WATER MONITORING REPORT

September 2021 – September 2022

ABSTRACT

This report contains the results of water quality monitoring conducted by Tasmanian Seafoods in accordance with EPL 276 in relation to a proposed sea cucumber aquaculture operation located at Berry Springs, NT, Australia.

Luke Turner

Tasmanian seafoods P/L

Version 1.0

15/09/22

Summary

Tasmanian seafoods obligations relating to the operation of a proposed sea cucumber nursery facility located at 160 William Rd Berry Springs, NT include reporting on the approved water monitoring plan associated with its environmental protection licence (EPL276). The sea cucumber nursery stage 1 development has been completed and the nursery operated during the reporting period from September 2021 to September 2022. The farm was operational (stocked with juvenile sea cucumber) between June 2021 and December 2021. The purpose of the sea cucumber nursery facility is to rear juvenile sea cucumbers in an extractive and extensive aquaculture system. Juvenile sea cucumbers are transferred from an off-site hatchery to the nursery facility where they are on grown for a period of six weeks in a recirculating raceway system. There are no feed, nutrients, or other inputs to the production system. Saline water is pumped onto the farm under licence from Darwin River.

Monitoring was conducted in each month during the reporting period until operation of the farm ceased in December 2021. Monitoring occurred mainly at the farm intake and at the downstream monitoring point (compliance point) in the Darwin River. The farm discharge point was also monitored at times when rainfall events resulted in surface water flowing from the farm discharge channel. During normal operation during the dry season no farm discharge occurs.

The water monitoring plan results provided here are discussed in relation to the water quality objectives (trigger limits) for the Darwin Harbour region. The results, expectedly, indicate the water quality of the upper estuary environment of the Darwin River is highly variable and heavily influenced by rainfall and the tidal cycle. Recommendations are made regarding the water monitoring plan objectives to improve the ability of the monitoring plan to detect impacts from future use at the site.

Contents

Monitoring Objectives

The objectives of the monitoring plan are to provide data to allow for the assessment of the water quality in the receiving environment and so that water quality objectives and declared beneficial uses of the Darwin Harbour environment may be maintained and protected. To achieve this, trigger limits have been set for some important parameters based on water quality objectives of the Darwin harbour region-Blackmore River. These trigger limits are described in the water monitoring plan (appendix 1).

Monitoring method

The monitoring plan is attached in appendix 1. The plan includes 4 sampling locations (Figure 1):

Bore: Ground water extraction point RN33415

AD1: authorised discharge point 1

CP1: Compliance point 1- 100m downstream of where the farm discharge meets the Darwin River receiving environment.

Intake1: The farm intake located on Darwin River.

Figure 1: Water quality monitoring plan sampling locations.

Each monitoring point was sampled monthly, and samples were sent to a NATA accredited laboratory (ALS Sydney) for analysis of the analytes as described in the water monitoring plan. The site AD1 was only sampled when water was available at the sampling point i.e. when wet season rainfall resulted in surface water flowing from the farm discharge outlet.

Water quality parameters of pH, DO, Temperature, Salinity (conductivity) and turbidity were measured *in-situ* using a YSI pro plus handheld water quality meter and a YSI 9500 photometer (Turbidity).

Monitoring results

Physico-chemical properties

Timestamp	Site	Salinity (ppt)	Dissolved Oxygen (%)	pH	Temperature (C)
2/01/2020	AD1	27.61	79.9	7.71	33.9
2/02/2020	AD1	12.24	92.8	8.24	32.6
2/03/2020	AD1	16.47	85	7.18	33.4
25/05/2020	AD1	14.8	57.9	7.76	21.9
4/11/2020	AD1	42.15	107.5	8.53	33.3
3/12/2020	AD1	36.86	84.6	7.59	30.5
30/12/2020	AD1	22.02	88.6	0.81	30.5
3/02/2021	AD1	13.98	89.9	7.77	30.4
22/03/2021	AD1	6.12	85.9	6.64	31.3
19/04/2021	AD1	3.03	79.6	6.5	29.7
30/11/2021	AD1	30.69	92.4	6.32	32.8
23/09/2019	CP1	37.82	69.5	8.16	29.3
4/11/2019	CP1	38.85	80.9	8.22	32.3
2/12/2019	CP1	36.53	57.7	7.76	32.4
2/01/2020	CP1	35.29	62.8	7.86	32.9
2/02/2020	CP1	11.16	71.5	8.2	32
2/03/2020	CP1	1.16	73.3	7.47	29.4
25/05/2020	CP1	29.78	51.3	7.83	25.2
23/06/2020	CP1	31.59	78	6.96	26
21/07/2020	CP1	33.33	115.9	7.47	25.1
24/08/2020	CP1	37.68	63.2	7.75	28.3
23/09/2020	CP1	40.91	47.2	7.65	30.6
6/10/2020	CP1	39.96	70	7.1	31.1
4/11/2020	CP1	38	64.2	7.77	32.8
3/12/2020	CP1	37.26	55.3	7.83	32.1
30/12/2020	CP1	2	64	8	28.4
3/02/2021	CP1	0.57	67.7	7.92	29
22/03/2021	CP1	4.88	76.4	7.28	30.9
19/04/2021	CP1	16.5	64	7.4	30.2
19/05/2021	CP1	24.49	72.7	7.62	26.6
15/06/2021	CP1	29.24	61.8	7.61	26.2
28/07/2021	CP1	32.98	75.4	7.71	26.7
30/08/2021	CP1	32.32	77.1	7.55	27.3
28/09/2021	CP1	36.95	65.2	7.59	29
26/10/2021	CP1	36.4	49.4	7.48	31.3
30/11/2021	CP1	30.18	70.3	7.59	33.3
23/09/2019	I1	38.45	67.2	8.16	28.7
4/11/2019	I1	38.41	75	8.31	32
2/12/2019	I1	36.47	59.8	7.69	32
2/01/2020	I1	34.7	63.4	7.89	32.7
2/02/2020	I1	10.26	71.7	8.21	31.8
2/03/2020	I1	0.67	79	8.71	29.9
25/05/2020	I1	30.05	54.4	7.89	25.3

23/06/2020	I1	31.02	75.8	7.42	26.1
21/07/2020	I1	32.87	112.5	7.51	25.2
24/08/2020	I1	37.4	64.3	7.75	28.2
23/09/2020	I1	39.91	52	7.73	30.4
6/10/2020	I1	39.74	64.6	7.76	31.1
4/11/2020	I1	37.81	60.3	7.78	32.8
3/12/2020	I1	36.71	56.7	7.82	32.1
30/12/2020	I1	2.19	63	4.16	28.4
3/02/2021	I1	0.49	68.9	8.49	28.8
22/03/2021	I1	5.13	76.8	7.16	29.9
19/04/2021	I1	13.69	64.4	7.41	30.1
19/05/2021	I1	24.12	69.8	7.56	26.5
15/06/2021	I1	28.6	59.8	7.64	26.2
28/07/2021	I1	32.26	72.8	7.72	26.7
30/08/2021	I1	31.94	75.4	7.51	27.3
28/09/2021	I1	36.6	65.9	7.6	29
26/10/2021	I1	36.2	45.7	7.44	31.3
30/11/2021	I1	29.79	72.4	7.62	33.4

Table 1: Results of in-situ recorded physico-chemical water quality parameters for sites CP1 (Compliance Point), AD1 (authorized discharge) and I1 (Intake point). Readings outside water quality monitoring plan objectives are highlighted in red.

