

Exploring an Estuary

A Field Guide to Te Ihutai/Avon-Heathcote Estuary
Ōtautahi/Christchurch

Third Edition, 2019



THIS GUIDE INCLUDES:

MAPS WITH SITES OF
HISTORIC & NATURAL INTEREST,
WALKING TRACKS,
BIRD-WATCHING GUIDE,
AND MUCH MORE



Winter sun sets over Moncks Bay
behind Rapanui/Shag Rock



PHOTO © BRONWYN GAY



PHOTO © EOS ECOLOGY / SHELLEY McMURTRIE



PHOTO © SHELLEY McMURTRIE

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Third Edition, 2019



written by Shelley McMurtrie and Sonia Kennedy / EOS Ecology

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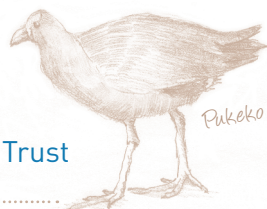
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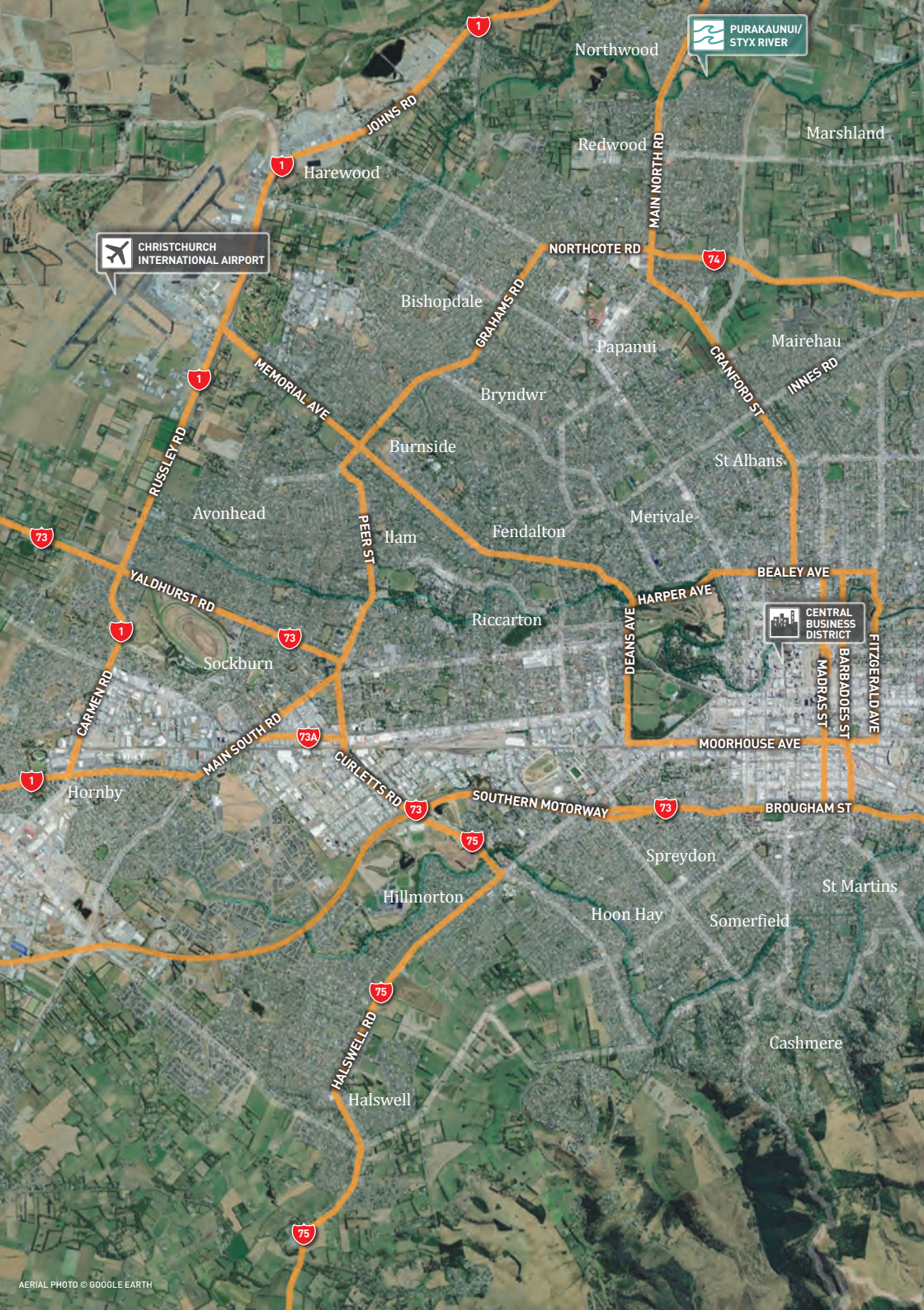
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Contents...

- 2 Ōtautahi/Christchurch City Map
- 4 Life in the Estuary
 - 6 Te Ihutai/Avon-Heathcote Estuary Habitats
 - 8 Best Bird-watching
- 10 History of the Estuary
 - 10 Māori
 - 12 European
 - 14 Earthquakes
- 16 Te Ihutai/Avon-Heathcote Estuary Sites of Interest Map
 - 18 Clifton Hill
 - 20 Rapanui/Shag Rock
 - 21 Moncks Bay
 - 22 Beachville Road
 - 24 McCormacks Bay
 - 26 Ōpāwaho/Heathcote River Mouth
 - 28 Settlers Crescent
 - 30 Charlesworth Wetland
 - 32 Humphreys Drive
 - 33 Sandy Point
 - 34 Wastewater Treatment Ponds
Te Huingi Manu Wildlife Refuge
 - 36 Bexley
 - 38 Ōtākaro/Avon River Mouth
 - 40 Pleasant Point Yacht Club
 - 42 South New Brighton Park
 - 43 Ebbtide Street
 - 44 Penguin Street
 - 46 Spit Reserve/Te Karoro Karoro
- 48 Avon-Heathcote Estuary Ihutai Trust





PURAKAUNUI/
STYX RIVER

CHRISTCHURCH
INTERNATIONAL AIRPORT

CENTRAL BUSINESS
DISTRICT

Ōtautahi/Christchurch City Map

 BOTTLE LAKE FOREST PARK

 PACIFIC OCEAN

 TRAVIS WETLAND NATURE HERITAGE PARK

 ŌTĀKARO/AVON RIVER

At 880 hectares Te Ihutai/Avon-Heathcote Estuary is the largest semi-enclosed estuary in Canterbury. It has a catchment of over 20,000 hectares that includes urban and rural land uses. The city's two main rivers, the Ōtākaro/Avon River and Ōpāwaho/Heathcote River, discharge into the Estuary and so link it to the wider catchment.

Map of the Estuary enlarged on page 16



 TE IHUTAI / AVON-HEATHCOTE ESTUARY

 ŌPĀWAHO/HEATHCOTE RIVER

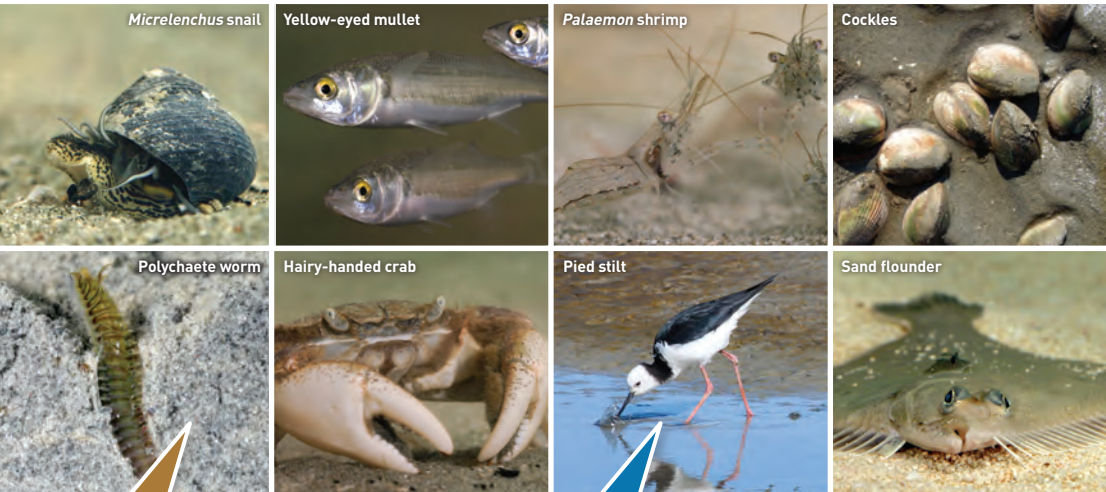


 GODLEY HEAD PARK

 WHAKARAUPŌ/ LYTTELTON HARBOUR

Life in the Estuary

ALL PHOTOS © SHELLEY McMURTRIE



Polychaete worms make up 98% of the Estuary's low tide fauna, reaching densities in excess of 20,000 worms per square metre.

Te Ihutai/Avon-Heathcote Estuary supports over 30,000 birds at different times of the year; and is home to many fish and invertebrates.

What is an Estuary?

Forming where fresh river water mixes with sea water in a semi-enclosed basin, an estuary is protected from strong shore currents and ocean waves.

These sheltered conditions, the mix of fresh and salt water, and the rich sediment washed into an estuary from rivers creates an environment abundant in life. Four times as productive as New Zealand's prime pasture, an estuary is home to huge numbers of invertebrates (such as crabs, worms, snails and shellfish), and attracts a wide variety of fish and birds to its sheltered habitat.

Estuary Life

Living in an environment with extreme changes in salinity, exposure at low tide, and lack of varied habitats is challenging. So despite their productive nature, estuaries are not overly

diverse in terms of the species that live there. Yet some invertebrates—such as mudflat snails, tunnelling mudcrabs, cockles and polychaete worms—have learned how to survive and even flourish in these unique conditions.

Fish use estuaries either as a sheltered, food-rich nursery for young fish (e.g. īnanga/whitebait), a migratory route between rivers and the sea (e.g. yellow-eyed mullet and tuna/eels), or as a permanent home (e.g. flounder).

Birds are the most visible wildlife feature of our estuaries, and with well over one hundred species reported, Te Ihutai/Avon-Heathcote Estuary is a great bird-watching spot. While many birds make the Estuary their permanent home, numbers swell to over 30,000 individuals at different times of the year. These seasonal visitors come for the abundant food that they need to get through the energy-intensive post breeding and moulting seasons.

Wetland of International Significance

The importance of the Estuary to visiting birds was formally recognised in 2018, when it became the only urban wetland in Australasia to join the East Asian-Australasian Flyway network. Formed in 2006 to protect migratory water birds and their habitat, the network includes 138 wetlands in twenty countries used by migratory birds, especially those on their way to/from the Arctic. Only four other areas in New Zealand are recognised by the Flyway network.

Proximity Versus Pollution

Te Ihutai/Avon-Heathcote Estuary is the largest semi-enclosed, shallow estuary in Canterbury. At approximately 800 hectares it is relatively small on a global scale, but this belies its value as a place special to people for its rich history, plentiful wildlife, beautiful scenery, recreation, and mahinga kai (food gathering) potential.

As an urban estuary, it offers the advantage of easy access, allowing visitors to interact

with their environment. However, it is this very proximity to urban development that has caused a gradual decline in its health and biodiversity values.

One of the functions of an estuary is to filter and process the water that flows through it. With an urban catchment, stormwater and associated contaminants (such as heavy metals) flow into the Estuary directly, or via the city's main rivers. Sewage can also bring in further contaminants (such as microplastics) and excess nutrients—and while treated wastewater is no longer discharged to the Estuary, overflows from the city's sewerage network can sometimes happen during floods. Settling in the sediment, these contaminants enter the food chain where they are taken up by tiny invertebrates that are in turn eaten by fish and birds, compromising health and mahinga kai values.

As the tide flushes in and out, almost 9,000,000 cubic metres of water moves through Te Ihutai/Avon-Heathcote Estuary twice a day.



PHOTO © SHELLEY McMURTRIE, 2009

Te Ihutai/Avon-Heathcote Estuary Habitats

TIDAL HABITATS

As the tide washes in and out it exposes the Estuary bed for different amounts of time. Combined with sediment type the tide cycle controls what lives in the different tidal zones.

