Delta Coal
Mannering & CVC Collieries

Lake Macquarie Benthos Survey

Results No. 26

by Dr Emma Laxton

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1. Executive Summary

J.H. & E.S. Laxton – Environmental Consultants P/L was engaged by Chain Valley Colliery to assess the potential effects of bord and pillar extraction mining beneath Lake Macquarie on benthic fauna.

The benthic survey and water quality monitoring were conducted on 10th and 11th March 2026. The survey involved the collection of sediments at 24 stations. The stations consisted of seven control, five reference and twelve impact stations. Two depth zones within the mud basin were sampled, -4.5m AHD and -5.5 to -6.0m AHD.

A total of 1146 marine benthic organisms greater than 1 mm in size were captured during the survey. These organisms represented nineteen species. The fauna included one nemertean and six polychaete worm species; eight bivalve species; one gastropod species; two echinoderm species and at least one juvenile crab species.

In March 2026, the greatest numbers of organisms were collected at benthic monitoring stations C7, R10, C5, R13 and R1. The stations with the least number of organisms captured were IM6, R12, IM3, C6, IM9 and IM5. The number of organisms collected ranged from 20 to 203 organisms at the control monitoring stations, 15 to 110 organisms at the reference stations; and 13 to 51 organisms at the impact monitoring stations.

Polychaete worms and bivalves were the most commonly occurring organisms in the sediments off Summerland Point and in Chain Valley Bay and Bardens Bay in Autumn 2026. A total of 564 polychaetes were recorded, representing 49.2 percent of the organisms collected. *Sthenelais petitiboneae* was the most represented and widespread polychaete. A total of 309 *Sthenelais petitiboneae* were recorded, representing 27 percent of the organisms sampled.

A total of 530 bivalves were collected during the benthic survey, representing 46 percent of the organisms sampled. The most commonly occurring bivalve species recorded were *Corbula sp*, *Dosinia sp*, *Theora lubrica*, *Trichomya hirsuta*, *Saccostrea glomerata* and *Paphia undulata*. Only one specimen of *Anadara trapezia* and seven *Mactra sp.* were found during the survey.

Other species that were recorded in the sediments were the sea star *Astropecten polyacanthus*, the brittle star *Ophionereis schayeri*, the sea slug *Philine angasi,* and crab species.

At the time of survey sampling sites with bottom sediments comprised predominantly of silt, were

defined by relatively high numbers of the polychaete *Sthenelais petitiboneae* and the bivalves *Theora lubrica* and *Corbula.* Sediments with high portions of sand were characterized by relatively higher numbers of the polychaete worm *Chaetopterus* and the bivalve *Dosinia*. Sea stars, brittle stars and sea slugs also defined the sandy sediments. Stations that comprised predominantly of shell substrate were characterized by the presence of the mussel *Trichomya hirsuta*, the oyster *Saccostrea glomerata*, and juvenile crabs. The dominant species were present at each depth zone indicating that water depth is not influencing the presence of these organisms in the sediments.

Sampling stations with the greatest organism diversity were IM11, IM12, R13, R10, C7 and R1. Benthic monitoring stations R9, IM4 and IM9 had the lowest organism diversity. Species diversity ranged from 3 to 9 species at the control stations, 2 to 10 species at the reference stations, and 3 to 13 species at the impact stations. Comparisons of the average number of species collected at each monitoring station over a fifteen-year period revealed no discernable differences in diversity with water depth.

These findings support previous data collected between September 2016 and March 2020 in the Chain Valley Bay, Bardens Bay and Summerland Point regions. Despite reported changes in bed levels associated with Chain Valley Colliery underground workings, no statistical differences were found between the benthic assemblages at sites designated as Impact, Reference and Control stations (EMM, 2020).

Comparisons between the number of organisms collected during the Autumn sampling periods of March 2024 and March 2026 showed an increase in the numbers of organisms collected at six of the 24 monitoring stations, a decrease at thirteen stations, and no significant change at five stations.

In March 2026, the sediment in the mud basin of Lake Macquarie off Summerland Point, Chain Valley Bay and Bardens Bay was largely composed of fine grey silt or fine grey silt with small to large shell fragments. Four monitoring stations had sediments with relatively high portions of silt and sand, and three stations had a substrate composed largely of shell.

Rainfall in the months preceding the annual Autumn benthic survey was 204.4 mm and 137.6 mm for January and February 2026 respectively (Cooranbong Lake Macquarie AWS No. 061412). By 11th March a further 89.6 mm had fallen in the catchment.

In March 2026, due to rainfall events, water temperature and pH decreased with water depth, and conductivity, salinity and turbidity increased with water depth. Dissolved oxygen either decreased with water depth or was uniform throughout the water column. Testing of bottom water at each station found water temperature ranged from 25.24°C to 27.10°C. The average bottom water temperature was 26.36°C. The conductivity of bottom waters ranged from 51.28 mS/cm to 52.66 mS/cm. Average bottom water conductivity was 52.22 mS/cm. Salinity of bottom waters ranged from 33.66 ppt to 34.68 ppt. Average bottom water salinity was 34.36 ppt. Average turbidity of the bottom waters ranged from 4.5 NTU to 60.2 NTU. The average bottom water turbidity was 24.0 NTU. Average pH of bottom waters ranged from pH 7.1 to pH 9.3. The average pH of bottom water was pH 7.9. The average dissolved oxygen of bottom waters ranged from 61.8% saturation to 91.5% saturation. The average dissolved oxygen of bottom waters was 74.0% saturation. Average water quality did not vary significantly between control, impact and reference stations.

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3. Introduction

Lake Macquarie is the largest saline lake in New South Wales. It lies on the central coast between Sydney and Newcastle within the local government areas of Central Coast Council and Lake Macquarie Council. Lake Macquarie has a catchment of approximately 700 square kilometers and a water surface area of 110 square kilometers. The average depth of the lake is 8 metres (26 ft), with a maximum depth of 15 metres (49 ft). The lake has a permanent entrance to coastal waters at Swansea, and a shore length of approximately 174 kilometres.

The catchment of Lake Macquarie is largely rural with large areas of bushland and grazing land. The shoreline of Lake Macquarie is heavily urbanized, especially the eastern, western and northern shorelines. The region has a relatively long history of coal mining and power generation, with mining occurring since the late 1800s and the first power station at Lake Macquarie commencing operations in 1958.

Chain Valley Colliery (CVC) is an underground coal mine situated on the southern shores of Lake Macquarie about 1 kilometre south-east of the township of Mannering Park, NSW. It is located approximately 60 kilometres south of Newcastle and 80 kilometres north of Sydney. The mine has been operating since 1963. Mining is continuing within the Chain Valley Coal Lease Area using the miniwall method. Prior to mining, there were three economically viable seams in the lease area, namely the Wallarah seam (not mined since 1997); the Great Northern seam, and the Fassifern seam. In 2018 CVC went into voluntary receivership and was taken over by Great Southern Energy Pty Ltd (trading as Delta Coal) to provide coal for Vales Point Power Station.

Delta Coal is currently mining the Fassifern Seam beneath Lake Macquarie. To protect the lake foreshore, a protection zone has been established as part of the extraction plan. This zone, known as the High Water Mark (HWM) Subsidence Barrier, was calculated using a 35^{o} angle of draw from the depth of mining. The zone is approximately 130 meters wide. J.H. & E.S. Laxton – Environmental Consultants P/L was engaged by Delta Coal to assess the impact of previous miniwall mining on benthic fauna in Lake Macquarie. The mine is currently undertaking first workings.

In March 2026, the monitoring programme consisted of 24 stations, seven Control, five Reference and twelve Impact stations. Control stations are in areas of lakebed sufficiently remote from previous or proposed mining. Reference stations are located in areas of lakebed above subsidence areas of previous mining. Impact stations are in areas of lakebed where subsidence is expected/ experienced

from previous workings or proposed future workings. Two depth zones within the mud basin were sampled, -4.5m AHD and -5.5 to -6.0m AHD.

Over the years, as mining has progressed, reference stations have been reclassified as impact stations. Three reference stations (R7, R8, R11) were reclassified as impact stations in 2024. Due to this reclassification and in preparation for future extraction plans, two reference stations were added to the study (R12 and R13) in 2024.

The annual benthic communities survey and water quality testing were conducted on the 10th and 11th March 2026.

4. Methods

Twenty-four stations were sampled in March 2026. At each station the following procedure was carried out:

- A GPS unit was used to locate the sampling station.
- A weighted line was used to measure water depth.
- A line with five sieve boxes (five replicates of 200 x 200 x 100 mm collection boxes with 1 mm mesh) and two core samplers (100 x 200 mm cylinders with 1 mm mesh) was cast overboard and secured as the boat drifted into position.
- The sieve and core samplers were filled using the forward momentum of the work boat.
- The samplers were then hauled to the surface, and the contents of each sampler placed in a clean, labeled zip-lock plastic bag.
- A 250mL jar was filled using the sediment collected from the core samplers.
- Processing of samples occurred in the laboratory.
- A water quality profile from surface to bottom or near bottom was measured using a calibrated Yeo-Kal 618 Water Quality Analyser. (The maximum reach of the Analyser is about 9 meters.) Water temperature, conductivity, salinity, pH, dissolved oxygen, turbidity and depth were measured. Each line of data was stored in the memory of the machine.

In the laboratory the marine benthic samples were treated in the following way:

- Each sample was tipped into a 1 mm mesh sieve and washed free of mud and fine sand.

- The washed material from each sample was then placed into an enamel dish and sorted for organisms.
- Organisms and parts of organisms were removed, counted, identified and the results entered into a spread sheet. This process was repeated until the debris of the entire sample had been examined.
- Sorted organisms were preserved in formaldehyde solution.

The 250mL samples of whole sediment were treated in the following way:

- Each sample was tipped into a 1L clear glass measuring cylinder and the volume made up to 800mL with freshwater.
- The cylinders were stoppered and shaken vigorously to suspend the sediment in the freshwater.
- The cylinders were then placed on the laboratory bench to allow the fractions of the sediment to settle.
- Fractions were decanted into separate measuring cylinders and allowed to settle.
- Once settled the volumes of each fraction (silt, sand, gravel and shell) were calculated and recorded. Results were displayed relative to the final volume of sediment collected.

5. Monitoring Points

Figure 5.1 shows the location of benthic monitoring stations, mine workings, and the SSD-S465 Consent boundary for March 2026. Twenty-four stations were sampled, seven control stations, five reference stations and twelve impact monitoring stations. Table 5.1 provides the depth zone, actual depth to the seabed at the time of sampling, and the location of each sampling station by eastings and northings using GDA 2020 coordinates. Two depth zones within the mud basin were sampled, -4.5m AHD and -5.5 to -6.0m AHD. Figure 5.2 shows the development consent areas for Delta Coal.

Figure 5.1 Location of benthic monitoring stations and mine workings

Table 5.1 Location, depth zone and actual depth to seabed for control (C), referenece (R) and impact (I) monitoring stations

Station	Type	Depth Zone (m) AHD	Depth (m) AHD	GDA 2020 Easting	GDA 2020 Northing
C1	C	-4.50	-4.50	364519	6330815
C2	C	-4.50	-5.20	366214	6332927
C3	C	-5.5 to -6.0m AHD	-5.80	366014	6333144
C4	C	--5.5 to -6.0m AHD	-6.40	364260	6332794
C5	C	-5.5 to -6.0m AHD	-6.60	367701	6334310
C6	C	--5.5 to -6.0m AHD	-6.00	363988	6332492
C7	C	-5.5 to -6.0m AHD	-4.50	366276	6334947
R1	R	-4.50	-3.80	364177	6331535
R9	R	-4.50	-5.50	365258	6331210
R10	R	--5.5 to -6.0m AHD	-4.90	365172	6334706
R12	R	--5.5 to -6.0m AHD	-6.80	365919	6330294
R13	R	--5.5 to -6.0m AHD	-3.80	366357	6334708
IM1	I	-4.50	-5.30	364738	6330734
IM2	I	-4.50	-4.00	364842	6332237
IM3	I	--5.5 to -6.0m AHD	-6.20	364693	6332101
IM4	I	--5.5 to -6.0m AHD	-7.60	364873	6332705
IM5 (R3)	I	-5.5 to -6.0m AHD	-7.30	364660	6332992
IM6 (R4)	I	-5.5 to -6.0m AHD	-6.80	364771	6332763
IM7 (R5)	I	--5.5 to -6.0m AHD	-5.20	364229	6333889

IM8 (R6)	I	--5.5 to -6.0m AHD	-7.20	364533	6334146
IM9 (R8)	I	--5.5 to -6.0m AHD	-6.20	364523	6332010
IM10 (R2)	I	-4.50	-4.80	365919	6330294
IM11 (R7)	I	--5.5 to -6.0m AHD	-8.80	366232	6333856
IM12 (R11)	I	--5.5 to -6.0m AHD	-7.00	367072	6333639

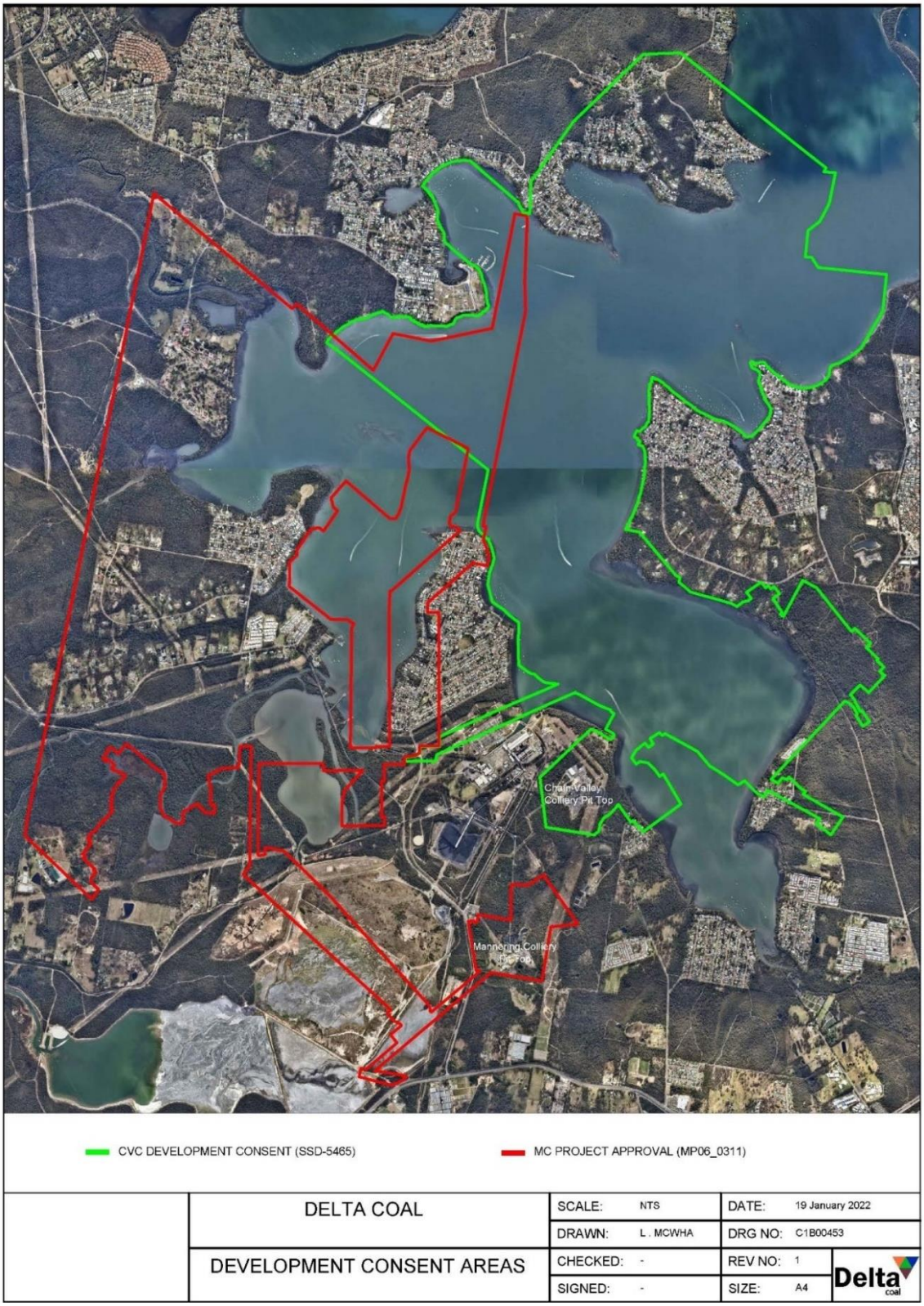


Figure 5.2 Development consent SSD-5465 and MP06_0311 areas

6. Results

a. Benthic organisms – Autumn 2026

Table 6A.1 shows the organisms found at each station sampled off Summerland Point and in Chain Valley Bay and Bardens Bay in March 2026. Benthic organisms were collected from twenty-four monitoring stations.

A total of 1146 benthic organisms greater than 1 mm in size were captured during the Autumn survey. These organisms represented nineteen species (Table 6A.1). The fauna included one nemertean and six polychaete worm species (Plate A3); eight bivalve species (Plate A5); one gastropod species (Plate A4); two echinoderm species (Plate A6) and at least one juvenile crab species.

In March 2026, the greatest numbers of organisms were collected at benthic monitoring stations C7 (203 organisms), R10 (110 organisms), C5 (100 organisms), R13 (91 organisms) and R1 (85 organisms). The stations with the least number of organisms captured were IM6 (13 organisms), R12 (15 organisms), IM3 (18 organisms), C6 (20 organisms), IM9 (20 organisms), IM5 (21 organisms) and IM8 (22 organisms). The number of organisms collected ranged from 20 to 203 organisms at the control monitoring stations, 15 to 110 organisms at the reference stations; and 13 to 51 organisms at the impact monitoring stations (Table 6A.1).

Polychaete worms and bivalves were the most commonly occurring organisms in the sediments off Summerland Point and in Chain Valley Bay and Bardens Bay in Autumn 2026. A total of 564 polychaetes were recorded, representing 49.2 percent of the organisms collected. *Sthenelais petitiboneae* was the most represented and widespread polychaete. It was found at all 24 benthic monitoring stations. A total of 309 were recorded, representing 27 percent of the organisms collected. The polychaete designated as “mud” was also found in relatively large numbers at 14 of the 24 monitoring stations. A total of 153 were recorded during the survey, representing 13 percent of the organisms collected. In addition, 35 *Chaetopterus* parchment tubes were collected from 6 monitoring stations (Table 6A.1).

A total of 530 bivalves were collected during the benthic survey, representing 46 percent of the organisms collected. The most commonly occurring bivalve species during the Autumn 2026 survey were *Corbula sp* (167 specimens), *Dosinia sp* (166 specimens), *Theora lubrica* (94 specimens), *Trichomya hirsuta* (65 specimens), *Saccostrea glomerata* (11 specimens) and *Paphia undulata* (10 specimens). *Corbula* was collected from 20 of the 24 monitoring stations. The stations with the highest

number of *Corbula* were IM10 (17 specimens), IM7 (20 specimens), IM1 (17 specimens) and C1 (17 specimens). *Dosinia* was collected from seven monitoring stations, with the majority (106 specimens) collected at benthic monitoring station C7. *Theora lubrica* was collected at 19 of the 24 monitoring stations. The highest numbers of *Theora* were collected from stations C2 (16 specimens), IM7 (8 specimens) and R10 (8 specimens). *Trichomya hirsuta* and *Saccostrea glomerata* were found at the same three monitoring stations, namely IM11, IM12 and R13. The most *Trichomya hirsuta* were collected at stations R13 with 50 specimens and IM11 with 42 specimens. Moderate numbers of *Saccostrea glomerata*, or the Sydney rock oyster, were found at stations IM11 (6 specimens) and IM12 (3 specimens). *Paphia undulata* was recorded at seven monitoring stations, and *Anadara trapezia* and *Mactra sp.* were found at R13 only (1 specimen and 7 specimens respectively) (Table 6A.1).

