



# POLLUTION BUSTERS CLUB

# ESTUARIES

Issue 44 - September 2010

## Kia ora Pollution Busters!

Welcome to the latest edition of Pollution Busters! Most of the winter is now behind us and we are all looking forward to hanging out at the beaches this summer. This issue will explore one of our most interesting coastal landscapes – Estuaries.

Inside, you'll find lots of interesting information about what estuaries are, how they form and what weird creatures make their homes in the mud. You'll also find some fun activities and a cool competition.

Tiakina tonu a Ranginui raua ko Papatuanuku / Keep protecting our Sky Father and Earth Mother

From your friends

BuzzBOP and the whole  
Pollution Busters team



# What is an estuary?

Estuaries form at the end of a river where the water takes a well earned rest from all the turbulence in the river before heading out to sea. In the estuary, all of the stuff that has been picked up by the river on its journey from mountain to sea (like tiny bits of soil) falls to the bottom of the resting water and gathers there, forming a muddy area.

Estuaries are some of the world's most diverse and productive systems. There are many different creatures and plants living and growing in Estuaries.

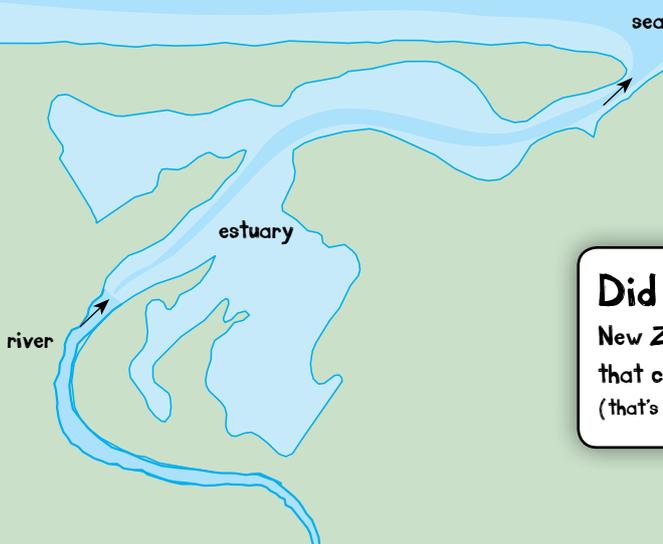
Estuaries have a wide range of habitats, from sand flats, deep channels, rocky platforms and seagrass meadows to sheltered mangrove forests and fringing marshes. This great variety of different habitats provides a wealth of living space, food and refuge for a wide range of plant and animal species, including humans.

## Estuaries in the Bay of Plenty

Our estuaries in the Bay of Plenty were formed between 6000 and 15,000 years ago when sea levels rose by more than 100 metres! Before this, Tauranga harbour was dry and you could walk to Matakana Island. The rising water flooded the harbour and part of the river valley. Matakana Island now acts as a "barrier island", which stops big waves hitting the shore. It also allows mud to gather and estuaries to form.



Photo courtesy of John Chapman



### Did you know?

New Zealand has more than 300 estuaries that cover an area of 100,000 hectares (that's an area just a little bit bigger than the Bay of Plenty!)



# Sediment

Sediments can be particles (tiny little bits) of sand, silt or clay.

As streams or rivers flow to the sea, they pick up sediments, transporting them and then leaving them in estuaries. Depending on the currents in the estuary, they may then be carried away further, where they'll settle on the sea floor.

Over years, sediment builds-up in estuaries. This happens faster now than it used to, because of what us humans do. Things like new housing subdivisions, road works and other major construction sites all contribute to the amount of sediment in our estuaries. One hundred years ago sediment used to build up by about 0.5mm per year, but these days it's about 6mm per year.

How much will that add up to in another hundred years? 60cm or two rulers deep!

