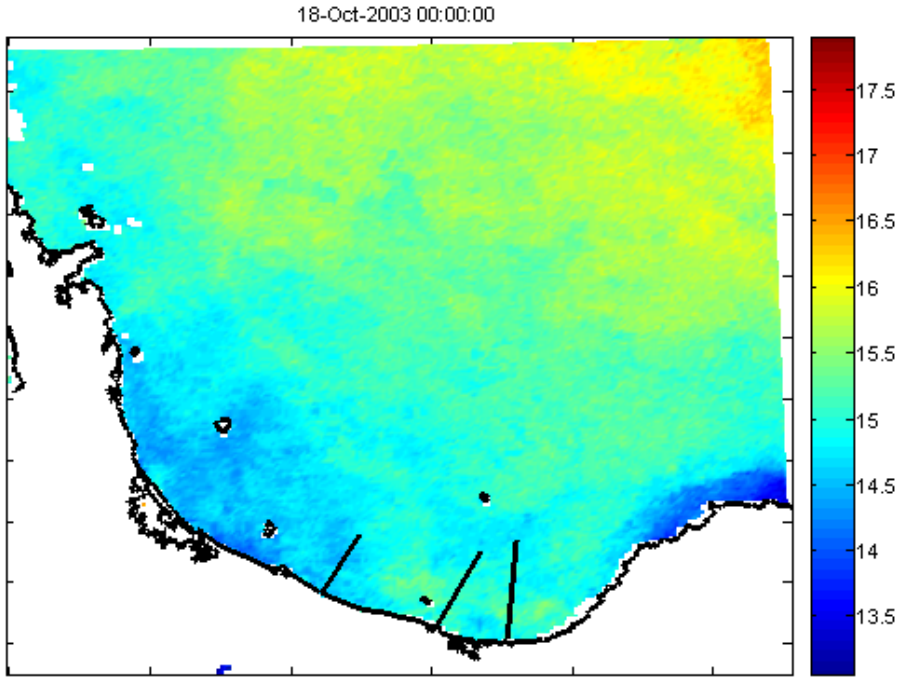
Bay of Plenty Shelf Water Properties Data Report 2003-2004: Aquaculture Management Areas



For

Environment Bay of Plenty

Marine Consulting and Research

Bay of Plenty Shelf Water Properties Data Report 2003-2004: Aquaculture Management Areas

Report Status

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V.2	June 2005	Final	K.Black

It is the responsibility of the reader to verify the currency of the version number of this report. All subsequent releases will be made directly to the Client.

Acknowledgements

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Bay of Plenty Shelf Water Properties Data Report 2003-2004: Aquaculture Management Areas

Initial Data Analysis of Shelf CTD and Water Sample Data to Determine Temporal and Spatial Patterns in the Physical and Chemical Aspects of the Water Column.

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Report prepared for Bay of Plenty Regional Council

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1 INTRODUCTION

This report was produced to assist Environment Bay of Plenty with their internal data reporting requirements. The goal was to provide a summary of the large amount of cross-section data recorded on the shelf in the eastern end of the Bay of Plenty as part of the AMA project over 2003/04. EBOP staff took responsibility for gathering and analysing the data and so this report simply provides assistance with that process. It will be superseded by the joint report produced within EBOP with ASR collaboration. A second goal is to ensure that all data is represented in the report, as the field measurement trips were jointly conducted by EBOP and ASR Ltd.

The magnitude of the effort and the success with the measurements is a credit to the field measurement teams.

Other reports being produced by ASR Ltd on the field data summarise:

- Measurements of currents and temperatures. 12 months of intermittent Acoustic Doppler Current Meter and thermistor records were collected during the 2-year programme.

- Observations with seabed video over the shelf with grain size, mud contents and biological organism assessments.

This report focuses on the water column characteristics during transect surveys.

2 SAMPLING TECHNIQUES

2.1 SAMPLING LOCATION:

The field sampling builds upon a previous survey of the coastal shelf waters undertaken in 1996/97 (Park, EBOP). In Figure 1, three transects in the centre of the bay (Pukehina, Whakatane & Opotiki) running from shore (10m depth) out to the edge of the continental shelf (200m depth) were used for the 2003/2004 field surveys. The Tauranga and Whakatane transects were both used in the 1996/97 survey. Grid references for the sampling points along each of these transects are provided in Appendix 1.

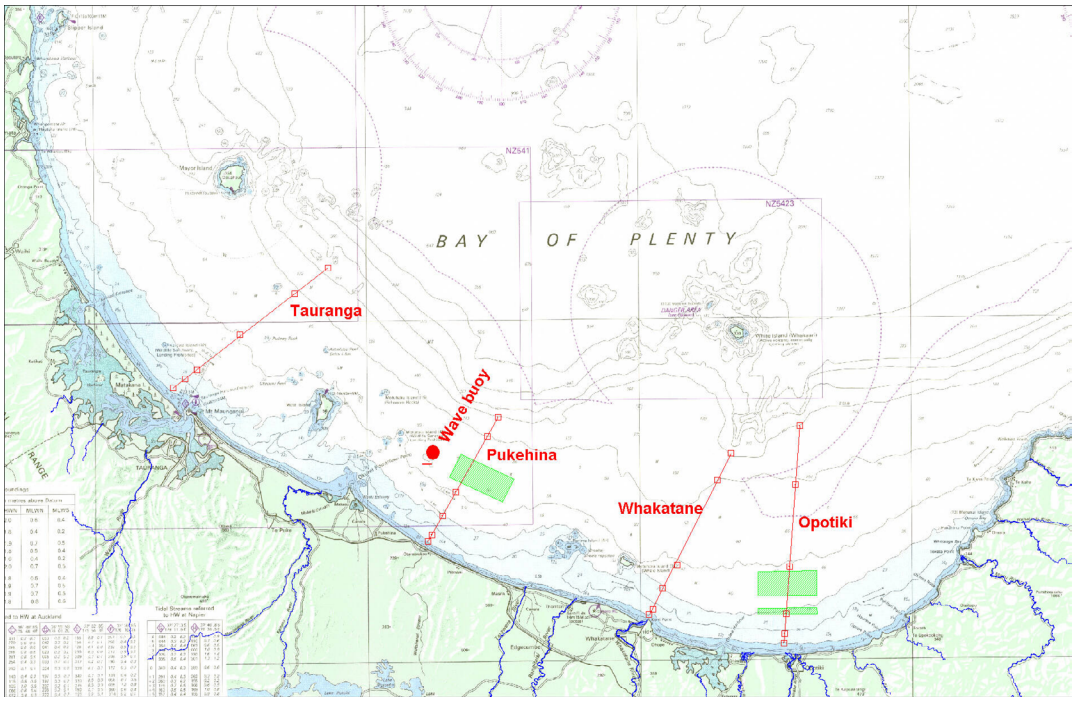

Figure 1 - Location of transects within the Bay of Plenty.

2.2 SAMPLING PROGRAM:

Field sampling was conducted at sites along each of the Pukehina, Whakatane and Opotiki transects shown in Figure 1. Surveys were conducted four times within a year to obtain data on seasonal variations in water quality and plankton assemblages. Each transect has sampling sites set at the 10, 20, 30, 50, 100 and 200m depth contours. This takes each transect from within a kilometre of the shore out to the edge of the continental shelf. This ensured that neritic coastal waters were fully covered and allows comparison to oceanic water masses.

At each of the sampling sites instrument readings, water samples, bacterial samples, and plankton samples were taken at specified depths. Appendix 1 sets out the sampling programme in detail listing depths and all chemical, physical, and biological sampling conducted.

The surface sample (0-5m) for all chemistry and plankton samples taken from each sampling location was obtained as a depth integrated tube sample. All other samples from each of the specified depths were point samples taken with a 3 litre van Dorn bottle.

Instruments readings at each site were taken with a SBE 19plus SEACAT Profiler from the surface down to the seabed. This probe recorded temperature, conductivity, pressure (depth), Oxygen (SBE 43), PAR (LI-COR LI-193SA), fluorometer (Turner SCUFA), and OBS (turbidity – Turner SCUFA). In addition temperature and conductivity were recorded from the water samples retrieved with the van Dorn bottles for sample analysis using a hand held YSI meter.

Samples were obtained on all transects within a day of the following dates:

17/10/03,
03/12/03,
18/03/04,
25/05/04,
01/08/04.

2.3 METHODS:

The following methods were used to derive the results from the field sampling. All samples for chemical analysis were stored and returned with the time period stipulated according to the method requirements;

Table 1 - Methods used for chemical / biological analysis.

Parameter	Method	Detection Limit†
Suspended Solids	APHA method 2540D	0.1 g/m^3
Total Organic Carbon	catalytic oxidation, IR detection. APHA 5310B 20th ed. 1998	0.5 g/m^3
Dissolved Organic Carbon	0.45 µm nylon filter, catalytic oxidation, IR detection APHA 5310B	0.5 g/m^3
Dissolved Reactive Silica	On-site filtration of sample. Molybdosilicate/ascorbic acid reduction	1 mg/m^3
Dissolved iron	On-site filtration of sample. 0.45 µm filtered sample. ICP_MS ultra-trace with dynamic reaction cell. APHA 3125B	4 mg/m^3
Total nitrogen	persulphate digestion, auto cadmium reduction, flow injection analyser	1 mg/m^3
Ammonium nitrogen	NWASCO Misc Pub. No. 38, 1982. phenolhypochlorite colorimetry	1 mg/m^3
Oxidised nitrogen	flow injection analyser, APHA 4500 NO3-1	1 mg/m^3
Total Phosphorus	acid persulphate digestion, molybdate colorimetry. Flow injection analyser. APHA 4500-PH	4 mg/m^3
Dissolved Reactive Phosphorus	NWASCO Misc Pub. No. 38, 1982. Antimony – phosphate – molybdate	4 mg/m^3
Phytoplankton	Phytoplankton samples were collected from set depths using a van Dorn bottle with the exception of the surface (0-5m) sample which was obtained from a depth integrated tube sample. Around 250 ml of sample was preserved with Lugol's Iodine. These samples were then sent to NIWA in Wellington for analysis by either Hoe Chang or his technical assistant Rob Stewart. Taxa were identified to at least genera or species if possible and quantitatively counted.	

†Detection limit with 95% confidence, some results are below this level

2.4 ANALYSIS METHODS

The raw data from both the CTD (data at each meter down the water column) and also from the water samples (data more sparse at discrete intervals – see Appendix 1) were plotted using Golden Software's Surfer software. Details of the gridding methods and dimensions are tabulated in Table 2.

Table 2 - Gridding methods used in the plotting of data.

	Transect	Grid extent	Gridding method	Grid cell size
CTD Data	Opotiki	0 – 38000 m(x), 0 - - 210 m(y)	Krigging	300 m(x) x 3 m(y)
	Whakatane	0 – 31000 m(x), 0 - - 210 m(y)		
	Pukehina	0 – 25000 m(x), 0 - - 210 m(y)		
Chemical Data	Opotiki	0 – 38000 m(x), 0 - - 210 m(y)	Triangulation with linear interpolation	3000 m(x) x 15 m(y)
	Whakatane	0 – 31000 m(x), 0 - - 210 m(y)		
	Pukehina	0 – 25000 m(x), 0 - - 210 m(y)		

3 DATA

Plots of water properties over the three transects and five time periods sampled are shown in the figures on the following pages.

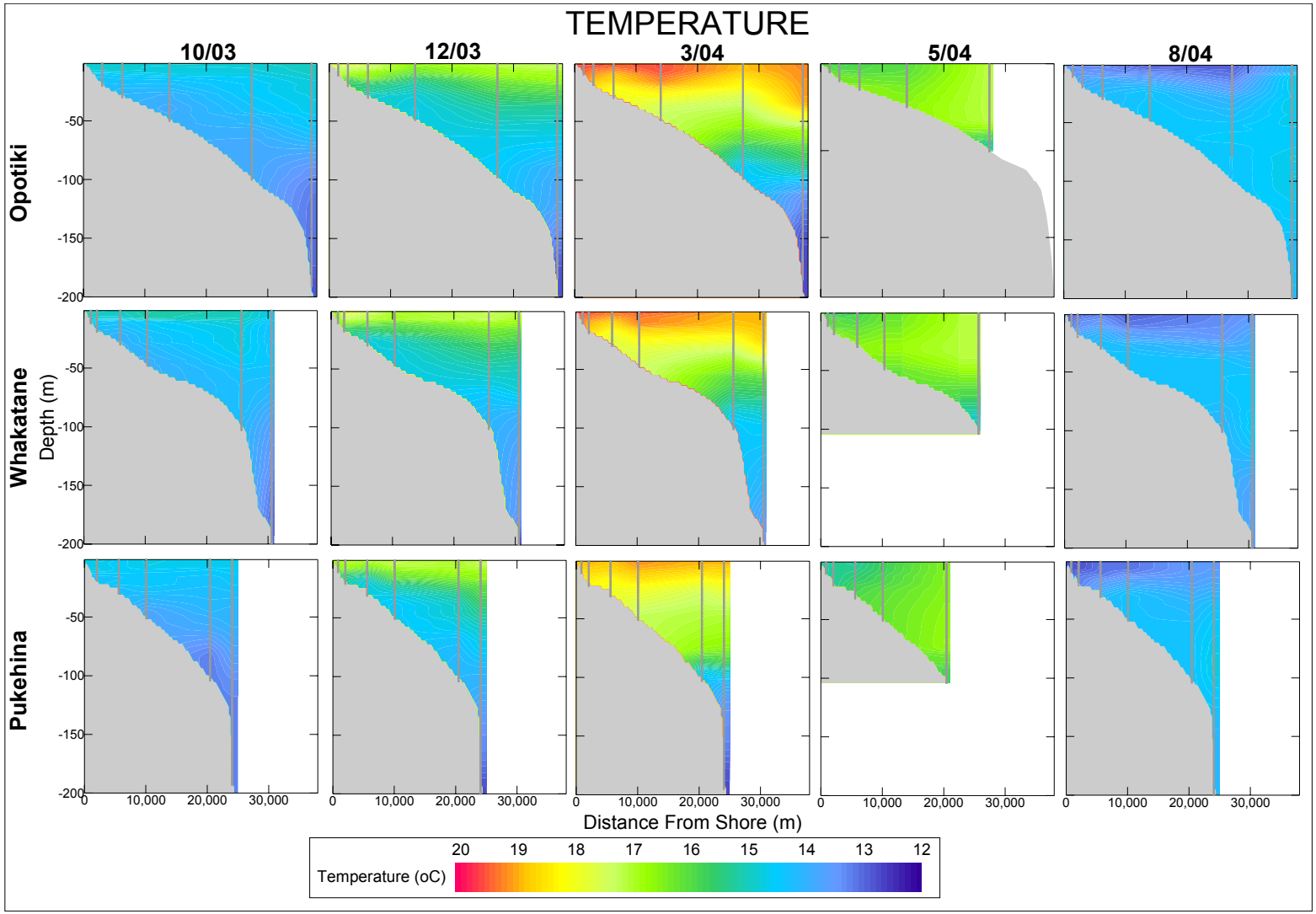

Figure 2 – Temperature (^{o}C) plots from Opotiki, Whakatane and Pukehina on the BOP continental shelf.

