



Maui's Dolphin – An inquiry to action

TEACHER'S RESOURCE





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WWF are keen to acknowledge schools that are active in action for the environment. If your students are actively involved in protecting the Maui's dolphin, please let us know so that we can celebrate your achievements with you. You can contact us via our website www.wwf.org.nz or by emailing info@wwf.org.nz.



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Introduction

Welcome to Maui's dolphin – An inquiry to action

Maui's dolphin – An inquiry to action is a cross-curricular inquiry-learning resource for schools. It is designed to support teachers and students to undertake their own inquiries into the protection of the world's most endangered marine mammal – the Maui's dolphin.

This resource is designed for levels 2–4 of the New Zealand curriculum; however, it can be modified by teachers or facilitators and used at all levels of the curriculum. While the curriculum links focus on science and social studies, teaching about this critically endangered dolphin can be integrated into any curriculum learning area.

The teacher's notes include curriculum links, inquiry-learning support, student activities and an extensive list of resources.

When using this resource, you may choose to undertake a short inquiry with your class over a few weeks, or you may prefer to undertake an extended, rich inquiry over a longer period. Whatever you decide, this resource aims to support students and teachers as they come to value the existence of this very special dolphin and start taking action to protect it from extinction.

Why undertake an inquiry to action using Maui's as a context for learning?

This inquiry:

- provides opportunities for new understandings and insights about how we live in relationship to each other and all living things on this planet
- provides an opportunity for schools to connect with their local communities
- meets the objectives of The New Zealand Curriculum, while providing an authentic context for implementing an inquiry, with the aim of empowering students to take action
- provides coherent opportunities for linking together the different learning areas of The New Zealand Curriculum.



Meet Maui's dolphin

The west coast of the North Island is home to one of our rarest endemic animals, the Maui's dolphin. This tiny marine mammal, a subspecies of Hector's dolphin, is the smallest in the world, with the adults the length of an average-sized 10-year-old child and the babies the size of a large cat. They are distinguishable by their small size, rounded dorsal fin (like Mickey Mouse's ear) and distinctive black, white and grey markings. They are a coastal dolphin, spending the majority of their time within 7 nautical miles of the shore along the stretch of coastline between Maunganui Bluff and the Whanganui River, however, some have been seen to venture beyond 12 nautical miles, including in Wellington harbour!

Sadly, Maui's dolphins are also distinguishable by their small number, qualifying them for the title of the world's rarest marine dolphin. Prior to 1970, the population was believed to have been close to a healthy 2,000 animals. Over the last 40 years, the population has significantly declined; it was most recently estimated at only 55 animals. Their coastal nature means that they share the same environment in which humans like to engage in activities such as fishing, surfing, swimming and boating. The primary causes of their population decline are human-related threats, in particular those from two of the methods we use to catch fish: set netting, which uses monofilament gill nets, and trawling. If urgent action is not taken, this species could become extinct within 20 to 30 years. By communities deciding to take action (be it writing or talking to politicians or being declared set-net free) and not allowing Maui's dolphin to become extinct, WWF-New Zealand firmly believes this species has a chance for survival. By removing their primary threats, there is no reason that these tiny dolphins couldn't thrive and recover to their pre-1970s population.

The work of WWF

WWF (also known as the World Wide Fund for Nature, and the World Wildlife Fund) is the world's largest and most experienced independent conservation organisation, with close to 5 million supporters and a global network active in more than 100 countries. WWF's mission is to stop the degradation of the planet's natural environment and build a future in which people live in harmony with and within the bounds of nature. WWF encourages all New Zealanders to be environmentally responsible and to be advocates for the protection of our native species.

In New Zealand, WWF is campaigning to secure a future for Maui's dolphins where they are no longer threatened by extinction; that they might return to their pre-1970s population. Saving the species is about tackling the problem from every angle, and WWF-New Zealand works with communities, schools, researchers and the government to take action towards a healthy future for these marine mammals.



Alignment with the New Zealand curriculum and guidelines

Developing the aims and competencies identified in *The New Zealand Curriculum (2007)*¹

This resource is strongly aligned with the New Zealand Curriculum (2007). The curriculum provides the following principles, all of which are evident in this resource:

- Community engagement – connecting students with their communities
- Coherence – making links within and across learning areas
- Future focus – encouraging students to consider the future and explore issues such as sustainability, citizenship, enterprise and globalisation

The values of innovation, community and participation, inquiry and ecological sustainability closely link with the objectives of this resource.

Of the five key competencies people use to live, learn, work and contribute as active members of their communities, Maui's dolphin – An inquiry to action links most directly to the 'Participating and contributing' key competency. Using this key competency, students will understand the importance of balancing rights, roles and responsibilities and will contribute to the quality and sustainability of social, cultural, physical and economic environments. Students will work in their own communicates and will be faced with real-life issues that have consequences now and in the future. Through exploring the issues around protecting the critically endangered Maui's dolphin; students will begin to understand their roles and responsibilities in contributing to change.

Possible objectives for this inquiry, derived from The New Zealand Curriculum (2007), may include:

- For our students to:
 - become actively involved contributors to the environmental well-being of New Zealand²
 - value ecological sustainability, including the care of the environment³
 - participate and contribute in their community⁴
 - use their growing science knowledge when considering issues of concern to them (levels 3–4 science learning area)
 - explore various aspects of an issue and make decisions about possible actions (levels 3–4 science learning area)

1 <http://nzcurriculum.tki.org.nz/Curriculum-documents/The-New-Zealand-Curriculum>

2 Ministry of Education. 2007. The New Zealand Curriculum p 8.

3 Ibid. p 10.

4 Ibid. p 13.



- understand how people participate individually and collectively in response to community challenges (level 4 social sciences learning area)
- develop the aims and competencies identified in the guidelines in Environmental Education in New Zealand Schools⁵ and The Education for Sustainability Senior Subject Guidelines⁶.

Educating students about Maui's dolphin enables teachers to meet the aims of the Ministry of Education's environmental education guidelines in many ways. In this resource, there are elements of the key aspects of environmental education:

- Education in the environment – using field studies and other outdoor activities to increase knowledge and enhance skill development
- Education about the environment – providing information about environmental phenomena and processes
- Education for the environment – activities directed at influencing environmental outcomes

Integrated in the resource are the five key aims of environmental education:

- Awareness and sensitivity to the environment and related issues
- Knowledge and understanding of the environment and the impact people have on it
- Attitudes and values that reflect feelings of concern for the environment
- Skills involved in identifying, investigating and solving problems about environmental issues
- A sense of responsibility by acting, as individuals or members of groups, whānau or iwi, to address environmental issues⁷

Undertaking an inquiry into the protection of Maui's dolphin would provide a pathway for levels 6–8 study to meet sustainability achievement standards in Education for Sustainability Senior Subject Guidelines. This resource incorporates the following education for sustainability strands:

- Knowledge and understanding – students develop knowledge and understanding of sustainability as it relates to protecting Maui's dolphin
- Attitudes and values – in the context of sustainability, students explore their own attitudes and values and the attitudes and values of others
- Actions – students participate in individual and co-operative actions to address protecting the Maui's dolphin

⁵ Ministry of Education. 1999.

⁶ Ministry of Education. 2009.

⁷ Ministry of Education. 1999. Guidelines for Environmental Education in New Zealand Schools.



Furthermore, this resource can lead to sustainability study in years 11, 12 and 13, notably through NCEA sustainability achievement standards⁸ such as:

- 90810 – ‘Plan, implement and evaluate a personal action that will contribute towards a sustainable future’
- 90815 – ‘Work co-operatively to develop and present a strategy or design for sustainability in response to a future scenario’
- 90811 – ‘Describe the consequences of human activity within a biophysical environment in relation to a sustainable future’

Developing literacy and information literacy skills identified in *The New Zealand Curriculum and Literacy Learning Progressions*⁹

An inquiry such as this is an excellent context for the development of your students’ literacy and information literacy skills. Possible objectives for this inquiry, derived from The New Zealand Curriculum and Literacy Learning Progressions, include:

- For students to:
 - form and express ideas and information with increased clarity, drawing on a range of sources (Level 3 English learning area)
 - show increasing awareness of a range of dimensions or viewpoints (Level 3 English learning area)
 - generate ideas alone and with peers or the teacher by brainstorming (writing progressions in Year 3)
 - plan and organise ideas and information logically, using tools such as headings, graphic organisers, questions and mind maps and using strategies such as note taking and note making (writing progressions by the end of Year 4)
 - identify and evaluate writers’ purposes and apply some criteria to evaluate texts (e.g. relevance for their purpose, accuracy of information, presence of bias, and so on) (reading progressions by the end of Year 8).

⁸ <http://seniorsecondary.tki.org.nz/Social-sciences/Education-for-sustainability>

⁹ <http://www.literacyprogressions.tki.org.nz>



Possible approaches and inquiry models

Inquiry learning is a practical approach to learning that involves students forming their own questions about a topic and then exploring their answers. Forming questions is part of the plan; solving problems is part of the outcome. Inquiry learning encourages ownership and responsibility, as students actively search for and construct knowledge and meaning through a variety of research methods and resources. As part of this process, students encounter challenging and conflicting ideas and can begin to transfer what they have learnt to new circumstances.

