Policy and Planning Committee

Thursday 1 September 2016
10.30am
Taranaki Regional Council, Stratford

Agenda for the meeting of the Policy and Planning Committee to be held in the Taranaki Regional Council chambers, 47 Cloten Road, Stratford, on Thursday 1 September 2016 commencing at 10.30am.

Members	Councillor N W Walker	(Committee Chairperson)
	Councillor P D Horton	
	Councillor B R Jeffares	
	Councillor C S Williamson	
	Councillor D L Lean	(ex officio)
	Councillor D N MacLeod	(ex officio)
Representatives	Councillor R Jordan	(New Plymouth District Council)
	Councillor R Vickers	(Stratford District Council)
	Councillor I D Armstrong	(South Taranaki District Council)
	Mr D H McIntyre	(Taranaki Federated Farmers)
Apologies	Councillor P Nixon	(South Taranaki District Council)

Notification of Late Items

Item 1	**Confirmation of Minutes - 28 July 2016**
Item 2	**Report on sensitive habitats and threatened species in the Taranaki Coastal Marine Area**
Item 3	**Draft Coastal Plan for Taranaki**
Item 4	**Swimmability - background information on water quality criteria for primary recreation**
Item 5	**SEM periphyton monitoring programme report for 2014-2016**
Item 6	**Regional Sector's views on Freshwater Reforms**
Item 7	**General Business**

Agenda Memorandum

Date 1 September 2016

Memorandum to
Chairperson and Members
Policy and Planning Committee

Subject: Confirmation of Minutes – 28 July 2016

Item: 1

Approved by: A D McLay, Director-Resource Management

B G Chamberlain, Chief Executive

Document: 1733805

Resolve

That the Policy and Planning Committee of the Taranaki Regional Council:

1. takes as read and confirms the minutes of the Policy and Planning Committee meeting of the Taranaki Regional Council held in the Taranaki Regional Council chambers, 47 Cloten Road, Stratford, on Thursday 28 July 2016 at 10.30am
2. notes the recommendations therein were adopted by the Taranaki Regional Council on 16 August 2016.

Matters arising

Appendices

Document #1720820 – Minutes Policy and Planning Committee Thursday 28 July 2016

Minutes of the Policy and Planning Committee Meeting of the Taranaki Regional Council, held in the Taranaki Regional Council Chambers, 47 Cloten Road, Stratford, on Thursday 28 July 2016 at 10.30 am.

Members	Councillors	N W Walker	(Committee Chairperson)
		P D Horton	
		B R Jeffares	
		C S Williamson	
		D L Lean	(ex officio)
Representatives	Councillor	P Nixon	(South Taranaki District Council)
	Councillor	R Vickers	(Stratford District Council)
	Councillor	R Jordan	(New Plymouth District Council)
	Mr	D McIntyre	(Federated Farmers Taranaki)
Attending	Messrs	A D McLay	(Director-Resource Management)
		G K Bedford	(Director-Environment Quality)
		M J Nield	(Director-Corporate Services)
		S R Hall	(Director-Operations)
		G C Severinsen	(Planning and Strategy Manager)
		C L Spurdle	(Planning Manager)
		S Tamarapa	(Iwi Communications Officer)
	Mrs	K van Gameren	(Committee Administrator)
	Ms	J Taylor	(Digital Media Co-ordinator)
	Mrs	V McKay	(Science Manager)
	Ms	D Young	(Policy Analyst)
	Mr	P Ledingham	(Communications Officer
	Mr	J Clough	(Wrightson Consulting)
	One member of the media.		
Apologies	The apology from Councillor M P Joyce and Councillor D N MacLeod was received and sustained.		
Notification of Late Items	There were no late items of business.		

1. Confirmation of Minutes – 9 June 2016

Resolved

THAT the Policy and Planning Committee of the Taranaki Regional Council

Doc# 1720820-v1

1. takes as read and confirms the minutes of the Policy and Planning Committee meeting of the Taranaki Regional Council held in the Taranaki Regional Council Chambers, Cloten Road, Stratford, on Thursday 9 June 2016 at 10.30 am

2. notes that the recommendations therein were adopted by the Taranaki Regional Council on 28 June 2016.

Williamson/Jeffares

Matters Arising

There were no matters arising.

2. Commentary by the Parliamentary Commissioner for the Environment on *Environment Aotearoa 2015*

2.1 Mr G C Severinsen, Policy and Strategy Manager, spoke to the memorandum introducing the Parliamentary Commissioner for the Environment's commentary on *Environment Aotearoa 2015*, New Zealand's state of the environment report prepared by the Secretary for the Environment and the Government Statistician in October 2015.

Recommended

THAT the Taranaki Regional Council

1. receive the memorandum Commentary by the Parliamentary Commissioner for the Environment on *Environment Aotearoa 2015*.

Vickers/Horton

3. NIWA Report – Water quality in NZ rivers – current state and trends

3.1 Mr G K Bedford, Director-Environment Quality, provided a presentation to the Committee on *Nation-wide water quality state and trends Report* by NIWA that presents an overview of the state of and trends in the quality of surface waters in New Zealand, drawing on regional council and national water quality monitoring networks. The Report allows data for the state of water quality at sites around Taranaki to be placed within a national context.

3.2 It was noted to the Committee that the Report shows Taranaki sites showing no trends of degradation, for any parameter, for the period under review.

Recommended

THAT the Taranaki Regional Council

1. receives the memorandum *NIWA report- water quality in NZ rivers- current state and trends*

2. notes the findings of the report

3. notes that the information within the NIWA report provides a very useful national context for the state of and trends in water quality in Taranaki.

Williamson/Horton

4. Submission on the Proposed National Policy Statement on Urban Development Capacity

4.1 Ms D Young, Policy Analyst, spoke to the memorandum introducing a submission made to the Proposed National Policy Statement on Urban Development Capacity released by the Ministry for the Environment and to recommend its endorsement. The submission was sent by the due date of 15 July 2016.

Recommended

THAT the Taranaki Regional Council

1. receives the memorandum *Submission on the proposed National Policy Statement on Urban Development Capacity*
2. endorses the submission.

Jeffares/Williamson

5. Climate Change Projections for New Zealand

5.1 The memorandum introducing to the Committee the Ministry for the Environment's *Climate Change Projects for New Zealand* report was received and discussed.

5.2 An typographical error was found in the memorandum relating to climate projections for Taranaki (Sea-level rise). The average rise in relative mean sea level was incorrectly written as 1.7m per year over the 20th century. Ms Young advised the Committee that New Zealand tide records show an average rise in relative mean sea level of 1.7mm per year over the 20th century. Globally, the rate of rise has increased and further rises are expected in the future.

Recommended

That the Taranaki Regional Council

1. receives the memorandum *Climate Change Projections for New Zealand*
2. note the projected changes to the Taranaki climate, including a slight increase in temperature (0.7 degrees to 1.1 degrees warmer by 2040 and 0.7 degrees to 3.1 degrees warmer by 2090), increase in winter rainfall in New Plymouth (by 5 to 9 per cent by 2090), and frosts will become an extremely rare event.

Williamson/Nixon

6. Report on Advocacy and Response activities for the 2015/2016 year

6.1 Mr G C Severinsen, Policy and Strategy Manager, spoke to the memorandum providing an overview summary to the Committee on the main advocacy and response activities for the 2015/2016 year that included 19 submissions made during the year on the policy initiatives of other agencies.

Recommended

That the Taranaki Regional Council

1. receives the memorandum on Advocacy and Response activities for the 2015/2016 year
2. notes that nineteen submissions were made during the year on the policy initiatives of other agencies
3. notes that senior staff were also involved in various working parties or other fora on central government policy development and review projects.

Vickers/McIntyre

7. District Council Transfer of RMA Powers for National Environmental Standard: Contaminated Soil to this Council

7.1 Mr A D McLay, Director-Resource Management, spoke to the memorandum outlining a New Plymouth, Stratford and South Taranaki district council proposal to transfer functions relating to the Resource Management (National Environmental Standard for Assessing and Managing Contaminated Soil to Protect Human Health) 2011 National Environmental Standard to the Taranaki Regional Council. This mainly concerns landfarming activities.

Recommended

That the Taranaki Regional Council

1. receives the memorandum on the proposal by District Council's to transfer functions relating to the Resource Management (National Environmental Standard for Assessing and Managing Contaminated Soil to Protect Human Health) 2011 (NES) pursuant to section 33 of the Resource Management Act 1991
2. notes that the Council's Consents and Regulatory Committee agreed to the transfer at their meeting held Tuesday 26 July 2016.

McIntyre/Nixon

8. Possum control on Egmont National Park and adjacent lands

8.1 Mr S R Hall, Director-Operations, spoke to the memorandum presenting a summary of the Council's involvement in the Egmont Pest Control Programme.

8.2 Mr Hall also updated Members on the PredatorFree NZ central government initiative and noted discussions were underway to utilise funds for Taranaki.

Recommended

That the Taranaki Regional Council

1. receives this memorandum *Possum control on Egmont National Park and adjacent lands*
2. notes that Council will shortly be undertaking direct possum control on approximately 15,000 hectares of privately owned land in support of Taranaki Mounga Project's pest control operation in the Egmont National Park.

Williamson/Jordon

9. Ngāruahine protected customary rights and customary marine title application

9.1 Mr A D McLay, Director-Resource Management, spoke to the memorandum providing an update to the Committee on Ngā Hapū ō Ngāruahine's application for protected customary rights and customary marine title under the *Takutai Moana (Marine and Coastal Area) Act 2011*.

9.2 Mr S Tamarapa, Iwi Communications Officer, gave a mihi (welcome) to Daisy Noble and David More from Ngāruahine. Mrs Noble provided a presentation to the Committee on the details of Ngāruahine's application as part of their key stakeholder engagement with the community and territorial authorities.

Recommended

That the Taranaki Regional Council

1. receives the memorandum *Ngāruahine protected customary rights and customary marine title application*
2. notes that Ngā Hapū ō Ngāruahine have applied for protected customary rights and customary marine title under the *Takutai Moana (Marine and Coastal Area) Act 2011*
3. notes the Council will have the opportunity to make a submission on the application when it is notified by the Ministry of Justice
4. notes that, as part of the review of the Coastal Plan, Council will be seeking to identify special areas of cultural , historical and spiritual associations to iwi in a revised Coastal Plan, and the application process and outcome will inform that review.

Williamson/Lean

10. General Business

There were no items of general business.

There being no further business, the Committee Chairperson Councillor N W Walker, declared the Policy and Planning Committee meeting closed at 12.35pm.

Confirmed

Committee Chairperson: _____

N W Walker

Date: **1 September 2016**

Agenda Memorandum

Date 1 September 2016

Memorandum to
Chairperson and Members
Policy and Planning Committee

Subject: Report on sensitive habitats and threatened species in the Taranaki Coastal marine area

Item: 2

Approved by: A D McLay, Director – Resource Management

B G Chamberlain, Chief Executive

Document: 1730187

Purpose

The purpose of this memorandum is to present the findings of investigations identifying sensitive marine habitats in the Taranaki region and introduce the consultant technical report *Sensitive habitats and threatened species in the Taranaki coastal marine area (2016)*(the Report). The report has contributed to the review of the *Regional Coastal Plan for Taranaki* and will inform the development of a section 32 report for the Draft Plan.

A copy of the Report is attached separate to this Agenda.

Executive summary

- The Taranaki Regional Council (the Council) is reviewing its *Regional Coastal Plan for Taranaki* (Coastal Plan).
- As part of that process the Council commissioned the Cawthron Institute (Cawthron) to undertake a desktop investigation, using existing available data, for the assessment of outstanding and sensitive substrates/benthic habitats and threatened (and at-risk) marine taxa in the Taranaki Coastal Marine Area (TCMA), with particular emphasis on the less well known offshore areas. The findings of this report have contributed to the preparation of a draft revised Coastal Plan (refer separate item).
- In 2015, the Council commissioned Cawthron to summarise sensitive and outstanding taxa/habitats within the TCMA. A preliminary technical study was undertaken that outlined habitats and substrate which might warrant protection in a revised Coastal Plan. It was based on a limited number of information sources but identified marine habitats regarded as being particularly important and sensitive because of their ecological values.
- Based upon the recommendations of the 2015 study, in March 2016 the Council commissioned Cawthron to prepare a second report with a more detailed assessment that identifies and maps (using existing information) outstanding and sensitive

substrates/benthic habitats and threatened marine taxa in TCMA, with particular emphasis on the less well known offshore areas.

- The attached report summarises the results of that further investigation. Key findings are as follows:
  - There were no 'threatened' invertebrate species matches within the TCMA boundaries.
  - In the regional vicinity of the TCMA (within ~200 km from the boundary) there were records of five 'threatened' invertebrate species matches. The record matches suggest that these species, might be present within the TCMA. The five 'threatened' invertebrate species are: the hydroid *Nemertesia elongata*, the whelk *Cominella quoyana griseicalx*, the crab *Leptomithrax tuberculatus mortenseni*, the pin-cushion star *Eurygonias hyalacanthus*, and the stony coral species *Madrepora oculata*.
  - Of the 13 Exclusive Economic Zone and Continental Shelf Act (2012) sensitive environment groupings, there were 11 with indicator species matches within, and in the regional vicinity of, the TCMA.
  - Within the TCMA there were 220 unique taxa records (158 species found no where else), when compared to the rest of New Zealand's taxa records using the 2016 Ocean Biogeographic Information System database.
  - The report notes that previous work in relation to the habitat and biological diversity of the Taranaki coastline has generally concluded that they "…*stand(s) out as being of overall low importance*". However, the report suggests that the ranking was generated using patchily distributed presence-only data, and that the TCMA may be more diverse than some of the previous references and charts suggested.
- The report will inform the development of the Council's section 32 [costs and benefits] report associated with the review of the Coastal Plan.
- The findings of the report have been incorporated into a schedule of a draft revised Coastal Plan with supporting Plan provisions that seek to protect identified taxa and habitats.

Recommendations

That the Taranaki Regional Council:

1. receives the memorandum and Cawthron Institute Report entitled *Sensitive habitats and threatened species in the Taranaki coastal marine area (2016)*
2. notes that the findings of the Report have contributed to the review of the *Regional Coastal Plan for Taranaki* and preparation of the associated section 32 policy assessment report.

Background

As Members are aware the Taranaki Regional Council (the Council) is reviewing its *Regional Coastal Plan for Taranaki* (Coastal Plan). As part of that process the Council has prepared a draft revised Plan that proposes a number of changes (refer to separate item). One of the matters looked at as part of the Plan review was the sensitivity and vulnerability of certain high value marine habitats to use and development in the coastal marine area.

The Taranaki Coastal Marine Area (TCMA) is, in relation to the Taranaki region, the area between the territorial sea limit (12 nautical miles offshore) and the line of Mean High Water Spring.

Offshore, the TCMA comprises of two separate marine biogeographic regions – the North Taranaki Bight and the South Taranaki Bight. The South Taranaki Bight area comprises of more gravel, sand and rock (higher energy) habitats, whereas there are generally more muds, fine sands and depositional sediments occurring in the North Taranaki Bight area.

TCMA depths at the 12 nautical mile boundary (territorial sea limits) range from 17 metres to 130 metres. The South Taranaki area has been noted as being 'important' habitat in terms of polychaete (worm) diversity. However, the TCMA as a whole was ranked low in terms of habitat complexity, suggesting that while they are distinct biogeographic areas, the North Taranaki and South Taranaki areas are each uniform physical environments.

Certain substrates within the TCMA are more likely to contain diverse, rare and/or sensitive benthic (sea dwelling) assemblages. The current Coastal Plan already contains provisions to protect rocky reef from activities such as drilling. However, in addition to reef systems, the Council is seeking to identify and protect other marine substrates/benthic habitat types. The Council is aware that areas of low-relief biogenic habitat (bivalve rubble and bryozoan rubble) that support diverse benthic assemblages exist in the South Taranaki Bight.

There are three main marine protected areas within the TCMA, the Parininihi Marine Reserve, Sugar Loaf Islands Marine Protected Area, and Tapuae Marine Reserve. In the North Taranaki Bight area there is also a specialised marine mammal sanctuary, which is part of the West Coast North Island (WCNI) Marine Mammal Sanctuary, founded in 2008 to help protect the critically endangered Māui dolphin.

In 2015 and 2016, the Council commissioned the Cawthron Institute (Cawthron) to undertake a desktop investigation for the assessment of outstanding and sensitive substrates/benthic habitats and threatened (and at-risk) marine taxa in the Taranaki coastal marine area, with particular emphasis on the less well known offshore areas. Set out below is a summary of the findings of these two studies.

Preliminary study (2015)

In 2015, the Council commissioned Cawthron to summarise sensitive and outstanding taxa/habitats within the TCMA and to determine appropriate buffer distance from sensitive habitats for oil and gas exploration and production activities. A preliminary study was undertaken that outlined habitats and substrate which might warrant protection in a revised Coastal Plan. It was based on a limited number of information sources but identified the following marine habitats as being particularly important and sensitive because of their ecological values:

- 66 sensitive coastal habitats - as identified by the Council in its Coastal Inventory
- other possible sensitive 'offshore' habitats—generic, including sensitive habitat types described in Schedule 6 of the Exclusive Economic Zone and Continental Shelf Act 2012 (EEZ Act) which were noted in the study as being a reasonable bench mark, or starting point, for which marine habitats should be protected
- other possible sensitive nearshore habitats within the TCMA, including North and South Traps and the Patea Shoals/Rolling Ground area.

The 2015 study noted that Graham Bank has not been investigated (as far as is known) yet could be a potentially outstanding area. The 2015 study, recommended that in order to identify additional outstanding habitats/substrates within the TCMA, marine taxa databases should be explored further for:

- characteristic species of sensitive environments in the Economic Zone and Continental Shelf Act (2012) sensitive environment groupings
- the New Zealand Threat Classification System list.

The Report

Based upon the recommendations of the 2015 study, in March 2016 the Council commissioned Cawthron to provide another fuller desktop investigation for the assessment of outstanding and sensitive substrates/benthic habitats and threatened marine taxa in TCMA, with particular emphasis on the less well known offshore areas. The aims of the study were to:

- identify and map threatened (and at-risk) taxa within, and in the wider vicinity of, the TCMA
- identify and map sensitive habitat within, and in the wider vicinity of, the TCMA
- identify unique taxa records within the TCMA (i.e. not occurring elsewhere in New Zealand)
- make recommendations for further investigation.

Methods used for this study were desk-top based, with specific focus on reviewing existing information in the form of databases, regional taxa lists, reports and legislation. Cawthron then assessed the information sources to identify the sensitive taxa and habitats that apply to the TCMA.

For the purpose of the study (and in the absence of any other relevant guidance) the EEZ (2012) sensitive environments list was used as an indication of sensitive and/or outstanding habitats that might be present in the deeper, outer reaches of the TCMA.

'Sensitivity' of environments was defined having regard to:

- Tolerance - of a species or habitat to damage from an external factor. Tolerance also incorporates rarity; the rarer a habitat is, the more an external factor is likely to damage a significant proportion of the habitat, and therefore it is assigned a lower tolerance rating.
- Recovery time - the time taken for its subsequent recovery from damage sustained as a result of an external factor.

In order to gain some idea of whether unique species occur within the TCMA, the 2016 Ocean Biogeographic Information System database was investigated further to identify a list of taxa exclusive to the TCMA area (unique taxa records).

This study has subsequently been completed and the findings of that investigation are summarized in the attached report. Key findings in the report are:

- There were no 'threatened' invertebrate species matches within the TCMA boundaries.
- In the regional vicinity of the TCMA (within ~200 km from the boundary) there were records of five 'threatened' invertebrate species matches. The record matches suggest that

these species, might be present within the TCMA. The five 'threatened' invertebrate species are: the hydroid *Nemertesia elongata*, the whelk *Cominella quoyana griseicalx*, the crab *Leptomithrax tuberculatus mortenseni*, the pin-cushion star *Eurygonias hyalacanthus*, and the stony coral species *Madrepora oculata*.

- Of the 13 EEZ (2012) sensitive environment groupings, there were 11 with indicator species matches within, and in the regional vicinity of, the TCMA (refer Table 1 below).

Table 1: Sensitive marine habitats off Taranaki

Sensitive habitats (EEZ 2012)	**Within the TCMA**	**In vicinity of the TCMA** (within 200km of the TCMA boundary)
(Beds of) large bivalve molluscs	**x**	**-**
Brachiopods	**x**	**-**
Bryozoans (thickets)	**x**	**-**
Calcareous tube worm (thickets)	**x**	**-**
Macro-algal (beds)	**x**	**-**
Sponge (gardens)	**x**	**-**
Rhodolith (maerl beds)	**x**	**-**
Chaetopteridae worm (fields)	**-**	**x**
Sea pens (field)	**-**	**x**
Stony coral (thickets)	**-**	**x**
Xenophyophores (sessile protozoan beds)	**-**	**x**
Deep-sea hydrothermal vents	**-**	**-**
Methane or cold seeps	**-**	**-**

- Within the TCMA there were 220 unique taxa records (158 species), when compared to the rest of New Zealand's taxa records (using OBIS 2016).
- The report specifies that the habitat and biological diversity of the Taranaki coastline, based on work to date, "…*stand(s) out as being of overall low importance*". However, the report also notes that the ranking was generated using patchily distributed presence-only data, and that results from Beaumont et al. (2013) suggest the South Taranaki area may be more diverse than some of the previous references and charts suggested.

Finally, the report notes that while the investigation yielded results identifying some sensitive marine habitats and threatened taxa within the TCMA, further physical investigation would be required to confirm the records, densities and spatial extents. Also highlighted in the report is that known records only cover a very small part of the TCMA, the vast majority of the TCMA still has not been sampled

Proposed approach to be adopted in a revised Coastal Plan

A separate item to this Agenda seeks Members' consideration of a Draft Coastal Plan for Taranaki.

The report has clearly identified sensitive marine benethic habitat types of high ecological value within the TCMA. As there is incomplete information on the location and extent of

these sensitive marine habitat types it is not possible (yet alone necessary given use pressures) for a revised Coastal Plan to map them.

Recognising the opportunities on building on information over time, it is proposed to schedule the habitat types in the draft Plan and include Plan provisions that seek to protect identified taxa and habitats. Through a revised Coastal Plan the Council will apply the consenting process to ensure activities within the TCMA do not have significant impact on the habitat types identified.

Of note, through the consenting process, new policies and rules apply that, amongst other things requires the adoption of a precautionary approach. As noted in the report, there is limited information on much of the TCMA. However, these information gaps can be addressed as part of the consenting process. In the event that a proposed activity in the TCMA, or adjoining area, is of a scale and type that poses a risk to these sensitive habitats, further work and investigation can be undertaken. Techniques such as video sled and drop camera monitoring methods, and ground-truthing with physical sampling could be undertaken to establish the presence or extent of sensitive marine habitats (or otherwise).

The Environment Protection Agency's processing of the marine consent application by Trans- Tasman Resources Ltd, to extract iron sand in the South Taranaki Bight, is a good example of a consent process providing the opportunity to provide considerable marine data and information for regulatory and policy development purposes in the TCMA..

Decision-making considerations

Part 6 (Planning, decision-making and accountability) of the *Local Government Act 2002* has been considered and documented in the preparation of this agenda item. The recommendations made in this item comply with the decision-making obligations of the *Act*.

Financial considerations—LTP/Annual plan

This memorandum and the associated recommendations are consistent with the Council's adopted Long-Term Plan and estimates. Any financial information included in this memorandum has been prepared in accordance with generally accepted accounting practice.

Policy considerations

This memorandum and the associated recommendations are consistent with the policy documents and positions adopted by this Council under various legislative frameworks including, but not restricted to, the Local Government Act 2002, the Resource Management Act 1991 and the Biosecurity Act 1993.

Legal considerations

This memorandum and the associated recommendations comply with the appropriate statutory requirements imposed upon the Council.

Appendices/Attachments – one separate report

Document number: 1729441. *Sensitive habitats and threatened species in the Taranaki coastal marine area*.