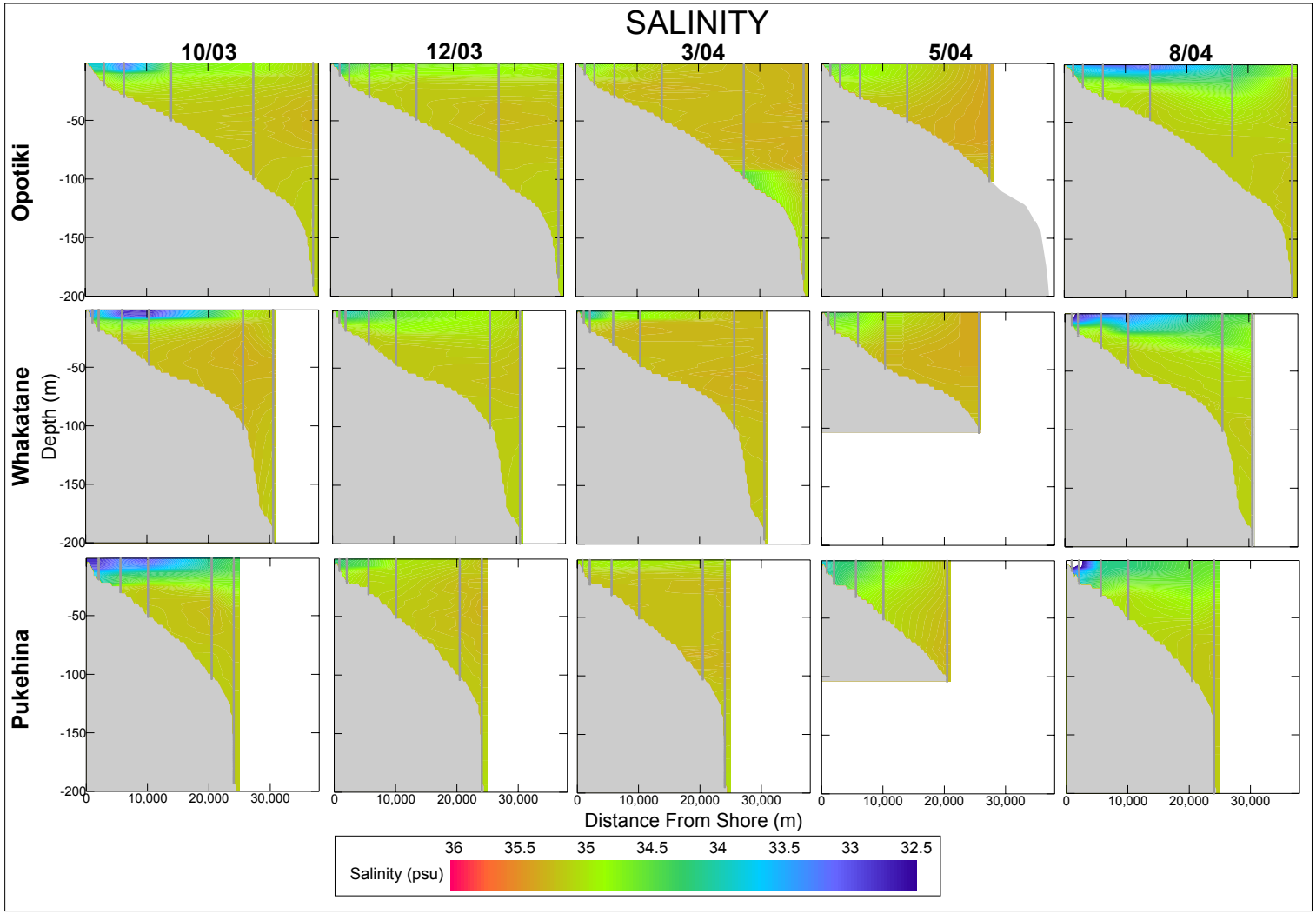

Figure 3 - Salinity (psu) plots from Opotiki, Whakatane and Pukehina on the BOP continental shelf.

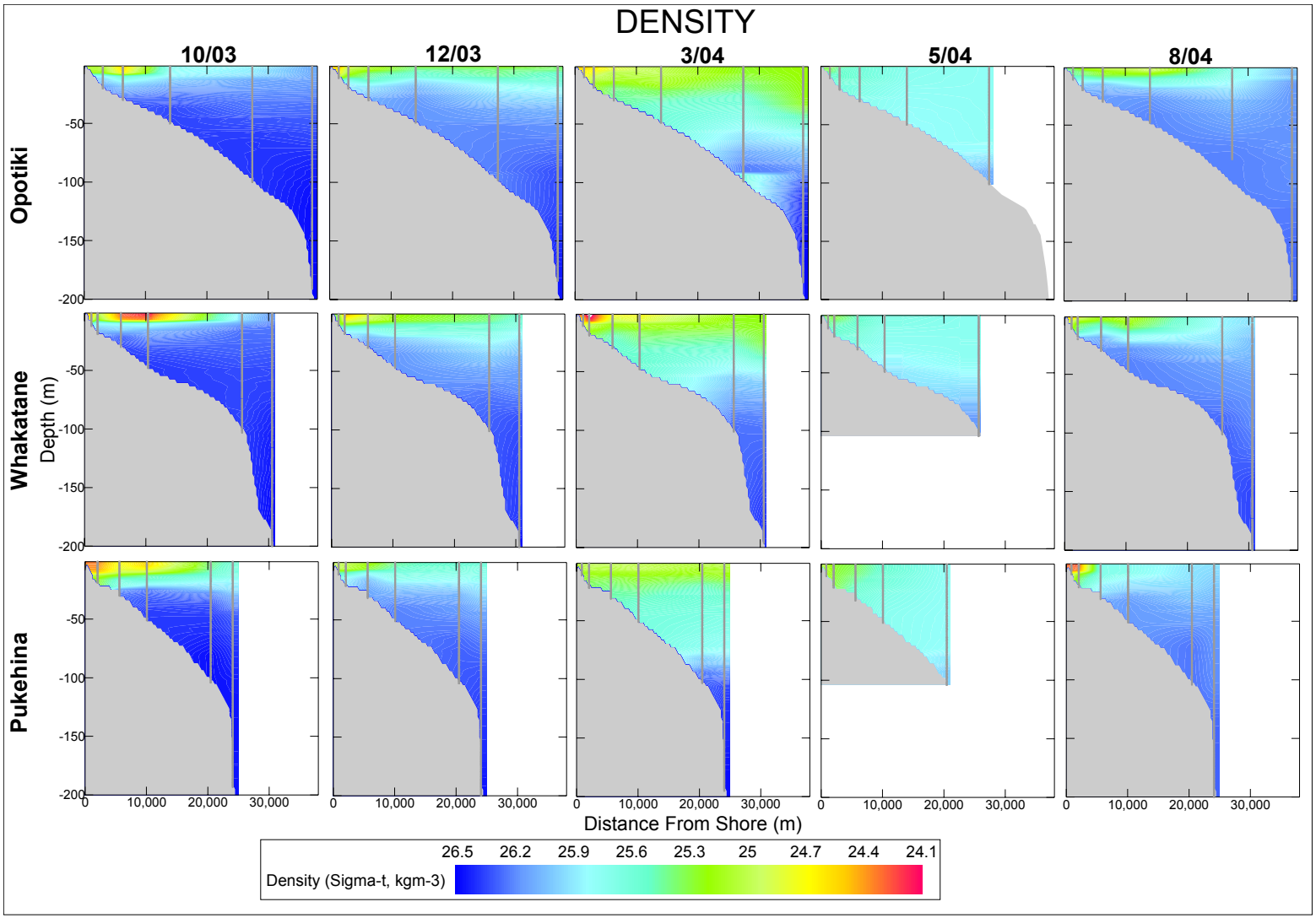

Figure 4 - Density (σ_t) plots from Opotiki, Whakatane and Pukehina on the BOP continental shelf.

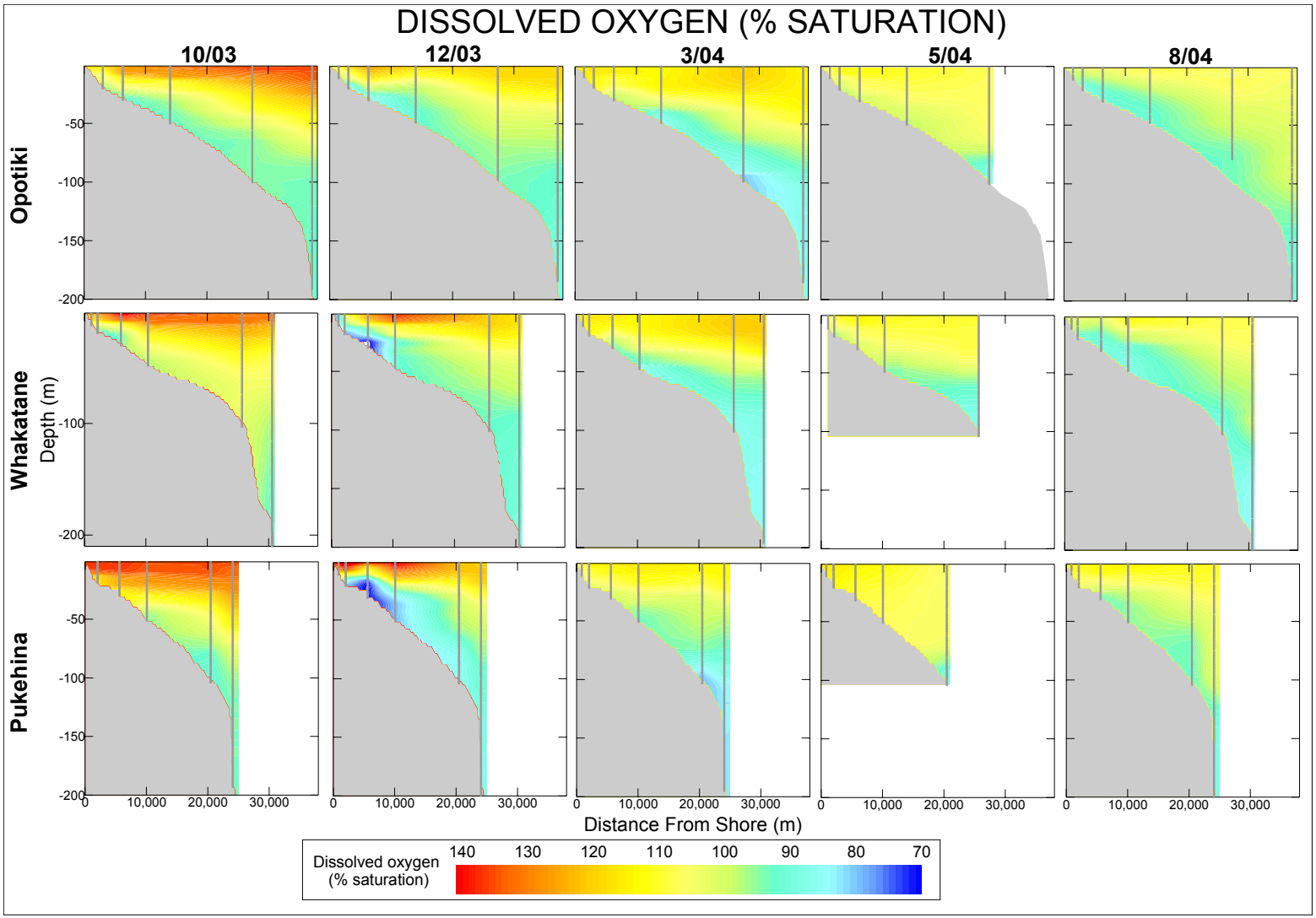

Figure 5 - Dissolved Oxygen (%) plots from Opotiki, Whakatane and Pukehina on the BOP contiental shelf.

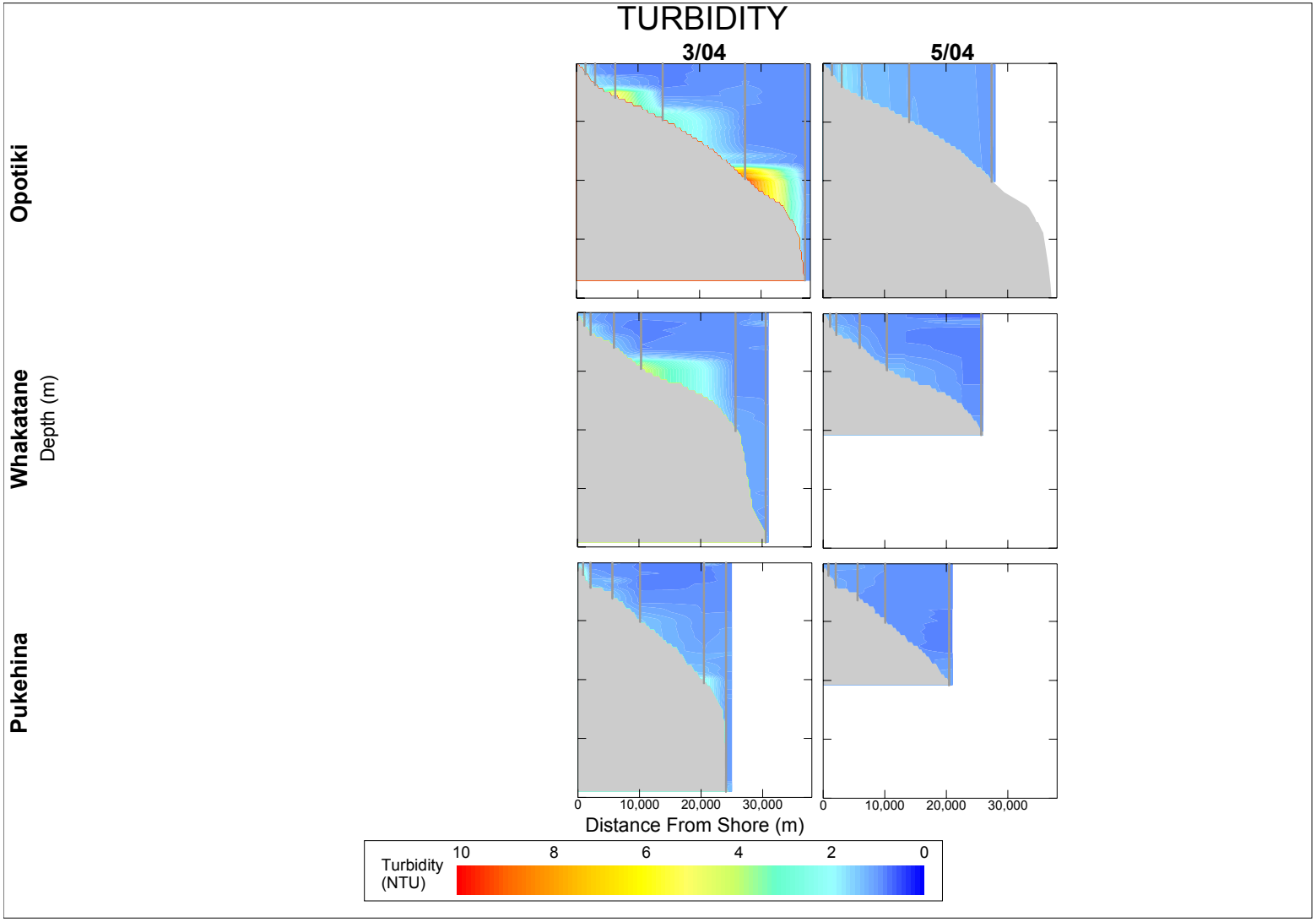

Figure 6 - Turbidity (NTU) plots from Opotiki, Whakatane and Pukehina on the BOP continental shelf.

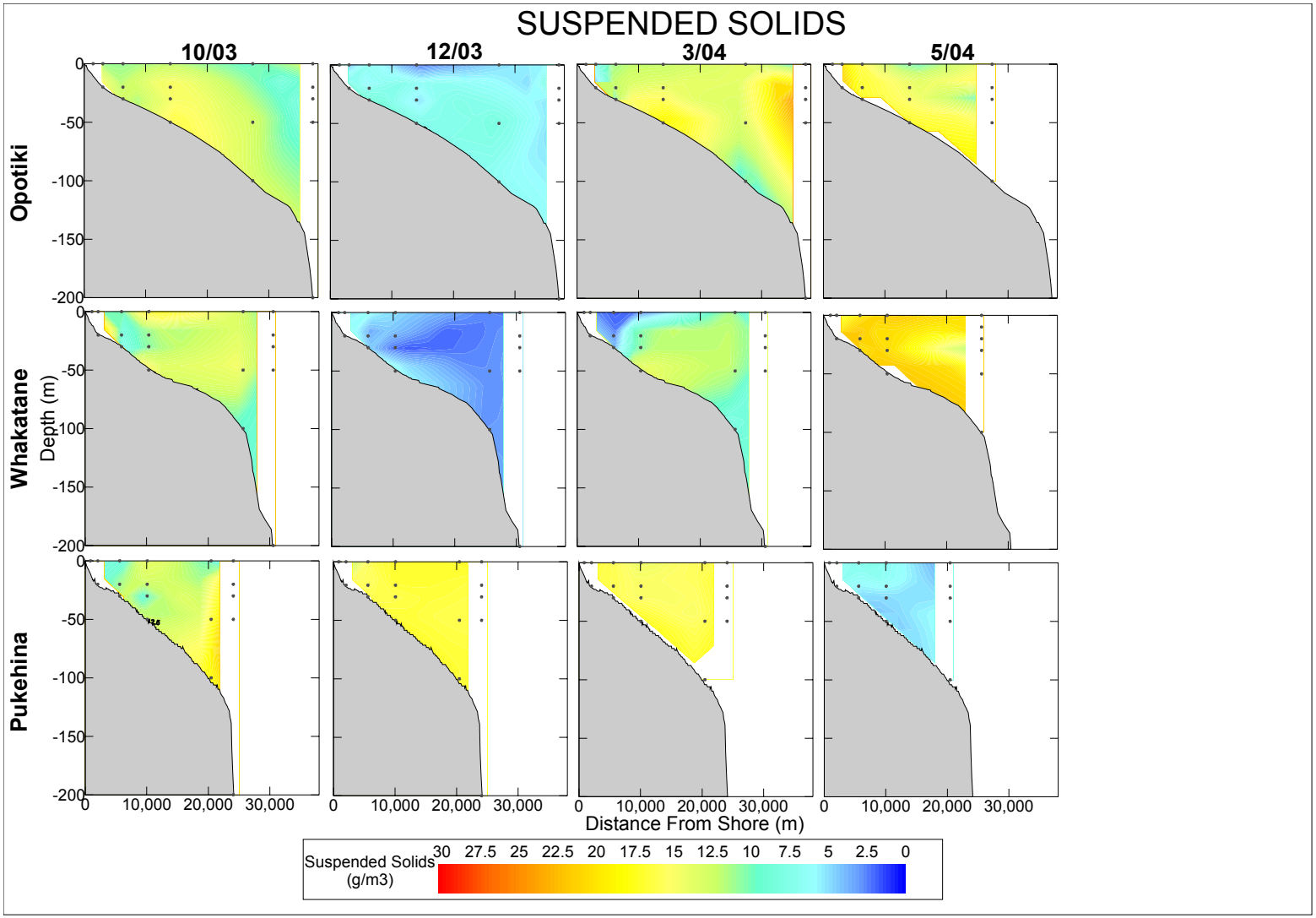

Figure 7 – Suspended solids (g/m^3) plots from Opotiki, Whakatane and Pukehina on the BOP continental shelf.

