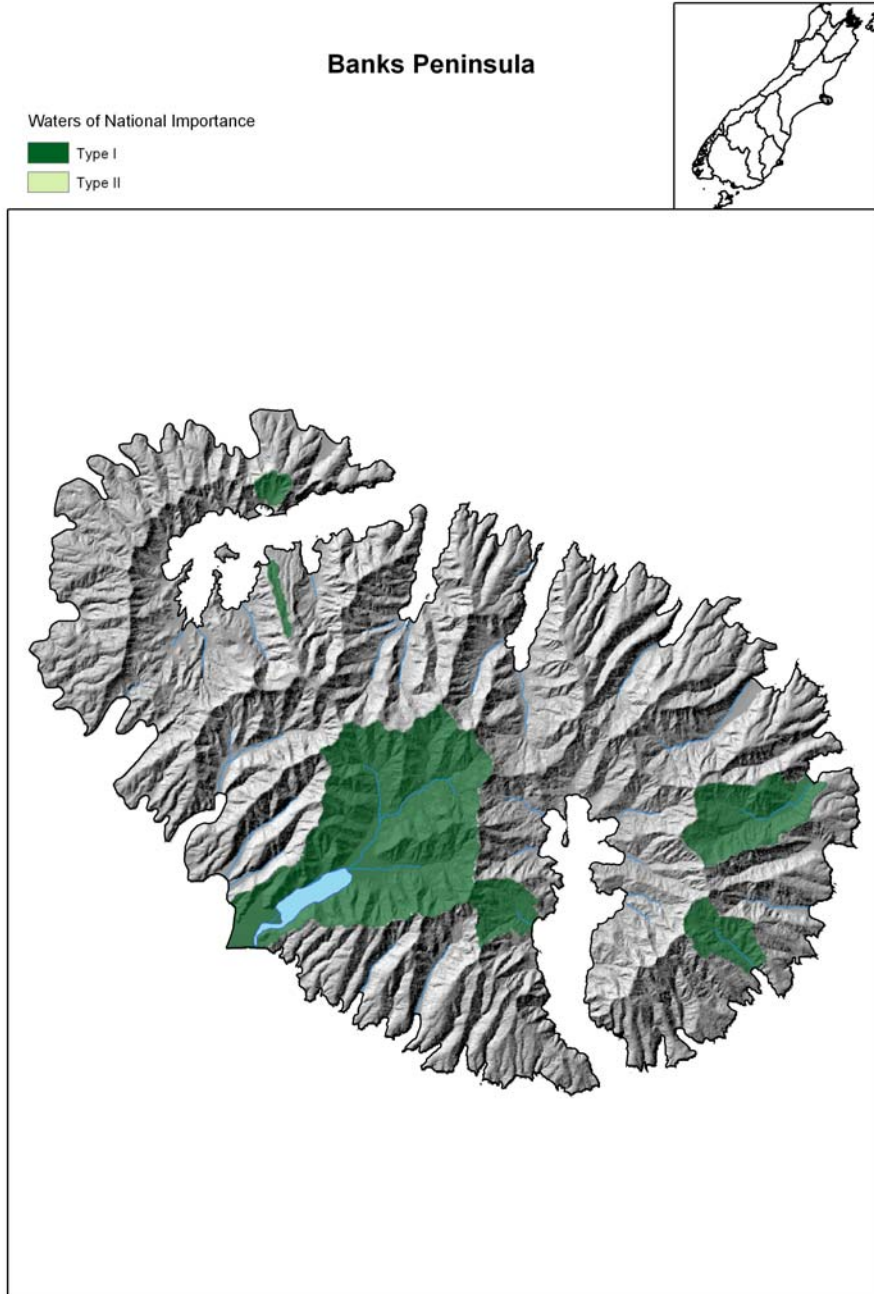


This unit encompasses the area south of a line running from Cape Rodney in the east to the northern side of the Waitakere Range, while its southern boundary extends eastwards from Port Waikato along the northern boundary of the Waikato catchment to include the Hunua Range and small catchments draining into the western shores of the Firth of Thames. The unit includes numerous offshore islands including Kawau, Tiritiri Matangi, Rangitoto, Motutapu, Waiheke and Ponui (Leathwick et al. 2003).

