

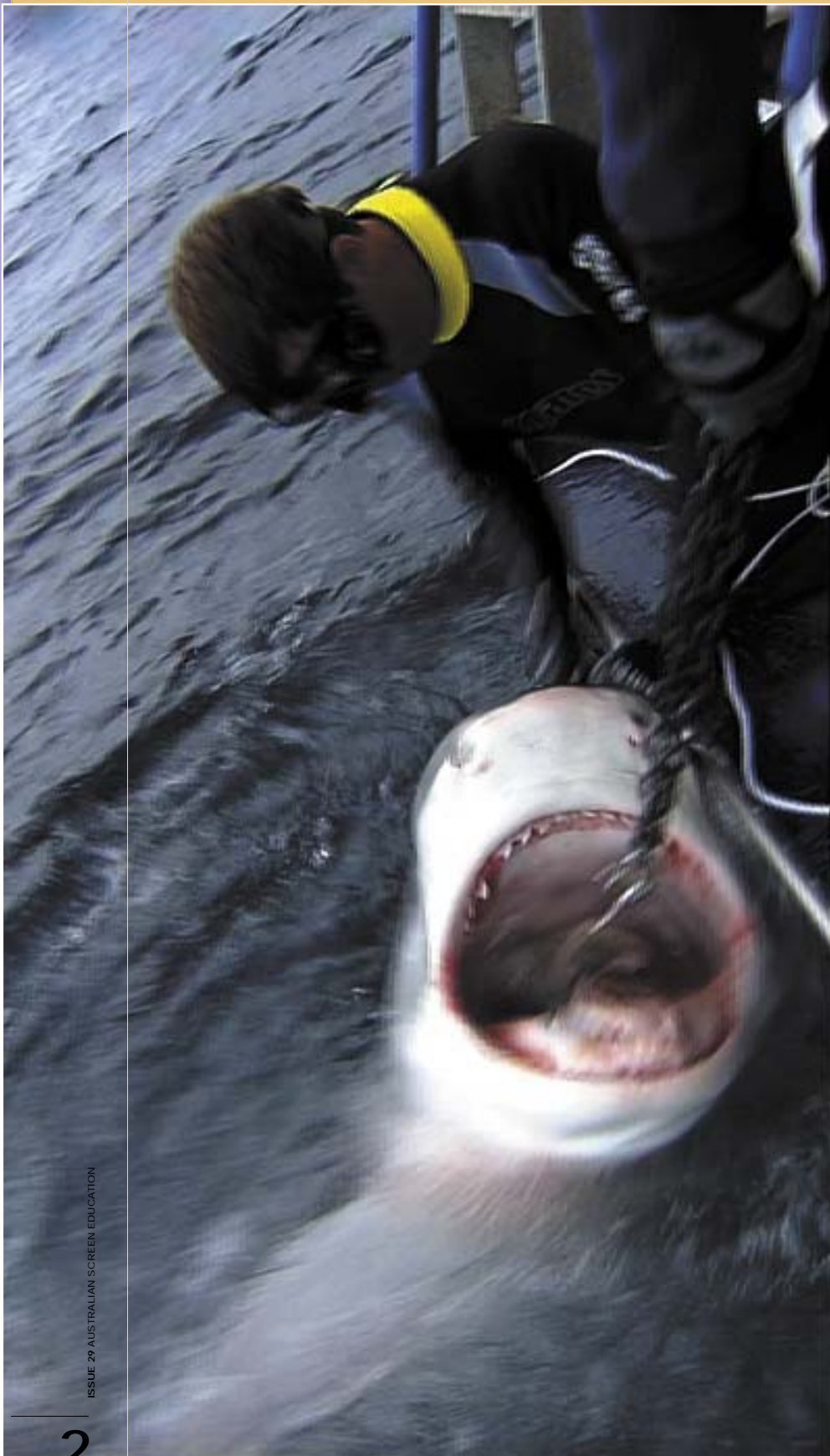
Shark Tracker

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AUSTRALIAN
FILM FINANCE
CORPORATION

STUDYGUIDE



INTRODUCTION

Sharks are creatures of mystery. Although they are familiar to everyone, they are almost universally both feared and admired. Compared to dolphins and many other sea animals, however, very little is known about them. *Shark Tracker* is a documentary that takes us on a voyage of discovery.