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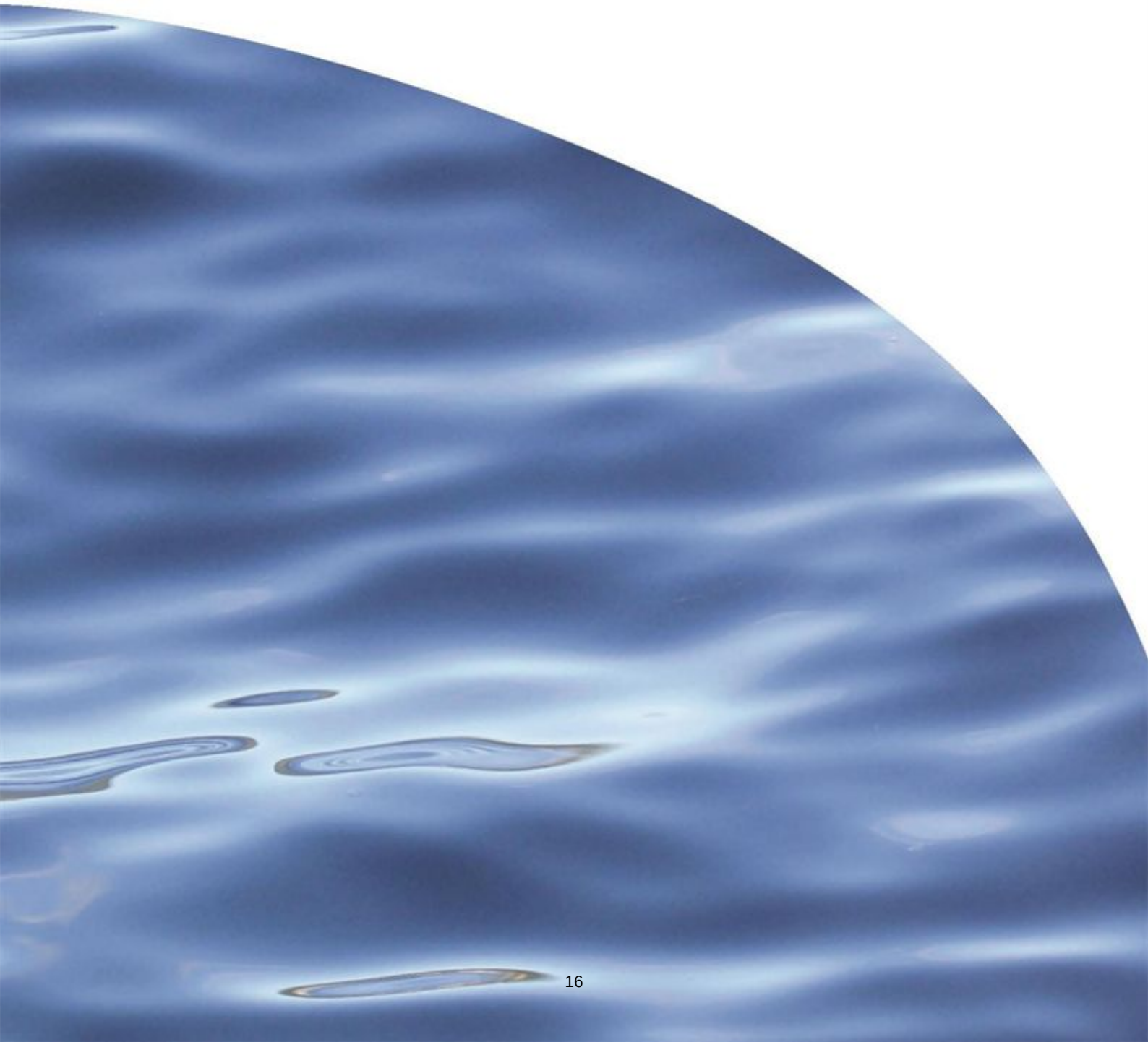
REPORT NO. 2877

SENSITIVE HABITATS AND THREATENED SPECIES IN THE TARANAKI COASTAL MARINE AREA (TCMA) — DATABASE INVESTIGATION



SENSITIVE HABITATS AND THREATENED SPECIES IN THE TARANAKI COASTAL MARINE AREA (TCMA) — DATABASE INVESTIGATION

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Prepared for Taranaki Regional Council (TRC)

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ISSUE DATE: 10 August 2016

RECOMMENDED CITATION: Johnston O 2016. Sensitive habitats and threatened species in the Taranaki Coastal Marine Area (TCMA) - database investigation. Prepared for Taranaki Regional Council. Cawthron Report No. 2877. 28 p. plus appendices.

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EXECUTIVE SUMMARY

Taranaki Regional Council (TRC) has commissioned Cawthron Institute to provide a desktop investigation for the assessment of outstanding and sensitive substrates/benthic habitats and threatened marine taxa in the Taranaki coastal marine area (TCMA), with particular emphasis on the less well known offshore areas. In order to address tier-one of the investigation, the Ocean Biogeographic information System (OBIS) online database was cross-referenced (compared) against threatened species lists and possible sensitive habitat indicator species lists. This resulted in the following findings:

- There were no 'threatened' invertebrate species matches within the TCMA boundaries.
- In the regional vicinity of the TCMA (within ~200 km from the boundary) there were records of five 'threatened' invertebrate species matches. The record matches suggest that these species, might be present within the TCMA: the hydroid *Nemertesia elongata,* the whelk *Cominella quoyana griseicalx,* the crab *Leptomithrax tuberculatus mortenseni*, the pin-cushion star *Eurygonias hyalacanthus)* and the stony coral species *Madrepora oculata*.
- Of the 13 EEZ (2012) sensitive environment groupings, there were 11 with indicator species matches[1] within, and in the regional vicinity of, the TCMA, as summarised below.

Sensitive habitats (EEZ 2012)	Within the TCMA	In vicinity* of the TCMA
(Beds of) large bivalve molluscs	x	-
Brachiopods	x	-
Bryozoans (thickets)	x	-
Calcareous tube worm (thickets)	x	-
Macro-algal (beds)	x	-
Sponge (gardens)	x	-
Rhodolith (maerl beds)	x	-
Chaetopteridae worm (fields)	-	x
Sea pens (field)	-	x
Stony coral (thickets)	-	x
Xenophyophores (sessile protozoan beds)	-	x
Deep-sea hydrothermal vents	-	-
Methane or cold seeps	-	-

*Within 200 km of the TCMA boundary

- Within the TCMA there were 220 unique taxa records (158 species), when compared to the rest of New Zealand's taxa records (using OBIS 2016). While some

[1] Where OBIS species records were sparse other information sources were investigated e.g. sea pens, coral, Chaetopteridae worms (using Cawthron's offshore database and Beaumont et al. 2013).

of these records appear to have resulted from Type 1 errors, results suggest that the TCMA could be more ecologically significant than previously thought.

- While this investigation yielded results that suggest sensitive marine habitats and threatened taxa are likely to exist within the TCMA, further physical investigation would be required to confirm the records, densities and spatial extents.

1. INTRODUCTION

1.1. Background

Taranaki Regional Council (TRC) has commissioned Cawthron Institute (Cawthron) to provide a desktop investigation for the assessment of outstanding and sensitive substrates/benthic habitats and threatened (and at-risk) marine taxa in the Taranaki coastal marine area (TCMA), with particular emphasis on the less well known offshore areas.

1.2. Scope

This report represents the first tier of a potentially two-tiered investigation. The scope of tier-one is comprised of the following components:

- identify and map threatened (and at-risk) taxa within, and in the wider vicinity of, the TCMA
- identify and map sensitive habitat within, and in the wider vicinity of, the TCMA
- identify unique taxa records within the TCMA (*i.e.* not occurring elsewhere in New Zealand)
- make recommendations for further investigation.

Each of these components is accompanied by support documentation in the form of GIS mapping packages (for external use) and Excel™ spreadsheets (for internal use).

If necessary, a second tier would follow on from this report, providing further investigation to address any identified information gaps.

1.3. Taranaki Coastal Marine Area (TCMA)

The coastal marine area (CMA) is the area between the territorial sea limit (12 nautical miles offshore) and the line of Mean High Water Spring (MHWS). The following sections describe characteristics of the Taranaki Coastal Marine Area (TCMA, Figure 1) from publicly available information sources.

1.3.1. Physical description

The Department of Conservation (DOC 2011) describes North Taranaki Bight and the South Taranaki Bight as different marine biogeographic regions (Figure 1). The South Taranaki area is comprised of more gravel, sand and rock (higher energy) habitats, whereas there are generally more muds, fine sands and depositional sediments occurring in the North Taranaki Bight area.

TCMA depths at the 12 mile boundary (territorial sea limits) range from 17 m to 130 m. The TCMA shallows to the north and south, with the deepest area (130 m) in the middle of the CMA, closest to the 12 mile boundary, northwest of Cape Egmont (approx. 1645387.626E; 5666699.104N).

The shallow shelf area in the southern TCMA is large with a greater proportion of shallow patchy bank/reef high energy habitat compared to other North Island coastlines (NZ LINZ chart). The southern shallow shelf area extends offshore approximately 2.5 km from adjacent Opunake, and increases in size to the south, extending approximately 25 km just west of Patea (100% of the CMA in this area). This area includes Patea Banks, and the North Trap, South Trap, Whenuakura Spur, Graham Bank and while outside the TCMA, the Rolling Ground (a shallow offshore reef —16 m depth) is near to the boundary (~4 km away). Within this shallow shelf area there are a number of even shallower patches (reefs/banks). Given that this area is very shallow, the prevailing weather and currents are likely to have strong effects on the benthic environment. The shallow shelf reduces to 7–10 km from shore adjacent Waiinu Beach (the inner edge of the TCMA), and continues to reduce in size and depth to the south (outside of the TCMA).

There are potential similarities between the finer sediment mud habitats and benthic communities in the Taranaki CMA and some of the Taranaki offshore areas (outside of the CMA), as described in DOC (2011), McKnight (1969), Grange (1991); and from the Cawthron offshore database (Caddis™ Database 2016). The nearby offshore habitats (outside the TCMA 12 mile zone) studied were soft sediment environments dominated by the fine silt and clay fractions, as opposed to some of the higher energy, coarser grain-size habitats found closer to shore. There may be similarities between habitats in the mid and north Taranaki Bight deep-mud lens (DOC 2011) and the offshore areas, particularly given their comparable sediment grain-size descriptions.

The South Taranaki area was noted in Beaumont et al. (2009) as being ‘important’ habitat in terms of polychaete diversity, and was noted as having three to four species (per ‘cell’[2]) of threatened invertebrate species (species undefined in report). However, the TCMA as a whole was ranked low in terms of habitat complexity, suggesting that while they are distinct biogeographic areas, the North Taranaki and South Taranaki areas are each uniform physical environments. The report specifies that the habitat and biological diversity of the Taranaki coastline ‘stand(s) out as being of overall low importance.’ However, it is noted that the ranking was generated using patchily-distributed presence-only data, and that results from Beaumont et al. (2013) suggest the South Taranaki area may be more diverse than some of the previous references and charts suggested.

[2] In order to map the measures of marine environmental value around New Zealand Beaumont et al. (2009) divided the NZ coastal area into smaller units called coastal ‘cells’. Approximately 300 cells were defined.

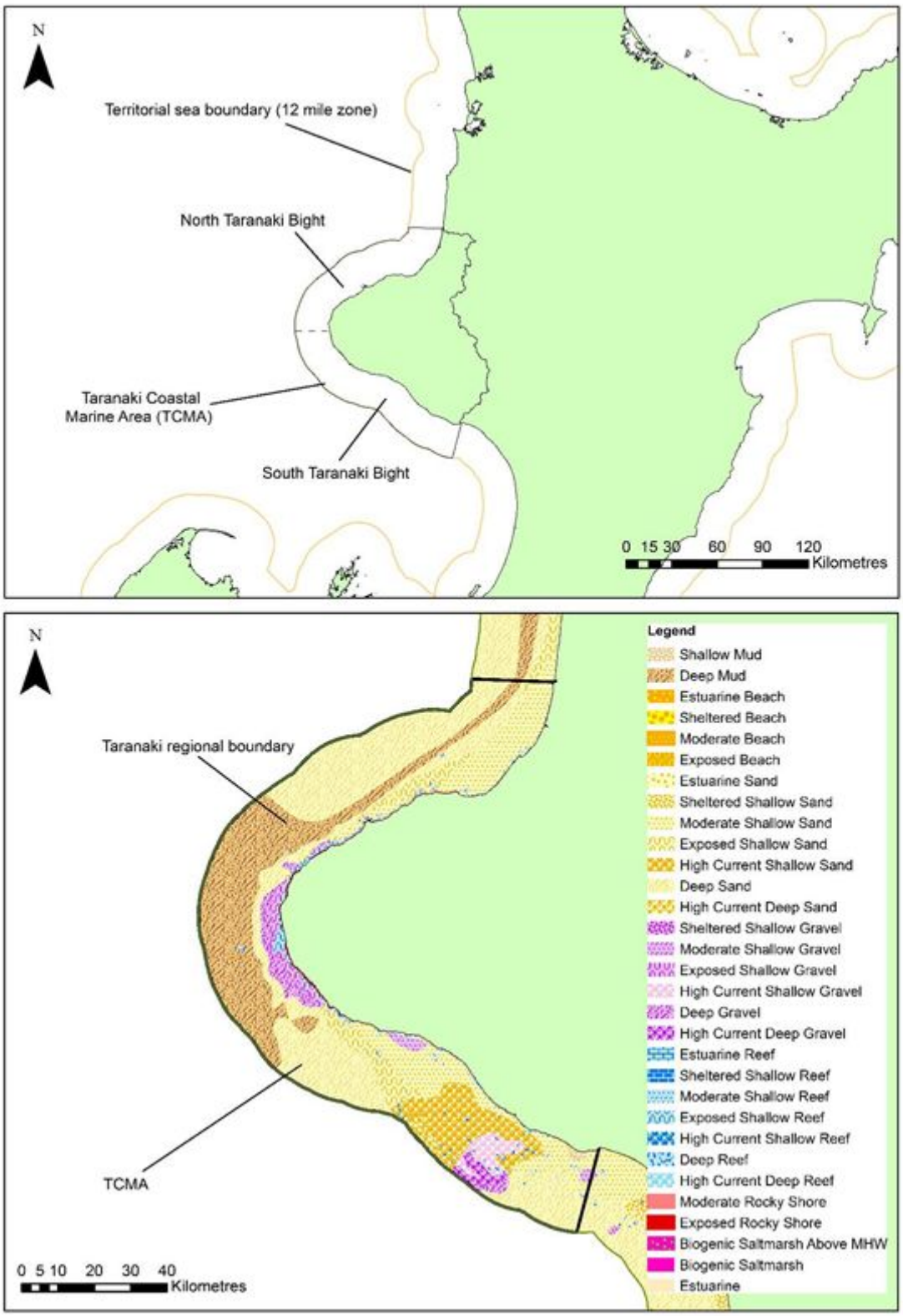

Figure 1. Top: Taranaki regional boundary and coastal marine area (CMA), New Zealand. Bottom: Map of the coastal marine habitat classification for the Taranaki coastal marine area, New Zealand (DOC 2011). Note: the key only includes those habitats present in the current map extent (~50% of the total possible habitat categories in New Zealand).

Marine protected areas

There are three main marine protected areas within the TCMA, the Parininihi Marine Reserve, Sugar Loaf Islands Marine Protected Area, and Tapuae Marine Reserve. In the North Taranaki Bight area there is also a specialised marine mammal sanctuary (Figure 2), which is part of the West Coast North Island (WCNI) Marine Mammal Sanctuary, founded in 2008 to help protect the critically endangered Māui dolphin (DOC 2015).

Anthropogenic structures

Taranaki also has areas that are restricted from marine activities (such as fishing and dredging) for the purpose of protecting anthropogenic structures and facilities relating to oil and gas production (Figure 2). The restrictions on sediment disturbance activities in these locations may have inadvertently shaped localised refuges for marine species within the TCMA.

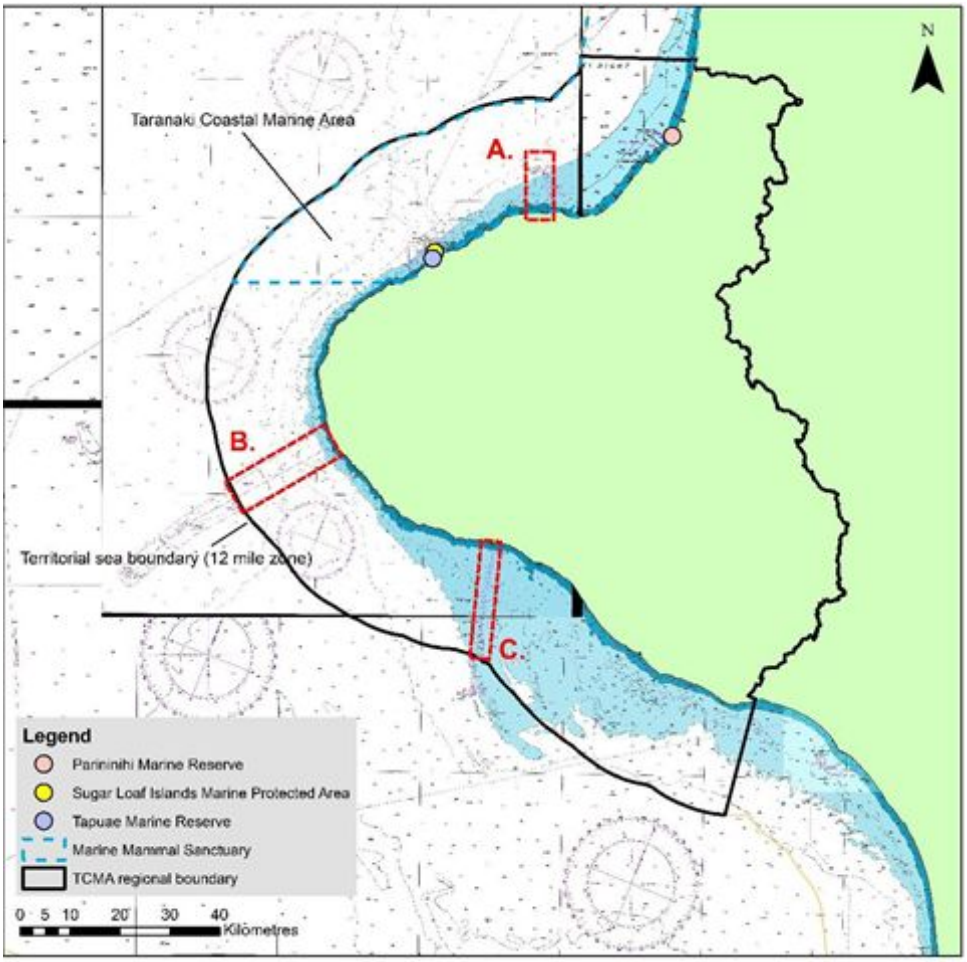

Figure 2. Taranaki coastal marine area (TCMA), anthropogenic marine structures/protection areas, marine reserves, and marine protected areas, over-laid on LINZ charts NZ43, 443 and 45. Outlined in red: A. Pohokura safety zone and protection area, B. Maui pipeline protection/restricted area, C. Kupe pipeline protection area.

1.3.2. Sensitive habitats background

The initial investigative letter by Johnston (2015) summarised sensitive and outstanding taxa/habitats within the TCMA. It outlined habitats and substrate which might warrant protection, based on a limited number of information sources (references therein). These taxa/habitats are listed as follows:

- sensitive coastal habitats: Taranaki Regional Council has defined a list of 66 sites as 'sensitive' habitats along the Taranaki coastline (MOSCP 2012)
- possible sensitive 'offshore' habitats—generic: The sensitive habitat types described in Schedule 6 of the EEZ Act (Exclusive Economic Zone and Continental Shelf Act; EEZ 2012) and MacDiarmid et al. (2013) represent a reasonable bench mark, or at least a starting point, for which habitats should be protected
- possible sensitive nearshore habitats within the TCMA:
    - North and South Traps. These are already identified as sensitive habitats in TRC's Marine Oil Spill Contingency Plan (MOSCP 2012), but could be investigated further
    - Patea Shoals / Rolling Ground area (LINZ charts and Beaumont et al. 2013) are worth considering as outstanding habitats in terms of ecological sensitivity (EEZ 2012), particularly the following sensitive habitats:
        - bryozoan rubble (possible thickets)
        - bivalve rubble
        - bivalve beds
        - other possible sensitive habitat identifiers (brachiopods, algae and sponges) described in the report by Beaumont et al. (2013)
    - Graham Bank has not been investigated (as far as is known), and may be a potentially outstanding area.

As per the recommendations from Johnston (2015), in order to identify additional outstanding habitats/substrates within the TCMA, marine taxa databases have been explored further for:

- characteristic species of sensitive environments (EEZ 2012)
- the New Zealand Threat Classification System lists (Freeman et al. 2010).

2. METHODS

Methods used for this investigation were desk-top based, with specific focus on examination of existing information in the form of databases, regional taxa lists, reports and legislation. How each of these information sources was used to assess the sensitive taxa and habitats of the TCMA is described in the following sections.

2.1. Obtaining a New Zealand marine invertebrate species list

In the first instance, a robust New Zealand marine invertebrate species list was required for comparison with threatened species lists, indicator taxa of sensitive environments and Taranaki-region specific records.

Taranaki-regional and New Zealand-wide taxa lists were obtained from the Ocean Biogeographic Information System (OBIS) online database (OBIS 2016). The spatial extent of the Taranaki OBIS taxa export was defined as including any record from within approximately 200 km from the TCMA boundary. The spatial extent of the New Zealand OBIS (2016) taxa export was defined as any invertebrate record with the spatial extent listed as 'New Zealand.'

Note: While OBIS is useful to provide context on sensitive environments in the TCMA, it is worth highlighting that OBIS records are derived from patchy presence/absence data, and are by no means a complete record of taxa in the region. The OBIS (2016) taxa list is therefore only intended to be indicative. Also, while the overall accuracy of the OBIS record locations were reliable, there were occasional outliers. Where these were considered extreme, the records were removed from the data-set.

2.2. Determining threatened taxa

To gain some insight into which taxa may be threatened or at risk within the TCMA, the 'conservation status of New Zealand marine invertebrates' list ('Excel™ spreadsheet' file derived from; Freeman et al. 2010, containing 311 invertebrate taxa) was cross-referenced against Taranaki regional taxa lists obtained from the Ocean Biogeographic information System (OBIS) online database (OBIS 2016).

Taxa listed in Freeman et al. (2010), are classified using a combination of terms, e.g., 'threatened', 'at-risk', 'naturally uncommon', 'nationally vulnerable' or 'range-restricted'. However, for the purpose of this assessment any taxa described using these terms are summarised as 'threatened.' Further details of the nature of the threat are provided in the individual results Sections (3.1.1 to 3.1.5).

2.3. Determining sensitive and/or outstanding habitats

For the purpose of this investigation (and in the absence of any other relevant guidance) the EEZ (2012) sensitive environments list[3] has been used as an indication of sensitive and/or outstanding habitats that might be present in the deeper, outer-reaches of the TCMA.

The 'sensitivity' of environments is described in MacDiarmid et al. (2013) as being defined by:

- **Tolerance** - of a species or habitat to damage from an external factor. Tolerance also incorporates rarity; the rarer a habitat is, the more an external factor is likely to damage a significant proportion of the habitat, and therefore it is assigned a lower tolerance rating.
- **Recovery time** - the time taken for its subsequent recovery from damage sustained as a result of an external factor.

Sensitive and/or outstanding habitats were identified by cross-referencing the indicator taxa specified in Schedule 6 of the EEZ Act (2012) (Summary table in Appendix 1) against Taranaki regional taxa lists obtained from the Ocean Biogeographic Information System (OBIS) online database (OBIS 2016). Where the OBIS database was found to be particularly low in indicator taxa data, other available databases and reports were investigated. Specifically:

- For additional sea pen and worm species records, the Cawthron database (Caddis™ Database 2016) was interrogated. However as these are client-owned data, only limited detail (presence/absence only) could be used without client approval.
- Beaumont (2013) was often referred to for information on other potential biogenic habitats in the area.

2.3.1. Possible indicator taxa selection

Where indicator taxa were not specified in the Exclusive Economic Zone and Continental Shelf Act (EEZ 2012) or MacDiarmid et al. (2013), possible 'indicator' taxa for these habitats were identified from publicly available references (references listed in Appendix 5). This method of selecting indicator taxa is therefore referred to here as 'possible indicator taxa,' and should not be used as a definitive list, as they are only approximations based on available information.

[3] The EEZ (2012) sensitive environments list was developed for use in New Zealand's exclusive economic zone, rather than the territorial seas.

2.4. Unique taxa records

In order to gain some idea of whether unique species occur within the TCMA, the OBIS (2016) database was investigated further. Taxa records within the TCMA were compared to those recorded elsewhere in the New Zealand Exclusive Economic Zone (EEZ). This provided a list of taxa exclusive to the TCMA area (unique taxa records).

Note: Some of these taxa record comparisons were impacted by Type 1 errors (detecting an effect that is not present). This was caused by differences in taxonomic resolution, typographic errors and patchy taxa records (in the OBIS database). However, it was outside of the scope of this investigation to groom the data further; therefore these errors have not been identified/removed.

Regional (within the TCMA) and national (NZ wide) distributions of potentially outstanding or sensitive habitats and threatened taxa were also discussed in each species- or habitat-specific report section. MacDiarmid et al. (2013) was often referred to for information regarding the regional and national distributions of sensitive species/habitats.

2.5. Data presentation

Results have been presented in Excel™ spreadsheets (lists). Species match locations have also been presented as geographic information system (GIS) mapping packages (using ArcMap 10.2.2). Maps were designed and edited for the purposes of adding future data, and public distribution. Excel™ sheets were designed for the purpose of internal use only.

3. RESULTS

The OBIS database extraction yielded over 150,000 taxa records in the vicinity of the TCMA (Appendix 3). Cross-referenced results for Taranaki CMA's threatened, at-risk and regionally significant taxa and possible sensitive environments/habitats are discussed in the following sections.

3.1. Threatened taxa

There were no threatened species list (Freeman et al. 2010) matches within the actual TCMA (OBIS 2016). However, there were five species detected in the vicinity of the TCMA (i.e. offshore and in neighbouring CMAs). These species are listed and described below in order of proximity to the CMA boundary. Cross-referenced results for Taranaki CMA's threatened, at-risk and regionally significant taxa are mapped in Figure 3 (with lists and GIS mapping files in Appendix 4).

3.1.1. Nemertesia elongata (Totton 1930)

Nemertesia elongata is a leptolid hydroid. It is a habitat-forming hydroid, with large colonial growths. It is considered an ecologically important biogenic substrata and is recorded from Spirits Bay to Foveaux Strait (Freeman et al. 2010). The *N. elongata* is classified by the threatened species list as 'at risk' and 'naturally uncommon,' and is reportedly threatened by bottom trawling and dredging (Freeman et al. 2010).

