

waitaha
waitaha wai

water of
canterbury

Section 4: Discovering your local waterway

Banks Peninsula/Horomaka



**Environment
Canterbury**
Regional Council

Contents

Introduction	4
Learning outcomes	4
Where is Banks Peninsula?	5
How the peninsula was formed	5
Who owns land on the peninsula and manages its resources?	5
Natural history of the peninsula	6
Pohatu Marine Reserve	6
Wildside projects	7
Maori history	8
Waitaha	8
Kati Mamoe	9
Ngai Tahu	9
Mahinga kai	9
European history of the area	10
Whalers	10
Transport and timber	10
Seed – cocksfoot growing	11
Farming	11
Tourism	11
The ecology of the peninsula and its waterways	12
Wetlands	12
Birds	12
Aquatic invertebrates	13
Fish	14
Lizards	16
Weta	16
Vegetation	17
Introduced species	18

Banks Peninsula waterways	19
The state of streams on Banks Peninsula	19
Water quantity	20
Water quality	20
Issues of concern for streams and waterways	21
• Tangata Whenua values	21
• Freshwater contaminants	22
• Suspended solids and sedimentation	22
• Faecal contamination	22
• Stock issues	23
• Chemical use	23
• Urbanisation	23
• Other issues	24
What is being done to manage the streams and waterways?	24
Environment Canterbury	24
Te Runanga	24
Banks Peninsula Conservation Trust	24
Governor's Bay Landcare Group	24
Akaroa Harbour Issues Working Party	25
Lyttelton Harbour Issues Group	25
Department of Conservation	25
Christchurch City Council	25
Activities	26

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Introduction

Banks Peninsula/Horomaka is a unique part of Canterbury. Almost surrounded by the Pacific Ocean, the peninsula has a geologically and ecologically distinctive volcanic and coastal landscape. The region also has a rich cultural tapestry with Maori and European history. In 1770 when Captain Cook first sailed past the peninsula in the Endeavour, it is recorded that he sailed close enough to see Maori on Banks Peninsula beaches but he did not land. Cook named the land Banks Island (after the botanist Joseph Banks on board the ship) because he did not realise it was connected to the mainland. In fact, Banks Peninsula was once an island and that is what makes it unique today. It is only in the past 20,000 years that Banks Peninsula has been joined to the Canterbury Plains. Several endemic species surviving today are proof of its island past. However, the peninsula's more recent history is one of change and turmoil both in terms of its people and ecology. There have been wars and whaling, and the peninsula has experienced a complete ecological transformation from dense forest to farmland. Nowadays many New Zealanders and overseas tourists are creating new and happy memories in some of the peninsula's prime holiday destinations.

This resource is designed to provide information about Banks Peninsula and some of the freshwater ecosystems found there. It is recommended that teachers use this resource in conjunction with the Waitaha Wai resource (Environment Canterbury) and the Guidelines for Environmental Education in New Zealand Schools (Ministry of Education 1999).

Included in this document is information relating to:

- Maori and European history of the area;
- Ecology and values of Banks Peninsula's waterways (in referring to some of these values, specific mention is made of some the peninsula's waterways);
- Current activities in and around the waterways;
- Activities for students to undertake in relation to this resource.

LEARNING OUTCOMES

- An understanding of the human interaction with the peninsula and stream habitats.
- An understanding of the dynamic nature of local waterways.
- An understanding of the different values of this area, in particular Tangata Whenua and their association with the area.
- How to monitor water quality in a freshwater system.
- An understanding of the factors influencing waterway health.



Aerial shot of Banks Peninsula. Photo courtesy of Department of Conservation.



Where is Banks Peninsula?

Banks Peninsula is about halfway down the east coast of the South Island. The peninsula is approximately 1000 sq km in area and its highest point is Mt Herbert at 920 m above sea level.

The main highway to the peninsula is around Lake Ellesmere, through Little River to the Summit Road, at the Hilltop. Here the road forks: the coastal route leads to Akaroa, and the spectacular Summit Road services the majority of the peninsula's northern and eastern bays. Built in the 1930s, the Summit Road runs around the crater rim of Akaroa Harbour with spectacular views down the harbour and access to some of the peninsula's prized reserves.

Banks Peninsula is governed by the Christchurch City Council.

How the peninsula was formed?

Banks Peninsula was originally an island formed by two very large volcanoes; one at Lyttelton, the other at Akaroa. They were active between 5 million and 12 million years ago and over time the volcanic cones eroded and the sea filled the old craters. These craters now form Akaroa and Lyttelton harbours. As soil built up on the plains, gravel and silt flowed with the rivers out to sea, gradually creating a land bridge between the volcanic island and the mainland, transforming the island into a peninsula.

The soils on Banks Peninsula comprise two different types, volcanic tephra and loess soil (including clays). The volcanic soils are high in iron and other minerals, giving them a strong reddish-brown colour. This type of soil tends to be found at higher levels (above 400 m). In the past, before vegetation became well established, loess was blown by strong nor'west winds from the plains and settled on top of the volcanic soil. The loess forms deep layers in places and is easily distinguished from volcanic soils by its paler colour. Strong winds, rain and the removal of native forest from Banks Peninsula have caused erosion of both soil types. Loess is particularly prone to erosion when native forest cover is removed.

The extinct volcanic cones have created a steep landscape with many deep valleys. Lyttelton and Akaroa harbours provide some protection from wind and coastal erosion. Around the outside of the peninsula there are dozens of small exposed bays, and a few longer bays such as Pigeon Bay and Port Levy which offer greater protection from strong winds.

Who owns land on the peninsula and manages its resources?

Much of the peninsula is in private ownership and is farmed, although increasingly more land is being bought by bach-owners, people owning "lifestyle" blocks, and businesses. There is also public conservation land managed by the Department of Conservation, and land and reserves owned and managed by Christchurch City Council, local runanga and iwi. Over the years there has developed strong community support for conservation projects to retain natural and historic features and to restore habitats once lost. Increasingly land is being purchased for conservation by private individuals and at the same time long established farming families are protecting areas of high conservation value on their land. The settlements of Akaroa and the inner harbour have grown as people have bought and built holiday houses. More recently people have begun to commute from the peninsula into work in Christchurch. Akaroa is 80 minutes drive from the centre of Christchurch.



Pohatu Marine Reserve

The marine reserve at Pohatu/ Flea Bay was opened in 1999 and is managed by the Department of Conservation and local landowners. This reserve protects the special marine environment that exists on the peninsula and is the only marine reserve on the east coast of the South Island.

Natural history of Banks Peninsula

Banks Peninsula is widely recognised as one of Canterbury's leading holiday destinations. One only has to reach the Hilltop and look down on Akaroa harbour to sense the area's majesty. A closer look at the peninsula reveals a unique biodiversity created by Banks Peninsula plants, animals, and a diverse range of habitats and soils. Within a short distance the peninsula's steep topography spans coastal, mid-altitude and semi-alpine habitats. Rainfall also varies markedly. There are dry, semi-arid parts that include Motukarara and Godley Head, and lush, wet microclimates of some of the peninsula's hidden valleys such as Kaituna Valley. Some of the peninsula's unique species have already been lost through land development and changing habitats, including a parrot and a giant sea eagle. Those native species that still exist are evidently better adapted to the peninsula's ever-changing and at times harsh natural environment. Unfortunately, there are still some plants and animals that are on the national threatened species list.

Today some people recognise how much has been lost and spend countless hours protecting threatened and endangered species. Others have dedicated their lives to restoring entire habitat types that, in a number of cases, include freshwater systems.



Akaroa Harbour. Photo courtesy of Department of Conservation.

Wildside projects

Flea Bay and Stony Bay

This project is run by two enthusiastic landowners (Armstrong and Helps) whose goal is to exclude predators completely from Stony and Flea Bay. To do this, the Armstrong and Helps families have set up a trap line around the ridges of the bays, creating in effect a mainland island. The traps catch stoats and hedgehogs that, left uncontrolled, take their toll on invertebrates and the eggs of ground-nesting seabirds.