Shark Tracker follows Richard Fitzpatrick, a passionate marine biologist, paleo-biologist and underwater-cameraman who has spent over 8,000 hours underwater. Richard caught his first shark when he was twelve-years-old. He is obviously quite fascinated by them.

In *Shark Tracker*, Richard and his team begin by catching two White Tip Reef sharks (affectionately known as Lefty and Jezebel) who need new batteries for their tracking tags. After their transmitters are inserted these sharks will be monitored by satellite tracking. This will allow Richard to study the animals social behaviour, movements and predating.

Richard goes to find Lefty, Jezebel and the other white tip sharks in the area. They tag new sharks and change the batteries of those which have been already fitted with audio transmitters. Jezebel however has disappeared and there is a scene onboard the Undersea Explorer where Richard says, 'I really miss Jezebel, she was a lovely shark'.

It is after this 'gentle' introduction, that Richard and his team seek more dangerous sharks.

As part of a joint project with scientists from CSIRO Marine Research in Hobart, Richard and his team head for Raine Island, off Cape York, in the Far North region of the Great Barrier Reef. Raine Island is the largest Green turtle rookery in the world. While on this protected island, we see a protected turtle-breeding colony and watch hundreds of baby turtles first journey into the ocean.

The purpose of Richard's team is to catch a tiger shark and insert a satellite transmitter (which has been custom built by CSIRO marine engineers) into its dorsal fin. The tag sends a signal to polar-orbiting satellites every time the shark comes to the surface, allowing researchers to track its movements and behaviour. This project signals the beginning of a long-term research programme to determine the relationship between Raine Island, its seasonal population of turtles and tiger sharks, and the role of the island in the ecological interconnectivity of the Great Barrier Reef Province.

Richard employs a number of unusual and unique techniques to achieve his goals. Although Richard understands the dangers and that there is 'no room for error with Tiger Sharks', he jumps into the water with one to tie a rope around it's tail so that he can hang it upside down to 'chill it out'...

The tiger shark tagged is given the name Nicole. After excitedly following her progress for months, transmissions from Nicole abruptly ceased. A call from a fisherman sadly reveals that Nicole has drowned in his commercial barramundi fishing net.

The project is over. New information can be added to our knowledge about sharks. Yet still, there are so many mysteries to be solved. Richard is now even more passionate about finding out more and is also driven in his quest to conserve sharks in the wild.

BEFORE VIEWING SHARK TRACKER

CURRICULUM LINKS

This video lends itself to a variety of different science concepts and themes. My students watched in awe when Richard and his team swam with the sharks and then caught and tagged them. Their fascination then gave way to many questions about sharks. From these questions followed an opportunity to develop their awareness of the complexity of some environmental and conservation issues.

Shark Tracker contains information relevant to Biology, Science and SOSE. Some key terms and concepts that could be introduced and explored using the video include:

- structural, behavioural (territorial, hunting, reproductive) characteristics of sharks
- food chains, food webs
- classification, Binomial nomenclature
- ecological issues
- fishing—why and how to control overfishing?
- vulnerable, threatened or endangered species, extinction
- habitat, habitat destruction and protection
- reasons why a species may become endangered or extinct
- conservation and conservation groups

An activity that worked well was where students brainstormed questions about sharks. This 'whet their appetite' to find out more about sharks. Each student in the class could be asked to draw a question from a 'lucky dip'. Their responses could be read out or attached/written on the board for the next class.

Here is an example of some of the questions asked:

1. What laws are there to protect sharks?
2. What is the average lifespan of a shark?
3. What impact do humans have on sharks and their habitats?
4. When sharks sleep do they close their eyes?
5. How would extinction of a shark species of sharks in general effect



