

**NELSON/MARLBOROUGH CONSERVANCY**

**Farewell Spit (39)**

**Location:** 40°32'S, 172°50'E. At the northern extremity of Golden Bay and the northwestern extremity of South Island, 38 km from the town of Takaka, Tasman District.

**Area:** 11,388 ha (land area c.1,961 ha; inter-tidal zone c.9,427 ha).

**Altitude:** Sea level to 3 m.

**Overview:** Farewell Spit is a classic recurved spit, approximately 30 km long, composed predominantly of uniform quartz sand derived from rivers draining westwards and transported northward by the westland current. The north is exposed to the Tasman Sea, but the south has extensive tidal mudflats. These provide feeding areas for large numbers of waterfowl. Some 95 species were recorded on the spit in March 1974, and more than 83 species of wetland birds are regularly recorded at the spit. The sand dunes provide habitat for a diverse and unusual plant community. Farewell Spit was listed as a wetland of international importance under the Ramsar Convention on 13 August 1976.

**Physical features:** Farewell Spit is a classic recurved spit. The material forming the spit is derived from erosion of the Southern Alps and West Coast sea cliffs, transported northwards by a long-shore current. Since the estimated origin of the spit 6,500 years ago, an estimated 2.2 million cubic metres of sand have been deposited per annum. Wind transports more surface sand towards Golden Bay, although the majority of sand lies below the mean low water mark. The sub-aerial part of the spit averages about 1 km in width, and extends for about 22 km eastwards into Golden Bay. It is reported to be extending by 15 m annually. At low tide, the sandflats and saltmarsh extend for about 6 km to the south of the spit. Along the northern coast, there is a succession of fairly stable barchans up to 27 m in height (a dune formation rare in New Zealand). The inter-dune areas contain a series of damp hollows and small lakes, some of which have fresh water and may be semi-permanent.

**Ecological features:** The dryland areas of Farewell Spit have been almost totally transformed from original light coastal bush, scrub and native grasses to a predominantly exotic cover dominated by Marram Grass *Ammophila arenaria* and Lupin *Lupinus arboreus*, but with some native Manuka *Leptospermum scoparium*, Kanuka *Kunzea ericoides*, New Zealand Flax *Phormium tenax*, Bracken *Pteridium aquilinum* var. *esculentum*, sedges *Carex* spp. and herbs. Regenerating native forest species include Kaitomako *Pennantia corymbosa*, Rimu *Dacrydium cupressinum* and some Akeake *Dodonaea viscosa*. The dune hollows and small lakes contain milfoil *Myriophyllum* spp., *Glossostigma elatinooides*, *Limosella tenuifolia*, *Lilaeopsis orbiculatus*, Sand Gunnera *Gunnera arenaria*, sedges *Carex* spp. and rushes *Juncus* spp. Three threatened endemic plant species are found in the sand-dune communities; *Euphorbia glauca*, Sand Daphne *Pimelea arenaria* and Pingao *Desmoschoenus spiralis*. The saltmarsh follows a classical development, with eelgrass *Zostera* spp. at the lower limit, then distinct zones of glasswort *Salicornia* spp., Sea Rush *Juncus maritimus* var. *australiensis* and Jointed Rush *Leptocarpus simplex*, and finally a zone of New Zealand Flax *P. tenax* near the dunes.

In 1975, all cattle and sheep were removed from the spit, and since then, despite the presence of some deer, the natural vegetation has begun to regenerate, with the character of the vegetated inter-dune areas changing, as native hardwood scrub species are colonising the mixed exotic/indigenous grass/herb swards. The emergence of this vegetation is a significant ecological development, as early explorers noted that the spit had "woody vegetation". Pingao is also showing signs of regeneration since the removal of cattle and sheep. There is evidence to suggest that this species is now competing successfully with introduced Marram Grass.

**Land tenure:** The spit is Crown land held as Nature Reserve. Surrounding areas are Crown land held as Recreation Reserve. The surrounding seas have no specially protected status.

**Conservation measures taken:** Farewell Spit (*i.e.* the entire sandspit) is a Nature Reserve, with public entry by permit only. Tourist traffic to the lighthouse is tightly controlled. The Nature Reserve status recognised Farewell Spit's outstanding values. It has been a protected area since 1938, when almost all the land (1,961 ha) above high tide level was set apart as a Flora and Fauna Reserve, and the area uncovered at low tide (then 9,360 ha) was set aside as a Sanctuary for the Preservation of Wildlife. The only adjacent land area, Puponga Farm Park, is Crown land and has been gazetted as a Recreation Reserve.

Farewell Spit was listed under the Convention on Wetlands of International Importance especially as Waterfowl Habitat (the Ramsar Convention) on 13 August 1976. The management plan for the Nature Reserve was revised in 1990. This plan covers both the Nature Reserve and the adjoining Farm Park (Farewell Spit Nature Reserve and Puponga Farm Park Management Plan, January 1990).

**Conservation measures proposed:** A National Park investigation for the entire northwest South Island area, including the spit and the Farm Park, is presently receiving submissions from interested parties in response to a discussion document put out by the Department of Conservation.

**Land use:** Conservation of flora and fauna and protection of wildlife are the main land uses at the spit. The area continues to be given a high level of protection against human interference. Some tourism occurs; there is currently one tour operator conducting daily tours to visit the lighthouse during the summer months and less frequently for the rest of the year. The lighthouse, which is now unstaffed, lies about 20 km west of Puponga. There is a house with some trees adjacent to the lighthouse. Puponga is run as a Farm Park with access to the public. The primary objective of management of the Farm Park is to protect the spit.

**Possible changes in land use:** None proposed.

**Disturbances and threats:** Introduced Red Deer *Cervus elaphus* and European Hare *Lepus europaeus* present a threat to the plant communities and especially the threatened plant species. There are still some problems with invasion of other introduced species, such as Gorse *Ulex europaeus*, Blackberry *Rubus fruticosus* and Climbing Dock. Trials were carried out to find an effective herbicide for Climbing Dock, and these appear to have been successful.

A major potential threat would be from an oil spill from the considerable amount of shipping in the area. The dumping of plastics from passing boats is also a problem. Fire is a major potential threat, especially in view of the strong winds which occur in the area in summer. Cockle harvesting nearby in Golden Bay may have some effect on marine food chains in the area, if harvesting exceeds sustainable levels.

**Hydrological and biophysical values:** The wetland plays a major role in the support of food chains. The sandspit is unique in New Zealand due to its extent and the biota it supports. The processes forming the sandspit have not, and probably could not, be altered by the hand of man.

**Social and cultural values:** The sandspit has high aesthetic value. The nearby Puponga area has a number of Maori village, midden and "pa" sites, notably Abel Head and middens on Triangle Flat. Pingao is highly valued by the Maori for weaving. The coasts were subject to sealing and whaling. Since 1840, there have been 11 shipwrecks on or near the spit. The spit was leased for grazing from 1874 until 1976.