Mark Armstrong of Stony Bay has also been protecting a sooty shearwater/titi (muttonbird) colony on his farm since 1999. Sooty shearwater, once numerous on the peninsula, would have provided valuable mahinga kai (see page 8) for Maori. Yet the arrival on the mainland of predators such as ferrets and stoats (mustelids), rats and cats led to a sharp decline in their numbers. When Mark first built a predator-proof fence around the dwindling colony on his property, only three burrows remained. There is now a colony of 40 birds breeding inside the enclosure. Also growing inside the fence and protected by the enclosure is the threatened plant Cooks Scurvy grass. A new fully predator-proof fence was built in late 2009. This expands the protected area, and should assist with survival of titi chicks. Reintroductions of species such as the jewelled gecko are also being considered in the near future.

Le Bons Bay

A dedicated team of community members led by local people Robin and Jo Burleigh and funded by the Joseph Langer Trust and the Antarctic Centre have built a trap line that completely encloses the coastal area of Le Bons Bay. The trap line, established in 2007 to protect white-flipped penguins, also provides protection for other birds, lizards and insects. Le Bons School is an Enviroschool and committed to the project, with students raising wider community and visitor awareness of the penguin's plight, and money to maintain the trap line.

Hinewai

Hinewai Reserve is a privately owned and managed nature reserve of 1,230 hectares in the south-east bays behind Akaroa. It is the largest protected area on the peninsula and is home, among other things, to bellbird, rifleman, kereru, jewelled gecko and the secretive banded kokopu. Ecological conservation and forest restoration are the prime goals but there is an extensive network of walking tracks open to the public. Since its beginning 20 years ago, forest regeneration through gorse has been impressive.



Banks Peninsula. Photo courtesy of Wayne McCallum.

Maori history

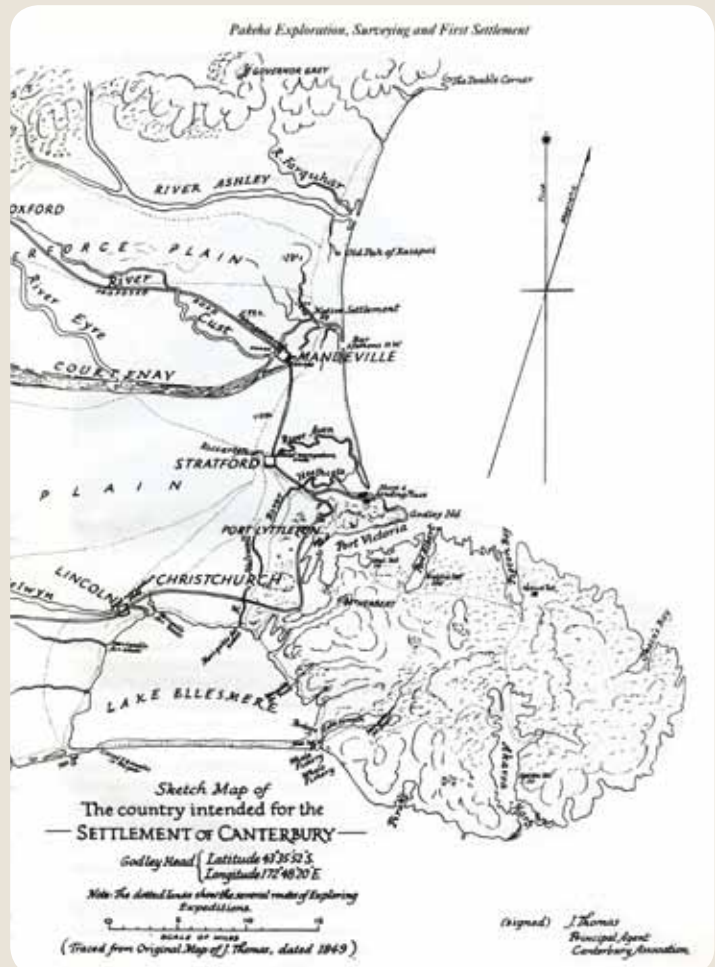
Maori myth credits Maui with forming the peninsula. After fishing up the North Island Maui settled down with his wife and children, but an evil giant came and tried to eat Maui's children and take his wife. Maui fought the giant and pushed him to the bottom of the sea. He piled mountains on top of him to hold him under. This was the beginning of the peninsula. Frozen by the winter cold, the giant lay still, but when summer came he warmed up and moved causing a huge crack to form in the land. The sea rushed in and Akaroa harbour was formed. Maui piled more mountains on top of the giant, but again, as summer came the giant moved forming Pigeon Bay and a large lake. But Maui did not give up, and in anger he piled more and more mountains on top of the giant. Finally the giant was defeated and the peninsula complete.

Present day Ngai Tahu Whanui are of Rapuwai, Hawea, Waitaha, Kati Mamoe and Ngai Tahu ancestry. Three waves of Maori settlement are recognised on Banks Peninsula.

Waitaha

The history of the Waitaha people in New Zealand goes back many generations to about 850 AD, when Rakaihautu (a Waitaha ancestor) came to Te Wai Pounamu (the South Island) from Hawaiki as the captain of the Uruao waka. The waka was beached at Whakatu/Nelson. While his son Rakihouia took some of the party to explore the East Coast, Rakaihautu led the remainder on an inland route over the Southern Alps or Ka Tiritiri o te Moana. With his famous digging stick (ko), Rakaihautu dug the southern lakes (Nga puna kari kari o Rakaihautu). Te Rakihouia then proceeded south down the Canterbury Coast in the Uruao waka.

It was on this journey that Te Rakihouia discovered the coastal lake (now Te Waihora/ Lake Ellesmere) and claimed the abundant resources of the area for his father. He named the lake Te Kete Ika Rakaihautu – the fish basket of Rakaihautu. These are guarded by a taniwha kaitiaki (guardian monster), named Tuterakihaunoa. Te Rakihouia named Banks Peninsula A te Whata o Rakaihautu (the storage place of Rakaihautu).



Captain Thomas's Map, 1849. Photo courtesy of Canterbury Museum.



Wiremu Harihona Puhirere "Big William" Onuku Chief captured by Te Rauparaha after the fall of Onawe, but later released.

Kati Mamoe

Generations later, the Kati Mamoe people arrived from the North Island (Te Ika a Maui) and settled among the Waitaha people. A prominent man of this tribe was Tutekawa, who in establishing his home at Waikakahi, declared Te Waihora as his own and the lake became known as Te Kete Ika a Tutekawa.

Until the late seventeenth century, Kati Mamoe was the main tribe in the South Island. When Tutekawa killed two senior Ngai Tahu women, Ngai Tahu warriors came from the north in pursuit of Tutekawa and his people. They ransacked the major Kati Mamoe pa Parakakariki (at Otanerito) and from there Ngai Tahu chiefs took control of key locations on the peninsula.

Ngai Tahu

By 1750, prior to European settlement, Ngai Tahu occupied most of the South Island.

Ngai Tahu had settlements in every bay on the peninsula and on many of the headlands. Ngai Tahu settlement differed from the earlier more nomadic tribes in that permanent gardens were established. The gardening expertise of peninsula Maori must have been well honed; kumara were grown successfully on Banks Peninsula despite it being 1000 kilometres further south than kumara grow in their native Chile.

In the early 1800s, there are records of trading between Maori and European sealers. However, as well as muskets, clothing, tobacco and alcohol, the Europeans brought with them a number of diseases. These diseases, combined with a ferocious civil war and raids led by Te Rauparaha from Kapiti, all took a huge toll on Peninsula Maori. A census conducted in 1848-49 estimated a population of only 300 Maori on the peninsula, whereas before the war and spread of disease there had been several thousand.

