



## “Exploring Sawfish” Ideas for Science and Technology

### Activities linked to grade levels 5 - 10

Choose a problem associated with marine creatures and their life in the marine environment. Use a problem-solving approach that includes:

- *Identification* of a problem
- *Investigation*, wherein solutions are proposed, investigated, and tested by drawing, collecting information or making models
- *Decision-making*
- *Modification*, wherein the model or drawing is evaluated and modified
- *Presentation*, where models are presented with explanations of how they work
- *Evaluation*, where work is evaluated for its effectiveness. (5 - 10)

Design a trash trap that can remove plastic bags, cigarette butts, cans and other solid waste from stormwater. Draw a neat sketch of a model complete with labels highlighting how it works. (5 - 10)

Design a turtle-friendly fishing net that enables turtles to be released when caught in trawling nets. Reflect on an existing turtle exclusion device (TED) for ideas. Discuss ideas for the net. Draw up ideas and explain how it works. Evaluate whether it works efficiently and economically for all turtle species, or whether modifications are required. Use the Internet to find examples. (5 - 10)

Design a viewing device to assist looking at the underwater world. Consider recycling plastic drink bottles, strong plastic and cellophane. (4 - 6)

Find a way to cleanse water. Design and construct a simple water filtration system. Consider using plastic bottles, yoghurt, or margarine containers, tubing and filtering materials. Start by viewing a sample of fresh rainwater or distilled water. Find out what pollutes water as it makes its way to the Great Barrier Reef. Add contaminants to the rainwater. Find out which materials are most dangerous to sea life. Make a list of materials that could simulate this reality and devise a new system to filter them out of ‘murky water.’ Draw neat sketches of the device and label it. Alternatively, make a filter and write an explanation of how it works. Evaluate whether the filter works, whether it is safe for marine creatures, and what else can be done to reduce the level of contamination entering the sea. (6 - 10)

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Investigate technologies used in tracking vulnerable or endangered marine species. Invent a new theoretical device to track a marine animal. Discuss the ethical, environmental, and economic considerations that need to be taken into account when devising technologies to monitor animal species. Give details of any technique, technology or system in use today. Report on findings. (6 - 10)

Discuss the need for industry and entrepreneurs to produce innovative and exciting mechanisms and systems to help conserve and preserve marine habitats and homes of endangered and vulnerable marine species. (6 - 10)

Get involved in a local community marine or environmental monitoring project, or conduct regular surveys of marine species, especially sawfish. (6 -10)

Select a political or social issue that affects a community’s ability to access technology and support at either the local, state, or national level, that would enable them preserve or monitor a threatened species. Formulate questions for an enquiry into the issue. (7 – 10)

As Marketing Director for the Sawfish Protection Society, produce a T-shirt and cap that promotes a biodiversity message. Take into account that the Sawfish Protection Society must appear as part of the design. Investigate how best to produce the chosen image on suitable fabrics. (5 - 10)

### Activities for Technology

#### Activities linked to grade levels 1 – 5

Integrate Technology into your teaching unit about the Sawfish, Seaweed 2008 or the sea.

#### Invent a Reef Fish

##### *Context*

The sea has a high diversity of fish. Scientists estimate that there are between ????. Many have different shapes, colours, patterns and sizes.

- **Fish Shape** – can help you figure out what a fish eats and where they live. Just by looking at the shape of a fish, you can tell whether it is a fast or slow swimming fish, whether it eats small or large prey, and how it hunts food.
- **Fish Colour** – can mean many different things. The colours and patterns of fish play many important roles in daily fish life, such as:
  - Warning,
  - Species recognition,
  - Individual recognition,
  - Gender recognition,
  - Courtship, and
  - Camouflage.
- **Fish Patterns** – tell us a lot, for example:
  - Many smaller fish use eyespots to confuse predators.
  - Lots of small dots are commonly found on slow swimming fish that rest on the seafloor and rely on camouflage.
  - Horizontal stripes are most common on fast swimming fish.

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- Vertical stripes are most commonly found on deep-bodied fish like angelfish and butterfly fish that do not have the speed to out run a predator, but rely on quickly pivoting to change direction.

All fish have fins. Fins help fish swim. All fish have gills. Gills are for breathing in the water. Fish come in many shapes and sizes. Some are big and some are small.

### **Task**

Design and make your own fish that lives in Australian waters. Why not a sawfish, as it is the focus of Seaweed 2008? (1 – 5)

### **Requirements**

Your Fish must have:

- A head with eyes and mouth
- A body with gills, patterns and colours
- A tail with fin shape and it must be constructed from recycled or junk materials.

