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# Hauraki Gulf Forum Community Monitoring Programme annual report 2014-2015

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## Executive Summary

This report updates the Hauraki Gulf Forum (the Forum) on the Community Shellfish Monitoring (CSM) programme for the period 1 July 2014 to 30 June 2015.

Nine sites were monitored over the 2014/15 summer period by schools and community groups supported by Auckland Council, Waikato Regional Council (WRC) and the Department of Conservation (DoC). Data from the surveys has been analysed by the Ministry for Primary Industries (MPI). A total of 523 volunteers from ten schools and four community organisations, were involved in the programme. Sites are located in both the Auckland and Waikato regions, although a large portion of the sites are within the Auckland region.

Shellfish monitoring results are presented for the nine sites that were surveyed. No region-wide trends in density over time are apparent from the data with most sites indicating natural fluctuations around an average. The most notable change in these time series is the cockle mortality in early 2009 at Lews Bay (Whangateau Harbour). At this location subsequent survey results indicate cockle densities are still about half of what they were before the mortality event.

Auckland Council and DoC have recently had a reduction in funding and staffing resource available to support the delivery and management of the CSM programme. This has implications for monitoring over summer 2015/16 and the future continuation of the programme. Auckland Council will facilitate discussions about potential funding and support options for the future of the programme and report back to the Forum in June 2016 on results.

## Recommendations

- a) That the report be received.
- b) That the Forum note the outcome of the Auckland Council Long Term Plan (LTP) and the implications it will have on the programme.
- c) That the Forum note that Auckland Council will facilitate discussions on potential options for the future of the programme and report back to the Forum in June 2016 on results.

## Background

In 2006 the Forum agreed to lead and support a community/iwi/school-based intertidal shellfish monitoring programme to detect trends in shellfish populations at selected beaches. Since the establishment of the programme, the number of sites that have been monitored by the community has increased from three to 20, however not all of these sites have been surveyed each year. Survey sites are located in both the Auckland and Waikato regions with a large portion of the sites being within the Auckland region. The surveys are undertaken by schools, community organisations and iwi supported by Auckland Council, WRC and DoC. The data from the surveys is analysed by MPI.

## Analysis

### Sites Monitored

Over the 2014-2015 summer months 523 volunteers, including students, teachers and parents from ten schools and volunteers from four community organisations were involved in surveys at 9 sites as listed in the table below.

Survey Site	Community Group/Iwi/School
Okahu Bay	Ngāti Whātua o Ōrākei, Ōrākei School, St Joseph's School, St Thomas's School.
Whangateau Harbour, Lews Bay	Whangateau Harbour Care with Mahurangi College
Sandspit	Sandspit SOS Inc with Kelston Boys High
Sandspit - Rainbow's End	Sandspit SOS Inc with Kelston Boys High
Pine Harbour	Maraetai Beach School
Beachlands	Beachlands School
Kawakawa Bay West	Clevedon School
Whangapoua Harbour, Great Barrier	Okiwa School, Kaitoki School, Mulberry Grove School
Wharekawa (Opoutere)	Ecoquest Foundation

### Auckland Council supported monitoring

Auckland Council has historically supported community shellfish monitoring at 15 sites in the Auckland Region. Currently 9 of these sites are active and have been surveyed most years since community monitoring was initiated in 2006.

Since monitoring was established, five sites have become inactive. Three sites (Umupuia Beach, Duder Regional Park and Kawakawa Bay East) were put on hold at the request of Te Waka Totara Trust (Ngai Tai). The Trust was concerned about monitoring at Umupuia being perceived by on-

lookers as harvesting, subsequently impacting on compliance with the rahui that is in place there. At Duder Regional Park and Kawakawa Bay East the iwi have concerns about the potential for the exposure of koiwi (ancestral bones) in the intertidal area and the spiritual and cultural safety of children.

The Ngaio Bay survey with the senior biology class from Mahurangi College has been discontinued due to a change in the schools' curriculum programme. The Whangateau Harbour Causeway site will continue to be surveyed once every 5 years by the Harbourcare group. The group is focusing their attention on two other sites in the harbour which are more interesting and rewarding for working with students from Mahurangi College.

The seasonal closure at Cackle Bay is continuing. The area is closed for the taking of all shellfish from 1 October to 30 April each year during the times when harvesting pressures are heaviest. Cackle Bay was not monitored this year due to a drop in engagement by the School.

#### DOC supported monitoring

The Great Barrier Area Office has supported annual shellfish monitoring at Whangapoua Harbour since 2007 with the three island schools.

The Te Matuku Bay site has not been surveyed since 2011 due to budget limitations at DoC.

Shellfish monitoring at Gardiners Gap on Motutapu Island has not been continued as the Motutapu Outdoor Education Camp have decided not to incorporate shellfish monitoring into their environmental education programme.

#### Independent community monitoring

Cheltenham Beach Caretakers have not carried out a survey in the last three years as they are finding it difficult to continue to engage volunteers in monitoring when cockle densities remain very low.

#### Waikato Region supported monitoring

Previously there were two community shellfish monitoring sites within the Waikato Region, at Wharekawa and Whitianga Estuaries on the eastern coast of the Coromandel Peninsula. The Waikato Regional Council also undertakes regular state of the environment monitoring (which includes shellfish monitoring) at five sites in the Firth of Thames. Tairua estuary has recently been added into the long-term monitoring programme.