Mahinga kai

The term 'mahinga kai' refers to the whole resource chain, from mountain top to ocean floor. Kai awa mahinga kai refers to the freshwater materials harvested. It encompasses social and educational elements as well as the process of food gathering. This includes the way resources are gathered, the places they are gathered from, and the resources themselves.

In the past, mahinga kai would have included seals, titi (muttonbirds), shellfish, eels and whitebait. These resources are considered taonga (particular treasures for food and cultural identity) because they sustained life and an industry for the area and those who resided there. Thus cultural use, traditionally and today, continues within a sustainable use framework.

For Ngai Tahu today, participation in mahinga kai activities is an important expression of cultural identity. This participation is reliant on Ngai Tahu people having sufficient access to mahinga kai sites, resources and a healthy environment.



*Mahika Kai Kowhitihiti - Collecting Watercress.
Photo courtesy of Mahana Paerata.*



Mahika Kai Tuaki - Collecting Cockles. Photo courtesy of Craig Pauling.

European history

Although they did not land, Cook and his sailors were the first Europeans to see the peninsula in 1770.

Whalers

Sealers and flax traders made fleeting visits to the peninsula in the early 1800s, making brief contact with local Maori, but whaling was the first industry to be properly established on the peninsula in the late 1830s. There were whaling stations in Peraki, Ikoraki, Oashore, Island Bay and Little Port Cooper. These stations targeted southern right whale, humpback and sperm whales.

Shore whaling was a perilous activity. When a whale was sighted from shore, five or six men would head out to sea in a 30-foot open rowboat. Having harpooned the whale, the boat was then dragged around by the angry and injured mammal on a dangerous ride until the whale died. This could take half a day. The whalers then had to row the dead weight back to shore; this sometimes took 24 hours. Once back on shore, the whale was processed and the blubber rendered down for whale oil. The bones were then cleaned and made ready for export.

Whaling was a lucrative but short-lived industry. By 1845, the whale population around the peninsula had dwindled and whalers turned their hand to farming, boat building and timber felling and processing.

In 1838, Captain Langlois of the French whaling boat Cachalot negotiated with Maori in Port Cooper to buy the whole of the peninsula. The deal was made and the price settled at 1000 francs. As noted in 'Peninsula and Plain' in 1874, "the first installment comprised a woollen overcoat, six pairs of linen trousers, a dozen waterproof hats, two pairs of shoes, a pistol, two woollen shirts and a waterproof coat". On return to France, Captain Langlois formed the Nanto-Bordelaise Company, which sent 63 settlers to Akaroa. However, William Hobson had been sent from London 3 months earlier with instructions to establish a British colony at Akaroa. He set in motion the Treaty of Waitangi that was signed by Maori in February 1840. The French settlers arrived in Akaroa 3 months after the Treaty of Waitangi had been signed. If the French Government had taken up their plans for colonisation more swiftly, the whole of the South Island could have been under French control.

Transport and timber

During the settlement period in Canterbury, there was a high demand for timber to build dwellings and fence paddocks. Unlike most of the plains, the peninsula was covered with podocarp forest. The first mill on the peninsula was set up at Robinson's Bay in 1854. Within a few years there were mills in every sizeable bay.

Timber milled on the peninsula was rafted across Waiwera/Lake Forsyth and Te Waihora/Ellesmere to the plains, or carried by sea to Sumner. Most of the early buildings in Canterbury, including the original Rakaia and Kaiapoi bridges, were built from peninsula timber. Within 50-60 years most of the peninsula had been cleared and mills started to close by 1903. Today, only three original rimu survive from the once vast podocarp forests. All are male and will never reproduce (Puaha Reserve).



Photo courtesy of Chandra Littlewood.



*German Bay (Takamatua) Dairy Factory circa 1904.
Photo courtesy of Akaroa Museum.*

Cocksfoot farming

Between the 1880s and 1930s grass seed was in high demand all over New Zealand and in other recently colonised parts of the world, as farmers attempted to turn recently cleared land into pasture. Following timber milling, grass seed growing became the primary industry on the peninsula. Cocksfoot flourished in the loess soil of the peninsula and was a profitable crop for the peninsula's larger property owners. Seed was collected by hand and employed hundreds of labourers.

Akaroa cocksfoot was considered the best in the world and was exported in quantity to South Africa, South America and Australia. During the peak, peninsula cocksfoot farmers were producing 50,000–60,000 sacks of seed annually. This was 83% of all cocksfoot seed produced in New Zealand.

Farming on the peninsula

The first sheep arrived on the peninsula in 1843, but farming only really took off once pasture was established. Dairying became a primary farming activity between 1910 and 1930. Milk, butter and cheese were transported by boat to Christchurch via the Avon River. When the economic depression hit in the 1930s, farmers had insufficient funds to upgrade pasture and herds, so dairying declined and sheep farming became the new primary industry. Nowadays, farming is still the peninsula's main activity, although many farmers have diversified into forestry, horticulture, aquaculture and tourism.

Tourism

Tourism has become one of the peninsula's primary earners, with holidaymakers flooding into Akaroa and other peninsula settlements over weekends and holidays.

An extensive tourist infrastructure has developed, with many accommodation options and tourist activities such as swimming with the dolphins and harbour tours, walking tracks and farm stays, restaurants and cafes. Tourism, just like more traditional peninsula industries, can put pressure on freshwater resources both in terms of consumer needs and effluent disposal.



Photo courtesy of Akaroa Museum.



Balcarres farm. Photo courtesy of Frances Schmechel.



*Swimming with Hector's dolphins.
Photo courtesy of the A.R.E.V.A. Project.*

Ecology of Banks Peninsula

Wetlands

The peninsula's steep sided valleys and limited flat land means it is difficult for wetlands to form. The small amounts of flat land have generally been drained and turned into farmland. The largest wetland areas on the peninsula are around the edges of Lake Ellesmere/Te Waihora. For more information on these habitats please refer to the Lake Ellesmere/Te Waihora resource in this series.

Main bird species of Banks Peninsula/Horomaka

Common name	Maori name
Australasian bittern (endangered)	<i>matuku-hurepo</i>
Australasian/NZ Shoveler	<i>kuruwheangi</i>
Banded dotterel	<i>powhera, tuturiwhatu</i>
Bar-tailed godwit	<i>kuaka</i>
Black shag	<i>koau</i>
Black swan	<i>kaki anu</i>
Black-backed gull	<i>karoro</i>
Canada goose	
Caspian tern	<i>taranui</i>
Grey duck	<i>parera, maunu</i>
Wood pigeon	<i>kereru</i>
Kingfisher	<i>kotare</i>
Little shag	<i>kawaupaka, koau</i>
Mallard duck	
New Zealand pied oystercatcher	
Variable oystercatcher	<i>torera</i>
New Zealand scaup	<i>papango</i>
Paradise shelduck	<i>putakitaki</i>
Pied stilt	<i>poaka</i>
Pukeko	<i>pukeko, pakura</i>
Shining cuckoo	
Spotted shag	<i>parekareka</i>
Spur-winged plover	
Welcome swallow	
White-faced heron	
White-fronted tern	<i>takkitak, tara</i>
Bellbird	<i>korimako</i>
South Island Tomtit	
Rifleman	
Brown creeper	
Fantail	<i>piwakawaka</i>

Birds

With the loss of forest habitat on the peninsula and the development of farmland, many forest and coastal birds could no longer survive. South Island robin, red-crowned parakeet/kakariki, kaka and weka disappeared from the peninsula and only a few tui remain.