**Noteworthy fauna:** Some 95 species of birds were recorded on the spit in March 1974, and more than 83 species of wetland birds are regularly recorded at the spit, notably international and internal migratory shorebirds. The vast expanses of inter-tidal sand and mudflats provide habitat for large numbers of waterfowl, especially shorebirds. As many as 33,000 shorebirds have been recorded in November/December and as many as 12,000 in June/July (Ornithological Society of New Zealand Wader Counts). Counts of shorebirds at the high-tide roosts on the spit have included up to 8,600 South Island Pied Oystercatcher *Haematopus finschi*, 1,300 Banded Dotterel *Charadrius bicinctus*, 19,000 Bar-tailed Godwit *Limosa lapponica*, 27,000 Red Knot *Calidris canutus* and 1,700 Ruddy Turnstone *Arenaria interpres*. The undisturbed dunes also provide breeding habitat for colonies of Australian Gannets *Sula serrator*, Caspian Tern *Sterna caspia* and White-fronted Tern *S. striata*. The gannet colony at the end of the spit continues to grow, and now holds over 2,000 adult birds. The spit is also a moulting area for an estimated 14,000 Black Swans *Cygnus atratus*, over 25% of the New

Zealand population of this species. The New Zealand Dotterel *Charadrius obscurus* is present in small numbers and may breed.

Rare international migratory shorebirds have included Grey Plover *Pluvialis squatarola*, American Whimbrel *Numenius phaeopus hudsonicus*, Lesser Yellowlegs *Tringa flavipes*, Wandering Tattler *T. incana*, Terek Sandpiper *T. cinerea* and Western Sandpiper *Calidris mauri*. Other unusual visitors have included Marsh Crake *Porzana pusilla*, Great Crested Tern *Sterna bergii* and White-capped Noddy *Anous tenuirostris minutus*.

Southern Fur Seals occasionally haul out, and Golden Bay is well known for its not infrequent mass whale strandings, which sometimes occur on the inner spit.

**Noteworthy flora:** Threatened plants include *Euphorbia glauca*, Sand Daphne *Pimelea arenaria* and Pingao *Desmoschoenus spiralis*. Other noteworthy plants include *Spinifex hirsutus*, occurring here at its southernmost locality, and Sand Spike Rush *Eleocharis neozelandica*, recently rediscovered here at its type locality (this species had not been collected in the South Island for many years).

**Scientific research and facilities:** The Ornithological Society of New Zealand and the former Wildlife Service have undertaken bird surveys. The Ornithological Society continues to monitor the shorebird populations regularly, with logistical assistance from the Department of Conservation. The Nelson/Marlborough Fish and Game Council monitor game-bird numbers by aerial counts. Various studies have been undertaken to determine the origin and formation of the sandspit. Accommodation is available to scientists through the Department of Conservation at Puponga and the lighthouse residence.

**Conservation education:** No conservation education is undertaken on the spit, as the area is remote and vulnerable, and access is restricted. However, some educational materials concerning the reserve have been produced.

**Recreation and tourism:** A safari tour operates daily visits to the lighthouse from Collingwood during the summer months and less frequently for the rest of the year. An application has been received for a second tour operator.

**Management authority:** The Department of Conservation (Nelson/Marlborough Conservancy) has general responsibility for the management of flora and fauna and the Nature Reserve, while the Takaka Field Centre is responsible for day-to-day management. The Tasman District Council has statutory responsibilities under the Resource Management Act 1991 for water resources and the preparation of coastal plans. The Nelson/Marlborough Fish and Game Council manages sport fishing and game-bird hunting.

**Jurisdiction:** Territorial: Tasman District Council. Functional: Department of Conservation (Nelson/Marlborough Conservancy) and Nelson/Marlborough Fish and Game Council.

**References:** Davidson *et al.* (1990); Jane (1991a, 1991b); OSNZ News No.61, December 1991; Walker (1987).

**Reasons for inclusion:**

- 1a Farewell Spit is a good example of a classic recurved spit, and contains barchans, a dune formation rare in New Zealand.
- 2a The spit supports populations of three threatened endemic plants, *Euphorbia glauca*, *Pimelea arenaria* and *Desmoschoenus spiralis*, and one globally threatened bird, *Charadrius obscurus*.
- 2b The spit supports regenerating sand dune plant communities and a very diverse avifauna, and is thus of special value for maintaining the genetic and ecological diversity of the region.
- 2c The spit is an important breeding area for several species of birds and an extremely important wintering area for large numbers of internal and international migratory shorebirds.
- 2d The spit is of special value for its endemic plants, including three threatened species.

- 3a The spit regularly supports over 20,000 waterfowl.
- 3c The spit regularly supports over 1% of the regional populations of *Cygnus atratus* (27%), *Haematopus finschi* (9.5%), *Charadrius bicinctus* (4.3%), *Limosa lapponica* (5.8), *Calidris canutus* (13.5%) and *Arenaria interpres* (at least 1.7%).

**Source:** Neil Deans.

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### Whanganui Inlet and Mangarakau Swamp (40)

**Location:** 40°31'S, 172°34'E. 14 km northwest of Collingwood, northern South Island.

**Area:** Whanganui Inlet c.2,744 ha; Mangarakau c.350 ha.

**Altitude:** Sea level to 2 m.

**Overview:** Whanganui Inlet is the largest shallow enclosed estuary on the West Coast of the South Island, with Mangarakau Swamp a freshwater swamp adjacent to it. Both estuary and swamp are relatively pristine.

**Physical features:** The inlet is a drowned river valley, 13 km long and 2-3 km wide, and enclosed by a barrier. Numerous small streams flow into the inlet. Mangarakau Swamp lies to the south, with the Patarau River to the south of it. The river previously flowed through the swamp into the inlet. A number of other aeolian or fluvial water bodies (e.g. the Kaihoka Lakes and Lake Otuhie) in the immediate vicinity increase the value of the freshwater complex for wildlife.

**Ecological features:** Whanganui Inlet is notable due to its lack of modification; most of the saltmarsh and the large eelgrass beds are intact. The freshwater streams flowing into the inlet are largely natural, and marginal vegetation grades into native forest around much of the inlet. Sedimentation, nutrient regimes, faunal composition and the food chains are essentially operating in a natural state. Mangarakau Swamp and other smaller wetlands nearby enhance the value of the inlet, although some of the smaller wetlands have been subject to moderate levels of modification. Although the present vegetation of Mangarakau Swamp has been induced by fire and has some gorse around its edges, the interior of the swamp has a substantially native fern rushland community dominated by species of *Baumea* and *Gleichenia*. The lakes also have a verge of Raupo *Typha orientalis* which is largely natural.