HIGH TIDE

MID TIDE

LOW TIDE

WETLAND

Wetlands are lands that are permanently or seasonally inundated. Often referred to as swamps or marshes, the water in wetlands can be fresh water, salt water or brackish. There are artificial freshwater wetlands (wastewater treatment ponds) and enhanced brackish wetlands around the Estuary, which make for seasonal bird havens.

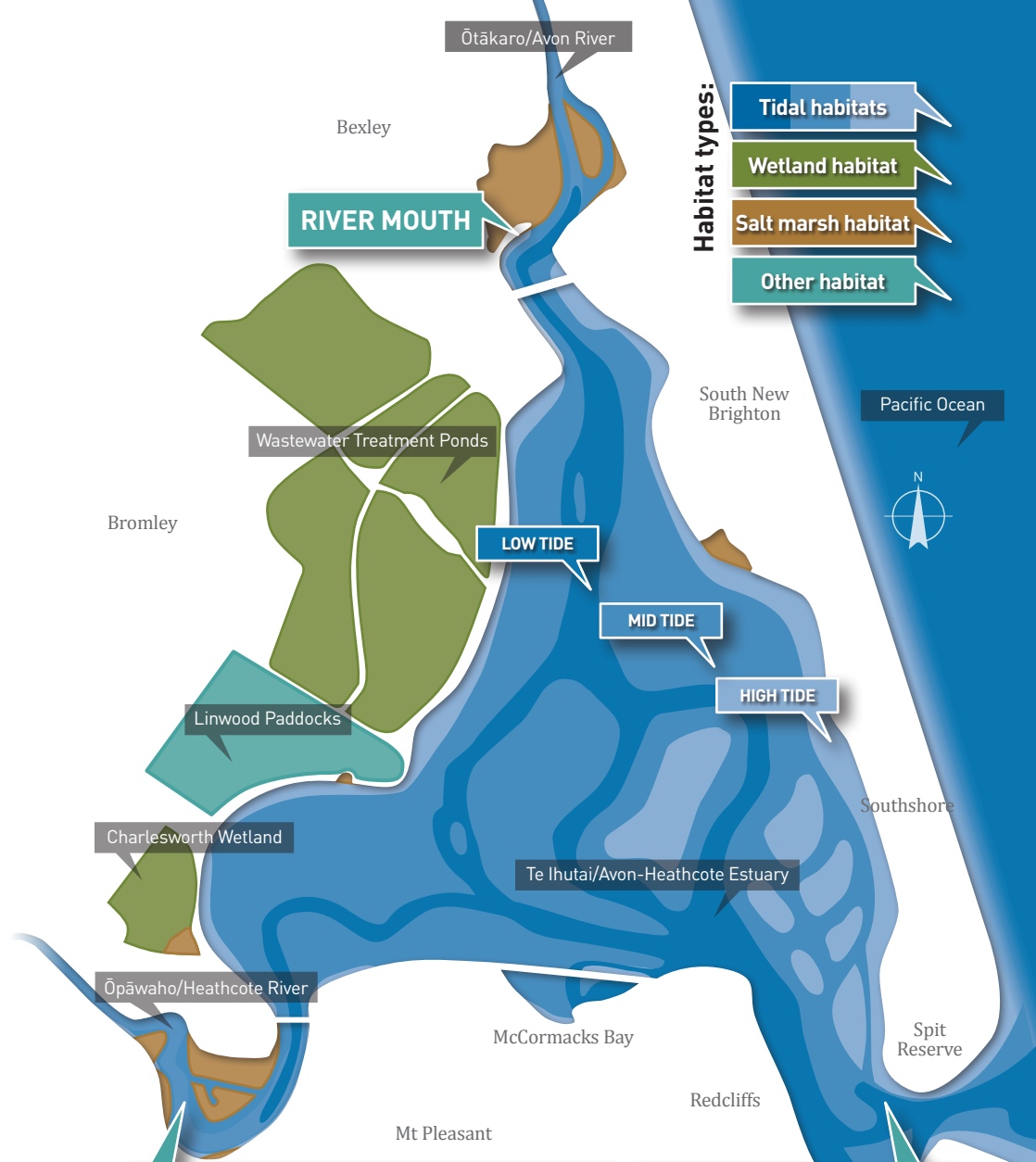
SALT MARSH

Salt marshes are found above the mid tide mark and are influenced by tide and salinity. Plants more tolerant of high salt levels grow closer to the mid tide mark. The main salt marsh plant of Te Ihutai/Avon-Heathcote Estuary is the sea rush (*Juncus kraussii*).

The HIGH TIDE area is the first to be exposed and the last to be covered by the tides. Containing drift algae, these sandy or gravelly areas are dominated by beach fleas (amphipods) and mud crabs. Retaining walls have reclaimed the natural high tide zone in many areas around the Estuary.

As the tide rises and the water spreads out over the mudflats, fine silty particles in the water settle out to make the MID TIDE area muddier than the high tide zone. The native mudflat snail (*Amphibola*) is the most visible animal of the mid shore during low tide. Crabs, polychaete worms and cockles dominate lower down the shoreline, while seagrass (*Zostera*) is the only New Zealand flowering plant able to live below mid tide.

The deep channels are a haven for fish during LOW TIDE, while at high tide schools of fish move across the inundated mudflats to feed. The main fish of the Estuary are sand flounder, yellow-bellied flounder, common sole, yellow-eyed mullet, kahawai, spotty, cockabully, globefish and common bully.



Habitat types:

- Tidal habitats
- Wetland habitat
- Salt marsh habitat
- Other habitat

RIVER MOUTH

RIVER MOUTH

The mix of salt and fresh water near the river mouth causes fine particles to drop out of the water column, making for a siltier habitat than elsewhere in the Estuary. The mudflats here are densely populated by tunnelling mudcrabs and the tiny (6 millimetres) brackish snails *Potamopyrgus estuarinus*—these like the fine silt and can cope with the changing salinities.

ESTUARY MOUTH

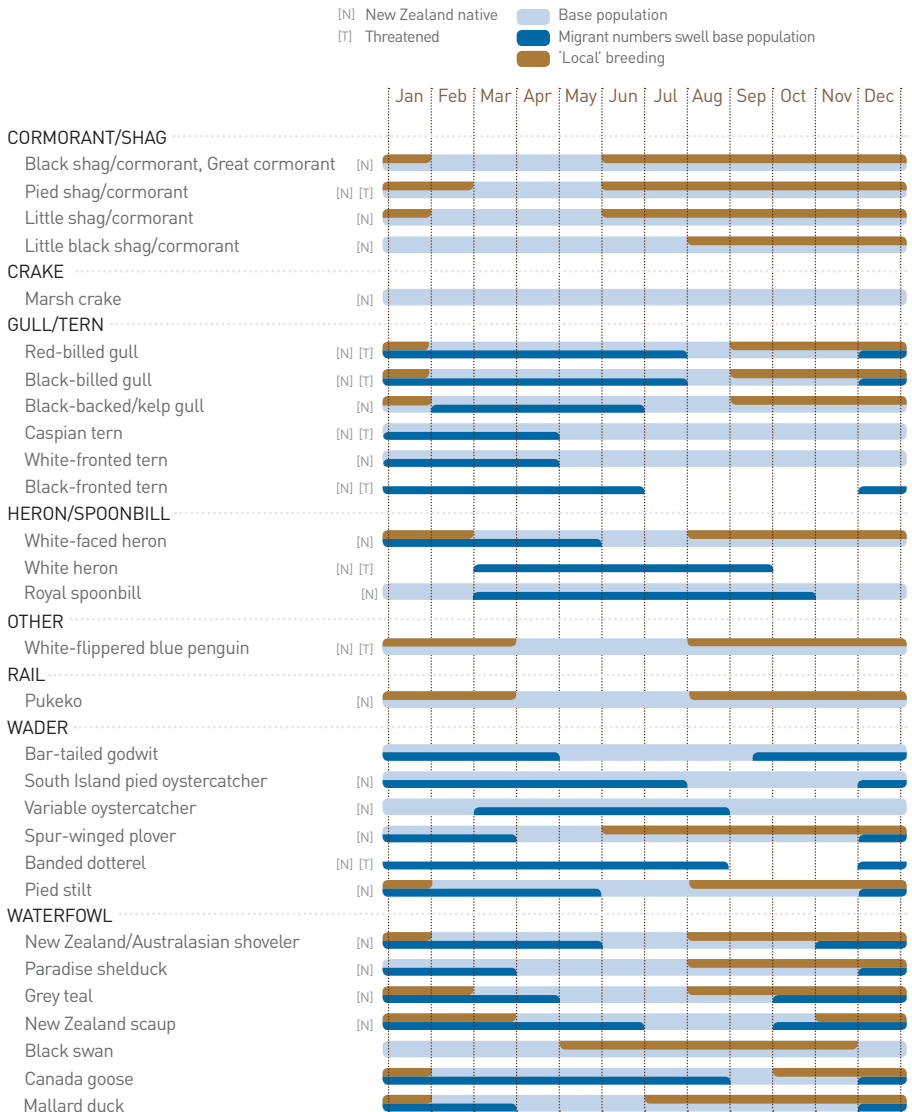
Incoming tides drop their heavier, coarser particles (like sand) near the mouth of the Estuary. Animals that live here cannot tolerate much fresh water, and are more like the animals that live along an open shore.

Best Bird-watching






Annual Cycles

What birds you see on the Estuary will depend on what time of the year you are out and about. Some species have a permanent base population, while a number overwinter away from their breeding grounds. Others merely stop in for a rest and a feed on their way elsewhere.



Base information provided by Andrew Crossland, CCC. Valid for 2010-2019.



-  Key bird BREEDING site
-  Common MID-HIGH tide ROOSTING area
-  Good bird-watching and photography area

History of the Estuary / Māori

The First Settlers

Te Ihutai/Avon-Heathcote Estuary is of great cultural and historical importance to tangata whenua/people of the land within Canterbury. Well before the arrival of Europeans in 1850, Te Ihutai was a place of settlement and food gathering for people of Waitaha, Ngāti Mamoe and Ngāi Tahu iwi/tribes.

Waitaha were the first to settle, living in two main kainga/settlements around the Estuary—Te Raekura/Redcliffs and Te Kai o Te Karoro (where South New Brighton Park now is). Ngāti Mamoe settled here in the 1500s on Tauhinu Korokio, known today as Mt Pleasant. In the 1600s Ngāi Tahu established a pā/fortified village in Kaiapoi, about twenty kilometres north of Christchurch, and a settlement at Rāpaki in Whakaraupō/Lyttelton Harbour. Instead of permanently living around the Estuary, Te Ngāi Tūāhuriri runanga and runanga of Rāpaki visited and used the area extensively as a mahinga kai.

Mahinga Kai

The people of Waitaha, Ngāti Mamoe and Ngāi Tahu moved from site to site as hunter-gatherers, depending on seasonal availability of food. Whare/houses were built from local materials such as flax, raupō and native trees, and caves along the shoreline between Redcliffs and Sumner provided not only shelter but also materials for making tools and red pigments for dye.

Their diet was varied thanks to the abundant food naturally on offer, such as tuere/blind eels, tuna/eels, īnanga/whitebait, pātiki/flounder, pipi/shellfish, tuangi/cockles, and whētiko/periwinkle. The sandy soils found at places like the mouth of the Ōtākaro/Avon River also allowed for the cultivation of edible roots like kūmara and aruhe/fern root, while the mouth of the Ōpāwaho/Heathcote River was used as

Hinaki set at mātuka weirs near the mouth of a river could catch vast numbers of eels—50 kilograms or more at one setting. Mātuka stumps are all that remain in the Estuary from these early fishing feats. These photos (from other parts of New Zealand) show how pā auroa/eel weirs worked.

Model eel weir. Hinaki attach to the mesh cane poha and contain the eels.

