NSW GOVERNMENT | Department of Primary Industries

SHARKSMART

SHARKSMART

A WORKBOOK FOR STUDENTS in Stage 2 and 3/years 3-6

HELICOPTER
SURVEILLANCE FLIGHTS

SHARKSMART
APP

SCIENCE &
RESEARCH

PERSONAL SHARK
DETERRENT
DEVICE

RESPECT THE OCEAN, SHARKS ARE IMPORTANT FOR HEALTHY SEAS

INTRODUCTION

Sharks are amazing! Did you know sharks have lived in the ocean longer then we have lived on earth? Their adaptations make them one of the most successful predators in the ocean.

Sadly for sharks instead of celebrating this, we fear them. We fear them because of scary shark movies and because, on the rare occasions that a person is bitten by a shark, the injuries can be quite serious and we hear all about it in the media.

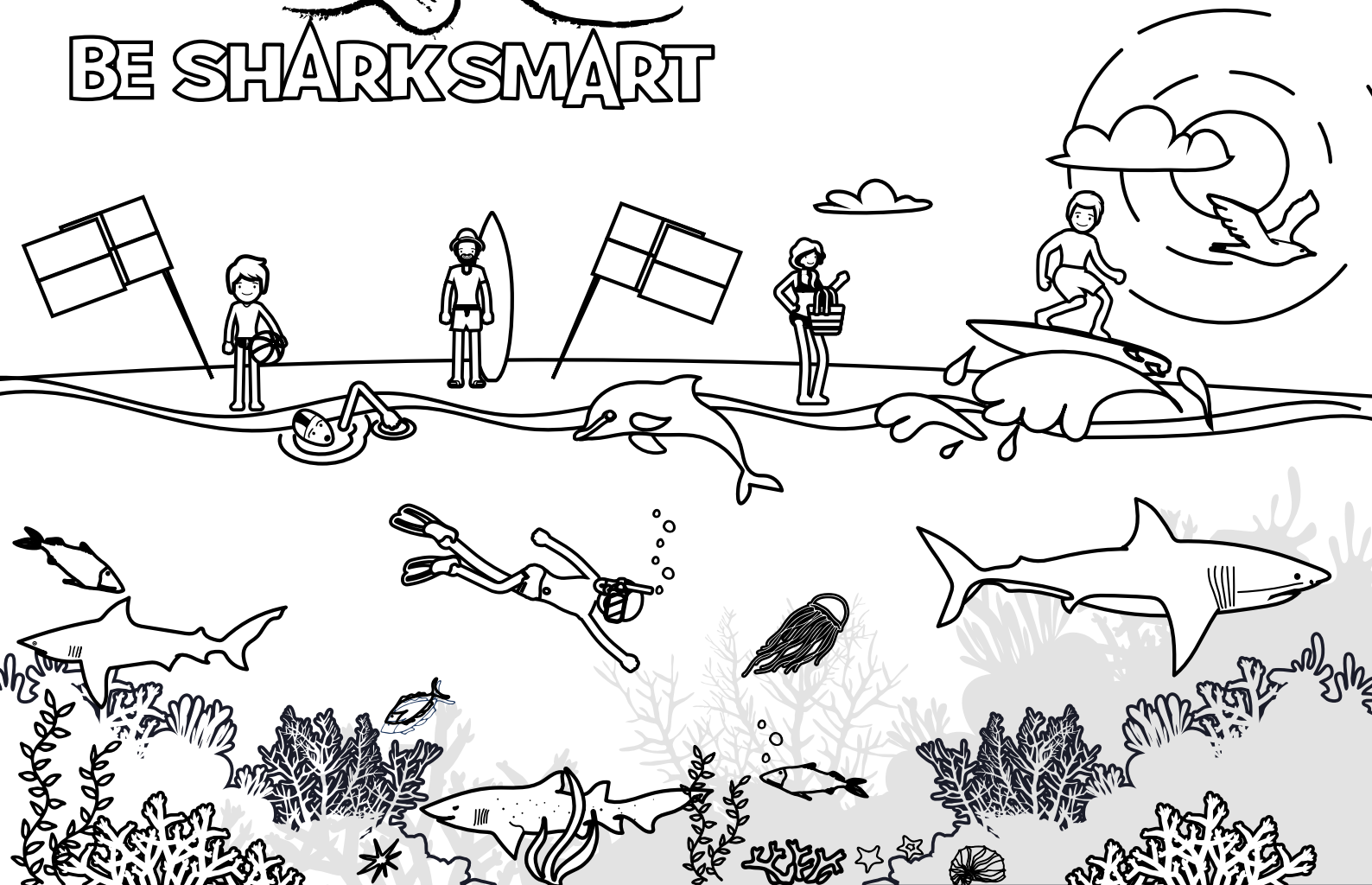
As we build towns along the coast and people become more involved in ocean activities, sharks and people interact more often - shark behaviour has not changed but we have. If we think about the millions of people swimming in the ocean everyday, it helps us to understand that shark bites are really rare. If we are SharkSmart they are even less likely - did you know more people are hurt taking selfies in silly places than are hurt by a shark?

The goal of the NSW Shark Management Strategy is to work out how people can be safer at beaches and protect sharks at the same time.

The NSW SharkSmart website, YouTube videos and social media channels will help you complete this workbook.

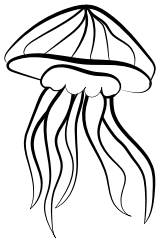
if you scan these QR codes, or click on a computer, you will link to the relevant information

BE SHARKSMART

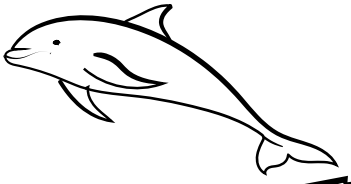


WHAT ARE SHARKS?