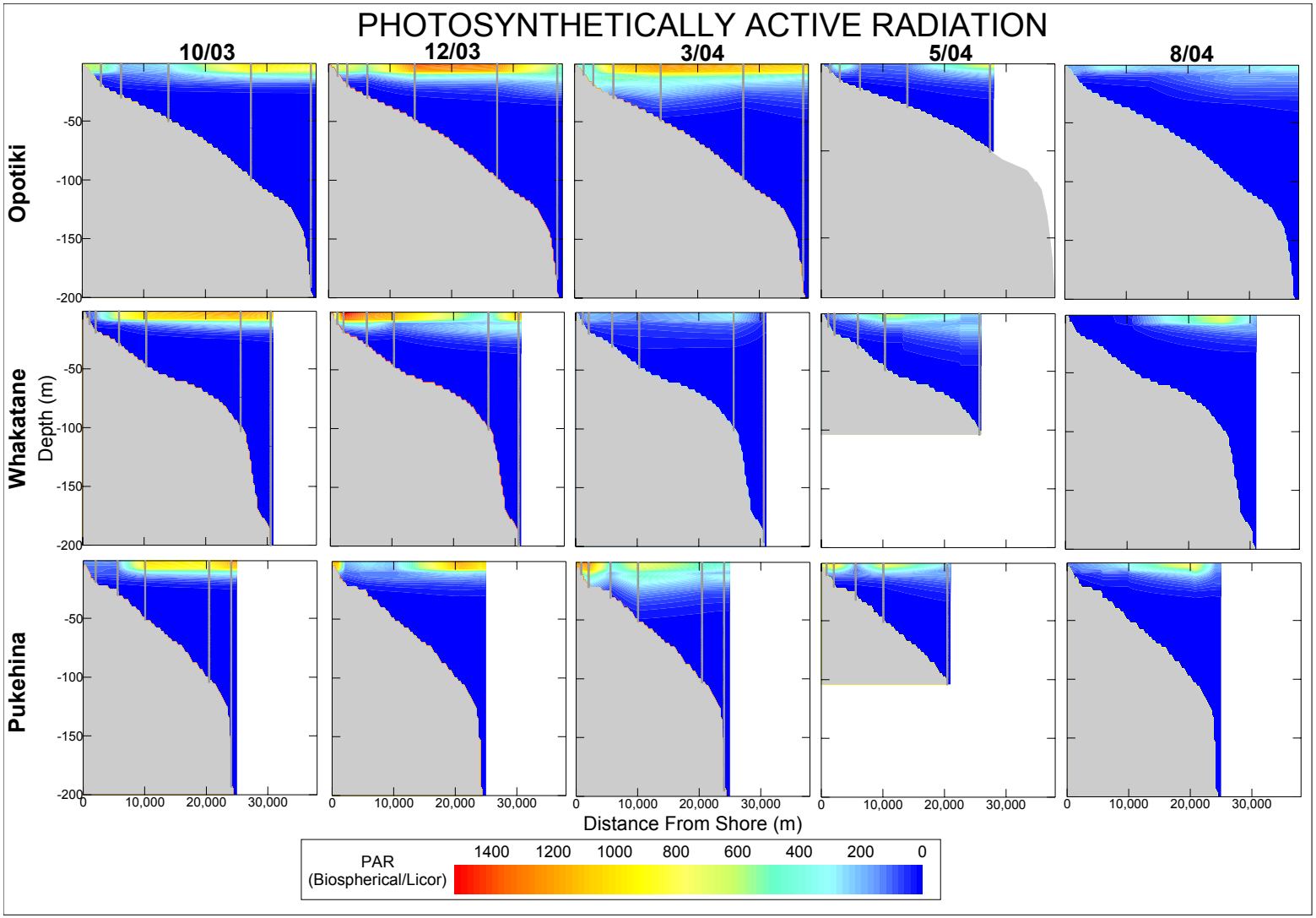

Figure 8 - Photosynthetically Active Radiation plots from Opotiki, Whakatane and Pukehina on the BOP continental shelf.

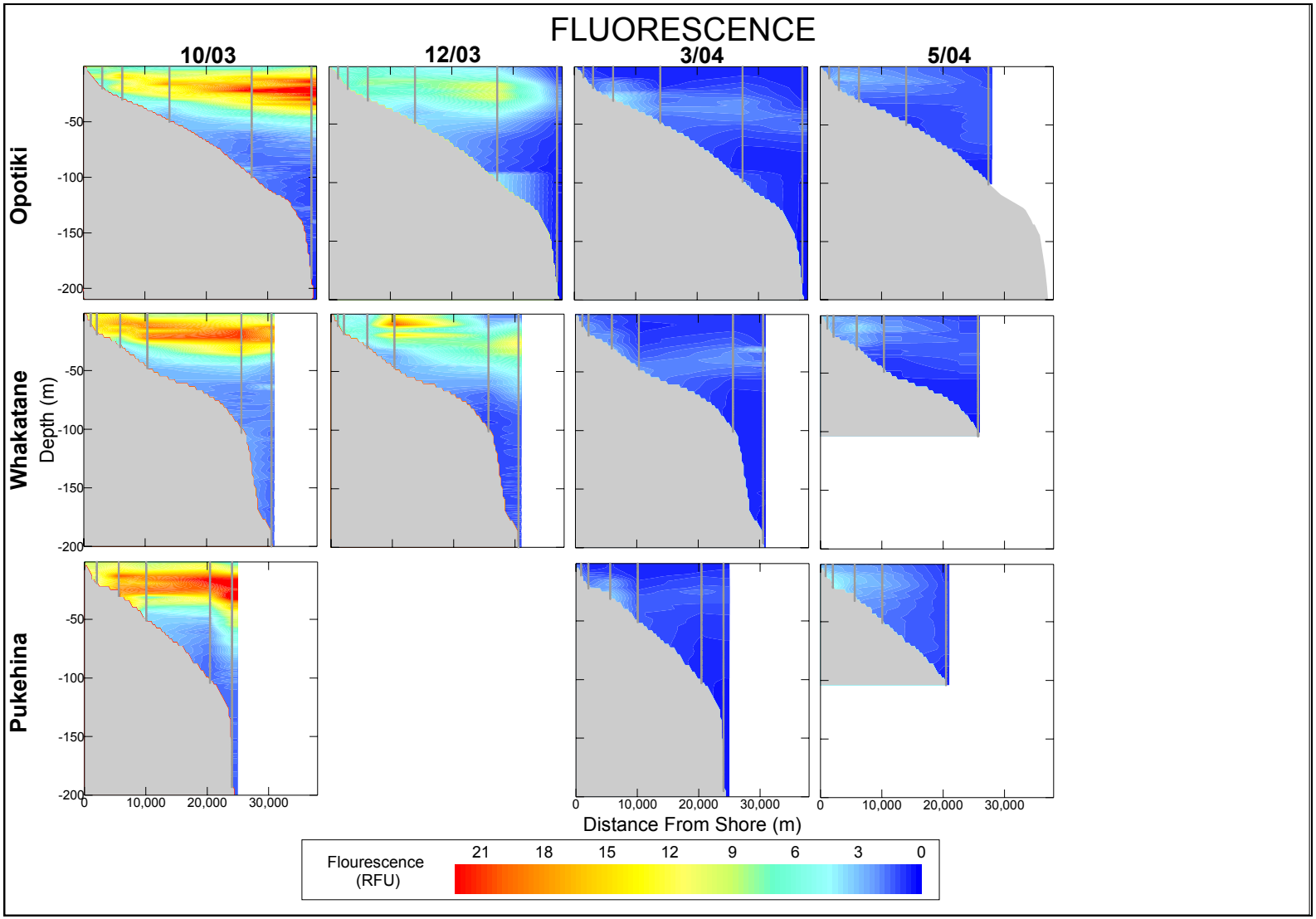

Figure 9 - Fluorescence (RFU) plots from Opotiki, Whakatane and Pukehina on the BOP continental shelf.

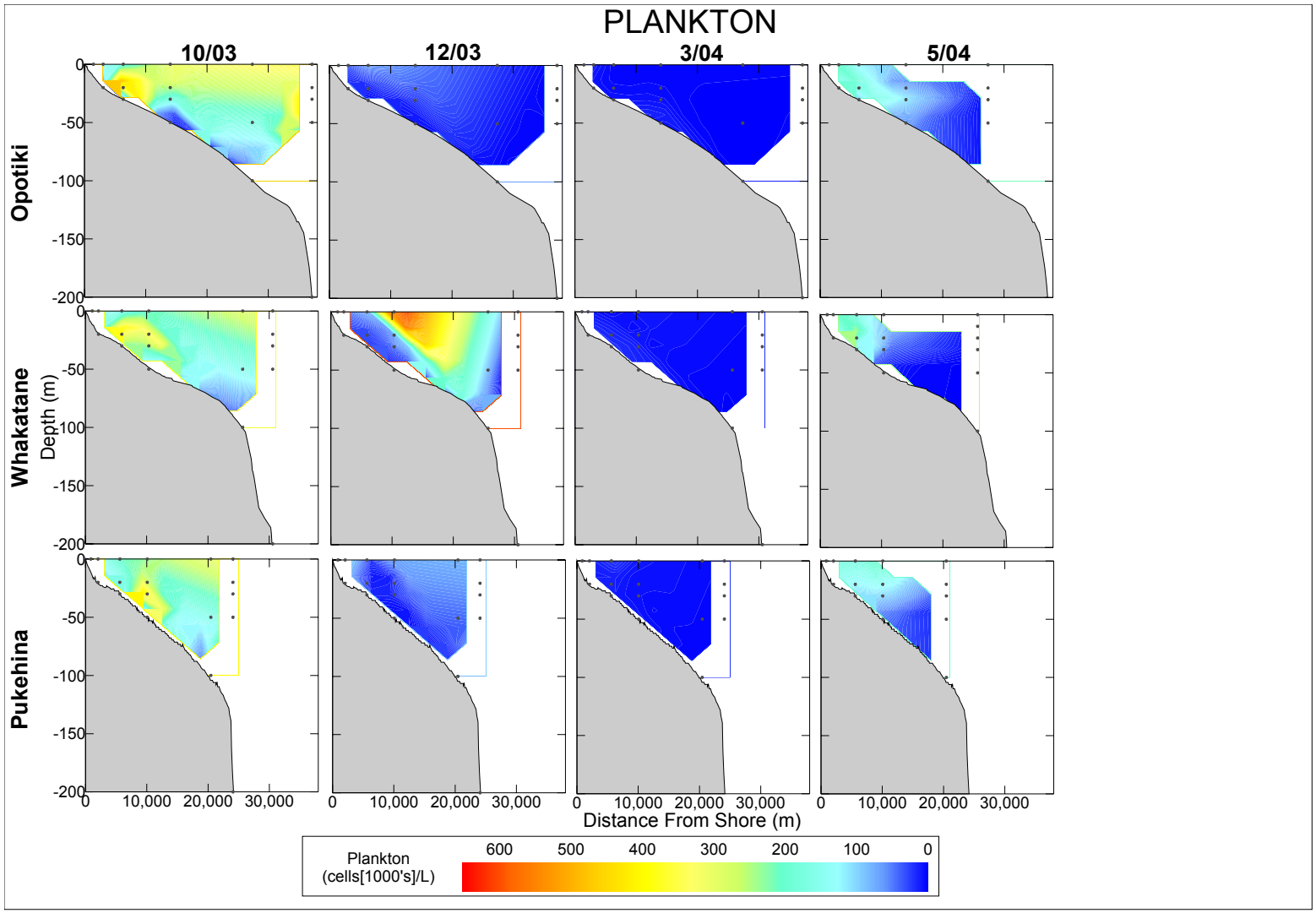

Figure 10 - Plankton cell (1000's/L) plots from Opotiki, Whakatane and Pukehina on the BOP continental shelf**.**

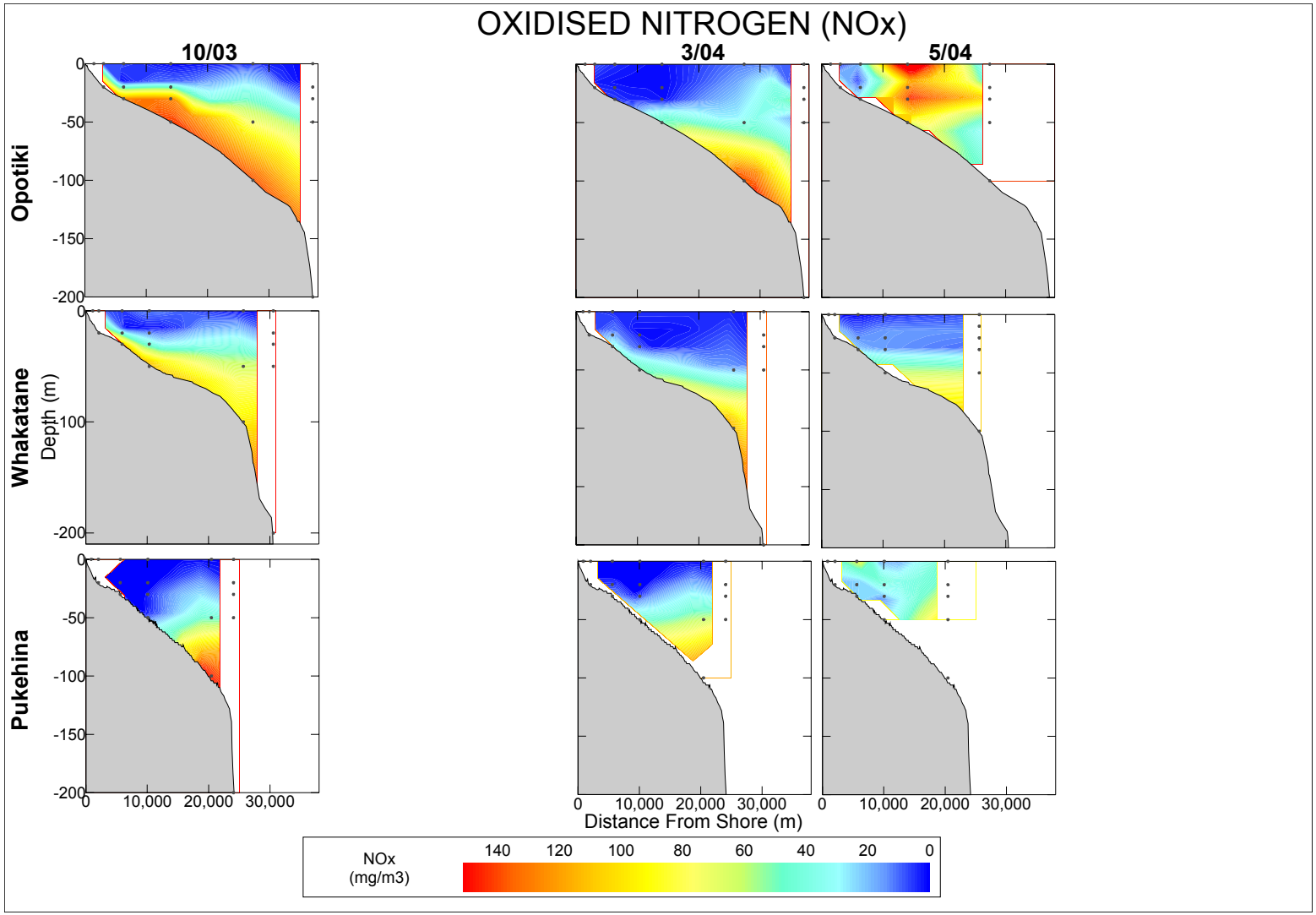

Figure 11 - Oxidised nitrogen (gm/m^3) plots from Opotiki, Whakatane and Pukehina on the BOP continental shelf.