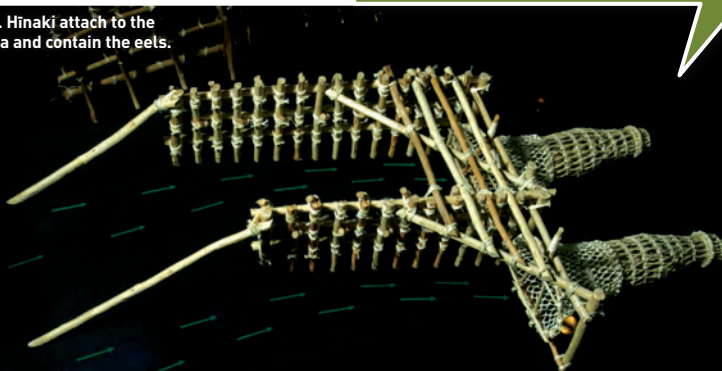


IMAGE: JOHN PUKETAPU (MUSEUM OF NEW ZEALAND TE PAPA TONGAREWA, ME023821)

a kainga nohoanga/seasonal settlement and gathering place for travellers.

A sophisticated mix of tools were used for fishing; from nets, spears and eel weirs built of mānuka, to horseshoe-shaped fish traps built of stone. Hīnaki/eel pots were also set at mānuka weirs near the mouth of the rivers, capturing large numbers of eels during their migrations. With no electricity and seasonal shifts in food availability, food preserving was essential. Tuna/eels and īnanga/whitebait were dried on racks in the sun while more oily fish were stored in kelp frond containers, and after cooking pipi were strung together with flax and left to dry.

A Trading Resource

The network of waterways draining into Te Ihutai were used to access other lowland Canterbury water bodies, from Te Waihora/Lake Ellesmere to the Kōwai River. As part of a key trade route and social network between hapū/clans and whānau/extended family, food and resources from Te Ihutai were traded throughout Te Waipounamu/South Island. In later years this trade also extended to early

The use of the Heathcote River is reflected in its traditional name—Ōpāwaho meaning ‘seaward pā’, O Hika Paruparu (the Estuary end of the Heathcote River) is ‘muddy fishing place’.

European sealers and whalers. Bird preserves, tuna and cultivated aruhe were common items traded between whānau, while flax and kūmara were sometimes exchanged for European items such as muskets and steel axes.

Hunting and gathering from surrounding rivers and wetlands were carefully managed by dividing the area into wakawaka/sections that were looked after by local hapū or whānau, with rāhui/restrictions protecting their gathering rights.

Displacement from Te Ihutai

By the 1900s increased development and pollution from European settlements rendered traditional kainga nohoanga and mahinga kai areas unsuitable. Long-held settlements around Te Ihutai were abandoned in favour of more distant areas such as Tuahiwi (north of the Waimakariri River), Wairewa/Little River, Ōnuku/Akaroa and Koukourārata/Port Levy. For tangata whenua, Te Ihutai became—and remains—a lost resource.

In 1868 a 10 hectare Māori Reserve named Te Ihutai (Māori Reserve 900) was established on the northern edge of the Estuary to recognise and preserve the fishing rights of Ngāi Tahu in this area. However, in 1956 the Reserve was compulsorily taken under the Public Works Act for the sewage treatment works, but monetary compensation was not accepted by the Reserve owners. This confiscation of land, and the subsequent offensive discharge of human effluent into the Estuary, has been an issue ever since. The Ihutai Ahu Whenua Trust represents those who claim ownership to the reserve.

Large fine-meshed hinaki for catching eels



PHOTO: J.R. STANTON (MUSEUM OF NEW ZEALAND TE PAPA TONGAREWA, MA_B.013380)

History of the Estuary / European

Trade and Travel

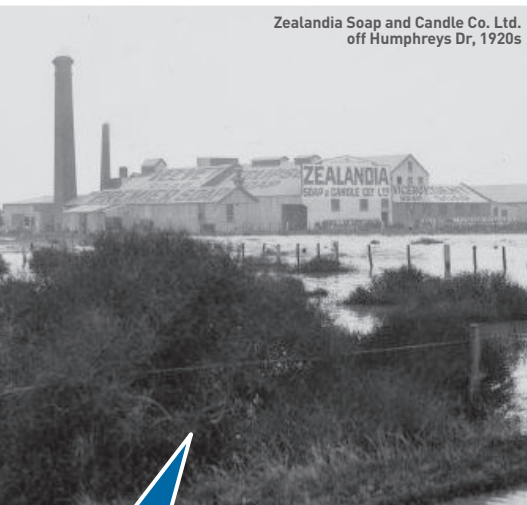
As with Māori settlers before them, early European settlers soon found the Estuary and its two rivers essential to their livelihood. The Estuary was a key trading post with ships bringing not only provisions, livestock, and farming machinery but also social contact to these isolated communities. The rivers flowing into the Estuary were their lifeline to the wider world, with their homesteads and small settlements surrounded by wetlands, the steep Port Hills and dense bush.

The deeper Ōpāwaho/Heathcote River channel was used by trading ships heading through the Estuary to St Martins, while schooners used the Ōtākaro/Avon River to take freight and passengers closer into the new town of Christchurch. Even into the 1880s,

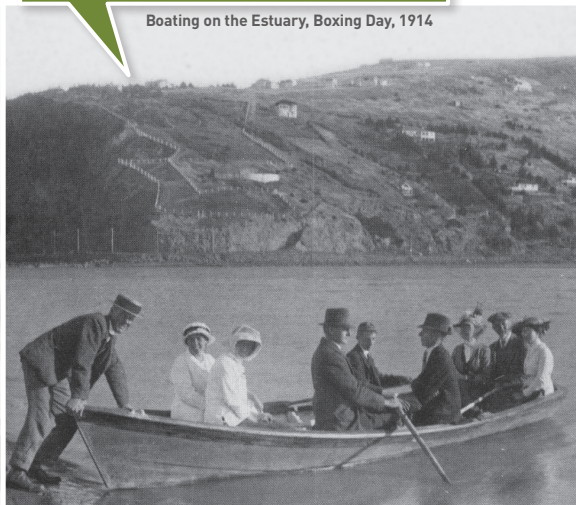
residents were still taking a passenger steamer up the Ōtākaro/Avon River to make the journey from New Brighton to Colombo St.

The completion of both the Lyttelton rail tunnel and a network of 'metalled' (gravel) roads in the 1860s, coupled with the silting up of the rivers in the 1880s and 1890s, saw the end of river travel and trade in Christchurch.

Regattas held by the Christchurch Yacht Club in the late 1890s and early 1900s included a wide variety of activities such as yacht racing, double sculls races, duck hunting and tug-of-war in punts—all of which were accompanied by the downing of ten gallons of beer!



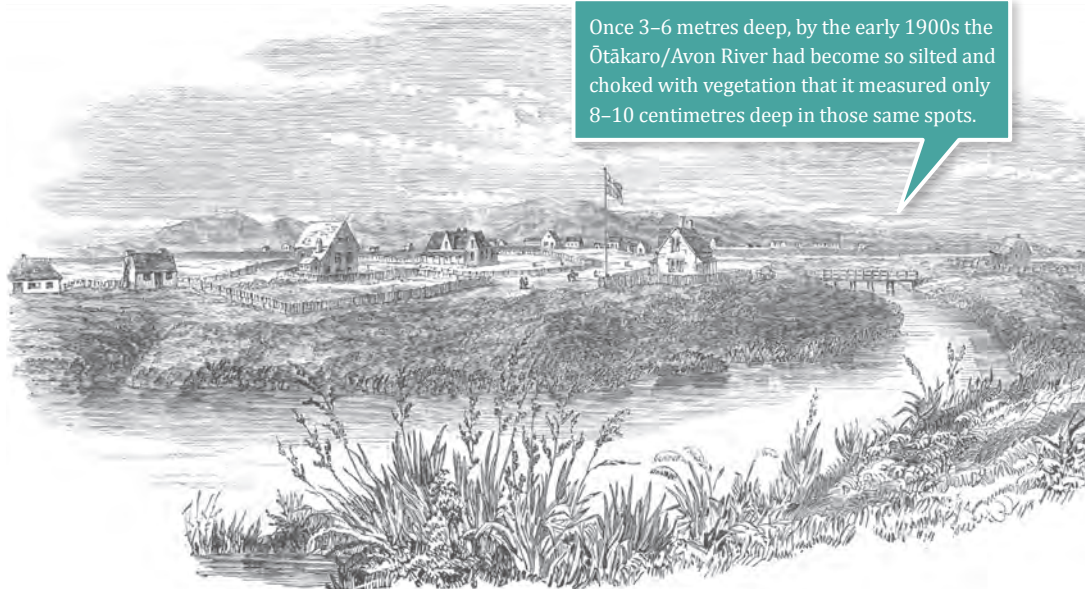
Zealandia Soap and Candle Co. Ltd.
off Humphreys Dr, 1920s



Boating on the Estuary, Boxing Day, 1914

In the early 1900s, a quarter of New Zealand's manufacturing was based near the Ōpāwaho/Heathcote River.

PHOTO ABOVE: WALTER DE THIER (PROVIDED BY CCC / ERIC BANKS)
PHOTO LEFT: ALEXANDER TURNBULL LIBRARY WELLINGTON, 1/2-041272-6



Once 3–6 metres deep, by the early 1900s the Ōtākaro/Avon River had become so silted and choked with vegetation that it measured only 8–10 centimetres deep in those same spots.

ILLUSTRATION: FROM THE ILLUSTRATED LONDON NEWS
(PROVIDED BY PAUL CORLISS)

CHRISTCHURCH, CANTERBURY COLONY, NEW ZEALAND.

A Place of Games and Sports

Following in the traditions of tangata whenua, the early settlers of Christchurch also used the Estuary and the rivers for recreation. European settlers followed suit by establishing canoeing and rowing clubs around the Estuary. Favoured sites for picnics, fishing and boating expeditions, the sheltered peaceful bays of the Estuary provided an escape from life in Christchurch's growing suburbs. From gala days at the beach resorts of Sumner and New Brighton to rowing regattas in the Estuary, the value of the Estuary as a resource was changing for Christchurch's residents. The less the Estuary and rivers were being used for trade and travel, the more they grew in value as a recreation spot.

The Rise in Pollution

As the Estuary and rivers became firmly established as routes for shipping freight into the city, numerous industries sprouted up along the edges of the rivers, in particular the Ōpāwaho/Heathcote River. From timber mills to flour mills, tanneries to wool washes, the riverbanks soon became the most thriving commercial areas in Christchurch.

The significant downside of this industrial expansion was that the rivers rapidly were used as waste disposal systems. By the early 1900s, the levels of pollution had risen to an estimated 4.5 million litres of industrial waste flowing into the Ōpāwaho/Heathcote River each day. Combined with the outflow of human waste from large communal septic tanks, Christchurch's rivers had become foul and the source of illnesses such as typhoid.

History of the Estuary / Earthquakes

Due to their very nature estuaries are in a constant state of flux. The relentless tides and river flows shift sands and sediments in the Estuary, creating a constantly changing environment. But large-scale natural events, such as the 2010–11 Canterbury earthquakes, have left their mark on the Estuary's recent history.

Sand Volcanoes and Tilted Beds

The series of large earthquakes and aftershocks that rocked Christchurch in 2010–2011 were seismic events that affected more than the city's infrastructure. Damage to the city's sewerage network meant thousands of litres of raw sewage was discharged into the rivers and Estuary for many months following the earthquakes until the network could be fixed, peaking at around 50,000 cubic metres per day immediately following the February and June 2011 earthquake events. The intense shaking of the Estuary floor brought long-buried sediment to the surface as liquefaction 'sand volcanoes' that peppered the Estuary, smothering plants and animals before they were smoothed out by the wind and tides. The bed of the Estuary also tilted, lifting the south-west end and dropping the Ōtākaro/Avon River mouth by up to half

a metre. This changed the amount of intertidal habitat and reduced the tidal prism (the volume of water exchanged between the Estuary and the ocean with every tide) by about 14%.

Over time the Estuary and its low tide channels are gradually reworking and adjusting themselves to the physical changes wrought by the earthquakes.

Irreparable Damage

In the aftermath of the earthquakes, some areas bordering the Estuary have irreparably changed. The two shallow and powerful 6.3 magnitude earthquakes in February and June 2011 tore apart the cliffs and bluffs below Kinsey Tce on the southern side of the Estuary, rendering the cliff-top edge dangerously unstable. On low-lying land bordering the eastern side of the Estuary the ground broke

PHOTO © EDS ECOLOGY / SHELLEY McMURTRIE, 2012




Reminiscent of a moon scape, sand volcanoes peppered the Estuary in the days following the earthquakes.