Volcanism has had an intermittent influence during the Pleistocene, with localised basaltic eruptions around Auckland, the most recent occurring about 500 years ago (Briggs et al. 1994). In addition, the neck of low-lying land between Manukau and Waitemata Harbours has been inundated during periods of sea level rise, and has probably acted as a barrier to dispersal of some organisms. Volcanic activity in Southern Auckland and Waitakere Ranges is considerably older (Leathwick et al. 2003).

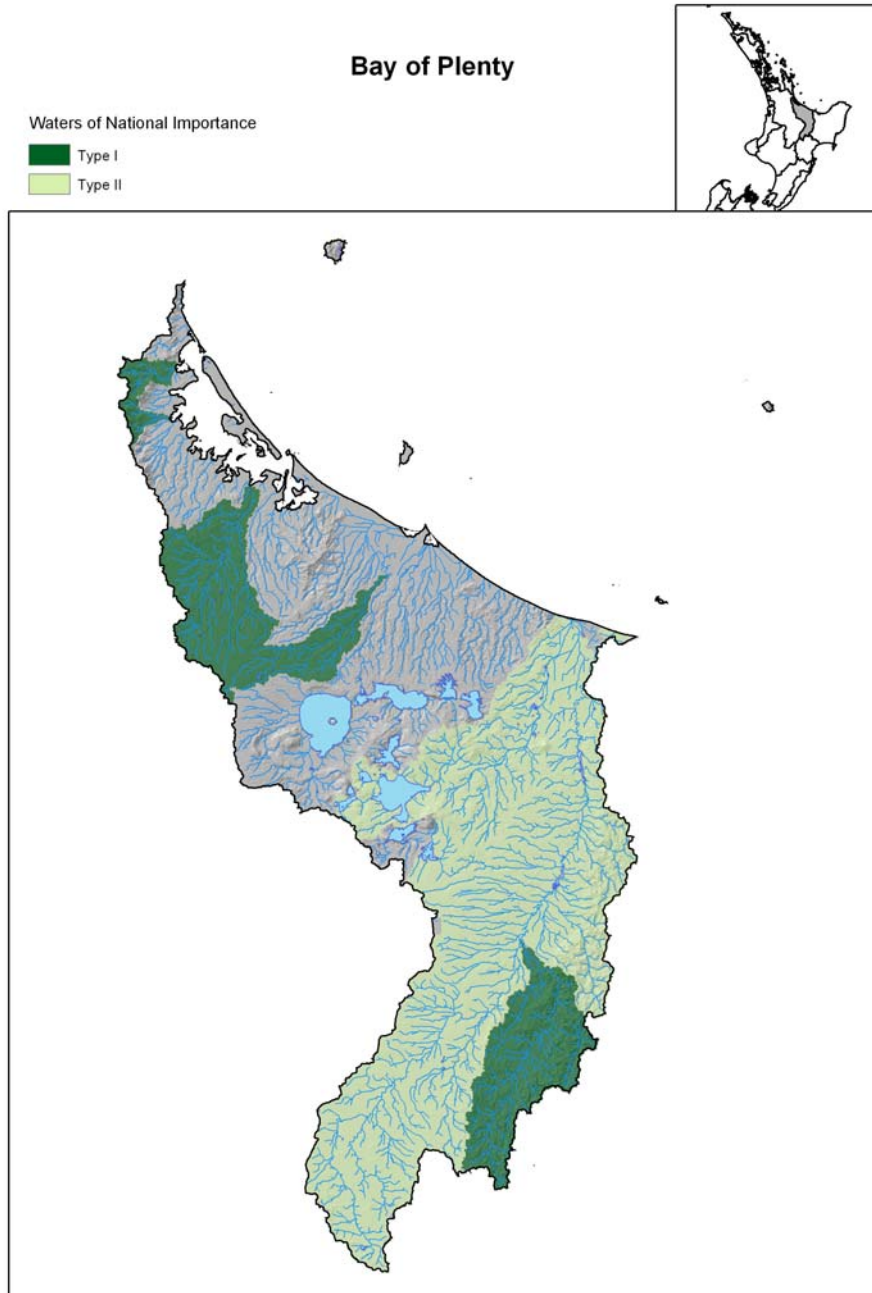
McLellan (1990) describes marked differences in stonefly assemblages between Auckland and Northland. Population-genetic differences have been recorded between individuals of three species collected in Northland compared to samples collected at sites further south, including around Auckland and/or in the Waikato (Smith & Collier 2001; Hogg et al. 2002; P. Smith pers. comm.). Auckland is also the northern limit for the giant kokopu.