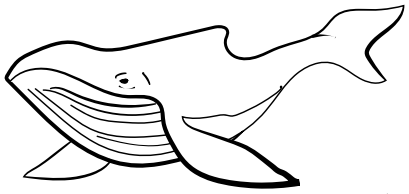
Sharks are closely related to some other animals that live in the ocean, which ones do you think they are most closely related to?



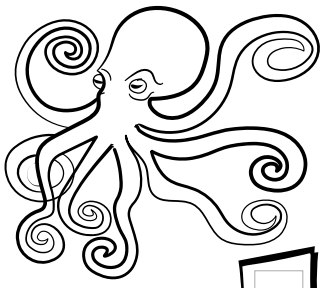
JELLYFISH ☐



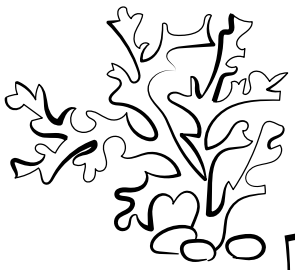
DOLPHINS ☐



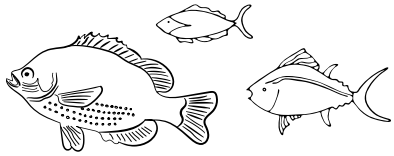
WHALES ☐



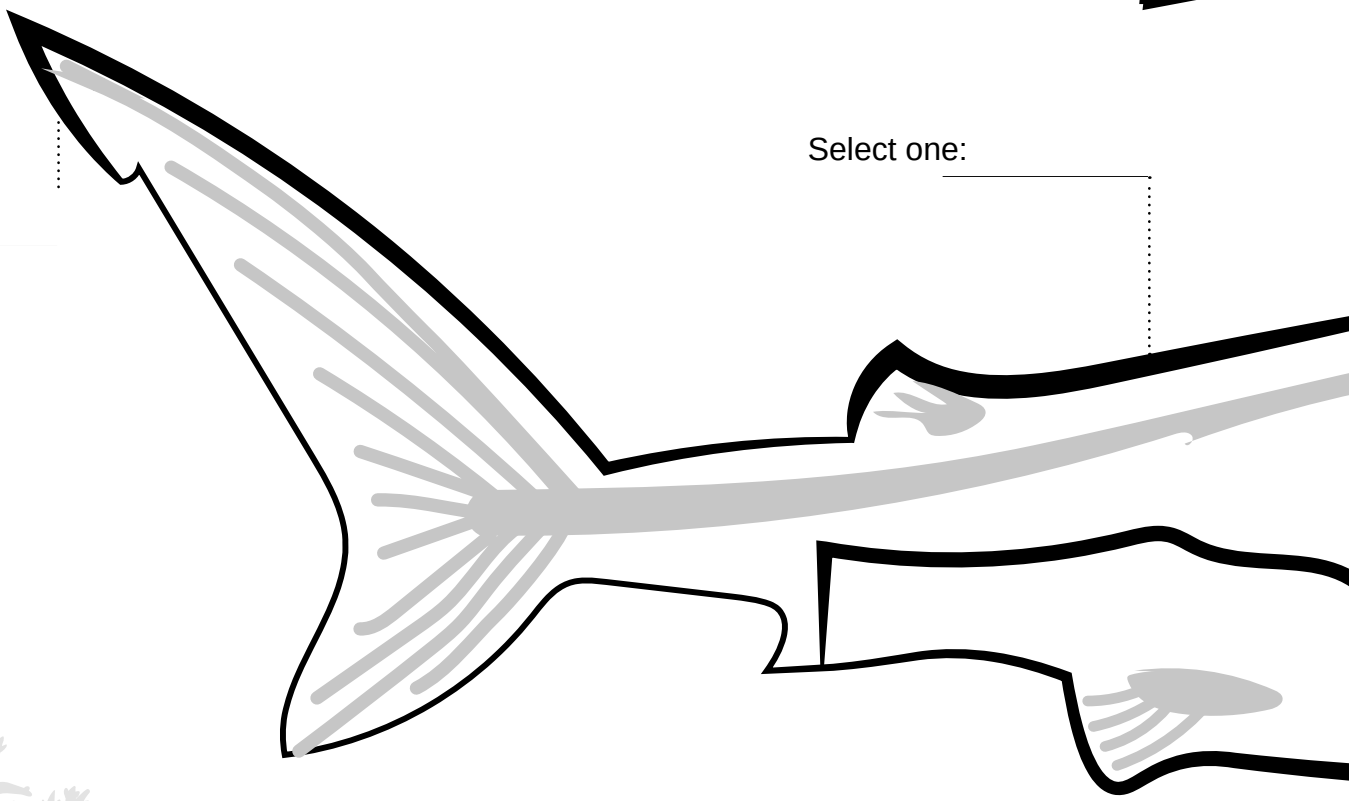
OCTOPUS ☐



CORAL ☐



FISH ☐



Select one:

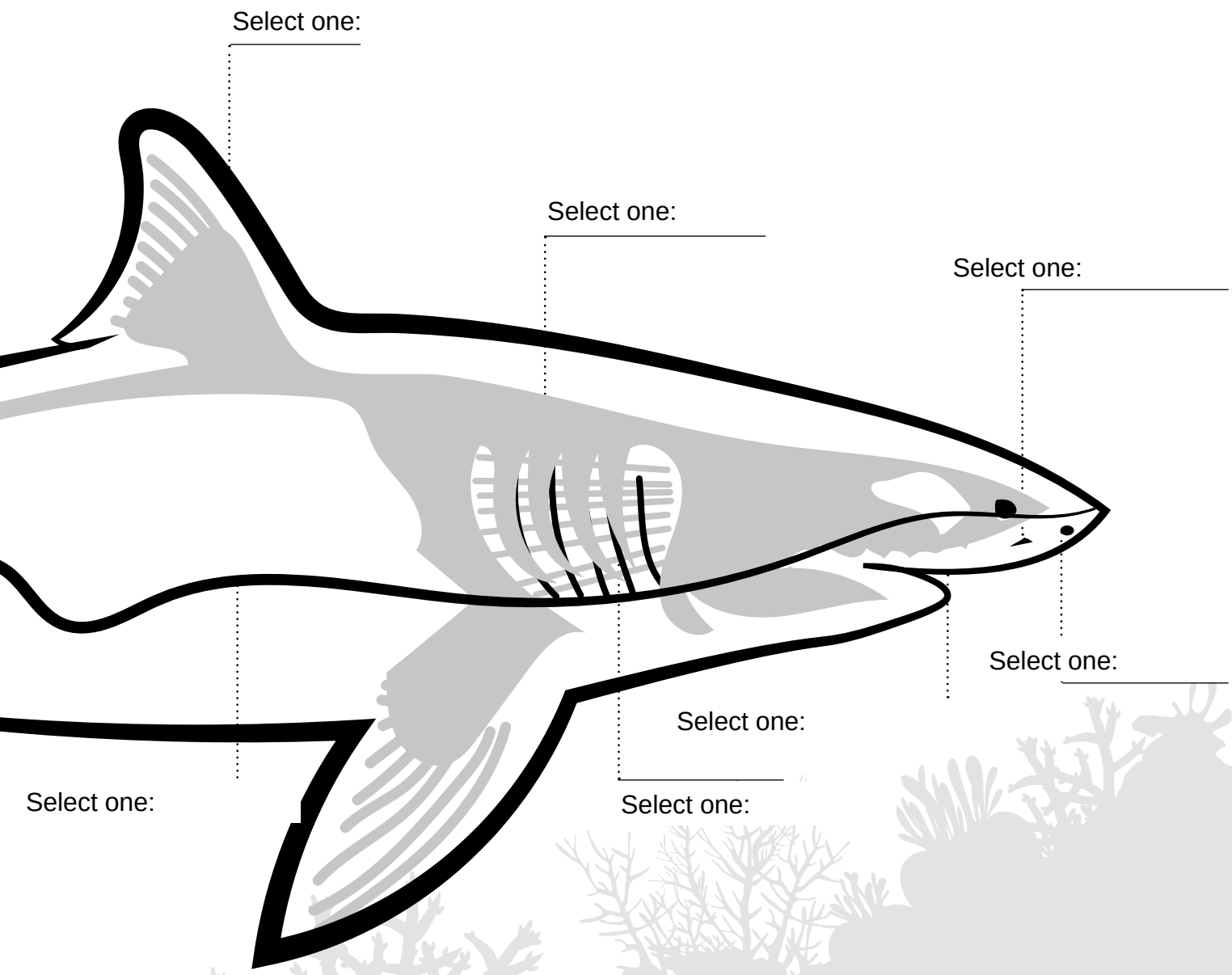
Select one:

This QR code will take you to a video about features of sharks.

HOW ARE SHARKS SUITED TO THEIR ENVIRONMENT?

Select the labels below to the features of this shark:

Caudal fin
Dorsal fin
Strong jaw
Skeleton of cartilage (not bones)
Highly developed sense of smell
Sensory organs to help detect vibrations
Electroreceptors
Dermal denticles
5 – 7 gills



SHARK ADAPTATIONS

Describe how the following features of sharks helps them to survive in the ocean:

Cartilaginous skeleton

Strong jaws

Highly developed caudal fin

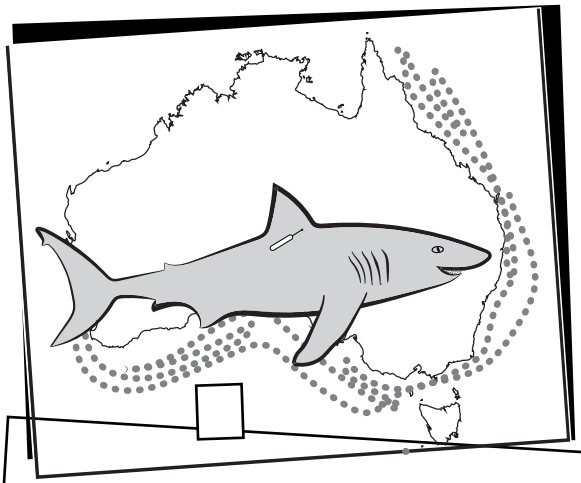
Oil filled liver

Lateral line of sensory organs

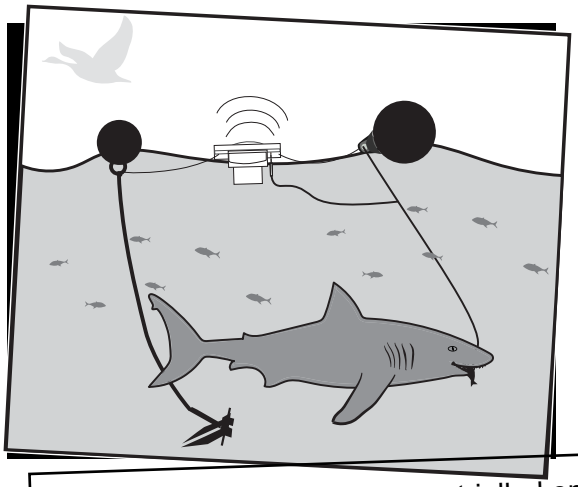
Electroreceptors around snout

THE NSW SHARK MANAGEMENT STRATEGY

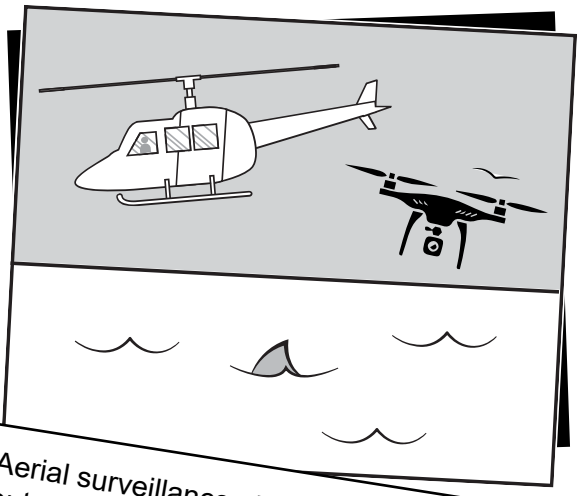
Over the last 5 years the NSW Department of Primary Industries (DPI) has conducted one of the largest shark research projects in the world. We needed to know more about sharks commonly found in our waters around New South Wales following a number of shark bites. Here is what has been happening...