Two echinoid species were represented in the samples, the sea star *Astropecten polyacanthus* (one specimen only) and the brittle star *Ophionereis schayeri* (one specimen). Both species were collected at station C7 (Table 6A.1).

A total of 27 sea slugs were recorded during the survey. *Philine angasi* was found at five monitoring stations. The sites with the greatest number of *Philine* were C5 (12 specimens), C7 (9 specimens) and R10 (4 specimens).

Juvenile crab species were also found in the sediments. Crab species were recorded at four monitoring stations. The greatest number of crabs were caught at IM11 (3 specimens) and R13 (3 specimens).

At the time of survey sampling sites with bottom sediments comprised predominantly of silt, were defined by relatively high numbers of *Sthenelais petitiboneae* and the polychaete designated as “mud”. The bivalves *Theora lubrica* and *Corbula* also dominated the fluid to plastic silty sediments. Sediments with high portions of sand were characterized by the polychaete worm *Chaetopterus* and the bivalve *Dosinia.* Sea stars, brittle stars and sea slugs also defined the sandy sediments. Stations that comprised predominantly of shell substrate were characterized by the presence of the mussel *Trichomya hirsuta* and the oyster *Saccostrea glomerata* (Figs 6A.1 and 6A.2, Table 6B.2). Juvenile crabs sheltering amongst the mussel beds also characterized the shell substrate.

Table 6A.1 Organisms found in the sediments during the Autumn 2026 benthic communities survey.

Control Station C1		Depth zone -4.50m AHD			Depth at time of survey -4.8m AHD				56 364519	6330815		Sampled 10-11 March 2026					
Replicates	Nemertea *Gorgonorhynchus*	Polychaete *Sthenelais*	Polychaete thin	Polychaete mud	Polychaete *Chaetopterus*	Polychaete *Onuphidae*	Polychaete Pectinariidae	Gastropod *Nassarius*	Gastropod *Bedeva*	Bivalve *Corbula*	Bivalve *Theora*	Bivalve *Paphia*	Bivalve *Dosinia*	Bivalve *Anadara*	Bivalve *Trichomya*	Ophuroid	Crab
C1.1	0	2	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0
C1.2	0	4	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0
C1.3	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0
C1.4	0	5	0	0	0	0	0	0	0	2	1	0	0	0	0	0	0
C1.5	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0
Total	**0**	**11**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**17**	**1**	**0**	**0**	**0**	**0**	**0**	**0**
Mean/station	0.0	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.4	0.2	0.0	0.0	0.0	0.0	0.0	0.0
no./m2	0	55	0	0	0	0	0	0	0	85	5	0	0	0	0	0	0
No. species		**3**												**Total Organisms at Station**			**29**

Control Station C2		Depth zone-4.50m AHD			Depth at time of survey -5.2m AHD				56 366214	6332927		Sampled 10-11 March 2026					
Replicates	Nemertea *Gorgonorhynchus*	Polychaete *Sthenelais*	Polychaete thin	Polychaete mud	Polychaete *Chaetopterus*	Polychaete *Onuphidae*	Polychaete Pectinariidae	Gastropod *Nassarius*	Gastropod *Philine*	Bivalve *Corbula*	Bivalve *Theora*	Bivalve *Paphia*	Bivalve *Dosinia*	Bivalve *Anadara*	Bivalve *Trichomya*	Ophuroid	Crab
C2.1	0	6	0	1	0	0	0	0	0	0	4	0	0	0	0	0	0
C2.2	0	2	0	5	0	0	0	0	0	5	3	0	0	0	0	0	0
C2.3	0	0	0	0	0	0	0	0	1	1	4	0	0	0	0	0	0
C2.4	0	4	0	2	0	0	0	0	0	3	4	0	0	0	0	0	0
C2.5	0	1	0	4	0	0	0	0	0	0	1	0	0	0	0	0	0
Total	**0**	**13**	**0**	**12**	**0**	**0**	**0**	**0**	**1**	**9**	**16**	**0**	**0**	**0**	**0**	**0**	**0**
Mean/station	0.0	2.6	0.0	2.4	0.0	0.0	0.0	0.0	0.2	1.8	3.2	0.0	0.0	0.0	0.0	0.0	0.0
no./m2	0	65	0	60	0	0	0	0	5	45	80	0	0	0	0	0	0
No. species		**5**												**Total Organisms at Station**			**51**

Control Station C3		Depth zone -5.50m AHD			Depth at time of survey -5.8m AHD				56 366014	6333144		Sampled 10-11 March 2026					
Replicates	Nemertea *Gorgonorhynchus*	Polychaete *Sthenelais*	Polychaete thin	Polychaete mud	Polychaete *Chaetopterus*	Polychaete *Onuphidae*	Polychaete Pectinariidae	Gastropod *Philine*	Gastropod *Bedeva*	Bivalve *Corbula*	Bivalve *Theora*	Bivalve *Paphia*	Bivalve *Dosinia*	Bivalve *Anadara*	Bivalve *Trichomya*	Ophuroid	Crab
C3.1	0	0	0	2	0	0	0	0	0	1	0	0	0	0	0	0	0
C3.2	0	3	0	3	0	0	0	0	0	4	1	1	0	0	0	0	0
C3.3	0	1	0	1	0	0	0	0	0	1	1	0	0	0	0	0	0
C3.4	0	1	0	1	0	0	0	0	0	2	1	0	0	0	0	0	0
C3.5	0	1	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0
Total	**0**	**6**	**0**	**7**	**0**	**0**	**0**	**0**	**0**	**10**	**3**	**1**	**0**	**0**	**0**	**0**	**0**
Mean/station	0.0	1.2	0.0	1.4	0.0	0.0	0.0	0.0	0.0	2.0	0.6	0.2	0.0	0.0	0.0	0.0	0.0
no./m2	0	30	0	35	0	0	0	0	0	50	15	5	0	0	0	0	0
No. species		**5**												**Total Organisms at Station**			**27**

Control Station C4 Depth zone -5.50m AHD Depth at time of survey -6.4m AHD 56 364260 6332794 Sampled 10-11 March 2026

Replicates	Nemertea *Gorgonorhynchus*	Polychaete *Sthenelais*	Polychaete thin	Polychaete mud	Polychaete *Chaetopterus*	Polychaete *Onuphidae*	Polychaete Pectinariidae	Gastropod *Nassarius*	Gastropod *Bedeva*	Bivalve *Corbula*	Bivalve *Theora*	Bivalve *Paphia*	Bivalve *Dosinia*	Bivalve *Anadara*	Bivalve *Trichomya*	Ophuroid	Crab
C4.1	0	5	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
C4.2	0	3	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0
C4.3	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C4.4	0	4	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
C4.5	0	2	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0
Total	**0**	**19**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**4**	**4**	**0**	**0**	**0**	**0**	**0**	**0**
Mean/station	0.0	3.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.8	0.0	0.0	0.0	0.0	0.0	0.0
no./m2	0	95	0	0	0	0	0	0	0	20	20	0	0	0	0	0	0
No. species		**3**														**Total Organisms at Station**	**27**

Control Station C5 Depth zone -5.50m AHD Depth at time of survey -6.6m AHD 56 367701 6334510 Sampled 10-11 March 2026

Replicates	Nemertea *Gorgonorhynchus*	Polychaete *Sthenelais*	Polychaete thin	Polychaete mud	Polychaete *Chaetopterus*	Polychaete *Onuphidae*	Polychaete Pectinariidae	Gastropod *Nassarius*	Gastropod *Philine*	Bivalve *Corbula*	Bivalve *Theora*	Bivalve *Paphia*	Bivalve *Dosinia*	Bivalve *Anadara*	Bivalve *Trichomya*	Ophuroid *Ophionereis*	Crab
C5.1	0	2	0	3	0	5	0	0	0	0	5	0	0	0	0	0	0
C5.2	0	3	0	9	0	4	0	0	0	0	0	0	0	0	0	0	0
C5.3	0	6	0	7	0	4	0	0	11	0	9	1	1	0	0	0	0
C5.4	0	5	0	4	0	5	0	0	1	0	2	0	0	0	0	0	0
C5.5	0	0	0	3	0	0	0	0	0	0	10	0	0	0	0	0	0
Total	**0**	**16**	**0**	**26**	**0**	**18**	**0**	**0**	**12**	**0**	**26**	**1**	**1**	**0**	**0**	**0**	**0**
Mean/station	0.0	3.2	0.0	5.2	0.0	3.6	0.0	0.0	2.4	0.0	5.2	0.2	0.2	0.0	0.0	0.0	0.0
no./m2	0	80	0	130	0	90	0	0	60	0	130	5	5	0	0	0	0
No. species		**7**														**Total Organisms at Station**	**100**

Control Station C6 Depth zone -5.50m AHD Depth at time of survey -6.0m AHD 56 363988 6332492 Sampled 10-11 March 2026

Replicates	Nemertea *Gorgonorhynchus*	Polychaete *Sthenelais*	Polychaete thin	Polychaete mud	Polychaete *Chaetopterus*	Polychaete *Onuphidae*	Polychaete Pectinariidae	Gastropod *Nassarius*	Gastropod *Bedeva*	Bivalve *Corbula*	Bivalve *Theora*	Bivalve *Paphia*	Bivalve *Dosinia*	Bivalve *Anadara*	Bivalve *Trichomya*	Ophuroid	Crab
C6.1	0	2	0	0	0	0	0	0	0	2	1	0	0	0	0	0	0
C6.2	0	2	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
C6.3	0	5	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
C6.4	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C6.5	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0
Total	**0**	**12**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**7**	**1**	**0**	**0**	**0**	**0**	**0**	**0**
Mean/station	0.0	2.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4	0.2	0.0	0.0	0.0	0.0	0.0	0.0
no./m2	0	60	0	0	0	0	0	0	0	35	5	0	0	0	0	0	0
No. species		**3**														**Total Organisms at Station**	**20**

Control Station C7 Depth zone -5.50m AHD Depth at time of survey -4.5m AHD 56 364736 6334947 Sampled 10-11 March 2026

Replicates	Nemertea *Gorgonorhynchus*	Polychaete *Sthenelais*	Polychaete thin	Polychaete mud	Polychaete *Chaetopterus*	Polychaete *Onuphidae*	Polychaete Pectinariidae	Gastropod *Nassarius*	Gastropod *Philine*	Bivalve *Corbula*	Bivalve *Theora*	Bivalve *Paphia*	Bivalve *Dosinia*	Bivalve *Anadara*	Echinoderm *Ophionereis*	Asteroidea *Astropecten*	Crab
C7.1	0	5	0	2	7	10	0	0	0	0	0	0	16	0	0	0	0
C7.2	0	6	0	2	3	3	0	0	0	0	0	0	16	0	1	1	0
C7.3	0	1	0	3	7	5	0	0	3	0	1	0	32	0	0	0	0
C7.4	0	1	0	2	3	8	0	0	3	0	3	0	24	0	0	0	0
C7.5	0	2	0	2	3	5	0	0	3	0	2	0	18	0	0	0	0
Total	**0**	**15**	**0**	**11**	**23**	**31**	**0**	**0**	**9**	**0**	**6**	**0**	**106**	**0**	**1**	**1**	**0**
Mean/station	0.0	3.0	0.0	2.2	4.6	6.2	0.0	0.0	1.8	0.0	1.2	0.0	21.2	0.0	0.2	0.2	0.0
no./m2	0	75	0	55	115	155	0	0	45	0	30	0	530	0	5	5	0

No. species 9 **Total Organisms at Station** 203

Station R1 Depth zone -4.50m AHD Depth at time of survey -3.8m AHD 56 364177 6331535 Sampled 10-11 March 2026

Replicates	Nemertea *Gorgonorhynchus*	Polychaete *Sthenelais*	Polychaete thin	Polychaete mud	Polychaete *Chaetopterus*	Polychaete *Onuphidae*	Polychaete Pectinariidae	Gastropod *Nassarius*	Gastropod *Bedeva*	Bivalve *Corbula*	Bivalve *Theora*	Bivalve *Paphia*	Bivalve *Dosinia*	Bivalve *Anadara*	Bivalve *Trichomya*	Ophuroid	Crab
R1.1	0	6	0	7	0	0	0	0	0	1	0	0	0	0	0	0	0
R1.2	0	0	0	15	1	0	0	0	0	1	0	0	4	0	0	0	0
R1.3	0	9	0	4	0	1	0	0	0	1	0	0	0	0	0	0	0
R1.4	0	0	0	9	1	0	0	0	0	1	0	0	0	0	0	0	0
R1.5	0	9	0	8	1	1	0	0	0	1	3	1	0	0	0	0	0
Total	**0**	**24**	**0**	**43**	**3**	**2**	**0**	**0**	**0**	**5**	**3**	**1**	**4**	**0**	**0**	**0**	**0**
Mean/station	0.0	4.8	0.0	8.6	0.6	0.4	0.0	0.0	0.0	1.0	0.6	0.2	0.8	0.0	0.0	0.0	0.0
no./m2	0	120	0	215	15	10	0	0	0	25	15	5	20	0	0	0	0

No. species 8 **Total Organisms at Station** 85

Station R9 Depth zone -6.00m AHD Depth at time of survey -5.5m AHD 56 366232 6331210 Sampled 10-11 March 2026

Replicates	Nemertea *Gorgonorhynchus*	Polychaete *Sthenelais*	Polychaete thin	Polychaete mud	Polychaete *Chaetopterus*	Polychaete *Onuphidae*	Polychaete Pectinariidae	Gastropod *Nassarius*	Gastropod *Bedeva*	Bivalve *Corbula*	Bivalve *Theora*	Bivalve *Paphia*	Bivalve *Dosinia*	Bivalve *Anadara*	Bivalve *Trichomya*	Ophuroid	Crab
R9.1	0	4	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0
R9.2	0	3	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0
R9.3	0	3	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
R9.4	0	4	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0
R9.5	0	2	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0
Total	**0**	**16**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**15**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Mean/station	0.0	3.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
no./m2	0	80	0	0	0	0	0	0	0	75	0	0	0	0	0	0	0

No. species 2 **Total Organisms at Station** 31

Station R10 Depth zone -6.00m AHD Depth at time of survey -4.9m AHD 56 365172 6334708 Sampled 10-11 March 2026

Replicates	Nemertea *Gorgonorhynchus*	Polychaete *Sthenelais*	Polychaete thin	Polychaete mud	Polychaete *Chaetopterus*	Polychaete *Onuphidae*	Polychaete Pectinariidae	Gastropod *Nassarius*	Gastropod *Philine*	Bivalve *Corbula*	Bivalve *Theora*	Bivalve *Paphia*	Bivalve *Dosinia*	Bivalve *Anadara*	Bivalve *Trichomya*	Ophuroid	Crab
R10.1	0	2	0	4	0	0	0	0	0	1	0	0	0	0	0	0	0
R10.2	0	0	0	2	2	0	0	0	2	0	0	0	16	0	0	0	0
R10.3	0	6	0	4	1	3	0	0	1	2	5	2	5	0	0	0	0
R10.4	0	2	0	4	2	0	2	0	1	0	0	0	22	0	0	0	0
R10.5	0	2	0	4	0	3	0	0	0	2	3	0	5	0	0	0	0
Total	**0**	**12**	**0**	**18**	**5**	**6**	**2**	**0**	**4**	**5**	**8**	**2**	**48**	**0**	**0**	**0**	**0**
Mean/station	0.0	2.4	0.0	3.6	1.0	1.2	0.4	0.0	0.8	1.0	1.6	0.4	9.6	0.0	0.0	0.0	0.0
no./m2	0	60	0	90	25	30	10	0	20	25	40	10	240	0	0	0	0

No. species 10 **Total Organisms at Station** 110

Station R12 Depth zone -6.00m AHD Depth at time of survey -6.8m AHD 56 365919 6330294 Sampled 10-11 March 2026

Replicates	Nemertea *Gorgonorhynchus*	Polychaete *Sthenelais*	Polychaete thin	Polychaete mud	Polychaete *Chaetopterus*	Polychaete *Onuphidae*	Polychaete Pectinariidae	Gastropod *Nassarius*	Gastropod *Philine*	Bivalve *Corbula*	Bivalve *Theora*	Bivalve *Paphia*	Bivalve *Dosinia*	Bivalve *Anadara*	Bivalve *Trichomya*	Ophuroid	Crab
R12.1	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
R12.2	0	0	2	0	0	0	0	0	0	4	0	0	0	0	0	0	0
R12.3	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
R12.4	0	0	2	0	0	0	0	0	0	2	0	0	0	0	0	0	0
R12.5	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0
Total	**0**	**1**	**4**	**1**	**0**	**0**	**0**	**0**	**0**	**9**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Mean/station	0.0	0.2	0.8	0.2	0.0	0.0	0.0	0.0	0.0	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
no./m2	0	5	20	5	0	0	0	0	0	45	0	0	0	0	0	0	0

No. species 4 **Total Organisms at Station** 15

Station R13 Depth zone -5.50m AHD Depth at time of survey -3.8m AHD 56 366357 6334708 Sampled 10-11 March 2026

Replicates	Nemertea *Gorgonorhynchus*	Polychaete *Sthenelais*	Polychaete thin	Polychaete mud	Polychaete *Chaetopterus*	Polychaete *Onuphidae*	Polychaete Pectinariidae	Gastropod *Nassarius*	Gastropod *Philine*	Bivalve *Corbula*	Bivalve *Theora*	Bivalve *Anadara*	Bivalve *Dosinia*	Bivalve *Mactra*	Bivalve *Trichomya*	Bivalve *Saccostrea*	Crab
R13.1	0	6	0	0	0	0	0	0	0	0	0	0	0	0	26	0	1
R13.2	0	3	0	0	0	0	0	0	0	0	0	0	0	2	0	1	0
R13.3	0	2	0	0	0	0	0	0	0	0	0	1	3	2	0	0	0
R13.4	0	1	0	1	1	1	0	0	0	0	0	0	1	2	15	1	2
R13.5	0	7	0	1	1	0	0	0	0	0	0	0	0	1	9	0	0
Total	**0**	**19**	**0**	**2**	**2**	**1**	**0**	**0**	**0**	**0**	**0**	**1**	**4**	**7**	**50**	**2**	**3**
Mean/station	0.0	3.8	0.0	0.4	0.4	0.2	0.0	0.0	0.0	0.0	0.0	0.2	0.8	1.4	10.0	0.4	0.6
no./m2	0	95	0	10	10	5	0	0	0	0	0	5	20	35	250	10	15

No. species 10 **Total Organisms at Station** 91

Station IM1 Depth zone -4.50m AHD Depth at time of survey -5.3m AHD 56 364738 6330734 Sampled 10-11 March 2026

Replicates	Nemertea *Gorgonorhynchus*	Polychaete *Sthenelais*	Polychaete thin	Polychaete mud	Polychaete *Chaetopterus*	Polychaete *Onuphidae*	Polychaete Pectinariidae	Gastropod *Nassarius*	Gastropod *Bedeva*	Bivalve *Corbula*	Bivalve *Theora*	Bivalve *Paphia*	Bivalve *Dosinia*	Bivalve *Anadara*	Bivalve *Trichomya*	Ophuroid	Crab
IM1.1	0	2	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0
IM1.2	0	0	0	0	0	0	0	0	0	12	2	0	0	0	0	0	0
IM1.3	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
IM1.4	0	2	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0
IM1.5	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0
Total	**0**	**7**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**17**	**4**	**0**	**0**	**0**	**0**	**0**	**1**
Mean/station	0.0	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.4	0.8	0.0	0.0	0.0	0.0	0.0	0.2
no./m2	0	35	0	0	0	0	0	0	0	85	20	0	0	0	0	0	5
No. species		**4**														**Total Organisms at Station**	**29**

Station IM2 Depth zone -4.50m AHD Depth at time of survey -4.0m AHD 56 364842 6332237 Sampled 10-11 March 2026

