

# Karunui's Tentacles

Activities for Budding Marine Explorers



With  
Photo Cards

New Zealand  
Curriculum  
Linked

# Introducing Karunui



The New Zealand Marine Studies Centre at Portobello used to have a model of a Colossal Squid thanks to Natural History New Zealand and Discovery Channel. The model was a life-size replica of a juvenile Colossal Squid fished up in 2003 from the Antarctic Ocean. This was one of the few intact specimens that have ever been found.

## How to Use the Picture Cards and Activities in this Book

This resource is designed to aid in the study of squid and their relatives, both in the classroom and in association with programmes offered by the New Zealand Marine Studies Centre. This booklet contains information and picture cards on cephalopod molluscs with related activities in maths, English, Maori, science, art, technology, social studies and physical education. The activities use information from the picture cards and are independent of each other. They can be used in any order and combination. Curriculum links are listed after each activity along with website and teaching tip information.

### Key to Symbols:



Reading Activity



Writing Activity



Doing

## Visit the New Zealand Marine Studies Centre

Book a visit to the New Zealand Marine Studies Centre to learn about the marine life of the Southern Ocean. Call the Marine Studies Centre to find out about wide range of educational programmes available for schools and interest groups.

**See [www.marine.ac.nz](http://www.marine.ac.nz)**

**Call 03 479 5826**

## *Selected School Programmes at the New Zealand Marine Studies Centre*

### LEVELS 3-5

#### Suckers and Tentacles

Get to know squid and octopus inside and out! Dissect a squid, write with squid ink and see live octopus in the Centre's tanks. Find out how these amazing animals are related to snails and slugs!

Curriculum Links: Science - Living World, Level 3 AO 1, 2; Level 4, AO 1, 2, 4; Level 5 AO 2.

### LEVELS 5-7

#### Mighty Molluscs

Learn what a mollusc is, how to classify them, investigate how they feed and survey the intertidal zone to compare the distribution of two chiton species.

Curriculum Links: Science – Living World, Level 5 AO 2, 4; Level 7 AO 1, Biology, Level 6.1, Level 7.1.

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# BIG, BIGGER, BIGGEST

## Maths



Karunui, the Aquarium's Colossal Squid, is a young female (six metres in length) and is worried she won't get any bigger. How big might she grow compared to her other squid relatives? Using the information on the back of Squid Card: *Big, Bigger, Biggest*, create a bar graph showing how each species compares to the others in length. Then write, in a few sentences, what the graph's information shows you. Should Karunui be worried about how big she could grow? Why or why not?

**Material:** Squid Card: *Big, Bigger, Biggest*, graphing paper, pencil.  
**Teaching Tips:** If desired, convert all lengths to centimetres or metres.  
**Curriculum Links:** Maths Stats - Level 2 AO 1,2; Level 3 AO 1, 2

## Technology



You are the aquarist at the Portobello Aquarium and the octopus keeps escaping out of its tank. You need to design a new home for the octopus.

**Material:** Graphing paper, activity sheet: "Help! Can you outsmart an Octopus?" and activity sheet: "Design a Home for an Octopus", pencil.  
**Teaching Tips:** Have students build a small model of this new tank. For older children have them make it to scale. Could a tank be built for a Colossal Squid?  
**Curriculum Links:** Technological Capability Level 3 AO 6; Level 4 AO 6  
Science – LivingWorld Level 4 AO 4; Level 5 AO 2  
English – Written Language: Reading Level 3/4, Processing Information Level 3/4  
**Websites:** [www.tonmo.com/science/public/giantsquidfacts.php](http://www.tonmo.com/science/public/giantsquidfacts.php),  
[www.tonmo.com/cephcare/equipment.php](http://www.tonmo.com/cephcare/equipment.php), [www.marine.ac.nz](http://www.marine.ac.nz)

## Art



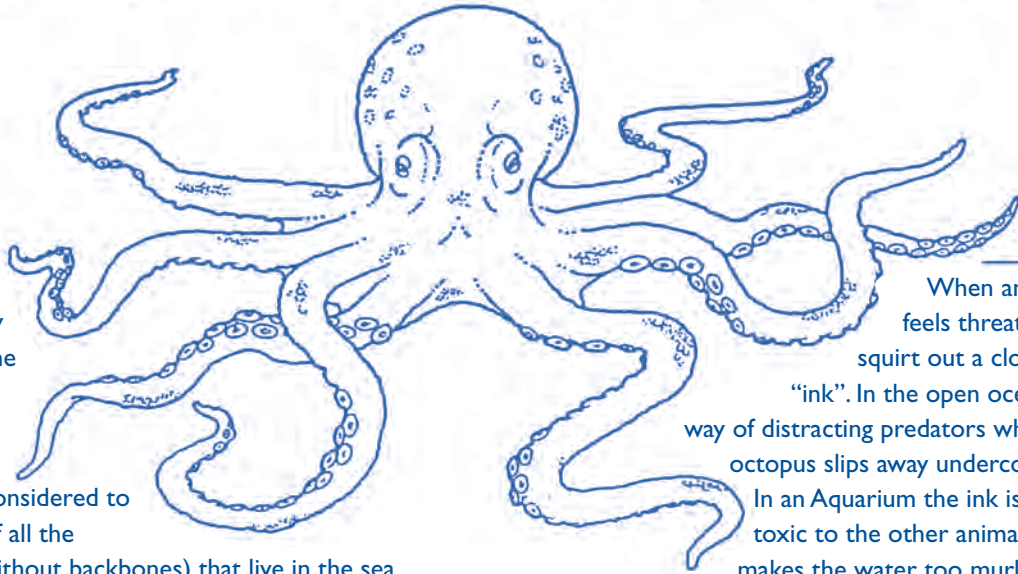
How big is colossal? Create a mural comparing how long a Colossal Squid is to a human (two metres high), large land mammal (elephant eight metres long), Sperm Whale (15 metres long) and/or a dinosaur (*Brachiosaurus* 26 metres long). Drawing it life-size on the playground with chalk is a fun option.

**Material:** Squid Card: *Big, Bigger, Biggest*, large roll of paper or newsprint, paint, pencils, rulers (or playground and chalk).  
**Teaching Tips:** Measure off two metre lengths of string to help students measure when on the playground. Draw the outline of a student next to each animal for comparison.  
**Curriculum Links:** Art Visual Level 2/3 (CI), (PK)



# HELP! Can you outsmart an Octopus?

*Houdini the Octopus keeps disappearing from his tank in the Westpac Aquarium. Can you help us to design a tank that he can't escape from?*



Aquarium staff all over the world would probably agree that octopus are one of the hardest animals to keep in a tank – they are the escape artists of the underwater world and considered to be the most intelligent of all the invertebrates (animals without backbones) that live in the sea.

When an octopus feels threatened it will squirt out a cloud of black “ink”. In the open ocean, this is a way of distracting predators while the octopus slips away undercover.

In an Aquarium the ink is toxic to the other animals and makes the water too murky

for viewing. When this happens, all of the animals need to be taken out of the tank and the water completely changed. The water can also become unhealthy if leftover food is not removed and starts to rot. Octopus like to eat crabs and shellfish but only the insides!

To start with, octopus are masters at squeezing their bodies through the smallest gaps. Their beak, which they use to bite and paralyse their prey, is the only hard part of their body. This means that if there is any opening in the tank (even as small as a drainpipe), chances are the octopus will find it!

At the Westpac Aquarium, the staff are at their wits end – Houdini, a common octopus (one metre long) keeps escaping from his covered tank, no matter what I've done to make it secure. He loves to roam around the Aquarium at night looking for a tasty meal (like the crayfish in the next tank!). And twice, the staff have found him on the floor next to the touch tanks, lying in slippery silence, waiting for the first visitor of the day. However, keeping Houdini in his tank is not the only problem – cleaning his tank can also be a challenge.

Houdini is also a great master of disguise. Sometimes the staff raise the “escaped octopus” alarm, only to find that he has been in his tank all along! His colour and texture match the rocks around him exactly. When the staff get into the tank to clean it, Houdini gets angry, turns red and hides in a cave among the rocks. Many people come to the Aquarium especially to see Houdini, but during the day he is often hiding or asleep because octopus are nocturnal animals. Even though Houdini is hard work we think we are very lucky to have an octopus with “personality” and we love having him at the Aquarium!

## PLEASE HELP US TO CREATE A BETTER OCTOPUS HOME:

1. **Research:** Read the story about Houdini (and any other information you can find) to find out what octopus need to survive and how they behave. Answer the questions on the next page. If you need more information, please contact the Westpac Aquarium for a fact sheet.
2. **Design:** Sketch a plan of your octopus tank on a sheet of paper. Label the different parts and describe their function. Use your design to create a 3D model.
3. **Report:** Present your ideas/designs/models to the class and explain your choices.
4. **Test:** Although you probably won't be able to test your design on a real octopus, show your plans to an Aquarist or check out [www.tomo.com/cephcare](http://www.tomo.com/cephcare).



*This activity can be done individually or as a class.*



# Design a Home for an Octopus

## Natural Habitat

1. Describe the area of the sea where octopus live \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
2. How will you decorate your tank to make your octopus feel at home? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
3. What other animals and plants will you put in your tank? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## Food

4. What do octopus like to eat? \_\_\_\_\_
5. Where will you find this food? \_\_\_\_\_  
\_\_\_\_\_
6. How often should the octopus be fed? \_\_\_\_\_
7. How will you remove the left-over food? \_\_\_\_\_

## Breathing

8. What structures do octopus have for breathing? \_\_\_\_\_
9. Where will you collect the water for the tank from? \_\_\_\_\_  
\_\_\_\_\_
10. How will you keep the water clean and full of oxygen? \_\_\_\_\_

## Movement

11. How will you catch an octopus to put in your tank? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
12. How will you prevent the octopus from climbing out of the tank? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
13. How should the tank be made so that you can watch the octopus when it is sleeping (daytime) and feeding (night-time)? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**My octopus tank will also need:** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

# SQUID RELATIVES

## Science



Who are squid related to? What features do all molluscs have in common? Why are squid described as having a “head-foot?” Using the information on ‘Squid Card: *Squid Relatives*, try to answer these questions. Find out more about squid relatives by completing “My Research Project” sheet on a mollusc of your choice.

- Material:** Squid Card: *Squid Relatives*, mollusc photos on back cover, mollusc books, activity sheet: “My Research Project”, pencil.
- Teaching Tips:** Design a research poster for each mollusc species and compare them to a squid and/or an octopus.
- Curriculum Links:** Science Living World Level 2 AO 1, AO 2; Level 3 AO 1, AO 2, AO 4
- Websites:** [www.marine.ac.nz](http://www.marine.ac.nz)

## Social Studies



Which molluscs on the Squid Card: *Squid Relatives* are harvested in NZ for food? Some are farmed (aquaculture) and others are collected from wild populations. Research the aquaculture of green-lipped mussels or oysters in NZ. Write an essay that looks at the past, present and future of the industry. What impact does this industry have on the local environment? Do you think we should be farming these animals?

- Material:** Squid Card: *Squid Relatives*, paper, books on NZ aquaculture, pencil.
- Teaching Tips:** Talk to, visit or write to someone working in the aquaculture industry.
- Curriculum Links:** English Transactional Writing Level 3; Social Studies Resources and Economic Activities Level 3; Place and the Environment Level 3; Technology Strand A Level 3, Strand C Level 3
- Websites:** [www.starfish.govt.nz/social/students/student-wel.htm](http://www.starfish.govt.nz/social/students/student-wel.htm)



## Social Studies/Māori



Find the Māori names for the molluscs on the Squid Card: *Squid Relatives*. Which ones were important to local iwi? How were they traditionally gathered and prepared? Are they still gathered today?

- Material:** Squid Card: *Squid Relatives*, activity sheet: “Resources from the Sea”, pencil.
- Teaching Tips:** Have a local person show how molluscs were gathered and cooked in the past.
- Curriculum Links:** Social Studies Resources and Economic Activities Level 3; Place and the Environment Level 3
- Websites:** [www.starfish.govt.nz/social/facts/fact-traditional-maori](http://www.starfish.govt.nz/social/facts/fact-traditional-maori)

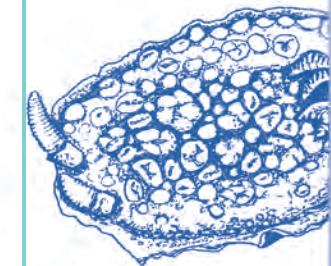




# My Research Project



Pāua



Pūpū



Kutai



Papatua

Choose a marine mollusc that you want to know more about. Using as many different methods of research as you can, answer the questions below about your animal:

My animal is \_\_\_\_\_

What is the scientific name?

How big does the mollusc grow?

Where does it live?

What does it eat?

How does it go about getting food?

Does anything eat your mollusc?

What does your mollusc do to protect itself from being eaten?

What things might threaten or harm your mollusc?

What can you do to help look after it?

Draw a diagram of your mollusc here and label as many features as you can:

Draw a food web that involves your mollusc:





# RESOURCES FROM THE SEA

The Māori people made great use of Otago Harbour both as a food resource and as a means of travel. Fishing was an activity that involved all members of the community. Women were skilled in the management of shellfish beds. Children were taught to gather food from the sea by their parents and other adults in their community.

## **Tangaroa/Takaroa/ God of the Sea**

The tikanga, or protocols, that were practiced while gathering resources acknowledged that kai moana belonged to Takaroa and this had to be respected. Prayers or karakia were said before people departed for the fishing grounds.

## **mataitai/shellfish tuaki/cockle**

Coastal midden sites show that shellfish were an important source of food, especially the clam species such as pipi and tuaki. It has been estimated that between five and ten percent of their total diet came from shellfish. This food source was important not only for its quantity but also because of its year round availability and the ease with which it could be gathered. Shellfish harvested in the Otago Harbour area include the pipi, tuaki, mussel, oyster, pāua and pūpū.

## **pūpū/cat's eye snail**

The pipi shell was put to a number of uses. It was used as a scraper (flax or potatoes), as a knife (to cut the navel string of newly born babies), and as a spoon.

## **kai moana/sea food**

The Otago Harbour area is renowned for its tuaki. Access to kai moana was so important to Otakou families that when lands were subdivided in 1863, it was done to ensure that each section included access to the sea. Boundary markers went across the cockle beds down to the low water tidal mark. Some of the cockle beds are now threatened due to pollution and reclamation.

## **mahika kai moana/ how shellfish was gathered**



Collecting shellfish was one of the tasks assigned to women. Women became adept at descending into the water feet first to gather shellfish and crayfish. Scuba diving or snorkelling was never practiced.



Mussels, kina, pūpū and often pāua were gathered by hand.



A lever of wood was used for prising pāua from the rocks.

## **kete kai/seafood kit**



Kete kai were used for bringing shellfish ashore. These kete were reserved for this purpose only. A kete used for carrying clothes could not be used for shellfish.



The stones, seaweed etc. clinging to the spines of kina were always removed and placed back in the pool from which the kina had been taken.