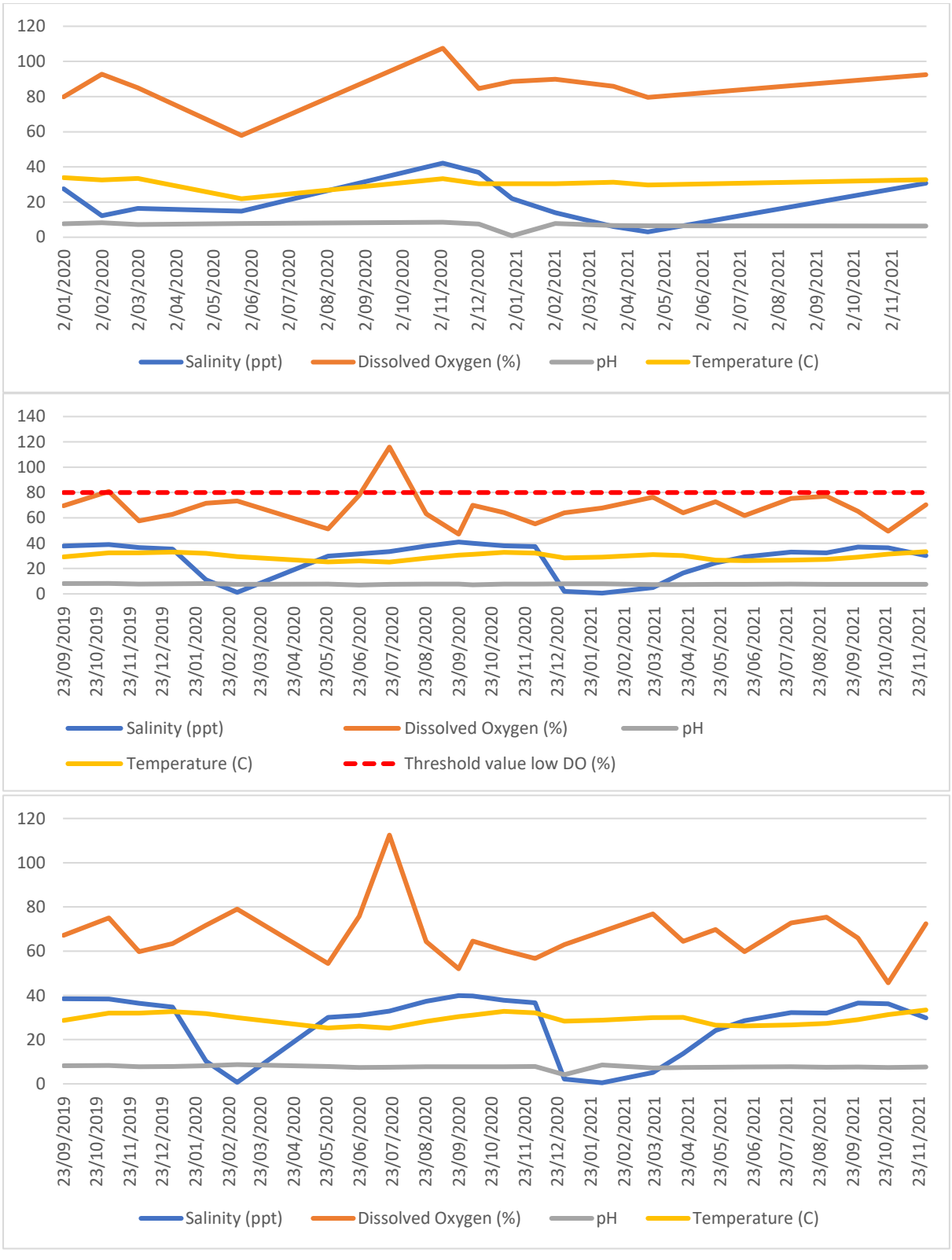

Figure 2: Dynamics of physico-chemical water quality parameters at sampling locations AD1 (top), CP1 (centre) and I1 (bottom) prior to and during the reporting period to December 2021. AD1 and I1 samples *ad libitum* and CP1 samples monthly.

Nutrients

Nitrogen

Month	Site	Total N	Nitrate	Nitrite	Ammonia	NOx

Nov	AD1	0.61	0.014	<0.002	<0.01	0.014
Dec	AD1	0.48	0.154	<0.002	<0.005	0.154
Feb	AD1	0.56	0.214	<0.002	0.011	0.214
Mar	AD1	0.89	0.539	<0.002	0.028	0.539
Apr	AD1	0.45	0.355	<0.002	0.019	0.355
Nov	AD1	0.11	0.002	<0.002	0.04	0.002
Sep	CP1	0.4	0.006	<0.002	0.01	0.006
Oct	CP1	0.28	0.002	<0.002	<0.01	0.002
Nov	CP1	0.19	0.003	<0.002	<0.01	0.003
Dec	CP1	0.15	0.006	<0.002	<0.005	0.006
Feb	CP1	0.17	0.004	<0.002	0.017	0.004
Mar	CP1	0.18	0.006	<0.002	0.013	0.006
Apr	CP1	0.22	0.014	<0.002	0.011	0.014
May	CP1	0.16	0.01	0.013	<0.005	0.023
Jun	CP1	0.18	0.014	<0.002	<0.005	0.014
Jul	CP1	0.15	0.012	<0.002	0.007	0.012
Aug	CP1	0.2	0.016	<0.002	<0.005	0.016
Sep	CP1	0.28	0.005	<0.002	<0.01	0.005
Oct	CP1	0.27	0.019	0.003	0.005	0.022
Nov	CP1	0.16	<0.002	<0.002	<0.005	<0.002
Sep	I1	0.21	0.017	0.005	<0.005	0.022
Oct	I1	0.15	<0.002	0.002	<0.01	0.002
Nov	I1	0.16	0.003	<0.002	<0.01	0.003
Dec	I1	0.16	0.007	0.002	<0.005	0.009
Feb	I1	0.18	0.005	<0.002	0.027	0.005
Mar	I1	0.18	0.01	<0.002	<0.005	0.01
Apr	I1	0.22	0.013	<0.002	0.009	0.013
May	I1	0.18	0.012	0.014	<0.005	0.026
Jun	I1	0.18	0.014	<0.002	<0.005	0.014
Jul	I1	0.14	0.01	0.002	0.012	0.012
Aug	I1	0.22	0.019	0.003	<0.005	0.019
Sep	I1	0.36	0.009	<0.002	<0.01	0.009
Oct	I1	0.26	0.028	0.004	<0.005	0.032
Nov	I1	0.23	<0.002	<0.002	0.009	<0.002

Table 2: Concentrations of nitrogen analytes (mg/L) in water samples from sites CP1 (Compliance Point), AD1 (authorized discharge) and I1 (Intake point) collected during the reporting period from September 2020 to Nov 2021. Readings outside water quality monitoring plan objectives are highlighted in red.

