

Shellfish Monitoring: Unit Outline

Pre-trip: Background Information

Specific Learning Outcomes/ Assessment Type	Learning Experience	Time	Resources Required
<i>Diagnostic assessment</i>	<p>Shellfish Monitoring: 1st & 2nd Definitions</p> <ul style="list-style-type: none"> A list of keywords is provided in a chart. Students to individually attempt to fill in 'first definition' column (leave the 'second definition' column blank). Collect and analyse (do not mark), to gain insight about existing knowledge. Second definition column to be filled by students throughout unit as formative assessment, or at end as summative 	10 min	Learning Journal Activity Pg 1-2
Define shellfish	<p>Class Definition</p> <ul style="list-style-type: none"> Discuss and create a class definition of shellfish on board. Students transfer definition into second definition list Example definition: 'an animal with a shell, soft body and muscular foot for moving, burying, or attaching, that lives in or near the water' <p>Shellfish</p> <ul style="list-style-type: none"> Students make a list of different ways having a shell helps a shellfish e.g. protection from predators, holds water and saves animal from drying out when tide is low, protects animal inside if it is tumbled by waves, is a suit of protective armour against abrasive sand and grit washed over it every day Students list shellfish species they know of, individually or in groups 	20 min	Learning Journal Activity Pg 3
Define survey & monitoring	<p>Powerpoint Presentation Part 1: Why do a shellfish survey?</p> <ul style="list-style-type: none"> Show students above powerpoint (covers next 3 outcomes also) Students could fill in second definition column for 'survey' and 'monitoring'. See Glossary for example definitions Ask: 'What other kinds of surveys do they know of?' (the list is endless!) Do they know of any other marine surveys? Some examples: <ol style="list-style-type: none"> water pollution - by measuring bacteria, every summer on Auckland's beaches fish counts - underwater video cameras that have a bait to attract fish 	20 min	Powerpoint Presentation Part 1

Pre-trip: Background Information continued...

Specific Learning Outcomes/ Assessment Type	Learning Experience	Time	Resources Required
<p>Explain why shellfish are being monitored</p> <ol style="list-style-type: none"> to collect sufficient data over a period of years to determine trends to determine areas of concern for further investigation ensure sustainable harvest, conserve resource for future generations 	<p>Powerpoint Presentation Part 1: Why do a shellfish survey?</p> <p>NOTE: A fact sheet 'Factors Affecting Distribution and Abundance in Intertidal Shellfish Populations' is included in the Teacher Resource Kit. It is recommended that teachers read this information as it gives good background information on shellfish ecology, and threats to shellfish. Senior students may also be able to use this fact sheet in their own shellfish research.</p>	<p>5 min</p>	<p>Powerpoint Presentation Part 1</p> <p>Fact Sheet, Teacher Resource Kit Pg 19</p>
<p>Detail reasons why shellfish are important</p> <ol style="list-style-type: none"> have intrinsic value, are part of marine ecosystem kaimoana, food resource Maori cultural significance are used as an environmental 'indicator' to measure wider ecosystem health 	<p>Powerpoint Presentation Part 1: Why do a shellfish survey?</p> <p>Marine Ecosystem</p> <ul style="list-style-type: none"> Students to create a simple marine ecosystem using activity in learning journal Point out that in reality it is much more complicated <p>Marine Biodiversity</p> <ul style="list-style-type: none"> Discuss as a class: separate out into 'bio' and 'diversity' first and discuss their meanings before putting it together Example definition: 'Biodiversity is the number and type of different species in an environment' Complete activity in learning journal <p>What is an Environmental Indicator?</p> <ul style="list-style-type: none"> Students to fill in indicator activity in learning journal <p>Shellfish are Important!</p> <ul style="list-style-type: none"> Students to fill in chart in learning journal 	<p>1 hour</p>	<p>Powerpoint Presentation Part 1</p> <p>Learning Journal Activities Pg 4-7</p>
<p>Explain potential threats to shellfish populations</p> <ol style="list-style-type: none"> over-harvesting land-use impact, especially sediment run-off pollution (e.g. stormwater contaminants, detergent, oil, rubbish, sewage) foreign marine species climate change 	<p>Powerpoint Presentation Part 1: Why do a shellfish survey? Threats to Shellfish</p> <ul style="list-style-type: none"> Students to complete matching activity in learning journal 	<p>10 min</p>	<p>Powerpoint Presentation Part 1</p> <p>Learning Journal Activity Pg 8</p>