Given that *N. elongata* has been found nearby in the surrounding CMAs 17-14 km from both the most northern and southern boundaries of the TCMA, located between depth contours 0-50 m), it is possible that it also inhabits the TCMA.

3.1.2. Cominella quoyana griseicalx (Willan 1979)

Cominella quoyana griseicalx is a marine gastropod mollusc (snail) in the family Buccinidae. The threatened species list specifies that it is 'at risk' and 'naturally uncommon' with a 'range restricted' distribution (Freeman et al. 2010).

This marine snail was recorded approximately 42 km from the TCMA boundary (WNW of New Plymouth). Given the reasonably close proximity of the records to the TCMA boundary, and that there are some benthic substrates similar to that within the TCMA (~130 m depth mud and fine sand), it is possible that *C. quoyana griseicalx* may be present in the TCMA.

3.1.3. Madrepora oculata (Linnaeus 1758)

Also called the zigzag coral, *Madrepora oculata* is a stony coral (order: Scleractinia) that is found worldwide (excluding polar regions), growing at depths of 80–1500 m. It

is one of the protected coral groups listed in both the Wildlife Act (Wildlife Act 1953) and the Coral Identification Guide by Tracey (2014). The threatened species list (Freeman et al. 2010) identifies *Madrepora oculata* as 'threatened' and 'nationally vulnerable' with a, 'D' status (5000–20,000 mature individuals) and '1/1' trend (decreasing 30–70%). In comparison to NZ populations, this coral is noted to have secure populations overseas.

The record for this coral in closest proximity to the TCMA was approximately 52 km WNW of the TCMA boundary. This area has many similarities in habitat, including depth (~130 m), and benthic substrate (mud and fine sand) to the marine areas adjacent Cape Egmont, within the TCMA. Given these similarities, and the relatively close proximity of other *Madrepora oculata* records, it is possible that the coral may also be present within the TCMA.

3.1.4. Leptomithrax tuberculatus mortenseni (Bennett 1964)

Leptomithrax tuberculatus mortenseni is a decapod crustacean (crab) in the family Majidae. The species was described in Yaldwyn and Webber (2011) as endemic to northern New Zealand and the Kermadec Islands, with a prevalence on inner shelf areas. The threatened species list (Freeman et al. 2010) identifies it as 'at risk' and 'naturally uncommon' with a 'range restricted' distribution.

This crab was recorded approximately 94 km from the TCMA boundary, near the 50 m depth contour on the eastern side of D'Urville Island (South Island). The DOC (2011) habitat type layer describes the substrate off D'Urville Island as 'High Current Shallow Sand'. Similar substrate, and inner shelf habitat, is prevalent in the vicinity of Patea within the TCMA, which suggests that *Leptomithrax t. mortenseni* may occur in this area of the TCMA.

3.1.5. Eurygonias hyalacanthus (Farquhar 1913)

Eurygonias hyalacanthus is a type of pin-cushion star with short arms, covered in distinctive bumps. The threatened species list (Freeman. 2010) identifies it as 'at risk' and 'naturally uncommon' with a 'sparse,' 'range restricted,' distribution. It is noted as present in the following locations: Cook Strait/Kapiti Island area, Stewart Island, Snares Islands, Cape Palliser/Wairarapa, Ruby's Reef (Kaikoura).

The closest record for *E. hyalacanthus* from the OBIS (2016) database was from the Cook Strait, about 156 km from the TCMA boundary, on the 100–150 m depth contour. *Eurygonias hyalacanthus* was (in this instance) found in high current deep sands and gravels (DOC 2011), similar to those found offshore from Patea. While the TCMA and Cook Strait areas are spatially distinct with undoubted differences in coastal currents, the similarities in habitat/sediment type suggest that *E. hyalacanthus* could potentially occur in areas of the TCMA.

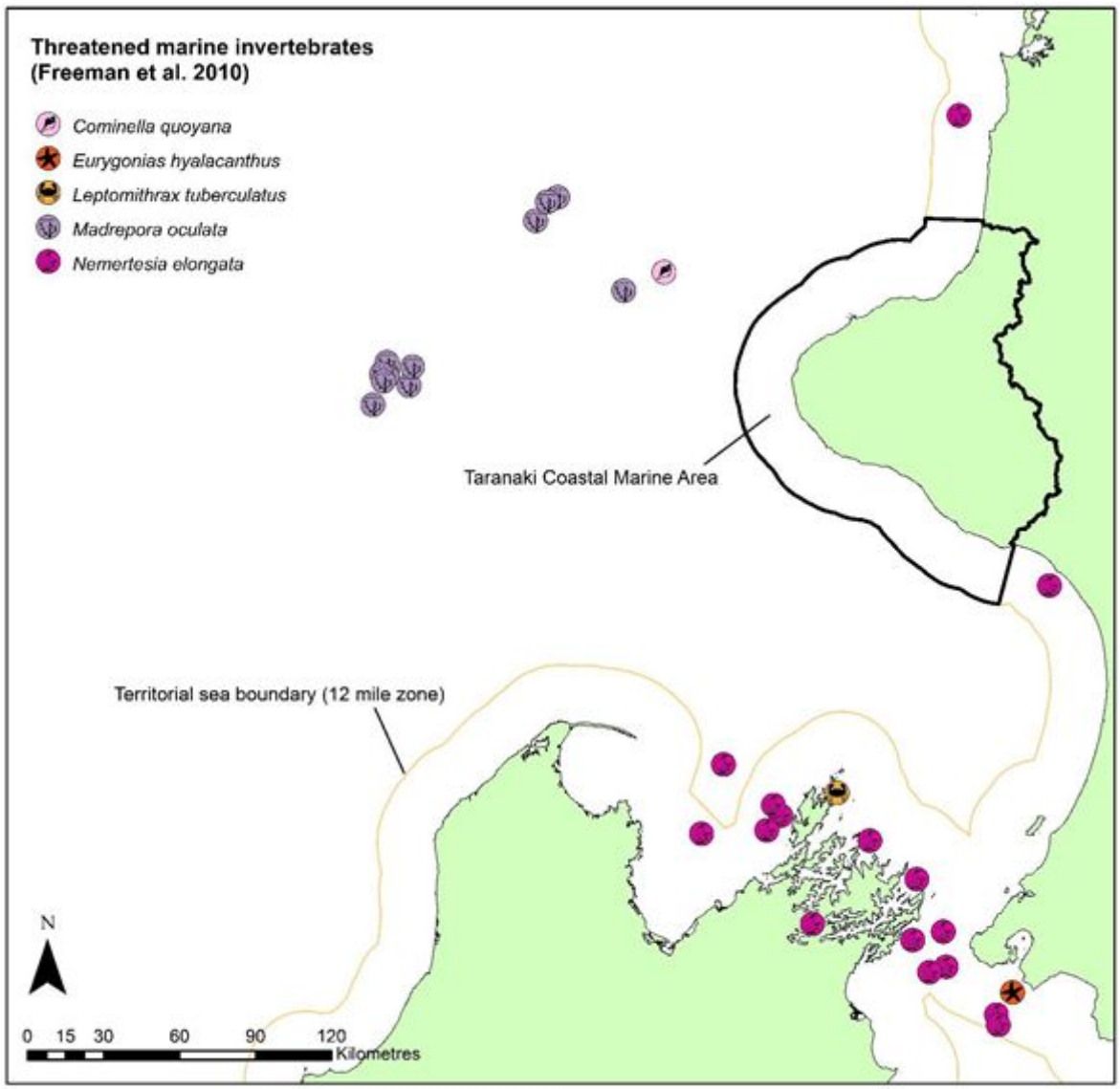

Figure 3. Taranaki coastal marine area (TCMA), in relation to the closest recorded instances of threatened marine invertebrates, as listed in the Excel™/electronic version of Freeman et al. (2010).

3.2. Sensitive and/or outstanding habitats

Of the thirteen EEZ (2012) sensitive environment (habitat) groupings (Appendix 1), 11 exhibited indicator species matches for locations within, and in the vicinity of, the TCMA. For each of these 11 sensitive habitats, possible indicator species and likelihood of occurrence within the TCMA are described in the following sections. Cross-referenced results for possible sensitive environments/habitats are mapped in Figure 4 (with lists and associated GIS mapping files in Appendix 5).

Note: none of the indicator species listed (by EEZ 2012) for deep sea hydrothermal vents or methane / cold seeps were present in the OBIS (2016) taxa list export.

3.2.1. Beds of large bivalve molluscs

Bivalvia is a superorder within the phylum Mollusca, commonly called shellfish. They are characterised by their shell, which has two halves (valves) connected by a ligament, hinge and adductor muscles (clams, mussels, oysters, scallops, etc.).

The EEZ (2012) criteria for identification of sensitive 'bed of large bivalve' habitats, appears to refer to biomass (Appendix 1), rather than the individual size (e.g. shell length) of the bivalve (as the category suggests). Therefore, it may be more appropriate to think of this category as 'large beds of bivalve molluscs'.

Out of 98[4] possible bivalve indicator taxa (obtained from; Tracey et al. 2011; Caddis™ Database 2016) cross-referenced against the OBIS database, 54 matches (over 36 sites) were identified as occurring within the TCMA (Figure 4). The 5 most common bivalve taxa records within the TCMA were; *Glycymeris modesta, Scalpomactra scalpellum*, *Nemocardium pulchellum*, *Notocallista multistriata* and *Tawera spissa.* With 2608 OBIS record matches within approx. 200 km of the TCMA boundary, bivalves were the most common of the possible habitat indicators detected in the TCMA (Figure 4).

As the OBIS (2016) results related to presence/absence rather than biomass or abundance, it was not possible to accurately determine whether the records constituted 'large' bivalve beds (based on the EEZ 2012 criteria). Also, the criteria specifies that the bivalves can be living or dead. To what extent broken shell / dead shell constitutes a bivalve bed is not specified. However, the shelly sand types occurring predominantly in the Southern Taranaki Bight region (LINZ marine chart NZ45), and *Tucetona* bivalve beds (live and dead/rubble) found at Patea Shoals (South Taranaki; Beaumont et al. 2013) could potentially fit the EEZ (2012: Appendix 1) description of a sensitive offshore habitat as well.

[4] According to Tracey et al. (2011) there are 680 species of bivalve in NZ, with 231 still undescribed. However, only 98 taxa names have been used in this analysis, as that was all that was obtainable from the available references.

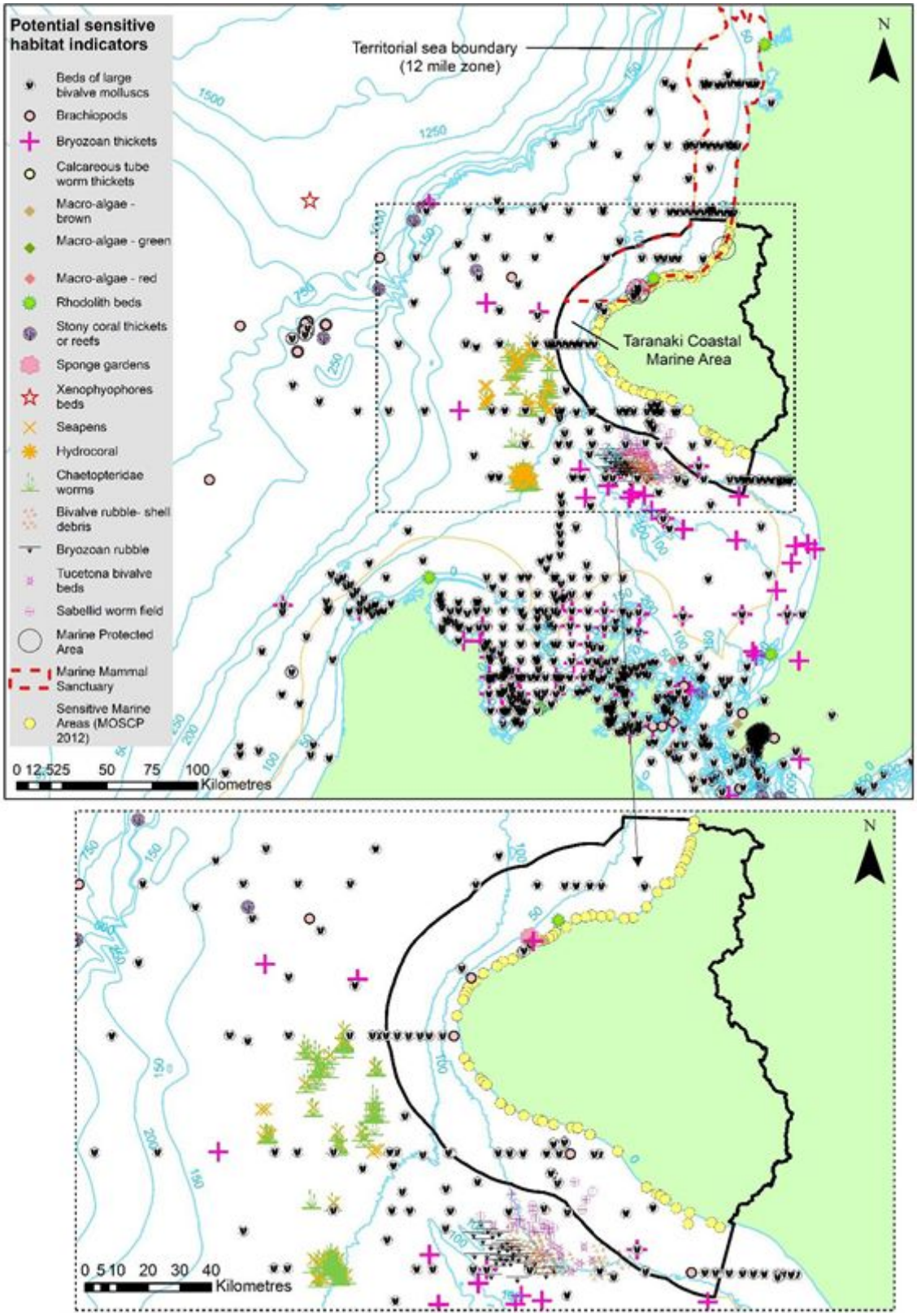

Figure 4. The Taranaki coastal marine area (TCMA), in relation to records of possible sensitive marine habitat indicators (as described in Wildlife Act 1953; EEZ 2012; MOSCP 2012). within the wider regional area. Inset map (lower) is a magnified subset, South Taranaki Bight. For further detail refer to Appendix 5.

3.2.2. Brachiopods

Brachiopods (lamp shells) are a phylum of organisms that resemble bivalve molluscs, but the valves enclose the body dorsally and ventrally rather than laterally. Some species attach to substrate via a short stalk emerging from the hinge area of the valves (Tracey et al. 2011). Bowen (1968) described Brachipoda as a 'rare or minor element of the marine fauna' and a 'declining group of marine organisms'.

Out of 10 possible brachiopod indicator taxa (obtained from Bowen 1968) cross-referenced against the OBIS (2016) database, three matches[5] (over eight sites) were identified within the TCMA (Figure 4); *Liothyrella*, *Magasella* and *Waltonia* (synonym *Calloria*). The locations of brachiopod records within the TCMA were reasonably wide spread, extending north adjacent to Puniho/Okato, and south, to the southernmost extent of the region. The furthest offshore of these records were for *Magasella*, located near the TCMA boundary (12 miles) to the south and southeast of Patea Shoals. In addition to this, there were 93 taxa matches from the wider surrounding area, around 200 kms from the TCMA boundary.

Beaumont (2013) collected a total of 395 brachiopod specimens from three species (*Calloria inconspicua, Neothyris lenticularis* and *Terebratella* sp.) in dredge samples from Patea Shoals, predominantly from bryozoan rubble habitats (Figure 4; inset map), with some from the mid-shelf areas. Brachiopods were also recorded as prevalent in the still photographs taken at most sites in the bryozoan rubble habitats (Section 5.3.3 below).

Given these findings, and the EEZ (2012) habitat criteria (Appendix 1), the TCMA does appear likely to have sensitive brachiopod habitat present.

3.2.3. Bryozoan thickets

Bryozoans mostly form calcium carbonate crusts or tufts that may superficially resemble other forms of marine life. They occur in a range of forms including; encrusting (resembling a moss-like layer), mats with upright folds (resembling small corals), perforated mats (i.e. lace 'corals'), tufted or bushy species (resembling hydroids or small seaweeds). Some large and abundant marine bryozoans form a type of bottom habitat referred to as a thicket. Bryozoan thickets (in particular frame-building varieties) provide habitat, refuge and resources for other organisms (e.g. hydroids, ascidians, barnacles, worms, sponges, sea stars, crustaceans, and fish; Smith & Gordon 2011).

Out of 86 possible bryozoan indicator taxa (obtained from Smith & Gordon 2011; Environment Guide 2016) cross-referenced against the OBIS database, 11 matches

[5] Identified to genus level only.

(over two sites[6]) were identified within the TCMA (Figure 4); *Akatopora circumsaepta, Cellaria immerse, Celleporaria agglutinans, Diaperoecia purpurascens, Escharoides angela, Escharoides excavate, Hippellozoon novaezelandiae, Hippomenella vellicata, Odontionella cyclops, Telopora lobata, Watersipora subtorquata.* The locations of these two sites within the TCMA were relatively distant, with one record to the north on the shoreline near the Sugar Loaf Islands, and the other to the south of the TCMA, near Grahams Bank (approx. 40 m depth, 17 km offshore). There were more than 20 bryozoan record matches outside of the TCMA (Figure 4, Appendix 5).

The Environment Guide[7] (2016) described two of the habitat-forming bryozoan species from the cross-reference matches (*Celleporaria agglutinans* and *Hippomenella vellicata),* found at the site furthest offshore (Figures 4, Appendix 5), as being important indicators of sensitive environments.

Beaumont et al*.* (2013) describes presence of 'bryozoan rubble' in the region (Figure 4).The rubble consisted of shell debris (below 60 m) heavily encrusted with late stage colonisers, dominated by branching bryozoans and other sessile suspension-feeding invertebrates. Their descriptions of the rubble habitat indicate it was fragile and of 'breakable nature.' Dredge samples of bryozoan rubble collected up to 3896 live specimens across combined taxa, with a total of 14,680 live bryozoan colonies from 161 species recorded from the dredge data. Several of the species collected by Beaumont et al*.* (2013) are known to form significant habitats in other parts of the country[8].

Given these findings and the EEZ (2012) habitat criteria (listed in Appendix 1), the TCMA appears to have sensitive frame-building bryozoan thicket habitat present.

3.2.4. Calcareous tube worm thickets

Calcareous tube worm thickets are formed by calcium carbonate secreting tube worm species that are large and abundant enough to provide biogenic habitat for other species. They occur at all depths in coastal, intertidal and abyssal waters (MacDiarmid et al*.* 2013; Environment Guide 2016).

Out of three possible calcareous tube worm indicator taxa (obtained from Morrison et al*.* 2014; Environment Guide 2016) which were cross-referenced against the OBIS (2016) database, one taxa match *Galeolaria hystrix* was identified over two sites within the TCMA (and the general vicinity, Figure 4, Appendix 5). Both records were on the rocky shore within and just south of the Sugar Loaf Marine Protected Area. In

[6] For better resolution the reader is referred to the electronic mapping files in Appendix 5.
[7] Environment Guide (2016): Sensitive environments were identified using the MarLIN method developed by the United Kingdom's Marine Life Information Network.
[8] e.g. *Cinctipora elegans* on the Otago Shelf and in Foveaux Strait, *Celleporaria agglutinans* ('Tasman Bay coral') in Tasman Bay and elsewhere, *Celleporina grandis* on Otago Shelf, *Adeonellopsis* sp. on the sills at the entrances to the fiords.

New Zealand, the range of *G. hystrix* is reported to extend from the Taranaki Coast down to Stewart Island (MacDiarmid et al. 2013).

Beaumont et al. (2013) had no record of calcareous tube worm thickets/fields in the Patea Shoal region.

Given these findings, and the EEZ (2012) habitat criteria (Appendix 1), the TCMA appears less likely to have calcareous tube worm thicket habitat present, with the exception of some nearshore/rocky shore locations. However, this may also be a result of the low level of information available for high energy shallow-shelf environments.

3.2.5. Chaetopteridae worm fields

The Chaetopteridae are a family of marine filter feeding polychaete worms that live in tunnels buried in marine sediments. In New Zealand little is known about tube-worm biogenic habitat, although low relief worm tube meadows are reported to be widespread in many areas. Of particular note is the meadow-forming species *Phyllochaetopterus socialis* (wire-weed). It forms beds of isolated individuals within mixed epifaunal assemblages, through to extensive dense meadows (MacDiarmid et al. 2013).

Out of two possible indicator taxa names (Chaetopteridae and *Phyllochaetopterus socialis*; MacDiarmid et al. 2013) which were cross-referenced against the OBIS database, there were no taxa matches identified within the TCMA or in the vicinity (within ~200 km of the TCMA boundary; Figure 4). When cross-referenced against the Cawthron database (Caddis™ Database 2016) the closest record to the TCMA boundary was 5 km from the deepest TCMA area adjacent Cape Egmont (Figure 4, Appendix 5). However, as most of the records are of single individuals (maximum 5 in one 10L sample), the densities are not likely to constitute a worm field in the context of the EEZ (2012) criteria. Despite this, Chaetopteridae worms/beds are known to occur in much higher densities (up to 600 individuals per sample) closer to the shoreline in the nearby Marlborough Sounds region (Caddis™ Database 2016)

Beaumont et al. (2013) showed no record of Chaetopteridae tube worm thickets/fields in the Patea Shoal region. However, the presence of a depauperate[9] 'worm field' dominated by the infaunal tubeworm *Euchone* sp. A was reported. Similar to chaetopterid worms, this sabellid worm binds the surrounding sediments together to form its tube. Worm field habitats were also described as abundant in sediments in mid-shelf areas to the north of the TCMA. While *Euchone* sp. A appears to be a common and abundant species within the Patea Shoals region (and adjacent northern

[9] Typically low abundance taxa were observed in the worm fields *i.e.* hermit crabs, small gastropods and the occasional bryozoan (Beaumont et al. 2013).

mid-shelf areas; Beaumont et al. 2013), it is reportedly 'undescribed' and is not yet known/described from other areas around New Zealand (Anderson 2014).

Given these findings, and the EEZ (2012) habitat criteria (listed in Appendix 1), it appears possible that there are Chaetopteridae, and potentially undescribed sabellid-dominated worm fields, present within the TCMA.

3.2.6. Macroalgae beds

Although not strictly an invertebrate species (the focus of this report), macroalgae are mentioned here due to their status as an EEZ (2012) sensitive habitat indicator. Given the availability of suitable habitat for macroalgae (Figure 1), there is potential for a diversity of macroalgal taxa within the TCMA.

Macroalgae or seaweeds are multicellular plants occurring in green, brown and red forms and frequently form mats, forests or 'beds'. Macro algal beds require the presence of enough light (for photosynthesis), and an attachment point for their root-like holdfasts (with the exception of some genera that float freely e.g. *Sargassum* and *Gracilaria*). Seaweeds tend to occupy habitat closer to the shore, frequently on rocky shorelines, but they will also grow on unconsolidated substrates, such as rubble, rodoliths and shells. In some areas, littoral seaweed can extend several kilometres out to sea. The deepest living seaweeds are some species of red algae, found at depths of 295 m in the clear waters of the Bahamas but more commonly macroalgae occur at depths less than 100 m (Fredericq 2016).

Out of 83 possible indicator taxa (obtained from Lindauer 1946; Hayward et al. 1999; Wassilieff 2015) cross-referenced against the OBIS database, three species matches were identified within the TCMA: the macroalgal taxa *Macrocystis* (brown), *Pterocladia lucida* (red) and *Ulva lactuca* (green). These species were located nearshore, directly north and south of the Sugar Loaf Islands (Figure 4, Appendix 5). No algal records were noted offshore. The taxa *Gracilaria* (red macroalgae), *Lessonia* (brown) and *Caulerpa brownii* (green) were present in the vicinity of the TCMA, particularly to the southwest of the North Island and in the outer reaches of the Marlborough Sounds (Figure 4, Appendix 5). The low level of macroalgae result matches appear to be largely attributable to differences in taxonomic ranking (Hayward et al. 1999, only reported to genus level, while OBIS [2016] was predominantly to species level).

Further investigation into the macroalgal taxa collected by Beaumont et al. (2013) revealed a total of twenty-six taxa were collected in the vicinity of TCMA's Patea Shoals (notably inner shelf, mid-shelf north and mid-shelf south, and offshore locations). Three species of red macroalgae recorded at the deeper 'offshore' sites (in bryozoan rubble habitat) in the vicinity of Patea Shoals (*n. gen. Cryptonemia-like* sp. [new species record], *Hymenena* sp. and *Haraldiophyllum crispatum*). Note: exact

locations for these records were not able to be mapped with the information provided by Beaumont et al. (2013).

Given the presence of macro-algal taxa within the TCMA and the reported red macro-algae in the offshore vicinity, it is likely that macro-algal beds occur at levels consistent with the EEZ (2012) sensitive habitat criteria, within the TCMA.

3.2.7. Sea pen field

Sea pens are colony-forming marine cnidarians (order Pennatulacea) that can inhabit widespread areas of soft-sediment sea floor. Out of 25[10] possible indicator sea pen taxa (obtained from Williams et al. 2014; Environment Guide 2016) cross-referenced with the OBIS (2016) taxa list, none were detected within, or in the vicinity of, the TCMA.