No	QUESTION	ANSWER
1	What is the occupation of Richard Fitzpatrick?	Marine biologist
2	What type of animal is Richard fascinated by?	Sharks
3	Approximately, how many hours has Richard spent diving?	About 8,000 hours
4	Why does Richard need to take the sharks back to the boat?	To tag them
5	What are the five steps involved in the tagging process from attracting to releasing?	1= attract; 2 = catch; 3 = hung upside down; 4= tag; 5 = release.
6	State four types of measurements that were recorded for the sharks.	1 = total length; 2 = distance between eyes; 3= presence of parasites; 4 = overall health/condition
7	Why may the shark be vulnerable to overfishing?	They don't usually move very far. They are territorial and stay in their territories. Another reason is their low rate of reproduction with female white sharks and tigers only reaching sexual maturity around fifteen-years-old.
8	Why could shark fishing be seen as unsustainable?	The entire stock of this type of reef shark could be 'taken'/fished in one day because they are territorial.
9	What is ecologically special about the Great Barrier Reef?	It is one of the greatest diverse ecosystems on the planet.
10	Why are sharks special in the food chain?	They are at the top of it and if they are eaten there are implications to the levels below.
11	Of what advantage was the involvement of students in the project?	It gave them both a theoretical and hands on experience.
12	Suggest why Richard's work is so exciting and unique.	He has the unique opportunity of studying sharks in their natural environment.
13	Over what radius could the ultrasonic audio receivers locate a shark?	They could locate a shark within a 200 metre radius
14	What does the ultrasonic audio receiver record?	A tagged shark's movement patterns can be recorded 24 hours a day, 365 days of the year.
15	Why does Richard think that <i>Jezabel</i> is a 'lovely shark'?	He can pat her and show her to people.
16	What was interesting about the sex ratio of the sharks recorded?	Male sharks were not as numerous as female sharks.
17	Why do you need to be more vigilant when you dive at night?	Sharks hunt at night.
18	What do sharks hope to find at night?	Fish that are asleep.
19	How does the Parrot fish camouflage itself?	It feeds on algae and at night uses a mucus bubble to mask its odour so that less likely to be detected by predators.
20	How big can the grey reef shark grow?	About 3 metres in length.
21	Why is the grey reef shark more dangerous than the white tipped sharks?	'It is all muscle and very powerful'.
22	What does Richard have on the back of his t-shirt when he is trying to catch the grey reef sharks from the boat?	Picture of sharks.
23	Why did Richard and his team turn the shark on its back and hold it down?	The shark 'shuts down' it seems to 'go to sleep'.
24	What happens when they hang the sharks upside down?	'They chill out, shut down ... they essentially go to sleep'
25	What is surgically implanted into the sharks body?	A transmitter.
26	Why is female shark skin twice as thick as the male shark skin?	The male sharks bite the females during mating.
27	Suggest a reason why the sharks are tagged with the transmitters.	To record their behaviour, where they swim, where they are, how many there are ... It is also important to see how vulnerable they are to overfishing. It is important to have the information to prevent the loss of shark populations.
28	What is the sixth sense of sharks and how is it useful?	Sharks can sense electromagnetic fields. This is useful in migration.

TABLE 1: WHITE TIP REEF SHARKS AND GREY REEF SHARKS AND TAGGING (0-25 MINUTES OF *SHARK TRACKER*)



- the ecosystem?
- 6. How long can sharks survive outside water?
- 7. Do sharks sleep? If so for how long?
- 8. Do sharks have any natural predators?
- 9. Why do sharks attack?
- 10. How much do sharks eat?
- 11. What is the range in size of sharks?
- 12. How much pressure does a shark bite with?
- 13. How do sharks attack?
- 14. What are the mating/courtship

- behaviours of sharks?
- 15. How do sharks communicate?
- 16. Is there a social structure hierarchy between sharks or are they solitary?
- 17. What are their feeding habits?
- 18. Should shark areas be zoned?
- 19. Do sharks ever stop moving?
- 20. Are any shark species endangered?
- 21. Which sharks are the most dangerous? Why?
- 22. Do sharks sink if they stop moving?
- 23. How can you tell the different

- types of shark?
- 24. How often do sharks give birth?
- 25. What are the smallest and the biggest sharks?

WHAT ARE SOME EXAMPLES OF QUESTIONS THAT COULD BE ASKED DURING OR AFTER VIEWING THE *SHARK TRACKER*?

A selection of questions that could be asked throughout the video is shown in **tables 1 - 3**.

SHARKS OF THE PAST?

No	QUESTION	ANSWER
1	What is the name of the island that Richard and his team have been given special permission to enter.	Raine Island
2	What type of turtles nest on this island? Describe the ways in which the turtle limbs are used to build the 'nest'.	Green turtles. The front limbs are used to dig the body pit and the rear limbs are used to make the egg chamber.
3	About how many eggs does a green turtle lay?	About 100 eggs.
4	Approximately how many of these eggs survive to become adults?	Only one to two of the green turtle eggs survive to become adults.
5	State two predators of green turtles.	Example: sharks, other fish and birds.
6	Does the mother green turtle stay around to look after the eggs once she has laid them?	No, she drops the eggs and leaves them.
7	Is there any recognition between the mother and the baby turtles? Why?	No. The mother never gets to see the babies, she lays the eggs and leaves.
8	When do the hatchling green turtles head for the water?	The hatchlings wait until the sun goes down and then they head for the water.
9	What are the migration patterns of tiger sharks linked to?	Turtle populations