With its long coastline, the peninsula provides habitat for many breeding seabirds. There are large breeding colonies of spotted shag/koautai on coastal cliffs and red-billed gulls/tarapuka on rocky islets. Some of the few remaining mainland breeding colonies of sooty shearwater/titi exist on isolated headlands. Two penguin species breed on the peninsula, the yellow-eyed penguin/hoiho in the outer bays and the white-flipped penguin/korora, which is endemic to the peninsula and Motunau Island. In forested areas, fantails/piwakawaka, brown creeper/pipipi, bellbird/korimako and rifleman/titipounamu can all be found. Wood pigeon are still numerous and, by dispersing around 70% of all native seed, are largely responsible for driving the recovery of native broadleaf forest on the peninsula. Wading birds such as oystercatchers, stilts, godwits and white-faced heron can be found on the peninsula's tidal flats.

Some introduced species are also found on the peninsula, with many of them now considered pests. Such species include Canada geese, magpies, rooks, black swans and sulphur-crested cockatoos.

Tui

Tui largely disappeared from the peninsula 20 years ago, although there are occasional sightings of solitary birds. A recent study carried out by Hugh Wilson suggests there is now enough forested

habitat around Banks

Peninsula to provide

year-round food to sustain a population of tui. Native plants attractive to tui and bellbird/korimako include kowhai, titoki, flax, native fuschia and kaikomako. Exotic species such as banksia, red hot poker and flowering gum (eucalyptus) are also food sources for tui and bellbird.

The Banks Peninsula Conservation Trust led a community group including Lincoln University, the Department of Conservation, Christchurch City Council, Environment Canterbury, Kaukapu Kereru, Tangata Whenua and interested individuals who have formed The Banks Peninsula Tui Restoration Project. In April 2009, 30 tui were successfully released in Hinewai Reserve and a further translocation of tui is planned for autumn 2010.



*Tui were released at Hinewai Reserve, April 2009.
Photo courtesy of Stephen Bradley.*

Aquatic invertebrates

Because of its island origins, some of Bank Peninsula's aquatic invertebrates are found nowhere else in the country. This is termed endemism. Among the list of endemic species are caddisflies and stoneflies, which spend their larval stage on the bottom of streams grazing on algae and slime layers on rocks, collecting and shredding leaves and other debris, or preying on other small insects. These insects, along with others such as mayflies and midges, suffer when exposed to agricultural contaminants and warm and un-shaded water, just like other closely related species found elsewhere in the country.

Studies on the peninsula have found that the greatest numbers of these "high value" insects are found where stream sections are edged by native forest. The same is true for some of our most secretive freshwater fish. Most forest on the peninsula is in small remnant areas, and its ecological value is often related to the size of the forest remnant and its position in the catchment (how far up towards the top of the stream it occurs).

Canopy forming trees are the most useful for shading streams and keeping water temperatures cool and optimum for fish and stream insects. Water emerging from springs and seeps (seepage areas) are generally of low and stable temperatures, but heat rapidly when exposed to the sun while flowing over dark coloured rocks. It takes a relatively short length of open stream to heat the water, but a long section of riparian (river bank or stream edge) vegetation to help reduce stream temperatures again to support healthy stonefly, caddisfly and mayfly populations. For this reason, it is most important to protect a waterway at or near its source higher up the valley. Bush cover at the headwaters of streams is extremely important for providing good conditions for aquatic insects, both at the site and further downstream.

Much can be achieved to further improve stream habitat and water quality for invertebrates and fish by retiring riparian land, fencing and planting stream sections further downstream. Environment Canterbury offers incentives to landowners to protect these most crucial of habitats through the Environment Enhancement Fund. Find out about the fund at www.ecan.govt.nz using the search words Enhancement Fund.



Fish and macroinverts Kotare Vale & Annelies Place. Photo courtesy of Rachel Barker.

MACRO-INVERTEBRATES



Water boatman



Worms



Crustacea



Snails



Fly larvae



Cased caddis larvae



Uncased caddis larvae



Mayfly larvae



Dobsonfly larva



Longfin eel/tuna, picture courtesy of Department of Conservation (Sonia Frimmel).



Shortfin eel/tuna, photo courtesy of Department of Conservation (Stephen Moore).



Inanga/Whitebait, photo courtesy of Department of Conservation (Stephen Moore).

Fish

Three representatives of the galaxiid family (koaro, banded kokopu, and inanga) are all found in peninsula streams. In addition there are several representatives of the bully family including redfinned bully, common bully in slower flowing water, and bluegilled bully and torrentfish/piripiripohatu, species most often associated with fast flowing water. There have also been unconfirmed sightings of giant kokopu/taiwharu, and possibly shortjaw kokopu. Banks Peninsula has the largest remaining populations of banded kokopu and redfinned bullies in Canterbury, and is also a significant stronghold for koaro, so protection of their habitats is important for their survival in the Canterbury region.