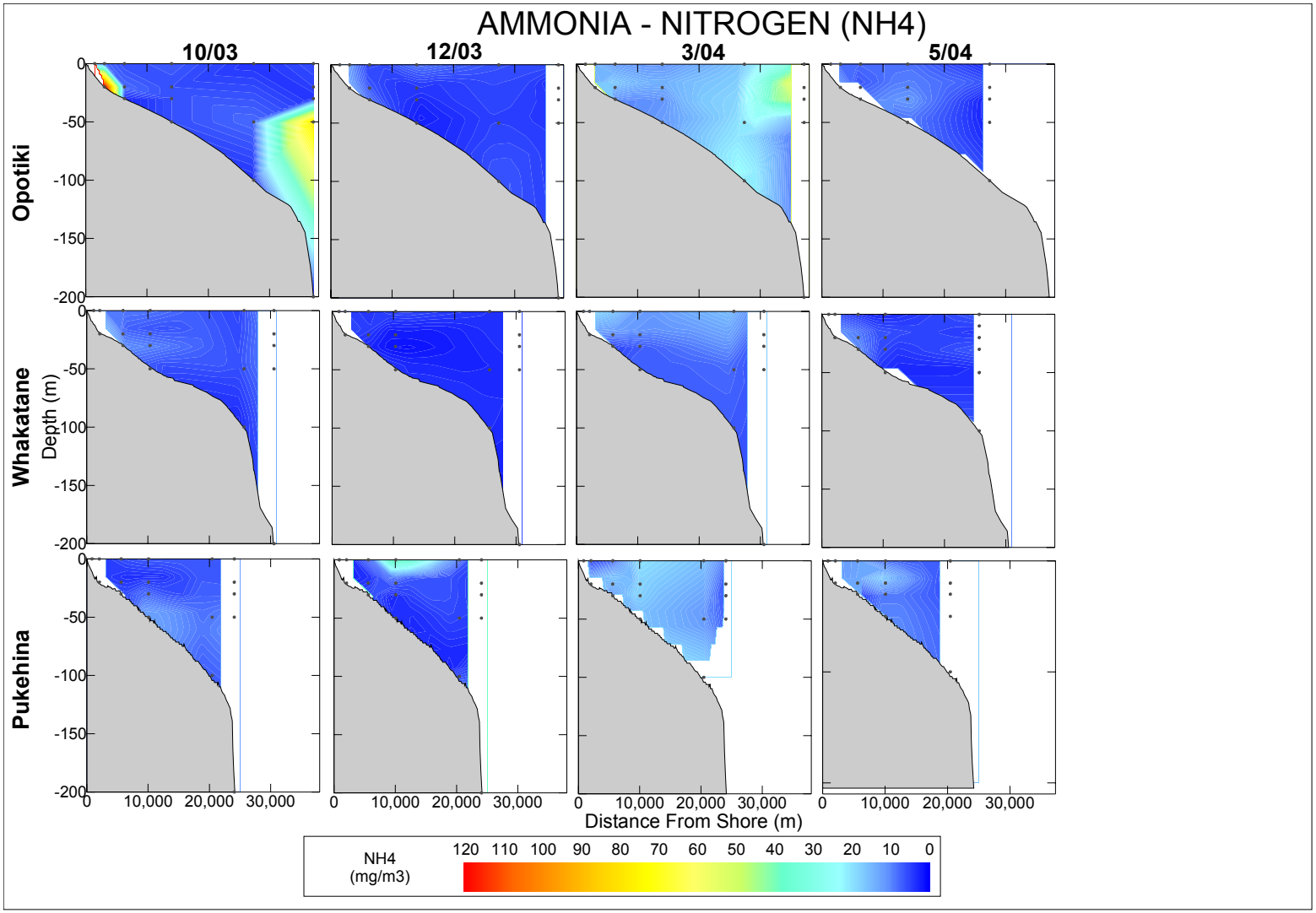

Figure 12 - Ammonical nitrogen (NH_4 mg/m^3) plots from Opotiki, Whakatane and Pukehina on the BOP continental shelf.

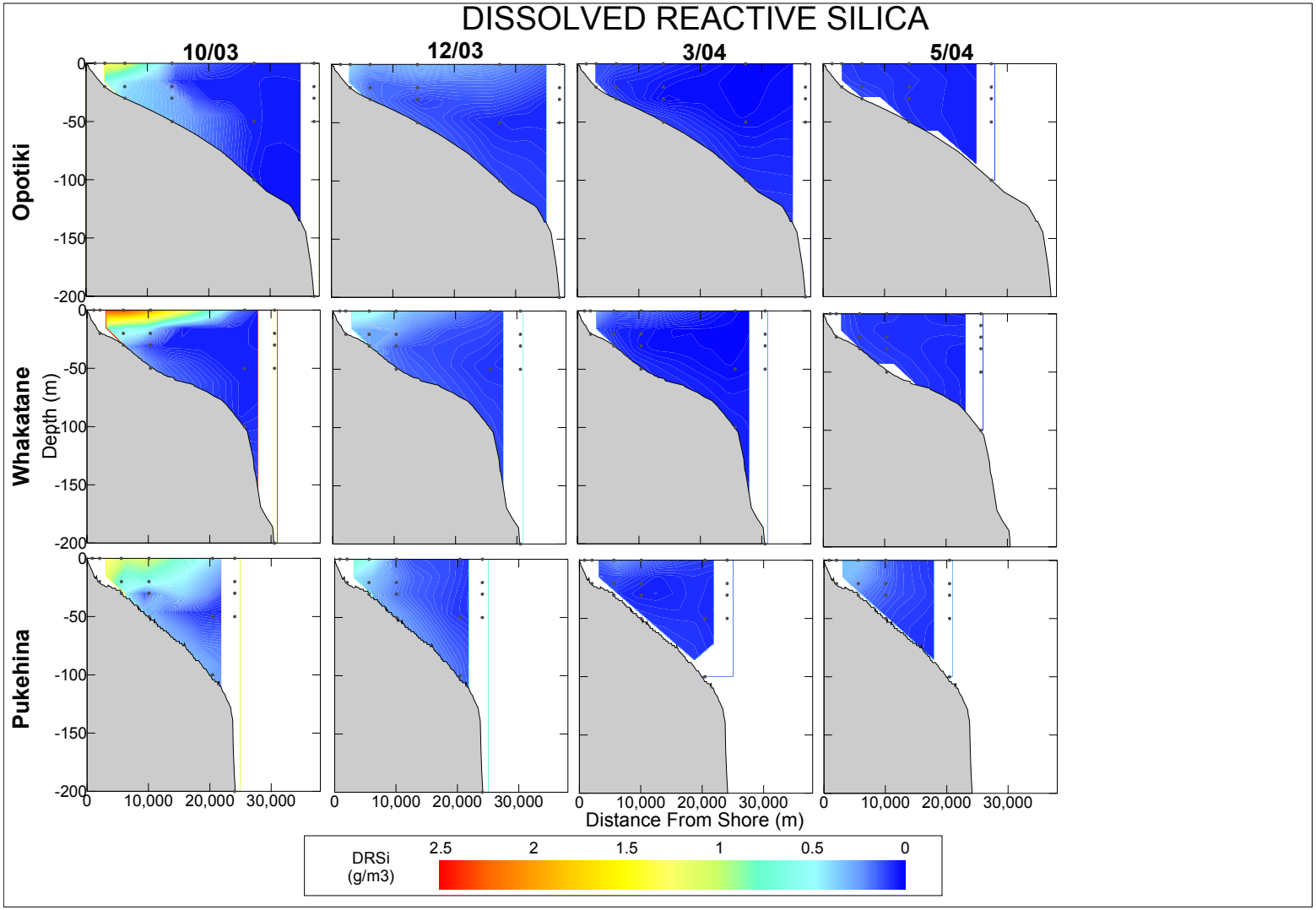

Figure 13 - Dissolved Reactive Silica (g/m^3) plots from Opotiki, Whakatane and Pukehina on the BOP continental shelf.

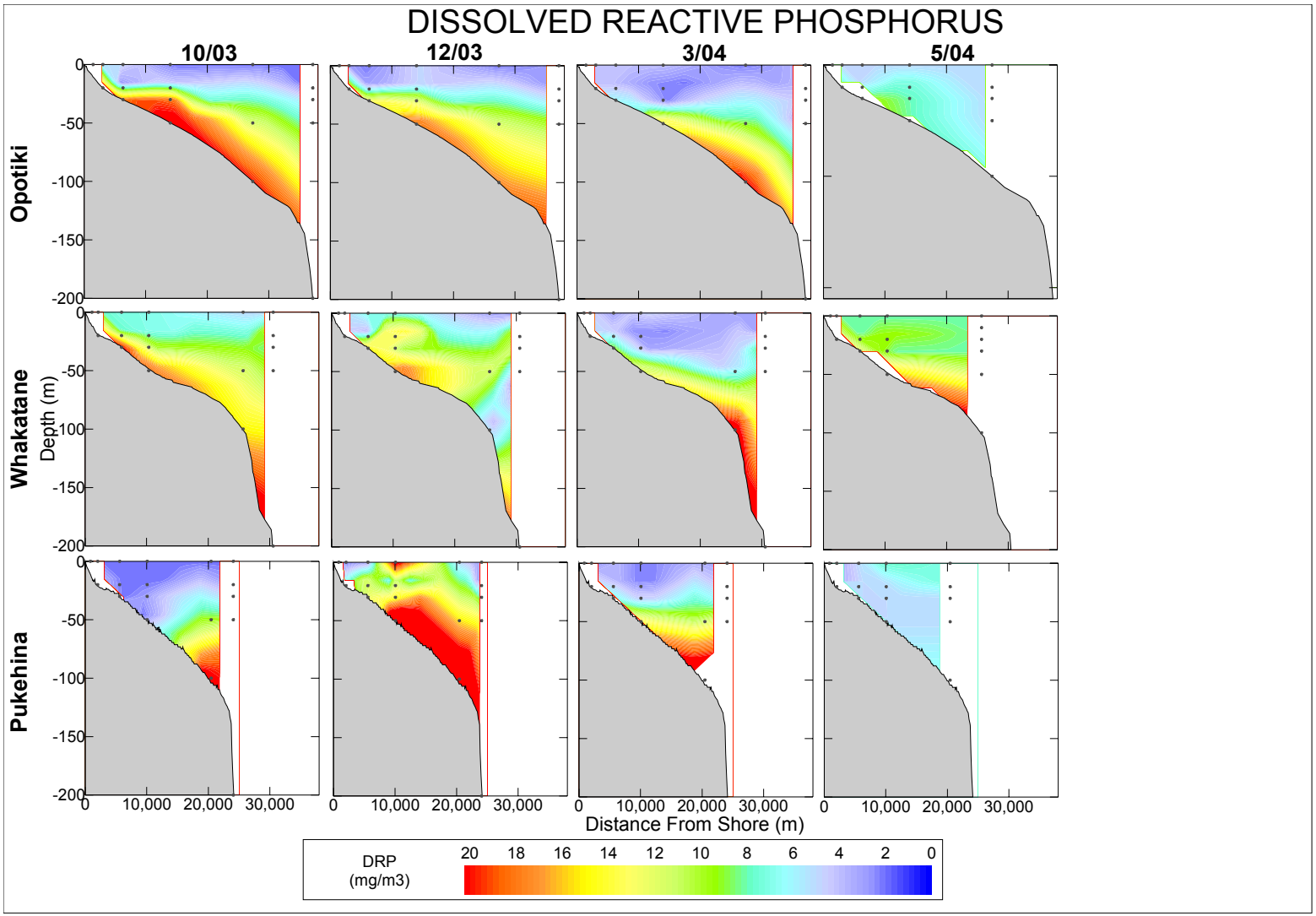

Figure 14 - Dissolved Reactive Phosphorus (mg/m^3) plots from Opotiki, Whakatane and Pukehina on the BOP continental shelf.

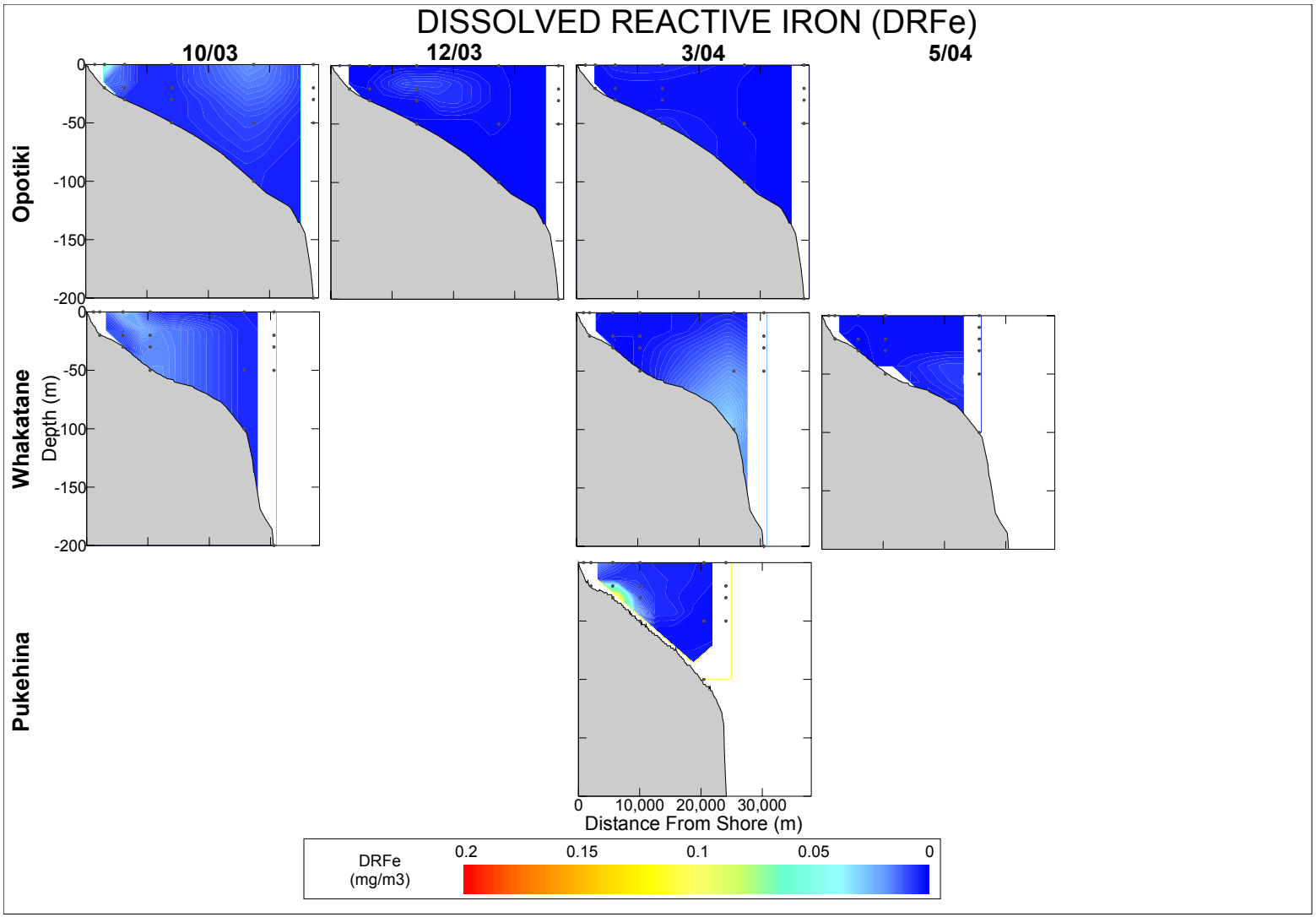

Figure 15 - Dissolved Reactive Iron (mg/m^3) plots from Opotiki, Whakatane and Pukehina on the BOP continental shelf.