Based on records from the Cawthron database (Caddis™ Database 2016) two sea pen species matches were made in the vicinity of the TCMA: *Funiculina quadrangularis* and *Virgularia gracillima.* The most prevalent was *Virgularia gracillima* (occurring at over 40 sites, Figure 4, Appendix 5). For both species, the majority of the sample records are of single individuals (maximum 2 sea pens in one 10L sample), occasionally obtained in successive point samples.

Given the presence of sea pen taxa in the offshore vicinity, it is possible that sea pen fields may occur within the TCMA at levels that meet the EEZ (2012) habitat criteria (listed in Appendix 1).

3.2.8. Sponge gardens

Sponges (phylum Porifera) are common marine invertebrates around the New Zealand coastline. Most species encrust hard rocky substrate, but many also live embedded in sandy muddy sediments with a root-like structure (Kelly & Herr 2015). In New Zealand glass sponges (class Hexactinellida[11]) generally dominate deep water environments and demosponges (the largest poriferan class) dominate the shelf and coastal faunas (1–250 m). Regions of high sponge bio- and morphological-diversity are often referred to as ‘sponge gardens’, but typically sponge gardens are defined by their spatial characteristics (Appendix 1; MacDiarmid et al. 2013).

Out of 89[12] possible sponge garden indicator taxa, one site showed sponge taxa present within the TCMA (Sugar Loaf Islands Mare Protection Area; Figure 4): *Crella incrustans, Polymastia fusca, Raspailia topsenti, Stelletta conulosathere*. There were

[10] MacDiamid et al. (2013) reports that 31 species of sea pens are known from New Zealand waters, with 19 still to be formally described. However, only 25 sea pen species names were obtainable from available literature.
[11] Hexactinellid sponges are relatively uncommon (compared to other classes like demosponge) with a skeleton made of pointed siliceous spicules, often referred to as glass sponges.
[12] To date well over 500 sponge species have been formally described from New Zealand (MacDiarmid et al. 2013). However, only 89 sponge species names were obtainable from available literature.

no other record matches in the TCMA vicinity (approx. 200 km from TCMA boundary), which is unusual given the ubiquity of sponges. This lack of record matches is likely related to a deficit of sampling/monitoring that is appropriate for detecting sponges in the TCMA, or a lack of possible indicator taxa (89 out of a possible 500), rather than an absence of sponge taxa. Recent work from the National Institute of Water and Atmospheric Research (Michelle Kelly, NIWA), has tentatively identified a dozen different sponge species on a small patch reef approximately 11 km off shore from Patea (pers. comm. Thomas McElroy, 15 July 2016). It is also recognised that other protected areas (e.g. Parininihi Marine Reserve, Sugar Loaf Islands Marine Protected Area, and Tapuae Marine Reserve) in the TCMA are likely to have many sponge species yet to be identified (pers. comm. Emily Roberts, 19 July 2016). Clearly, there are more sponge taxa present in the TCMA than the OBIS database search was able to detect.

Glass-sponge gardens have also been reported by MacDiarmid et al. (2013) to occur in North Taranaki Bight area, at depths of 160–330 m. In this instance they were classified as of 'low species diversity, low morphological diversity, low to medium density, low percentage cover, uniform distribution'. The exact location of the North Taranaki Bight record was not able to be obtained from the report, however they appear to occur at depths near-to or greater-than the TCMA maximum depth (approximately 130 m).

Given the presence of sponge taxa within the TCMA marine protected areas and the reported glass sponge gardens in the offshore vicinity, it is possible that sponge gardens may occur within the TCMA, at volumes[13] and surface areas[14] that meet the EEZ (2012) habitat criteria (listed in Appendix 1).

3.2.9. Stony coral thickets or reefs

Corals are a group of colonial organisms belonging to the phylum Cnidaria. Deepwater (cold water) corals are found between approximately 200–2000 m depths and 4–12°C temperatures. Coldwater corals are slow growing, long-lived and fragile, often having high biodiversity associated with them. As such, these habitats are considered to be vulnerable marine ecosystems that warrant protection (MacDiarmid et al. 2013).

Out of five possible stony coral habitat-forming indicator taxa (listed in Appendix 1, EEZ 2012 and described in MacDiarmid et al. 2013), none have been recorded from within the TCMA. However, two species have been found in the vicinity (Figure 4, Appendix 5):

[13] Sponges comprising 20-25% the volume of successive point samples; or any sample collected using towed gear.
[14] Sponges comprising 25% of seabed over 100m^2 in a visual imaging survey.

- *Goniocorella dumosa*—30 km from TCMA boundary WNW of Cape Egmont, North Taranaki Bight and between the 50–100 m depth contours. Sediment types in vicinity were muddy shell (M.Sh), rubble (R), fine sand/shell/cobbles (fS.Sh.Co; LINZ chart NZ45).
- *Madrepora oculata*—50 km from TCMA boundary SW of Grahams Bank, South Taranaki Bight and between the 100 – 150 m depth contours. Sediment types in the vicinity consisted of; fine sand mixed with mud and shell, and areas of homogeneous muds (M.Sh.fS; LINZ chart NZ45).

Goniocorella dumosa and M. oculata are two of the five[15] most significant habitat-forming species of coral in New Zealand (MacDiarmid et al. 2013). MacDiarmid et al. (2013) also note that *G. dumosa is* found primarily around 400 m on slopes and rises, however the OBIS record match (Figure 4; Appendix 5) between 50–100 m depth suggests that this coral also occurs in shallower depths.

Other protected corals

Two other protected corals (as specified in; Wildlife Act 1953; Tracey et al. 2014) were detected from the OBIS database, and reported in Beaumont et al. (2013):

- the hydrocoral species *Calyptopora reticulata* was recorded in the vicinity of the TCMA, 120 km to the SW in the Marlborough Sounds (Figure 4, Appendix 5)
- while not strictly thicket or reef-forming, the protected solitary stony cup coral (Flabellidae) was reported by Beaumont et al. (2013) as occurring within the deeper bryozoan rubble habitats near Patea Shoals (South Taranaki Bight; Figure 4).

Given the presence of these taxa in the vicinity of the TCMA, it is possible that stony corals and hydrocorals occur at levels consistent with the EEZ (2012) criteria and/or the NZ Wildlife Act (1953) within the TCMA.

3.2.10. Rhodolith (maerl) beds

Rhodoliths are fragile free-living calcified red algae that occur in localised areas worldwide. They form structurally and functionally complex habitats (maerl), which feature high benthic biodiversity and support many rare and unusual species (MacDiarmid et al. 2013). Very little information exists about the spatial extent and ecosystem functioning of rhodolith beds in New Zealand. They are reported to occur at other NZ coastal localities including North Cape, Bay of Islands, Kapiti Island, Marlborough Sounds, and Foveaux Strait (MacDiarmid et al. 2013).

[15] Four of the five most significant habitat-forming species of stony coral in New Zealand waters (*Madrepora oculata, Solenosmilia variabilis, Goniocorella dumosa, Enallopsammia rostrata*) are distributed throughout the region. The fifth species, *Oculina virgosa*, is found only in warmer waters off North Cape and along the Kermadec Ridge.

Out of two possible rhodolith indicator taxa (obtained from Nelson et al. 2012) which were cross-referenced against the OBIS database, one match for *Sporolithon durum* was identified at one site within the TCMA (Figure 4; Appendix 5). The location of the rhodolith was adjacent to Bell Block (approximately 2 km offshore, near the 20 m depth contour). *Sporolithon durum* was also identified at five other sites in the regional vicinity of the TCMA boundary (~200 km).

The Environment Guide (2016) and MacDiarmid et al. (2013) state that it is likely that rhodolith species occur in the EEZ at localities characterised by strong currents to depths of 200 m (depending on water clarity), particularly around the margins of reefs or elevated banks, like much of the TCMA coastline.

Given these findings and the EEZ (2012) habitat criteria (listed in Appendix 1), the TCMA appears to feature rhodolith bed habitat, and more may exist, particularly since conditions within the TCMA appear well suited to forming this type of biogenic habitat.

3.2.11. Xenophyophore (sessile protozoan) beds

Xenophyophores are very large single-celled foraminiferal protozoans, forming as branched, transparent, organic tubes or sheaths. Xenophyophores are fragile and difficult to identify (MacDiarmid et al. 2013). They appear to be particularly abundant below areas of high surface productivity. Documented xenophyophore locations within the New Zealand EEZ are on the eastern, northern and western continental slopes, and on the Chatham Rise at depths of 500-1300 m (MacDiarmid et al. 2013).

Out of 6[16] possible xenophyophore indicator taxa, none were detected within the TCMA. The nearest record was 150 km west of the TCMA boundary (between the 1250–1500 m depth contours). Given that the TCMA depth range is much shallower, it seems unlikely that xenophyophores occur within the TCMA. However, the lack of records in this area may also be somewhat attributable to the delicate nature of the specimens, causing sample damage and consequent misidentification.

3.3. Unique taxa records

An OBIS (2016) database comparison of taxa records from within the TCMA to those recorded elsewhere in New Zealand, returned 220 unique taxa records within the TCMA (158 species; Appendix 6). Some of these records appear to have been caused by differences in taxonomic resolution, typographic errors and patchy taxa records in the database (Type 1 errors). Nevertheless, this large number of unique records suggests that the TCMA could be more ecologically significant than previously

[16] Seven species have been recorded from New Zealand, three of these are endemic (MacDiarmid et al. 2013). However, only six xenophyophore species names were obtainable from available literature.

thought. Further investigation into unique records from other New Zealand regions would potentially clarify this.

3.3.1. Extent of area investigated

It appears that much of the TCMA OBIS (2016) invertebrate records are from the north Taranaki region, with few records close to the TCMA boundary and sparse records to the south (Figure 5). While the OBIS database does not include every invertebrate record available, these results suggest that the majority of the TCMA invertebrate communities, particularly in the further offshore and southern areas, are undescribed.

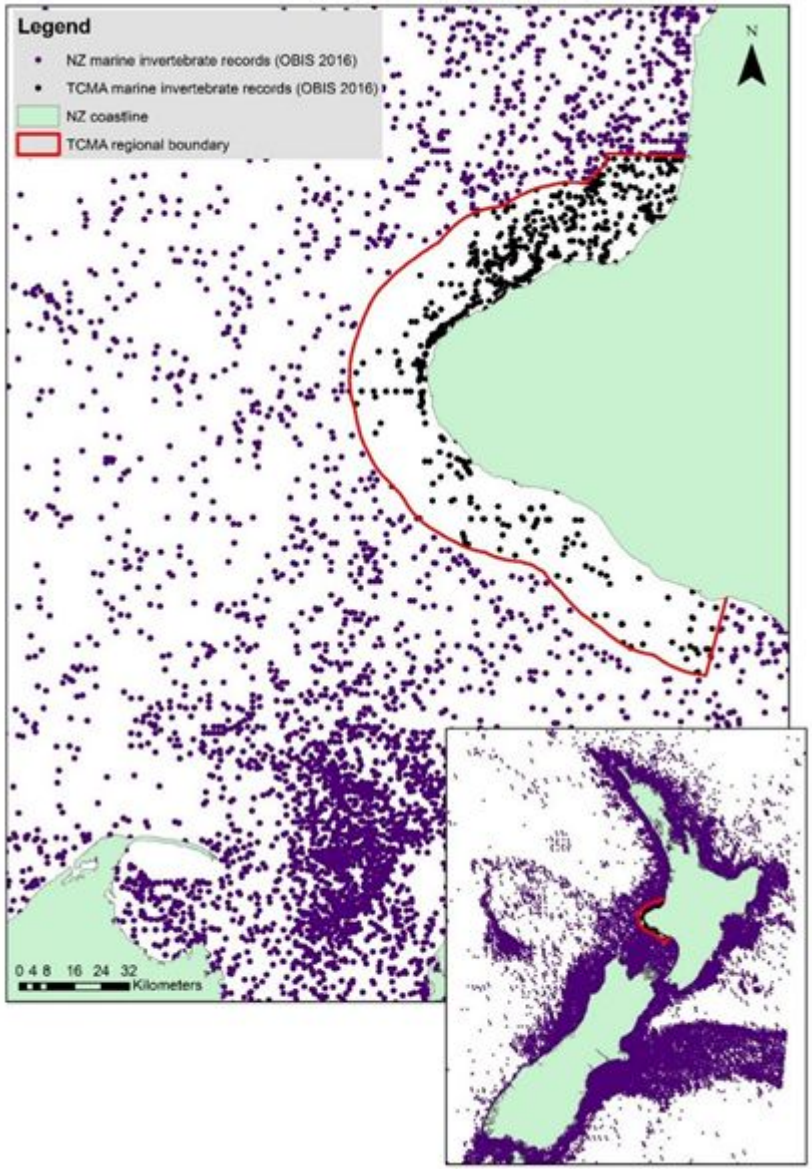

Figure 5: The Taranaki coastal marine area (TCMA), in relation to invertebrate taxa records (OBIS 2016) in the New Zealand region (inset). For further detail refer to Appendix 6.

4. SUMMARY

The OBIS (2016) search results in the regional vicinity of the TCMA yielded 150,000+ taxa entries which were assumed to be indicative of that which might be present in the TCMA. When the OBIS results were cross-referenced against the threatened species list (Freeman et al. 2010), the following findings were made:

- there were no threatened or at-risk species matches within the TCMA boundaries
- in the regional vicinity of the TCMA (within ~200 km from the boundary) there were five 'threatened' invertebrate species record matches. The record matches suggest that these species might be present within the TCMA:
    - the hydroid *Nemertesia elongata*
    - the whelk *Cominella quoyana griseicalx*
    - the crab *Leptomithrax tuberculatus mortenseni*
    - the pin-cushion star *Eurygonias hyalacanthus*)
    - the stony coral species *Madrepora oculata*.

When the OBIS results were cross-referenced against possible EEZ (2012) sensitive habitat indicator species, the following finding was made:

- of the 13 EEZ (2012) sensitive habitat groupings, there were 11 with indicator species matches[17] within, and in the regional vicinity of, the TCMA. These matches are listed in Table 1.

The presence of threatened and sensitive habitat indicator species, within and in the vicinity of the TCMA (~200 km) suggests that these species, and the associated sensitive and/or outstanding habitats, may also be present within the TCMA.

Regional significance of sensitive and threatened taxa/habitats.

When the OBIS records from within the TCMA were compared to those occurring outside its boundaries (in the wider New Zealand region), there were 220 taxa records (158 species) unique to the TCMA. While some of these records appear to have been caused by Type 1 errors, results suggest that the TCMA could be more ecologically significant than previously thought. Further investigation into unique records from other New Zealand regions would potentially clarify this.

Overall, this investigation has yielded results that suggest sensitive marine habitats exist within the TCMA. However, there were a number of information gaps which, if addressed, would better aid the understanding of sensitive habitats and threatened species in the TCMA:

[17] Where OBIS species recorded were scarce for other information sources were investigated e.g. sea pens, coral, Chaetopteridae worms (using Cawthron's offshore database and Beaumont et al. 2013).

- the nature of the present/absence data obtained from OBIS was not sufficient to determine whether the criteria's densities had been met (e.g. for a 'bed', 'thicket' or 'field, shown in parenthesis in Table 1)
- low numbers of species records from within the TCMA
- patchy data, from a range of sources
- particularly low levels of data on the habitats around the mid and northern TCMA boundaries
- possible Type 1 errors, particularly when comparing the large OBIS datasets with EEZ possible indicator taxa, there were differences in taxonomic resolution, dataset typographic errors.

Table 1. Possible sensitive habitat indicator species matches within and in the regional vicinity (within approximately 200 km) of the TCMA boundary, using the OBIS (2016) database.

Sensitive habitats (EEZ 2012)	Within the TCMA	In vicinity of the TCMA*
(Beds of) large bivalve molluscs	x	-
Brachiopods	x	-
Bryozoans (thickets)	x	-
Calcareous tube worm (thickets)	x	-
Macro-algal (beds)	x	-
Sponge (gardens)	x	-
Rhodolith (maerl beds)	x	-
Chaetopteridae worm (fields)	-	x
Sea pens (field)	-	x
Stony coral (thickets)	-	x
Xenophyophores (sessile protozoan beds)	-	x
Deep-sea hydrothermal vents	-	-
Methane or cold seeps	-	-

*Within 200 km of the TCMA boundary

5. RECOMMENDATIONS

In response to the gaps in information identified in this investigation, a second tier of this investigation could be implemented. It is recommended that this should utilize video sled and drop camera monitoring methods, ground-truthed with physical sampling. A particular focus would be on searching for the listed possible sensitive habitats and threatened/at-risk species in key habitat types throughout the north and south Taranaki biogenic regions.

This tier-2 fieldwork may align well with current National Science Challenge investigations, potentially cutting down costs whilst increasing the information returns for TRC.

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7. APPENDICES

Appendix 1. Summary table of EEZ Act 2013. Schedule 6 - Sensitive environments

Sensitive environment	Indicator of existence of sensitive environment
Stony coral thickets or reefs	A stony coral reef or thicket exists if— a colony of a structure-forming species (i.e., *Madrepora oculata, Solenosmilia variabilis, Goniocorella dumosa,Enallopsammia rostrata, Oculina virgosa*) covers 15% or more of the seabed in a visual imaging survey of 100 m^2 or more; or a specimen of a thicket-forming species is found in 2 successive point samples; or a specimen of a structure-forming species is found in a sample collected using towed gear.
Xenophyophores (sessile protozoan) beds	A xenophyophore bed exists if average densities of all species of xenophyophore found (including fragments) equal or exceed 1 specimen per m^2 sampled.
Bryozoan thickets	A bryozoan thicket exists if— colonies of large frame-building bryozoan species cover at least 50% of the of an area between 10 m^2 and 100 m^2; or colonies of large frame-building bryozoan species cover at least 40% of an area that exceeds 10 km^2; or a specimen of a large frame-building bryozoan species is found in a sample collected using towed gear; or 1 or more large frame-building bryozoan species is found in successive point samples.
Calcareous tube worm thickets	A sensitive tube worm thicket exists if— 1 or more tube worm mounds per 250 m^2 are visible in a seabed imaging survey; or 2 or more specimens of a mound-forming species of tube worm are found in a point sample; or mound-forming species of tube worm comprise 10% or more by weight or volume of a towed sample.
Chaetopteridae worm fields	A sensitive Chaetopteridae worm field exists if worm tubes or epifaunal species— cover 25% or more of the seabed in a visual imaging survey of 500 m^2 or more; or make up 25% or more of the volume of a sample collected using towed gear; or are found in 2 successive point samples.
Sea pen field	A sea pen field exists if— a specimen of sea pen is found in successive point samples; or 2 or more specimens of sea pen per m^2 are found in a visual imaging survey or a survey collected using towed gear.
Rhodolith (maerl) beds	A rhodolith bed— exists if living coralline thalli are found to cover more than 10% of an area in a visual imaging survey: is to be taken to exist if a single specimen of a rhodolith species is found in any sample.
Sponge gardens	A sponge garden exists if metazoans of classes Demospongiae, Hexactinellida, Calcerea, or Homoscleromorpha— comprise 25% or more by volume of successive point samples; or comprise 20% or more by volume of any sample collected using towed gear; or cover 25% or more of the seabed over an area of 100 m^2 or more in a visual imaging survey.
Beds of large bivalve molluscs	A bed of large bivalve molluscs exists if living and dead specimens— cover 30% or more of the seabed in a visual imaging survey; or comprise 30% or more by weight or volume of the catch in a sample collected using towed gear; or comprise 30% or more by weight or volume in successive point samples.
Macro-algae beds	A macro-algae bed exists if a specimen of a red, green, or brown macro-algae is found in a visual imaging survey or any sample.
Brachiopods	A brachiopod bed exists if 1 or more live brachiopods— are found per m^2 sampled using towed gear; or are found in successive point samples.
Deep-sea hydrothermal vents	A sensitive hydrothermal vent exists if a live specimen of a known vent species is found in a visual imaging survey or any sample. The following vent species are known to exist in New Zealand waters: *Vulcanolepis osheai*: *Ashinkailepas kermadecensis*: *Gigantidas gladius*: *Vulcanidas insolatus*: *Alvinocaris niwa*: *A. longirostris*:

Sensitive environment	Indicator of existence of sensitive environment
	A. alexander: *Lebbeus wera*: *Nautilocaris saintlaurentae*: *Gandalfus puia*: *Xenograpsus ngatama*: *Paralomis hirtella*: *Bathyaustriella thionipta*: *Siboglinum* sp: *Oasisia fujikurai*: *Lamellibrachia juni*: *Sclerasterias eructans*: *Parachnoidea rowdeni*: *Pyrolycus moelleri*: *Symphurus thermophiles*.
Methane or cold seeps	A methane or cold seep exists if a single occurrence of one of the following taxa is found in a visual imaging survey or any sample: large siboglinid tubeworms *Lamellibrachia sp:* vesicomyid clams *Calyptogena sp:* mussels in the family *Bathymodiolinae:* solemyid clams *(Acharax clarificata):* the sponges *Stelletta n sp* and *Pseudosuberites sp:* *ampharetid, dorvilleid, and pogonophoran (Siboglinum sp) polychaete worms.*

Appendix 2. EEZ (2012) possible indicator species list and source references. Presented as an excel list. See attached electronic files.

Appendix 3. OBIS (2016) data export. Presented as an excel list. See attached electronic files.

Appendix 4. Threatened and/or at-risk species from within, and in the vicinity-of, the TCMA. Presented as an excel list (Freeman et al. 2010) and GIS mapping package. See attached electronic files.

Appendix 5. Possible sensitive environment indicator species EEZ (2012) from within in the vicinity-of, the TCMA. Presented as an excel list and GIS mapping package. See attached electronic files.

Appendix 6. Unique taxa within the TCMA data spreadsheet (OBIS 2016) and GIS mapping package. See attached electronic files.

Agenda Memorandum

Date 1 September 2016

Memorandum to
Chairperson and Members
Policy and Planning Committee

Subject: Draft Coastal Plan for Taranaki

Item: 3

Approved by: A D McLay, Director – Resource Management

BG Chamberlain, Chief Executive

Document: 1731550

Purpose

The purpose of this memorandum is to introduce the draft *Coastal Plan for Taranaki* (the Draft Coastal Plan) and seek Members' agreement to release the Draft Coastal Plan for targeted consultation.

Attached separate to the Agenda is a copy of the Draft Coastal Plan. Officers will also be making a presentation on the Draft Coastal Plan, in particular highlighting key changes proposed for Council and community consideration.

Executive summary

- The Taranaki Regional Council has commenced a review of its current *Regional Coastal Plan for Taranaki* under the Resource Management Act 1991 (the RMA). The current Coastal Plan was the first produced by the Council and is the rule book addressing the Council's statutory functions relating to the coastal marine area.
- The coastal marine area or CMA refers to the wet bit of the coast. Its landward boundary is the mean high water mark and extends seaward to 12 nautical miles. Beyond this is the Exclusive Economic Zone, which is managed by the Environmental Protection Authority, based in Wellington.
- The purpose of the Draft Coastal Plan is to seek the early views and input of key stakeholders and the wider community on revised Plan provisions.
- The Draft Coastal Plan takes into account the findings of comprehensive state of the environment monitoring and an interim review that confirmed that the current Plan has largely been effective and efficient in its implementation. Notwithstanding that, the plan review has identified areas where improvement or changes could be made to the current Plan to build on the progress made so far.
- Further changes are also required to give effect to national directions such as the *New Zealand Coastal Policy Statement 2010* (NZCPS), and take into account changing environmental practices and community aspirations for our coastal resources.

- The Draft Coastal Plan largely continues the existing regime but with a number of important changes. Key changes proposed in the Draft Coastal Plan include:
  - Greater recognition of cross-boundary effects from activities undertaken in the CMA on the landward side of the coastal environment
  - Recognising more coastal areas of outstanding value
  - Increased recognition of Māori values, including a schedule of sites with high cultural, spiritual and historical associations
  - Increased protection for 80 named surf breaks, including a 'Nationally Significant Surfing Area' and schedule of nationally and regionally significant surf breaks
  - Increased protection for indigenous biodiversity and areas of outstanding value
  - Prohibiting discharges of untreated human sewage and new discharges of wastewater containing human waste into estuaries
  - Requiring existing coastal wastewater discharges to improve the quality of their discharge and a reduction in their quantity over time
  - Increased recognition and provision for regionally significant infrastructure and activities subject to appropriately manging adverse effects
  - Bundling of activities within rules to streamline regulatory requirements and ensuring the fuller consideration of effects
  - Increased controls on hard protection structures to manage coastal natural hazards.
- It is proposed that the Draft Coastal Plan be distributed widely to Iwi authorities, district councils, major consent holders, oil and gas sector groups, Department of Conservation, other government departments, and non government organisations with an interest in coastal matters.
- Consultation on the Draft Coastal Plan is an extra non statutory step in the review process. The emphasis on pre plan notification engagement with stakeholders has generally paid dividends for this Council in reducing the time and cost of the formal plan process under the RMA and further developing understanding and relationships with stakeholders.

Recommendations

That the Taranaki Regional Council:

1. receives this memorandum and the *Draft Coastal Plan for Taranaki* attached separate to this Agenda
2. notes that the policy approaches adopted in the current Coastal Plan have been generally effective in achieving the desired environmental outcomes and promoting sustainable management within the coastal marine area
3. notes requirements under the *New Zealand Coastal Policy Statement* to update the *Regional Coastal Plan for Taranaki* to give effect to the Policy Statement
4. agrees to release the *Draft Coastal Plan for Taranaki* to seek the views of key stakeholders and the wider community.