Replicates	Nemertea *Gorgonorhynchus*	Polychaete *Sthenelais*	Polychaete thin	Polychaete mud	Polychaete *Chaetopterus*	Polychaete *Onuphidae*	Polychaete Pectinariidae	Gastropod *Nassarius*	Bivalve *Saccostrea*	Bivalve *Corbula*	Bivalve *Theora*	Bivalve *Paphia*	Bivalve *Dosinia*	Bivalve *Anadara*	Bivalve *Trichomya*	Ophuroid *Ophionereis*	Crab
IM2.1	0	3	0	1	1	0	0	0	0	0	2	1	0	0	0	0	0
IM2.2	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IM2.3	0	3	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0
IM2.4	0	1	0	3	0	0	0	0	0	1	1	0	0	0	0	0	0
IM2.5	0	4	0	3	0	0	0	0	0	0	1	0	0	0	0	0	0
Total	**0**	**14**	**0**	**10**	**1**	**0**	**0**	**0**	**0**	**1**	**4**	**1**	**0**	**0**	**0**	**0**	**0**
Mean/station	0.0	2.8	0.0	2.0	0.2	0.0	0.0	0.0	0.0	0.2	0.8	0.2	0.0	0.0	0.0	0.0	0.0
no./m2	0	70	0	50	5	0	0	0	0	5	20	5	0	0	0	0	0
No. species		**6**														**Total Organisms at Station**	**31**

Station IM3 Depth zone -5.50m AHD Depth at time of survey -6.2m AHD 56 364693 6332101 Sampled 10-11 March 2026

Replicates	Nemertea *Gorgonorhynchus*	Polychaete *Sthenelais*	Polychaete thin	Polychaete mud	Polychaete *Chaetopterus*	Polychaete *Onuphidae*	Polychaete Pectinariidae	Gastropod *Nassarius*	Gastropod *Philine*	Bivalve *Corbula*	Bivalve *Theora*	Bivalve *Paphia*	Bivalve *Dosinia*	Bivalve *Anadara*	Bivalve *Trichomya*	Ophuroid	Crab
IM3.1	0	3	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0
IM3.2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IM3.3	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0
IM3.4	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IM3.5	0	2	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0
Total	**0**	**8**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**9**	**0**	**1**	**0**	**0**	**0**	**0**	**0**
Mean/station	0.0	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8	0.0	0.2	0.0	0.0	0.0	0.0	0.0
no./m2	0	40	0	0	0	0	0	0	0	45	0	5	0	0	0	0	0
No. species		**3**														**Total Organisms at Station**	**18**

Station IM4 Depth zone -6.00m AHD Depth at time of survey -7.6m AHD 56 364673 6332705 Sampled 10-11 March 2026

Replicates	Nemertea *Gorgonorhynchus*	Polychaete *Sthenelais*	Polychaete thin	Polychaete mud	Polychaete *Chaetopterus*	Polychaete *Onuphidae*	Polychaete Pectinariidae	Gastropod *Nassarius*	Gastropod *Bedeva*	Bivalve *Corbula*	Bivalve *Theora*	Bivalve *Paphia*	Bivalve *Dosinia*	Bivalve *Anadara*	Bivalve *Trichomya*	Ophuroid	Crab
IM4.1	0	6	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0
IM4.2	0	5	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
IM4.3	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IM4.4	0	4	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
IM4.5	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	**0**	**21**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**3**	**1**	**0**	**0**	**0**	**0**	**0**
Mean/station	0.0	4.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.2	0.0	0.0	0.0	0.0	0.0
no./m2	0	105	0	0	0	0	0	0	0	0	15	5	0	0	0	0	0

No. species 3 **Total Organisms at Station** 25

Station IM5 (was R3) Depth zone -5.50m AHD Depth at time of survey -7.3 m AHD 56 364660 6332992 Sampled 10-11 March 2026

Replicates	Nemertea *Gorgonorhynchus*	Polychaete *Sthenelais*	Polychaete thin	Polychaete mud	Polychaete *Chaetopterus*	Polychaete *Onuphidae*	Polychaete Pectinariidae	Gastropod *Nassarius*	Gastropod *Bedeva*	Bivalve *Corbula*	Bivalve *Theora*	Bivalve *Paphia*	Bivalve *Dosinia*	Bivalve *Mactra*	Bivalve *Trichomya*	Ophuroid *Ophionereis*	Crab
IM5.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IM5.2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IM5.3	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IM5.4	0	3	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
IM5.5	0	7	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	**0**	**15**	**5**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Mean/station	0.0	3.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
no./m2	0	75	25	0	0	0	0	0	0	5	0	0	0	0	0	0	0

No. species 3 **Total Organisms at Station** 21

Station IM6 (was R4) Depth zone -6.00m AHD Depth at time of survey -6.8 m AHD 56 364771 6332763 Sampled 10-11 March 2026

Replicates	Nemertea *Gorgonorhynchus*	Polychaete *Sthenelais*	Polychaete thin	Polychaete mud	Polychaete *Chaetopterus*	Polychaete *Onuphidae*	Polychaete Pectinariidae	Gastropod *Nassarius*	Gastropod *Bedeva*	Bivalve *Corbula*	Bivalve *Theora*	Bivalve *Paphia*	Bivalve *Dosinia*	Bivalve *Anadara*	Bivalve *Trichomya*	Ophuroid	Crab
IM6.1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
IM6.2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IM6.3	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IM6.4	0	1	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0
IM6.5	0	1	0	3	0	0	0	0	0	0	2	0	0	0	0	0	0
Total	**0**	**5**	**0**	**4**	**0**	**0**	**0**	**0**	**0**	**1**	**3**	**0**	**0**	**0**	**0**	**0**	**0**
Mean/station	0.0	1.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.2	0.6	0.0	0.0	0.0	0.0	0.0	0.0
no./m2	0	25	0	20	0	0	0	0	0	5	15	0	0	0	0	0	0

No. species 4 **Total Organisms at Station** 13

Station IM7 (was R5) Depth zone -6.00m AHD Depth at time of survey -5.2 m AHD 56 364229 6333889 Sampled 10-11 March 2026

Replicates	Nemertea *Gorgonorhynchus*	Polychaete *Sthenelais*	Polychaete thin	Polychaete mud	Polychaete *Chaetopterus*	Polychaete *Onuphidae*	Polychaete Pectinariidae	Gastropod *Nassarius*	Gastropod *Bedeva*	Bivalve *Corbula*	Bivalve *Theora*	Bivalve *Paphia*	Bivalve *Dosinia*	Bivalve *Anadara*	Bivalve *Trichomya*	Ophuroid	Crab
IM7.1	0	4	0	0	0	0	0	0	0	6	4	0	0	0	0	0	0
IM7.2	0	5	0	0	0	0	0	0	0	7	1	0	0	0	0	0	0
IM7.3	0	0	0	1	0	1	0	0	0	2	0	0	0	0	0	0	0
IM7.4	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
IM7.5	0	4	0	1	0	0	0	0	0	5	3	1	0	0	0	0	0
Total	**0**	**15**	**0**	**2**	**0**	**3**	**0**	**0**	**0**	**20**	**8**	**1**	**0**	**0**	**0**	**0**	**0**
Mean/station	0.0	3.0	0.0	0.4	0.0	0.6	0.0	0.0	0.0	4.0	1.6	0.2	0.0	0.0	0.0	0.0	0.0
no./m2	0	75	0	10	0	15	0	0	0	100	40	5	0	0	0	0	0

No. species 6 **Total Organisms at Station** 49

Station IM8 (was R6) Depth zone -6.00m AHD Depth at time of survey -7.2 m AHD 56 364533 6334146 Sampled 10-11 March 2026

Replicates	Nemertea *Gorgonorhynchus*	Polychaete *Sthenelais*	Polychaete thin	Polychaete mud	Polychaete *Chaetopterus*	Polychaete *Onuphidae*	Polychaete Pectinariidae	Gastropod *Nassarius*	Gastropod *Bedeva*	Bivalve *Corbula*	Bivalve *Theora*	Bivalve *Paphia*	Bivalve *Dosinia*	Bivalve *Anadara*	Bivalve *Trichomya*	Ophuroid	Crab
IM8.1	0	3	0	1	0	0	0	0	0	1	1	0	0	0	0	0	0
IM8.2	0	2	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0
IM8.3	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0
IM8.4	0	1	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0
IM8.5	0	2	0	1	0	0	0	0	0	1	1	0	0	0	0	0	0
Total	**0**	**8**	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**7**	**5**	**0**	**0**	**0**	**0**	**0**	**0**
Mean/station	0.0	1.6	0.0	0.4	0.0	0.0	0.0	0.0	0.0	1.4	1.0	0.0	0.0	0.0	0.0	0.0	0.0
no./m2	0	40	0	10	0	0	0	0	0	35	25	0	0	0	0	0	0

No. species 4 **Total Organisms at Station** 22

Station IM9 (was R8) Depth zone -6.00m AHD Depth at time of survey -6.2 m AHD 56 364323 63322010 Sampled 10-11 March 2026

Replicates	Nemertea *Gorgonorhynchus*	Polychaete *Sthenelais*	Polychaete thin	Polychaete mud	Polychaete *Chaetopterus*	Polychaete *Onuphidae*	Polychaete Pectinariidae	Gastropod *Nassarius*	Gastropod *Bedeva*	Bivalve *Corbula*	Bivalve *Theora*	Bivalve *Paphia*	Bivalve *Dosinia*	Bivalve *Anadara*	Bivalve *Trichomya*	Ophuroid	Crab
IM9.1	0	4	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0
IM9.2	0	3	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
IM9.3	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0
IM9.4	0	4	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0
IM9.5	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	**0**	**12**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**3**	**4**	**1**	**0**	**0**	**0**	**0**	**0**
Mean/station	0.0	2.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.8	0.2	0.0	0.0	0.0	0.0	0.0
no./m2	0	60	0	0	0	0	0	0	0	15	20	5	0	0	0	0	0

No. species 4 **Total Organisms at Station** 20

Station IM10 (was R2) Depth zone -4.50m AHD Depth at time of survey -4.8 m AHD 56 365919 6330294 Sampled 10-11 March 2026

Replicates	Nemertea *Gorgonorhynchus*	Polychaete *Sthenelais*	Polychaete thin	Polychaete mud	Polychaete *Chaetopterus*	Polychaete *Onuphidae*	Polychaete Pectinariidae	Gastropod *Nassarius*	Gastropod *Bedeva*	Bivalve *Corbula*	Bivalve *Theora*	Bivalve *Paphia*	Bivalve *Dosinia*	Bivalve *Anadara*	Bivalve *Trichomya*	Ophuroid	Crab
IM10.1	0	5	0	0	0	0	0	0	0	9	1	0	0	0	0	0	0
IM10.2	0	5	0	0	0	0	0	0	0	5	1	0	0	0	0	0	0
IM10.3	0	2	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0
IM10.4	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0
IM10.5	0	1	0	0	0	0	0	0	0	4	1	0	0	0	0	0	0
Total	**0**	**13**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**23**	**4**	**0**	**0**	**0**	**0**	**0**	**0**
Mean/station	0.0	2.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.6	0.8	0.0	0.0	0.0	0.0	0.0	0.0
no./m2	0	65	0	0	0	0	0	0	0	115	20	0	0	0	0	0	0

No. species 3 **Total Organisms at Station** 40

Station IM11 (was R7) Depth zone -6.00m AHD Depth at time of survey -8.8 m AHD 56 366232 6333856 Sampled 10-11 March 2026

Replicates	Nemertea *Gorgonorhynchus*	Polychaete *Sthenelais*	Polychaete thin	Polychaete mud	Polychaete *Chaetopterus*	Polychaete *Onuphidae*	Polychaete Pectinariidae	Ophuroid *Ophionereis*	Gastropod *Philine*	Bivalve *Corbula*	Bivalve *Theora*	Bivalve *Paphia*	Bivalve *Dosinia*	Bivalve *Anadara*	Bivalve *Trichomya*	Bivalve *Saccostrea*	Crab
IM11.1	0	2	0	3	0	0	0	0	0	1	1	0	1	0	6	3	0
IM11.2	0	3	0	0	0	0	0	0	0	0	0	0	1	0	2	1	2
IM11.3	0	3	1	0	0	0	0	0	1	0	0	0	0	0	0	2	0
IM11.4	0	6	0	0	1	0	0	1	0	1	0	0	0	1	4	0	0
IM11.5	0	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
Total	**0**	**16**	**1**	**4**	**1**	**0**	**0**	**1**	**1**	**2**	**1**	**0**	**2**	**1**	**12**	**6**	**3**
Mean/station	0.0	3.2	0.2	0.8	0.2	0.0	0.0	0.2	0.2	0.4	0.2	0.0	0.4	0.2	2.4	1.2	0.6
no./m2	0	80	5	20	5	0	0	5	5	10	5	0	10	5	60	30	15

No. species 13 **Total Organisms at Station** 51

Station IM12 (was R11) Depth zone -6.00m AHD Depth at time of survey -7.0 m AHD 56 367072 6333638 Sampled 10-11 March 2026

Replicates	Nemertea *Gorgonorhynchus*	Polychaete *Sthenelais*	Polychaete thin	Polychaete mud	Polychaete *Chaetopterus*	Polychaete *Onuphidae*	Polychaete Pectinariidae	Porifera *Tetilla*	Gastropod *Philine*	Bivalve *Corbula*	Bivalve *Theora*	Bivalve *Paphia*	Bivalve *Dosinia*	Bivalve juvenile	Bivalve *Trichomya*	Bivalve *Saccostrea*	Crab
R11.1	0	2	0	2	0	0	0	0	0	1	0	0	0	0	0	0	0
R11.2	2	3	0	2	0	0	0	0	0	0	0	0	0	0	2	2	1
R11.3	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	1	0
R11.4	1	1	0	5	0	0	0	0	0	0	1	0	0	0	0	0	0
R11.5	1	3	1	0	0	0	0	0	0	1	0	0	1	0	1	0	0
Total	**4**	**11**	**1**	**11**	**0**	**0**	**0**	**0**	**0**	**2**	**1**	**0**	**1**	**0**	**3**	**3**	**1**
Mean/station	0.8	2.2	0.2	2.2	0.0	0.0	0.0	0.0	0.0	0.4	0.2	0.0	0.2	0.0	0.6	0.6	0.2
no./m2	20	55	5	55	0	0	0	0	0	10	5	0	5	0	15	15	5

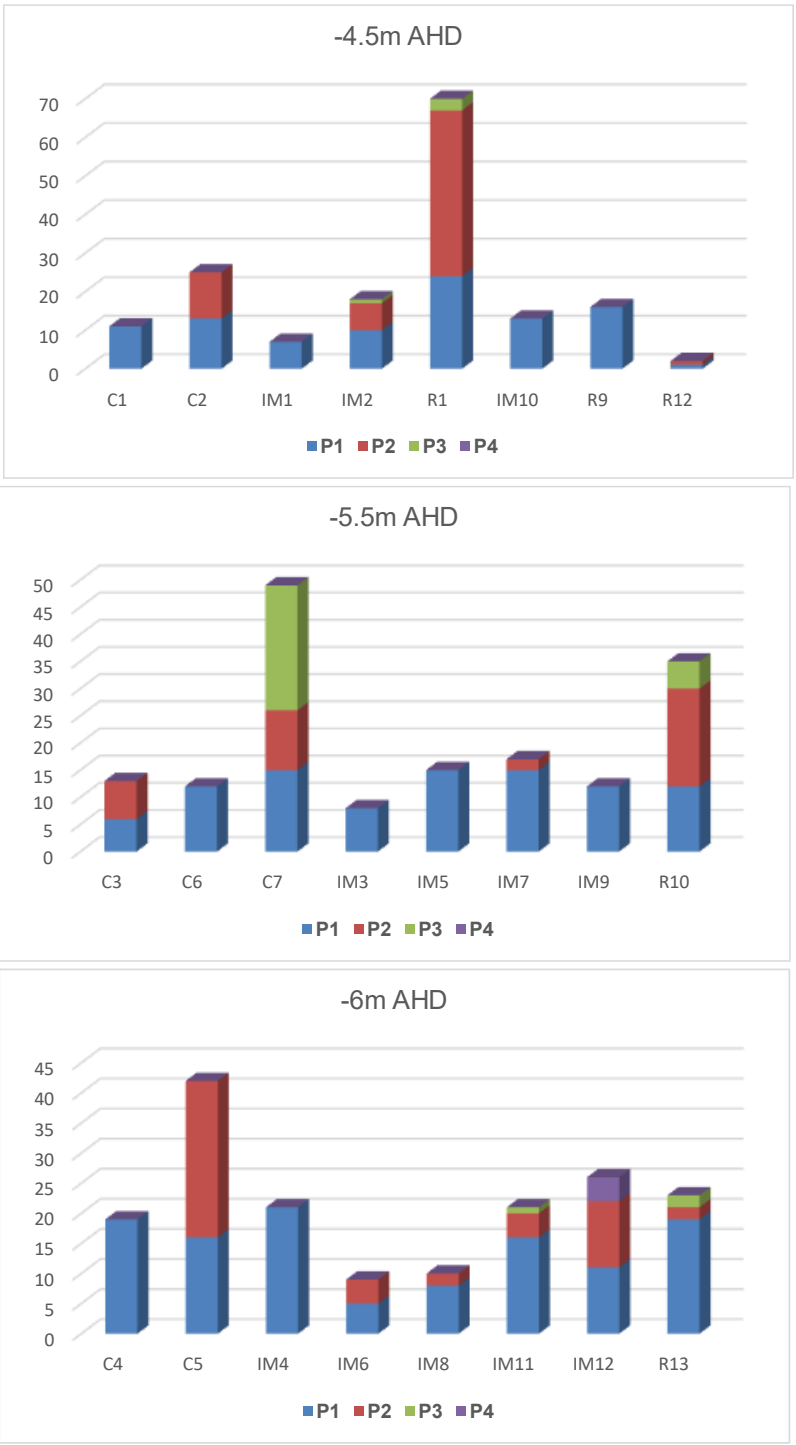
No. species 10 **Total Organisms at Station** 38

Total Organisms Collected 1138
Total number of species recorded 19

The dominant species such as *Sthenelais*, *Chaetopterus*, *Theora*, *Corbula* and *Dosinia* were present at each depth zone. This indicates that at the time of the survey, water depth was not influencing the presence of these organisms in the sediments (Figures 6A.1 and 6A.2).

In Autumn 2026, the sampling stations with the greatest organism diversity were IM11, IM12, R13, R10, C7 and R1 with 13, 10, 10, 10, 9 and 8 species recorded respectively. Stations C5 (7), IM2 (6), IM7 (6) and C2 (5) also had relatively high organism diversity. Benthic monitoring stations R9, C1, IM10, C6, IM3, IM5, C4 and IM4 had the lowest organism diversity with only 2 to 3 species recorded at each station (Table 6A.2). Species diversity ranged from 3 to 9 species at the control stations, 2 to 10 species at the reference stations, and 3 to 13 species at the impact stations. Comparisons of the number of species collected at each monitoring station over a fifteen-year period revealed no discernable differences in diversity with water depth (Table 6A.2).

These findings support previous data collected between September 2016 and March 2020 in the Chain Valley Bay, Bardens Bay and Summerland Point regions. Despite reported changes in bed levels associated with Chain Valley Colliery underground workings, no statistical differences were found between the benthic assemblages at sites designated as Impact, Reference and Control stations (EMM, 2020).