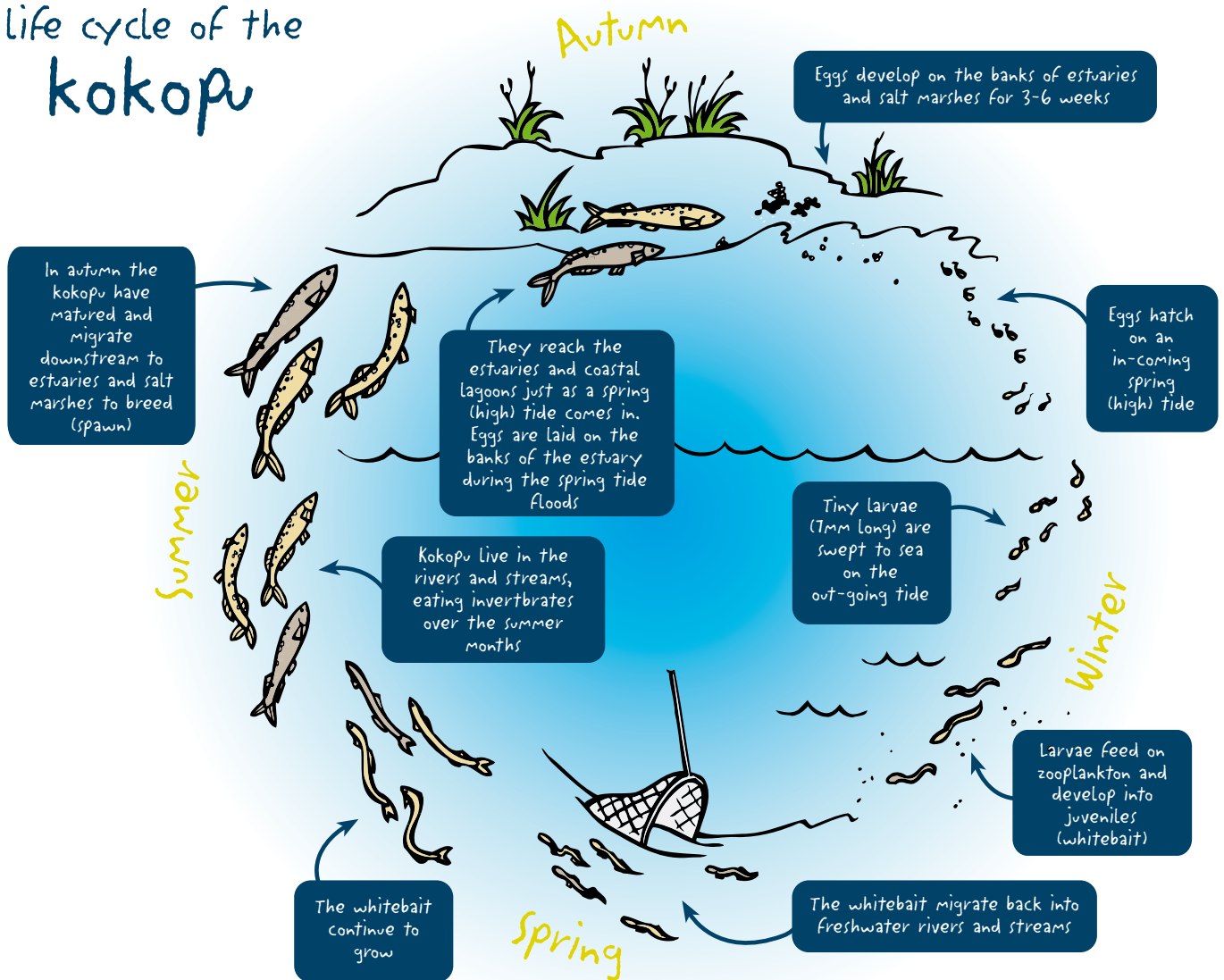
Eels

Longfin and shortfin eels are common in Banks Peninsula streams, and in particular the longfin eel can grow to large sizes in pools in forested streams. Shortfin eels are more common in the lower reaches of streams living in undercut banks and log jams closer to the sea. Some Banks Peninsula streams, including Hinewai's Narbey Stream and Akaroa Harbour's Wainui Stream, play host to another curious eel-like visitor, the lamprey. They are now rare and the seldom-seen lamprey has no eyes. It has a highly efficient disc-shaped mouth with rows of small teeth that enable it to suck onto rocks in fast water and onto prey. Their larvae (ammocetes) live buried in sandy areas of stream beds and feed by filtering out insects and detritus (rotting plant matter). The juveniles go to sea when about 2 years old and feed on marine fish, but return to streams as adults to spawn and die. The returning adult lamprey were once a highly favoured food delicacy for Maori and caught at specially constructed 'lamprey weirs'.

Inanga

Inanga is the fish species that makes up the majority of a whitebait catch in Canterbury. They don't venture far upstream but are common in all lowland stream reaches, which in their modified state, are often fringed by farmland and, increasingly, urban development. This in itself may not pose such a problem for inanga provided that grasses on stream banks are left to grow and overhang the stream. While marginally more tolerant of sedimentation and warmer temperatures than their forest galaxiid cousins, inanga nevertheless require a food source and a refuge from predation, which trailing river-edge vegetation provides. Dense streamside vegetation also provides ideal conditions for inanga to undertake a most remarkable feat. Inanga spawn (lay their eggs) in autumn, when adults migrate downstream to tidal and estuarine areas during the highest spring tides. And here's the amazing bit – eggs laid on the stream banks amongst dense vegetation during spring high tides spend 3-6 weeks developing completely out of the water – fish eggs growing on land! It is only when the eggs are re-submerged by the next high spring tide that they begin their life in water. But for this to occur, spawning adult inanga must have access to vegetation that will keep their eggs cool and moist during this crucial developmental stage.

Life cycle of the kokopu



Vegetation preferred by inanga includes flax roots and native sedges, but inanga may also spawn in rank grass. Streamside vegetation cropped close to the ground, as by sheep, or stream banks disturbed by cattle, provide a very poor environment for egg development and eggs very quickly dry out and die or are eaten by hedgehogs or rodents. Stock disturbance is the biggest problem where salt and freshwater meet in a waterway, as this is the place that inanga most typically spawn.

Once back in the water, the emergent larvae (7 mm long) are swept out to sea on the ebbing tide. The larvae spend the winter out at sea feeding on tiny oceanic plankton and then migrate back upstream in the spring. This is when Kiwis dust off their whitebait nets and head to the river mouth to catch enough whitebait for a pattie or two. The whitebait fishery is of great value to Ngai Tahu as mahinga kai. It is also an important recreational fishery, and some are caught and sold commercially. But to sustain the fishery, which has long been in a state of decline, we need to recreate some of the spawning and rearing habitat lost to native fish on the peninsula.

Koaro and banded kokopu

Koaro and banded kokopu, the two other galaxiids found on Banks Peninsula, are sometimes referred to as forest galaxiids because of their preference for cool forested streams. Their ability to overcome significant in-stream obstacles means they are found further upstream than inanga. Koaro are spectacular climbers and use their flattened fins to shimmy up waterfalls in order to reach shady forest streams. Indeed only the highest falls such as those at Long Bay defeat these determined wee fish in their quest to reach upstream habitat. Unfortunately the upstream migration of native fish is more often restricted by human-made barriers such as perched culverts and concrete fords. Inappropriately installed culverts placed a short distance upstream of a stream mouth may act as a barrier for fish access into an entire stream.

Koaro and banded kokopu spawn in their forest stream habitats rather than tidal areas like inanga. Like inanga they also lay their eggs on land, but they do this during floods rather than at high tides. Their eggs develop in damp vegetation for 3-6 weeks and hatch when the next flood soaks the river edge vegetation. Therefore, like inanga, their forest habitats need to be fenced or protected from trampling by cattle to avoid their eggs being destroyed. Just like inanga, the young go to sea as small larvae (8-10 mm long) and return as whitebait (30-40 mm long). Whitebaiters catch fish at peninsula stream mouths that are a mixture of inanga, koaro and banded kokopu. The koaro and kokopu can often be identified as they are the fish that wriggle to the top of the catch bucket, and climb up the sides of the bucket to escape.

Lizards

Prior to the loss of the peninsula's forest cover, lizards/ngarara were abundant on the peninsula. Lizards eat berries, small invertebrates and the nectar from flowers. They play a role in dispersing seeds and pollinating the flowers of some of our native plants. There are two main types of lizards in New Zealand, skinks and geckos.

What is the difference between a skink and a gecko? Skinks blink and geckos don't! Skinks are streamlined, fast and shiny, whereas geckos are velvety with a larger, broader head. Skinks and geckos are both present on the peninsula. Lizards are now restricted to small pockets of suitable habitat on the peninsula and consequently are at risk from further habitat loss as well as the additional threat of predation from cats, stoats, rats and magpies.



Jewelled Geckos. Photo courtesy of Department of Conservation.

There are two peninsula gecko species, the nocturnal Canterbury gecko/mokopapa (*Hoplodactylus maculatus*) and the beautiful jewelled gecko/moko-kakariki (*Naultinus gemmeus*). Both these species can be found in forest and shrubland, but the Canterbury gecko is more likely to turn up in your back garden under artificial cover e.g. roofing iron, concrete blocks. An easy and effective way of tempting lizards back into your garden is to lay down sheets of corrugated iron in a quiet part of your garden. Not only do lizards enjoy basking in the heat, but few predators can bother them there.

Three skink species exist on the peninsula, the common skink/mokomoko and McCanns skink/mokomoko, which can both be found in suburban gardens. The spotted skink/mokomoko is less common and may be found in tussock grassland, in sand dune vegetation and other coastal sites such as Kaitorete Spit.

Weta

There are two species of weta present on Banks Peninsula, the Canterbury tree weta (*Hemideina femorata*) and the rare Banks Peninsula tree weta (*Hemideina ricta*), which is found at only a few locations on the peninsula east of Pigeon Bay and Akaroa Harbour. The weta are nocturnal and during the day occupy holes in live trees and recently fallen logs. They feed on leaves, berries and small invertebrates. Both species are at risk from habitat loss and also predation from mustelids, possums, cats, rats and mice. Weta will readily use artificial homes called weta 'motels'. These 'motels' provide homes and protection for weta. Weta 'motels' are easy to make. See www.doc.govt.nz, using the search words weta motels, for details of how to make one.



Weta. Photo courtesy of Department of Conservation.

Vegetation

Of the 547 native plant species found on the peninsula, six of these are endemic to the peninsula, a legacy of the many million years that these plants evolved in an island setting. These species include the beautiful flowering shrub *Hebe stictissima*, and the Akaroa Daisy, *Celmisia mackau*.

Prior to the arrival of Polynesians, Banks Peninsula was covered with dense podocarp forest. By the time Cook sailed past in the Endeavor in 1770, large tract forest clearance had already taken place. Maori had cleared forest to cultivate kumara and bracken, to flush birds from forest cover and to create walking tracks along ridgetops. Forest clearance occurred on a much larger scale, however, when Europeans settled on the peninsula. When all the easily accessible timber was milled, large areas were burnt off in their haste to clear and cultivate the land. The evidence of this wholesale land clearance is still visible today in the form of twisted, bleached totara trunks strewn throughout paddocks on the peninsula.