Auckland										
Catchment number	Name	Type	Heritage value score	Euclidean distance	Total REC classes (41)	Cumulative % REC classes	Area (ha)	% Natural cover	% DOC	Special features and notes
1071	Karekare Stream	I	0.725	0.730	5	12.2	1518.8	93.3	0.0	T10, highly natural, frog
902	Huia Streams	I	0.600	0.319	10	29.3	2237.5	99.6	0.0	T10, highly natural, frog
1790	Nihotupi Streams	I	0.397	0.803	5	31.7	563.2	94.5	0.0	T10, highly natural, frog
3632	Motatapu Stream 1	I	0.382	0.870	2	36.6	152.7	0.8	98.3	T10
2541	Pareoha Bay	I	0.245	0.998	1	36.6	281.3	100.0	0.0	T10, highly natural
1186	Waitakere River	I	0.166	0.661	5	39.0	1244.8	99.1	0.0	Highly natural
4673	Motatapu Stream 2	I	0.154	0.878	2	41.5	101.3	0.2	99.3	
1117	Tapapakanga Stream	I	0.050	0.450	7	51.2	1409.3	68.3	0.0	
2298	Nukumea Stream	I	0.045	0.484	3	51.2	344.3	75.3	0.0	Threatened fish
1872	Te Matuku Bay west	I	0.005	0.596	3	51.2	520.5	57.9	4.4	Flows into marine reserve
1189	Okura River	II	0.014	0.436	7	56.1	1240.5	54.3	3.1	



This unit consists of small, steep catchments flowing off the old weathered basaltic cones that formed Banks Peninsula in the late Miocene and early Pliocene. The cones were originally islands isolated from the mainland prior to the formation of the Canterbury plain (Stevens 1980). This isolation explains the presence of at least six endemic invertebrate species that are restricted to this unit (Harding 2003). The Peninsula is also the last remaining refuge for two other aquatic invertebrate species (Collier et al. 2000). Streams on the Peninsula contain populations of banded kokopu and red-finned bully, that are effectively isolated in the wider Canterbury region.

Banks Peninsula										
Catchment number	Name	Type	Heritage value score	Euclidean distance	Total REC classes (21)	Cumulative % REC classes	Area (ha)	% Natural cover	% DOC	Special features and notes
1288	Narbey Stream	I	0.106	0.153	5	23.8	1065.2	69.2	0.0	T10
2525	Lyttelton Basin	I	0.011	0.596	2	28.6	284.5	32.3	34.1	
2929	Charteris Bay	I	0.006	1.113	1	33.3	219.5	14.1	3.3	Highly distinctive
1306	Wainui Bay	I	0.004	0.120	6	42.9	1033.3	23.3	2.5	
408	Okuti River	I	0.003	0.108	16	81.0	11441.6	24.5	7.2	Threatened plants and Nat.Imp.Site (Lake Forsyth)
850	Le Bons Bay	I	0.002	0.079	10	85.7	2490.3	27.7	1.0	