## Wordfind

B	C	Y	J	C	H	I	T	O	N
F	S	X	P	E	N	G	U	I	N
M	L	E	S	T	U	A	R	Y	A
U	A	T	D	T	V	O	B	P	K
D	G	N	B	I	R	D	U	C	I
C	T	B	G	A	M	F	L	O	W
R	I	V	E	R	V	E	E	A	C
A	D	Y	M	J	O	H	N	S	H
B	E	K	G	L	P	V	C	T	L
L	R	Y	N	Q	A	D	E	P	J

SEDIMENT  
RIVER  
ESTUARY  
MANGROVE  
TURBULENCE

PENGUIN  
TIDE  
MUD  
CHITON  
CRAB

FLOW  
COAST  
BIRD

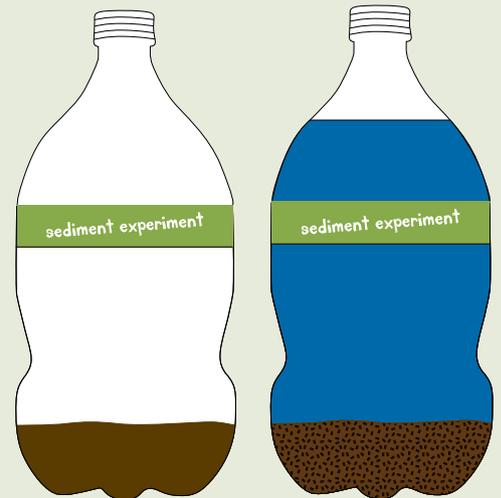


# SEDIMENT EXPERIMENT

You will need:

- 2 litre plastic bottle
- mud
- water

**Step 1:** Put some mud in the bottom and fill with water.



**Step 2:** Put the lid on the bottle and shake hard for 1 minute (this is what happens to mud and sediment in the river)



Now place the bottle on a table and watch what happens. The sediment should slowly settle on the bottom as the water slows down and stops moving, just like what happens at the end of the river.

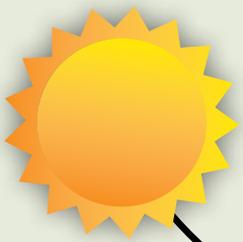


# Mangroves

Mangroves are amazing plants and can grow into big waterlogged forests with heaps of fish life, snails and funny roots that poke up in the air called pneumatophores. Mangroves love muddy salty water so grow really well where lots of dirt gets washed off the hills in to the harbour. This can happen when farms and housing areas are being made on the hills around the harbour. The mangroves have grown bigger and spread around the Tauranga harbour in the last 15 years. Some people who live close to the harbour's edge sometimes think mangroves ruin their view, are smelly and make it hard to get boats in and out.

## An estuary food chain

Food is very important, it gives us energy to grow. This is the same for other living creatures as well. A food chain is the name given to the order that plants and animals are eaten. For example the mangrove will make its food from sunlight—this will give it energy to grow. The crab eats the mangrove leaf litter and the oyster catcher eats the crab. They depend on each other for food—if there were no mangroves then crabs would have no food and neither will the oyster catchers.



mangroves



mudcrab



oyster catcher

# Māori and estuaries

Photo courtesy of Matthew Keam

Estuaries and their surrounding margins are regarded by Māori as a taonga or treasure. Many have historical and cultural importance and may include wahi tapu (sacred sites). They are mahinga kai (food gathering) sites, and provide significant habitats for a range of culturally important animals including fish, tuna (eel), birds, reptiles, amphibians and insects. Many plants found in estuaries are used for weaving, medicine and carving.

Sheltered coastal sites were the first homes for our early Māori. Fish, shellfish and waterfowl (eg ducks) were a large part of their diet. Mōa were also very important in the very early years of settlement. Several important “moa hunter” sites have been found in estuarine environments, mainly on dry shingle spits or sand dunes bordering lagoons or river mouths. Papamoa means hunting ground for Mōa.

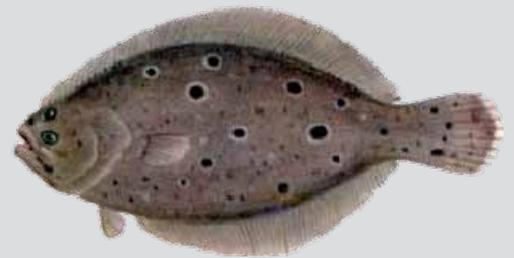
## Match the English to Māori words

Match Māori to English names

mahinga kai	bittern
hao	whitebait
pūkeko	white heron
īnanga	food gathering places
pātiki	black flounder
kōtukutuku	common smelt
kūwharuwharu	shortfin eel
matuku	swamp hen
ngaoire	longfin eel



The pātiki (flounder) pattern (above) in Māori art, see if you can draw your own.



This type of pātiki or flounder is a sea type, it is from the flounder that the Maori designs are taken. The pātiki is a flat type fish that is also a diamond shape pattern and can be usually found on the tukutuku (weaving) panels in a whare nui (ancestral house). One of its meanings relates to a person who is really good at gathering food for their family.