Older children were encouraged to look carefully at the predominant physical features when collecting shellfish:

- the bottom type (small stones, sand, large boulders).
- the rock type (rough, smooth, fixed etc).
- exposure of shoreline (fully exposed, semi-sheltered, calm).

From these observations they should be able to predict the type of shellfish they would find at the different types of shoreline.

The traditional Māori was adept at finding food because of his/her ability to 'read' the beach.

## Science



Are you as smart as an octopus? Read the back of the Squid Card: *Intelligent?* and suggest ways to measure intelligence.

Can you remove a crab from a shape-sorter faster than an octopus? Using a child's shape sorter, place all shapes inside and a small toy crab. Seal the top. Time how quickly you can remove the crab through one of the shapes' holes. An octopus can do it in ten seconds, even on the first try.

**Material:** Squid Card: *Intelligent?*, shape sorter, toy crab and timer.

**Teaching Tips:** An octopus is very tactile and the tentacles are good at feeling and recognising items.

**Curriculum Links:** Science LW Level 2 AO 1, AO 2; LW Level 3 AO 1, AO 2, AO 4



## English/Māori



Look at the Squid Card: *Intelligent?* – suggest a title for the book the squid is reading. What things do you think interest a squid?

There are many proverbs about the sea. How many can you come up with and what did they originally mean? (i.e. knock the wind out of your sails) Read the Māori proverbs out loud and discuss what they mean.

**Material:** Squid Card: *Intelligent?*, activity sheet: "Whakatauaki."

**Teaching Tips:** Look at common proverbs first so that children understand what a proverb is.

**Curriculum Links:** English Oral Language: Speaking Level 3/4, Listening Level 3/4

**Websites:** [http://seawifs.gsfc.nasa.gov/OCEAN\\_PLANET/HTML/education\\_lesson2.html](http://seawifs.gsfc.nasa.gov/OCEAN_PLANET/HTML/education_lesson2.html)

## Science



Are you ready to become a Squid Squad member? How well do you know your squid facts? Players are asked a question and given two possible answers. If they think it is the first answer, they put their hands on their heads, if they choose the second answer, they put their hands on their hips. Those who choose incorrectly have to sit down. The object of the game is to stay standing the longest.

**Material:** Squid Squad Quiz

**Teaching Tips:** Play this at the end of the unit to see how much everyone remembers.

**Curriculum Links:** Science LW Level 2 AO 1, AO 2; LW Level 3 AO 1, AO 2, AO 4

# WHAKATAUAKI

## ‘Māori Proverbs’



**He koura kia we te whero.**

**The water makes the crayfish red.**

It does not take long to turn a crayfish red by boiling. The saying is applied to a person who is quickly overpowered by a superior force. The same expression is used for an impatient man who soon turns to fight.

**Kotahi te koura a wetewete, tutakina te hiku.**

**Don't divide the crayfish, give it whole (a little thing).**

This is similar to the English saying, "Don't take two bites at a cherry."

**Ko te hamama popoia to tangata, e kore e mau te ika.**

**If a man yawns whilst fishing he will be unsuccessful.**

A saying which is applied to a person who has not persevered enough to finish what he has begun. If he gets tired of it, it will never be completed.

**E moe ana to mata hi tuna, e araana to mata hi aua.**

**When the eyes of those who fish for eels are closed, the eyes of those who fish for the yellow eyed mullet are open.**

Some persons sleep during siege, while others are watching; they who keep awake prevent the pa from being surprised by the enemy.

**E hoki te patiki ki tona puehutanga?**

**Does the flounder return to the mud it has stirred up?**

or

**A flounder will not go back to the mud it has stirred up.**

**E kore te patiki e hoki ano ki tona puehu.**

Once one's place of concealment becomes known another place must be found. This could also be metaphorically rendered as the necessity of one having to move to a new area to escape from one's past.

**He ika haehae kupenga.**

**A fish that tears the fishing net.**

Often said of a trouble maker.

**Ka pu te ruha, ka aho te rangatahi.**

**When the old net is worn out it is cast aside and a new one takes its place.**

When the present generation fades away the rising generation takes its place.

Brougham, A.E., Reed, A.V. and Karetu, T. (1999): The Reed Book of Māori Proverbs; Te Kohikohinga Whakatauki a Reed, Reed Publishing, Auckland.

## Squid Squad Quiz (Correct answers are underlined.)



- Which animals are squid related to?  
☐ Snails ☒ Fish
- How many hearts does a squid have?  
☐ One ☒ Three
- What colour is squid blood?  
☐ Red ☒ Blue
- What is the biggest squid in the world?  
☐ Colossal Squid ☒ Giant Squid
- What is the smallest squid in the world?  
☒ Pygmy Squid ☐ Arrow Squid
- Are squid only found in warm water?  
☐ No ☒ Yes
- Do squid have teeth?  
☐ Yes ☒ No
- What is the special name for a squid's toothed tongue?  
☒ A radula ☐ A rasp
- Do any other animals have a radula?  
☐ Yes ☒ No
- How fast can a squid swim?  
☐ About 30 km/hr ☒ About 5 km/hr
- What does a squid do if it gets scared?  
☐ Freezes on the spot ☒ Squirts ink and jets away
- How many species of squid are there in the world?  
☒ About 250 ☐ About 10
- What do squid eat?  
☐ Seaweed ☒ Other animals
- What does a squid mouth look like?  
☐ A straw ☒ A parrot's beak
- How does a squid change colour?  
☐ Opens/closes colour sacs in skin ☒ Eats different coloured seaweed



## Science



Look at the Squid Card: *Sign Language* and discuss how colour, patterns and posture are used for communication.

Think about the environment in which squid live. When do you think they would be angry, scared or relaxed? Use the Squid Diorama Activity to create an environment in which the squid blends in, shows aggression, is scared or is feeling relaxed. Think about to whom the squid would be communicating.

- Material:** Squid Card: *Sign Language*, activity sheet: “Squid Diorama”, paper, glue, crayons and scissors.
- Teaching Tips:** Discuss other ways animals communicate with each other.
- Curriculum Links:** Science Living World Level 3 AO 2, Level 4 AO 2

## Art



Camouflage colouration helps animals disappear. Make a list of all the reasons why an animal might want to disappear. Read the Squid Card: *Sign Language* to find out why squid change colours.

Have a go at making your painting disappear. Mix 1/4 cup of warm water with six teaspoons of salt. Add three drops of food colouring. Mix well. Paint a picture on white paper. Let it dry. The water will evaporate but the coloured salt will remain.

- Material:** Squid Card: *Sign Language*, salt, water, measuring spoons and cup, food colouring, paper and paint brushes.
- Teaching Tips:** It is a good time to investigate evaporation! Be careful with the food colouring as it may stain clothing.
- Curriculum Links:** Arts Developing Ideas (DI) Level 2/3



## English/Science



Look at the Squid Card: *Sign Language*. Discuss who you think each squid is trying to communicate with and what they might be saying.

Create the environment in which squid live using the Squid Diorama activity. Think about the colour of your squid, it is angry, scared, relaxed. Think about who the squid would be communicating with in your environment. Add them to the diorama.

Write a story about a squid and at each stage of the story describe the mood of the squid and its colour. Try to tell a story to your friend using the diorama and different coloured squid.

- Material:** Squid Card: *Sign Language*, activity sheet: “Squid Diorama”, paper, pencil, crayons and glue.
- Teaching Tips:** Research other animals that use colours to communicate.
- Curriculum Links:** English Written Language-Writing Levels 3/4; Science Living World Level 3 AO 2, 4



# SQUID DIORAMA

A Colossal Squid, known only from the Southern Hemisphere, has joined the fish at Portobello. Please help us design a home for our newest resident.

## Diorama Activities

### 1. Create the home of the squid.

Do some research and add drawings and cutouts of other marine species you think are found in the same habitat.

### 2. Write a squid story.

Think about what life might be like as a squid. Give each character in your diorama a speech bubble. Name the characters and write a short story.

### 3. Supper in the sea.

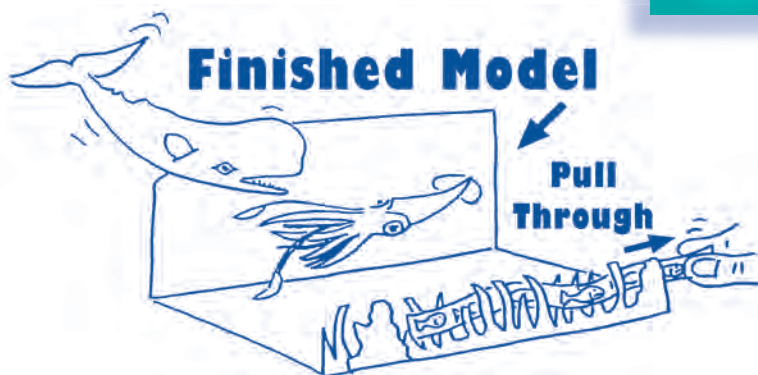
Think about what each animal eats. Add animals and plants required to complete a food chain / web. Add arrows to show who eats who.

### 4. Identify murder weapons.

How do the animals in your diorama catch and eat their prey? Add to the drawings and label the feeding structures.

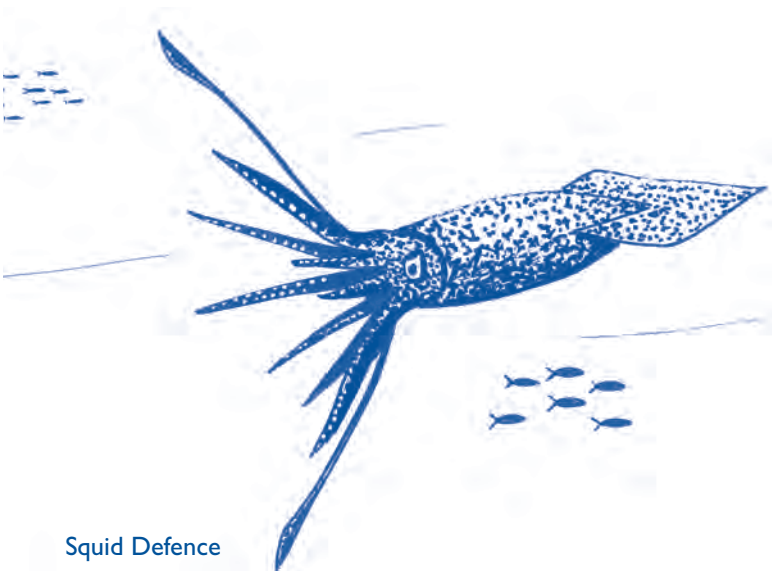
### 5. Humans vs. Squid.

Think about what human activities might affect squid and their habitat. Make cutouts to illustrate these activities and then create a short play with the characters in your diorama to illustrate how the animals would react.

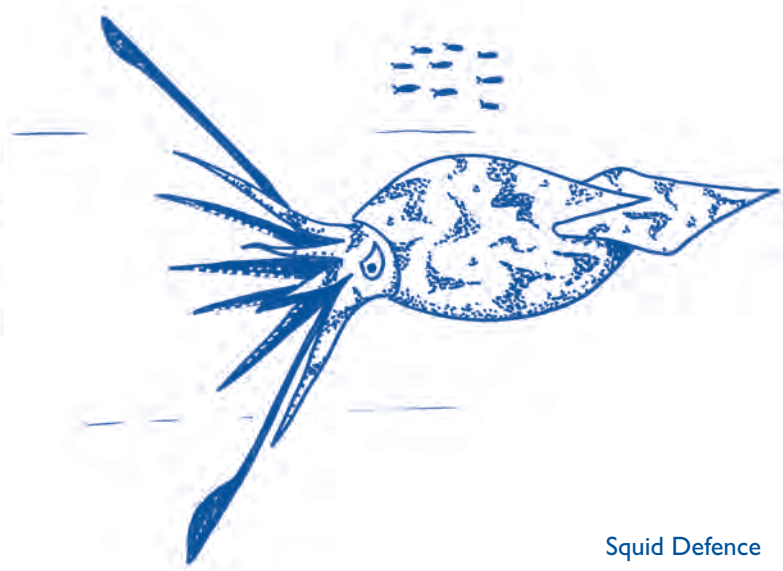


## Instructions

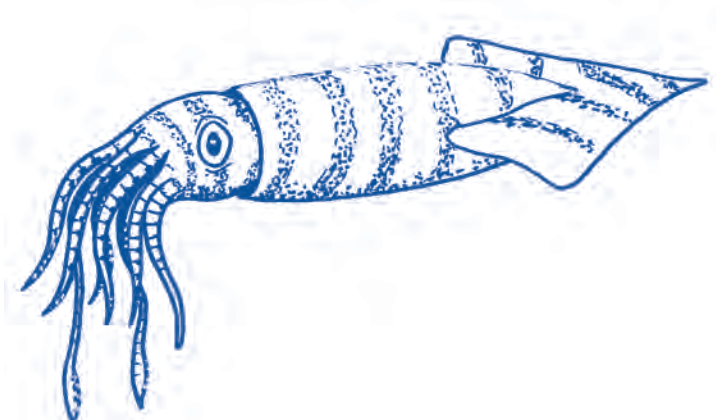
1. Photocopy the master onto white card (120g).
2. Colour in the fish at the bottom of the page and cut out as one long strip.
3. Colour in the Squid and cut out.
4. Cut a slit in the side of the whale (teachers may want to do this).
5. Turn the page over and colour the seaweed on the reverse side.
6. Cut out the seaweed and fold at the base of the plants.
7. Colour in the squid and background and fold along dotted line.
8. Cut out the tab on the upper left corner and feed through the slit in the side of the whale's body (you may need sellotape to secure the fin).
9. Weave the strip of fish through the seaweed.