This unit encompasses catchments flowing into the Bay of Plenty from the North Island's central volcanic plateau, the largest catchments being the Kaituna and Rangitaiki. The area has been exposed to severe disruption both from recent (e.g. Taupo: AD 130) and older eruptions of ignimbrite and tephra deposition. These have resulted in the development of a coastal plain built up predominantly from water-transported rhyolitic material, large areas of which are overlain with accumulations of peat (Leathwick et al. 2003). These catastrophic disturbances have shaped the communities present in the unit today and led to the development of some unique landlocked catchments associated with some of the smaller Rotorua Lakes. These lakes lack surface outlets (e.g. Lakes Rotoehu, Okataina, Rotomahana), hence their freshwater communities have evolved in the absence of fish species.

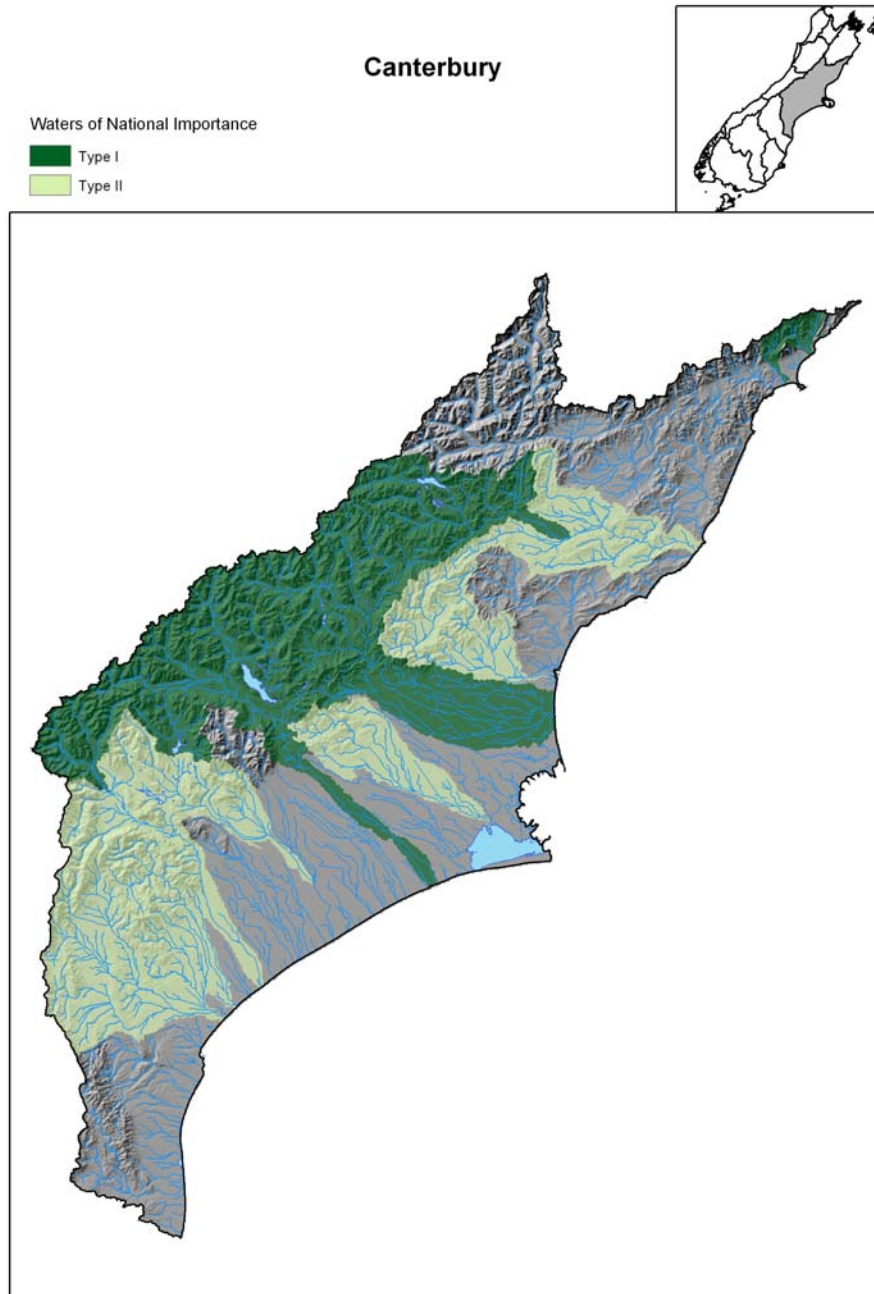
The unit includes the offshore islands Tuhua or Mayor Island, Motiti, Moutohora (Whale) and White Islands. Tuhua supports a number of small freshwater lakes.