Background

Taranaki's 300 kilometres of coastline is exposed to the west, with high energy and wave conditions. Dominated by cliffs and boulder reefs, the coastline also includes estuaries at the larger river mouths, active dunelands and beaches. The coastline has a rich cultural history. It is enormously valued, both in terms of its natural character, ecological values and as a

place where people play, gather food, and relax. The coastline is noted for its high quality surf breaks.

Offshore are New Zealand's only producing oil and gas fields. Nationally significant infrastructure and assets such as Port Taranaki, production platforms, pipelines, telecommunications criss-cross the coastal marine area to contribute to Taranaki's (and New Zealand's) economic and social well being.

Pursuant to the Resource Management Act 1991 (RMA) the Taranaki Regional Council (the Council) is responsible for promoting the sustainable management of the coastal marine area (CMA) of the Taranaki region and is required to prepare a Coastal Plan. The CMA refers to the wet bit of the coast. Its landward boundary is the mean high water mark and extends seaward to 12 nautical miles. Beyond this is the Exclusive Economic Zone, which is managed by the Environmental Protection Authority (EPA), based in Wellington.

The current Coastal Plan was prepared and made operative on 1 October 1997. The plan was the first prepared under the RMA. Council practice is to undertake an interim effectiveness and efficiency review of its plans. An interim review of the *Regional Coastal Plan for Taranaki* was undertaken in 2002. The interim review, which included feedback from targeted consultation, concluded that the current Plan has been largely effective and that Council had made good progress in maintaining and protecting Taranaki's coastal environment while also facilitating the efficient processing of resource consents and reducing compliance costs. The interim review highlighted only a small number of relative minor changes to Plan provisions that could be addressed as part of a full review.

Commencement of the full review was delayed awaiting the promulgation of a revised *New Zealand Coastal Policy Statement* (NZCPS) that was subsequently adopted by the Government in December 2010. Shortly afterwards the Council signalled its intention to undertake a full review of the Coastal Plan, including the preparation of a draft revised Plan. However, policy resources went into the review of the regional fresh water and land plans, as there were no coastal issues requiring urgent attention.

Set out below is a summary of the key drivers for change in a revised Coastal Plan, the Plan review process and investigations undertaken to date, including a discussion on key changes proposed. Recommendations on the Coastal Plan review process are also presented for Members' consideration.

Drivers for change

Since the adoption of the current Coastal Plan in 1997, there have been a number of developments or change factors that have occurred and which have been taken into account when drafting the provisions of the revised Plan. These include the following:

- state of the environment trends and monitoring;
- Council experiences in implementing the plans and changes to provisions in terms of their usefulness, relevance and effectiveness;
- changing environmental issues, community attitudes and priorities, which have flagged some issues for ongoing or heightened attention;
- changing industry best practices; and
- changes to the statutory context, including amendments to the RMA, the adoption of a revised *Regional Policy Statement for Taranaki* (2010), Treaty of Waitangi settlement

legislation, and the promulgation of national policy statements and standards including the NZCPS.

In summary, the current Coastal Plan has stood the test of time well. As at June 2016 there were only 254 current coastal permits (representing 5% of all resource consents administered by the Council). Since the adoption of the current Plan the number of coastal permits has reduced over time, e.g. there are only four major treated community or industrial discharges to coastal waters compared to some 25 major discharges 30 years ago. State of the environment monitoring has shown that the Council's policy approach has been generally effective in achieving the desired environmental outcomes for the coast. The Draft Coastal Plan is therefore largely an enhancement and refinement of an existing framework, rather than wholesale change.

Notwithstanding the above, through the Plan review, the Council is ambitious for improvements in some areas, not only to give effect to new national directions such as the NZCPS (refer below), but also to keep Taranaki ahead of the field and to better promote integrated coastal management.

Changes to the RMA and the NZCPS

Changes to the RMA since the adoption of the current Coastal Plan have included the following:

- new section 30 functions for regional councils relating to establishing, implementing and reviewing objectives, policies and methods for maintaining indigenous biodiversity
- a new section 66(2A) [Matters to be considered by regional councils], which states that local authorities, when preparing or changing regional plans, must now "…*take into accoun*t" Iwi planning documents
- a new section 32 – more detailed consideration of alternatives, benefits and costs
- a new section 67(1) and (2) [Contents of regional plan], which, amongst other things, reduced those content matters that must be included in regional plans
- a new section 67(3) [Contents of regional plan] requires the Plan to "…*give effect to a national policy statement or New Zealand coastal policy statement*" (rather than simply not being inconsistent with them)
- requirements that consent authorities have regard to the value of the investment of the existing consent holder.

Of note, in 2003, changes to section 67(1) and (2) [Contents of regional plan] reduced those content matters that must be included in regional plans to objectives, policies and rules (if any) to implement the policies. The changes provided that a regional plan may (but need not) include the issues that a regional plan seeks to address, methods (other than rules) for implementing the policies, reasons for adopting the policies and methods, the environmental results anticipated, and procedures for monitoring the efficiency and effectiveness of the policies and methods. The Draft Coastal Plan attached has taken advantage of the opportunity to reduce some of the 'optional' content matters. However, other 'optional' content matters have been retained to improve understanding and workability of Plan provisions for users.

As previously noted, in 2010, the Government gazetted a revised NZCPS. The amended NZCPS came into effect on 3 December 2010 and superseded the 1994 version. The NZCPS sets out seven objectives and 29 policies relating to the coastal environment that regional

councils (and district councils) must give effect to. Local authorities must also take any other action specified in a national policy statement.

The Coastal Plan is the primary vehicle for giving effect to the objectives and policies of the NZCPS.

Review of the Coastal Plan to date

Taranaki's 'rule book' governing the coastal marine area is under review. As part of the review process to date, the Council has already undertaken preliminary engagement with iwi, district councils, and key stakeholders in the consideration of management options and the development and refinement of provisions for inclusion in a draft Coastal Plan.

To date the review process has involved scientific, policy and consents staff, amongst other things, examining previous research, policy developments and reviews, and state of the environment monitoring information, and drafting a revised Plan. Council has also commissioned research and prepared reports to inform the development of a draft Plan, including:

- State of the environment monitoring reports (2003, 2009, 2015)
- *Efficiency and effectiveness of the Regional Coastal Plan for Taranaki* (2002)
- *Taranaki Region Coastal Plan Review – Archaeological scoping study* (December 2012)
- *Taranaki Regional Council – Offshore seismic data acquisition permitted activity review* (May 2015)
- *Taranaki Regional Council – Offshore petroleum drilling review* (August 2015)
- *Petroleum Drilling Activities; Buffer distances from outstanding areas and substrate types requiring protection* (October 2015)
- *Regional Landscape study of the Taranaki coastal environment* (November 2015)
- *Taranaki Surf breaks of National Significance* (May 2016)
- *Sensitive habitats and threatened species in the Taranaki coastal marine area (August 2016)* (refer separate Agenda item).

The Draft Plan

A Draft Coastal Plan is presented for consideration by this Committee.

The Draft Coastal Plan largely continues the existing regime set out in the current Plan but with a number of important changes. These changes seek to build on the success of the past and continue the decades-long process of incrementally and systematically improving on the maintenance and enhancement of coast values and uses while providing for appropriate use and development. Other changes are also proposed to give effect to recent national directives such as the NZCPS, and take into account changing environmental practices and community aspirations, plus our experiences and lessons learned from the implementation of the current regional plans.

Key changes proposed in the Draft Coastal Plan include:

- **Greater recognition of cross-boundary effects from activities undertaken in the CMA on the landward side of the coastal environment**

The Draft Coastal Plan addresses the wider coastal environment. Although relatively few pressures exist in Taranaki's coastal marine area, the Plan recognises that natural and physical resources across the wider coastal environment consist of interconnected systems. Activities within the CMA (that part of the coast that Council has jurisdiction responsibilities for) can have an impact on values and uses above mean high water springs. Accordingly, while the Draft Plan rules apply only to the CMA, for the purposes of improved integrated management, Plan objectives, policies, and other methods may apply to the wider coastal environment (i.e. the landward part) involving regional and district planning.

- **Amendments to coastal management areas:**

  The current Coastal Plan already adopts a zoning approach that recognises that some coastal areas have values, characteristics or uses that are more vulnerable or sensitive to the effects of some activities, or that have different management needs than other areas. However, the Draft Coastal Plan has fine-tuned this approach by dividing the CMA into five coastal management areas (currently there are four) to better target the policies and rules. The five coastal management areas are: Outstanding value; Estuaries unmodified; Estuaries modified; Port; and Open coast.

- **Additional coastal areas of outstanding value**
  Schedule 2 of the Draft Plan identifies coastal areas of outstanding value these are areas that have outstanding natural character and areas identified as outstanding natural features and landscapes. These areas contain values and attributes that are exceptional because of their characteristics including landforms, land cover, cultural and heritage associations and visual qualities. Studies and investigations undertaken identified seven new coastal areas of outstanding value primarily due to recognising the inland component of the coastal environment. These areas are afforded the highest level of protection through Plan rules.

- **Increased recognition of Māori values, including a schedule of sites with high cultural, spiritual and historical associations**

  Tangata whenua principles and values have been integrated throughout the Plan provisions (rather than being in a separate stand alone chapter). This is a work in progress but reflects feedback from tangata whenua and recognises that while some values and concepts may be expressed as distinctly Maori, their meaning and intent already align with values and concepts shared by wider New Zealand culture, i.e. sustainable management.

  The Draft Coastal Plan also includes a Schedule that identifies known sites with special cultural, spiritual, historical and traditional associations located within the CMA. The information included within the schedule's tables and maps represents a start to this identification process and is acknowledged as being incomplete. The schedule, along with any silent files, will be added to over time to build a complete picture of culturally significant sites along the Taranaki coast.

- **Increased protection for 80 named surf breaks, including a 'Nationally Significant Surfing Area' and schedule of nationally and regionally significant surf breaks**

  The Taranaki region boasts numerous surf breaks of national and regional significance. Eighty named surf breaks are currently identified as regionally significant in the *Regional Policy Statement for Taranaki*. Four of these surf breaks have also been identified as nationally significant in the NZCPS. In accordance with Policy 16 of the NZCPS the Council must protect surf breaks of national significance. However, following the 5 May 2016 Policy and Planning Committee meeting the Council also determined to support the concept of a 'Surfing Reserve' that includes all of the surf breaks between Kaihihi

Road and Cape Road (referred to as the 'Nationally Significant Surfing Area' in the Draft Plan). Surf breaks within this area would be afforded the highest level of protection.

Both nationally and regionally significant surf breaks, including the Nationally Significant Surfing Area, are identified in Schedule 4 of the Draft Coastal Plan with supporting policies and standards, terms and conditions in the rules that seek to protect these areas.

- **Increased protection for indigenous biodiversity**

  Policy 11 of the NZCPS contains explicit requirements relating to the protection of indigenous biodiversity that the Council must give effect to. Accordingly, the Draft Coastal Plan includes supporting policies and standards, terms and conditions in the rules that seek to protect significant indigenous biodiversity. Schedules in the Draft Coastal Plan identify significant coastal biodiversity. Schedule 6A includes a table identifying coastal indigenous flora and fauna species identified as threatened or at risk of extinction and another table identifying naturally rare and uncommon ecosystem types found on the Taranaki coast. Schedule 6B identifies sensitive marine benthic habitats.

- **Increased restrictions on discharges of wastewater containing human sewage**

  The Draft Coastal Plan aligns with the NZCPS and prohibits the discharge of untreated human sewage directly to the CMA. New treated wastewater discharges containing human sewage will only be allowed to the Open Coast Coastal Management Area (subject to getting a consent) and not allowed in the other four Coastal Management Areas. Existing treated wastewater discharges containing human sewage will be allowed to continue, including the discharge associated with the Patea Estuary, however a new Policy applies requiring that the quality of discharges will improve and the quantity reduced over time (this will be given effect to through the consent process). The Policy also requires that existing wastewater overflows, following extreme rainfall events, will be reduced and eliminated over the life of the Plan.

- **Increased recognition and provision for regionally significant infrastructure and activities subject to appropriately manging adverse effects**

  Some activities are regionally and nationally significant in terms of contributing to social and economic outcomes and are dependent on the use of coastal resources and/or location within the CMA, e.g. Port Taranaki, telecommunications, and oil and gas production stations and infrastructure. Policies in the Draft Plan seek to explicitly recognise and provide for these activities subject to avoiding, remedying and mitigating adverse effects. Of note the Port Coastal Management Area has been slightly extended to factor in potential future developments.

- **Bundling of activities within rules to streamline regulatory requirements and ensuring the fuller consideration of effects**

  Unnecessary duplication of rules has been avoided by, first, bundling rules to take into account coastal management areas and, second, to capture within a rule associated but often incidental activities, e.g. maintenance of a structure in the CMA not only involves occupation of the CMA but associated activities such as disturbance, deposition and discharges. The effect of bundling has been to significantly streamline the Draft Plan compared with the current Plan.

- **More explicit recognition of sites of significance**

  Significant work has also been undertaken and incorporated into the schedules identifying and mapping (where possible) coastal management units, coastal areas of outstanding value, coastal sites with significant amenity values, significant surf breaks,

sites of geological significance, significant indigenous biodiversity, and significant historic heritage, including iwi cultural values and sites of significance.

- **Hard protection structures**

  Policy 25 of the NZCPS requires the use of hard protection structures to be discouraged. Accordingly, the Draft Plan includes policies that support this approach but also acknowledge that hard protection structures may be the only practical means to protect nationally and regionally important infrastructure located along the high energy Taranaki coastline.

A number of amendments have also been made to the policies and rules in the current plans to reflect the changes made to the RMA and other requirements of the NZCPS and to provide greater clarity and operability for the Plan users. Current rules that are now redundant because they are addressed under the *Resource Management (Marine Pollution) Regulations 1998* have also been removed.

Of note 'issues' have not been identified in the Draft Coastal Plan because the Council considers that there are no coastal 'problems' requiring attention. Rather, the Plan identifies 'matters of interest' that represent potential issues (and in some cases opportunities) that the Plan objectives, policies, methods and rules seek to address. This is consistent with the policy approach adopted for the original plan.

The review process is ongoing with staff working on the provisions of the Draft Coastal Plan so there may be minor changes to the Draft presented to be made before it is available for public comment.

Process hereon

Now is the time for a wider community conversation to test whether our proposals stack up and to see what might need changing before we advance to a more formal public consultation process in mid 2017 when a Proposed Plan is released.

It is suggested that the Draft Coastal Plan be forwarded to key stakeholders and other interested parties to seek their early views and input. The Council will be targeting iwi authorities, district councils, major consent holders, oil and gas sector groups, Department of Conservation, other government departments(e.g. EPA), and non- government organisations with an interest in coastal matters. As part of this engagement the Council will also be putting the Draft Coastal Plan on its website for others wishing to comment and Council officers have developed a summary information sheet to explain key changes.

The emphasis on pre-plan notification engagement with stakeholders has generally paid dividends for this Council in reducing the time and cost of the formal plan process under the RMA and further developing relationships with stakeholders. Members should note at this stage, the Council is not adopting the revised Plan. It is a draft document only, prepared and proposed to be distributed for comment as part of the process of adopting and refining the final Proposed Plan.

Following the targeted consultation and community engagement on the Draft Coastal Plan, a revised plan will be prepared for final consideration by the Committee as the *Proposed Coastal Plan for Taranaki*. If the Committee agrees, the Proposed Plan will then be publicly notified for submissions. This stage represents the formal statutory part of the review and there will be further opportunities for formal public input into the Plan review process.

Members should note that a report prepared pursuant to section 32 of the RMA will accompany the *Proposed Coastal Plan for Taranaki*. The section 32 report will contain an evaluation of the benefits and costs of the objectives, policies and methods in the Proposed Plan and the appropriateness of the objectives and policies and methods having regard to alternatives. This report must be available for public inspection at the time the Proposed Plan is notified.

Decision-making considerations

Part 6 (Planning, decision-making and accountability) of the *Local Government Act 2002* has been considered and documented in the preparation of this agenda item. The recommendations made in this item comply with the decision-making obligations of the *Act*.

Financial considerations—LTP/Annual plan

This memorandum and the associated recommendations are consistent with the Council's adopted Long-Term Plan and estimates. Any financial information included in this memorandum has been prepared in accordance with generally accepted accounting practice.

Policy considerations

This memorandum and the associated recommendations are consistent with the policy documents and positions adopted by this Council under various legislative frameworks including, but not restricted to, the *Local Government Act 2002*, the *Resource Management Act 1991* and the *Biosecurity Act 1993*.

Legal considerations

This memorandum and the associated recommendations comply with the appropriate statutory requirements imposed upon the Council.

Appendices/Attachments

Document 1735249: Draft Coastal Plan for Taranaki

Agenda Memorandum

Date 1 September 2016

Memorandum to
Chairperson and Members
Policy and Planning Committee

Subject: Swimmability- background information on water quality criteria for primary recreation

Item: 4

Approved by: G K Bedford, Director-Environment Quality

B G Chamberlain, Chief Executive

Document: 1730038

Purpose

The purpose of this memorandum is to present background information to the Committee on the subject of 'swimmability', or water quality guidelines for primary contact recreational water quality, in freshwaters in New Zealand, using Taranaki's water quality data to illustrate the points that are raised.

Executive summary

There are currently a number of references offering varying guidance as to what is an acceptable bacteriological quality of fresh water intended for recreational use. Given that 'swimmability' is becoming a matter of conversation at a national level, and in light of the current review of the Regional Freshwater Plan whereby provision for recreational use of water bodies will have to be contemplated by the Council, it is therefore considered that there would be benefit in having the various guidelines and their interpretation and uses set out for the Committee's information and reference. It should be noted that this memo concentrates on bacteriological criteria for aquatic recreation; other criteria of suitability do also apply (eg water clarity, temperature, and the absence of potentially toxic cyanobacteria), as well as water and site safety considerations and questions of public accessibility. While the term 'swimmability' suggests a focus on swimming, primary contact recreation incorporates a wider range of activities likely to lead to frequent and repeated full immersion (eg kayaking, white water rafting).

Council officers suggest that the Council's current practice of weekly sampling at recognised recreational sites with public reporting of bacteriological results 24 hours later is considered to give the public the most relevant and timely information on the suitability of water for recreational use at any one time. Providing a summary of the number of and percentage of individual samples meeting the guideline during the season offers the regional community an easily understood sense of how likely the site is to meet the guideline on an on-going

basis. By this criterion most of the **popular freshwater sites** used by the communities of Taranaki routinely score very favourably, the exceptions being sites where water fowl cause a high level of contamination.

Further, **year-round data at regional state of the environment** water quality monitoring sites shows that almost all sites complied with the recreational guidelines for at least 80% of the time year round when flows were below median flow ie were suitable for swimming. That is, almost all our rivers are almost always swimmable, in terms of meeting bacteriological guidelines, whenever they are swimmable from other perspectives.

Besides providing day by day quality guidance, the **MfE/MoH 2003 guidelines** also postulate that grading a site utilising its Sanitary Inspection Category (ie a site's susceptibility to pollution based on land use) and Microbiological Assessment Category (the worst results at the site over several years in the past- the 95th%iles) to generate a 'Suitability for Recreation Grade' will give the public meaningful information about the general condition of a site at any time, independent of any actual sampling.

The **National Objectives Framework (NOF**) within the National Policy Statement for Fresh Water Management 2014 (NPS-FM) uses the worst results at a site over several years in the past (the 95th%iles) to categorise sites according to the risk of infection for someone using the site for activities involving full immersion. Microbiological statisticians have noted that the NOF utilises a highly conservative approach to the protection of human health when describing categories of acceptability.

The memorandum also discusses criteria in use overseas, illustrating the range in standards by applying them to the results of both Taranaki's recreational monitoring and the year-round region-wide environmental data. In every case the guidelines are built on probability models that interpret public health 'risk' using data that is close to thresholds of detectability.

From recent and ongoing discussions with other regional councils and with senior MfE staff, it is apparent that the presentation of site results in terms of the percentage of occasions that the site meets the 'swimmability' guidelines is now strongly favoured over other statistical means of presenting a site's suitability. It is apparent that there are a number of factors to take into account if formalising 'swimmability' as a value that might be imposed on some or any waterway in Taranaki.

Given these issues, it is respectfully suggested to the Committee that the approach that has been presented within draft discussion documents for the revised RFWP, whereby 'swimmability' is not formally recognised as a universal requirement within Freshwater Management Units but is rather protected and explicitly provided for through the monitoring and reporting of community recreational sites each summer (in conjunction with water quality management interventions that will enhance water quality overall) is a well-considered and appropriate approach. In reviewing the Council's *Regional Fresh Water Plan for Taranaki*, the Council and community will need to more explicitly make decisions about expectations and objectives for various potential and actual uses of water in the region, including swimmability. This memo provides information around context and perspective for that discussion.

Recommendations

That the Policy and Planning Committee of the Taranaki Regional Council:

1. receives the memorandum *Swimmability- background information on water quality for primary recreation*
2. notes the information presented within the memorandum.

Background

Section 35 of the Resource Management Act requires local authorities to undertake monitoring of the region's environment, including land, soil, air, and fresh and marine water quality. Monitoring is undertaken to identify pressures upon the regional resources, their state, changes in their state (i.e. trends), and the effectiveness of the policies and actions undertaken to maintain the suitability of the region's resources for various uses, and to enhance the quality of the environment.

The Taranaki Regional Council initiated freshwater contact recreational water quality monitoring at a number of designated sites as part of Council's state of the environment monitoring (SEM) in 1996, in a manner aligned with the national guidance of the time. The Council's on-going annual programme is designed to monitor the bacteriological quality (as well as other, physicochemical and biological measures of quality) of lakes, rivers and streams at popular contact recreational sites during periods of highest usage. This work is undertaken principally for state of the environment purposes, measuring the current condition of the sites and looking for any trends as indicators of changing pressures and as feedback on water quality management interventions, but the results are also compared with contact recreational guidelines and publicly notified as a means of providing timely information and perspective on the significance of the results. Further, the results of each sample allow for the detection of any polluting sources, for follow-up.

Freshwater contact recreational water quality monitoring measures the number of bacteria in the sampled water that indicate faecal pollution from warm-blooded creatures. The Council measures three types or families of bacteria in the water sample: *E.coli*, enterococci, and faecal coliforms. The designated indicator bacterium is *E.coli*. Sample test results are compared with the Ministry for the Environment's (MfE) *Microbiological Water Quality Guidelines for Marine and Freshwater Recreational Areas* (2003). These guidelines have been developed for application to high-contact use of water used intensively for recreational purposes, but are applied by the Council to each of the region's recognised freshwater recreational sites without differentiation as to risk e.g. sites where there is paddling or children playing in or near the water are treated the same as sites where there is repeated full immersion of swimmers' heads through activities such as diving or body-surfing rapids. The guidelines describe the potential health hazard '*when the water is used for recreational activities such as swimming and other high-contact water sports. In these activities there is a reasonable risk that water will be swallowed, inhaled (Harrington et al 1993), or come in contact with ears, nasal passages, mucous membranes or cuts in the skin, allowing pathogens to enter the body*'.

Discussion

1. Day by day monitoring

Choice of sampling occasions: The 2003 guidelines specify that '*Samples should be collected during the bathing season, or when the water body is used for contact recreation. For rivers this may exclude periods of high flow, during which hazardous river conditions would prohibit bathing*' (pg

E1). The guidelines do go on to recommend (rather than insist on) random sampling, explaining '*generally this means samples should be collected weekly regardless of the weather*', but given that (i) in Taranaki rainfall is closely associated with higher river flows in any case, and the earlier caution therefore applies, as well as the facts that (ii) restricting sampling to dry weather strengthens the rigour of trend analysis, (iii) sampling in only dry weather allows better detection of any intermittent point source discharge, (iv) the Council provides a public caution against bathing during or for 3 days following rainfall, and (v) in any case the guidelines stress that wet-weather sample results must be excluded from any calculations of overall suitability of a site for swimming (see next section), Council officers have exercised professional judgement to focus sampling on periods of highest use (ie dry weather). It is noted that MfE staff have concurred with this approach (meeting of TRC and MfE staff, December 2004).

Criteria to be applied: The 2003 guidelines specify that for any single freshwater sample, a result less than 550 *E coli*/100 mls represents acceptable water quality for bathing.

If the result is below 260 *E coli*/100 mls ('Acceptable/green mode'), the protocol is to continue monitoring on a weekly basis.

If the result is between 260 and 550 *E coli*/100 mls ('Alert/amber mode'), the protocol is to investigate any cause if otherwise unknown, in part by an increased frequency of sampling.

If the result is above 550 *E coli*/100 mls, then the protocol is to investigate and increase monitoring, and for the public health authorities to provide a public warning.

It must be stressed that if a site had a result of more than 550 *E coli*/100 mls, it does not mean that it was 'unsafe'. E coli are an indicator of a degree of risk from other microorganisms such as Campylobacter bacteria and adenoviral viruses. If an analysis of the concentration of *E coli* gives a result below 550/100 mls, then it is considered that the risk of exposure to pathological organisms is minimal. If the result is above 550/100 mls, it is considered that the probability that a swimmer will be exposed to pathological organisms has become unacceptable from a public health perspective. It does not mean that pathogenic organisms are actually present, nor does it imply any particular concentration or virulence. It does not mean a swimmer will certainly become infected- most will not (see next section). It does not even mean that a swimmer is likely to become infected. And the *E coli* count does not give an indication of the severity of any consequent infection. It is a quite different situation from exposure to a toxic chemical, where the effect is generally inevitable and the greater the dose, the greater the effect.