**Land tenure:** Whanganui Inlet is largely Crown land (harbour bed), although this is disputed by the local Maori tribes who claim use of certain harbour resources. Approximately one third of Mangarakau Swamp is Crown land held as reserve. Approximately half of the catchment of Whanganui Inlet is Crown land held as reserve and forest park. The remainder is private land, some of which is still in forest or scrub, and some of which is farmed.

**Conservation measures taken:** North-West Nelson Forest Park and several smaller reserves protect much of the catchment of both Whanganui Inlet and Mangarakau Swamp.

**Conservation measures proposed:** Proposals for the creation of a Marine Reserve in the southern portion of Whanganui Inlet and habitat protection measures for the northern half are presently under way. Little progress has been made on these proposals due to local concerns.

**Land use:** A limited amount of recreational marine fishing takes place in Whanganui Inlet, and there is some fishing for whitebait and game-bird hunting around the margins. The reserve land at Mangarakau Swamp is used for the conservation of plants and animals. There is also a very limited amount of flax and kiekie harvesting for cultural purposes at the swamp. Some of the adjacent flat lands in private ownership have been drained for farming, while other areas have been burned and are in various states of regeneration. There has been logging of native trees in some of the contributing catchments, although this has recently ceased as the

remaining resource is uneconomic. Much of the hill country to the north and west is farmed. There are isolated farms in the area but no significant settlements, although Rakopi and more recently Mangarakau have been small settlements in the past.

**Possible changes in land use:** No major are changes foreseen at the wetland or in the catchment area.

**Disturbances and threats:** Goats, sheep and cattle regularly enter conservation area surrounding the inlet and swamp. Saltmarsh vegetation is also heavily grazed, especially near Rakopi. Drainage has modified the water regime, especially in the White Pine Creek/Rakopi area and in the northern portion of Mangarakau Swamp. The harvesting of sphagnum moss, spread of Gorse and fire are major threats to the vegetation of Mangarakau Swamp. Logging in the Wairoa Catchment has increased sedimentation in the inlet. A small rubbish tip near the northern tip of Mangarakau Swamp is a source of leachate to the inlet, and may act as a source of food for the predators of crakes and rails (Rallidae). Causeways and road building have modified the natural tidal flows and trapping of sediments. Notwithstanding all these potential threats, their combined effect on the integrity of the inlet is presently minimal, and extensive areas are largely unaffected.

**Hydrological and biophysical values:** The inlet is a valuable nursery area for marine fish and for freshwater fish due to its natural state and the absence of introduced fish.

**Social and cultural values:** This is a remote area of social significance only to the residents. Some people visit the area during summer, but these are mostly local people from the Golden Bay area. The inlet is of considerable significance to the Maori, being a traditional fishing area and source of flax, pingao and kiekie for use in weaving. Several "urupa" (burial sites) and "waahi tapu" (sacred places) are known from the inlet, which was also on the "Greenstone Trails". The inlet has high aesthetic significance due to its natural state and spectacular scenery.

The area has a rich Maori and European history. Eighteen Maori and three European archaeological sites are known from around the inlet. Three Maori "pa" were present around the inlet in the 1830s. European activity was concerned with timber, flax, gold and coal extraction. Seven ships were wrecked or burnt in the inlet.

**Noteworthy fauna:** Forty-two species of waterfowl have been recorded at the site, including three globally threatened species, the Australasian Bittern *Botaurus poiciloptilus* (a resident), Black Stilt *Himantopus novaezelandiae* (an occasional visitor) and Wrybill *Anarhynchus frontalis* (one record). Other resident species and regular visitors include Pacific Reef Egret *Egretta sacra* (resident), Great Egret or White Heron *E. alba* (winter visitor), Royal Spoonbill *Platalea regia* (non-breeding visitor), Banded Rail *Rallus philippensis assimilis* (resident), Variable Oystercatcher *Haematopus unicolor* (resident in small numbers), Banded Dotterel *Charadrius bicinctus* (winter visitor) and Caspian Tern *Sterna caspia* (regular visitor). Occasional visitors include Pacific Golden Plover *Pluvialis fulva*, Far Eastern Curlew *Numenius madagascariensis* and Sharp-tailed Sandpiper *Calidris acuminata*.

Thirty-eight marine and 12 freshwater species of fish have been recorded, including 13 commercially important marine species and large numbers of Banded Kokopu *Galaxias fasciatus*. The latter is one of the whitebait species that spend the early part of their juvenile stage in the sea and the remainder of their life cycle in freshwater.

A total of 163 species of estuarine invertebrates has been recorded from the inlet, more than in any other South Island estuary. Of particular interest are three new species of Amphipoda discovered in the inlet.

**Noteworthy flora:** There are extensive areas of eelgrass, especially in the northern part of the inlet. The interior of Mangarakau Swamp has a substantially native fern rushland community (*Baumea-Gleichenia*), and there are largely natural verges of *Typha orientalis* around the lakes. No detailed investigations have been made on the vegetation of Mangarakau Swamp.

**Scientific research and facilities:** A report by Davidson (1990) is the first into the ecology of the inlet. Infrequent visits by the former New Zealand Wildlife Service and more regular visits since 1984 by members of the Ornithological Society of New Zealand have provided information on wildlife. The freshwater fish have been investigated by Eldon and Ward (1991). There are no facilities for scientific investigation at the site, although accommodation may be available at Collingwood or Puponga.

**Conservation education:** None to date. The remoteness of the estuary does not lend itself to conservation education, but the unmodified nature of the wetlands and spectacular scenery would render it suitable to educational use through visual media.

**Recreation and tourism:** Very limited. Some holiday-makers visit the area during the summer, and there is some fishing in the inlet, whitebaiting and game-bird hunting. Mangarakau Swamp is unlikely to receive any visitor use. Although both the inlet and the swamp are readily accessible by roads, these are unsealed and distant from population centres.

**Management authority:** The Department of Conservation (Nelson/Marlborough Conservancy) has general responsibility for the management of flora and fauna, while the Takaka Field Centre is responsible for day-to-day management. The Tasman District Council has statutory responsibilities under the Resource Management Act 1991 for water resources and the preparation of coastal plans. The Nelson/Marlborough Fish and Game Council manages sport fishing and game-bird hunting.

**Jurisdiction:** Territorial: Tasman District Council. Functional: Department of Conservation (Nelson/Marlborough Conservancy) and Nelson/Marlborough Fish and Game Council.

**References:** Barne (1986); Davidson (1990); Davidson & Courtenay (1990); Eldon & Ward (1991); Mitchell (1989); Mitchell & Mitchell (1990); Rushton (1987).