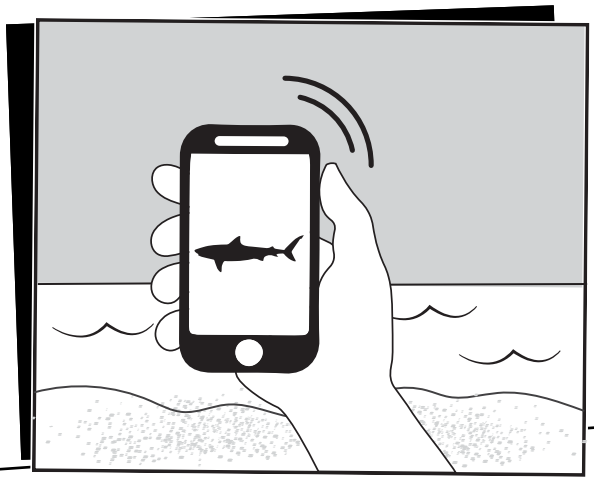
Roughly 650 white, bull and tiger sharks have been caught and tagged. This scientific research will help us find out more about their movements. This information will help us predict when there is likely to be more sharks along different parts of the coast and if there are times and places that are riskier than others.



SMART drumlines have been trialled on parts of the NSW coastline. Traditional drumlines catch sharks (and some other non-target species) but they often die. SMART drumlines send an alert when something is caught and within half an hour someone is on the way to release the animal and tag it if it is a white, bull or tiger shark.



Aerial surveillance along the coast is carried out with drones and helicopters. The aim of the surveillance is to identify when there is a shark near to swimmers and to alert the swimmers.



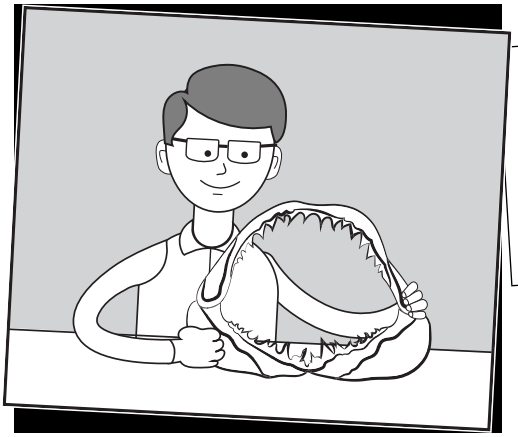
A SharkSmart app, our Twitter feed and community engagment keeps beach goers and water users informed about ways to stay as safe as possible.

This QR code will take you to more information about the trials and research.

WHO IS DOING THE RESEARCH?

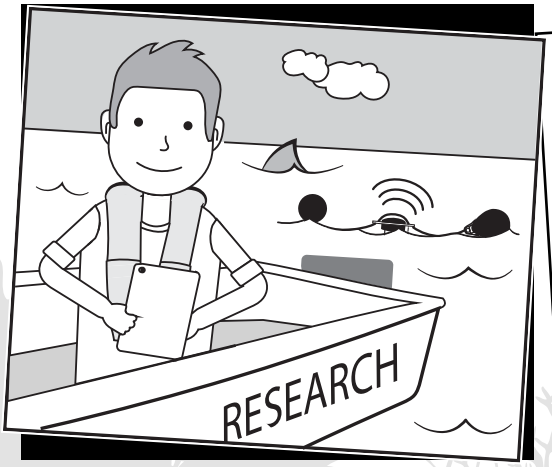
The SharkSmart team includes scientists, technical officers, IT and communications staff as well as contractors. The roles in the team vary from collecting and analysing data, operating boats and drones, tagging and releasing sharks, trialling new technology, and communicating with water users.

Some of the staff involved include:



Dr Vic Peddemors Fisheries Scientist studies the sharks that are found around NSW beaches. Information comes to Vic from sharks caught in shark nets, from the sharks caught on SMART drumlines and sometimes from shark bites.

Dr Amy Smoothey, Fisheries Scientist.
Amy's research is focussed on the movement and biology of bull sharks. She is studying the data that we get from the tagged bull sharks and the samples that are taken from the sharks that are caught and released as part of the research. This research will help ensure that sharks are managed in an ecologically sustainable way and help keep people safe.



Dr Paul Butcher, Fisheries Scientist.
Paul is concentrating his research on how effective the tagging and tracking of sharks is in minimising human-shark interactions. He studies the effectiveness of SMART drumlines and the movement of tagged sharks following their capture and release. He is looking at what the data tells us about their behaviour but is also looking for the impact that tagging might have on the sharks.

This QR code will take you to more information about the scientists.

THE SHARKSMART TEAM ALSO INCLUDES:

Shark Management Strategy Manager - manages all the different parts of the strategy so that they work together to give DPI useful information and practical recommendations.

Media Manager - ensures that information about the Strategy is available and accurate.

Fisheries technicians - build and maintain SMART drumlines, skipper shark tagging boats, maintain boats and equipment.

Fishing contractors - respond to SMART drumline alerts to tag and release sharks and work with DPI scientists.