The Tarawera and Rangitaiki Rivers contain nationally important sections (Type II rivers). The Upper Tarawera is highly natural and is known for its high water quality, whereas the lower river below the Kawerau is heavily impacted by the discharges from the pulp-and-paper mills there. The lower Rangitaiki River contains river classes not found elsewhere in the unit, as well as an isolated population of *Galaxias divergens* and significant numbers of giant kokopu. The Bay of Plenty contains the largest known populations of giant kokopu in north-eastern New Zealand, and is therefore probably critical to the maintenance of this species in the region. North-eastern stocks appear to be geographically isolated and hence they may be genetically distinct (David et al. 2004). The headwaters of the Rangitaiki River also contain blue duck and numerous aquatic threatened plant species; it flows out of Te Urewera National Park, so scores highly for water quality and naturalness.

Geothermal activity in the Bay of Plenty region (and also Upper Waikato/Tongariro/Taupo) is associated with unusual geothermal features, containing distinctive and unusual biota that have adapted to these extreme

Bay of Plenty										
Catchment number	Name	Type	Heritage value score	Euclidean distance	Total REC classes (45)	Cumulative % REC classes	Area (ha)	% Natural cover	% DOC	Special features and notes
728	Ngututuru/Rereatukahia	I	0.352	0.345	10	22.2	3361.4	74.3	68.9	T10, frog
569	Tuapiro Creek	I	0.322	0.356	11	26.7	5210.9	68.4	56.7	T10, frog
173	Whirinaki River	I	0.259	0.338	24	55.6	52086.2	82.5	74.5	T10, highly natural, B.Duck and threatened fish
198	Wairoa River and tributaries	I	0.223	0.172	16	60.0	45368.6	64.3	39.0	T10, B.Duck and threatened birds
308	Mangorewa River	I	0.027	0.180	15	60.0	20492.6	42.2	20.9	Threatened birds and plants, B.Duck, Nat.Imp. site
29	Rangitaiki River	II	0.128	0.109	33	75.6	297370.4	30.1	29.8	Threatened birds, plants and fish, and B.Duck
116	Tarawera Stream	II	0.013	0.197	25	86.7	82098.8	35.4	14.8	Highly natural headwaters

environments. These communities have few parallels internationally (Boothroyd 2000), and are characterised by low diversity, but often high abundance of macro-invertebrate species—presumably due to the lack of competition or predation (Vincent & Forsyth 1987).



This unit encompasses a large part of the eastern South Island, including the catchments of the Conway, Waiau, Hurunui, Waimakariri, Rakaia and Rangitata Rivers. The Waihao River, a small catchment located just north of the Waitaki River mouth, forms the southern boundary. Most of the larger rivers in this unit arise from the eastern flanks of the Southern Alps, but flow across extensive glacial outwash plains before reaching the Pacific Ocean. The smaller rivers tend to drain the foothills, or Canterbury plains. Many of these rivers are spring-fed.