You may have an inquiry-planning model that you use regularly in your school. If not, we suggest you explore a number of alternative approaches, such as:

Social-inquiry model

Using a social-inquiry approach, students:

- ask questions, gather information and background ideas and examine relevant current issues
- explore and analyse people's values and perspectives
- consider the ways in which people make decisions and participate in social action
- reflect on and evaluate the understanding they have developed and the responses that may be required.

Have a look at the interactive 'Social Inquiry Planning Tool', which can be found on the Social Sciences Online website.¹⁰

Action-competence approach

An action-competence approach is an integral feature of education for sustainability/ environmental education. It includes the ability to identify problems, make decisions about solutions and take action that develops the students' ability to participate in future action on environmental issues. This approach allows students to be hands on, participate in decision making and consequently have more ownership of their learning, while also enabling them to make a significant difference in the community.

The Ministry of Education's Education for Sustainability website has a framework for students developing action competence.¹¹ Furthermore, the Guidelines for Environmental Education in New Zealand Schools contains an action-planner template.

An inquiry-learning (information-literacy) model

An internet search should help you to discover a number of commonly used models for inquiry learning. They vary in complexity, but all attempt to provide a framework for inquiry planning, including stages related to inquiry planning, searching for information, choosing information, processing information, coming to conclusions and planning for subsequent action.

¹⁰ <http://socialinquiry.ssol.tki.org.nz/>

¹¹ <http://efs.tki.org.nz/Efs-in-the-curriculum/Taking-action/Action-competence>



Planning a teacher-directed inquiry

A teacher-directed inquiry is most suitable for younger students. In your classroom, the exploration into the protection of Maui's dolphin will be 'OUR' inquiry. You will direct the students through a number of learning experiences to develop their understanding, which can then be used as a base for taking action to save Maui's dolphin.

We have provided a blank planning template created by a teacher on pages 36–37. You may find this model useful or you may choose to use another model. The following is some guidance for you to help fill out your inquiry template, with examples for levels 3 and 4 of the New Zealand curriculum. The order is not intended on being linear as the process should be flexible and reflect the needs of your students.

Concepts and conceptual understandings

Choose the concepts and conceptual understandings to focus on in the inquiry. For example: 'People's actions can disrupt the survival of Maui's dolphins, leading to changes in the ecology of our world.' Students will need to revisit these conceptual understandings in a variety of contexts.

Key competencies

The key competencies in the New Zealand curriculum fit perfectly with inquiry-based learning. Choose which key competencies you wish to focus on in your Maui's inquiry. For example, ecological sustainability.

Learning outcomes

It is important to specify the learning outcomes that you expect from this inquiry. These learning outcomes could be from any of the learning areas.

For example, from the nature of science strand in the Science learning area at levels 3 and 4, students will:

- build on prior experiences, working together to share and examine their own and others' knowledge (investigating in science)
- use their growing knowledge of science to consider issues of concern to them (investigating in science)
- explore various aspects of an issue and make decisions about possible actions (participating and contributing)
- explain how living things are suited to their particular habitat and how they respond to environmental changes, both natural and human induced (ecology).



Inquiry stage one: Immersion

At this stage, students spend time immersing themselves in the topic and getting enthused about the topic. There are many ideas of what teachers and students may wish to do to gain knowledge of the background to a focus of learning. See pages 14–28 for possible learning experiences.

Students need to formulate a question or set of questions related to protecting Maui's dolphins. The question can be posed by the teacher or the student. However, many students will need teacher guidance to ensure they choose a rich question. Students also need to establish subsidiary questions that will help them answer their key question. It is recommended that, for students and teachers new to inquiry, there be just one class question. If the teacher and students are more experienced, they may be able to cope with groups or pairs of students investigating different key questions.

Give students time to work by themselves, in pairs or in groups to sort out some questions that they would like to study in the time available.

Sample key questions:

- Why isn't more being done to save the endangered Maui's dolphin from extinction?
- Why is it important to save Maui's dolphins from extinction?

Sample subsidiary questions:

- What threats to their survival are Maui's dolphins facing in New Zealand? What is being done to help them face these threats?
- How does the life cycle of Maui's dolphin affect other species?
- Where in New Zealand are Maui's dolphins found? Are any of these areas close to your school?

Inquiry stage two: Choosing and using information

Once the question is posed, students are encouraged to investigate the topic by gathering information from sources that have been either provided by the teacher or found in learning resources or tools that are readily available to the students. When enough information related to the topic of inquiry is gathered, it is either organised into categories or the important information relative to the topic is highlighted. This helps the student make connections between new and prior knowledge. Note that prior knowledge was established during the immersion stage, but this stage should be revisited once the key question has been decided. This will ensure that specific prior knowledge relating to that question is established.

The information is discussed and analysed for further understanding. The teacher can direct the discussion, highlighting the issues that arose from the investigation and how these, in turn, have an impact on the choice of action to take.



Here are some ideas you could use:

You could use a KWHL chart¹² – what I know, what I want to find out, how I will find out, what I learned. Try to take key words and ideas out of the general brainstorm and into some other form of graphic organiser¹³; for example, a chain or persuasion organiser or a T-chart.

Sources for gathering information could be websites, people in the community, experts via phone, fax, email, books or pictures. See pages 29–35 for an extensive list of resources. Talk to students about how to ensure sources are reliable and remind them about obtaining information from a variety of sources.

The tools and strategies¹⁴ that could be used at this stage will vary according to the key question, but some possibilities include PMIs, a decision-making matrix, comparing and contrasting, similarities and differences, and evaluation and generalisation.

Inquiry stage three: Coming to our conclusions

Conclusions are made and student reflections are encouraged; they serve as a way to relate back to the inquiry and retrace the steps that led to the conclusions. This also serves to reinforce the model so that students can repeat the process in any problem-solving situation.

At this stage, there is a lot of reflecting and analysis. During the inquiry process, students and the teacher or students with other students may find themselves asking questions similar to the ones outlined below. This may necessitate a return to the previous stage to gather more information.

- What do we know about Maui's dolphins and the importance of their survival?
- Should humans be playing a role in their survival?
- What could we do to help Maui's dolphins?
- What are some of the differences between protecting terrestrial animals and marine animals in New Zealand?
- Why has New Zealand not banned the use of set-nets like some other countries have?

Inquiry stage four: Planning our action

This is when we ask, 'So what?' and, 'Now what?'. That is, we answer the key questions, present our findings and take action.

There are many possibilities for presenting findings. These include posters, charts, wiki, a blog or a prezi, or recorded explanations in the form of an interview using Photo Story 3 (PC), iMovie (Mac) or Movie Maker (PC). Further ideas include PowerPoint presentations, mobiles, talks at assembly, photo stories and digital stories.

While students may have thought of a way of presenting or displaying their work at an earlier stage, they may need to change or adapt their idea as the inquiry progresses.

12 <http://www.graphic.org/kwhl.html>

13 <http://www.enchantedlearning.com/graphicorganizers/>

14 <http://olc.spsd.sk.ca/DE/PD/instr/strats/graphicorganizers/>



Now what? Action and review

The action arises from all the research students have undertaken and the various discussions students have been having with their teacher and others in the class. There are many different ways of administering action. It is important to determine which action project will best fit the brief and criteria. Some possibilities are:

- make a pamphlet that outlines the facts about the declining Maui's dolphin population and how people can help. This could be dropped into the letter boxes on each student's street
- write letters to MPs or the editor of the local paper
- use VoiceThread to share their understandings about the endangered Maui's dolphin and capture feedback from parents, teachers and peers about their video.
- create a digital story about the positive action they have taken to protect the Maui's dolphin and sharing it with the parent community. Use a flow chart, storyboard or Comic Life¹⁵ application with accompanying procedural text to capture ideas and the sequence of key actions. Consider how the nature of the audience might affect the content and duration of the digital story.
- become kaitiaki (guardians) for a local waterway – use the Whitebait Connection Programme website¹⁶ to help you get started. Find out if there is a programme running in your area.
- canvas views within your community about declaring yourselves a 'set-net free' community. Find out which other countries have banned this type of fishing.
- hold a concert at your school for Maui's dolphins
- adopt a Hector's dolphin.

It is important for both students and teachers to review how the whole process went. Students should review their work according to the effectiveness and efficiency of the process asking questions such as:

- Did I achieve my purpose?
- What could I do better next time?

Both peer- and self-assessment are helpful strategies at this stage.

¹⁵ <http://comiclfe.com/>

¹⁶ See <http://www.whitebaitconnection.co.nz/>



Possible learning experiences and resources

Learning experiences

Below are some suggested learning experiences you could do with your class. The ideas below might be used during the inquiry or early on to spark the beginning of the inquiry and serve as a guiding force for the remaining stages. In addition, some of these learning experiences may be used as a formative pre-assessment for your programme.

Activity 1: Maui's dolphin – an endangered species

Background

IUCN (The World Conservation Union) assesses the conservation status of species worldwide using the IUCN Red List Categories and Criteria (www.redlist.org) to highlight species threatened with extinction and promote their conservation.

Maui's dolphin (*Cephalorhynchus hectori maui*) is categorised as "critically endangered". This is because the population has declined by more than 90% over the last three generations. In the 1970s Maui's dolphins are believed to have numbered almost 2,000, but today only about 55 remain,

The main threat to Maui's dolphins is accidental death by being caught in fishing nets. Additional threats include pollution, disease, being hit by boats, and changes to their habitat.