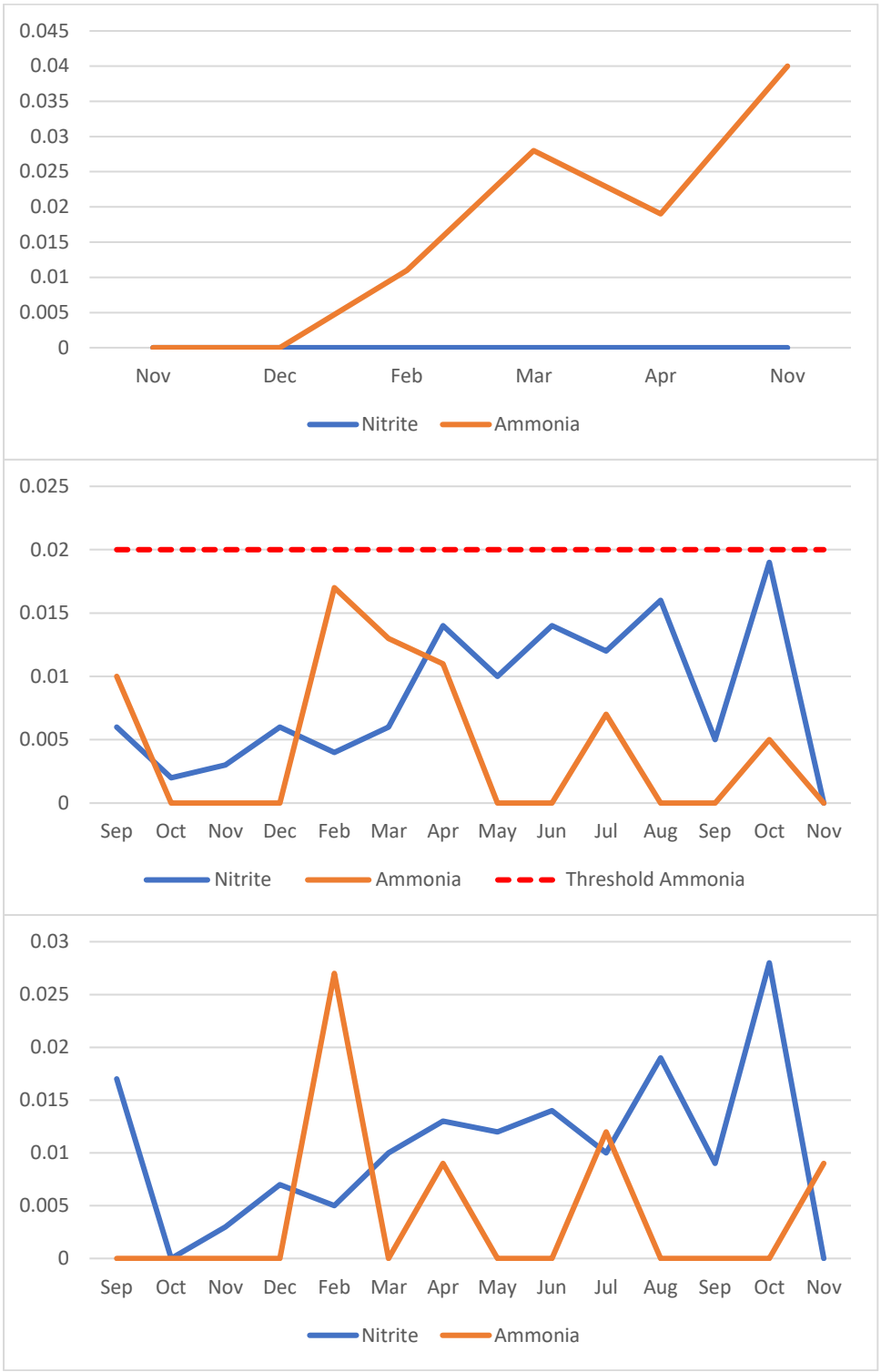

Figure 3: Nitrite and ammonia concentration recorded at the sampling locations AD1 (top), CP1 (centre) and I1 (bottom) from September 2020 to November 2021.