Non-diadromous fish recorded from the province are *Galaxias paucispondylus* (middle and upper reaches of larger rivers), *Galaxias prognathus* (larger river headwaters, mostly from the Rakaia south), *Neochanna burrowsius* (lowlands), *Galaxias vulgaris* and *Gobiomorphus breviceps* (the latter two both widespread). Evidence suggests a high degree of genetic homogeneity in freshwater fish in this unit. For example, both *G. vulgaris* (Waters & Wallis 2001b) and *N. burrowsius* (Davey et al. 2003) show little genetic differentiation across a range of sites in Canterbury. Stokell's smelt *Stokellia anisodon*, a diadromous species of restricted geographic range, is limited to the lower reaches of several major rivers of this unit. *Zelandopsyche ingens*, one of New Zealand's few obligate macro-invertebrate shredders, appears to be restricted to beech forest streams east of the main divide (Winterbourn 2000) centred on the headwaters of the Waimakariri River.

Canterbury is highly notable for its braided rivers of a type that is rare internationally (O'Donnell & Moore 1983): most braided rivers elsewhere are formed by different geological processes (O'Donnell in press). As a habitat type, they are highly unstable, and characterised by high spring-summer flows, and rapid and frequent flooding. Canterbury has 60% of all braided river habitat in New Zealand. Other large braided rivers are mainly found in the South Island (especially Nelson-Marlborough, and Southland). They are notable for their extensive groundwater communities, and are significant habitats for birds.

High levels of endemism among freshwater bird species occurring on New Zealand braided rivers highlights their importance internationally (e.g.

Canterbury										
Catchment number	Name	Type	Heritage value score	Euclidean distance	Total REC classes (132)	Cumulative % REC classes	Area (ha)	% Natural cover	% DOC	Special features and notes
151	Rangitata Headwaters	I	0.428	0.334	32	24.2	61234.8	88.7	60.3	T10, highly natural
50	Upper Waimakariri catchment	I	0.289	0.369	40	35.6	168751.1	82.7	66.6	T10, highly natural
30	Rakaia and tributaries	I	0.286	0.224	68	55.3	287571.3	68.5	32.3	T10, B.Duck, threatened plants and birds
463	Kowhai River	I	0.266	0.286	14	56.1	8492.1	82.3	78.0	
17	Waimakariri River	I	0.189	0.115	78	73.5	360895.1	53.2	37.8	T10, Nat.Sign. braided river bird pops, Nat.Imp. groundwater communities
67	Lake Sumner Catchment	I	0.172	0.275	43	76.5	131908.1	74.3	46.9	T10 and REC types
379	Hapuku River	I	0.138	0.259	25	78.0	13525.6	80.7	51.9	
47	Rangitata River	II	0.134	0.164	56	79.5	181611.0	59.0	26.2	T10, Nat.Sign. braided river bird pops
31	Hurunui River	II	0.037	0.136	66	84.8	266941.0	44.7	24.4	Highly natural and diverse headwaters, including Lake Sumner, Nat.Sign. braided river bird pops
77	Ashley River	II	0.022	0.203	53	84.8	114983.3	45.5	23.8	Nat.Sign. braided river bird pops
35	Opihi River	II	0.008	0.169	53	85.6	237597.6	14.6	4.2	Nat.Sign. braided river bird pops
135	Orari River	II	0.005	0.165	37	87.9	71473.4	8.2	1.0	Headwaters: B.Duck, threatened plants and birds
85	Opihi River headwaters	II	0.004	0.183	50	87.9	105804.0	20.3	8.5	Nat.Sign. braided river bird pops
94	South Branch Ashburt	II	0.003	0.158	70	92.4	97493.8	30.1	6.8	Nat.Sign. river bird pops, threatened birds
95	Selwyn River	II	0.001	0.315	43	92.4	97354.8	9.2	3.7	Threatened fish(Mudfish), Buffer function Ellesmere (RAMSAR site)

wrybill, black stilts, black-billed gulls and black-fronted terns). Elsewhere in the world, few bird species are specifically adapted to braided rivers as they have in New Zealand (O'Donnell & Moore 1983; O'Donnell in press). The

Canterbury (Continued)