TABLE 2: RAINE ISLAND AND GREEN TURTLES (25-30 MINUTES OF *SHARK TRACKER*)

No	QUESTION	ANSWER
1	Of all sharks, how dangerous is the Tiger shark?	The Tiger shark is the second most dangerous shark after the Great White shark.
2	Describe behaviour that is typical of a Tiger shark.	They are very cautious and are generally slow moving, but keep coming back.
3	Other sharks take the bait, why don't the Tiger sharks take the bait as easily?	Tiger sharks are very cautious and 'shy'.
4	Where is the satellite tag 'placed' on the Tiger shark?	On the dorsal fin.
5	How does the satellite tag work?	When salt water covers the tag, it turns off. When salt water doesn't cover the tag, the terminal dries out and it turns on. The signal is sent to a satellite and then the signal is sent to GPS.
6	What does Richard suggest is the 'trick' to remember when dealing with sharks?	'... to know when to stop!'
7	State an advantage and disadvantage of using a barb on the hook used to catch the Tiger shark.	ADVANTAGE: reduces damage to shark. DISADVANTAGE: shark can spit out the bait and swim off.
8	When do the hatchling Green turtles head for the water?	The hatchlings wait until the sun goes down and then they head for the water.
9	What are the migration patterns of Tiger sharks linked to?	Turtle populations
10	What does Richard drill into the dorsal fin of the Tiger shark?	A satellite tag
11	When does the tag send a signal?	Each time the shark surfaces.
12	State the name given to the tagged Tiger shark.	Nicole
13	Why did Richard take a piece of fin from the Tiger shark?	For DNA analysis for genetic identification and studies.
14	What was Richard's hypothesis about Tiger sharks? Did the data support it? Explain.	Richard's hypothesis was that Tiger sharks moved large distances. Two months of data from GPS points provided from CSIRO allowed Richard to plot Nicole's movements on a map. This data supported his hypothesis.
15	Why are these sharks under threat?	By fishing, their low reproductive rates and the 'health' of the oceans.
16	How can we begin to reduce the threat to sharks?	Find out more about shark biology and ecology. Reduce overfishing.
17	When, where, how and by whom was Nicole caught?	WHEN: 22 May, 2002. WHERE: 18 km from where she was tagged two months earlier. HOW: in a Barramundi net. WHOM: a fisherman
18	What happened to Nicole?	She suffocated in the Barramundi net.
19	Suggest a food chain or a food web that includes Green turtles and Tiger sharks. Suggest possible implications of either the turtles or sharks dying out or becoming extinct.	EXAMPLE OF FOOD CHAIN: Algae, Green turtles, Tiger sharks. EXAMPLE OF FOOD WEB: Sea grasses, Algae, Green turtles, Tiger sharks, birds, fish.
20	Why do we need to understand the relationships between sustainability, biodiversity and ecosystems?	To look after our planet and the survival of the living organisms on it.

CHARACTERISTIC	BONY FISH	SHARKS
Skeleton	Bones and cartilage	Cartilage
Swimming	Can swim forwards and backwards	Can only swim forward
Buoyancy (floating)	Gas-filled swim bladder	Large oily liver
Gills	Covered gill slits	Gill slits but no gill cover
Reproduction	Eggs usually fertilised in the water.	Eggs fertilised in female's body
Skin	Slippery, overlapping scales	Rough, sandpaper-like placoid scales

Did you know that sharks were around before dinosaurs? The oldest sharks in the fossil record date back to about 350 million years ago. It is amazing that modern sharks closely resemble those in the fossil records. One particularly interesting looking shark is the Goblin shark (*Scapanorhynchus owstoni*) whose fossil teeth were first found 90 million years ago.

IN YOUR FISH BOWL?

Did you know that sharks comprise of only about 1 per cent of all living fishes? Sharks are quite different from the goldfish swimming in your fish bowl at home. Goldfish and many other fish belong to the osterichthyan group because they have skeletons made out of bone. Many people like to eat shark (or flake) because their skeleton is made out of cartilage. Other organisms such as rays, skates

and chimaeras also have cartilaginous skeletons and are included with sharks in the chondrichthyan. Some other differences between bony fish and sharks are shown in **table 4**.