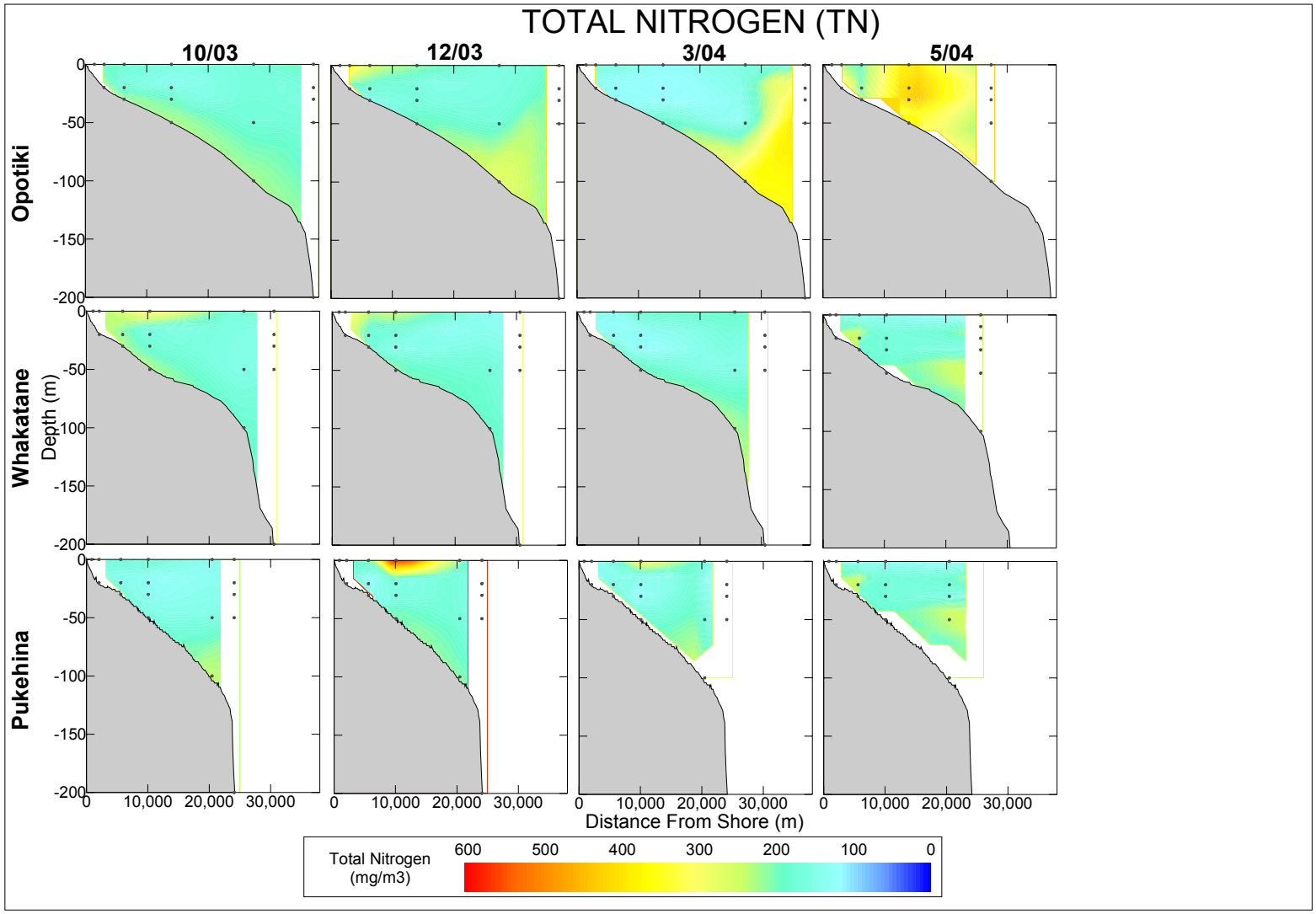

Figure 16 - Total Nitrogen (mg/m^3) plots from Opotiki, Whakatane and Pukehina on the BOP continental shelf.

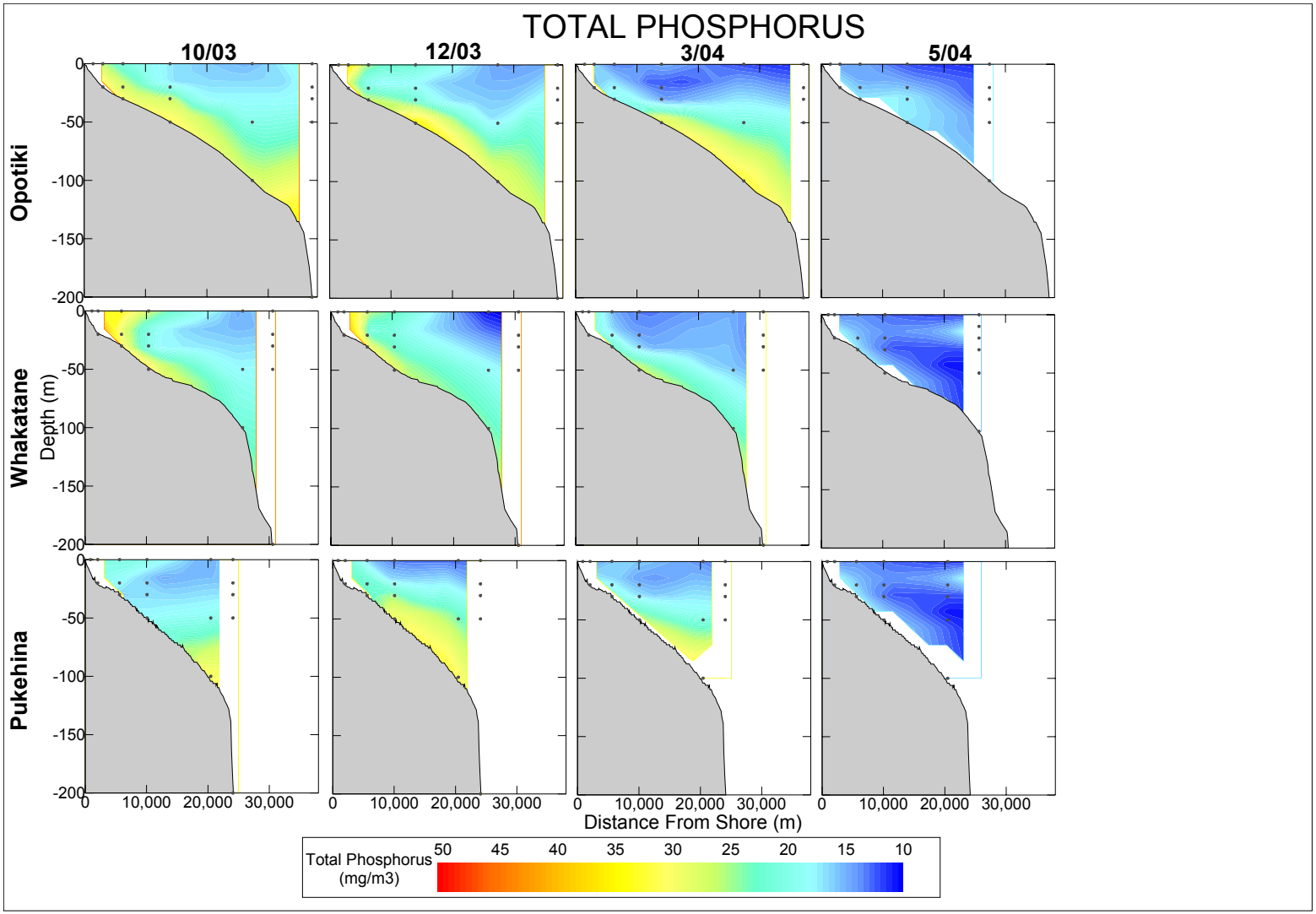

Figure 17 - Total Phosphorus (mg/m^3) plots from Opotiki, Whakatane and Pukehina on the BOP continental shelf.

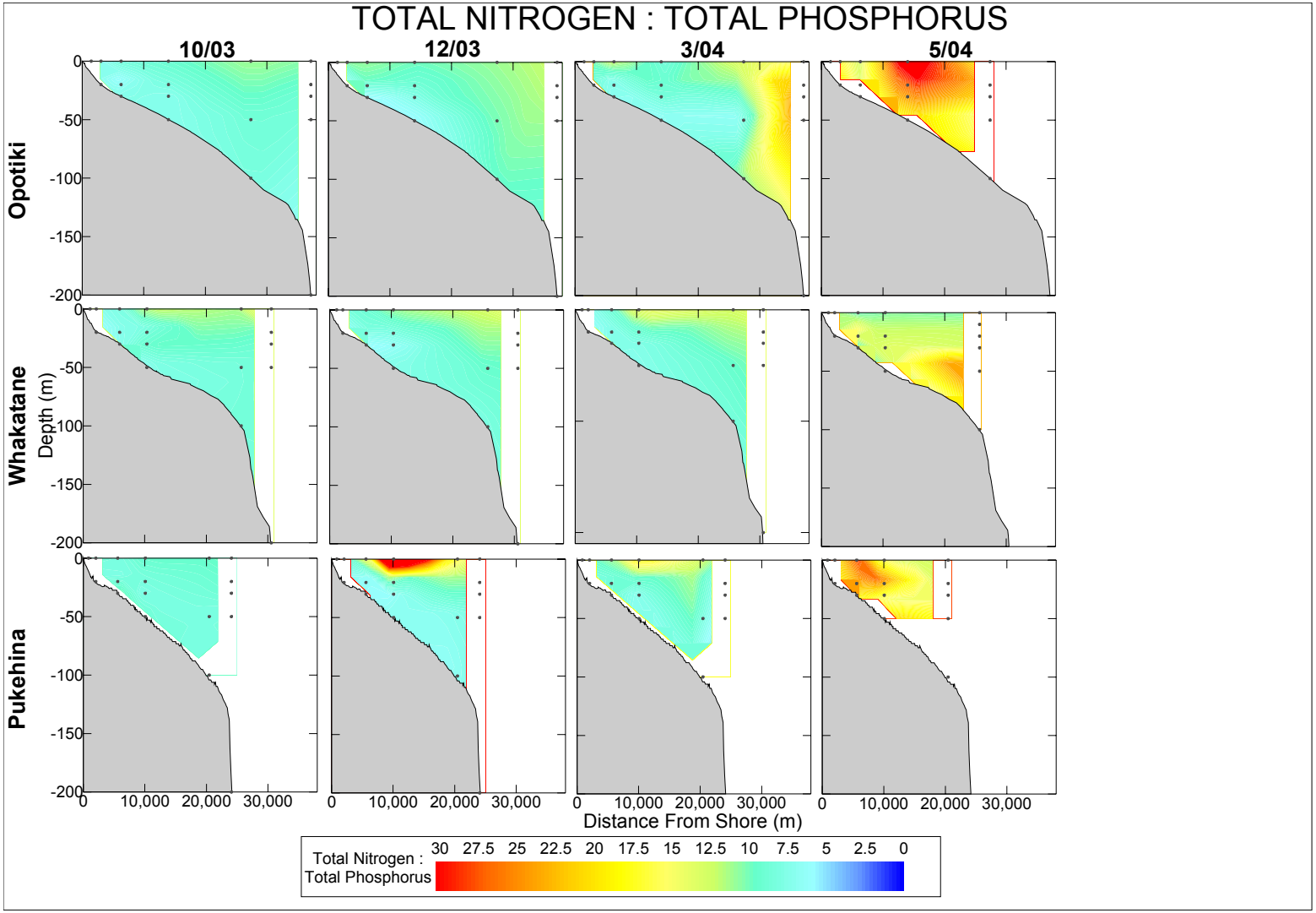

Figure 18 - Total Nitrogen : Total Phosphorus ratio plots from Opotiki, Whakatane and Pukehina on the BOP continental shelf**.**

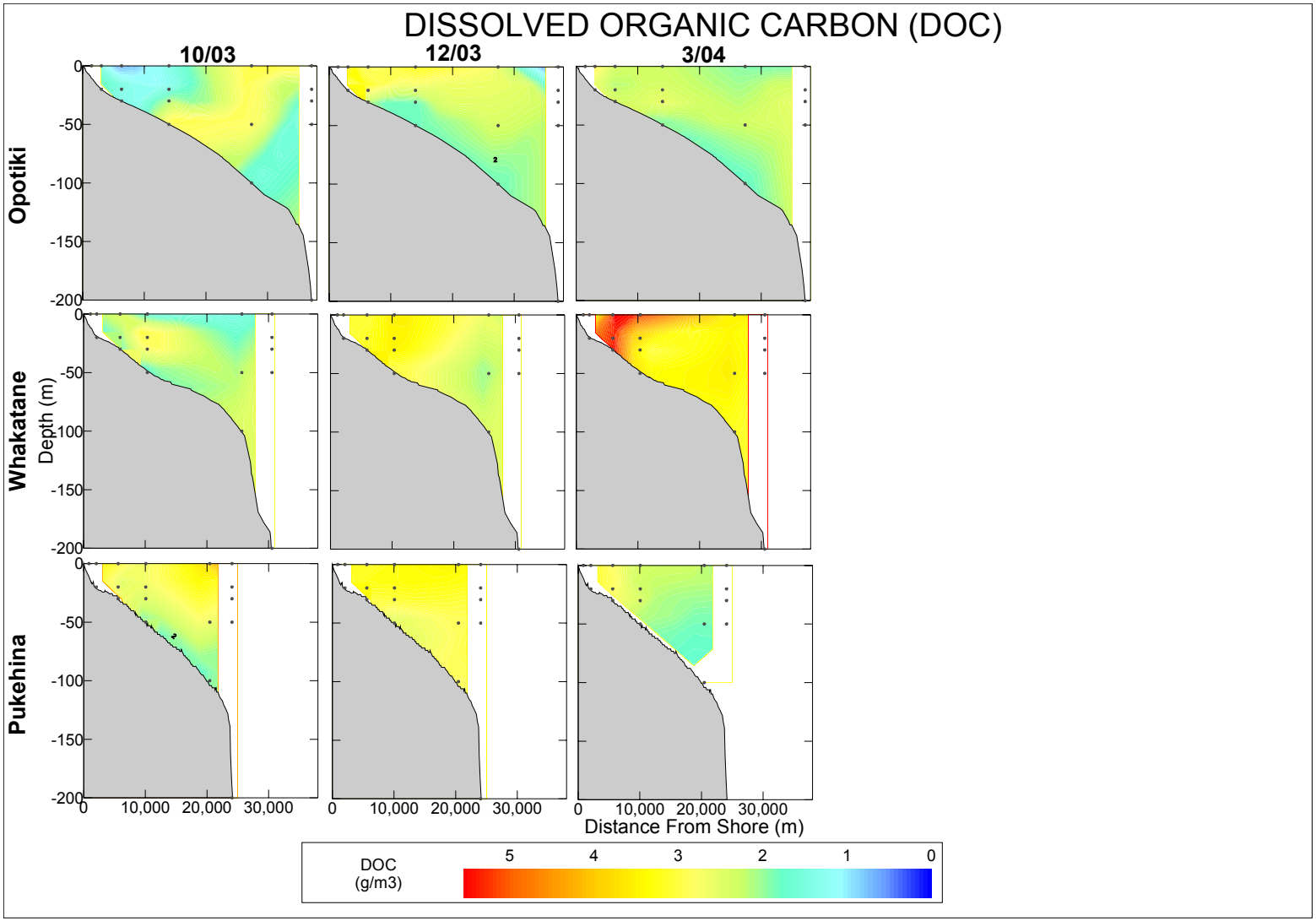

Figure 19 - Dissolved Organic Carbon (g/m^3) plots from Opotiki, Whakatane and Pukehina on the BOP continental shelf.

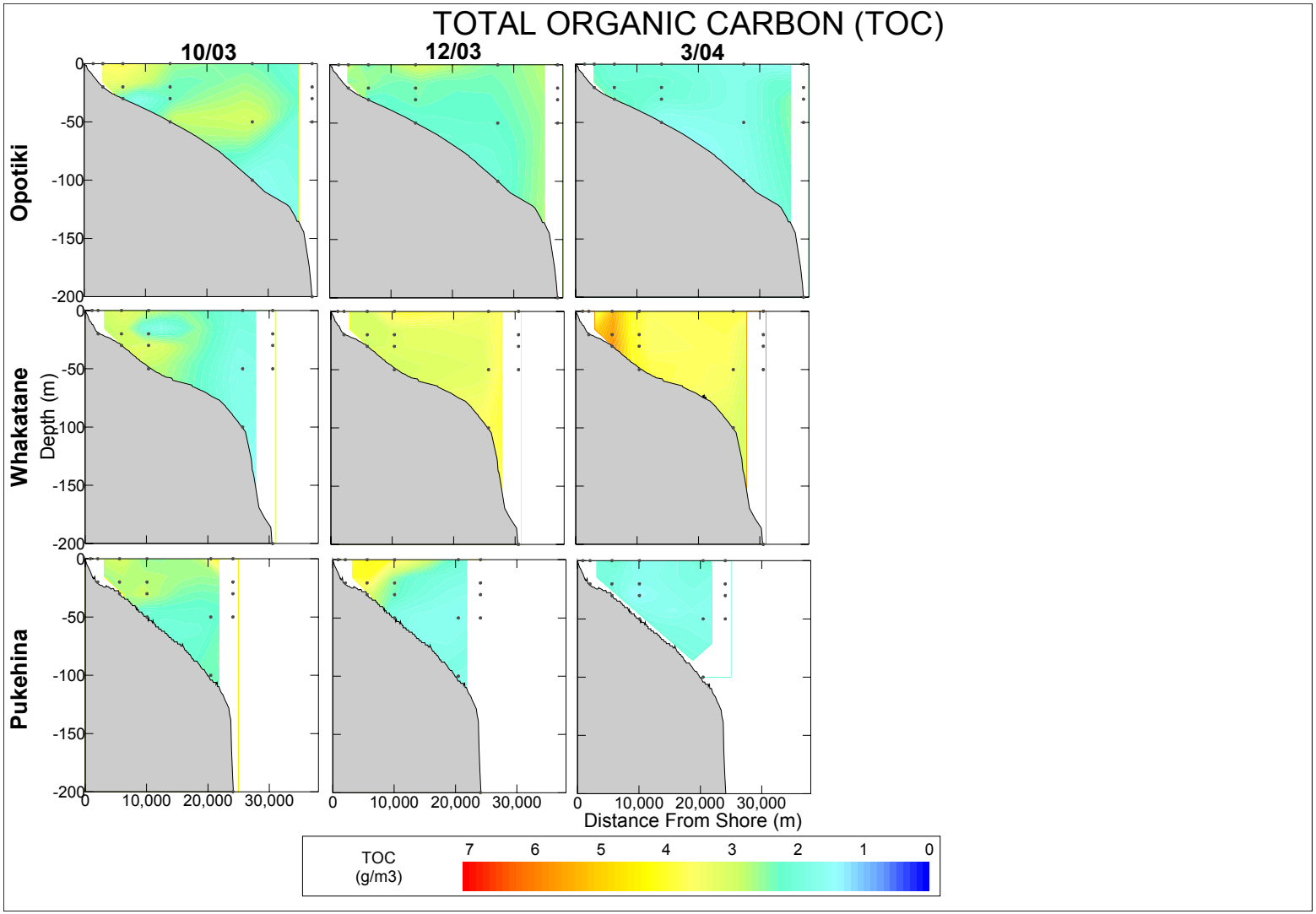

Figure 20 - Total Organic Carbon (g/m^3) plots from Opotiki, Whakatane and Pukehina on the BOP continental shelf.

