Patuharakeke
TE IWI TRUST BOARD

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13 January 2020

Hon Stuart Nash
Minister of Fisheries
c/- Ministry for Primary Industries
P O Box 2526
Wellington 6140

Tena Koe

RE: Proposal to re-apply a Section 186A Closure on Mair and Marsden Banks, Marsden Point to the harvesting of ALL SHELLFISH

Ko Manaia te Maunga
Ko Whangarei Terenga Paraoa te Moana
Ko Patuharakeke te Hapu
Ko Takahiwai te Marae
Ko Te Pirihi te Tangata

1. INTRODUCTION

1.1 The Patuharakeke Mana Moana Roopu, as Kaitiaki gazetted in May 2009 under the Kaimoana Fisheries Regulations 1998, hereby submit this application requesting a renewal of the Temporary (S186A Closure) to all shellfish gathering on Marsden and Mair Bank. The closure commenced in June 2018 and is due to end in June 2020. We wish to extend the closure for a further two-year period, as provided for under the Fisheries Act 1996. We ask that you give effect to our customary rights and allow this closure to continue in order for ourselves and the wider community to continue our research into what is impeding the recovery of the Marsden Bank pipi population and formulate a plan for its restoration.

1.2 Te Roopu Mana Moana (the Roopu) is a subcommittee of the Patuharakeke Te Iwi Trust Board Inc (PTB) and is authorized to make this submission.

1.3 A visual depiction of our gazetted rohe moana boundary is provided below.

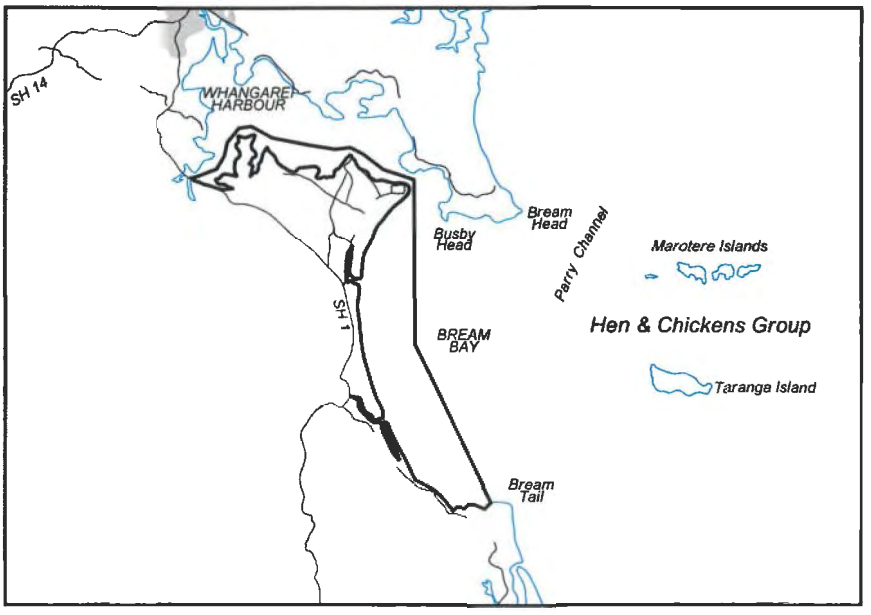

Figure 1: Patuharakeke Gazetted Rohe Moana Boundary

2. BACKGROUND

2.1 As stated in our previous correspondence going back a decade with the Ministry on this significant cultural location, much of the area along the foreshore and dunes between the now Marsden Point Wharf and Refinery Jetty was regularly used as a nohoanga site for harvesting kai by Patuharakeke and other whanaunga from the Whangarei area up until the 1960s when industrial development of the site began and consequently restricted this practice. Extensive mussel beds in the area were wiped out. Until recent times this area was still an important site for harvesting pipi for customary use and for day to day feeding our whanau. Since 2011 PTB have progressed applications in 2011 and 2013 to close Marsden Bank under section 186A of the Fisheries Act 1996 and subsequently supported the indefinite closure of Mair and Marsden Bank under s11 of the Fisheries Act 1996 set down in October 2014. The latest 2018 closure of both areas to all shellfish collection was a result of our continued monitoring and lobbying following the re-establishment of a healthy kutai/mussel population in 2015 and its decimation due to harvest pressure within only 12 months.

2.2 Over recent years PTB have been investigating the development of a mahinga maitaitai reserve application and collaborating with other agencies such as Northland Regional Council (NRC) and stakeholders such as Refining NZ and Northport Ltd. In December of 2015 we made a successful bid

to the Whangarei Harbour Health Improvement Fund to Undertake a 5 Year Monitoring Programme of the health of Pipi Beds at these locations along with other Mahinga Kai at One Tree Point and Ruakaka Estuary. We are now into our final year of that study (although we intend to continue this work indefinitely) and attach as Appendix A the most recent reporting from that study, along with a summary draft of recent drop camera work lead by Dr Drew Lohrer of NIWA (report not finalized). All of this work has been focused on trying to better understand the dynamics amongst pipi and mussel at these locations whilst allowing this bed to rejuvenate and us to further prepare a mataitai application with the goal of eventually getting bylaws in place to better manage these important taonga species. Unfortunately, as the study shows, the pipi and mussel populations have not materially improved to a state that would support reopening the beds to harvest at this stage (see also Appendix B for a copy of most recent Mana Moana Committee Minutes).

3. INFORMATION REQUIREMENTS

3.1 Describe tāngata whenua non-commercial customary fishing use and management practices;

Historical korero from our kaumatua tells that whanau from Takahiwai would ride out to these banks on horseback, harvest a couple of sacks of pipi and mussel and take back to the Takahiwai Bridge where it would be left for the locals to come and take what they needed so all of the kainga had a share. This occurred weekly or less and had negligible impact therefore other management methods were not required. After Marsden Point was developed these banks became less important with the hapu tending to favour in-harbour sites closer to Marsden Bay. However, these were impacted by the Timber Port development in the early 2000s and people again went back to the outer banks which in the interim had mainly been targeted by commercial pickers. As had historically been the case, prior to closures starting in 2011, pipi and mussels were usually gathered by hand for the purpose of feeding whanau but also for hui and tangihanga, birthday celebrations etc. When gathered for whanau purposes people use their recreational catch limit. For marae related events a customary permit would be issued.

3.2 Provide reason(s) for requesting the temporary closure, i.e. the fishing activity of concern;

As per the attached report into our ongoing annual monitoring of pipi, the population remains at a level too low to sustain any harvest. Mussels have not re-established to the level observed in 2015, and because they settling in clumps on sandy substrate the intertidal or shallow subtidal zones along the channel, they are extremely easy to pick by hand and pull up 10-15 mussels at a time. The problem is also that this site is very accessible, vehicles are allowed on the beach so people can park nearby and carry large quantities to their cars. Boats can also anchor adjacent and divers take large quantities along the edge of the channel. Since the closure and our customary rahui has been in place there has been a marked decrease in observations of harvest or illegal harvest. This time around and with assistance from our community and industry partners we have carried out a comprehensive communications campaign on social media, local newspapers etc. Our kaitiaki have been patrolling and liaising closely with Fisheries Officer's. For example, this summer we have been at the bank on busy weekend/holiday days on the low tide and handed out pamphlets (attached as Appendix C).

3.3 Explain how the customary use and management practices are being impacted upon;

We are unable to pick to feed our whanau because of the lack of pipi and mussel and also that as kaitiaki and the responsible hapū we are trying to lead by example. This causes some ill will amongst our own people as we are unable to issue customary permits even for tangihanga.

However, the practice of rahui associated with the closures has allowed our hapū to restore these traditions that had not been utilized for many decades [add photo rahui ceremony]. Rahui put down in response to a resource sustainability issue would not generally be lifted until the resource was restored to a healthy state. The 186A closure sits well alongside our customary rahui. Therefore lifting the closure at this point in time could undermine the success of the customary practice.

3.4 Indicate how a S186A temporary closure, for up to two years, will recognise use and management practices through improving either the availability and/or size of a species, or recognising a customary fishing practice. [While the section requires that only one of the elements of S186A needs to be established, it is preferable to address both these elements so that all relevant information is available];

Since 186A closures began to be implemented in 2011, Patuharakeke Kaumatua have supported these with the practice of customary rahui. After conferring with our taumata they have confirmed that that the overall use and management practice we are exercising over the Mair Bank and its fisheries is kaitiakitanga. Historically, and now in contemporary times, we have not only exercised kaitiakitanga on a single species basis. Kaitiakitanga recognises and provides for the relationships between and amongst the different species of fish that inhabit the Bank, and the way each of those species should be maintained in balance to revitalise and maintain the mauri of the bank and it fish stocks as a whole.

Kaitiakitanga is also about how the people relate to the fisheries and the environment. Our kaumatua have advised that kaitiakitanga includes their responsibility to ensure people comply with any rahui that is applied to rebuild the fishery and recognise and provide for kaitiakitanga. While compliance is carried out by MPI staff, the Kaumatua /kaitiaki have a role as kaitiaki in ensuring compliance can be achieved. Closing all fisheries both achieves a rebuild of the fisheries in a balanced way that recognises how Patuharakeke exercise kaitiakitanga and also ensures compliance can be achieved.

On that basis our Kaumatua are saying that the closure to rebuild all species will both:

a) improve the availability and size of all the shellfish which are utilised by Patuharakeke for customary purposes; and

b) recognise the customary practice of Patuharakeke which is to exercise kaitiakitanga by managing all the species on the Bank as an integrated group, not by managing individual species.

Patuharakeke Kaumatua at the unveiling of pou rahui in December 2018

3.5 Describe the proposed area/s and boundaries;

See below map as pertains to the current shellfish closure[1].

[1] As per Fisheries (Marsden Bank and Mair Bank, Closure of Pipi Fishery) Notice 2014 (Notice No. MPI 380).
(a) commencing at a point on the mean high-water mark (MHWM) at the base of the Marsden Point oil refinery jetty (at 35ø50.24'S and 174ø29.91'E); then
(b) proceeding in a north-easterly direction to a point at the seaward end of the Marsden Point oil refinery jetty (at 35ø50.21'S and 174ø29.95'E); then
(c) proceeding in a south-easterly direction to the Whangarei Harbour main channel port-hand buoy no. 18 (at 35ø50.32'S and 174ø30.44'E); then
(d) proceeding in a south-easterly direction to the Whangarei Harbour main channel port-hand buoy no. 16 (at 35ø50.54'S and 174ø30.94'E); then
(e) proceeding in a south-easterly direction to the Whangarei Harbour main channel port-hand buoy no. 14 (at 35ø50.76'S and 174ø31.19'E); then
(f) proceeding in a south-westerly direction to a point offshore (at 35ø50.86'S and 174ø30.50'E); then
(g) proceeding due west to a point on the MHWM
(at 35ø50.86'S and 174ø29.65'E); then
(h) proceeding along the MHWM in a generally
north-easterly then north-westerly direction to the point of commencement.

3.6 The species at issue is:

Primarily paphies australis/ pipi and Green Lipped Mussel/ Kutai. However, we remain of the view that for ease of monitoring and enforcement it is simpler to close the area to the gathering of "ALL SHELLFISH". This also better aligns with our customary practice of rahui which sits alongside the closure.

3.7 Describe the fishing method and how this is having an adverse effect (if applicable);

Refer to 3.2 above

3.8 Proposed length of time for temporary closure.

We are seeking a 24 month closure to allow stocks to regenerate and give us time to progress our mataitai application to a point where we can look at alternative methods of management (eg. through bylaws based on customary tools such as the maramataka, rahui, and kaitakitanga to potentially reduce the quota or impose a season) rather than closures, and also look at education and advocacy so that they are not wiped out again in so rapidly. We also intend to monitor and map the mussels using a drone so that we can look at the distribution and have a baseline to measure against in future when the bed recovers and is reopened. Further we are also be working with the Department of Conservation, Northland Regional Council and other agencies to look at the issue of vehicle on beaches and other ways we can better protect kutai (and pipi) including seeking ongoing support for our kaitiaki monitors to police any rahui or closures.

4. CONSULTATION

PTB have consulted with the following groups:

- Ngatiwai Trust Board
- Refining NZ Ltd
- Northport Ltd
- Ruakaka Residents and Ratepayers Association
- Bream Bay College
- Marsden Cove Marina

Letters of support are attached in Appendix D. We look forward to hearing from you at your earliest convenience regarding this urgent matter.

Naaku noa, na

For Patuharakeke Te Iwi Trust Board

Appendices:

A – Community Pipi Monitoring Report
B – Rohe Moana Committee Minutes
C – Signage and Pamphlets Developed by PTB and sponsored by our Industry Partners
D – Letters of Support

Patuharakeke Community Pipi Monitoring Programme: Project Report Update

Patuharakeke
TE IWI TRUST BOARD

Prepared for: Northland Regional Council (NRC)
Prepared by: Patuharakeke Te Iwi Trust Board (PTB)
Date: 11 November 2019

Prepared by Taryn Shirkey

Reviewed by Juliane Chetham (PTB) & Dr James Williams (NIWA)

Contents

1. Introduction

The pipi or kōkota (*Paphies australis*) is a burrowing infaunal bivalve mollusc, endemic to Aotearoa New Zealand. Pipi inhabit sandy deposits in areas of moderate wave energy and generally occur in stacked aggregations (up to 1000^{-1}) known as 'beds' (Dickie, 1986; Hooker, 1995). Pipi beds are characteristic of mid-intertidal to subtidal sandbanks near the mouths of estuaries and harbours (Morton & Miller, 1968; Powell, 1979). Larval pipi settle out of the plankton and metamorphose into post-larval 'spat' in the mid-intertidal zone, with juveniles and adults gradually migrating down-shore towards and into the sub-tidal zone with age (Hooker, 1995; Williams et al. 2007; Williams & Hume, 2014).

Pipi are an important customary, recreational and commercial fishery species. There is no minimum legal size (MLS) for pipi, but larger organisms are generally targeted over smaller individuals. Pipi were commercially harvested from the estensice and highly abundance pipi beds as Mair and Marsden banks at the entrance to Whangārei Harbour from at least the 1980s for at least five decades (Ministry for Primary Industries, 2016). The highly productive commercial fishery occurred year-round, creating a relatively constant harvesting pressure (Pawley, 2014), with commercial catches sometimes exceeding 250 tonnes annually (Ministry for Primary Industries, 2016). However, the renowned pipi beds at Mair and Marsden nanks declined substantially from about 2009–10 to 2014, possibly due to high natural mortality of an ageing pipi population and low recruitment, coincident with changes in the physical morphology of Mair Bank (Williams & Hume, 2014). Consequently, commercial pipi harvesting ceased in 2012.

Pipi have long been an important Māori taonga (treasured) species that supports highly valued customary fishery for the local hapū, Patuharakeke. Many of our whanaunga (relatives) grew up eating pipi several times a week, which supplemented the larders of our generally lower income whānau. Pipi beds were once abundant mahinga mātaitai (food gathering places) and it is central to our role as tangata tiaki to understand the state of health of these mahinga kai and work to restore these sites to their former abundance.

Patuharakeke initiated a rāhui (closure under section 186A of the Fisheries Act 1996) at Marsden Bank prohibiting the take of pipi soon after the decline was first observed in 2009–10 and the banks remain closed today, although harvesting is still permitted at other sites in the local area such as One Tree Point and Ruakākā Estuary.

In 2015, Patuharakeke Te Iwi Trust Board (PTB) were successful in gaining Whangārei Harbour Health Improvement Fund (WHHIF) funding to conduct a community driven pipi monitoring programme, which was initiated by conducting pipi surveys in 2016 and 2017 (Williams et al. 2017). The programme takes a longitudinal look at four important locations within Patuharakeke's rohe moana (Figure 1), by sampling using a western scientific approach and assessing the mauri of each location by using a cultural health indicator (CHI) monitoring framework. The work involves providing kaitiaki with survey methods and tools to conduct scientific surveys independently, to compliment tikanga.

The key aims of this project include;

- To enable and promote the contemporary expression of kaitiakitanga and effective customary fisheries management by tangata whenua;
- To gather informative time series data on pipi population dynamics that will assist in making ongoing management decisions in relation to Mair Bank and other mahinga kai sites;

- To provide mana whenua with an assessment of the condition and trend of the environmental health of selected significant mahinga kai areas;
- To determine whether cultural values are being enhanced or diminished; and
- To provide a flexible monitoring model to incorporate contemporary scientific data collection systems alongside cultural health indicator methods.

The present study reports the findings of pipi surveys in 2018 and 2019 considering data from 2016 and 2017, by providing a comprehensive and detailed report of pipi distribution, population dynamics and total population estimates over four significant sites – Mair and Marsden banks, One Tree Point and Ruakākā.

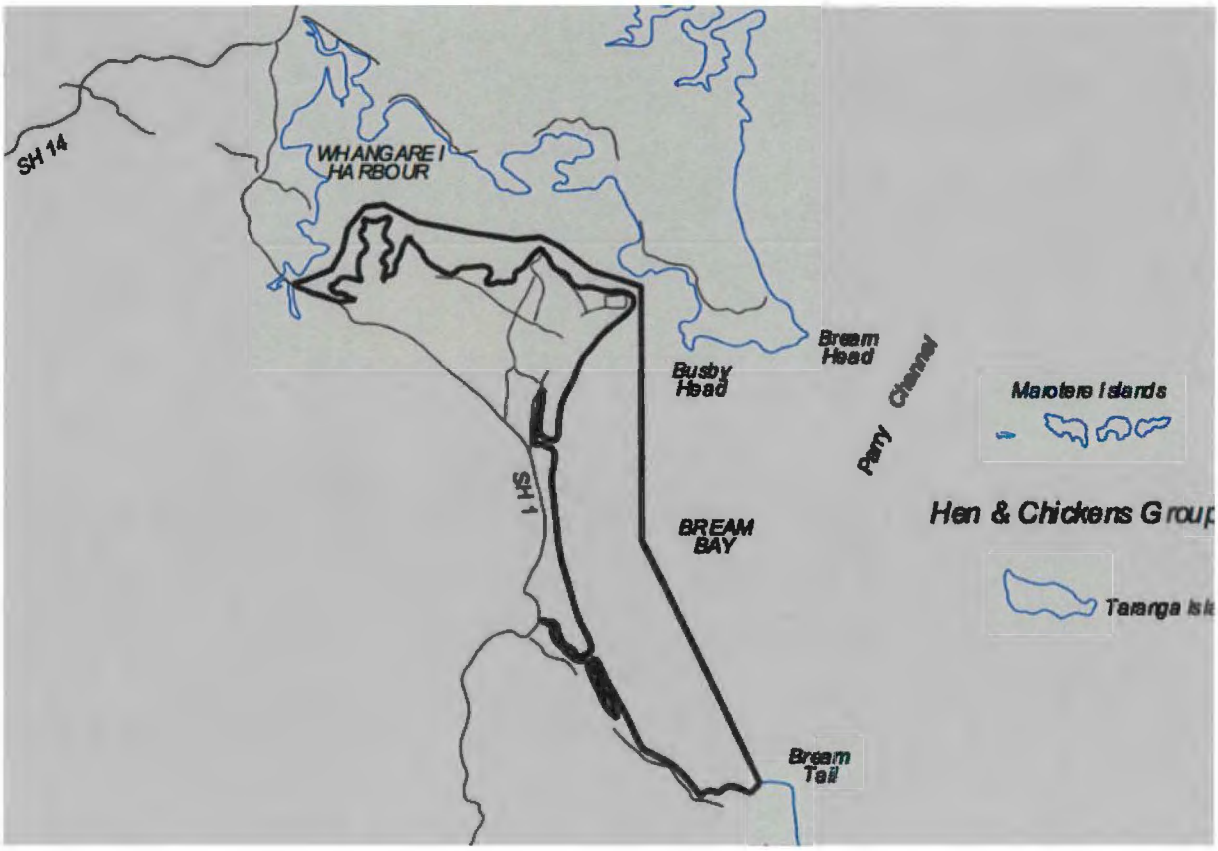

Figure 1: Patuharakeke rohe moana shown by the black polygon, gazetted in May 2009 under the Kaimoana Regulations.

2. Methods

Scientific Survey Design

Surveys of pipi were conducted in 2018 and 2019 using stratified random sampling methodology as described by Williams et al. (2017). This methodology was used at all four sites – Mair Bank, Marsden Bank, One Tree Point and Ruakākā - throughout the four years (2019-19) of the programme conducted so far (Figure 2). Marsden and Mair bank surveys were co-led by NIWA and PTB, while PTB independently surveyed the One Tree Point and Ruakākā sites in 2019 following training and using field instructions provided by NIWA.

Before constructing the stratified design for each survey site, the high-tide and low-tide boundaries at each site were mapped along with the boundaries of the known pipi beds in the respective areas. This was done

as pipi beds are known to move and it is important to predetermine the area of focus before designating the points in the random stratified design.

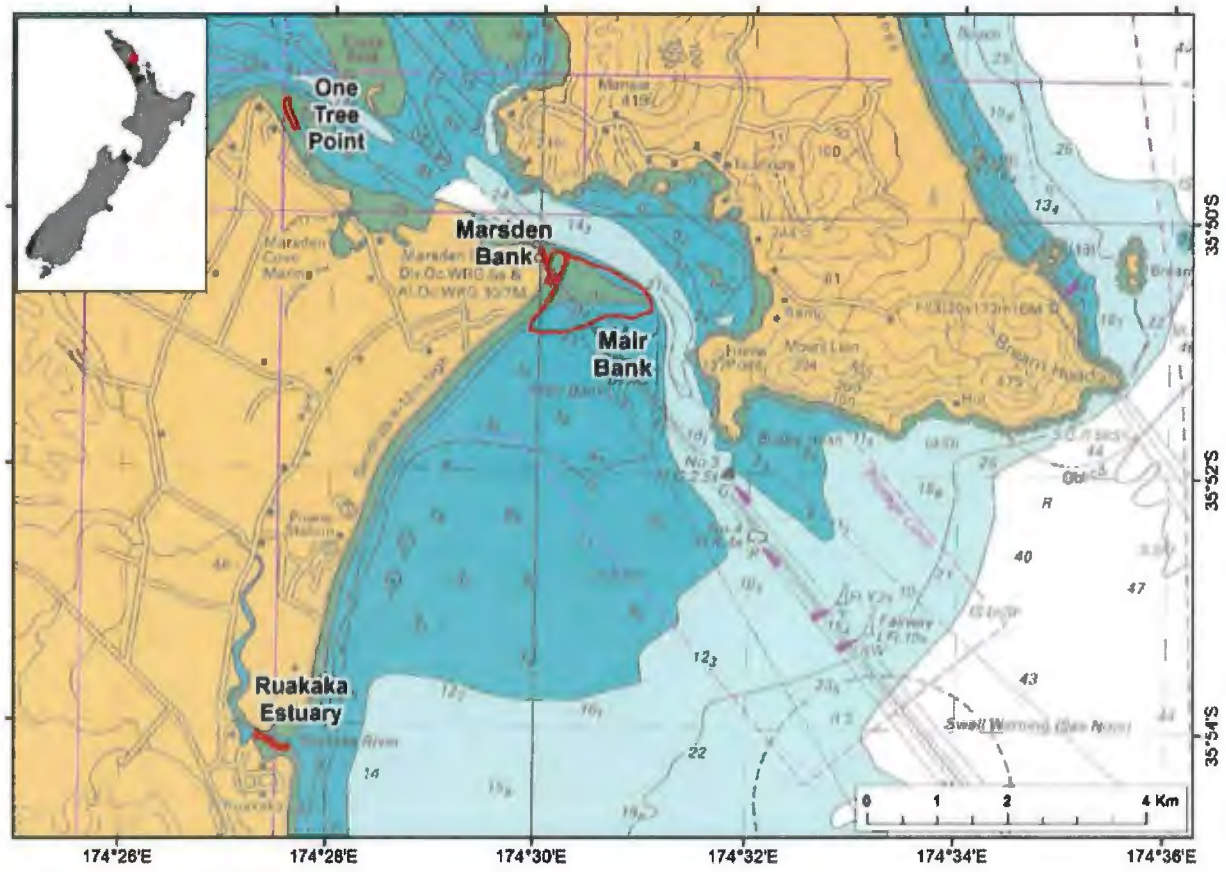

Figure 2: Survey sites 2016-19: Mair Bank, Marsden Bank, One Tree Point (Whangarei Harbour) and Ruakākā Estuary (Bream Bay).