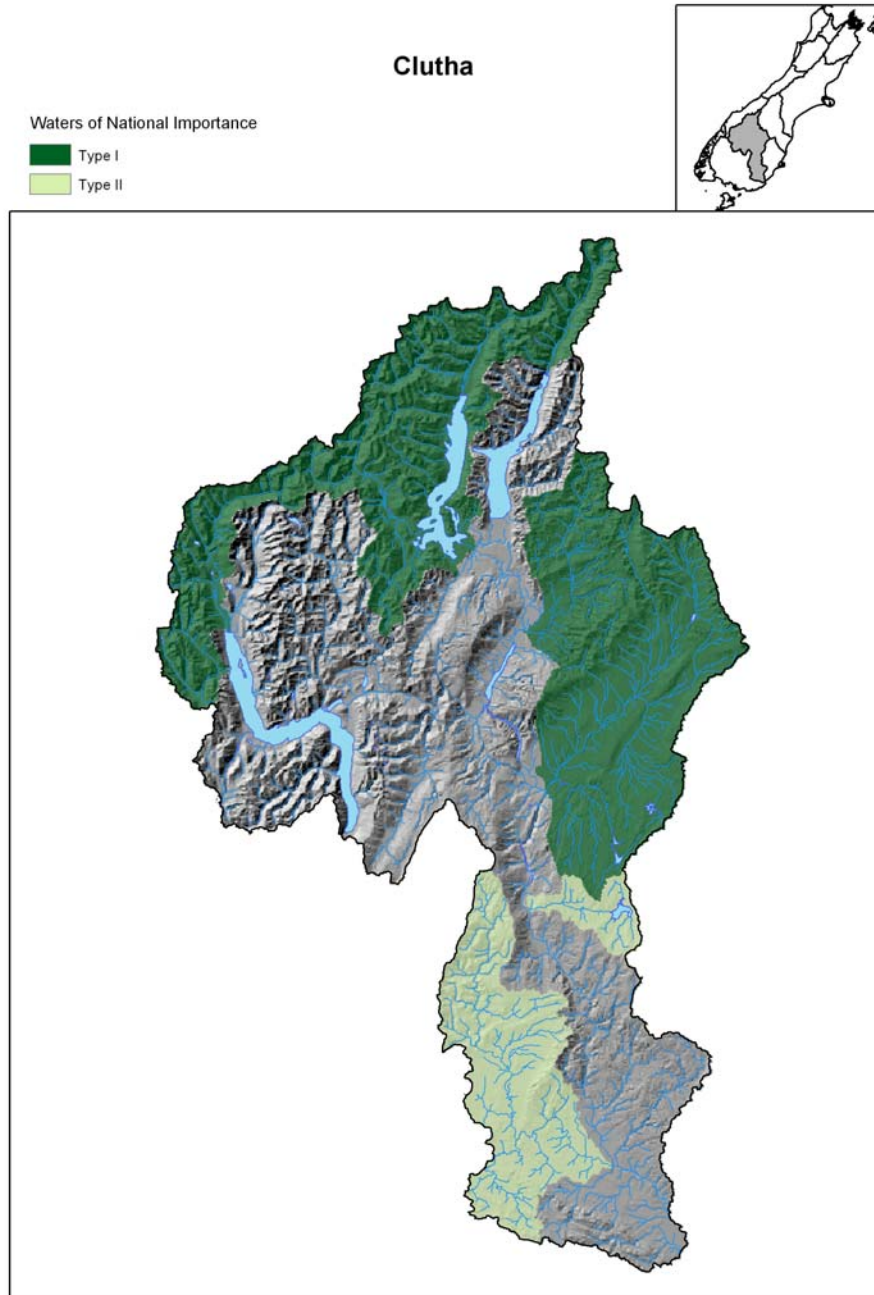
conservation of these threatened riverine bird species is dependent on maintaining their river habitats.

