



Shellfish Monitoring Student Workbook:

Biology NCEA Level 2

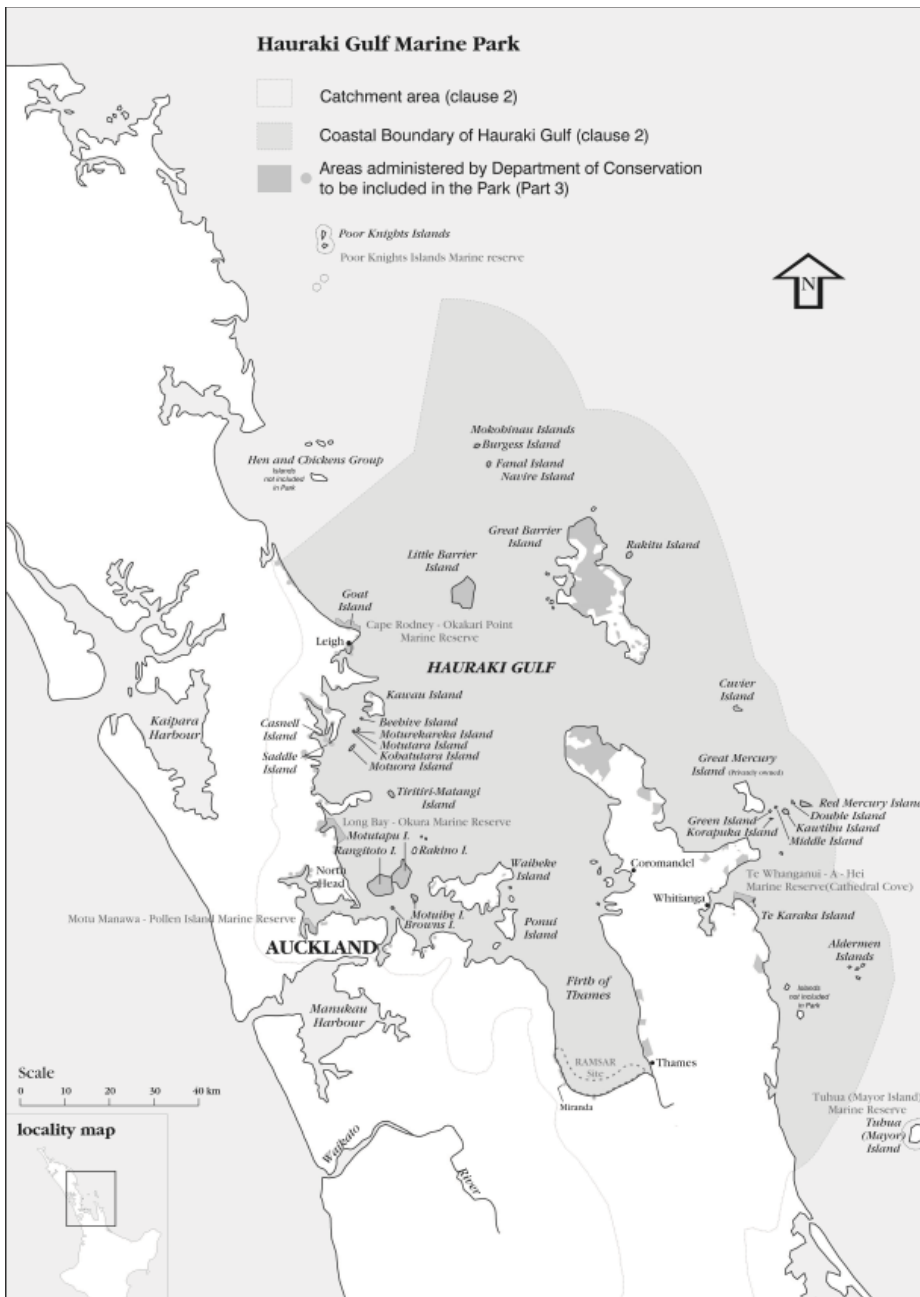
Name

Class

School



**Hauraki
Gulf
Forum**
Tikapa Moana



The Hauraki Gulf Forum promotes and facilitates the integrated management of the Gulf, its islands and catchments. Its members are: representatives of tangata whenua, Auckland Regional Council and Environment Waikato, the Auckland, Manukau, North Shore and Waitakere city councils, the Franklin, Hauraki, Matamata-Piako, Rodney, Thames-Coromandel and Waikato district councils, and the Ministers of Conservation, Maori Affairs and Fisheries.

See www.arc.govt.nz/haurakigulfforum for further information.

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'Native Animals of New Zealand' A.W.B. Powell, 1993, Auckland Institute and Museum, for drawing of marine animals

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'Pauatahanui Inlet - A Living Resource' written by Neil Bellingham for the Guardians of Pauatahanui, for supplementary cockle activities and information

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Shellfish Monitoring Overview

Outline

This topic allows you to investigate a soft-shore marine environment, and the impacts that humans have on this and related ecosystems. As part of this topic you will take part in the Hauraki Gulf Forum (HGF) Community Shellfish Monitoring Project. This contributes towards improved understanding of the state of inter-tidal shellfish resources and biodiversity in the Hauraki Gulf Marine Park. This experience will give you the knowledge and skills to carry out your own investigations for two NCEA Biology Level 2 Achievement Standards:

2.2 'Research the interaction between humans and an aspect of biology'

2.4 'Investigate an interrelationship or pattern in an ecological population or community'

Learning Outcomes

By the end of this topic you will be able to:

- define key terms: shellfish, bivalve, univalve, survey, monitoring, ecosystem, ecosystem services, biodiversity, environmental indicator, sustainable harvesting, sediment, transect, quadrat, abundance, density, natural variation, kaitiakitanga, rahui, bioaccumulation
- explain why shellfish are being monitored
- detail reasons why shellfish are important
- explain potential threats to shellfish populations
- detail abiotic and biotic factors that affect shellfish
- list what data will be collected in shellfish survey to allow a possible pattern or interrelationship to be identified
- describe and demonstrate basic sampling methods & equipment used: transects, quadrats, sieves, measuring device
- explain why accuracy in measuring and recording data is important, and where common sampling errors can occur
- describe human impacts on area being surveyed
- analyse data using appropriate data display
- interpret data display to describe the pattern or interrelationship being investigated
- explain and discuss the pattern or interrelationship identified with reference to
 - a) environmental factors
 - b) the biology of the organism
- develop a specific question to be investigated about human impacts on shellfish find a range of relevant resources relevant to the question
- write a report that
 - a) describes biological concepts and processes (e.g. bioaccumulation, shellfish as environmental indicators, ecosystem services)
 - b) describes the impacts of humans
 - c) discusses the current and future management options for the ecosystem and the implications of decisions made (socially, ecologically, economically)
 - d) references resources used and includes a bibliography

HGF Shellfish Survey Procedure

Note: this is one method of shellfish surveying only, other valid options also exist. This method is detailed in the accompanying powerpoint presentation.