If these threats are not reduced the Maui's dolphin may become extinct! To save them from extinction we need to reduce these threats. To reduce these threats we need to know about the biology and behaviour of the dolphins and how people interact with them. We need to help people realise the impact of their actions on the dolphins and help them change their attitudes and behaviours so Maui's dolphin will not end up on the IUCN's Extinct Red List!

Instructions

1. As a class brainstorm all the endangered species that students know. You may like to focus just on native animals or think of all plants and animals worldwide.
2. Introduce students to the concept of the IUCN Red List and its categories:
 - Extinct (e.g. moa, huia, short-tailed bat)
 - Extinct in the wild
 - Critically endangered (e.g. kakapo, Archey's frog, black stilt, Cromwell chafer beetle)
 - Endangered



- Vulnerable
 - Low risk
 - Data deficient
3. Ask students why it is a good idea to have the same categories worldwide to determine the conservation status of plants and animals. Some ideas are to:
 - provide a system that is consistently used by different people
 - provide people with clear guidance on how to evaluate risks of extinction
 - provide a way to compare different plants and animals
 - give people a better understanding of how individual species are classified.
 4. In groups ask students to come up with an example of one animal to fit each of the categories above. Note, there are no “extinct in the wild” but alive in captivity species in New Zealand so you may like to discount this category. Senior students can visit www.redlist.org to conduct a search by category and country if you prefer.
 5. Each student in the group chooses to be one of the brainstormed animals and must find other animals in the class who are in the same category. Once these groups are formed, each group chooses one of the animals to role-play to the rest of the class. In the role-play, all students have to mime just one animal so they will have to cooperate to be the head, feet/tail, wings/flippers etc. Sounds are permitted and should be practiced first so everyone in the group is consistent. Once groups have had time to practise their performance, sit everyone down and allow one performance at a time while the audience guess what animal they are.



Activity 2: Drawing Maui

You will need

Maui's dolphin drawing (see Appendix 2)

Instructions

Follow the instructions to draw a Maui's dolphin on the board, while discussing distinctive features for survival and identification:

1. Discuss: Imagine you were dumped at sea. How well could you survive and what challenges would you face? Talk about difficulties a human faces in the sea for example, gets cold if in too long, gets tired swimming too long, hard to stay afloat a long time (without the help of a life jacket).
 - Introduce the body that is layered in "blubber". Blubber is a layer of fat that insulates the marine mammal and helps them stay warm and buoyant. The blubber is found all over the body.
 - Draw a streamlined shape of a dolphin's body on the board.
2. Discuss: The marine mammal is warm and buoyant, but can't move very well. What can help the marine mammal move through the water?
 - Introduce flukes. The flukes are tail fins that propel the marine mammal through the water. The flukes can pump up and down for a long time without getting tired.
 - Draw flukes on the tail of the dolphin body.
3. Discuss: Now the marine mammal is warm, buoyant and can move, but the only problem is it can only move in one direction. It can't turn. What can help it to steer left or right?
 - Introduce pectoral flippers. Inside the pectoral flippers are bones just like our hands, but the flippers have adapted by becoming flat and wide (webbed). The flippers help the marine mammal go left, right or stop.
 - Draw pectoral flippers on the body.
4. Discuss: So the marine mammal is warm, buoyant, can move forward, left, right and stop, but it has one more problem. When it moves forward, it starts to wobble about. It's finding it hard to stay upright. What could help it stay upright in the water?
 - Introduce the dorsal fin. The dorsal fin acts like a rudder. It helps the dolphin stay upright in the water as it swims along.
 - Draw a rounded dorsal fin on top.
5. Discuss: Take a close look at the dorsal fin. It is different from any other dolphin you'll see around New Zealand. It is short and rounded. Other dolphins have a larger, more, pointy or sickle shaped dorsal fin. Maui's dolphins are a lot smaller than the other dolphins. A full grown adult is only about 1.4 metres long. Other dolphins can be nearly twice as big or bigger.
6. Draw the distinctive markings and colouration of Maui's dolphin and discuss how these differ from other dolphins.



Activity 3: Flippers, fins and flukes

You will need

Juniors

- Pre-cut black construction paper flukes (one for each student)
- Pre-cut black construction paper dorsal fins (one for each student)
- Pre-cut black construction paper pectoral flippers (two per student)
- Large brown paper rubbish bag dolphin body (one for each student)

Seniors

- Plenty of black construction paper for students to make flukes, dorsal fins and flippers
- Large brown paper rubbish bags (one for each student or group)

All

- Maui's dolphin drawing (see Appendix 2)
- Glue
- Black and white crayons

Instructions

1. Distribute brown paper rubbish bags to students and ask them to cut an opening up the front of the bag, a circle at the top for the head and armholes on each side. The bag is the streamlined body (with blubber) of the Maui's dolphin.
2. Review the name and function of the body parts, draw them on the board and then pass out to the students (or ask students to cut) fluke, pectoral flippers and dorsal fin.
3. Students glue the fluke to the base (open end) of the bag.
4. Show students how to glue around the outside of the pectoral flippers to make a "glove" they can slip their hand into. Set them aside to dry.
5. Show students how to fold flaps at the bottom of the dorsal fin and glue the bottoms of the flaps to the back (uncut side) of the bag so that the fin stands up. Glue fin about two thirds along the centre of bag. Make sure that the fin curves back towards the flukes.
6. Students colour the fronts and backs of their bags.
7. Students can now put on their suits with the cut side in front. The pectoral flippers slide over the hands. Role-play Maui's dolphin behaviour including swimming (flukes move up and down), jumping, diving, steering and turning with their flippers, and chasing and catching food.



Activity 4: How do you compare to Maui? – Dolphin maths

You will need

- Maui's dolphin drawing (see Appendix 2)
- Tape measure and ruler per group of three students
- Bathroom scales

Instructions

1. Students first estimate whether or not they think they will be smaller than, the same length as or longer than a Maui's dolphin. Record a tally of each of these on the board.
2. Students then lie along the length of a life-size Maui's dolphin drawn in chalk on the ground or a line measuring 1.2–1.4m and arrange themselves into groups, who are smaller, the same length or longer than a Maui's dolphin.
3. Make a table on the board with two columns. Label the first column, "Height/Length" and the second column "Number of students". Students work in groups of three to measure each other's height. One student stands against a wall. The second student marks the height against the wall by placing a ruler on top of the first student's head. The third student uses the tape measure to measure the height from the ruler to the floor. Alternatively they may prefer to lie along the floor.
4. As each group completes their height/length measurements, their data is recorded on the table by writing in the height/length of each student and making a tally mark in the second column. If their height is already listed, then only a tally mark is needed.
5. After all the data is collected the students display the results as a bar graph.
6. Depending upon the level of students conclude the analysis by:
 - a. Writing the total number of students whose height is:
 - less than the smallest average length of an adult dolphin (1.2m), using the < symbol
 - greater than the largest average length of an adult dolphin (1.4m), using the > symbol
 - the same as the length of the dolphins (1.2–1.4m), using the = symbol
 - b. Calculating the fraction or percentage of students that:
 - are shorter than the smallest average length of an adult dolphin (1.2m)
 - are taller than the largest average length of an adult dolphin (1.4m)
 - have the same height as the average length of an adult dolphin (1.2–1.4m)



7. Additional exercises

- a. Students can repeat this exercise by using a bathroom scale to measure their weight. From the results they discover the percentage of students that weigh less/more/the same as the average weight of adult Maui's dolphins (36–60 kg). If you have any students who may be sensitive to their weight being measured, you may wish to consider avoiding this activity.
- b. Students can make a list of items in the classroom that are the same length as a newborn calf (50–70cm).
- c. Students can conduct research to find out the average length and weight of a newborn human baby to discover if they are about the same size or smaller or larger than newborn Maui's dolphin calves.
- d. Students can compare the maximum length of the four most commonly seen dolphins in New Zealand: bottlenose dolphin (4.0m); common dolphin (2.4m); dusky dolphin (2.1m) and Maui's dolphin (1.5m). On a concrete surface, the students measure and mark out the different lengths of the commonly seen dolphins using different coloured chalk. This offers a simple but vivid visual comparison.



Activity 5: What is endemism?

Background

Maui's dolphins are endemic to New Zealand. This means they occur nowhere else in the world. Students may be confused over the terms; native, endemic and endangered. This activity helps to clarify that species may be a) native but not endemic, b) both native and endemic or c) neither (i.e. introduced).