P1 *Sthenelais pettiboneae* P2 Polychaete mud P3 Chaetopteridae P4 *Gorgonorhynchus repens*

Figure 6A.1 Number of worms found at each control, reference and impact Station, March 2026

B1 *Theora* B2 *Corbula* B3 *Paphia* B4 *Dosinia* B5 *Trichomya* B6 *Saccostrea*

Figure 6A.2 Number of bivalves found at each control, reference and impact Station, March 2026

Table 6A.2 Number of species found at each monitoring station with depth – years 2012 to 2026

-4.5m AHD. Overall mean: 5.14

Station	C1	C2	IM1	IM2	IM10 (R2)	R1	R9	R12
Feb 2012	10	5	7	4	8	8		
Sep 2012	3	6	4	4	3	6		
Mar 2013	4	5	7	5	5	6		
Sep 2013	6	6	4	3	6	5		
Mar 2014	4	3	5	9	4	6		
Sep 2014	3	4	5	6	5	6		
Mar 2015	3	3	5	4	3	5		
Sep 2015	5	4	5	5	3	5		
Mar 2016	6	4	6	6	5	6		
Sep 2016	7	3	6	4	4	8	8	
Mar 2017	2	4	3	4	5	4	5	
Sep 2017	4	4	5	5	3	4	4	
Mar 2018	4	4	5	7	8	7	4	
Sep 2018	3	4	4	8	4	4	5	
Mar 2019	6	3	5	5	5	4	4	
Sep 2019	5	6	6	5	3	4	4	
Mar 2020	5	6	7	7	6	6	4	
Aug 2020	6	5	5	6	5	4	5	
Mar 2021	5	6	7	7	4	5	6	
Sep 2021	4	4	3	7	4	5	4	
Mar 2022	5	6	5	6	4	6	5	
Sep 2022	5	5	6	8	5	6	7	
Mar 2023	6	6	8	9	4	6	6	
Mar 2024	6	6	9	8	3	7	4	5
May 2025	4	5	4	12	4	6	3	7
Mar 2026	3	5	4	6	3	8	2	4
Mean	**4.77**	**4.69**	**5.38**	**6.15**	**4.46**	**5.65**	**4.71**	**5.33**
STD	**1.66**	**1.09**	**1.47**	**2.03**	**1.39**	**1.26**	**1.45**	**1.53**
Min	**2**	**3**	**3**	**3**	**3**	**4**	**2**	**4**
Max	**10**	**6**	**9**	**12**	**8**	**8**	**8**	**7**

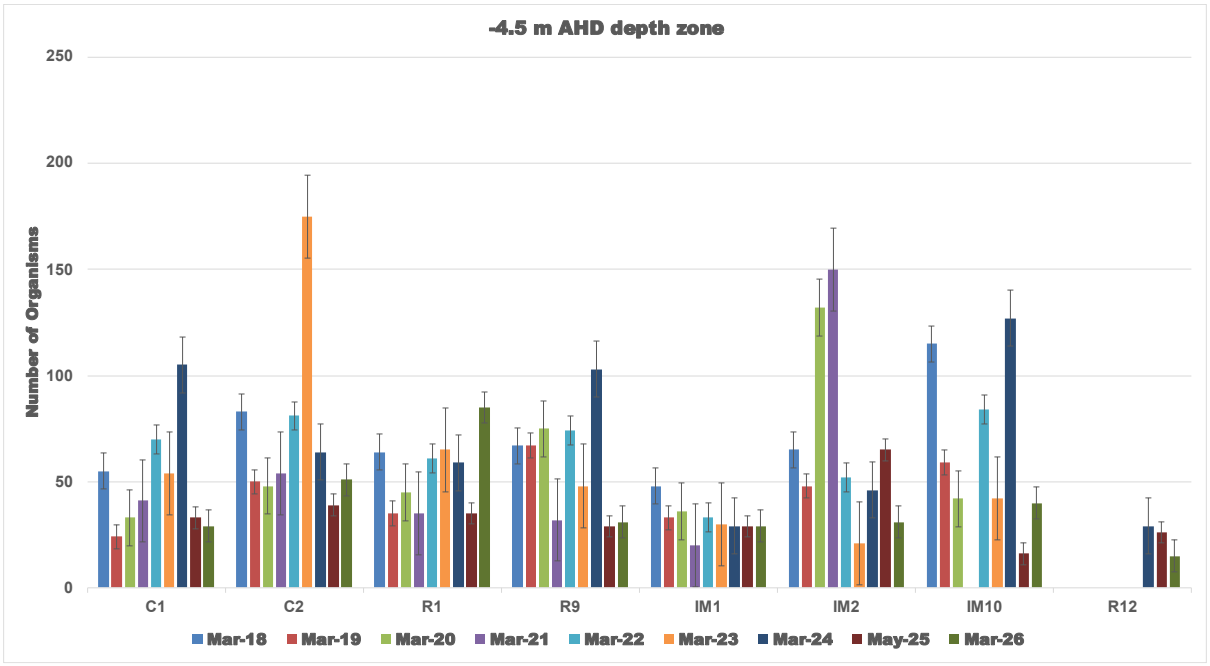
-5.5m AHD. Overall mean: 5.02

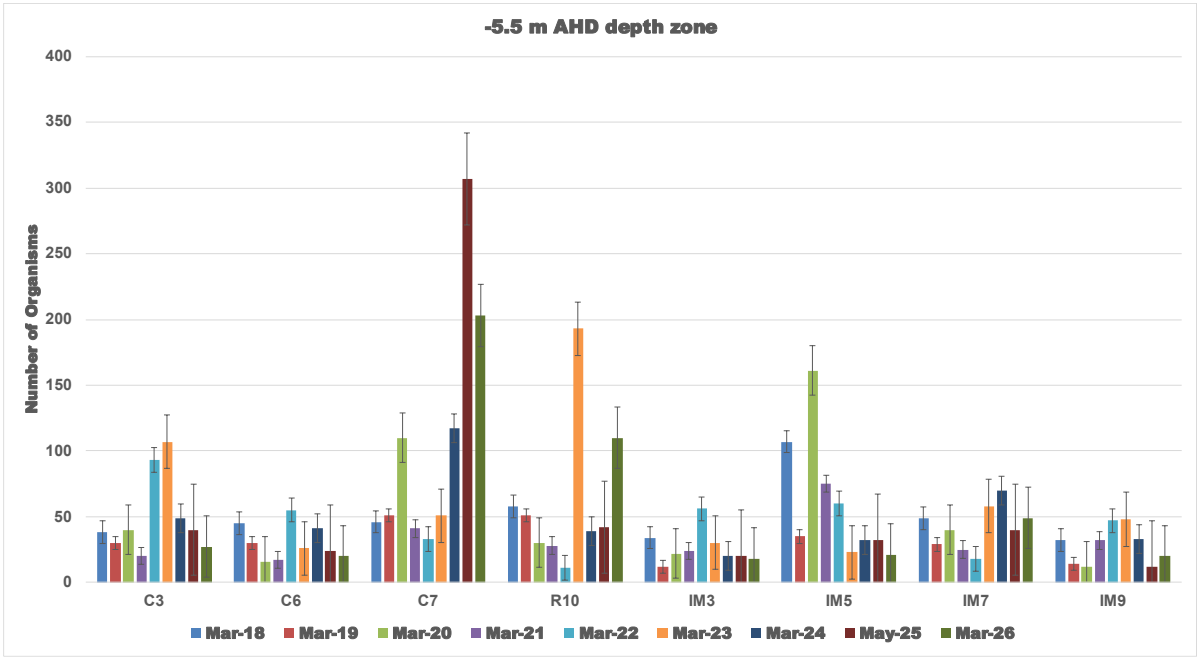
Station	C3	C6	C7	IM3	IM5 (R3)	IM7 (R5)	IM9 (R8)	R10
Feb 2012	5			4	5			
Sep 2012	4			3	4			
Mar 2013	7			5	6			
Sep 2013	3			4	5			
Mar 2014	5			4	5	4		
Sep 2014	4			3	6	3		
Mar 2015	5			4	6	3		
Sep 2015	4			4	4	5		
Mar 2016	5			3	6	4		
Sep 2016	6	8		6	5	6	5	
Mar 2017	5	5		3	4	4	3	
Sep 2017	4	5		5	6	4	5	
Mar 2018	8	3	5	3	5	6	3	4
Sep 2018	4	5	5	4	5	5	4	4
Mar 2019	4	5	3	2	7	5	4	6
Sep 2019	5	5	6	7	7	4	4	4
Mar 2020	6	3	6	4	7	4	3	4
Aug 2020	4	5	5	4	7	7	4	5
Mar 2021	3	2	2	5	7	5	4	5
Sep 2021	7	7	6	4	8	4	3	6
Mar 2022	4	7	4	5	9	4	3	6
Sep 2022	7	5	6	6	7	5	6	6
Mar 2023	5	4	6	4	4	4	6	5
Mar 2024	9	6	8	6	12	5	4	5
May 2025	7	6	11	4	8	5	3	6
Mar 2026	5	3	9	3	3	6	4	10
Mean	**5.19**	**4.94**	**5.86**	**4.19**	**6.08**	**4.64**	**4.00**	**5.43**
STD	**1.52**	**1.60**	**2.32**	**1.17**	**1.90**	**1.00**	**1.00**	**1.55**
Min	**3**	**2**	**2**	**2**	**3**	**3**	**3**	**4**
Max	**9**	**8**	**11**	**7**	**12**	**7**	**6**	**10**

-6m AHD. Overall mean: 5.11

Station	C4	C5	IM4	IM6 (R4)	IM8 (R6)	IM11 (R7)	IM12 (R11)	R13
Feb 2012	7		5	5				
Sep 2012	4		5	5				
Mar 2013	7		5	5				
Sep 2013	7		5	4				
Mar 2014	5		5	3	3			
Sep 2014	8		6	6	3			
Mar 2015	3		5	5	3			
Sep 2015	3		4	6	4			
Mar 2016	5	5	4	4	4	8		
Sep 2016	5	4	3	6	7	7		
Mar 2017	3	5	4	5	4	4		
Sep 2017	4	4	5	5	4	4		
Mar 2018	4	4	4	4	3	4	4	
Sep 2018	6	5	4	5	4	6	4	
Mar 2019	4	6	4	3	4	4	6	
Sep 2019	5	4	5	4	4	5	3	
Mar 2020	4	7	4	4	4	8	4	
Aug 2020	4	3	6	4	5	8	4	
Mar 2021	4	5	7	4	5	5	8	
Sep 2021	6	7	4	3	4	7	7	
Mar 2022	7	6	6	7	4	8	6	
Sep 2022	7	6	3	6	4	4	5	
Mar 2023	6	6	7	4	5	5	4	
Mar 2024	6	8	4	4	4	13	7	9
May 2025	6	6	3	4	4	9	12	12
Mar 2026	3	7	3	4	4	13	10	10
Mean	**5.12**	**5.44**	**4.62**	**4.58**	**4.09**	**6.78**	**6.00**	**10.33**
STD	**1.51**	**1.34**	**1.13**	**1.03**	**0.87**	**2.84**	**2.60**	**1.53**
Min	**3**	**3**	**3**	**3**	**3**	**4**	**3**	**9**
Max	**8**	**8**	**7**	**7**	**7**	**13**	**12**	**12**

Figure 6A.3 shows the number of organisms collected at each station from 2018 to 2026. Comparisons between the number of organisms collected during the Autumn sampling periods of March 2024 and March 2026 showed an increase in the numbers of organisms collected at six of the 24 monitoring stations, a decrease at thirteen stations, and no significant change at five stations.


-4.5 m AHD depth zone
Number of Organisms
250
200
150
100
50
0
C1
C2
R1
R9
IM1
IM2
IM10
R12
Mar-18
Mar-19
Mar-20
Mar-21
Mar-22
Mar-23
Mar-24
May-25
Mar-26


-5.5 m AHD depth zone
Number of Organisms
400
350
300
250
200
150
100
50
0
C3
C6
C7
R10
IM3
IM5
IM7
IM9
Mar-18
Mar-19
Mar-20
Mar-21
Mar-22
Mar-23
Mar-24
May-25
Mar-26

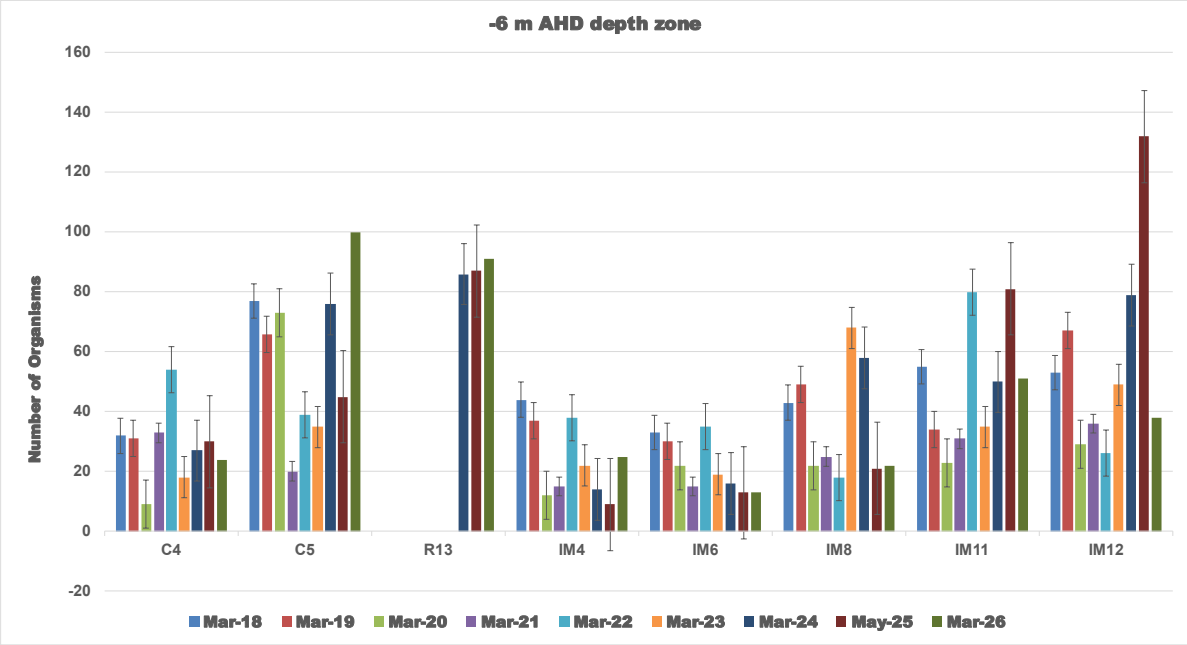


Figure 6A.3 Number of organisms at each benthic monitoring station from 2018-2026

b. Sediment Analysis

In March 2026, the sediment in the mud basin of Lake Macquarie off Summerland Point, Chain Valley Bay and Bardens Bay was largely composed of fine grey silt or fine grey silt with small to large shell fragments (Table 6B.1). Benthic monitoring stations that had a high portion of silt were C1 (95%), C2 (95%), C3 (98%), C4 (100%), R9 (95%), R12 (98%), IM5 (100%) and IM12 (100%). Monitoring stations with both silt and shell fragments were C6 (90% silt/ 10% shell), IM3 (75% silt/ 25% shell), IM6 (90% silt/ 10% shell), IM10 (78% silt/ 22% shell), and IM11 (49% silt/ 51% shell). Silt was mostly fluid as opposed to plastic (able to be molded).

Four monitoring stations had sediments with relatively high portions of silt and sand. These benthic monitoring stations were C7 with 61% sand, R10 with 25% sand, C5 with 15% sand and R1 with 11% sand. Benthic monitoring station R13, IM2 and IM1 were comprised of 100, 90 and 84 percent small to large sized shell fragments respectively (Table 6B.2).

Table 6B.1 Description of sediment collected from benthic sampling stations, March 2026

Station	Description
C1	Dark grey silt with small to large sized shell fragments.
C2	Dark grey silt with small to medium sized shell fragments.
C3	Dark grey silt with some small to medium sized shell fragments.
C4	Dark grey silt. Fluid consistency.
C5	Dark grey silt with fine to medium grained grey sand.
C6	Dark grey silt with small to large shell fragments. Mud plastic in nature.
C7	Dark grey silt with fine to medium grained grey sand. Fluid consistency.
R1	Dark grey silt with fine to medium grained grey sand.
R9	Dark grey silt with some small to medium sized shell fragments.
R10	Dark grey silt with sand. Mud plastic in nature.
R12	Dark grey silt with some small to large shell fragments.
R13	Small to large shell fragments.
IM1	Small to large sized shell fragments with some dark grey silt.
IM2	Small to large shell fragments and some dark grey silt.
IM3	Dark grey silt with some small to large sized shell fragments. Fluid consistency.
IM4	Dark grey silt and small to medium sized shell fragments. Fluid consistency.
IM5 (R3)	Dark grey silt. Fluid consistency.
IM6 (R4)	Dark grey silt with some small to large sized shell fragments.
IM7 (R5)	Dark grey silt with some grey sand.
IM8 (R6)	Dark grey silt with small to medium sized shell fragments.
IM9 (R8)	Dark grey silt. Fluid consistency.
IM10 (R2)	Dark grey silt and small to large sized shell fragments.
IM11 (R7)	Dark grey silt and small to large shell fragments.
IM12 (R11)	Dark grey silt. Fluid consistency.

Table 6B.2 Percentage of silt, sand, gravel and shell in sediment collected at each station, 2026

	% Silt	% Sand	% Gravel	% Shell
C1	95	0	0	5
C2	95	0	0	5
C3	98	1	0	2
C4	100	0	0	0
C5	85	15	0	0
C6	90	0	0	10
C7	34	61	0	5
R1	89	11	0	0
R9	95	0	0	5
R10	75	25	0	0
R12	98	0	0	2
R13	0	0	0	100
IM1	16	0	0	84
IM2	10	5	0	90
IM3	75	0	0	25
IM4	95	0	0	5
IM5 (R3)	100	0	0	0
IM6 (R4)	90	0	0	10
IM7 (R5)	95	5	0	0
IM8 (R6)	98	0	0	2
IM9 (R8)	100	0	0	0
IM10 (R2)	78	0	0	22
IM11 (R7)	49	2	0	51
IM12 (R11)	100	0	0	0

c. Physical characteristics of water in Lake Macquarie – March 2026

Rainfall in the months preceding the annual Autumn benthic survey was 204.4 mm and 137.6 mm for January and February 2026 respectively (Cooranbong Lake Macquarie AWS No. 061412). By 11th March a further 89.6 mm had fallen in the catchment.

At each station, a water quality profile was taken using a calibrated Yeo-Kal 618RU Analyser. The physical characteristics were measured on 10th and 11th March 2026**.** Units of measurement were Temperature (Temp, degrees Celsius), Conductivity (Cond, mS/cm), Salinity (Sal, parts per thousand), pH, Dissolved Oxygen (DO, % saturation and mg/L) and Turbidity (Turb, NTU).

Throughout the study area, water temperature declined with water depth (Appendix B). Water temperature at C6, for instance, was 27.34°C at the surface and was 26.36°C at -6.0m AHD. The water temperature throughout the water column ranged from 25.24°C at C5 (-6.6m AHD) to 28.89 °C at R1 (-0.5m AHD). The average water temperature throughout the water column was 26.88°C and the standard deviation was 0.67°C. There was no significant difference in water temperature throughout the water column between Control, Impact or Reference sites. The temperature of bottom water ranged from 25.24°C at C5 (-6.6m AHD) to 27.1°C at C2 (-4.0m AHD). Average bottom water temperature was 26.36°C and the standard deviation was 0.4°C (Table C6.1).

Conductivity increased slightly with water depth throughout the study area (Appendix B). At the time of survey water conductivity at R9 was 51.17 mS/cm at the surface increasing to 52.13 mS/cm at -5.5m AHD. The increase in conductivity with water depth was due to the recent rainfall events with the influx of freshwater at the surface of the water profile. Conductivity throughout the water column ranged from 50.52 mS/cm at IM8 (-1.5m AHD) to 52.67 mS/cm at IM12 (-7.0m AHD). Average conductivity throughout the water column was 51.62 mS/cm and the standard deviation was 0.58 mS/cm. Average conductivity throughout the water column did not vary significantly between Control, Impact or Reference sites. The conductivity of bottom waters ranged from 51.28 mS/cm at C2 (-4.0m AHD) to 52.66 mS/cm at C5 (-6.6m AHD). Average bottom water conductivity was 52.22 mS/cm and the standard deviation was 0.33 mS/cm (Table C6.1).

The influx of freshwater from rainfall events decreased salinity of surface waters throughout the study area and resulted in an increase of salinity with water depth throughout the water column (Appendix B). At the time of the survey, water salinity at monitoring station C1 was 33.51 ppt at the surface and 34.15 ppt at -4.5m AHD. Salinity throughout the water column ranged from 33.11 ppt at IM8 (-1.0m

AHD) to 34.69 ppt at IM12 (-6.5m AHD). Average salinity throughout the water column was 33.92 ppt and the standard deviation was 0.43 ppt. Average salinity did not vary significantly between Control, Impact or Reference sites. The salinity of bottom waters ranged from 33.66 ppt at C2 (-4.0m AHD) to 34.68 ppt at IM12 (-7.0m AHD). Average bottom water salinity was 34.36 ppt and the standard deviation was 0.25 ppt (Table C6.1).