1. Use a new data record sheet for each new sampling station along the transect.
2. Write the name of group, recorder name, transect survey site and point location (letter & number on flag), on the data record sheet.
3. Look around you and briefly record what you see at the sample location in the 'Site Description' box. Substrate type / composition and surface flora (eg seagrass, algae) should be observed and recorded to encourage participants to consider habitat conditions for shellfish.
4. Randomly place your quadrat - within about 2m of each sample station marker.
5. Clearly mark the quadrat outline by tracing around the outside edge of the quadrat with your trowel.
6. Use the trowel to carefully dig out your sample within the quadrat outline, to about 10cm deep, and put all diggings into the sieve or a bucket.
7. Shake the sieve in a nearby pool of water, or in the sea if it is close by. Alternatively pour a bucket of water through to help remove sand and mud.
8. Remove rocks, stones and (dead) shells from the quadrat.
9. Sort out the different species of live shellfish & identify them.
10. Count & measure all live cockles and/or pipi with the measuring device. Some cockles/pipi may look live, but are filled with sand, so watch out for blackish shells and try to open them to see if they are alive or dead (empty or filled with sand). Use a tally system to record numbers of cockles/pipi on data sheet.
11. Count all other live shellfish species, recording how many on data record sheet.
12. Total the number of each species. If you don't find any shellfish at all at a particular sample station, record zero or write nil, so that it is clear that this sample station was not overlooked.
13. Return all rocks, shells and live shellfish into the sampling hole after you have recorded everything.
14. Before moving to the next sample station check you have recorded ALL information correctly and that the recorder's name and sample station number are filled out at top of data record sheet.
15. Check that you have all items of equipment before moving to next sample station.
16. Reallocate jobs (i.e. data sheet recorder, water bucket filler, digger, sievers, shellfish sorter, shellfish identifier, counter and measurer) when you move to a new survey sample point.
17. Ask Hauraki Gulf Forum support staff for to help with advice and answering questions.

At end of surveying

- Do a quick check of data record sheets to ensure that all information is properly recorded.
- Bring marker poles and all other equipment (quadrat, trowel, bucket, measuring stick & clip board/sheets) back to assembly area.

Activity 1: Key Terms Definitions

Below is a table of key terms for this topic. See how much you know before you start by filling in the 'first definition'. Do not refer to any dictionary/glossary etc.

Key Term	First Definition
shellfish	
bivalve	
univalve	
survey	
monitoring	
ecosystem	
ecosystem services	
biodiversity	
kaitiakitanga	
environmental indicator	
sustainable harvesting	
bioaccumulation	
sediment	
quadrat	
density	
natural variation	

As you learn more about the key terms throughout this topic fill in the 'second' definitions below.

Key Term	Second Definition
shellfish	
bivalve	
univalve	
survey	
monitoring	
ecosystem	
ecosystem services	
biodiversity	
kaitiakitanga	
environmental indicator	
sustainable harvesting	
bioaccumulation	
sediment	
quadrat	
density	
natural variation	

Activity 2: Shellfish Mindmap

Create a mindmap with the picture below at the centre.

To get you started think about

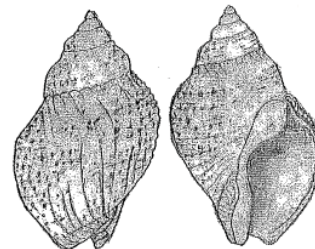
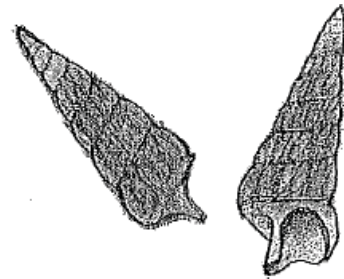
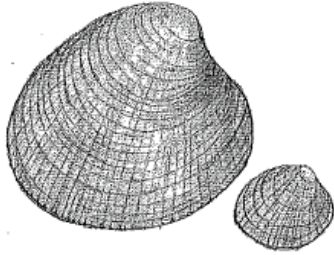
- names/types/species of shellfish
- their habitat
- what they might eat
- what impacts humans might have on them



Activity 4: Shellfish Identification

1) Write the english, maori, and scientific names under each of the shellfish below.

2) Circle the bivalves



Activity 5: Pipi or Cockle/Tuangi Passport

Research the ecology and biology of the pipi or cockle/tuangi and fill in the below 'passport' details.

English name:

Maori name:

Scientific name:

Description:

Habitat:

Adult size:

Lifespan:

Diet:

Predators:

Common companion species:

Adaptations:

Freshwater Tolerance:

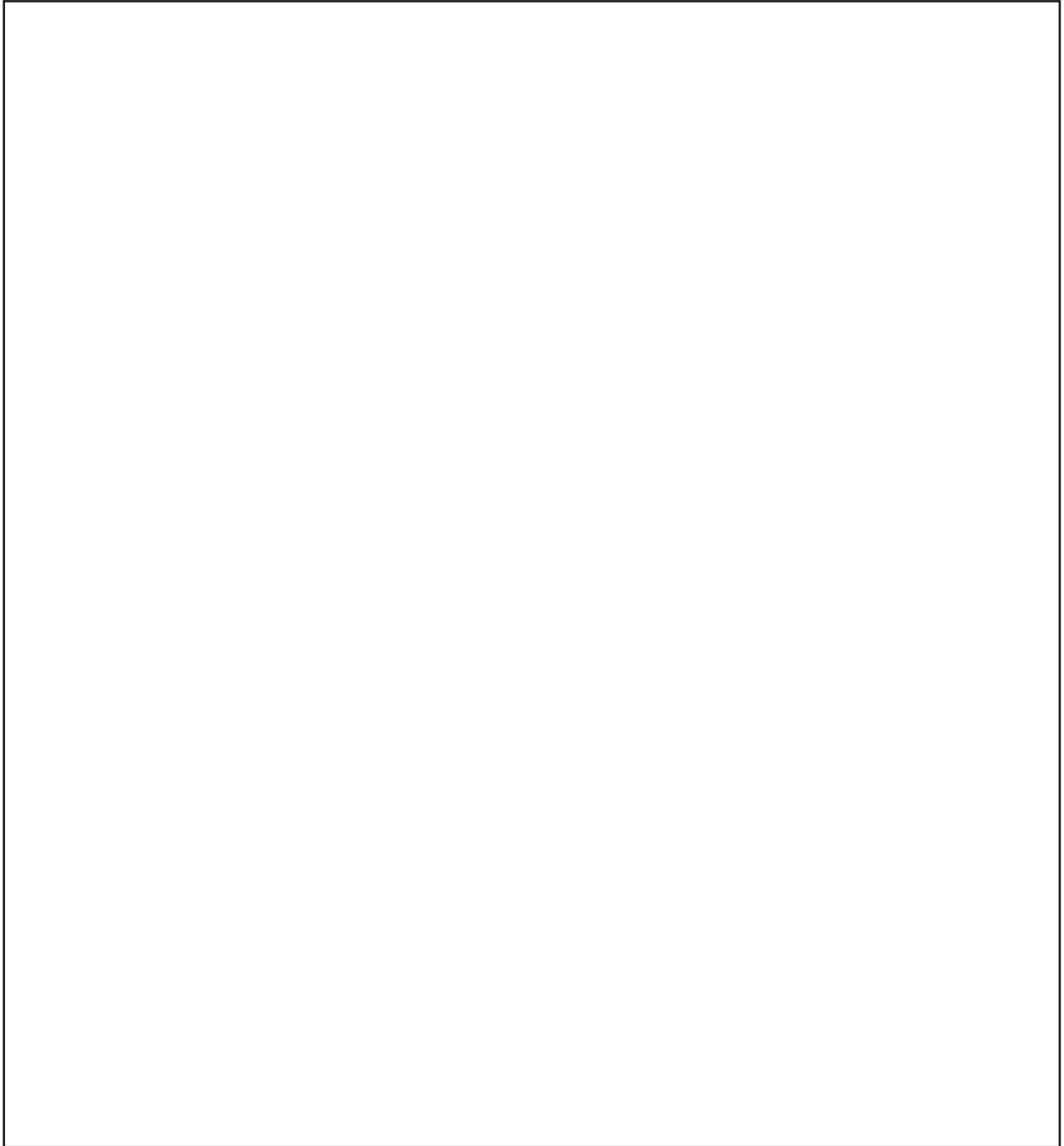
Submergence Requirements:

Harvesting Limits for your area:

Traditionally used by Maori for:

Negatively affected by:

Structure (labelled diagram)



Other interesting information:

Activity 6: Factors Affecting Shellfish

All organisms are affected by the conditions under which they live and by the other organisms that live in their ecosystem. Biotic and abiotic factors affect their lives and living conditions.

1) Define:
ecosystem -

abiotic -

biotic -

2) Below is a list of factors that can affect shellfish. Divide them into 'biotic' or 'abiotic' using the table below. Note that some can be both. Design a symbol or icon to use for each one.

- | | | |
|-----------|----------------|---------------|
| sun | wind | plants |
| predators | substrate | competition |
| salinity | harvesting | pathogens |
| sediment | water movement | pollutants |
| parasites | temperature | phytoplankton |

Biotic Factors		Abiotic Factors	
Symbol	Factor	Symbol	Factor

Activity 7: Patterns & Interrelationships

You are going to investigate a pattern and/or an interrelationship found in a soft-shore shellfish ecosystem.

- 1) Brainstorm below some patterns and interrelationships found in the natural environment
- 2) Circle ones that you could investigate for soft-shore shellfish

PATTERNS

Interrelationships

Activity 8: Field Techniques

Which of the following field techniques would be useful for shellfish monitoring? Fill in the below table to justify your answers. Think about where sampling errors could occur.

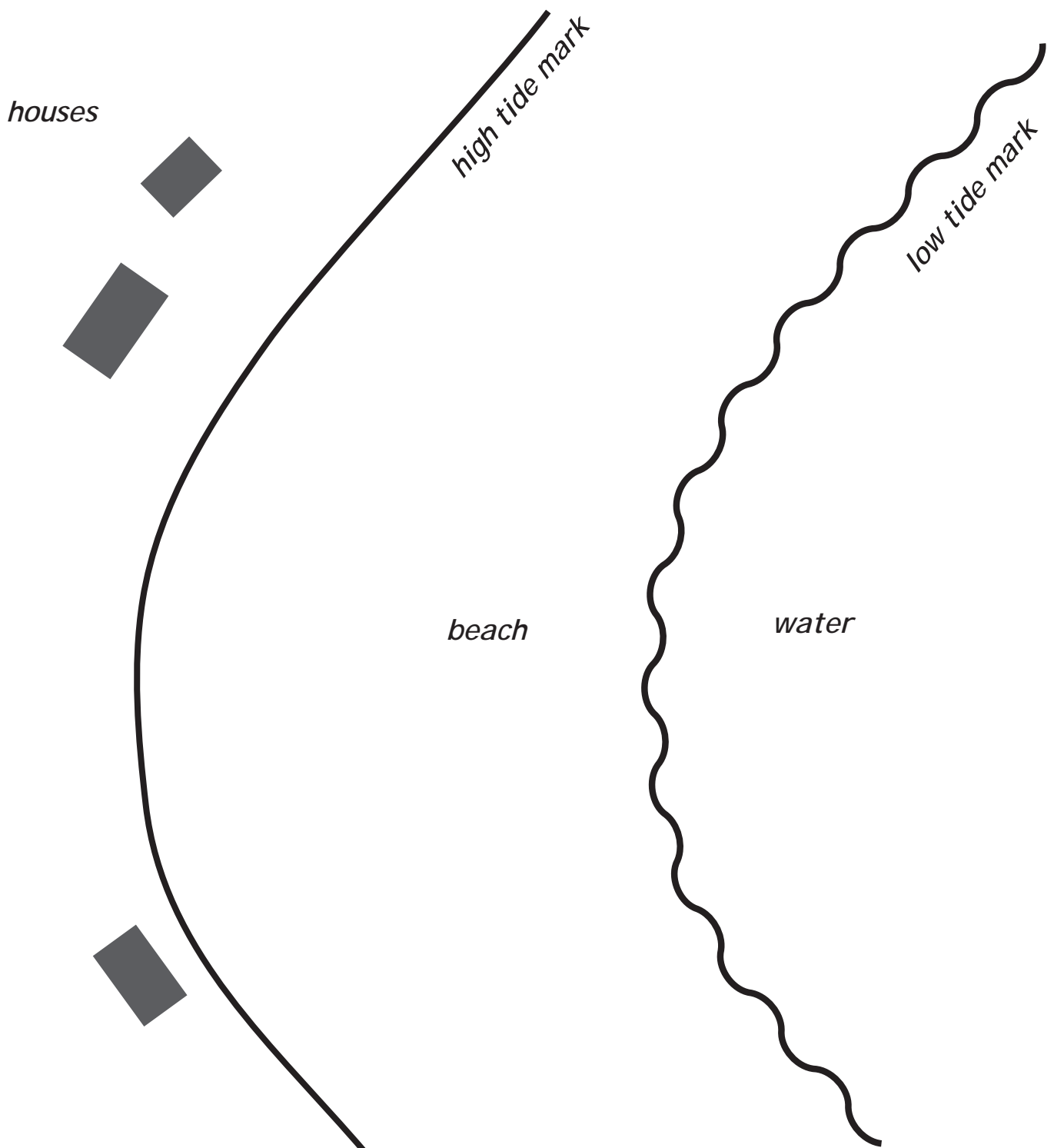
Field Technique	Suitability for Shellfish Monitoring	
	Advantages	Disadvantages
Line Transect		
Belt Transect		
Quadrat		
Direct Counts		
Capture-Mark-Release -Recapture		
Sample Size - Small		
Sample Size - Large		

Activity 9: Field Technique Example

HGF Community Shellfish Monitoring Project

Below is a bird's eye view of a beach to be sampled for shellfish. Draw on this beach six parallel transects, with eight sampling points along each one.

