



Code 3

**You're the solution to water pollution**

## Code 3 You're the solution to water pollution Year Level 3 / 4

### You can make a difference



### Specific Learning Outcomes

By completing this code a Junior Fisher learns to:

- properly recycle all rubbish created while fishing
- use reusable containers where possible. e.g. bait tubs
- safely dispose of non-recyclable rubbish, including bait bags, hooks and line
- understand some of the problems of entanglement and ingestion of rubbish by wildlife
- maintain clean and healthy waterways for fish, fishers and all other wildlife


These activities and skills support the following NSW Board of Studies Stage 2 syllabus outcomes:

HSIE	Science & Technology	PDHPE	English	Creative Arts
ENS2.6	LTS2.3 INVS2.7	COS2.1 INS2.3 DMS2.1	TS2.2	DRAS2.3



**Good Junior fishers know they can be part of the solution to water pollution.**



 View the background information from the *Get Hooked DVD*.

## △ Background notes

### What is water pollution?

The introduction by man, directly or indirectly, of substances or energy into the aquatic environment. This can result in harming living resources and aquatic life. It can be hazardous to human health, hinder activities such as fishing and other water uses, or impair the quality of the water.

### What is stormwater?

Solid and liquid wastes deposited in streets end up being washed through stormwater pipes into some water body: a river, lake or ocean. These same waterways frequently provide the recreational fun and enjoyment from activities such as fishing, boating and swimming.

Types of waste: garbage, paper, plastics, glass, aluminum, oil and petrol spills, detergents and pesticides, animal droppings, soil, leaves and other natural materials.

### Our home

In cities and larger towns, pipes take the water from the bathroom, kitchen and laundry to a sewage treatment plant. Screening, filtering and settling, cleans the water wastes and the cleaned water in some places is discharged into the seas and rivers.

The leftover sludge is burnt, buried or is sold as fertilisers. However the 'cleaned water' often contains grease, fat and chemicals.

In a body of water, the chemicals in the cleaned water can cause the growth of extra water plants, which may alter the balance of plant life.

### Our school

A piece of rubbish lying in the playground could spell disaster for our fish and other aquatic life such as birds, dolphins, seals and platypus.

Many fish swallow even the smallest items such as plastic lunch bags washed down drains, thinking they

are edible food. These bags swell in their stomachs and intestines, causing the animal to become increasingly weak and a possible subject for prey for a predator further down the foodchain.

This pollutant is then transferred to the second fish, possibly continuing the process of injury. Alternatively, the fish may become so weak it may simply die from starvation.

Drink bottles and cans can also cause harm. Larger animals can ingest parts of these, smaller animals sometimes colonise cans and bottles, using them as homes.

### Our farms

Fertilisers are very important for farmers so that soils can be improved and more productive crops grown. Careful management of fertilisers is needed so they are not washed out of the soil into nearby creeks, rivers, estuaries and bays where they cause a lot of unwanted and excessive algal growth.

Why is **excessive algal growth** a problem? Algae does occur normally in the aquatic environment and is necessary as a food source and to produce oxygen for fish and invertebrates.

However, adding increased amounts of **nutrients** unnaturally to the water via stormwater increases the amount of food to certain species of algae. This results in an algal bloom. The algae grows too rapidly and reduces the available sunlight for other aquatic plants living below.

These plants on the bottom (eg seagrass) may grow very slowly or may die out altogether.

### Algal blooms and soluble phosphate

Occurs naturally due to rocks weathering and plants breaking down in the water. While low concentrations of phosphate are vital for life in the water, algal blooms and excessive plant growth can cause phosphorous concentrations to become too high.





### Can our animals cause problems for fish?

Stock allowed free and uncontrolled access to riparian land, can directly foul the water with their own wastes and increase soil erosion by overgrazing and developing walking tracks and pads, reducing water quality downstream<sup>6</sup>, thereby disturbing or destroying aquatic habitat.