IN YOUR STOMACH, EYES OR YOUR MEDICINE CHEST?

Fancy a bit of flake? One of the world's most common kind of fish is the dogfish. These are among one of those most heavily fished for its flesh (as Flake) and for its liver. The flesh and liver of the Whitetip reef shark are also eaten by humans.

Shark fin soup has long been a delicacy in many Asian countries. Sometimes, after the fin has been removed, the shark is thrown back into the sea. This means that it will suffer a slow and extremely painful death.

Many parts of sharks are also found in your medicine chest—or even in your eyes! Shark cornea are used in corneal transplants. The liver of the dogfish, like that of other sharks is rich in oil and is used in soaps, perfumes and skin creams. Shark cartilage is often powdered and used to treat conditions such as arthritis.

SHARK TRACKER STARS

How can the stars in *Shark Tracker* be distinguished from each other? Find out in **table 5**:

TAILS TELL A TALE

The structure of the tail of a shark can give you an indication as to how it moves. The ratio of the tail lobes holds the secret. Nurse and Zebra sharks have huge upper tail lobes and little or no lower lobe. They are slow movers

	TIGER SHARK	GREY REEF SHARK	WHITE TIP REEF SHARK
Scientific name	<i>Galeocerder cuvier</i>	<i>Carcharhinus amblyrhynchos</i>	<i>Traenodon obesus</i>
Distinguishing features	<ul style="list-style-type: none"> • Grey with faint stripes and paler undersides • Large squarish head with a blunt snout • Big curved teeth with pointed tips and very jagged edges. 	<ul style="list-style-type: none"> • Dark grey to bronze with paler undersides • Along the outside edge of the tail fin is a black band. • Triangular teeth with lower ones narrower and less jagged than the upper teeth 	<ul style="list-style-type: none"> • Gray with conspicuous white tips on its dorsal and caudal fins. • Medium sized, pointed teeth with smooth edges, which are flanked by small cusps
Territory	Surface of coastal waters, often in river estuaries	Coral reefs, from surface down to 280 metres	Live close to shore at depths of 8-40m
Diet and teeth	Will eat almost anything e.g. bony fish, birds and sea mammals. Tiger shark's heavily serrated cockscomb shaped teeth and the jaw strength will also allow it to cut through bodies of large sea turtles, seals, sea lions and crustaceans.	Feeds on small fish, squid, octopus, lobsters and crabs. Teeth with triangular with fine serrations are well suited to feeding on small reef fish.	Feeds mostly on the ocean floor, using its tooth structure short, broad snout to pursue prey into reef crevices where they cannot escape.
Type of reproduction	ovoviviparous	viviparous	viviparous
Number and size of pups	10-82 pups after about a year long gestation each about 50-75 cm long	Up to six pups after a year's gestation, each about 50-60cm in length	Litters of one to five pups after about 50-60cm in length after a 5 month gestation period
Age of maturity	Mature after about 4-6 years and 3.0m (male) and 3.3 m (female)	Mature at about 7 years being around 1.3 – 1.4m	At about 1 m
Size of adults	Some texts suggest up to six metres in length and 1350 kg in weight.	About 1.3-1.8m in length	About 1.6-2.2 m
Average lifespan	12 years		

TABLE 5: SHARK TRACKER STARS

that mainly live on the seabed and glide about with a lazy, wave like motion. Bull, blue and sand tiger sharks, however, could be described as being cruisers and although not speedy, they can be hard to shake off. Their tail's upper lobe is much bigger than the lower. Finally there are the seriously fast swimmers like the great white shark in which both the upper and lower lobes are almost the same size.

BITS AND BITES

The mating behaviour of sharks can be a little sharp. The male sharks can bite their mates during mating. This is why the skin of many female sharks is much thicker than that of males. Sharks can also grasp one another's mouths during mating.

Sharks possess reproductive strategies that in many ways are more like those of birds and mammals than of other fishes. Most fish are **oviparous**, depositing egg with little development inside the mother's body. These help to increase the chances of survival of their relatively few precious offspring. Most sharks (including the White Tip and Grey Reef sharks in *Shark Tracker*) are **viviparous**. They give birth to live young after their embryo has developed entirely within the uterus. Tiger sharks, however are **ovoviviparous** and give birth to well developed young from eggs that hatch within the moth-

er's body.