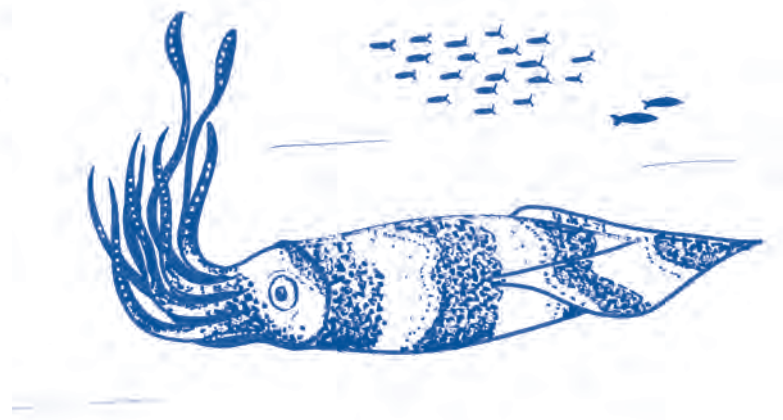
Squid Defence



Squid Defence



Courting Squid



Feeding Squid



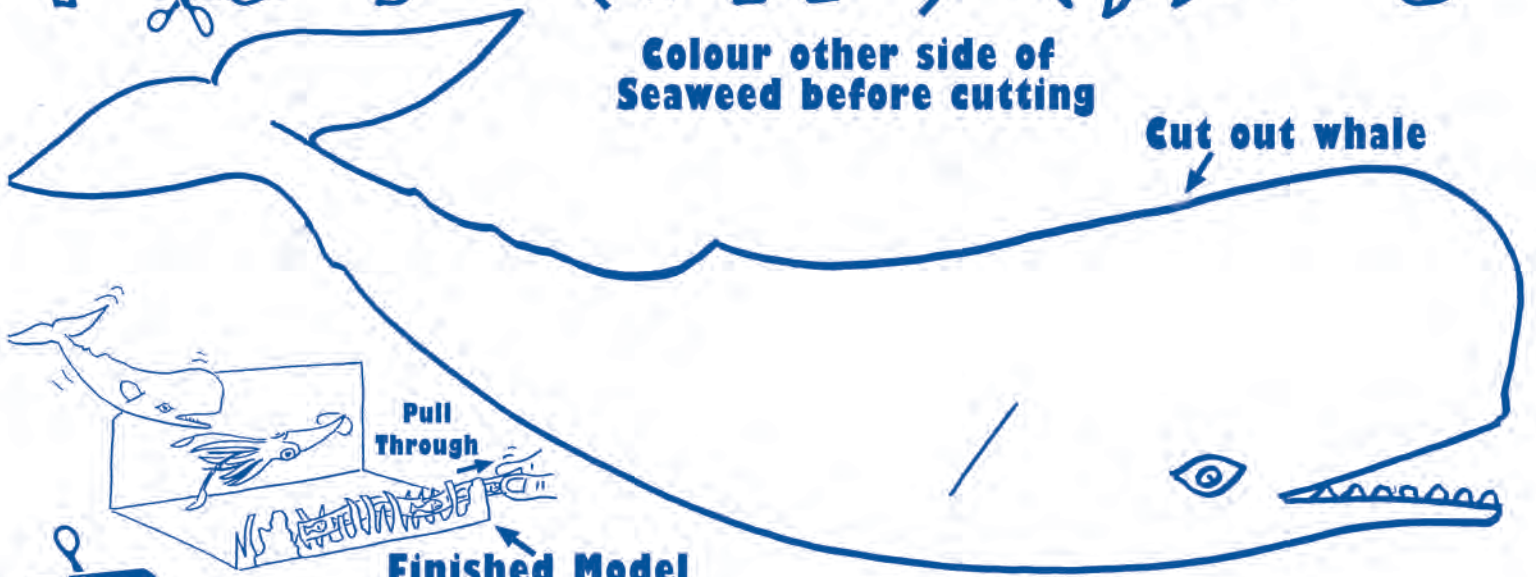
**Fold**



**Fold**

**Colour other side of  
Seaweed before cutting**

**Cut out whale**



**Pull  
Through**

**Finished Model**





# SQUID SUPPER

## Science



Look at the Squid Card: *Squid Supper* and Squid Card: *Squid Rings*. Discuss what squid eat and how they catch and kill their food. Draw a food chain/web for a Colossal Squid. Compare it to the Arrow Squid food web.

How do scientists find out what animals eat? Try the What's for Dinner Mr. Squid? activity to find out how Jean McKinnon, Ph D student, found out what Arrow Squid eat.

**Material:** Squid Card: *Squid Supper*, activity sheet: "What's for Dinner Mr. Squid?" and pencil.

**Teaching Tips:** Record your own diet for a day. Create a food chain/web with this information.

**Curriculum Links:** Science Living World Level 3/4 AO 4

## Technology



Our supper also may include food from the sea. Look at the Squid Card: *Squid Supper* and identify which animals you like to eat too. Squid are carnivores, meat eaters, but many of us are herbivours (vegetarians). Make Kelp Chips and see how tasty seaweed can be!

When harvesting Bladder Kelp, just take the outer portion of the blade or frond in order not to kill the plant and stay away from polluted areas. Rinse quickly in fresh water, hang to dry on your clothes line. The seaweed will finish drying in a warm house overnight. Store in airtight plastic bags.

1. Cut dried kelp into bite sized pieces.
2. Heat a thin layer of olive oil in frying pan or wok.
3. Cook kelp over medium high element for 2 – 3 minutes. Toss the seaweed continuously.
4. Sprinkle with sesame seeds or sugar (optional).
5. When green and crispy take off heat and drain on paper towel.
6. Serve as you would potato crisps.

**Material:** Dried kelp, pan, stove, oil, sesame seeds/sugar (optional), paper towel and slotted spoon.

**Teaching Tips:** Cook the kelp carefully so that the oil doesn't splatter. Dried kelp is also available in the specialty section of most large grocery stores.

**Curriculum Links:** Technology Levels 3/4

## Maths



If squid don't find food, they will eat each other. If an average 12-year old child was a squid, he/she would need to eat two kg of food every two hours! How many pizzas/hamburgers would that be?

Write your own story problems using the following information. As the aquarist at the aquarium, you need food for the cephalopods (two Arrow Squid and three octopus). How much food should you order for the month to feed these animals? An Arrow Squid eats around four grams of krill (about 1000 krill) every day and octopus eat five crabs every day.

**Material:** Paper, pencil and calculators (optional).

**Teaching Tips:** Vary the time period and the number of animals.

**Curriculum Links:** Maths- ENP story problem writing, Number Level 3



# WHAT'S FOR DINNER MR. SQUID?

To find out what animals eat, scientists often look at indigestible prey parts in vomit and poo samples and in the stomachs of dead animals.

This activity is based on real research done on the diet of the Southern Arrow Squid. Ph.D. student Jean McKinnon dissected the stomach out of 1100 squid. She sieved the contents of the stomach to get rid of any fluid and found the hard bits. You need to help her sort and identify what was left. **Give it a go!**

**Material:** Squid Stomach Contents Sheet, Food Identification Guide, four ice cream containers, several small dishes, tweezers/forceps.

**Methods:** Photocopy the Squid Food sheet and cut out the “food,” place it in an ice cream container (the “squid stomach”) and mix them up. Grab a handful and place it in another ice cream container. Repeat this until all the “food” is randomly placed in the four ice cream containers. This represents the stomach contents of four squid.

**Results:** Sort the food into like groups and count the items in each group. Use the Food Identification Guide to find out what your squid had for lunch! Repeat for the other three squid stomachs. Record your data in a table and graph your results.

**Discussion:** Did the stomach contents vary between the four specimens? Why did Jean look at the stomachs of over 1000 squid? What can you say about the diet of your four specimens? Do you think that this method tells us everything squid eat? What types of animals might be missing? How could we find out more about what squid eat? What questions do you now have about squid? What might Jean's next research project be?

## FOOD IDENTIFICATION GUIDE



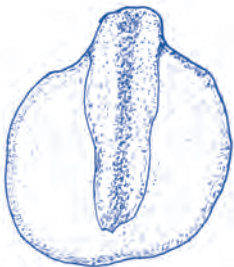
Squid beak remains



Squid pen remains



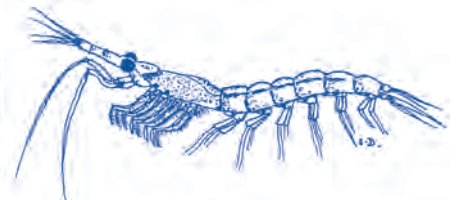
Ear bone (otolith) from Lanternfish fish



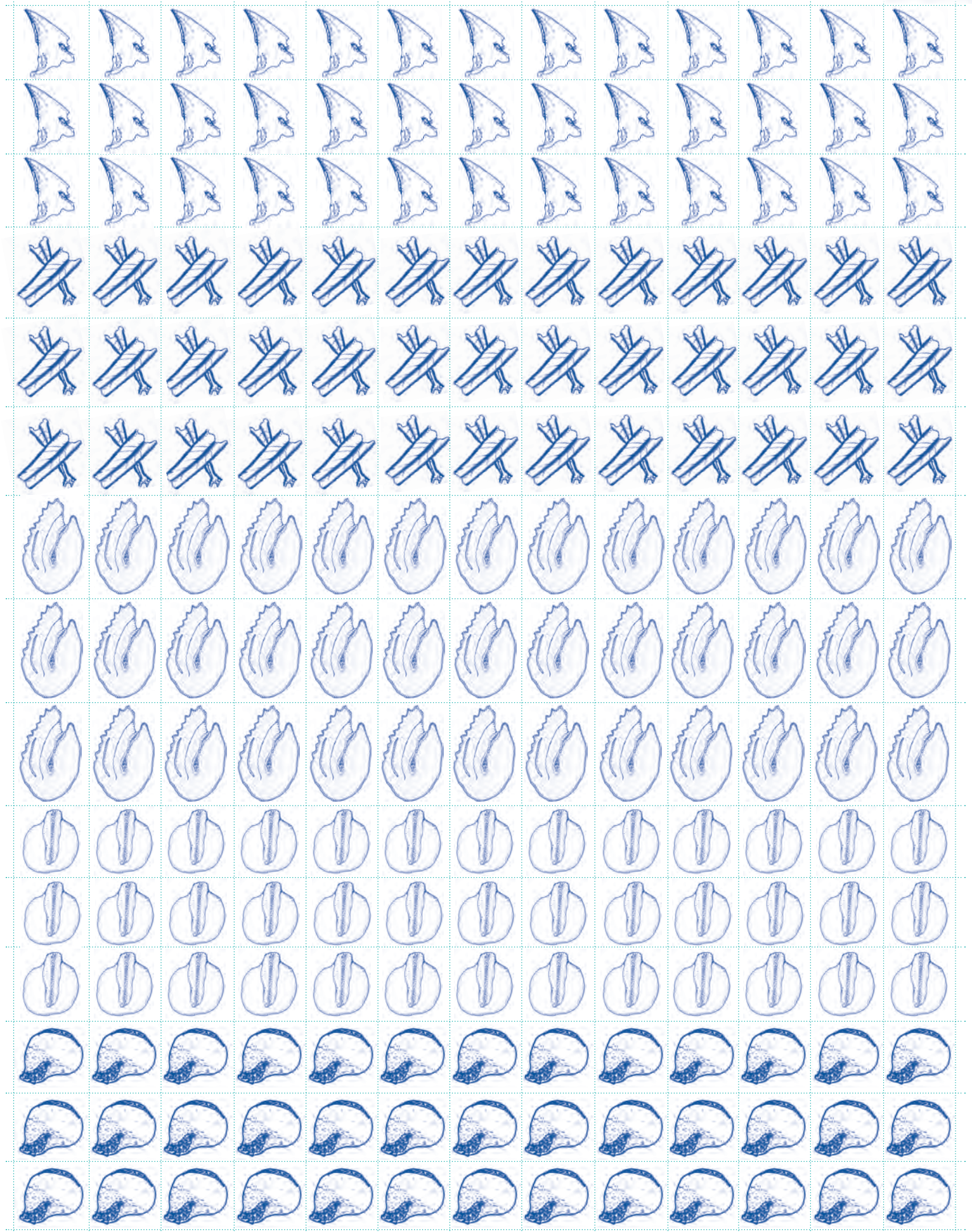
Ear bone (otolith) from Pearlside fish



Eye from a Krill



# SQUID STOMACH CONTENTS





## English



Look at the Squid Card: *Squid Rings* and make a list of all the animals that eat squid. How many tonnes of squid were caught in the waters around NZ the year of your birthday?

What is the impact of humans fishing for squid on the diets of other marine animals? Read this article and debate the following question — are humans overfishing squid or not? What do you think? Is there evidence to support your view?

**Material:** Article - *Is NZ Whale Watching haven at risk from overfishing?* from website.  
**Teaching Tips:** Research other aspects of squid fishing to support your views.  
**Curriculum Links:** English Reading Levels 2/3, Presenting Level 5  
**Websites:** [www.wdcs.org.au/info\\_details.php?select=1083557904](http://www.wdcs.org.au/info_details.php?select=1083557904)



## Social Studies / Maths



Find the squid jig on the Squid Card: *Squid Rings*. Do some research to find out how it works. What is the difference between jigging for squid or trawling for squid?

Pretend you are working for the Ministry of Fisheries. Graph the catch of Arrow Squid over time. Add the quota level to your graph as a red line. Why does the total catch change from year to year? Why does the quota change?

**Material:** Squid Card: *Squid Rings*, research on squid fishing, graph paper, coloured pencils.  
**Teaching Tips:** Explain how the quota system works.  
**Curriculum Links:** Social Studies Place and Environment Level 2/3, Science Living World Level 3 AO 4  
**Websites:** [www.seafood.co.nz/business/fishaqua/species/squid.asp](http://www.seafood.co.nz/business/fishaqua/species/squid.asp)

## Science



What animals on the Squid Card: *Squid Rings* are affected by the squid fishery? Research the impact of humans fishing for squid on the web, in the newspaper and in the Conservation Issues article.

Review the food web on Squid Card: *Squid Supper*. Are there any other animals that might be affected by the squid fishery?

**Material:** Web articles, Squid Card: *Squid Rings*, Squid Card: *Squid Supper*, Conservation Issues article.  
**Teaching Tips:** Create posters to show findings.  
**Curriculum Links:** Science Living World Level 3 AO 4, Level 4 AO 4  
**Websites:** [www.fish.govt.nz/current/press/pr6505.htm](http://www.fish.govt.nz/current/press/pr6505.htm)  
[www.fish.govt.nz/current/press/pr071003.htm](http://www.fish.govt.nz/current/press/pr071003.htm)  
[www.wdcs.org.au/info\\_details.php?select+1083557904](http://www.wdcs.org.au/info_details.php?select+1083557904)



## Squid Fishing and Sea Lions

The southern squid fishery is often in the news because the fishery has a bycatch problem with NZ or Hookers Sea Lions. The sea lions eat squid and the presence of tonnes of squid in a trawl net represents an easy meal for the sea lions. The sea lions swim into the net and can't get out and they drown. The fishing industry has been trialling sea lion exclusion devices in the nets (a sort of trapdoor to let the sea lions out) but it's not clear if these are working. Unfortunately, when the squid fishery is operating in the Auckland Islands, the sea lions are breeding at the same time and many of the sea lions that are caught are female. This is a huge problem because of the way sea lions breed. An adult female sea lion will have a pup waiting for her back on shore. It won't survive unless she returns. In addition the female sea lion is pregnant as mating occurs shortly after she gives birth. So for every one female sea lion that is caught, two more sea lions will die.

This year (2005 –2006) the Ministry of Fisheries raised the number of sea lions that could be killed from 53 to 150 (Seafood NZ, May 2006 vol 14 (4) p. 6). If half were female, than the numbers actually killed are much higher. It is possible that the numbers are even higher than the estimates below, as there are often more females present than males. Scientists studying the sea lions have noticed that pup numbers are decreasing in the Otago region (S.Williams, pers. com.)