Cultural Health Monitoring

A Cultural Health Indicator (CHI) framework (which we refer to as a "Takutai Health Analysis") was developed to enable kaitiaki to independently assess the health of the takutai (coastal ecosystem) and mahinga kai (Table 1) using mātauranga Māori. This template has been adapted by the Rohe Moana Committee based on Tipa & Tierney (2006) and Chetham & Shortland (2013). For Patuharakeke it is important to continue adapting and evolving meaningful methods of measuring the mauri of these culturally significant sites. This method uses a ranking system of 1 to 5 (1 being very poor, 5 being very healthy) which can be totalled and averaged, giving an overall health measure for that site. A key distinguishing factor between this cultural assessment and traditional scientific methodology includes carrying out the kaimoana taste test where any impurities of the kaimoana can be commented on and identified. It's also important to gain collective agreement on the score for each indicator at each site, which naturally invokes healthy conversation and justification during this process. The results of the Takutai Health Analysis are attached in Appendix 3 (Figure Appendix 9; Figure Appendix 10; Figure Appendix 11; Figure Appendix 12).

Table 1: Patuharakeke Takutai Health Analysis (Coastal Health Index) adapted by Patuharakeke Rohe Moana Committee from Tipa & Tierney (2006) and Chetham and Shortland (2013).

Tohu (indicators)	Takutai-mate or Takutai-kino (unhealthy, sick or polluted)	Takutai-maori (average coastline/ shoreline)			Takutai-ora (healthy coastline/shoreline)
SCORES					
Catchment What does the land look like next to the Takutai?	1. Land very changed (roads, houses, industry, no plants, trees or wetlands)	2	3	4	5. Still natural, lots of bush or trees other coastal plants
Takutai What does the sand/shore look like?	1. Covered by mud/sand/slime, litter	2	3	4	5. Clean sand, shells
Wai tai What is the water quality like?	1. Looks polluted (eg. foams oils, slime, dirty colour)	2	3	4	5. Clean, clear water no apparent pollution
Mahinga Mataitai Number of kaimoana	1. No kaimoana or dead and dying	2	3	4	5. Large number of kaimoana
Whanaungatanga What are the size classes of population?	1. No adults or no babies (only one size class represented)	2	3	4	5. Adults, juveniles/babies (various size ranges, well represented)
Whakapapa Number of other species in the mataitai area. Te Ao Maori worldview all species whakapapa to one another	1. Very limited number of other species seen	2	3	4	5. A range of other species present and in good numbers
Kaimoana Taste Test, quality of kaimoana for consumption	1. Looks and smells yuck, you wouldn't want to eat it	2	3	4	5. Kai reka! Delicious!
Mauri Overall health of this site	1. Takutai-mate or takutai-kino	2	3	4	5. Takutai-ora

3. Results

Pipi distrubution

Spatial distributions of pipi density (number of pipi per square metre) in 2018 and 2019 were plotted and compared with densities found in the previous surveys from 2016 and 2017 as shown in Figure 4 to Figure 7.

At Mair Bank (Figure 4), pipi were found only in limited discrete patches. Throughout this sampling programme, the intertidal area exposed at low tide has consisted of two separate banks, divided by a shallow channel. In the 2017 survey, pipi were found mainly at the north of the northernmost intertidal bank. In 2017 and 2018 pipi were found in a narrow band along the southern part of the southernmost intertidal bank. Adult pipi were also found along that boundary in 2019, and small densities of juveniles also appeared along at the north of the northernmost intertidal bank. In 2019, pipi appeared on an exposed patch near the southern boundary of the extended surveyed area for that year.

Pipi also exhibited a very patchy distrubution at Marsden Bank (Figure 5). The 2016 and 2017 surveys showed that the central area of Marsden Bank contained suitable habitat for small pipi, but in 2017 the pipi distribution expanded out from the central area towards the east and north. In 2018, pipi were concentrated in the north-eastern area of Marsden Bank, and less toward the central area as in previous years. In 2019,

juvenile pipi were distributed in the north-eastern corner of the bank. Overall, the pipi distribution stayed reasonably stable from 2017 to 2019, and 2018 was the only year adult pipi were found at Marsden Bank.

At One Tree Point (Figure 6), the study focussed on a small discrete intertidal pipi bed which remained reasonably consistent in its position throughout 2016 to 2019. The bed contained juvenile and small adult pipi, and the surveys showed no evidence of the pipi growing through to larger adult sizes at this site.

At Ruakākā Estuary (Figure 7), pipi exhibited high densities throughout the main estuary channel, where the majority of the population was found. Pipi were distributed mainly along the south-eastern edge of the main channel in 2016 and 2017, then in 2018 and 2019 pipi spread towards the boundaries of the survey areas into the western and eastern reaches of the main channel. Overall, the pipi distribution at Ruakākā was stable over time, and there were consistently high densities of juvenile pipi, and lower numbers of small adult pipi.

Figure 3: Patuharakeke tanga tiaki, Taryn and Shilane Shirkey surveying Ruakākā Estuary, 2019.

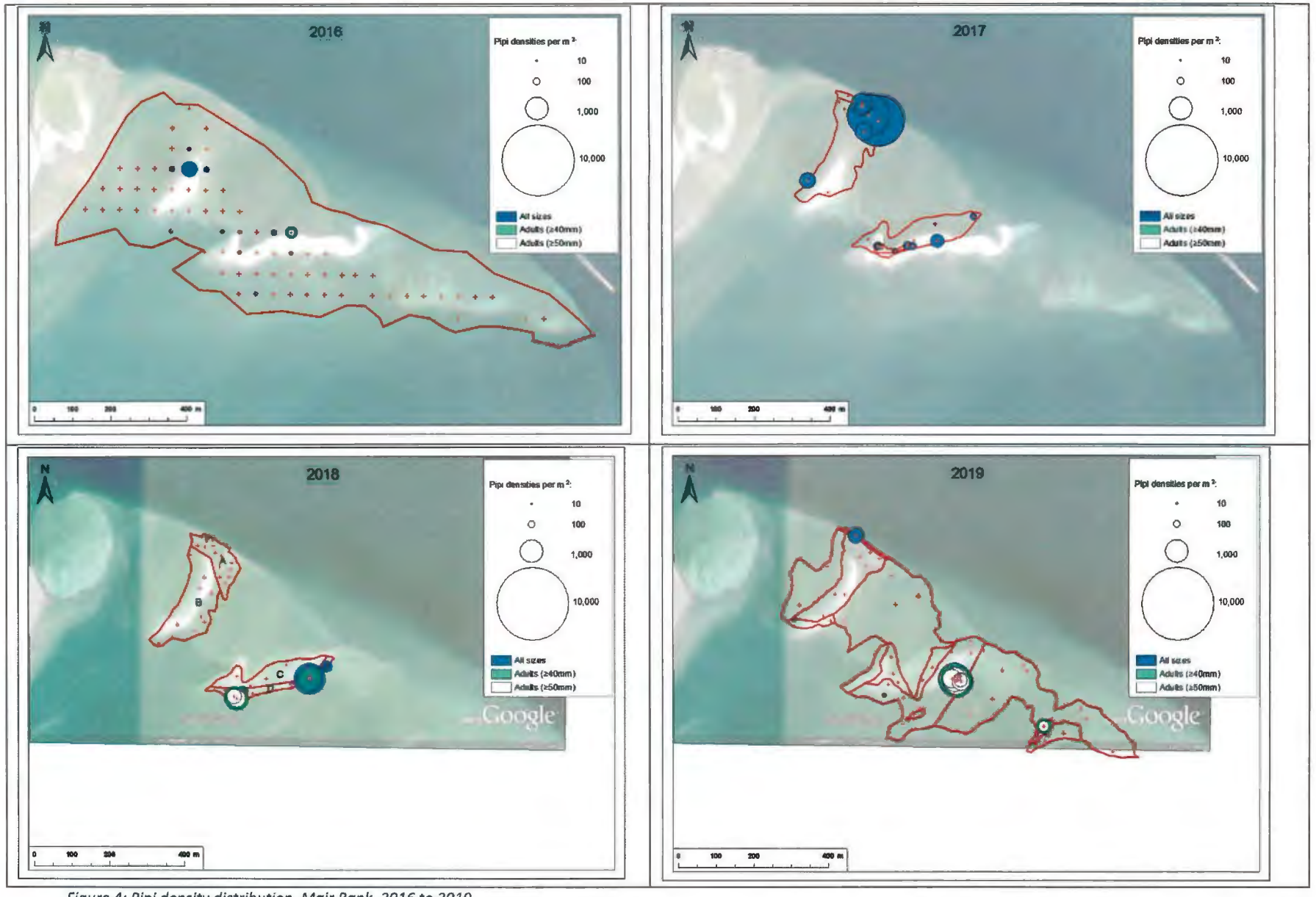

Figure 4: Pipi density distribution, Mair Bank, 2016 to 2019.

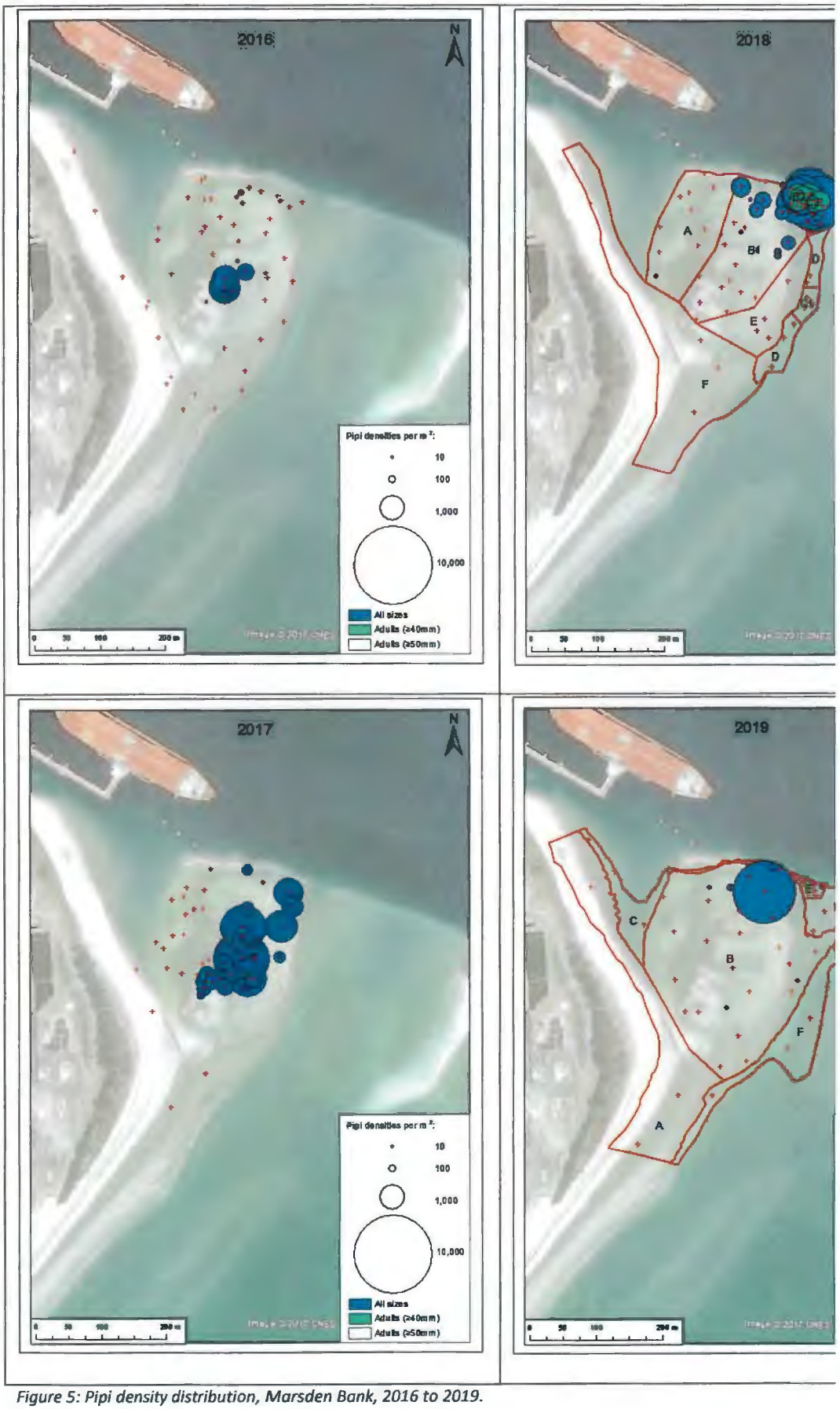

Figure 5: Pipi density distribution, Marsden Bank, 2016 to 2019.

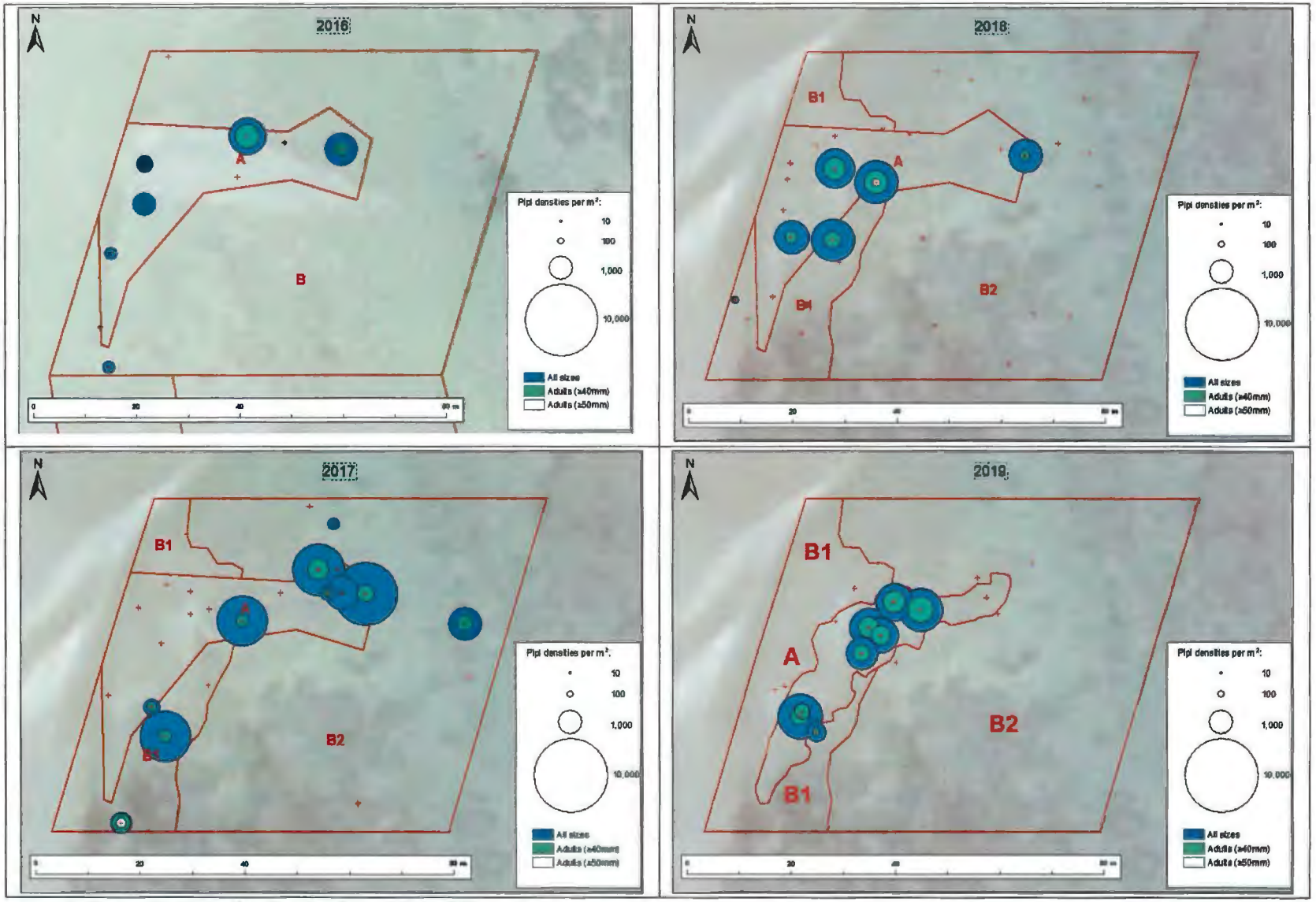

Figure 6: Pipi density distribution, One Tree Point, 2016 to 2019.

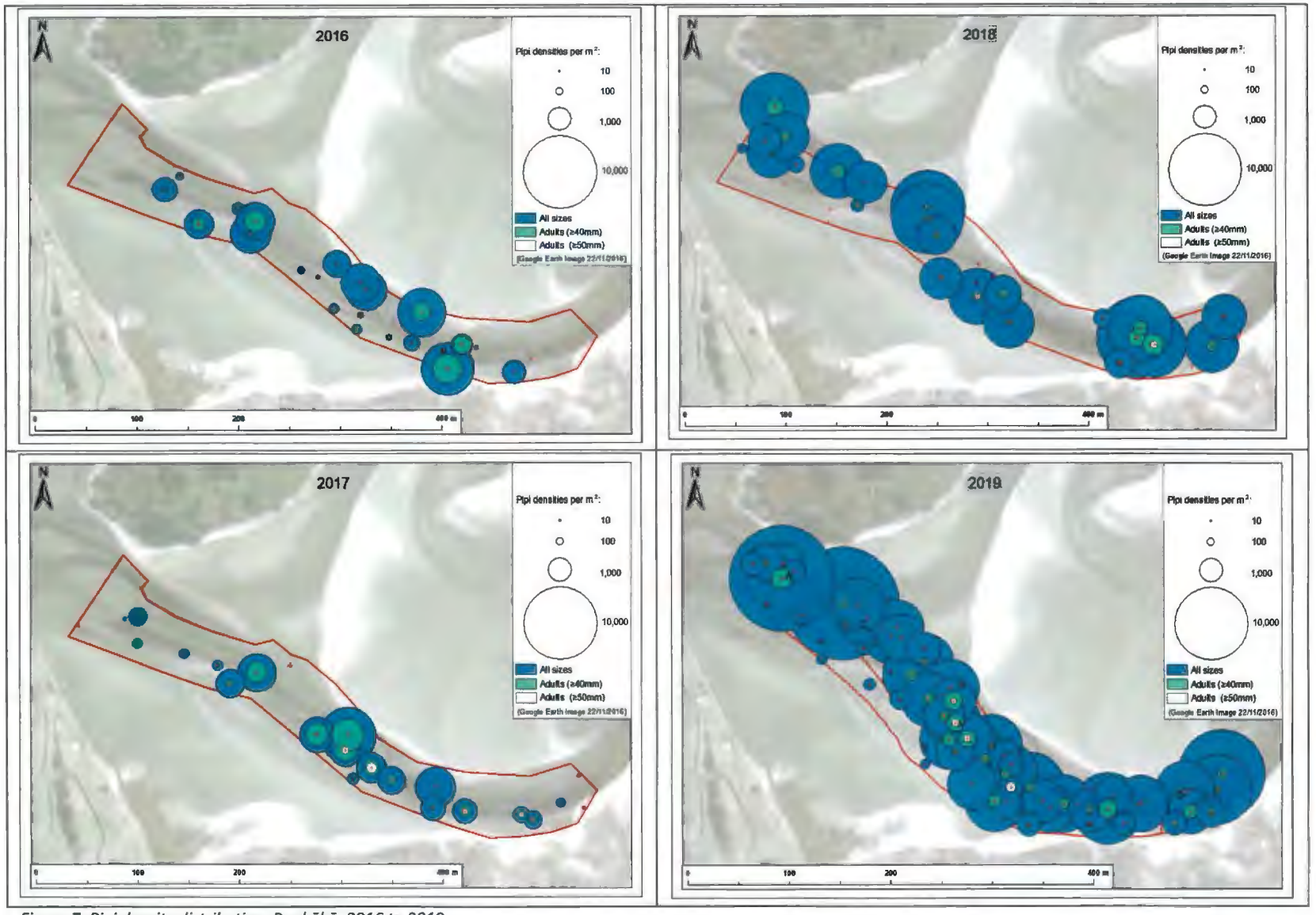

Figure 7: Pipi density distribution, Ruakākā, 2016 to 2019.

Pipi length frequencies

Mair Bank

At Mair Bank (Figure 8), the 2016 length frequency graph (top panel) from the subtidal survey carried out in June 2016 shows that the subtidal survey area was virtually devoid of pipi. Refining NZ commissioned an intertidal survey early in 2016, therefore Williams et al. (2017) carried out a subtidal survey that year. Important to note that the figure shows only adult pipi, this is due to the scaling of densities to the overall survey area. The proportional length frequency plots by stratum show that the pipi found ranged from small juveniles to small adults (Figure Appendix 1). In 2017, the intertidal Mair Bank population (second top panel) shows most pipi were below 35 mm in shell length, with very low numbers of larger pipi present. In 2018 (second bottom panel), pipi length frequencies covered a larger and broader modal size covering wider range of shell lengths, ranging from 13 mm to 64 mm respectively. The mode of the population is slightly right skewed at approximately 58 mm. The length range was very similar in 2019 (bottom panel) (range = 13 to 61 mm), but two modes were present; one in the smaller range centred around 18 mm, and the other with larger individuals centred around 52 mm.

Marsden Bank

In 2016 at Marsden Bank (Figure 8), pipi were mainly very small juveniles (mode = ~ 8mm), with very low numbers of larger pipi (37 to 44 mm) present (top panel). In 2017 (second top panel) the population again consisted almost entirely of juveniles, which were notably in higher abundance, with a larger and broader modal size (mode = ~19 mm); maximum size was 37 mm in 2017. In 2018, (second bottom panel) the pipi population consisted of individuals ranging from 7 mm to 57 mm in length, with two well-defined modes, at 13 mm and 36 mm (figure 7). The 2019 population distribution shows a similar length range (range = 8 to 51 mm) however, most of the population sits between 7 to 30 mm with a much narrower modal range. This population show virtually no individuals larger than 30 mm in length, with few above 48 mm and a maximum length of 51 mm (figure 8, bottom panel).