### **Research** (This is not investigating)

Look at pictures of Sawfish and list their body shape, colour and pattern. Identify their unique features.

Compare the size and placement of the fins to common fish types.

### **Devise Solutions**

Draw a plan of the fish / Sawfish you are going to make .

- Make a large, colourful drawing of it.
- Label its features.
- What is its name?
- Look at the materials available and make a list of what you need.

### **Produce**

Make your fish / Sawfish

### **Evaluate**

Does your fish / Sawfish have a head with eyes and a mouth, a body with gills, patterns and colours, and a fin-shaped tail?

- Write some sentences to describe what your fish / Sawfish looks like.
- What does it eat?
- Where does it live?
- Write a story. A day in the life of a -----

## Sea Snake Tales

### Activities linked to grade levels 3 - 6

#### **Context**

Sea snakes are a family of marine reptiles found in Australian waters. They are related to land snakes and lizards and marine turtles and crocodiles. Sea snakes have adapted to life in the water by developing a paddle tail and a body shaped like the keel of a boat.

#### **Task**

Design and make a sea snake.

#### **Requirements**

Materials – cardboard, plywood strips, split pins, tape, paints.

Tools – scissors, hand drills, clamps, saws, sand paper, cork blocks.

#### **Investigate**

1. Find out ways of joining materials together that allow movement.
2. Research sea snakes that live in Australian waters.

#### **Devise Solutions**

1. Name your sea snake.
2. Draw your sea snake, labelling the parts.
3. Divide it into segments, showing where the joins will be.
4. Colour your drawing, showing any markings.

#### **Produce**

Make your sea snake.

#### **Evaluate**

Does your model move well?

Is it similar to your design?

Write about the changes you made.

Which tools were difficult to use? Why?

What safety rules were most important?

## Marine Animal Homes

### Activities linked to grade levels 4 – 7

#### **Context**

Crabs, shrimps, fish, eels and worms all live under or within coral colonies in marine environments for protection.

#### **Task**

Design and produced a home for a marine animal of your choice.

#### **Requirements**

Use paper-mache or a cardboard silhouette to replicate a coral colony. Use recycled or junk materials wherever possible.

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### **Investigate**

1. Make a list of animals that live under or within coral colonies.
2. Select an animal and study it using the following headings - diet, habitat and behaviour.

### **Devise Solutions**

1. Draw a sketch of the different homes you could make for your reef animal.
2. Select your best idea and complete a labelled drawing of it. List all the materials you need to make it.

### **Produce**

Make your marine animal home.

### **Evaluate**

Write a paragraph – 'A day in the life of your animal'.  
Explain how your house will accommodate your marine animal.

## **Life in the sea**

### **Activities linked to grade levels 5 - 7**

#### **Context**

There are many different marine animals and plants living in the sea. They have adapted well to their environment. However, they now have to cope with some environmental problems.

#### **Task**

Design and produce a diorama that illustrates the habitat of a marine creature in the sea. Show the shelter it requires, the food it eats, the defence mechanisms it has, and the possible environmental problems that may affect it.

#### **Requirements**

Materials – Use a box, cardboard, cellophane, egg cartons, recycled or junk materials, glue and paint.

#### **Investigate**

1. List 10 marine animals that live in the sea.
2. Decide on an animal that interests you.
3. Find and record all of the information mentioned in the task.

#### **Devise solutions**

1. Sketch some ideas on the environment you will create for your animal.
2. On graph paper, draw a design showing the environment you will create for your animal. Show front and top views.

#### **Produce**

Make your diorama.

#### **Evaluate**

What was the most interesting information you found out about your animal?  
Does your diorama match your design? Describe and explain any differences.

## Clear as Mud

### Activities linked to grade levels 5 - 8

#### **Context**

Storm water entering the sea from coastal areas is polluted.

#### **Task**

You are an engineer and have been asked to design and produce a water filtration system in your laboratory to clean 'mucky' water.

#### **Requirements**

Materials – Soft drink bottles, cream, yoghurt, margarine containers, film containers, tubing, filtering materials.

Groups – Work in groups of 3 to 4 students.

#### **Investigate**

1. Start with a bottle of fresh rainwater. Find out what contaminates this water as it makes its way over land into the sea. Add these contaminants to the water.
2. Research what materials are used in commercially made water filters. Make a list of materials you could use to filter your 'mucky' water.