### When fishing: By the sea, on the river

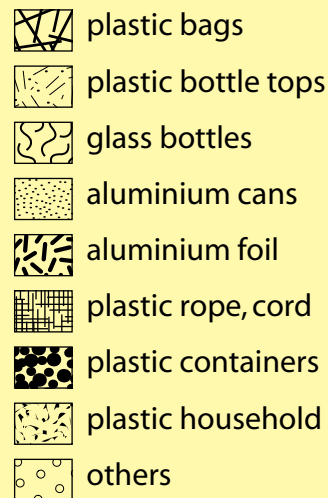
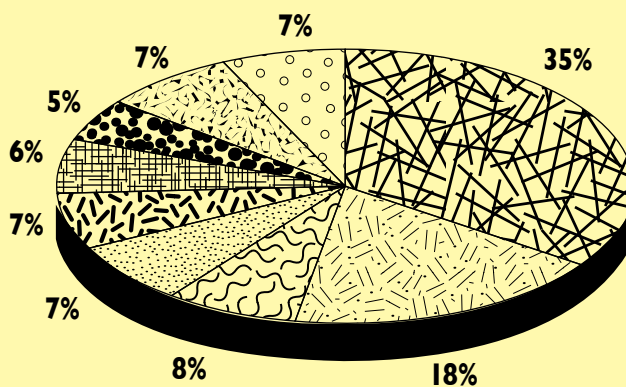
Discarded fishing line and netting is difficult for many native fish, animals and birdlife to see drifting in the currents of the water. It can easily become entangled around their bodies causing injury or an inability to swim, hunt or feed.

Cigarette butts can be mistaken for food, as can fishing bait bags which once again give the animal who has ingested the product the sensation of being too full to consider hunting for further prey.

### How can we help our fish?

1. Love and enjoy our resource, but leave nothing but our footprints behind when we leave a fishing site.
2. Don't bury your rubbish. It may soon become uncovered by the movement of water, animals' or people's foot traffic.
3. Compost your organic rubbish.
4. Do not wash tea leaves, vegetable peel, food scraps, milk, cooking oil and fat down the sink.
5. When you take your dog for a walk, clean up after it.
6. Wash your car on the lawn to prevent soap from running down the gutter.
7. Use biodegradable or natural cleaners to do the job and avoid products like toilet blues and dyed toilet paper.
8. Sweep paths and gutters, rather than hosing refuse into the stormwater system.

Percentage of hard rubbish that enters our waterways



Source: Greenpeace Australia

<sup>6</sup> Land & water Resources, Riparian Management Booklets 1 p. 4-5



## Fishy activities: Waterwatch program

Activity will be motivated by the following interactive drama, as an alternative to an oral tale.

### Interactive drama: 'That's a funny looking fish'

#### Props:

📄 "Fun with food webs" picture cards (see Appendix 6).

📄 Section of fishing net

- Room set-up: four poles and a net/canopy with various pieces of litter tied to it. Students sit underneath as the oral tale begins.
- As students walk through the door give them picture cards with images of fish and aquatic invertebrates, that students pin on as they walk into the room.

**'That's a funny looking fish' role-play:** Welcome to our ocean/river. As a creature of the water, you're going to need to get rid of those legs...they're no use at all. They'd better turn into a tail, where your arms are, there would be fins. Take a few deep breaths, you are now breathing through gills that are near the side of your neck, or for some of you, near your ears.

- Introduce concepts of feeding and hunting for food as you take them through the role-play. Discuss that as some of them are scavengers, they suddenly notice the attractive looking 'cola can fish' that isn't doing anything much on the surface of the water and looks like an aquatic animal that is floundering.
- Encourage a child who is one of the fish below to mime how they might feel as they go to take a bite  
Wilbur the Wrasse (can): mmmm munch, munch, oh crunch, crunch, crunch  
Larry the Leatherjacket (can): ouch, this doesn't feel too good between my teeth
- Introduce other types of rubbish which may be mistaken for animal or plant life:  
Wendy the Whiting (6-pack ring): became entangled in a six pack ring that was invisible in the fast moving currents.  
Frank the Freshwater Tortoise (Bait bag): ate bait bag because it was covered in algal growth.



Things go from bad to worse until a crisis meeting is called...

**‘Call a fish emergency meeting’**

‘This is an emergency meeting, Bluey the eastern blue groper here is feeling sick and Nursey the grey nurse shark has a bloated stomach. So we’re in deep trouble, if this keeps up we will have to either move house or we will all start feeling ill. Where has all this waste come from?’

(Freshwater alternative animals: Perchy the silver perch, Murray the murray crayfish, etc.)