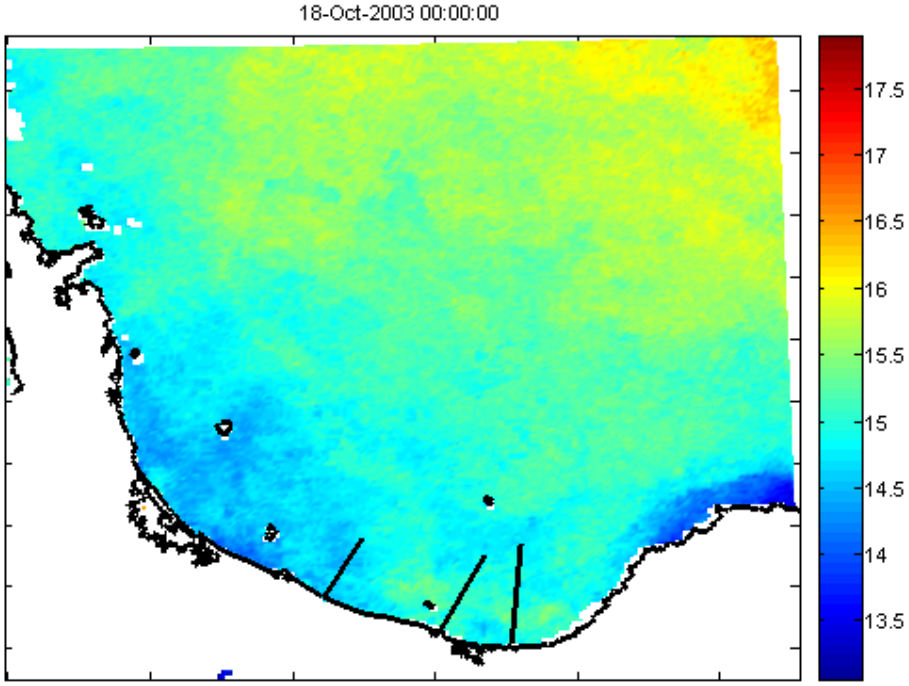

Figure 21 - Sea Surface Temperature in the Bay of Plenty 18/10/2003

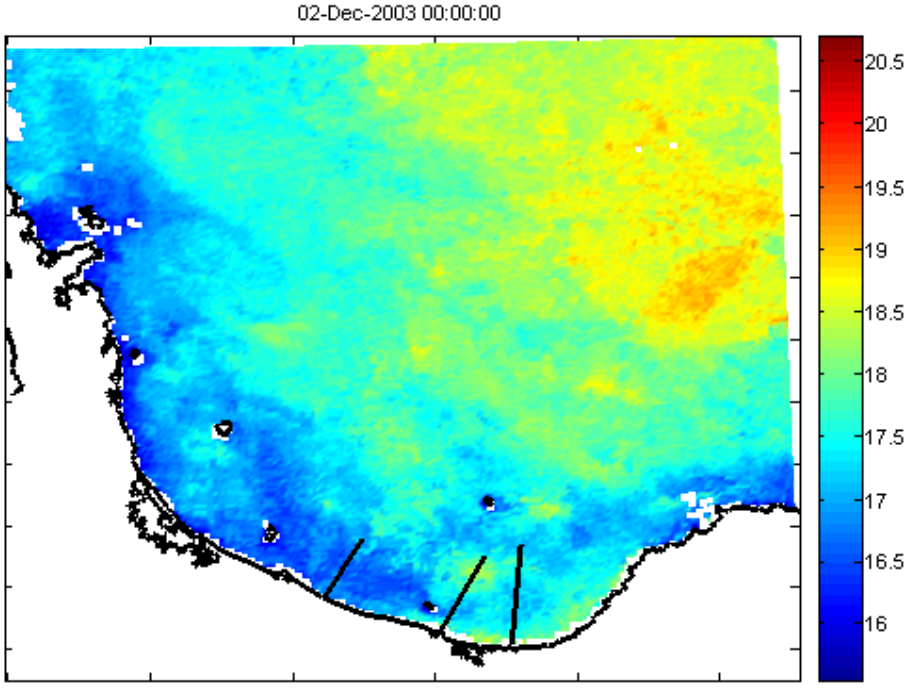

Figure 22 - Sea Surface Temperature in the Bay of Plenty 2/12/2003

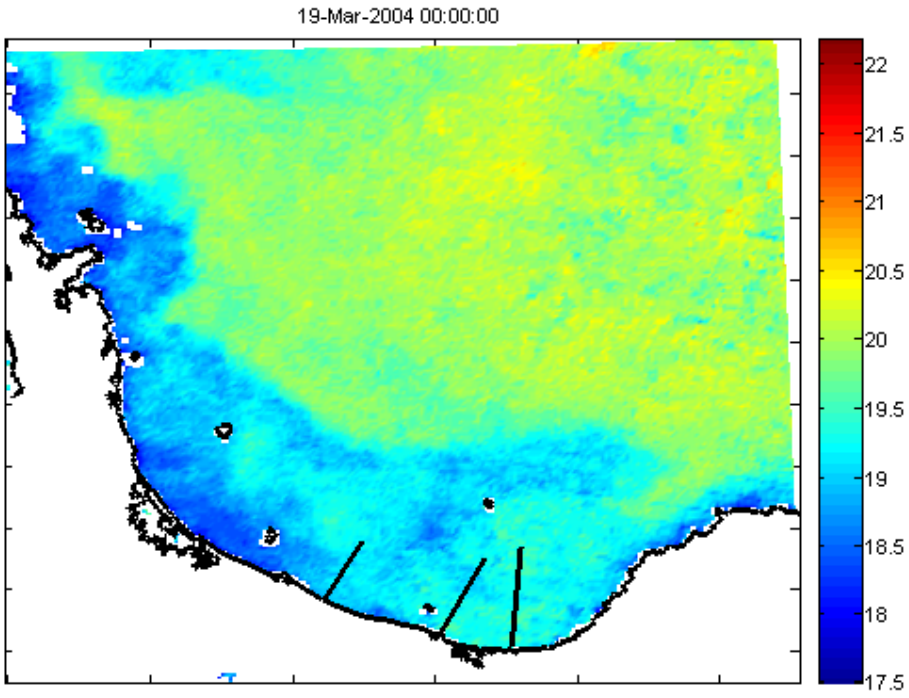

Figure 23 - Sea Surface Temperature in the Bay of Plenty 19/3/2004

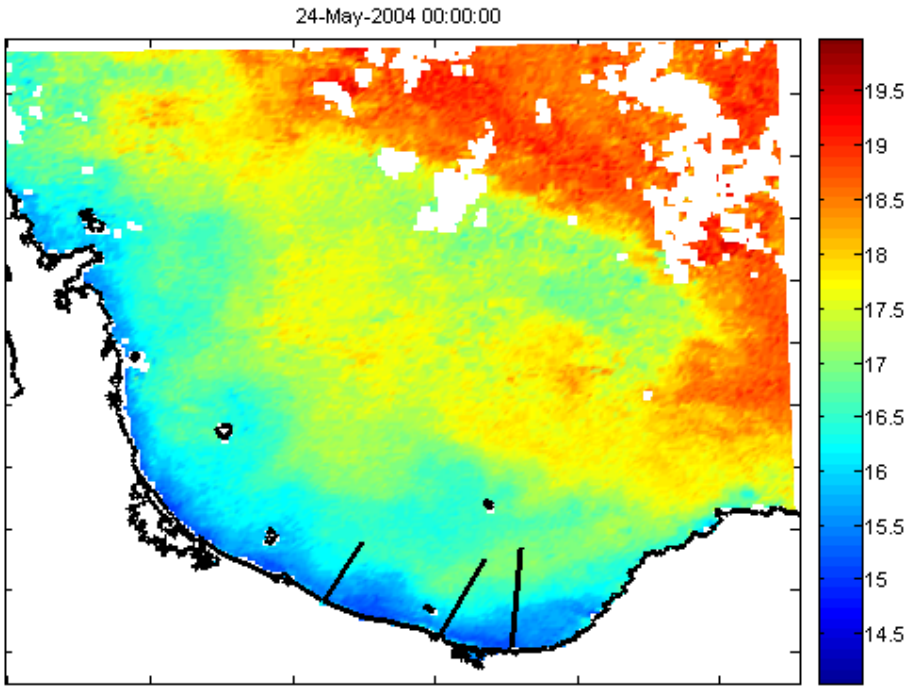

Figure 24 - Sea Surface Temperature in the Bay of Plenty 25/5/04

APPENDIX 1. SITE LOCATIONS

Sampling Sites

	Latitude	Longitude	NZMS 260 Grid ref. (m)	labstar #
Tauranga Transect				
10 m depth	37 35 40.9	176 08 34.8	27877376395999	730031
20 m	37 34 53.4	176 09 54.0	2789731 6397394	730032
30m	37 34 05.5	176 11 13.2	27917256398800	730033
50m	37 31 00.0	176 16 00.0	27989666404261	730034
100m	37 27 45.0	176 22 21.0	2808542 6409921	730035
200m	37 25 12.0	176 25 43.0	28136826414446	730036
Pukehina Transect				
10m	37 49 25.3	176 36 34.8	28278926369054	730043
20m	37 48 51.6	176 36 59.3	28285336370066	730044
30m	37 47 11.5	176 38 10.8	28304086373078	730045
50m	37 45 05.0	176 39 41.1	28327746376884	730046
100m	37 40 12.4	176 43 10.9	28382786385687	730047
200m	37 38 30.7	176 44 23.6	28401896388745	730048
Whakatane Transect				
10m	37 56 02.0	177 00 53.3	28629826355319	730037
20 m	37 55 35.4	177 01 17.3	28636046356112	730038
30m	37 53 43.1	177 02 22.4	28653486359500	730039
50m	37 51 41.9	177 04 00.0	28678996363125	730040
100m	37 44 12.9	177 08 30.5	28751416376649	730041
200m	37 41 51.9	177 10 02.0	28775806380891	730042
Opotiki Transect				
10m	37 58 41.4	177 15 44.1	28844796349415	730049
20m	37 57 50.0	177 15 47.5	28846366350990	730050
30m	37 56 04.3	177 15 58.0	28850476354233	730051
50m	37 51 55.7	177 16 23.1	28860216361859	730052
100m	37 44 42.6	177 17 06.2	28877106375147	730053
200m	37 39 27.4	177 17 37.3	28889336384817	730054

Sampling plan for phytoplankton identification and enumeration, 168 spot samples (14 per transect)

Sample	**Sampling Station** (depth contour m)					
Depth (m)	10	20	30	50	100	200
0-5 .	x	x	x	x	.	x
10 . .	.	.	.	.	.	.
20	x	x	x	.	x	
30		.	x	.	x	
50				x	.	x
100				x	.	
200					.	

Sampling plan for TN, TP, SS, DRSi, DFe and TOC/DOC, 192 spot samples (16 per transect).

Sample	**Sampling Station** (depth contour m)					
Depth (m)	10	20	30	50	100	200
0-5 .	x	x	x	x	x	x
10	.	.	.	.	.	
20	x	x	x	.	.	
30		x	x	.	x	
50				x	x	.
100					x	.
200						x

APPENDIX 2 – CHEMICAL AND PHYTOPLANKTON RAW DATA

In the following results the first column lists the transect sampled (Pukehina, Whakatane & Opotiki) with the depth contour along the transect given in the fourth column, then the actual water depth at that site from which the samples were taken. The following abbreviations and units are used;

Temp	temperature (degrees Celsius)
Cond	conductivity @ 25 ^{o}C
Saln	salinity
Secchi	secchi disc (measured in metres without a viewing tube)
Vlec	vertical light extinction coefficient derived from PAR measurements
Ent	Enterocci number cfu/100ml
PH	pH measurement @ 25^{o}C
SS	Suspended Solids (g/m^3)
TOC	Total Organic Carbon (g/m^3)
DOC	Dissolved Organic Carbon (g/m^3)
DNPOC	Dissolved non-purgable organic carbon (g/m^3)
NPOC	Non-purgable organic carbon (g/m^3)
DRSi	Dissolved Reactive Silica (mg/m^3)
Dfe	Dissolved iron (mg/m^3)
TN	Total nitrogen (mg/m^3)
NH4	Ammonium nitrogen (mg/m^3)
Nox	Oxidised nitrogen (mg/m^3)
TP	Total Phosphorus (mg/m^3)
DRP	Dissolved Reactive Phosphorus (mg/m^3)
Chla	Chlorophyll-a total filterable on 0.7µm (mg/m^3)
Nanochla	Chlorophyll-a for plankton 0.7-20µm (mg/m^3)
Microchla	Chlorophyll-a for plankton 20-200 µm (mg/m^3)
Plankton	Phytoplankton (thousands of cells per litre)