One Tree Point

At One Tree Point (Figure 9), the range in pipi length was similar in 2016 (top panel) (11 to 47 mm) and 2017 (second top panel) (5 to 51 mm), but in 2017 abundance was higher and a modal length (of about 32 mm) was more apparent. In 2018, the pipi population consisted of individuals ranging from 5 to 50 mm in length, with a reasonably well-defined mode sitting between 30 mm and 40 mm length (figure 9, second bottom panel), with an obvious spike in individuals measuring 29 mm. In 2019 the length range was very similar (range = 7 to 51 mm), with a single defined mode at around 38 mm (figure 9, bottom panel).

Ruakākā

In 2016 at Ruakākā (figure 10, top panel), the population consisted of pipi 5 to 50 mm in length, with a poorly defined mode of about 31 mm. The length range was very similar in 2017 (second top panel) (range = 4 to 51 mm), but clear length modes of about 5 and 40 mm were present. In 2018 (second bottom panel), the pipi population at Ruakākā ranged from 4 to 49 mm in length, with a strong skew in the population towards small juvenile lengths (< 10 mm) (figure 10). For 2019, the population shows a very similar length range (range = 4 to 54 mm) however, the mode is clearly defined and sits centred around 21 mm length (figure 10, bottom panel).

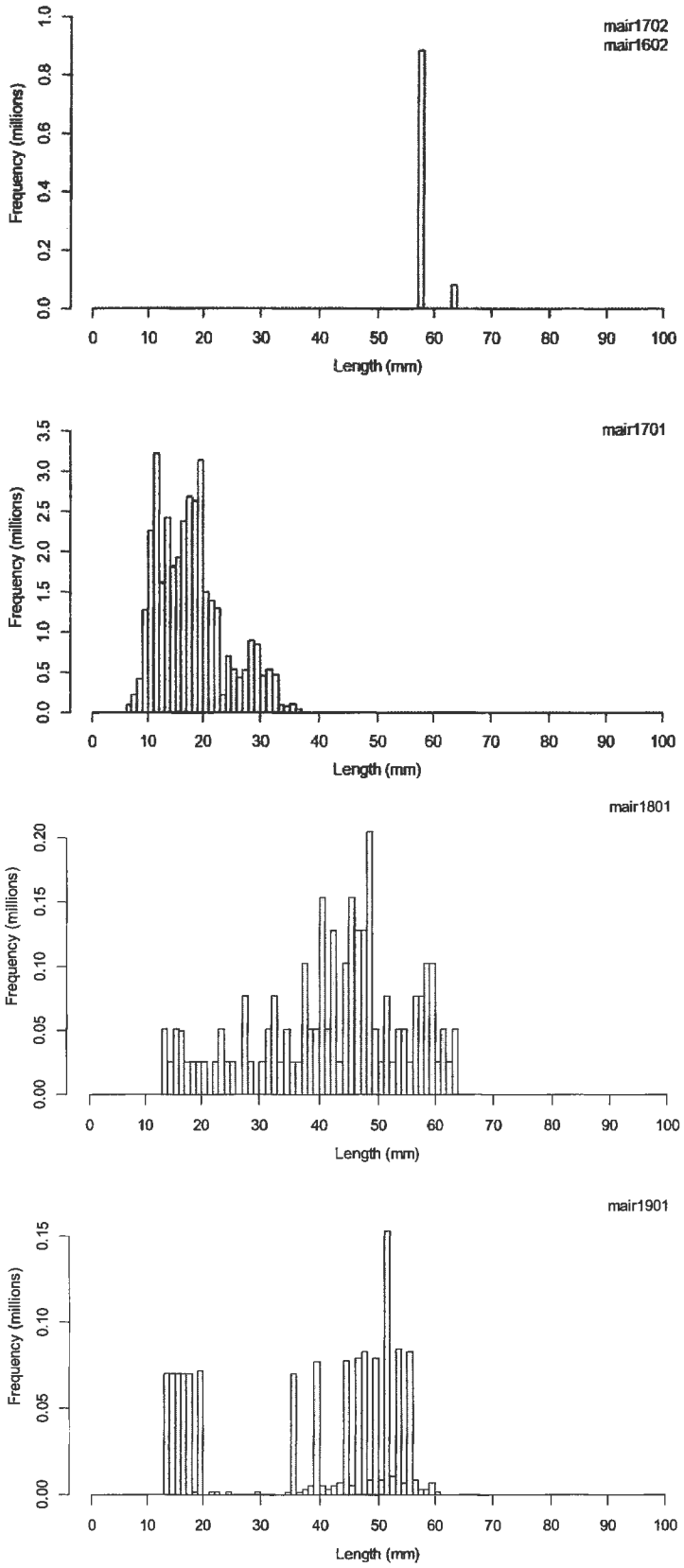

Figure 8: Pipi length Frequencies, Mair Bank, 2016-2019 (top to bottom). Scaled to estimated population size. Note the y-axis scales differ.

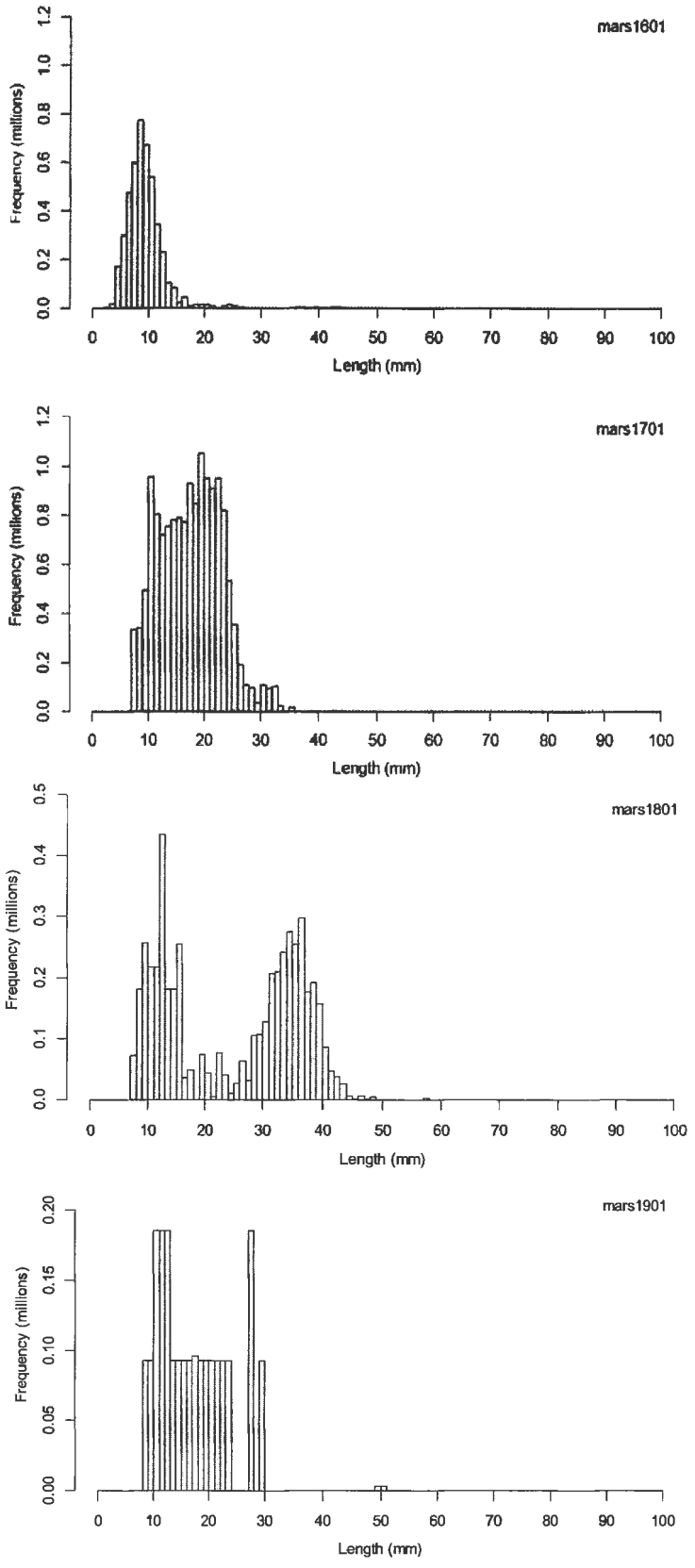

Figure 9: Pipi length frequencies, Marsden Bank, 2016 -2019 (top to bottom). Scaled to estimated population size. Note the y-axis scales differ.

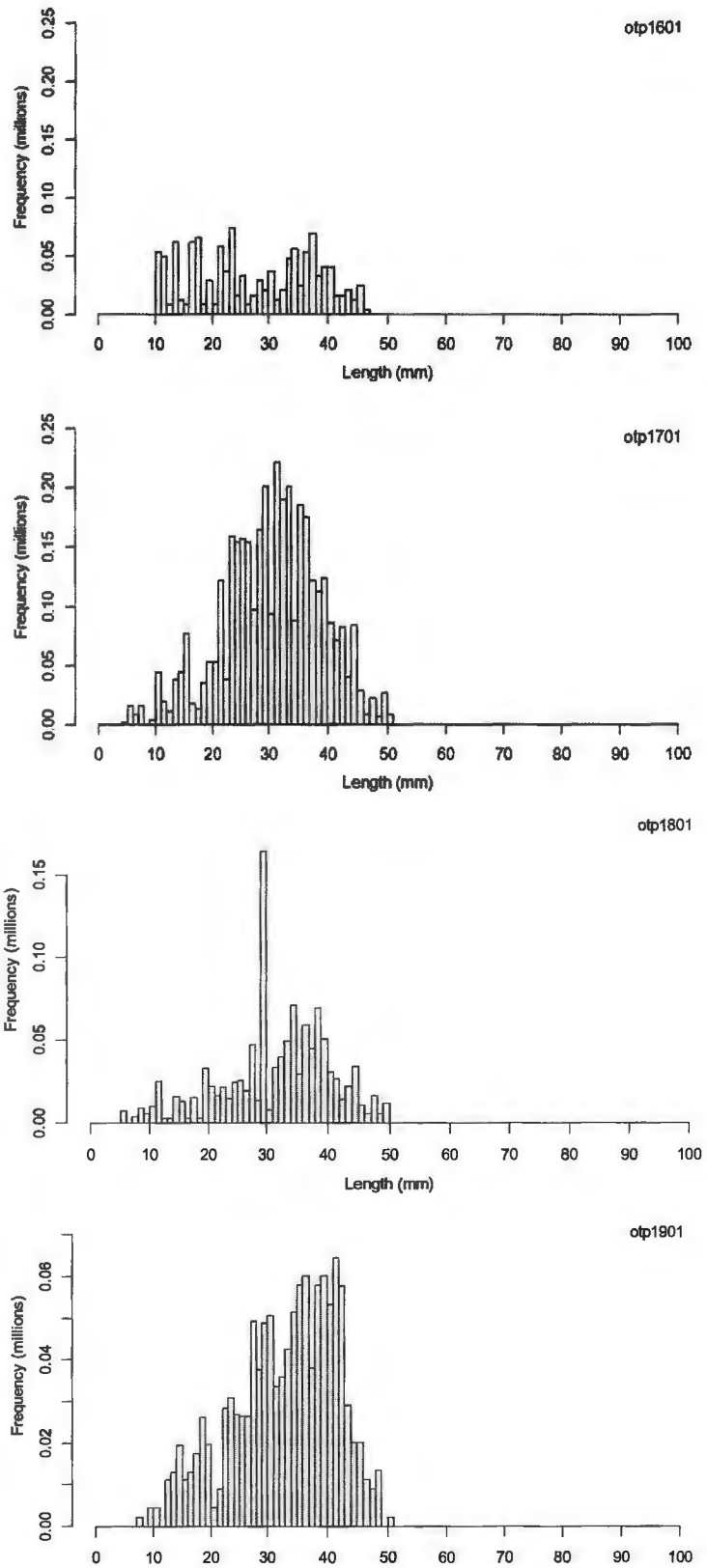

Figure 10: Pipi length frequencies, One Tree Point, 2016-2019 (top to bottom). Scaled to estimated population size. Note the y-axis scales differ.

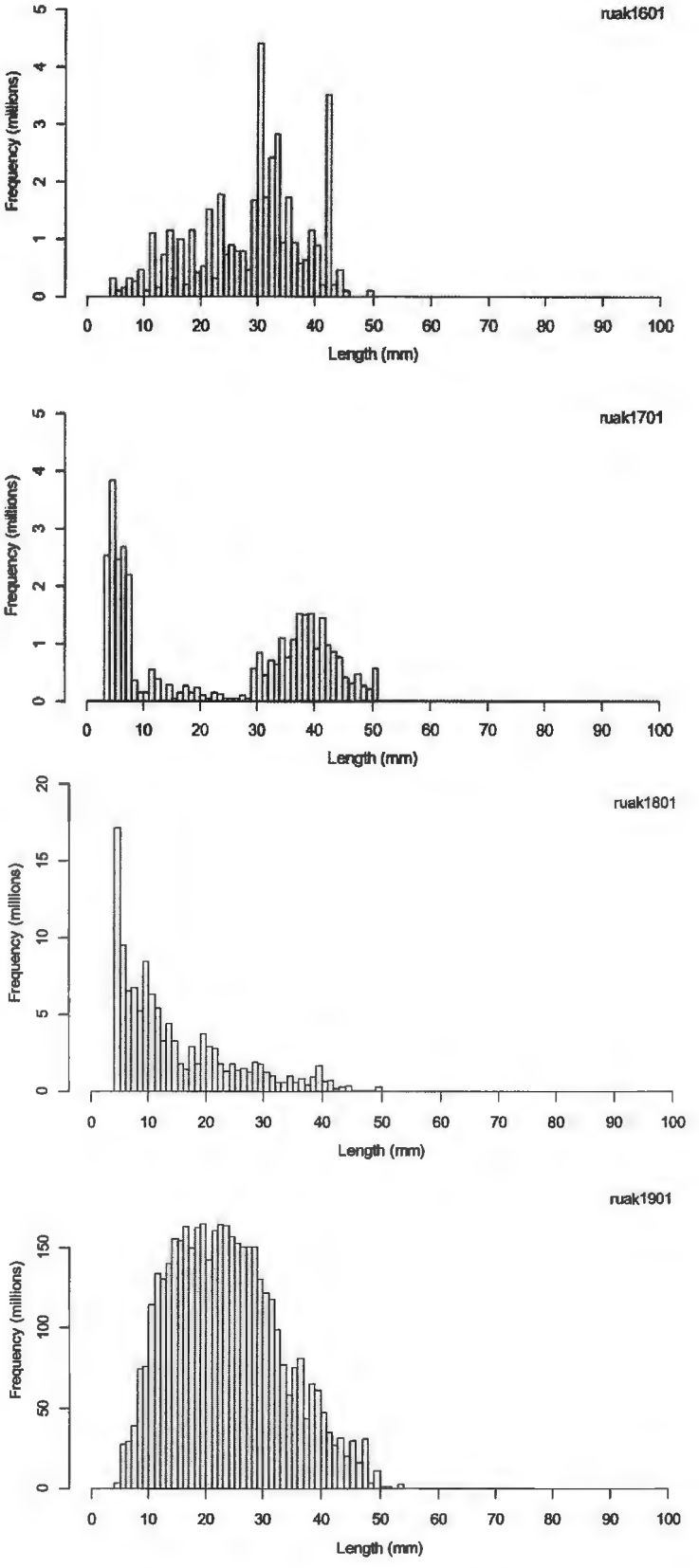

Figure 11: Pipi length frequencies, Ruakākā, 2016-2019 (top to bottom). Scaled to estimated population size. Note the y-axis scales differ.

Pipi population estimates

Pipi population estimates for 2016 and 2017 are tabulated in Table Appendix 1 and 2018 and 2019 are tabulated in Table Appendix 2. Co-efficient of variation is denoted as CV, which can otherwise be described as the level of dispersion from the mean value. Put simply, this value describes how much spread the data points have around the given estimate, which lets us know the precision of the estimate. Estimates of absolute abundance are summarised as follows;

- At Mair Bank subtidal (Figure 8) in 2016 there was an estimated 1 million pipi (23 t biomass), based on the few (n = 9) individual pipi found in the survey samples; the most numerically abundant species found in the samples was the clam *Ruditapes* sp. (total of n = 699 from the 55 stations sampled);
- At Mair Bank intertidal (Figure 8) in 2017 there was an estimated 36.2 million pipi (CV = 53%), or 38 t biomass (CV = 45%). At Mair Bank, abundance estimates dropped by approx. 0.7 million from 2018 to 2019. Estimates show 2.9 million, (CV = 47%) for 2018 and 2.2 million (CV = 52%) for 2019.
- At Marsden Bank (Figure 9), abundance was estimated to be three-fold higher in 2017 (14.9 million, CV = 29%) than in 2016 (4.5 million, CV = 50%); Abundance was estimated to be just over three-fold higher (16 million, CV = 20%) in 2019 than in 2018 (4.7 million, CV = 97%).
- At One Tree Point (Figure 10), abundance was estimated to be three-fold higher in 2017 (3.7 million, CV = 43%) than in 2016 (1.2 million, CV = 44%); Abundance estimates remained similar between 2018 (1.2 million, CV = 43%) and 2019 (1.2 million, CV = 26%).
- At Ruakākā Estuary (Figure 11), the pipi population in the main channel (Stratum A) was an estimated 40 million (CV = 25%) in June 2016 and 35 million (CV = 26%) in April 2017. Abundance estimates increase by 12 million from 118 million (CV = 18%) in 2018, to 130 million (CV = 15%) in 2019.

Longitudinal Pipi Population Dynamics

Pipi populations at Mair Bank show low abundances, all < 5 million in 2016, 2018 and 2019 (CV = NA for 2016, noting subtidal populations recorded here; CV = 47% for 2018; CV = 52% for 2019) (Figure 12). 2017 is an outlier year with abundances peaking at around 35 million in this year (CV = 53%)

Marsden Bank shows fluctuating pipi abundance between 2016 and 2019 (Figure 13). In 2016 and 2018 populations were as low as 5 million pipi (CV = 50% in 2016; CV = 20% in 2018) compared to 2017 and 2019 where pipi reached numbers of between 15 and 16 million (CV = 29% in 2017; CV = 97% in 2019) (Figure 13Figure 14).

Pipi populations at One Tree Point show stable abundances around 1.2 million for 2016, 2018, 2019 (CV = 43% in 2016; CV = 43% in 2018; CV = 26% in 2019). 2017 is an outlier year with abundances peaking at around 3.6 million in this year (CV = 44%) (Figure 14).

At Ruakākā Estuary, pipi populations show an increasing trend from 2016 to 2019 (Figure 15). In 2016 the estimated abundance is 40 million (CV = 25%), it drops only slightly to 38 million (CV = 26%) in 2017. Abundance estimates increase to 120 million in 2018 (CV = 0.18) and 130 million in 2019 (CV = 15%) (Figure 15).

In summary, pipi abundance at Mair, Marsden and One Tree Point was generally low from 2016 to 2019, except for higher numbers in 2017 with the recruitment of small juvenile pipi at all three sites. Note that relatively high point estimate for Marsden bank 2019, has very high uncertainty or low precision and is due

to one of the sampling stations exhibiting high abundance of small pipi when the majority of stations had no pipi or only 1 or few individuals. Pipi abundance is much higher at Ruakākā than at the other three sites. At Ruakākā, abundance increased substantially in 2018 and remained high in 2019, due to recruitment of juveniles, and apparent survival and growth of those pipi.

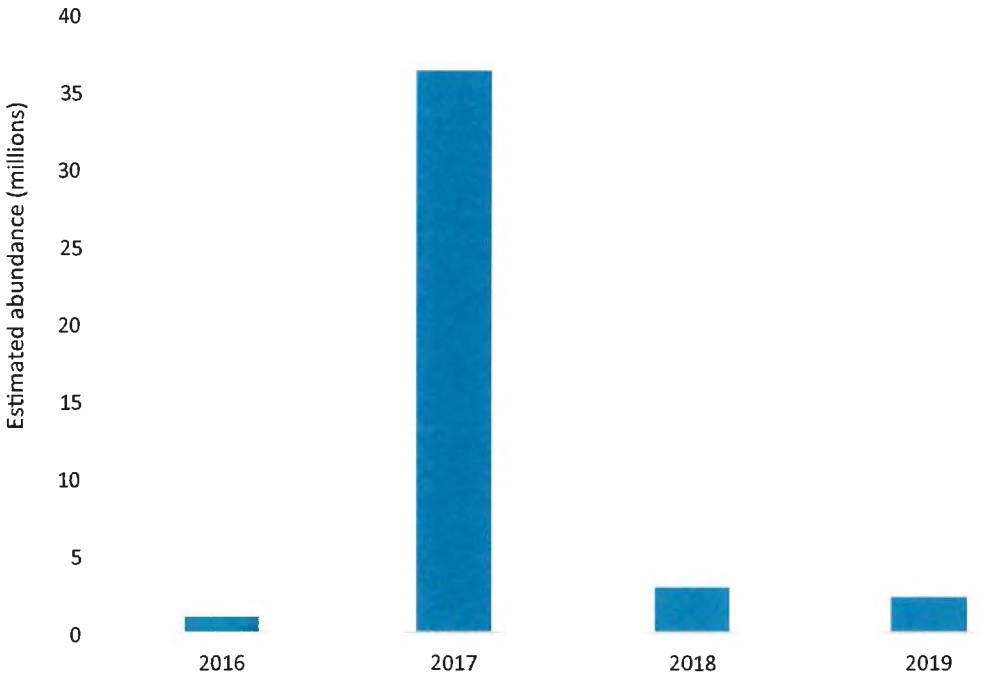

Figure 12: Pipi population estimates of absolute abundance 2016-2019 at Mair Bank. Note: 2016 estimates are from sub-tidal populations were sampled (see Williams et al. 2017 for reasoning). 2016: CV = NA, 2017: CV = 0.53, 2018: CV = 0.47, 2019: CV = 0.52

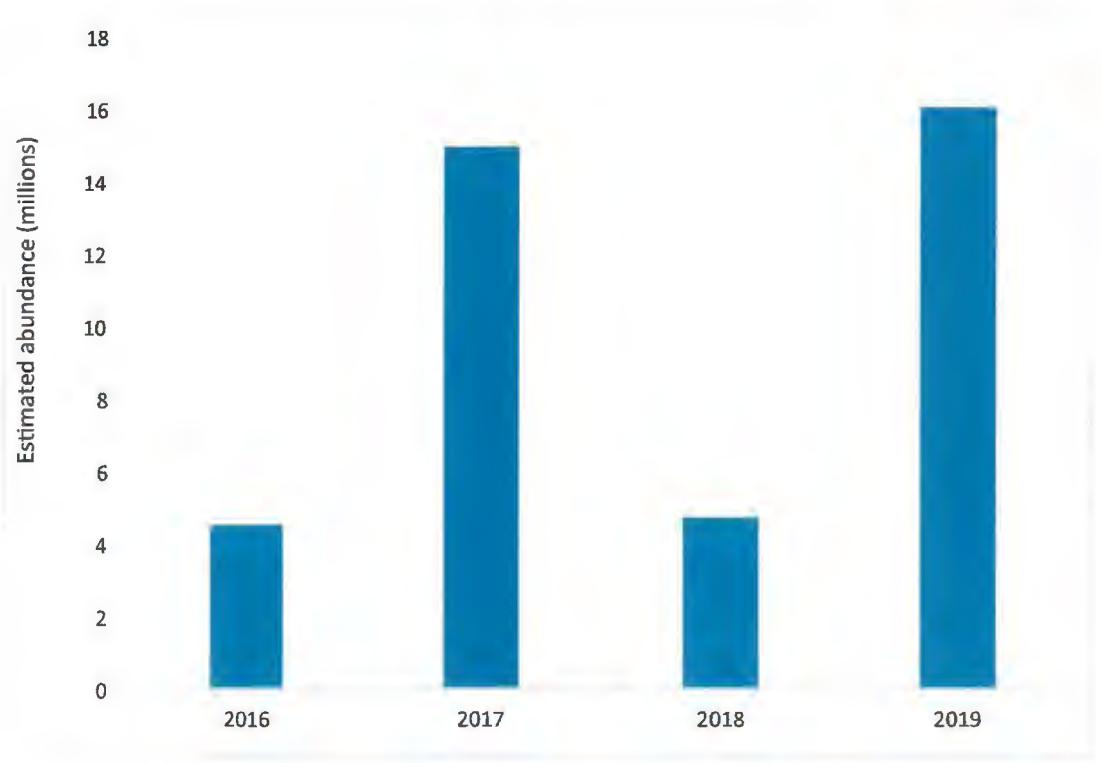

Figure 13: Pipi population estimates of absolute abundance 2016-2019 at Marsden Bank. 2016: CV = 0.50, 2017: CV = 0.29, 2018: CV = 0.20, 2019: CV = 0.97.