RAINE 'N' TURTLES

Raine island has special significance due to its seabird breeding and roosting sites. It has been considered as the most significant tropical seabird breeding site in the Great Barrier Reef. It is also the principal nesting sites of the largest breeding population of Green turtles (*Chelonia mydas*) in the world. During the peak nesting period it is estimated that about 4000 turtles come ashore each night to lay their eggs.

Although Green Sea turtles are found in tropical and subtropical seas worldwide they are relatively abundant along the tropical coasts of Australia and along the Great Barrier Reef. They have a heart-shaped shell, a small head and single-clawed flippers. Green turtles require sandy beaches for nesting and lay a clutch of eggs of approximately 115 ping-pong, ball-sized eggs. Hatchlings eat a variety of plants and animals whereas adult Green turtles are considered the only true herbivorous sea turtle feeding almost exclusively on seagrasses and marine algae. The age of sexual maturity is believed to be about 20–50 years and they can grow to a maximum size of about 1.2 m and weight of about 200 kg.

Although there are many nesting loca-

tions known worldwide, in most cases the populations are depleted or are declining. One of the major reasons for the worldwide decline in Green turtles is commercial harvest for eggs and meat. Some of the other factors included disease (e.g. fibropapillomatosis), loss or degradation of nesting habitats, disorientation of hatchling by beachfront lighting, excessive nest predation by both native and non-native predators, incidental capture from dredging and commercial fishing operations and marine pollution. This has led to the listing of Green Turtles (*Chelonia mydas*) in the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). Technically, this means that trade in these turtles and their products are subject to strict regulation and international trade for primarily commercial purposes is forbidden.

WEAVING TANGLED WEBS

Oceanic food webs can be described as being the most intricate and complex food webs on our planet. The flow of energy and cycling of elements can govern many of our global processes. Oceanic food webs can impact on the carbon, nitrogen, sulfur cycles and have implications for the availability of atmospheric oxygen. An example of an oceanic food web is shown below. Consider the consequences of removing organisms from various

NAME OF WEB SITE	ADDRESS?	WHAT'S IT ABOUT?
Discovery Online, Nature-shark Realities, Shark Tank	http://www.discovery.com/stories/nature/sharkweek/tank.html	Info on some of the 350 types of sharks found in Earth's water.
The ocean of the know page home	http://oceanofk.org/home.html	Info on sharks and tagging activities
The pelagic shark research foundation—overview	http://www.pelagic.or/background/	A research foundation that studies sharks—biology, images and video.
Sharks—predators of the deep	http://www.xs4all.nl/~jkoetze	Shark info and facts and fun activities
Shark surfari	http://www.nationalgeographic.com/sharks/	Quiz, ask and expert and find out more.
ZOOM Sharks	http://www.EnchantedLearning.com/subjects/sharks/	Info sheets and printouts
Shark Myths	http://www.marinelab.Sarasota.fl.us/~rhueter/sharks/myths.phtm	Myths and cartoons
The dedicated sharks site	http://www.angelfire.com/hi2/haaitje/	Shark info
Shark research	www.filmprojects.com.au/tigershark www.sharkresearch.com	Info on Nicole, the tiger sharks' journey

TABLE 6

trophic levels.

<http://www.oceanonline.com/oceanicfoodwebs.htm>

See Crossword inset 7

SHARK HUNT RESEARCH ACTIVITY

Name:.....

PART A: COLLABORATIVE COLLECTION:

- In groups, assign each member a question (or work in pairs for some questions).
- You have about 20 minutes to find out as much information as you can to answer the question.
- You will then have about 10 minutes to write up your answer.
- There will then be about 15 minutes for group sharing of the responses.
- Please attach library reference sheets to your named Part A responses.

PART B: INDIVIDUAL ANALYSIS AND EVALUATION:

- You will be presented with a series of questions to respond to individually.

SHARK HUNT QUESTIONS:

1. Sharks have a sixth sense. Find out what it is, how it works and how it increases the shark's chances of survival.
2. Find out about the reproductive structures, processes and behaviours for a particular species of shark.
3. 'Overfishing can wipe out an entire population of sharks within a day!' How accurate is this statement? What are the arguments FOR and AGAINST shark fishing?
4. Construct a 'menu' of all of the different uses of shark body parts.
5. Describe examples of innate behaviour shown by sharks. Explain how these examples increase the shark's chances of survival.
6. What do sharks eat? Construct

a food web showing how they fit into their ecosystem.

