Appendix L: Porirua WWTP discharge consent: NZCPS Policy 11 (a) assessment

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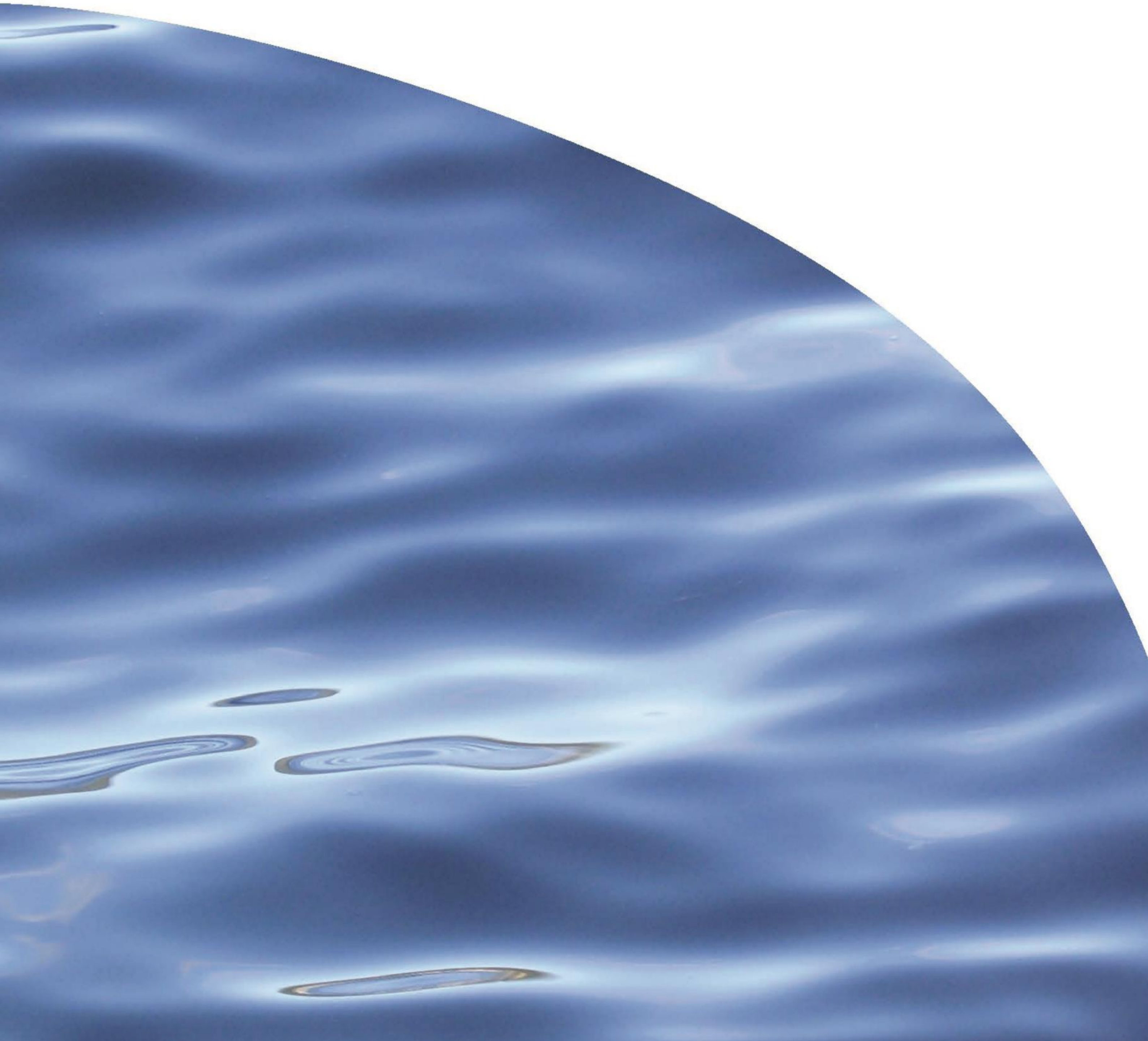

PORIRUA WWTP DISCHARGE CONSENT: NZCPS POLICY 11 (A) ASSESSMENT

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EXECUTIVE SUMMARY

Stantec New Zealand Ltd (Stantec) are currently assisting Wellington Water Ltd (Wellington Water) with an options assessment for upgrading and re-consenting an existing discharge of treated wastewater. The wastewater treatment plant (WWTP) discharges to coastal waters near Titahi Bay, north of Wellington. As part of the assessment of coastal ecological effects of the discharge, Wellington Water and Stantec have requested that Cawthron Institute (Cawthron) provide an assessment of the marine flora and fauna of the outfall site in the context of Policy 11 of the New Zealand Coastal Policy Statement (NZCPS) and Policy 39A of the Greater Wellington Proposed Natural Resource Plan (PNRP) (Decision version). These policies require that use and development within the coastal marine area avoid adverse effects on threatened or at risk species (as defined in the New Zealand Threat Classification System), their habitats, indigenous ecosystems and vegetation types and certain other high-value habitats.

The purpose of the present study is to identify whether any relevant species occur in the habitats near the outfall and assess whether, if the values were present (but unrecorded), there would be any adverse effects on them from the proposed discharge.

Valued habitat types and key sites for biodiversity in the Wellington coastal marine area were identified in an earlier report[1] for Greater Wellington Regional Council in the context of fulfilling its obligations under the NZCPS and PNRP. Of the habitat types identified, subtidal reefs and kelp beds are present around the outfall. None of the identified key sites are near the outfall location (Porirua Harbour is the closest key site but the harbour entrance is 3 km northeast of the outfall).

Because of the difficulty of demonstrating the absence of small, rare and cryptic plants and invertebrates, we took an indirect approach to assessing the likelihood of any Threatened or At Risk[2] species occurring at the discharge location. Information was collected on the distribution and habitat preferences of Threatened or At Risk species (where available) and used to identify which could *potentially* occur at the discharge location.

From this assessment, five algal and eight invertebrate species were identified that are classified as Threatened or At Risk and could potentially occur in the outfall location. There are no features of the outfall location that might make these species more likely to occur there than at other locations along the adjacent coast. Two Threatened and two At Risk species of sharks could also potentially occur in the outfall location, but in passage rather than as residents. Nine species of marine mammals classified as Threatened or At Risk have been recorded in the coastal area from Cook Strait to Taranaki. Most species are seasonal

[1] MacDiarmid A, Nelson W, Gordon D, Bowden D, Mountjoy J, Lamarche G 2012. Sites of significance for indigenous marine biodiversity in the Wellington Region. NIWA Client Report No. WLG2012-19. Prepared for Greater Wellington Regional Council. 85 p.

[2] As per the New Zealand Threat Classification System.

migrants. Māui's dolphins, and possibly blue whales, are resident in this region but Māui's dolphins have not been recorded from the Kapiti coast.

Phases 1 and 2 of the assessment of ecological effects of the discharge identified levels of short-term and long-term risk to habitats and organisms on rocky and sandy substrata as ***negligible*** or ***less than minor***. The same levels of risk were assumed to apply to the Threatened and At Risk taxa and, consequently, adverse effects will be avoided. We note that the assumption that the low level of risk posed by the outfall options to the general habitats and biota at the discharge location will also apply to Threatened and At Risk invertebrate taxa is subject to unavoidable uncertainty. It is possible that some of these taxa are more sensitive than others to habitat disturbance or to altered nutrient concentrations or salinities. The lack of relevant information on these taxa makes it impossible to predict effects with certainty. Conversely, we are also assuming that these taxa *could* be present, but they may not be. It is also relevant that the outfall has been operating since 1989 and additional future effects on the wider receiving environment (rather than that immediately around the outfall) are unlikely. The risk of adverse effects on Threatened or At Risk marine mammals is also considered to be negligible.

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GLOSSARY

Term	Definition
Benthic	Relating to the seabed
°C	Degrees Celsius
AEE	Assessment of Environmental Effects
cm	Centimetre
DOC	Department of Conservation
IUCN	International Union for Conservation of Nature
km	Kilometre
m	Metre or metres
NIWA	National Institute of Water and Atmospheric Research
nm	Nautical mile
NZCPS	New Zealand Coastal Policy Statement
NZTCS	New Zealand Threat Classification System
PNRP	(Greater Wellington) Proposed Natural Resource Plan
Taxon (plural taxa)	General term for a level of classification of plants and animals (e.g. species)
WWTP	Wastewater Treatment Plant

1. INTRODUCTION

1.1. Background

Stantec New Zealand Ltd (Stantec) are currently assisting Wellington Water Ltd (Wellington Water) with an options assessment for upgrading and re-consenting an existing discharge of treated wastewater from a wastewater treatment plant (WWTP) to coastal waters near Titahi Bay, north of Wellington (Figure 1). Wellington Water and Stantec contracted the Cawthron Institute to provide the coastal ecological assessment, which consisted of two phases, both now complete:

1. a desktop assessment of existing coastal ecology values and potential adverse effects of the discharge to inform the options assessment process (Morrisey 2018); and
2. a detailed assessment, including field surveys, for inclusion in an AEE and consent application (Morrisey et al. 2019).

Following completion of Phases 1 and 2, Wellington Water and Stantec have requested that Cawthron provide an assessment of the marine flora and fauna of the outfall site in the context of Policy 11 of the New Zealand Coastal Policy Statement (NZCPS) and Policy 39A of the Greater Wellington Proposed Natural Resource Plan (PNRP) (Decision version). The scope of work, as provided by Stantec[3], is set out below.

1.2. Scope of this study

The purpose of Policy 11 (a) of the NZCPS is to protect indigenous biological diversity in the coastal environment by avoiding adverse effects on:

i. indigenous taxa that are listed as threatened or at risk in the New Zealand Threat Classification System (NZTCS) lists
ii. taxa that are listed by the International Union for Conservation of Nature and Natural Resources as threatened
iii. indigenous ecosystems and vegetation types that are threatened in the coastal environment, or are naturally rare
iv. habitats of indigenous species where the species are at the limit of their natural range, or are naturally rare
v. areas containing nationally significant examples of indigenous community types and
vi. areas set aside for full or partial protection of indigenous biological diversity under other legislation.

[3] email from Richard Peterson (Stantec) to Don Morrisey, 11 November 2019.