The combination of rainfall and wind, wave and current action resulted in an increase of water turbidity with water depth throughout the study area (Appendix B). At the time of the survey, turbidity at monitoring station C3 was 9.4 NTU at the surface increasing to 30.5 NTU at -5.8m AHD. Throughout the water column turbidity ranged from 2.7 NTU at IM8 (-2.5m AHD) to 71.5 NTU at IM4 (-1.0m AHD). Average turbidity throughout the water column was 16.0 NTU and the standard deviation was 15.3 NTU. Average turbidity did not vary significantly between Control, Impact or Reference sites. Average turbidity of bottom waters ranged from 4.5 NTU at IM5 (-7.3m AHD) to 60.2 NTU at IM4 (-7.0m AHD). The average bottom water turbidity was 24.0 NTU and the standard deviation was 13.3 NTU (Table C6.1).

Throughout the study area, pH decreased slightly with water depth (Appendix B). At IM6, for instance, pH was 9.76 at the surface and decreased to 8.65 at -6.8m AHD. Throughout the water column pH ranged from 6.51 at R13 (-2.0m AHD) to 9.91 at IM1 (-0.5m AHD). Average pH throughout the water column was 8.33 and the standard deviation was 0.71. Average pH did not vary significantly between Control, Impact or Reference sites. Average pH of bottom waters ranged from pH 7.05 at C7 (-4.5m AHD) to pH 9.27 at R1 (-3.8m AHD). The average pH of bottom water was pH 7.90 and the standard deviation was 0.56 (Table C6.1).

Dissolved oxygen decreased with depth or was uniform throughout the water column and the study area. At IM3, for instance, dissolved oxygen decreased from 86.4% saturation at the surface to 73.6% saturation at -6.2m AHD. At monitoring station R10 dissolved oxygen decreased from 88.4% saturation at the surface to 74.6 % saturation at -4.9m AHD (Appendix B). Throughout the water column, dissolved oxygen concentrations ranged from 61.8% saturation at IM8 (-7.0m AHD) to 102.2% saturation at IM4 (-0.3m AHD). The average dissolved oxygen throughout the water column was 82.84% saturation and the standard deviation was 7.43% saturation. Average dissolved oxygen did not differ significantly between Control, Impact or Reference sites throughout the water column. The average dissolved oxygen of bottom waters ranged from 61.8% saturation at IM8 (-7.0m AHD) to 91.5% saturation at C2 (-4.5m AHD). The average dissolved oxygen of bottom waters was 74.01% saturation and the standard deviation was 7.3% saturation. (Table C6.1).

Table 6C.2 compares the average water quality variables of bottom water over a ten-year period from March 2016 to March 2026. Water temperature ranged from 23.9°C to 27.54°C, with an average of 25.66°C and a standard deviation of 1.09°C. Conductivity ranged from 50.52 mS/cm to 58.47 mS/cm, with an average of 54.64 mS/cm and a standard deviation of 2.97 mS/cm. Salinity had a range of 33.3 ppt to 39.0 ppt, with an average of 35.89 ppt and standard deviation of 2.09 ppt. Dissolved oxygen had a range of 63.6% saturation to 109.5% saturation, with an average of 86.7% saturation. pH ranged from pH 7.73 to pH 9.74, with an average of pH 8.40 and a standard deviation of pH 0.58. The water quality variables over the ten-year period did not vary significantly, and any variation was largely due to rainfall and other weather conditions such as wind and wave action.

Table 6C.1 Physical characteristics of bottom waters at benthic stations – March 2026

Station	Depth m	Temperature °C	Conductivity mS/cm	Salinity ppt	pH	Turbidity NTU	DO % sat	DO mg/L
Control Stations								
C1	4.5	26.63	51.94	34.15	8.26	23.7	78.2	4.82
C2	4.0	27.10	51.28	33.66	8.16	16.6	91.50	5.66
C3	5.8	26.60	51.88	34.10	8.53	30.5	89.5	5.57
C4	6.4	26.37	52.22	34.36	7.54	8.7	68.2	4.18
C5	6.6	25.24	52.66	34.68	7.37	27.2	73.3	4.65
C6	6.0	26.36	52.38	34.47	7.25	6.2	70.2	4.31
C7	4.5	26.22	52.31	34.43	7.05	16.9	76.0	4.72
Mean		**26.36**	**52.10**	**34.26**	**7.74**	**18.54**	**78.13**	**4.84**
Stdev		**0.57**	**0.45**	**0.33**	**0.57**	**9.13**	**9.10**	**0.57**
Min		**25.24**	**51.28**	**33.66**	**7.05**	**6.2**	**68.2**	**4.18**
Max		**27.10**	**52.66**	**34.68**	**8.53**	**30.50**	**91.50**	**5.66**
Reference Stations								
R1	3.8	27.08	51.71	33.98	9.27	31.3	80.6	4.93
R9	5.5	26.68	52.13	34.30	8.47	24.3	71.5	4.36
R10	4.9	26.17	52.46	34.54	7.75	14.7	74.6	4.62
R12	6.8	26.12	52.42	34.50	7.76	15.0	77.3	4.81
R13	3.8	26.30	52.37	34.47	7.13	16.6	69.7	4.28
Mean		**26.47**	**52.22**	**34.36**	**8.08**	**20.38**	**74.74**	**4.60**
Stdev		**0.41**	**0.31**	**0.23**	**0.82**	**7.25**	**4.38**	**0.28**
Min		**26.12**	**51.71**	**33.98**	**7.13**	**14.70**	**69.70**	**4.28**
Max		**27.08**	**52.46**	**34.54**	**9.27**	**31.30**	**80.60**	**4.93**
Impact Stations								
IM1	5.3	26.43	51.77	34.03	8.33	38.2	79.8	4.96
IM2	4.0	26.49	52.31	34.42	8.18	34.8	72.6	4.45
IM3	6.2	26.49	52.29	34.41	8.36	23.6	73.6	4.52
IM4	7.0	26.33	52.24	34.38	8.15	60.2	79.9	4.29
IM5 (R3)	7.3	26.25	52.37	34.47	7.87	4.5	69.0	4.24
IM6 (R4)	6.8	26.54	52.34	34.45	8.65	28.1	62.8	3.80
IM7 (R5)	5.2	26.33	52.54	34.59	7.29	8.8	71.2	4.37
IM8 (R6)	7.0	26.30	52.54	34.59	7.38	15.2	61.8	3.75
IM9 (R8)	6.2	26.56	52.29	34.41	7.75	31.0	69.0	4.21
IM10 (R2)	4.8	26.43	51.79	34.04	8.03	24.7	77.9	4.83
IM11 (R7)	6.5	26.23	52.33	34.44	7.95	24.8	74.4	4.61
IM12 (R11)	7.0	25.39	52.65	34.68	7.18	50.1	63.7	3.98
Mean		**26.31**	**52.29**	**34.41**	**7.93**	**28.67**	**71.31**	**4.33**
Stdev		**0.31**	**0.27**	**0.20**	**0.46**	**15.97**	**6.30**	**0.37**
Min		**25.39**	**51.77**	**34.03**	**7.18**	**4.5**	**61.8**	**3.75**
Max		**26.56**	**52.65**	**34.68**	**8.65**	**60.20**	**79.90**	**4.96**
Bottom Water Quality - all stations								
Mean		**26.36**	**52.22**	**34.36**	**7.90**	**23.99**	**74.01**	**4.54**
STDev		**0.40**	**0.33**	**0.25**	**0.56**	**13.27**	**7.28**	**0.47**
Min		**25.24**	**51.28**	**33.66**	**7.05**	**4.5**	**61.8**	**3.75**
Max		**27.1**	**52.66**	**34.68**	**9.27**	**60.2**	**91.5**	**5.66**

Table 6C.2 Average water quality of bottom waters - 2016 to 2026

	Temperature °C	Conductivity mS/cm	Salinity ppt	Dissolved Oxygen % sat	Dissolved Oxygen mg/L	pH	Turbidity NTU
Mar-16	27.54	51.00	33.40	99.2	6.50	8.20	4.0
Mar-17	23.90	57.10	38.00	109.5	7.42	8.30	7.5
Mar-18	25.73	58.47	39.04	87.7	5.73	8.96	46.5
Mar-19	26.20	58.39	38.97	83.3	5.39	9.74	1.6
Mar-20	24.86	50.52	33.33	63.6	4.36	8.69	6.88
Mar-21	24.93	51.88	34.11	88.9	6.05	7.98	5.02
Mar-22	24.36	53.77	35.55	90.0	6.12	8.58	11.39
Mar-23	26.90	57.48	35.28	88.4	5.68	7.73	27.46
Mar-24	25.80	55.53	36.82	81.9	5.41	7.91	10.45
Mar-26	26.36	52.22	34.36	74.0	4.52	7.90	25.15
Average	25.66	54.64	35.78	86.7	5.72	8.40	14.60
Std	1.09	2.97	2.09	11.94	0.85	0.58	13.43
Min	23.90	50.52	33.33	63.6	4.36	7.73	1.60
Max	27.54	58.47	39.04	109.5	7.42	9.74	46.50

7. Discussion

In March 2026, 24 benthic stations were sampled in the study area. A total of 1146 organisms greater than 1mm in size were found, comprising 19 species. Polychaete worms and bivalve molluscs were the most frequently encountered organisms. Stations were distinguished by the relative abundance of the dominant species.

During this survey, the presence of species in the benthos were not determined by water depth. The dominant species occupied sediments at each depth zone, from – 4.5m AHD to -6.0m AHD. These findings support the data collected by J.H. & E.S. Laxton - Environmental Consultants P/L from September 2016 to March 2020 in the Chain Valley Bay, Bardens Bay and Summerland Point regions, analysed independently by EMM in April 2020. It was found that despite reported changes in bed levels associated with Chain Valley Colliery underground working, no significant differences were identified

between the benthic assemblages at control, reference and impact sites (EMM, 2020).

Sediment composition is a major parameter influencing the presence of organisms in the benthos. At the time of survey sampling sites with bottom sediments comprised predominantly of silt, were defined by relatively high numbers of *Sthenelais petitiboneae* and the polychaete designated as "mud". The bivalves *Theora lubrica* and *Corbula* also dominated the fluid to plastic silty sediments. Sediments with high portions of sand were characterized by the polychaete worm *Chaetopterus* and the bivalve *Dosinia.* Sea stars, brittle stars and sea slugs also defined the sandy sediments. Stations that comprised predominantly of shell substrate were characterized by the presence of the mussel *Trichomya* hirsuta, the oyster *Saccostrea glomerata* and juvenile crab species.

Physical variables such as salinity, conductivity and turbidity of the bottom water had little influence on the species composition of the benthos. Dissolved oxygen concentration, however, can have a major effect on abundance. Major extinction events have occurred in the mud basin of Lake Macquarie. The evidence for this lies in the presence of large numbers of intact but dead bivalve shells entombed in the mud in Chain Valley Bay. The cause of extinction events appeared to be prolonged dissolved oxygen depletion of bottom water.

8. Conclusion and Compliance Table

The results from the March 2026 benthic communities monitoring survey show compliance to Schedule 4 Environmental Conditions – underground mining performance measures – natural environment biodiversity – benthic communities table with respect to effects of subsidence on Benthic communities which display nil to minor environmental consequences due to underground mining.

The Environmental Subsidence Impact Performance Measures for benthic communities are listed in the table below:

Conditions from SSD-5465 – Mod 4	Compliance Status and Comments
Schedule 4 Environmental Conditions – underground mining Performance Measures – Natural Environment Biodiversity – Benthic Communities Subsidence Impact Performance Measure – Minor environmental consequences, including minor changes composition and/or distribution.	Compliant – See section 16 - Conclusions
Measurements undertaken by generally accepted methods. Measures Methods fully described.	Compliant – See section 4 and 5 Compliant – See section 4 and 5

9. References

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Appendices

A. Background Information

i. Factors Affecting Depth of Water in Lake Macquarie

The bathymetric chart (**Figure A1**) of Lake Macquarie shows water depths relative to AHD throughout the year 1997. The actual water depth above the lakebed varied greatly, between 0 and 1.3m above AHD over the year.

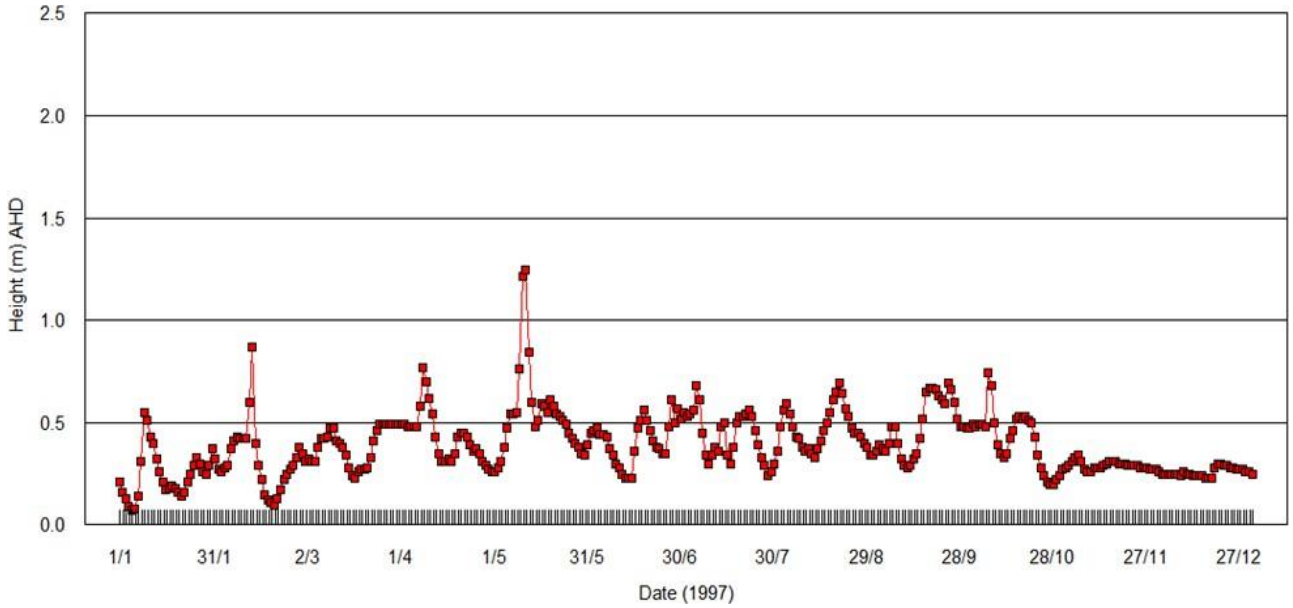


Figure A1 **Water level changes in a coastal lagoon with an entrance open to coastal waters.**

Water depths in coastal saline lakes with an open entrance to coastal waters vary due to combinations of the following factors:

- The body of Lake Macquarie is subject to tidal influence. The height of the tidal prism at Swansea Head may reach almost 2m (during spring tides) but by the time the body of the lake is reached, the tidal prism has been reduced to around 0.05m.
- The height of coastal waters and coastal lakes are influenced by changes in atmospheric pressure. The Tasman Sea acts as a huge barometer. When the atmospheric pressure is high

the sea surface is depressed. This causes water to drain from Lake Macquarie causing the depth of water in the body of the lake to decrease. When the atmospheric pressure over the Tasman Sea is low, the surface of the sea bulges upwards. This raising of sea level causes water to flow into Lake Macquarie, increasing the water depth.

- Low pressure systems in the Tasman Sea almost always generate strong winds and coastal rainfall. The strong winds cause large swells to form that impact the coast. Wave setup at the entrance to Lake Macquarie causes the water level in the lake to rise as large volumes of seawater enter the system.

- Rainfall during a period of low atmospheric pressure causes runoff into catchment rivers and streams to increase. When this extra water reaches the body of Lake Macquarie, the water level rises in proportion to the runoff volume. This water is prevented from exiting the lake by wave setup at the entrance and the state of the tide. Under these circumstances, the level of the lake may rise to heights of a meter or more above AHD.

ii. Benthic Organisms in Lake Macquarie

Previous studies (Laxton, 2022) conducted off Summerland Point and in Chain Valley Bay, Lake Macquarie between February 2012 and March 2026 found the following organisms were present in the benthos (**Table A1**):

Table A1 Organisms found in Benthos of Lake Macquarie (2012-2026)

Designated name	Family or Species	Comments
Foraminifera	*Spiroloculina* *Trochammina*	Single-celled heterotrophic organisms that live predominantly in marine environments.
Anemone	Coelenterata	Found associated with mussel shells.
Planaria (Flat worm)	Platyhelminthes	Two specimens found in 2017.
Polychaete thin	*Sthenelais pettiboneae*	Most common polychaete present.
Polychaete	*Gorgonorhynchus repens*	Common.
Polychaete (mud tube)	Not yet identified	Present in small numbers.
Polychaete	*Chaetopterus sp*	Common.
Polychaete	*Diopatra sp*	Common.

Polychaete	*Pectinaria sp*	First found in March 2019
Gastropod	*Nassarius jonasii*	Present in small numbers.
Gastropod	*Lepsiella* (*Bedeva*) *hanleyi*	Present in small numbers.
Gastropod	*Philine angasi*	First recorded in August 2014.
Bivalve	*Corbula truncata*	Common as live animals and dead shells.
Bivalve	*Theora lubrica*	Common
Bivalve	*Paphia undulata*	Uncommon as live animals. Common as dead shells.
Bivalve	*Cyamiomactra mactroides*	Uncommon as live animals.
Bivalve	*Mactra sp*	First collected in December 2022 off Pulbah Island.
Bivalve	*Anadara trapezia*	Uncommon.
Bivalve	*Dosinia sculpta*	Found in sandy sediments.
Bivalve	*Trichomya hirsuta*	Common as dead shells. Found in large clumps.
Bivalve	*Saccostrea glomerata*	Occasionally found on mussel shells.
Ophuroid	*Ophionereis schayeri*	Found amongst mussel clumps and on mud.
Echinoid	*Astropecten polyacanthus*	Found in sandy sediments.
Echinoid	Sea urchins	Encountered in sandy sediments.
Echinoid	*Echinocardium cordatum*	Encountered in sandy sediments.
Sponge	*Tetilla sp*	Collected occasionally.
Sponge	*Dysidea sp*	Collected occasionally.
Sponge	Red sponge	Several specimens found in 2019.
Crabs	Small	Captured occasionally.
Prawn	Small	Captured occasionally.

Plates A1 to A8 provide information about the benthic organisms present in the basin muds and sands of Lake Macquarie, NSW.

Plate A1 Sponge species found on the benthos of Lake Macquarie

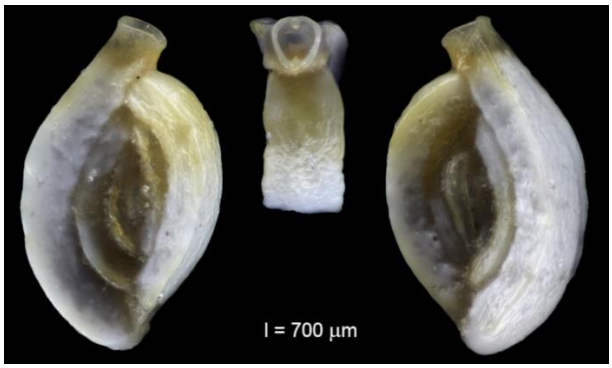
Phylum: Porifera
Class: Demospongiae
Subclass: Errantia
Order: Tetractinellida
Family: Tellidae
Species: *Tetilla sp*

Remarks: Tetillids are ovoid to spherical sponges which are found commonly in all marine habitats at all depths. They are especially common in sedimented habitats.