- Transects and sampling sites should be evenly spaced
- Name your transect lines with a letter (A, B, C etc)
- Name each sampling site with the transect letter, and the distance (in metres) along each transect. (Spacings could be 20, 50, 100m apart, depending on size of beach - you choose for this example).



Activity 10: Shellfish Sampling Practice

Use the shell sample set provided to fill in the field data form below.

Note: In the field you will only record live shellfish!

Hauraki Gulf Shellfish Survey Field Data Form

Location:

Date:

School:

Transect:

Sample Site:

Name of Recorder:

(distance along transect)

Site Description - what can you see on the surface?:

Key Species:

mm	<5	5-<10	10-<15	15-<20	20-<25	25-<30	30-<35	35-<40	40-<45	45-<50
	A	B	C	D	E	F	G	H	I	J
Tally										
Total										

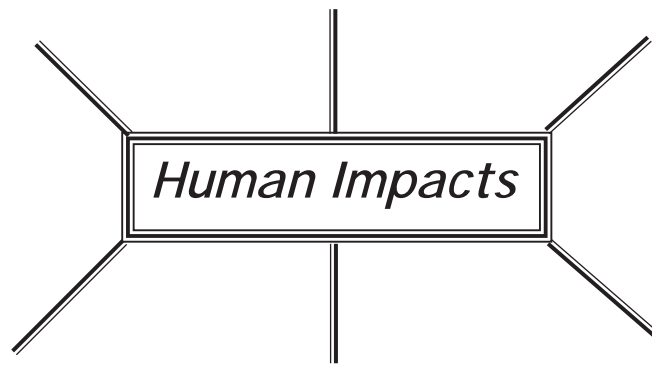
Shellfish Count

Species	Cockle	Pipi	Wedgeshell	Nutshell	Troughshell	Topshell	Hornshell	Whelk
Total								

List any other species:

Activity 11: Human Impacts

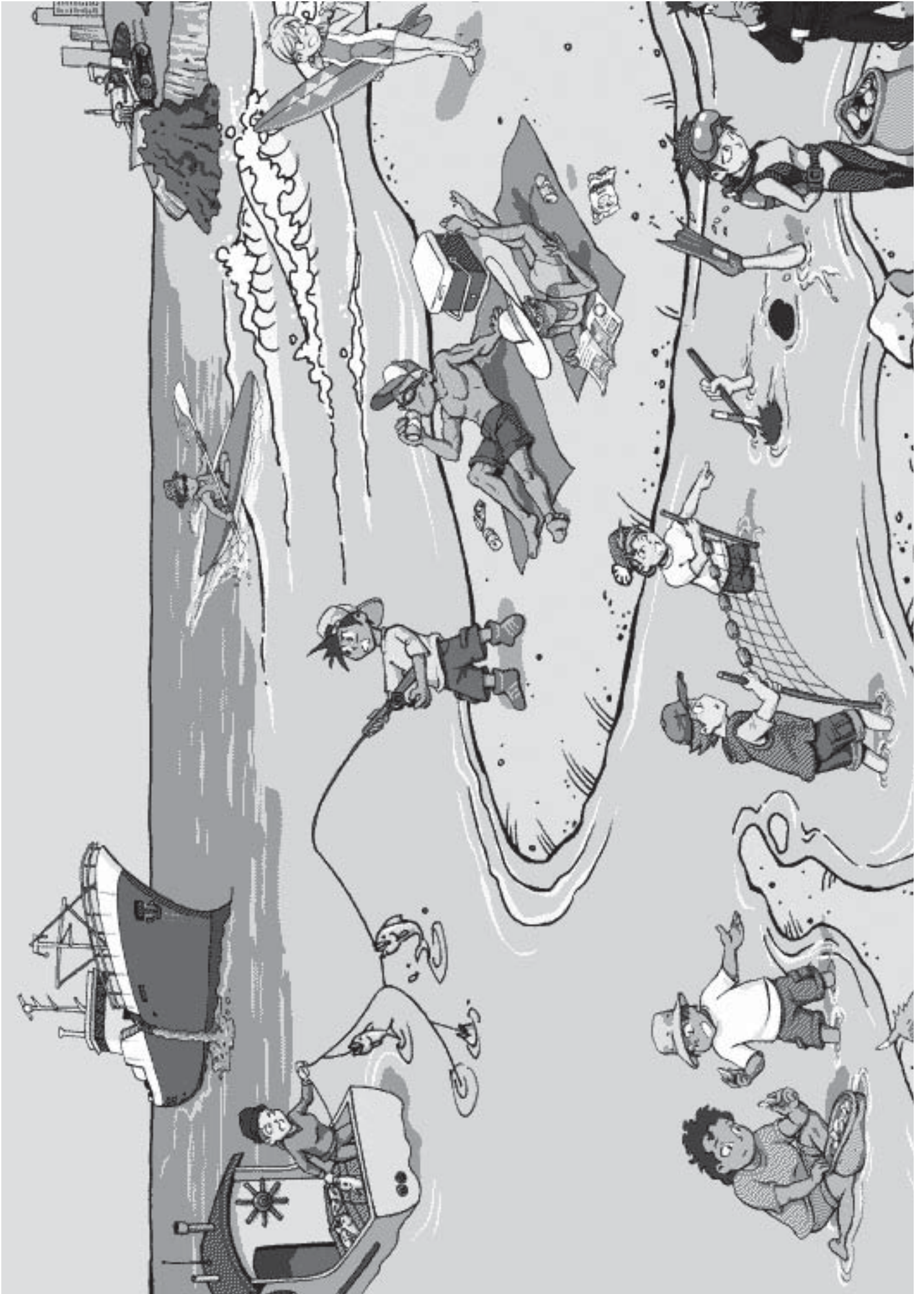
Brainstorm below how humans have affected or changed your survey area. The picture on the next page may help you.



Circle the human impacts above which you think are positive. Put a rectangle round those you think are negative. Some may be both!

Choose four of your impacts from above and fill in the table below

Impact	Effect on marine life



Activity 12: Data Analysis

Hauraki Gulf Shellfish Monitoring Project

From the data you have collected you can investigate the following:

- abundance of species
- species density distribution along a transect
- cockle/pipi size class distribution along a transect

Use the following worksheets to create graphs for data analysis, then answer the graph interpretation questions.