Transect	date	sample	contou	depth	Temp	Cond	Saln	Secchi	Vlec	Ent	pH	SS	TOC	DOC	DNPOC	NPOC	DRSi	Dfe	TN	NH4	Nox	TP	DRP	Chla	NanoCh	Microch	plankton
Pukehina	16/10/03	03/4994	10	0																							
Pukehina	16/10/03	03/4995	20	0	15	4929	32.2		0.26	0.5	8.2	8.2	2.8	3.4			1500	5	171	4		20	2	0.9	<0.1	0.9	121.5
Pukehina	16/10/03	03/4996	20	20	15.2	5070	33.2				8.1	7.2	2.5	3.3			1300	5	145	6	0.5	20	5	2.2	0.8	1.4	60.0
Pukehina	16/10/03	03/4997	30	0	14.9	4960	32.5	3.5	0.24	0.5	8.2	7.8	3.1	3.0			1000	5	167	6	0.5	21	2				210.0
Pukehina	16/10/03	03/4998	30	20							8.2	12	2.7	2.3			600	5	141	3	0.5	18	2				
Pukehina	16/10/03	03/4999	30	30	14.9	5120	33.5				8.2	13	2.7	2.7			500	5	174	5	0.5	16	2				
Pukehina	16/10/03	03/5000	50	0	15	4934	32.3	5.2	0.24	0.5	8.2	15	2.5	2.6			1100	5	190	7	0.5	20	2	0.8	0.2	0.6	234.0
Pukehina	16/10/03	03/5001	50	20	14.6	5080	33.3				8.2	14	2.7	2.6			700	5	126	3	0.5	15	2	1.1	0.5	0.6	286.0
Pukehina	16/10/03	03/5002	50	30	14.5	5260	34.7				8.1	8.2	3.0	2.4			50	5	131	9	0.5	17	3	2.3	1.8	0.5	521.0
Pukehina	16/10/03	03/5003	50	50							8.2	12	1.9	1.8			300	5	156	14	0.5	18	2	1.1	0.5	0.6	99.5
Pukehina	16/10/03	03/5004	100	0	15.4	5030	33	6	0.21	0.5	8.2	9.4	2.8	3.8			400	5	132	7	0.5	14	2				
Pukehina	16/10/03	03/5005	100	50	14.8						8.1	14	2.0	2.9			50	5	154	9	48	19	10				
Pukehina	16/10/03	03/5006	100	100	13.8	5260	34.7				8	18	2.4	1.7			300	5	251	6	175	32	24	0.1	0.1	<0.1	8.0
Pukehina	16/10/03	03/5007	200	0	16	5070	33.3	6.3	0.21	0.5	8.2	4.5	7.2	5.1			300	5	189	7	0.5	18	2	1.1	0.6	0.5	326.0
Pukehina	16/10/03	03/5008	200	20	14.8	5160	33.8				8.2								141	4	0.5	15	2				485.0
Pukehina	16/10/03	03/5009	200	30							8.1	27	2.5	2.5			50	5	139	6	0.5	17	3	2.5	2	0.5	543.0
Pukehina	16/10/03	03/5010	200	50	14.2	5300	34.8				8.1								190	14	38	22	10				120.5
Pukehina	16/10/03	03/5011	200	200	13.6	5300	34.1				8	17	2.2	2.5			300	5	263	3	172	37	22				
Whakatane	17/10/03	03/5055	10	0	15.9	4341	28.1	1.4	0.37	13.0	8.2	15	1.8	2.8			2000	5	163	16	10	25	12				104.7
Whakatane	17/10/03	03/5056	20	0	15.8	4817	29.8	4.5	0.23	7.0	8	9.8	2.9	2.1			2300	5	226	9	11	32	8	8.5	6.4	2.1	159.0
Whakatane	17/10/03	03/5057	20	20	14.9	5260	34.7				7.9	30	2.7	1.4			500	5	266	22	104	52	20	1.4	1.2	0.2	32.0
Whakatane	17/10/03	03/5058	30	0	16.5	4415	28.8	3.5	0.22	1.0	8.2	9.6	3.3	2.5			2400	30	261	9	5	34	7				139.3
Whakatane	17/10/03	03/5059	30	20	14.4	5260	34.7				8	7.6	3.0	1.9			50	5	197	7	0.5	27	8				481.0
Whakatane	17/10/03	03/5060	30	30	14.2	5300	34.8				8	7	2.9	1.8			300	5	225	11	109	31	22				
Whakatane	17/10/03	03/5061	50	0	16.4	4585	29.8	2.9	0.22	0.5	8.1	19	2.9	1.5			2000	5	321	9	14	26	7	1.3	0.7	0.6	203.0
Whakatane	17/10/03	03/5062	50	20	14.5	5260	34.7				8	11	1.6	3.3			50	20	141	6	0.5	18	7	1.8	1.1	0.7	408.5
Whakatane	17/10/03	03/5063	50	30	14.6	5280	34.8				8	11	3.3	3.0			50	20	175	10	29	18	10	1.3	0.8	0.5	171.0
Whakatane	17/10/03	03/5064	50	50	14.2	5290	34.9				8	14	2.9	1.7			200	20	230	5	117	31	19	0.4	0.3	0.1	24.5
Whakatane	17/10/03	03/5065	100	0	15.3	5190	34.2	5.8	0.22	20.5	8.2	13	1.9	1.4			50	5	157	5	0.5	14	5				
Whakatane	17/10/03	03/5066	100	50	14.7	5290	34.8				8.1	15	1.6	2.1			50	5	148	6	66	18	12				
Whakatane	17/10/03	03/5067	100	100	14.7	5290	34.8				8	9	1.7	2.5			50	5	184	3	92	21	15	0.1	0.1	<0.1	15.0
Whakatane	17/10/03	03/5068	200	0	15.1	5250	34.8	6.6	0.23		8.1	9.2	1.7	1.8			50	5	296	14	1	18	5	0.9	0.5	0.4	309.0
Whakatane	17/10/03	03/5069	200	20	14.7	5280	34.8				8.2									5	5		12				249.5
Whakatane	17/10/03	03/5070	200	30	14.7	5340	35				8	10	2.0	2.6			50	5	152	12	18	17	8	1.8	1.6	0.2	280.0
Whakatane	17/10/03	03/5071	200	50	14.7	5290	35				8.1										75						15.3
Whakatane	17/10/03	03/5072	200	200	13.3	5290	34.9				8	8.2	1.0	2.4			200	5	222	7	168	29	24				
Opotiki	17/10/03	03/5013	10	0	14.5	4909	32.1	1.1		4.0	8.0	13.0	3.0	1.6			1600	20	199	13	41	39	10				43.5
Opotiki	17/10/03	03/5014	20	0	15.0	4951	32.4	1.8	0.25	8.0	8.0	11.0	3.6	1.4			1300	60	180	8	3	25	5	8.2	7.4	0.8	151.0
Opotiki	17/10/03	03/5015	20	20	14.4	5260	34.7				8.0	16.0	3.4	2.0			400	5	230	126	118	32	17	5.2	4.9	0.3	21.7
Opotiki	17/10/03	03/5016	30	0	15.2	4788	31.2	4.5	0.19	2.0	8.1	11.0	3.9	0.5			1200	5	180	6	8	21	5				158.6
Opotiki	17/10/03	03/5017	30	20	14.5	5200	34.2				8.1	12.0	3.2	1.7			200	5	157	8	0.5	28	2				601.0
Opotiki	17/10/03	03/5018	30	30	14.4	5270	34.7				8.0	10.0	1.4	0.8			400	5	224	3	131	29	19				
Opotiki	17/10/03	03/5019	50	0	15.0	5180	34.1	7.4	0.21	<1	8.1	12.0	2.6	1.4			200	5	157	7	0.5	17	2	6.8	6.5	0.3	310.7
Opotiki	17/10/03	03/5020	50	20	14.9	5250	34.8				8.0	16.0	2.3	1.2			50	5	137	6	12	17	5	6.5	5.3	1.2	313.0
Opotiki	17/10/03	03/5021	50	30	14.1	5270	34.7				8.0	15.0	2.3	2.2			300	5	194	6	130	27	19	7.9	7.7	0.2	53.0
Opotiki	17/10/03	03/5022	50	50	14.8	5280	34.8				8.0	17.0	3.0	3.2			300	5	233	6	145	32	22	1.9	1.8	0.1	3.0
Opotiki	17/10/03	03/5023	100	0	15.0	5200	34.2	6.9	0.25	2.0	8.2	9.4	2.4	3.1			50	20	168	4	5	15	2				
Opotiki	17/10/03	03/5024	100	50	14.5	5270	34.8				8.1	13.0	3.1	3.0			50	10	176	8	79	20	12				
Opotiki	17/10/03	03/5025	100	100	14.0	5280	34.8				8.0	13.0	1.6	1.5			30	5	225	4	140	27	20	1.1	1.1	<0.1	8.0
Opotiki	17/10/03	03/5026	200	0	14.1	5270	34.8		0.22	<1	8.1	13.0	1.9	3.1			50	5	207	6	0.5	20	2	12.6	11.8	0.8	352.0
Opotiki	17/10/03	03/5027	200	20	14.8	5270	34.8				8.2									5	0.5		2				675.0
Opotiki	17/10/03	03/5028	200	30	14.8	5280	34.8				8.1	7.0	2.1	1.4			50	5	158	4	5	18	5	6.1	5.3	0.8	443.0
Opotiki	17/10/03	03/5029	200	50	14.8	5280	34.8				8.1									80	48		7				188.5
Opotiki	17/10/03	03/5030	200	200	13.4	5300	34.8				8.0	15.0	1.6	2.8			20	5	241	2	178	47	25				

Transect	date	sample	contou	depth	Temp	Cond	Saln	Secchi	Vlec	Ent	pH	SS	TOC	DOC	DNPOC	NPOC	DRSi	Dfe	TN	NH4	Nox	TP	DRP	Chla	NanoCh	Microch	plankton
Pukehina	05/12/03	036100	10	0	17.7	5030	33.1	3.4	0.33	2.0	8.3	8.7	4.4	3.7			1200	2	233	6		28	2				199.5
Pukehina	05/12/03	036101	20	0	18.2	5070	33.3	4.2	0.28	1.0	8.4	11.0	3.9	3.2			853	2	212	4		23	2	2.3	1.6	0.7	135.0
Pukehina	05/12/03	036102	20	20	15.5	5270	34.8				7.9	18.0	3.9	2.9			319	2	157	2		24	8	2.4	1.8	0.6	54.6
Pukehina	05/12/03	036103	30	0	18.1	5020	33.0	6.3	0.22	<1	8.3	16.0	4.1	3.1			561	2	140	3		16	3				13.0
Pukehina	05/12/03	036104	30	20	15.1	5280	34.9				7.9	15.0	4.4	3.4			286	2	118	4		24	14				10.0
Pukehina	05/12/03	036105	30	30	15	5300	35.1				7.9	16.0	3.1	3.0			305	2	135	7		22	12				
Pukehina	05/12/03	036106	50	0	17.3	5240	34.6	7.6	0.14	<1	8.2	17.0	4.0	3.3			140	2	672	46		13	22	1.0	0.9	0.1	73.0
Pukehina	05/12/03	036107	50	20	16	5250	34.7				8.1	17.0	2.2	3.3			180	2	144	7		17	8	2.1	1.9	0.2	1.5
Pukehina	05/12/03	036108	50	30	15.2	5290	34.9				7.9	16.0	2.3	3.1			175	2	158	2		26	14	1.1	1	0.1	17.0
Pukehina	05/12/03	036109	50	50	14.6	5290	34.9				8.0	17.0	1.6	2.4			255	2	219	3		31	26	0.3	0.2	0.05	1.7
Pukehina	05/12/03	036110	100	0	17.1	5030	33.1	5.8	0.14	2.0	5.8	17.0	2.0	3.5			116	2	177	6		13	5				
Pukehina	05/12/03	036111	100	50	14.9	5250	34.7				8.1	16.0	1.5	2.8			86	2	179	6		25	163				
Pukehina	05/12/03	036112	100	100	14.5	5280	34.8				8.0	17.0	1.9	3.0			180	2	210	2		33	26	0.1	0.05	0.05	7.1
Pukehina	05/12/03	036113	200	0	17.2	5270	34.7	6.6	0.15	0.5	6.6	18.0	2.0	3.1			56	2	212	7		13	3	0.5	0.3	0.2	81.0
Pukehina	05/12/03	036114	200	20	16.3	5270	34.8				8.1									3			3				86.0
Pukehina	05/12/03	036115	200	30	16.1	5280	34.8				8.1	16.0	1.7	3.0			47	2	129	3		15	8	1.8	0.9	0.9	134.0
Pukehina	05/12/03	036116	200	50	15.5	5280	34.9				8.1	16.0								4			14				2.3
Pukehina	05/12/03	036117	200	200	13.1	5290	34.9				8.0	16.0	1.5	2.0			135	2	258	5		33	27				
Opotiki	03/12/03	035979	10	0	19.1	4750	31	3.7	0.30	<1	8.1	4.7	2.4	2.6			575	2	302	15		29	3				20.0
Opotiki	03/12/03	035980	20	0	19.1	4886	32	4.4	0.23	3.0	8.1	4.2	3.0	3.8			377	2	409	12		39	3	1.3	1.1	0.2	37.0
Opotiki	03/12/03	035981	20	20	15.8	5060	33.1				7.9	8.6	2.3	2.7			224	2	145	13		26	12	0.5	0.4	0.1	7.0
Opotiki	03/12/03	035982	30	0	17.8	4958	32.6	4.6	0.21	<1	8.2	7.2	2.3	2.7			251	2	251	4		23	2				68.7
Opotiki	03/12/03	035983	30	20	16.3	5030	33				8.1	6.0	2.6	3.3			130	2	152	6		16	3				6.3
Opotiki	03/12/03	035984	30	30	15.4	5070	33.4				8.0	9.4	2.1	1.8			191	2	145	7		27	14				6.0
Opotiki	03/12/03	035985	50	0	17.7	4955	32.5	6.2	0.15	<1	8.1	2.2	3.1	3.3			311	2	216	9		22	5	1.2	0.9	0.3	55.0
Opotiki	03/12/03	035986	50	20	15.8	4990	32.8				8.0	7.6	2.3	2.6			163	11	149	4		17	5	1.1	0.6	0.5	39.0
Opotiki	03/12/03	035987	50	30	15.6	5040	33				8.0	5	2.4	1.8			99	2	167	3		22	12	0.6	0.4	0.2	19.3
Opotiki	03/12/03	035988	50	50	15.3	5050	33.1				8.0	7.6	2.1	1.8			161	2	207	2		37	19	0.3	0.2	0.05	5.5
Opotiki	03/12/03	035989	100	0	17.7	4963	32.5	7.2	0.12		8.1	5	2.4	2.7			238	2	154	6		14	2				
Opotiki	03/12/03	035990	100	50	15.9	5080	33.3				8.1	8.2	2.2	2.4			62	2	171	5		17	12				
Opotiki	03/12/03	035991	100	100	15.6	5050	33.2				8.0	6.6	2.0	1.8			111	2	285	7		29	17	0.1	0.05	0.05	0.7
Opotiki	03/12/03	035992	200	0	17.6	5030	33	8.1	0.11	<1	8.1	6	2.9	0.0			139	2	186	6		15	3	0.7	0.6	0.05	0.5
Opotiki	03/12/03	035993	200	20	17.1	5010	33				8.0	8.4								3			3				5.5
Opotiki	03/12/03	035994	200	30	16.4	5020	33				8.1	4.8	2.8	2.3			52	2		4			5	1.2	1.1	0.1	
Opotiki	03/12/03	035995	200	50	15.9		33				8.1	4.6								4			10				3.5
Opotiki	03/12/03	035996	200	200	13.9	5100	33.5				8.1	7.2	3.0	2.3			135	2	216	5		31	26				
Whakatane	04/12/03	036080	10	0	19.5	4714	30.8	3.3	0.29	<1	8.1	5	3.9	3.5			797	2	299	9		40	8				46.0
Whakatane	04/12/03	036081	20	0	19.1	4833	31.6	4.5	0.17	<1	8.0	4.8	3.1	3.1			618	2	324	5		39	5	2.0	1.7	0.3	58.0
Whakatane	04/12/03	036082	20	20	15.7	5080	33.3				7.9	9.6	3.1	2.9			264	2	290	6		51	5	0.8	0.6	0.2	6.0
Whakatane	04/12/03	036083	30	0	18.2	4910	32.1	6.1	0.20	<1	8.1	6.2	3.0	3.0			591	2	232	4		26	7				36.0
Whakatane	04/12/03	036084	30	20	15.6	5080	33.4				8.0	2.6	3.1	3.2			176	2	155	5		19	3				31.0
Whakatane	04/12/03	036085	30	30	15.2	5110	33.5				7.9	4.4	2.9	3.2			287	2	172	3		30	17				
Whakatane	04/12/03	036086	50	0	18.1	5010	32.8	6.3	0.18	<1	8.2	4.8	4.1	3.7			347	2	253	6		23	7	4.2	2.1	2.1	669.6
Whakatane	04/12/03	036087	50	20	15.8	5050	33.1				8.0	3.8	3.1	3.6			214	2	162	2		20	17	1.8	1.4	0.4	24.0
Whakatane	04/12/03	036088	50	30	15.5	5090	33.4				8.0	1.6	3.2	3.6			134	2	140	1		22	10	0.5	0.4	0.05	41.0
Whakatane	04/12/03	036089	50	50	15.1	5090	33.5				8.0	6.4	3.0	3.0			169	2	207	4		27	20	0.2	0.1	0.05	2.6
Whakatane	04/12/03	036090	100	0	18	5030	33	13.4	0.15	<1	8.1	2.4	3.4	2.6			130	2	127	4		10	3				
Whakatane	04/12/03	036091	100	50	15.6	5060	33.2				8.0	2.8	3.2	1.9			77	2	180	3		19	12				
Whakatane	04/12/03	036092	100	100	14.6	5100	33.5				8.0	2.6	3.7	2.4			116	2	191	4		24	4	0.1	0.05	0.05	1.0
Whakatane	04/12/03	036093	200	0	17.9	5020	33	14.3	0.13	<1	8.1	2.4	3.9	2.0			107	2	146	3		10	2	0.3	0.3	0.05	9.3
Whakatane	04/12/03	036094	200	20	16.7	5060	33.3				8.1									2			12				2.3
Whakatane	04/12/03	036095	200	30	16.3	5050	33.1				8.0	3.4	4.2	2.6			66	2	143	4		14	12	1.2	1.1	0.05	4.0
Whakatane	04/12/03	036096	200	50	15.4	5100	33.5				8.1									3			2				1.0
Whakatane	04/12/03	036097	200	200	14.1	5060	33.2				8.0	4.2	3.9	2.6			118	2	229	0.5		29	22				