**Reasons for inclusion:**

- 1a Whanganui Inlet and Mangarakau Swamp are particularly good representative examples of a shallow enclosed estuary and associated freshwater swamp, wetland types characteristic of New Zealand.
- 2a The wetlands support populations of two globally threatened species of birds, the Australasian Bittern *Botaurus poiciloptilus* and Black Stilt *Himantopus novaezelandiae*.
- 2b The wetlands support a very diverse fauna (marine invertebrates, fish and birds), and are thus of special value in maintaining the genetic and ecological diversity of the region.
- 2c The wetlands are of special value as the habitat of various marine invertebrates, fish and migratory waterfowl at a critical stage of their biological cycles.

**Source:** Neil Deans.

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### Waikoropupu Springs and Takaka Marble Aquifer (41)

**Location:** 40°51'00"S, 172°46'20"E. 4 km north-northwest of Takaka, Golden Bay, South Island.

**Area:** Waikoropupu Springs Reserve 25.21 ha.

**Altitude:** 15 m.

**Overview:** A large marble-topped aquifer through which the largest spring in the southern hemisphere emerges in a series of springs within a reserve. The water chemistry is unusual, and the springs support a diverse and unusual aquatic flora and fauna.

**Physical features:** The Takaka Marble Aquifer is approximately 200 sq.km in area, and has an estimated aquifer volume of 1.5-3.5 cubic km. Water within the aquifer has an estimated residence time of four years. The springs cover an area of 30 m by 30 m. The largest spring has a maximum depth of 6.9 m and produces a flow of 5.3 to 21 cubic metres per second (average 9.6 cubic metres per second). The temperature of the water is constant at 11.7°C. The dissolved oxygen is 6.6 g.m<sup>-3</sup> (61% saturated), and the pH 7.5.

The springs are a karstic feature, and show a marine influence, presumed to be due to a venturi effect from submarine springs in Golden Bay in the same karst system. There is a daily tidal fluctuation in the springs, considered to be largely due to earth tides. The water is approximately one part in 200 salt, and is exceptionally clear, with a black disc distance of at least 35 m; this is probably the clearest water in New Zealand.

**Ecological features:** The springs support a diverse aquatic flora which includes 16 species of algae, seven species of mosses, three species of liverworts and two species of angiosperms. These form a mosaic of plant communities, structured mainly by water velocity. In areas with still water, the community is dominated by the introduced Watercress *Rorippa microphylla* and Starwort *Callitriche stagnalis*; in moderate flows, the milfoil *Myriophyllum triphyllum* and the introduced *Juncus microcephalus* are co-dominants; in the swifter flows, several bryophytes characterise the community.

**Land tenure:** The wetland is Crown land held as Scenic Reserve; surrounding areas are private land.

**Conservation measures taken:** The area into which the springs emerge has been held as Scenic Reserve since 1979, and is managed and administered by the Department of Conservation. This provides protection for the physical substrate and plants and animals of the springs, but not their waters. The springs were recognised as a Project Aqua site of international significance in 1973, and were considered to be internationally significant by Worthy (1989). The effects of use by divers on the vegetation is being monitored on an annual basis.

**Conservation measures proposed:** A proposed water management plan under the Resource Management Act 1991 was scheduled for completion by 1994. This would recognised the importance of the springs, and should protect them by way of policies covering the catchment. It has been suggested that it may be appropriate to apply for a Water Conservation Order for the aquifer and springs.

**Land use:** Conservation of plants and animals in the reserve. Visitor use is just under 30,000 site visits per annum. Diver use is in the order of several hundred per annum. There is a large salmon farm 150 metres downstream of the springs, taking up to four cubic metres of spring water per second. Private land in the immediate vicinity of the springs is used for pastoral farming, mainly dairy farming. The Takaka catchment, which feeds into the springs, has significant areas of protected forest, hydro-electric power stations and agricultural/horticultural use. The local population of the Takaka Valley is about 2,100 (1986 census).

**Possible changes in land use:** An underwater viewing scope may be installed and improved visitor information provided at the main spring. Some planting may be undertaken to enhance the area around the main spring. No other changes to the management of the reserve are foreseen. There has been a proposal to expand the salmon farm, and further agricultural and horticultural development is likely within the catchment.

**Disturbances and threats:** Over-use or inappropriate use of the springs by recreational divers is a major threat. Expansion of the salmon farm could result in more water being taken from the springs, or require modification of the stream bed to ensure an adequate flow of water for the salmon. The introduced watercress *Rorippa microphylla* grows prolifically, both around the edge of and within the springs, and has to be removed. Pollution to the aquifer from mining

or nutrient run-off is unlikely, but would be impossible to remedy if it were to happen. For this reason, it has been suggested that a Water Conservation Order may be appropriate to protect the entire aquifer. This issue would have to be addressed in a catchment management plan.

**Hydrological and biophysical values:** Williams (1977) rates the hydrology of the marble aquifer and springs as internationally significant.

**Social and cultural values:** The springs are visited by 30,000 people per annum, and are of immense cultural significance to the local Maori people. The spring water is regarded as fundamentally pure, and the Maori have used the springs as a symbol of themselves and as part of their name and identity. The area was mined by alluvial means in the 1880s, and the remains of these mining activities are still present. These are considered of local significance.

**Noteworthy fauna:** Ten species of worms, six species of crustacea, two mites, 28 species of insects, three snails and four fish have been recorded from the springs. Michaelis (1977) found enormous numbers of *Potamopyrgus antipodarum* (30,000 m<sup>-2</sup>), and considered these to be a special feature of the springs. An eyeless pale species of *Neppia* (Dugesiidae), normally a cave inhabitant, has been found in the area. Other notable species found in the springs include the caddisfly *Rakiura vernale* and amphipod *Paracalliope karitane*; both of these are known from few other localities in New Zealand.

**Noteworthy flora:** The springs support a diverse aquatic flora (16 species of algae, seven species of mosses, three species of liverworts and two species of angiosperms). The diversity of mosses and liverworts is unique in New Zealand. The liverworts *Lophocolea* spp. and *Neesioscyphus phoenicorhizus* were found submerged in the springs rather than on damp rocks, where they have been recorded previously.

**Scientific research and facilities:** Michaelis (1976 & 1977) undertook her Ph.D. thesis on the springs. Williams (1977) studied them extensively, also during the 1970s. The water rights for the salmon farm are carefully monitored by the Department of Conservation, as are the possible impacts of use by divers (since 1990). There are no research facilities at the site.

**Conservation education:** Except for some interpretation at the site, no formal educational use is made of the area.

**Recreation and tourism:** Large numbers of people visit the reserve (30,000 annually). Increasing numbers of people dive in the springs to enjoy the unique experience which this affords, and many then drift-dive downstream. There have been proposals in recent years to offer commercially guided diving, access by glass-bottomed boats and gold mining displays, but these have all been rejected.

**Management authority:** The Department of Conservation (Nelson/Marlborough Conservancy) has general responsibility for the management of flora and fauna and the Nature Reserve, while the Takaka Field Centre is responsible for day-to-day management. The Tasman District Council has statutory responsibilities under the Resource Management Act 1991 for water resources.