PHOTO © BRONWYN GAY, 2011



Earthquake damage to Kinsey Tce cliffs

Residential Red Zone Areas Around the Estuary



There is around 834 hectares of land within the city that is part of the Residential Red Zone, 34 hectares of which borders the Estuary, and 69 hectares in the nearby Bexley area.

apart (lateral spread) and fine sand liquefied (liquefaction). The Estuary edge dropped in places, increasing erosion and flooding risk.

While these areas were affected by the earthquakes in different ways, the result is the same—they now form part of the City's Residential Red Zone—where it was deemed too difficult or costly to safely remediate the land to rebuild on.

NOTE: From this point on throughout this Field Guide for ease we'll refer to the series of earthquakes and resulting aftershocks that rocked Christchurch in 2010–2011 and onwards simply as 'the earthquakes'.

74

BEXLEY / pg 36



AVON RIVER MOUTH / pg 38



SOUTH NEW BRIGHTON PARK / pg 42



PLEASANT POINT YACHT CLUB / pg 40



WASTEWATER TREATMENT PONDS / pg 34



74

SANDY POINT / pg 33



HUMPHREYS DRIVE / pg 32



CHARLESWORTH WETLAND / pg 30



McCORMACKS BAY / pg 24



HEATHCOTE RIVER MOUTH / pg 26



SETTLERS CRESCENT / pg 28



73

74















Te Ihutai/Avon-Heathcote Estuary Sites of Interest Map



Habitat types:

-  Tidal habitat
-  Wetland habitat
-  Salt marsh habitat
-  Other

Activities, features & amenities:

-  Walkway/track
-  Beach walk (tidal)
-  Public toilets
-  Wildlife
-  Bird-watching
-  Lookout point
-  Quake damage
-  Human history
-  Water sport area
-  Best at low tide
-  Best at high tide
-  Stroller friendly
-  Walking only
-  Dogs prohibited or on a leash



EBBTIDE STREET / pg 43

PENGUIN STREET / pg 44

BEACHVILLE ROAD / pg 22

SPIT RESERVE / pg 46

SHAG ROCK / pg 20

MONCK'S BAY / pg 21

CLIFTON HILL / pg 18

Clifton Hill



Built on an eight-million-year-old lava flow that descends from Mt Pleasant and finishes at cliffs eroded by the sea, the streets of Clifton Hill offer a spectacular view of Te Ihutai/Avon-Heathcote Estuary with Christchurch city and mountains beyond.

Sir Joseph Kinsey

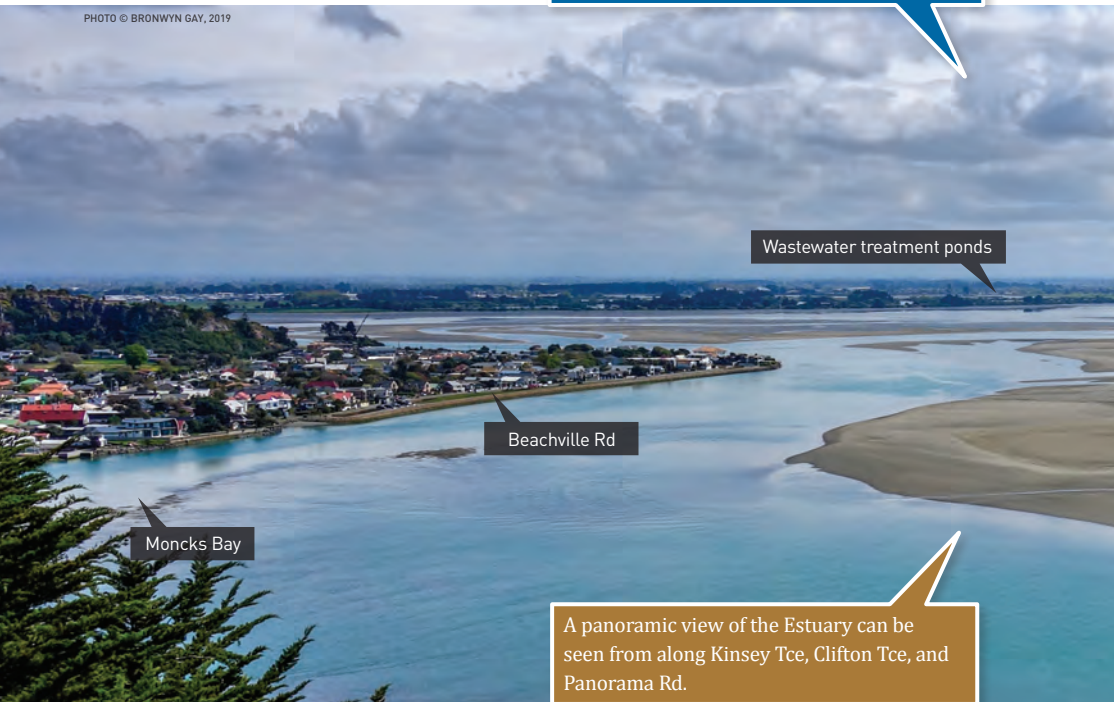
Kinsey Tce (located near the base of Clifton Hill) is named after, and was once home to, Sir Joseph Kinsey—one of Christchurch’s most notable citizens of the early 1900s and a significant benefactor of the Canterbury Museum. His cliff-top cottage (now restored and relocated to Godley Head Park) became known as Te Hau o te Atua/The Breath of Heaven and was designed by one of Christchurch’s well known architects, Samuel Hurst Seagar.

As a wealthy man, Kinsey became a supporter of the Antarctic expeditions of Captain Robert Falcon Scott and Ernest Shackleton. In preparation for his 1910 trip south, Captain Scott slept out on these cliffs above the Estuary in Kinsey’s garden.

“The scene is wholly enchanting, and such a view from some sheltered sunny corner...tends to feelings of inexpressible satisfaction with all things.”

Journal entry about Kinsey’s cliff-top outlook by Captain Robert Falcon Scott, 1910

PHOTO © BRONWYN GAY, 2019



Moncks Bay

Beachville Rd

Wastewater treatment ponds

A panoramic view of the Estuary can be seen from along Kinsey Tce, Clifton Tce, and Panorama Rd.

The Ultimate Cliffhanger


The collapse of the cliffs below Kinsey Tce during the earthquakes has changed the face of Clifton Hill forever. The sections of the cliff that collapsed, taking houses and gardens (fortunately unoccupied) with them, have since been removed. The resurfaced cliff face clear of unstable rock and the large landscaped 'rockery' in front are now permanent reminders of that earth-moving event, as is the uninhabited Residential Red Zone that borders the top of the cliff face.



Earthquake damage to Kinsey Tce house, 2011



New rockery and path at the bottom of Kinsey Tce cliffs, 2019

 The coastal path at the foot of Clifton Hill is perfect for prams and wheelchairs.

PHOTOS © SPENCER GAY



Te Ihutai/Avon-Heathcote Estuary

Pacific Ocean

Spit Reserve

Rapanui/Shag Rock



Known as Rapanui, the great sternpost, Shag Rock is a place of significance for the people of Ngāi Tahu due to its position as a sentinel at the entrance to the Estuary. Its distinctive outline has been captured by countless photographers and artists over the years, however, the Shag Rock we see today bears only a passing resemblance to its once statuesque form pre-quakes.

Peacock's Gallop

A sandy beach reclaimed in the 1930s, Shag Rock Reserve (formerly named Peacock's Gallop) is at the base of the cliff alongside the road leading from Shag Rock to Sumner. One version of the name's origin dates back to the 1850s when John Jenkins Peacock, a Lyttelton trader, would ride his horse along the route from Sumner to Christchurch. With the road running at the base of the cliffs, Peacock was so afraid of rocks falling on him that he would gallop that stretch. His concerns were realised 160 years later with the earthquakes causing substantial rockfalls along this cliff face.

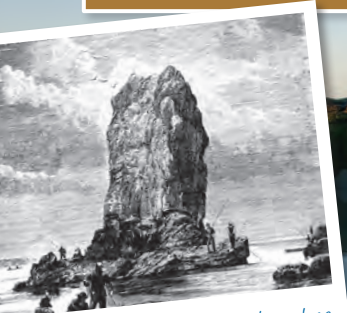
Food and Recreation

The beaches along this stretch are popular places for people to exercise their dogs and the Shag Rock corner is also a popular fishing spot. The green-shelled mussel makes its home on the rocks found along the southwestern edges of the Estuary mouth, while tuatua are hidden in the sands of the Sumner Bar.

Formerly rising approximately 11 metres from the sea, Shag Rock was damaged in the earthquakes and is now reduced to a collection of rubble, colloquially referred to as 'Shag Pile'.

Shag Rock is named after its status as a favoured roosting spot for the spotted shag.

PHOTO © BRONWYN GAY, 2011



Shag Rock BEFORE earthquakes



Shag Rock AFTER earthquakes

ILLUSTRATION: FROM THE ILLUSTRATED LONDON NEWS
C1900 (PROVIDED BY CCC / ERIC BANKS)

Sumner Bar

An excellent, if inconsistent, surfing spot, Sumner Bar has a treacherous history as the site of numerous shipwrecks in the 1800s prior to the opening of the Lyttelton rail tunnel. This bar crossing was so dangerous, however, that ships sometimes had to wait 3–6 weeks for favourable conditions.



Moncks Bay



Named after early farming resident, John Stanley Monck, Moncks Bay was once the site of a dairy farm that provided the people of Christchurch with butter.

Digging up Pieces of the Past

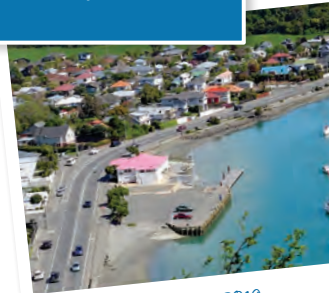
Bordered by ancient lava spurs, the valley leading down to Moncks Bay was once heavily forested and home to many birds. Remains found in nearby Māori middens at Te Ana-o-Hineraki/Moa Bone Cave show the bones of moa, kiwi, weka, kaka and sea mammals.

In 1889, while quarrying rock to build roads, early resident John Monck and his men discovered many Māori artifacts in Moncks Cave, situated at the base of Cave Tce. Closed by a landslide in pre-European times, the cave's three chambers acted like a time capsule, providing a snapshot of early Māori life. In the adjacent Barnett Park are other caves which were occupied as long as 600 years ago.

The Old Tramway

A designated heritage spot, the stone tram shelter and wall (on Main Rd opposite Wakatu Ave) are the last remnants of the tramway to Sumner. Prior to the completion of the causeway in 1907, the trams would travel the long route around the inside of McCormacks Bay and on into Redcliffs and Moncks Bay. Laid in 1888, the extended tramway to Sumner ceased operation in the early 1950s when it was replaced by a diesel bus service. Today the tram shelter is still in use as a bus shelter.

Māori artifacts found in Te Ana-o-Hineraki/Moa Bone Cave—boating and fishing equipment—show how important the Estuary was for travel and fishing.



Moncks Bay, 2019



Christchurch Yacht Club, Moncks Bay, 1920s

PHOTO PROVIDED BY CCC / ERIC BANKS

Christchurch Yacht Club (CYC)

Yacht racing in the Estuary began in colonial times, with races sailing from Moncks Bay or the mouth of the Ōtākaro/Avon River. John Monck, a keen sailor, built a small jetty near his home and in 1891 was one of the founding members of the CYC. As one of the oldest sailing clubs in the country, the CYC continues today to offer sailors access to the water at all states of the tide.

Shags and Cormorants

Shags and cormorants are often seen hunting for fish in the Estuary's main channels and at the Estuary mouth. With non-waterproof feathers, they first perch with wings outstretched as they wait for them to dry before flying away.



Pied shag

Beachville Road



Built on reclaimed land, the reserve between the seawall and Beachville Rd was once a popular fishing beach. Offering an abundance of easily accessible seafood, this area was formerly home to numerous little fishing cottages and remains a popular recreational fishing spot today.