### Possible numbers of sea lions killed in squid fishery

No. of sea lions allowed to be caught	No. of males (assuming 50/50 males and females)	No. of females	Plus pup and foetus	No. potentially killed
<b>53</b>	26.5	26.5	79.5	<b>106</b>
<b>150</b>	75	75	225	<b>300</b>

## Squid Fishing and Squid

Squid seem to be a great species to catch as they only live for one year and then die. It is thought that it is a natural resource which we must use or we will lose it. Actually the short life span of squid means that we must be much more careful how we harvest it. Squid breed right at the end of their life cycle and there is a danger that we will catch the squid before they have a chance to reproduce. This is what seems to be happening. Recent research shows that over 90% of all squid being caught are immature (see below). Only the squid at stage five are likely to have produced some baby squid.

### Percent of squid in each maturity stage from commercial harvests

Maturity stage	Percent of squid in each stage	Cumulative percentage
1 (Juvenile)	<b>9.84</b>	<b>9.84</b>
2 (Immature)	<b>67.42</b>	<b>77.26</b>
3 (Preparatory)	<b>14.72</b>	<b>91.98</b>
4 (Maturing)	<b>4.68</b>	<b>96.66</b>
5 (Mature)	<b>3.34</b>	<b>100</b>



## OTHER CONSERVATION ISSUES

Many of the Giant Squid and the specimen of the Colossal Squid our model is based on are caught by commercial fishers. While it is really exciting to have these specimens, we know very little about these animals and their environment so we don't know what the effect of catching these squid has been on their populations or their environment.

We do know that many of our deep water fishing techniques are very destructive to the environment. Deep sea dredging and bottom trawling severely damage the sea bed. Once one of these dredges or nets has been dragged over the sea bottom, there is nothing left. The pictures below show the sea bottom before and after trawling. Many of the animals they kill are hundreds of years old (e.g. bubblegum coral) and provide homes for many other animals, quite often the babies of the animals we want to harvest!

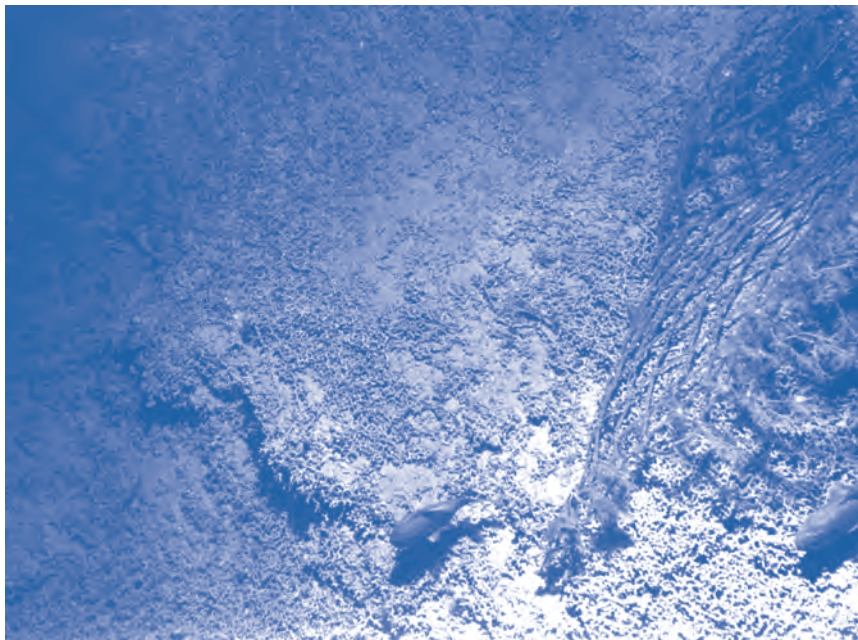
The evidence: photographs taken A) before and B) after bottom trawling.

A.



Orange roughy swimming through a healthy deep sea coral forest, several hundred years old, from the Chatham Rise. © NIWA

B.



The Chatham Rise area after bottom trawling © NIWA



# ARMED AND DANGEROUS



Māori/English



Think about any “tough people” that you have encountered at school, during sports, in your community and in stories. What do they all have in common? Look at the Squid Card: *Armed and Dangerous*. What is it about the picture that makes you think this squid is tough?

Find and read the story “Kupe and the Great Octopus of Maturangi.” Why is this story important? Can you find Nga Whatu on a map?

**Material:** Story from library or Tourist. net website and map.  
**Teaching Tips:** Create your own heroic story with an octopus or squid starring. Do heroes have to be tough?  
**Curriculum Links:** English Reading Level 2, Social Studies Place and Environment Level 2/3  
**Websites:** [www.tki.org.nz/r/maori/nga\\_purakau\\_maori/kupe\\_e.php](http://www.tki.org.nz/r/maori/nga_purakau_maori/kupe_e.php)  
[www.tourism.net.nz/new-zealand/about-new-zealand/kupe-and-te-wheke.html](http://www.tourism.net.nz/new-zealand/about-new-zealand/kupe-and-te-wheke.html)

## Science



How does a squid defend itself? Look at the Squid Card: *Armed and Dangerous* and identify all the structures used in defense.

What is a squid’s mantle and the rest of the body parts used for? If the head is in the middle, which end goes first when the squid is swimming?

**Material:** Squid Card: *Armed and Dangerous*, Squid Card: *The Real Thing*.  
**Teaching Tips:** Squid ink is stored as gritty particles and liquifies when it mixes with seawater.  
**Curriculum Links:** Science Living World Level 3 AO 2

## English



Read about the Kraken on the Squid Card: *Armed and Dangerous*. Imagine you can borrow a submarine to search for the Colossal Squid, but the captain is a bit superstitious. He has heard one too many stories about the Kraken. He will need some really good reasons to take you down to look for the squid. Formulate some good arguments that might convince the sub’s captain. Write them down and try them out on a friend.

**Material:** Squid Card: *Armed and Dangerous*, paper, pencil.  
**Teaching Tips:** Role play and see if a student can persuade the captain. Read some of the old mariner legends about Kraken of the sea.  
**Curriculum Links:** English Written Language Level 3/4, Oral Language Level 3/4  
**Websites:** [www.marine.ac.nz](http://www.marine.ac.nz)

## Science



Draw a food pyramid using the information on the back of the Squid Card: *The Battle*.

What happens if part of the food web has pollutants in it? Play the Trails and Trials of Marine Toxins activity to find out what happens to top predators when there is pollution.

Squid are often described as important indicator species. They are short-lived (most only live for ~ one year) and changes in water temperature, food availability and food quality affects their growth rate. How might their sensitivity to environmental change provide information on the health of our marine ecosystem?

- Material:** Squid Card: *The Battle*, activity sheet: “Trails and Trials of Marine Toxins.”
- Teaching Tips:** Research how we end up with high levels of toxins as top predators. (ie. mercury in tuna)
- Curriculum Links:** Science Living World Level 2 AO 4, Level 4 AO 4
- Websites:** [www.coolantarctica.com/Antarctica%20fact%20file/wildlife/whales/food%20web.htm](http://www.coolantarctica.com/Antarctica%20fact%20file/wildlife/whales/food%20web.htm)  
[www.marine.ac.nz](http://www.marine.ac.nz)

## Physical Education



**Squid Tag – (similar to Blob Tag)** One person is “it” (Sperm Whale). The rest of the group (squid) line up behind a start line. When the Sperm Whale says “tentacles,” the squid jet to the finish line at the other end of their play area. If they cross the finish line they are safe. If the Sperm Whale touches a squid, then the squid is “eaten” and joins hands with the Sperm Whale and helps tag the other squid that are left. If the whale becomes too long, it may split into two whales. Continue calling tentacles until all are eaten. The last remaining squid can be the Sperm Whale for the next game.

- Material:** Rectangular playground area with marked start and finish lines.
- Teaching Tips:** Have the Sperm Whale call out different ways the squid should move, i.e. skip, hop on one foot, etc. The whale should always run or walk.
- Curriculum Links:** Physical Education Level 2/3 Strand A, Strand B, Strand C

## English



Who will win the battle? Make a list of all the structures, behaviours and other features that would give the Colossal Squid the advantage. Do the same for the Sperm Whale.

Write a story describing the encounter illustrated on the Squid Card: *The Battle*. You could describe it from the squid’s or the whale’s perspective. What happened before the picture, what happened afterwards, who wins? Do you escape? How do you catch such a large creature?

- Material:** Squid Card: *The Battle*, paper and pencil.
- Teaching Tips:** Come to the aquarium to see a model of a Sperm Whale jaw.
- Curriculum Links:** English Level 3 & 4 Expressive Writing and Poetic Writing.
- Websites:** [seawifs.gsfc.nasa.gov/OCEAN\\_PLANET/HTML/squid\\_defend\\_itself.html](http://seawifs.gsfc.nasa.gov/OCEAN_PLANET/HTML/squid_defend_itself.html)  
[www.tonmo.com/science/public/giantsquidfacts.php](http://www.tonmo.com/science/public/giantsquidfacts.php)



# Trails and Trials of Marine Toxins

## Background

### Food Chains /Food Webs

Food chains are relatively simple and may include no more than two or three links. Interlocking food chains form food webs. Food webs are formed because few animals rely on a single type of food. The bottom of the food chain is dominated by large numbers of small organisms like plankton. As the chain grows in length, the size of the animals at each level increases. Each successive level tends to be dominated by larger organisms preying on animals smaller than themselves.

### Marine Pollution

Increasing quantities of industrial waste, agricultural chemicals, untreated sewage, radioactive discharges, oil, plastics, and a huge variety of other pollutants are dumped directly in the sea – or slowly make their way there via rivers, run off and atmospheric deposition. Once released into the environment recovering them is very difficult and they could continue to cause harm for years or even decades. The effect of these pollutants on marine organisms is difficult to measure. In large quantities they may cause immediate death. However in most cases they are believed to weaken the animals, gradually causing hormonal imbalances, a lowering of disease resistance, brain damage and various neurological disorders, cancer, liver troubles, lowering or a total loss of fertility, thickening of shells, and many other abnormalities and chronic health problems.

### Biomagnification

Minute quantities of toxins in the sea are picked up by marine plankton, which are then eaten by fish and squid and these in turn are eaten by top predators, such as whales, dolphins and sharks. In this way, high concentrations of toxins build up in the body of animals at the top of the food chain. This build-up increases with age and may be passed on from one generation to another. For example, a lactating female whale may deliver high concentrations of toxins to her calf through her milk.

## Objectives

To explain the feeding relationships of marine animals and plants and to investigate the results of human intervention on these relationships.

### Curriculum Links

Science/Living World – level 4.4, 5.4, 7.4,  
Biology – level 7.3, 8.3

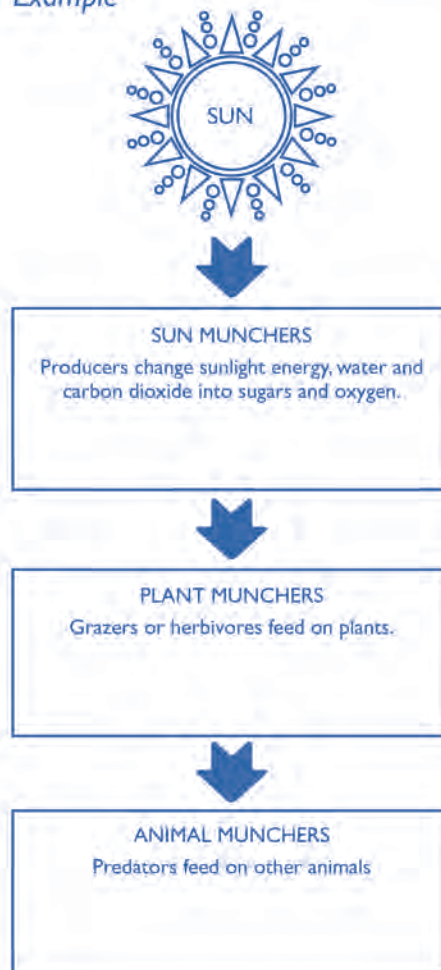
### What You Need

A label for each student in the class (these can be made by the students), About 20 rocks (3 to 5 cm in diameter), open space. The activity works best with 12 or more students.

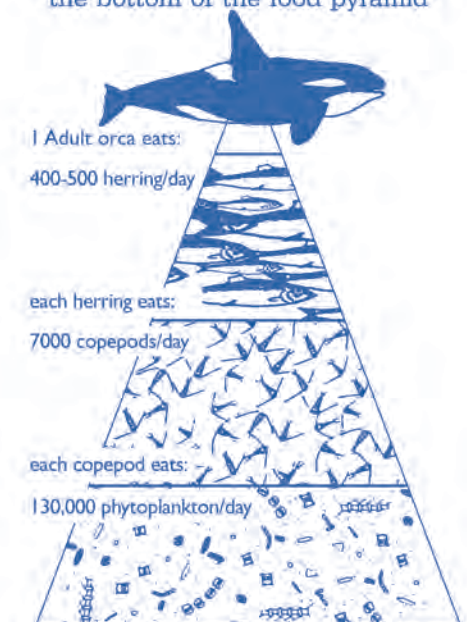
### Method

1. Review concepts of food chains, food webs and feeding strategies with students.
2. As a class or in small groups compile a list of organisms that fit in each trophic level – then create food chains and food webs

### Example



3. Choose one food chain and create a food chain pyramid. Because all animals depend on plants directly or indirectly for food, they are at the bottom of the food pyramid



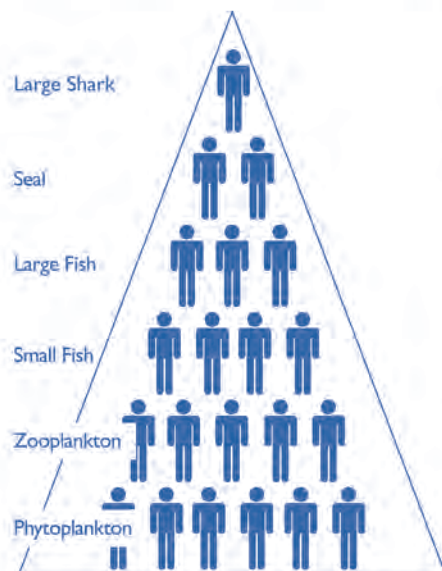
Human made chemicals like PCB's, DDT and dioxins affect reproduction in marine mammals, sometimes causing sterility. These have been found in the tissues of NZ's threatened Hector's Dolphin.





The harmful effects of pollution can be subtler than death or infertility. When sticklebacks (a freshwater fish) were fed PCB-contaminated crustaceans, they took 35% more time rolling the food around in their mouth. This may result in the fish having less time to mate or evade predators as a result of their altered dining habits.

- Have the students choose a role and make themselves a label or costume. Ask the sun munchers to line up side by side, the plant munchers to line up behind and so on – so that you create a pyramid formation. Remember that you will need more students to be sun munchers than animal munchers otherwise you won't have a stable pyramid. Your pyramid may have less levels than the example given.



- Now introduce a toxin into the water (rocks) – think about what that toxin may be and how it might have got into the sea.
- Pass on the toxin (1 or 2 rocks per person) to the bottom of the food chain – the sun munchers. They in turn are eaten by the plant munchers – who are eaten by the animal munchers and the toxin continues to be passed up the pyramid.