**Jurisdiction:** Territorial: Tasman District Council. Functional: Department of Conservation (Nelson/Marlborough Conservancy).

**References:** Michaelis (1976, 1977); Williams (1977); Worthy (1989).

**Reasons for inclusion:**

- 1d Waikoropupu Springs and Takaka Marble Aquifer are an example of a wetland type that is rare in New Zealand. The springs are the largest in the Southern Hemisphere.
- 2b The springs support a diverse flora and invertebrate fauna, including a diversity of mosses and liverworts that is unique in New Zealand, and are thus of special value in maintaining the genetic and ecological diversity of the region.

**Source:** Neil Deans.

### Waimea Inlet (42)

**Location:** 41°17'S, 173°07'E. 12 km west of Nelson City, northern South Island.

**Area:** c.3,445 ha.

**Altitude:** Sea level.

**Overview:** Waimea Inlet is an extensive shallow bar-built estuary, the largest in the South Island. It has various islands throughout, and despite extensive modification around its edges still provides outstanding habitat for wildlife. It is important for its fisheries, and is used extensively by people.

**Physical features:** Waimea Inlet is a shallow bar-built estuary open to Tasman Bay at the western (Mapua) and eastern (Nelson) ends of Rabbit Island. There are numerous islands of various sizes within the estuary. The inlet has a large tidal volume (up to 62 million cubic metres of seawater) which, combined with the shallow nature of the estuary and the large tides in Tasman Bay, results in a rapid tidal flushing. The major freshwater input is derived from the Waimea River, which presently flows only into the eastern half of the estuary. A further 22 small streams enter the estuary. The usual freshwater input for the entire inlet is only about 19 cubic metres per second, but may flood to 2,000 cubic metres per second.

**Ecological features:** Waimea Inlet is an extensive estuary with a great variety of habitats because of the extent of the margins between islands and channels and varying freshwater and tidal inputs. The inlet is utilised by 112 species of marine invertebrates, 41 species of fish and 50 species of waterfowl.

**Land tenure:** The estuarine areas are virtually all Crown land (harbour bed) below the mean high water mark. Most adjacent land is private land, much of which has been reclaimed from the harbour. Rabbit Island and Grossis Point are Crown land held as Recreation Reserves. Bells Island is a sewage treatment plant.

**Conservation measures taken:** The estuarine areas have no specific protection status. Rabbit Island and Grossis Point are Crown land held as Recreation Reserves. Neiman's Creek has a small Wildlife Management Area. Higgs Reserve is a 3 ha margin of forest near Mapua. The total area under protection in the surrounding land is negligible, given the extent of the estuary. Management of the estuarine area is now undertaken under a form of conservation mandate.

**Conservation measures proposed:** It has been recommended that Pearl Creek and Neiman's Creek, two small spring-fed creeks which provide habitat for lowland freshwater fish and wildlife, be given some form of protection.

**Land use:** The inlet is used extensively for recreation and fishing. The possibility of farming the seaweed *Gracilaria* spp. has been investigated on a small scale between Rough and Rabbit Islands. Most of the adjacent land is either pastoral, horticultural or agricultural. To the east, there is considerable industrial development, and at Mapua and Monaco/Tahuna, some residential land use.

**Possible changes in land use:** Aquacultural use may occur on a larger scale if the current attempts to farm seaweed *Gracilaria* spp. are successful. Intensification of use is likely in the catchment area, especially to the east of the inlet. A new motorway is proposed adjacent to the eastern margin. The motorway proposal involves the reinstatement of about 150 ha of natural high shore habitat in exchange for the loss of a slightly larger area of mudflat habitat.

**Disturbances and threats:** Threats include erosion on the Aerodrome Peninsula and inner eastern margin of Rabbit Island, increased siltation behind the road causeways due to reduced flow, and trampling and grazing in saltmarsh and freshwater marshes fringing the estuary. There are about 20 ha of the exotic cordgrass *Spartina anglica* in the inlet; this is considered a weed by the Department of Conservation. Enrichment from Bell's Island sewage works is also a problem. Netting in the inlet is reducing fish stocks. Game-bird hunting in areas with high

value for protected wildlife species may have an adverse effect on these species. Discharge of leachates from two closed refuse dumps may have localised or long-term effects.

**Hydrological and biophysical values:** The wetland plays a general role in sediment trapping, maintenance of water quality, prevention of coastal erosion and the support of food chains.

**Social and cultural values:** The inlet is extensively used for recreation and fishing. It forms the backdrop to Nelson and Richmond and the township of Mapua, and is a significant component of the Nelson landscape. Some inter-tidal flats near Nelson are used for educational study.

There are 33 archaeological sites known from the inlet and its islands. These are predominantly middens and some "urupa" (burial sites), especially near Mapua. Oral traditions indicate early Maori settlement in the Waimea area, once an important fishing and wildfowling area.

**Noteworthy fauna:** Waimea Inlet was assessed as an "outstanding" "Site of Special Wildlife Interest" (SSWI), particularly for Anatidae and wading birds, by the Fauna Survey Unit of the New Zealand Wildlife Service. This is a nationwide wildlife habitat ranking system officially recognised by the Department of Conservation. Fifty species of waterfowl have been recorded at the inlet. Residents and regular visitors include Australasian Bittern *Botaurus poiciloptilus* (resident in low numbers), Royal Spoonbill *Platalea regia* (non-breeding visitor), Banded Rail *Rallus philippensis assimilis* (resident), Variable Oystercatcher *Haematopus unicolor* (resident), Banded Dotterel *Charadrius bicinctus* (non-breeding visitor), Wrybill *Anarhynchus frontalis* (winter visitor), Caspian Tern *Sterna caspia* (breeding visitor) and Black-fronted Tern *Chlidonias albobristatus* (summer visitor). Occasional visitors include Pacific Reef Egret *Egretta sacra*, Great Egret or White Heron *E. alba* (up to 11), Pacific Golden Plover *Pluvialis fulva*, Far Eastern Curlew *Numenius madagascariensis*, Siberian Tattler *Tringa brevipes* and Little Tern *Sterna albifrons*.

Forty-one species of fish (marine and freshwater) have been recorded from the inlet, including the Giant Kokopu *Galaxias argenteus*. A total of 112 species of marine invertebrates has been reported.

**Noteworthy flora:** The inlet contains the southernmost populations of the estuarine tussock, *Stipa stipoides*. Small populations of the endangered Coastal Peppercross *Lepidium banksii* are known from No-man's Island. *Baumea articulata* has been recorded from the Rough Island wetland, the only locality for this species in the South Island.

**Scientific research and facilities:** A detailed investigation of the ecology of the Waimea Inlet has recently been undertaken (Davidson & Moffatt, 1990). Proximity to the towns of Nelson and Richmond reduces the need for specialised facilities.