Policy 39A of the PNRP (Decision version) similarly specifies that:

> To protect the indigenous biodiversity values of aquatic ecosystems, habitats and species, use and development within the coastal marine area shall:
>
> a) avoid adverse effects on:
>
> i. indigenous taxa listed as threatened or at risk in the NZTCS lists or as threatened by the International Union for Conservation of Nature and Natural Resources
>
> ii. indigenous ecosystems and vegetation types in the coastal marine area that are threatened or are naturally rare
>
> iii. habitats of indigenous species where the species are at the limit of their natural range, or are naturally rare
>
> iv. areas in the coastal marine area containing nationally significant examples of indigenous community types
>
> v. areas set aside for full or partial protection of indigenous biological diversity under other legislation.

Because both policies provide strong direction to avoid adverse effects on their listed values, and as a result may be given particular weight in the Regional Council's decision, Wellington Water and Stantec have determined that they need to support the application with evidence that:

- it is reasonable to conclude that the listed values are not present
- even if listed values are present, there are unlikely to be any adverse effects on them.

Based on this context Cawthron was asked to:

1. Identify which of the taxa covered in the policies do or do not occur in the habitats present near the existing outfall
2. confirm that there are no records (if that is the case) of the listed values being found in the proposal area, and (if possible) set out why it is reasonable to conclude that in all likelihood the listed values are not present
3. assess whether, if the values were present (but unrecorded), there would or would not be adverse effects on them from the proposed discharge (i.e. continuation of the existing discharge).

In relation to point 3, it is noted that the proposal for which resource consent will be sought does not involve physical works above (or below) the high-tide level. Therefore, no land-based activities need to be taken into consideration. For this reason, we have not considered effects on terrestrial plants or birds.

2. APPROACH TO THE ASSESSMENT

In order to comply with Policy 11 (a) of the NZCPS and Policy 39A of the PNRP it is necessary to demonstrate that relevant taxa, ecosystems or habitats are not present in the receiving environment of the WWTP discharge[4] and / or that, if present, any adverse effects on them from the discharge can be avoided. The presence of valued habitats, ecosystems and vegetation types was assessed from information in the reports for Phases 1 and 2, including surveys of the intertidal and subtidal area around the outfall and at two locations away from it (Morrisey 2018; Morrisey et al. 2019). Assessing whether threatened or at risk organisms are present is more difficult, for the reasons discussed in Section 2.2, and compliance was more reliant on demonstrating that, if any were present, adverse effects were unlikely.

2.1. Valued habitats

Valued habitats in Wellington coastal marine area have been identified by MacDiarmid et al. (2012) to help Greater Wellington Regional Council fulfil its obligations under the NZCPS and to develop the PNRP. The objectives of that study were to:

- identify the key rare and diverse sites for biodiversity in the Wellington Region's coastal marine environment (mean high water of spring tides to 12 nm), and the present and future activities that could impact these sites
- identify representative examples of the habitat types that occur in the Wellington coastal marine area (including deep water), worthy of protection
- identify the coastal marine areas that are important as migration routes for sea birds and marine mammals or supply / dispersal routes for marine invertebrates and fish, and describe existing and future activities that threaten the species using these areas.

The key coastal sites and habitats identified by MacDiarmid et al. (2012) were included in the present assessment. Habitats of indigenous species where the species are at the limit of their natural range, or are naturally rare, were identified during the assessment of which Threatened or At Risk taxa might occur at the discharge location (see Section 2.2). In many cases, these are likely to be broad types, such as intertidal or subtidal reefs or shallow subtidal sediments.

[4] The 'receiving environment' of the discharge is difficult to delineate because the spatial extent of effects varies among the various contaminants (suspended solids, nutrients, etc.). Also, the quality and quantity of discharge is likely to change over time, and some organisms will be more sensitive than others. The 200-m radius mixing zone specified in the current consent is one possible definition, although this was based on the distance required to achieve compliance with bacteriological standards for contact-recreation activities rather than for ecological reasons (Beca Steven 1997). For present purposes it is not essential to define the extent of the receiving environment because the assessment of effects concluded that even very close to the discharge point, effects would be negligible or less than minor.

2.2. Threatened and At Risk taxa

The New Zealand Threat Classification System (NZTCS) was developed by the Department of Conservation:

> to classify New Zealand taxa according to their threat of extinction using criteria that are appropriate for New Zealand conditions (e.g. a geographically diverse, small country that has taxa with naturally restricted distributions). The NZTCS is intended to complement, not compete with, the IUCN system and is tailored to New Zealand's unique ecology. The NZTCS lists more taxa than the IUCN Red List simply because effort has been made to include as many species as possible and there are regular triennial updates when new species can be added (DOC 2019).

Demonstrating that a threatened marine species does or does not occur at a given location is difficult because target species are concealed by the medium in which they live, or by low water clarity. Also, they are often also small and cryptic. In these environments, failure to detect the target species, even after repeated, intensive surveys, provides only limited confidence that it is truly absent (conversely, even a single detection demonstrates conclusively that it is not absent). The intensity of search effort required, and the taxonomic resources needed to identify these often poorly known taxa, make it cost-ineffective in many circumstances to rely on targeted surveys[5]. In the future, environmental DNA (eDNA) methods are likely to make these kinds of searches much more feasible and effective but are not currently possible in the present context because the molecular reference databases are not available for many of these species.

There are, nevertheless, some taxa that are Threatened, At Risk or at the limits of their natural range and that are large and conspicuous enough to be identified from the level of survey effort employed during the assessment of ecological effects (Morrisey et al. 2019). These include large macroalgae such as *Durvillaea antarctica* and *Macrocystis pyrifera*. In addition to the surveys reported by Morrisey et al. (2019), the presence of macroalgal communities was assessed by: 1) examination of the herbarium records from the Porirua area, held at Te Papa Tongarewa, 2) examination of the NIWA algal database, 3) an intertidal survey from Titahi Bay to the existing outfall on 23 November 2019, and 4) checking species lists (Adams 1972) and other relevant literature (Adams 1994; Nelson 2013).

Because of the difficulty of demonstrating the absence of small, rare and cryptic taxa we took an indirect approach to assessing the likelihood of their occurring at the discharge location. Information was collected (where available) on the distribution and

[5] See http://www.stuff.co.nz/dominion-post/news/wellington-archived/4353704/Wellingtons-south-coast-home-to-Smeagol-slug for an example of the sampling effort required to search for one of the invertebrate taxa listed as Threatened.

habitat preferences of the marine invertebrate, chondrichthyan (sharks, rays and chimaeras), marine mammal and marine algal taxa listed as Threatened or At Risk (Freeman et al. 2014; Duffy et al. 2018; Baker et al. 2019; Nelson et al. 2019, respectively). This information was used to identify which taxa could *potentially* occur at the discharge location.

We then referred to the assessment of ecological effects (Morrisey et al. 2019) to determine whether adverse effects are predicted for the habitats where these taxa might occur. If adverse effects were not predicted, we assumed that Threatened or At Risk taxa will also be unaffected if they occur at the site. This approach also addresses potential indirect adverse effects on these taxa in the form of changes in the abundance of food or predators of target taxa as a result of the discharge.

3. PRESENCE OF VALUED HABITATS

3.1. Threatened, naturally rare or nationally significant indigenous ecosystems and vegetation types (Policy 11 a iii and v)

MacDiarmid et al. (2012) identified seven *sites* of significant marine biodiversity and five *habitats* of significant marine biodiversity in the territorial seas within the Wellington Region. The sites included Porirua Harbour, close to the outfall location (3.5 km: Figure 1). Its selection was based on it being the largest moderately intact shallow harbour ecosystem in the Wellington Region and containing habitat features specific to its sheltered nature. These habitat features included saltmarsh, seagrass beds and cockle beds, none of which occur on the adjacent open coast (Morrisey 2018). Effects of the current outfall, or of the alternative options, are not expected to extend as far as the entrance to Porirua Harbour (Morrisey et al. 2019).

Rhodolith (calcareous red algal) beds around Kapiti Island (Figure 1) were also identified as significant sites by MacDiarmid et al. (2012). The Kapiti Island beds are the only ones known in the lower North Island and effects of the current outfall, or of the alternative options, are not expected to extend as far as Kapiti Island (based on comparative intertidal and subtidal surveys at, and up to 500 m from, the outfall: Morrisey et al. 2019).

The remaining sites identified by MacDiarmid et al. (2012) were distant from the discharge location. They include freshwater seeps and red algal beds in Wellington Harbour, shelf-edge canyons in Cook Strait and off the Wairarapa coast, Mataikona Reef (near the northeastern boundary of the Greater Wellington Region) and Opouawe Bank methane seeps (in 850–1000 m depth off the southern tip of the North Island).

Habitats of significance for marine biodiversity included several relevant to the discharge location. Subtidal reef and kelp-bed habitats are present at the location (Morrisey et al. 2019), though the latter might be classed as moderately sheltered rather than exposed (as in MacDiarmid et al.'s designation) because of their proximity to The Bridge and Mana Island.

As noted in Section 1.2, the proposal for which resource consent will be sought does not involve physical works above the high-tide level, i.e. there will be no land-based activities. Consequently, habitats, ecosystems, vegetation or communities of the types listed in Policy 11 (a) that are present above the high-tide level are not expected to be adversely affected.

3.2. Habitats of species at the limit of their natural range (Policy 11 a iv)

Bell et al. (1969) (cited in Blaschke et al. 2010) state that Porirua Harbour is the most southerly habitat for some benthic (presumably invertebrate) species, but Blaschke et al. did not identify which these were. Information on most of the very large number of invertebrate taxa present at the discharge location is unlikely to be sufficiently detailed to allow an assessment of where distributional limits lie.

In terms of shallow-subtidal flora and fauna, the Wellington Region has previously been divided into the warmer Abel Bioregion north of Cape Terawhiti[6] and the cooler Cook Bioregion east of Cape Terawhiti (Shears et al. 2008, cited in MacDiarmid et al. 2012). The Porirua WWTP outfall lies in the Abel Bioregion but is more than 26 km north of Cape Terawhiti; therefore, the outfall location itself is less likely to represent the distributional limit of some taxa (as might be expected at the edge of a bioregion).