## Results

- What happens to the top predator? How many rocks do they have? Can they hold on to them? Can they move normally with them?

## Discussion

Have the students brainstorm answers for the questions as a class or in small groups, then have them do some research to confirm their predictions.

- What effect you think toxins might have on marine species? Do some research to follow up your ideas.
- What are the potential sources of marine toxins in your local area? Do some research to find out which ones are likely sources.
- Should we be concerned about pollution sources in other parts of NZ or the world? Investigate the migration of local seabirds, marine mammals, sharks and fish.
- Why are top predators typically more vulnerable to toxins than species lower on the food chain? Find out what toxin levels have been measured in marine mammals or sharks in NZ and other parts of the world.
- Are all toxins in the marine environment a result of human activity? Investigate toxic algal blooms.
- How do marine toxins affect us? What safeguards are in place to ensure that humans aren't affected?
- How do marine toxins and other pollutants affect biodiversity? Why is biodiversity in the marine environment so important?



NZ's first outbreak of shellfish poisoning from a harmful algal bloom occurred in 1992. Some species of phytoplankton produce a natural toxin that can find their way through the food chain from fish to shellfish to humans causing gastrointestinal and neurological illness in humans. Algal blooms are a natural occurrence but are increasingly the result of elevated nutrient loads caused by human activities (eg. effluent disposal and fertilising arable land).



Tri-butyl tin, found in antifouling paints used on the bottom of boats, causes gender bending in snails. Microalgae absorb it, it is then passed on to the grazing snails that eat the algae and on to the predatory snails that eat the grazing snails. High levels of tri-butyl tin cause male snails to develop female sex organs, making them incapable of breeding as a male or a female.

## Extension Activities

- Think about what YOU could do to increase awareness about the number of toxins entering the local marine environment.
- Design a plan to carry out one of the actions suggested above. Identify the skills you will need to carry out your plan. Find out who makes the decisions about the place and the activity. Explore what other people think about the issue. Discuss how you will increase other people's awareness of the issue.



Large levels of mercury were released to the environment during the industrial revolution. Although strict regulations are now in place, mercury does not degrade once it is in an ecosystem. In Victoria, Australia, the shark fishery has a minimum size to protect the fishery but also a maximum size to protect human health. The older, larger specimens have often built up high levels of mercury in their tissues. As there is no way organisms can process and excrete the mercury, it would quickly build up to life threatening levels in people who ate a lot of fish and chips!

For more information about pollution and the marine environment check out these web sites:

NZ Ministry for the Environment – [www.mfe.govt.nz](http://www.mfe.govt.nz)  
[www.environment.org.nz/seaweek](http://www.environment.org.nz/seaweek)



## Science



How do squid swim? Look at Squid Card: *Speedy Squid* and think about what body parts are important in movement. How do they swim fast and slow?

Make a squid rocket to understand how squid propel themselves.

**Material:** Activity sheet: "Squid Rocket," balloons, strong adhesive tape, fishing line, straws.  
**Teaching Tips:** Modify the balloons to see if adding fins changes anything.  
**Curriculum Links:** Science Physical World Level 2 AO 1, 2; Living World Level 3 AO 2  
**Websites:** [www.unmuseum.org/exjet.htm](http://www.unmuseum.org/exjet.htm)

## Maths



Using the information from Squid Card: *Speedy Squid* compare the speed of Arrow Squid to other animal species. Graph the information. What factors might affect speed? How does your speed rate? Have someone time you running a measured distance. Calculate your speed to km/hr.

**Material:** Squid Card: *Speedy Squid*, pencil, paper and timer.  
**Teaching Tips:** Convert the km/h into metres/hour or metres/minute.  
**Curriculum Links:** Maths – Number Level 3/4  
**Websites:** [www.teach-at-home.com/fastfacts/animalkingdom/Speed.asp](http://www.teach-at-home.com/fastfacts/animalkingdom/Speed.asp)

## English



Create haiku or lanterne poems about the speed of squid.

Haiku-consists of three unrhymed lines of five, seven, five syllables -17 syllables in all. Haiku is written in the present tense and focuses on nature.

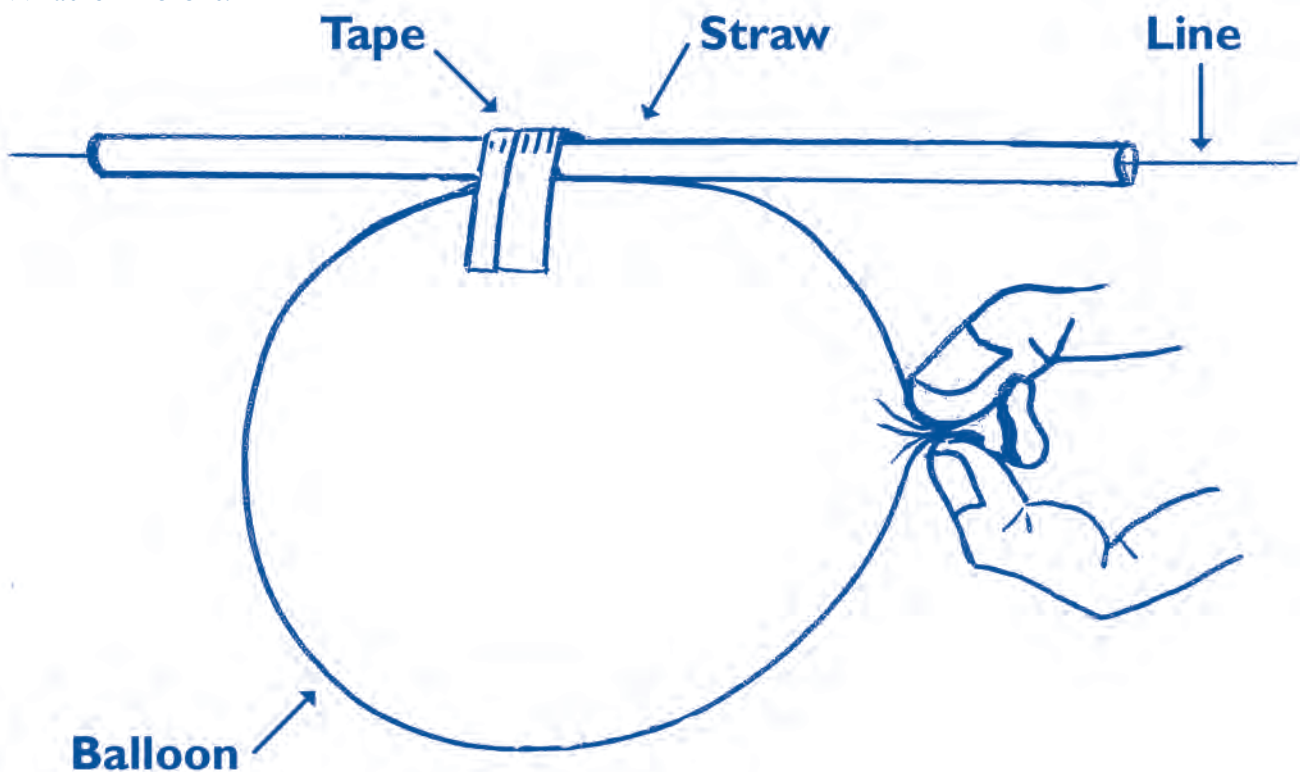
Lanterne is shaped like a Japanese lantern. It is written in five lines using a syllabic pattern of one, two, three, four, one.

**Material:** Dictionary, paper, pencil.  
**Teaching Tips:** Writing adjectives and group brain-storming of words is helpful.  
**Curriculum Links:** English Written Language Level 2/3 Poetic Writing  
**Websites:** [www.shadowpoetry.com/resources/wip/types.html](http://www.shadowpoetry.com/resources/wip/types.html)



# SQUID ROCKET ACTIVITY

1. Tie one end of the fishing line to an anchored object at the front or back of the classroom about one metre off the floor. Then stretch the line out across the classroom.
2. Thread a plastic straw onto the line.
3. Blow up one of the balloons, filling it about one third full of air while carefully holding the nozzle end tight (but not tying it) so that air will not escape.
4. Tape the plastic straw to the top of the balloon so that the straw is parallel to the long part of the balloon and the top of the balloon is pointed toward the anchored end of the line.
5. Have a student hold the other end of the line off the floor (so both ends are at the same height) while making the line tight.
6. Let the nozzle end of the balloon go and watch the balloon rocket fly along the line. Use a timer to record the time. Measure the distance the balloon travelled along the line. Repeat three times. For each trial, record distance and time.
7. Repeat STEPS 1-6, changing the following:
  - Fill the balloon  $\frac{2}{3}$  full of air.
  - Fill the balloon completely full of air.
  - Do each test at least three times.
8. Compare the movement of the balloon with the jet propulsion of a squid.
  - What is the same?
  - What is different?



## Science



Scientists think Colossal Squid live alone in the deep, dark ocean, so how do you think they find a mate?

Try out your theories. Have the class form a big circle (the deep ocean), two people become squid and are placed at opposite sides of the circle blindfolded (There is no light in the deep ocean). How long does it take them to find each other? Does the time decrease if they make a noise, move to the surface where there is more light? What happens if they find the other squid and discover that it is the same sex?

Look at the squid eggs on the Squid Card: *Sexy Squid*. What are some of the dangers of leaving your eggs on the ocean floor, what are some of the advantages?

Material: Squid Card: *Sexy Squid*, timer and blindfolds.  
 Teaching Tips: Do we know the whole story of squid? Investigate how much we really know and don't know.  
 Curriculum Links: Science Living World Level 2 AO 3  
 Websites: [www.tonmo.com/science/public/giantsquidfacts.php](http://www.tonmo.com/science/public/giantsquidfacts.php)

## Maths



### Squid Survival Game

How many baby squid survive to become adults? Each player (adult squid) starts with 100,000 eggs. To find out how many babies die each month roll one die to see the base number lost and roll the other die to see the multiplication factor. (example: 5 and 1000 = 5000 eggs gone). See who has the most surviving eggs after 5-10 rounds. Keep a running record of each round.

Material: 2 dice (regular die and one modified with 0, 5, 10, 100, 1000, 10,000 on), paper, pencils, calculators (optional).  
 Teaching Tips: Have students state what may have happened to their babies.  
 Curriculum Links: Maths – Number Level 2/3

## English



Create love poems and rhymes with a squid theme.

For Example:

Algae is red,  
 Seaweed is green,  
 A cephalopod love  
 happens in the deep, unseen.

Material: Paper, pencil.  
 Teaching Tips: Modify familiar poems and limericks.  
 Curriculum Links: English Written Language Level 2/3 Poetic Writing  
 Websites: [www.shadowpoetry.com/resources/wip/types.html](http://www.shadowpoetry.com/resources/wip/types.html)



## Science



How can we find out about something we can't see? Prepare small boxes by placing a few small items inside (i.e. nail, paperclip, cotton ball, clay ball, marbles, counters). Tape box closed. Give a box to a group of students. Have them develop a test to determine what is inside the box. Students may shake and rattle boxes but they may not open them. Lead students to build a test box and have them place items in to see if they can recreate the feel and sound of their boxes. This shows that sometimes when you cannot investigate a subject directly, you can use an indirect method (e.g. we haven't seen many large squid, but we can study the stomach contents of Sperm Whales).

**Material:** Small boxes, items for inside boxes, extra empty boxes for students to try ideas on.  
**Teaching Tips:** This is also good for introducing molecules and atoms.  
**Curriculum Links:** Science Physical World Level 3 AO 1, 2, 3

## Social Studies



Review the timeline for the Colossal Squid on Squid Card: *Hide and Seek*. What do you think scientists will discover in the next 10 year, next 100 years? Create a future timeline with your key discoveries on it. Think about the technology that will need to be developed to allow us to learn more about the Colossal Squid. If advances in technology give us better access to the sea, will we have to worry about the survival of the squid?

**Material:** Squid Card: *Hide and Seek*, paper, pencil.  
**Teaching Tips:** Reading stories like *20,000 Leagues Under the Sea* shows how our ideas have changed about the squid over time.  
**Curriculum Links:** Social Studies Time Continuity and Change Level 3

## Art



### Create a View out of a Submarine Window –

Cut the centres out of two paper plates or use card circles of plate size. Cut a piece of dark blue cellophane paper larger than the hole and layer it between the two plates. Fasten the plates at the edges with glue. Create deep sea creatures and glue them to the cellophane paper. What is your submarine passing?

**Material:** Paper, paper plates, cellophane paper, glue, scissors, books on deep sea creatures.  
**Teaching Tips:** Hang them up so light can pass through them for a pretty effect.  
**Curriculum Links:** Art Developing Ideas (DI) Level 2/3

# THE REAL THING

## Science



Look at the Squid Card: *The Real Thing*, to see the specimen on which the Colossal Squid model at the Aquarium has been based. Why does the squid in the picture not seem as long as the model? Build a small model of a squid out of an empty toilet roll and rubber bands. Cut the rubber bands so that they are open. Hole punch 10 holes around one end of the empty toilet roll. Tie one end of a rubber band to a hole and let it dangle down. Two rubber bands should be longer than the rest. You can add fins and eyes if desired. Try to measure the length. Do you measure just the toilet roll (mantle)? Or include the arms? Do you stretch them or not? Scientist find that the arms contract after death. Which is an accurate way to tell people how big the squid really is?

- Material:** Squid Card: *The Real Thing*, Squid Card: *Big, Bigger, Biggest*, paper rolls, rubber bands-two lengths, hole punch, ruler, paper for extra parts (optional).
- Teaching Tips:** Scientist usually like to report size by mantle length. It's more accurate.
- Curriculum Links:** Science Living World Level 4 AO 3
- Websites:** [www.tonmo.com/science/public/giantsquidfacts.php](http://www.tonmo.com/science/public/giantsquidfacts.php)  
[www.news.nationalgeographic.com/news/2003/04/0423\\_030423\\_seamonsters.html](http://www.news.nationalgeographic.com/news/2003/04/0423_030423_seamonsters.html)

## English



Take a look at Squid Card: *The Real Thing*. What we know about the Colossal Squid is listed on the back. If you were a squid scientist what questions would you be trying to answer? Write a narrative that asks these questions and tells what you are going to do to try to answer them. The scientist in the picture is Dr. Steve O'Shea. Do some research on Dr. O'Shea and other marine scientists and find out what they do. If you wanted to be a scientist, what qualifications and qualities would you need?

- Material:** Squid Card: *The Real Thing*, paper, pencil, books on marine scientists.
- Teaching Tips:** Do some research on Dr. Steve O'Shea and other marine scientists to find out how they spend their days.
- Curriculum Links:** English Written Level 3/4
- Websites:** [www.tonmo.com/oshea.php](http://www.tonmo.com/oshea.php)  
[www.thesciencesite.info/squidcam.shtml](http://www.thesciencesite.info/squidcam.shtml)  
[www.news.bbc.co.uk/1/hi/sci/tech/2910849.stm](http://www.news.bbc.co.uk/1/hi/sci/tech/2910849.stm)

## Science



Ask at your local fish shop for an ungutted squid to do a class dissection. Follow the instructions found on the squid dissection sheet and have a great time!