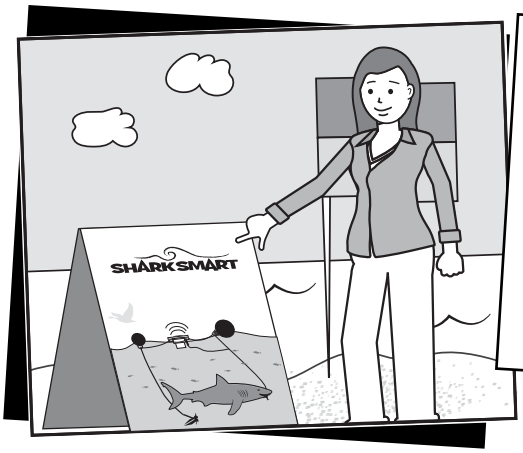
VR4G maintenance contractors - maintain the listening stations

Digital communications staff - look after the website and social media.

Policy staff - work to create guidelines and recommendations that ensure Strategy activities are safe and beneficial for staff, the public and marine life.

Helicopter and Drone operators - carrying out surveillance operations.

Social researcher - gathering information from the community both about the Strategy and to inform the strategy.



Kim Wolfenden, Community Engagement Officer. Kim's role is to connect with the community. She can usually be found out and about talking to communities about the trials and communicating the research findings from the Shark Management Strategy. It is really important that the work that we do is understood in the community and that we give the community an opportunity to tell us how they feel and what they know. That's Kim's job!

The SharkSmart team also includes university students doing research projects on:

- looking at what sharks have eaten,
- using video cameras to see how sharks behave along beaches
- using video cameras to see how sharks behave around SMART drumlines
- using tag information to see how sharks behave after they have been caught and released
- if burying whales on beaches changes the way sharks behave off those beaches,
- using drones to track dangerous sharks to see what they do when they swim along our beaches.

WHAT DOES THE RESEARCH TELL US?

(select the correct answer)

Three out of 400 species of sharks found in Australian waters are known to be potentially dangerous to humans.

White sharks are known to travel huge distances and are not temporary residents in any one location. Some juvenile White sharks are known to move regularly up and down the coast from Northern Territory to New South Wales and Queensland while others seem more random. Shark #28 travelled nearly 40,000km in three years.

Bull sharks can live ***in*** lakes and nearshore areas. Juveniles tend to stay in the rivers where they were born until they are large enough to join the adults in the open ocean and harbours . Bull sharks have been tracked moving between New South Wales and Queensland closer to the coast line. Many travel east or winter. Shark #20 travelled >3050 km in a year and a half.

Tiger sharks prefer cold oceans and open water. Tracking shows tiger sharks spend less time in open water than bull sharks.

Statistics in the videos were current at the time of publication. Visit **www.sharksmart.nsw.gov.au** for updated data

HOW DOES THE RESEARCH HELP US DECIDE WHAT WE SHOULD DO?

The research findings and understanding of shark behaviour have resulted in a set of recommendations aimed at reducing shark / human interactions.

Match the scientific finding or shark behaviour with the SharkSmart recommendations:

Avoid the water at dawn and dusk.	1	10	Sharks are able to sense blood in the water and it may attract them.
Avoid swimming after heavy rainfall.	2	15	Nets are designed to entangle sharks so it's best to keep clear.
Avoid swimming near bait balls or fishing activity.	3	15	Runoff from rainfall often contains nutrients that attract fish to feed which can then attract bigger fish like sharks.
Swim between the flags at patrolled beaches.	4	15	Sharks and dolphins often feed together on the same food.
Tell an on-duty lifesaver or lifeguard if you spot a shark near swimmers or surfers.	5	15	Lifesavers can warn swimmers of the presence of a shark and suggest that they leave the water.
Don't swim too far from shore.	6	15	Sharks are more likely to be beyond the surf zone.
Don't swim with bleeding cuts or wounds.	7	15	Many sharks feed at dawn and dusk.
Always swim, dive or surf with other people.	8	15	If you get into trouble, your friend can help you.
Avoid murky water, waters with known effluents or sewage.	9	15	Sharks are attracted to bait balls and fish activity due to the availability of food.
Do not rely on sightings of dolphins to indicate the absence of sharks.	10	15	Sharks may sense or be attracted to your pets splashing and activity.
Be aware that sharks may be present between sandbars or near steep drop offs.	11	15	Sharks cruise in gutters or deeper waters to ambush their prey.
Avoid swimming in canals and swimming or surfing in river/harbour mouths.	12	15	Some shark deterrent products have been scientifically tested and shown to deter sharks.
Avoid having pets in the water with you.	13	15	Surf lifesavers are on the lookout for any dangers including sharks, rips and dangerous surf and can helping if you get into trouble.
Do not swim/surf near or interfere with shark nets.	14	15	The nutrient in murky water and water containing effluent may attract small fish.
Consider using a personal deterrent.	15	15	Bull Sharks can be present in these waters that are often very murky.

This QR code will take you to information about the recommendations

WHAT ARE WE DOING TO KEEP SHARKS AND PEOPLE APART?

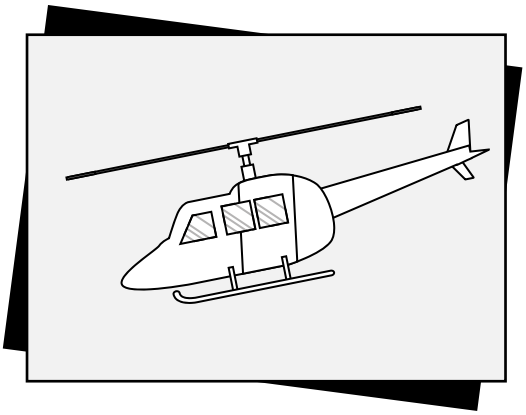
DPI is trialling ways to track sharks, deter them from coming too close to swimmers ... or to spot them when they do!

AERIAL SURVEILLANCE

Helicopters and drones are both used to keep an eye out for sharks around popular swimming beaches.