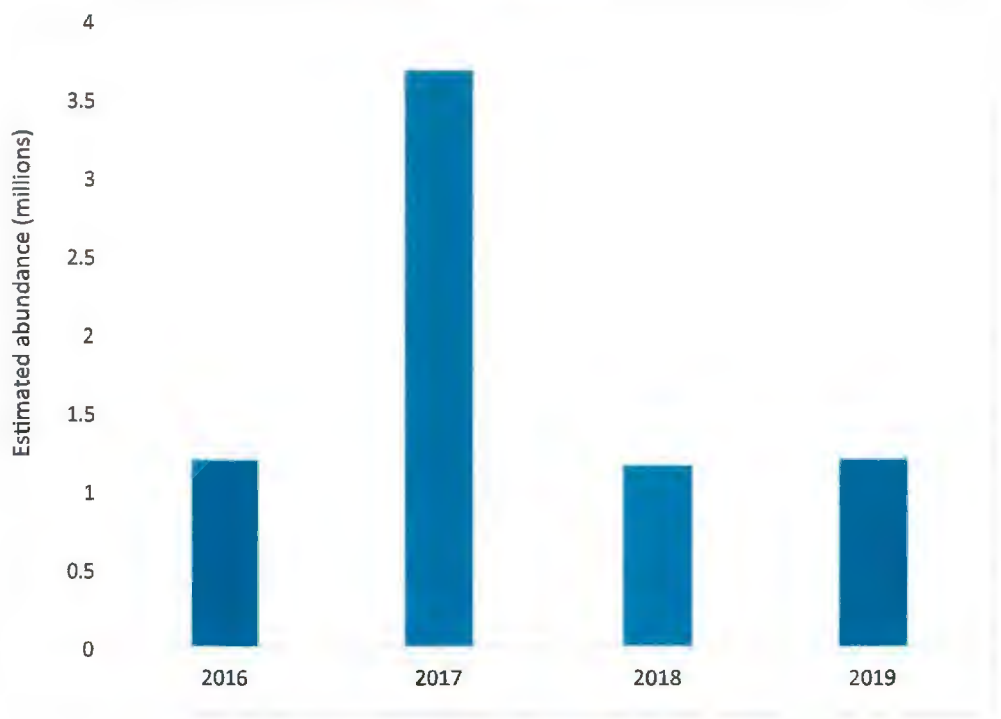

Figure 14: Pipi population estimates of absolute abundance 2016-2019 at One Tree Point. 2016: CV = 0.43, 2017: CV = 0.44, 2018: CV = 0.43, 2019: CV = 0.26.

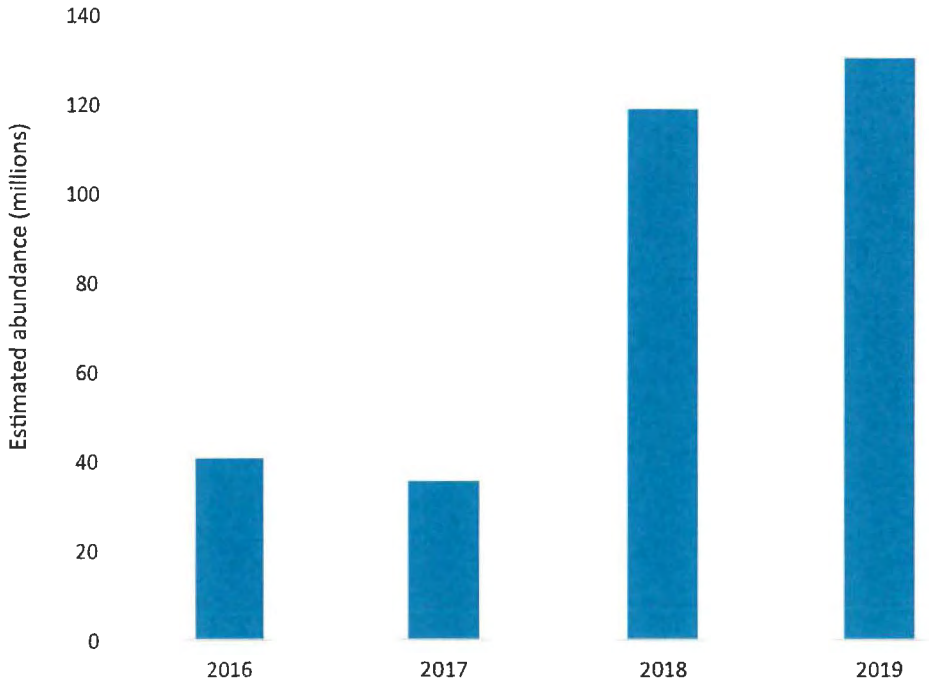

Figure 15: Pipi population estimates of absolute abundance 2016-2019 at Ruakākā. 2016: CV = 0.25, 2017: CV = 0.26, 2018: CV = 0.18, 2019: CV = 0.15.

4. Discussion

At most sites, current estimates indicate pipi populations at Mair and Marsden Banks, and at One Tree Point, remains low. Overall abundance is low, and is mainly made up of small juveniles, with very limited patches of larger pipi. The surveys provide evidence of successful juvenile recruitment (e.g. 2017), but lack of (or low numbers of) larger pipi suggests few juveniles are surviving and growing larger. This points to the habitat being unsuitable (possibly a lack of or limited suitable sand substrate for the pipi to inhabit). Ruakaka provides as with the surveys provide good evidence of successful juvenile recruitment, growth and survival, suggesting habitat in the estuary channel is suitable, supporting an increase in the population in the last two years.

Pipi populations have remained reasonably stable over time since the initiation of this study, with no evidence of the recovery of larger pipi. Some of the population fluctuations can be attributed to variation in the strength of recruitment events, with large influxes of recruits linked to substantial population increases. The only sub-section of the study that showed signs of annual cohort growth and succession was a relatively small point at the south western extent of Mair Bank, which may be the remnants of a pipi bed, however this is no longer suitable to support any harvesting.

Pipi population status, especially adult pipi show very low levels compared to historical population estimates. Juvenile pipi were more abundant and more wide spread in 2017 compared to other years. This is a sign of higher levels of recruitment, from larval pipi successfully settling and establishing on the bank. The surveys found a general lack of large individuals and the strong influence of recruitment events, such as the 2017 event showing evidently more juveniles in the populations of Mair and Marsden Banks, as well as One Tree Point. This same pattern isn't observed at Ruakākā Estuary is a geographically separate population and

would be less connected by larval dispersal than the Whangārei Harbour sites. Ruakākā Estuary has had considerably higher recruitment (presence of more juvenile pipi) over the duration of this monitoring, leading to an increase in population size and density, consistent with findings from Berkenbusch & Neubauer (2019) who estimated 91.64 million (CV: 17.84%) pipi in 2018–19 similarly, finding only few individuals >50 mm shell length, consistent with our estimates.

Pipi are gonochoristic and reproduce sexually when they reach approximately 40 mm shell length, by free-spawning, external fertilisation (Hooker & Creese, 1995; Williams et al. 2007). Spawning and fertilization is strongly linked to local environmental conditions such as water temperature in bivalves (Hooker, 1995). Natural fluctuations of these conditions can explain such years of good recruitment, such as those observed in 2017. However, tidal currents also have a bearing on the movement of juvenile pipi, especially at early life stages (Hooker, 1995), and natural fluctuations of juvenile populations are expected.

Successful recruitment is evident throughout distinct patches apparent in all sites. However, it is apparent that pipi are not surviving through to larger sizes (i.e. 40-50 mm shell length). It is suggested that the change in substrate at Mair and Marsden Banks has undergone substantial change from sand to hard compact shell. It is possible that pipi have far less sandy habitat to inhabit, which may explain their low survival through to larger size classes. Bank morphology and associated hydrodynamic changes have been observed in previous studies Williams and Hume (2014) and anecdotal evidence (J. Chetham, PTB, pers. comm.). Gaining a better understanding of how sediment characteristics, bank morphology and hydrodynamic movements affect recruitment, settlement, and survivability of pipi would be of interest for future research. Habitat suitability for pipi is poorly understood and studies investigating this are well dated.

Some of the population estimates had high uncertainty, (CV: 97% for Marsden Bank 2019), as absolute abundance estimates reflected the entire sampling extent, inclusive of areas that were not specific pipi beds. The precision of these point estimates is generally low, due to the high variation in abundance and very patchy distribution of pipi that inevitably leads to some uncertainty in the estimates. In the future, precision could be increased through sampling many more stations, something that requires more resourcing, but will substantially increase estimate precision. However, a degree of uncertainty will always exist.

Recovery of such populations is restricted by recruitment or mortality, both of which are governed by environmental cues and suitability. The present study revealed a high level of recruitment over multiple sites, allowing us to infer that these locations are not devoid of new recruits, which suggests high levels of mortality before they reach adulthood. Factors governing natural mortality and longevity of pipi are poorly understood, and methods of understanding these are being refined. Improving knowledge of potential causes of natural mortality, especially during juvenile life stages would be key to understanding the reasons for pipi not surviving through to adulthood.

During the 2018 and 2019 surveys, the Patuharakeke tangata tiaki noticed large areas of recently dead and decaying pipi at One Tree Point. This warranted further research so PTB are currently working with MPI's Aquatic and Environmental Health team to investigate presence and levels of disease (such as Rickettsia) in the population and have recently provided samples for processing and assessment. Subsequent findings will be discussed in 2020 reporting.

5. Acknowledgements

For the 2018 and 2019 our appreciation surveys a special thank you is extended to those who helped with the fieldwork of these pipi surveys.

In 2019 we were assisted by Patuharakeke tangata tiaki including Ari Carrington, Taumauri Carrington, Xzavier Watson, Josh Foote, Taryn Shirkey, Shilane Shirkey and Katarina Poutama Taniwha. Alongside was the team from NIWA consisting of James Williams, Graeme Mackay, Richie Hughes, Ann Parkinson, Oleksandra (Sasha) Chernikina, Rosy Harbron.

Special thanks go to James Williams for designing this methodology and providing technical expertise within and around this project.

Figure 16: Patuharakeke tangata tiaki, Taumauri Carrington helping collect samples from Ruakākā Estuary, 2019.

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Appendix 1

Year	Survey	Stratum	Area (m^2)	Stations	Density ($no.m^{-2}$)	CV	Abundance (millions)	Density ($kg\ m^{-2}$)	CV	Biomass (t)
2016	otp1601	A	873	8	856.99	0.43	0.748	2.94	0.52	2.569
		B	3927	3	100.45	1.00	0.394	0.11	1.00	0.424
		C	3657	6	12.35	0.63	0.046	0.05	0.63	0.166
		Total	8457	17	140.54	0.43	1.189	0.37	0.44	3.159
	mars1601	A	25768	6	0.67	1.00	0.017	7E-05	1.00	0.002
		B	11603	6	0.00	NA	0.000	0	NA	0
		C	13987	6	0.00	NA	0.000	0	NA	0
		D	22027	18	199.11	0.51	4.386	0.04	0.40	0.985
		E	16454	18	5.78	0.66	0.095	0.00	0.85	0.081
		Total	89839	54	50.07	0.50	4.498	0.01	0.38	1.067
	mair1602	B	119	4	28.302	0.64	0.003	0.835	0.61	0.099
	(subtidal)	C	683	4	4.000	1.00	0.003	0.001	1.00	0.001
		F	52873	1	0	NA	0	0	NA	0
		G	60552	5	0	NA	0	0	NA	0
		H	444848	19	1.986	1.00	0.884	0.046	1.00	20.321
		I	141056	6	0	NA	0	0	NA	0
		J	323953	8	0	NA	0	0	NA	0
		K	17328	8	4.717	1.00	0.082	0.165	1.00	2 861
		Total	1041412	55	0.933	NA	0.971	0.022	NA	23.282
	ruak1601	A	32053	23	1259.48	0.25	40.370	3.65	0.26	117.069
		Total	32053	23	1259.48	0 25	40.370	3.65	0 26	117 069
2017	otp1701	A	873	15	1358.49	0.46	1.186	3.76	0.45	3.283
		B1	707	4	1386.79	0.81	0.980	4.27	0.62	3.019
		B2	3220	5	467.92	0.87	1.507	1.67	0.93	5.368
		Total	4800	24	765.24	0.44	3.673	2.43	0.47	11.670
	mars1701	A	52941	5	48.80	1.00	2.584	0.02	1.00	0.995
		B	11835	26	742.77	0.31	8.791	0.52	0.35	6.204
		C	25063	19	142.11	0.58	3.562	0.17	0.61	4 195
		Total	89839	50	166.25	0.29	14.936	0.13	0.31	11.394
	mair1701	A	1254	9	64.44	0.31	0.081	0.44	0.30	0 555
	(intertidal)	D	46909	14	760.86	0.54	35.691	0.79	0 46	36.943
		E	1505	3	312.00	1.00	0.470	0.27	1.00	0.409
		Total	49668	26	729.67	0.53	36.241	0.76	0.45	37.907
	ruak1701	A	32053	23	1100.90	0.26	35.287	3.22	0.31	103.111
		Total	32053	23	1100.90	0.26	35.287	3.22	0.31	103 111

Table Appendix 1: Pipi population estimates, 2016 and 2017. CV, co-efficient of variation. Biomass estimates for One Tree Point and Ruakaka were calculated using length-weight regression (a = 0.000127, b = 2.896451).

Year	Survey	Stratum	Area (m^2)	Stations	Density (no. m^2)	CV	Abundance (millions)	Density ($kg.m^{-2}$)	CV	Biomass (t)
2018	Mair Bank	A	9562	15	2.52	1.00	0.024	0.00	1.00	0.011
		B	21644	10	0	NA	0	0	NA	0
		C	12477	5	0	NA	0	0	NA	0
		D	6787	10	422.64	0.47	2.869	3.57	0.48	24.258
		Total	50470	40	57.32	0.47	2.893	0.48	0.48	24.269
	Marsden Bank	A	16763	10	3.77	1.00	0.063	0.00	1.00	0.071
		B1	24012	31	83.99	0.37	2.017	0.04	0.35	1.010
		B2	383	7	1353.10	0.33	0.518	5.53	0.35	2.118
		C1	3159	9	4.19	1.00	0.013	0.01	1.00	0.046
		C2	599	7	3482.48	0.26	2.087	13.74	0.26	8.236
		D	4755	6	0	NA	0	0	NA	0
		E	10317	4	0	NA	0	0	NA	0
		F	35882	4	0	NA	0	0	NA	0
		Total	95872	78	49.01	0.20	4.698	0.12	0.20	11.480
	One Tree Point	A	873	12	896.23	0.44	0.782	3.16	0.45	2.756
		B1	707	7	528.30	0.94	0.374	1.82	0.96	1.287
		B2	3220	11	0	NA	0	0	NA	0
		Total	4800	30	240.82	0.43	1.156	0.84	0.43	4.043
	Ruakākā	A	32053	30	3691.82	0.18	118.334	3.06	0.21	97.929
		Total	32053	30	3691.82	0.18	118.334	3.06	0.21	97.929
2019	Mair Bank	A	28856	15	27.67	1.00	0.799	0.19	1.00	5.547
		B	465	10	818.87	0.31	0.381	3.96	0.27	1.840
		C	37252	20	28.30	0.80	1.054	0.05	0.55	1.703
		D	127955	15	0	NA	0	0	NA	0
		Total	194528	60	11.48	0.52	2.233	0.05	0.62	9.091
	Marsden Bank	A	28779	3	0	NA	0	0	NA	0
		B	63881	26	251.09	0.97	16.040	0.02	0.72	1.406
		C	5938	3	0	NA	0	0	NA	0
		D	6535	10	0	NA	0	0	NA	0
		E	1109	12	6.29	0.67	0.007	0.07	0.67	0.078
		F	15351	6	0	NA	0	0.00	NA	0.000
		Total	121593	60	131.97	0.97	16.047	0.01	0.68	1.484
	One Tree Point	A	533	9	1928.72	0.25	1.028	7.95	0.23	4.236
		B1	910	4	188.68	1.00	0.172	0.38	1.00	0.343
		B2	3357	4	0	NA	0	0	NA	0
		Total	4799	17	249.87	0.26	1.199	0.95	0.22	4.579
	Ruakākā	A	15146	40	4572.34	0.13	69.253	294.25	0.13	4456.751
		B	13723	12	1397.80	0.43	19.182	113.28	0.50	1554.498
		C	3346	5	7075.62	0.62	23.673	400.70	0.59	1340.618
		D	1791	3	9877.48	0.22	17.688	346.07	0.33	619.711
		Total	34005	60	3816.91	0.15	129.795	234.42	0.16	7971.578

Table Appendix 2: Pipi population estimates, 2018 and 2019. CV, co-efficient of variation. Biomass estimates calculated using length-weight regression (a = 0.000127, b = 2.896451).

Appendix 2

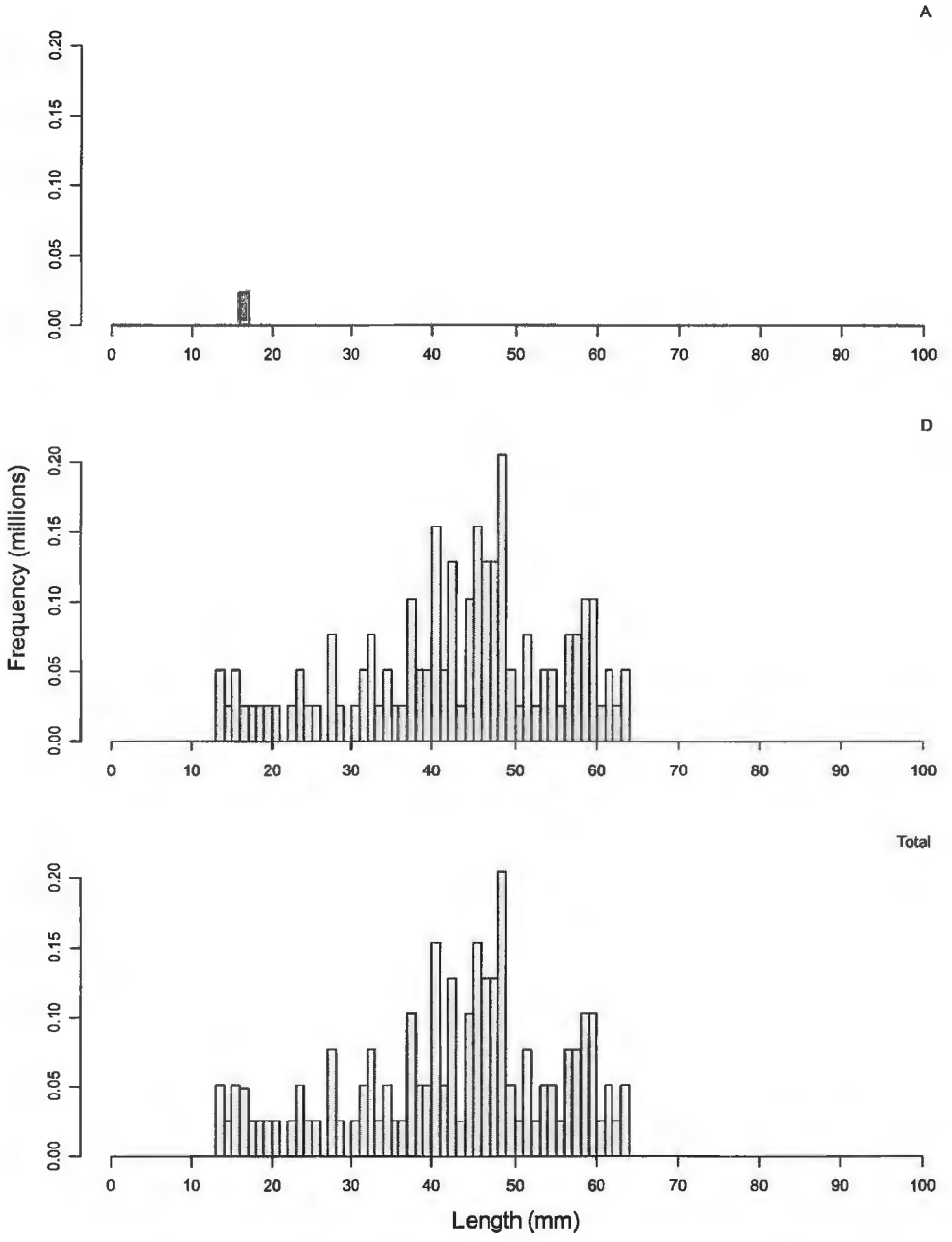


Figure Appendix 1: Pipi length frequencies by stratum, Mair Bank, 17 May 2018. Scaled to estimated population size.