Pre-trip: Survey Preparation

Specific Learning Outcomes/ Assessment Type	Learning Experience	Time	Resources Required
Investigate and classify shellfish by observing physical features a) bivalves: cockle, pipi, wedgeshell, troughshell, nutshell b) gastropods: hornshell, topshell, whelk	<p>Powerpoint Presentation Part 3: Shellfish identification Shell Kit Identification</p> <ul style="list-style-type: none"> Students use the shell kit and species identification guide to sort shells into separate species. Discuss the difference between bivalves (two shells, usually filter feeders) and gastropods (one shell) <p>(Note: Teachers may be provided with a shell kit by their HGF coordinator, otherwise it is simple to make your own by collecting (dead) shells from a nearby beach)</p>	30 min	<p>Powerpoint Presentation Part 3</p> <p>Shell Kit</p> <p>Species Identification Guide</p>
<i>Formative Assessment</i>	<p>Name that Shell</p> <ul style="list-style-type: none"> Students use the drawings in the learning journal to name the species, and decide whether they are bivalves or univalves 	10 min	Learning Journal Activity Pg 9
Use a simple food chain to explain the feeding relationships of shellfish	<p>What Do Shellfish Eat?</p> <ul style="list-style-type: none"> Students to research what shellfish eat and complete chart in learning journal (useful reference: 'Which Seashell?' by Andrew Crowe, other suggestions in 'reference and resource' list) Students to complete food chain activity in learning journal 	15 min	<p>Learning Journal Activity Pg 10</p> <p>Shellfish Reference Books & Internet</p>
List the data that will be collected in survey	<p>Powerpoint Presentation Part 2: How do we conduct a shellfish survey?</p> <ul style="list-style-type: none"> Show to students and discuss (leads into next activity) 	10 min	Powerpoint Presentation Part 2
Describe and demonstrate surveying methods and equipment used: transects, quadrats, sieves, measuring device	<p>Powerpoint Presentation Part 2: How do we conduct a shellfish survey? (see above)</p> <p>Make Practice Measuring Devices</p> <ul style="list-style-type: none"> Teachers and/or students to use the templates and instructions included in the teachers resource kit to make a class set of measuring devices. <p>Shell Kit: Practice measuring and using tally chart</p> <ul style="list-style-type: none"> Students use the shell kit as a practice sample, measuring the appropriate species using the practice measuring devices and noting results on tally chart included in learning journal 	20 min	<p>Powerpoint Presentation Part 2</p> <p>Practice Measuring Device Instructions and Templates, Teachers Resource Kit Pg 31-32</p> <p>Shell Kit</p> <p>Learning Journal Activity Pg 13</p>

Explain why accuracy in measuring and recording data is important	Powerpoint Presentation Part 2: How do we conduct a shellfish survey? (see above)	part of previous	
<i>Formative Assessment</i>	<p>What is a Shellfish Survey?</p> <ul style="list-style-type: none"> • Students to complete activity in learning journal <p>Survey Equipment</p> <ul style="list-style-type: none"> • Students to complete activity in learning journal 	15 min	Learning Journal Activities Pg 11 & 12
Field Trip: Carry out Survey			
Specific Learning Outcomes/ Assessment Type	Learning Experience	Time	Resources Required
Locate survey site, use quadrat and sieves to collect sample	<p>Field Survey</p> <ul style="list-style-type: none"> • Students to complete location activity in learning journal (could be done pre-trip) • Students to locate group sampling site, and use quadrat and sieves to collect sample 	1 day	Learning Journal Activity Pg 14
Use a tally chart to record types and numbers of shellfish, use a measuring device to measure shellfish	<p>Field Survey</p> <ul style="list-style-type: none"> • Students to use survey equipment to complete field data form 		Shellfish Monitoring Equipment
Describe human impacts on area being surveyed	<p>Human Impacts</p> <ul style="list-style-type: none"> • Students to complete activity in learning journal 		Shellfish Monitoring Equipment Field Data Form
			Learning Journal Activity Pg 15-16