Beds of kelp, including *Ecklonia radiata*, *Macrocystis pyrifera* (giant kelp), and other species occur on the exposed subtidal reefs along this part of the Wellington coast (MacDiarmid et al. 2012). Among the large brown algae (kelp and fucoid species) recorded along the Porirua coast, only the giant kelp is at the limit of its natural range. *Macrocystis pyrifera* reaches its northern limit in the North Island on the east coast at Castle Point (Adams 1972) while on the west coast it was recorded from Makara (Adams 1972) and The Bridge between Mana Island and the mainland, near the outfall location (Hay 1990).

The distribution of these kelps can be temporally variable, as Hay (1990) reported for beds of *M. pyrifera* on The Bridge. Hay (1990) noted that *M. pyrifera* occurs intermittently southwards from Kapiti Island and that its distribution is constrained by temperature. It appears to occur *where the highest monthly mean temperature is cooler than 16–17 °C and there is little likelihood of summer maxima exceeding 18–19 °C*. Temporal variability on scales of years to decades, as observed at The Bridge, and larger-scale temporal and geographical variability within Cook Strait, may relate to changes in sea-surface temperatures (Hay 1990). This variability makes it difficult to define the limits of distribution of *M. pyrifera* for present purposes, and suggests that larger-scale factors are likely to be of much greater significance in influencing distribution than any effect of the outfall.

The bull kelp *Durvillaea antarctica* is widespread in New Zealand from Manawatāwhi / Three Kings Islands to the Subantarctic Islands. It also occurs in the Southern Ocean, South America and southern Atlantic islands (Neill & Nelson 2016). *Durvillaea antarctica* and *D. poha* are listed as Threatened species (Nelson et al. 2019) because of documented declines of populations of bull kelp in the South Island (Thomsen et al. 2019; D'Archino et al. 2019) and anecdotal reports of decline in the North Island.

[6] Cape Terawhiti is at the southwestern 'corner' of the North Island, due west of Wellington city centre. The Abel Bioregion extends up to Cape Egmont and the Cook Bioregion to Flat Point on the Wairarapa coast.

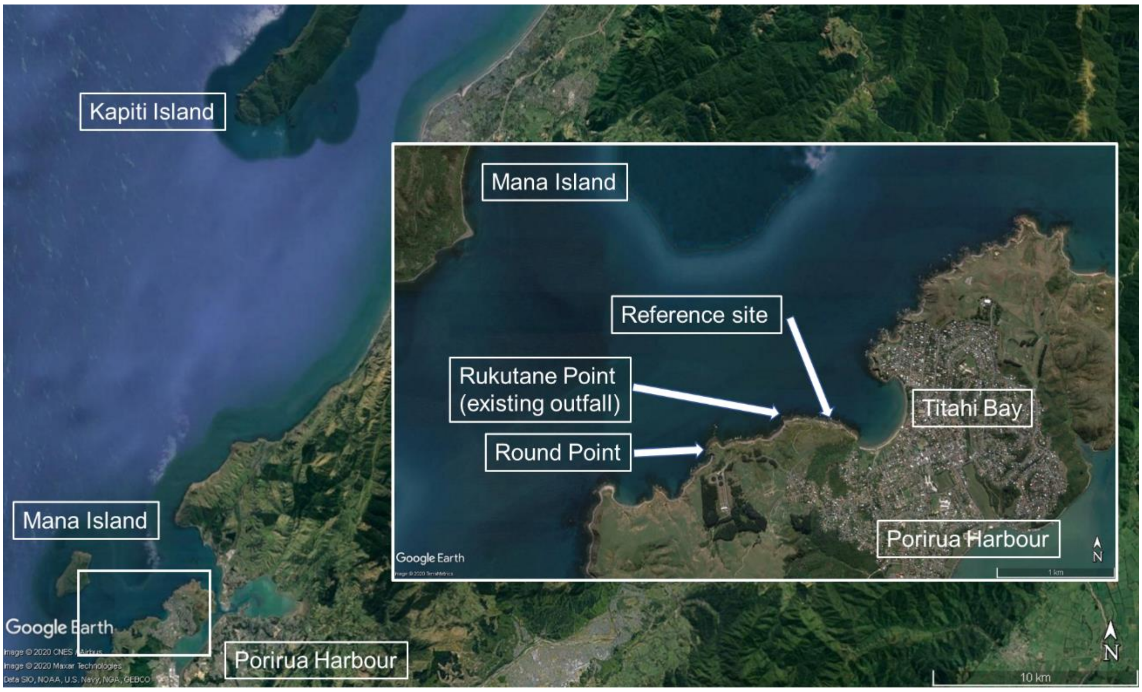

Figure 1. Aerial photograph of the coastal area between the existing WWTP outfall at Rukutane Point and Kapiti Island. The inset image shows the locations of the intertidal and subtidal surveys at Round Point, Rukutane Point and the reference site. Other features mentioned in the text are also shown.

4. PRESENCE OF THREATENED AND AT RISK TAXA (POLICY 11 A I AND II)

4.1. Macroalgae

None of the 938 taxa listed as Threatened or At Risk in Nelson et al. (2019) were found along the Porirua coast during recent surveys, or from records in the Te Papa Tongarewa herbarium or NIWA database. It is worth mentioning that 609 of the listed taxa were classified as ‘data deficient’ and that this category could include species at risk that could not be assessed.

The number of relevant algal records held in the Te Papa Tongarewa herbarium was limited because most of the collections have been made in Pauatahanui Inlet and Porirua Harbour (60 records). Relatively few records were from Titahi Bay (15 records) or Mana Island / Plimmerton (9 records). Twelve records in the NIWA database were from Titahi Bay. The presence of the outfall has probably discouraged phycologists from collecting around this area, and moreover, the shoreline between Titahi Bay and the outfall is not easily accessible in places.

Carpophyllum maschalocarpum, *C. flexuosum* and *Ecklonia radiata* were the dominant subtidal species observed around the outfall location and the most common intertidal species were *Hormosira banksii*, *Scytothamnus australis*, and *Splachnidium rugosum* (Morrisey et al. 2019). None of these species are listed as Threatened (Nelson et al. 2019). The concrete structure of the existing outfall was covered by the invasive Asian kelp *Undaria pinnatifida* and species of the green alga *Ulva.*

4.1.1. Threatened: Nationally Critical

None of the six species listed by Nelson et al. (2019) as ‘Threatened: Nationally Critical’ occur along the Porirua coast. The listed species include some with restricted distributions, such as *Dione arcuata* (which is only found on the Kaikoura coast), or species whose distributional range does not include the southwest coast of the North Island, such as *Gelidium johnstonii* which only occurs in the northern North Island (Table 1). Two of the taxa have uncertain taxonomic status.

4.1.2. Threatened: Nationally Endangered

Prasiola novaezelandiae is classified as Threatened: Nationally Endangered and occurs in the North Island and South Island. It could have been missed during the field surveys because it is a tiny species that forms small green patches on rocks in the supralittoral. However, the habitat at and around the outfall is probably unfavourable for this species, in that it is found associated with guano deposits or near marine mammal colonies (Heesch et al. 2012).

4.1.3. At Risk: Declining

Five species have been listed as At Risk: Declining (Table 1). Because *Durvillaea antarctica* occurs in the North Island, it could be present on the rocky reefs along the Porirua coast. It was not observed during the field surveys in May and November 2019 and the closest record of this species to the existing outfall was in Makara (Adams 1972). D'Archino et al. (2019) produced distributional maps of large brown algae (kelp and fucoid) including herbaria records, verified citizen observations and survey records. *Durvillaea* was not recorded along the Porirua coast (figure A10.12., p. 200 in D'Archino et al. 2019).

It is unlikely that bull kelp was overlooked during surveys because it is large and easily identifiable. The obligate epiphyte *Pyrophyllon subtumens* and the endophytic *Herpodiscus durvilleae*, both strictly dependent on *Durvillaea* species, can also be assumed to be absent from this area. *Durvillaea poha* has been recorded only from the South Island and Subantarctic islands.

Macrocystis pyrifera was not observed in the area of the existing outfall during the recent field surveys in 2019. However, it is possible that beds or subtidal plants still occur on The Bridge, as reported by Hay (1990).

Table 1. Marine macroalgae listed as Threatened or At Risk: Declining by Nelson et al. (2019). Taxa that could potentially occur at the discharge location area shown in bold.

Species name	Known distribution or habitat	Conservation status
Dione arcuata W.A. Nelson	Kaikoura	Threatened: Nationally Critical
Gelidium johnstonii Setch. & N.L. Gardner	Northern North Island	Threatened: Nationally Critical
Gigartina dilitata (Hook. f. & Harv.) N.M. Adams	South Island, Stewart Island	Threatened: Nationally Critical
Prasionema heeschiae W.A. Nelson & J.E. Sutherland	Campbell Island	Threatened: Nationally Critical
Prasiola sp. A (WELT A024286; Antipodes Is)	Antipodes Islands	Threatened: Nationally Critical
Gigartina sp. C (WELT A016481; Bounty I.)	Bounty Islands	Threatened: Nationally Critical
Prasiola novaezelandiae S. Heesch & W.A. Nelson	North I. and South I.	Threatened: Nationally Endangered
Durvillaea antarctica *(Cham.) Har.*	Three Kings, North Is., South Is., Chatham Is and Subantarctic Islands	At Risk: Declining
Durvillaea poha C.I. Fraser, H.G. Spencer & J.M. Waters	South Island and Subantarctic Islands	At Risk: Declining
Herpodiscus durvilleae (Lindauer) South	Endophyte of *Durvillaea* spp.	At Risk: Declining
Macrocystis pyrifera (L.) C.Agardh	Southern North I., South I, Stewart I, Subantarctic Islands	At Risk: Declining
Pyrophyllon subtumens (J. Agardh ex Laing) W.A. Nelson	Obligate epiphyte of *Durvillaea* spp.	At Risk: Declining

4.2. Marine invertebrates

None of the 11 species listed by Freeman et al. (2014) as Threatened (Appendix 1) or the 222 species listed as At Risk (Appendix 2) were recorded during the surveys described by Morrisey et al. (2019). We are not aware of any other site-specific ecological studies of the rocky coastal area around the existing outfall, or of the sediment habitats offshore, that might have detected these species.

The known distribution for many of the listed species is very restricted but this is no doubt partly (perhaps largely) because they have not been widely searched for. The lack of information on the abundances and distributions of most of New Zealand's marine fauna is illustrated by the fact that 55 species of marine invertebrates were listed as Data Deficient in the New Zealand Threat Classification System and the majority of the New Zealand marine invertebrate fauna (over 95%) remain unassessed (Freeman et al. 2014).