- A) Species Abundance Calculation
- B) Species Abundance Percentage Bar Graph & Interpretation
- C) Species Density Distribution Calculation
- D) Species Density Distribution Kite Diagram & Interpretation
- E) Cockle/Pipi Size Class Distribution Calculation
- F) Cockle/Pipi Size Class Distribution Histogram & Interpretation

For the 'Cockle/Pipi' worksheets, choose which of these two species is the most dominant at your survey site.

B) Species Abundance Percentage Bar Graph & Interpretation

Use the percentages you calculated on the 'abundance worksheet' to create a percentage bar graph. Don't forget a title and a key!

Graph Interpretation

- 1) Which shellfish species is the most abundant?
- 2) Which shellfish species is the least abundant?
- 3) Compare your graph to a different transect graph (i.e. from another student group) .
What are the differences?

What are the similarities?

C) Species Density Calculation

Another way to measure abundance is by calculating the population density. Population density is a measurement of the numbers per unit area. This time compare the density of different species along a transect, using a kite diagram. The density measurement used is number of shellfish per square metre (m^2).

Density = number counted / quadrat area.

Quadrat area for HGF surveys has been standardised at $0.1m^2$. Density can be calculated by dividing number counted by 0.1, or by multiplying by 10. As multiplying by 10 is the easier method, this is what has been used in the table below.

Step One

Choose three most abundant shellfish to compare.

Step Two

Use your 'shellfish count total' field data to fill in 'number counted' for each species chart below. Then use the quadrat area to calculate the density for each shellfish species.

Shellfish 1:	Name of sample site					
	Put in order from high tide (left) to low tide (right)					
Number counted						
Density (shellfish per m^2): number counted x 10						

Shellfish 2:	Name of sample site					
	Put in order from high tide (left) to low tide (right)			Put in order from high tide (left) to low tide (right)		
Number counted						
Density (shellfish per m ²): number counted x 10						

Shellfish 3:	Name of sample site					
	Put in order from high tide (left) to low tide (right)			Put in order from high tide (left) to low tide (right)		
Number counted						
Density (shellfish per m ²): number counted x 10						

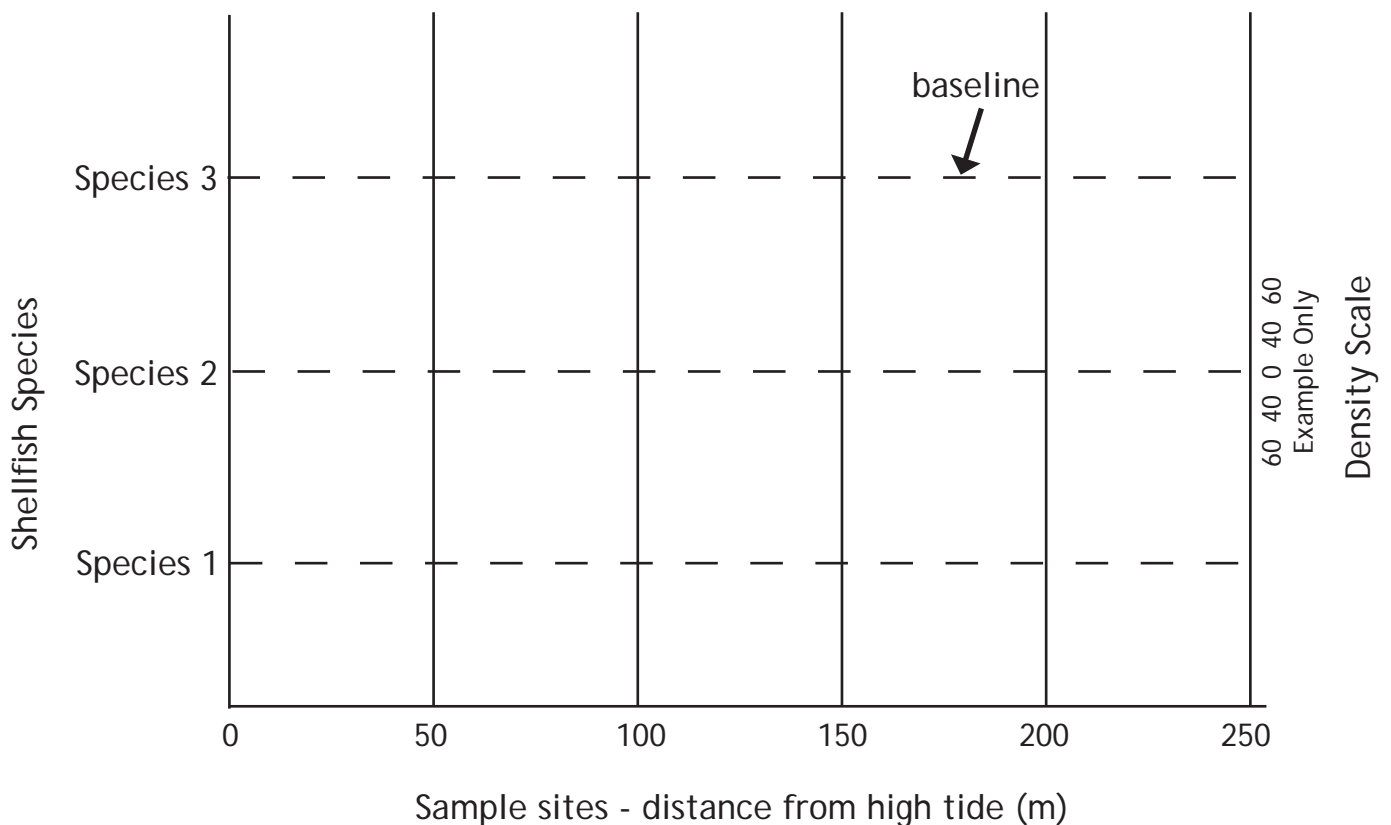
D) Species Density Distribution Kite Diagram & Interpretation

Use the densities you have calculated to create a kite diagram showing the density variation of your chosen shellfish species from high tide to low tide.

Notes for Kite Diagram:

- 1) You will need to use a whole page of graph paper and turn it horizontally (the next page has been left blank so you can attach your diagram).
- 2) Write a suitable title
- 3) x-axis (horizontal) = sample sites distances from high tide
y-axis (vertical) = species names
- 4) Divide the y-axis into three equal parts. Draw a line through the middle of each, parallel to the horizontal axis. These will be the baselines (equal to 0)
- 5) Scan your data to find the highest density value. Divide this in half.
- 6) Make a scale on your y-axis above and below each baseline that will cover this value.
- 7) Divide the rest of the data in half and plot points above and below the baseline with an x. Mark O's on the baseline with an x. Join the points above and below each baseline with a ruler and the same underneath. Shade each 'kite'.