A survey did not occur at Whitianga this year due to the loss of the lead teacher who had been driving the programme with the school. Ongoing engagement with the school continues and they may become involved again.

### **Survey Results - Shellfish Population Density and Size Class Trends**

Attached is a series of charts showing the changes in shellfish density and size frequencies from the sites monitored during summer 14/15. An interpretation of the results is also provided.

At most sampling sites a variety of shellfish species are recorded in addition to cockles and pipi, including wedge shells, nut shells and gastropods. These species are not reported as the sampling programme is focused on the dominant shellfish species, which in most cases are cockles.

Early on in the time series it is easy to report trends which are later shown to be part of natural fluctuations in abundance. Time series' become increasingly valuable as the length of time monitored increases. Therefore groups are encouraged to continue their surveying.

No region-wide trends in density over time are apparent from the data, with most sites showing natural fluctuations around an average. The most notable change in these time series is the cockle mortality in early 2009 at Lews Bay in the Whangateau Harbour. The site experienced substantial decline from 750 cockles per m<sup>2</sup> (considered high compared to other monitored sites) to 300 cockles per m<sup>2</sup> between January and May 2009. This decline was caused by a combination of naturally occurring effects including a coccidian parasite and a mycobacterium. This effect was possibly exacerbated by heat stress<sup>1</sup>. Surveys carried out in December 2012 showed the first marked density increase since 2009. This was driven by a pulse of recruits. However, this was followed by a slight decrease in cockle density in the following year (2013 survey).

The largest densities of cockles from the monitored sites in the past year were found at Sandspit Rainbow's End, which showed a density of 1656 per m<sup>2</sup> (refer figure 9). Although high in density, this site supported smaller cockles (the most common size at both of this site was 10-20 mm long). The smaller cockle sizes are generally less preferred by harvesters. The greatest densities of larger sized cockles (greater than 30 mm in length) were seen at Lews Bay in Whangateau Harbour (refer figure 12).

The site with the most significant increase in densities over the last year has been at Pine Harbour with cockle densities increasing from 190 per m<sup>2</sup> to 380 per m<sup>2</sup> since the previous year's survey (refer figure 5). Okahu Bay has also shown a general upward trend with densities increasing over that last two years (refer figure 3). These increases in densities suggest a pulse in recruitment.

Cockle density can be highly variable, both spatially and temporarily. Recruitment in cockles is sporadic so often recruitment 'pulses' of large numbers of juveniles will enter the population which may, or may not, grow into adults at that site. Cockles grow the best in sandy sheltered sites with high current flow so these sites usually support the largest cockles. Changes in shellfish densities or sizes are due to either harvesting or environmental effects (position relative to tidal ranges, changes in sediment grain size, food supply, competition etc). Harvesting will often result in a decline in the number of the largest cockles (as harvesters usually preferentially take larger cockles).

Environmental effects can also cause a decline in densities of large cockles. For example, naturally increasing deposition of fine sediments at a site may be accelerated by human activities (e.g. excavations upstream). This can lead to a siltier and shallower cockle habitat, influencing the site's ability to support larger sized cockles.

Variability in recruitment, and other changes to a habitat, means that it is not always easy to identify the cause of declines in intertidal shellfish. This makes it difficult for implementing the best management response. Some sites where fishing has ceased cockle beds have never recovered to their former health (e.g. Cheltenham beach). This indicates that something about the cockle habitat conditions has changed at the site.

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<sup>1</sup> <http://www.biosecurity.govt.nz/media/21-08-09/cockle-death-whangateau-estuary>

## **Financial and Resourcing Implications**

### Auckland Council supported monitoring

In July 2015 Auckland Council announced its Long Term Plan budget for the next 10 years including a reduction in the total rates rise. This impacted budgets across Council and in July 2015 the CSM programme funding ceased and with it the programme management role.

This loss of funding has resulted in a significant drop in the level of service previously provided to manage and deliver the programme in Auckland. For the 2015/16 summer monitoring Auckland Council is providing support to the management of four sites (Okahu Bay, Whangateau Lews Bay, Sandspit, and Rainbows End) and this is only due to the extremely active nature of the community groups and schools who monitor these sites. It is uncertain if this support will continue to be available. However, it is noted that:

- Evaluation of the programme by teachers in past years has shown it is well received by the schools involved.
- Connecting to nature (people, education, citizen science) and the effects of land use activities on waterways and the sea are areas of focus identified within the Auckland Growing Greener strategy to implement the Auckland Plan.

Auckland Council will facilitate discussions early next year looking at potential funding and support options for the future of the programme. This will involve current and potential future project partners (including private sector) and Auckland Council Local Boards. A report on the results of this will be reported back to the Forum in June 2016.

### DoC supported monitoring

Over the past two years DoC have received budget and staffing cuts, meaning an impact on their ability to support the programme. It is expected similar constraints will occur into the future. A lack of funding will prevent monitoring over the 2015/16 summer period even though strong community interest remains.

### Waikato Region supported monitoring

Waikato Regional Council will continue to deliver the programme in their area while they have engaged community or schools.

## **Legal and Legislative Implications**

There are not considered to be legal or legislative implications arising from the report.

## **Consultation**

This report was developed with an officers group from participating agencies.