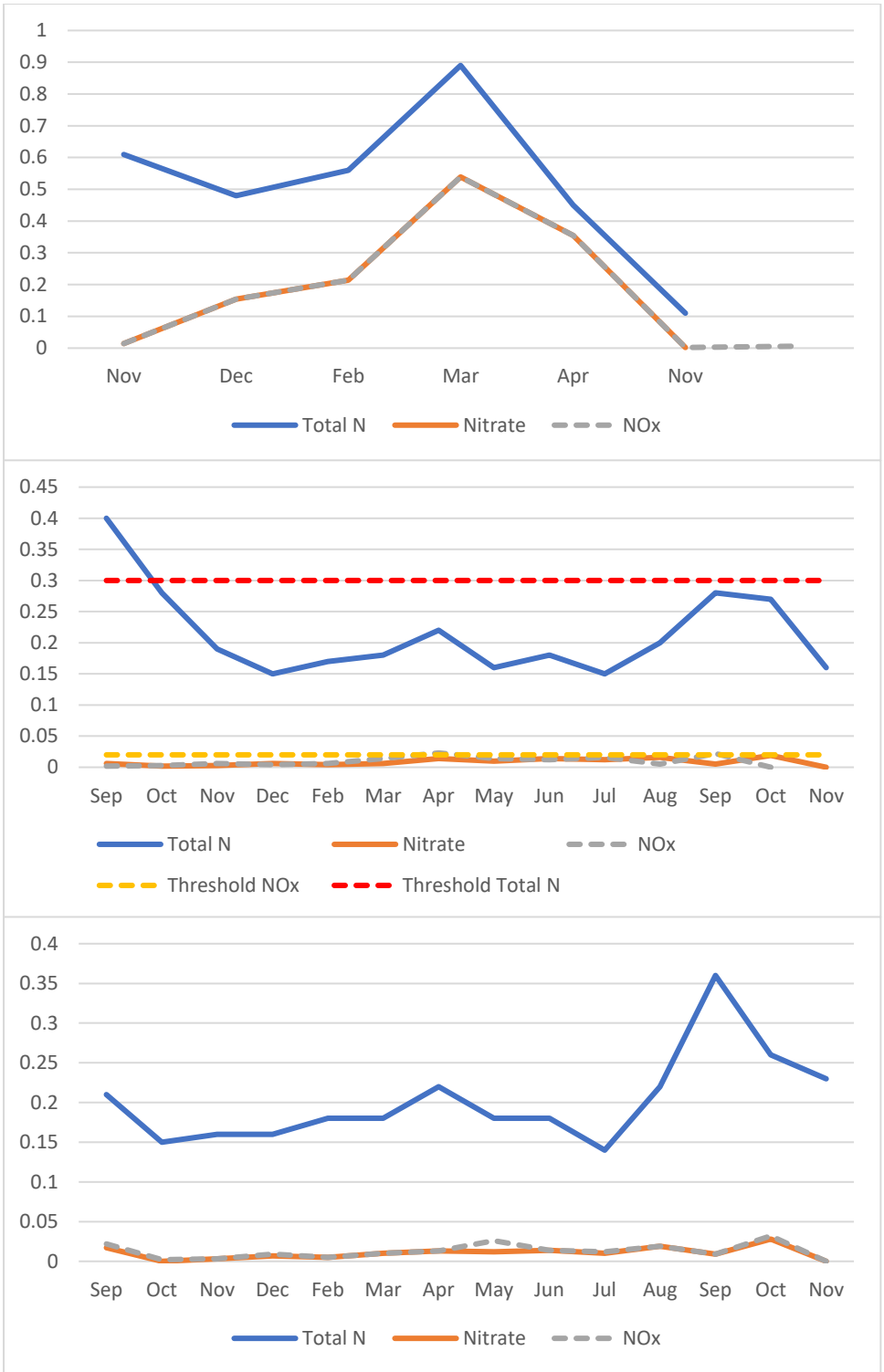

Figure 4: Total Nitrogen, Nitrate and Total oxidized nitrogen (NOx) concentration recorded at the sampling locations AD1 (top), CP1 (centre) and I1 (bottom) from September 2020 to November 2021.

Phosphorus

Month	Site	Total P	DRP
Nov	AD1	<0.005	<0.001
Dec	AD1	<0.005	<0.001
Feb	AD1	<0.005	<0.001
Mar	AD1	0.006	<0.001

Apr	AD1	0.006	<0.001
Nov	AD1	<0.005	0.002
Sep	CP1	<0.01	0.002
Oct	CP1	<0.005	0.007
Nov	CP1	<0.005	0.003
Dec	CP1	<0.005	0.006
Feb	CP1	0.024	0.01
Mar	CP1	0.01	0.004
Apr	CP1	<0.005	0.004
May	CP1	0.014	0.008
Jun	CP1	0.017	0.015
Jul	CP1	0.02	0.002
Aug	CP1	0.023	0.006
Sep	CP1	0.023	0.009
Oct	CP1	0.026	0.01
Nov	CP1	0.009	0.002
Sep	I1	0.032	0.015
Oct	I1	<0.005	0.007
Nov	I1	<0.005	0.004
Dec	I1	<0.005	0.008
Feb	I1	0.018	0.009
Mar	I1	0.007	0.006
Apr	I1	0.006	0.005
May	I1	0.016	0.008
Jun	I1	0.02	0.011
Jul	I1	0.019	0.007
Aug	I1	0.026	0.006
Sep	I1	0.027	0.01
Oct	I1	0.03	0.012
Nov	I1	0.02	0.004

Table 3: Total phosphorus (Total P) and reactive phosphorus (DRP) concentrations (mg/L) in water samples from sites CP1 (Compliance Point), AD1 (authorized discharge) and I1 (Intake point) collected during the reporting period from September 2020 to November 2021. Readings outside water quality monitoring plan objectives are highlighted in red.

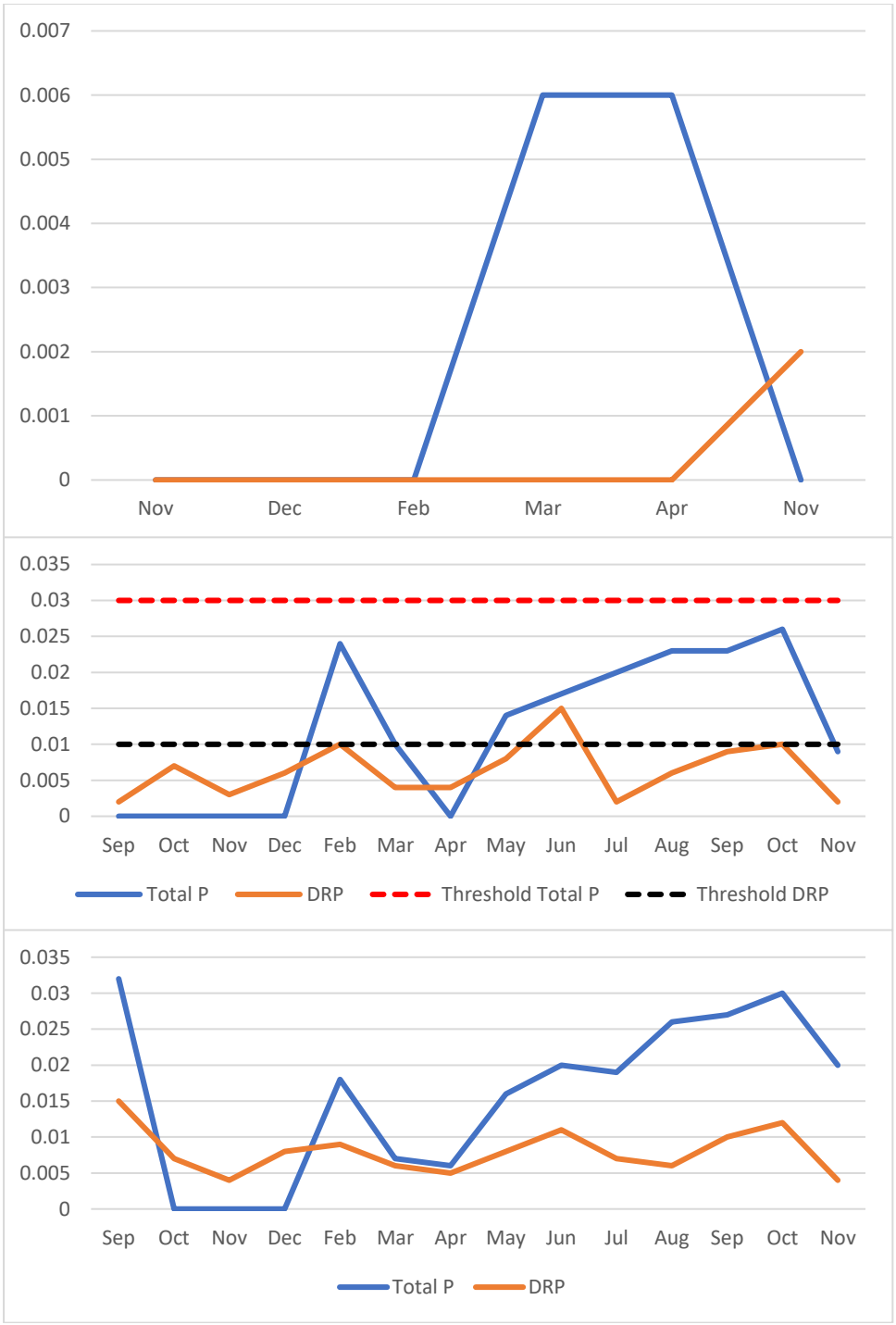

Figure 5: Changes in total phosphorus (Total P) and reactive phosphorus (RP) nutrients in water sampled from sites CP1 (top), AD1 (centre) and I1 (bottom) from September 2020 to November 2021.