Title



*attach
kite
diagram*

D) Species Density Distribution Kite Diagram & Interpretation continued...

Use your kite diagram to answer the following questions:

- 1) Compare the changing densities of the different species with the distance from high tide.

- 2) What abiotic and biotic factors could account for the density distributions observed?

- 3) Compare your transect data with another group's data (i.e. a different transect along the same beach).
 - a) What differences are there?

 - b) What similarities are there?

 - c) Is this what you would expect? Give reasons for your answer.

- 4) If you have previous year's graphed data, compare the graphs and answer the following questions:
 - a) What differences can you see?

 - b) Are there any noticeable trends (are densities increasing or decreasing)?

 - c) What could this be due to?

F) Cockle/Pipi Size Class Histogram & Interpretation

Use the percentages calculated on previous table to create a histogram. Attach to the next page.

Notes for Histogram:

- 1) Write a suitable title
- 2) x-axis (horizontal) = % of cockles/pipi sampled
y-axis (vertical) = size class
- 3) Remember a histogram has no spaces between the bars.

Interpretation Questions

- 1) Which size class had the largest percentage?
- 2) Which size class had the lowest percentage?
- 3) Cockles/pipi are considered big enough for eating by humans if cockles are larger than 30mm/pipi are larger than 50mm. Calculate the percentage of cockle/pipi along your transect that would be big enough for harvesting.
- 4) If you have previous years graphed data, compare the graphs and answer the following:
 - a) What differences can you see?
 - b) Are there any noticeable trends?
 - c) What could this be due to?

Discussion Questions

- 1) What could the presence or absence of large numbers of small shellfish indicate?
- 2) What could the presence or absence of large numbers of larger shellfish indicate?
- 3) Compare the numbers of small shellfish, with the numbers of larger shellfish. What does this indicate about this population?

attach
histogram

Activity 13: Field Trip Evaluation

HGF Community Shellfish Monitoring Project

After your experience doing a shellfish survey as part of the Hauraki Gulf Shellfish Monitoring Project, answer the questions below. This will enable you to plan your own shellfish investigation.

1) What worked well?

2) What didn't work well?

3) Where do you think sampling errors could have occurred?

4) How could these sampling errors be avoided or minimised?

5) How else could the field trip have been improved?

6) Make some initial planning notes for your own shellfish investigation.

Activity 14: Initial Planning

My Shellfish Investigation

1) Pattern or interrelationship I would like to investigate:

2) Details of field techniques/sampling method I would like to use (including sample size):

3) Equipment needed:

4) I need to find out/Questions I have:

Teacher Comment:

Activity 15: Research Report Planning

Human Impacts on Shellfish Ecosystems

1) Specific question I would like to investigate:

2) Initial resource/reference list:

3) I would like to present my report as a:

4) My initial thoughts on things to include:

5) Things I need to find out/questions I have:

Teacher Comment:

Activity 16: Topic Evaluation

- 1) What were the three main biological ideas in this topic?

- 2) What was the most interesting fact that you learnt?

- 3) What did you find the hardest to understand/didn't understand?

- 4) A question I still have is.....

- 5) The most enjoyable part of this topic was....

- 6) The most rewarding part of this topic was...

- 7) I think this topic could be improved by...

- 8) If I was teaching this topic I would...

Student Workbook:

- 1) My favourite activities were....

- 2) It could be improved by...

Glossary of Key Terms

Abundance - an estimate of the number of individuals of a species in a population

Biodiversity - the number and type of different species in an environment

Bioaccumulation - the accumulation of a substance (such as a toxic chemical), in various tissues of a living organism, over time

Bivalve - a shellfish with two distinct shells, joined with a hinge

Data - information collected from research

Density - a measurement of population abundance per unit area

Ecosystem - a community of living things and the environment in which they live

Environmental indicator - a species whose abundance or presence can be used to help assess changes to the general state of the environment

Gastropod - Any of various molluscs of the Class Gastropoda, such as the snail, slug, cowrie, or limpet

Kaitiakitanga - the responsibilities of people to take care of the environment

Monitoring - repeated comparable surveys over a regular time period

Natural Population Variation - the natural increases and decreases in a population size, due to a range of environmental factors that effect reproductive success and mortality, for example temperature, currents that effect food supply

Quadrat - a square frame with an exact known area, used for sampling

Sample - a part of the population. Counting and measuring all the shellfish on the beach would be impossible. A sample is a representative subset of manageable size. We collect many samples to make estimates about the population's abundance and make up.

Shellfish - an animal with a shell, soft body and muscular foot for moving, burying, or attaching, that lives in or near the water

Species - traditionally defined as the name for a group of animals or plants that can breed together and produce fertile offspring, now more precise or differing measurements are often used such as similiarity of DNA

Sustainability - one definition is "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (the Brundtland Report, Our Common Future, 1987)

Survey - a one-off investigation into the number, size or variety of species. A series of comparable surveys could be used for monitoring

Transect - a straight line used for surveying a given area, of any length along which samples are taken, usually at regulat intervals

Trend - the general direction in which data is seen to change - can go up or down or remain the same, over time or over distance

Univalve - a shellfish whose shell is in one piece e.g. snails and limpets

Add your own....

Reference and Resource List

Shellfish Identification and Ecology

Shellfish Nature Flip Guide, Andrew Crowe (2004), Penguin Books

A laminated fold out chart, designed for use at the beach , or displayed as a poster

Which Seashell? Andrew Crowe (1999), Penguin Books

Clearly laid out, excellent for student use.

Seashells of New Zealand, Margaret Morley (2004), New Holland Publishers

More detail

General Beach and/or Estuary References

Books

Life-Size Guide to the New Zealand Beach, Andrew Crowe (2004), Penguin Books

What's on the Beach? G. Stace (1997), Penguin Books

Nature Watching at the Beach, J. Walsby (1990), Wilson & Horton

Animals of the Estuary Shore - An Illustrated Guide and Ecology, M. Jones (1983), University of Canterbury

Between the Tides, M. Bradstock (1999), David Bateman

New Zealand's Estuaries: How they work and the issues that affect them, M. Green (2006), NIWA Information Series, No. 59 ISSN 1174-264X

Download from www.niwascience.co.nz

Internet

Department of Conservation www.doc.govt.nz

Good general information about marine conservation in New Zealand.

Te Ara: Encyclopedia of NZ www.teara.govt.nz/EarthSeaAndSky/HarvestingTheSea/en

This section of Te Ara focuses on harvesting the sea. Includes information about mataitai (shellfish gathering).

MarineNZ www.marinenz.org.nz

A virtual marine online world, full of stunning underwater photography, videography and leading marine biology reports and presentations.