Transect	date	sample	contour	depth	Temp	Cond	Saln	Secchi	Vlec	Ent	pH	SS	TOC	DOC	DNPOC	NPOC	DRSi	Dfe	TN	NH4	Nox	TP	DRP	Chla	NanoCh	Microch	plankton
Pukehina	15/03/04	04/1584	10	0	19.4	5220	34.3	6.8	0.25	0.5	8.2	15	1.9	3.5			198	6	13	18	6	15	2				30.5
Pukehina	15/03/04	04/1585	20	0	19.2	5250	34.6	15.4	0.14	0.5	8.1	17	1.8	3.2			113	20	135	5	0.5	14	2	0.8	0.7	0.1	9.6
Pukehina	15/03/04	04/1586	20	20	18.5	5320	35.1				8.1	16	2.3	3.1			125	2	138	16	1	20	7	1.9	1.5	0.4	13.5
Pukehina	15/03/04	04/1587	30	0	19.2	5250	34.6	12.0	0.14	0.5	8.2	16	2.3	2.8		2.7	239	11	158	8	0.5	16	4				24.8
Pukehina	15/03/04	04/1588	30	20	18.5	5320	35.1				8.1	16	1.7	3.0			76	2	144	20	0.5	17	4				8.6
Pukehina	15/03/04	04/1589	30	30	18.2	5330	35.2				8.1	16	2.1	2.7		2.0	76	150	196	11	17	21	7				
Pukehina	15/03/04	04/1590	50	0	19.1	5250	34.6	18.0	0.08	0.5	8.1	14	1.5	2.3		2.0	164	5	307	20	0.5	16	2	0.4	0.3	0.05	9.0
Pukehina	15/03/04	04/1591	50	20	18.7	5320	35.1				8.1	15	1.6	2.2			38	6	113	18	0.5	14	2	0.3	0.2	0.05	2.1
Pukehina	15/03/04	04/1592	50	30	18.3	5320	35.1				8.1	15	1.3	2.4			50	12	119	18	0.5	17	4	0.5	0.4	0.05	5.8
Pukehina	15/03/04	04/1593	50	50	17.6	5320	35.1				8	18	1.9	2.0			92	2	173	15	45	27	14			0.2	9.8
Pukehina	15/03/04	04/1594	100	0	19.1	5300	35	22.0	0.09	0.5	8.1	16	2.0	2.3			92	4	175	16	0.5	14	4				
Pukehina	15/03/04	04/1595	100	50	17.4	5320	35.1				8.1	15	1.7	1.8			78	2	211	11	61	20	11				
Pukehina	15/03/04	04/1596	100	100	15.5	5330	35.2				8	17	2.0	1.6		1.8	99	4	263	20	146	35	25	0.1	0.05	0.05	2.0
Pukehina	15/03/04	04/1597	200	0	19.1	5290	34.9	22.0	0.09	0.5	8.1	16	2.6	1.8			107	2	113	9	0.5	12	2	0.4	0.3	0.05	3.6
Pukehina	15/03/04	04/1598	200	20	18.4	5330	35.1				8.1									6	0.5		2				3.0
Pukehina	15/03/04	04/1599	200	30	17.9	5330	35.1				7.9	18	1.5	2.0			30	2	24	8	26	16	7	0.6	0.5	0.05	5.1
Pukehina	15/03/04	04/1600	200	50	17.3	5320	35.2				8.1									6	78		14				2.6
Pukehina	15/03/04	04/1601	200	200	19.2	5290	34.9				8.2	17	2.3	2.0			167	2	135	13	0.5	14	4				
Opotiki	16/03/04	04/1652	10	0	20.3	5320	35	5.4	0.25		8.1	9.8	2.6	2.9	1.1	1.9	66	2	136	12	18	19	4				6.7
Opotiki	16/03/04	04/1653	20	0	20.2	5210	34.5	12.4	0.10		8.2	6.8	2.2	3.0			131	2	166	15	8	16	4	0.3	0.2	0.05	12.5
Opotiki	16/03/04	04/1654	20	20	20.0	5240	34.5				8.1	2.8	2.4	2.5	1.5	1.5	131	2	126	13	0.5	15	4	0.8	0.7	0.05	6.3
Opotiki	16/03/04	04/1655	30	0	20.0	5280	34.8	15.8	0.16		8.2	12	2.0	2.3	1.2	1.5	117	5	163	12	4	13	4				2.5
Opotiki	16/03/04	04/1656	30	20	18.6	5310	35.3				8.1	13	2.1	2.0	1.1	1.3	48	2	111	18	0.5	18	4				2.1
Opotiki	16/03/04	04/1657	30	30	18.6	5330	35.2				8.1	15	2.4	2.3	1.3	1.8	88	2	127	10	2	21	7				
Opotiki	16/03/04	04/1658	50	0	20.0	5310	35	27.0	0.09		8.1	12	2.0	2.3	1.0	1.6	70	5	126	11	1	15	4	0.3	0.2	0.05	2.3
Opotiki	16/03/04	04/1659	50	20	20.1	5330	35.2				8.1	14	2.2	2.4			29	2	109	15	0.5	12	2	0.3	0.2	0.05	4.5
Opotiki	16/03/04	04/1660	50	30	18.3	5330	35.1				8.1	16	2.0	2.6			14	2	121	11	0.5	14	2	1.4	0.4	1	7.8
Opotiki	16/03/04	04/1661	50	50	17.4	5360	35.1				8	20	1.5	1.8	1.2	1.5	117	5	203	12	60	32	16	0.7	0.4	0.3	17.8
Opotiki	16/03/04	04/1662	100	0	19.6	5340	35.3	20.8	0.12		8.2	14	1.7	1.9	1.1	1.3	14	2	161	17	13	12	2				
Opotiki	16/03/04	04/1663	100	50	17.0	5330	35.7				8.1	13	1.7	2.3			19	2	130	20	31	21	9				
Opotiki	16/03/04	04/1664	100	100	15.5	5330	35.4				8	8.1	1.6	1.7	0.9	1.1	76	2	361	25	152	33	21	0.1	0.05	0.05	0.7
Opotiki	16/03/04	04/1665	200	0	19.2	5340	35.2	29.5	0.09		8.1	8.5	1.5	1.9	1.0	1.4	22	2	176	37	8	11	4	0.3	0.2	0.05	2.1
Opotiki	16/03/04	04/1666	200	20	19.2	5340	35.2				8.2									65	0.5		4				1.5
Opotiki	16/03/04	04/1667	200	30	19.1	5310	35				8.1	27	2.7	2.7	1.6	1.6	28	2	410		60	15	4	0.4	0.3	0.05	2.8
Opotiki	16/03/04	04/1668	200	50	17.4	5330	35.3				8.1									5	0.5		2				3.6
Opotiki	16/03/04	04/1669	200	200	13.9	5300	35.1				8	5.9	2.0	2.3			133	2	317	6	184	36	23				
Whakatane	17/03/04	04/1705	10	0	19.9	4880		4.4	0.20	13	8.1	4.7	2.0	2.5	1.5		314	2	418	58	71	22	7				16.5
Whakatane	17/03/04	04/1706	20	0	19.4	5080		5.5	0.18	16	8.1	3	2.8	2.5	0.2	1.6	292	4	149	19	7	22	5	0.8	0.7	0.1	10.5
Whakatane	17/03/04	04/1707	20	20	18.5	5320					8.1	6.5	5.5	5.6	1.3		81	2	122	11	0.5	21	5	1.3	0.8	0.5	23.3
Whakatane	17/03/04	04/1708	30	0	19.9	5240		11.0	0.09	0.5	8.2	1.8	5.6	5.6	1.4	1.4	138	2	132	17	4	15	3				2.5
Whakatane	17/03/04	04/1709	30	20	18.0	5330					8	1.7	5.8	5.4	1.2	1.4	37	2	122	11	15	17	5				17.6
Whakatane	17/03/04	04/1710	30	30	17.8	5330					8.1	3.4	6.0	5.6	1.4	1.7	89	2	178	5	36	23	10				
Whakatane	17/03/04	04/1711	50	0	19.8	5230		16.0	0.07	0.5	8.1	2.5	3.6	5.3	1.0	1.2	161	2	188	11	5	13	5	0.4	0.3	0.05	9.6
Whakatane	17/03/04	04/1712	50	20	18.9	5330					8.1	12.4	3.5	3.5	1.2	1.2	18	2	131	10	1	14	2	0.3	0.2	0.05	4.5
Whakatane	17/03/04	04/1713	50	30	18.3	5180					8.1	11.7	3.5	2.9	1.0	1.4	23	2	113	7	0.5	15	3	0.6	0.5	0.05	14.0
Whakatane	17/03/04	04/1714	50	50	17.6	5320					8	14.8	3.9	3.4	1.1	1.2	79	2	208	7	56	28	14	1.0	0.7	0.3	17.1
Whakatane	17/03/04	04/1715	100	0	18.9	5320		12.5	0.10	0.5	8.2	12	3.8	3.4	1.1	1.3	17	5	189	16	4	15	3				
Whakatane	17/03/04	04/1716	100	50	17.1	5320					8.1	12.1	3.6	3.6	1.1	1.2	19	20	151	8	16	16	5				
Whakatane	17/03/04	04/1717	100	100	15.0	5320					8	6.9	3.2	3.2	0.7	1.0	59	34	235	7	127		22	0.1	0.05	0.05	0.2
Whakatane	17/03/04	04/1718	200	0	18.9	5310		14.0	0.10	0.5	8.2	3.6	3.7	3.6	1.2	1.3	13	2	185	6	1	13	3	0.4	0.3	0.05	3.8
Whakatane	17/03/04	04/1719	200	20	18.9	5320					8.2									3	0.5		2				7.8
Whakatane	17/03/04	04/1720	200	30	18.8	5340					8.2	9.5	2.7	3.1	1.2	1.4	23	6	133	3	0.5	12	10	0.5	0.4	0.05	1.8
Whakatane	17/03/04	04/1721	200	50	17.3	5350					8.1									6	13		7				16.5
Whakatane	17/03/04	04/1722	200	200	14.7	5320					8	11.4	2.8	2.9	0.9		61	2	251	5	148	34	22				

Transect	date	sample	contou	depth	Temp	Cond	Saln	Secchi	Vlec	Ent	pH	SS	TOC	DOC	DNPOC	NPOC	DRSi	Dfe	TN	NH4	Nox	TP	DRP	Chla	NanoCh	Microch	plankton
Whakatane	24/05/04	043057	10	0	15.4	5080	31.5	4.2	0.22		8.1	11			1.4	1.2	228	2	141	8	3	17	8				207.5
Whakatane	24/05/04	043058	20	0	15.5	5140	33.8	6.3	0.23		8.1	16			1.3	1.3	128	2	154	6	1	13	8	2.2	1.54	0.66	218.5
Whakatane	24/05/04	043059	20	20	16.4	5250	34.6				8	22			1.3	1.2	120	2	205	13	33	21	14	1.3	0.81	0.46	34.3
Whakatane	24/05/04	043060	30	0	15.7	5190	34.2	8.6	0.18		8.1	20			1.3	1.2	79	2	135	4	0.5	14	8				165.0
Whakatane	24/05/04	043061	30	20	16.0	5210	34.4				8.1	23			1.3	1.2	90	2	282	11	14	16	8				273.0
Whakatane	24/05/04	043062	30	30	16.3	5270	34.8				8.1	20			1.4	1.5	103	2	145	11	21	17	12				
Whakatane	24/05/04	043063	50	0	16.0	5230	34.5	9.2	0.15		8.1	22			1.2	1.2	85	2	139	3	4	13	8	2.3	1.81	0.48	90.3
Whakatane	24/05/04	043064	50	20	16.1	5210	34.3				8.1	20			1.2	1.1	76	2	179	7	20	14	10	1.0	0.52	0.46	71.8
Whakatane	24/05/04	043065	50	30	16.4	5270	34.8				8.1	21			1.3	1.1	83	2	166	4	14	12	8	1.5	1.02	0.52	39.8
Whakatane	24/05/04	043066	50	50	16.4	5280	34.9				8.1	22			1.3	1.1	107	2	183	3	68	17	17	0.2	0.1	0.14	5.0
Whakatane	24/05/04	043067	100	0	17.2	5270	34.8	18.2	0.08		8.1	20			1.2	1.1	47	2	113	7	9	11	8				
Whakatane	24/05/04	043070	100	10	17.1	5270	34.8				8.2	18			1.6	1.6	67	2	180	3	10	15	8	0.5	0.07	0.46	1.8
Whakatane	24/05/04	043071	100	20	17.1	5270	34.8				8.1	24			1.4	1.4	111	2	330	5	20	27	8				3.8
Whakatane	24/05/04	043072	100	30	17.1	5260	34.7				8.1	10			2.4	2	49	2	155	7	9	12	8	0.5	0.07	0.4	1.0
Whakatane	24/05/04	043068	100	50	16.6	5240	34.6				8.1	20			1.3	1.3	45	11	290	3	66	10	12				
Whakatane	24/05/04	043069	100	100	15.5	5300	35.0				8	22			1.2	1.1	49	2	146	7	123	11	24	0.1	0.01	0.04	0.2
Opotiki	25/05/04	043107	10	0	15.2			5.2	0.16	0.5	8.1	9			1.7	1.4	191	2	200	9	19	15	5				109.0
Opotiki	25/05/04	043108	20	0	15.8			6.8	0.22	0.5	8.1	20			1.9	1.6	93	2	234	8	4	14	5	2.0	1.39	0.59	224.0
Opotiki	25/05/04	043109	20	20	16.5						8.1	22			1.9	1.5	114	2	360	12	36	18	8	3.3	2.67	0.61	103.5
Opotiki	25/05/04	043110	30	0	15.9			8.2	0.19	0.5	8.1	16			1.6	1.5	87	2	194	8	20	15	5				112.3
Opotiki	25/05/04	043111	30	20	16.0						8.1	17			1.1	1	89	2	202	6	3	15	5				201.5
Opotiki	25/05/04	043112	30	30	16.6						8.1	17			1.7	1.6	125	2	206	9	23	17	10				
Opotiki	25/05/04	043113	50	0	16.1			11.0	0.13	0.5	8.1	9.4			1.4	1.3	66	2	423	9	195	12	5	1.6	1.14	0.5	91.5
Opotiki	25/05/04	043114	50	20	16.2						8.1	15			1.6	1.3	77	2	452	10	92	15	8	1.3	0.86	0.4	46.0
Opotiki	25/05/04	043115	50	30	16.4						8.1	15			1.8	1.6	65	2	464	12	156	18	8	1.5	1.03	0.5	125.0
Opotiki	25/05/04	043116	50	50	16.6						8.1	17			1.3	1.5	70	2	333	9	82	17	8	0.9	0.59	0.31	54.5
Opotiki	25/05/04	043117	100	0	17.0	5290	34.9	10.1	0.09	0.5	8.1	15			1.4	1.4	41	2	187	3	16	11	5				
Opotiki	25/05/04	043118	100	20	17.0	5290	34.9				8.1	18			1.3	1.4	47	2	274	7	36	13	5	0.5	0.05	0.4	9.5
Opotiki	25/05/04	043119	100	30	17.0	5290	34.9				8.1	9			1.4	1.4	49	2	247	2	114	12	5	0.4	0.04	0.4	2.8
Opotiki	25/05/04	043120	100	50	17.0	5280	34.9				8.1	16			1.3	1.3	49	2	175	2	19	14	5				
Opotiki	25/05/04	043121	100	100	16.8	5280	34.8				8.1	20			1.6	1.6	55	2	324	6	48	16	7	0.3	0.03	0.24	3.7
Pukehina	26/05/04	043127	10	0	15.9	4957	33.2	6.3	0.30	2.0	8.2	9			1.4	1.3	734	2	279	11	8	16	5				300.0
Pukehina	26/05/04	043128	20	0	15.5	5140	33.4	6.2	0.26	1.0	8.2	5.8			1	1.3	327	2	253	11	26	14	3	2.9	1.73	1.12	186.0
Pukehina	26/05/04	043129	20	20	15.5	5170	33.9				8.2	8.2			1.4	1.2	400	2	259	12	19	14	3	3.0	1.79	1.18	145.5
Pukehina	26/05/04	043130	30	0	15.2	5120	33.6	8.7	0.18	0.5	8.2	7.4			1.2	1.1	349	2	417	14	64	14	5				163.5
Pukehina	26/05/04	043131	30	20	15.5	5190	34.1				8.2	5.6			1.2	1	248	2	316	12	6	14	5				120.0
Pukehina	26/05/04	043132	30	30	15.7	5200	34.2				8.2	4.8			1.1	1.1	195	2	258	4	21	16	5				
Pukehina	26/05/04	043133	50	0	15.8	5210	34.2	13.1	0.19	1.0	8.2	7			1.1	1	140	2	178	8	6	13	8	2.9	2.06	0.86	223.0
Pukehina	26/05/04	043134	50	20	15.9	5220	34.4				8.2	6.6			1.4	1.1	142	2	366	19	30	14	5	2.7	1.74	0.99	151.0
Pukehina	26/05/04	043135	50	30	16.1	5230	34.5				8.2	4.8			1.2	1	135	2	208	10	6	15	5	2.0	1.38	0.64	108.5
Pukehina	26/05/04	043136	50	50	16.1	5260	34.7				8.1	4			1.4	1.1	105	2	282	11	14	13	5	1.6	0.95	0.62	43.0
Pukehina	26/05/04	043137	100	0	16.5	5290	34.9	8.1	0.10	0.5	8.1	2.8			1.3	0.9	63	2	175	7	40	14	7				
Pukehina	26/05/04	043138	100	20	16.5	5290	34.9				8.2	3.6			1	1	66	2	174	6	42	14	7	0.5	0.09	0.36	5.3
Pukehina	26/05/04	043139	100	30	16.5	5290	34.9				8.1	4.8			1.2	1	79	2	6040	6	5630	15	5	0.5	0.12	0.34	13.0
Pukehina	26/05/04	043140	100	50	16.6	5270	34.8				8.2	6.6			1	0.9	67	2	246	7	82	14	5				
Pukehina	26/05/04	043141	100	100	16.4	5210	34.4				7.7	6			1.1	1.1	62	2	3920	8	3050	15	7	0.7	0.09	0.58	14.4