Phylum: Porifera
Class: Demospongiae
Family: Dysideidae
Species: Dysidea *sp*

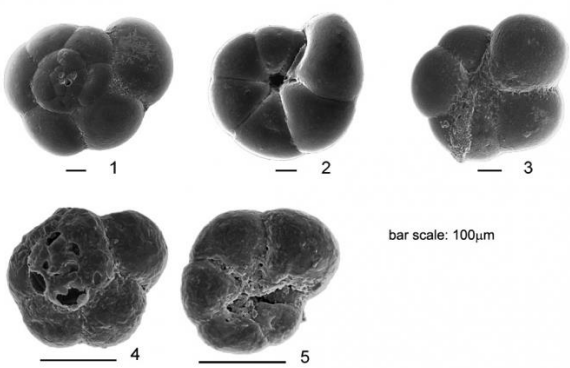
Remarks: Typically mauve in colour, irregularly shaped with varying numbers of oscula and a coarse, hard and bumpy surface texture.

Plate A2 Foraminifera greater than 1mm in size found in the benthos of Lake Macquarie



Phylum: Foraminifera
Class: Miliolata
Family: Spiroloculinidae
Species: *Spiroloculina communis*

Remarks: Genus of porcelaneous Foraminifera known from the Upper Cretaceous to the present. Planispiral throughout development.



Phylum: Foraminifera
Class: Miliolata
Family: Spiroloculinidae
Species: *Trochammina sp*

Remarks: Test trochospiral, free or attached. Wall agglutinated, single layered imperforate. Chambers subglobular or axially strongly compressed.

Plate A3 Annelid and Nemertean species found in the benthos of Lake Macquarie

Phylum: Annelida
Class: Polychaeta
Subclass: Errantia
Order: Phyllodocida
Family: Sigalionidae
Species: *Sthenelais petitiboneae*

Remarks: Found in marine environments

Phylum: Annelida
Class: Polychaeta
Subclass: Canalipalpata
Order: Terebellida
Family: Chaetopteridae
Genus: *Chaetopterus*

Remarks: *Chaetopterus* or the parchment worm or parchment tube worm is a genus of marine polychaete worm that lives in a tube it constructs in sediments or attaches to a rocky or coral reef substrate. The common name arises from the parchment-like appearance of the tubes that house these worms.

Phylum: Annelida
Class: Polychaeta
Subclass: Canalipalpata
Order: Terebellida
Family: Pectinariidae

Remarks: Pectinariidae live vertically, head-down in sandy sediments, with the narrow tip of the conical tube at about the sediment surface. They feed on buried organic matter within the sediments. *Pectinaria anitpoda* is one of the most common and widespread of this family. Found in inshore waters and off the continental shelf to a depth of about 90 m.

Phylum: Annelida
Class: Polychaeta
Subclass: Errantia
Order: Eunicida
Family: Onuphidae
Genus: *Diopatra*

Remarks: Members of this genus live in thick, parchment-like tubes that project from the sediment on the seabed. The tubes comprise of fragments of shell, algae, fibers and other small objects collected by the worm and stuck in place by mucus.

Phylum: Nemertea

Class: Anopla

Order: Heteronemertea

Family: Gorgonorhynchidae

Species: *Gorgonorhynchus repens*

Remarks: *G. repens* is orange in colour and grows to an unstretched length of about 50 mm. It is cylindrical in shape with bluntly tapering ends. The proboscis is a densely branching structure giving the impression of a cloud of mucus secretion. Proboscis worms are predatory, snaring or spearing their prey.

Plate A4 Gastropod species found in the benthos of Lake Macquarie

Phylum: Mollusca

Class: Gastropoda

Superfamily: Buccinoidea

Family: Nassariidae

Species: *Nassarius jonasii*

Remarks: Endemic to Australia; Noosa Heads, Qld, to SA. Inhabit sand and mud flats in estuaries and lagoons, intertidal down to 100 m. Most *Nassarius* species are very active scavengers. They often burrow into marine substrates and then wait with only their siphon protruding, until they smell nearby food.

Phylum: Mollusca

Class: Gastropoda

Order: Neogastropoda

Family: Muricidae

Species: *Lepsiella (Bedeva) hanleyi*

Remarks: Common name mussel drill. Shell up to 32 mm, with angulated whorls, a high spire and moderately long anterior canal and with both spiral threads and axial ribs. Endemic to Australia. Found in temperate and southern parts of tropical Australia. Lives mainly on sheltered shores, including estuaries and often in association with mangroves. Feeds by drilling holes in bivalves. Lays lens-shaped capsules and development is direct.

Phylum: Mollusca

Class: Gastropoda

Subclass: Heterobranchia

Family: Philinoidae

Species: *Philine angasi*

Remarks: Species of sea snail, marine opisthobranch gastropod mollusc. Commonly called headshield slugs. The foot of this family has developed into fleshy rounded lobes that surround and obscure the shell.

Plate A5 Bivalve species and other molluscs found in the benthos of Lake Macquarie

Phylum: Mollusca

Class: Bivalvia

Order: Myoida

Family: Corbulidae

Species: *Corbula sp*

Remarks: Marine bivalve mollusc.

Phylum: Mollusca

Class: Bivalvia

Order: Veneroida

Family: Semelidae

Species: *Theora lubrica*

Remarks: Small infaunal bivalve native to the Northwest Pacific. It has been introduced to California, Australia, New Zealand, the Mediterranean Sea, and the Atlantic coast of Spain. It typically occurs in soft, muddy subtidal or lower intertidal sediments, rich in organic matter. It is considered a pollution-indicator species, because of its frequent dominance in highly polluted sediments. No ecological or economic impacts have been reported for this species.

Phylum: Mollusca

Class: Bivalvia

Order: Veneroida

Family: Veneridae

Species: *Paphia undulata*

Remarks: Saltwater clam, marine bivalve mollusc. Inhabits inshore shallow sandy seabeds.

Phylum: Mollusca

Class: Bivalvia

Order: Veneroida

Family: Veneridae

Species: *Dosinia sculpta*

Remarks: *Dosinia* is a genus of saltwater clams, marine bivalve molluscs in the family Veneridae, (subfamily Dosiniinae). The shell of *Dosinia* species is disc-like in shape, usually white, and therefore is reminiscent of the shells of Lucinid bivalves.

Typically found in the intertidal zone at the water's edge at a mean distance from sea level of -15 meters (-50 feet).

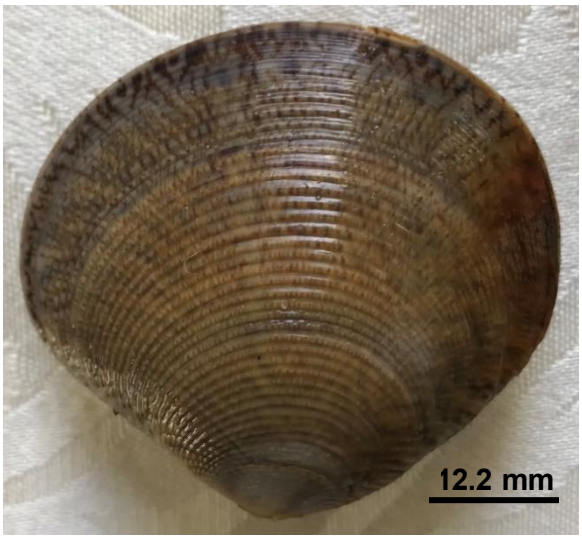
Phylum: Mollusca

Class: Bivalvia

Order: Veneroida

Family: Cyamiidae

Species: *Cyamiomactra mactroides*



Phylum: Mollusca

Class: Bivalvia

Order: Veneroida

Family: Mactridae

Species: *Mactra*

Remarks: Large genus of medium-sized marine bivalve mollusc or clam, commonly known as trough shells or duck clams. The word "trough" refers to the large ligamental pit at the hinge line, which contains a large internal ligament. Most bivalves in other families have an external ligament.

Phylum: Mollusca

Class: Bivalvia

Order: Arcoida

Family: Arcidae

Species: *Anadara trapezia*

Remarks: Sydney cockle, or ark cockle is an estuarine filter-feeding bivalve. Its calcareous, heavily-ribbed, shell can grow to approximately 7 to 8 cm across. Its current range is along the east coast of Australia, from Queensland to Victoria. It has been used as an indicator species to study levels of the metals selenium, copper and cadmium.

Phylum: Mollusca

Class: Bivalvia

Order: Mytiloida

Family: Mytilidae

Species: *Trichomya hirsuta*

Remarks: The hairy mussel is a major part of the megafauna of Lake Macquarie. It is tolerant of low oxygen levels in the water and its temperature tolerance range has been researched in connection with using the waters of the lake for cooling power stations.

Hairy mussels have been used as bioindicators to monitor concentrations of heavy metals (namely Pb, Cd, Cu, Zn, Co, Ni, and Ag) in marine environments.

Phylum: Mollusca

Class: Bivalvia

Order: Ostreoida

Family: Pectinidae

Species: *Saccostrea glomerata*

Remarks: Sydney rock oysters are endemic to Australia and New Zealand. In Australia it is found in bays, inlets and sheltered estuaries from Wingan Inlet in eastern Victoria, along the east coast of NSW and up to Hervey Bay QLD, around northern Australia and down the west coast to Shark Bay in WA. Sydney rock oysters are capable of tolerating a wide range of salinities. They are usually found in the intertidal zone to 3 metres below the low water mark.

Phylum: Mollusca

Class: Polyplacophora

Remarks: Chitons have a shell composed of eight separate shell plates or valves. These plates overlap slightly at the front and back edges, enabling articulation. These plates protect the mollusc; and enable the animal to flex upward when manoeuvering over uneven surfaces. It also makes it possible for chitons to curl up into a ball when dislodged from rocks. The shell plates are encircled by a skirt known as a girdle.

Chitons live worldwide, from cold to tropic waters. They live on hard surfaces such as under rocks or in crevices. They are fully marine.

Plate A6 Sea stars found in Lake Macquarie, NSW

Phylum: Echinodermata

Class: Ophiuroidea

Order: Ophiurida

Family: Ophionereididae

Species: *Ophionereis schayeri*

Remarks: Largest and most common brittle star found in Sydney waters. Brittle stars have five long, slender arms which radiate out from a central disc. The mouth is located in the centre of the underside of the disc. There is no anus. Offshore, brittle stars form dense aggregations. In intertidal zones, they are typically found as single individuals in crevices, under stones and amongst seaweed. They feed by raising their arms above the substrate; extending tube-feet; and removing particles from the water. They pass food along the arms to the mouth. They also scavenge on decaying matter.

Phylum: Echinodermata

Class: Asteroidea

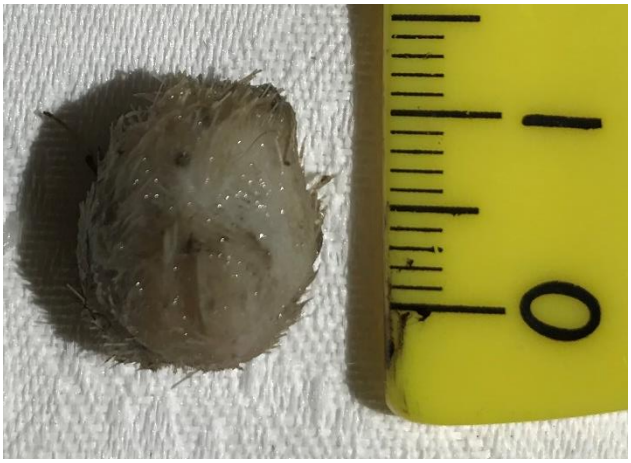
Order: Paxillosida

Family: Astropectinidae

Species: *Astropecten polyacanthus*

Remarks: Sand sifting starfish or comb sea star is a widespread species found throughout the Indo-Pacific region. The armspread is up to 20 cm. Spends much of its time buried in the silty seabed. Feeds on detritus, bivalves and gastropods. Also digests biofilm and small invertebrates. Mostly nocturnal.

Plate A7 Sea urchins found in Lake Macquarie, NSW



Phylum: Echinodermata

Class: Echinoidea

Order: Spatangoida

Family: Loveniidae

Species: *Echinocardium cordatum*

Remarks: Sand dollars are small in size. They possess a rigid skeleton called a test. The test consists of calcium carbonate plates arranged in a fivefold symmetric pattern.

Phylum: Echinodermata
Class: Echinoidea
Order: Cidaroida

Plate A8 Crab species found in Lake Macquarie, NSW

Phylum: Arthropoda
Class: Malacostraca
Order: Decapoda

B. Water Quality Data

Control monitoring stations

C1

Date	Time	Depth (m)	Temp (C)	Cond (ms/cm)	Sal (ppt)	pH (pH)	Turb (ntu)	D.O. (%sat)	D.O. (mg/L)
11/03/2026	13:24:49	0.3	27.87	51.07	33.51	9.86	8.7	86.6	5.23
11/03/2026	13:25:07	0.5	27.86	51.06	33.50	9.88	9.0	87.4	5.28
11/03/2026	13:25:10	1.0	27.86	51.06	33.50	9.89	9.0	87.5	5.29
11/03/2026	13:25:21	1.5	27.84	51.08	33.51	9.87	9.2	87.9	5.32
11/03/2026	13:25:33	2.0	27.76	51.10	33.53	9.83	9.7	88.4	5.37
11/03/2026	13:25:58	2.5	27.00	51.34	33.71	9.67	14.6	89.6	5.54
11/03/2026	13:26:22	3.0	26.89	51.41	33.76	9.48	18.7	88.0	5.45
11/03/2026	13:26:49	3.5	26.62	51.75	34.01	9.13	19.0	86.6	5.38
11/03/2026	13:27:20	4.0	26.78	52.00	34.19	8.90	26.5	83.4	5.14
11/03/2026	13:28:51	4.5	26.63	51.94	34.15	8.26	23.7	78.2	4.82
Average			**27.31**	**51.38**	**33.74**	**9.48**	**14.81**	**86.36**	**5.28**
Stdev			**0.57**	**0.38**	**0.28**	**0.55**	**6.76**	**3.29**	**0.20**
Min			**26.62**	**51.06**	**33.50**	**8.26**	**8.70**	**78.20**	**4.82**
Max			**27.87**	**52.00**	**34.19**	**9.89**	**26.50**	**89.60**	**5.54**

C2

Date	Time	Depth (m)	Temp (C)	Cond (ms/cm)	Sal (ppt)	pH (pH)	Turb (ntu)	D.O. (%sat)	D.O. (mg/L)
11/03/2026	12:06:39	0.3	27.77	50.95	33.42	8.70	10.80	89.20	5.42
11/03/2026	12:07:31	0.5	27.76	50.94	33.41	8.17	8.20	90.60	5.51
11/03/2026	12:08:00	1.0	27.71	50.94	33.41	8.24	8.50	91.30	5.57
11/03/2026	12:08:18	1.5	27.55	51.00	33.46	8.10	8.00	92.00	5.63
11/03/2026	12:08:32	2.0	27.39	51.09	33.53	8.02	8.60	92.60	5.69
11/03/2026	12:08:48	2.5	27.25	51.19	33.60	8.00	10.20	93.00	5.74
11/03/2026	12:09:17	3.0	27.18	51.24	33.63	8.16	14.90	93.40	5.77
11/03/2026	12:09:40	3.5	26.76	51.62	33.91	8.03	19.80	92.80	5.78
11/03/2026	12:10:11	4.0	27.10	51.28	33.66	8.16	16.60	91.50	5.66
Average			**27.39**	**51.14**	**33.56**	**8.18**	**11.73**	**91.82**	**5.64**
Stdev			**0.35**	**0.22**	**0.16**	**0.21**	**4.31**	**1.33**	**0.12**
Min			**26.76**	**50.94**	**33.41**	**8.00**	**8.00**	**89.20**	**5.42**
Max			**27.77**	**51.62**	**33.91**	**8.70**	**19.80**	**93.40**	**5.78**

C3

Date	Time	Depth (m)	Temp (C)	Cond (ms/cm)	Sal (ppt)	pH (pH)	Turb (ntu)	D.O. (%sat)	D.O. (mg/L)
11/03/2026	12:15:37	0.3	27.92	50.87	33.36	8.96	9.4	86.7	5.24
11/03/2026	12:15:49	0.5	27.92	50.87	33.37	8.90	8.9	87.8	5.31
11/03/2026	12:16:07	1.0	27.91	50.88	33.37	8.84	8.1	89.4	5.41
11/03/2026	12:16:18	1.5	27.85	50.87	33.36	8.81	7.6	90.3	5.48
11/03/2026	12:16:39	2.0	27.76	50.90	33.39	8.78	7.7	91.2	5.56
11/03/2026	12:17:11	2.5	27.61	50.95	33.42	8.80	8.2	92.4	5.65
11/03/2026	12:17:33	3.0	27.35	51.04	33.49	8.80	9.7	93.9	5.78
11/03/2026	12:17:54	3.5	27.00	51.19	33.60	8.62	11.5	94.1	5.85
11/03/2026	12:18:16	4.0	26.80	51.37	33.73	8.58	15.2	93.1	5.80
11/03/2026	12:18:30	4.5	26.55	51.62	33.91	8.49	17.4	92.9	5.82
11/03/2026	12:18:39	5.0	26.52	51.68	33.96	8.43	19.0	91.5	5.73
11/03/2026	12:18:51	5.5	26.57	51.76	34.02	8.49	21.3	89.9	5.61
11/03/2026	12:19:15	5.8	26.60	51.88	34.10	8.53	30.5	89.5	5.57
Average			**27.26**	**51.22**	**33.62**	**8.69**	**13.42**	**90.98**	**5.60**
Stdev			**0.60**	**0.39**	**0.28**	**0.18**	**6.95**	**2.30**	**0.20**
Min			**26.52**	**50.87**	**33.36**	**8.43**	**7.60**	**86.70**	**5.24**
Max			**27.92**	**51.88**	**34.10**	**8.96**	**30.50**	**94.10**	**5.85**

C4

Date	Time	Depth	Temp (C)	Cond (ms/cm)	Sal (ppt)	pH	Turb (ntu)	DO (%sat)	D.O. (mg/L)
10/03/2026	7:07:10	0.3	27.19	51.31	33.69	8.86	8.24	76.2	4.64
10/03/2026	7:07:26	0.5	27.20	51.31	33.68	8.60	8.26	77.0	4.69
10/03/2026	7:07:43	1.0	27.19	51.31	33.69	8.60	8.28	77.8	4.74
10/03/2026	7:08:04	1.5	27.20	51.31	33.69	8.56	8.24	78.6	4.79
10/03/2026	7:08:25	2.0	27.20	51.31	33.69	8.50	8.17	79.0	4.82
10/03/2026	7:08:46	2.5	27.04	51.46	33.80	8.48	8.10	79.8	4.88
10/03/2026	7:09:10	3.0	26.54	51.49	33.82	8.45	7.99	80.8	5.02
10/03/2026	7:09:30	3.5	26.54	51.97	34.17	8.45	7.96	78.9	4.88
10/03/2026	7:09:44	4.0	26.46	52.04	34.22	8.55	7.91	77.9	4.82
10/03/2026	7:10:00	4.5	26.43	52.10	34.27	8.58	7.84	76.0	4.69
10/03/2026	7:10:13	5.0	26.42	52.15	34.30	8.49	7.77	74.0	4.56
10/03/2026	7:10:31	5.5	26.38	52.21	34.35	8.43	7.73	71.5	4.40
10/03/2026	7:10:47	6.0	26.35	52.28	34.40	8.49	7.65	68.9	4.22
10/03/2026	7:12:12	6.4	26.37	52.22	34.36	8.53	7.54	68.2	4.18
Average			**26.75**	**51.75**	**34.01**	**7.98**	**8.54**	**76.04**	**4.67**
Stdev			**0.38**	**0.42**	**0.31**	**0.25**	**0.11**	**3.97**	**0.25**
Min			**26.35**	**51.31**	**33.68**	**7.54**	**8.43**	**68.20**	**4.18**
Max			**27.20**	**52.28**	**34.40**	**8.28**	**8.86**	**80.80**	**5.02**