A further 108 taxa were listed by Freeman et al. (2014) as taxonomically indeterminate. Most have been recorded in a single sample and most can only be identified to genus at present. Of the 108 taxa, 6 were considered data-deficient in terms of assessing their threat status and 102 were considered At Risk. Because of the taxonomic uncertainty, we have not considered these taxa in our assessment.

In the following sections we review information on the distribution of Threatened or At Risk marine invertebrate taxa to determine whether they might be expected to occur in the discharge location.

4.2.1. Threatened: Nationally Critical

Six of the Threatened species are classified as Nationally Critical. The polychaete worm *Boccardiella magniovata* has been recorded in the Hutt River estuary (the type locality[7], Read 1975). Read (1975) described the species as occurring

> sparsely on the banks of this stretch of river, from high to low tide level, but…found abundantly (about 1000/m^2) in one place only... This location was at the high tide mark in poorly sorted sandy mud, stiffened by the roots of a remnant clump of *Juncus maritimus* rush. *B. magniovata* inhabits a vertical, mucus-lined, V-shaped burrow in the mud, and does not form a sand-grain tube or surface chimney. Normal river salinity in this area may be as low as 0.5‰.

It has also been recorded in Pauatahanui Inlet near Wellington, Okura Estuary north of Auckland, the upper Waitemata Harbour, Whangarei Town Basin and Lake Ellesmere[8]. Given its estuarine distribution, it is very unlikely that this species would occur at the discharge location.

The stalked barnacle *Idioibla idiotica* has been recorded from intertidal to deep subtidal locations around New Zealand (Buckeridge & Newman 2006). This species was apparently once relatively common in the low intertidal in New Zealand but had not been collected in this habitat for at least a decade at the time of Buckeridge and

[7] i.e. the source of the original specimen(s) from which the species was first described.

[8] www.endangeredspecies.org.nz/store/doc/Polychaete%20worm%20Endangered%20species%20factsheet.pdf, accessed 17 December 2019

Newman's 2006 paper. A single specimen was collected from 50 m water depth in Spirits Bay (Northland) in 1998. The likelihood of it occurring at the discharge location is, therefore, unknown.

The lampshell (brachiopod) *Pumilus antiquatus* has been recorded on rocks and boulders below the low-tide mark from three locations in the South Island: Lyttelton Harbour, near Karitane and Otago Harbour (Bowen 1968). Given that its distribution is poorly known, it is possible that it could occur at the discharge location.

Three species of mollusc are listed as Nationally Critical, one of which, the giant seep mussel *Gigantidas* (*Bathymodiolus*) *tangaroa*, lives around methane seeps at depths of c. 1000 m off the southeastern North Island. It is not likely to occur at the discharge location.

The other two Nationally Critical molluscs belong to the genus *Smeagol* (gravel maggots), *S. climoi* and *S. manneringi*. Both species live in upper-intertidal shingle and gravel (Tillier & Ponder 1992). The type species, *S. manneringi*, was first recorded from Kaikoura and later from Wellington (Climo 1980). It lives on exposed rocky beaches with steep profiles, where the upper intertidal area consists of clean, wave-sorted gravel (2–4 cm particle diameter) overlying finer sediments or bedrock. *S. climoi* has only been collected from Te Raekaihau Point (Lyall Bay, Wellington) but this is almost certainly a consequence of the lack of targeted surveys in other locations. Both species could potentially occur at the discharge site, given that areas of intertidal gravel occur there.

4.2.2. Threatened: Nationally Endangered

Only the polychaete *Spio aequalis* is listed in this category. It has been recorded from the Chatham Islands, Moeraki, Banks Peninsula, Wellington and Northland (Aupouri Peninsula). It is one of the largest species of spionid (5–15 cm) and occurs on exposed coasts, possibly burrowing in sand under stones[9]. This species could potentially occur at the discharge location, given the presence of suitable habitat.

4.2.3. Threatened: Nationally Vulnerable

Of the 4 species in this category, the bryozoan *Spiritopora perplexa* was originally collected from the Cavalli Islands and Spirits Bay, Northland between 1996 and 1999 (Taylor & Gordon 2003). A second Nationally Vulnerable bryozoan, *Calvetia osheai*, was originally collected from Spirits Bay in 1999 (Taylor & Gordon 2003). Specimens of both species were obtained from water depths of c. 40–80 m. Taylor and Gordon (2003) noted that, while the abundance and biomass of *C. osheai* in the Spirits Bay region was 'modest', *S. perplexa* was locally abundant and conspicuous. They

[9] See www.inaturalist.org/posts/6784-rediscovery-of-spio-aequalis-after-missing-for-over-50-years, accessed 17 December 2019.

suggested that the latter species was likely to have a restricted distribution and that it was:

> unlikely that failure to sample *S. perplexa* elsewhere explains its limited distribution, given the comprehensive benthic sampling undertaken by NIWA around New Zealand coupled with the large and conspicuous nature of *S. perplexa* colonies, although it would be imprudent to rule out the possibility of undiscovered populations existing elsewhere around New Zealand.

At least 55 species of bryozoan are endemic to the Three Kings Shelf region, in which Spirits Bay lies. Given the lack of other records for *C. osheai*, it may also be endemic to the region and, therefore, like *S. perplexa*, is unlikely to occur at the discharge location.

The remaining 2 species in this category are a bamboo coral, *Chathamisis bayeri*, recorded from 400 m on the Chatham Rise (Grant 1976) and a bubblegum coral, *Paragorgia alisonae*. Both species occur only in deep water and will not occur at the discharge location.

4.2.4. At Risk: Declining

Of the 222 taxa in the At Risk category, 13 species are characterised as Declining, rather than Threatened, because they are buffered by large population sizes and / or a relatively slow rate of decline.

The bryozoan *Steginoporella perplexa* has only been recorded in the far north of New Zealand (Gordon et al. 2016). The stony corals *Goniocorella dumosa*, *Solenosmilia variabilis*, *Enallopsammia rostrata* and *Madrepora oculata* and the bubblegum coral *Paragorgia arborea* are all deep-water species and are unlikely to occur at the discharge location.

Basket stars of the genus *Gorgonocephalus*, of which three species are listed in this category, occur in cold-water environments including the Arctic, Antarctic and the deep sea[10]. They are unlikely, therefore, to occur at the discharge location.

The golden limpet, *Cellana flava*, is described by Willan et al. (2010) as frequent to common in mid- to low intertidal areas from Dunedin to East Cape and the Chatham Islands. This species could potentially occur at the discharge site.

Two cephalopods are listed in this category, of which the benthic *Octopus kaharoa* has been recorded in the depth range 73–540 m on soft substrata[11]. It has been collected from Northland, Taranaki, the Bay of Plenty, East Cape, Hawkes Bay, the

[10] See https://en.wikipedia.org/wiki/Gorgonocephalus, accessed 17 December 2019.
[11] See https://www.iucnredlist.org/species/163340/1000039, accessed 17 December 2019.

coast of Wairarapa and the west and east coasts of the South Island as far south as the Canterbury Bight[12]. Given that it is rare, and records are sparse, it may also occur in shallower water than previously recorded and could potentially occur at the discharge location.

The second species of cephalopod, *Opisthoteuthis mero*, belongs to a genus that occurs throughout New Zealand waters, generally on soft seafloors in the depth range 360–1000 m (Willan et al. 2010). An individual of this species was found cast up on a beach many years ago but Willan et al. (2010) suggested that it had probably been regurgitated by a whale. It is unlikely to occur at the discharge location.

The remaining species in this category is the volute (gastropod) *Alcithoe davegibbsi*, which has been collected off Spirits Bay. We were unable to find information on habitat type (probably soft sediments, similar to other species in the genus) or depth range. This species could potentially occur at the discharge location, given the presence of potentially suitable habitat.

4.2.5. At Risk: Naturally Uncommon

Freeman et al. (2014) list 209 species whose distribution is confined to a specific geographical area or which occur within naturally small and widely scattered populations, where this distribution is not a result of human disturbance. Many of these have been collected from the deep sea, including hydrothermal vents, and will not occur at the discharge location. Others with restricted geographical distributions away from the discharge, such as the Kermadec and sub-Antarctic islands, will also be absent. We did not consider it necessary to search for information on the distribution of the remaining species in this category. We have already identified Threatened and At Risk – Declining taxa that could potentially occur at the discharge location, and assessment of risk to these species is focussed on the likelihood of adverse effects. Knowing that additional At Risk species might also be present does not significantly affect this overall assessment of risk (there is no reason to believe that these species would be more sensitive than others in the At Risk category).

4.2.6. Conclusions

Based on the above assessments, eight species of Threatened or At Risk marine invertebrates could potentially occur at the discharge location (Table 2: excluding those classified as At Risk: Naturally Uncommon).

[12] See https://www.gbif.org/species/4357191, accessed 17 December 2019.

Table 2. Marine invertebrates listed as Threatened or At Risk: Declining by Freeman et al. (2014) that could potentially occur at the discharge location.

Species name	Common name	Conservation status
Idioibla idiotica	Stalked barnacle	Threatened: Nationally Critical
Pumilus antiquatus	Dwarf white lampshell	Threatened: Nationally Critical
Smeagol climoi	Gravel maggot	Threatened: Nationally Critical
Smeagol manneringi	Gravel maggot	Threatened: Nationally Critical
Spio aequalis	Giant spionid worm	Threatened: Nationally Endangered
Cellana flava	Golden limpet	At Risk: Declining
Octopus kaharoa	Octopus	At Risk: Declining
Alcithoe davegibbsi	Volute	At Risk: Declining

4.3. Chondrichthyans

Duffy et al. (2018) listed one species of chondrichthyan (cartilaginous fish) as Threatened – Nationally Endangered, one as Threatened – Nationally Vulnerable and eight as At Risk – Naturally Uncommon (Table 3). A further 42 species were listed as Data Deficient.

Table 3. List of New Zealand chondrichthyans listed as Threatened or At Risk by Duffy et al. (2018).