By 1900 only fragments of the original podocarp forest remained. The majority of these remnants are at high altitude and their long-term viability is not assured due to their small size, inadequate buffers to outside influences and isolation from other seed sources. More recently gullies and roadside verges have been left to regenerate. Dominant shrub and tree species in regenerating bush include kowhai, ribbon wood, mahoe, fuchsia, broadleaf, five finger and kanuka. Approximately fifteen percent of the peninsula is now covered in regenerating forest. Although still threatened by possums, feral goats, pigs, and deer, regenerating bush in many areas has been fenced. There is a possum control programme run throughout the peninsula by a group of agencies, and several landowners are putting efforts into managing these pests on their own land.

If you stray from the track in one of the peninsula's reserves, you are likely to meet one the peninsula's most memorable plants. Native stinging nettle (*Urtica ferox*), or ongaonga, is common on the peninsula. Its leaves and twigs are covered in stinging hairs that will leave you itching for days if you accidentally brush against it. Ongaonga is, however, an important food source and hideaway for the red admiral butterfly. The caterpillars eat the leaves and then pupate on the plant, protected from birds and browsers by the stinging spines.



*Windswept tree at Paua Bay.
Photo courtesy of Rachel Barker.*



*Native stinging nettle
(Ongaonga). Photo
courtesy of Rachel Barker.*



*Red admiral butterfly. Photo
courtesy of Rachel Barker.*



Feral goats are a pest on the Peninsula as they eat native vegetation.

Introduced species

Goats, possums, pigs, deer, mustelids (ferrets, stoats and weasels), cats, people and various weed species including old man's beard, all pose risks to conservation on the peninsula.

A combined effort between the Department of Conservation, Christchurch City Council, Banks Peninsula Conservation Trust and Environment Canterbury aims to rid the peninsula of feral goats. Goats browse on all vegetation from grassland to native bush and, when medium to high densities are reached, goats can prevent forest regeneration and ring-bark mature trees causing them to die. In the past 4 years, over 3,900 feral goats have been culled from the peninsula.

Cats and mustelids threaten the survival of several bird species on the peninsula such as the ground-nesting penguin species and the burrow-nesting sooty shearwater, as well as weta and lizards. Control of these pest species is time-consuming and difficult. With complete eradication all but impossible, these species will need to be controlled indefinitely if the peninsula's native fauna is going to be protected.

Gorse

Gorse was introduced to New Zealand as early as the 1830s and propagated and sold to farmers as a hedging species. Gorse quickly escaped control in the New Zealand environment, taking over good pasture. Since then, farmers and other landowners have toiled to rid their properties of this weed with herbicide, fire and hand tools. Gorse can produce millions of seeds per hectare, and each seed remains viable for many years, often decades. Worse still, gorse thrives in modified environments so efforts by farmers to eradicate gorse using fire and earth-moving equipment produce ideal conditions for gorse regeneration.

Matt Bloxham spent years at Pigeon Bay and remembers the struggle and environmental costs clearly. "As a child in the 1970s, I remember one Pigeon Bay farmer spending thousands to clear a farm overrun with gorse, using colossal bulldozers. The hills were stripped bare, and the stream that ran alongside our place ran brown with sediment for weeks afterwards, yet the gorse soon returned".

When Hugh Wilson first took over management of Hinewai Reserve, it was a farm overrun with gorse. Recognising the potential to use gorse as a nursery for

shade tolerant native plant species, Hugh set about securing the reserve's boundaries and preparing the land to fast-track its transition from pasture back into forest. Much has been achieved, though not without significant work from Hugh and his army of helpers. Native seed dispersed amongst the gorse by wind and native birds have, with protection from the elements and nitrogen-rich humus, established more easily under gorse than they could within pasture. After about 10-20 years the gorse canopy eventually opens, providing light wells for natives to push through into the light; the natives eventually overtopping and shading out the gorse. While it is very much a long-term option, using gorse in such a manner is a viable way for controlling gorse and assisting revegetation through natural succession in areas of marginal farmland.



*Gorse used as a nurse crop to encourage regeneration of natives.
Photo courtesy of Prue Kennard.*

Banks Peninsula waterways

The state of streams on Banks Peninsula

With so many bays, harbours and valleys, the peninsula contains over 100 streams. Due to the nature of the landscape, the catchments are all short (less than 10 km long), and very steep, with lowland stream reaches generally measuring only a few kilometres long. In pre-European times (pre 1840s), upper headwaters would have issued from densely clad totara and New Zealand cedar montane forests. Lowland streams would have run through tall totara, matai, rimu and kahikatea podocarp (native pine) forests. The once vast areas of podocarp forest have mostly all gone now. Some reserves containing small remnant podocarp stands still exist, but they are small and vulnerable to fire, wind and animal and plant pests.

At higher elevations, snow tussock and the occasional alpine shrubland can be found. However pastoral farming dominates all but the steepest hill sides and valley floors. Streams are therefore much more open than before European colonisation. Other streams run through mixed podocarp forest, scrub comprising gorse and regenerating native bush, and pine plantations. By slowing the rate of movement of water into streams, dense riparian (river bank) and wetland vegetation helps to soften the flow peaks of flash flood streams, therefore helping to prevent erosion. Riparian vegetation also provides a buffer that traps contaminants and sediment that would otherwise enter streams with runoff from agricultural and urban land use, such as housing subdivision developments, roads and fertiliser application.

Historical changes in vegetation type and extent have wrought significant changes to aquatic habitat as well. Though helped by their steep and fast flowing nature, because they are so open and exposed, pastoral streams are nevertheless subject to contaminants from agriculture and heating by the sun, particularly as streams widen and slow down as they near the coast.



Hinewai. Photo courtesy of Brooke Turner.



Photo courtesy of Wayne McCallum.

Water quantity

Banks Peninsula streams are all quite small and many are ephemeral (stop flowing in the summer). Streams in Lyttelton Harbour are generally smaller and dry up sooner or more frequently than those in Akaroa Harbour and the outer bays. This is because of the (northerly) direction the harbour faces; meaning lower rainfall and more sun. Akaroa Harbour streams receive more frequent southerly rain and are less exposed to hot north-facing sun. The Akaroa Harbour rock is also generally more fractured and stores more water, allowing springs to flow more regularly and reliably all summer.

Forest or dense tussock cover prevents the land and soil drying out and so generally keeps streams flowing longer in the summer. Also where forest cover has been removed, loess soil is easily eroded and washed into streams during rainfall events. Streamside vegetation plays an important role in filtering and stopping excess sediment from getting into a waterway, and preventing stream bank erosion. Streamside vegetation also keeps water cool and reduces the amount of evaporation in the heat of the summer.

Water quality

Water quality of the springs and seeps (seepage areas) in the headwaters of peninsula streams is generally very good and the water is suitable for drinking. However, as it moves down the valleys the water is affected by widespread removal of streamside vegetation, stock use, agricultural activities such as fertiliser application, storm water run-off and urban development.

Movement of sediment is typical in many Banks Peninsula streams due to highly erodible soils and steep catchments. Mud and soil transported downstream is most often referred to as suspended sediment. Even streams such as Narbey Stream, which has thick streamside vegetation for almost its entire length, often has a milky appearance due to small amounts of sediment being held in suspension. This must be due in part to the contribution of Canterbury soil, transported by wind onto the peninsula for thousands of years, still having an effect on streams (according to Jon Harding of the University of Canterbury). Many native freshwater fish species are adapted to, and will tolerate a certain level of suspended sediment for short periods, such as during storms. However, few species will withstand prolonged high sediment loadings. Banded kokopu, for example, actively avoid streams with high sediment loadings and may in time disappear from such streams.



Red Bay. Photo courtesy of Rachel Barker.