## **Attachments**

1. Shellfish monitoring results - population density trends and size frequency distribution

## Signatories

Authors	Hazel Meadows, Environmental Initiatives Team Manager, Auckland Council, Richard Ford, Ministry for Primary Industries
Authorisers	Gael Ogilvie, Manager Environmental Services, Auckland Council Hilke Giles, Team Leader Coasts, Land and Wetlands Programme, Waikato Regional Council

### ATTACHMENT 1: Survey Results

#### Methodology and Analysis

The data collected by the various community surveys has been groomed for this report and analysed by Ministry of Primary Industry (MPI) fisheries scientists. This ensures that the results present accurate trend information.

All data collected was analysed using a stratified analysis. This ensures compatibility with MPI surveys and allows all sites surveyed to be utilized in the analysis. The stratified analysis subdivides the site into two areas (or strata) of similar internal density (a high and a low density strata). The density in each strata is then calculated and the resulting densities are combined based on their relative area to get an overall site density. This usually increases the accuracy of our estimate of density (decreases the size of the error bars). Where possible a set of consistent stations at a site were also analysed over time and the results compared to the stratified analysis. Often stratified analyses show lower densities than analyses of consistent sites as they sometimes display results from a larger area that incorporates less favourable shellfish habitat. In all cases where a stratified analysis was completed trends generated from consistent and stratified analyses were similar, therefore the stratified analysis is presented.

For length frequency plots variable numbers of sites can contribute to these plots over time (particularly for site where a stratified analysis is used). Therefore the relative proportions of bars to each other, within a graph, over time within a beach are meaningful; however the absolute size of bars may not correspond to patterns in density, as surveyed area sometimes changes.

Some of the communities monitoring sites are also periodically monitored by MPI as part of its obligations under the Fisheries Act 1996. The research methods used by MPI are different to those used by the community monitoring programme; therefore the results of MPI research are not directly comparable to the results from community groups. However where monitoring programmes overlap comment is made in this report on similarities or differences in trends. Sites that are monitored by both community groups and MPI can validate the findings of both groups, by comparing general trends and estimates.

At most sampling sites a variety of shellfish species are recorded in addition to cockles and pipi, including wedge shells, nut shells and gastropods however these are not analysed as the analysis is focused on the dominant shellfish species, which in most cases is cockles.

*Note: The scale on the y-axis changes between sites and the dots on the density plots are the estimated density and the length of the vertical bars represents the extent of the uncertainty (95% confidence intervals) for that estimate.*

## Beachlands

Beachlands has been monitored by Beachlands School since 2008, supported by Auckland Council. Apart from an initially low density (137 per m<sup>2</sup> in 2008), the cockle density has been relatively stable around an average of 230 per m<sup>2</sup>. From 2008 to 2015, the population had been consistently dominated by cockles of 15-25mm in size, however in 2015 the cockle size increased to most being larger than 20mm.

Figure 1: Cockle density at Beachlands, 2008-2015

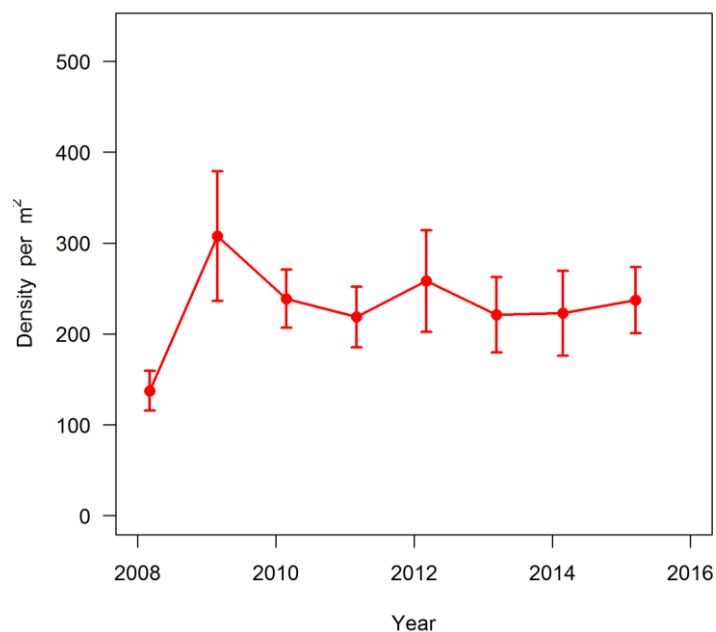
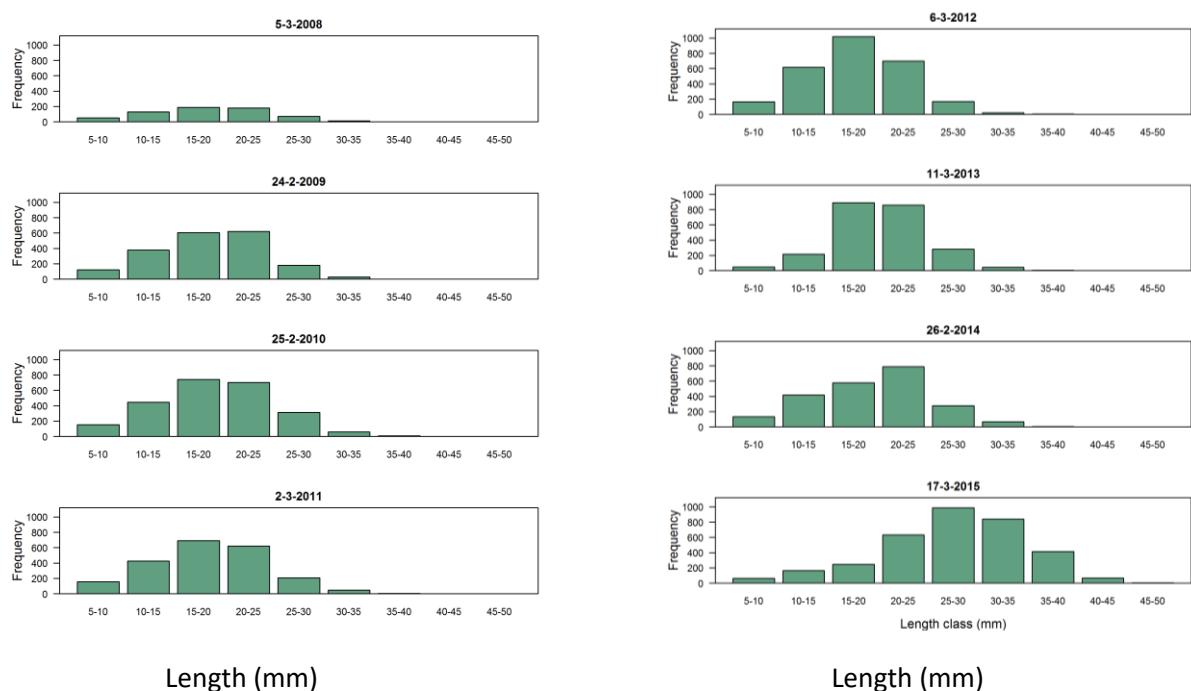