Species name	Common name	Conservation status
Carcharodon carcharias	Great white shark	Threatened – Nationally Endangered
Cetorhinus maximus	Basking shark	Threatened – Nationally Vulnerable
Chlamydoselachus anguineus	Frilled shark	At Risk – Naturally Uncommon
Cirrhigaleus australis	Southern mandarin dogfish	At Risk – Naturally Uncommon
Echinorhinus brucus	Bramble shark	At Risk – Naturally Uncommon
Echinorhinus cookei	Prickly shark	At Risk – Naturally Uncommon
Etmopterus pusillus	Smooth lantern shark	At Risk – Naturally Uncommon
Heptranchias perlo	Sharpnose sevengill shark	At Risk – Naturally Uncommon
Mitsukurina owstoni	Goblin shark	At Risk – Naturally Uncommon
Odontaspis ferox	Smalltooth sand tiger shark	At Risk – Naturally Uncommon

Great white and basking sharks (both Threatened) may pass through the waters of the Kapiti Coast but are presumably unlikely to spend prolonged periods of time around the outfall location.

Most of the At Risk taxa are widely distributed around the world but are generally uncommon, and most are deep-water species. Frilled sharks are widely but patchily distributed throughout the Atlantic and Pacific oceans and occur on the outer continental shelf and upper to middle continental slope in depths of 0–1,600 m (but most often 120–1,300 m)[13,14]. In New Zealand, the southern mandarin dogfish occurs on the mid-continental slope from the West Norfolk and Kermadec ridges south to Kaikoura[15], in depths of 360–640 m. Bramble sharks occur at depths of 10–900 m, but usually 350–900 m. Smooth lantern sharks have been recorded at depths of 0–1,100 m but most commonly occur at 400–700 m. Sharpnose sevengill sharks occur in depths of 0–1,000 m, usually between 180 and 450 m. The recorded depth range of goblin sharks is 30–1,300 m, but most frequently 270–960 m.

Species that are more commonly recorded in shallower depths and, therefore, could potentially occur at the discharge location are prickly sharks (11–1,100 m, usually below 70 m) and smalltooth sand tigers (10–2,000 m, usually 13–880 m).

Several chondrichthyans are protected under the Wildlife Act 1953, including the oceanic whitetip shark, basking shark, deep-water nurse shark, great white shark, whale shark, manta ray and spine-tail devil ray. These are all open-water species and are only likely to be present in the outfall location during passage.

4.4. Osteichthyans

There is no current NZTCS list for New Zealand marine osteichthyans (bony fish)[16]. Two species of grouper (*Epinephelus lanceolatus* and *E. daemelii*) are protected under the Wildlife Act 1953. The giant grouper (*E. lanceolatus*) seldom occurs in New Zealand waters[17]. The distribution of the spotted black grouper (*E. daemelii*) in New Zealand is mainly around the Kermadec and Three Kings islands and it is rare elsewhere (Francis 2012), although it has been recorded off the coast of Westland and in Cook Strait[15]. Neither is likely to occur at the outfall location.

4.5. Marine mammals

Marine mammals are often referred to as 'marine sentinel organisms' for ocean-health (e.g. Bonde et al. 2004; Jessup et al. 2004; Wells et al. 2004; Bossart 2011). With

[13] Information on depth ranges for the species discussed in this paragraph are from fishbase.se, accessed 17 December 2019.
[14] See https://en.wikipedia.org/wiki/Frilled_shark and references therein, accessed 17 December 2019.
[15] See https://www.iucnredlist.org/species/161321/68617985 and Bray DJ, *Cirrhigaleus australis* in Fishes of Australia, http://fishesofaustralia.net.au/home/species/3501, accessed 17 December 2019.
[16] A list was compiled in 2005 but there has been no subsequent assessment.
[17] See A fisher's guide: New Zealand protected fish and reptiles. Department of Conservation. Available at: https://www.doc.govt.nz/globalassets/documents/conservation/marine-and-coastal/marine-conservation-services/resources/identification-guide-protected-fish-and-reptiles.pdf. Accessed 14 January 2020.

their long life spans, high-trophic-level diets and coastal residency, marine mammals are vulnerable to land-derived microorganisms (e.g. protozoans, bacteria and viruses) and the bioaccumulation of anthropogenic contaminants. As a result, local marine mammals are often considered when assessing the potential effects of industrial or other discharges and / or contaminants on marine ecosystem health (Bonde et al. 2004).

There have been no dedicated marine-mammal surveys of the coast around the outfall and therefore it is necessary to consider marine mammals that may be found in the broader Kapiti coast and Cook Strait regions. Based on recorded sightings, at least nine species of cetaceans (whales, dolphins and porpoises) and one pinniped (seals and sea lions) are thought to live or regularly frequent the coastal waters of Kapiti and Cook Strait (Department of Conservation sighting / stranding database; Beaumont et al. 2009; pers. comm. C. Lilley, Department of Conservation). Of these, four are classified as Threatened and one as At Risk (Baker et al. 2019: Appendix 4). A further two species are classified as Data deficient. The humpback whale (*Megaptera novaeangliae*), classified as Migrant in the NZTCS, is listed as Endangered by IUCN. A list of all these species is given in Appendix 4, categorised by their currently known distribution patterns within this region as either: 'resident', 'migrant' or 'visitor'. Appendix 5 provides a visual summary of the marine mammal sightings reported in the DOC database for the region.

Other marine mammal species may also occur in the area but are likely to be rare or infrequent visitors. It is important to note that most of the sightings and strandings used in this assessment were opportunistic (e.g. public sightings, tourism reports, fisheries' observers, etc.). Opportunistic sightings generally reflect a closer proximity to larger towns or harbours and / or where most coastal activities occur (e.g. tour boats, commercial and recreational fishing, diving, etc.). Hence, the inferences of distribution and frequency for species described in this assessment are likely to change with time as more information is collected.

The species most likely to be found in the vicinity of the discharge is the New Zealand fur seal (*Arctocephalus forsteri*). Known fur seal haul-out sites are located to the north and south of Porirua, along the Kapiti coast and Cook Strait (including Mana and Kapiti islands), with an established breeding colony situated at Red Rocks on the Wellington south coast. Haul-out sites are rocky-shore areas where fur seals tend to come ashore regularly and rest, particularly over the colder winter months. While fur seals are considered non-migratory, they easily and repeatedly cover large distances and rarely remain at any one location year-round. Seals are more densely clumped within breeding colonies in summer and pups generally leave these colonies in late winter and spring. Fur seals are classified as Not Threatened under the NZTCS.

Other species in the region include the nationally vulnerable Hector's dolphin (*Cephalorhynchus hectori*; see details below), which is occasionally reported in along the Kapiti coast, and, to a much lesser extent, other dolphin species (including common and bottlenose) and whales that venture into shallow coastal waters (e.g. Bryde's and southern right whales). Bottlenose dolphins (*Tursiops truncates*), common dolphins (*Delphinus delphis*) and pilot whales (*Globicephala* sp.) are occasionally sighted in both coastal and offshore waters within the wider region throughout the year. Southern right whales (*Eubaleana australis*) and humpback whales are known to migrate seasonally through Cook Strait and along the Kapiti coast on their way north in winter and south in spring. Unlike right whales, humpbacks tend to travel in straight lines from headland to headland, only occasionally passing inshore to bays, bights or harbours. Little is known about the seasonal movements of Bryde's whales (*Balaenoptera* sp.) off the North Island's west coast. However, the sighting data suggest this species is present in coastal waters of the Taranaki Bight over summer months.

While the Taranaki region is not known as an important breeding ground for any cetacean species (Dawbin 1956, Patenaude 2003), cow-calf pairs of bottlenose and common dolphins, southern right and humpback whales have been sighted migrating through these waters. Only New Zealand fur seals and blue whales are known to have specific feeding or breeding grounds in the coastal area of the southwest North Island. Recent research has suggested that offshore waters (greater than 100 m in depth) in the South Taranaki Bight may be an important foraging ground for blue whales (Torres 2013).

4.5.1. Hector's and Māui's dolphins

Hector's dolphins, classified as Threatened – Nationally vulnerable, are occasionally reported from the Cook Strait and Kapiti coast regions, but the area is considered low density for this species. It is unlikely that these regions include significant breeding or nursery grounds. However, recent sightings in the Taranaki Bight of Hector's dolphins from the South Island emphasise the importance of these waters as a 'genetic corridor' between Hector's dolphins to the south and Māui's dolphins to the north. Māui's dolphins have not been reported from the Kapiti coast.

5. ADVERSE EFFECTS FROM THE DISCHARGE

Using the approaches to assessing risk proposed by Burgman (2005) and EIANZ (2015), Morrisey et al. (2019) identified levels of long-term risk from effects of the continued operation of the existing outfall as ***negligible*** (for effects of maintenance access on intertidal rocky areas) or ***less than minor*** (for nutrient enrichment and reduced salinity). This was based on the lack of observed effects of the current discharge at Rukutane Point compared with the other two sites surveyed (Morrisey et al. 2019). The assessment took into account the planned increase in hydraulic capacity of the WWTP, and the consequent increase in maximum volumes discharged and reduced frequency of bypass discharges. For the same reasons, these same levels of long-term risk are considered to apply to the Threatened and At Risk taxa.

The assumption that the low level of risk posed by the outfall options to the general habitats and biota at the discharge location will also apply to Threatened and At Risk invertebrate taxa is subject to unavoidable uncertainty. It is possible that some of these taxa are more sensitive to altered nutrient concentrations or salinities. The lack of relevant information on these taxa (and many others) makes it impossible to predict effects with certainty. On the other hand, we are also assuming that these taxa *could* be present but there is no evidence that they are. It is also relevant that the outfall has been operating since 1989 and additional future effects on the wider receiving environment (rather than that immediately around the outfall) are unlikely.

The chondrichthyan species that might potentially occur at the outfall location (great white, basking, prickly and smalltooth sand tiger sharks) are mobile species and unlikely to spend prolonged periods there. They are also capable of moving away from or avoiding areas where adverse effects occur without any significant loss of habitat.

With respect to marine mammals, a comprehensive review of contaminant concentrations across Southern Hemisphere marine mammals found that coastal, higher-trophic-level (fish-eating), and smaller-bodied species tended to have relatively high concentrations of most contaminants (Evans 2003). The lipophilic (fat soluble) and persistent nature of some chemicals make marine mammals particularly vulnerable to bioaccumulation within their thick blubber layers. Because of their generally higher trophic level, marine mammals may also biomagnify contaminants (Woodley et al. 1991, Weisbrod et al. 2000). Trace elements (e.g. trace metals) are also known to accumulate in marine mammals' protein-rich tissues, such as the liver and muscle. Once contaminants are absorbed by tissues, they are not easily eliminated, except during pregnancy and lactation, when they may be passed to the offspring (Tanabe et al. 1994).