**Conservation education:** An estuarine ecology card series has been produced for local schools based upon the Waimea Inlet. Proximity to a population of over 40,000 people means that the estuary is often used for ecological studies and could be used even further.

**Recreation and tourism:** Much casual recreation is undertaken at Tahuna beach and Rabbit Island; water-skiing occurs in two areas at high tide, and game-bird hunting occurs in several localities. Fishing for whitebait takes place in the small streams and rivers, and other types of fishing occur in various other places. There is little true tourism in the area.

**Management authority:** The Department of Conservation (Nelson/Marlborough Conservancy) has general responsibility for the management of wildlife and Recreation Reserves, while the Takaka Field Centre is responsible for day-to-day management. The Tasman District Council has statutory responsibilities under the Resource Management Act 1991 for water resources and the preparation of coastal plans. The Tasman District Council and Department of Conservation are responsible for management of areas below the Mean High Water Spring mark, while various private landowners manage areas above this mark.

The Nelson/Marlborough Fish and Game Council manages sport fishing and game-bird hunting.

**Jurisdiction:** Territorial: Tasman District Council. Functional: Department of Conservation (Nelson/Marlborough Conservancy) and Nelson/Marlborough Fish and Game Council.

**References:** Davidson & Moffatt (1990); Davidson *et al.* (1990).

**Reasons for inclusion:**

- 1a Waimea Inlet is a particularly good representative example of a shallow estuary, a wetland type characteristic of New Zealand.
- 2a The inlet supports an appreciable assemblage of threatened species, including Coastal Peppergrass *Lepidium banksii*, Giant Kokopu *Galaxias argenteus* and three species of birds, *Botaurus poiciloptilus*, *Anarhynchus frontalis* and *Chlidonias albostrigatus*.
- 2b The inlet supports a very diverse fauna (marine invertebrates, fish and birds), and is thus of special value in maintaining the genetic and ecological diversity of the region.
- 2c The inlet is of special value as the habitat of various marine invertebrates, fish and migratory waterfowl at a critical stage of their biological cycles.
- 2d The inlet is of special value for its endemic plant and animal species, including several nationally and globally threatened species.

**Source:** Neil Deans.

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### Wairau Lagoons (43)

**Location:** 41°32'S, 174°05'E. 10.5 km east-southeast of Blenheim township, Marlborough Province, South Island. The lagoons are immediately to the south of, and linked to, the mouth of the Wairau River.

**Area:** 2,292.7 ha.

**Altitude:** Sea level to 3 m.

**Overview:** The Wairau Lagoons, also known as Vernon Lagoons, are a large coastal lagoon-estuarine system with substantial fresh and saltwater inputs and a diverse range of habitats, especially for fish and birds. The system is relatively unmodified, although it receives changed freshwater inputs and the associated freshwater marshes formerly associated with it have been largely eliminated.

**Physical features:** The Wairau Lagoons form a large expanse of semi-enclosed shallow water areas and spring-fed kidney ponds. They are bounded to the north and east by a boulder bank fronting onto Cloudy Bay, to the south by the Vernon Hills, and to the west by low sediment flats from the Opawa River. The lagoons have formed in a complex interaction of the development of a boulder bank from the south, the inflowing Wairau River and other rivers from the northwest and west, and the strong tectonic activity forcing the underlying sediments up or down. A main channel (Te Aropipi) divides to drain the three lagoons (Big, Chandlers and Upper), while the direct freshwater flow is from a diverse range of small streams, springs and kidney ponds. Most of the lagoons are only about 0.5 m deep with fine sediment bottoms, while the channels have coarse sand or gravel substrates. The waters are brackish (17-35 parts per thousand).

**Ecological features:** The complex geomorphology of the lagoon system has produced a unique estuarine ecosystem in New Zealand. Although modified around the edges and receiving increased nutrient and modified sedimentation and circulation patterns from the adjacent Opawa and Wairau Rivers, the lagoons are still largely natural. The vegetation surrounding the lagoons is typical of many other saltmarsh areas. Extensive flats of Glasswort

*Salicornia australis* and the maritime grass *Hordeum marinum*, with scattered New Zealand Flax *Phormium tenax*, Sea Primrose *Selliera radicans* and Batchelor's Button *Cotula coronopifolia*, are found to the west of the lagoons. To the south, the margin is narrower and composed largely of grazed Sea Rush *Juncus maritimus* and New Zealand Flax, with Shore Ribbonwood *Plagianthus divaricatus* occurring on higher ground. The margins of the lower Opawa and Wairau Rivers also have extensive areas of Sea Rush. The boulder bank is a dry environment with xerophilous plants such as Tauhinu *Cassinia leptophylla*, Pohuehue *Muehlenbeckia complexa*, *Hymenanchera crassifolia* and Scabweed *Raoulia tenuicaulis*. The lagoons themselves have extensive areas of algae, Horsemane *Ruppia megacarpa* and some eelgrass *Zostera novaezelandica*.

**Land tenure:** Approximately 1,800 ha are Crown land held as Conservation Area. The remainder of the wetland area is private land. The Opawa and Wairau Rivers and their riparian margins are private land, as is the southern margin and part of Chandler's Lagoon (which is part of the Mt Vernon run). The Marlborough District Council owns the nearby oxidation ponds and adjacent land to the west.

**Conservation measures taken:** Approximately 1,800 ha are held as Conservation Area, and managed and administered by the Department of Conservation. The western 40% of this area has an overlying status of Wildlife Refuge.

**Conservation measures proposed:** Various processes have been initiated, but these have not yet been completed because of the complexity of protecting all relevant values for coastal wetlands, while allowing appropriate harvesting to continue and recognising the interests of various local Maori tribes which dispute "mana whenua". A further consultative process has recently been recommended, and an "issues and options" paper is being drafted.

**Land use:** Conservation of plants and animals in the Conservation Area and protection of wildlife in the Wildlife Refuge. There is a walkway in the central western section which is seldom used as it begins adjacent to the oxidation ponds. Access is easiest to the north Wairau bar which is most frequently visited and from which boats may be launched or fishing undertaken. The lagoons themselves are not fished intensively, the lower Wairau River being more popular and accessible. Game-bird hunting takes place outside the Wildlife Refuge during the appropriate season. Hunting is popular, with up to 80% of local hunters using the lagoons. Access to other areas (especially the southern boulder bank) is restricted due to its historic and archaeological significance and due to the wishes of the local Maori. Much of the land in the immediate catchment has been cleared and is now grazed.

**Possible changes in land use:** None foreseen at the wetland. A brine concentration development was considered during the 1970s, but this has since been abandoned. The inadequate Blenheim sewage treatment ponds and freezing works oxidation ponds, adjacent to the lagoons, are intended for modification, and this will undoubtedly have an impact on the lagoon system.