- Material:** Ungutted squid, sharp scissors, activity sheets: "Squid Dissection" and "Internal Anatomy of a Squid", pan or tray to hold squid, latex gloves (optional).
- Teaching Tips:** If you don't want to deal with the mess or smell, come out to the NZ Marine Studies Centre and Aquarium and do the dissection with experts.
- Curriculum Links:** Science Living World Level 3 AO 2
- Websites:** [www.longbeachmarineinst.com/education/ed\\_material/files/Squid%20dissection.pdf](http://www.longbeachmarineinst.com/education/ed_material/files/Squid%20dissection.pdf)



# SQUID DISSECTION

**Objective:** To investigate the external and internal structures of an Arrow Squid and understand how these help them stay alive.

**Equipment:**









Whole squid, Tray, Dissecting scissors, Scrap paper, Latex gloves (optional!)

**Method:**





**1. Examine your squid.** Describe it using as many of your senses as you can. Write these in the box below.

**2. Examine the outside of the squid.** Does the shape suggest a fast or slow moving animal?

Draw a picture of your squid and label the following parts in the box below:

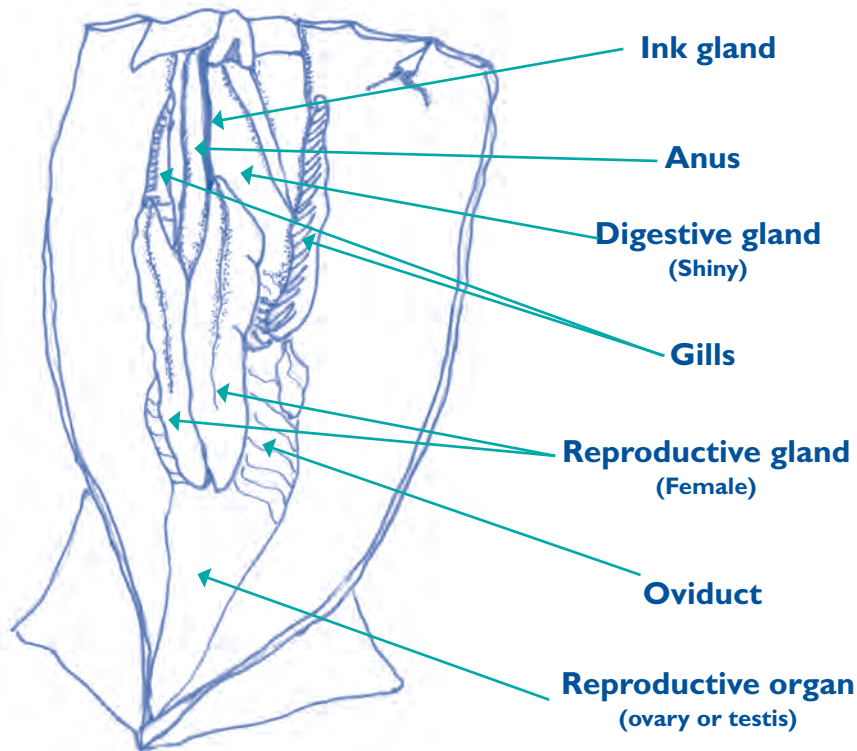
-  large eyes
-  chromatophores (colour sacs on the skin)
-  arms (8 arms and 2 longer feeding tentacles)
-  suckers (look for horny sucker rings equipped with teeth!)
-  funnel
-  mouth and beak
-  fins
-  mantle

**3. Examine the inside of the squid.** Using your scissors, cut the mantle open, beginning at the siphon and cutting to the end of the squid. Lift the mantle away from the squid as you cut so that you don't cut any of the organs inside. Use the Internal Anatomy of the Squid diagram to find each organ.

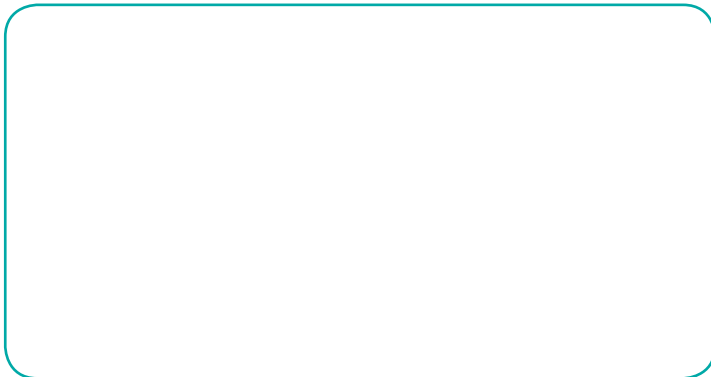
-  digestive gland (does the job of our liver and kidneys)
-  ink sac (silvery) gently slice open the ink sac and remove some ink from the sac, note that it is gritty. Place some in a small dish for later.
-  anus (found on top of ink sac)
-  stomach



# INTERNAL ANATOMY OF A SQUID

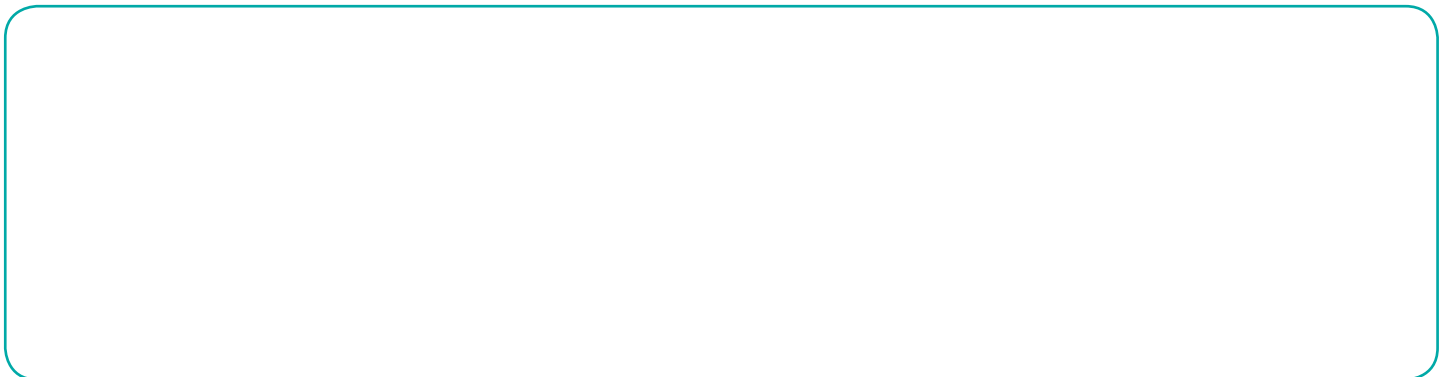


4. Draw the gills below. Why are they feathery?



5. Open the stomach and investigate what is in it. As a general rule fish prey is silvery, crustacean prey is red and cephalopod prey is lavender. Look for fish ear bones, scales and bones, crustacean eyes and shells, and cephalopod beaks.

6. Using your hands gently pull all the internal organs off of the inner wall of the mantle. This reveals the squid pen or gladius. This is the remnant mollusc shell. It can be removed by gently sliding the closed scissors under the pen and levering it off the muscle. Draw the pen below and then use it to write your name with the squid ink collected earlier. Do not be tempted to use the ink to write on skin as it can be very irritating and some people are allergic to it.



7. When you are finished, clean up. Wash your hands in cold water to prevent the pores in your skin from opening up and letting the smell in. Lemon or tea tree soap are very good at removing fishy (or squiddy) smells.

## Design a Home for an Octopus (page 4)

NB; these instructions are for holding a SMALL octopus such as a midget octopus. Common octopus grow to be too large for most home or classroom aquariums (up to 3m arm spread and 20kg weight).

1. Octopus live where there is shelter. They tend to live in areas with rocky reefs that offer many crevices for dens. The reefs they choose are often close to sand flats where there is an abundant source of food.
2. The tank should have places for the octopus to hide (rock caves, pipes, bottles, or anything that the octopus can squeeze into) and a sand or gravel bottom.
3. Small seastars and snails are good neighbours for octopus. Crabs will quickly become an octopus' dinner! Avoid sea anemones as they can sting the octopus' delicate skin.
4. Octopus eat live crabs, crayfish and their relatives. They are not rubbish collectors so the food must be alive!
5. Visit the rocky shore at low tide to find this food.
6. A small octopus should be fed 2 – 3 crabs every day.
7. Use tongs to remove the big pieces and a siphon hose to remove small bits.
8. Octopus have gills for breathing.
9. Collect seawater from your local beach or wharf for your tank. Avoid sewage outfall or other polluted areas. Alternatively you can make seawater using a product such as Instant Ocean (from pet shops) and aged tap water (let stand overnight to remove chlorine).
10. You will need to replace two thirds of the seawater every week. Use a siphon hose to remove the old water. Use a water filter that cascades into the tank to oxygenate the water. Do not use an air bubbler as the bubbles may get trapped in the octopus' body cavity and kill it.
11. An octopus can be trapped by leaving a bottle or drink can near a rocky reef. Put a crab in the bottle, attach a rope and float (so you can find it again!) and leave it overnight. Be patient, it may take a few attempts before you catch an octopus.
12. Octopus love to go exploring and they can squeeze through tiny gaps. Your tank MUST have a tight fitting lid, and all gaps need to be covered with duct tape. Put a heavy brick on the lid (octopus can lift up to seven times their own weight!).
13. To see the octopus when it is sleeping have its den facing the glass. To see it at night use a red light or moonlighting (some aquarium stores sell them).

## Answers to Some of the Questions Asked in this Book

### Big, Bigger, Biggest

Karanui should not be worried about how big she will get. Colossal Squid may grow up to 18 metres in length. She is only 6 metres, so she has room to grow.

## Squid Relatives

Squid are related to snails, limpets, mussels, cockles, scallops, octopus, cuttlefish and nautilus. This is not an inclusive list. If it is a mollusc, it is related to the squid.

Most molluscs have a shell or remnant shell, muscular foot, gills, mantle and some have a radula.

It is called "head-foot" because of the way the tentacles seem to come right out of the head.

All the molluscs on the card are harvested for food either traditionally or commercially in New Zealand.

## Intelligent?

Food is the main interest for a squid.

## Sign Language

Angry-When someone is trying to attract your mate. When someone wants the same piece of food you do.  
Scared-Something is trying to eat you. When you're hooked on a jig.  
Relaxed-When just hanging around.

## Squid Supper

An average 12-year old would need to eat 17.5 quarter pound hamburgers or 4.2 - 475gram pizzas every 2 hours. 30 days – Arrow Squid – 240 grams of krill and 450 crabs for the octopus.

## Squid Rings

Animals that eat squid – fish, dolphins, whales, squid, humans, sharks. All animals on the card would be affected by the fishing of squid to some degree. It is a part of their diet.

## Armed and Dangerous

Where is Nga Whatu? One of the rocks is next to Arapawa Island in the Tori Channel and it is said to be bad luck to gaze upon the "eye of the octopus" if you are a first time traveller on the Raukawa Moana (the Cook Strait). The other eye landed at Ngawhata, a small valley at the back of Stoke. The full name of the valley is Nga Whatu o Te Wheke o Muturangi (The Eyes of The Octopus Of Muturangi).

How defend self – Hooks on tentacles, ink for decoy, speed, sucker rings and beaks. Mantle is the pump or bellows, fins are for steering/guiding. Tentacles are used to catch any dinner swimming by. The body goes first when swimming.

## The Battle

Colossal Squid advantage – size, hooks on tentacles, sucker rings, speed and agility when turning, ink, beak, can breathe underwater, lives at great depths.

Sperm Whale – size, teeth, biting power, speed, sonar, great diving ability.

## NZ Marine Studies Centre Publications

Shell Line Key Poster, Mollusc Poster & Teachers' Guide (NZMSC)

Sea shell identification, information on molluscs and an activity guide for the beach and classroom.

Outrageous Octopus & Squid Activity Booklet (NZMSC)

Information and stories about octopus and squid.

## Books:

The Giant Squid.

Bunting, Eve, 1981. Messner, New York.

Octopus and Squid: The Soft Intelligence.

Cousteau, J. 1973. Cassell, London.

Octopuses, Squids and Their Relatives: Cephalopods.

Blaxland, B. 2002. Macmillan, Victoria.

The Incredible Hunt for the Giant Squid.

Matsen, B. 2003. Enslow, New Jersey.

Outside and Inside Giant Squid.

Markle, S. 2003. Walker, New York.

Squids.

Weber, V. 2005. Gareth Stevens, Milwaukee, Wis.

Squids Suck.

Greenberg, N. 2005. Allen & Unwin, Crows Nest, NSW.

A Guide to the Octopus, Squid and Cuttlefish of Australasia.

Nonman, M. 2000. Gould League, Collingwood (Vic).

About Molluscs : a Guide for Children.

Sill, C. 2005. Peachtree, Atlanta, Ga.

Molluscs.

Miller, R. 2005. Raintree, Oxford.

Which Seashell? A simple guide to the identification of NZ seashells.

Crowe, A. 1999. Penguin, Auckland, NZ.

Nature Flip Guides - "Seashells".

Crowe, A. 1998. Penguin, Auckland, NZ.

Deep New Zealand - Blue water, black abyss.

Batson, P. 2003. Canterbury Univ. Press. Christchurch, NZ.

## Videos:

The Octopus's Garden (NHNZ Ltd)

Filmed in southern NZ, it follows the incredible life-journey of an octopus.