Reporting of seasonal or long-term data sets: at the end of each bathing season the Council undertakes trend analysis for each bathing site. It also reports an overall pattern of compliance with the guidelines for each site, by way of reporting what percentage of samples at each site lay below the 'Action' criterion.

For the interest of members, the water quality of recognised freshwater bathing sites around the region over recent years is re-produced below (second-last column), together with further classifications that will be discussed in the next section of this memo. This data has been reported previously to the Council (June 2016).

Table1 **R**ecreational water quality for freshwater sites for the period November 2011 to March 2016

Site	Sanitary Inspection Category SIC*	Microbiological assessment MAC* *E.coli* (nos/100ml)			SFR Grade*	% of all samples in compliance (ie: <550 *E.coli*)	Grading (as per MfE, modified [see text]
		95 %ile	Number of samples	Category			
L Rotomanu: western beach	High	802	65	D	Very poor	89	
Waiwhakaiho R: Merrilands domain	High	220	65	B	Poor	98	
Waiwhakaiho R at L.Rotomanu	High	3075	65	D	Very poor	27	
Te Henui S: mouth	High	4525	65	D	Very poor	16	
Patea R: King Edward Park	High	528	65	C	Poor	96	
Patea R. boatramp, Patea	High	80	65	A	Poor	100	
Waingongoro R: Eltham camp	High	392	65	C	Poor	100	
Waingongoro R: Ohawe beach	High	662	65	D	Very poor	93	
Kaupokonui R: Beach domain	High	482	65	C	Poor	98	
L Opunake: adjacent boat ramp	High	570	65	D	Very poor	95	
Timaru S: Lower Weld Road	High	690	65	D	Very poor	92	
Oakura R: d/s SH45	High	812	65	D	Very poor	93	
Waitara R: Town wharf	High	638	65	D	Very poor	95	
Urenui R: estuary	High	60	65	A	Poor	100	
Manganui R: Everett Park	High	348	65	C	Poor	96	
L Ratapiko: boatramp	High	230	60	B	Poor	100	
L Rotokare: adjacent boatramp	Low	196	42	B	Very good	100	

*See text below in 'Suitability for recreational use gradings (MACs, SICs, and SFRGs)' section

Members may note that for a number of years, MfE reported compliance nation-wide in a manner similar to that used by this Council. The MfE gradings were:

- sites that met the threshold guideline of less than 550 *E coli*/100 mls in at least 95% of all samples
- sites that met the threshold guideline of less than 550 *E coli*/100 mls in 90- 94.9% of all samples
- sites that met the threshold guideline of less than 550 *E coli*/100 mls in 75-89.9% of all samples
- sites that met the threshold guideline of less than 550 *E coli*/100 mls in less than 75% of all samples.

It should be noted that even a site in the 'worst' MfE category could well have been suitable for swimming on the majority of occasions- that is, it is more likely than not to meet the threshold. Therefore the last column in the table above modifies the MfE categorisation slightly. Dark blue, light blue and green represent the first three MfE categories. Orange has been used for the fourth category, modified to apply to sites that met the threshold guideline in between 25 and 75% of the samples (meaning 'an equal chance that it may or it may not meet the guideline on any one occasion'), and red is applied to sites that were highly unlikely (ie less than 25% of the time) to have met the guideline.

The strength of this style of presentation of data is that it allows a member of the public to readily identify how likely it is that on any particular random occasion, a site will meet the public health guideline for use of the water body for primary recreation.

2. Suitability for recreational use gradings (MACs, SICs, and SFRGs)- 2003 Guidelines

Site gradings and how they are applied: Alongside the event-specific bacteriological quality guideline, the 2003 MfE/MoH guidelines also provide a grading system for categorising the longterm 'suitability for recreational use'. This grading system assesses sites using the Ministry's 'Suitability for recreation grading' (SFRG) criteria, which in turn combines a 'Sanitary Inspection Category' (intended to describe its susceptibility to pollution, based on land use) and a 'Microbiological Assessment Category' (which incorporates the worst results at the site over several years in the past).

The SFRG is a risk-based categorisation process rather than an actual water quality-based categorisation process (although it does utilise worst-case historical data, as explained below).

The SIC requires a catchment assessment to identify possible sources of faecal contamination. Risk factors in the assessment include any intensive agriculture eg dairying with potential for run-off, any uncontrolled points of stock access to waterways, the incidence and density of birdlife, upstream sewage treatment systems, urban run-off, any potential for runoff from feral animals in bush or forest, any evidence that wet weather may increase microbiological contamination, and/or any exceedance of the national guideline in any sample.

The MAC categories a site based on its 95th%ile result. The latter is the result that is greater than 95% of all results in a dataset for that site. That is, for a site sampled 13 times a season (as is the case for most bathing sites in the Council's programme), the 95th%ile result is the second worst result occurring in any 3 year period, or the 3rd worst result in any 4 year period. It is apparent that use of the 95th%ile to characterise a site means it is being defined by its worst couple of results, which may well be 'one-off' type events atypical of quality at other times, and not by the usual or overall state of the site. Further, there are 4 gradings of MAC (see middle column in Table 1 above). Grades A, B, and C require the 95th%ile result to be below 130, 260, and 550 *E coli* per 100 mls, respectively. These numbers can be compared with the single sample acceptable level of 550 *E coli* per 100 mls. So a site may have almost all results over a long period within the best category for recreational use (ie below 130 *E coli* per 100 mls), and yet be rated only a 'B'; a site may have almost all results over a long period within the 'alert'category for recreational use, which would mean it remains acceptable for recreational use (ie below 550 *E coli* per 100 mls), and yet be rated only a 'C'.

From Table 1, it emerges that although most of the derived SFRGs for freshwater bathing sites in Taranaki would appear to suggest there would be possible high risks associated with contact recreational usage, those SFRG gradings have been dictated by the agricultural nature of all catchments. This means that the sites have <u>downgraded gradings regardless of proven historical quality</u>.

For example, the 5-year microbiological data to 2016 indicated fourteen of 17 sites achieving compliance on 90% or more of occasions (Table 1 above). Yet the only freshwater bathing site in Taranaki that can be graded either 'good' or 'very good' according to MfE SFRG criteria is Lake Rotokare. Further, the Waingongoro River site at the Eltham camp, the Patea River estuary site, the Urenui River estuary site, the Lake Ratapiko site, and Lake Rotokare have never reached the 'Action' mode at any time during the last five seasons, under the sampling protocols of the SEM programme, and yet according to the Ministry for the Environment, all these sites should be identified to the public as 'poor' or even 'very poor' sites for bathing, from a public health perspective. According to the 2003 guidelines, sites with an SFRG rating

of 'very poor' will '*very rarely pass the guidelines*', yet Table 1 shows that 5 of the 8 site so rated in Taranaki meet the guidelines more than 90% of the time.

Members may recall the release in 2013 of a report by the Ministry for the Environment, ('*Suitability for swimming: indicator update*' July 2013 INFO 690), which focused solely on the grading system used by MfE and the Ministry of Health to indicate the presence of risk factors at swimming spots. The Council has repeatedly expressed its disappointment that the 2003 classification system, which does not take into account the state of water as revealed by day to day monitoring, is given so much emphasis, as is its mis-interpretation (eg ' 60% of NZ's waters unsafe to swim in') by the media. However, it is also acknowledged that within the 2013 report at least, MfE noted that the suitability for recreation criteria (SFRG):

- do not represent an accurate picture of water quality in the catchment
- reflect a precautionary approach to managing health risk
- are not designed to represent health risks on a particular day
- tend to reflect the poorest water quality measured at a site rather than the average water quality
- may grade a site that is suitable for swimming much of the time as 'unsafe'
- do not replace the site-specific information available on council websites.

It is noted that the guidelines state that if monitoring shows that higher bacteriological counts are associated with wetter weather, and if a council then provides public advice against swimming in such conditions, that any subsequent MAC assessment should discount sample results obtained during wet weather. However, as noted above, sites in Taranaki would still be downgraded because of the SIC that apply.

Health risks and relationships with measures of bacteriological contamination: medians and 95th%iles:

It needs to be understood that the derivation of guideline values for protection of public health against bacteriological or viral infection involves considerable statistical modelling and analysis of survey results and/or estimations of risk base on assumptions of probable degree of contamination by pathogenic organisms, given any particular measurement of indicator organisms, together with multiple layers of assumptions around distributions of indicator organisms in samples vs spatial and temporal distributions at any site in question. For a given concentration of an indicator organism such as *E coli*, survey results or models give a wide band of possible values for the associated likelihood of an infection. Public health authorities tend to layer a precautionary approach on top of survey and study results, focusing on the greatest estimated risk rather than the midpoint or most probable of the range of risks.

Earlier guidelines for New Zealand were based on the calculation that for a site with a median *E coli* concentration of 126 (rounded off to 130) per 100 mls, the best estimate of a swimming-associated illness risk was 8 per 100 swimmers. That is, over the long term, a site that had a seasonal median count of 126-130 *E coli* (understanding that the *E coli* number on individual occasions could vary widely during a season), would, over the course of the season, see about 8 in every 100 swimmers infected. While intuitively one would suspect that the higher the count on any particular occasion, the greater the proportion of swimmers who would be infected, this would not necessarily be true, nor is the relationship between indicator organism counts and infection rates linear. The distribution pattern of *E coli* has not been found to match with the distribution of campylobacter.

The rate of infection at this level of contamination over the long-term was estimated as doubling the background rate of infection. That is, in simple terms if you went for a swim at a site where the median count had been found to be 130 *E coli* /100 ml, you were doubling your chances of being infected (but there was no way of subsequently knowing whether you had been infected because you had swum or not). In the past, the infection rate for swimmers was not chosen on the basis of a pre-determined acceptable rate of risk, but rather was based on the minimum level at which an adverse health effect from exposure through swimming could be confidently anticipated based on statistical interpretation of study results. A long-term median concentration of 150 *E coli* /100 ml is considered to be the lowest concentration at which any adverse effect from exposure while swimming can be expected with a high degree of certainty.

The current key guideline values of 130, 260, and 550 *E coli* per 100 mls are estimated to relate to estimations of degrees of risk of a consequent infection rate. These are set out below in Table 2.

For a single sample (that is, beach water quality on any particular day), the action level of 550 *E coli*/100 mls is considered to keep the risk of illness to below about 2%.

Over a season or longer, the focus of risk estimations turns to the 95th%iles, which is the result from the full dataset that is higher than 95% of all the results of samples collected at that site. Note that Table 2 gives the risk of infection rather than risk of illness. NIWA have suggested that the rate of illness is about half the rate of infection. It should also be noted that the risk probabilities in the table are considered to be highly precautionary. In particular, the infection probabilities were based on median values, but in the table below these were substituted by 95th%ile values, thus ensuring the median value of any dataset would be well below the numerical threshold value for which the risk had been calculated. For example, while the 'limit' is expressed as 550 *E coli*/100 mls and the associated infection risk is given as 5%, this infection risk was based on the median of the dataset being 550 *E coli*/100 mls; in such cases the 95th%ile value would most likely lie between 2,100 and 8,600 *E coli*/100 mls, depending on the distribution of concentrations at the site. Effectively, by setting the numerical value as a 95th%ile rather than as a median, health authorities are ensuring the 'true' median of the dataset will always be well below the numerical criterion, thus allowing for sample variability and 'burden of proof' of compliance. Table 4 below shows that for rivers in Taranaki, the median of a dataset will be between 2.5 times and 13 times lower than the 95th%ile. This means a huge margin of safety is being incorporated when bathing criteria are applied in the region.

Table 2: Guideline values for risk estimation at fresh water bathing sites
(Table H2, 2003 Guidelines)

95th%ile value of measurements of *E coli*/100 mls	Estimated risk of Campylobacter infection
< 130	<0.1% occurrence: There is expected to be less than 1 case of infection in every 1000 exposures
131-260	0.1-1% occurrence: The upper 95%ile value of 260 relates to an average probability such that there is expected to be (*ie for results in this range it is more likely that there will be*) about 1 case of infection in every 100 exposures
261-550	1-5% occurrence: This range represents a probability of (*ie for results in this range, it is more likely that there will be*) between 1 in 100

	to 5 in 100 infections in every 100 exposures
>550	>5% occurrence: A 95%ile value of 550 represents a greater than 5 in 100 chance of an infection

3. Primary and secondary recreational water quality measures in the National Objectives Framework

The Council is required to give effect to the *National Policy Statement for Freshwater Management 2014* (NPS-FW) by implementing measures '*to safeguard…. (b) the health of people and communities, **at least as affected by secondary contact with fresh water**; in sustainably managing the use and development of land, and of discharges of contaminants'* (Objective A1 for Water Quality, emphasis added).

This is colloquially described as ensuring at least a 'wadeability' quality in all water bodies. The NOF provides the numerical criteria by which a grade for 'wadeability' can be categorised. It also provides an optional second set of criteria to categorise water bodies used for primary recreation, ie its 'swimmability'. The latter criteria are much more stringent. (Note: the Council does not attempt to differentiate types of water-based activity at any site i.e. all recognised recreational sites are regarded as needing to meet the 2003 'swimmable' criteria).

The NOF categorises sites for swimmability on the basis, not of the typical water quality, but on the basis of the worst results (95th%iles) within any record of data. In the NOF there are only 3 categories of the attribute- *E coli* concentrations- that is provided for activities likely to involve full immersion. The NOF criteria were intentionally aligned with the 2003 guidelines. These are reproduced in Table 3 below.

Table 3: National Objective Framework attribute states for activities involving full immersion

Attribute state	Numeric criteria for attribute state: *E coli*/100 ml	Sampling statistic	Description
A	<260	95th%ile	People are exposed to a low (<1%) risk of infection
B- minimum acceptable state	260-540		People are exposed to a moderate (<5%) risk of infection
C- unacceptable	>540		People are exposed to a high (>5%) risk of infection

As with the 2003 guidelines, NIWA note that in fact the risk probabilities presented above are conservatively estimated. For a 95th%ile of 260, the median is most likely in the range 16-66 *E coli* /100 ml- this is far below the level at which any differentiation in illness rates between swimmers and non-swimmers could be detected. For a 95th%ile value of 540, the median can be expected to be within the range 34- 137 *E coli* /100 ml. Even the highest of this range of 'expected' median values does not attain the threshold of probable detectability of increased illness rates (a 'Predicted Lowest Adverse Effect Level').[1]

[1] *The NPS and MfE/MoH freshwater primary contact guidelines (2003) for E coli are based on a precautionary approach but their implementation is in line with overseas practice,* G McBride (NIWA) and Jeff Soller (Soller Environmental, California) 16 June 2016

4. New Zealand's measures of suitability for bathing, compared with international criteria, and monitoring of water quality at primary recreational sites under high-use conditions, vs all year round data gathered under all conditions at other sites

The Committee has been previously advised of how criteria used in New Zealand for assessing the suitability of waters for recreational use compare against those used in Europe (5 May). It was noted to the Committee on that occasion that '*When that review is conducted, it becomes apparent that New Zealand has chosen to impose far more stringent tests upon 'swimmability' than is the case in Europe. Consequently, many of our rivers that would be deemed unacceptable for bathing according to the NPS-NOF, would be regarded as quite acceptable for swimming in Europe.*'

As a further example in practice of the differing criteria, set out below is data from the Council's year-round water quality monitoring data. It should be noted that this data is NOT from the Council's summer recreational monitoring of recognised swimming locations. The samples in question have instead been gathered year round regardless of river and weather conditions, at sites representative of all water bodies in the region. This data is presented within this memorandum in order to highlight the consequences and significance of the choice of criteria.

To make the data more meaningful for a discussion of swimmability, the monitoring data for periods of below median flow has been isolated. That is, this subset of the data represents water quality over the half of each year (regardless of season) when rivers will be safer to swim (ie are not in flood, with attendant risk of floating debris, turbid water, and strong currents). The data is presented in Table 4 below, and depicted graphically on the following map.

The data shows that region-wide there is a very high rate of compliance with the national bathing guidelines under these conditions. Almost all sites (9 of 11, or 82%) complied with the recreational guidelines for at least 80% of the time whenever flows were below median flow ie when flows were amenable for swimming. That is, almost all our rivers are almost always swimmable, in terms of meeting bacteriological guidelines, whenever they are swimmable from other perspectives. This data is presented graphically in the map on the next page of this memo.

Nevertheless, when the same sites are categorised according to the NOF classification, only 3 of the 11 sites in question can be deemed 'swimmable' when below-median flow data is reviewed. And when the entire (ie regardless of flow) data set of results is considered, only 2 of the region's waterways could be deemed swimmable.

On the other hand, when the NOF criteria for 'wadeability' (secondary recreation) is applied, every single site meets at least the minimum requirement.

There is thus a substantial difference in suitability for swimming, between the picture emerging from cumulative day by day results on one hand, and predictive modelling on the other.

When the European Union criteria for swimmability are applied to the regional below-median flow data, 7 of the 11 sites can be deemed 'swimmable', compared with only 3 under the NOF criteria. Of 4 sites that the NOF would deem unswimmable, 2 are in fact rated 'good' and the other two 'sufficient' for swimmable quality by European criteria. The

percentage of the region's waterways (as represented by the SEM sites) that would be deemed 'not suitable for swimming' would immediately drop from 73% to 36%. That is, more than one-third of the region's sites change from being unsuitable for swimming, to acceptable for swimming, by applying the EU criteria in preference to the NOF criteria.

The European Commission (now the European Union) developed its guidelines in the intervening period since the New Zealand guidelines were developed. Also, the United States Environmental Protection Agency has more recently undertaken a series of studies of illness in large cohorts of both swimmers and non-swimmers. These studies culminated in the USEPA's 2012 Recreational Water Quality Criteria. Both fresh water and coastal recreation are covered in the criteria. The EC/EU criteria are described above. In describing the long-term suitability of a bathing beach for use, the USEPA makes use of the geometric mean (GM) and the 90th%ile value of the dataset for that beach. In this context, the 90th%ile is referred to as the Statistical Threshold Value, or STV.

In mathematical terms, the GM is the antilog of the average of the log values of all the results. The geometric mean is one way of expressing the general quality or nature of a dataset across the dataset, and shows some influence of the more extreme values (which the median does not). The more commonly used average or mean (which is more strictly the arithmetic mean) is quite substantially influenced by any extreme outlier values. For example, a dataset consisting of almost all low values, but one or two extremely high values, will have an arithmetic mean that might be much higher than almost every value in the dataset. For the same set of data, the geometric mean will still be somewhat higher than most of the data, and certainly higher than the median, but not to the same extent as the arithmetic mean.

The USEPA has a binary classification system- that is, a beach is either suitable for swimming or it is not. The criteria are that the GM of results must be below 126 *E coli*/100 mls, and the STV (ie the 90th%ile value) must be below 410 *E coli*/100 mls.

For bathing waters that over the longer term have a GM of 126 *E coli*/100 mls, the USEPA's best estimate of the health risk is derived as 36 cases per 1000 primary contact events- that is, a 3-4% chance of illness. The EPA studies concluded that below 100 *E coli*/100 mls there was no measurable effect; the criterion of 126 *E coli*/100 mls is therefore essentially the lowest level at which any effect could be said to occur.

The USEPA also investigated whether non-human sources of *E coli* would carry the same degree of risk of illness as human sources. Without reaching a definitive conclusion, the evidence suggests that recreational water impacted by gulls, poultry, and swine carries a lower risk of human infection; the risk from waters impacted by fresh cattle wastes appears to be not substantially different to that impacted by human sources, but aged cattle wastes (eg runoff from land application of farm effluent) may carry a lower risk also. Bird life in NZ is considered by carry high levels of disease–causing organisms such as salmonella and campylobacter, and so questions do remain over the relative risks of mixed or non-human sources.

In Table 4 below, the USEPA criteria have been applied to this region's year-round SEM data, to highlight the similarities and differences that application of the various criteria makes. Using the *E coli* results collected during below-median flow conditions, 4 of the 11 sites meet the GM criterion (these sites are shown in blue in Table 4), while another 3 have GM values very close to but just above the USEPA GM criterion. (These 3 sites are flagged as

yellow). Four sites meet the STV criterion, including 3 of the sites that also meet the GM criterion, with one site that has a GM close to the criterion.

This compares with the fact that only 3 of the SEM sites meet the NOF criterion (which is based on each site's 95th%ile value).

In simple terms, New Zealand's NOF criterion is the most stringent of the three sets of guidelines for primary recreation. The NOF criterion excludes sites that meet the USEPA criteria in part or come close to them, while the EU would consider a number of sites acceptable for swimming that are however excluded by the other two guidelines.

5. A review of our recent recreational data (2015/2016 bathing season and the last five years)

Fifteen of the 17 recognised fresh water bathing sites in Taranaki routinely comply with the 2003 Guidelines in between 92 and 100% of the samples. Over the last 5 years, samples at 5 sites were 100% compliant; at 6 sites 95-99% compliant, and at 3 sites 90-94% compliant. However, only 2 of the region's 17 sites can be assigned into an 'A' MAC category as described in the 2003 guidelines, 3 into a 'B' category, and 4 into a 'C' category. The remaining 8- half of all sites- fall into the MAC 'D' category. Two of the sites that have had 100% of samples compliant over the past five years get rated only a 'B' by the MAC; one even gets rated only a 'C'.

Applying the NOF criteria, out of the 17 fresh water bathing sites that the Council routinely monitors each season, 5 fall into the 'A' NOF category for primary (swimming) usage, 4 into the 'B' category, and 8 would be deemed 'unacceptable for bathing'. Of these latter eight sites, 6 routinely meet the guidelines between 92-95% of the time, but because their 95th%ile results exceed the NOF criteria (that is, they do not have 95% or more of their results below 540 E coli/100 ml), they are to be regarded as 'unsuitable' according to the NOF even though their samples almost always meet the bathing guidelines.
Fifteen of these freshwater bathing sites would meet the criteria for bathing waters applied across Europe, compared with only 9 that would meet the NOF criteria.

Conclusion

These data illustrate the consequences for defining 'swimmability' of categorisation frameworks that are based upon landuse/perceived impacts and/or worst case results (95%iles) , rather than basing gradings upon actual monitoring data measured throughout the bathing seasons and the measured likelihood of meeting risk criteria. The results of the Council's contact recreational water quality programmes confirm that gradings do not reflect the recreational water quality experienced by recreational users, and therefore it remains an open question as to whether they should be used or relied upon to make any statement about how suitable water actually is for recreational purposes. They show only susceptibility, and predominantly reflect perceptions and suppositions about how some land uses might influence quality, as designated 'risk factors', and/or a highly precautionary approach. It is the view of Council staff that when there is regular and systematic testing of the actual quality, under weather and river conditions amendable to recreational use, then those results reflect actual levels of contamination and are far more informative and meaningful to recreational water users. The Council emphasises the importance of results of systematic and on-going testing and reporting of actual contact recreational water quality.