**Disturbances and threats:** The waters of the lower Wairau Catchment are increasingly used indirectly (through the aquifer) in intensification of land use. The river has also been modified and may be further modified by flood protection works, the most significant being the diversion bypassing the lagoons. Blenheim sewage treatment ponds and freezing works oxidation ponds discharge into the Opawa River and lower Wairau River, respectively. The town of Blenheim is located in the Opawa catchment, and may provide additional pollution. The Opawa River has been substantially modified by flood protection works. The lagoons have lost virtually all their freshwater marsh buffer. Noxious plants are prominent on the boulder bank, especially Gorse *Ulex europaeus* and African Boxthorn *Lycium ferocissimum*. Erosion of the soft clays in the catchment has resulted in a large influx of sediment, decreasing the water quality and water depth in some shallow parts of the lagoons.

**Hydrological and biophysical values:** The lagoons play a general role in the recharge and discharge of groundwater, the maintenance of water quality and the support of food chains. The lagoons are notable as a nursery area for various fish, especially for Yellow-belly *Rhombosolea leporina* and Sand Flounder *R. plebeia*.

**Social and cultural values:** The area is used for wildlife observation, fishing and game-bird hunting. The lagoon complex has long been a food gathering ("mahinga kai") area for the Maori. Moa and waterfowl were hunted by the Maori along the boulder bank, and eels and other fish were caught in the "Maori channels". The Historic Places Trust has recorded 18 archaeological sites around the lagoons, including numerous midden areas and oven stones, pits and weirs, stone rows and stone crossing. The boulder bank is internationally significant for its archaeological investigations, with several investigations by Dr Roger Duff in the 1950s radically altering prehistoric knowledge and understanding in New Zealand. It is very important to local Maori. The boulder bank and north Wairau bar were important in early European settlement.

**Noteworthy fauna:** Ninety species of birds have been recorded in the area. The lagoons are especially important for shags *Phalacrocorax* spp., swans, geese and ducks (Anatidae), and gulls and terns (Laridae), but also support a great diversity of shorebirds. Most notable is the breeding colony of Royal Spoonbill *Platalea regia*, the largest in New Zealand. The endangered Black Stilt *Himantopus novaezelandiae* is an occasional winter visitor to the general area. Other notable species include Australasian Bittern *Botaurus poiciloptilus*, Pacific Reef Egret *Egretta sacra*, Great Egret or White Heron *E. alba* (winter visitor), Banded Rail *Rallus philippensis assimilis* (resident), Variable Oystercatcher *Haematopus unicolor* (rare), Pacific Golden Plover *Pluvialis fulva*, New Zealand Dotterel *Charadrius obscurus* (occasional winter visitor), Banded Dotterel *C. bicinctus* (small breeding population), Wrybill *Anarhynchus frontalis* (winter visitor), Far Eastern Curlew *Numenius madagascariensis*, Asiatic Whimbrel *N. phaeopus variegatus*, Red-necked Stint *Calidris ruficollis*, Sharp-tailed Sandpiper *C. acuminata*, Curlew Sandpiper *C. ferruginea*, Black-fronted Tern *Chlidonias albobristatus*, Caspian Tern *Sterna caspia* and Little Tern *S. albifrons*.

The lagoons support a diverse array of marine and freshwater fish, and are important nursery areas for several species, especially Yellow-belly *Rhombosolea leporina* and Sand Flounder *R. plebeia*. The system also supports a typical assemblage of mysid shrimps, amphipods, isopods, crabs, cockles, pipis, mudflat polychaetes and snails.

**Noteworthy flora:** None recorded.

**Scientific research and facilities:** There has been research into the archaeology, history, vegetation, fisheries, wildlife and estuarine ecology. Bird populations are monitored annually by the New Zealand Ornithological Society and Fish and Game Council. Recent archaeological digs have been proposed. The proximity of the wetlands to Blenheim eliminates the need for specific research facilities.

**Conservation education:** Presently very limited, although the proximity of the site to State Highway One and Blenheim suggests it could be used more extensively.

**Recreation and tourism:** Fishing, game-bird hunting and bird-watching are the main recreational activities, with some walking on the walkway and north bar. The shallowness and extent of the lagoons limits boating. A tourism venture involving helicopters has been suggested, but nothing currently operates.

**Management authority:** The Department of Conservation (Nelson/Marlborough Conservancy) is responsible for the management of conservation area and wildlife, with Blenheim Field Centre responsible for day-to-day management. The Marlborough District Council has statutory responsibilities under the Resource Management Act 1991 for water resources and the preparation of coastal plans. The Nelson/Marlborough Fish and Game Council manages sport fishing and game-bird hunting.

**Jurisdiction:** Territorial: Marlborough District Council. Functional: Department of Conservation (Nelson/Marlborough Conservancy) and Nelson/Marlborough Fish and Game Council.

**References:** Black (1979); Brailsford (1981); Davidson *et al.* (1990); Knox (1983, 1990); MacRaild & Singleton (1970); McLay (1975); Pascoe (1986); Thomson (1976); T.S.E. Group Consultants Ltd. (undated); Victoria University (1979); Walls (1976).

**Reasons for inclusion:**

- 1d Wairau Lagoons are an example of a large coastal lagoon-estuarine system with complex geomorphology, the only one of its kind in New Zealand.
- 2a The lagoons support populations of five globally threatened species of birds, *Botaurus poiciloptilus*, *Himantopus novaezelandiae*, *Charadrius obscurus*, *Anarhynchus frontalis* and *Chlidonias albostrigatus*.
- 2b The lagoons support a very diverse fauna (marine invertebrates, fish and birds), and are thus of special value in maintaining the genetic and ecological diversity of the region.
- 2c The lagoons are of special value as the habitat of various marine invertebrates, fish and waterfowl at a critical stage of their biological cycles. They are especially important as nursery areas for certain fish species and as a breeding area for the Royal Spoonbill *Platalea regia*.
- 2d The lagoons are of special value for their endemic plants and animals, including Shore Ribbonwood *Plagianthus divaricatus*, Eelgrass *Zostera novaezelandica* and a number of bird species.

**Source:** Neil Deans.

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#### Buller River Catchment (44)

**Location:** Approximate centre (at the confluence of the Buller and Matakita Rivers) 41°47'S, 172°19'E; river mouth 41°44'S, 171°35'E. The river originates in Nelson Lakes National Park, with the main tributaries flowing north, then west-southwest through Murchison to reach the sea at Westport on the west coast of South Island.

**Area:** Total area of catchment, 6,500 sq.km; length of main stem of river, 159 km, with a further 30 km above Lake Rotoiti.

**Altitude:** Sea level to 2,300 m. The highest point in the catchment is Mount Franklin at 2,339 m. Only 12% of the catchment area lies below 300 m altitude.

**Overview:** The Buller River Catchment is the largest substantially unmodified catchment in the country. It has a diversity of sub-catchments, gorges, lakes and tarns, and supports a nationally significant native fishery and sport fishery.

