

X.1 INTERTIDAL SHELLFISH MONITORING PROJECT

P266-04

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The report has been prepared in accordance with the provisions of section 76 and 77 of the Local Government Act 2002, having regard to section 79.

STRATEGIC FIT – LINKS TO THE HAURAKI GULF FORUM STRATEGIC ISSUES

<input type="checkbox"/> Communication	<input type="checkbox"/> Co-operation
<input type="checkbox"/> Co-ordination	<input type="checkbox"/> Cultural heritage
<input type="checkbox"/> Water quality and sedimentation	<input type="checkbox"/> Coastal hazards
<input checked="" type="checkbox"/> Biological diversity and fisheries	<input type="checkbox"/> Public access
<input type="checkbox"/> Natural character and landscape	<input checked="" type="checkbox"/> Knowledge and monitoring
<input checked="" type="checkbox"/> Relationships with tangata whenua and community	

X.1.1 EXECUTIVE SUMMARY

The Hauraki Gulf Forum intertidal shellfish monitoring programme commenced in 2006 with three sites. The programme has now grown to include 13 sites. Monitoring has also been extended to include parts of the Waikato Region. In 2008/09 400 volunteers, including those from nine schools, were involved in the programme.

The programme is starting to develop useful long term monitoring information. This year the monitoring detected a significant die-off of cockles at Whangateau Harbour. The cause of the die-off has not yet been determined. MFish is working with stakeholders to identify appropriate management responses. The monitoring also detected a significant recruitment of cockles at a number of site bordering Manukau city.

NIWA has linked its estuarine ecodiagnosics programme to the monitoring programme. This programme has analysed water and sediment quality and shellfish health at three sites; Okahu Bay, Kawakawa Bay and Beachlands. A summary of the results is provided.

X.1.2 PURPOSE

This report updates the Forum with the results from its intertidal shellfish monitoring programme. In particular, the report addresses:

- sites monitored
- population density trends
- size class information
- comments on monitoring methodologies
- monitoring information and management
- environmental health information

X.1.3 BACKGROUND

Intertidal shellfish are a valued fishery resource (pātaka kai). They are valued as food by recreational and customary Maori fishers, as taonga by Maori, and as an

indicator of the general well-being of the environment by others. Shellfish are also important within the food chain and make an important ecological contribution.

In 2006 the Forum determined to lead and support a community/iwi/school based intertidal shellfish monitoring programme to detect trends in shellfish populations at selected beaches. A number of existing shellfish monitoring programmes undertaken under the leadership of Forum constituents at Te Matuku Bay, Cockle Bay, and Whangateau Harbour, were brought under the umbrella of the programme.

The Ministry of Fisheries also operates an intertidal shellfish monitoring programme as part of its responsibilities under the Fisheries Act. Both programmes are co-ordinated to support each other and ministry scientists analyse data from the Forum's community base programme.

This report describes the trends in shellfish populations. Previously reports on the programme were presented to the Forum in June 2007 meeting and in March 2008.

X.1.4 MAIN REPORT

Sites Monitored

Since the establishment of the Forum's shellfish monitoring programme in 2006, the number of sites monitored has increased from three to 13. Sites are now located within both the Auckland and Waikato regions.

Over the summer of 2008/09, community surveys have involved over 400 volunteers including students from nine schools.

A map showing the locations of the monitoring sites is attached as Appendix 1.

Population Density Trends

Shellfish density can be highly variable, both spatially and temporarily. The intertidal shellfish monitoring programme is largely based on the monitoring of cockles. Cockles demonstrate less natural variability, less mobility and are less subtidal than pipi and tuatua which makes them easier to monitor using a community based programme.

It is important to have some idea of what level of variability is "natural" and what level of variability is beyond that normally expected. A number of factors, both natural and human, can affect variability. High levels of variability bring uncertainty into predicting trends.

In general, uncertainty is reduced by increasing the number of samples at any one location, by making the locations of each sampling site consistent across time, and by having a long time sequence of monitoring.

The HGF programme is still relatively new. It has only been undertaken since 2006. Few sites have a sufficiently long monitoring record to show reliable trends. An exception to this is Cockle Bay and Lews Bay, Whangateau Harbour. Both these areas had pre-existing monitoring programmes and have monitoring information covering four to five years.

