

Simple Science exercises

Year 3 primary to year 10 secondary

Experiment

Polluting the shallows with waste food

What happens when large amounts of waste food left uneaten by fish accumulate in the shallows of a popular beach?

Materials

- Two large mouthed jars (eg, 1 pint Agee jars)
- Seawater
- Filter funnel and paper
- Slice of cut bread, desert spoon of frozen peas and small piece of dog sausage

Method

Nearly fill both jars with clear filtered seawater.

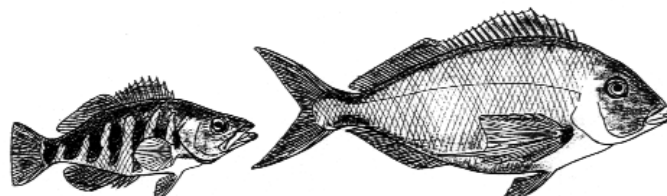
Crumble half a slice of cut bread into one jar and add the peas and dog sausage.

Place both jars on windowsill.

Observe and smell each day.

Keep a diary of the changes – two entries each day: at beginning and end of school day.

Senior classes can also use a microscope to examine growths that develop in the jar with the food scraps.



What do fish really eat?

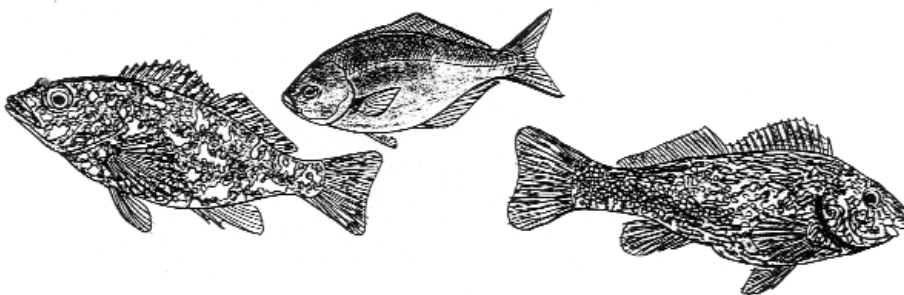
Focus on the common species illustrated in DOC pamphlet *The Underwater World*. Published September 2001

Have students conduct a book or internet search to investigate the diets of common fish in the marine reserve.

Suggested books

- Paulin C. et al *New Zealand Fish – A complete guide*
Pub. GP Books (Government Printing Office) 1989
- Francis M. *Coastal Fishes of New Zealand*
Pub. Heinemann Reed, 1988
- Ayling T. & Cox G. *Collins Guide to the Sea Fishes of New Zealand*
Pub. Collins, 1982
- Paulin C. &
Roberts C. *The Rockpool Fishes of New Zealand*
Pub. Museum of New Zealand / Penguin, 1992
- Thompson S. *Fish of the Marine Reserve*
Pub. Leigh Laboratory, University of Auckland, 1981

From this information have each student create a graphic, three level feeding pyramid diagram for each of any two species of fish shown in the pamphlet. These should show a range of food each fish eats and the types of food that the food species eat.



Art, Language and Science

Getting the message across – making a poster

Have the students create A3 sized posters each showing one or more of the problems of feeding fish in a reserve.

- Posters should have bold slogans and simple, single sentence messages
- Blocks of text to be read should be discouraged
- Posters should be eye-catching.
- Posters should include details and logo of the issuing authority.

Each poster should be assessed on its graphic impact and on the clarity of the captions and texts.

Some ideas

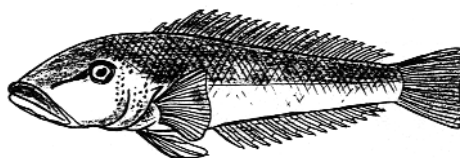
- a) Some fish in a natural unspoilt habitat eating only natural foods
- b) The same fish, bloated with bread and frozen peas, in a habitat polluted with food debris

or

- a) fish swimming amongst a cloud of peas and disintegrating bread in the sea alongside
- b) fish, peas and bread on a plate (suggesting that the human foods are misplaced in the sea)

or

- a) fish 'biting the hand that feeds it' with appropriate caption about changes to fish behaviour

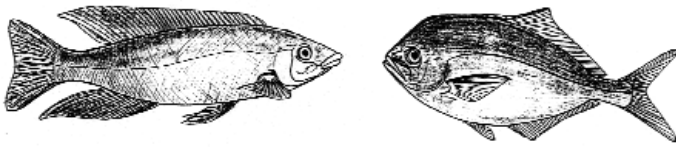


Science and Language

year 6

A page from a fish's diary

Write a diary entry for a fish living in a marine reserve recording a Saturday in summer when it was tempted by a strange hard cold green food. Relate how it ate the food because all the other fish were fighting over it but how it suffered after all the visitors had left the shore at the end of the day.