C5

Date	Time	Depth (m)	Temp (C)	Cond (ms/cm)	Sal (ppt)	pH (pH)	Turb (ntu)	D.O. (%sat)	D.O. (mg/L)
11/03/2026	11:30:00	0.3	27.47	51.57	33.88	8.94	61.3	85.5	5.20
11/03/2026	11:30:14	0.5	27.48	51.57	33.88	8.76	8.2	86.6	5.27
11/03/2026	11:30:31	1.0	27.48	51.56	33.87	8.66	5.4	87.1	5.30
11/03/2026	11:30:47	1.5	27.41	51.56	33.88	8.31	5.1	87.6	5.35
11/03/2026	11:31:25	2.0	27.11	51.64	33.93	7.80	4.8	88.7	5.46
11/03/2026	11:31:45	2.5	26.98	51.61	33.91	7.72	5.0	88.3	5.45
11/03/2026	11:32:07	3.0	26.79	51.63	33.93	7.63	6.1	87.4	5.42
11/03/2026	11:32:29	3.5	26.32	52.01	34.21	7.29	10.0	85.3	5.33
11/03/2026	11:32:55	4.0	26.13	52.26	34.39	7.54	13.6	81.2	5.07
11/03/2026	11:33:18	4.5	25.63	52.51	34.57	7.60	16.6	81.0	5.12
11/03/2026	11:33:37	5.0	25.44	52.60	34.64	7.62	20.1	79.9	5.07
11/03/2026	11:34:12	5.5	25.33	52.64	34.67	7.64	22.7	76.1	4.83
11/03/2026	11:34:30	6.0	25.26	52.65	34.68	7.57	25.3	75.5	4.79
11/03/2026	11:34:52	6.5	25.25	52.66	34.69	7.59	42.4	75.0	4.76
11/03/2026	11:35:49	6.6	25.24	52.66	34.68	7.37	27.2	73.3	4.65
Average			**26.35**	**52.08**	**34.25**	**7.87**	**18.25**	**82.57**	**5.14**
Stdev			**0.93**	**0.50**	**0.37**	**0.53**	**16.09**	**5.47**	**0.27**
Min			**25.24**	**51.56**	**33.87**	**7.29**	**4.80**	**73.30**	**4.65**
Max			**27.48**	**52.66**	**34.69**	**8.94**	**61.30**	**88.70**	**5.46**

C6

Date	Time	Depth (m)	Temp (C)	Cond (ms/cm)	Sal (ppt)	pH (pH)	Turb (ntu)	D.O. (%sat)	D.O. (mg/L)
10/03/2026	6:45:07	0.3	27.34	51.43	33.78	7.99	8.3	79.6	4.83
10/03/2026	6:45:21	0.5	27.36	51.43	33.77	7.98	5.7	80.0	4.86
10/03/2026	6:45:42	1.0	27.35	51.43	33.77	7.92	5.3	80.7	4.91
10/03/2026	6:46:01	1.5	27.34	51.44	33.78	7.87	5.5	81.7	4.97
10/03/2026	6:46:21	2.0	27.33	51.45	33.79	7.81	5.3	82.3	5.01
10/03/2026	6:46:44	2.5	27.24	51.48	33.81	7.74	5.1	82.7	5.05
10/03/2026	6:47:01	3.0	26.81	51.81	34.06	7.65	5.4	83.4	5.14
10/03/2026	6:47:24	3.5	26.56	52.03	34.22	7.55	5.7	81.3	5.03
10/03/2026	6:47:39	4.0	26.48	52.06	34.24	7.53	5.8	80.2	4.96
10/03/2026	6:47:59	4.5	26.38	52.25	34.38	7.47	5.9	78.4	4.86
10/03/2026	6:48:16	5.0	26.37	52.32	34.43	7.40	6.3	77.0	4.76
10/03/2026	6:48:39	5.5	26.34	52.37	34.47	7.30	8.5	73.3	4.52
10/03/2026	6:49:00	6.0	26.36	52.38	34.47	7.25	6.2	70.2	4.31
Average			**26.87**	**51.84**	**34.07**	**7.65**	**6.08**	**79.29**	**4.86**
Stdev			**0.46**	**0.41**	**0.30**	**0.26**	**1.09**	**3.82**	**0.23**
Min			**26.34**	**51.43**	**33.77**	**7.25**	**5.10**	**70.20**	**4.31**
Max			**27.36**	**52.38**	**34.47**	**7.99**	**8.50**	**83.40**	**5.14**

C7

Date	Time	Depth (m)	Temp (C)	Cond (ms/cm)	Sal (ppt)	pH (pH)	Turb (ntu)	D.O. (%sat)	D.O. (mg/L)
11/03/2026	11:17:02	0.3	26.97	51.44	33.78	8.62	25.3	78.8	4.83
11/03/2026	11:17:47	0.5	26.92	51.43	33.77	8.13	5.8	80.9	4.97
11/03/2026	11:18:10	1.0	26.89	51.42	33.77	7.52	6.0	81.4	5.01
11/03/2026	11:18:29	1.5	26.81	51.41	33.76	7.52	6.0	81.5	5.03
11/03/2026	11:18:53	2.0	26.56	51.48	33.81	7.51	7.6	80.8	5.01
11/03/2026	11:19:11	2.5	26.63	51.65	33.94	7.60	8.5	80.9	5.01
11/03/2026	11:19:48	3.0	26.60	51.70	33.97	7.39	9.0	83.2	5.16
11/03/2026	11:20:15	3.5	26.59	51.70	33.98	7.17	10.0	82.6	5.12
11/03/2026	11:20:45	4.0	26.56	51.78	34.04	7.02	12.6	76.5	4.72
11/03/2026	11:21:16	4.5	26.22	52.31	34.43	7.05	16.9	76.0	4.72
Average			**26.68**	**51.63**	**33.93**	**7.55**	**10.77**	**80.26**	**4.96**
Stdev			**0.23**	**0.28**	**0.21**	**0.49**	**6.16**	**2.41**	**0.15**
Min			**26.22**	**51.41**	**33.76**	**7.02**	**5.80**	**76.00**	**4.72**
Max			**26.97**	**52.31**	**34.43**	**8.62**	**25.30**	**83.20**	**5.16**

Reference monitoring stations

R1

Date	Time	Depth (m)	Temp (C)	Cond (ms/cm)	Sal (ppt)	pH (pH)	Turb (ntu)	D.O. (%sat)	D.O. (mg/L)
11/03/2026	13:49:22	0.3	28.81	50.91	33.39	8.82	10.2	84.4	4.97
11/03/2026	13:49:44	0.5	28.89	50.92	33.40	8.41	9.3	85.6	5.04
11/03/2026	13:50:18	1.0	28.80	50.95	33.42	7.61	7.5	85.8	5.06
11/03/2026	13:50:21	1.5	28.81	50.93	33.41	7.60	7.5	85.9	5.07
11/03/2026	13:51:10	2.0	28.71	50.94	33.42	7.51	7.6	87.0	5.15
11/03/2026	13:51:32	2.5	28.58	50.98	33.44	7.72	9.3	87.7	5.21
11/03/2026	13:51:55	3.0	28.44	51.05	33.50	7.53	10.0	88.6	5.28
11/03/2026	13:52:52	3.5	26.83	52.11	34.27	7.08	34.5	84.6	5.21
11/03/2026	13:53:12	3.8	27.08	51.71	33.98	7.27	31.3	80.6	4.93
Average			**28.33**	**51.17**	**33.58**	**7.73**	**14.13**	**85.58**	**5.10**
Stdev			**0.79**	**0.44**	**0.32**	**0.55**	**10.72**	**2.32**	**0.12**
Min			**26.83**	**50.91**	**33.39**	**7.08**	**7.50**	**80.60**	**4.93**
Max			**28.89**	**52.11**	**34.27**	**8.82**	**34.50**	**88.60**	**5.28**

R9

Date	Time	Depth (m)	Temp (C)	Cond (ms/cm)	Sal (ppt)	pH (pH)	Turb (ntu)	D.O. (%sat)	D.O. (mg/L)
11/03/2026	13:37:02	0.3	27.15	51.17	33.59	9.89	8.7	86.6	5.33
11/03/2026	13:37:30	0.5	27.14	51.18	33.59	9.89	8.3	87.9	5.41
11/03/2026	13:38:00	1.0	27.14	51.18	33.59	9.83	8.0	88.4	5.45
11/03/2026	13:38:33	1.5	27.00	51.16	33.58	9.64	8.5	88.4	5.47
11/03/2026	13:39:04	2.0	26.81	51.19	33.60	9.29	10.5	88.0	5.47
11/03/2026	13:39:37	2.5	26.51	51.47	33.80	8.95	14.4	85.0	5.30
11/03/2026	13:40:06	3.0	26.37	51.67	33.95	8.67	15.5	84.9	5.31
11/03/2026	13:40:39	3.5	26.46	51.82	34.06	8.69	17.4	83.3	5.18
11/03/2026	13:41:07	4.0	26.67	52.16	34.32	8.66	20.0	79.9	4.92
11/03/2026	13:41:34	4.5	26.69	52.17	34.33	8.64	19.9	76.8	4.71
11/03/2026	13:41:52	5.0	26.67	52.26	34.39	8.60	41.8	74.7	4.57
11/03/2026	13:42:16	5.5	26.68	52.13	34.30	8.47	24.3	71.5	4.36
Average			**26.77**	**51.63**	**33.93**	**9.10**	**16.44**	**82.95**	**5.12**
Stdev			**0.27**	**0.46**	**0.34**	**0.57**	**9.68**	**5.86**	**0.39**
Min			**26.37**	**51.16**	**33.58**	**8.47**	**8.00**	**71.50**	**4.36**
Max			**27.15**	**52.26**	**34.39**	**9.89**	**41.80**	**88.40**	**5.47**

R10

Date	Time	Depth (m)	Temp (C)	Cond (ms/cm)	Sal (ppt)	pH (pH)	Turb (ntu)	D.O. (%sat)	D.O. (mg/L)
11/03/2026	10:47:04	0.3	27.20	50.89	33.38	8.28	5.3	88.4	5.45
11/03/2026	10:47:38	0.5	27.24	50.89	33.38	8.25	3.6	88.2	5.43
11/03/2026	10:48:25	1.0	27.06	50.90	33.39	8.21	4.0	88.9	5.50
11/03/2026	10:48:40	1.5	26.80	50.89	33.38	8.14	4.5	89.9	5.60
11/03/2026	10:49:06	2.0	26.87	51.64	33.93	8.13	4.5	87.5	5.41
11/03/2026	10:49:20	2.5	26.68	51.88	34.11	8.05	5.9	87.1	5.40
11/03/2026	10:49:35	3.0	26.67	51.93	34.14	8.00	7.9	84.9	5.25
11/03/2026	10:49:48	3.5	26.36	52.13	34.29	7.90	7.5	84.2	5.24
11/03/2026	10:49:59	4.0	26.41	52.42	34.51	7.80	14.4	82.6	5.13
11/03/2026	10:50:18	4.5	26.31	52.42	34.51	7.82	13.3	75.3	4.65
11/03/2026	10:50:32	4.9	26.17	52.46	34.54	7.75	14.7	74.6	4.62
Average			**26.71**	**51.68**	**33.96**	**8.03**	**7.78**	**84.69**	**5.24**
Stdev			**0.37**	**0.67**	**0.49**	**0.19**	**4.30**	**5.28**	**0.33**
Min			**26.17**	**50.89**	**33.38**	**7.75**	**3.60**	**74.60**	**4.62**
Max			**27.24**	**52.46**	**34.54**	**8.28**	**14.70**	**89.90**	**5.60**

R12

Date	Time	Depth (m)	Temp (C)	Cond (ms/cm)	Sal (ppt)	pH (pH)	Turb (ntu)	D.O. (%sat)	D.O. (mg/L)
11/03/2026	10:56:22	0.3	27.45	50.69	33.23	8.39	7.0	85.9	5.26
11/03/2026	10:56:34	0.5	27.45	50.68	33.22	8.35	6.6	86.2	5.28
11/03/2026	10:56:57	1.0	27.23	50.71	33.25	8.30	5.8	86.9	5.35
11/03/2026	10:57:11	1.5	26.90	51.07	33.51	8.23	5.9	88.1	5.46
11/03/2026	10:57:32	2.0	26.79	51.38	33.74	8.29	5.9	88.3	5.48
11/03/2026	10:57:53	2.5	26.64	51.55	33.86	8.21	7.0	88.2	5.49
11/03/2026	10:58:14	3.0	26.74	51.79	34.04	8.26	6.6	86.6	5.37
11/03/2026	10:58:29	3.5	26.65	51.87	34.10	8.22	7.1	86.4	5.36
11/03/2026	10:58:49	4.0	26.36	52.15	34.31	8.09	9.5	85.4	5.32
11/03/2026	10:59:12	4.5	26.30	52.26	34.39	8.03	11.3	82.8	5.16
11/03/2026	10:59:26	5.0	26.27	52.33	34.44	8.04	12.9	81.6	5.08
11/03/2026	10:59:48	5.5	26.28	52.46	34.54	7.95	14.6	79.2	4.92
11/03/2026	11:00:05	6.0	26.25	52.42	34.51	7.94	14.8	76.9	4.77
11/03/2026	11:00:17	6.8	26.12	52.42	34.50	7.76	15.0	77.3	4.81
Average			**26.67**	**51.70**	**33.97**	**8.15**	**9.29**	**84.27**	**5.22**
Stdev			**0.45**	**0.69**	**0.51**	**0.18**	**3.65**	**4.01**	**0.24**
Min			**26.12**	**50.68**	**33.22**	**7.76**	**5.80**	**76.90**	**4.77**
Max			**27.45**	**52.46**	**34.54**	**8.39**	**15.00**	**88.30**	**5.49**

R13

Date	Time	Depth (m)	Temp (C)	Cond (ms/cm)	Sal (ppt)	pH (pH)	Turb (ntu)	D.O. (%sat)	D.O. (mg/L)
11/03/2026	11:06:44	0.3	27.08	51.22	33.62	7.90	6.8	81.4	4.99
11/03/2026	11:08:46	0.5	26.73	51.39	33.75	6.68	5.8	85.4	5.30
11/03/2026	11:09:07	1.0	26.68	51.60	33.90	6.73	6.0	85.9	5.33
11/03/2026	11:09:26	1.5	26.59	51.65	33.94	6.73	6.9	86.0	5.35
11/03/2026	11:10:14	2.0	26.53	52.06	34.24	6.51	10.7	78.5	4.85
11/03/2026	11:10:36	2.5	26.37	52.31	34.43	6.54	13.6	72.9	4.49
11/03/2026	11:11:04	3.0	26.30	52.36	34.46	6.63	13.6	73.2	4.52
11/03/2026	11:11:29	3.5	26.31	52.40	34.49	6.85	18.4	70.2	4.32
11/03/2026	11:11:47	3.8	26.30	52.37	34.47	7.13	16.6	69.7	4.28
Average			**26.54**	**51.93**	**34.14**	**6.86**	**10.93**	**78.13**	**4.83**
Stdev			**0.26**	**0.47**	**0.34**	**0.43**	**4.82**	**6.82**	**0.44**
Min			**26.30**	**51.22**	**33.62**	**6.51**	**5.80**	**69.70**	**4.28**
Max			**27.08**	**52.40**	**34.49**	**7.90**	**18.40**	**86.00**	**5.35**

IM1

Date	Time	Depth (m)	Temp (C)	Cond (ms/cm)	Sal (ppt)	pH (pH)	Turb (ntu)	D.O. (%sat)	D.O. (mg/L)
11/03/2026	13:14:25	0.5	27.64	51.00	33.46	9.91	9.7	81.7	4.95
11/03/2026	13:14:43	1.0	27.64	50.99	33.45	9.74	9.4	82.4	4.99
11/03/2026	13:14:59	1.5	27.60	51.00	33.46	9.56	9.0	83.0	5.04
11/03/2026	13:15:38	2.0	27.54	51.03	33.48	8.31	6.4	83.8	5.10
11/03/2026	13:16:06	2.5	27.35	51.09	33.53	8.41	7.8	84.4	5.16
11/03/2026	13:16:51	3.0	27.15	51.18	33.59	8.55	9.7	83.8	5.14
11/03/2026	13:17:27	3.5	26.51	51.79	34.04	8.35	15.6	82.0	5.09
11/03/2026	13:17:55	4.0	26.46	51.79	34.04	8.33	19.2	80.6	5.00
11/03/2026	13:18:11	4.5	26.57	51.90	34.12	8.36	30.6	79.5	4.92
11/03/2026	13:18:29	5.3	26.43	51.77	34.03	8.33	38.2	79.8	4.96
Average			**27.09**	**51.35**	**33.72**	**8.79**	**15.56**	**82.10**	**5.04**
Stdev			**0.54**	**0.40**	**0.29**	**0.67**	**10.78**	**1.71**	**0.08**
Min			**26.43**	**50.99**	**33.45**	**8.31**	**6.40**	**79.50**	**4.92**
Max			**27.64**	**51.90**	**34.12**	**9.91**	**38.20**	**84.40**	**5.16**

IM2

Date	Time	Depth (m)	Temp (C)	Cond (ms/cm)	Sal (ppt)	pH (pH)	Turb (ntu)	D.O. (%sat)	D.O. (mg/L)
11/03/2026	12:27:30	0.3	28.18	50.97	33.44	8.88	13.9	84.0	5.03
11/03/2026	12:27:48	0.5	28.17	50.96	33.43	8.89	8.1	84.5	5.06
11/03/2026	12:28:05	1.0	28.03	50.97	33.43	8.89	8.1	86.0	5.18
11/03/2026	12:28:25	1.5	27.51	51.01	33.47	8.83	8.9	88.2	5.39
11/03/2026	12:29:09	2.0	26.81	51.04	33.49	8.90	15.2	86.4	5.37
11/03/2026	12:29:33	2.5	26.63	52.04	34.23	8.63	19.5	83.6	5.17
11/03/2026	12:30:30	3.0	26.52	52.25	34.38	8.29	20.6	78.8	4.86
11/03/2026	12:30:50	3.5	26.51	52.28	34.40	8.16	23.2	76.5	4.71
11/03/2026	12:31:08	4.0	26.49	52.31	34.42	8.18	34.8	72.6	4.45
Average			**27.21**	**51.54**	**33.85**	**8.63**	**16.92**	**82.29**	**5.02**
Stdev			**0.76**	**0.65**	**0.48**	**0.33**	**8.74**	**5.18**	**0.31**
Min			**26.49**	**50.96**	**33.43**	**8.16**	**8.10**	**72.60**	**4.45**
Max			**28.18**	**52.31**	**34.42**	**8.90**	**34.80**	**88.20**	**5.39**

IM3

Date	Time	Depth (m)	Temp (C)	Cond (ms/cm)	Sal (ppt)	pH (pH)	Turb (ntu)	D.O. (%sat)	D.O. (mg/L)
11/03/2026	12:37:22	0.3	28.11	50.99	33.45	9.87	39.2	86.4	5.19
11/03/2026	12:37:42	0.5	28.11	51.01	33.47	9.63	12.6	88.4	5.32
11/03/2026	12:38:02	1.0	28.07	50.99	33.45	9.51	9.6	89.4	5.39
11/03/2026	12:38:28	1.5	27.88	50.95	33.42	9.31	8.9	90.5	5.49
11/03/2026	12:38:49	2.0	27.10	51.03	33.48	9.18	10.9	92.9	5.76
11/03/2026	12:39:05	2.5	26.94	51.01	33.47	9.04	12.6	92.5	5.75
11/03/2026	12:39:50	3.0	26.60	51.63	33.93	8.52	15.0	90.1	5.62
11/03/2026	12:40:24	3.5	26.65	51.92	34.14	8.56	16.1	85.8	5.32
11/03/2026	12:40:52	4.0	26.62	52.10	34.27	8.52	18.7	83.5	5.17
11/03/2026	12:41:34	4.5	26.59	52.22	34.36	8.68	21.8	79.7	4.91
11/03/2026	12:42:04	5.0	26.53	52.30	34.42	8.52	26.2	77.2	4.75
11/03/2026	12:42:13	5.5	26.49	52.29	34.41	8.49	24.8	76.3	4.70
11/03/2026	12:42:42	6.2	26.49	52.29	34.41	8.36	23.6	73.6	4.52
Average			**27.09**	**51.59**	**33.90**	**8.94**	**18.46**	**85.10**	**5.22**
Stdev			**0.68**	**0.60**	**0.45**	**0.51**	**8.57**	**6.49**	**0.40**
Min			**26.49**	**50.95**	**33.42**	**8.36**	**8.90**	**73.60**	**4.52**
Max			**28.11**	**52.30**	**34.42**	**9.87**	**39.20**	**92.90**	**5.76**