A brief summary of the population trends for each site is given in Appendix 2.

A series of charts are provided as Appendix 3 showing the changes in shellfish density at the various monitoring locations.

Whangateau Harbour

Visual observations and monitoring by Whangateau HarbourCare Group and others has shown a significant die off of cockles in the Whangateau Harbour. The die-off was first recorded in January 2009 and extended into late Autumn.

Monitoring by Whangateau HarbourCare Group documented the early stages of the die-off. Monitoring by the University of Waikato documented its later stages. This monitoring suggests that 98 percent of cockles greater than 30mm shell length have died and about 68 percent of the total population in Lews Bay have perished. The die-off appears to extend over much of the harbour. The charts in Appendix 2 show the die-off as detected by the Whangateau HarbourCare Group.

The cause of the die-off is yet to be determined. Biosecurity New Zealand is currently analysing samples. Initial indications are that it is likely to be a result of a natural pathogen, but other factors such as heat stress may have played some role.

The Ministry is working with Tangata Whenua (Ngati Manuhiri), the Whangateau HarbourCare Group, the ARC and local scientists (Dr. Karen Tricklebank and others) to determine appropriate responses to the die-off.

Size Class information

The size class information is one indication of the “wellness” of the population. Natural populations generally show a broad distribution of age classes, however, this can be affected by a number of factors. Human harvest is generally size selective, and populations subject to harvest pressure tend to show a decline in the number of larger animals. Environmental issues may also influence this. It is likely that a number of sites where cockles larger than 30mm are uncommon or are reducing may be experiencing such effects.

It is encouraging to see that a number of locations, Beachlands, Okahu Bay, Duder, Cockle Bay, have been the subject of significant recruitment. Hopefully this recruitment will flow on to an increase in the number of larger cockles.

A brief summary of the size class trends is given in Appendix 2.

A series of charts showing size frequencies from monitored sites are provided in Appendix 3. These charts provide an account of the proportion of the population within each size class. It is important to note that they give no indication of population numbers.

Comments on Monitoring Methodologies

A key to the success of the programme is quality management. Generally the monitoring undertaken under the project shows a good level of consistency and structure. This enables the resultant information to be comparable across years and trends to be drawn.

There are some minor differences between some of the earlier programmes and those set up by the Forum. However, so long as consistency in methodology is maintained within these programmes, data will be comparable and useful for trend analysis.

One area where some inconsistency between years occurs is that of site selection within years. The level of work that can be completed on any one day is dependent on the number of community volunteers that turn up. If insufficient people are available, the co-ordinator must reduce the number of sites monitored.

Where resources are insufficient to monitor all sites, it is being recommended that organisers give priority to sites with the longest monitoring history. This will allow for greater consistency across years and the delivery of best comparable data for trend analysis.

Monitoring Information and Management

Information from the monitoring programme has been greatly influential in shellfish management within the Hauraki Gulf Marine Park. Data from the HGF programme was used to support a two year closure to cockle harvesting at Umupuia Beach and was the primary information used in the establishment of the seasonal closure to shellfish harvesting at Cockle Bay. Both of these controls commenced in late 2008.

The Whangateau Harbour information has helped to determine the magnitude of the cockle die-off and will be significant for informing any management decisions.

Environmental Health Information

At three of the sites (Okahu, Kawakawa Bay and Beachlands) shellfish, water and sediment samples were collected in order to build a picture of the ecological health of these areas. This work was carried out by NIWA as part of its Estuarine Ecodiagnosics research into biomarkers of shellfish health in urban estuaries.

In addition to shellfish numbers and size frequency, the ecological health assessment included:

- water quality – pH, salinity, nutrients and bacteria,
- sediment quality – metal concentrations, organic matter content and chlorophyll content,
- Shellfish health and quantity – abundance, condition index (“fatness”), tissue metal concentrations, stress proteins, and detoxifying enzyme activity.

The following is a summary of the results.

Water quality results

Okahu Bay	No unusual features.
Beachlands	Nutrient concentrations within expected range. E.Cole counts were well above recreational contact guidelines.
Kawakawa Bay	Nutrient concentrations slightly elevated. Both bacterial indicators above contact recreation guidelines.