### He whakatauki (a proverb) E kore te pātiki ehoki anō ki tōna puehu

The flounder will not return to the mud it has stirred up  
A person will always seek alternative ways to do well.

*Credit page 36 Mead & Groove*



Answers: mahinga kai = food gathering places, hao = shortfin eel, pūkeko = swamp hen, īnanga = whitebait, pātiki = black flounder, kōtukutuku = white heron, kūwharuwharu = longfin eel, matuku = bittern, ngaoire = common smelt

# Human impacts

Everywhere you look people have changed the estuaries and harbours in the Bay of Plenty. Houses, bridges, jetties, the port, marinas, farms and factories in and around the harbours all lead to more pollution and fewer natural places.

## Oil spills

Bay of Plenty Regional Council has a trained oil spill response team who can be called any time of the day or night if there is an oil spill. In a really big spill we will get help from the Maritime New Zealand, their website is <http://www.maritimenz.govt.nz>.

We have to act fast after an oil spill as oil can kill marine plants and animals. The oil can clog the feathers of birds so they cannot fly, and it can get sucked into shellfish and poison them. Plants like mangroves are easily poisoned because they have roots on the surface of the water.



Oil spill training exercise

## Marine debris

Marine debris can be all sorts of rubbish that you will find on the beach or in the sea and estuary. They can include big things like cars or something as small as plastic bags or drink cans. Some of the rubbish will have been carried to the estuary by the rivers and streams.

In the picture below you will see the most common marine debris. Take part in our "Clean Up Crusade" (page 7) and compare what you find with what is below.



# Clean up crusade

Now that you know a bit more about marine debris, here is a way you can help clean up the estuary, beach and sea near you!

Use the chart below when you clean up the estuary (beach, lake or river) near you. Write down the different kinds of rubbish that you find—compare it to the most common pieces of rubbish found on page 6.

**You will need:** gloves, old plastic bags, bins or boxes (to separate the rubbish), Clean Up Crusade chart, pen or pencil.

What did you find? eg food scraps, plastic, paper, aluminium, other	Where did you find it?	Is it reusable, recyclable, used for a compost?	Is there an alternative?
<i>eg drink can</i>	<i>on the beach</i>	<i>recyclable</i>	<i>make xmas decorations from it</i>

Make sure you get an adults permission before starting this project



# BuzzBOP's Friend

**Braden Rowson, Estuary Care Officer**

**What do you do?**

My role involves supporting the community to carry out restoration projects around Tauranga Moana. Typical projects we help with include rodent control (to help the native birdlife), weed control, native planting, and mangrove management. I get muddy a lot!

**How did you become an estuary care officer?**

I consider myself a conservationist at heart and have a love for the coast and beaches in general so when the opportunity came up to do this work around Tauranga Harbour I jumped at it.

**What's the best part of your job?**

Getting out amongst the environment. The passion of the various people in the community is infectious and it is really rewarding to help make a difference.

**What's your message to Pollution Busters?**

If you are interested in starting up a restoration project in your local estuary don't be scared to give it a go. Give me a bell, we're here to help.



**KIDS DOING STUFF!**



**CONGRATULATIONS!** Winners of Newsletter #43 Bee Prepared Wordfind Competition are...  
12 years and over: **Antonia Allen**, 12 years old, Murupara, 7 to 11 years old: **Gemma Bateman**, 9 years old, Tauranga,  
Up to 6 years old: **Claytin Thompson**, 6 years old, Rotorua



**Pollution Busters join up or change of address here...**

Please have an adult check that the details are correct before this is sent.

- I am a new Pollution Buster
- I am already a Pollution Buster but I have changed my address

Name \_\_\_\_\_

School \_\_\_\_\_ Birthday \_\_\_\_/\_\_\_\_/\_\_\_\_ day / month / year

Address \_\_\_\_\_

\_\_\_\_\_ (Postcode) \_\_\_\_\_

**BuzzBOP & Team**  
 Freepost Environment  
 Bay of Plenty  
 PO Box 364  
 Whakatane 3158  
 buzzbop@envbop.govt.nz

Write your name, age and address on your letters and on the back of your artwork.

**Have you moved and changed address?**  
 If you have moved and changed address, please write to us so we can make sure you get your newsletter.