You will need

- Different coloured beans, beads, counters or other small coloured objects
- Six different jars labelled with different regions, for example, Africa, Europe, Asia, North America, South America, and Australasia

Instructions

1. Lay out the jars on a display table labelled by region.
2. Explain that each colour of counters represents an animal or plant species.
3. Explain that a "global" species lives in many habitats or places around the world and drop a few or many of your most common coloured counters in most or all of the jars.
4. Explain that an "endemic" species only lives in one specific habitat or place and drop all of a different colour into only one jar. Explain that all the individuals of this species are found only in this one place.
5. Ask students to come up and distribute another "global" species and another "endemic" species to reinforce the concept.
6. Brainstorm New Zealand animals that the students know to be global (e.g. black-backed gull and bottlenose dolphin) and endemic (kiwi and tuatara). Emphasise that Maui's dolphin is endemic and found nowhere else in the world except around the West Coast of the North Island of New Zealand!
7. If you wish to distinguish between "endemic" and "native", explain that "native" species are those that have always lived in the same place, but they can be native to more than one place. Drop a few tokens of a different colour into two jars. Introduced species are those that were not originally found here but arrived within human history, either by natural means (e.g. birds being blown over from Australia) or intentionally or accidentally introduced by people. You may like to move some counters of one colour from one jar to another which does not have that colour (be sure to leave some behind, not all individuals of the same species would leave! A species is of course "extinct" once all individuals have died out. Remove all of one colour from all the jars. You may use this to illustrate why endemic species are more vulnerable to extinction.



8. As an extension, students can create a marine collage of their local coast. One group can take responsibility for drawing a large base map of their local area showing distinctive landmarks and water depth (if available). Another group can research a species list of plants and animals that live in the local area, while others gather images of these species from magazines, newspapers, photographs and the Internet. These images should be placed in relevant areas of the map depending upon where they live; deep sea, shallow waters, rocky shore, sandy shore etc. A key can be made to indicate special features of some species, for example; endemic, native or endangered.



Activity 6: Maui's dolphin life cycle

Background

Maui's dolphins are thought to live to about 22-30 years old. Like humans, Maui's dolphins are slow breeders compared to other mammals and female Maui's will only have four to seven calves. This low rate of population growth is what makes Maui's dolphin so vulnerable as a species. If the death rate is larger than the reproductive rate, this will cause the population to decline over time.

You will need

- Maui's Dolphin Life Cycle drawing (see Appendix 2)

Instructions

1. Hand out copies of the drawing and talk through the different stages of the life cycle, starting with the calf.
2. Introduce each life stage, using the information provided below.
3. After introducing each stage, ask the students to describe the similarities and differences between each stage of a Maui's dolphin life and humans.
4. Once the life cycle is complete, ask students which life stages they think are most vulnerable to human activities and why.
5. Ask why they think it is important to avoid killing or stressing female adults in particular. Discuss the scenario that would occur if an adult female died; for example, if she was feeding a calf it may not survive and she would be unable to have any more calves. Therefore although we only knew of one dolphin dying, the population lost the potential to have four or seven more dolphins.

Notes to accompany Maui's Dolphin Life Cycle drawing:

Calves

Maui's dolphin calves are born in summer. Newborn calves are half the size of adults, darker in colour, and have pale vertical lines (called foetal folds) along their sides, caused by being curled up inside their mother. Initially they are completely dependent on their mother for protection; to practice swimming to the surface to catch a breath and to drink milk so they can build up a fat layer of blubber to withstand the cold water temperatures of winter. Mothers with newborn calves are more wary of boats and other things that could harm them. Often nursery groups of mothers and calves will stay together and help each other. This allows mothers to dive deep to the seafloor to get food without worrying about leaving her calf. At around six months, calves begin to feed on small crustaceans (e.g. crabs and shrimps) and small fish near the surface. By the end of their first year, calves will eat the same as adults and will wander/swim off on their own to play with other calves, dolphins and even seagulls. However, they are still noticeably smaller than adults and stay with their mother most of the time. Like other mammals, this time is very important to the survival of a calf. It is probably when they learn about what to eat (or not eat), to be alert



for sharks, orcas, leopard seals and other predators, and how to search for food using their sonar.

Human babies are also completely dependent on adults for protection and most drink their mother's milk as their only source of food for the first few months of their lives before starting to eat other solid foods about the same time as the calves. Many babies also still have mother's milk for a year or more, just like dolphins. When they are one year old many human babies are crawling and walking and starting to play with others, but still need an adult nearby just like dolphin calves. Humans with babies group together to share care and give each other a break from looking after their babies, just like dolphins.

Juveniles

After their first year, calves become curious, highly active juveniles and often get in trouble with their mother or other adults (just like human toddlers!). This time is probably when they learn how to behave and communicate with other Maui's dolphins. Juveniles will stay with their mother (sometimes still nursing) until she has another calf, when the juvenile is two or three years old.

Immature Adults

Once they leave their mothers, these immature adults are almost fully grown and can take care of themselves but cannot yet have their own calves. Immature adults spend their time exploring and interacting with other dolphins and different species. This stage only lasts for a few years in dolphins; in humans this stage lasts a lot longer!

Mature Adults

Female dolphins mature between seven and nine years old, while males mature around six to nine years. At this point, they can reproduce and have their own calves and the cycle will start again.



Activity 7: Clever clicks – echolocation

You will need

- 3 blindfolds
- Echolocation in Maui's dolphin drawing (see Appendix 2)

Instructions

1. Form a circle, close enough together so students can just touch hands. Choose one student to be the Maui's dolphin and hand her/him a blindfold to wear. Ask the students why the dolphin is wearing a blindfold when in real life dolphins can see well (because Maui's sometimes hunt for their prey in murky shallow waters where they cannot rely on their sight).
2. Ask what type of fish Maui's dolphins eat. Choose two students to be the prey and give them blindfolds for the same reason as above.
3. The idea of the game is for the Maui's dolphin to try and catch a fish. But with no sight the dolphin must use echolocation. Bring the dolphin and fish into the circle (with blindfolds off) and demonstrate how the dolphin will say "click" to represent the sound a Maui's makes when it is trying to work out what is in its surroundings. The crucial instruction is that every time the dolphin says "click" the fish MUST reply "fish" as quickly as possible to represent the sonar sound bouncing off the fish and echoing back to the dolphin. In this way, the dolphin can "hear" where the fish are and has to try to catch them! Ensure the students understand their roles – dolphin says "click" and must try to catch the fish; fish must reply "fish" whenever they hear a "click" and have to try to avoid being caught.
4. Ask students to put their blindfolds on and have three other students spin them around to disorient them. The rest of the students should spread their arms to complete the circle and stay quiet. Their job is to gently prevent the fish and dolphin wandering outside the circle.
5. Start the game! Stop when one fish has been caught and give other students a turn. A dolphin student should quickly discover that by saying "click", "click", "click", "click" in quick succession (but waiting briefly for an answer), they will get the most information possible and can hone in on a fish quicker! If your students do not try this technique, suggest it to the 2nd or 3rd dolphin. You may also like to try the game with two dolphins working together to catch one fish. Is it easier or more difficult to interpret the clicks and echoes?
6. Discuss what was easy and what was difficult about the game from the fish and the dolphin's point of view. What would be similar or different when a real dolphin tries to catch a real fish?
7. You may like to show students the Echolocation in Maui's dolphin drawing, to reiterate how echolocation works and/or the parts of the dolphin involved in echolocation.
8. Ask the students what else could Maui's dolphins use their echolocation or click sounds for? You may like to follow this game immediately with the next activity: Where's My Baby?



Activity 8: Where's my baby?

You will need

- Six pairs of sound makers (such as balloons, dried beans in a jar, whistles, clickers, etc)
- 12 blindfolds (or students must keep eyes closed)

Instructions

1. In a clear space, select six students and ask them to choose a partner (others will have a turn soon). Hand out sound makers so both individuals in each pair makes the same sound.
2. Each pair decides which person is the "mother" and which is the "calf".
3. Separate the mothers to one side of the room and the calves stand on the opposite side of the room. The other students need to blindfold the calves and mothers and mix them up within their groups gently.
4. When the teacher gives the signal, the calves beginning "calling" their mothers using their sound makers; the mothers can only respond using their matching sound. No talking or sound making other than the pairs' signal is allowed.
5. The game stops when all of the pairs find each other.
6. Discuss:
7. Why do you think the blindfolds were used? (The blindfolds represent the marine environment, where it is murky and hard to see.)
8. Can you think of other characteristics of the marine environment or the dolphins that would make it hard for mothers and calves to find each other? (For example, Maui's dolphins all look alike; individuals do not have many distinguishing characteristics. The marine environment is three dimensional, so marine animals move forward and backward (as we do) but they also can move up and down through the water.)
9. What sounds were most successful? Were there any similarities and/or differences between the sounds that were successful and those that were not?
10. Was there anything that made finding your calf harder and/or easier?
11. What mother/calf recognition signals, other than sound, may be successful for communication in a marine environment? For example other marine animals have developed a heightened sense of smell to identify prey or predators. Sharks have developed electro-receptors, capable of picking up electric discharges from muscle contractions and use these to identify different types of animals.
12. Repeat the game with the rest of the class, asking pairs to make up their own unique sounds such as clapping, finger popping, clucking tongue, etc. Remind them to consider what did and didn't work for the first group.
13. Did any two pairs have very similar sounds, how did this add to the confusion? Ask the students what else could Maui's dolphins use their echolocation or click sounds for? If you



haven't played Clever Clicks yet, you may like to immediately after this activity.

Activity 9: Protect Maui's from pollution

Background

For generations humans have been dumping waste in the ocean because they thought it was large enough to dilute most substances. However it is shallow coastal areas that receive the most pollution from sewage outfalls, storm water, and agricultural and industrial run-off. We need to start taking responsibility for our waste and not dumping it where it will harm other living organisms. Most people like to think of themselves as friends of the environment and declare a deep concern for the future of the planet, but their actions can be in conflict with these values. The Pollution Quiz will show you we can all easily improve our polluting habits.