Figure 2: Cockle length frequencies at Beachlands, 2008 – 2015





## Okahu Bay

Okahu Bay has been monitored since September 2007 by Ngāti Whātua o Ōrākei, and in 2011/12 Ōrākei School also became involved. Cockle densities have generally trended upwards at this site, with increases in density recorded at the last two monitoring times. The most common size of cockles has been highly variable over these dates, between 5-20 mm in length; the fluctuations are likely to be due in part to pulses of recruits.

Figure 3: Cockle density at Okahu Bay, 2007-2014

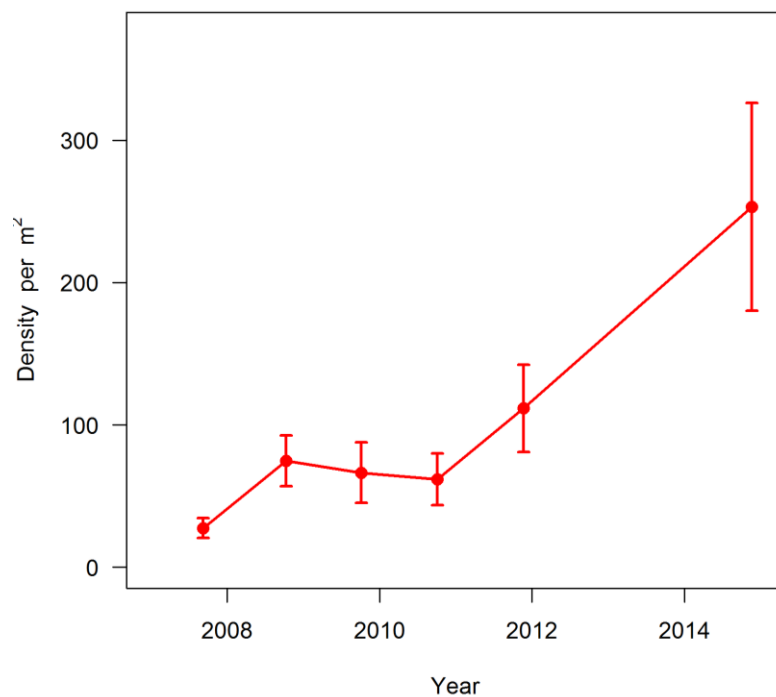
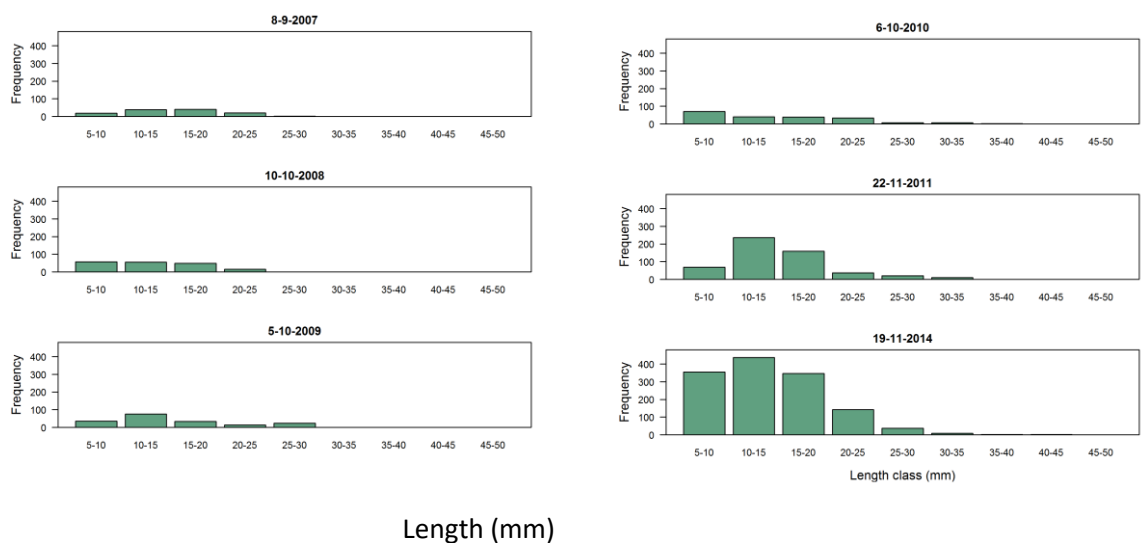