SOME QUESTIONS FOR STUDENTS

TERRIFIC TURTLES

1. Use the Internet to find out the differences (for (a) – (h)) between two of the following six marine turtle species: Loggerhead turtle (*Caretta caretta*); Flatback turtle (*Nattator depressus*); Green turtle (*Chelonia mydas*); Hawksbill turtle (*Ertmochelys Imbricata*); Leatherback turtle (*Dermochelys coriacea*); Olive Ridley turtle (*Lepidochelys olivacea*).
 - (a) distinctive features
 - (b) feeding distribution
 - (c) habitat
 - (d) food
 - (e) reproductive strategies
 - (f) nesting distribution
 - (g) description and number of eggs in a clutch
 - (h) description and size of hatchlings
2. Why is the assessment of marine turtle populations very difficult?
3. Find out more about Green turtles and present your information as a

SHARK TRACKER CROSSWORD

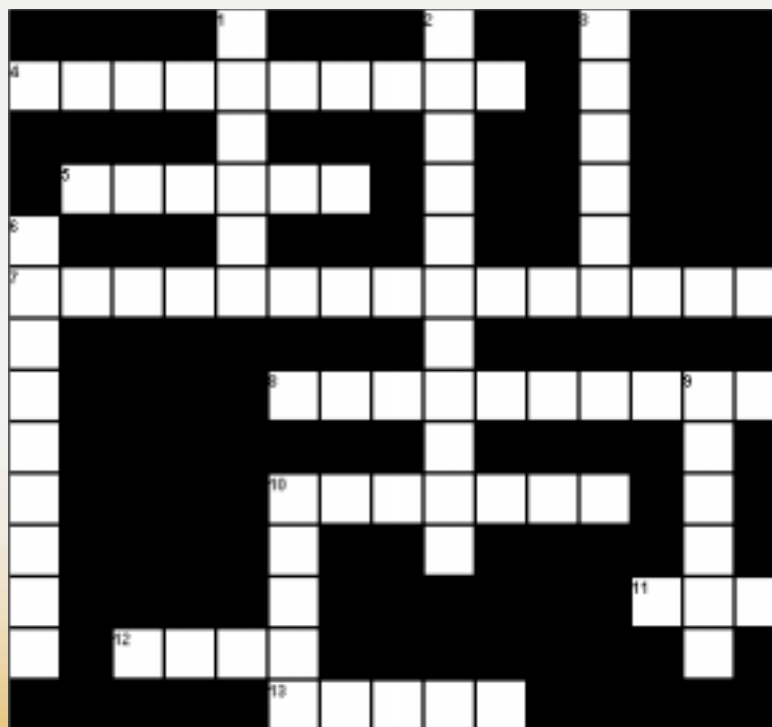
ACROSS

- 4 A type of audio receiver that can locate a shark within a 200 metre radius.
- 5 Richard Fitzpatrick is fascinated by these animals.
- 7 The sixth sense of sharks.
- 8 The type of fishing net in which the tagged Tiger Shark suffocated.
- 10 A way in which female shark skin is different from males.
- 11 This is used to track a shark.
- 12 Male sharks can do this to females during mating.
- 13 This island contains one of the largest breeding populations of Green turtles in the world.

DOWN

- 1 This type of fish secretes a mucus layer at night to help avoid detection by predators.
- 2 The surname of the marine biologist Richard in *Shark Tracker*.
- 3 The name of the tiger shark tagged near Raine Island.
- 6 Tagging and tracking sharks helps the study of this.
- 9 The name of the type of fin into which the CSIRO satellite was drilled into.
- 10 Nicole belongs to this particular shark group.

Answers: ACROSS: 4 Ultrasonic; 5 Sharks; 7 Electromagnetic; 8 Barramundi; 10 Thicker; 11 Tag; 12 Bite; 13 Raine; DOWN: 1 Parrot; 2 Fitzpatrick; 3 Nicole; 6 Behaviour; 9 Dorsal; 10 Tiger.





poster.

4. Write a story about your life as a recently hatched Green turtle.

SHARK STUFF

1. Find out what was misleading about the teeth portrayed in the advertising posters for the movie *Jaws*.
2. Many movies show sharks going into a 'feeding frenzy'. Find out more about this behaviour.
3. Find out about the lethal weapons that sharks possess for hunting and feeding. Record details for both anatomical and behavioural adaptations that increase the sharks' chances of survival.
4. Explain how TWO structural, physiological or behavioural char-

acteristics of sharks increase their chances of survival.