Ministry of Fisheries www.starfish.govt.nz


This website provides educational resources for further investigation into fishing in NZ.

WWF New Zealand www.wwf.org.nz

WWF has a special focus on protection of Hector's and Maui's Dolphins, and provides education resources.

Powerpoint Presentation Slides: Introduction to Shellfish Monitoring


PART 1: Why do a shellfish survey?



Hauraki Gulf Forum
Tikapa Moana


Introduction to Shellfish Monitoring

Preparing students to undertake a shellfish survey
PART 1: Why do a shellfish survey?



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Tikapa Moana

Part One Why do a shellfish survey?




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Why do we monitor shellfish?

To find out information so that we can:



- ensure that shellfish are being harvested sustainably
- to ensure that this precious resource is conserved for future generations
- to preserve the biodiversity (variety of life) of the Hauraki Gulf



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What is a shellfish survey?



- A survey is an investigation to find out information about the shellfish that live on a beach
- The type of information we find out is:
 - What kinds of shellfish live on the beach?
 - How many are there?
 - How big are they?



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What is shellfish monitoring?

- A monitoring programme is when surveys are repeated in the same way through time eg each year.
- We can then compare the information from each survey to see what is changing.
 - Is the biodiversity (variety of marine life) changing?
 - Are the numbers of cockles/pipi going up or down?
 - Is their size changing?



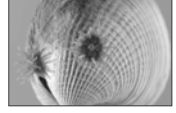
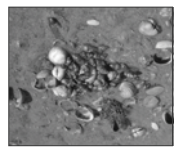
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Why are shellfish important?

1) They provide 'ecosystem services'

These include

- a) filtering the water to improve water quality
- b) providing an essential food source for other organisms in the marine ecosystem. eg cockles are a food source for whelks, crabs, birds, fish and rays
- c) Providing a habitat for other organisms. eg limpets, anemones and chitons attach themselves to cockles



Why are shellfish important?



2) They are kaimoana, and provide a significant food source for many people



3) They are used as an 'environmental indicator' to measure the health of the surrounding ecosystem

Maori traditional use



- Kaimoana
- Fishing: harpoon heads, fish hooks, spinners
- Scaling fish, scraping vegetables
- For pendants, necklaces, earrings
- For fastening cloaks (paua)
- Making instruments
- Tattooing

What are threats to shellfish?



1) Sediment run-off from cleared areas and building sites



What are threats to shellfish?



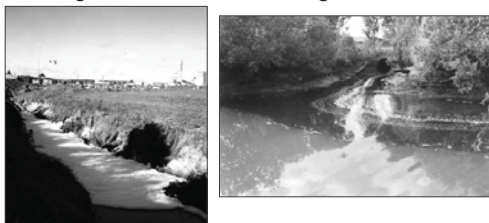
- Mud/silt running off from the land into the sea clogs the gills of filter-feeding shellfish eg cockles, pipi



What are threats to shellfish?



2) Pollution eg stormwater contaminants, detergent, oil, rubbish, sewage



What are threats to shellfish?



- Shellfish collect toxic substances from pollution in the surrounding water. These can accumulate in the shellfish over time, and cause toxicity and death, both to the shellfish and the organisms that eat them (including humans!)

What are threats to shellfish?

- 3) Over harvesting – people taking more than they're allowed to

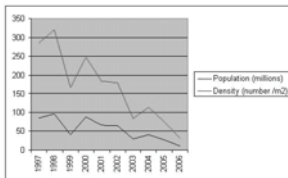


What are threats to shellfish?

- 4) Invasive species
- Can affect shellfish by competing with them for food and space, by preying upon them or by introducing new parasites and diseases.
- 5) Climate change
- Possible future threats due to climate change may be:
 - Warmer water temperatures
 - More invasive species (due to warmer water)
 - More storms and stormwater inputs

What is the survey information used for?

- We want to collect enough data over a period of several years so that trends can be determined
- A trend is a consistent change through time



What is the survey information used for?

- If the trend shows that shellfish numbers and /or biodiversity are decreasing this might mean that
 - Too many shellfish are being taken
 - The shellfish are being affected by what is happening on the land
- From these trends the agencies of the Hauraki Gulf Forum can determine areas of concern for further investigation & appropriate management responses

Powerpoint Presentation Slides: Introduction to Shellfish Monitoring

PART 2: How do we conduct a shellfish survey?

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Introduction to Shellfish Monitoring

Preparing students to undertake a shellfish survey
PART 2: How do we conduct a shellfish survey?

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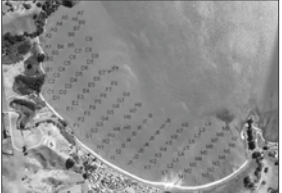
Part Two How do we conduct a shellfish survey?



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Designing a sampling grid

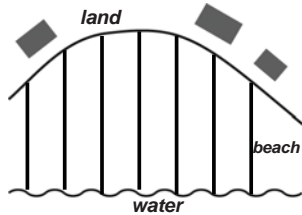
- We can't count all the shellfish on the beach so we estimate how many there are by taking samples
- A coordinator will help to design a beach sampling grid covering the intertidal area where there is suitable habitat for shellfish



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Designing a sampling grid

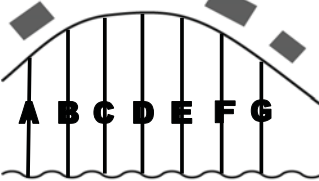
- **Transects** are parallel lines which run from high to low tide. The same transects are surveyed each year.



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Designing a sampling grid

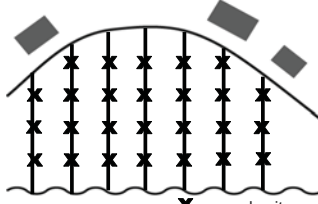
- We find where the location of each transect is by using objects around the beach, or a GPS
- Each transect is given a letter



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Designing a sampling grid

- The places where you will sample are spaced evenly along the transects at 20m, 50m or 100m intervals, depending on size of beach



X = sample site

Survey Method



- 1) Find a sample site and write the location on your data form.
- Can you describe the location of this sample site?



Survey Method



- Samples are taken using a QUADRAT
 - The quadrat is a square frame with an exact area - usually $\frac{1}{10}$ of a square meter (0.1m²)
- 2) Randomly place the quadrat & trace around the frame. Dig out the area inside.



Survey Method



- 3) Sieve using water to remove sand and mud



Survey Method



- 4) Identify and count all the live shellfish.



Survey Method



- 5) Measure all the live cockles and/or pipi



using a measuring stick



using a v-board

Survey Method



- 6) Record numbers and measurements on your data sheet. Use a new form for each sample site.



Powerpoint Presentation Slides: Introduction to Shellfish Monitoring

PART 3: Shellfish identification, measuring and recording data

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Introduction to Shellfish Monitoring

Preparing students to undertake a shellfish survey
PART 3: Shellfish identification, measuring and recording data

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Part Three Practising identifying & measuring shellfish and recording data



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Its for real!