The overall risk from the combined outfall discharge is expected to be low for those marine mammal species with the highest potential exposure; the New Zealand fur seal and possibly individual Hector's dolphins, common dolphins, southern right whales or orcas. However, the species known to occur in these waters are generalist feeders, potentially ranging and foraging widely throughout the Kapiti coast, Cook Strait and beyond and, in the case of fur seals, off the continental shelf edge (Goldsworthy & Gales 2008). The lack of any year-round resident marine mammal in these coastal waters means the chance of an individual animal consuming prey or swimming through areas exposed to the wastewater would be very small.

The secondary treatment of wastewater helps remove a high proportion of chemical and biological pollutants. These reductions in pollutant concentrations, and the predicted scale of dilution and dispersion into a high-energy, dispersive marine environment, are important mitigating factors that suggest an individual marine mammal's chances of direct or indirect exposure to contaminants or pathogens from the treated wastewater effluent are extremely low.

6. MITIGATION

Given the low levels of risk, mitigation of adverse effects is not considered necessary.

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9. APPENDICES

Appendix 1. Marine invertebrate taxa classified as Threatened (qualifiers and criteria are defined in Appendix 3). Source: Freeman et al. 2014.

Threatened: Nationally Critical

NAME AND AUTHORITY	COMMON NAME	FAMILY	CRITERIA	QUALIFIERS
Phylum Annelida				
Boccardiella magniovata (Read, 1975)	Large-egged polychaete	Spionidae	B(2/1)	
Phylum Arthropoda				
Idioibla idiotica (Batham, 1945)	Barnacle	Idioiblidae	C	
Phyllum Brachiopoda				
Pumilus antiquatus Atkins, 1958	Dwarf white lamp shell	Kraussinidae	C	PE
Phyllum mollusca				
Bathymodiolus tangaroa Cosel & Marshall, 2003	Giant seep mussel	Mytilidae	A(3)	RR
Smeagol climoi Tillier & Ponder, 1993	Gravel maggot	Smeagolidae	A(3)	OL
Smeagol manneringi Climo 1981	Gravel maggot	Smeagolidae	A(3)	DP, OL

A—very small population (natural or unnatural)

A(1) <250 mature individuals, regardless of cause

A(2) ≤2 subpopulations, ≤200 mature individuals in the larger subpopulation

A(3) Total area of occupancy ≤1 ha (0.01 km²)

B—small population (natural or unnatural) with a high ongoing or predicted decline

B(1/1) 250–1000 mature individuals, predicted decline 50–70%

B(2/1) ≤5 subpopulations, ≤300 mature individuals in the largest subpopulation, predicted decline 50–70%

B(3/1) Total area of occupancy ≤10 ha (0.1 km²), predicted decline 50–70%

C—population (irrespective of size or number of subpopulations) with a very high ongoing or predicted decline (>70%)

C Predicted decline >70%

Threatened: Nationally Endangered

NAME AND AUTHORITY	COMMON NAME	FAMILY	CRITERIA	QUALIFIERS
Phylum Annelida				
Spio aequalis Ehlers, 1904	Giant spionid worm	Spionidae	A(1/1)	DP, RR, Sp

Threatened: Nationally Vulnerable

NAME AND AUTHORITY	COMMON NAME	FAMILY	CRITERIA	QUALIFIERS
Phylum Bryozoa				
Calvetia osheai Taylor & Gordon, 2003	O'Shea's tree bryozoan	Calvetiidae	C(3/1)	CD, PD, RR
Spiritopora perplexa Taylor & Gordon, 2003	Bryozoan	Diaperoeciidae	C(3/1)	CD, OL, PD, RR
Phylum Cnidaria				
Chathamisis bayeri Grant, 1976	Bamboo coral	Isididae	D(3/1)	DP, Sp
Paragorgia alisonae Sanchez, 2005	Bubblegum coral	Paragorgiidae	D(3/1)	DP, Sp

Appendix 2. Marine invertebrate taxa classified as At Risk. Source: Freeman et al. 2014.

At Risk: Declining

NAME AND AUTHORITY	COMMON NAME	FAMILY	CRITERIA	QUALIFIERS
Phylum Bryozoa				
Steginoporella perplexa Livingstone, 1929	Bryozoan	Steginoporellidae	C(2/1)	CD, PD, RR
Phylum Cnidaria				
Goniocorella dumosa (Alcock, 1902)	Stony coral	Caryophylliidae	C(2/1)	CD, SO
Solenosmilia variabilis Duncan 1873	Stony coral	Caryophylliidae	C(2/1)	CD, SO
Enallopsammia rostrata (Pourtalès, 1878)	Stony coral	Dendrophylliidae	C(2/1)	CD, PD, SO
Paragorgia arborea (Linnaeus, 1758)	Bubblegum coral	Paragorgiidae	C(2/1)	SO, Sp
Madrepora oculata Linnaeus, 1758	Stony coral	Oculinidae	C(2/1)	CD, SO
Phylum Echinodermata				
Gorgonocephalus chilensis (Philippi, 1858)	Basket star	Gorgonocephalidae	C(2/1)	SO
Gorgonocephalus dolichodactylus Döderlein, 1911	Basket star	Gorgonocephalidae	C(2/1)	SO
Gorgonocephalus pustulatum (H.L. Clark, 1916)	Basket star	Gorgonocephalidae	C(2/1)	
Phylum Mollusca				
Cellana flava (Hutton, 1873)	Golden limpet	Nacellidae	A(2/1)	RR
Octopus kaharoa O'Shea, 2000	Octopus	Octopodidae	C(2/1)	
Opisthoteuthis mero O'Shea, 2000	Mero's umbrella octopus	Opisthoteuthidae	C(2/1)	DP
Alcithoe davegibbsi Hart, 1999	Volute	Volutidae	C(2/1)	OL

At Risk: Naturally Uncommon

NAME AND AUTHORITY	COMMON NAME	FAMILY	QUALIFIERS
Phylum Arthropoda			
Alvinocaris alexander Ahyong, 2009	Vent shrimp	Alvinocarididae	RR
Alvinocaris longirostris Kikuchi & Ohta, 1995	Vent shrimp	Alvinocarididae	RR
Alvinocaris niwa Webber, 2004	Vent shrimp	Alvinocarididae	RR
Gandalfus puia McLay 2007	Crab	Bythograeidae	RR, Sp
Mursia microspina Davie & Short, 1989	Crab	Calappidae	RR, SO
Philanisus fasciatus Riek, 1976	Caddisfly	Chathamiidae	OL
Vulcanolepas osheai (Buckeridge, 2000)	Barnacle	Eolepadidae	OL
Elamena momona Melrose, 1975	Crab	Hymenosomatidae	Sp
Halimena aotearoa Melrose, 1975	Crab	Hymenosomatidae	Sp
Lebbeus wera Ahyong, 2009	Vent shrimp	Hippolytidae	OL
Chitinolepas spiritsensis Buckeridge & Newman, 2006	Barnacle	Idioiblidae	DP
Lithodes macquariae Ahyong, 2010	King crab	Lithodidae	DP, RR, Sp
Lithodes robertsoni Ahyong, 2010	King crab	Lithodidae	DP, Sp
Neolithodes bronwynae Ahyong, 2010	King crab	Lithodidae	DP, RR, Sp
Paralomis dawsoni Macpherson, 2001	King crab	Lithodidae	DP, Sp
Paralomis hirtella Macpherson & Saintlaurent, 1998	King crab	Lithodidae	SO
Paralomis poorei Ahyong, 2010	King crab	Lithodidae	DP, Sp
Paralomis zealandica Dawson & Yaldwyn, 1971	King crab	Lithodidae	Sp
Leptomithrax tuberculatus mortenseni Bennett, 1964	Spider crab	Majidae	RR

At Risk: Naturally Uncommon (continued)

NAME AND AUTHORITY	COMMON NAME	FAMILY	QUALIFIERS
Leptomithrax tuberculatus mortenseni Bennett, 1964	Spider crab	Majidae	RR
Colubrisquilla dempsey Ahyong, 2012	Mantis shrimp	Tetrasquillidae	DP, Sp
Heterosquilla koning Ahyong, 2012	Mantis shrimp	Tetrasquillidae	DP, Sp
Heterosquilla laevis (Hutton, 1879)	Mantis shrimp	Tetrasquillidae	Sp
Heterosquilla tricarinata (Claus, 1871)	Mantis shrimp	Tetrasquillidae	Sp
Heterosquilla tridentata (Thomson, 1882)	Mantis shrimp	Tetrasquillidae	DP, RR, Sp
Pariliacantha georgeorum Ahyong, 2012	Mantis shrimp	Tetrasquillidae	DP, Sp
Xenograpsus ngatama McLay, 2007	Crab	Xenograpsidae	RR, SO
Phylum Cnidaria			
Balanophyllia chnous Squires, 1962	Stony coral	Dendrophylliidae	RR
Crateritheca novaezelandiae (Thompson, 1879)	Stony coral	Dendrophylliidae	RR
Falcatoflabellum raoulensis Cairns, 1995	Stony coral	Flabellidae	RR
Keratoisis glaesa Grant, 1976	Bamboo coral	Isididae	DP, Sp
Keratoisis hikurangiensis Grant, 1976	Bamboo coral	Isididae	Sp
Keratoisis projecta Grant, 1976	Bamboo coral	Isididae	Sp
Keratoisis tangentis Grant, 1976	Bamboo coral	Isididae	OL, RR, Sp
Keratoisis zelanica Grant, 1976	Bamboo coral	Isididae	Sp
Antipathella fiordensis (Grange, 1990)	Black coral	Myriopathidae	RR
Oculina virgosa Squires, 1958	Stony coral	Oculinidae	RR
Nemertesia elongata Totton, 1930	Hydrozoan	Plumulariidae	RR
Calyptrophora cucullata Cairns, 2012	Sea fan	Primnoidae	DP, Sp
Calyptrophora inornata Cairns, 2012	Sea fan	Primnoidae	DP, Sp
Narella hypsocalyx Cairns, 2012	Sea fan	Primnoidae	DP, Sp
Narella mesolepis Cairns, 2012	Sea fan	Primnoidae	DP, RR, Sp
Narella vulgaris Cairns, 2012	Sea fan	Primnoidae	DP, Sp
Errina bicolor Cairns, 1991	Red coral	Stylasteridae	DP, Sp
Errina chathamensis Cairns, 1991	Red coral	Stylasteridae	DP, Sp
Errina cheilopora Cairns, 1983	Red coral	Stylasteridae	DP, Sp
Errina laevigata Cairns, 1991	Red coral	Stylasteridae	DP, Sp
Errina reticulata Cairns, 1991	Red coral	Stylasteridae	DP, Sp
Errina sinuosa Cairns, 1991	Red coral	Stylasteridae	DP, RR, Sp
Lillipathes lillei (Totton, 1923)	Black coral	Schizopathidae	RR, S?O
Sphenotrochus squiresi Cairns, 1995	Stony coral	Turbinoliidae	RR
Phylum Echinodermata			
Eurygonias hyalacanthus Farquhar, 1913	Cushion star	Odontasteridae	RR, Sp
Phylum Mollusca			
Ruapukea carolus Dell, 1953	Snail	Aclididae	DP, RR
Discotectonica acutissima (G.B. Sowerby III, 1914) (NZOI TAN107.122)	Snail	Architectonicidae	DP, RR, SO
Suterilla imperforata Fukuda, Ponder & B.A. Marshall, 2006	Snail	Assimineidae	RR
Fictonoba oliveri (Powell, 1927)	Snail	Barleeiidae	RR
Cominella quoyana griseicalx Willan, 1979	Whelk	Buccinidae	RR
Cominella regalis Willan, 1979	Whelk	Buccinidae	RR
Caecum maori Pizzini & Raines, 2006	Snail	Caecidae	RR
Bathyfautor rapuhia B.A. Marshall, 1996	Snail	Calliostomatidae	RR