Issues of concern for the streams and waterways

Tangata Whenua values

The whole of Banks Peninsula has considerable spiritual and physical significance to Ngai Tahu.

Issues that relate to Tangata Whenua values have many similarities to those identified in the other categories. However, issues specific to Tangata Whenua include:

- The degradation of the mauri or life force of waterways and stream health;
- The protection and enhancement of taonga (things that are highly treasured);
- Access to and quality of mahinga kai (food and fibre and traditional ways);
- The degradation of wahi tapu (sacred sites such as burial grounds).

The act of sourcing, processing and preparing of mahinga kai is an important mechanism for the transmission of culture within these communities. It is at these times of communal activity that whakapapa, histories, and cultural practices are discussed and handed down from one generation to another.

The breaking of this link has had a serious and damaging impact on Ngai Tahu tribal life. Because of its fundamental importance, the tribe is committed to restoring these resource-centred relationships and activities.

Underlining the importance of these natural resources is the necessity to manage the resources of any given area in a sustainable manner. Over many generations, and after some serious mistakes, these principles of sustainable management were developed, refined, and codified into the laws of society. They were then implemented through religious mechanisms and controls, such as the concepts of rahui and tapu (sacred).



Akaroa Harbour. Photo courtesy of Department of Conservation (M Perry).



Akaroa Harbour Issues Working Party community day.

Freshwater contaminants

Poorly protected freshwater systems are exposed from time to time to elevated levels of nutrients, suspended solids, pathogens, pesticides and herbicides, and other potential contaminants, such as heavy metals from stormwater; vehicle emissions and hormones in human sewage and animal effluent entering receiving waters. The ability of freshwater systems to deal with such contaminants is limited. Some contaminants such as heavy metals may accumulate in fish and insects in a water body. Others, such as excessive nutrient levels, may cause smothering of the stream bed with nuisance algae growths, bringing about changes in the composition of freshwater communities. In addition to these factors, Tangata Whenua are concerned about potential impacts on the spiritual quality of the water (mauri) and the protection of cultural uses of these waterbodies.

Where do the nutrients come from?

The bulk of the nutrients entering the waterways come from pasture and horticultural runoff, runoff from underground paddock drains, stock access to the waterways and stormwater. Nutrients bound to cultivated soils can also be blown or washed into waterways. Nutrients can also enter surface waters (streams, river and lakes) via groundwater (water travelling through the soil). This is a result of nutrients being washed through the soil (called leaching) into the groundwater. There is widespread evidence that waterways are affected by increases in concentrations of phosphorus and nitrogen from animal wastes and fertilisers. Banks Peninsula streams typically have higher levels of phosphorus than are found in streams in other parts of the Canterbury region, due to the volcanic rocks being rich in phosphorus. Excessive inputs of nitrogen, which can only occur through agricultural activities, such as fertiliser application and effluent disposal, should therefore be avoided to prevent impacts such as dense nuisance slimes and weeds in streams.



Well planted streams provide shade, habitats, bank stability and filtration of contaminants.

Suspended solids and sedimentation

Suspended solids include soil, rock dust, faecal and plant matter. Suspended solids affect the clarity of streams. When suspended solids drop out of suspension and onto the bed of a stream, they can smother aquatic plants, invertebrate habitat, and fish spawning sites. Invertebrates make up much of the food source for fish.

High levels of suspended solids make stream waters murky, which means that sight-feeding fish have difficulty locating their food. In addition, the aesthetic and amenity values of the streams are compromised. Furthermore, heavy metals and nutrients such as phosphorus bind themselves to suspended solids and get into streams during rainfall.

Sedimentation is a particularly important issue on Banks Peninsula due to the easily eroded loess soils, the historical removal of vegetation (which is slowly being re-planted) and the sensitive ecosystems that inhabit the lower reaches of streams and the harbours and bays where sediment settles out.



Stream banks with few plants which are open to stock are prone to erosion.

Faecal contamination (bacteria and viruses)

Faecal contaminants can enter the water through poorly maintained septic tanks, live stock access to streams and poorly managed disposal of animal wastes (such as from dairy sheds). These contaminants, which include pathogens such as viruses and bacteria, are a health risk to humans and stock that drink the water. Faecal contamination in streams can also be transported into the harbours and bays and create a health risk to those who use these areas for recreational activities like swimming, diving, surfing and boating, and the collection of shellfish.

Stock issues

Stock in local waterways can be a significant issue. Cattle often defecate and urinate when they wade in water because of what is often referred to as a reflex action. Cattle effluent can make the water unsuitable for swimming, drinking, stock drinking water or food gathering. Cattle effluent also reduces water quality by introducing nutrients that encourage excessive plant growth, and ammonia that is toxic and can kill fish and invertebrates.

If waterways in the area are fenced off, cattle can not wander close to the water and in and out of streams and drains. Bank stability is maintained and erosion, a cause of increased siltation, is reduced. This will assist in making the water clearer and cleaner, ensuring the habitats of birds, fish and invertebrates are protected. Fencing streams on the peninsula is not always an easy task because of the steep and often rocky terrain, but stock management techniques such as putting on water troughs or controlled limited access to the stream for stock water can help.



Before fencing - stock can access stream and contamination and erosion occurs.

Chemical use near waterways

Many of the farms on the peninsula struggle with weeds such as gorse and broom taking over farmland. Where it is not economic to allow the pasture to regenerate into native forest, herbicide sprays are often used to control these weeds. Herbicides may be applied by hand, truck or helicopter. Fine herbicide spray can easily drift into streams. Once in a waterway, these toxins work their way into harbours, estuaries and the sea. The toxins can affect the behaviour and reproduction of aquatic animals, and can even kill them.

Urbanisation

Urban development in a catchment can affect freshwater ecosystems. Sediment can be blown or washed into waterways during subdivision development. Covering the land with impermeable concrete surfaces causes:

- Flash floods – rapid peaks in water runoff increasing erosion and changing the composition of animal and plant communities.
- More contaminants reaching waterways, particularly where stormwater treatment devices are not very effective.



After fencing - plants maintain bank stability and contamination of waterways is reduced.

Taking drinking water from streams can reduce stream flow and create habitat losses for fish and aquatic invertebrates. Water demands during summer months from Akaroa residents and visitors puts pressure on the local waterway flows.

Environment Canterbury seeks to reduce such impacts using rules, policies and methods in its water and land plans and in its input to the regional and district resource consent process.



Other issues

Other issues that affect Banks Peninsula waterways include:

- Unmanaged invading willow, wattle and sycamore trees and other weed species;
- Increased numbers of livestock;
- Excessive fine sediment runoff;
- Stormwater runoff.

What is being done to manage waterways on the peninsula?

Below is a list of groups actively involved in protecting the unique Banks Peninsula environment. This is not an exhaustive list and many locals and groups are putting much effort and voluntary time into looking after and restoring waterways on the peninsula.

Environment Canterbury

It is Environment Canterbury's role to manage and sustain the natural and physical resources of the Canterbury region. This includes monitoring and controlling waterway levels, water and discharge permits and water quality. Environment Canterbury is also responsible for controlling plant and animal pests in the area.

'Living Streams' is an Environment Canterbury programme that builds partnerships within local communities, to enable and encourage the best environment possible for our streams.

The Resource Care team at Environment Canterbury currently works with landowners, local community groups and agencies to maintain and enhance a number of streams on Banks Peninsula.

Te Runanga

The Runanga on the peninsula are undertaking waterway enhancement projects and re-creating mahinga kai resources. For example, Onuku Runanga, Wairewa Runanga, Te Runanga o Koukourarata, and Te Hapu o Ngati Wheke (Rapaki) have all carried out native planting on, and fencing of, waterways near their Marae. Te Runanga o Koukourarata is re-creating a Pa Harakeke resource so that there is an improved harakeke (common flax) resource for weaving.