Figure 4: Cockle length frequencies at Okahu Bay, 2007-2014



## Pine Harbour

Pine Harbour has been monitored since March 2010 by Maraetai Beach School. There has been minimal change in the density of cockles from 2010 until 2014. In the 2015 survey the cockle density increased substantially from approximately 190 per m<sup>2</sup> to 380 per m<sup>2</sup>. This increase in density was mainly observed in the juvenile cockles, i.e. cockles smaller than 15 mm, which indicates a pulse in recruitment.

Figure 5: Cockle density at Pine Harbour, 2010- 2015

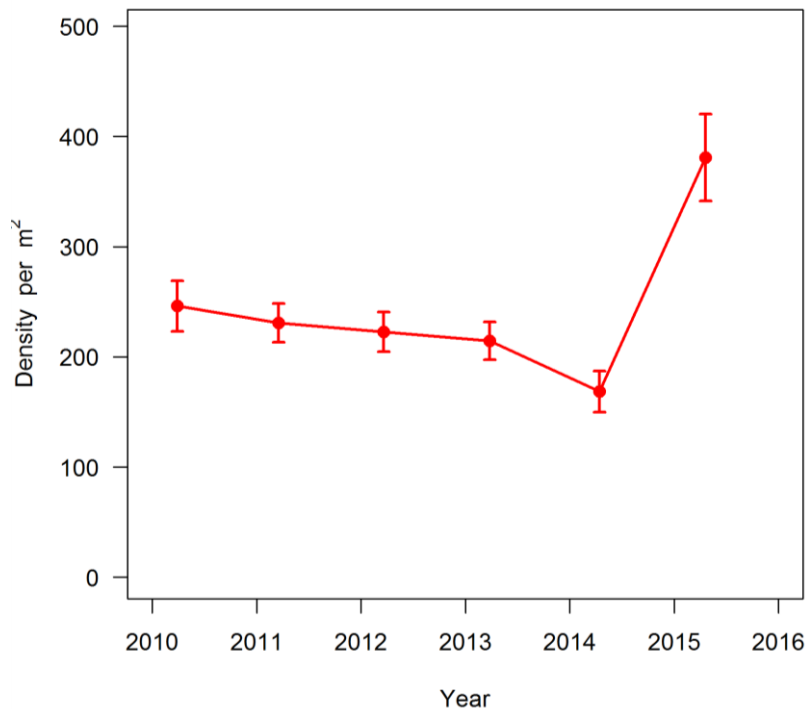
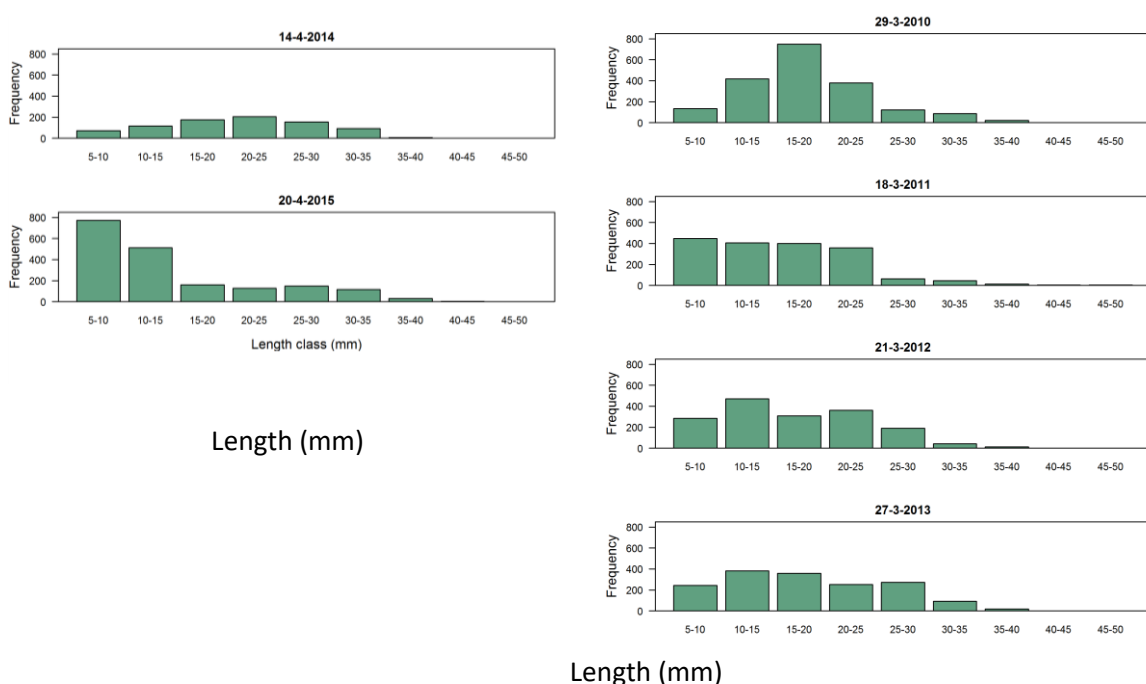