Figure 1: Regional water quality: frequency of compliance with bathing criteria (Refer Table 4)

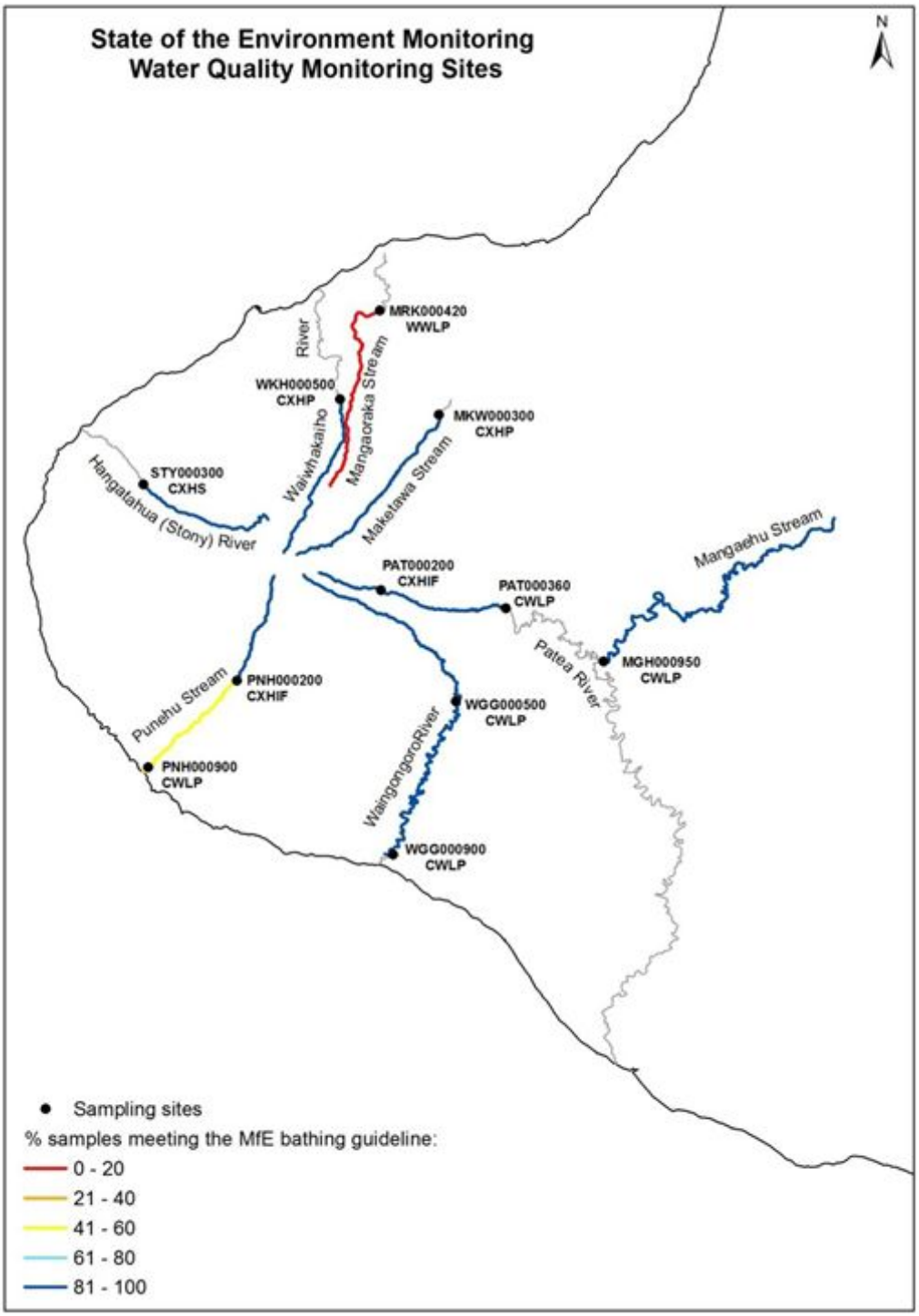

Table 4: Comparison of year-round SEM data with various national and international recreational water quality criteria

Standards/ Guidelines applied		*Site data and MfE bathing guideline- single samples*		*Site data and NOF gradings*			*Site data and EU gradings*		*Site data summary description*		*Site data (below median flow) and USEPA recreational water quality criteria*	
		% of all samples below Action level <550		NOF gradings for activities with full immersion- flows below median dataset	NOF gradings for activities with full immersion- all flows dataset	Activities with occasional immersion- Dataset for below median	Below median flows data	EU grading for activities with full immersion	Median of dataset	Ratio of median to 95%ile	Compliance with Geometric mean	Compliance with STV (90th%ile)
Site	Sampling statistic	Individual samples	Grade	95th percentile of dataset		Median	95th percentile value				Below 126	Below 410
MGH000950		97%	Dark blue	B	D	A	340	Excl	85	3.2		
MKW000300		87%	Dark blue	D	D	A	2950	Poor	235	12.6		
MRK000420		20%	Red	D	D	C	6100	Poor	985	6.2		
PAT000200		100%	Dark blue	A	B	A	240	Excl	27	8.9		
PAT000360		87%	Dark blue	D	D	A	1650	Poor	150	11		
PNH000200		83%	Dark blue	C	C	A	730	Good	108	6.8		
PNH000900		60%	Yellow	D	D	B	1200	Sufficient	475	2.5		
STY000300		100%	Dark blue	A	B	A	26	Excl	5	5.2		
WGG000500		87%	Dark blue	D	D	A	1060	Sufficient	185	5.7		
WGG000900		87%	Dark blue	D	D	A	1800	Poor	175	10.3		
WKH000500		93%	Dark blue	C	D	A	590	Good	175	3.4		
									Mean and SD of ratio	*6.9+/-3.4*		

Map grading system

0-20%	Red
21-40%	Orange
41-60%	Yellow
61-80%	Light blue
81-100%	Dark blue

NOF Grading system

95%ile	median
A	≤260
B	>260 and ≤540
C (unacceptable)	>540 and ≤1000
D (unacceptable)	>1000

EU grading system

	95%ile
Excellent	500
Good	1000
Sufficient	*1300*
poor	*>1300*

(*estimated from EU criterion 1000 @ 90%)*

USEPA definition:

STV = statistical threshold value = 90th%ile of dataset

Meets criterion

Almost meets

Does not meet

Decision-making considerations

Part 6 (Planning, decision-making and accountability) of the *Local Government Act 2002* has been considered and documented in the preparation of this agenda item. The recommendations made in this item comply with the decision-making obligations of the *Act*.

Financial considerations—LTP/Annual plan

This memorandum and the associated recommendations are consistent with the Council's adopted Long-Term Plan and estimates. Any financial information included in this memorandum has been prepared in accordance with generally accepted accounting practice.

Policy considerations

This memorandum and the associated recommendations are consistent with the policy documents and positions adopted by this Council under various legislative frameworks including, but not restricted to, the *Local Government Act 2002*, the *Resource Management Act 1991* and the *Biosecurity Act 1993*.

Legal considerations

This memorandum and the associated recommendations comply with the appropriate statutory requirements imposed upon the Council.

Agenda Memorandum

Date 1 September 2016

Memorandum to
Chairperson and Members
Committee name or Taranaki Regional Council

Subject: SEM periphyton monitoring programme report for 2014-2016

Item: 5

Approved by: Gary Bedford, Director- Environmental Quality

BG Chamberlain, Chief Executive

Document: 1730539

Purpose

The purpose of this memorandum is present to the Committee the latest report on the quality of streams and rivers in the Taranaki region, as measured by assessing periphyton during the 2014-2016 years. The programme is reported in *Freshwater Periphyton Monitoring Programme (Periphyton monitoring in relation to amenity values) State of Environment Monitoring Report 2014-2016.*

The Executive Summary and recommendations from the report are attached to this memorandum.

Executive summary

Section 35 of the Resource Management Act requires local authorities to undertake monitoring of the region's environment, including land, air, and fresh and marine water quality. The freshwater periphyton programme has been designed to monitor the presence, distribution, and characteristics of algae in Taranaki streams and rivers, especially if this reaches levels which may affect the instream values of these streams i.e. aesthetic values (contact recreation and amenity values) and biodiversity values. Periphyton provide much of the energy (food) for aquatic ecosystems, but given the right combination of conditions, periphyton can proliferate to a degree that degrades the system, forming large nuisance growths (either thick mats or long filamentous strands). The New Zealand Periphyton Guidelines provide a reference for the point at which growths of periphyton exceed the recreational guideline. Periphyton cover is deemed to have become unacceptable when at least 30% of the bed is covered by filamentous algae and/or at least 60% of the bed is covered by thick mats of algae.

The Taranaki Regional Council initiated a periphyton monitoring programme within its suite of the State of the Environment Monitoring (SEM) programmes for Taranaki, in the 2002-2003 monitoring year. The latest reports on the state of stream health and quality as

measured by periphyton indicators is being presented today, covering the 2014-2016 period. It describes the results of the programme for the two monitoring periods, and in addition provides an overall assessment (based on fourteen years of data) and identifies trends in the extent of periphyton cover at each site where present.

Twenty-one sites in ten catchments around the Taranaki region were surveyed on four occasions, generally in each spring and summer, according to consistent protocols including a minimum period after flow conditions that could scour and flush periphyton. In other words, sampling is conducted under 'worst case' conditions that allow nuisance periphyton to proliferate. Five sites could not be surveyed in spring 2014, due to the frequency of flooding at these five sites. Sites have been chosen to be representative of different catchment types found in the region, such as high conservation, riparian establishment, and major abstraction. Most of the rivers/streams in the programme have one upper site (ie less potential effect from human activities), and one or two lower sites (with various degrees of potential effect or influence). The results were interpreted to both provide a periphyton index score (PI) and to record exceedances of the recreational and aesthetic guidelines. For the PI, a higher value represents better in-stream conditions. The numerical index score is expressed in equivalent descriptive terms, ranging from 'very poor' through 'poor', 'moderate', and 'good' to 'very good' (the highest grading).

Surveillance monitoring was also undertaken for the presence of didymo (an invasive alien species of periphyton) and for cyanobacteria (some forms of which can become toxic).

In the **2014-2016** period, out of 158 individual site surveys conducted (79 for each of thick mats and for filamentous algae), 148 complied with the MfE guidelines- a compliance rate of 93.7%. In 2012-2014 the compliance rate had been 98.8%. Fourteen of the 21 sites never had any breach. Only 2 sites had more than a single breach (out of the 8 surveys at each site): one site each on the Mangaehu (one beach of the filamentous guideline, and one of the thick mat guideline, on a different occasion) and the Kapoaiaia (two breaches of the filamentous guideline, one in each summer). In terms of seasonality, there was one breach in spring 2014, 4 in summer 2015, 2 in spring 2015, and 3 in summer 2016.

Of the 21 individual sites, 13 had a median score of 'very good' in the 2014-2016 period (the same number as in 2012-2014), 6 had a median score of 'good' (7 in 2012-2014), and 2 a score of 'moderate'. During the same period, out of 79 individual ratings of state that could be assigned, 3 fell into the 'poor' category (1 in 2012-2014); there were 9, or 11%, in the moderate' category (7); 16, or 20%, in the 'good' category (26%), and all remaining surveys (65%) found that periphyton condition was 'very good' (65% in 2012-2014 also).

In terms of indicative trends in the extent of coverage by periphyton, for the 14 years to the end of the summer 2016 survey, coverage by thick mats has been decreasing at 13 sites (9 to 2014) sites and increasing at 8 sites (11 to 2014). The trends were statistically significant at 4 sites (Kapoaiaia Stream x 2, Manganui Stream, and Waingongoro River); at all 4 sites coverage by thick mats has been reducing. Trends at 2 of these sites remained significant even after the more robust test of significance involving FDR.

In terms of indicative trends in the extent of proliferation of long filaments, for the 14 years to the end of the summer 2016 survey, filaments have been decreasing at 18 sites and increasing at only 2 sites (same results as for the period to 2014). The trends were statistically significant at 5 sites (Kapoaiaia Stream [2 sites], Maketawa Stream, Patea River, Waingongoro River); at all 5 sites coverage by long filaments has been reducing. Trends at 2

of these sites remained significant even after the more robust test of significance involving FDR.

No didymo has been found at any time at any site.

True upstream sites with little agriculture in their catchment generally have a low biomass and stable periphyton canopy throughout the year. Catchments with a proportion of their catchment used for agriculture are more likely to have periphyton growths at sites lower in the catchment during an average summer (not necessarily to a nuisance degree). The report notes that there has been generally an increase in riparian exclusion and planting implemented throughout the Taranaki region in the time since periphyton monitoring first began; and this may have led to the reduction in nuisance growths at the large number of sites (62% for thick mat measurements, 90% for filamentous measurements where negative (reducing) trends for periphyton are apparent.

The report includes recommendations for the continuation of the programme.

Recommendations

That the Taranaki Regional Council:

1. receives this memorandum on the results of the Council's SEM programme monitoring periphyton, and the accompanying reports *Freshwater Periphyton Monitoring Programme (Periphyton monitoring in relation to amenity values) State of Environment Monitoring Report 2014-2016 Technical Report 2016-34.*
2. adopts the specific report recommendations contained therein.

Background

The Council's *Regional Fresh Water Plan for Taranaki (2001*) includes the following objectives:

Obj 3.1.2 *To maintain and enhance the natural, ecological and amenity values of rivers and streams of value in the region…*

Obj 3.1.4 *To safeguard the life-supporting capacity of water and aquatic ecosystems from the adverse effects of the use and development of fresh water*

Obj 3.1.5 *To maintain and enhance amenity values and the quality of the environment of Taranaki's rivers…*

The Council's Annual Plan for 2009-2010 contained a target for managing the algal state of the region's streams, as follows: *'Improvements in…algal cover, against a baseline of 1995 water quality, as applicable at 10 representative sites'*.

Section 35 of the Resource Management Act requires local authorities to undertake monitoring of the region's environment, including land, air, and fresh and marine water quality.

The Taranaki Regional Council initiated the periphyton monitoring programme within the Council's suite of the State of the Environment Monitoring (SEM) programmes for Taranaki in the 2002-2003 monitoring year. The freshwater periphyton programme has been designed

to monitor the presence, nature, and distribution of algae in Taranaki streams and rivers with particular regard to the extent of proliferation which may affect the instream values of these streams i.e., aesthetic values (contact recreation and landscape values), biodiversity values, and those values linked to Maori culture and tradition. The programme is a continuing programme so as to test the effectiveness of regional water resources management policies. The most obvious of these is the progressive development of riparian planting in Taranaki, as shading of a stream may serve to limit periphyton growth and riparian planting may also filter runoff that is high in nutrients and sediment, which in turn may help reduce conditions conducive to the establishment of nuisance growths. The consequences of management of discharges to surface waters are also being monitored through the periphyton programme. Reductions in contaminant concentrations and mass loadings in discharges (whether agricultural or industrial) within a catchment may consequently improve water quality and limit the nutrients which allow nuisance periphyton to proliferate.

When managing rivers and streams for instream values, it is important to consider periphyton for two reasons:

1. Periphyton provides much of the energy (food) for the ecosystem.

2. Given the right conditions, periphyton can proliferate, forming large nuisance growths. Such growths interfere with human uses and degrade the habitat for other organisms.

The New Zealand Periphyton Guidelines provide a reference at which point growths of periphyton exceed the recreational guideline. This point is exceeded when at least 30% of the bed is covered by filamentous algae and/or at least 60% of the bed is covered by thick mats of algae.

Discussion

This report summarises the results of the programme for the monitoring period 2014-2016, and follows on from earlier reports covering up to the end of the 2014 monitoring period. Twenty-one sites were surveyed each year in ten catchments around the Taranaki region. Sites were chosen to be representative of different catchment types such as high conservation, riparian and major abstraction. In most cases, each river/stream has one upper site (where there is less potential effect from human activities), and one or two lower sites (with various degrees of potential effect). Sampling was undertaken generally twice each year, in spring (between September and December) and summer to late summer (between January and April), in accordance with protocols that required a minimum period since preceding freshes that may have served to reduce pre-existing periphyton growths. In other words, sampling is undertaken under the conditions that serve to promote a proliferation of periphyton (a worst case circumstance). In some cases surveys had to be omitted because of the absence of suitable (low flow) conditions for the time being.

At each site, ten random assessments were made across the stream using a periphyton viewer. Periphyton cover on the stream bed within each square were estimated visually as a percentage cover on the substrate, as being of one of three types-thin film, mats, and/or filaments. The colour of the growth (brown, black, or green) was also recorded.

Information on the extent of coverage and the characteristics of the algae present is used to establish a periphyton index score (PI) and to determine whether the site exceeded the

national recreational and aesthetic guidelines. The PI index is based on more information that just the percentage cover or whether the guidelines are exceeded.

While a periphyton index has been presented within national stream habitat assessment protocols (the 'SHMAK' PI), this has been found to not be suitable for characterising sites where periphyton communities are frequently affected either by scouring in floods, or by proliferation during low flow stable conditions, such as occurs in Taranaki. Therefore the Council has modified this PI methodology to generate its own index (the 'TRC PI'). In simple terms, a site clear of any algae will have a score of 10 (the maximum), and a site completely covered in filamentous green algae will have a score of 1 (the lowest possible score). While a site that has an exceedence of the periphyton guidelines could conceivably still have a reasonable PI score, even up to 8.2 (depending on the nature of the periphyton present, rather than its extent), a low TRC PI (somewhat at or below 6.0) will generally indicate undesirable growths are present to a significant, even if not at excessive levels. In descriptive terms, the categories are as follows:

Category ratings for TRC PI scores

Rating	TRC PI score
Very good	8-10
Good	6-8
Moderate	4-6
Poor	2-4
Very poor	0-2

An approximate scale for interpreting PI values is as follows:-

Score: 0 to 1.9
There are mainly long filamentous green algae at the site indicating that there is high to moderate enrichment. Such enrichment could be from enriched seepage/discharge, or could occur naturally in streams that have a high proportion of recent volcanic rocks (central North Island) in their catchments.

Score: 2 to 3.9
These communities suggest a moderate level of enrichment.

Score: 4 to 5.9
These communities suggest slight enrichment. Clean stones can result from recent abrasion by flood flows or intense grazing by invertebrates/insects that live in the gravels.

Score: 6 to 7.9
These communities are generally composed of species that are able to grow under moderate to low nutrient conditions. These communities also usually grow back first after a flood has removed previous growths, but may be out-grown by filamentous algae if nutrient levels are sufficiently high.

Score: 8 to 10
These communities usually signify low concentrations of nutrients and/or intensive grazing by invertebrates/insects that live among the gravels, or recent scouring.

In the **2014-2016** period, out of 158 individual site surveys conducted (79 for each of the extent of proliferation of either thick mats or for filamentous algae), 148 found that the site in

question complied with the MfE guidelines. This represents a compliance rate of 93.7%. In 2012-2014, the compliance rate had been 98.8%. Fourteen of the 21 sites never had any breach during the period under review. Only 2 sites had more than a single breach (out of the 8 surveys at each site): one site each on the Mangaehu (one beach of the filamentous guideline, and one of the thick mat guideline, on a different occasion) and the Kapoaiaia (two breaches of the filamentous guideline, one in each summer). In terms of seasonality, there was one breach in spring 2014, 4 in summer 2015, 2 in spring 2015, and 3 in summer 2016.

Of the 21 individual sites, 13 sites had an overall median score of 'very good' in the 2014-2016 period. This is the same number as scored 'very good' in 2012-2014. Six had a median score of 'good' (7 in 2012-2014), and 2 a score of 'moderate'. During the same period, out of 79 individual ratings of state that could be assigned (ie the ratings for each survey), 3 surveys fell into the 'poor' category (1 in 2012-2014); there were 9, or 11%, in the moderate' category (7); 16, or 20%, in the 'good' category (26%), and all remaining surveys (65%) found that periphyton condition was 'very good' (65% in 2012-2014 also). Each of the 3 sites that scored a 'poor' survey result at some time during the period under review also scored a 'very good' at least once during the same period.

Indicative and significant 14-year trends to summer 2016

In terms of indicative trends in the extent of coverage by periphyton, for the 14 years to the end of the summer 2016 survey, coverage by thick mats has been decreasing at 13 sites (9 sites to 2012, 13 sites to 2014), and increasing at 8 sites. Thus, 62% of sites are showing indications of reductions in periphyton at times of highest susceptibility to proliferation. The trends were statistically significant (including FDR) at 2 sites (Kapoaiaia Stream and Waingongoro River); at both sites coverage by thick mats has been reducing.

In terms of indicative trends in the extent of proliferation of long filaments, for the 14 years to the end of the summer 2016 survey, filaments have been decreasing at 18 sites (90%) and increasing at only 2 sites. This is the same result as to 2014. The trends were statistically significant at 5 sites (Kapoaiaia Stream [2 sites], Maketawa Stream, Patea River, and the Waingongoro River. At all 5 sites coverage by long filaments has been reducing.

Overall, sites located upstream in catchments had low levels of periphyton, while sites further downstream had higher levels of periphyton, which on infrequent occasions (assessed under conditions when proliferation was most likely to occur and to be at its greatest extent) breached guidelines. Correlation analysis was carried out to try and ascertain which environmental factors might be most closely associated with proliferation of periphyton. Results of this were inconclusive. While some strong correlations emerged for some surveys at some sites, these were not consistent across all sites or all surveys when higher levels of proliferation were found. It should also be borne in mind that correlation does not establish causation.

Chlorophyll-a concentration measurements

The National Policy Statement for Fresh Water (2014) establishes attribute states (criteria) for the allowable concentration of chlorophyll-a, the pigment in periphyton. The attribute states and their associated numerical descriptions are: 'A' less than 50 mg chl-a/m^2; 'B' 50-120 mg chl-a/m^2; 'C' 120-200 mg chl-a/m^2 ; and 'D' (ie below the bottom line) more than 200 mg chl-a/m^2. Compliance is determined on the basis of samples collected monthly under 'random systematic' conditions ie on the same day of each month regardless of weather and flow conditions. Compliance is defined as having 1 or less samples each year containing more than 200 mg chl-a/m^2.

The Council has to date measured chlorophyll only once per year (summer), under worst case conditions ie when periphyton proliferation is at its most productive, rather than on a random basis. Therefore there can be no direct comparison made with the NOF criteria. However, a review of available chlorophyll-a data is still informative.

No site gave one than one result above 200 mg chl-a/m^2 when sampled under worst case conditions in the two summers. Ten sites (approximately half of all sites) had no results above 50 mg chl-a/m^2, and are effectively in the 'A' band. Three sites had no result above 120 mg chl-a/m^2, and are therefore effectively equivalent to the 'B' band. The remainder of the sites are effectively equivalent to 'C' grade.

Conclusions

In summary, the weight of evidence is that there is an on-going trend of improving in-stream health across the region's streams and rivers. The report notes that there has been generally an increase in riparian exclusion and planting implemented throughout the Taranaki region in the time since periphyton monitoring first began; and this may have led to the reduction in nuisance growths at the large number of sites (62% for thick mat measurements, 90% for filamentous measurements where negative (reducing) trends for periphyton are apparent.

Thus, the Council and regional community are meeting the various LTP targets even more robustly on a year by year basis, and over the long term additional measures for maintaining and enhancing water quality, like the riparian programme and exclusion of direct discharges of treated farm effluent to water, should see further and more robust gains in in-stream ecological health across the region.

Decision-making considerations

Part 6 (Planning, decision-making and accountability) of the *Local Government Act 2002* has been considered and documented in the preparation of this agenda item. The recommendations made in this item comply with the decision-making obligations of the *Act*.

Financial considerations—LTP/Annual plan

This memorandum and the associated recommendations are consistent with the Council's adopted Long-Term Plan and estimates. Any financial information included in this memorandum has been prepared in accordance with generally accepted accounting practice.

Policy considerations

This memorandum and the associated recommendations are consistent with the policy documents and positions adopted by this Council under various legislative frameworks including, but not restricted to, the *Local Government Act 2002*, the *Resource Management Act 1991* and the *Biosecurity Act 1993*.

Legal considerations

This memorandum and the associated recommendations comply with the appropriate statutory requirements imposed upon the Council.

Appendices/Attachments

Document: 1681833: Freshwater Periphyton Monitoring Programme (Periphyton monitoring in relation to amenity values) State of Environment Monitoring Report 2014-2016 Technical Report 2016-34.

Freshwater Periphyton Monitoring Programme (Periphyton monitoring in relation to amenity values) State of Environment Monitoring Report 2014-2016 Technical Report 2016-34.

Executive summary and recommendations

Executive summary

Section 35 of the Resource Management Act requires local authorities to undertake monitoring of the region's environment, including land, air, and fresh and marine water quality. The Taranaki Regional Council began monitoring for nuisance periphyton in the 2002-2003 monitoring year. This report summarises the results of the State of the Environment periphyton programme for the monitoring period 2014/2016.

Periphyton is a mixture of algae and cyanobacteria that naturally occurs in rivers and streams. It plays a fundamental role in stream ecosystem functioning by utilising sunlight via photosynthesis and providing a food source for invertebrates which in turn provide food for other organisms such as fish and birds. Nuisance periphyton in the form of prolific thick mats, pervasive long filaments or cyanobacteria can cause a range of issues such as streams becoming un-inviting for recreational users, anglers having difficulty fishing, streams closures due to cyanobacteria toxins and adverse impacts on stream ecology.

This freshwater periphyton programme has been designed to monitor for the presence and biomass of 'nuisance' algae in Taranaki streams and rivers at levels which may affect the instream values of these streams i.e., aesthetic values (contact recreation and landscape values), biodiversity values, and those values linked to Maori culture and tradition.

Twenty-one sites are surveyed each year in 10 catchments around the Taranaki Region. Sites were chosen to be representative of different catchment types such as high conservation, agriculture, riparian and major abstraction. Most rivers or streams had one upper (mostly un-impacted) site, and one or two lower sites (with various degrees of land use impact).

The Hangatahua (Stony) River and Maketawa Stream were selected for their high conservation values. The Manganui, Patea and Waiwhakaiho Rivers, and the Mangaehu River were chosen as examples of waterways with large catchments and /or multiple human impacts. The Waingongoro River was included in the programme as a river under intensive usage and the Waiongana Stream as a stream from which there is a major water abstraction. The Punehu Stream was included as a stream within a primarily agricultural catchment and the Kapoaiaia Stream as a western Taranaki stream targeted for riparian planting initiatives.

Periphyton surveys were scheduled for two times per year, spring (15 September to 31 December) and summer (1 January to 15 April). Sampling was always carried out after an extended period of low flow of at least 10 days since a fresh of 3x median base flow (i.e. after sufficient time for excessive growths to establish). At each site, ten random assessments were made across the stream using a periphyton viewer. Types of periphyton cover on the stream bed within each square were estimated visually as percentage coverage on the substrate; types being one of a range e.g. thin, medium and thick films of mats and short and long filaments. The colour of the growth (brown, black, or green) was also recorded. Additionally, during the summer period periphyton samples were collected from ten rocks randomly selected at each site and levels of chlorophyll *a* pigment analysed in a laboratory to determine periphyton biomass.

The New Zealand Periphyton Guidelines, established by the Ministry for the Environment (Biggs, 2000), provide a reference at which point growths of periphyton exceed the recreational guideline. This point is exceeded when at least 30% of the bed is covered by filamentous algae and/or at least 60% of the bed is covered by thick mats of algae. A TRC specific periphyton index score derived from the standard periphyton index score (Biggs et al., 1998) was also calculated from the periphyton cover data and scores converted into one of five grades.

Chlorophyll *a* was used to estimate the amount of live periphyton biomass over two summers. Guidelines for chlorophyll *a* were established by the Ministry for the Environment (Biggs, 2000). The National Objectives Framework (NOF) (MfE, 2014) also uses chlorophyll *a* to assign bands to rivers and streams. There is a Government-imposed requirement to ensure streams and rivers are above the D band (chlorophyll *a* 200 mg/m^2) from 2025 onwards. The Council's long-established chlorophyll *a* sampling protocol differs from that established more recently for the NOF guideline and therefore results cannot be directly translated to NOF bands.