**Physical features:** The Buller River is an antecedent river, cutting through granite to form two major gorges. The upper reaches are largely sedimentary, with localised limestone or marble in some sub-catchments. The catchment is rugged, with various mountain ranges over 1,500 m elevation between tributaries. There are three substantial tributaries to the west of the main stem of the river and seven to the east. There are no substantial dams within the catchment. The climate is typified by a moderate temperature range and a generous, well distributed rainfall on the many mountain ranges.

**Ecological features:** Approximately 71.6% of the catchment remains as native forest, mostly beech forest with some mixed podocarp/broadleaf forest in lowland areas or on better soils. Some 17.7% is comprised of native grasslands, wetlands or alpine areas. Relatively few

wetlands exist, with some 1% of the catchment being rivers or lakes. Only 4.5% of the catchment area has been modified for farming, forestry or other human use. Aquatic habitats are relatively pristine, with the only substantial introductions being trout and Canadian pondweed in the Nelson Lakes, and limited areas of willows in the lower catchment. The trout fishery is a nationally important recreational fishery. The absence of any significant dams on the river enhances the value of the catchment for native fish, giving fish unimpeded access to the sea.

**Land tenure:** River and lake beds are Crown land. Most of the upper catchment is Crown land held in a variety of ways including national park, forest park, conservation area and reserves. The flats immediately adjacent to the river are private land and are farmed, especially in the upper Mangles, Matakītaki, Four Rivers Plain, upper Maruia, Inangahua and coastal parts of the catchment.

**Conservation measures taken:** Most of the upper catchment and the gorges are protected in some way in the Nelson Lakes National Park, Paparoa National Park, Victoria Forest Park, conservation areas and reserves. These areas are managed and administered by the Department of Conservation. The catchment is subject to a Draft National Water Conservation Order which is being addressed by the Planning Tribunal at present.

**Conservation measures proposed:** A National Park investigation for the entire northwest South Island area, including the Owen and Matiri catchments, is presently receiving submissions from interested parties in response to a discussion document put out by the Department of Conservation. A Forest Park centred on Murchison has been mooted.

**Land use:** The river is nationally important for recreation including trout fishing, canoeing, rafting and boating at the Nelson Lakes. Some alluvial gold mining occurs in the river. Crown land in adjacent areas is used for the conservation of plants and animals and outdoor recreation. Privately owned areas of alluvial flats are farmed. Westport is the largest town in the catchment with a population of about 5,000. The total population of the area was around 9,200 in 1981.

**Possible changes in land use:** Nothing foreseen, although hydro-electric development has been considered in the past for some of the tributaries (*e.g.* the Matiri), especially where Tasman Energy hold certain water permits.

**Disturbances and threats:** Mining for gold and coal occurs in the Inangahua catchment, and there is some mining for alluvial gold in many areas upstream. Both pose a threat of increased sedimentation. Hydro-electric development is unlikely at present. The area is tectonically very active, and previous earthquakes have had dramatic effects upon water courses. Fertiliser and chemical inputs are negligible. Raw sewage is discharged at Inangahua and Westport. Harvesting of native trees still occurs sporadically within the catchment, although this has lately diminished. Fire is used as a tool to rejuvenate scrubland by pastoral farmers, but this probably has little direct effect on the catchment.

**Hydrological and biophysical values:** The Buller Catchment is the fifth largest catchment area in New Zealand. Because of its exposure to wet westerly winds, the river is vulnerable to floods and has the highest flood flows in New Zealand, the record being 8,232 cubic metres per second.

**Social and cultural values:** The Buller River provides the focus for the district (known as Buller). It is used extensively for recreation, including trout fishing, rafting, canoeing and boating (at the Nelson Lakes). The river was one of a network of "greenstone trails" used by Maori in trading the culturally important greenstone.

**Noteworthy fauna:** The globally threatened Blue Duck *Hymenolaimus malacorhynchus* is common in many upper tributaries. Some 19 of New Zealand's 27 native freshwater fish are present in the area, including the Giant Kokopu *Galaxias argenteus*. The Maruia tributary has an unusual fauna including three fish species normally recorded only to the east of the main

divide; Long-jawed Galaxias *Galaxias prognathus*, Alpine Galaxias *G. paucispondylus* and Dwarf Galaxias *G. divergens*.

**Noteworthy flora:** None known from the aquatic habitats.

**Scientific research and facilities:** Many surveys have been undertaken of wildlife and fisheries within the catchment. The hydrology and geology is also well understood. There are few research facilities as such in the catchment; research has been undertaken into the fresh water of the Nelson Lakes from the park headquarters.

**Conservation education:** Lake Rotoiti Outdoor Education Lodge runs many conservation education programmes for schools, focused on the St Arnaud area.

**Recreation and tourism:** The primary focus is Nelson Lakes National Park, but the entire catchment is nationally important for trout fishing, rafting, canoeing and various other freshwater recreational activities. There is a small but growing tourist use of the catchment. Visitor numbers in Nelson Lakes National Park in 1965 were 1,600; by 1991 there were 55,000 visitors to the visitor centre alone.

**Management authority:** The Department of Conservation is responsible for management of the national parks, forest park, reserves, conservation area and wildlife; the Nelson/Marlborough Conservancy Office is responsible for the upper catchment, and the West Coast Conservancy Office is responsible for the lower catchment. The Tasman District Council and the West Coast Regional Council have statutory responsibilities under the Resource Management Act 1991 for water resources within the provisions of the Draft National Water Conservation Order. The Nelson/Marlborough Fish and Game Council and the West Coast Fish and Game Council manage sport fishing (trout and salmon) and game-bird hunting.

**Jurisdiction:** Territorial: Tasman District Council and West Coast Regional Council. Functional: Department of Conservation (Nelson/Marlborough Conservancy and West Coast Conservancy), Nelson/Marlborough Fish and Game Council and West Coast Fish and Game Council.

**References:** Deans (1992); Morse (1981); Nelson Acclimatisation Society (1989); Westland Catchment Board and Regional Water Board (1987).

**Reasons for inclusion:**

- 1a The Buller River complex is a particularly good representative example of a river complex composed of tributaries, gorges, lakes and tarns, wetland types characteristic of New Zealand.
- 2a The river complex supports substantial populations of the globally threatened Blue Duck *Hymenolaimus malacorhynchus* and Giant Kokopu *Galaxias argenteus*.
- 2b The river complex supports a very diverse fish fauna, including three species normally recorded only to the east of the main divide, and is thus of special value in maintaining the genetic and ecological diversity of the region.
- 2d The river complex is of special value for its endemic fish and bird species, including the fish *Galaxias argenteus*, *G. prognathus*, *G. paucispondylus* and *G. divergens*, and the Blue Duck *Hymenolaimus malacorhynchus*.

**Source:** Neil Deans.