Figure 6: Cockle length frequencies at Pine Harbour, 2010- 2015



## Sandspit

Sandspit harbour was sampled from 2010 to 2013 by the Matakana Estuary Care group in conjunction with Kaurilands School. Over that time density has varied from 502 to 665 per m<sup>2</sup>. In all four surveys, the most common size of cockle was 15-20mm in length.

Figure 7: Cockle density at Sandspit, 2010- 2014

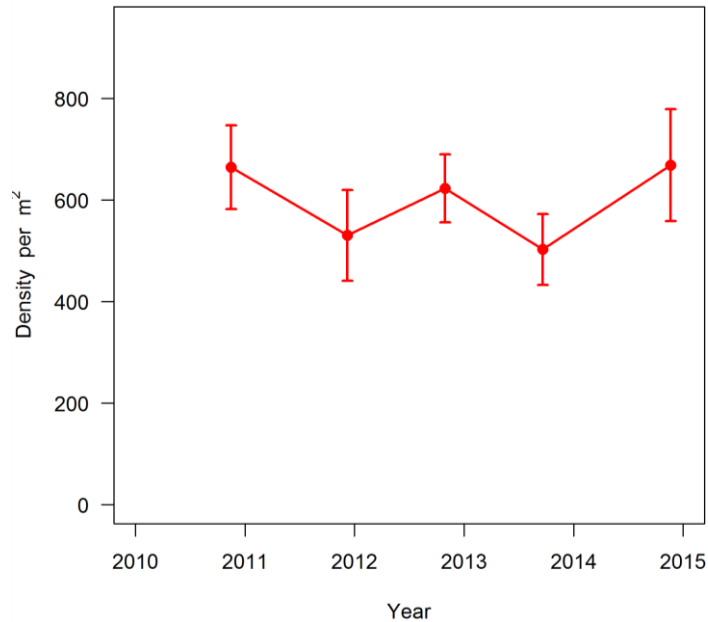
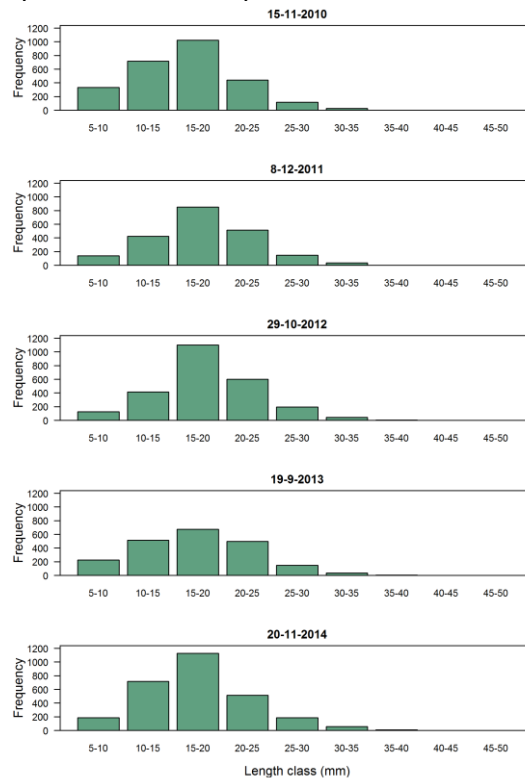


Figure 8: Cockle length frequencies at Sandspit, 2010- 2014



Length (mm)

## Sandspit - Rainbow's End

Rainbow's End in the Mahurangi Harbour was first sampled in 2014 by Auckland Council. Total cockle density was 1656 per m<sup>2</sup>, and cockles at this site are most commonly 10-20mm in length.

Figure 9: Cockle density at Rainbow's End, 2014

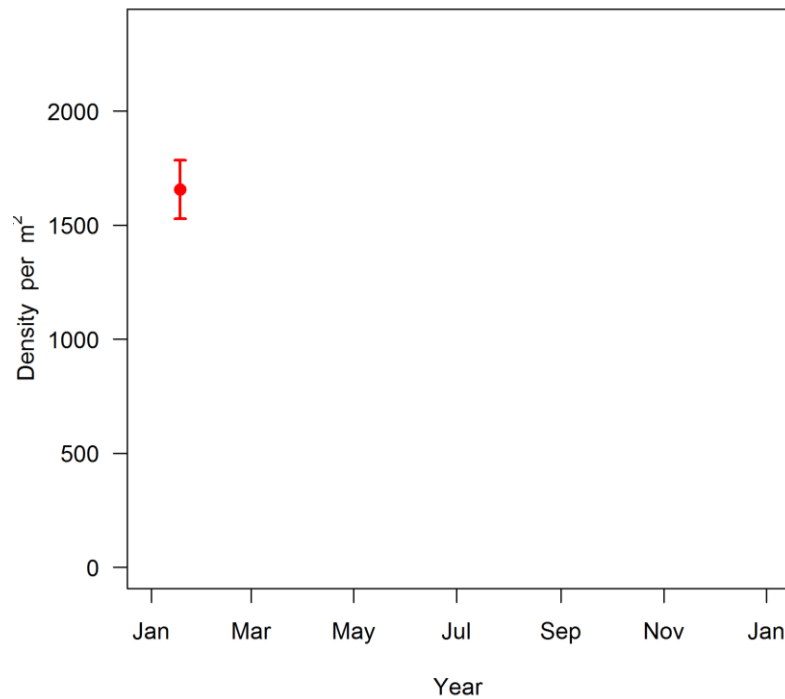
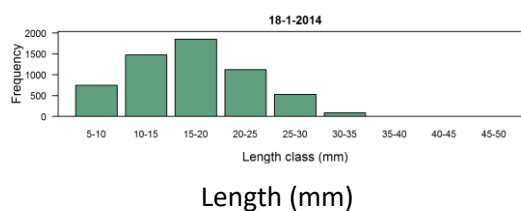