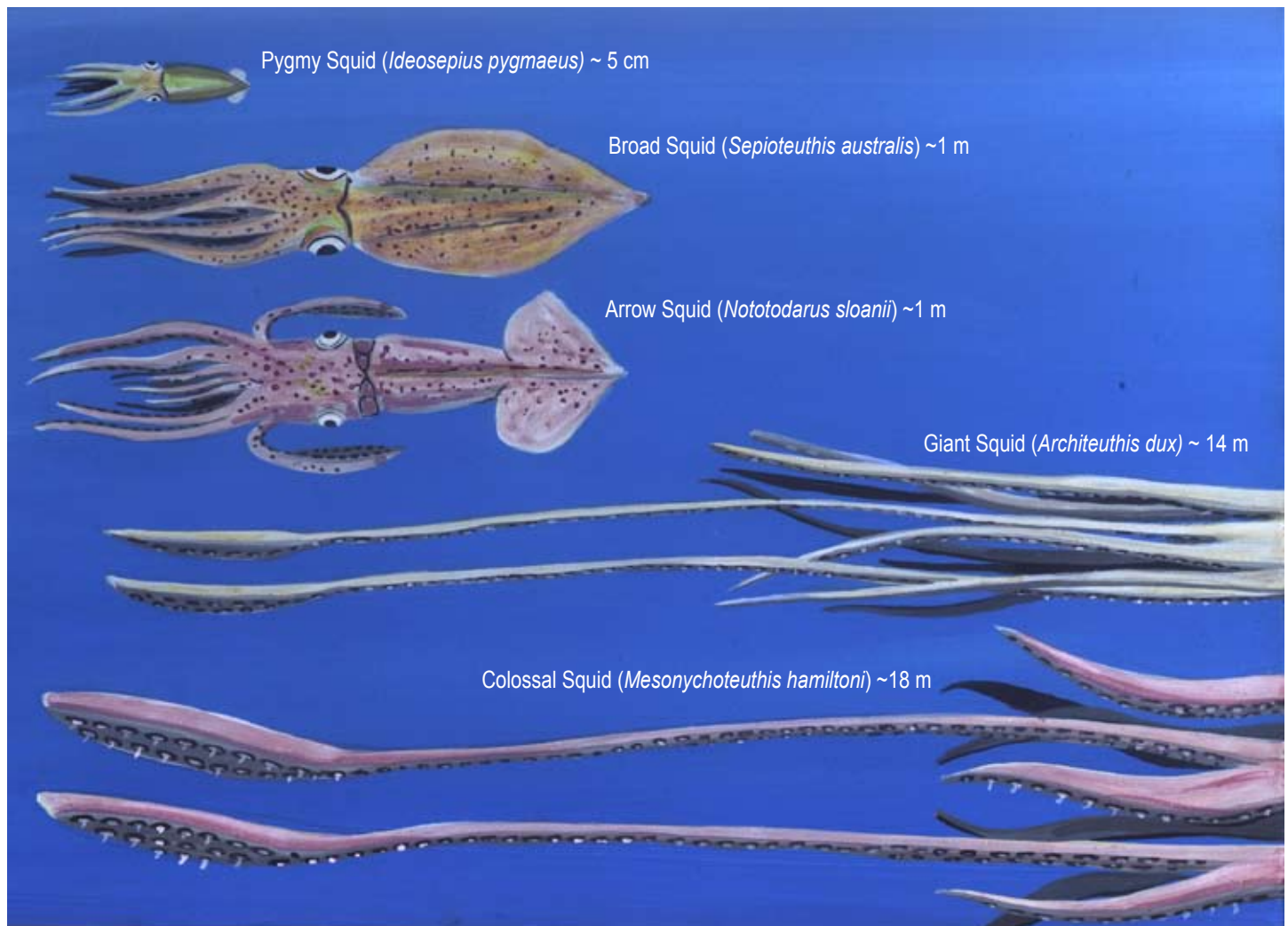


# NEW CURRICULUM LINKS

Squid Card	Page	Activity	Curriculum Link	Strands
Big, Bigger, Biggest	2	Maths	Mathematics & Statistics	Level 2 Statistics-Statistical Investigation; Statistical Literacy Level 3 Statistics-Statistical Investigation
	2	Technology	Technology Science English	Level 2 & Level 3 Technological Practice Level 3 & Level 4 Living World-Ecology Level 3 & Level 4 Speaking, Writing, Presenting
	2	Art	Arts	Level 2 Visual Arts-Developing Practical Knowledge, Developing Ideas
Squid Relatives	5	Science	Science	Level 2 & Level 3 Living World-Evolution
	5	Social Studies	English Social Sciences	Level 3 Listening, Reading Viewing; Speaking, Writing, Presenting Level 3 & Level 4 Place & Environment; Continuity & Change; The Economic World
			Technology	Level 2 Technological Practice
	5	Social Studies/Māori	Social Sciences	Level 3 Identity, Culture and Organisation; Place & Environment
Intelligent?	6	Science	Science	Level 2 Living World-Ecology
	6	English/Māori	English	Level 3 Listening, Reading, Viewing; Speaking, Writing, Presenting
	6	Science	Science	Level 2 Living World – Ecology; Life Processes Level 3 Living World - Ecology
Sign Language	10	Science	Science	Level 3 Living World – Life Processes; Ecology
	10	Art	Arts	Level 2 Arts-Developing Practical Knowledge
	10	English/Science	English Science	Level 3 Speaking, Writing, Presenting Level 3 Living World-Life Processes; Ecology
Squid Supper	13	Science	Science	Level 2 & Level 3 Living World-Life Processes
	13	Technology	Technology	Level 3 Technological Practice
	13	Maths	Mathematics & Statistics	Level 3 Number & Algebra-Number Strategies; Equations & Expressions
Squid Rings	16	English	English	Level 3 Speaking, Writing, Presenting; Listening, Reading, Viewing
	16	Social Studies/Maths	Social Sciences Mathematics & Statistics	Level 3 The Economic World Level 4 Number & Algebra – Patterns & Relationships
			Science	Level 2 Living World-Life Processes
	16	Science	Science	Level 3 & 4 Living World-Ecology
Armed and Dangerous	19	English/Māori	English Social Sciences	Level 2 Listening, Reading, Viewing Level 3 Place and Environment
	19	Science	Science	Level 2 Living World-Life Processes
	19	English	English	Level 3 & 4 Speaking, Writing, Presenting
The Battle	20	Science	Science	Level 2 Living World-Life Processes; Level 3 & 4 Living World-Ecology
	20	Physical Education	Health and Physical Education	Level 2 Movement Concept & Motor Skills
	20	English	English	Level 3 & 4 Speaking, Writing, Presenting
Speedy Squid	23	Science	Science	Level 2 Living World-Ecology; Level 3 Physical World-Physical Inquiry
	23	Maths	Mathematics & Statistics	Level 3 Statistics-Statistical Investigation
	23	English	English	Level 2 & 3 Speaking, Writing, Present
Sexy Squid	25	Science	Science	Level 2 Living World-Ecology
	25	Maths	Mathematics & Statistics	Level 3 Number & Algebra-Number Strategies; Number Knowledge
	25	English	English	Level 2 & 3 Speaking, Writing, Presenting
Hide & Seek	26	Science	Science	Level 2 & 3 Physical World-Physical Inquiry
	26	Social Studies	Social Sciences	Level 4 Continuity & Change
	26	Art	Arts	Level 2 & 3 Developing Practical Knowledge; Communicating & Interpreting
The Real Thing	27	Science	Science	Level 3 & 4 Living World-Life Processes
	27	English	English	Level 3 Speaking, Writing, Presenting
	27	Science	Science	Level 2 Living World-Ecology

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	Sub Windows	Hide and Seek	26
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	Legend	Armed and Dangerous	19
	Māori Proverbs	Intelligent?	8
	Persuade Others	Armed and Dangerous	19
	Poetry	Sexy Squid	25
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<b>Māori Emphasis</b>			
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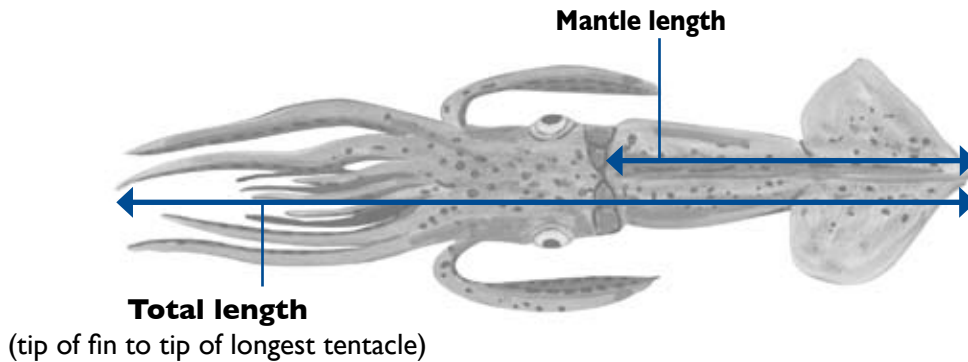


# 1. Big, Bigger, Biggest

Colossal Squid are thought to be the biggest squid in the world, although their maximum length is unknown. Pygmy squid are the smallest of the 450 squid species found world wide.

## How do you measure a squid?

The size recorded on the front of the court is total length of the squid. However mantle length is also recorded by scientists as the arms and tentacle of a squid are very elastic and easy to stretch.



## Are old squid, big squid?

The growth rate and maximum size of squid also depends on:

- sea temperature (squid born in summer will grow slower and get larger than one born in winter)
- amount of food available
- quality of food available

# 2. Squid Relatives

Squid and octopus are cephalopod molluscs which means “*head-foot*”, but their foot has been divided into tentacles. As molluscs, they are related to snails, slugs, scallops, mussels and cockles.

## What is a mollusc?

A mollusc has the following features:

- single shell (snails, limpets) or a shell with two valves - bivalves (mussels, cockles, scallops) or 8 shell plates (chitons) or a remnant shell (squid and some octopus) or no shell at all (sea slugs, most octopus)
- Muscular foot (which is divided into tentacles in octopus, squid, nautilus)
- Gill
- Mantle tissue (lines the shell or forms a sac which contains organs)
- Toothed tongue called a radula (bivalves don't have one)

Cephalopod molluscs also have:

- tentacles (8 in octopus, 10 in squid and cuttlefish, 99 in nautilus),
- an organised lobed brain and more advanced nervous system,
- good eyesight (similar to a mammals).











# 3. Intelligent ?

Octopus, cousins to the squid, are among the cleverest animals in the sea. They can discriminate between patterns, learn a maze and they can remember things they have been taught. Perhaps squid are as clever... but we really don't know.

## How do squid compare with us?




-  Squid have an organised brain with ~30 lobes. (We have eight lobes)
-  Squid can see polarised light. (We need Polaroid sunglasses to see this)
-  Squid have three hearts with one chamber. (We have one heart with four chambers)
-  Squid have blue blood with copper. (We have red blood with iron)
-  Squid change colour to communicate. (We talk to others)
-  Squid have to coordinate eight arms and two tentacles. (We have two arms and two legs)

# 4. Sign Language

Skin colour and patterns can change with the opening and closing of special pigment cells called chromatophores. This communicates readiness to breed, aggression and fear and may provide camouflage.

## What do the colours mean?

Well we don't know for sure, but based on other behaviour (e. g. biting!) we think that;

-  red means anger.
-  white means fear.
-  lavender is relaxed.

## What about body movements?

Patterns and posture also appear to be used for communication in squid and octopus.

Communication	Directed towards	Signal	Presumed message	Presumed function
Courtship	Mates (usually male to female)	Vertical bars, arms droop	Marry me	Attract a mate
Aggression	Competing males	White and black bars	Keep away, MY girl	Scare other males away
Feeding	Prey	Dark moving waves (passing cloud), dark arm waving	Watch me!	hypnotise prey
Defence	Predators	Heavy texture, dark mottled pattern, arm posture wide	See my weapons!	Threaten predator
Defence	Predators	Ink decoy	Eat this not me!	Trick predator
Defence	Predators	Rapid colour and pattern changes with body swelling and arm spreading	I am large and fierce!	Startle predator





## 5. Squid Supper

All squid are meat eaters (carnivores)...if it moves they'll eat it!

The fishers that caught the only intact specimen of a Colossal Squid, said that the squid was trying to attack and eat a two metre long Toothfish caught on their line. What a big meal!

**Royal albatross, Fur seal, Sea lion, Yellow eyed penguin, Humans, Sperm Whale.**



**ARROW SQUID**

**Fish : Common lanternfish, Pearlside fish, Red cod, etc.**



**Zooplankton (krill etc.)**



**Phytoplankton**



**Sun's energy**



## 6. Squid Rings

Small squid are eaten by many animals, including humans. They are important members of the Southern Ocean food chain and the main food of albatrosses and fur seals.

Humans eat squid and in New Zealand we have been fishing for them in large numbers since the late 1960's.

Arrow Squid Landings in New Zealand from 1960-2004

Fishing Year	Total Landings (tonnes)	Quota	Fishing Year	Total Landings (tonnes)	Quota
1960's	10	-	1991-92	60 509	118 571
1973	13,242	-	1992-93	37 278	122 875
1980-81	70 000	-	1993-94	74 492	122 875
1981-82	43 945	-	1994-95	99 315	123 011
1982-83	41 210	-	1995-96	62 668	123 011
1983-84	217 072	-	1996-97	65 403	123 332
1984-85	37 963	-	1997-98	45 362	127 332
1985-86	26 976	-	1998-99	27 553	127 332
1986-87	74 040	90 000	1999-00	20 747	127 332
1987-88	69 316	121 010	2000-01	35 071	127 332
1988-89	114 160	135 080	2001-02	48 173	127 332
1989-90	46 915	166 250	2002-03	43 720	127 332
1990-91	40 900	118 571	2003-04	84 862	127 332





# 7. Armed and Dangerous

Colossal Squid are not only big, they are well armed!

They have a large strong beak and a toothed tongue (radula) for biting and tearing! The arms are well equipped with suckers that have rings of teeth and swivel hooks.

Squid squirt ink as a decoy. The ink sac of a Colossal Squid contains half a litre of ink!

## The Stuff of Legends

*"I looked in my turn, and could not repress a gesture of disgust. Before my eyes was a horrible monster worthy to figure in the legends of the marvelous. It was an immense cuttlefish, being eight yards long. It swam crossways in the direction of the Nautilus with great speed, watching us with its enormous staring green eyes".*

So says the Naturalist, in the Jules Vern classic *20,000 Leagues Under the Sea*. Though this book is a work of fiction, the squid encounter that Vern wrote about was based on an 1861 account of a French naval ship that was attacked by a giant squid. Old mariners' tales include stories of sailors being whisked off boats by giant tentacles armed with plate sized suction cups. There are even stories of entire ships being dragged to their doom. But recently myth has become reality and it is now thought that the Kracken of old is the Colossal Squid of today.



Colossal Squid hook and suckers

(K Bolstad)



Colossal Squid beak

(K Bolstad)



Sucker rings in Arrow Squid

(J. McKinnon)

# 8. The Battle

Many Sperm Whales have battle scars from the hooks of Colossal Squid. We know who wins some of these battles because Colossal Squid remains have been found in the stomachs of Sperm Whales.

A sperm whale eats 101,600g of fish and squid each day, the fish and squid eat 1,016,000g of small fish, the small fish eat 10,160,000g of zooplankton, the zooplankton eats 101,600,000g of phytoplankton, the phytoplankton's energy comes from the sun!