5. Suggest reasons why sharks are hunted and killed.
6. Did you know that shark teeth are made into necklaces and that their skin was once used as sandpaper. It is now made into leather goods such as wallets. Find out what other parts of sharks' bodies are used.
7. Tiger sharks consume almost a hundred kilos (10 per cent of its body weight) each week. Find out what these sharks eat and then construct a food web.
8. Explain the possible ecological consequences of overfishing sharks.
9. Write a story about your life as a shark.

10. Explore three of the web sites in **table 6** finding five points of interest from each.

TAGS AND TRAVELS UNDER, ON AND ABOVE...

1. Where is Raine Island and why it is special?
2. Find out about other projects that involve tagging of sharks (e.g. CSIRO and the satellite tagging of Whale sharks <http://marine.csiro.au/LeafletsFolder/51wshark/51.html>)
3. See pictures of shark tagging at <http://www.elasmoworld.org/tagging/index.html>
4. Describe the different types of tags used for shark tagging.
5. SHARK ZAPPER? Design an experiment that will test the effectiveness on a new invention that repels sharks. This newly designed electronic device produces a pulsing electronic field that interferes with sharks' sensitive electro-receptors, creating an unpleasant but harmless irritation.
6. Innate or learned? Describe a behaviour shown by sharks. Design an experiment that would test the hypothesis that this type of behaviour was innate.
7. Find and report on two examples of underwater research.
8. What does CITES stand for? Suggest how it is relevant to conservation and endangered species?
9. Find out and report on the evolution of sharks.

TALES AND TROUBLES

1. Issues from the video - class brainstorm. There are many issues that arise when watching *Shark Tracker*. One key issue is that of overfishing. Get the students to work in groups to develop arguments for and against SHARK FISHING. The class could then be involved in a 'tag' debate on this.
2. There are many uses of shark parts—some medicinal. Students could research some of these and include them in the debate. Find out six differences between sharks and bony fish.

3. Make a list of about ten 'myths' about sharks and them are true and which are false.
For example: Sharks have poor vision (F: sharks' eyes are equipped to distinguish colours and are seven times more powerful than humans <http://new-brunswick.net/new-brunswick/sharks/myths.html>)
4. What are shark nets? Why are they used? What are the issues related to the use of shark nets?
5. Should there be a shark in your medicine cabinet? Parts of sharks are used by humans in a variety of ways. Find out the human uses of five different parts of sharks. For each use, state your opinion of either advantages or disadvantages.

EXTINCTION: THE GREY NURSE SHARK PRESERVATION PROJECT

Discuss the issue of extinction of this particular species.

The Grey Nurse (*Carcharias taurus*) was the first shark in the world to be declared a protected Species but its numbers are still declining. Once widely distributed their range has now been greatly reduced. Growing to over three metres these fearsome looking sharks were hunted throughout the 1960s and 1970s until their numbers were close to critical.

In Australia, Grey Nurse sharks are now restricted to two separate populations, one on the east coast of NSW and southern Queensland, and the other in coastal waters off Western Australia. The east coast Grey Nurse shark population has been listed by the Commonwealth as critically endangered' under the Environment Protection and Biodiversity Conservation Act, while the west coast population is listed as 'vulnerable'. Now their number along the Australian East coast is thought to be as low as 500.

Divers can swim with these docile but 'nasty' looking sharks in many locations in New South Wales including Maroubra in Sydney and Coffs Harbour, although they may disappear within 10-15 years.

Dr Barry Bruce of the CSIRO Marine Division who has just started satellite tagging Grey Nurse sharks in New South Wales in association with NSW Fisheries (see the website for info on the Grey Nurse Preservation project)

<http://www.fisheries.nsw.gov.au/conservation/species/grey-nurse/home-grey-nurse.htm>

SOME FUN ACTIVITIES

1. Go to the following web address and play some of the puzzles, mazes and activities:
<http://www.kidzone.ws/sharks/activities/>

SOME OTHER WORTHWHILE REFERENCES:

RAINE ISLAND

Reef Research: vol. 6, no. 1 March 1996 at http://www.gbrnoa.gov.au/corp_site/infor_service/1raine.htm

GREEN TURTLES

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Please also refer to those in the student questions sections.

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