Chlorophyll-α

Month	Site	Chlorophyll a
Nov	AD1	4
Dec	AD1	3
Feb	AD1	<1
Mar	AD1	<1
Apr	AD1	<1
Nov	AD1	1

Sep	CP1	<1
Oct	CP1	2
Nov	CP1	3
Dec	CP1	<1
Feb	CP1	<1
Mar	CP1	3
Apr	CP1	2
May	CP1	2
Jun	CP1	1
Jul	CP1	2
Aug	CP1	2
Sep	CP1	1
Oct	CP1	2
Nov	CP1	4
Sep	I1	1
Oct	I1	2
Nov	I1	3
Dec	I1	1
Feb	I1	<1
Mar	I1	<1
Apr	I1	2
May	I1	2
Jun	I1	1
Jul	I1	1
Aug	I1	2
Sep	I1	2
Oct	I1	2
Nov	I1	4

Table 4: Chlorophyll α concentrations (µg/L) in water samples from sites CP1 (Compliance Point), AD1 (authorized discharge) and I1 (Intake point) from September 2020 to November 2021. Readings outside water quality monitoring plan objectives are highlighted in red.

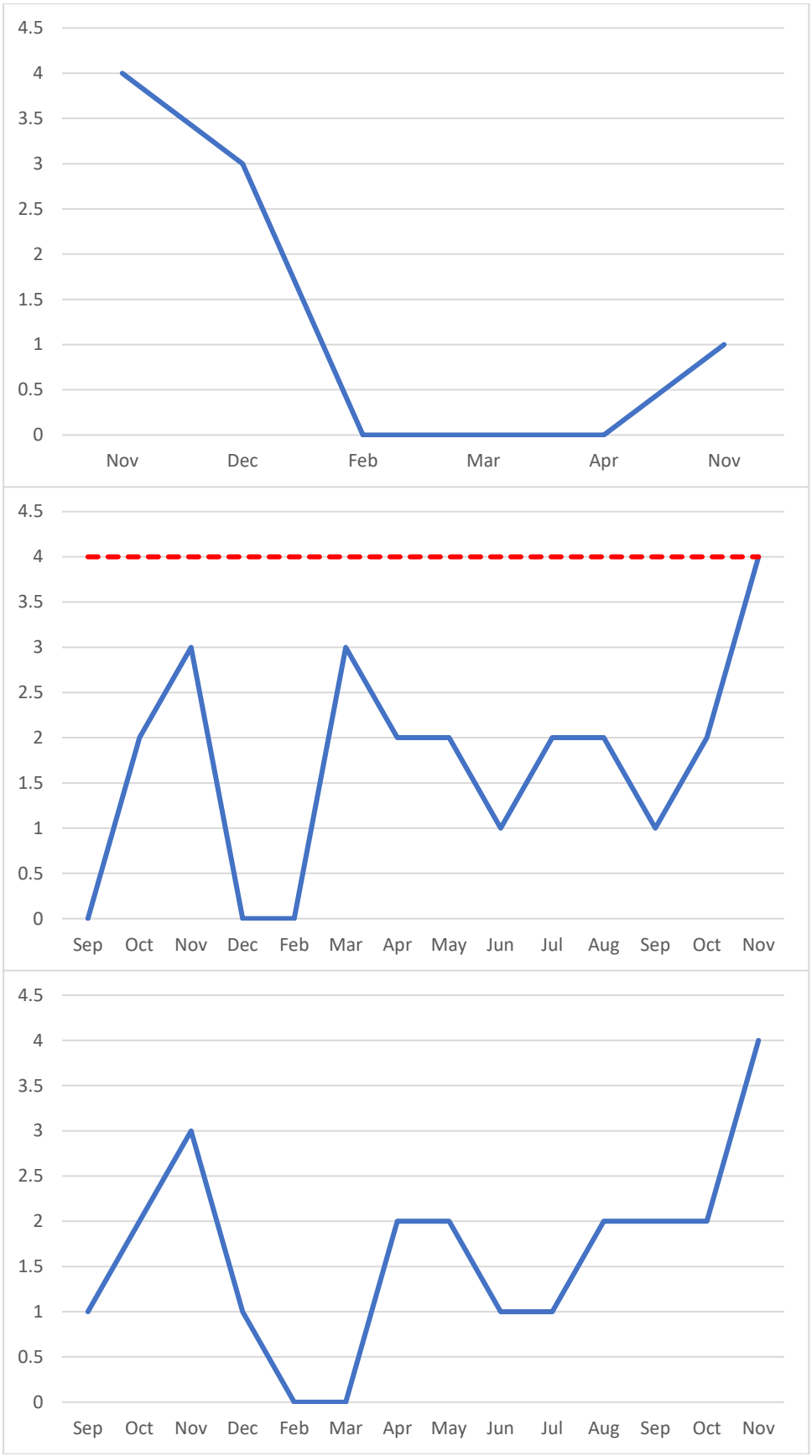

Figure 6: Changes in chlorophyll levels in water sampled from sites AD1 (top), CP1 (centre) and I1 (bottom) collected from September 2020 to November 2021.

Biochemical oxygen demand

Month	Site	BOD
Nov	AD1	<2
Dec	AD1	<2
Dec	AD1	<12
Feb	AD1	<2
Mar	AD1	<03
Apr	AD1	<2
Nov	AD1	<2
Sep	CP1	4
Oct	CP1	4
Nov	CP1	<2
Dec	CP1	<2
Dec	CP1	<12
Feb	CP1	<2
Mar	CP1	<03
Apr	CP1	<2
May	CP1	<2
Jun	CP1	<2
Jul	CP1	<2
Aug	CP1	<2
Sep	CP1	<2
Oct	CP1	<2
Nov	CP1	2
Sep	I1	3
Oct	I1	2
Nov	I1	<2
Dec	I1	<2
Dec	I1	<12
Feb	I1	2
Mar	I1	<03
Apr	I1	<2
May	I1	<2
Jun	I1	<2
Jul	I1	<2
Aug	I1	2
Sep	I1	<2
Oct	I1	<2
Nov	I1	<2

Table 5: Biochemical oxygen demand (BOD) of water samples collected from September 2020 to November 2021 for sites AD1, I1 and CP1.