You will need

- Pollution Quiz – one per student (see Appendix 2)

Instructions

1. Hand out copies of the Pollution Quiz worksheet to each student to take home and fill in with their family as a homework exercise.
2. The next day, draw a tally table on the board as below and ask students to come and mark off their score. This gives some anonymity to the scores rather than asking for a raise of hands or answers to be called out.
3. How did you and your family score?

Pollution points	100 points or above: Indeed, you are a friendly family of the planet!	80–99 points: You are a concerned family and doing well.	60–79 points: Your family is making an effort but could make a plan to try and pollute less.	Below 60 points: Your family is contributing to the problem! You need to make a plan to try and pollute less.
Class Tally				

4. Discuss what were the easiest things to do that gave you + pollution points? What were the hardest things to do that gave you + pollution points? What was the most common thing people did that gave them – pollution points? How could you easily overcome this problem?
5. Students can then identify the things that their family does that gave them – points and ask them to talk to their family about how they can all help each other change these.
6. Brainstorm other things that people can do to decrease pollution.



7. Brainstorm how the students can make a difference to help protect Maui's dolphins from pollution.

Here are some more ideas for learning experiences you could do with your students.

Social studies

- Watch the WWF short film *Take action for Maui's*¹⁷, where the students at Te Huruhi School tell us about the Maui's dolphin and how to take action to save it. Have students take notes while watching the film stopping the film periodically. Ask the students what does the film tell us about the Maui's dolphin? What does the film tell us about the issues? How are the students taking action to save the Maui's from extinction? This links to English.
- Watch the compelling animated short film for children, made by Massey University graduate, Julie Holmes¹⁸. This film works well in the immersion stage of your inquiry as it presents information about the Maui's in a child-friendly manner. After watching the film, add new information to a KWHL¹⁹ chart. Ask the students to reflect: What new information have we learned? What else would we like to know? This links to English.
- Create two pictures of Maui's dolphin in its habitat – one with humans and one without humans – to show the impact humans can have. This links to English and visual arts.
- Read or use the internet to find out how people are trying to protect Maui's dolphin. This links to English, technology and inquiry skills.
- Use graphs, continue a sequence or use number sentences using $<$ and $>$ to provide information about endangered species' populations. This links to mathematics.
- Use drama to develop a community of people who use the sea where Maui's dolphins live. Use drama to explore the rights and responsibilities of these people. This links to English and drama.
- Make a class poster containing instructions that define the responsibilities of people who use marine areas, or a children's book about how people can enjoy the sea and also look after Maui's dolphins. This links to English and visual arts.
- Think, pair, share. Listen to a range of stories and non-fiction texts about the sea and its use to make a star diagram showing people's uses of the marine environment. This links to English.
- Use a flow chart to show cause and effect of threats to the dolphin population.

17 <http://www.youtube.com/watch?v=aKHRugVtrJg&feature=related>

18 <http://digitalmedia.massey.ac.nz/exposure/student.php?id=86>

19 <http://www.ncsu.edu/midlink/KWL.chart.html>



- Use speech bubbles or hot seating to compare and contrast people's views of the marine environment. This links to English and drama.
- Investigate what the New Zealand Government has done to protect Maui's dolphin.

Science

- Study photos, pictures or diagrams of Maui's dolphin to help draw it. Use card and materials such as string or wool to explore how to compose the correct shapes, colours and lines and express the function of various parts of the dolphin. This links to visual arts and mathematics.
- Use internet sites to determine the definitions of and differences between mammals and fish. Give reasons for classifying Maui's dolphin as a mammal and not a fish. This links to technology and science processes.
- Use interactive internet sites about classification. Group cut-outs of marine organisms (such as marine plants, crustaceans, fish and mammals) according to differences and give reasons for your groupings. This links to technology and mathematics.
- In pairs, use books and internet sites to find about dolphins' special physical features and skills. Create labels for a poster or outline of a Maui's dolphin that describe its special features. Play an echolocation game.²⁰ This links to physical education and health.
- Use Maui's and Hector's dolphin sites to explain why the population is so small.
- Describe factors that prevent a quick recovery of the populations (such as slow breeding). Make estimates and explore concepts of numerical change relating to the future population of Maui's dolphin (such as birth and death rates). This links to mathematics.
- Interpret diagrams and maps and draw and interpret scale maps. Create a food-chain mobile or a group or whole-class mural of a Maui's dolphin habitat. This links to visual arts, English and mathematics.
- In groups, investigate what is being done to protect Maui's dolphin. Read about children's environmental activism in texts or on the internet. After a class discussion, brainstorm and then mind map solutions, dividing them into things that all people can do together and things that adults and students can do as separate groups. Include a category for what the class could do. This could involve a class survey and measuring qualitative data. Come to an agreement on a class project. This links to mathematics.

²⁰ For example, <http://www2.scholastic.com/browse/lessonplan.jsp?id=1301>



- Show, through drama, why the class is involved with protecting Maui's dolphin. Devise a series of scenes to convey students' ideas, feelings and attitudes about the endangerment of Maui's dolphin. Present the scenes in the format of a current-events programme that is suitable for young people. This links to drama, technology and English.

Resources

Background information for teachers

Learn more about Maui's dolphin's ecology, distribution and the threats it faces by visiting the WWF-New Zealand website ²¹. This website has the following downloads for your inquiry:

- Factsheets:
 - What we know about Hector's and Maui's dolphins
 - Dolphin details
- Colmar Brunton Research: New Zealanders' views on the protection of Hector's and Maui's dolphins

Books

New Zealand dolphins	
<p>Author: Todd, Barbara</p> <p>Title: Maui's Dolphin</p> <p>Summary: Describes the physical characteristics, behaviour and habitat of Maui's dolphins and looks at the threats to their survival in the wild.</p> <p>Suggested level: Junior, primary</p>	<p>Author: Jones, Jenny</p> <p>Title: The Hector's Dolphin</p> <p>Summary: Describes the physical characteristics, behaviour and habitat of Hector's dolphins and looks at the threats to their survival in the wild.</p> <p>Suggested level: Junior, primary</p>
<p>Author: Dawson, Stephen and Elisabeth Slooten</p> <p>Title: Dolphin Down Under: Understanding the New Zealand dolphin</p> <p>Summary: Discusses the habits and behaviour of the Hector's dolphin and causes of accidental deaths by entanglement in gillnets.</p> <p>Suggested level: Secondary</p>	

²¹ <http://www.wwf.org.nz/?1500/Dolphin-briefing-for-politicians>



<p>Author: Atkinson, Tania Title: Pelorus Jack: The Story of New Zealand's Famous Dolphin Summary: The true story of Pelorus Jack, a dolphin who was a regular escort of the Wellington–Nelson steamers for 25 years until his disappearance in 1912. Suggested level: Primary, intermediate</p>	<p>Author: Todd, Barbara Title: Whales and Dolphins Summary: Describes the different types of whales and dolphins that live around New Zealand, including what they eat, where they travel, how they use techniques such as echolocation to find food and why they strand. Looks at the ways these mammals interact with each other and with humans, and what can be done to protect them. Suggested level: Primary, intermediate</p>
<p>Title: The Amazing Dolphin of Opononi (New Zealand) Details: Video recording, director Rudall Hayward Publisher: Auckland: Hayward Film Trust, c1991 Summary: A documentary about Opo, the friendly lone dolphin who made the Hokianga Harbour her home for about two years and became a tourist attraction during the summer of 1955–56. Suggested level: Primary, intermediate, secondary</p>	<p>Author: Graham, Julia Title: Opo the Happy Dolphin Summary: Opo rescues Captain Jack from a shark attack when he is washed overboard from his fishing boat. Opo then becomes a local celebrity at Opononi. Author: Lee-Johnson, Eric and Elizabeth Lee-Johnson Title: Opo: The Hokianga Dolphin Summary: A photographic essay about Opo, the friendly dolphin who made the Hokianga Harbour her home, captured the hearts of the Hokianga people and became a major tourist attraction at Opononi during the summer of 1955–56.</p>
<p>Author: Graham, Julia Title: Opo te Aihe Harikoa (Opo the Happy dolphin) Suggested level: Primary, intermediate Summary: Picture book for children in Māori. Translation of Opo the Happy Dolphin.</p>	