Q. There are advantages to both drones and helicopter. What do you think they are?

DRONE:

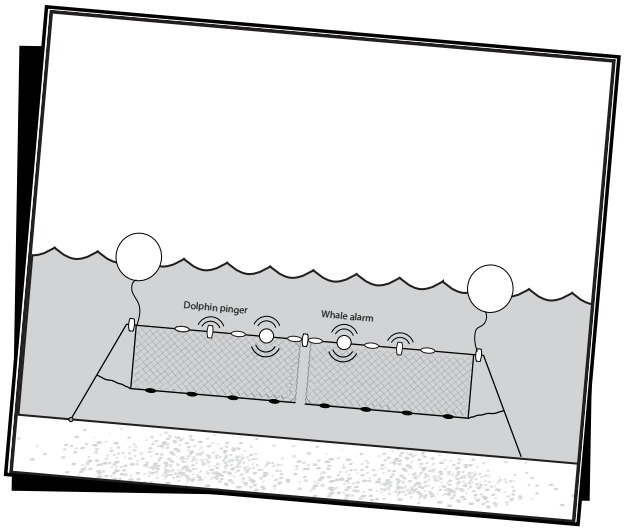


HELICOPTER:

SHARK NETS

Sharks nets are used along some NSW beaches to intercept large sharks near popular swimming locations and to reduce the chance of shark interactions. They do not create a total barrier and are located below the water surface.

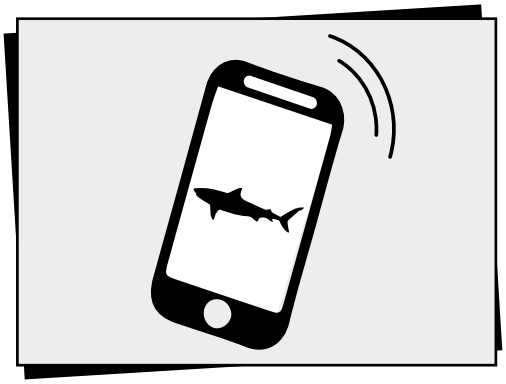
Q. What do you think the whale alarm and the dolphin pinger on the nets are for?



TAGGING AND TRACKING

Mark the path of one of the sharks from each species on this map (use a different colour for each species and label them in the legend). The movements of tagged sharks are shown in the video 'NSW tagged as a world leader in shark program'.

Legend

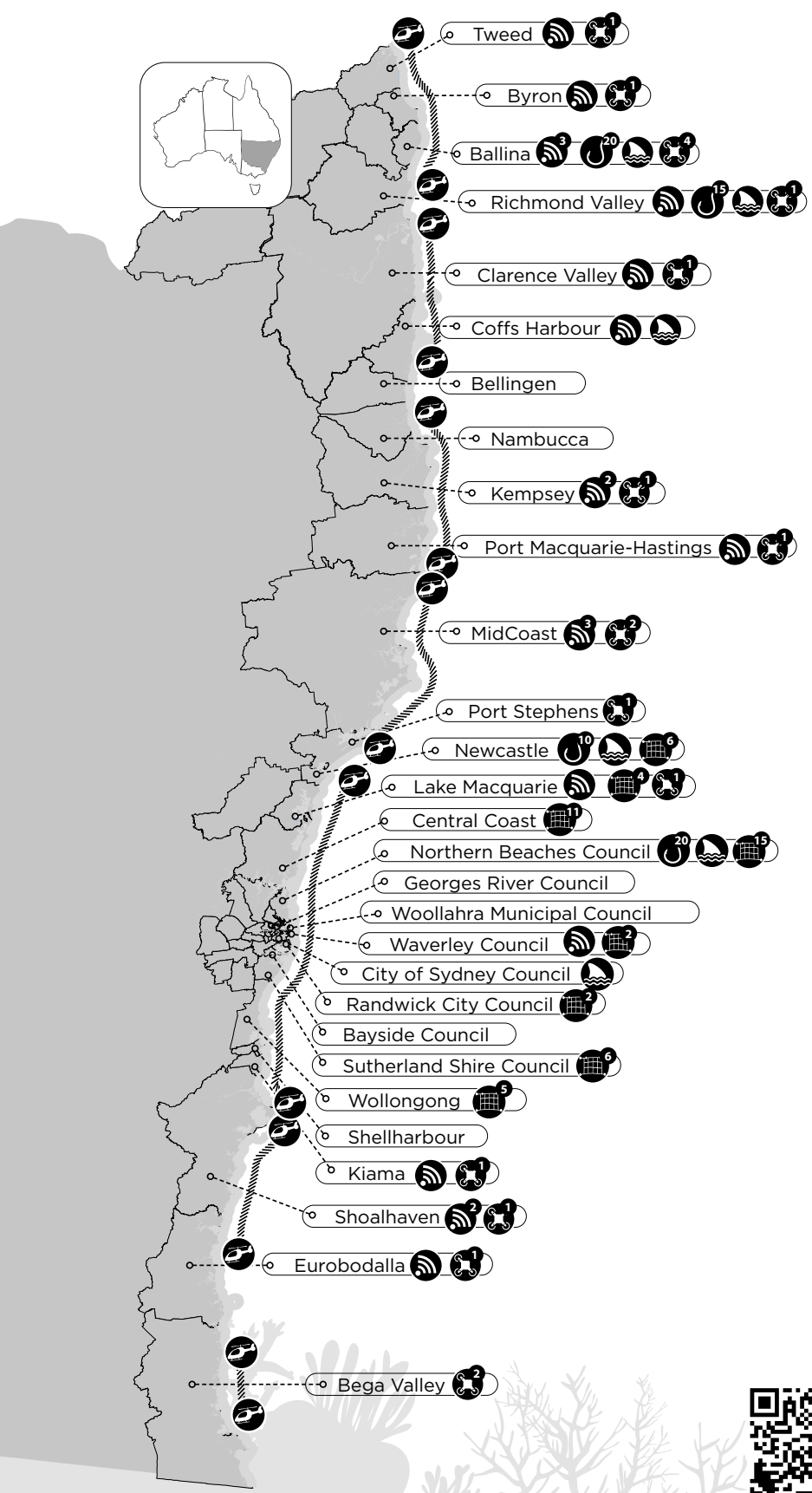


SHARKSMART APP

If a shark is detected that potentially poses a threat to swimmers an alert is sent to surf lifesavers, to twitter and to the SharkSmart app.