Shellfish, an Essential Resource

New Zealand's native cockle is the most well-known food resource in estuaries. It is of particular significance to Māori as an important food and bait species, and is also an essential food for the Estuary's abundant birdlife. The areas west of Beachville Rd sustain some of the most dense cockle populations in the Estuary. Averaging one kilogram of cockles per square metre, they support estuarine barnacles, limpets and mudflat anemones that cling to their shells.

Cockles were once a prized food source of the Estuary, but now contaminants from the surrounding City's catchment can make them unsafe to eat. Because cockles are such efficient filter-feeders they pick up bacteria and viruses in the water which can be passed onto humans, making them ill. Monitoring *E. coli* levels (an indicator for the presence of pathogens from faecal material) in cockles has sometimes shown levels that make them unsafe for human consumption.

Flourishing between the low and mid tide mark, cockles can survive with as little as 1.5 hours under water each tide cycle, and are capable of filtering 1.5–3 litres of water per hour.



PHOTO © EOS ECOLOGY / BRONWYN GAY

Cockles

Cockles can live up to 20 years and are an important part of the Estuary ecology.

Scientists collecting cockles in the Estuary to test for food safety.



PHOTO © EOS ECOLOGY / SHELLY McMURTRIE, 2010

Fishermans Flat

Pātiki/flounder were once abundant in the shallow waters off Beachville Rd—an area previously known as Waipātiki/flounder water. Up until the 1930s Fishermans Flat (the area of houses now between the Estuary and Beachville Rd) was a bustling fishing village, with a wide beach where both cockles and shrimp were

abundant, and with mudflats where residents could spear flounders and eels. Redcliffs shrimps (*Palaemon affinis*), cooked in old 4-gallon kerosene tins, were considered a delicacy and were sent throughout the country. The building of a seawall in the 1930s infilled the wide shallow beach, and a nearby sewage outlet spelled the eventual demise of the shrimp fishery and safe shellfish harvesting.

Despite these changes, the seawall running along Beachville Rd still remains a popular fishing spot today and is the perfect place to take the kids for an afternoon of fishing.



Yellowbelly flounder

PHOTO © EDS ECOLOGY / SHELLEY McMURTRIE

PHOTO: ISAAC WILSON (PROVIDED BY PAUL CORLISS)



Fishermans Flat, c1915



South Island pied oystercatcher

PHOTO © EDS ECOLOGY / BRONWYN GAY

In one year a pied oystercatcher, weighing only half a kilogram itself, will eat over 75,000 cockles, or the equivalent weight of a newborn calf!



South Island Pied Oystercatcher

Up to one half of New Zealand's estimated 80,000-strong South Island pied oystercatcher population will stopover at the Estuary while migrating to the warmer North Island climes in autumn. Despite their name, oystercatchers are actually rather partial to cockles.

Once part of the main Estuary, the 1907 construction of the Ferrymead to Redcliffs causeway created a separate bay called McCormacks Bay. From the early 1900s through to the 1950s, the land around the Bay was a series of large market gardens, providing vegetables and flowers for the Christchurch market.

Rocky Shores

A search between the rocks that line the causeway can unearth animals more typical of a rocky open seashore than an estuary. When the tide is out, a close observer will find black mussels, barnacles, limpets, fan worms, and chitons clinging to the rocks.

These animals find a home in the Estuary on the rocky causeway banks.

ALL PHOTOS © EDS ECOLOGY / SHELLEY McMURTRIE



Fan worm



Black mussels and barnacles



Scientists study the algae-enriched environment

Sea Lettuce

With its sunny northerly aspect, limited tidal flushing and shallow waters, McCormacks Bay provides the perfect environment for algae such as sea lettuce and green string lettuce. In small amounts they provide food and shelter for snails and crabs that, in turn, are food for birds. However, with excess nutrients they can grow too dense, smothering life by forming a layer of oxygen-depleted mud that gives off an unpleasant odour, reminiscent of rotten eggs. Seismic uplift from the earthquakes, and increased flushing from the Bay's culverts has improved tidal flushing and intertidal habitat. A sign of improving health, there are now reports of seagrass colonising the intertidal mudflats, which hasn't been there since the 1950s.



Causeway, 2015

When the tramway was initially built it skirted around McCormacks Bay. In 1907 the Tramway Board built the causeway, providing a more direct tram route to Sumner and creating the bay we see now.



Electric tram with two double-decker trailers on the causeway, prior to construction of roadway in 1930s

Causeway, 1930s

PHOTO: WALTER DE THIER
(PROVIDED BY CCC / ERIC BANKS)

McCormacks Bay Restoration

Local residents are helping to improve the health of the Bay through rubbish cleanups and planting. They are supported by the Drayton Reserve Volunteers, who are helping reforest the hillside valley of Glenstrae Stream, the one stream that flows into McCormacks Bay at its southern end.

Skylark Island—a Look into the Past

Prior to the causeway being built, there was a low-lying island off McCormacks Bay called Skylark Island where sheep were farmed, wells were sunk for Sumner’s water supply, and people often picnicked. The construction of the causeway pushed the main Ōpāwaho/Heathcote River channel northwards within the Estuary, changing the tidal flows and fully eroding the island by the mid 1900s.

A Regal Visitor

The Estuary is a key wintering ground for royal spoonbills—large white wading birds iconic for their black spatulate bill that they sweep from side to side, filtering small animals from the sediment. With only around 100 of these regal birds visiting the Estuary from their Otago and Te Waihora/Lake Ellesmere colonies, the best place to find them is at McCormacks Bay or across the Estuary around the South New Brighton jetty and Bexley.



Ōpāwaho/Heathcote River Mouth



Siltier than the mouth of the Ōtākaro/Avon River due to runoff from the erosion-prone soils of the Port Hills, even in pre-European days the mouth of the Ōpāwaho/Heathcote River was known for its soft mud. The Māori name for this part of the Estuary—O Hika Paruparu—can be translated as ‘muddy fishing place’.

The Old Ferry and First Bridge

In the 1850s Ferrymead was a bustling spot. Passengers and stock coming from Lyttelton over the Bridle Path walked alongside the Ōpāwaho/Heathcote River to the river mouth where they then paid to be ferried across. By the 1860s records indicate that an estimated 30,000 people, 12,000 saddle-horses and 10,000 carts used the ferry each year.

The ferry crossing trade ended in 1864 when the Provincial Council had the first bridge built across the mouth of the Ōpāwaho. Originally referred to as the Heathcote Swing Bridge, it was designed to swing open, allowing for the passage of ships through the bridge's middle section.

With a toll gate attached, the bridge also generated a decent income. While foot passengers were not charged, people riding a horse or driving a horse and cart paid sixpence to cross—the equivalent at that time to the price of two loaves of bread. The bridge was replaced with a new cantilever design in 1907.

The current Ferrymead Bridge is not only a key transport route for the coastal suburbs but also carries all the power and sewerage services for suburbs east of the river.

The second (cantilever) bridge on this site was also built to open in the middle. Problems with getting it to close properly meant it was never opened again after the initial ceremony!



PHOTO: PROVIDED BY CCC / ERIC BANKS

Mt Pleasant Yacht Club

Formed in 1930, the first job for the Mt Pleasant Yacht Club was building a wharf at the mouth of the Ōpāwaho/Heathcote River. After the original timber they had sourced was pilfered (by those suffering hardship from the Great Depression), one of the yachtsmen managed to acquire 3,000 feet of timber as a gift. The wharf was finally built in 1938 only to be destroyed in 1952 in a terrible storm.

In 1934, in the midst of the Depression, the local community at Mt Pleasant chipped in enthusiastically to build a small club building that has since been extended. Today the club's budding sailors continue to run weekend racing of their small dinghies, such as Optimist, P-class, and Sunburst yachts.



PHOTO © RENE BORSBOOM

Yachting at Ōpāwaho/Heathcote River mouth

Cob Cottage

The cob cottage in Scott Park was restored from an original older sod hut erected there by a Captain Penfold in the 1860s. Home to Penfold, his wife and nine children, this tiny cottage was constructed from timber salvaged



Penfold's sod cottage, later restored in cob

PHOTO: PROVIDED BY PAUL CORLISS

from his small schooner (wrecked when crossing the Sumner Bar) and sods from the nearby riverbank.

Occupied until 1908, the cottage deteriorated badly over the next thirty years. In September 1940, the first of many voluntary working bees was held involving young men from the neighbouring yacht club not yet been called away to World War II. The restored cottage was opened in December 1944 and remains Christchurch's best example of a cob cottage. Repairs to earthquake damage are being completed.

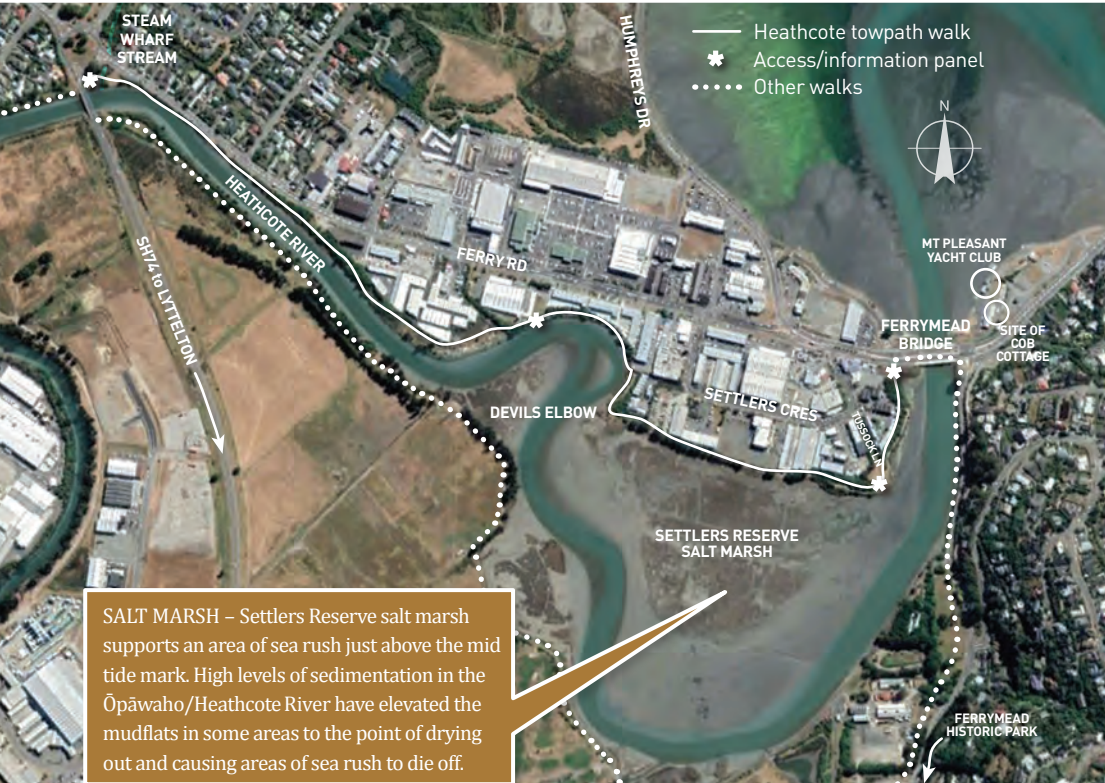
Muddy Revelations

With a quarter of New Zealand's manufacturing based near the Ōpāwaho/Heathcote River at Woolston and Sydenham in the early 1900s, it's no surprise that river pollution increased dramatically at that time. A far cry from its original "clear as crystal" state, the river soon became choked with silt and contaminated with tars, acids, alkalis and heavy metals. In 1925, a mechanical river sweeper began shifting this silt towards the Estuary. Today, scientists looking at sediment cores from the bed of the river mouth can see the evidence of these past activities laid down in the riverbed sediment.

Settlers Crescent



With its deep tidal channels, the Ōpāwaho/Heathcote River has been an important transport route for hundreds of years. Providing a link between the pā of Ōpāwaho with the Estuary and with Rāpaki, canoes could also travel up the river to its source near Wigram and gain access down the Huritini/Halswell River to Te Waihora/Lake Ellesmere.