**Activity**

Students brainstorm how the waste came to the waterway in the first place

**Suggested role-play discussion topics**

- Fish (students) pose a question: ‘Why would anyone who cares for fish and fishing leave all this rubbish behind?’  
‘Don’t they know if we swallow it, we’ll become ill and maybe die?’  
‘If that happens, we’ll never have a chance to reproduce and restock the water with young fish.’
- Fish (students) pose a question: ‘How can we escape it?’  
‘We need more help from all the students who fish to take their rubbish home.’

**‘Safe ways to dispose of this rubbish’.**

Props:

- Rubbish from net on ceiling

**Activity**

Brainstorm safe ways to handle rubbish that is in the net above your heads.

Pull the rubbish from the net, using the most appropriate handling method.

Examples may include:

- gloves - never pick up sharp rubbish with bare hands (examples; glass/aluminum cans)
- tongs/stick

Afterwards sort the litter into 3 categories

Litter	Total number
1. <b>Naturally recyclable</b> ie. biodegradable	
2. <b>Commercially recyclable</b> ie. some glass, aluminum, plastic and paper	
3. <b>Non recyclable</b> (solution: reduce) ie. many plastics and other synthetic products	

**Brainstorm:** What can we do about each of these categories?

- |                             |                                      |
|-----------------------------|--------------------------------------|
| 1. Naturally recyclable     | <b>Solution:</b><br>return & reuse   |
| 2. Commercially recyclable: | <b>Solution:</b><br>return & recycle |
| 3. Non recyclable           | <b>Solution:</b><br>return & reduce  |

**Discuss why you would want to pick up rubbish that you hadn’t even dumped by the river in the first place**

- Why there may be no bins near beaches?
- Why bins only open so far?  
(Safety for wildlife scavenging for food - all those attractive smells in the bins!)



## Evaluation activity:

### 'Fish friend or foe'

- one set of 'Fish friend or foe' activity sheets for each student (Appendix 6)
- one set of 'Fish friend or foe' pictures for each student (Appendix 6)

1. Describe what makes a 'friend'.

2. Investigate what makes a 'foe'.

### 3. Picture Puzzle

There are eight pictures on the activity sheet showing people and waterways.

Four of the pictures show fish friends using waterways responsibly.

Decide which pictures show fish friends and put a tick next to them.

Four of the pictures show fish foes behaving in an irresponsible way.

Decide which pictures show fish foes and put a cross next to them.

### 4. Cutting and pasting

Cut out all eight pictures. Paste the pictures under the correct heading on the Activity sheets provided.

Fish friends	Fish foes
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### 5. Writing

Write a sentence about each of the situations shown in the pictures. Explain why you think the scene shows a fish friend or foe. What impact would the people in each picture have on fish and fish habitat?



## 'Fish friend poster'

### Props:

- A4 or A3 paper
- Paints/coloured pens, glue, glitter, other decorative materials
- items of litter



### Activity

■ Working individually, in pairs, or in small groups, design a 'Fish Friend - Poster' with the message that litter can cause problems for fish and other aquatic life when it reaches our waterways. It can be decorated with any materials at hand that you may deem appropriate.

## Suggested follow-up class activities for teachers

### 'Fabulous feely box'

#### Props:

- 'Feely box'
- Various 'feely' items listed below



**Natural/unnatural:** You are a frisky fish on the prowl for some fresh food. You have reasonable eyesight, but sense your food mainly through the vibrations in the water. Your effect in the sea is to help clean it up with your friends... You also like to scavenge for food that you think is dead or dying.

As you swim you encounter the following objects: can, rope, etc.

Students should feel inside the box and remove one item at a time. As each item appears, encourage them to predict a natural item that the fish may mistake the rubbish for.

Students may suggest:



- 6 pack ring: Seaweed / river plant life (A disguised hazard)
- can: Fizzy fish? Looks like a multicoloured fish
- bait bag: Sea jelly / or freshwater food source
- fishing line: Seaweed / plant life
- bottle top: Rock
- plastic straws: Food
- netting: Invisible ghost nets
- chip packets: Sea jelly

### 'Favourite fish'

#### Props:

- Feely box waste items (rope, six pack ring, bait bag, ghost net, etc)

**Imagine:** Each piece of rubbish you pick up you could save a life of your favourite fish.



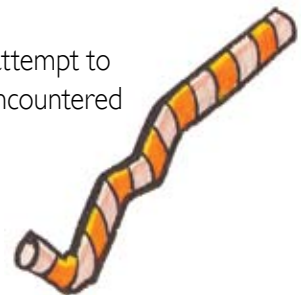
### Activity Brainstorm

- What's your favourite fish or animal that lives in the water? (eg dolphin, Murray cod, leatherjacket, etc)
- Which of these things from the feely box may cause your favourite fish harm?
- What is a wish you might have for this fish?