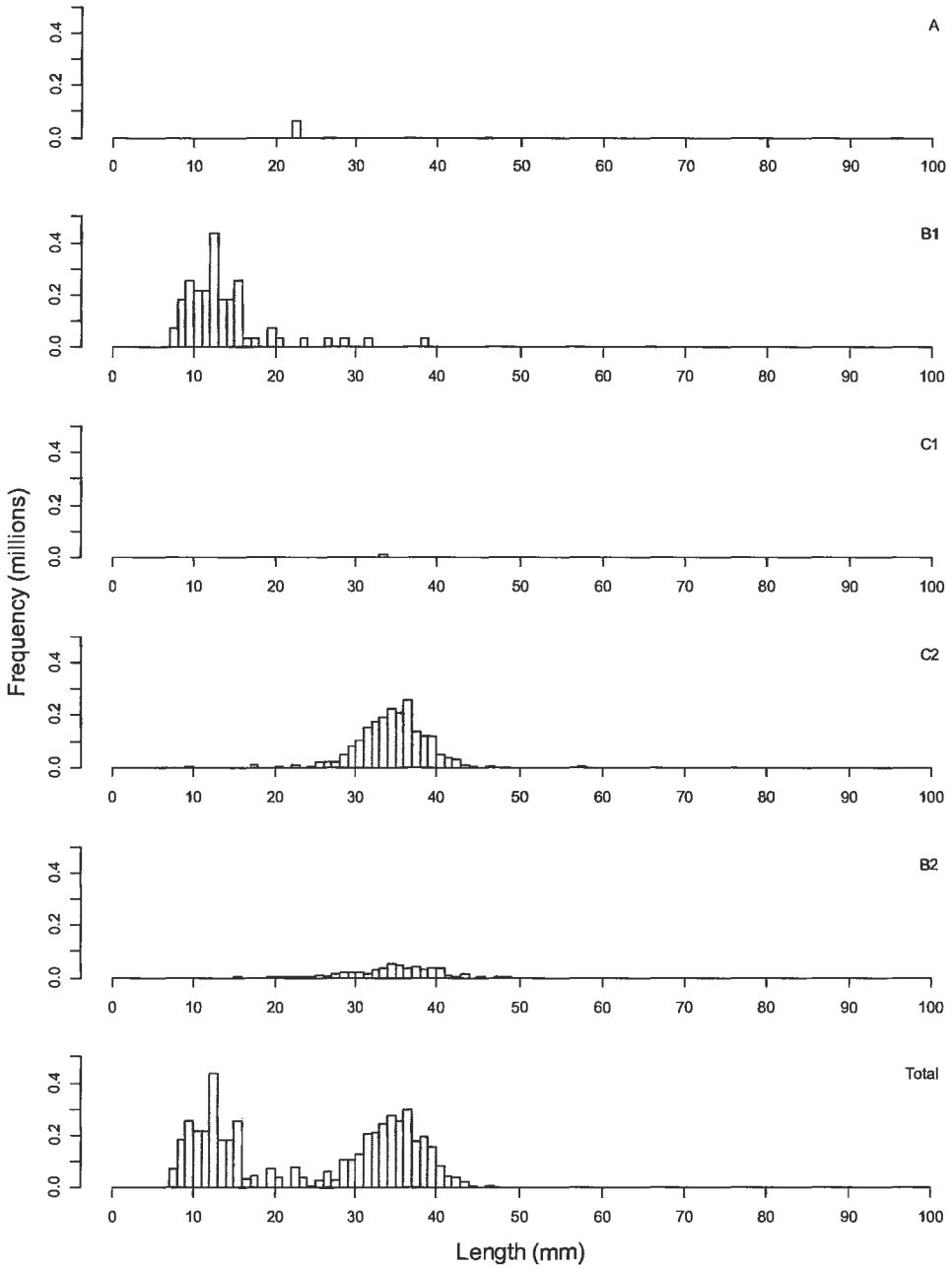


Figure Appendix 2: Pipi length frequencies by stratum, Marsden Bank, 14 May 2018. Scaled to estimated population size.

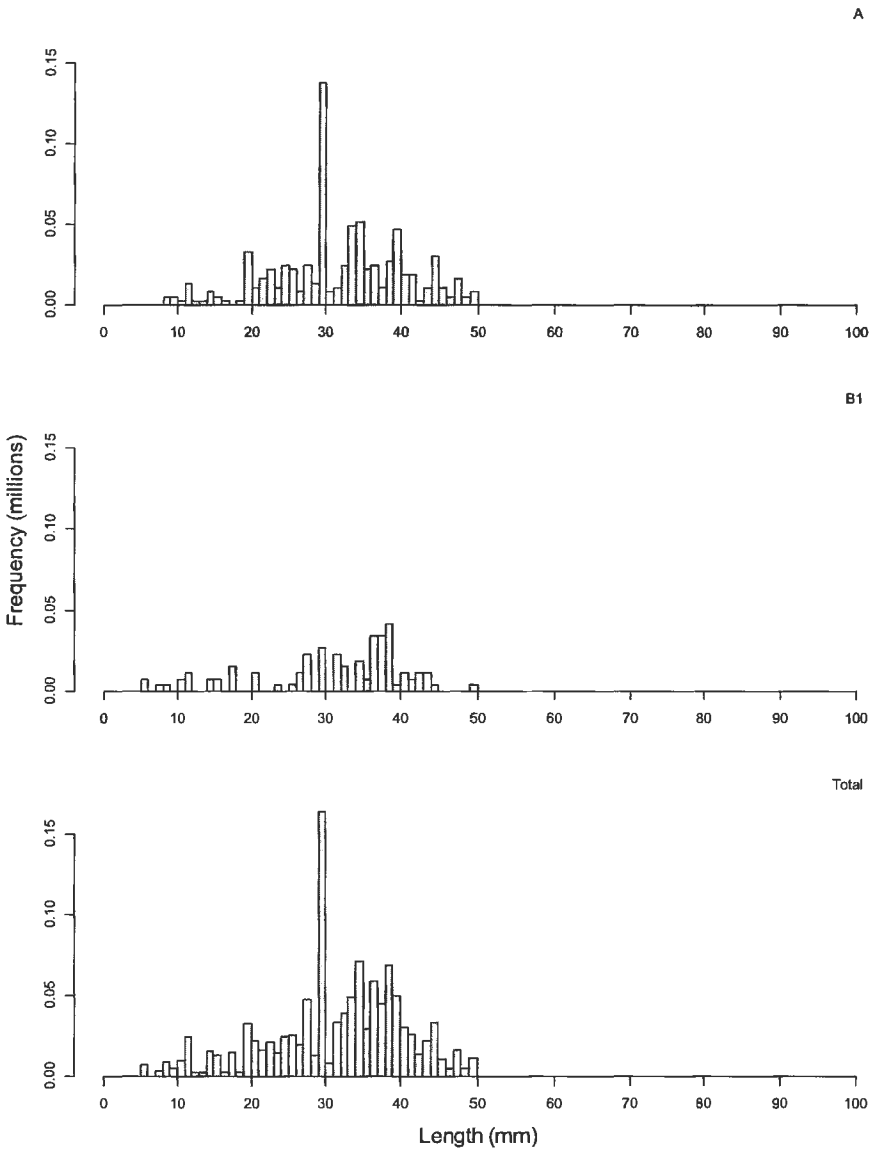


Figure Appendix 3: Pipi length frequencies by stratum, One Tree Point, 27 April 2018. Scaled to estimated population size.

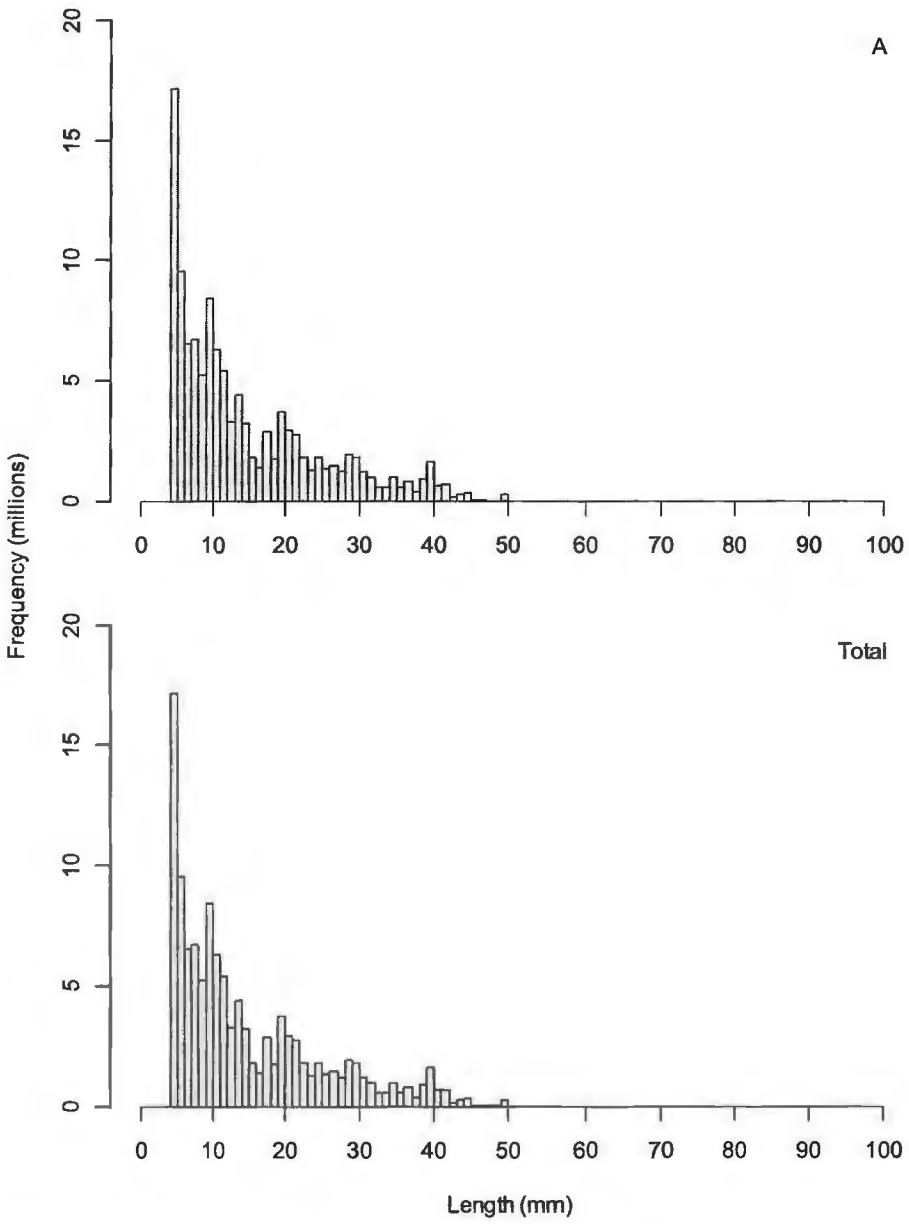


Figure Appendix 4: Pipi length frequencies by stratum, Ruakākā, 29 May 2018. Scaled to estimated population size.

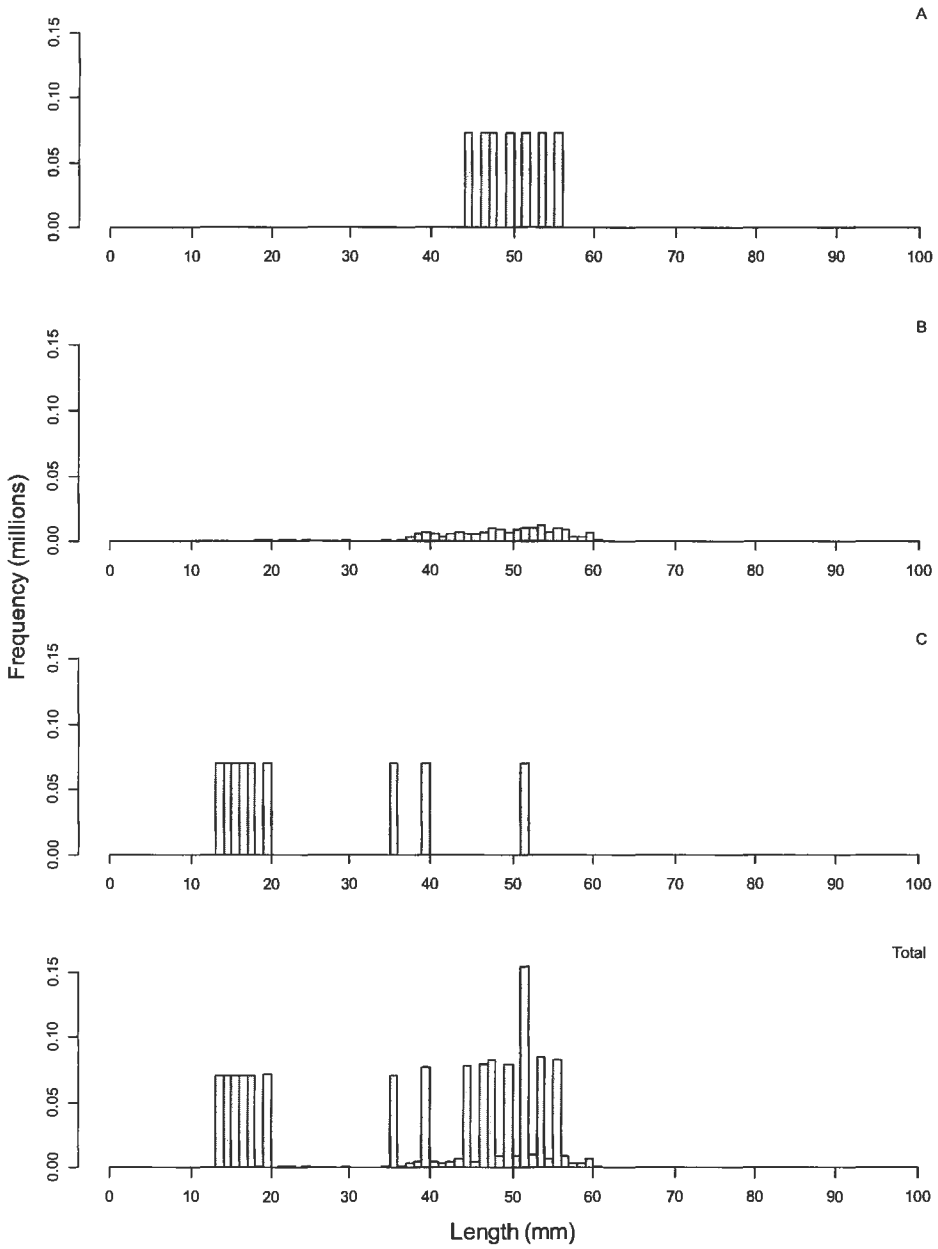


Figure Appendix 5: Pipi length frequencies by stratum, Mair Bank, 16 June 2019. Scaled to estimated population size.

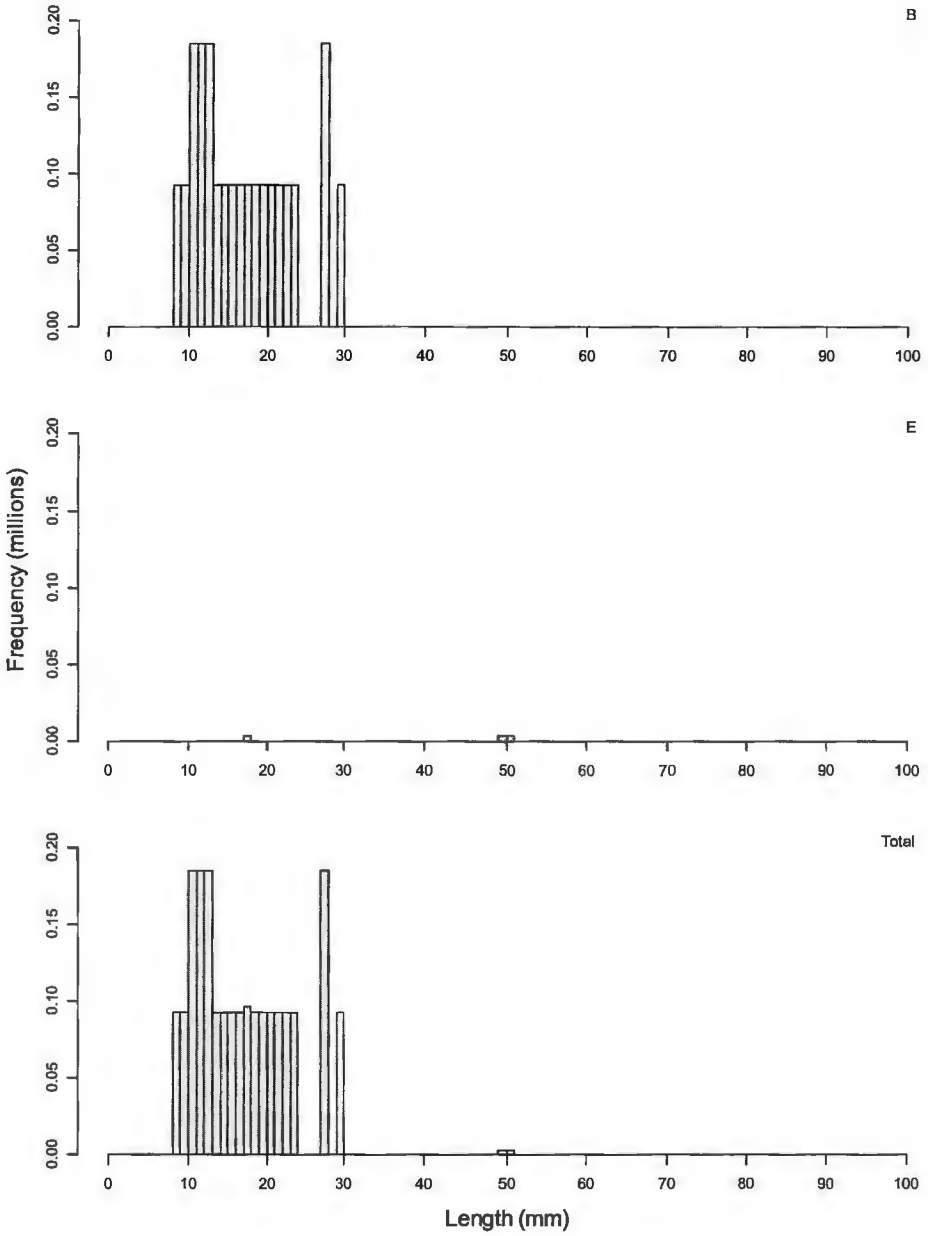


Figure Appendix 6: Pipi length frequencies by stratum, Marsden Bank, 17 June 2019. Scaled to estimated population size.

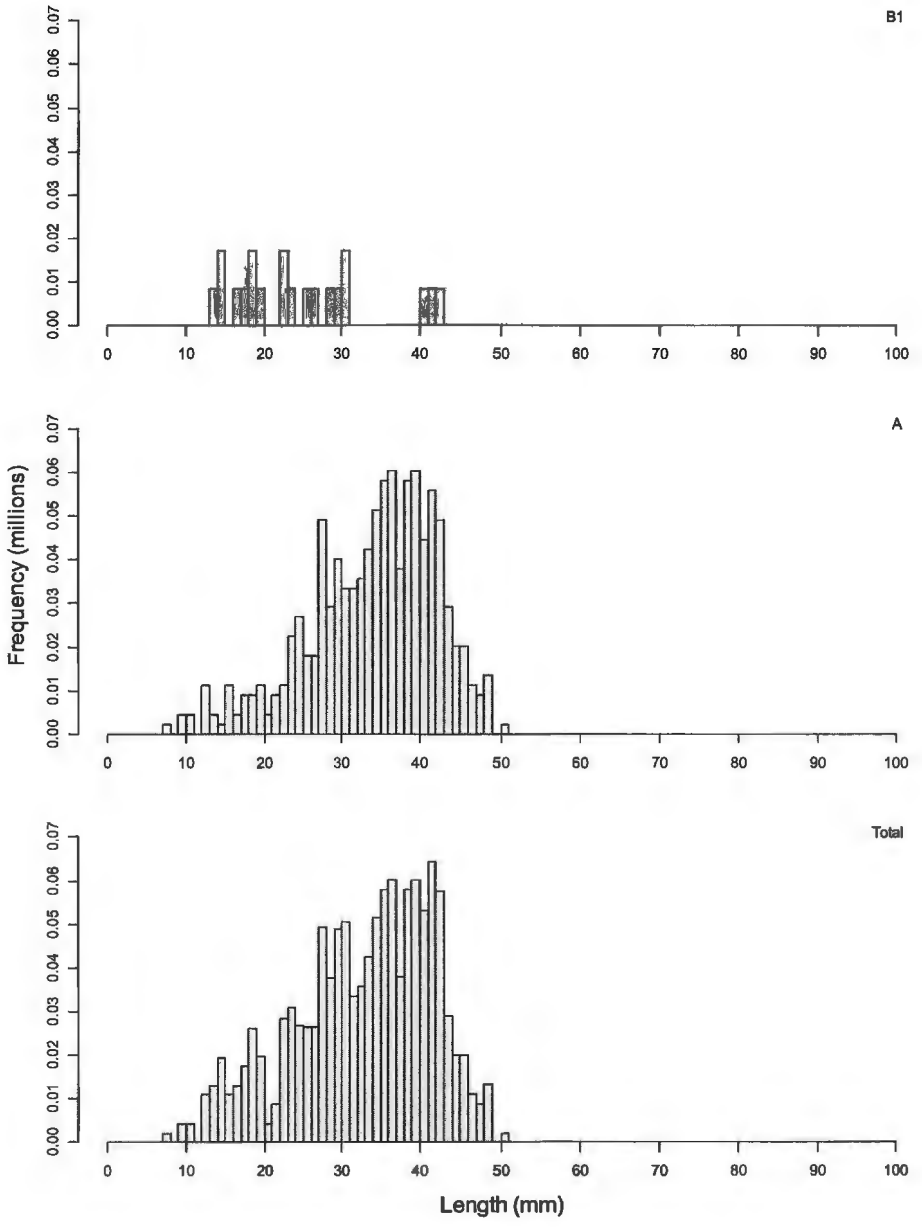


Figure Appendix 7: Pipi length frequencies by stratum, One Tree Point, 16 May 2019. Scaled to estimated population size.

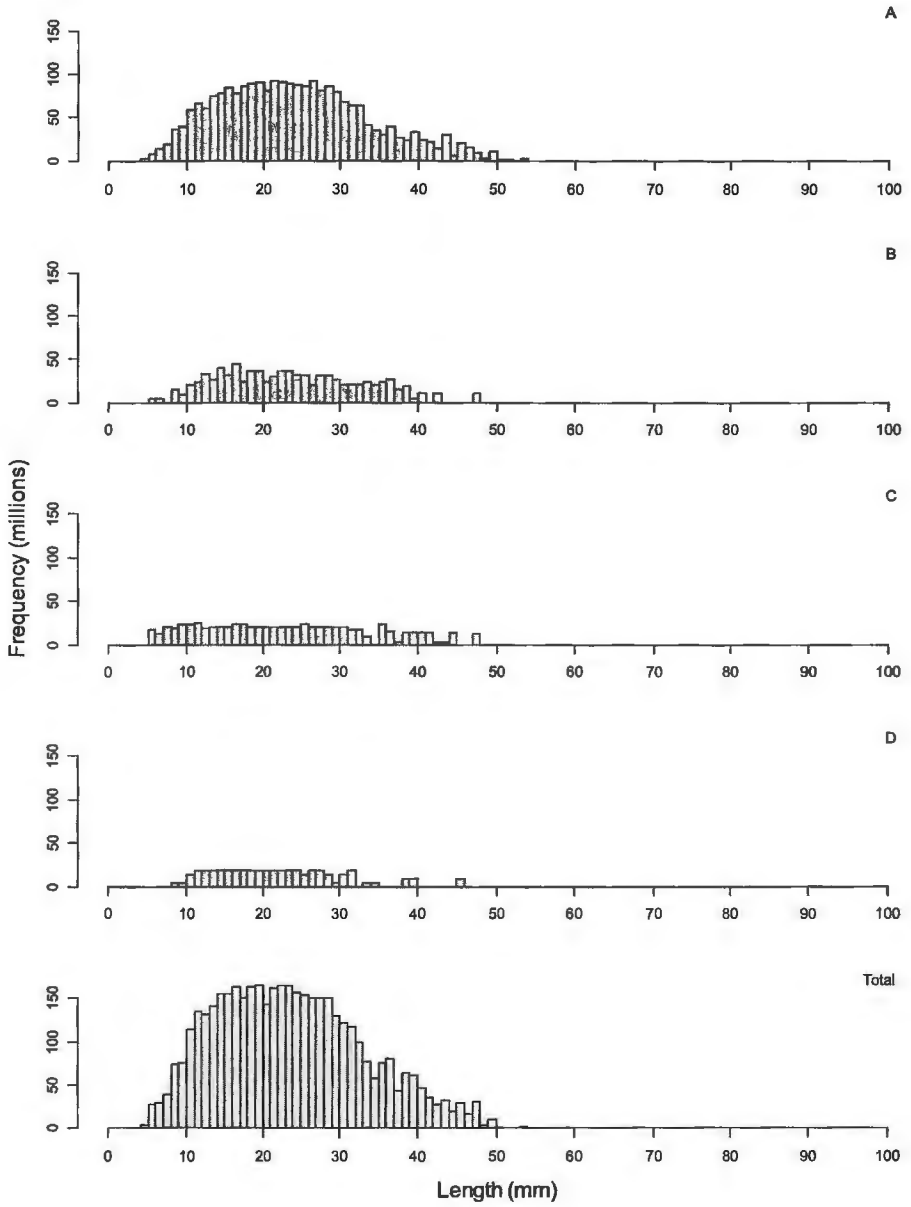


Figure Appendix 8: Pipi length frequencies by stratum, Ruakākā, 18 June 2019. Scaled to estimated population size.