SALT MARSH – Settlers Reserve salt marsh supports an area of sea rush just above the mid tide mark. High levels of sedimentation in the Ōpāwaho/Heathcote River have elevated the mudflats in some areas to the point of drying out and causing areas of sea rush to die off.

AERIAL PHOTO © WWW.CANTERBURYMAPS.GOVT.NZ

The Heathcote Towpath Walk (1.25 hours return)

Best at low to mid tide, the Heathcote Towpath walk follows the path the horses used when towing ships that were labouring up the river. Offering superb views of the Port Hills, this walk follows the salt marsh of the meandering lower Heathcote. With parking in Settlers Cres, walkers can follow the grassed path near Tussock Lane to the information board located on the riverside at the site of the ferry crossing that operated from 1850–1864. Planted with indigenous plants to shield walkers from nearby factories and the traffic of Ferry Rd, this ‘there-and-back’ walk eventually joins Ferry Rd shortly before the bollard monument for Steam Wharf.

ILLUSTRATION: WALTER DE THIER (PROVIDED BY PAUL CORLISS)



On the Heathcote River near Radley Bridge, Captain P.J. Messervey aboard the Minnie, c1880

Freight charges for the 12 miles from Lyttelton to Christchurch via the Bridle Path and river used to cost almost the same as the freightage for the 12,000 miles from London to Lyttelton!

Steam Wharf

Steam Wharf, located close to the roundabout on Ferry Rd and SH74, was the upper reach of the river for trading and passenger vessels that used to make their way up the Ōpāwaho/Heathcote River until the construction of the railway in the late 1860s. Ships were usually towed by horse along the stretch of river called the Devil's Elbow due to the fickle winds and strong tidal flows that would otherwise make progress here slow. Smaller boats could continue on upstream to Christchurch Quay, in the industrial hub of Woolston, where horses and drays carted the goods to Christchurch. Larger ships were able to offload cargo and turn around where Steam Wharf Stream joins the river.

Heathcote Tunnel portal, NZR booklet
ILLUSTRATION: W.W. STEWART (PROVIDED BY PAUL CORLISS)

The Lyttelton Rail Tunnel

The construction of the Lyttelton Rail Tunnel had a significant impact on the Ōpāwaho/Heathcote River. Trade on the river ceased with the opening of the tunnel, as trains carrying freight and passengers from Lyttelton to Christchurch were much faster than the circuitous hill (Bridle Path) and river route.

When the 2.4 kilometre tunnel was completed in 1867 it was one of the longest tunnels in the world at that time, and the first tunnel to be built through the side of an extinct volcano. Due to the tunnel's length, the contractors devised a ventilation process which was soon replicated in other tunnels around the world. After the two sides of the tunnel connected in the middle (thanks to the precise calculations of engineer Edward Dobson), a celebratory banquet was held in the middle of the tunnel with 2,000 people attending!



The Ferrymead line was not only the first public railway to be opened in New Zealand — it was also the first to close. Ferrymead was bypassed on the completion of the Lyttelton Rail Tunnel and the line was no longer economically viable to run.

Charlesworth Wetland



Restored from farmland through the hard work of a team of Estuary Trust volunteers and Christchurch City Council Park Rangers, the Charlesworth Wetland is now a successful feeding, roosting and breeding ground for many of the Estuary's bird species.

Restoring a Salt Marsh

Formerly a remnant salt marsh that had been infilled for grazing, this 20 hectare piece of farmland was returned to wetland habitat in 2002. A series of 'wader scrapes' with pools, channels and islands attract wading birds and has turned this wetland into a bird haven, with walking tracks allowing public access around the western perimeter of this reserve.

Considering its small size, this is a diverse salt marsh that now supports areas of coastal ribbonwood shrubland—the least common of the Estuary's salt marsh vegetation. Three large pipes beneath Humphreys Drive allow tidal flows in and out of this restored salt marsh.

The Estuary's Gardener

Ranking among the most tolerant of species worldwide, the native mudsnail, *Amphibola crenata*, can happily survive extremes of salinity, dehydration and temperature, and is therefore found around much of the Estuary. Burrowing into the sediment when the tide comes in, the snail only comes out when the tide recedes, to feed on algae and tiny organisms on the mud's surface. Found in significant numbers on the mudflats around Humphreys Drive, this snail, like the worms in our garden, helps to condition the sediment of the Estuary mudflats.

Mudflat snails can work their way through as much as 58 kilograms of estuary mud a year. Not bad for a snail which is only about 15 millimetres long!

Volunteers planting at Charlesworth Reserve



Over 130,000 plants have been planted in this reserve between 2005 and 2019.

Amphibola snails in the Estuary



PHOTO © TANYA JENKINS, 2019

PHOTO © EOS ECOLOGY / SHELLEY McMURTRIE



Charlesworth Wetland Walks

- **WHERE:** Parking is on Charlesworth St at the reserve carpark.
- **WHEN:** During high tide birds will roost on the islands, while at low tide they wade through the channels feeding.
- Dogs are prohibited within the wetland itself and must be on a leash on all walkways and the adjacent Ti Rakau Kotuku Reserve.
- Do not disturb birds nesting during summer.

A Bird Watcher's Hotspot

Islands covered in salt marsh plants house an abundance of insect life that is an excellent food for birds. White-faced heron, spur-winged plover, pied stilt, banded dotterel, paradise shelduck, New Zealand scaup, grey teal and mallard duck are some of the birds regularly seen here.



Pied stilt

PHOTO © EOS ECOLOGY / SHELLEY McMURTRIE

Pied Stilts

The pied stilt is a breeding resident of the Charlesworth Wetland, and is also seen around the edges of the Estuary. Habitat restoration and predator control have recently boosted the Estuary's stilt population with over 50% of stilt chicks now surviving to adulthood. Favouring muddy ground for feeding, stilts' preferred diet is small crabs, insects, shrimp, and small fish such as young flounder.

Humphreys Drive



With consistent winds, the western end of the Estuary is a popular spot for wind-based watersports. Not just for the experts, the shallow waters and ready access make it one of the safest places to learn the sport.

Windsurfing and Kitesurfing

When high tide and a stiff easterly combine, both windsurfers and kitesurfers converge on this part of the Estuary to take advantage of the perfect conditions. The windsports area, located off Humphreys Dr at the south-east end of the Linwood Paddocks, caters well to the public—with parking, toilets, cold showers, a ramp, and grass areas for rigging gear and having post-surfing barbeques.

For kitesurfers, the area just north-east of the car park is the prime launching spot for beginners, and kitesurfing lessons are held there. There are two launching spots for windsurfers—the windsports area at the Linwood Ave end, and just off Tidal View, with wind-surf shops handily located on Ferry Rd.



PHOTO © BRONWYN GAY

Sandy Point



Home to many birds, Linwood Paddocks act as a critical buffer between suburban Christchurch and the Estuary shoreline. One of the first feeding grounds to appear at low tide, Sandy Point also offers bird watchers the chance to spot some rare migrant wading birds.



Linwood Paddocks—the Creation of a ‘Sewage Farm’

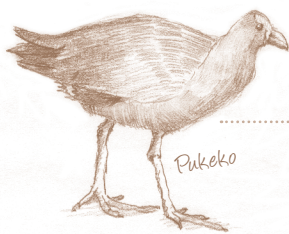
In the 1880s, farmland between the wastewater treatment plant and Estuary (now the treatment ponds) received regular applications of treated wastewater. Until 1997, sections of the lower Linwood Paddocks also received applications of thickened biosolids. Aiming to enrich the sandy soil, this method would build up enough organic matter to grow pasture for around five years before the process would need to be repeated. Dairy cows were initially run on the pasture, providing a milk supply for the city, but in the 1960s farming changed to cattle fattening for beef.

Birdlife of the Paddocks

Gaze across the Linwood Paddocks at any time of the year and you will see pukeko and spur-winged plover. In winter they are joined by hundreds of other birds feeding on the plants, snails and insects in the wet paddocks.

Winged Swimmers

Despite their lack of webbed feet, pukeko are surprisingly effective swimmers as well as strong fliers. Often flying at night, pukeko have been known to fly across the Southern Alps, and one was even supposedly sighted 700 kilometres south of New Zealand on the chilly subantarctic Campbell Island; most likely helped along by the strong winds!



Birdlife of the Mudflats

The foreshore around Linwood Paddocks to Sandy Point is a birding hotspot, offering prime viewing for those keen to spot rare migrant birds from Asia and Australia. Native banded dotterel, South Island pied oystercatcher, spur-winged plover, and grey teal are commonly found feeding on the intertidal flats, while during high tide many adjourn to the adjacent Linwood Paddocks to roost. Introduced Canada geese and black swans are also a common sight.

Wastewater Treatment Ponds

Te Huingi Manu Wildlife Refuge



Combining wastewater treatment with a wildlife refuge, Christchurch's wastewater treatment ponds offer a protected environment for thousands of birds.



The Treatment System

By the 1870s Christchurch had New Zealand's highest rate of deaths per thousand people—linked to its equally high rate of water-borne diseases such as typhoid and diphtheria, caused by the city's drainage problems. To solve this the Christchurch Drainage Board was formed, which soon provided its citizens with the best drained and sewered city in the country, and later led to the creation of the Christchurch wastewater treatment ponds and plant.

Providing the final disinfection step in the treatment of the city's wastewater, the ponds use UV radiation from the sun and the oxygen-producing effects of algae to kill off pathogenic bacteria. Construction of the three northern ponds began as early as 1958, with the three southern ponds commissioned in the 1970s to account for an expanding city. From then until 2010, on every high tide the ponds discharged around 160,000 cubic metres per day of treated

wastewater to the Estuary. This changed the habitat, and therefore the animals living in the Estuary—especially around the discharge point.

Discharging treated wastewater to the Estuary ceased in March 2010 with the completion of an ocean outfall pipe. The ponds, however, still perform the same valuable disinfection function as they have done for the last fifty years.

While annoying for us, swarms of midges emerging from the ponds are perfect food for birds during moulting. The operation of the ponds and planting of trees as a natural barrier aims to reduce the effect of midges on neighbouring residents.



Midge (*Chironomus*)

PHOTO © ANGUS McINTOSH

A Wildlife Refuge

Visited by over 15,000 birds annually, the ponds are a designated wildlife refuge, called Te Huingi Manu. With a predator control programme active since 1997, waterfowl and gulls use the ponds as a safe haven to moult, or as a post-breeding resting area through autumn and winter. Other waterfowl and cormorants/shags have commandeered the vegetation covered islands for safe nesting, and some are permanent residents.

There is currently no public access to Te Huingi Manu Wildlife Refuge as it is part of an operational treatment plant.

Wastewater treatment ponds from the air



PHOTO © ANDREW CROSSLAND, 2007



PHOTO © BRIAN BETTS

Shoveler ducks

Around 5% of the Australasian population of shoveler ducks live at the wastewater treatment ponds, where they outnumber all other bird species during their seasonal moult.

Bexley



Prior to the earthquakes, the wetland at Bexley had freshwater springs, salt meadow, and predator control measures. With substantial subsidence due to the earthquakes the area is now effectively part of the wider Estuary, with tidal inundation twice a day.



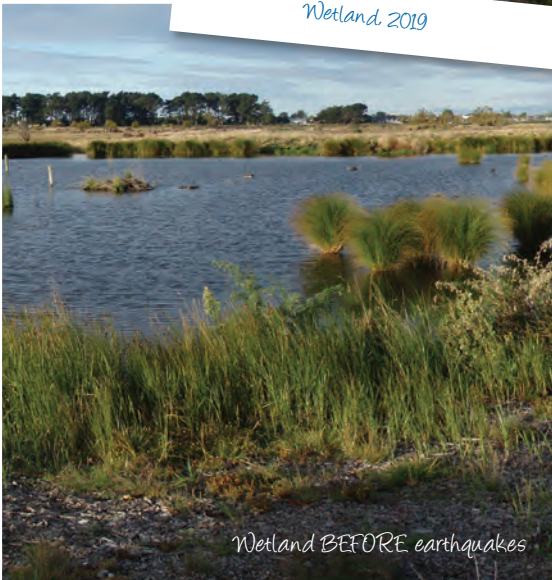
Future Restoration

Already a location of remnant salt marshes of great importance to birdlife, the long-term regeneration vision for the Bexley Residential Red Zone focuses on restoring natural environments. Future opportunities include further extending the Bexley salt marsh habitat, creating natural environments to link the lower River with Travis Wetland, and the potential for eco-sanctuaries.



