

1. 1st Off Effort Sighting (2020.05.08)

3 Indo-Pacific humpback dolphins were spotted at non effort sighting outside of Budai Port on May 8. Their behaviors suggested they are foraging. Environmental factors of the vessel location are as followed: water depth: 7.9m, water temperature 28.5℃, salinity: 33.7 ‰, pH value pH 8.18.

2. 2nd Off Effort Sighting (2021.02.21)

On February 21, a survey vessel departed for the wind farm and during the journey, sighted one Indo-Pacific humpback dolphins displaying swimming behavior. The environmental factors at the vessel's location during the sighting were: water depth of 5.9 meters, water temperature of 19.5°C, salinity of 32.7 psu, and pH of 8.16.

3. 3rd Off Effort Sighting (2023.10.19)

2 Indo-Pacific humpback dolphins were observed coming out of the water about 30 meters away from the vessel on the way to the wind farm on October 19, at 9:30 a.m. They dived deeply after the vessel approached, and then came out of the water at the stern of the vessel. They moved at a slow speed and in an irregular direction, so the pattern

cannot be identified.

4. 4th Off Effort Sighting (2024.2.14)

   7 Indo-Pacific humpback dolphins (including 3 mother-child pairs) were observed coming out of the water about 30 meters away from the vessel on the way to the wind farm on February 14, at 9:27 a.m. The individuals were swimming closely together, exhibiting slow and frequent changes in direction, indicative of typical foraging behavior such as diving with raised tails. Therefore, it was concluded that the group was engaged in milling behavior, circling and lingering in the area.

5. 5th Off Effort Sighting (2024.2.14)

   On February 14, at 3:07 PM, during the return journey to port, eight Indo-Pacific humpback dolphins were sighted at the 11 o'clock direction from the vessel, about 400 meters away. The location was near the previous sighting spot, but the group composition had changed. The group now included only one mother and calf pair. The dolphins were dispersed, with variable swimming directions and speeds, frequently tail-diving. During the observation, several dolphins were seen leaping completely out of the water. Due to the lack of clear interactions between individuals, it is inferred that their behavior was primarily foraging, with occasional social interactions.

In this Q1 of 2025, two surveys were conducted with a sighting rate of 0.00%. Comparing data from previous years shows that during the EIA period (2016/2017), as well as in 2019, 2021, and 2023, sightings were recorded. Compared to other seasons, Q1 and Q4 have higher cetacean sighting rates, suggesting these seasons are when cetaceans are more active in this marine area. Refer to Table 3.1.1-20 for details.

Over 30 survey trips conducted this year, 2025, no confirmed cetacean sightings were recorded. In contrast, between 2019 and 2023, the same 30 survey trips per year resulted in 1 to 6 cetacean sightings annually, making this year’s sighting rate the lowest on record. However, due to high variability in cetacean sighting rates, further monitoring is required to determine whether offshore construction has impacted activity and whether sightings will increase post-construction.

Cetacean sighting rates in this offshore marine area vary widely. Possible explanations are: (1) The natural variability of cetacean activities is high, and (2) Cetaceans are rare in this project area. Accurately reflecting activity frequency requires long-term survey data. Cetaceans are highly mobile, and their prey is unevenly distributed, requiring extensive movement to find food or mates. Offshore/pelagic cetaceans have even broader ranges, making encounters rare. Since cetaceans spend most of their time underwater and surface briefly, detection is difficult, making marine survey sightings uncommon.

Table 3.1.1-20 Comparison of Sighting Rates in Previous Quarters

Year	Quarter	Trips	On-effort sighting	On-Effort Mileage(km)	On-Effort hour(hr)	On-effort Sighting (on-effort/100km)
2016/2017 (EIA)	Q1	8	4	569.8	44.62	0.70
	Q2	9	2	785.6	53.40	0.26
	Q3	7	0	511.8	32.68	0
	Q4	6	1	479.4	31.78	0.21
2019	Q1	4	2	241.7	17.06	0.83
	Q2	12	0	685.5	42.41	0
	Q3	7	1	416.3	25.90	0.24
	Q4	7	1	430.4	24.65	0.23
2020	Q1	6	0	364.0	25.94	0
	Q2	10	0	605.7	43.99	0
	Q3	6	0	330.3	23.49	0
	Q4	8	2	324.5	23.30	0.62
2021	Q1	10	1	486.7	34.78	0.21
	Q2	10	0	509.9	35.70	0
	Q3	6	0	312.4	21.31	0
	Q4	4	0	245.0	15.75	0
2022	Q1	7	0	407.9	28.09	0
	Q2	16	0	915.5	61.91	0
	Q3	3	0	157.6	10.77	0
	Q4	4	3	231.0	15.89	1.30
2023	Q1	8	0	421.1	25.91	0.00
	Q2	12	0	638.9	42.53	0.00
	Q3	6	1	338.0	21.77	0.46
	Q4	4	0	231.5	15.71	0.00
2024	Q1	8	0	388.3	28.65	0.00
	Q2	17	0	915.1	65.73	0.00
	Q3	3	0	182.1	13.57	0.00
	Q4	2	0	106.7	9.00	0.00
2025	Q1	12	1	718.6	54.82	0.14

VII. Electromagnetic Field

The historical monitoring result is shown as Table 3.1.1-21. In all surveys conducted in this Project, all results comply with the value suggested by the Induction for Limiting Exposure of Time-varying electronic field, Magnetic Field and Electromagnetic Field.

Table 3.1.1-21 Monitoring Result of Electromagnetic Field

Sampling Station	Taixi Substation	Sihu Substation
	Magnetic Field (mG)	Magnetic Field (mG)
112.08.28	0.294	-
113.08.13	0.01	3.68
Suggested Value	833	

Remark: Refer to Induction for Limiting Exposure of Time-varying electronic field, Magnetic Field and Electromagnetic Field, 2021.01.21. Amendment is made under Official No. 1090004463 , which comes into effect 6 months after its issuance.

3.1.2Abnormal Environmental Monitoring results and Response Actions

No abnormal issue was found in the environmental monitoring results of this quarter.

3.2 Recommendations

No recommendation for the environmental program. This project will implement relevant monitoring tasks as stated in the program.

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2. 允能風力發電股份有限公司籌備處，民國 107 年 12 月，「雲林離岸風力發電廠興建計畫變更內容對照表(變更監測計畫)」(定稿本)。
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