Appendix 3

Patuharakeke Takutai Health Analysis
(Coastal Cultural Health Index)

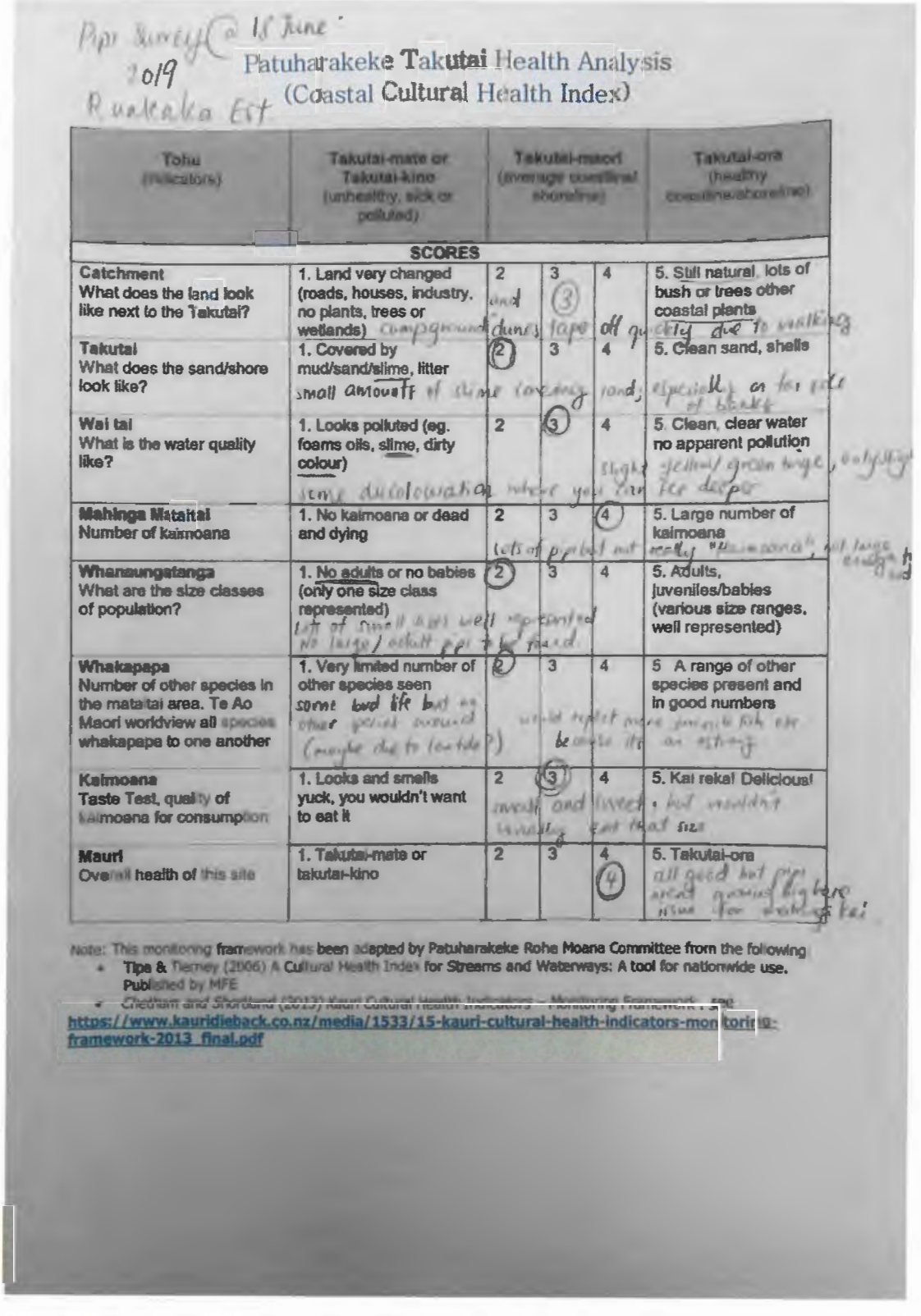
Marsden Bank : 16 June 2019

Tohu (indicators)	Takutai-mate or Takutai-kino (unhealthy, sick or polluted)	Takutai-maori (average coastline/ shoreline)			Takutai-ora (healthy coastline/shoreline)
	SCORES				
Catchment What does the land look like next to the Takutai?	1. Land very changed (roads, houses, industry, no plants, trees or wetlands) ①	2 wharf interfere near	3 + dolphin [illegible] right to [illegible]	4 [illegible]	5. Still natural, lots of bush or trees other coastal plants ([illegible]).
Takutai What does the sand/shore look like?	1 Covered by mud/sand/slime, litter	2	3	4 ④	5. Clean sand, shells Clean but some shells have slime on top, algae, not great looking.
Wai tai What is the water quality like?	1. Looks polluted (eg. foams oils, slime, dirty colour)	2	3	4	5. Clean, clear water no apparent pollution ⑤ clean water (appears clean)
Mahinga Mataitai Number of kaimoana	1. No kaimoana or dead and dying ① very Low numbers of living pipi	2	3	4	5. Large number of kaimoana
Whanaungatanga What are the size classes of population?	1. No adults or no babies (only one size class represented) seems stunted at that size; few larger. all pipi found are small <30mm; too small to eat	2 ②	3	4	5. Adults, juveniles/babies (various size ranges, well represented)
Whakapapa Number of other species in the mataitai area. Te Ao Maori worldview all species whakapapa to one another	1 Very limited number of other species seen would expect more crabs, other infaunal species, or species attached to wharf poles. no juvenile fish only the odd	2 ②	3	4	5. A range of other species present and in good numbers ← mussel (kūtai) [illegible] ([illegible]) small crab ([illegible])
Kaimoana Taste Test, quality of kaimoana for consumption	1. Looks and smells yuck, you wouldn't want to eat it	2	3	4 ④	5 Kai reka! Delicious! good taste, but small and not plump (could be season)
Mauri Overall health of this site	1. Takutai-mate or takutai-kino	2	3 ③.⑤	4 similar to Mair Bank. Feels the mauri has been stripped from this site.	5. Takutai-ora

Note: This monitoring framework has been adapted by Patuharakeke Rohe Moana Committee from the following:

- Tipa & Tierney (2006) A Cultural Health Index for Streams and Waterways: A tool for nationwide use. Published by MFE
- Chetham and Shortland (2013) Kauri Cultural Health Indicators – Monitoring Framework . see https://www.kauridieback.co.nz/media/1533/15-kauri-cultural-health-indicators-monitoring-framework-2013_final.pdf

Figure Appendix 9: Patuharakeke Takutai Health Analysis, Marsden bank, 2019.



Pipi Survey @ 18 June 2019 Ruakaka Est

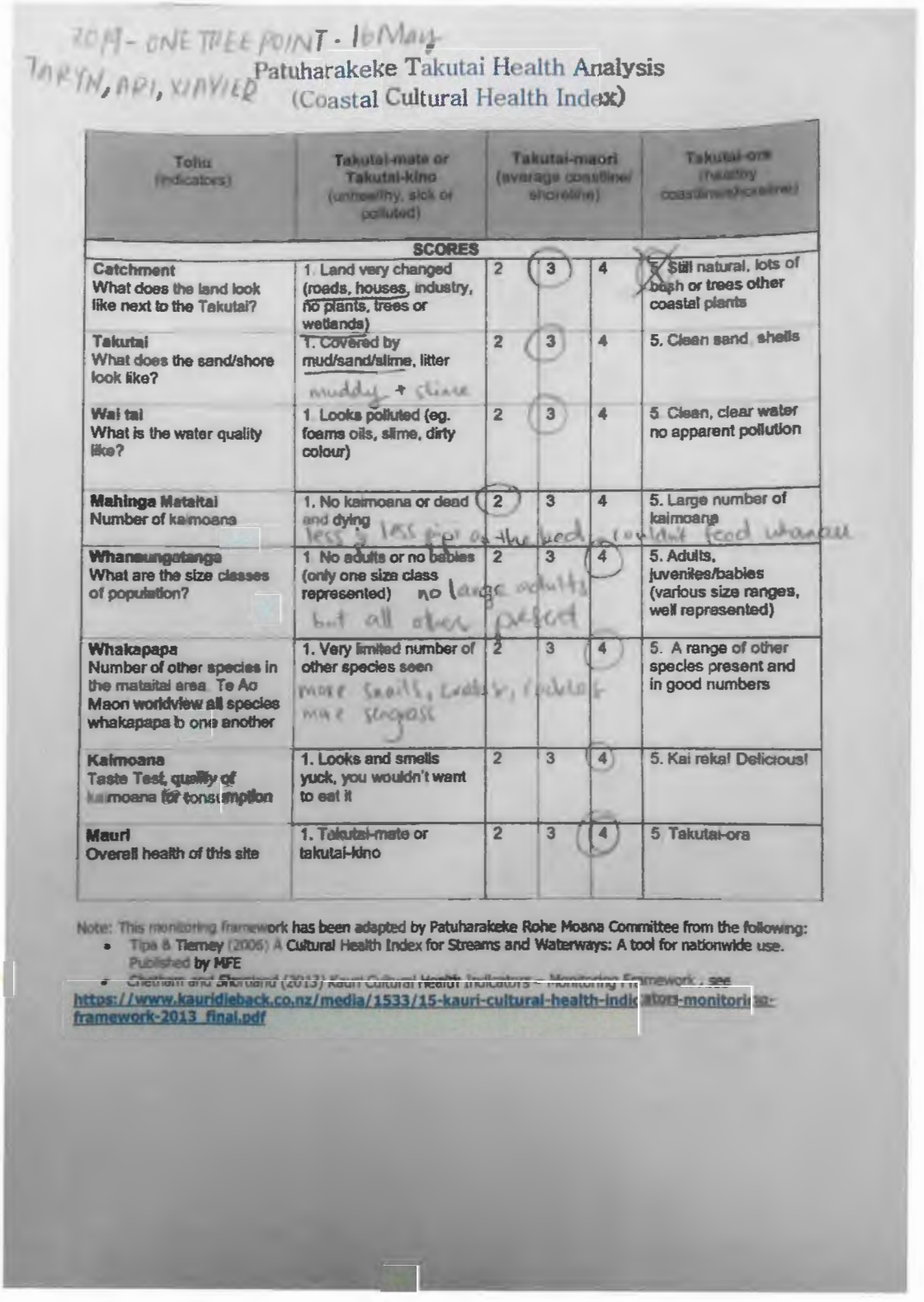
Patuharakeke Takutai Health Analysis (Coastal Cultural Health Index)

Tohu (Indicators)	Takutai-mate or Takutai-kino (unhealthy, sick or polluted)	Takutai-maori (average coastline/ shoreline)			Takutai-ora (healthy coastline/shoreline)
SCORES					
Catchment What does the land look like next to the Takutai?	1. Land very changed (roads, houses, industry, no plants, trees or wetlands) campground	2 and dunes	3 (3) tape	4 off quickly due to walking	5. Still natural, lots of bush or trees other coastal plants
Takutai What does the sand/shore look like?	1. Covered by mud/sand/slime, litter small amount of slime covering	(2)	3	4 sand, especially on far side of bank	5. Clean sand, shells
Wai tai What is the water quality like?	1. Looks polluted (eg. foams oils, slime, dirty colour) some discolouration where you can see deeper	2	(3)	4 slight yellow/green tinge, cloudy	5. Clean, clear water no apparent pollution
Mahinga Mataitai Number of kaimoana	1. No kaimoana or dead and dying	2 lots of pipi but not really "kaimoana"	3	(4)	5. Large number of kaimoana
Whanaungatanga What are the size classes of population?	1. No adults or no babies (only one size class represented) lots of small ages well represented no large/adult pipi to be found.	(2)	3	4	5. Adults, juveniles/babies (various size ranges, well represented)
Whakapapa Number of other species in the mataitai area. Te Ao Maori worldview all species whakapapa to one another	1. Very limited number of other species seen some bird life but no other species around (maybe due to location?)	(2)	3 would expect more juvenile fish etc because it's an estuary	4	5 A range of other species present and in good numbers
Kaimoana Taste Test, quality of kaimoana for consumption	1. Looks and smells yuck, you wouldn't want to eat it	2 smelt and looked wrong	(3)	4 lovely, but wouldn't eat that size	5. Kai reka! Delicious!
Mauri Overall health of this site	1. Takutai-mate or takutai-kino	2	3	(4)	5. Takutai-ora all good but pipi need growing bigger time for eating kai

Note: This monitoring framework has been adapted by Patuharakeke Rohe Moana Committee from the following

- Tipa & Tierney (2006) A Cultural Health Index for Streams and Waterways: A tool for nationwide use. Published by MFE
- Cheatham and Shortland (2013) Kauri Cultural Health Indicators – Monitoring Framework. See https://www.kauridieback.co.nz/media/1533/15-kauri-cultural-health-indicators-monitoring-framework-2013_final.pdf

Figure Appendix 10: Patuharakeke Takutai Health Analysis, Ruakākā, 18 June 2019.



10AM - ONE TREE POINT - 16 May
TARYN, ARI, XAVIER

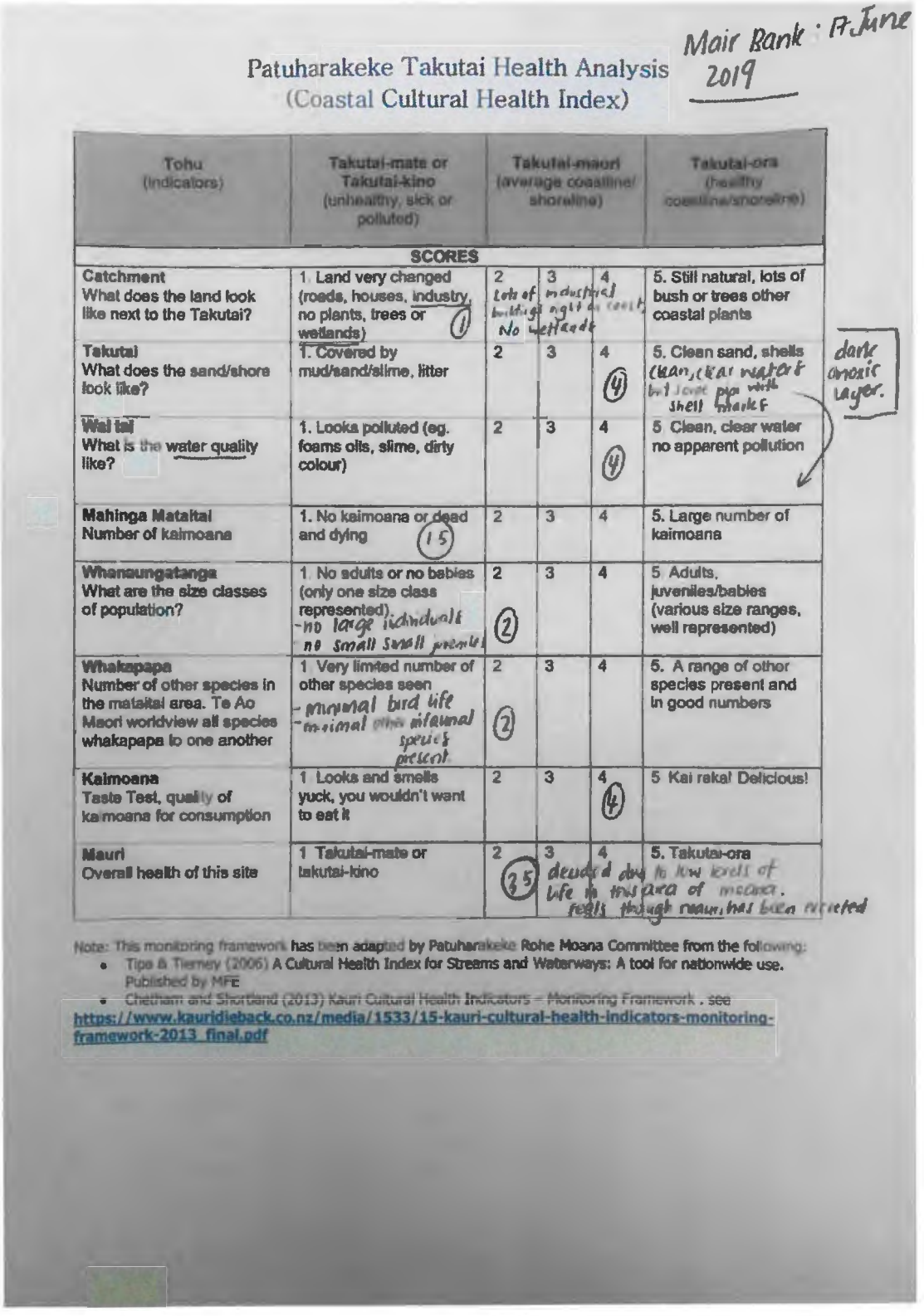
Patuharakeke Takutai Health Analysis
(Coastal Cultural Health Index)

Tohu (Indicators)	Takutai-mate or Takutai-kino (unhealthy, sick or polluted)	Takutai-maori (average coastline/ shoreline)			Takutai-ora (healthy coastline/shoreline)
	SCORES				
Catchment What does the land look like next to the Takutai?	1. Land very changed (roads, houses, industry, no plants, trees or wetlands)	2	3	4	5. Still natural, lots of bush or trees other coastal plants
Takutai What does the sand/shore look like?	1. Covered by mud/sand/slime, litter muddy + slime	2	3	4	5. Clean sand, shells
Wai tai What is the water quality like?	1. Looks polluted (eg. foams oils, slime, dirty colour)	2	3	4	5. Clean, clear water no apparent pollution
Mahinga Mataitai Number of kaimoana	1. No kaimoana or dead and dying less + less pipi on the beach couldn't feed whanau	2	3	4	5. Large number of kaimoana
Whanaungatanga What are the size classes of population?	1. No adults or no babies (only one size class represented) no large adults but all other present	2	3	4	5. Adults, juveniles/babies (various size ranges, well represented)
Whakapapa Number of other species in the mataitai area. Te Ao Maori worldview all species whakapapa to one another	1. Very limited number of other species seen more snails, crabs, pukeko + more seagrass	2	3	4	5. A range of other species present and in good numbers
Kaimoana Taste Test, quality of kaimoana for consumption	1. Looks and smells yuck, you wouldn't want to eat it	2	3	4	5. Kai reka! Delicious!
Mauri Overall health of this site	1. Takutai-mate or takutai-kino	2	3	4	5. Takutai-ora

Note: This monitoring framework has been adapted by Patuharakeke Rohe Moana Committee from the following:

- Tipa & Tierney (2006) A Cultural Health Index for Streams and Waterways: A tool for nationwide use. Published by MFE
- Cheetham and Skerland (2013) Kauri Cultural Health Indicators – Monitoring Framework , see https://www.kauridieback.co.nz/media/1533/15-kauri-cultural-health-indicators-monitoring-framework-2013_final.pdf

Figure Appendix 11: Patuharakeke Takutai Health Analysis, One Tree Point, 16 May 2019.



Patuharakeke Takutai Health Analysis
(Coastal Cultural Health Index)

Mair Bank · 17 June 2019

Tohu (Indicators)	Takutai-mate or Takutai-kino (unhealthy, sick or polluted)	Takutai-maori (average coastline/ shoreline)			Takutai-ora (healthy coastline/shoreline)
SCORES					
Catchment What does the land look like next to the Takutai?	1. Land very changed (roads, houses, industry, no plants, trees or wetlands) (1)	2 Lots of industrial building right at coast No wetlands	3	4	5. Still natural, lots of bush or trees other coastal plants
Takutai What does the sand/shore look like?	1. Covered by mud/sand/slime, litter	2	3	4 (4)	5. Clean sand, shells (clean, clear water but lots pipi with shell thick) dark anoxic layer.
Wai tai What is the water quality like?	1. Looks polluted (eg. foams oils, slime, dirty colour)	2	3	4 (4)	5 Clean, clear water no apparent pollution
Mahinga Mataitai Number of kaimoana	1. No kaimoana or dead and dying (15)	2	3	4	5. Large number of kaimoana
Whanaungatanga What are the size classes of population?	1. No adults or no babies (only one size class represented). -no large individuals no small small juvenile (2)	2	3	4	5 Adults, juveniles/babies (various size ranges, well represented)
Whakapapa Number of other species in the mataitai area. Te Ao Maori worldview all species whakapapa to one another	1 Very limited number of other species seen -minimal bird life -minimal other infaunal species present (2)	2	3	4	5. A range of other species present and in good numbers
Kaimoana Taste Test, quality of kaimoana for consumption	1 Looks and smells yuck, you wouldn't want to eat it	2	3	4 (4)	5 Kai raka! Delicious!
Mauri Overall health of this site	1 Takutai-mate or takutai-kino	2 (2.5)	3	4	5. Takutai-ora devoid due to low levels of life in this area of moana. reefs though mauri has been restored

Note: This monitoring framework has been adapted by Patuharakeke Rohe Moana Committee from the following:

- Tipa & Tierney (2006) A Cultural Health Index for Streams and Waterways: A tool for nationwide use. Published by MFE
- Cheetham and Shortland (2013) Kauri Cultural Health Indicators – Monitoring Framework . see https://www.kauridieback.co.nz/media/1533/15-kauri-cultural-health-indicators-monitoring-framework-2013_final.pdf

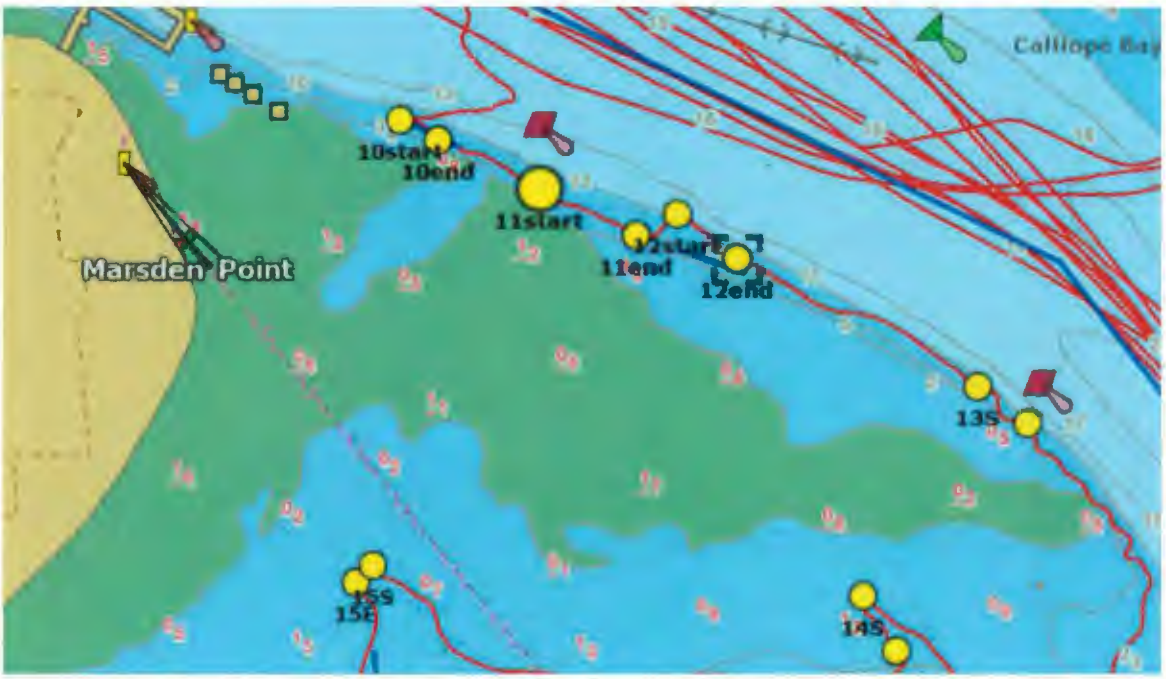
Figure Appendix 12: Patuharakeke Takutai Health Analysis, Mair bank, 17 June 2019.