O'Donnell (in press) notes:

“Braided rivers are extensive habitats that provide a much wider variety of microhabitats than single-channel rivers that are typical of other parts of New Zealand. The largest is the Rakaia River, and covers well over 30,000 ha. Braided rivers represent some of the largest habitats for aquatic birdlife in New Zealand. Their sheer size means that these habitats are extensive enough to support viable populations of a large number of bird species. The very wide range of channel sizes, shapes and flow rates, and extensive areas of shingle, islands and terraces, provide diverse habitat that supports breeding and feeding populations of over 80 species of birds; many of these are unique to New Zealand (O'Donnell & Moore 1983). Individual rivers can support many thousands of birds. For example > 20,000 wetland birds have been recorded on the Ashburton River at one time (O'Donnell 1992). Each braided river, while superficially similar to the others, is sufficiently distinctive in its habitat characteristics to provide for a unique combination of birdlife, each with different requirements (O'Donnell & Moore 1983).”

Each braided river usually contains its own distinctive invertebrate and fish communities also. For instance, the absence of glacial sediment in the Waimakariri River means it is notable for its groundwater and hyporheic faunas. The presence of glacial sediments in the Rakaia and Rangitata Rivers is believed to have led to relatively depauperate groundwater communities (G. Fenwick pers. comm.).

Selwyn River is listed as containing sections of national importance, reflecting the presence of nationally important populations of Canterbury mudfish in its upper reaches, as well as the connectivity and buffer function the river provides to Te Waihora (Lake Ellesmere). This lake is an internationally significant habitat for aquatic birds in New Zealand (O'Donnell 1985; Cromarty & Scott 1996).



The Clutha Unit comprises a single large catchment arising on the eastern slopes of the Southern Alps and flowing through large, glacially sculpted lakes. The lower tributaries drain the extensive inter-montane basins of central Otago, and the lower-elevation ranges of eastern Otago and Southland.

Non-diadromous fish species include *Galaxias anomalus*, *G. pullus*, *Galaxias* sp. D, and *Gobiomorphus breviceps*. All occur mostly in the lower half of the catchment. Similarly, *Galaxias paucispondylus* has been found recently in the headwaters of the Manuherikia, and an isolated population also occurs in the Lochy River, which flows into Lake Wakatipu. The lower Clutha River is heavily modified by the impacts of two major hydro-electricity dams, but historically it is believed to have sustained large stocks of native fish (Jellyman 1984).

The mouth of the Clutha River, and nearby wetlands and lacustrine habitats associated with Lake Tuakitoto, are believed to be important habitats for native fish, including the threatened giant kokopu and water fowl species (M. Neilson pers. comm.). However, large river systems in New Zealand are poorly studied and there are limited specific data on the values of the lower river.

Clutha										
Catchment number	Name	Type	Heritage value score	Euclidean distance	Total REC classes (97)	Cumulative % REC classes	Area (ha)	% Natural cover	% DOC	Special features and notes
148	Dart River	I	0.247	0.298	34	35.1	63186.1	98.1	91.7	T10, highly natural
132	Makarora River	I	0.231	0.257	33	41.2	74549.2	95.5	85.9	T10, highly natural
235	Greenstone River	I	0.177	0.359	26	48.5	34472.8	97.9	90.1	T10, highly natural
209	Hunter River	I	0.168	0.308	28	50.5	41293.5	89.0	66.3	T10, highly natural
32	Lake Wanaka tributaries (NE)	I	0.086	0.145	47	57.7	258655.7	68.2	47.4	T10, highly natural
90	Lindis River	I	0.001	0.268	35	63.9	103960.3	6.8	0.7	Threatened fish
28	Manuherikia River	I	0.000	0.240	64	85.6	303452.7	7.1	3.1	Threatened fish
40	Pomahaka River	II	0.003	0.313	53	95.9	206048.3	7.6	6.3	Threatened fish
241	Teviot River	II	0.000	0.441	24	96.9	33223.7	5.8	0.2	Threatened fish

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