PHOTO © TANYA JENKINS

Wetland 2019



Wetland BEFORE earthquakes

PHOTO © EOS ECOLOGY / SHELLEY McMURTRIE, 2007

A Changing Landscape

The area marked 'Bexley Wetland' on city maps has changed greatly over the years. Originally part of extensive natural brackish (a mix of salt and fresh water) wetlands of the Ōtākaro/Avon River mouth, the land was reclaimed to become part of a collection of small dairy farms set up to supply milk for the growing city of Christchurch. When the government required milk to be pasteurised, the direct milk sales the farmers had enjoyed were no longer viable. The farmers soon abandoned the land which then became wasteland and later a vehicle wrecking yard.

In 1992, 12.5 hectares of land was set aside as an ecological heritage site and a group of enthusiastic volunteers dedicated their time and resources to create a partly freshwater wetland, separated from the Ōtākaro/Avon River mouth by a stopbank and fed from freshwater springs. With land movement and subsidence from the earthquakes, the freshwater spring stopped flowing and the lowered land has now become reconnected to the salt marsh habitat of the lower reaches of the River. Similar land subsidence in the adjacent residential suburb of Bexley has rendered it part of the Residential Red Zone—land where it is too difficult or costly to safely remediate the land for rebuilding.

Wetland Dynamics

Prior to European settlement this area was an extensive salt marsh habitat, surrounded by extensive wetlands of toetoe, flax, grasses and rushes. An unbroken stretch of salt marsh still grows from the jetty at South New Brighton Park upstream on both sides of the Ōtākaro/Avon River to Admirals Way, and now incorporates the wetlands at Bexley. Offering an excellent bird habitat for feeding, roosting and nesting, these salt marsh areas include coastal bush and salt meadows.

An abundance of fish and invertebrates in the river mouth provide an ideal feeding ground for birds such as the pied stilt, mallard ducks, paradise shelduck, grey teal, pukeko, marsh crane, the New Zealand shoveler and banded dotterel.

An abundance of fish migrating in and out of the river, combined with rich soils for cultivating, made the mouth of the Ōtākaro/Avon River a vital food gathering area for tangata whenua. Distinctive marshes and a diverse range of trees and plants also provide an ideal breeding and roosting habitat for birds.

An Abundance of Kai

The Ōtākaro/Avon River has always been highly regarded for mahinga kai (traditional food and other natural resources, and the places where they are gathered). Tuatahi, a chief from Koukourārata/Port Levy on Horomaka/Banks Peninsula, would make forays up the river to take advantage of the seasonal abundance of food.

Hīnaki/eel pots would be set at mānuka weirs built near the mouth of the river. A little further upstream kōkopu /native trout, īnanga/whitebait and ducks were caught, while kumara/sweet potato and aruhe/fern root were grown in the sandy soils of the surrounding land.

Māori artefacts have been recovered at the mouth of the river, including a canoe paddle made of mānuka, retrieved by a boy's fishing line from the bed of the river opposite the small island colloquially known as Rat Island.

An Eastern Bird Habitat

The eastern edge of the Estuary towards Spit Reserve is home to a wide variety of roosting and feeding birds. Offering mudflats for feeding and planted shorelines and tall trees for roosting, around 40 species of birds (including 19 Arctic migrants) were regularly seen here. With restored and revitalised wetlands to the north, this part of the shoreline has evolved into a core bird breeding and wintering habitat.

The loss of tall pine trees lining the east side of the river following the earthquakes has removed much of the mature roosting habitat for birds, but revegetation options with native species should provide future habitat.



Hīnaki whakatikotiko or Corf for holding tuna (eels), 1923

PHOTO: FROM 1923 ELSDON BEST BOOKLET A MAORI KOROTETE, J. MACDONALD (PROVIDED BY PAUL CORLISS)

Eels on their annual migration to the sea were caught by local iwi in eel pots set at mānuka weirs built near the river mouth.



Longfin eel

PHOTO © EOS ECOLOGY / BRONWYN GAY

The vista off the bridge spanning the Ōtākaro/Avon River showcases one of the best examples of original salt marsh and marsh ribbonwood areas in Christchurch. Although dominated by sea rush and oioi, the area around the bridge also offers the greatest diversity of plant species on the Estuary.

Sea rush



PHOTO © BRONWYN GAY

Potamopyrgus snail



PHOTO © SHELLEY McMURTRIE

A Tiny, Prolific Snail

Potamopyrgus estuarinus, a tiny brown snail which is less than 6 millimetres long, peppers this area, where up to 200,000 snails per square metre have been recorded. Generally found on hard surfaces or partly buried in the mud, this deposit-feeding snail is a ready food source for fish in these lower river reaches.

Naughty Boys' Island

Urban legend reports Naughty Boys' Island was named for two boys who were tragically killed in 1961 by collapsing sand as they tunnelled into the riverbank. The Island was created in the 1950s by a cutting designed to alleviate flooding. Situated north of the bridge, opposite Bexley, this 400 metre long island and the nearby riverbanks have been extensively replanted in recent years. As it can only be reached by squelching through knee-deep mud, the island offers a safe haven for breeding birds

Unique Marshes

The area around Bridge St and Bexley is the largest area of salt marsh in the Estuary. A nursery habitat for fish and important feeding area for wildlife, salt marshes also cleanse the Estuary through trapping sediment and filtering out contaminants and nutrients. Located in the intertidal margin between land and water, they protect shorelines from erosion.

Subsidence from the earthquakes and sea level rise are causing increased tidal inundation. This is forcing the ecologically valuable salt marshes to move further up the shoreline. Where there is room to naturally expand, the saltmarsh habitat has moved with the changing tides. However, in other areas stopbanks bordering the Estuary, or increased competition from more aggressive exotic grasses, will halt the natural shorewards movement of the salt marsh, with a net loss of habitat.

Pleasant Point Yacht Club



The former site of the yacht club was near Bridge St (1928–2011), but subsidence and flooding led to the club relocating over the river in South New Brighton Park.

Yachting on the Estuary

Established in the mid 1800s as a sport for the upper classes, yachting on the Estuary involved regular informal races using heavy timbered scows. Today, the boats used are generally lightweight catamarans and dinghies.

Founded in 1921, the Pleasant Point Yacht Club was notable as the first yachting club on the Estuary to admit women.

Originally located next to the South New Brighton jetty, the club was moved in 1928 to the western side of the Avon River mouth next to the Bridge St bridge. The club and land around it sadly suffered significant damage in the earthquakes, leading to the demolition of the club building. The club has since re-established its base back in South New Brighton Park on the eastern side of the Estuary.

Pleasant Point Yacht Club opening, 1929



Yachting outings to Spit Reserve were often planned by club members in the 1950s. Leaving on a morning high tide, they would picnic and net flounders off Spit Reserve, before sailing back to the club rooms on the rising evening tide.



Kūaka/Godwit sculpture by local artist Bon Suter installed in 2019 on Bridge St.



Sited on what was once called Rat Island since the 1920s, the earthquakes finally spelled the end for the Pleasant Point Yacht Club building, with land subsidence leaving the site flooded during high tide.

The Ocean Outfall Pipeline

Up until March 2010, treated wastewater was discharged into the Estuary, significantly impacting the state of the Estuary's health. The wastewater discharge provided an abundant food source for vast numbers of polychaete worms, which filtered tiny particles out of the water, as well as hundreds of birds that fed upon the tiny invertebrates discharged along with the water. However, the excess nutrients entering the Estuary also contributed to blooms of sea lettuce and other algae which, on rotting, produce a horrendous smell and create layers of black, oxygen-depleted mud.

The wastewater also contained contaminants such as heavy metals and some pathogens that entered the food chain through filter-feeding shellfish such as cockles. As a result, the harvesting of shellfish is not recommended due to concerns with food safety.

The new outfall pipe commenced operation on 4 March 2010, and has operated continuously since then—not even stopping for the earthquakes! The treated wastewater is now discharged into Pegasus Bay, 3.2 kilometres offshore. Diffusers over the last 360 metres of pipeline ensure the wastewater is well mixed with the sea water.

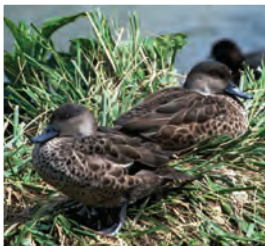


PHOTO © DOC / MIKE AVISS

Tētē/grey teal

Looking very much like a small version of the mallard duck, the diminutive tētē/grey teal can often be seen on the wastewater treatment ponds, McCormacks Bay and at Charlesworth Wetland. Their plumage is mainly grey, but you may spot the white triangles on both sides of their wings as they fly overhead. The grey teal has gone through a massive population increase nationally in recent decades, with thousands now found on the Estuary in autumn and winter.

South New Brighton Park



Once sited just south of the South New Brighton jetty, Te Kai o Te Karoro (meaning 'the food of the seagull') was a significant Māori pā/settlement on the Estuary, ideally located to make use of the abundant resources of the Estuary.

Raupō Bay

Named after the wetland plant raupō, once abundant here, Raupō Bay now supports a brackish salt marsh habitat. With a strong dislike of saltwater, raupō indicated the presence of a freshwater spring—a useful water source. The plant itself was valuable—Māori used to mix raupō pollen with water to make cakes called pungapunga, while early European settlers used the raupō 'wool' of the female flowers to stuff pillows.

The remains of mātuka posts that formed part of Māori eel weirs can be seen at low tide from the jetty looking across to the wastewater treatment pond pump station.

Eel weir remnants



PHOTO © CCC / ANDREW CROSSLAND, 2005

Domain and Jetty

During World War I, Pleasant Point Domain (now incorporated into South New Brighton Park), gained in popularity with day visitors who arrived by yacht or punt. Originally called Dog Bay, after the washed-up bodies of dogs drowned by inhumane owners upstream, the name was changed in the early 1920s to the much more welcoming 'Pleasant Point' by the members of the yacht club. Club members built the first jetty in an afternoon, using timber they supplied themselves. The local council finally saw what an asset the area was and created the domain, erecting bathing shelters, drilling a well and creating better road access for visitors.

Today the jetty remains a popular fishing and bird-watching spot.

White-faced heron



PHOTO © PAUL CORLISS

Birds Galore

The elusive marsh crake would have once been found hiding in the stand of raupō. With the changing vegetation the birds most likely to be seen today at Raupō Bay are the pied stilt—that can number in the hundreds during their roosting time in autumn, or the white-faced heron—stalking its prey near the jetty.



Ebbtide Street



The starting point for a 6.5 kilometre walk down and around Spit Reserve, Ebbtide St offers beautiful views across the Estuary and access to the southern boundary of South New Brighton Park.



South New Brighton Park

With shady picnic spots under tall trees, an excellent play area for children, a campground, a boat ramp and jetty, a recreation field and walks along the Estuary edge for bird-watching—this park is a truly excellent spot on a summer's day.

International Migrants

As the most southern point of a route called the East Asian–Australasian Flyway, Te Ihutai/Avon-Heathcote Estuary is at times home to nineteen species of short-term Arctic residents. Arriving at the Estuary to escape the harsh winters in the Arctic Circle, some of these Arctic waders will spend roughly one third of their lives migrating between their two homes. The best time to see some of these migrants along the walkway is in summer, as they stock up on fat to carry them through their arduous journey home.

The Southshore Spit Walk (1.5 hours)

Taking 1.5 hours to complete, this route follows a bundled walkway through the Residential Red Zone along the Estuary edge down to Spit Reserve. Offering wonderful views across the Estuary towards Redcliffs, walkers are likely to spot some of the 141 species of birds recorded here. The second half of the walk loops around Spit Reserve (pg 47) and leads north up Southshore Beach with its stunning view of Pegasus Bay and, on a clear day, the peaks of the distant Kaikōura mountain range.

- **WHERE:** Parking off Ebbtide St/Estuary Rd.
- **WHEN:** Visit throughout the year as the birds change with the seasons.
- Dogs are prohibited within the Estuary and shore around Spit Reserve, and must be under effective control elsewhere.