Trend analysis was performed by applying a LOWESS fit (tension 0.4) to a time scatterplot of the percentage cover of thick mats, and long filaments of periphyton for all sites and by testing the significance of any trend using the Mann-Kendall test at the 5% level, followed by Benjamini-Hochberg False Discovery Rate (FDR) analysis.

The results for the SEM nuisance periphyton programme during the 2014/2015 monitoring year showed that five sites breached nuisance periphyton guidelines at some time. No sites breached the guideline for thick mats, but 5 out of 21 sites surveyed breached the guidelines for long filaments. For the 2015/2016 monitoring year 4 sites breached nuisance periphyton guidelines. One site breached each of the thick mat and long filament guidelines on one occasion for each, while three other sites breached only the long filament guideline, on one occasion (refer Table 1 for all results). The Mangaehu River at the Raupuha Road site failed the guideline for thick algal mats (the only site to do so on any occasion over the two years under review). Eight sites in total failed for long filamentous algae on at least one occasion out of the four surveys conducted at each site during the two years under review.

Out of 84 site surveys for each of the two periphyton measures- thick mats and long filaments- over the two years (ie 168 surveys in total), 158 surveys (94%) found periphyton levels to be below guideline limits.

All rivers received a rating of at least 'moderate' for the TRC periphyton index score in all individual surveys except for the Waiongana at Devon Rd and the Kapoaiaia River at Wataroa Rd, which each had 'poor' ratings for one survey. One hundred and sixty-eight surveys in total were conducted.

For the TRC Periphyton Index, the median index value for 2014-2016 monitoring showed that 13 sites (62%) recorded a 'very good' rating, 6 sites (29%) recorded a 'good' rating, and two sites (10%) recorded a 'moderate' rating.

No sites had cyanobacteria mats above 50% streambed coverage, that would place a site in the 'Action' category and present a significant health hazard.

Table 1: Summary of SEM periphyton results for 2014-2016 monitoring year

River/Stream	Site	Distance from Nat Park (km)	Median TRC Periphyton Index	Indicative trend		Periphyton cover		Periphyton biomass (chlorophyll *a* mg/m²)	
				Thick mats	Long filaments	Thick mats	Long filaments	2015	2016
Hangatahua (Stony)	Mangatete Road	7.3	Very good	Decreasing	Decreasing	4/4	4/4	5	4
	SH45	12.5	Very good	Decreasing	Decreasing	4/4	4/4	5	4
Maketawa	Derby Rd	2.3	Very good	Decreasing	Increasing	4/4	4/4	2	1
	Tarata Road	15.5	Very good	Decreasing	Decreasing	4/4	4/4	10	28
Manganui	SH3	8.7	Very good	Decreasing	Decreasing	4/4	4/4	2	1
	Bristol Road	37.9	Good	Increasing	Decreasing	4/4	3/4	219*	10
Patea	Barclay Road	1.9	Very good	Decreasing	Decreasing	4/4	4/4	15	6
	Skinner Road	19.2	Good	Increasing	Decreasing*	4/4	4/4	106	126
Waiwhakaiho	SH3 (Egmont Village)	10.6	Very good	Increasing	Decreasing	4/4	3/4	212*	19
	Constance St, NP	26.6	Good	Increasing	Decreasing	4/4	4/4	70	10
Waingongoro	Opunake Road	7.2	Very good	Decreasing*	Decreasing	4/4	4/4	9	7
	Stuart Road	29.6	Very good	Decreasing	Decreasing	4/4	4/4	196	173
	Ohawe Beach	66.6	Good	Increasing	Decreasing	4/4	3/4	193	140
Punehu	Wiremu Road	4.4	Very good	Increasing	Decreasing	4/4	4/4	3	2
	SH45	20.9	Very good	Decreasing	Decreasing	4/4	4/4	12	8
Kapoaiaia	Wiremu Road	5.7	Very good	Decreasing*	Decreasing*	4/4	4/4	10	2
	Wataroa Road	13.5	Very good	Decreasing	Decreasing	4/4	3/4	790*	132
	Cape Egmont	25.2	Good	Decreasing	Decreasing	4/4	2/4	86	78
Waiongana	SH3a	16.1	Good	Decreasing	Decreasing	4/4	3/4	318*	104
	Devon Road	31.2	Moderate	Increasing	Increasing	4/4	3/4	674*	140
Mangaehu	Raupuha Road	NA	Moderate	Increasing	Decreasing	3/4	3/4	112	246*

* Significant trend at $p<0.05$ after FDR adjustment or breach of NOF standard

Periphyton biomass was in excess of the NOF standard (200 mg/m²) at five sites for the summer 2015 survey and at one site for the summer 2016 survey, and was in excess of the guideline to protect benthic biodiversity (50 mg/m²) at eleven sites for the summer 2015 survey and eight sites for the summer 2016 survey.

Periphyton biomass results reflected nuisance periphyton levels and to a lesser extent TRC PI scores. There were six sites with chlorophyll *a* levels in exceedance of the NOF bottom line criterion but for each of the six sites only one of the two surveys was in exceedance. As noted above, these results do not mean that a 'D' NOF classification can be applied to the six sites, as three years of monthly data is required to produce a NOF rating, and the NOF protocol allows sites to have one sample per year (out of 12 surveys if the NOF procedure was used) above the 200 mg/m² standard without deeming the site's quality to be in non-compliance.

Long term periphyton trend analysis) revealed that for the majority of sites nuisance periphyton was decreasing but the trends were not statistically significant. Thirteen sites showed decreasing trends (ie reductions in the average extent of periphyton) for thick mats (reductions at two sites were statistically significant after FDR adjustment) and 18 sites

showed decreasing trends for long filaments (reductions at two sites were statistically significant after FDR adjustment). The significant trends were at three sites: the upper Kapoaiaia and Waingongoro River sites having decreasing levels of thick algal mats and the upper Kapoaiaia and lower Patea River sites having decreasing levels of long filamentous algae. No sites showed a statistically significant increase in either periphyton measure.

The data used for nuisance periphyton guidelines (thick algal mats and long filaments) overlaps with the periphyton index score but was potentially completely distinct from the periphyton biomass data as rocks viewed for periphyton cover are not necessarily, and probably unlikely, to be the same ones used to collect periphyton biomass. Therefore, even though ten replicates were used, results can potentially differ significantly between the two methods. Furthermore, periphyton coverage examines both live and dead periphyton while periphyton biomass uses chlorophyll *a* which is contained within live material only.

Of the 21 sites used for periphyton monitoring, two rivers with two sites each were selected based on their high conservation values/ water quality and an additional seven sites were selected as upper, mostly unimpacted sites, situated relatively close to the National Park boundary. Of these eleven sites, all of them except for the upper sites in the Waiwhakaiho River and Waiongana Stream contained very low levels of periphyton based on all three measures used in the current SEM programme (nuisance periphyton limits, TRC PI and chlorophyll *a*). The upper sites in the Waiwhakaiho River and Waiongana Stream were the furthest downstream from the National Park boundary (>10 km) of all the upper sites.

All ringplain sites located further than 10 km from the National Park boundary and the Mangaehu River site, except for the two high conservation value waterbodies the Stony River and Maketawa Stream, had moderate to high levels of periphyton for at least one of the four surveys and of those eleven sites, eight had at least one breach of a nuisance periphyton limit and six had a periphyton biomass level above the NOF guideline at some time over the four biomass surveys at each site. Two of the other three sites came extremely close to breaching one of the guidelines (ie a result 2% below long filament guideline or 4-7 mg/m^2 of chlorophyll *a* below NOF standard). This indicates that the majority of sites located a reasonably distance from the National Park boundary or that have a substantial modified catchment above the site can potentially have problems with nuisance periphyton under certain conditions conducive to proliferation.

In keeping with the last reported period (2012/2014) but unlike other earlier reported results, the difference between spring and summer surveys was not significant. Summer surveys usually have considerably higher periphyton levels than spring surveys (e.g. TRC, 2014) but the average TRC PI score was identical for the spring 2014, spring 2015 and summer 2016 surveys, though the summer 2015 had a slightly lower score. Average thick mat levels were either the same or higher for the spring surveys compared with the summer surveys. Average long filament levels were higher for both summer surveys but not by a considerable amount. Breaches in guidelines were similar between surveys though slightly higher for the summer 2015 survey: spring 2014 one breach, summer 2015 four breaches, spring 2015 two breaches and summer 2016 three breaches.

No *Didymosphenia geminate* was found for the monitoring period under review.

Overall, the following conclusions can be made:

1. Generally, the monitored sites almost always complied with nuisance periphyton guidelines, with 99% and 89% of surveys complying with the periphyton guideline for thick mats and long filaments respectively.
2. 'Upstream sites' with little agriculture in their catchment had typically lower levels of periphyton compared with sites located further down the catchment that had nuisance periphyton levels which occasionally breached guideline limits.
3. Due to the number of variables involved (e.g. nutrients, sunlight, temperature, substrate type, time since last fresh or flood, water clarity, level of invertebrate grazing etc) and interaction affects between variables it can be difficult to ascertain the main factors driving periphyton biomass.
4. The cumulative effects of agricultural discharges via point source or diffuse pollution were probably the main cause of algae proliferation in 'downstream' catchment sites.
5. Flood flows can cause a reduction in periphyton growth but the degree of this effect is not consistent within streams or seasons.

From these conclusions, a number of recommendations are made in the report. Monitoring of the streams should continue as previously performed.

In response to the invasion of *Didymosphenia geminate* in the South Island, it is also recommended that samples continue to be taken by the Council at selected sites and sent away for analysis.

6. Recommendations

1. THAT monitoring of the periphyton communities in the Stony, Maketawa, Manganui, Patea, Waiwhakaiho, Waingongoro, Punehu, Kapoaiaia, Waiongana and Mangaehu Rivers is continued for periphyton cover.

2. THAT in the 2016-2018 monitoring period, the Waiwhakaiho, Manganui, Patea, Waingongoro, Stony and Kaupokonui Rivers and Kapuni and Mangaoraka Streams are monitored for the invasive alga *Didymosphenia geminata*.

3. THAT the periphyton survey results are included in the next SEM 5 yearly state of environment report.

4. THAT programmes designed to limit nutrient input into Taranaki streams and rivers continue to be implemented such as riparian planting/fencing and disposal of dairy shed effluent to land in order to reduce periphyton levels in lowland streams and rivers in agriculturally dominated catchments.

Agenda Memorandum

Date 1 September 2016

Memorandum to
Chairperson and Members
Policy and Planning Committee

Subject: **Regional Sector's views on Freshwater Reforms**

Item: 6

Approved by: A D McLay, Director – Resource Management

B G Chamberlain, Chief Executive

Document: 1732788

Purpose

The purpose of this memorandum is to introduce, for Members' information, a letter from Local Government New Zealand to the Ministry for the Environment outlining the Regional Sector's views on the Freshwater Reforms.

A copy of this letter is attached to this memorandum.

Executive summary

In February 2016, the Ministry for the Environment released the *Next Steps for Freshwater: Consultation document*. This consultation document suggested making a number of amendments to the *National Policy Statement for Freshwater Management 2014* (NPS-FM).

Subsequently, the Ministry for the Environment (MfE) has invited the regional and unitary councils, as a sector, to provide additional comment on four matters of particular interest, namely:

- Suitability of rivers and lakes for swimming;
- Managing nutrients in rivers;
- Economic factors; and
- Entries to Appendix 3 and 4 of the NPS-FM.

On 2 August 2016, the Chair of the Regional Sector of LGNZ, responded with the attached letter.

Key points made in the response highlight issues and challenges associated with the four areas of interest.

The sector response also raised general concerns about poor problem identification and definition by MfE, and the need to take a considered approach to making any further

amendments to the NPS-FM.

The sector response highlights concerns that the proposed changes to the NPS-FM will result in an overly prescriptive policy statement, which undermines the devolved local decision-making processes set out in the Resource Management Act 1991 (RMA).

Recommendation

That the Taranaki Regional Council:

1. receives the memorandum *Regional Sector's views on the Freshwater Reforms.*

Background

In February 2016, the Ministry for the Environment (MfE) released the *Next Steps for Freshwater: Consultation document*. This consultation document suggested making a number of amendments to the National Policy Statement for Freshwater Management 2014 (NPS-FM). Submissions on the NPS-FM closed on Friday 22 April 2016. This Council, along with many other councils in the sector, lodged a submission on this document.

Subsequent to the consultation on the discussion document, MfE has invited the regional and unitary councils, as a sector, to provide additional comment on the following four matters in relation to *The Next Steps for Freshwater Consultation document*:

- Suitability of rivers and lakes for swimming;
- Managing nutrients in rivers;
- Economic factors; and
- Entries to Appendix 3 and 4 of the NPS-FM.

On 2 August 2016, the Chair of the Regional Sector of LGNZ, responded with the attached letter. In addition to responding to the four matters raised by Ministry for the Environment, the regional sector highlighted general concerns about poor problem identification and definition by MfE, and the need to take a considered approach to making any further amendments to the NPS-FM. In particular, the sector requested that MfE take into account the findings of their recent survey of NPS-FM implementation, in order to have a better understanding of the *status quo*, and how the proposed changes will impact on the sector.

The sector raised general concerns about the risks of making the NPS-FM overly prescriptive and hence undermining the efficiencies of devolved, outcome-based regional decision making.

Set out below is a brief overview and discussion of the key points made in the sector's response.

Suitability of rivers and lakes for swimming

Regional and unitary councils agree that making appropriate provision for swimming within the overall context of water quality management is a high priority for communities. However, there is a significant lack of clarify about how "suitability for swimming" is to be determined. In particular, there is confusion about whether decisions about what is

"swimmable" should be made at a national level or by communities and councils at a regional level.

The sector submits that decision should be made at a local level for the following reasons:

- Not all water bodies are suitable or safe for swimming;
- Some water bodies are more highly valued for competing values – for example wetlands and some rivers where birds are managed for biodiversity value; and
- Costs, benefits and the implications of improving water quality states where swimming is an objective are best assessed at a regional level.

The sector is also concerned about the simplistic use of the *E.coli* indicator as a measure of risk to swimming. The sector has requested a review of the science and evidence supporting the threshold set for *E.coli* in relation to human health risk. An agenda item addresses this important matter further in the agenda.

Managing nutrients in rivers

The NPS-FM requires the measurement of algae (using chlorophyll) to indicate trophic state as part of the National Objectives Framework (NOF) to measure ecosystem health. Nitrate is included in the NOF, in respect of its toxic effects on ecosystems, not as a nutrient determining algal growth.

There are many drivers that impact on algae growth, including availability of nutrients, water flow, climate, shade, sediment and temperature. These relationships are very complex. The sector is concerned about a less than integrated approach to water management, where NOF measures for nutrients are not linked as a driver for algae growth across a diversity of aquatic ecosystems. Specification about nutrient management or nutrient states does not lend itself to a national approach for algae control, due to the complexity of the drivers involved. However, the sector supports the use of guidelines and further research.

The sector also emphasises that the limits based approach under the NPS-FM to managing nutrients is not the only driver or available methodology for better resource management. Further national prescription as to how nutrients are managed may undermine the ability for communities to take a flexible, efficient and adaptive approach to achieving good environmental outcomes at the least cost.

Economic factors

The NPS-FM already requires regional councils to consider the economic implications of new water management provisions, including the setting of freshwater objectives, on resource users. In addition, section 32 of the RMA requires Councils to assess the costs and benefits, including, the impact on the economy, of plan provisions and proposals.

The sector does not see the need for further direction in the NPS-FM in relation to the consideration of economic effects. Rather MfE needs to ensure there is a good level of understanding and a range of tools in place, which assess the impacts of the NPS-FM on regional economic outcomes.

Entries to Appendix 3 and 4 of the NPS-FM

The NPS-FM does not prescribe a process as to how Appendix 3 (Existing infrastructure for the purposes of Policy CA3(b) and Appendix 4 (Freshwater management units and periods of time for transition for the purposes of Policy CA4) are to be populated.

The sector agrees that a consistent process or procedure should be developed and that those processes should be managed by regional councils.

Decision-making considerations

Part 6 (Planning, decision-making and accountability) of the *Local Government Act 2002* has been considered and documented in the preparation of this agenda item. The recommendations made in this item comply with the decision-making obligations of the *Act*.

Financial considerations—LTP/Annual plan

This memorandum and the associated recommendations are consistent with the Council's adopted Long-Term Plan and estimates. Any financial information included in this memorandum has been prepared in accordance with generally accepted accounting practice.

Policy considerations

This memorandum and the associated recommendations are consistent with the policy documents and positions adopted by this Council under various legislative frameworks including, but not restricted to, the *Local Government Act 2002*, the *Resource Management Act 1991* and the *Biosecurity Act 1993*.

Legal considerations

This memorandum and the associated recommendations comply with the appropriate statutory requirements imposed upon the Council.

Attachment

Document 1732807: Letter from Local Government New Zealand to the Ministry for the Environment in relation to the Regional Sector's views on the Freshwater Reforms.

2 August 2016

Barry Johnson
Manager, Operational Policy
Water Directorate
Ministry for the Environment

E: barry.johnson@mfe.govt.nz

Dear Barry

Regional Sector's views on Freshwater Reforms

The government has invited the opportunity to comment on a select number of matters raised in *The Next Steps for Freshwater* consultation.

Regional and unitary councils are pleased to take this opportunity and this letter is on their behalf.

General comments

The input being sought is very high-level, and provides no context in relation to these matters. Four questions about specific amendments to the NPS-FM are asked.

Regional councils are concerned that the questions arising from the consultation about national policy for water management presume a solution based on NPS amendments without clear articulation of the problem or range of potential solutions. We wish to impress upon the Ministry the importance of a considered approach to making any further amendments to the NPS-FM.

Before forming a view on the need for any further amendments to the NPS-FM, we encourage the Ministry to take into account any findings arising from their recent survey of NPS implementation, develop a better understanding of rates of progress and barriers to further progress, and how regional plans are being developed and refined over time including up to the 2025/2030 deadlines written into the NPS.

This will enable the Ministry to better understand how well the status quo "no change" option will perform relative to its policy goals. This might result in a streamlined set of amendments that results in fewer plan changes and reduced costs to ratepayers in our regions.

We are anxious to avoid unnecessary prescription which may result in additional plan change processes and resulting costs to ratepayers, particularly where changes are for small gains to achieve national consistency, or where a regional plan already substantially delivers the required outcomes.

We believe the Ministry needs to consider whether the NPS-FM risks becoming overly prescriptive and undermining the fundamental tenets of the resource management system of local decision-making, outcome-based planning and enabling flexible, adaptive and efficient responses to outcomes sought.

We have chosen to respond to the questions with a more generic, issues based approach below in order to assist in future decision making.

Suitability of rivers and lakes for swimming

Regional and unitary councils agree that managing water for swimming is a high priority for communities, warranting national policy recognition but the management of fresh water for this value comes with a number of complicating challenges. These arise not just in relation to the NPS but also reflect the wider social implications and public involvement, the practical management challenges, the technical and scientific uncertainties and the cost implications. They include:

- Lack of clarity in understanding how "suitability for swimming" is to be determined and what it entails (we consider suitability for swimming is not just about E. coli), including:
    - The NPS-FM provides an E.coli standard, plus a direction to provide for human health, but algae (especially phormidium) and macrophytes are also of concern in relation to swimming values. Some might also argue temperature and clarity are important factors too.
    - Times of the year and flows are relevant determinants of swimming value and are not consistently defined/understood or applied.
    - Development of tools, models and further guidance about how to identify, define and communicate water suitability for swimming would potentially be more helpful changes to the NPS.
- The tendency for "suitability for swimming" to be considered by some people as a proxy for 'good' water quality in any water body, not just those where swimming is a value.
- The confusion in the debate about whether decisions about swimming objectives should or need to be made at a national level or by communities and councils at the regional scale. Regional and unitary councils consider that decisions about where swimming needs to be provided for must be made at a local level because:
    - Not all water bodies are suitable or safe for swimming;
    - Some water bodies are more highly valued for competing values –for example wetlands and some rivers where birds are managed for biodiversity value; and
    - Costs, benefits and the implications of improving water quality states where swimming is an objective are best assessed at a regional level
- Concerns about the simplistic use of the E. coli indicator as a measure of risk to swimming. The Regional Sector has been requesting a review of the science and evidence supporting the thresholds set for E.coli in relation to health risk.
- Concerns about the use of annual maximums in determining attribute state and how that informs appropriate management responses.
- The description in the NPS of the recreational values of water is inconsistent with how other values are described and lacks clarity in terms of managing water for swimming as a national value. The sector considers a revision of the way bands and bottom lines are used with the NPS may lead to a better framework for management.

Swimming is clearly an important value held by communities and therefore it is necessarily already being addressed through NPS-FM planning exercises throughout the country. In contrast to some of the national rhetoric, communities are presently identifying where they value swimming and they are managing for this. The Regional Sector agrees that some of the practical challenges with the current approach might be resolved by amendments to the NPS, but recommends a more considered and structured approach to this issue, rather than an ad hoc response to concerns expressed about secondary contact recreation being perceived as an inadequate national bottom. Leadership on the complexity and substance of this issue is required by the Regional Sector and by the Government.

Managing Nutrients in Rivers

The NPS-FM requires measurement of algae (using chlorophyll) to indicate trophic state as part of the compulsory aspect of ecosystem health. Nitrate is included in the NOF in respect of its toxic effects on ecosystems – not as a nutrient for algal growth.

Councils and communities recognise the presence of algae as an indicator of the suitability of the river for a range of social and recreational values. New and helpful measures and thresholds to assess suitability for these other community held values are being developed and refined and this work should be supported (e.g. PeriWCC for algae and water column volume for macrophytes). These guidelines could be better aligned to assist with comparative evaluations, including for phormidium growth.

As with concerns arising from the management of MCI, the occurrence and management of algae is determined by a range of catchment specific drivers. It is also clear that algae growth is variably affected at different nutrient levels and different algae populations will grow at different rates depending on relative availability of nutrients (and flow, climate, shade, sediment, temperature). The relationships are very complex.

The Regional Sector considers that as algae is a key indicator and attribute of water quality and affected by a range of drivers, including nutrients, any proposals that result in a response targeted at nutrient levels could result in perverse outcomes and a less than integrated approach to water management.

Specification about nutrient management or nutrient states does not lend itself to a national approach for algae control, although use of guidelines and further research is supported. Councils and communities are addressing these challenges as part of establishing water objectives and attribute states. Amending the NPS-FM is not necessarily the best way to support this work.

We note also, that while the NPS-FM and the limits based approach has been an important part of the background that has enabled some councils to make good progress in this area, managing nutrients in this way is not the only driver for better resource management. Overall regional and unitary councils are concerned that further prescription on nutrient management risks undermining the fundamental premise of outcomes-based planning of the Resource Management Act, the focus on achieving community values first and foremost within the NPS-FM, and the opportunity for communities to take flexible and adaptive approaches to making the most progress on outcome at the least cost.

Economic factors

The NPS-FM already requires regional councils to consider the implications of new water management provisions on resource users, including economic implications:

i. consider all national values in Appendix 1 of that document, which includes a number of economic values, and identify them where applicable (Policy CA2(a) and (b)); and
ii. consider economic implications when setting freshwater objectives (Policy CA2(f)).

The RMA at section 32 also requires a careful assessment of the costs and benefits (including economic effects). Expertise, tools, models and frameworks are being developed across the country to add value to the understanding about the economic, as well as the associated social, cultural and environmental consequences of resource use.

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Therefore we do not see the need for further direction in the NPS-FM – but welcome support to further develop understanding and tools. We also caution the potential for perverse outcomes should new weightings be introduced for "economic factors" relating to water management that are in conflict with other national policies.

The Regional Sector considers that economic performance arising from water use is a matter of vital strategic importance to New Zealand, and therefore we implore the Ministry to consider how the entirety of the NPS-FM's implementation is impacting on regional economies. This is not a question of weighting the objectives by the centre so that one particular objective is more important than another, setting objectives needs to be driven by community values. Rather the Ministry needs to ensure there is a good level of understanding of whether the processes and approaches required or incentivised by the NPS-FM are driving the best regional economic outcomes with a sustainable management framework, or whether instead costs are being incurred directly or indirectly that are avoidable or exceeding the benefits they create.

Entries to Appendix 3 and 4 of the NPS

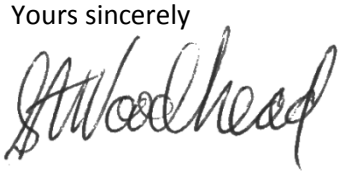
The NPS-FM does not contain any instruction or direction as to the process to be followed in seeking to add infrastructure or transitional management regimes to Appendices 3 and 4 of the NPS-FM. The Regional Sector agrees that such a process or procedure should be provided for. We suggest that such a process be managed and directed by regional and unitary councils as they are the entities responsible for setting objectives for water bodies, in liaison with their communities.

The process should identify how to test whether an exception to a national bottom line is appropriate, and why using the 'target' concept under Policy CA2 of achieving a freshwater objective over a specified timeframe is not. As long as process guidance and criteria are clear there is no reason why decision-making in this domain should not be the reserve of local communities. This would be consistent with the fundamental premises of the Resource Management Act in relation to the role and purpose of National Policy Statements.

As always, the Regional Sector would welcome deeper and more detailed engagement on any of these matters should decisions be taken to do detailed policy analysis on these or any changes to the NPS-FM.

Thank you for the opportunity to comment.

Yours sincerely



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Policy and Planning Committee
General Business

Agenda reports / plans

Policy and Planning Committee, September 2016

Item 3: Draft Coastal Plan for Taranaki

Draft Coastal Plan for Taranaki (multiple documents)