Scan this QR code, or click the link, to see a video about shark movement patterns along the NSW coast.

WHERE WERE THE TRIALS LOCATED?



The SMART drumlines page on the SharkSmart website gives more information about the trial locations and results.

WHAT'S HAPPENING AT YOUR LOCAL BEACH?

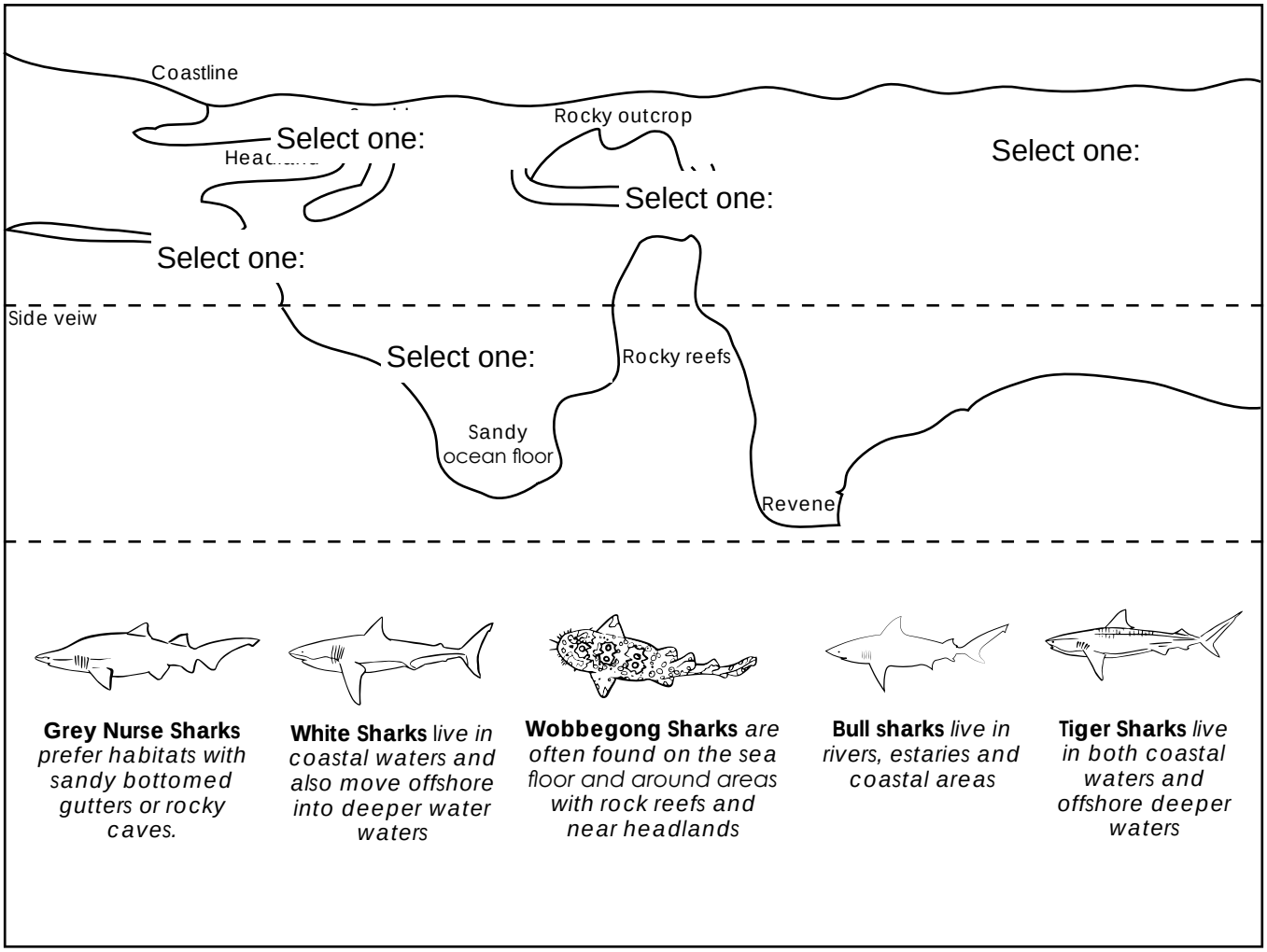
Look at the beach closest to you on Google Maps (or visit the beach if you can!). Draw a map of the beach. If you know there are shark management devices on your beach, mark and label where you think they are located. Mark the location of other features for example, the surf lifesaving station, where the flags are often located, bathrooms, car park, or access path.

Mark the location of your beach on the map of NSW on the opposite page.

WHERE DO SHARKS LIVE?

This habitat diagram shows you where five of the sharks found in NSW coastal waters can live. Water temperature, water depth and the food sharks eat can determine where you might find them. Some sharks live in wide-open oceans, some in shallow waters, and sometimes they can even live in rivers!

Learning more about where sharks can live helps us to be SharkSmart and think about where and when we choose to swim and surf. Help these sharks find their way back home - draw a line between the shark and the area they prefer to be in the ocean.