Figure 10: Cockle length frequencies at Rainbow's End, 2014



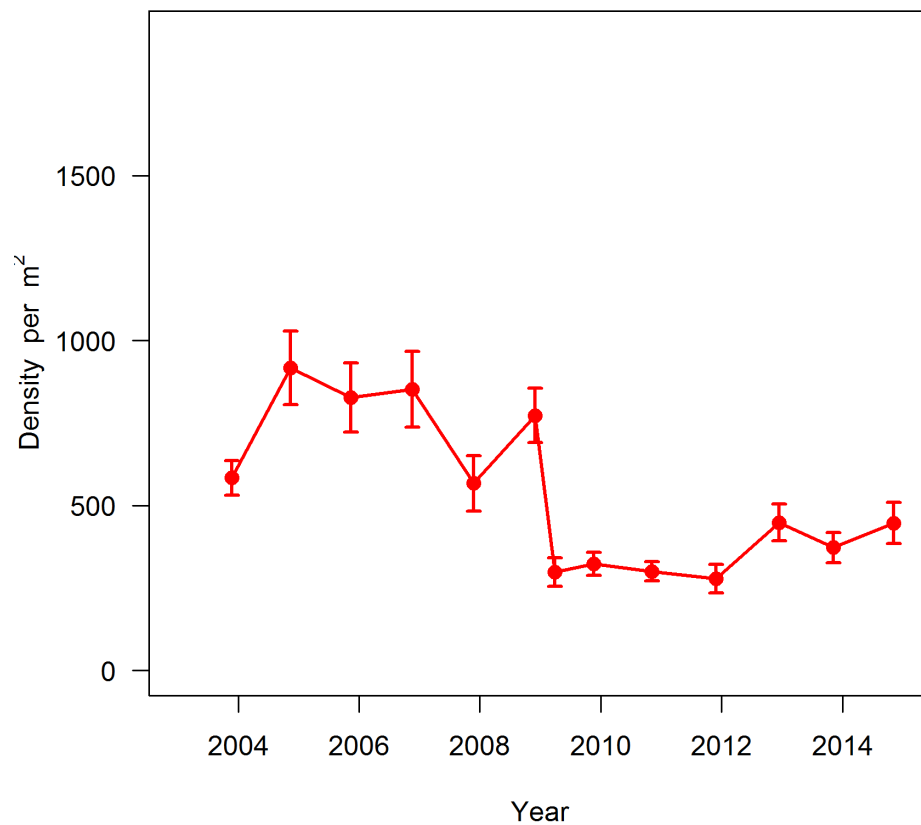
## Whangateau Harbour—Lews Bay

The Lews Bay site in Whangateau Harbour has been monitored since November 2003 by the Whangateau Harbourcare Group with support from Mahurangi College since 2010. From 2003 until late 2008, densities fluctuated without trend around an average of 753 per m<sup>2</sup>. A mortality event occurred in early 2009, and from then until December 2011 densities have been stable around an average of 300 per m<sup>2</sup> (less than half the previous density). Since 2012 the density of cockles has been slightly variable, but overall the density trend has been increasing. Before the 2009 mortality event, the most common cockles were those in the 30-35mm size category. After the mortality event, the most common cockle size decreased,

and has varied as pulses of recruits have moved through the population.