**In pairs:** Role-play how your fish may react if they encountered one of these items. ie. rope, 6 pack ring, etc.

With at least six different pieces of rubbish in front of you, mime what you think may occur if you encountered one of these items. ie. dolphin and ghost net.

Encourage your partner to attempt to guess what item you have encountered from your mimed actions.





## Fishy activities: Stormwater program —Alternative

### Interactive drama: 'That's a funny looking fish' (as an alternative to an oral tale)

Use the same version of the interactive drama 'That's a funny looking fish,' as your introduction to the following activities. This time, the emphasis will be more on liquid wastes if that is appropriate to your region.

#### Props:

- Substitute some of the cans and bait bags for coloured cellophane on top of the net, to represent poor water quality.

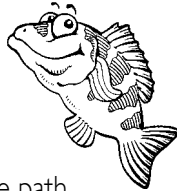
### Suggested follow-up class activities for teachers

#### 'Washed away'

Props: nil

#### Local field trip:

During a period of heavy rain, trace the path of the water from your home or school yard.



#### Discuss the following

- What sorts of both natural and manufactured waste did you see flowing to the stormwater drain after heavy rain? Any surprises?
- How would these items end up in the gutter? Were you able to trace the source?
- Could any of this rubbish or pollution have come from your home or school?
- Brainstorm practical ways you can change the amount of waste entering the gutter
- What businesses do you have in your area? Can you think of any ways to minimise waste?
- Locally can you trace where the rubbish from your school yard ends up?

#### 'Algal blooms'

Props:

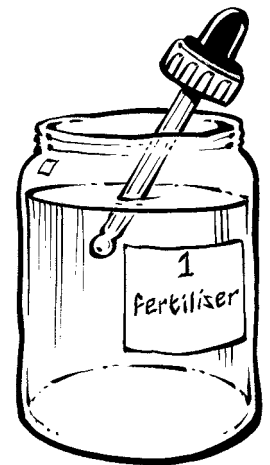
- 3 jars of distilled water
- Eyedroppers
- Liquid fertiliser, detergents
- Local algae

Fill 3 jars with distilled water and label them 1,2,3.

Place in a sunny spot.

1. Into Jar 1, stir an eyedropper of liquid fertiliser. **Label: 'Fertiliser'.**
2. Into Jar 2, stir an eyedropper of washing detergent. **Label: 'Household detergents'.**
3. Into Jar 3, stir with an empty teaspoon. **Label: 'Normal water'.**

Add a small beaker of algae from a local pond to each of the jars.



## 'Growth diary'

### Props:

- Notepad as a daily diary

Keep a daily record of how often your home washes the dishes *or* clothes with a detergent.

For each occurrence, the next day add a drop of detergent to your respective jars for each time a detergent was used in your home.

Over a period of two – four weeks, keep a plant diary and compare each of the jars for algal growth.

### 🔊 Suggested discussion points

- Which jar shows the greatest amount of algal growth? Was it the jar you expected? Can you explain what has occurred here?
- If algae completely covers the surface of the water, what problems will this cause for animals and plants below the water surface?
- Could this type of situation with detergents, fertilisers and chemicals constantly entering our waterways occur in real life?
- Discover some ways you can minimise the amount of chemicals entering our waterways. (Ideas: riparian vegetation that acts as a natural filter; consider the types and amounts of liquid detergents you are using).
- Use the internet, and research modern oil spills clean-up techniques using bacteria.

## 'Clean water is everyone's business'

### Props:

- Tank
- School yard refuse
- Fill a glass aquarium with water. Over a period of 10 days send a student out into the yard each day to add a piece of rubbish found on the ground to the tank – paper, grass, fruit skins, left over drink bottles, chip packets, lunch bags, etc. As the material begins to fill the container, discuss with students the changes taking place.

Present your findings to another class or at a school assembly.

- **Safety note:** Educate students on what rubbish may be handled and what may not (e.g. syringes, glass). Always handle all rubbish with gloves and tongs. Wash hands thoroughly afterwards.