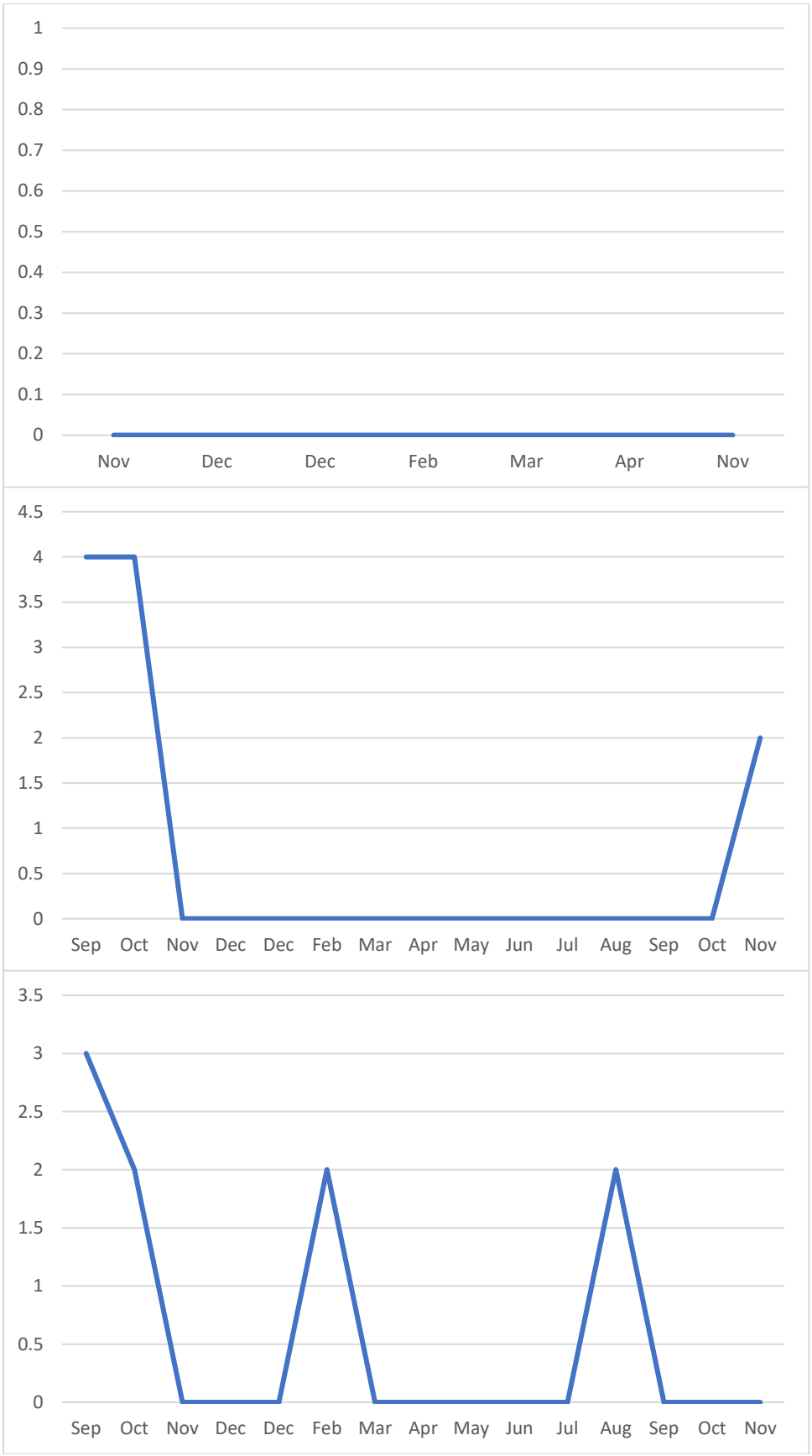

Figure 7: Changes in biochemical oxygen demand (mg/L) in water sampled from sites AD1 (top), CP1 (centre) and I1 (bottom) from September 2020 to November 2021.

Total suspended solids and turbidity

Month	Site	TSS	Turb	Turb (Lab)
Nov	AD1	<5	8	4.2
Dec	AD1	<5		3.4
Dec	AD1			
Feb	AD1	<5	6	1.8
Mar	AD1	<5	2	1
Apr	AD1	6	2	1.4
Nov	AD1	13		10.5
Sep	CP1	7	8	4.8
Oct	CP1	<5	10	4.4
Nov	CP1	12	14	5.3
Dec	CP1	8		5.6
Dec	CP1		54	
Feb	CP1	14	14	36.4
Mar	CP1	6	10	5
Apr	CP1	<5	10	4.8
May	CP1	12	14	5.9
Jun	CP1	18	10	7.8
Jul	CP1	<5	18	3.2
Aug	CP1	14		6
Sep	CP1	10	6	4
Oct	CP1	21	6	5.4
Nov	CP1	10		9.5
Sep	I1	5	8	5.4
Oct	I1	<5	12	4.5
Nov	I1	8	24	4.4
Dec	I1	7		6.2
Dec	I1		64	
Feb	I1	14	16	36.9
Mar	I1	<5	12	4.7
Apr	I1	6	12	5.6
May	I1	20	16	6.5
Jun	I1	10	14	9.1
Jul	I1	10	18	2.5
Aug	I1	16		5.4
Sep	I1	8	4	3.6
Oct	I1	9	12	5.9
Nov	I1	20		10.6

Table 6: Total suspended solids (mg/L) and turbidity recorded in water samples from sites CP1 (Compliance Point), AD1 (authorized discharge) and I1 (Intake point) sampled from September 2020 to November 2021. Readings outside water quality monitoring plan objectives are highlighted in red. Both *in-situ* (YSI 9500 photometer) and laboratory turbidity (NATA) are presented.