At Risk: Naturally Uncommon (continued)

NAME AND AUTHORITY	COMMON NAME	FAMILY	QUALIFIERS
Calliostoma antipodense B.A. Marshall, 1996	Snail	Calliostomatidae	RR
Calliostoma benthicola (Dell, 1950)	Snail	Calliostomatidae	RR
Calliostoma consobrinum (Powell, 1958)	Snail	Calliostomatidae	RR
Calliostoma eminens B.A. Marshall, 1996	Snail	Calliostomatidae	RR
Calliostoma gendalli B.A. Marshall, 1980	Snail	Calliostomatidae	RR
Calliostoma gibbsorum B.A. Marshall, 1996	Snail	Calliostomatidae	RR
Calliostoma jamiesoni B.A. Marshall, 1996	Snail	Calliostomatidae	RR
Calliostoma peregrinum B.A. Marshall, 1996	Snail	Calliostomatidae	RR
Calliostoma xanthos B.A. Marshall, 1996	Snail	Calliostomatidae	SO, Sp
Carinastele coronata B.A. Marshall, 1989	Snail	Calliostomatidae	DP, RR
Carinastele jugosa B.A. Marshall, 1989	Snail	Calliostomatidae	DP, RR
Carinastele kristelleae B.A. Marshall, 1989	Snail	Calliostomatidae	RR
Fautrix candida B.A. Marshall, 1996	Snail	Calliostomatidae	RR
Selastele kopua (B.A. Marshall, 1995)	Snail	Calliostomatidae	RR
Selastele limatulum (B.A. Marshall, 1995)	Snail	Calliostomatidae	RR
Selastele onustum (Odhner, 1924)	Snail	Calliostomatidae	RR
Calliotropis crystalophorus B.A. Marshall, 1980	Snail	Calliotropidae	DP, RR
Acrosterigma sorenseni (Powell, 1967)	Veneroid bivalve	Cardiidae	RR
Purpurocardia reinga (Powell, 1933)	Bivalve	Carditidae	RR
Sundaya exquisita Oliver, 1915	Snail	Cerithiopsidae	RR
Herpetopoma pruinosa B.A. Marshall, 1980	Snail	Chilodontidae	RR
Chiton themeropis (Iredale, 1914)	Chiton	Chitonidae	RR
Onithochiton oliveri (Iredale, 1914)	Chiton	Chitonidae	RR
Rhyssoplax exasperata Iredale, 1915	Chiton	Chitonidae	RR
Cirroctopus hochbergi O'Shea, 2000	Four-blotched umbrella octopus	Cirroctopodidae	DP, Sp
Etrema hedleyi (Oliver, 1915)	Cone snail	Clathurellidae	RR
Lienardia roseocincta (Oliver, 1915)	Snail	Clathurellidae	RR
Leptothyra benthicola B.A. Marshall, 1980	Snail	Colloniidae	RR
Leptothyra kermadecensis B.A. Marshall, 1980	Snail	Colloniidae	RR
Zafra fuscolineata Oliver, 1915	Whelk	Columbellidae	RR
Zafra kermadecensis Oliver, 1915	Whelk	Columbellidae	RR
Benthocardiella obliquata bountyensis Powell, 1934	Bivalve	Condylocardiidae	DP, RR
Vexillum iredalei (Powell, 1958)	snail	Costellariidae	RR
Crassatina iredalei (Powell, 1958)	Bivalve	Crassatellidae	RR
Crosseola favosa Powell, 1937	Snail	Crosseolidae	RR
Crosseola intertexta Powell, 1937	Snail	Crosseolidae	RR
Cyclochlamys pileolus Dijkstra & B.A. Marshall, 2008	Scallop	Cyclochlamydidae	DP, RR
Iredalea subtropicalis Oliver, 1915	Cone shell	Drilliidae	RR
Eatoniella (E.) *iredalei* (Oliver, 1915)	Snail	Eatoniellidae	RR
Epigrus gracilis Oliver, 1915	Snail	Epigridae	RR
Epigrus insularis Oliver, 1915	Snail	Epigridae	RR
Annulobalcis marshalli Warén, 1981	Snail	Eulimidae	RR
Fuscapex ophioacanthicola Warén, 1981	Snail	Eulimidae	OL, DP, RR
Fusceulima goodingi Warén, 1981	Snail	Eulimidae	OL, DP, RR
Melanella kermadecensis Oliver, 1915	Snail	Eulimidae	RR
Melanella luminosa B.A. Marshall, 1997	Snail	Eulimidae	RR
Melanella perplexa Oliver, 1915	Snail	Eulimidae	RR
Melanella spinosa Oliver, 1915	Snail	Eulimidae	RR
Ophieulima fuscoapicata Warén, 1981	Snail	Eulimidae	OL, DP
Punctifera ophiomoerae Warén, 1981	Snail	Eulimidae	OL, DP
Pyramidelloides suteri (Oliver, 1915)	Snail	Eulimidae	RR

At Risk: Naturally Uncommon (continued)

NAME AND AUTHORITY	COMMON NAME	FAMILY	QUALIFIERS
Cornisepta festiva (Crozier, 1966)	Snail	Fissurellidae	RR
Diodora bollonsi (Oliver, 1915)	Snail	Fissurellidae	RR
Emarginula connectens Thiele, 1915	Snail	Fissurellidae	RR
Fissurisepta manawatawhia Powell, 1937	Snail	Fissurellidae	RR
Zygoceras tropidophora Warén & Bouchet, 1991	snail	Haloceratidae	OL, DP, SO
Larochea spirata Geiger & B.A. Marshall, 2012	Snail	Larocheidae	RR
Larocheopsis amplexa B.A. Marshall, 1993	Snail	Larocheidae	RR
Leptochiton norfolcensis subtropicalis (Iredale, 1914)	Chiton	Leptochitonidae	RR
Laevilitorina antipodum (Filhol, 1880)	Snail	Littorinidae	RR
Laevilitorina bifasciata Suter, 1914	Snail	Littorinidae	RR
Laevilitorina delli (Powell, 1955)	Snail	Littorinidae	RR
Munditia anomala Powell, 1941	Snail	Liotiidae	RR
Munditia aupouria Powell, 1937	Snail	Liotiidae	RR
Munditia delicatula Powell, 1941	Snail	Liotiidae	RR
Munditia echinata Powell, 1937	Snail	Liotiidae	RR
Munditia manawatawhia Powell, 1937	Snail	Liotiidae	RR
Munditia suteri (Mestayer, 1919)	Snail	Liotiidae	RR
Bathyaustriella thionipta Glover, Taylor & Rowden, 2004	Bivalve	Lucinidae	RR
Lutraria bruuni Powell, 1967	Bivalve	Mactridae	OL, DP, RR
Oxyperas belliana (Oliver, 1915)	Bivalve	Mactridae	RR
Serrata raoulica B.A. Marshall, 2004	Snail	Marginellidae	RR
Cancilla kermadecensis (Cernohorsky, 1978)	Snail	Mitridae	RR
Mitromorpha expeditionis Oliver, 1915	Cone shell	Mitromorphidae	RR
Mysella tellinula (Odhner, 1924)	Bivalve	Montacutidae	RR
Hexaplex puniceus Oliver, 1915	Snail	Muricidae	RR
Hirtomurex tangaroa Marshall & Oliverio, 2009	Snail	Muricidae	RR
Hirtomurex taranui B.A. Marshall & Oliverio, 2009	Snail	Muricidae	RR
Trophon subtropicalis Iredale, 1913	Snail	Muricidae	RR
Hunkydora rakiura B.A. Marshall, 2002	Bivalve	Myochamidae	RR
Gigantidas gladius Cosel & B.A. Marshall, 2003	Vent mussel	Mytilidae	RR
Cellana craticulata (Suter, 1905)	Limpet	Nacellidae	RR
Cellana oliveri Powell, 1955 E	Limpet	Nacellidae	RR
Nacella terroris (Filhol, 1880)	Limpet	Nacellidae	RR
Micropilina rakiura B.A. Marshall, 1999	Monoplacophoran	Neopilinidae	RR
Micropilina tangaroa B.A. Marshall, 1991	Monoplacophoran	Neopilinidae	DP, RR
Rokopella capulus B.A. Marshall, 2006	Monoplacophoran	Neopilinidae	DP
Pronucula kermadecensis Oliver, 1915	Bivalve	Nuculidae	RR
Opisthoteuthis chathamensis O'Shea, 2000	Roughy umbrella octopus	Opisthoteuthidae	Sp
Scutellastra kermadecensis (Pilsbry, 1894)	Limpet	Patellidae	RR
Ciclopecten fluctuatus (Bavay, 1905)	Scallop	Pectinidae	DP, RR, SO
Dilemma inexpectatum (Crozier, 1967)	Bivalve	Poromyidae	RR
Cyclopecten fluctuosus Dijkstra & B.A. Marshall, 2008	Scallop	Propeamussiidae	DP, RR
Cyclopecten horridus Dijkstra, 1995	Scallop	Propeamussiidae	DP, RR
Cyclopecten kermadecensis (E.A. Smith, 1885)	Scallop	Propeamussiidae	RR
Pteria avicula (Holten, 1802)	Bivalve	Pteriidae	DP, RR, SO
Eulimella inexpectata (Oliver, 1915)	Snail	Pyramidellidae	RR
Hinemoa punicea Oliver, 1915	Snail	Pyramidellidae	RR
Besla insularis (Oliver, 1915)	Snail	Pyramidellidae	RR
Kermia benhami Oliver, 1915	Cone shell	Raphitomidae	RR
Rastodens electra (Oliver, 1915)	Snail	Rastodentidae	RR
Pusillina wallacei (Oliver, 1915)	Snail	Rissoidae	RR