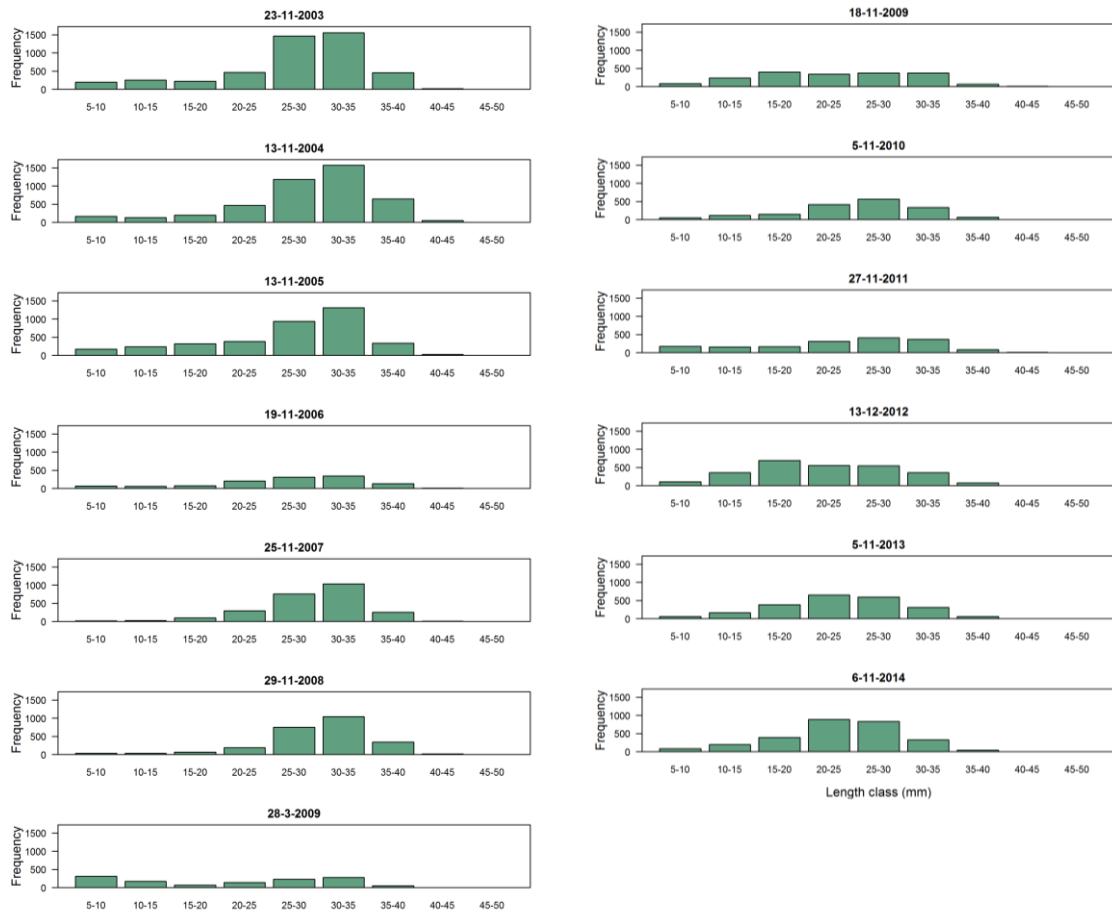
The MPI survey in Whangateau Harbour surveys using slightly different methods and a broader area than just Lews bay. Lews bay had the highest density of adult cockles and was hardest hit by the mortality event. This survey showed a decrease in density from 2004 to 2010 (from 544 to 369 per m<sup>2</sup>) and the survey extent was dominated by cockles in the 18 – 22 mm size range. The cockle density has shown a slow recovery since the mortality event. A similar trend in densities is seen between the two surveys, but the community survey is more likely to show a marked effect from the mortality event.

Figure 11: Cockle density at Whangateau Harbour— Lews Bay, 2003 – 2014



See the next page for length frequency plots for this site.

Figure 12: Cockle length frequencies at Whangateau Harbour— Lews Bay, 2003 – 2014



Length (mm)

## Wharekawa

Wharekawa has been sampled since September 2010 by Ecoquest Foundation with support from Waikato Regional Council. Over that time the cockle density has ranged from approximately 500 to 1000 per m<sup>2</sup>. Throughout this time the most common cockles surveyed have been 10-20mm long.

Figure 13: Cockle density at Wharekawa, 2010 - 2015

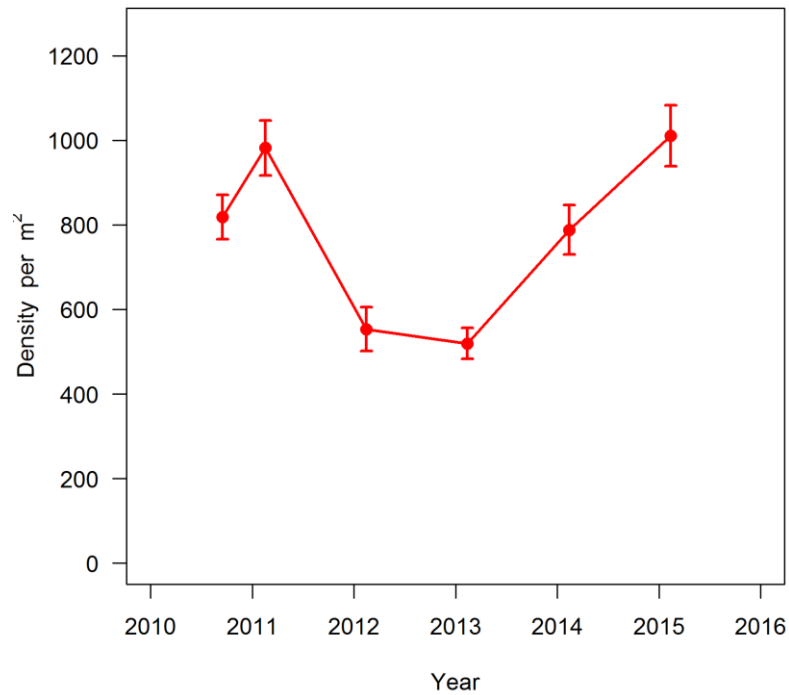


Figure 14: Cockle length frequencies at Wharekawa, 2010 – 2015