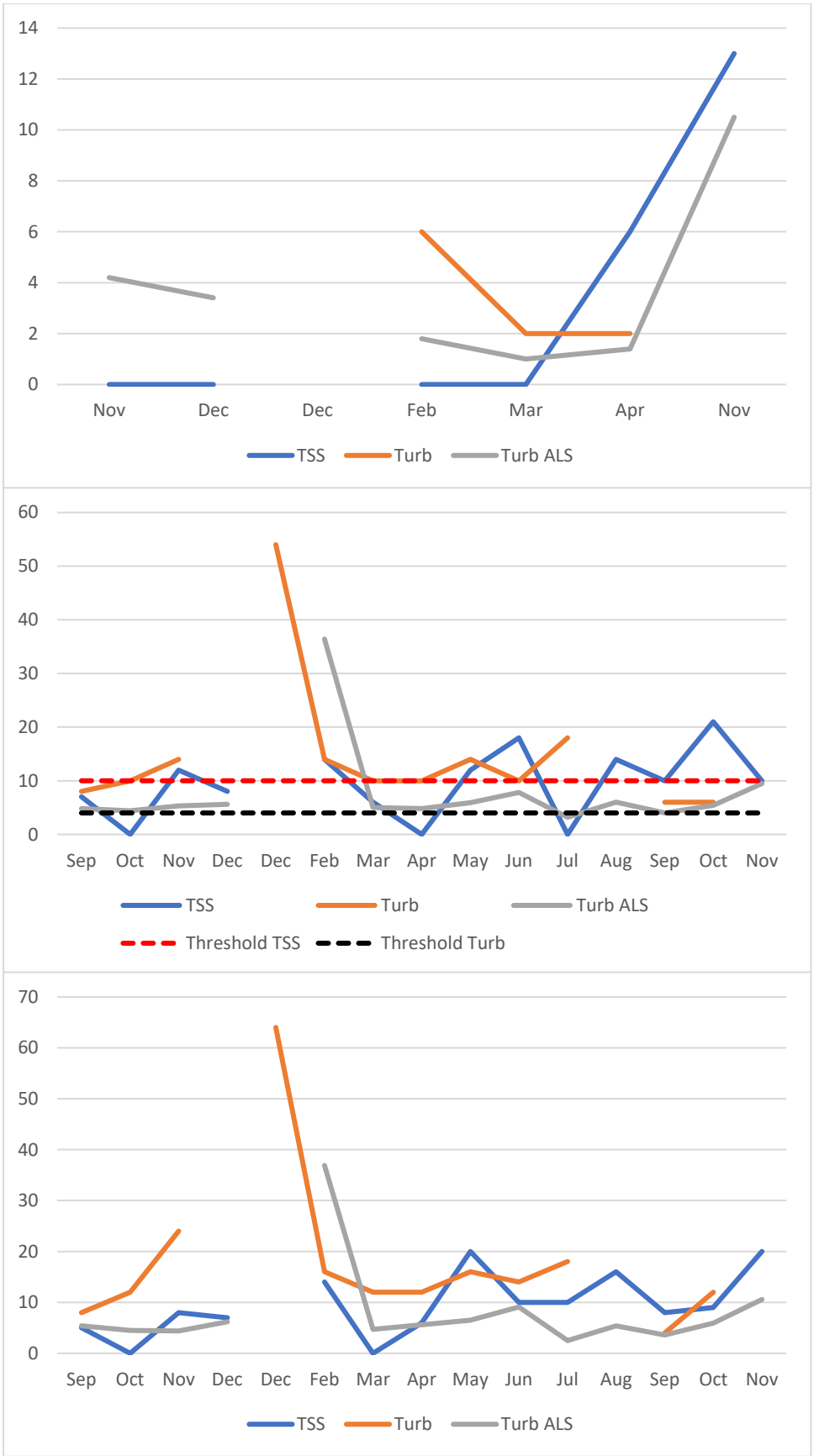

Figure 8: Variability of total suspended solids (TSS (mg/L)) and turbidity (FTU/NTU) in water sampled from sites AD1 (top), CP1 (centre) and I1 (bottom) collected from September 2020 to November 2021.

In-situ turbidity

Turb	AD1	I1	CP1
13-Oct		18	
19/10/2020		12	
26/10/2020		34	
24/11/2020	6	16	
3-Dec	6	16	14
23/12/2020	8		
29/12/2020	6		
8/02/2021	0	38	
12-Feb	2	16	
15/02/2021	0	54	
12/04/2021	0	8	
10/11/2021		30	
16/11/2021		26	
4/01/2022	2		

Table 7: *In-situ* turbidity readings (sampled *ad libitum*) for AD1, I1, and CP1 (data reported previously; shown here for comparison).

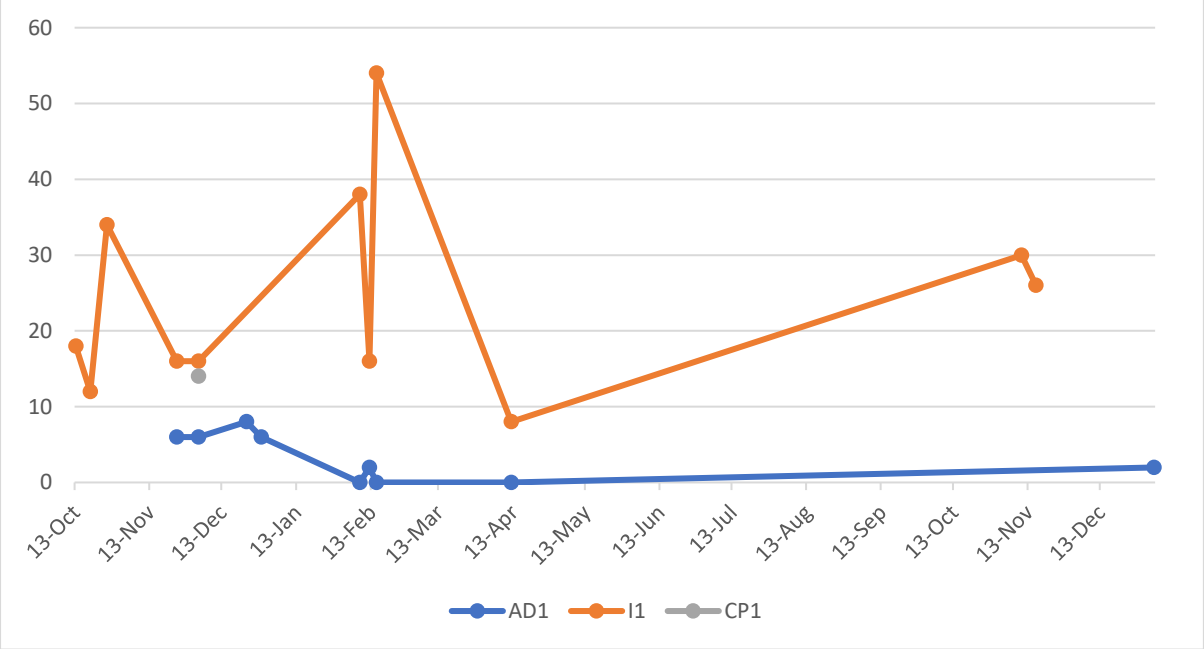

Figure 9: *In-situ* turbidity record for *ad libitum* sampling at CP1, AD1 and I1 from September 2020 – Jan 2022.

Groundwater supply water quality

Bore water quality

	DATE	4/11/2019	24/08/2020	28/09/2021
	Sampling point	Dam	Dam	Dam
	Time	1254	1136	
	Total Alk	203	171	189
	Sulfate	2	2	3
	Cloride	10	16	28
	Calcium	33	24	36
	Magnesium	30	26	28
	Sodium	4	5	11
	Potassium	<1	<1	<1
DISSOLVED METALS	Al	<0.01	<0.01	<0.01
	As	<0.001	<0.001	<0.001
	Cu	<0.001	<0.001	<0.001
	Pb	<0.001	<0.001	<0.001
	Ni	<0.001	<0.001	<0.001
	U	<0.001	<0.001	<0.001
	Zn	0.009	<0.005	<0.005
TOTAL METALS	Al	<0.01	<0.01	<0.01
	As	<0.001	<0.001	<0.001
	Cu	<0.001	<0.001	<0.001
	Pb	<0.001	<0.001	<0.001
	Ni	<0.001	<0.001	<0.001
	U	<0.001	<0.001	<0.001
	Zn	0.009	<0.005	<0.005
	NOx	<0.01	0.01	0.01
	TKN	<0.1	<0.1	0.2
	TN	<0.1	<0.1	0.2
	TP	<0.01	0.01	<0.01
	Total anion	4.38	3.91	4.63
	Total Cation	4.29	3.56	4.58
	Ion Balance	1.04	4.75	0.53

Table 8: Water quality results from Bore RN033415 sampled.

	Conductivity (µS/cm)	Salinity (ppt)	DO (%)	pH	Temperature (°c)	Turbidity (FTU)
2019	503	0.21	76.9	8.65	31.5	<<
2020	533	0.24	117.1	8.42	29.0	<<
2021	533	0.23	63.8	7.75	29.2	4

Table 9: *In-situ* water quality of bore water sampled on 24/08/2021. (<<=below test detection limits of YSI photometer 9500).