Sediment quality results

Heavy metals	Okahu Bay, Beachlands and Kawakawa Bay had sediment concentrations of zinc, lead, copper, cadmium and mercury below ARC Response Criterion (ERC green value).
Sediment pigment	Okahu Bay had low organic carbon content and generally low chlorophyll and phaeopigment content at the western end. Higher sediment chlorophyll and organic content at the eastern end of the beach. Consistent with finer sediments and the presence of seagrass. Sediment pigments were not measured at Beachlands or Kawakawa Bay. Organic content was low at both locations.

Shellfish health indicators

Okahu Bay	Tissue cadmium, nickel and zinc levels comparable to Waiheke Island control. Elevated tissue levels of chromium, cobalt, copper, lead and mercury. Generally the western end had lower levels than the eastern end (near outfall).
Beachlands/ Kawakawa Bay	Low metal concentrations typical of non-contaminated sites.

Condition index

Okahu Bay	Condition index was generally high and comparable with low impacted sites. Cockles appeared well nourished. Slightly lower condition at the eastern end.
Beachlands/ Kawakawa Bay	Condition indices calculated differently to Okahu Bay. Okahu Bay may have been calculated incorrectly. Beachlands and Kawakawa Bay may have higher condition index. Volume condition index suggests that Kawakawa Bay cockles were “fatter” than Beachlands cockles. Cockles in Transect 1 at Kawakawa Bay were fatter than those at Transect 6. Weight condition index for both sites were similar. Cockle condition index for Beachlands was similar across all transects.

Cockle biomarkers

Okahu Bay	High to medium biomarker health score (high is good). Cockles at the western end of the beach had more favourable scores than those at the eastern end (near outfall).
Beachlands/ Kawakawa Bay	Biomarkers were not measured.

X.1.5 FINANCIAL IMPLICATIONS

The budget to continue the shellfish project for the 2009/10 period has been approved in the Forum’s 2009/10 annual planning process. This budget covers the co-ordination of the project. Individual constituent agencies will need to continue to provide practical and technical support for community/school surveys.

X.1.6 LEGAL IMPLICATIONS

There are no legal implications arising from this report.

X.1.7 CONSULTATION

Consultation on the project was undertaken through the project’s steering committee.