Studying dolphins	
<p>Author: Wallace, Karen Title: Diving Dolphin Summary: A young dolphin's life is full of adventure — can he escape the killer whales? Suggested level: Junior</p>	<p>Author: Stephens, Jane Title: Dolphin Summary: A poem that introduces the characteristics and behaviour of the dolphin. Also includes factual information about dolphins. Suggested level: Junior, primary</p>
<p>Author: Samuels, Amy Title: Follow That Fin! Studying Dolphin Behaviour Summary: Follows two biologists as they study the behaviour and everyday life of bottlenose dolphins in Shark Bay, Australia. Suggested level: Primary, intermediate</p>	<p>Author: Davies, Nic Title: Dolphin: Habitats, Life Cycles, Food Chains, Threats Summary: Describes the habitat, physical characteristics, behaviour and life cycle of dolphins, as well as the threats they face and efforts to protect them. Suggested level: Primary, intermediate</p>
<p>Author: Davies, Nicola Title: Wild About Dolphins Summary: Describes searching for dolphins around Newfoundland and in the Indian Ocean on two scientific expeditions. Includes a guide to dolphin species. Suggested level: Junior, primary</p>	<p>Author: Houghton, Sue Title: Dolphin Summary: Describes some different species of dolphins and their physical characteristics and behaviour. Suggested level: Primary, intermediate</p>
<p>Author: Robinson, Claire Title: Dolphins Summary: Presents the physical characteristics, habitat, behaviour and life cycle of dolphins, with an emphasis on the bottlenose dolphin. Suggested level: Junior, primary</p>	<p>Author: Dobbs, Horace E Title: Follow a Wild Dolphin: The Story of an Extraordinary Friendship</p>
<p>Author: Cole, Melissa S Title: Dolphins Summary: Describes the different species of dolphins, examining their habitat, physical features, behaviour, reproduction, development and interaction with humans. Suggested level: Primary, intermediate</p>	<p>Author: James, Sylvia M Title: Dolphins Summary: Provides introductory information about the dolphin, including its body parts and life cycle. Suggested level: Primary</p>



<p>Author: Mead, James G Title: Whales and Dolphins in Question: The Smithsonian Answer Book Summary: Students, teachers, and scientists all have amazingly varied questions about whales and dolphins, and the most revealing inquiries are presented here with detailed answers. Suggested level: Secondary</p>	<p>Author: Renne Title: Little Dolphin's Big Adventure Summary: One day a little dolphin leaves the sandy bay where he was born and follows a ship into the deep ocean. There he has a big adventure as he encounters new friends and strange places. Includes fact boxes about dolphins and their behaviour. Suggested level: Junior, primary</p>
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Stories about dolphins

<p>Author: Pohatu, Warren Title: Mòkai Rangatira: Māori Animal Myths Summary: Retelling of fourteen Māori tales and myths about animals and birds. Suggested level: Primary, intermediate Note: Available in English and Māori</p>	<p>Author: Anderson, Lonzo Title: Arion and the Dolphins: Based on an Ancient Greek Legend</p>
<p>Author: Dunlop, Beverley Title: The Dolphin Boy Summary: Adventure story for 8–12 year olds.</p>	<p>Author: Butterworth, Christine Title: The Sand Dolphin Summary: Mary makes a dolphin in the sand at the beach and dreams of moonlit adventures with it. For 4–7 year olds.</p>
<p>Author: Benchley, Nathaniel Title: The Several Tricks of Edgar Dolphin Series: An I can read book</p>	<p>Author: Grover, Wayne Title: Dolphin Adventure: A True Story Summary: A diver describes how he encounters and gains the trust of a family of dolphins and saves the life of their baby.</p>

Mammals

<p>Author: Snedden, Robert Title: What is a Mammal? Summary: Explains what mammals have in common with each other and what makes them different from other types of animals. Suggested level: Intermediate, junior secondary</p>	<p>Author: Thomas, Peggy Title: Marine Mammal Preservation Summary: Looks at how man-made pollution, habitat destruction and shipping traffic are endangering marine mammals, and how scientists, government agencies and volunteers track down the offenders and endeavour to save the marine mammals' lives. Suggested level: Intermediate, secondary</p>
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<p>Author: Kalman, Bobbie and Jacqueline Langille</p> <p>Title: What is a Marine Mammal?</p> <p>Summary: Describes ways in which marine mammals have adapted to ocean habitats, including their physiology, reproductive behaviour, diet and other behaviour.</p> <p>Suggested level: Primary, intermediate</p>	<p>Author: Kalman, Bobbie</p> <p>Title: What is a Mammal?</p> <p>Summary: Introduces mammals, showing and describing the main groups and discussing their anatomy, habitats, reproduction and diet.</p> <p>Suggested level: Primary, intermediate</p>
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The marine environment – teaching kits

<p>Title: Seaweek: Our Secret Seas: A Resource Booklet for Schools</p> <p>Summary: Seaweek is an annual public-awareness campaign to increase community knowledge and appreciation of the sea and marine habitats.</p>	<p>Title: The Underwater World/Te Marae Nui o Hine-Moana</p> <p>Summary: A kit for teachers of forms 1 and 2, prepared by the Department of Conservation with support from the Royal Forest and Bird Protection Society. Designed to stimulate students’ interest in the marine environment and is intended for use by teachers of 10–12-year-old children.</p>
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Food chains

<p>Author: Greenaway, Theresa</p> <p>Title: Food Chains</p> <p>Summary: Explains what food chains are, looks at how they work in a variety of habitats and discusses how humans disrupt natural food chains.</p> <p>Suggested level: Primary</p>	<p>Author: Riley, Peter D</p> <p>Title: Food Chains</p> <p>Summary: Introduces the basic science behind food chains and presents experiments to show how they work.</p> <p>Suggested level: Primary, intermediate</p>
<p>Author: Lauber, Patricia</p> <p>Title: Who Eats What? Food Chains and Food Webs</p> <p>Summary: Explains the concept of a food chain and how plants, animals and humans are ecologically linked.</p> <p>Series: Let’s-read-and-find-out stage 2</p>	<p>Author: Silverstein, Alvin</p> <p>Title: Food Chains</p> <p>Summary: Explains various components of a food chain and discusses the concepts of food webs, umbrella species, biogeochemical cycles and more.</p>



Author: Kalman, Bobbie and Jacqueline Langille
 Title: What are Food Chains and Webs?
 Summary: A simple introduction to food chains and webs, featuring both herbivores and carnivores and discussing energy, food production and decomposition in various ecosystems.
 Suggested level: Primary

Author: Hickman, Pamela M
 Title: Hungry Animals: My First Look at a Food Chain
 Summary: When Jill and her mother visit a field, they discover the fascinating cycle of nature – a food chain. Includes lift-the-flap pages, factual information and notes for parents.
 Suggested level: Junior, primary

Young people and the environment

Author: Collard, Sneed B
 Title: Acting for Nature: What Young People Around the World Have Done to Protect the Environment
 Summary: Describes the efforts of 15 young people to protect the environment in their communities in different countries around the world.
 Suggested level: Intermediate, junior secondary

Author: Leuzzi, Linda
 Title: To the Young Environmentalist: Lives Dedicated to Preserving the Natural World
 Summary: Well-known environmentalists from a variety of fields describe how they developed an interest in the environment, how they got where they are today and things to think about when considering a career that focuses on preserving and protecting the natural world.
 Suggested level: Intermediate, junior secondary

Resources available elsewhere

Author: Spilbury, Louise
 Title: Taking Action! WWF
 Publisher: Reed Educational and Professional Publishing, 2000.
 Summary: Look behind the scenes of WWF, the global environmental network, to get a real feel for how the organisation works and what it aims to achieve. Part of a series of books looking at the work being done around the world by people committed to a better future for the earth and its inhabitants.

Title: Life's a Beach: A Coastal Care Kit Designed for Curriculum Levels 4–5
 Summary: The kit includes a video, lesson plans, teacher notes and fact sheets.
 Contact: The Environment Bay of Plenty regional council



Facts about Maui's and Hector's dolphins

- www.mauisdolphin.org.nz
- www.kcc.org.nz/animals/hectorsdolphin.asp
- www.sharkfriends.com/whales/hectors.html
- www2.wdcs.org/species/index.php
- www.marine.ac.nz/

Research into Maui's and Hector's dolphins

- www.cetaceanresearch.com/sounds/index.html

Other conservation organisations

- <http://takeaction.worldwildlife.org/results/hectors.asp>
- <http://www.earthtrust.org/hector.html>
- <http://www.whaledolphintrust.org.nz>
- <http://www.forestandbird.org.nz/what-we-do/campaigns/help-our-hectors>

Local communities

- <http://www.blacksands.org.nz/new/maui.htm>

The government's role in protecting Maui's dolphin

- <http://www.fish.govt.nz/en-nz/Starfish/Staff+Room/default.htm>

The role of the Department of Conservation and the Marine Mammals Protection Act 1978

- <http://www.doc.govt.nz/publications/conservation/native-animals/marine-mammals/sharing-our-coasts-with-marine-mammals/marine-mammals-protection-act-1978/>

Marine mammal sanctuaries

- <http://www.doc.govt.nz/conservation/marine-and-coastal/marine-protected-areas/marine-mammal-sanctuaries/>

Interactive dolphin quiz sites

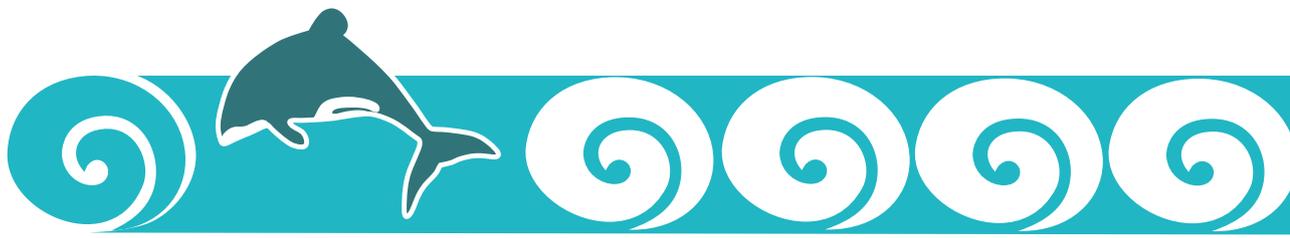
- <http://www.english-zone.com/reading/dolphins1.html>
- <http://kids.nationalgeographic.com/>

Mix-and-match labelling activity

- <http://www.enchantedlearning.com/subjects/whales/label/labeldolphin.shtml>

The dolphin family

- <http://animaldiversity.ummz.umich.edu/chordata/mammalia/cetacea/delphinidae.html>



Appendix 1: Blank teacher-directed inquiry template

This template is designed to help teachers plan and carry out an inquiry with their class.