Authorised discharge

A flow velocity meter installed at the farm discharge failed to accurately record flows at the farm discharge during the reporting period. However, water flowed at the discharge only because of rainfall and the farm was only in operation between September 2021 and December 2021. Excess water from rain falling on the ponds caused pond drains to flow to the authorised discharge point. Only during the November 2021 sampling was the farm discharging water due to a small amount of rainfall the previous day. As no discharge occurred

outside the wet season the total rainfall and pond catchment area has been used to estimate the discharge. As the calculation does not account for evaporation and seepage it is probably an overestimation. The property received 616.7mm of rainfall between Sept 2021 and December 2021 when the farm was in operation. With a total pond surface area catchment of 80,441m^2 the total discharge from rainfall during the operational period can be calculated at 20.5ML. For the whole reporting period the farm received 1693.9mm of rainfall which could amount to a total discharge of 163ML. Water quality at the farm discharge point AD1 was very good and did not impact the water quality at the compliance point CP1. Water sampled at the farm discharge contained higher levels of dissolved oxygen, lower TSS, lower Turbidity, lower nitrite and lower Phosphorus when compared to water sampled from the farm intake point and compliance point. The water sampled from the farm discharge point did contain levels of total nitrogen and nitrate when compared to the farm intake so net nitrogen discharge was used to calculate the total amount of waste discharged by the farm. The source of the nitrates in the farm discharge may be related to natural productivity within the ponds at the farm but are not related to the activity as the elevated nitrates were present prior to any activity taking place. The net nitrogen discharged from the farm was calculated using the formula; mean total nitrogen at farm discharge (TN_{AD1}) minus mean total nitrogen at farm intake point in Darwin River (TN_{I1}) multiplied by the total volume discharged via the authorised discharge point (V_{AD1}).

$$(TN_{AD1} - TN_{I1}) \times V_{AD1}$$

(TN_{AD1} = 0.517 - TN_{I1} = 0.202) x V_{AD1} = 163ML

Net N discharge = 0.314mg/l

Total Net Nitrogen discharged = 42kg Nitrogen

Monitoring results quality evaluation

Sampling was conducted in accordance with the conditions of EPL276.

Samples were collected at the locations listed in the WQMP. A scheduled analysis of samples in December 2021 was missed due to miscommunication between the testing laboratory and the sampler regarding a partial shutdown in the logistics chain due to a holiday shutdown. Samples were collected but were unable to be shipped before samples exceeded specified holding times for some analytes.

Water sampling opportunities are limited by a combination of short withholding times of some of the analytes (24h), limitation of freight services to NATA accredited lab services (Mon-Thurs) and tidal access (>3.8m) to the sampling locations. These are usually restricted to about 2-3 days twice per month.

Analysis of all samples were conducted at ALS Sydney laboratory which has NATA accreditation for the required analysis. Chain of custody information for the samples and QA/QC documentation for the analysis conducted by the lab is kept on file and can be made available on request.

Discussion

Objective	Result at compliance point (CP1)	Discussion	Recommendation
DO 80-100%	Not met - DO below 80% at CP1 on all occasions. Resulting in exceedance levels in Sept, Oct and November.	DO also low at I1 on all occasions. DO levels higher at AD1. Likely normal DO range for Darwin River estuary environment. No non-compliance during production.	Now that data are available from 2 years of monthly samples at the Darwin River upper estuary adjacent to the farm site specific trigger values will be proposed for DO to better reflect the receiving environment.
Turbidity <4NTU	Met on condition 35 that exceedance only if Turbidity not also high at I1.	As expected in the Darwin River estuary Turbidity levels were always above the objective limit of 4 (NTU/FTU). Turbidity was also high and at similar levels at I1 when high at CP1. Turbidity at AD1 was generally lower than CP1 and I1 but variable with rainfall.	Now that data are available from 2 years of monthly samples at the Darwin River upper estuary adjacent to the farm site specific trigger values will be proposed for turbidity to better reflect the receiving environment.
Ammonia <0.02 mg/L at CP1	Objective met- No Exceedances	Detectable levels during the wet season	No recommendation
NOx <0.02 mg/L at CP1	Objective met - No exceedance	Objective met	No recommendation
TN <0.3 mg/L at CP1	Objective met- No exceedance	Objective met	No recommendation
Chlorophyll-a <4µg/L at CP1	Objective met- No exceedance	Objective met	No recommendation
TSS <10mg/L at CP1	Objective met- One exceedance recorded in October 2021	TSS at similar or higher levels at farm intake at same time.	No recommendation
TP <0.03 mg/L at CP1	Objective met- No Exceedances	Objective met	No recommendation
RP <0.01mg/L at CP1	Objective met- No Exceedances	Objective met	No recommendation
pH 6-8.5	Objective met- No exceedance	Objective met	No recommendation

Table 10: Water quality monitoring plan performance analysis and discussion.

Proposed Site-Specific Trigger Values

Non-compliance-level exceedances were recorded at the compliance point for DO less than 80% on consecutive sampling occasions. Mean DO% at the farm intake point was not significantly different from the mean DO at the compliance point. Water quality data from both the intake point and compliance point were pooled to calculate site specific trigger limits which are more appropriate. Site specific guideline values are proposed based on the 80th and 20th percentiles from 2 years of monthly sampling data for in the Darwin River at sites I1 and CP1. ANZECC & ARMCANZ 2000, https://www.waterquality.gov.au/anz-guidelines.

	Dissolved Oxygen (%)	Total N	Ammonia	NOx	DRP	TSS	In-situ Turbidity
Calculated SSTL	>60%	0.27	0.016	0.022	0.011	16	17.2

Current TL	>80% <100	0.3	0.02	0.02	0.01	10	4
Difference %	25	10	20	-10	-10	-60	-330
Proposed New SSTL	>60% no upper TL	0.3	0.016	0.02	0.01	16	17.2

Table 11: Comparison of current trigger limits (TL) and proposed new site-specific trigger limits (SSTL) based on reference data collected from the farm intake point (I1) and the Compliance point (CP1).

Calculations for site-specific guideline values for TN, NOx and DRP were very close to the existing trigger limits (±10%) and these values should remain unchanged.

An application to amend the water quality monitoring plan associated with the EPL to reflect the proposed SSTVs for DO%, Turbidity, TSS and Ammonia will be made to the NTEPA.

Conclusion

Even with very little activity taking place the water quality objectives were not completely achieved despite the high quality and low volume of water that is discharged by at the site. Although exceedance events were recorded these cannot be attributed to discharges or emissions resulting from the activity as there was no discharge during or after the period that the farm was stocked with juvenile sea cucumber. Now that two years of monthly water monitoring data are available, more appropriate site-specific trigger limits can be proposed in accordance with the ANZ water quality guidelines. These new site-specific trigger limits will improve the water monitoring plan by ensuring guideline values are based on real data from the immediate receiving environment and thus more appropriate.

Certification

I Luke Turner of Tasmanian Seafoods Pty. Ltd. Prepared this report and I confirm to the best of my knowledge and ability that all information provided in this report is true and accurate.

23/09/2022