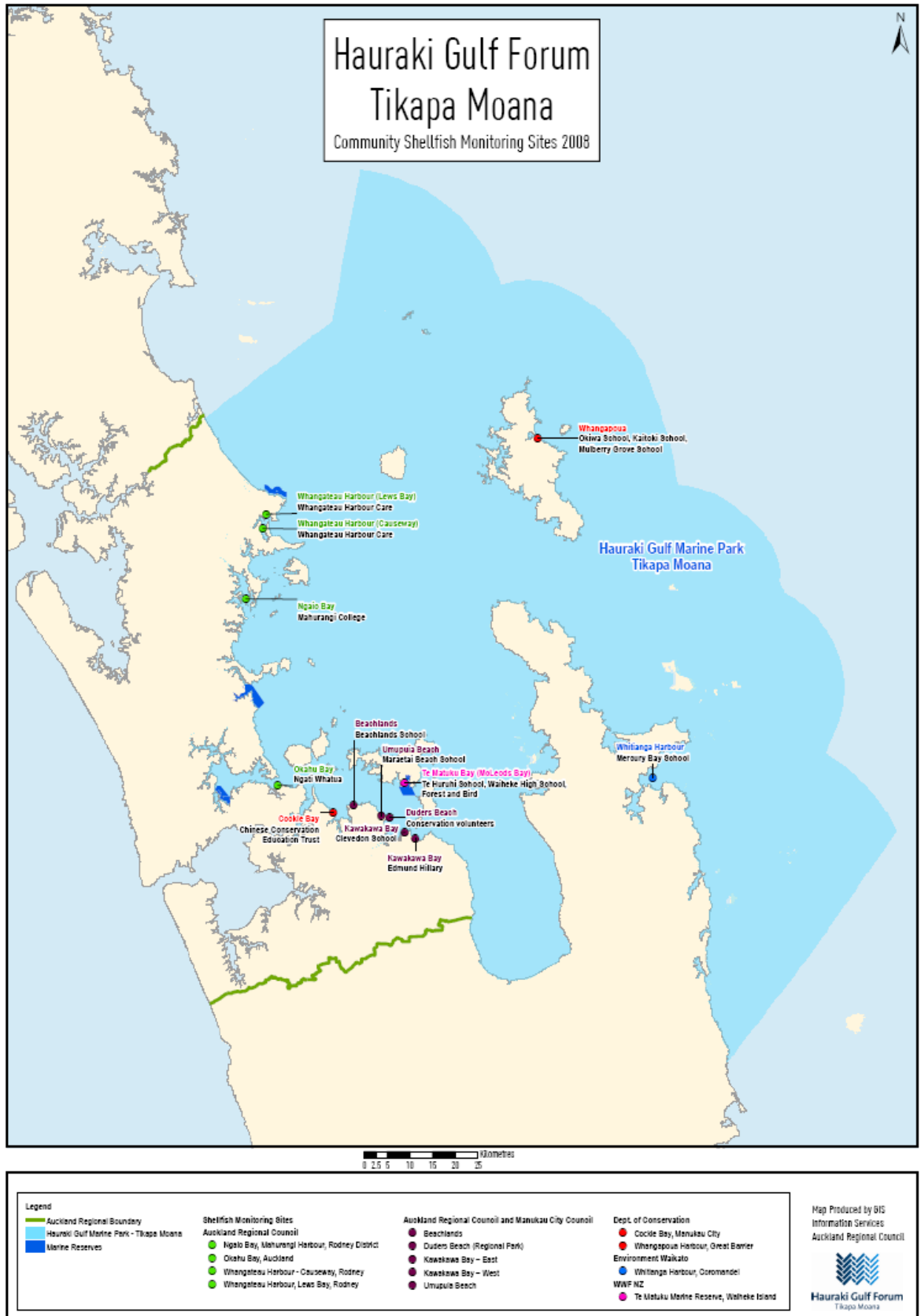
ATTACHMENTS

- Appendix 1: Map showing the locations of the monitored sites

- Appendix 2: Summary of sites, and trend information
- Appendix 3: Charts showing shellfish density trends and size frequencies of shellfish at monitored sites.

RECOMMENDATION

- a) That the report be received.



HAURAKI GULF FORUM – SHELLFISH MONITORING PROGRAMME - SUMMARY OF MONITORED SITES				
Monitoring Site	Started	Recent	Events	Population Trends
Whangateau - Causeway	2006	2008	3	Relatively stable. 2009 cockle die-off effect unknown. Low proportion of large cockles.
Whangateau – Lews Bay	2004	2009	5	Population was dominated by large cockles. Significant die-off in 2009. Decrease in cockles greater than 30mm.
Ngaio Bay		2009	2	Monitored twice (173 cockles/m ²). Small proportion of large cockles.
Okahu Bay	2007	2008	2	Monitored twice, limited trend information. Large juvenile settlement in 2008. Possible population increase. Lack of large cockles.
Cockle Bay	2007	2008	4 (+1)	Decline in population. Some inconsistency in monitoring locations. Consistently high numbers of adult cockles. Effect of seasonal closure not yet reflected in results.
Beachlands/ Beachlands – Motukaraka	2008	2009	2	Monitored twice. Limited trend information. Motukaraka shows a possible population decrease. Motukaraka has a greater number of large cockles than Beachlands. Beachlands shows a population increase as a result of cockle recruitment.
Umupuia Beach	2006	2008	3	Some correlation with MFish survey, but does not show strong downward trend. Numbers of large cockles declining.
Duder	2008	2009	2	Monitored twice. Limited trend information. Possible increase in population associated with settlement of juveniles. Low numbers of large cockles.
Kawakawa Bay - West	2007	2009	3	Relatively consistent population. Greater proportion of large cockles compared to Kawakawa East. Evidence of recruitment in 2009.
Kawakawa Bay - East	2006	2009	3	Variable population. No real population trends. Small number of large cockles. Good recruitment in 2009.
Te Matuku Bay	2007	2008	2	Monitored twice. Low numbers of cockles and highly variable. Consistently high proportion of large cockles.
Whangapoua (GBI)	2007	2009	2	Monitored twice. Limited trend information. Possible increase in population, but monitoring location issues. Low numbers of large cockles.
Whitianga	2008	2009	2	Monitored twice. Average density 496 cockles/m ² . Cockles generally small. Absence of large cockles