- The survey data will be used by the Hauraki Gulf Forum so its important that the data you collect and record is **accurate**.
- **You will need to know how to:**
 - Correctly use the quadrat to take a sample
 - Identify the different types of shellfish
 - Correctly use the measuring stick or V-board to measure the length of cockles and/or pipi
 - Correctly fill out the data forms

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Bivalves

Shellfish with two distinct shells

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Cockle Tuangi



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Pipi



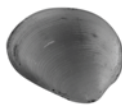
Pipi



Wedge Shell Hanikura



Nut Shell



Trough Shell Ruheruhe



Quiz Q1



Q: How do you tell the difference between a nutshell and a small cockle?

A: The nut shell is smooth with no ridges or lines like a cockle

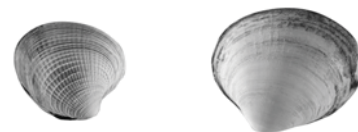



Quiz Q2



Q: How can you tell the difference between a cockle and a trough shell?

A: A trough shell is usually bigger than a cockle and the shell is thinner. The trough shell has fine radial growth lines while the cockle has ridges going in both directions




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Gastropods

These Gastropods (snails) are also Univalves (shellfish whose shell is in one piece)



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Mud Whelk





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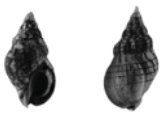
Other kinds of whelks



Speckled whelk



Spotted whelk



Red mouthed whelk


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Harbour Top Shell Whētiko





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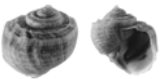
Horn Shell

Koeti





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Other gastropods



Mud snail **Tiitiko**



Olive shell **Tikoaka**



Oyster borer **Kaikai tio**

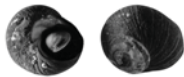
Quiz Q4



Q: Is a harbour top shell a cats eye?



A: No. Cats eyes live on the rocky shore and have a distinctive circular green and white 'trap door' on the underside of the shell.



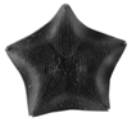
Other marine creatures you might find



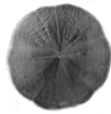
Echinoderms



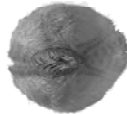
Echinoderm is Greek for 'spiny skins'



Cushion Starfish



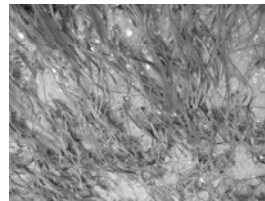
Sand dollar or 'snapper biscuit'



Heart urchin

You may find these near low tide

Others



Seagrass



Various kinds of crabs



Shrimp

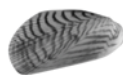


Various kinds of worms

Introduced species



Clubbed tunicate
A type of sea squirt



Asian date mussel

Measuring



Only the dominant *live* shellfish are measured eg cockle and/or pipi
All other *live* shellfish are counted but not measured

Correct measuring technique

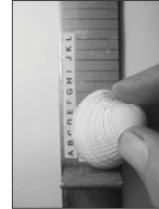


1. Place the shell against the baseplate with the hinge at the side so that you are measuring its **longest** dimension.
2. When reading off the shellfish length, **look straight down** on it (not on an angle).
3. The letters marked on the measuring sticks correspond to shellfish size classes, A = 0-5mm, B = 5-10mm, C = 10-15mm etc. **If the cockle length is between the lines, read off the letter written beside the line above.** If the cockle is exactly on a line, read off the letter beside the line.

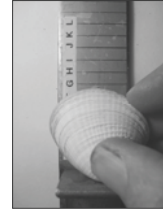
Quiz Q5



- Which is the right and wrong way to measure a cockle and why?



Right



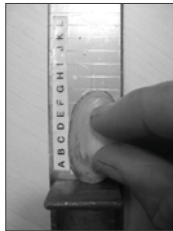
Wrong – not measuring the longest axis

Quiz Q6

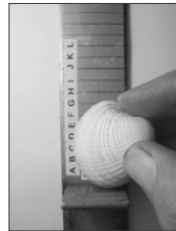


- What letter would you record these shellfish as measuring?

This pipi touches the line so it is a 'G'



This cockle is just over the 'G' line so it is an 'H'



Data forms



First things first



There are four things to remember when you get to a new sampling station

1. Use a fresh form (one form for each sample)
2. Write down the sample location on the form:
 - the transect letter AND
 - the distance or number along the transect
 - Eg A2, A20
3. Write down the name of the person doing the recording
4. Observe and describe what you see on the surface

Observations



At your sample site look at the surface and write down what you see:

- Are there lots of dead shells or stones?
- Are you in a channel or hollow, or on top of a shell bank?
- Is the surface muddy and slippery, hard and rocky, or sandy?
- Is there seagrass growing?
- Are you sampling in water?

This information may help you make sense of your data later

Recording data



- Use a **tally** system to record the number of **live** shellfish in the quadrat in the correct box on the form



- If there are no living animals in your sample write **NIL** in large letters across your form
- If you make a mistake, cross it out really well
- At the end, count up your tally marks and record the total

Now its your turn



Have a turn practicing identifying, measuring and recording using dead shells

For the survey you will need to bring



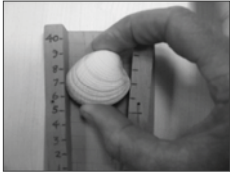
- Covered shoes that can get wet and muddy
- Clothes and shoes to put on afterwards
- Plastic bag for wet and muddy clothes
- Warm and waterproof clothes
- Sunscreen and hat
- Food and water

Correct measuring technique for using v-boards

Correct measuring technique

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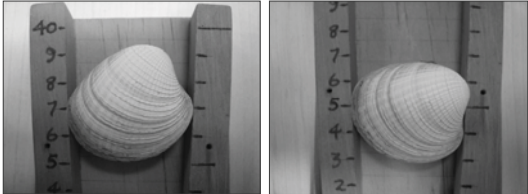
1. Pick up the cockle/pipi between the thumb and forefinger with the hinge at the top
2. Slide the shellfish down the V board until the longest shell axis touches the same measurement point on both sides of the board
3. When reading off the shellfish length, look straight down on it (not on an angle).



Quiz Q5

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- Which is the right and wrong way to measure a cockle and why?

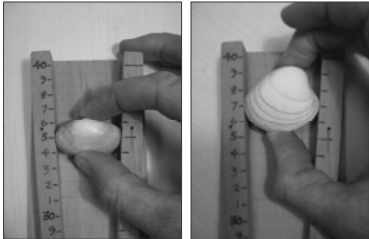


Right Wrong – not measuring the longest axis

Quiz Q6

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- What would you record these shellfish as measuring?



35mm 37mm