Post-trip: Analyse and Interpret Results

Specific Learning Outcomes/ Assessment Type	Learning Experience	Time	Resources Required
Analyse results of shellfish surveying using appropriate data display e.g. bar graph, pie graphs, to report on a) what species are present, and where on beach they live b) where the biggest/smallest shellfish are located c) whether shellfish numbers and sizes are changing from year to year	<p>Data</p> <ul style="list-style-type: none"> Students to complete activity in learning journal <p>Data Analysis: Student Worksheets</p> <ul style="list-style-type: none"> Students to complete data input and graphs from following worksheets. They will need survey results from one transect. <ol style="list-style-type: none"> What lives on the beach? How big are the cockles/pipi? How does cockle/pipi abundance change with distance from high tide? Let's compare the entire beach 	2-3 hours	<p>Learning Journal Activity Pg 17</p> <p>Data Analysis Introduction (information for teachers), Teacher Resource Kit Pg 49</p> <p>Data Analysis: Student Worksheets, Pg 51-62</p>
Interpret and evaluate data displays using concepts of density, abundance, natural variation, trends	<p>Data Analysis: Student Worksheets</p> <ul style="list-style-type: none"> Students to complete interpretation questions on worksheets. <p>Our Shellfish Survey Conclusions</p> <ul style="list-style-type: none"> Students to complete activity in learning journal 	30-40 min	<p>Data Analysis: Student Worksheets, Teacher Resource Kit Pg 52-62</p> <p>Learning Journal Activity Pg 19</p>
<i>Formative Assessment</i>	<p>What Does the Data Tell Us?</p> <ul style="list-style-type: none"> Students to match definitions with concepts in learning journal 	10 min	<p>Learning Journal Activity Pg 18</p>

Take Action - Suggested Follow-on Activities

<p><i>Some examples - see Teachers Resource Kit, pg , for a further suggestions</i></p> <p>Identify further potential strategies/ actions that could be taken to protect shellfish and/or marine biodiversity e.g. marine reserves, rahui, rubbish clean up, community education about quotas, stormwater pollution</p> <p>Make decisions and carry out actions to improve the health of the marine environment</p> <p>Explain the Maori concept of 'kaitiakitanga' and how this relates to shellfish and the wider marine environment</p>	<p>Consequence Wheel</p> <ul style="list-style-type: none"> Students to us a consequence wheel diagram to start thinking about specific actions that could help prevent an identified threat to shellfish <p>Evaluate an Action</p> <ul style="list-style-type: none"> Students to choose one of the actions identified in the previous activity, and evaluate its potential. This can be done individually or in groups <p>Kaitiakitanga</p> <ul style="list-style-type: none"> Students to create a 'beach care code' that shows how they can be kaitiaki for the marine environment. 	<p>1-2 hours</p> <p>Learning Journal Activities Pg 20-22</p>
<p>Summative Assessment</p>	<p>Glossary Match</p> <ul style="list-style-type: none"> Cut out the words and definitions from the glossary for students to match together <p>Topic Summary</p> <ul style="list-style-type: none"> Students create a classroom/wall display of their work during the shellfish monitoring project using the following headings: Title Shellfish are important Threats to shellfish What we wanted to find out How we did the survey The results of our survey <p>Topic Evaluation</p> <ul style="list-style-type: none"> Students to complete evaluation in learning journal. Teachers to collect and send to the HGF Coordinator. 	<p>1-2 hours</p> <p>Learning Journal Activities Pg 19, 20</p> <p>Glossary, Teacher Resource Kit Pg 68</p> <p>Large sheets of paper, felt pens</p>