#### **Devise Solutions**

Discuss ideas for your water filter.

Draw up your selected idea and explain how it will work.

#### **Produce**

Make your water filter and run polluted water through it.

#### **Evaluate**

Does your filter work?

What can be done to reduce the volume of contaminants entering the sea?

## Ocean Care

Activities linked to grade levels 6 - 8

#### **Context**

The ocean is under pressure and everything we do on the ocean, along the shore and even on the land, affects this diverse and fragile ecosystem. The plant and animal communities in the ocean need to be protected. Did you know:

- Pollution levels have increased, and show little sign of abatement.
- Fish stocks have declined on some parts of the ocean.
- High percentages of wetlands have been lost from the major river catchments feeding the ocean.
- Nutrients in river discharges, such as phosphate and nitrogen have increased significantly

As a result, the ocean is now under pressure – from fishing, farming, coastal development, land-based pollution, and simply from overuse. Some significant species are having difficulty adapting to these changing conditions and have now become rare or threatened. These

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trends are worrying indications of what may happen to other species and habitats in the ocean.

### **Task**

Design and produce a plan that could be used to help solve a problem that is occurring in local oceans. This plan should be able to be presented to the Minister for Environment.

### **Requirements**

Work in small groups.

Each student needs to keep notes on what the group is doing.

### **Investigate**

Make a list of pressures on the ocean.

Select an issue that interests your group and research it.

### **Devise Solutions**

Discuss ideas to solve the problem with your group.

Develop a detailed plan, which should include more than one strategy.

### **Produce**

Use a computer to present your plan in the best possible way.

### **Evaluate**

In a 5-minute presentation to the class, use all of your group members to “sell” your idea.

## **Litter Traps**

### **Activities linked to grade levels 6 - 8**

#### **Context**

There are problems with litter traps covering the stormwater drains that feed some waterways entering the ocean. At times of high water flow, litter is washed over the traps or pushed through them. Soil is also entering the waterways, silting them up. A number of additional litter traps are planned for the metropolitan area but their design needs to be improved to fix the problem.

#### **Task**

Design a system for filtering the water entering the waterways that will reduce pollution and silting problems.

#### **Requirements**

Work in groups of 4-5 students.

#### **Investigate**

Study a natural wetland. How is the water filtered? Does the water enter the wetland from one, two or many points? Does the water enter at high velocity? How deep is it? What are the bank characteristics?

#### **Devise Solutions**

In your group, discuss ideas. Devise a human-made system based on the natural wetland filtering system.

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Your group is tendering for a ‘best practice water and litter management solution’ in the area feeding into the ocean. Devise a strategy to achieve this goal.

### ***Produce***

On an A3 sheet of card, produce your plan and strategy. Include diagrams and notes.

### ***Evaluate***

Present your system to others and seek feedback on your submission.

## **What a lot of rubbish**

### **Activities linked to grade levels 6 - 8**

#### ***Context***

Are we managing the waste which our schools produce each day in a sensible way? For most schools, the answer is ‘probably not.’ In many school playgrounds there’s a lot of rubbish on the ground. It may end up in our rivers, the ocean. Much of the waste could have been avoided by not producing it in the first place. In addition, much ‘unavoidable waste’ can be reused or recycled in some way. Consider what could be done with waste food scraps, paper, cardboard, plastics, cans and liquids.

#### ***Task***

Design a system to manage our waste more productively and in a way more friendly to the ocean and its environment.

#### ***Requirements***

Take account of the school’s resources and especially the good things already happening to manage waste more effectively, such as recycling bins. Consider what additional activities might be undertaken.

#### ***Investigate***

- What waste is produced?
  - (**Note:** It may help to divide the waste into categories such as organic or green wastes that can be composted, plastic, glass, metals and paper that can be reused or recycled, and ‘other’ wastes that might be more difficult to dispose of, or require special treatment, such as chemicals from the science lab)
- What waste is continually found in the school grounds as litter?
- Does the Local Council provide any rubbish collection or recycling service?
- What organisations collect rubbish for recycling? Where do they take it? What do they do with it?

#### ***Devise Solutions***

Design a system for managing all waste from the school. Take into account, for example, food scraps, bin positions, new equipment needed, costs, restrictions on student movement, foods from the canteen, efficient time use, and possible health hazards associated with the program.

#### ***Produce***

Produce a plan and strategy that aims to implement the system at the start of next year.

#### ***Evaluate***

Whether the system is operating efficiently and whether changes or modifications might be needed in any parts of the system.



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