## Animal Face Off's Colossal Squid

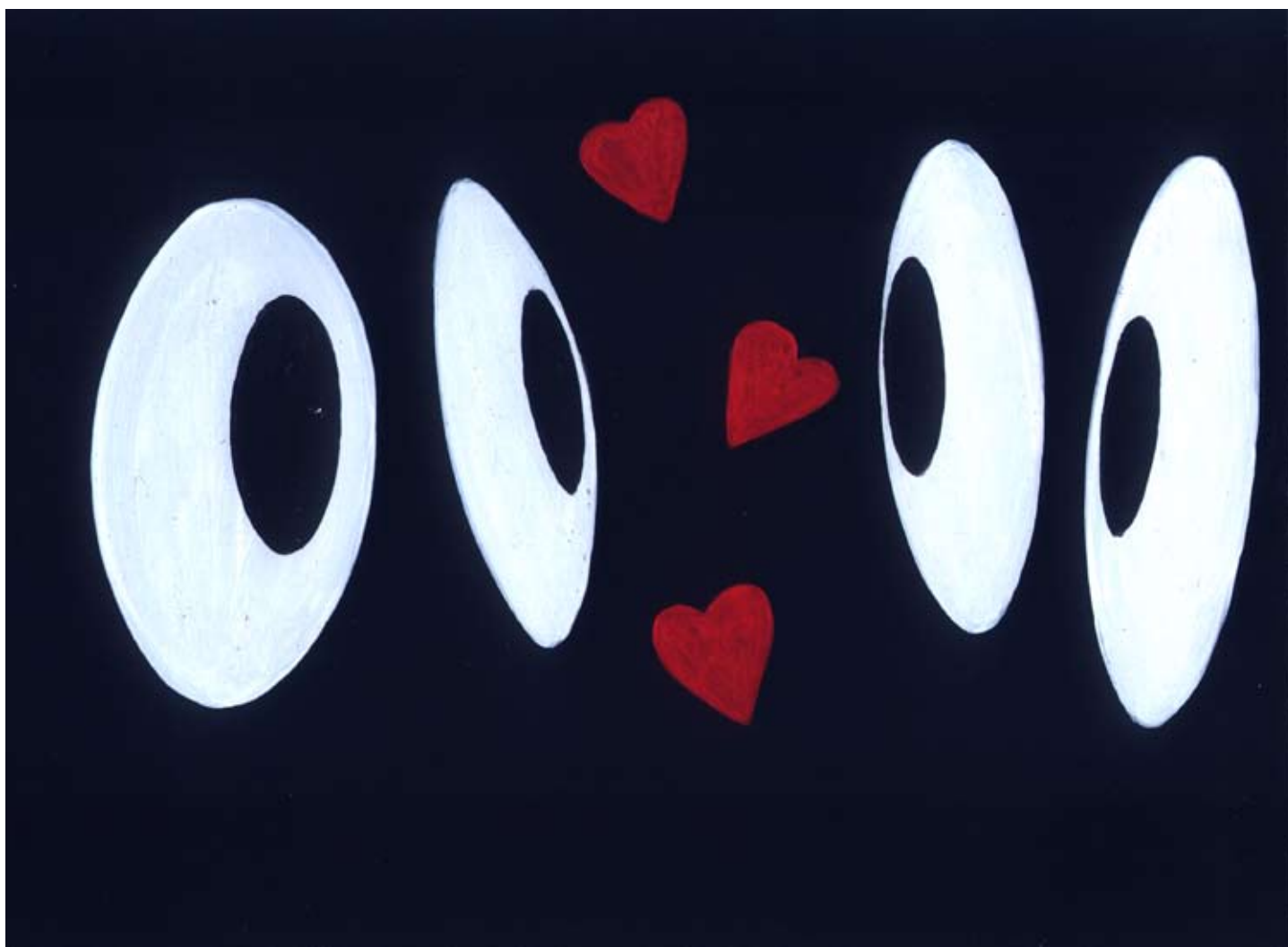
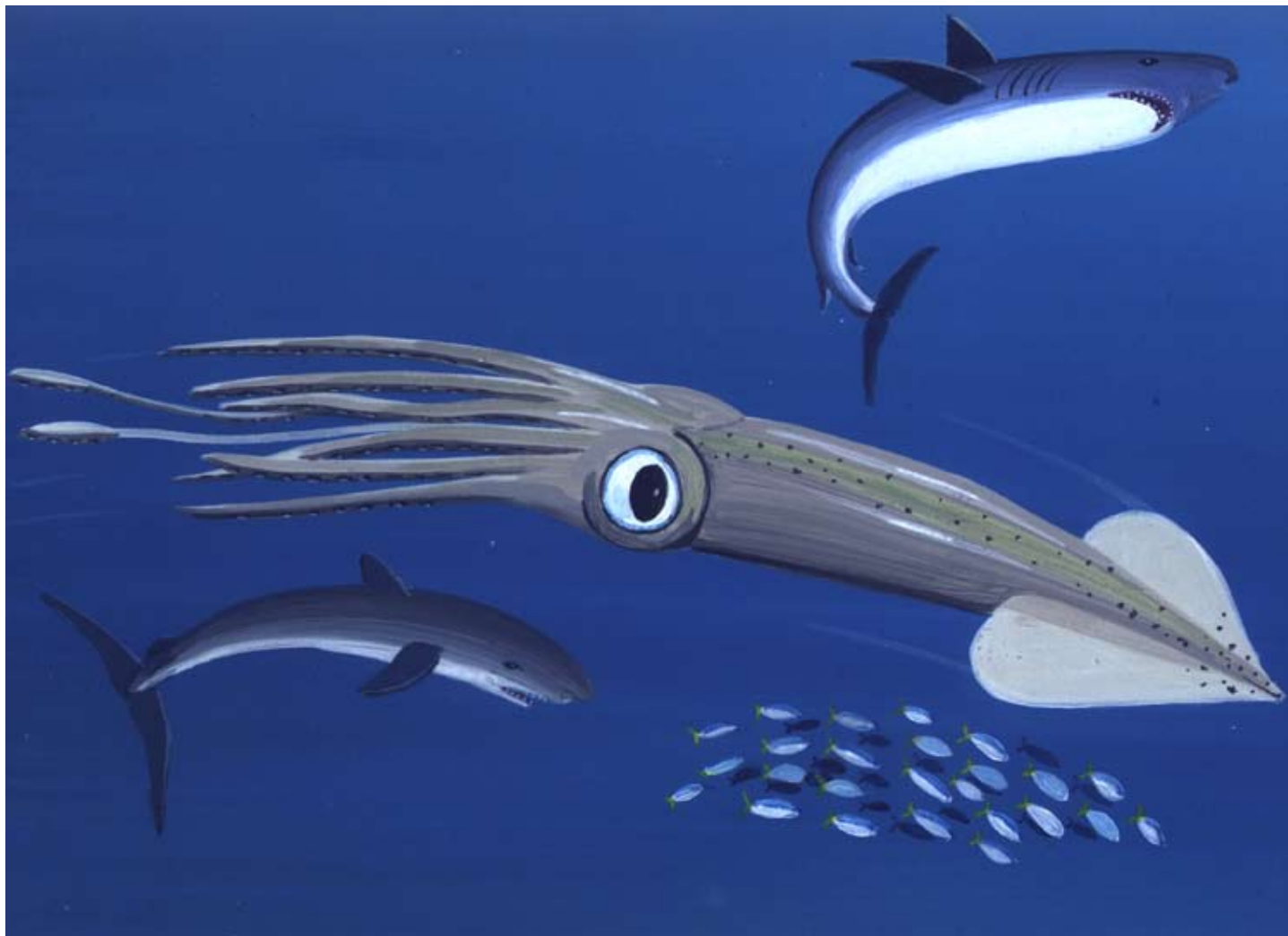
In 2003 Dunedin-based NHNZ began working on a new 13-part series for the United States cable channel Discovery called *Animal Face Off*.

The premise was simple: examine the strengths and weaknesses of an iconic predator; then pit that animal, and their attributes, against another iconic predator in a hypothetical altercation realised with computer graphics to discover who really reigns supreme in a particular environment. The final episode was an epic battle between a Sperm Whale and a Colossal Squid.

A replica Colossal Squid was designed, built by Glasshammer and taken out to sea for filming.

The footage was then used by Drummond Design to generate the computer graphics that resolve the question of who would reign supreme in a deep water "face off" between the undersea giants; the Colossal Squid and the Sperm Whale.

This replica is now on display at the NZ Marine Studies Centre and Aquarium.



## 9. Speedy Squid

Squid are jet propelled. They suck water into their body (mantle) and then squirt it out through a narrow funnel below the head.

### How fast is fast?

The Arrow Squid can swim at 30 kilometres an hour. How does that compare to other animals?

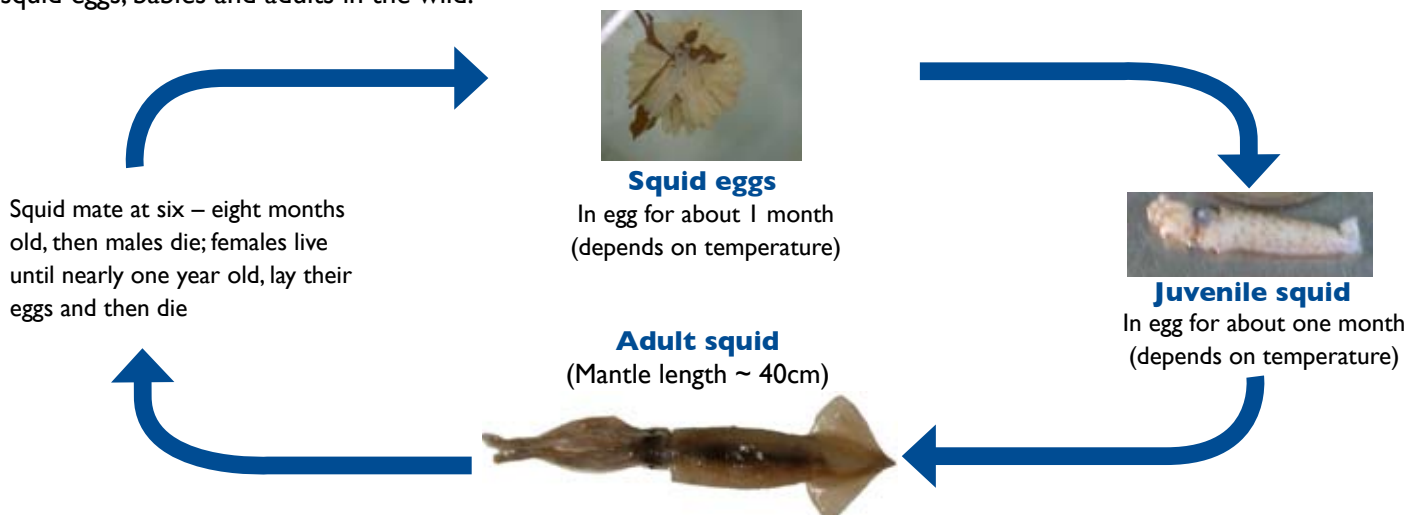
Animal	Speed Kilometres per hour
Cheetah	112
Greyhound	112
Lion	80
Killer whale	56
Domestic rabbit	56
Domestic cat	48
Human (athlete!)	43
California sea lion	40
Arrow squid	30
Squirrel	19

## 10. Sexy Squid

When Colossal Squid breed, the male injects sperm into the female's arms. After that it is a mystery! What we do know is that squid breed only once in their life and then die!

### Squid life cycle

The following information is based on a few species which can be kept in captivity (mainly in America) and from observations of squid eggs, babies and adults in the wild.



Most small squid live for less than a year, however Giant and Colossal Squid may live for four - five years. These ages are worked out by counting rings in their ear bones, rather like counting tree rings. Instead of one ring equalling one year, in squid they equal one day.





# 11. Hide and Seek

Many squid live in the deep sea, where it is dark all the time. The only light comes from other animals that make their own.

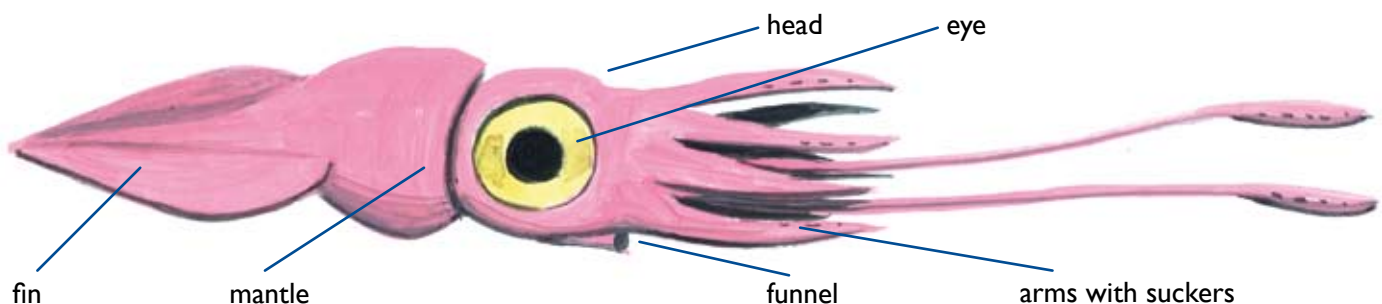
So how do scientists find and study an animal that lives in such an inaccessible environment?

## Colossal Squid Time Line.

- 1680** First recorded incident of a Kraken trapped in rocks in Norway.
- 1752** The Bishop of Berger described the Kraken as a floating island 1.5 miles across.
- 1875** The barque Pauline spotted a sperm whale with a snake like creature wrapped round its middle. The "snake" was probably the arm of a giant squid.
- 1930's** At least three reports of giant squid attacking ships.
- 1954** The film *20,000 Leagues under the Sea* features a giant squid attacking a submarine.
- 1978** Since this date, more than 60 Giant Squid have been fished or stranded around New Zealand. The largest one was 14 metres long.
- 1996** Peter Benchley's *The Beast* mini-series released, featuring a giant squid terrorising a resort town!
- 2003** First ever intact specimen of a Colossal Squid caught.
- 2004** Natural History New Zealand commissioned to make *Animal face off: Colossal Squid versus the Sperm Whale* for Discovery Channel. A model Colossal Squid is made for the documentary.
- 2005** In September, Japanese scientists take the first ever pictures of a Giant Squid in the wild. The Colossal Squid model is loaned to the New Zealand Marine Studies Centre.
- 2006** The Colossal Squid model, named Karunui (Big Eye) joins the fish at Portobello.

# 12. The Real Thing

Scientific Name:	<i>Mesonychoteuthis hamiltoni</i>
Habitat:	Southern Ocean from Antarctica to Chatham Rise. Have been recorded feeding at the surface at night and are thought to spend days at depths up to ~ 2500 metres or more.
Features:	Large well-developed eyes. Only squid species with swivel hooks. Colour variable, pink when showing aggression.
Size:	World's largest invertebrate, (up to ~18 metres and 400kg)
Age:	Unknown (estimated as four - five years, most smaller squid live for less than a year)
Prey:	Toothfish (and may eat a variety of fish and squid)
Predators:	Sperm Whale
Specimens Collected:	One intact specimen (on which our model is based). Five partial specimens found in the stomachs and vomit of Sperm Whales.
Other Large Squid Species:	Giant Squid, world-wide distribution, but most specimens have been found around New Zealand.







## **New Zealand Marine Studies Centre and Aquarium**

# **Close Encounters of the Marine Kind!**

The New Zealand Marine Studies Centre and Aquarium showcases marine life from southern NZ waters. Whether you want to touch a sea star, feed a crab, look down a microscope, ramble along the rocky shore or become a scientist for a day, this is the place for you. The Aquarium is open daily and is of interest to visitors of all ages. School programmes range from one hour to one week in length and a “hands-on, feet-wet, minds-salty” experience is guaranteed! The content is exciting, current and links closely with the science curriculum from early childhood to senior secondary.

For further information about the programmes,  
resources or facilities please contact:



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