**Art and Language**

‘Don’t Feed the Fish’ – designing a public notice board

A small notice board already exists at the entrance to Goat Island beach to dissuade the public from feeding fish in the marine reserve. See copy attached.

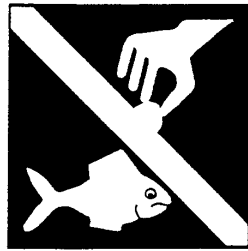
As a class project have students created their own designs for a notice board to advise and educate the public about this issue. Standardise the design to an A4 sheet. The most interesting designs or those stimulating discussion can easily be enlarged to A3 or A2 size for critical evaluation in the classroom.

To introduce the reality of budget constraints and ‘cost effectiveness’ in conservation, designs should be limited to two colours. Two colour printing is much cheaper than full colour but this does not limit design to black and white or a coloured background with black or white text. Any two colours can be used to create an arresting panel.

Showing or not showing the class a copy of the existing notice before students attempt their own designs will affect the quality and creativity. Not showing them will often result in the production of more original work which will stimulate lively discussion. Showing the design beforehand may stifle creativity and original thought, as well as the use of language.

Assessment of the work should cover:

- a. Eye catching design to capture public's attention
- b. Coverage of all the important points, showing that the student has grasped all of the issues
- c. Use of simple sentences or catch phrases and avoidance of large blocks of text that the public will not read
- d. Careful use of language so that each point is clear and that the reader is not antagonised but rather encouraged to co-operate
- e. Inclusion of details and logo of the issuing authority
- f. Attention to cost by use of only two colours



Please do not feed the fish



It can make them sick



They may bite you



It changes their behaviour



**There's plenty of natural food
for them in the ocean**

**Please help protect the fish and keep the
marine reserve natural**



Department of Conservation
Te Papa Atawhai

Science, Mathematics and Sociology

A tonne of bread and peas

By word of mouth people have learnt and believe that frozen peas, bread and dog sausage are good foods to feed fish. All are commercially produced foods and can only be obtained easily by purchasing them at shops. Shopkeepers have exploited the demand and some have incidentally encouraged the illegal practice of feeding fish by making up small (200g) bags from bulk supplies that they sell as 'peas for feeding fish'.

From basic information and approximations students can complete calculations which will indicate the amount of food thrown into the marine reserve:

- Over 100,000 people visit Goat Island Marine Reserve each year
- This is an average of about 2000 per week throughout the year
- However most visit during the summer and most of those at weekends. It is therefore not unusual for 5000 people to visit the reserve over a weekend
- If one person in 10 feeds the fish then 500 people feed fish per weekend
- If each person fed out 200 grams of peas then

$$\text{Total peas fed per weekend} = 200 \times 500 \text{ g} = 100,000 \text{ g} = 100 \text{ kg}$$

$$\text{Over a 10 week holiday period this rate} = 10 \times 100 \text{ g} = 1,000 \text{ kg}$$

$$= 1 \text{ tonne of frozen peas}$$
- Extend the exercise by changing the ratios of visitors to feeders, total number of visitors or the amount fed out

Other calculations can be made to indicate the money spent on feeding the fish and the class could then be asked to suggest better ways in which that money could be spent if the public's desire was to 'help the fish'.

Appreciating a tonne of weight (mass)

A whole class of school children weighs about 1 tonne

Primary school children weigh about 30 kg. A class of 33 children therefore weighs $30 \text{ kg} \times 33 = 990 \text{ kg}$ (1 tonne = 1000 kg)

Secondary school children weigh about 50 kg but classes are generally smaller. A class of only 20 adolescents therefore weighs $50 \text{ kg} \times 20 = 1000 \text{ kg} = 1 \text{ tonne}$.

These measurements could be refined in class with scales and simple calculations.