Appendix A(ii) – Marsden and Mair Bank Survey Reporting
Brief Summary of findings (report still to be published – Drew Lohrer, NIWA December 2019)

Kia ora Taryn (cc Juliane),

We deployed the drop camera to several sites on the two banks east of Marsden Point.

One drop (site 10) was made in the shallow subtidal fringe on the northeastern side of Marsden Bank. Three drops (sites 11, 12 and 13) were made in shallow subtidal zone on the northern edge of Mair Bank. And two drops (sites 14 and 15) were made on the southern edge of Mair Bank.



Each of the camera drops was ~100 m or ~10 minutes in length. Water clarity enabled us to capture high quality images of the seafloor at all these sites.

Site 10. Shallow subtidal fringe, northeastern side of Marsden Bank. 04/Dec/2019
10start S 35°50.304'; E 174°30.278'
10end S 35°50.321'; E 174°30.319'

Video Time	Depth	Notes
01:00	5.1	Wave/current rippled sand with sparse pipi shell and other shell hash
01:44	6.0	Same as above. Three possibly remnant standing dead mussels
02:00	6.4	Wave/current rippled sand with sparse pipi and other shell hash. Burrows observed. (Burrows are probably pipi, but could be dog cockle or even calliannassid shrimp burrows—the animals cannot be observed directly)
03:00	5.1	Same as above. 03:22 saw one bit of horse mussel shell hash

03:27	4.5	Wave/current rippled sand with sparse pipi shell and other shell hash. Burrows observed. (Burrows are probably pipi, but could be dog cockle or even calliannassid shrimp burrows—the animals cannot be observed directly)	
05:00	1.9	Dense shell hash (started at around 03:35). Comprised of pipi, dog cockle, cockle, other surf clam, gastropod Zethalia, occasional sand dollar fragment, etc). Frame to the right is from 04:41 and includes a scallop shell fragment and a mussel shell fragment.	
05:40	2.3	Dense shell hash	
07:00	1.3	Some live pipi on sed surface? (probably mostly shell hash)(frame to right is 07:34)	
07:51	3.4	Some live pipi on sed surface? (probably mostly shell hash)	
08:20	1.8	Same as above. A bit deeper by 09:00 and seeing some burrows in undulating sand again.	
09:17	3.6	Shell hash (frame to right is from 09:17)	
10:00	2.9	Shell hash	

Site summary: no evidence of any live mussels or mussel bed. Pipi shell hash was common, and there are potentially some buried pipi in the wave rippled sand (in the deeper, less shelly parts of the bank).

Site 11. Shallow subtidal fringe, northeastern side of Mair. 04/Dec/2019

11start S 35°50.364'; E 174°30.426'

11end S 35°50.405'; E 174°30.528'

Video Time	Depth	Notes
01:00	3.6	Dense shell covered seabed. Silted up dead shell, with occasional red algae tufts (frame is from 0:42) 
01:36	4.6	Same continues. Shell hash is large intact values of pipis and Ruditapes? Occasional live pipi? (frame to right is 01:05) 
01:54	3.8	Transition to smaller shells from intertidal, but still shell hash dominated.
03:32	1.8	Same as above, but a few pockets of sand with burrows. Could be evidence of buried pipi. 
04:00	2.9	Same. More of the burrowed sand. A few big shell hash banks in between.
04:25	3.9	Interspersed shell mounts and burrowed sediment
05:12	5.0	Red algae tufts on the shell hash. Patiella star fish. A few scallop shells seen in the shell hash mixture. (frame from 05:33) 
06:38	5.4	More Patiriella star fish at 06:05. A bit deeper here, some green algal fuzz on the shell hash, a few freshly unburied pipi observed.

07:41	4.7	Green (Codium) and red filamentous algae. Shell hash in burrowed sand. (frame 07:38)	
08:41	5.0	Same as above till end. Patiriella cushion stars, burrowed undulated shelly sand with tufts of green and red algae. Not much evidence of any live mussel beds. This example from 09:16 is only observation of mussel shell.	

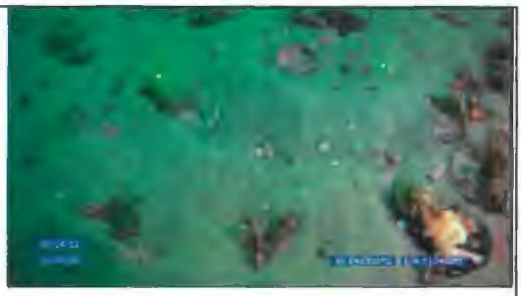
Site summary: no evidence of any live mussels or mussel bed. Pipi shell was very abundant in places. There are potentially some buried pipi in the wave rippled sand in some places, but this location did not appear to be a densely populated live pipi bed.

Site 12. Slightly deeper subtidal fringe, northeastern side of Mair. 04/Dec/2019

12start S 35°50.386'; E 174°30.572'

12end S 35°50.425'; E 174°30.635'

Video Time	Depth	Notes
01:00	12.6	Sandy sediment with red algae tufts on small broken shell hash.
02:00	12.3	Same as above. Sediment appears current rippled. A bit more shell at the 02:00 mark relative to 01:00. Patiriella cushion star
03:00	10.9	Same as above. Composition of shell hash appears to be dog cockle and pipi mainly. Starting to see tufts of algae
04:00	10.5	First evidence of a mussel shell. No live ones seen. Not well represented in the shell hash either. 
05:21	9.4	Algal covered shells in sand. A few burrows in the sand. Pocked, deteriorated shell debris here.
06:21	8.4	Wave rippled sand, less shell at this point. Serpulid worm tubes on some of the shells. Patiriella cushion star at 06:58

07:10	7.9	Undulating shelly sand, possibly some burrows in the sand. Algal tufts on many of the shells. Most of the shell looks long dead (rather than fresh). A mussel at 08:01 (frame at right). Another at 08:20. Certainly not abundant though.	
09:00	7.0		

Site summary: Potentially some buried pipi in the wave rippled sand in some places, but this location did not appear to be a densely populated live pipi bed. A couple of isolated mussel shells, but no evidence of mussel bed at this location.

Site 13. Subtidal fringe, northeastern side of Mair Bank. 04/Dec/2019

13start S 35°50.537'; E 174°30.892'

13end S 35°50.569'; E 174°30.945'

Video Time	Depth	Notes	
1:00	10.5	Dense hell hash on sand; algal tufts on shell, and some of the shell was old and deteriorated with serpulid worm tubes on it. Occasionaly foliose red algae, but mostly green algal tufts.	
2:00	11.2	Same as above. (frame from 2:15)	
2:38	11.0	Large bivalve shell debris, some from pipi but also Ruditapes and surf clam species, dog cockle too?).	
4:00	9.5	Same as above.	

4:50	8.5	Example of filamentous red and green algae on frame to the right (from 4:58).	
5:10	8.2	Same as above. The white shell hash to lower right of frame is the shape of a Ruditapes largillierti 	
6:15	7.5	Much the same.	
6:30	7.0	Much the same.	
6:45	6.7	Much the same (moving up slope)	
7:00	6.0	Now we have more bleached out shell hash and more pipi shell hash. Still not much evidence of a dense live pipi population.	
7:25	5.2	Much the same as previous.	
7:45	4.4	Much the same as previous. Serpulid worms and algae still present on the shell hash.	
8:05	3.3		
8:38	2.2	Same. The algae is more scummy here. And shell fragments more crushed and smaller.	
9:20	2.3	Same. Shell-armoured sandy bank. In this very shallow area, cockle shells are part of the shell hash mixture. (9:13). Cosinasterias 11 arm star fish (predator) observed.	
10:00	4.0	Dropping down in depth again. Dog cockles and other larger shell halves.	

		More of the filamentous red algae again.
10:10	5.0	At 10:15 some sand with burrows (infaunal pipi?). But otherwise much the same. Still a shell dominated channel habitat.
10:30	6.0	
10:50	7.0	
End at	9.0	

Summary: this location did not appear to be a densely populated live pipi or live mussel bed.

Site 14. Subtidal area, south side of Mair Bank. 04/Dec/2019

14start S 35°50.720'; E 174°30.770'

14end S 35°50.768'; E 174°30.806'

Video Time	Depth	Notes
1:00	1.8	Sandy bottom with shell hash (relatively sparse). Looks to be a firm packed sand bottom with mixed pipi and other shell.
2:00	1.8	Occasional red algal tufts, but mainly the shell is covered by a scummy green algae. The shell appears to be pipi and Ruditapes and maybe some other surf clams (not much cockle). (2:52 at the right) 
3:15	2.0	Same as above.
4:00	2.1	Quite a bit of the green fuzzy scummy looking algae on the seabed. Possibly a live pip bed underneath, but doubtful (no evidence of burrows or siphon holes). A few Patiriella cushion stars. Occasional Codium green algae.
5:30	2.2	Same.
6:15	2.3	Same. 
7:00	2.3	Cosinasterias 11 arm starfish (7:05) 
7:45	2.5	Same. Gunge covered shell armoured sand.

8:30	2.5	Same. Gunge covered shell armoured sand. (8:45)	

Summary: this location did not appear to be a densely populated live pipi or live mussel bed.

Site 15. Subtidal area, south side of Mair Bank. 04/Dec/2019

15start S 35°50.693'; E 174°30.248'

15end S 35°50.708'; E 174°30.229'

Video Time	Depth	Notes	
0:30	1.9	Firm clean fine sand with scattered thin shell. Shell bits are smaller (cockle, wedge shell, pipi). Sand has little dark mounds, possibly covered with microphytobenthos or green filamentous algal tufts.	
1:00	1.8	Same.	
1:25	1.9	Red algal tuft at 1:25 (frame at right is 1:36)	
2:30	2.0	Same (2:17)	
3:00	2.0	Same. Some wave ripples here	

Summary: there does not appear to be a pipi or mussel bed here.

Mana Moana Meeting Wed 20 Nov 2019

Present: Grant Pirihi (GP), Reece Newton (RN), Shane Watson (SW), David Milner (DM), Hannah Pirihi (HP).

Karakia: RN

Agenda:

1. Re-instate permit books
2. S186a Closure review
3. Mātaitai update

1 – Re-instate permit books

An increase in requests and queries for customary kai moana permits have promptedthe Mana Moana Sub-committee (MMSC) to review our current position on permits books. We have not been issuing permits due to the decline, and harvesting pressures in some kai moana taonga e.g. Pipi, kutai, scallops etc.
Not being able to issues permits impacts on our ability to carry out our kaitiaki roles to enable whānau to manāki whānau and manuhiri at the Marae.
For birthdays and other events that are planned for, people can collect beforehand.
Another issue arose about beach cast scallops and other shellfish after heavy easterlies. It would be good to provide permits for these ocassions to avoid moumou kai. It's also worh asking to provide a permit for seized kai moana rather than letting them be destroyed or thrown back into the water dead. A discussion with MPI is required to test these option. We also need to provide taonga kai moana for our kaumatua kuia as a priority.

Why shouldn't we re-instate permit books?

- Certain species are still under pressure
- Vehicles on the beach bylaws, allow people to drive onto the bed at Marsden Bank
- Vehicles driving over tuatua spat
- Do we know the condition of our kai moana?
- Costs involved in collecting kai moana on multiple ocassions can escalate e.g. travel, bost costs, and time.

Why should we re-instate permit books?

- To support manākitanga at the marae
- Whānau are requesting them
- To support kaitiakitanga responsibilities

If we were to re-instate permits, what needs to be in place and carried out?

- Receive new permit books (2 only – 1 to use and 1 as a back up)
- Have 1 permit issuer, with another person as a back up if they aren't available
- Enquire about an permit app
- Tangi & marae based hui only
- Refresh the guidelines we had in place e.g. how many/much kai moana is required per amount of people at the function (see appendix 1 below)
- Have these guidelines and map with the book/and issued permit if possible

- Share with whānau at all committee hui
- Share with whānau via all methods of communication
- Bring some rangatahi on board
- Permits may be issued via phone as well until an app is developed.

Recommendation to PTB:

- To reinstate 2 permit books. RN is the main permit issuer, with SW as emergency back up
- Receive quotes for apps
- Refresh the guidelines
- Communicate via all comms
- Bring some rangatahi on board
- Check with MPI re providing permits for beach cast and seized kai moana.

2 – S186a Closure review

The closure has 6 months to go before completing a 2 year closure period for all shellfish. Previous to this was a closure on Pipi only. It takes approximately 6 months to go through the closure process so we need to make a decision now, on whether to roll over the closure, adjust to allow certain species e.g. kutai, or open it up for harvesting all species. New signs are being developed including translating key text into other languages. Unfortunately, monitoring results do not show great signs of recovery however, it may take more than 18 months to see recruitment.

Why shouldn't we roll it over?

- Vehicles on the beach bylaws allow people to drive onto the bed at Marsden Bank
- Vehicles driving over tuatua spat
- Pipi populations are still collapsed
- A balanced holistic approach is required to restore the mauri of the ecosystem

Recommendation:

- To roll over the status quo
- To investigate stopping vehicles from going past the pou rahui or staying off the pipi bed
- Ask MPI what their programme is for the summer at Mair and Marsden banks
- Support the new signage being proposed

3 - Mātaitai

An update was provided on the work Taryn is carrying out on Mātaitai interviews and identifying recommended areas as a part of the NIWA project we are undertaking. More support is required to get site recces done. Taryn will be undertaking research on our Mātaitai areas to get sn understanding of the state of the environment. This information will be critical for informing the Mātaitai application.

Appendix 1 – Permit Guidelines (to be reviewed)

Species	Recreational Limit	50 People	100 People	150 People	Special Conditions
Snapper	9	10	20	30	*Check by-catch if netting
Kahawai	20	10	20	30	"
Kingfish	2	3	6	9	"
Terakihi	20	10	20	30	"
Trevally	20	10	20	30	"
Mullet	30	10	20	30	"
Flounder	20	10	20	30	"
Cockles	150	25kg	50kg	75kg	
Kina	50	200	300	400	
Mussels	50	25kg	50kg	75kg	Excludes Waipu Cove/Langs Beach. Recreational take only in these areas.
Oysters	250	25kg	50kg	75kg	
Rock	250	25kg	50kg	75kg	
Pacific	250	25kg	50kg	75kg	
Paua	10	10	10	10	**100mm & methodΔ**
Pipi	150	25kg	50kg	75kg	All harvesters using boats must harvest from the commercial bank.
Scallops	20	100	200	300	**400max. If more people then still 400max Check each season See footnote. #**
Crayfish	6	10	20	20max	20 max. If more people then still 20max.
Crab		50	100	150	*Check by-catch

TIAKINA Ā TĀTOU KAIMOANA

Mair and Marsden Bank are **CLOSED** to the collection of **ALL SPECIES OF SHELLFISH**
(under 186A of the Fisheries Act 1996).

此区域不准捡拾贝类

Ua fa'asaina le fagota o mea ai sami i Mair Bank, se'i vagana le fagota o i'a

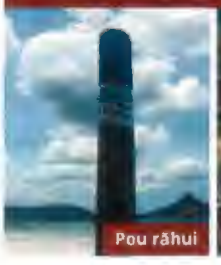
Ipinagbabawal ang pamumulot o pangungulekta ng kabibe/tulya, tahong at iba pa dito sa Mair Bank

메어뱅크에서는 모든조개류의 채취가 금지되었습니다.

Patuharakeke Te Iwi Trust Board · NIWA · Refining NZ · Department of Conservation Te Papa Atawhai · Northport Limited · Whangarei District Council · Ministry for Primary Industries Manatū Ahu Matua · Marsden Maritime Holdings Ltd · Northland Regional Council · Marsden Cove Marina

Patuharakeke have placed a rāhui over the area shown on the map below and would like your support to help restore shellfish populations.

If you pass one of the pou rāhui (see photo below) **on the beach, you are entering a closed area under S186A of the Fisheries Act 1996, where gathering of any shellfish is prohibited.**


Pou rāhui

Shellfish includes **pipi, mussels, Tuatua** and **scallops**, but also **squid, octopus, paddle crabs**.

Fishing for finfish ie. surfcasting is still okay in this area. Vehicles are allowed on the beach, but Patuharakeke request that visitors please protect the habitat by avoiding driving in this area, as it can destroy the habitat and disturb shorebirds.


Pipi


Green lipped mussel


Paddle crab

Please respect the rāhui and help Patuharakeke and the community create a sustainable kaimoana resource here for our tamariki and mokopuna.

Please Call 0800 4 POACHER/ 0800 47 62 24 to report any shellfish harvesting within the rāhui area.

14TH January 2020

PO Box 558 Whangarei
0140 Northland

Patuharakeke
TE IWI TRUST BOARD

Tēnā Koe,

The Patuharakeke Mana Moana Roopu, as Kaitiaki gazetted in May 2009 under the Kaimoana Fisheries Regulations 1998, are seeking letters of support as we will be requesting Minister of Fisheries Stuart Nash to roll over the exisiting S186A Closure to the gathering of all shellfish at Marsden and Mair Banks. The current closure is due to end in June 2020 and is supported by a customary rahui.

Over the last decade PTB have progressed applications in 2011 and 2013 to close Marsden Bank under section 186A of the Fisheries Act 1996 and subsequently supported the indefinite closure of Mair and Marsden Bank under s11 of the Fisheries Act 1996 set down in October 2014. The latest 2018 closure of both areas to all shellfish collection was a result of our continued monitoring and lobbying following the re-establishment of a healthy kutai/mussel population in 2015 and its decimation due to harvest pressure within only 12 months.

Over recent years PTB have been investigating the development of a mahinga maitaitai reserve application and collaborating with other agencies such as Northland Regional Council (NRC) and stakeholders such as Refining NZ and Northport Ltd. In December of 2015 we made a successful bid to the Whangarei Harbour Health Improvement Fund to Undertake a 5 Year Monitoring Programme of the health of Pipi Beds at these locations along with other Mahinga Kai at One Tree Point and Ruakaka Estuary. We are now into our final year of that study. All of this work has been focused on trying to better understand the dynamics amongst pipi and mussel at these locations whilst allowing this bed to rejuvenate and us to continue preparing a mataitai application with the goal of eventually getting bylaws in place to better manage these important taonga species. Unfortunately, our study indicates the pipi and mussel populations have not materially improved to a state that would support reopening the beds to harvest at this stage, however we intend to initiate our mataitai application within the next 18 months.

Observations from our kaitiaki and Fisheries Officers indicate that since the 2018 closure and customary rahui has been in place there has been a marked decrease in harvest or illegal harvest. This time around and with assistance from our community and industry partners we have carried out a comprehensive communications campaign on social media, local newspapers and our kaitiaki have been patrolling and liaising closely with Fisheries Officer's.

Further, the practice of rahui associated with the closure has allowed our hapū to restore these traditions that had not been utilized for many decades. Rahui put down in response to a resource sustainability issue would not generally be lifted until the resource was restored to a healthy state. The 186A closure sits well alongside our customary rahui. Therefore lifting the closure at this point in time could undermine the success of the customary practice.

Kaitiakitanga recognises and provides for the relationships between and amongst the different species that inhabit the Bank, and the way each of those species should be maintained in balance to revitalise and maintain the mauri of the bank and it fish stocks as a whole. It is also about how the people relate to the fisheries and the environment. Therefore we are seeking the community's support extend the closure and rahui to rebuild all species on the bank to;

a) improve the availability and size of all the shellfish which are utilised by Patuharakeke for customary purposes and our community to provide food for their whānau; and

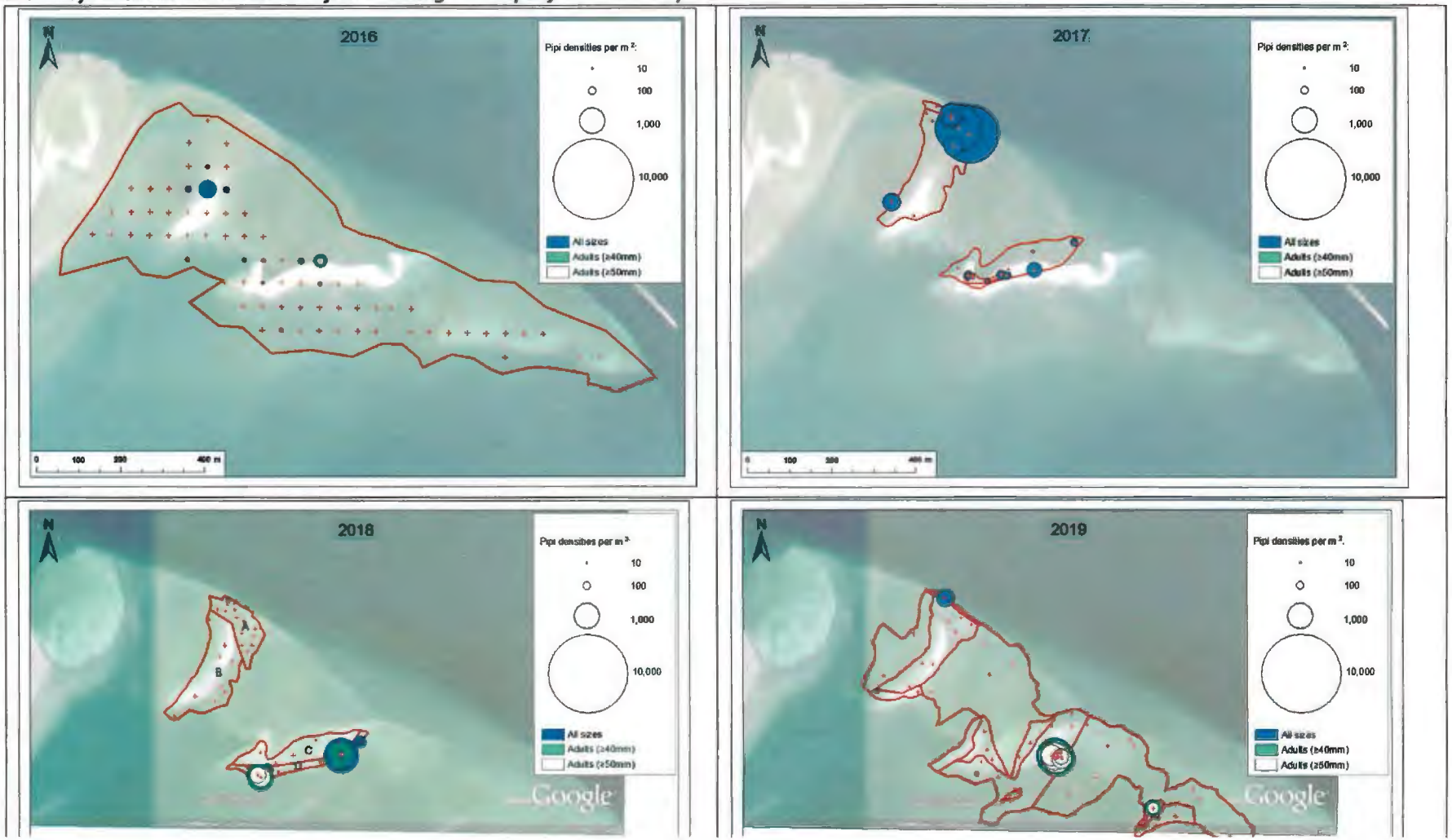
b) recognise the customary practice of Patuharakeke which is to exercise kaitiakitanga by managing all the species on the Bank as an integrated group, not by managing individual species.