At Risk: Naturally Uncommon (continued)

NAME AND AUTHORITY	COMMON NAME	FAMILY	QUALIFIERS
Striatestea poutama Ponder, 1967	Snail	Rissoidae	RR
Striatestea bountyensis Powell, 1927	Snail	Rissoidae	RR
Striatestea eulima Powell, 1940	Snail	Rissoidae	RR
Alvania kermadecensis (Oliver, 1915)	Snail	Rissoidae	RR
Sinezona brucei Geiger, 2012	Slit shell	Scissurellidae	RR
Sinezona enigmatica Geiger & B.A. Marshall, 2012	Slit shell	Scissurellidae	OL
Sinezona pacifica (Oliver, 1915)	Slit shell	Scissurellidae	RR
Sinezona platyspira Geiger & B.A. Marshall, 2012	Slit shell	Scissurellidae	RR
Satondella bicristata Geiger & B.A. Marshall, 2012	Slit shell	Scissurellidae	RR
Scissurella bountyensis Powell, 1933	Slit shell	Scissurellidae	RR
Scissurella fairchildi Powell, 1934	Slit shell	Scissurellidae	RR
Brookula stibarochila (Iredale, 1912)	Snail	Seguenzioidea	RR
Lissotesta conoidea Powell, 1937	Snail	Seguenzioidea	RR
Cirsonella laxa Powell, 1937	Snail	Skeneidae	RR
Cirsonella maoria (Powell, 1937)	Snail	Skeneidae	RR
Cirsonella paradoxa Powell, 1937	Snail	Skeneidae	RR
Philorene texturata Oliver, 1915	Snail	Skeneidae	RR
Archiminolia dawsoni (B.A. Marshall, 1979)	Snail	Solariellidae	DP, RR
Archiminolia hurleyi (B.A. Marshall, 1979)	Snail	Solariellidae	DP, RR
Bathymophila valentia B.A. Marshall, 2000	Snail	Solariellidae	RR
Grippina acherontis B.A. Marshall, 2002	Bivalve	Spheniopsidae	OL, RR
Grippina globosa B.A. Marshall, 2002	Bivalve	Spheniopsidae	RR
Grippina pumila B. Marshall, 2002	Bivalve	Spheniopsidae	RR
Grippina spirata B. Marshall, 2002	Bivalve	Spheniopsidae	RR
Spondylus raoulensis Oliver, 1915	Scallop	Spondylidae	RR
Tectus royanus (Iredale, 1912)	Snail	Tegulidae	RR
Graphis sculpturata (Oliver, 1915)	Snail	Tofanellidae	RR
Tornus aupouria (Powell, 1937)	Snail	Tornidae	RR
Tornus maoria (Powell, 1937)	Snail	Tornidae	RR
Metaxia kermadecensis B.A. Marshall 1978	Snail	Triphoridae	RR
Cantharidus antipoda hinemoa (Powell, 1956)	Snail	Trochidae	RR
Cantharidus burchorum B.A. Marshall, 1999	Snail	Trochidae	RR
Cantharidus festivus (B.A. Marshall, 1999)	Snail	Trochidae	RR
Clanculus atypicus Iredale, 1913	Snail	Trochidae	RR
Coelotrochus carinatus (B.A. Marshall, 1998)	Snail	Trochidae	RR
Coelotrochus polychroma (B.A. Marshall, 1999)	Snail	Trochidae	RR
Coelotrochus rex (B.A. Marshall, 1998)	Snail	Trochidae	RR
Monilea incerta Iredale 1913	Snail	Trochidae	RR
Stomatella oliveri (Iredale, 1912)	Snail	Trochidae	RR
Bolma kermadecensis Beu & Ponder, 1979	Snail	Turbinidae	RR
Vanikoro wallacei Iredale, 1912	Snail	Vanikoridae	RR
Phylum Porifera			
Aulocalyx australis Reiswig & Kelly, 2011	Glass sponge	Aulocalycidae	DP, RR, Sp
Auloplax breviscopulata Reiswig & Kelly, 2011	Glass sponge	Aulocalycidae	DP, RR, Sp
Chonelasma lamella Schulze, 1888	Glass sponge	Euretidae	Sp
Farrea ananchorata Reiswig & Kelly, 2011	Glass sponge	Farreidae	DP, RR, Sp
Farrea anoxyhexastera Reiswig & Kelly, 2011	Glass sponge	Farreidae	DP, Sp
Farrea similaris Reiswig & Kelly, 2011	Glass sponge	Farreidae	Sp
Hexactinella simplex Reiswig & Kelly, 2011	Glass sponge	Tretodictyidae	DP, Sp

Appendix 3. Qualifiers and criteria and used in the lists of Threatened and At Risk taxa (from Freeman et al. 2014).

Qualifiers

CD	Conservation Dependent
De	Designated
DP	Data Poor
EF	Extreme Fluctuations
EW	Extinct in the Wild
IE	Island Endemic
Inc	Increasing
OL	One Location
PD	Partial Decline
RF	Recruitment Failure
RR	Range Restricted
SO	Secure Overseas
Sp	Sparse
St	Stable
TO	Threatened Overseas

Criteria for Threatened – Nationally Critical

A—very small population (natural or unnatural)

A(1) <250 mature individuals, regardless of cause

A(2) ≤2 subpopulations, ≤200 mature individuals in the larger subpopulation

A(3) Total area of occupancy ≤1 ha (0.01 km^2)

B—small population (natural or unnatural) with a high ongoing or predicted decline

B(1/1) 250–1000 mature individuals, predicted decline 50–70%

B(2/1) ≤5 subpopulations, ≤300 mature individuals in the largest subpopulation, predicted decline 50–70%

B(3/1) Total area of occupancy ≤10 ha (0.1 km^2), predicted decline 50–70%

C—population (irrespective of size or number of subpopulations) with a very high ongoing or predicted decline (>70%)

C Predicted decline >70%

Criteria for Threatened – Nationally Endangered

A(1/1) 250–1000 mature individuals, predicted decline 10–50%

Criteria for Threatened – Nationally Vulnerable

C(3/1) Total area of occupancy ≤100 ha (1 km²), predicted decline 10–50%

D(3/1) Total area of occupancy ≤1000 ha (10 km²), predicted decline 30–70%

Criteria for At Risk – Declining

A—moderate to large population and low ongoing or predicted decline

A(1/1) 5000–20 000 mature individuals, predicted decline 10–30%

A(2/1) Total area of occupancy ≤1000 ha (10 km²), predicted decline 10–30%

B—large population and low to moderate ongoing or predicted decline

B(1/1) 20 000–100 000 mature individuals, predicted decline 10–50%

B(2/1) Total area of occupancy ≤10 000 ha (100 km²), predicted decline 10–50%

C—very large population and low to high ongoing or predicted decline

C(1/1) >100 000 mature individuals, predicted decline 10–70%

C(2/1) Total area of occupancy >10 000 ha (100 km²), predicted decline 10–70%

Appendix 4. The residency patterns of marine mammal species known to frequent the waters of Cook Strait, the Kapiti coast and the Taranaki Bight. Species' conservation threat status is listed for both the NZTCS and the International Union for Conservation of Nature (IUCN) system (Baker et al. 2019).

Common name	Species name	New Zealand threat classification		IUCN red listing	Residency category
RESIDENTS					
Māui's dolphin	*Cephalorhynchus hectori maui*	Native and resident, evaluated, threatened	Threatened - Nationally critical	Critically endangered	Year-round resident
New Zealand fur seal	*Arctocephalus forsteri*	NZ native and resident, evaluated	Not Threatened	Least Concern	Seasonal to year-round resident
Blue whale	*Balaenoptera musculus* (spp. *intermedia* or *brevicauda*)	Native	Data deficient	Critically endangered to data deficient	Potential offshore resident or frequent visitor
MIGRANTS					
Southern right whale	*Eubalaena australis*	Native and resident, evaluated, threatened	At risk - Recovering	Least concern	Seasonal migrant
Humpback whale (oceanic population only)	*Megaptera novaeangliae*	Non-resident native	Migrant	Endangered	Seasonal migrant
VISITORS					
Common dolphin	*Delphinus delphis/capensis*	Native and resident, evaluated	Not threatened	Least concern	Seasonal to frequent visitor
Bottlenose dolphin	*Tursiops truncatus*	Native and resident, evaluated	Threatened - Nationally endangered	Data deficient	Seasonal to frequent visitor
Bryde's whale	*Balaenoptera edeni/brydei* sp.	Native and resident, evaluated, threatened	Threatened - Nationally critical	Data deficient	Seasonal to frequent visitor
Orca (killer whale)	*Orcinus orca*	NZ native and resident, evaluated, threatened	Threatened - Nationally critical	Data deficient	Seasonal to frequent visitor
Pilot whale	*Globicephala* sp.	Native	Data deficient or Not threatened	Data deficient	Seasonal to frequent visitor
Hector's dolphin	*Cephalorhynchus hectori hectori*	NZ native and resident, evaluated, threatened	Threatened - Nationally vulnerable	Critically endangered	Infrequent to rare visitor

Appendix 5. Reported marine mammal sightings (1978–2018) and strandings (1869–2018) in the Cook Strait, Kapiti coast and Taranaki region, including an insert of the Porirua area. Source: Department of Conservation sightings and strandings database.