Banks Peninsula Conservation Trust (BPCT)

A community group and charitable trust since 2001, with a vision to create an environment in which the community value, protect, and care for the biodiversity, landscapes, and character of Banks Peninsula. The BPCT works with landowners and agencies to promote the conservation and enhancement of indigenous biodiversity and sustainable land management on Banks Peninsula through events, presentations, newsletters and publications. The BPCT is a covenantee authority and can offer a Conservation Covenant to landowners who wish to protect natural areas on Banks Peninsula. BPCT can assist landowners in voluntary covenanting by applying on their behalf for funding. BPCT coordinates a Banks Peninsula conservation forum, biodiversity monitoring, pest management strategies, and is coordinating translocations to bring back tui to the peninsula. BPCT also has a volunteer restoration group which carries out weed control and planting.

Governors Bay Landcare Group

A community group with a vision of working together to care for Governors Bay – our land, nature and each other. The Governors Bay Landcare Group works with landowners and agencies to coordinate pest plant and animal control, raise awareness of the importance of caring for local streams, and to protect and enhance biodiversity.



Akaroa Harbour Issues Working Party

A long-standing community group (since 1999) made up of enthusiastic, dedicated locals whose aims and vision are to promote a sustainable and improved harbour for present and future users. Its purpose is to provide a forum for the community to consider and decide on the uses and environment of the harbour. Environment Canterbury facilitates the group meetings and Christchurch City Council and Department of Conservation provide useful updates on their environmental activities in the Akaroa area. The meetings are an opportunity to raise issues, questions and suggestions then all work together to try to find the best solutions to problems and opportunities.



Lyttelton Harbour Issues Group

A long-standing community group (since 1999) with a vision to improve the harbour environment and habitat and achieve a fair balance between all interests. Goals identified by the group include improving public education about harbour environmental issues; greater awareness of, and input into, Christchurch City Council and Environment Canterbury activities and policies, and creating a forum for cooperation between communities and agencies to find solutions to common problems. The group has a broad range of members, both private individuals and representatives of the other many local community groups. It also includes representatives of organisations such as Environment Canterbury, Christchurch City Council, Department Of Conservation, Lyttelton Port Company, Community and Public Health, Te Hapu o Ngati Wheke (Rapakī), Te Runanga o Koukourarata (Port Levy), Te Runanga o Ngai Tahu, and University of Canterbury.



Department Of Conservation (DOC)

DOC is responsible for the management of protected species and ecosystems, providing for public enjoyment of public conservation lands, conserving historic resources to protect areas and promoting the conservation of natural and historic resources generally. This includes the preservation of indigenous freshwater fisheries and the protection of recreational freshwater fisheries and their habitats. There are a number of reserves managed by DOC on the peninsula, many of which have walking tracks.



Christchurch City Council

Christchurch City Council is responsible for a variety of community services including maintaining local parks and reserves in the city and on Banks Peninsula. The council manages the peninsula through the district plan. The Christchurch City Biodiversity Strategy 2008-2035 establishes a vision for biodiversity in the city and on the peninsula and provides key goals and objectives for the many organisations and individuals involved in the protection and enhancement of local biodiversity. The Biodiversity Strategy goals include:

- conserve and restore indigenous biodiversity in Christchurch and Banks Peninsula;
- priority species are protected and restored;
- ecosystems supporting biodiversity are protected and restored;
- species and habitats important to Ngai Tahu are protected and restored;
- pests are managed to minimise their impact on biodiversity;
- new Council policies will take account of the Biodiversity Strategy.





Kereru. Photo courtesy of Department of Conservation.



Kayaking with Hector's dolphins. Photo courtesy of the A.R.E.V.A. Project.



Jewelled Gecko.

Activities

Below are some activities that will enable students to gain a better understanding of the values of Banks Peninsula waterways. The activities are designed to enable students to raise public awareness about the state of Banks Peninsula waterways.

- Locate Banks Peninsula on a map and find the waterway(s) closest to your school and/or home. You could draw your own map showing other nearby rivers, roads, settlements, and different land-uses. You can also access GIS (geographic information system) maps from the Environment Canterbury website: www.ecan.govt.nz.
- As a class, discuss what has an effect on these waterways and who is involved.
- Role play - divide the class into different representative groups who interact with the waterway e.g. farmers, businesses, bach owners, recreational fishers, environmentalists etc. Have them brainstorm arguments as to why their activity should be allowed to continue and whether the positives outweigh the negatives. Each group should present their arguments to the class.
- Undertake a restoration project for one of the waterways. Create a long-term plan looking how it will be organised and tended to in the future. Section Four of the Waitaha Wai water education resource gives more detail on how students could do this.
- You could undertake a study to find out what birds, fish and aquatic invertebrates live and use your chosen waterway.

Ask questions such as:

- Why does it come to/live in the waterway?
- Where else could it go?
- What issues will this species have to contend with in the future?
- Write a story from the perspective of either an early Maori or European settler. Take yourself back in time and imagine you are one of these. Imagine what Banks Peninsula and its waterways would have looked like and what you would have seen there. Where would you live? What would you use for tools? What would you eat? How would you provide for your family? Focus on water and how early settlers' lives relied upon it.
- Talk to your family/whanau or local iwi, friends and neighbours, local fisher people and business people about their memories of the peninsula and its waterways. How has it changed? You could interview a member of the Historic Places Trust or a local community group. Write up the stories for display in school or write up a play showing how the waterway has been modified by people.
- Undertake a study of the waterways on the peninsula. Highlight the similarities and differences and why these are so important.
- Write a short play highlighting a restoration issue. Perform it to other classes in your school. Host a question and answer session afterwards.
- What have you seen lately that you feel might have a negative impact on a Banks Peninsula waterway? Design a poster identifying the issues surrounding the waterway with symbols to show tourists or recreational users how to look after the area. The poster could also target homeowners or land developers. Symbols could include an empty tin can to signify litter or a skull and crossbones to illustrate poisons.

Using the table below, identify the species of traditional importance to Tangata Whenua. How many are there? Research one species noting where it lives, what habitat and food it requires, why it is highly valued by Maori and what threats there are to its survival. Develop a presentation of your research for your class.

Ika (fish)	
Maori name	English name
tuna	eel
inanga	adult whitebait
kokopu	native trout
mata	juvenile whitebait
patiki totara	yellow-belly flounder
mohoao	black flounder
patiki	sand flounder
kakahi	freshwater mussels
waikoura	freshwater crayfish
Manu (birds)	
Maori name	English name
pukeko/pakura	swamp hen
putakitaki	paradise shelduck
papango	New Zealand scaup
parera	grey duck
ka hua	eggs
karoro	black-backed gull
kaki anau	swan
koau	shag
Ka rakau (plants)	
Maori name	English name
whiwhi/wewe	reeds and sedges
ti kouka	cabbage tree
raupo	bullrush
harakeke	flax
aruhe/tauhinu	fern root (bracken)
pingao	sand sedge
watakirihi	watercress
toe toe	sedge grass
Marine mammals	
Maori name	English name
kekeno / pakake	fur seal
aihe	dolphins
tohora	right whale



Pukeko.



Photo courtesy of Chandra Littlewood.



Photo courtesy of Wayne McCallum.

Things you can do at home:

- Talk to your parents about directing the rainwater that runs down the spout away from the stormwater drains and into a large plastic drum. This can be used to water the garden and recharge the groundwater (See your local recycling centre about getting a drum).
- Naturalise your garden so it can soak up rain: provide habitats and food for birds.
- Pick up the rubbish around the streets to prevent it from finding its way into the river.
- Wash your car on the lawn, not the road, and use a bucket, not a hose.
- Research the plant species that could be planted along river banks to assist restoration. Develop an action plan and organise a planting day.
- Monitor the stream near your home or farm to see how healthy it is. Talk to landowners about fencing streams and riparian plantings.



Akaroa Harbour Issues Working Party community day.



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