PLANNING THE INQUIRY:

Topic:

Concepts and conceptual understandings:

Key competencies:

Learning outcomes:



**INQUIRY STAGE ONE:
IMMERSION**

Empty rectangular box for notes.

**INQUIRY STAGE TWO:
CHOOSING AND USING
INFORMATION**

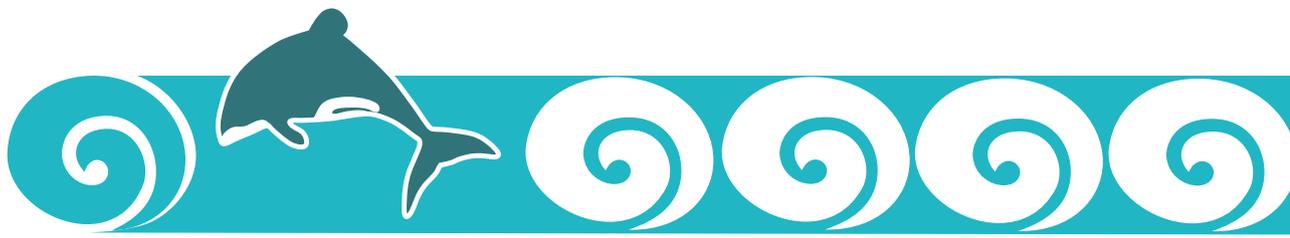
Empty rectangular box for notes.

**INQUIRY STAGE THREE:
COMING TO OUR
CONCLUSIONS**

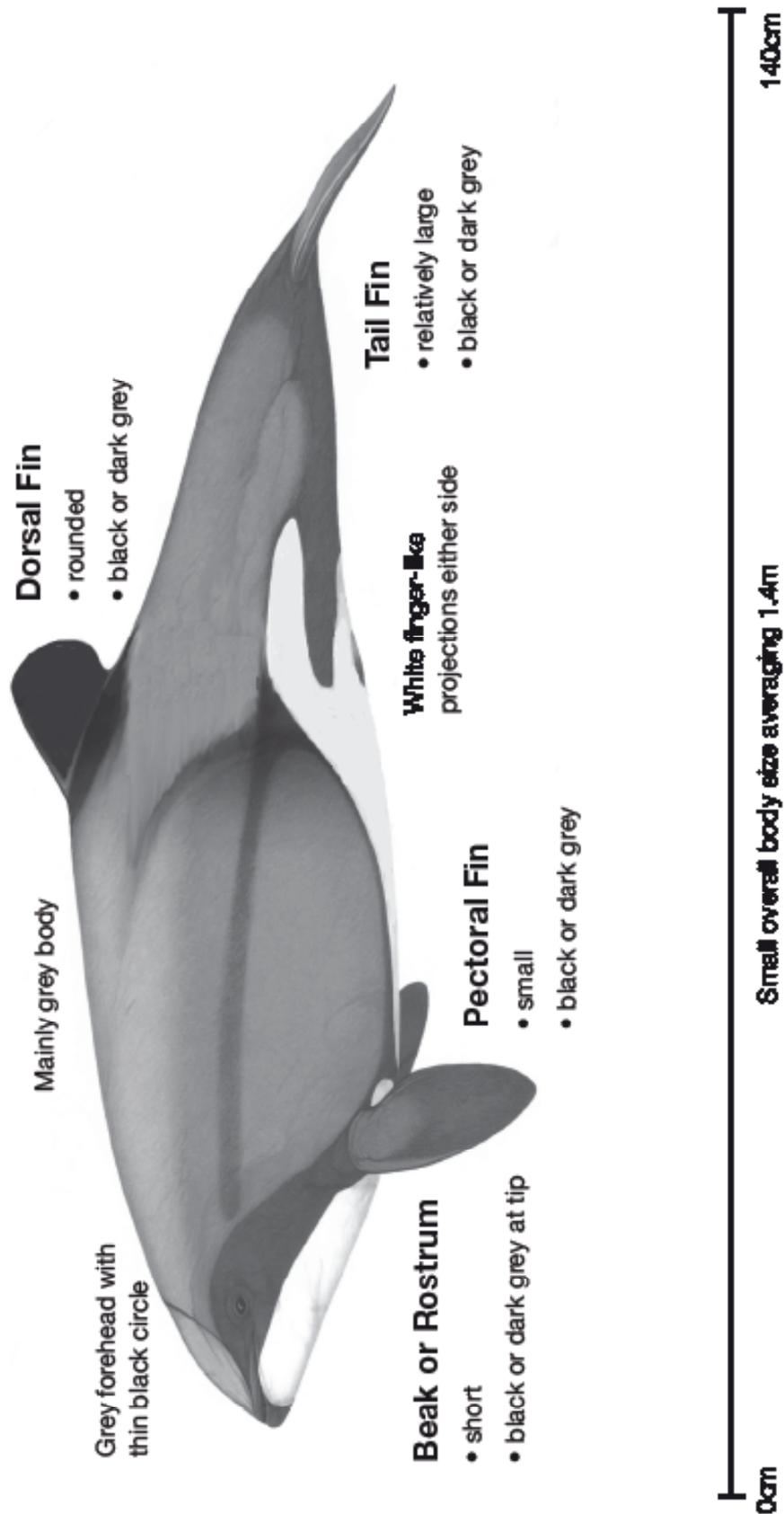
Empty rectangular box for notes.

**INQUIRY STAGE FOUR:
PLANNING OUR ACTION**

Empty rectangular box for notes.