We would be very grateful if your organisation could provide a letter/email of support that we can attach to our application to Hon Stuart Nash. Should you have any queries please don't hesitate to contact me.

Naku noa, na,

Juliane Chetham (Convenor Taiao Unit) On behalf of Patuharakeke Te Iwi Trust Board Inc

Attachments: Key Discussion and Results of Monitoring - excerpts from 2019 Report:



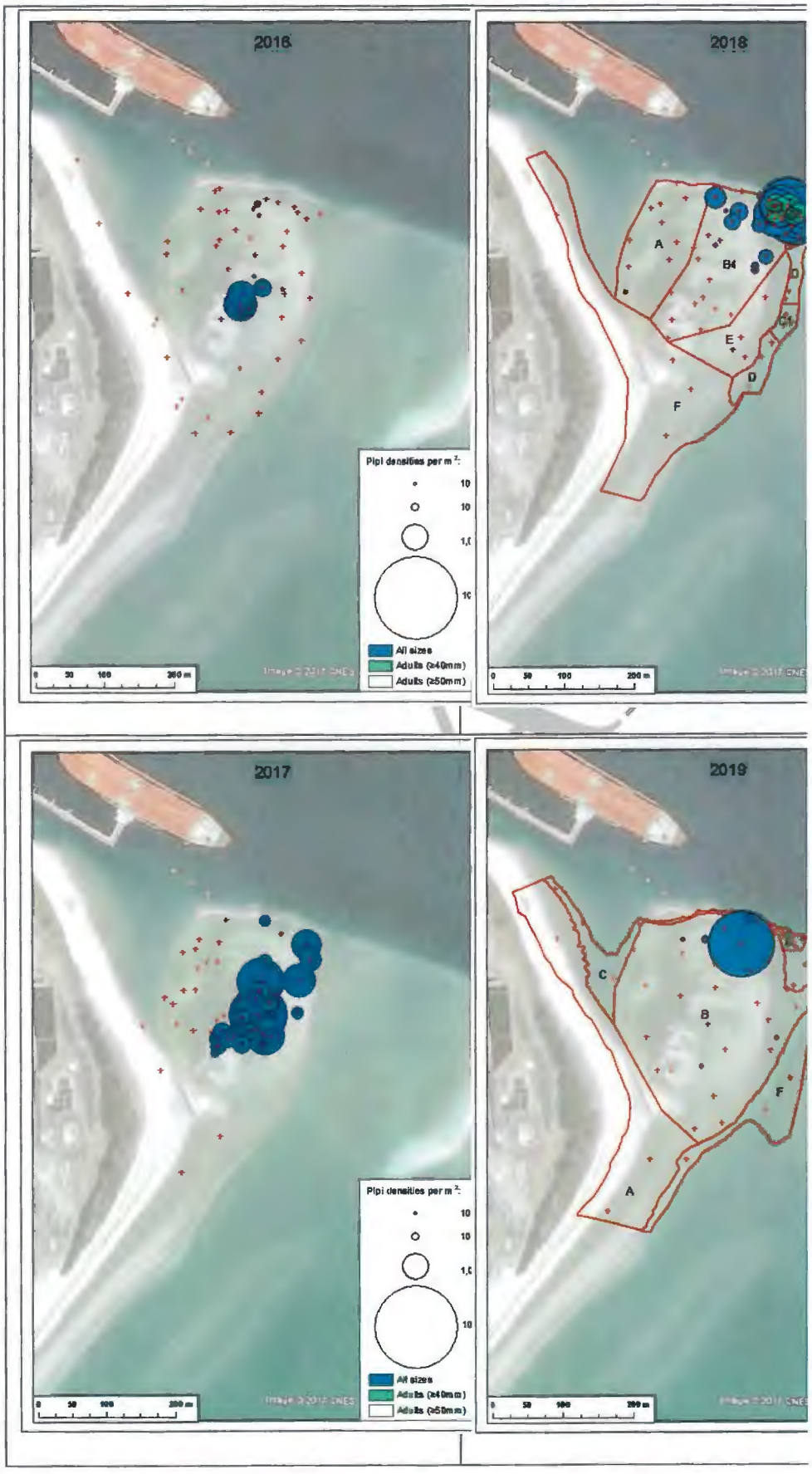

2016
2018
2017
2019
A
B4
C
C1
D
E
F
B
Pipi densities per m²:
All sizes
Adults (≥40mm)
Adults (≥50mm)

Figure 2: Pipi density distribution, Marsden Bank, 2016-2019

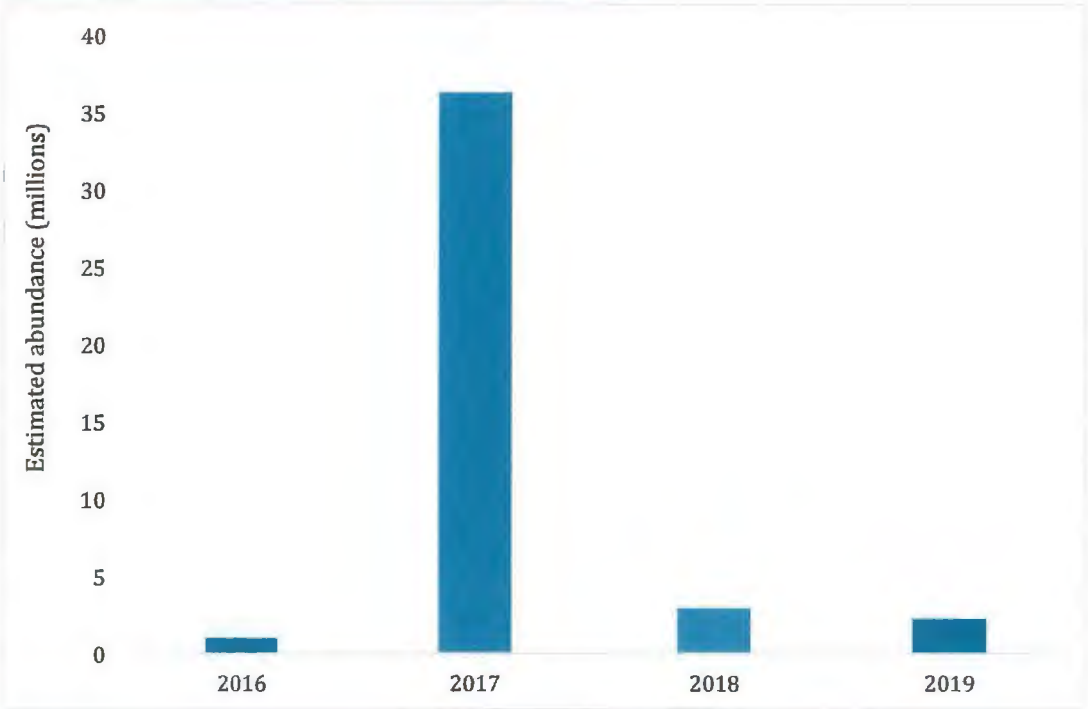


Figure 11: Pipi population estimates of absolute abundance 2016-2019 at Mair Bank. Note: 2016 estimates are from sub-tidal populations were sampled (see Williams et al. 2017 for reasoning). 2016: CV = NA, 2017: CV = 0.53, 2018: CV = 0.47, 2019: CV = 0.52.

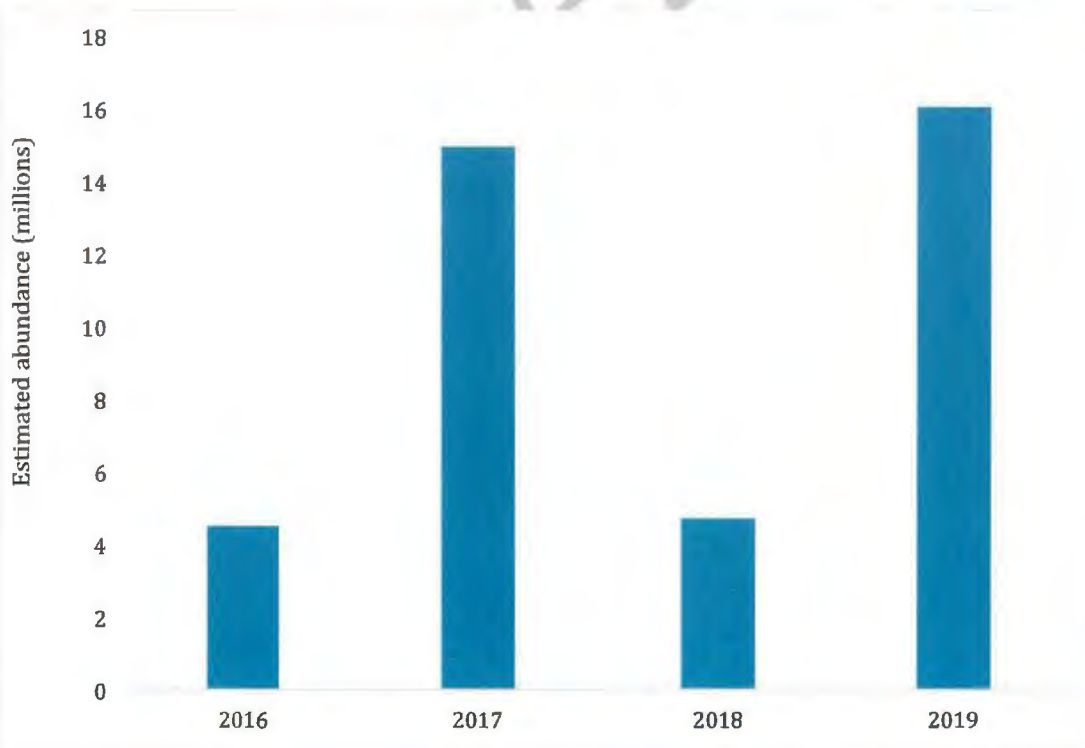


Figure 12: Pipi population estimates of absolute abundance 2016-2019 at Marsden Bank. 2016: CV = 0.50, 2017: CV = 0.29, 2018: CV = 0.20, 2019: CV = 0.97.

Discussion

At most sites, current estimates indicate pipi populations have remained reasonably stable over time since the initiation of this study in 2016, with no evidence of the recovery of larger pipi. Some of the population fluctuations can be attributed to variation in the strength of recruitment events, with large influxes of recruits linked to substantial population increases. The only sub-section of the study that showed signs of annual cohort growth and succession was a relatively small point at the south western extent of Mair Bank, which may be the remnants of a pipi bed, however this is no longer suitable to support any harvesting.

Pipi population status, especially adult pipi show very low levels compared to historical population estimates. Juvenile pipi were more abundant and more wide spread in 2017 compared to other years. This is a sign of high levels of recruitment, with high densities of pipi successfully settling and establishing on the bank. Patterns of pipi population and size structure show a general lack of large individuals and the strong influence of recruitment events, such as the 2017 event showing evidently more juveniles in the populations of Mair and Marsden Banks, as well as at One Tree Point. This same pattern isn't observed at Ruakākā Estuary which is a distinctly separate population and would not be exposed to the same larval movements as the other study sites. Ruakākā Estuary has had considerably higher recruitment (presence of more juvenile pipi) over the duration of this monitoring, leading to an increase in population size and density, consistent with findings from Berkenbusch & Neubauer (2019) who estimated 91.64 million (CV: 17.84%) pipi in 2018–19 similarly, finding only few individuals >50 mm shell length, consistent with our estimates.

Pipi are gonochoristic and reproduce sexually when they reach approximately 40 mm shell length, by free-spawning, external fertilisation (Hooker & Creese, 1995; Williams et al. 2007). Spawning and fertilization is strongly linked to local environmental conditions such as water temperature in bivalves (Hooker, 1995). Natural fluctuations of these conditions can explain such years of good recruitment, such as those observed in 2017. However, tidal currents also have a bearing on the movement of juvenile pipi, especially at early life stages (Hooker, 1995), and natural fluctuations of juvenile populations are expected. Bank morphology and associated hydrodynamic changes have been observed in previous studies Williams and Hume (2014) and anecdotal evidence (J. Chetham, PTB, pers. comm.). Gaining a better understanding of how sediment characteristics, bank morphology and hydrodynamic movements affect recruitment, settlement, and survivability of pipi would be of interest for future research. Habitat suitability for pipi is poorly understood and studies investigating this are well dated.

Recovery of such populations is restricted by recruitment or mortality, both of which are governed by environmental cues and suitability. The present study revealed a high level of recruitment over multiple sites, allowing us to infer that these locations are not devoid of new recruits, which suggests high levels of mortality before they reach adulthood. Factors governing natural mortality and longevity of pipi are poorly understood, and methods of understanding these are being refined (Pawley, 2013). Getting knowledge on key causes of natural mortality, especially during juvenile life stages would be key to understanding the reasons for pipi not surviving through to adulthood.

DRAFT

During the 2018 and 2019 surveys, the Patuharakeke tangata tiaki noticed large areas of recently dead and decaying pipi at One Tree Point. This warranted further research so PTB are currently working with MPI's Aquatic and Environmental Health team to investigate presence and levels of disease (such as rickettsia) in the population and have recently provided samples for processing and assessment. Subsequent findings will be discussed in 2020 reporting. In December 2019 Patuharakeke representatives accompanied NIWA undertaking drop camera surveys of mussel along the channel. Unfortunately very few live mussel were observed.

BREAM BAY COLLEGE

Peter Snell Road, P O Box 111, Ruakaka, NZ
Ph: 09) 4328226 Fax: 09) 4328228
Email: admin@breambaycollege.school.nz
Principal: W.R. Buckland
(BSc, PG DIP SM, Dip Tchg)

13 February 2020

Dear Mr Nash

RE: Proposal to re-apply a Section 186A Closure on Mair and Marsden Banks, Marsden Point for the harvesting of Mussels (Kutai)

Bream Bay College supports the application made by the Patuharakeke Trust Board for a renewal of the temporary (S186A Closure) to all shellfish gathering on Marsden and Mair Banks. The closure commenced in June 2018 and is due to end in June 2020. We support the application to extend the closure for a further two-year period, as provided for under the Fisheries Act 1996.

Patuharakeke Mana Moana Rōpu has made the application after a long-term monitoring project regarding the health and sustainability of pipi and mussel beds in the rohe. We understand that populations have not yet reached sustainable levels, and the customary rahui currently in place would not usually be lifted until populations had fully recovered. Therefore, we support the continuation of the S186A Closure for another two years.

The College is working with the larger Patuharakeke Trust Board around Wananga Taiao and supporting our rangatahi to be involved in the environmental health and well-being of the area. Understanding the dynamics of the inner harbour and why the populations are not recovering is important to the long-term sustainability of the area. We are looking forward to working with the Mana Moana Rōpu in the future on this issue, and urge you to grant the application for renewing the closure on shellfish gathering on Marsden and Mair banks.

Regards

Gwyneth Cooper
HOD Science and Senior Leader

REFINING NZ
Your Energy Hive

5 February 2020

Gilbert Paki
Chairman
Patuharakeke Trust Board
P O Box 558, Whangarei 0140

Via email: admin@patuharakeke.maori.nz

Tēnā koe Gilbert,

Closure of Marsden and Mair Banks to the take of all shellfish pursuant to S11 of The Fisheries Act 1996

Refining NZ operates New Zealand's only refinery in New Zealand which is located at Marsden Point, and is immediately adjacent to the area to which the closure relates.

Refining NZ recognises the high value of the marine environment and in particular that of Whangarei Harbour to the community, and supports the principles of good environmental management through engagement with stakeholders, and environmental protection measures supported by ongoing monitoring programmes of the marine environment. This includes assisting Patuharakeke with their kaitiakitanga obligations where possible. Mair and Marsden Banks have been subject to a shellfish collection closure of some form under the Fisheries Act 1996 since 2012. The objective being to assist with the recovery of the pipi populations on the bank.

Recent years saw the establishment of a mussel bed on the bank however this was soon decimated by over harvesting by the public in general. As a consequence, this led to the closure of the banks to all shellfish collection in 2018.

We understand that Patuharakeke have been undertaking several initiatives to assist with rehabilitation of the shellfish populations on the banks the closure (Rahui) being one of them. To date monitoring indicates that whiles there seems to be some improvement on shellfish stock on the banks they are certainly not at the stage where a sustainable harvest for customary purposes and by the community would be possible.

Part of ensuring the success of the closure as one of the mechanisms towards recovery of shellfish stocks is to ensure buy in by the community including in the way of compliance with the closure. It would seem there has been good success in this area.

To this end Refining NZ supports Patuharakeke's application to extend the closure as we see it as a necessary part of the recovery of shellfish stocks on the bank and recognises Patuharakeke's responsibilities of Kaitiakitanga.

Nāku noa, nā

Paul Zealand
Managing Director

Refining NZ
Port Marsden Highway, Ruakaka, Northland 0171, Private Bag 9024, Whangarei 0148, New Zealand
Telephone: +64 9 432 5100 Email: corporate@refiningnz.com www.refiningnz.com

Ruakaka Parish Residents and Ratepayers Association Inc.

PO Box 151, Ruakaka, 0151

21 January 2020

The Honourable Stuart Nash,

Minister of Fisheries,

Parliament Buildings,

Wellington

Dear Sir,

Re: The Continuation of the Prohibition on the Taking of Shellfish off Mair and Marsden Banks, Whangarei Harbour Entrance

Ruakaka Parish Residents and Ratepayers Association Inc. strongly supports the Application by Patuharakeke Iwi Trust Board to extend the present prohibition on the taking of shellfish from both Marsden and Mair Banks at the entrance to Whangarei Harbour for a further two years.

The sudden decrease in the huge stocks of pipi found on the Banks several years ago was very alarming and of very real concern to all of our residents and ratepayers.

The sudden re-appearance of mussels on the Banks was most gratifying but their disappearance was also very alarming. Over-harvesting would have played a significant part in their demise.

We are very concerned that monitoring of the Banks by Patuharakeke Iwi Trust has revealed that immature pipi are re-colonising the area but are dying before they reach maturity. We ask that your Ministry, in combination with other agencies, mount a full scale programme of investigation and research into this problem.

We hope that you will extend the Ban for a further two years and we will look forward to the time when we can again collect pipi and mussels from Mair and Marsden Banks.

Yours faithfully,

.....

(W.J. Daniel)

Secretary

Northport

Northport Limited

P O Box 44, Ruakaka 0151
New Zealand
Telephone + 64 9 432 5010
Facsimile + 64 9 432 8749

4 February 2020

Patuharakeke Te Iwi Trust Board
PO Box 557
Whangarei

Dear Sir/Madam

Re: rollover of the existing S186A Closure to the gathering of all shellfish at Marsden and Mair Banks

Northport is in support of the continued closure of Marsden and Mair Banks. Northport agrees that the closure should be granted to:

- Stop the juvenile pipi from being collected
- Prevent the total depletion of the pipi
- Allow time for the pipi bed to rejuvenate
- Allow for the mussel population to re-establish

We therefore fully support the initiatives that Patuharakeke have for this area and look forward to the successful rejuvenation of the shellfish stock levels back to harvestable densities that will benefit the local and wider community, hapu, and Iwi in the future.

Yours sincerely

Greg Blomfield
Terminal Facilities Manager
Northport Limited

Gmail Juliane Chetha[redacted]

RE: Patuharakeke Te Iwi Trust seeking support to continue rahui/closure at Marsden/Mair Bank for 2 more years

1 message

Brent Wilson <brent@marsdencovemarina.co.nz> Tue, Jan 14, 2020 at 3:23 PM
To: Juliane Chetham[redacted]

Good afternoon Juliane,

This email is written in total support of extending the closure/Rahui on Marsden/Mair Bank for any period required to replenish the shellfish grounds. This is a great initiative and well done!

Kind Regards,

Brent Wilson

Marina Complex Manager

Marsden Cove Marina

48 Rauiri Dr, Marsden Cove 0118

PO Box 196, Ruakaka 0118

VHF CH18

Mobile: 021 540 888

DDI: 09 4327740

Email: brent@marsdencovemarina.co.nz

Web: www.marsdencovemarina.co.nz

From: Juliane Chetham[redacted]
Sent: Tuesday, 14 January 2020 12:40 PM
Subject: Patuharakeke Te Iwi Trust seeking support to continue rahui/closure at Marsden/Mair Bank for 2 more years

Tēnā Koe

Please find a letter attached regarding extending the closure at Marsden/Mair Bank for 2 more years.

--

Nga Mihi

Juliane Chetham

Office: **09 437 7462** Mobile: **021 169 7162**

Address: 120 Abbey Caves Road, Whangarei, New Zealand

Chetham
CONSULTING

Gmail [redacted]

RE: Patuharakeke seeking letters of support from our whanaunga hapū/iwi to extend rahui/closure at Mair/Marsden Bank for another 2 years

Jim Smillie <jim@ngatiwai.iwi.nz> Tue, Jan 14, 2020 at 1:26 PM
To: Juliane Chetham [redacted]
Cc: Haydn Edmonds <haydn@ngatiwai.iwi.nz>

Kia ora Julianne

This is to advise that Ngatiwai has reviewed the content of your letter dated 14 January 2020 and is supportive of the extension of the rahui and the application to the Minister to extend the closure of the beds at Marsden and Mair Banks.

Ngā mihi

Jim Smillie

Acting General Manager

Ngātiwai Trust Board I 129 Port Road I P O Box 1332 I Whangarei 0140

Office: 09 4300 939 I DDI: 09 283 9448 I 027 575 4215

From: Juliane Chetham [redacted]
Sent: Tuesday, 14 January 2020 12:43 p.m.
Subject: Patuharakeke seeking letters of support from our whanaunga hapū/iwi to extend rahui/closure at Mair/Marsden Bank for another 2 years

Kia Ora

We would be grateful if you could take a look at the attached letter we have put together and provide us with a letter or email of support. Also happy to meet to discuss further if required.

--

Nga Mihi

Juliane Chetham

Office: **09 437 7462** Mobile: **021 169 7162**

Address: 120 Abbey Caves Road, Whangarei, New Zealand

Chetham
CONSULTING