Grey Nurse Sharks *prefer habitats with sandy bottomed gutters or rocky caves.*

White Sharks *live in coastal waters and also move offshore into deeper water waters*

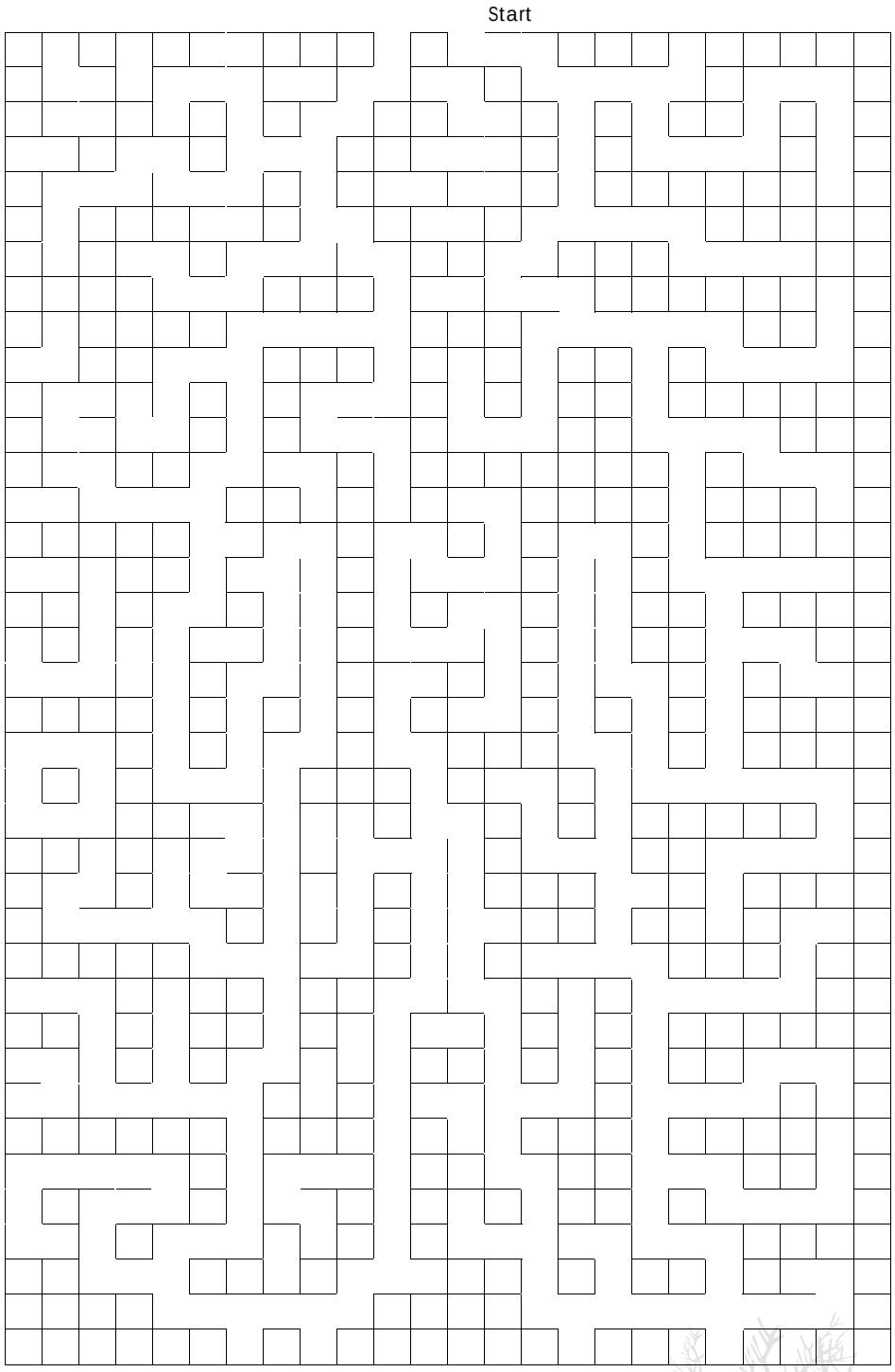
Wobbegong Sharks *are often found on the sea floor and around areas with rock reefs and near headlands*

Bull sharks *live in rivers, estaries and coastal areas*

Tiger Sharks *live in both coastal waters and offshore deeper waters*

SHARKS IN THE ECOSYSTEM

What is an ecosystem? Look up the definition in a dictionary.
List some of the parts of an ocean ecosystem.



A healthy ecosystem is one where all the parts that play a role are in balance and able to fulfil their role in the ecosystem. For healthy oceans we need sharks. We need them to play their role of predator to keep the balance in the ecosystem.

So, if sharks are one of the most successful predators in the ocean, which animals pose a threat to them?

Solve the maze to find out.

PEOPLE ARE THE GREATEST THREAT TO SHARKS THROUGH UNSUSTAINABLE FISHING PRACTICES AND HABITAT LOSS.

For an interesting example of how removal of one predator can throw an ecosystem out of balance view 'How wolves change rivers' video on YouTube.

But we can all make a difference.

Tick some of the ways that you can help protect sharks and the ocean ecosystem - explain how this will help the environment.

- ☐ Always put your rubbish in the bin _____
- ☐ Use recycling facilities when they are available _____
- ☐ Encourage your school and council to set up recycling programs or make recycling bins available _____
- ☐ Avoid using single use plastics _____
- ☐ Find out about over fishing and how you can make better choices about the seafood you eat. Visit www.goodfish.org.au _____
- ☐ Avoid products that are over-packaged _____
- ☐ Support programs that aim to clean up or reduce rubbish entering the environment. _____

How does this help protect sharks? _____

_____

WHAT ARE OTHER PEOPLE DOING?

There are organisations all over the world working on ways to reduce pollution in the environment. They operate in different ways, some aim to reduce waste, others to clean up polluted environments including oceans. Check some of these innovations out, look at how they work to protect the oceans. Look at how they started as well, one was a school project!

TAKE THREE FOR THE SEA (www.take3.org)
SEABINS PROJECT (seabinproject.com)
BOOMERANG BAGS (boomerangbags.org)

Can you find some others? List them here and describe how they are helping to protect the ocean environment.


DONT SURF OR SWIM AT DAWN
BE AWARE IF YOU SEE BIRDS DIVING & BAITFISH, SHARKS MAY BE PRESENT
SURFERS CHECK CONTITIONS AND ASSESS THE RISKS
AVOID RIVER MOUTHS AND STEEP DROP-OFFS SHARKS COULD BE PRESENT
DON'T SWI OR SURF I MURKY WATERS


SHARKSMART
DRONE
SURVEILLANCE
SHARK LISTENING
STATIONS
80
TAGGING
& TRACKING
SMART DRUMLINE