Appendix 2: Photocopy masters

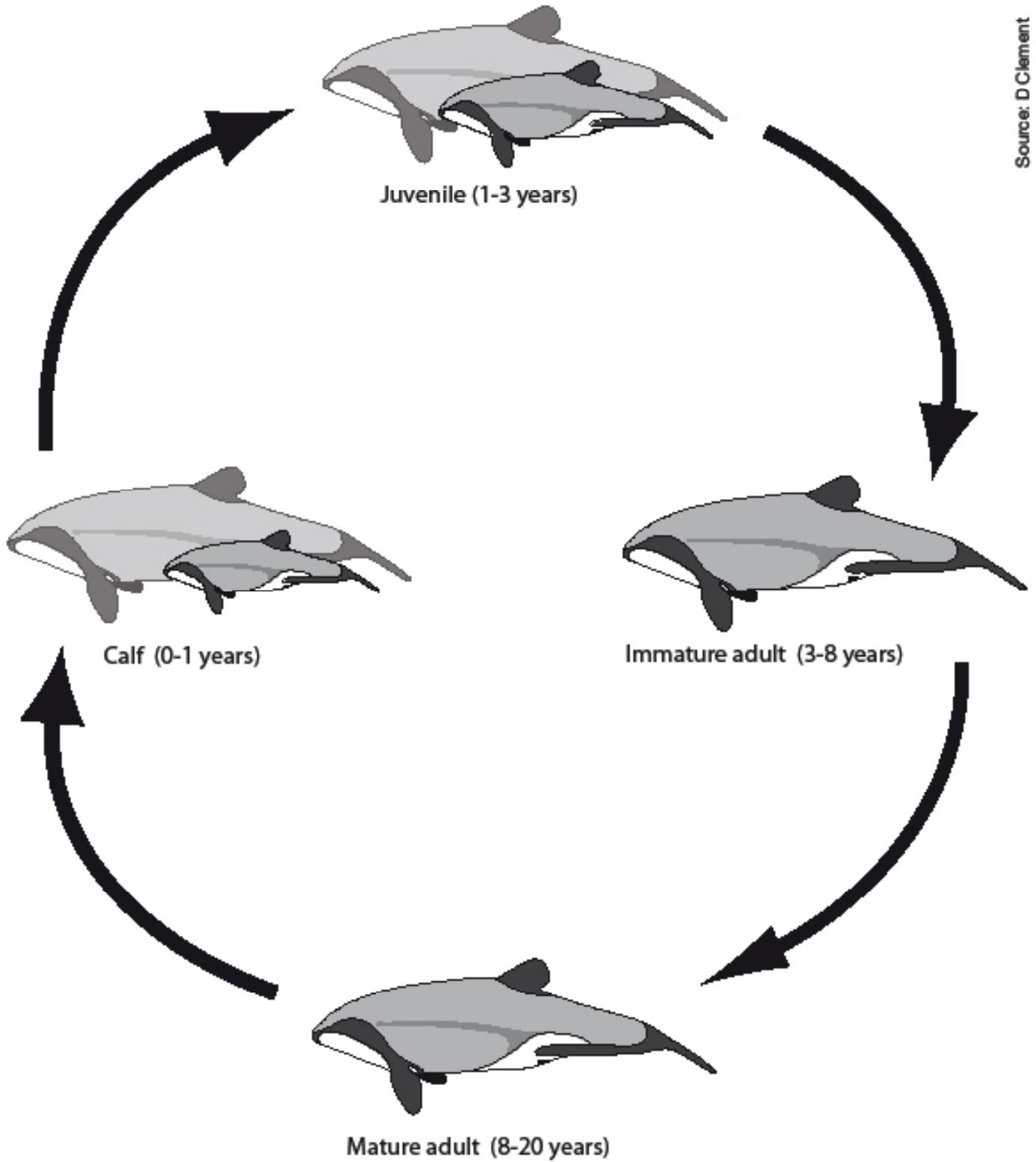


 **Maui's Dolphin** *Cephalorhynchus hectori Maui*

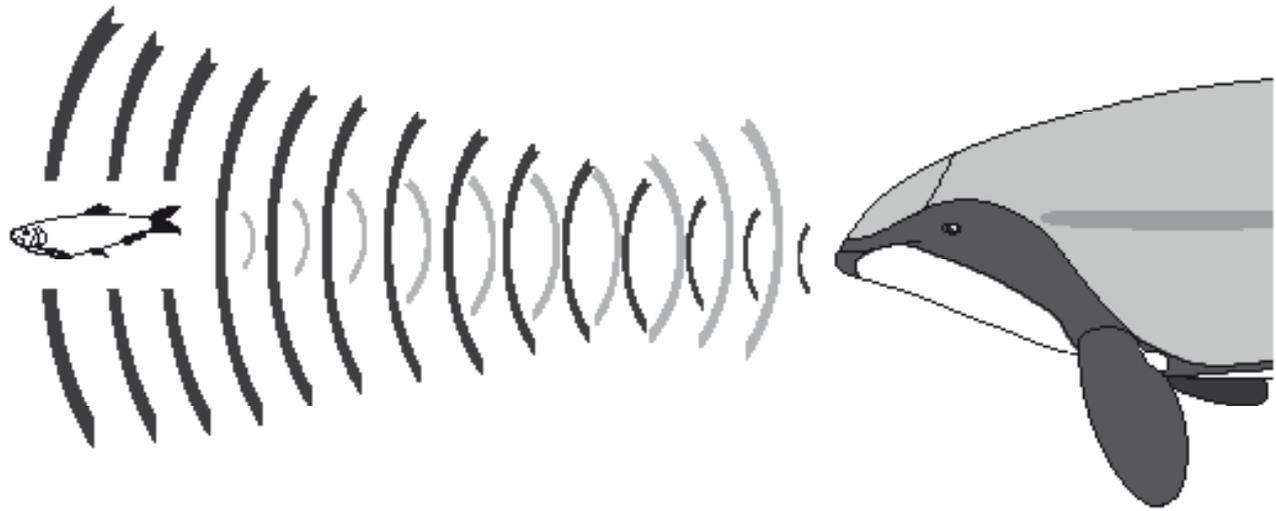
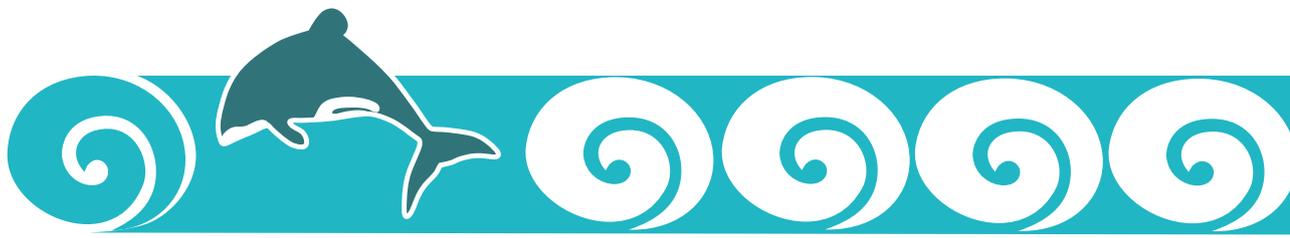
Source: D. Clement



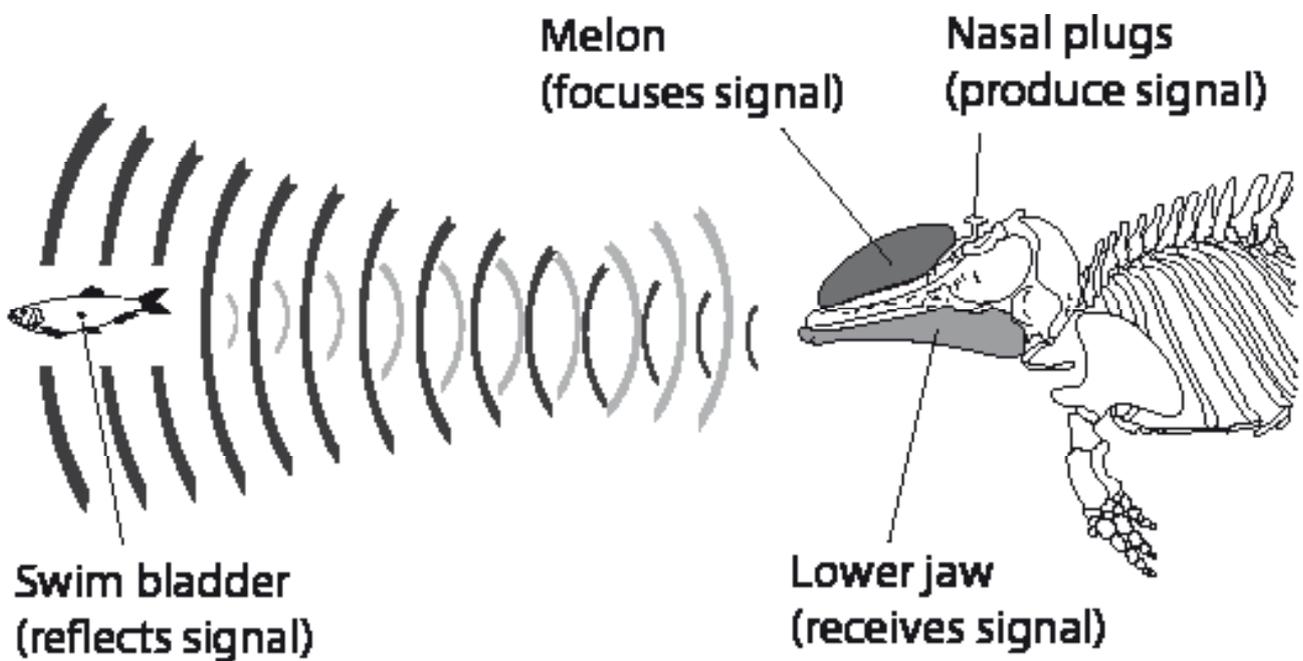
Source: D Clement



Activity 6: Maui's Dolphin Life Cycle



Source: S. Dawson



Activity 7: Clever Clicks – Echolocation



Activity 9: Pollution Quiz

- | | | |
|---|-------------|--------------------------|
| 1. If you use both sides of a piece of paper before recycling it ... | + 5 points | <input type="checkbox"/> |
| 2. If you picked up litter in a public place in the past week... | + 5 points | <input type="checkbox"/> |
| 3. If you let leaves or grass clippings decompose... | + 5 points | <input type="checkbox"/> |
| 4. If your family uses energy efficient appliances... | + 5 points | <input type="checkbox"/> |
| 5. If your family recycles aluminum cans... | + 10 points | <input type="checkbox"/> |
| 6. If your family recycles glass and plastics 1 and 2... | + 10 points | <input type="checkbox"/> |
| 7. If your family takes your own bags shopping... | + 10 points | <input type="checkbox"/> |
| 8. If your family has a vegetable garden... | + 10 points | <input type="checkbox"/> |
| 9. If you walked, rode a bike or used a bus in the last week... | + 10 points | <input type="checkbox"/> |
| 10. If your family planted 1 or more trees in the past year... | + 10 points | <input type="checkbox"/> |
| 11. If your family recycles newspaper and other paper... | + 10 points | <input type="checkbox"/> |
| 12. If your family helped an environmental issue in the past year... | + 10 points | <input type="checkbox"/> |
| 13. If you told someone about the issue above and what you did... | +10 points | <input type="checkbox"/> |
| 14. If you left a light, TV or radio on in an empty room yesterday... | - 5 points | <input type="checkbox"/> |
| 15. If you littered in the past year... | - 10 points | <input type="checkbox"/> |
| 16. If your family burns or bags your leaves or grass clippings... | - 10 points | <input type="checkbox"/> |
| 17. If your family bought food packed in polystyrene in the last week ... | - 10 points | <input type="checkbox"/> |
| 18. If your family always gets new plastic bags at the supermarket... | - 20 points | <input type="checkbox"/> |
| 19. If your family has put paint, chemicals or plastic down a drain... | - 20 points | <input type="checkbox"/> |
| 20. If your family has used a car to go less than two blocks... | - 20 points | <input type="checkbox"/> |

ADD and SUBTRACT all your family's points (max = 110)

What 2 things could you change to reduce the pollution your family makes?