IM4

Date	Time	Depth (m)	Temp (C)	Cond (ms/cm)	Sal (ppt)	pH (pH)	Turb (ntu)	D.O. (%sat)	D.O. (mg/L)
10/03/2026	9:54:40	0.3	27.49	51.17	33.58	8.51	70.7	102.2	5.61
10/03/2026	9:55:09	0.5	27.49	51.19	33.60	8.69	66.1	100.4	5.49
10/03/2026	9:55:17	1.0	27.49	51.19	33.60	8.67	71.5	100.0	5.46
10/03/2026	9:55:20	1.5	27.49	51.19	33.60	8.67	70.1	99.9	5.46
10/03/2026	9:55:30	2.0	27.26	51.11	33.54	8.59	65.5	100.3	5.53
10/03/2026	9:55:43	2.5	27.04	51.13	33.55	8.55	65.9	100.3	5.57
10/03/2026	9:56:06	3.0	26.31	51.05	33.50	8.58	67.7	101.0	5.75
10/03/2026	9:56:25	3.5	25.84	50.86	33.36	8.67	69.5	100.3	5.79
10/03/2026	9:56:50	4.0	26.28	51.53	33.85	8.92	67.2	92.6	5.17
10/03/2026	9:57:13	4.5	26.40	51.82	34.06	8.86	61.2	88.6	4.87
10/03/2026	9:57:36	5.0	26.38	51.98	34.18	8.66	57.0	88.1	4.84
10/03/2026	9:57:48	5.5	26.38	52.17	34.32	8.52	60.2	87.3	4.77
10/03/2026	9:58:03	6.0	26.34	52.20	34.34	8.38	60.8	84.2	4.57
10/03/2026	9:58:19	6.5	26.33	52.24	34.37	8.28	60.2	82.3	4.45
10/03/2026	9:58:36	7.0	26.33	52.24	34.38	8.15	60.2	79.9	4.29
Average			**26.72**	**51.54**	**33.86**	**8.58**	**64.92**	**93.83**	**5.17**
Stdev			**0.58**	**0.51**	**0.38**	**0.20**	**4.63**	**7.97**	**0.50**
Min			**25.84**	**50.86**	**33.36**	**8.15**	**57.00**	**79.90**	**4.29**
Max			**27.49**	**52.24**	**34.38**	**8.92**	**71.50**	**102.20**	**5.79**

IM5

Date	Time	Depth (m)	Temp (C)	Cond (ms/cm)	Sal (ppt)	pH (pH)	Turb (ntu)	D.O. (%sat)	D.O. (mg/L)
10/03/2026	7:25:29	0.3	27.08	51.34	33.71	8.31	8.2	74.8	4.55
10/03/2026	7:25:49	0.5	27.07	51.33	33.70	8.27	7.2	76.4	4.66
10/03/2026	7:26:12	1.0	27.07	51.32	33.69	8.31	7.1	77.6	4.74
10/03/2026	7:26:31	1.5	27.06	51.32	33.69	8.30	7.7	78.4	4.79
10/03/2026	7:26:49	2.0	27.02	51.32	33.70	8.30	7.2	79.0	4.84
10/03/2026	7:27:04	2.5	26.80	51.28	33.66	8.24	7.0	79.8	4.92
10/03/2026	7:27:18	3.0	25.94	51.10	33.53	8.15	6.3	82.6	5.23
10/03/2026	7:27:30	3.5	26.11	51.41	33.76	8.13	6.5	80.9	5.08
10/03/2026	7:27:46	4.0	26.47	51.86	34.09	8.08	6.2	77.5	4.79
10/03/2026	7:28:01	4.5	26.41	52.17	34.32	8.09	7.0	76.0	4.69
10/03/2026	7:28:17	5.0	26.29	52.29	34.41	8.05	8.0	74.2	4.58
10/03/2026	7:28:30	5.5	26.28	52.30	34.42	8.02	8.0	73.3	4.52
10/03/2026	7:28:45	6.0	26.29	52.30	34.42	7.98	8.1	72.8	4.49
10/03/2026	7:28:57	6.5	26.28	52.32	34.43	7.97	11.1	72.6	4.48
10/03/2026	7:29:10	7.0	26.24	52.39	34.49	7.89	15.9	71.3	4.40
10/03/2026	7:29:22	7.3	26.25	52.37	34.47	7.87	4.5	69.0	4.24
Average			**26.54**	**51.78**	**34.03**	**8.12**	**7.88**	**76.01**	**4.69**
Stdev			**0.40**	**0.51**	**0.38**	**0.15**	**2.54**	**3.71**	**0.25**
Min			**25.94**	**51.10**	**33.53**	**7.87**	**4.50**	**69.00**	**4.24**
Max			**27.08**	**52.39**	**34.49**	**8.31**	**15.90**	**82.60**	**5.23**

IM6

Date	Time	Depth (m)	Temp (C)	Cond (ms/cm)	Sal (ppt)	pH (pH)	Turb (ntu)	D.O. (%sat)	D.O. (mg/L)
11/03/2026	14:06:00	0.3	27.97	50.96	33.43	9.76	7.4	83.3	5.01
11/03/2026	14:06:24	0.5	27.89	51.02	33.47	9.60	6.2	83.6	5.04
11/03/2026	14:07:04	1.0	27.86	51.02	33.48	9.58	3.4	84.4	5.09
11/03/2026	14:07:43	1.5	27.45	51.29	33.67	9.03	5.1	84.6	5.15
11/03/2026	14:07:46	2.0	27.46	51.28	33.67	9.04	5.1	84.6	5.15
11/03/2026	14:08:16	2.5	27.02	51.59	33.90	9.59	9.8	84.5	5.19
11/03/2026	14:08:39	3.0	26.71	51.79	34.04	9.64	15.0	83.2	5.14
11/03/2026	14:09:00	3.5	26.64	51.97	34.18	9.46	17.9	81.1	5.01
11/03/2026	14:09:24	4.0	26.61	52.19	34.34	9.20	19.3	78.9	4.86
11/03/2026	14:09:48	4.5	26.57	52.26	34.39	8.91	20.1	76.9	4.73
11/03/2026	14:10:09	5.0	26.54	52.33	34.44	8.54	25.5	73.8	4.53
11/03/2026	14:10:29	5.5	26.54	52.34	34.45	8.31	26.1	69.6	4.25
11/03/2026	14:11:02	6.0	26.51	52.37	34.47	8.55	35.3	64.0	3.88
11/03/2026	14:11:15	6.5	26.48	52.37	34.47	8.58	51.5	62.4	3.78
11/03/2026	14:11:43	6.8	26.54	52.34	34.45	8.65	28.1	62.8	3.80
Average			**26.99**	**51.81**	**34.06**	**9.10**	**18.39**	**77.18**	**4.71**
Stdev			**0.57**	**0.56**	**0.41**	**0.49**	**13.42**	**8.52**	**0.53**
Min			**26.48**	**50.96**	**33.43**	**8.31**	**3.40**	**62.40**	**3.78**
Max			**27.97**	**52.37**	**34.47**	**9.76**	**51.50**	**84.60**	**5.19**

IM7

Date	Time	Depth (m)	Temp (C)	Cond (ms/cm)	Sal (ppt)	pH (pH)	Turb (ntu)	D.O. (%sat)	D.O. (mg/L)
11/03/2026	10:23:16	0.3	27.56	50.81	33.32	9.04	4.0	91.0	5.57
11/03/2026	10:23:37	0.5	27.49	50.85	33.35	8.86	4.2	92.2	5.66
11/03/2026	10:23:51	1.0	27.49	50.80	33.31	8.76	4.3	92.0	5.65
11/03/2026	10:24:03	1.5	27.37	50.83	33.33	8.61	3.9	92.0	5.66
11/03/2026	10:24:17	2.0	27.29	50.91	33.39	8.55	4.0	91.5	5.64
11/03/2026	10:24:31	2.5	27.40	51.29	33.68	8.47	4.0	90.2	5.53
11/03/2026	10:24:53	3.0	26.59	52.09	34.26	8.09	4.0	90.2	5.61
11/03/2026	10:25:15	3.5	26.40	52.47	34.54	7.82	8.5	84.5	5.25
11/03/2026	10:25:34	4.0	26.31	52.49	34.56	7.74	6.7	79.9	4.96
11/03/2026	10:25:51	4.5	26.31	52.49	34.56	7.65	6.6	77.9	4.82
11/03/2026	10:26:07	5.0	26.31	52.52	34.58	7.51	9.0	75.8	4.68
11/03/2026	10:26:55	5.2	26.33	52.54	34.59	7.29	8.8	71.2	4.37
Average			**26.90**	**51.67**	**33.96**	**8.20**	**5.67**	**85.70**	**5.28**
Stdev			**0.56**	**0.81**	**0.60**	**0.59**	**2.11**	**7.56**	**0.46**
Min			**26.31**	**50.80**	**33.31**	**7.29**	**3.90**	**71.20**	**4.37**
Max			**27.56**	**52.54**	**34.59**	**9.04**	**9.00**	**92.20**	**5.66**

IM8

Date	Time	Depth (m)	Temp (C)	Cond (ms/cm)	Sal (ppt)	pH (pH)	Turb (ntu)	D.O. (%sat)	D.O. (mg/L)
11/03/2026	10:34:12	0.3	27.60	50.55	33.13	7.30	5.5	87.5	5.35
11/03/2026	10:34:26	0.5	27.58	50.54	33.12	7.37	4.9	87.9	5.38
11/03/2026	10:34:55	1.0	27.64	50.53	33.11	7.60	3.9	88.4	5.40
11/03/2026	10:35:08	1.5	27.59	50.52	33.11	7.71	3.6	88.7	5.43
11/03/2026	10:35:23	2.0	27.40	50.66	33.21	7.73	3.2	89.7	5.52
11/03/2026	10:35:37	2.5	27.25	50.93	33.41	7.72	2.7	90.0	5.55
11/03/2026	10:35:57	3.0	27.34	51.24	33.63	7.83	2.9	88.8	5.44
11/03/2026	10:36:11	3.5	26.88	51.82	34.06	7.73	3.4	89.3	5.52
11/03/2026	10:36:30	4.0	26.64	52.22	34.36	7.65	5.4	85.9	5.32
11/03/2026	10:36:48	4.5	26.40	52.42	34.50	7.61	8.4	82.7	5.13
11/03/2026	10:37:05	5.0	26.35	52.48	34.55	7.61	11.7	78.4	4.85
11/03/2026	10:37:32	5.5	26.32	52.49	34.56	7.60	12.7	72.9	4.49
11/03/2026	10:38:12	6.0	26.30	52.54	34.59	7.46	14.3	64.6	3.94
11/03/2026	10:38:31	6.5	26.24	52.55	34.60	7.41	16.3	63.2	3.85
11/03/2026	10:39:18	7.0	26.30	52.54	34.59	7.38	15.2	61.8	3.75
Average			**26.92**	**51.60**	**33.90**	**7.58**	**7.61**	**81.32**	**4.99**
Stdev			**0.58**	**0.90**	**0.66**	**0.16**	**5.01**	**10.50**	**0.66**
Min			**26.24**	**50.52**	**33.11**	**7.30**	**2.70**	**61.80**	**3.75**
Max			**27.64**	**52.55**	**34.60**	**7.83**	**16.30**	**90.00**	**5.55**

IM9 (was R8)

Date	Time	Depth (m)	Temp (C)	Cond (ms/cm)	Sal (ppt)	pH (pH)	Turb (ntu)	D.O. (%sat)	D.O. (mg/L)
11/03/2026	12:47:15	0.3	28.24	51.04	33.49	9.73	11.4	81.9	4.88
11/03/2026	12:47:44	0.5	28.23	51.01	33.47	9.58	10.3	85.3	5.10
11/03/2026	12:48:07	1.0	28.18	51.02	33.47	9.48	9.7	87.1	5.23
11/03/2026	12:48:36	1.5	27.97	51.01	33.46	9.38	9.7	89.0	5.38
11/03/2026	12:49:09	2.0	27.86	50.95	33.42	9.08	9.4	89.3	5.41
11/03/2026	12:49:32	2.5	26.79	51.06	33.50	8.66	13.6	92.2	5.75
11/03/2026	12:49:57	3.0	26.69	51.43	33.78	8.45	16.2	89.7	5.59
11/03/2026	12:50:32	3.5	26.67	51.78	34.04	8.61	18.3	86.0	5.33
11/03/2026	12:50:55	4.0	26.64	52.23	34.36	8.50	24.5	80.8	4.98
11/03/2026	12:51:23	4.5	26.61	52.25	34.38	7.95	27.7	75.3	4.62
11/03/2026	12:51:47	5.0	26.59	52.27	34.40	7.70	29.0	73.0	4.47
11/03/2026	12:52:08	5.5	26.53	52.29	34.41	7.54	31.8	71.9	4.40
11/03/2026	12:52:24	6.0	26.49	52.32	34.43	7.55	35.9	70.0	4.28
11/03/2026	12:52:55	6.2	26.56	52.29	34.41	7.75	31.0	69.0	4.21
Average			**27.15**	**51.64**	**33.93**	**8.57**	**19.89**	**81.46**	**4.97**
Stdev			**0.74**	**0.61**	**0.45**	**0.79**	**9.70**	**8.12**	**0.51**
Min			**26.49**	**50.95**	**33.42**	**7.54**	**9.40**	**69.00**	**4.21**
Max			**28.24**	**52.32**	**34.43**	**9.73**	**35.90**	**92.20**	**5.75**

IM10 (was R2)

Date	Time	Depth (m)	Temp (C)	Cond (ms/cm)	Sal (ppt)	pH (pH)	Turb (ntu)	D.O. (%sat)	D.O. (mg/L)
11/03/2026	13:02:59	0.3	26.96	51.03	33.48	9.64	11.6	82.6	5.10
11/03/2026	13:03:16	0.5	26.95	51.04	33.49	9.52	8.4	82.6	5.10
11/03/2026	13:03:45	1.0	26.97	51.03	33.48	9.42	7.9	82.5	5.09
11/03/2026	13:04:09	1.5	26.89	51.05	33.50	9.32	8.6	82.8	5.12
11/03/2026	13:04:27	2.0	26.81	51.09	33.53	9.27	9.6	83.1	5.15
11/03/2026	13:04:41	2.5	26.47	51.19	33.60	9.18	11.7	84.1	5.26
11/03/2026	13:05:07	3.0	26.04	51.18	33.59	9.05	17.2	83.4	5.27
11/03/2026	13:05:38	3.5	26.01	51.22	33.62	8.90	20.1	79.4	5.00
11/03/2026	13:05:58	4.0	26.41	51.78	34.03	8.89	23.8	77.5	4.80
11/03/2026	13:06:20	4.5	26.48	51.82	34.06	8.61	27.2	77.4	4.79
11/03/2026	13:06:47	4.8	26.43	51.79	34.04	8.03	24.7	77.9	4.83
Average			**26.58**	**51.29**	**33.67**	**9.08**	**15.53**	**81.21**	**5.05**
Stdev			**0.36**	**0.33**	**0.24**	**0.46**	**7.31**	**2.59**	**0.17**
Min			**26.01**	**51.03**	**33.48**	**8.03**	**7.90**	**77.40**	**4.79**
Max			**26.97**	**51.82**	**34.06**	**9.64**	**27.20**	**84.10**	**5.27**

IM11 (was R7)

Date	Time	Depth (m)	Temp (C)	Cond (ms/cm)	Sal (ppt)	pH (pH)	Turb (ntu)	D.O. (%sat)	D.O. (mg/L)
11/03/2026	11:54:30	0.5	27.65	50.93	33.41	9.25	9.5	85.4	5.19
11/03/2026	11:54:50	1.0	27.68	50.90	33.39	9.16	8.6	86.5	5.26
11/03/2026	11:55:14	1.5	27.60	50.93	33.41	8.80	8.2	87.9	5.36
11/03/2026	11:55:46	2.0	27.45	50.98	33.44	8.59	7.5	88.6	5.42
11/03/2026	11:56:12	2.5	26.58	51.37	33.73	8.36	8.7	88.6	5.54
11/03/2026	11:56:32	3.0	26.47	51.37	33.73	8.34	9.3	87.7	5.49
11/03/2026	11:57:02	3.5	26.41	51.46	33.80	8.15	9.3	86.7	5.43
11/03/2026	11:57:42	4.0	26.38	51.48	33.81	7.96	10.7	85.9	5.38
11/03/2026	11:58:13	4.5	26.49	51.59	33.89	7.79	10.6	85.9	5.36
11/03/2026	11:58:39	5.0	26.44	51.99	34.19	7.73	10.6	86.0	5.36
11/03/2026	11:59:20	5.5	26.39	52.14	34.30	7.59	17.8	82.1	5.10
11/03/2026	11:59:44	6.0	25.82	52.52	34.58	7.66	26.0	78.5	4.93
11/03/2026	11:59:58	6.5	26.23	52.33	34.44	7.95	24.8	74.4	4.61
Average			**26.74**	**51.54**	**33.86**	**8.26**	**12.43**	**84.94**	**5.26**
Stdev			**0.62**	**0.55**	**0.41**	**0.56**	**6.29**	**4.21**	**0.26**
Min			**25.82**	**50.90**	**33.39**	**7.59**	**7.50**	**74.40**	**4.61**
Max			**27.68**	**52.52**	**34.58**	**9.25**	**26.00**	**88.60**	**5.54**

IM12 (was R11)

Date	Time	Depth (m)	Temp (C)	Cond (ms/cm)	Sal (ppt)	pH (pH)	Turb (ntu)	D.O. (%sat)	D.O. (mg/L)
11/03/2026	11:42:02	0.3	27.20	51.30	33.68	8.50	16.7	79.8	4.87
11/03/2026	11:42:15	0.5	27.20	51.29	33.67	8.55	9.3	80.4	4.91
11/03/2026	11:42:47	1.0	27.20	51.26	33.65	8.56	8.1	82.8	5.07
11/03/2026	11:43:22	1.5	27.11	51.36	33.73	8.57	7.7	85.6	5.26
11/03/2026	11:43:45	2.0	27.06	51.50	33.82	8.64	7.5	86.9	5.35
11/03/2026	11:44:13	2.5	27.06	51.53	33.85	8.49	8.0	88.0	5.42
11/03/2026	11:44:33	3.0	27.03	51.57	33.88	8.31	8.4	88.6	5.46
11/03/2026	11:44:53	3.5	27.01	51.57	33.88	8.18	9.0	89.1	5.50
11/03/2026	11:45:09	4.0	26.99	51.57	33.88	8.04	9.3	89.6	5.54
11/03/2026	11:45:43	4.5	25.61	52.58	34.63	7.42	37.8	76.2	4.80
11/03/2026	11:46:07	5.0	25.44	52.64	34.67	7.60	48.6	69.8	4.39
11/03/2026	11:46:40	5.5	25.35	52.66	34.69	7.47	47.2	66.6	4.18
11/03/2026	11:47:03	6.0	25.30	52.67	34.69	7.35	49.5	66.0	4.15
11/03/2026	11:47:06	6.5	25.30	52.66	34.69	7.34	49.4	66.0	4.15
11/03/2026	11:47:43	7.0	25.39	52.65	34.68	7.18	50.1	63.7	3.98
Average			**26.42**	**51.92**	**34.14**	**8.01**	**24.44**	**78.61**	**4.87**
Stdev			**0.87**	**0.62**	**0.46**	**0.55**	**19.47**	**9.73**	**0.56**
Min			**25.30**	**51.26**	**33.65**	**7.18**	**7.50**	**63.70**	**3.98**
Max			**27.20**	**52.67**	**34.69**	**8.64**	**50.10**	**89.60**	**5.54**