Penguin Street



Named after the white-flipped penguin that is now a rare breeding resident of Southshore, the Estuary off the end of Penguin St provides ample opportunity for some up close and personal interactions with the Estuary's smaller inhabitants.



Micrelenchus snail



Diloma snail



Amphibola snail



Mud whelk



Pill-box crab



Hairy-handed crab



Stalk-eyed mud crab

If fossicking around at low tide, keep an eye out for these tiny creatures hiding among the seagrass in a continuous struggle of eat or be eaten.

ALL PHOTOS © SHELLEY McMURTRIE

A Bug-spotting Haven

With the seagrass providing a welcome home, and proximity of the Estuary mouth bringing in fresh saltwater, the diversity of invertebrates in the Estuary is at its greatest along here.

Pill-box Crab (*Halicarcinus whitei*)

Smaller than one centimetre, these flat crabs with long thin legs can be found under stones or buried in the mud. A nomadic species that doesn't build a permanent burrow, the pill-box crab feeds on eelgrass, algae and polychaete worms.

Mud Whelk (*Cominella glandiformis*)

Found on sand, rocks and in seagrass meadows, the mud whelk is both scavenger and predator, catching small snails (e.g. *Diloma*) and even cockles. Using a black siphon extended to detect food, the proboscis then searches its prey for soft tissue which can then be sucked into its gut. Generally found in abundance where cockles (their preferred prey) are found, densities of up to 340 whelks per square metre have been found along this eastern edge of the Estuary.

It appears seagrass beds on the eastern side of the Estuary are slowly recovering from the negative impacts of liquefaction sand and excess nutrients after the earthquakes.



Seagrass

PHOTO © ISLAY MARSDEN



White-flipped blue penguin

PHOTO © DOC / BRIAN D BELL

Stalk-eyed Mud Crab

(*Macrophthalmus hirtipes*)

As a nomad, the stalk-eyed mud crab constructs temporary burrows in the sediments below the mid tide. Using the burrow for protection from predators, they feed on organic matter sieved from the surface mud or algae growing on the shells of the plentiful mudflat snails (*Amphibola crenata*). In this part of the Estuary, these tiny vegetarians can reach population densities of up to 250 per square metre.

Seagrass (*Zostera*)

Able to grow while fully submerged in seawater, seagrass (also known as eelgrass) offers one of the most highly productive ecosystems in the world. They are the only marine plants with roots as well as rhizomes and play a significant role stabilising sediment, while also concentrating heavy metals in their leaves (without any apparent negative effect). An ally in the challenge to slow global warming, seagrasses also act as effective carbon sinks. Seagrass beds in the Estuary serve as home and feeding grounds for fish and small invertebrates.

Despite these critical benefits, seagrass is declining globally due to degraded habitat health, poor water quality and smothering by sediment the key culprits.

A Rare Sight

A penguin is not what you would expect to find in an estuary, but the white-flipped blue penguin, which only breeds on spots from around the Banks Peninsula coast to Motunau Island, is listed as a breeding resident. But don't expect to see these small (30 centimetres tall) birds—while their conservation status has improved from 'Nationally Vulnerable' to 'At Risk – Declining' over ten years, few are now seen around the Estuary.



A popular spot for birds and humans alike, Spit Reserve is a truly magical place. Offering visitors a sense of peace and isolation, Spit Reserve also provides some of the best opportunities to see terns and waders such as the famous Eastern Bar-tailed Godwit (Kūaka).

The Incredible Travelling Bar-tailed Godwit

There is a treat in store for bird watchers during spring at Spit Reserve with the arrival of the eastern bar-tailed godwit from Alaska. To escape the Arctic winter, the Alaskan godwits face an 11,500 kilometre non-stop flight across the Pacific Ocean to reach Te Ihutai/Avon-Heathcote Estuary. Arriving mid-September, they make the Estuary their home for six months, and with up to 2,000 birds they become the dominant wader species on the Estuary. With a long flight home they spend most of their time building up their fat stores by feeding on polychaete worms, small flounders, cockles and shrimp from the Estuary,

but during high tide will often congregate along the shore of Spit Reserve.

Before leaving for their breeding grounds in the Arctic tundra in March, flocks of excited Godwits often let out their pre-migratory jitters through a show of spectacular stunts above the Estuary. The city of Christchurch gives a send-off to the birds, with the first 'Farewell to the Godwits' celebration held in 1996. Allowing people to farewell the endurance athletes of the sky prior to their epic journey north, the celebration has become a popular event for local residents and visitors alike.

Burning 50% of her body weight in the process, a female Godwit was recorded travelling 11,500 kilometres non-stop from Alaska to New Zealand—the equivalent of “a human running at 70 km/hr constantly for seven days straight”.

Rob Schuckard, Ornithological Society of New Zealand

Godwits on Spit Reserve

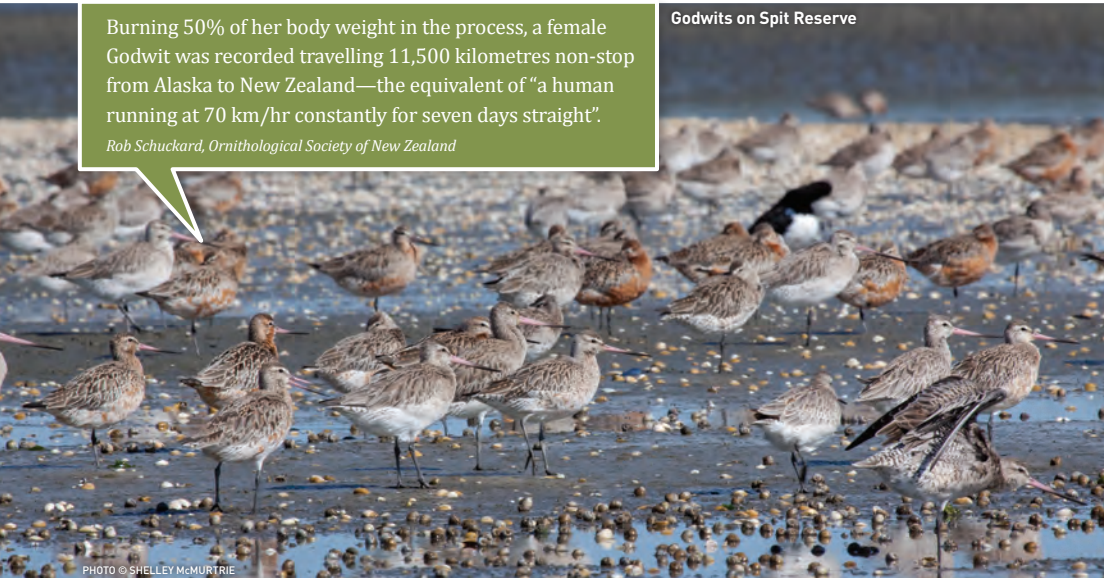


PHOTO © SHELLEY McMURTRIE

A Prized Food Resource

Tangata whenua established a number of kainga (settlements) around the Estuary, with the earliest settlement on Spit Reserve called Te Karoro Karoro (seagulls' chatter). Māori fishing equipment, mounds of pipi shells, and ovens for cooking fresh seafood have been discovered here, and are a testament to the bounty of seafood found at the mouth of an estuary. Pipi were especially abundant and following cooking were preserved by stringing them together with flax and hanging them out to dry.

Sadly, today the pipi beds have diminished and are sometimes unsafe to eat. Tuatua, another traditionally prized shellfish, are still found near the Estuary mouth and along New Brighton Beach. Winged locals, such as the black-backed gull, have worked out that they can get a tasty feed of tuatuas if they drop them from a height to split open their shells.



- **WHERE:** Parking at the end of Rocking Horse Rd.
- **WHEN:** At high tide birds gather just offshore from the tip of Spit Reserve on a sand island.
- Dogs must be on a leash or under control—check information panel at Rocking Horse Rd.



Recreation at Spit Reserve

The reserve at Southshore Spit was designated a Scenic Reserve in 2005. A walking track and information panels detailing plant and bird life of this sand dune ecosystem are found amongst the rolling dunes, long grass and shrubs. The tip of Spit Reserve is an excellent spot for bird-watchers and one of the best places on the Estuary to see waders and terns.



Avon-Heathcote Estuary Ihutai Trust




The Avon-Heathcote Estuary Ihutai Trust is a charitable society incorporated in 2003. With representation from the community, Christchurch City Council, Environment Canterbury, and mana whenua, the Trust is active in the protection and enhancement of the Estuary for recreational, ecological, educational, and landscape values.



For anyone interested in projects involving wetland advocacy or restoration in Te Ihutai, please contact us at info@estuary.org.nz.

Trust Vision

The Avon-Heathcote Estuary Ihutai Trust has a vision of communities working together to create and maintain:

-  Clean water
 -  Open space
 -  Safe recreation, and
 -  Healthy ecosystems that we can all enjoy and respect
- *Toi tū e taonga ā iwi*
 - *Toi tū e taonga ā Tāne*
 - *Toi tū e taonga ā Tangaroa*
 - *Toi tū te iwi*

A Message from the Trust

This field guide is intended to educate, inspire and promote Te Ihutai as one of the nation's important urban wetlands. We hope you enjoy the details within it and are able to appreciate the wonderful features, history and wildlife that constitutes its nature.

Since the inception of the Trust, we have worked to improve the quality of the Estuary and you will see in our vision statement the values that we hold dear and the goals we aim for.

This booklet describes the history and current state of the Estuary. It records major changes, including the effects of the earthquake sequence on 2010/11 and the diversion of treated effluent from the Estuary to the ocean outfall pipeline in 2010. Water quality has improved as a result, but there is a long way to go—the city's stormwater system remains a major source of contaminants and we have worked with the Council to introduce improvements over the coming years, and we are still advocating for the reduction of nitrates and phosphate levels that disturb the water quality balance. We have several projects underway to restore the Estuary edge in order to improve the natural environment, including five areas promoting the re-establishment of wetland flora and habitats.

With clean water the Estuary can return to a thriving and safer place for its natural inhabitants, and for human recreational pursuits and enjoyment. But for that to happen, we all need to know and appreciate the value of the Estuary, which is where this booklet will help. Enjoy the guide, use it as a reference and most of all use it to explore and appreciate this wonderful place of ours, Te Ihutai.

Ko ngā awa ngā moana me ngā whenua te wai ū mō ngā uri whakatipu.

It is our rivers, our seas and our lands that will sustain our future generations.

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Lastly thanks to all those who provided photos for inclusion and are credited throughout the field guide. Aerial imagery is from www.canterburymaps.govt.nz and Google Earth.

The Trust works with many other community groups, tangata whenua, statutory bodies, and agencies. In particular they would like to thank all those who sponsored the production of this book from its inception to the current edition:



PLEASE NOTE: Every effort has been made to ensure the accuracy of the information in this book. We apologise if items we've discussed differ slightly to what you may find at your time of viewing



PHOTO © SHELLEY McMURTRIE, 2006



PHOTO © SHELLEY McMURTRIE

Yellow-eyed mullet found in low tide channels

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Numerous books, reports and websites were referred to in the writing of this guide. Below are the main references used. For further resources, visit the Trust website at www.estuary.org.nz/our-estuary/bibliography.html.

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Codwits





www.estuary.org.nz

Estuaries are one of the most productive habitats in the world and one of the most heavily populated. The sheltered waters of Te Ihutai/Avon-Heathcote Estuary are not only home to countless birds and animals, but have also played a significant role in the lives of people for hundreds of years.

Designed to be taken with you as you explore one of Christchurch's greatest treasures, this field guide will introduce you to the abundant wildlife, sites of historical interest, and favoured recreation spots of Te Ihutai.

"This book is a wonderful guide to a beautiful place within our Christchurch community, showing us the past with all its treasures as well as the present with all its changes. The future of this brilliant estuary, however, is dependent on you and me." Ruud Kleinpaste



CLEAN WATER



OPEN SPACE



SAFE RECREATION



HEALTHY ECOSYSTEMS



PHOTO © BRONWYN GAY



PHOTO © AHEIT



Cover photo:
View of the estuary from Kinsey Tce
© BRONWYN GAY, 2019

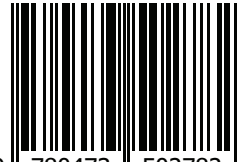


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