BIODIVERSITY
IN THE EAST OTAGO CATCHMENT GROUP AREA

Looking back, planning ahead

JULY 2026

East Otago Catchment Group

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This report has been prepared for the East Otago Catchment Group by Emeritus Professor David Norton and Becky Hardinge.

Cover photo: Mature kahikatea, Seacliff Conservation Area.

David Norton, Biodiversity Solutions Ltd., Lake Hāwea.
Becky Hardinge, Otago Regional Council, Alexandra.

All photos by David Norton unless otherwise stated.

Contents

1. Executive summary

- This report has been developed to provide context and to suggest key priorities and actions for biodiversity conservation within the East Otago Catchment Group area. The report focuses on biodiversity native to New Zealand, rather than species that have been introduced as a result of human settlement.
- The report covers the Waihemo Shag River, Waikouaiti River and Te Hakapupu Pleasant River catchments, as well as Stony Creek, Waipaku Post Office Creek, and the coastal hill country draining directly into the Pacific Ocean between the Waihemo Shag River and Warrington.
- Prior to human settlement, cool-temperate conifer-broadleaved forest would have been widespread, covering approximately 96% of the area. Kahikatea, matai and tōtara would have grown emergent over a diversity of broadleaved tree species. In the south branch of the Waikouaiti River, silver beech would have been the dominant forest canopy tree. Other vegetation types including snow tussock grassland and wetlands (freshwater and saltmarsh) were of minor extent. These pre-human forests would have supported a diverse array of plants and animals.
- Human settlement occurred around 1250-1300 C.E. and was followed over the next few hundred years by a rapid transformation of the vegetation through burning, followed by logging, drainage and cultivation. Initially, snow tussock grassland expanded to cover much of the district, but it has since contracted. Today, exotic pasture and cropland, along with increasingly widespread exotic tree plantations, are the dominant vegetation types. Native vegetation now covers only about 14% of the area, with snow tussock grassland (6%) and native woody vegetation (5%), particularly regenerating kānuka forest, comprising the largest remaining vegetation types.
- Despite these marked changes, the area still supports a diverse range of flora and fauna, including some nationally Threatened and At Risk species such as Otago and grand skinks, hoiho, kākā, Taieri flathead galaxias, tree daisies and white mistletoe. However, this biodiversity is threatened by a range of factors, including invasive plants and animals, habitat fragmentation, lack of awareness, lack of management and climate change.
- This report recommends a biodiversity vision and proposes 20-year outcomes as a starting point for a future community biodiversity strategy. Based on this, it identifies priorities and recommends management actions that could help achieve these outcomes. Finally, the report outlines a possible approach to developing a community-based biodiversity strategy for the area.

2. Introduction

This report has been developed to provide context and identify key priorities and actions for biodiversity conservation within the East Otago Catchment Group area (referred to as the report area throughout this document). It is not intended as a prescriptive guide to what individual landowners and managers should do, but rather as a high-level baseline to help guide future action by the catchment group, landowners, managers, and others. Before this report, no single overview of East Otago's native biodiversity existed. Information was scattered across agency databases, research papers and local knowledge, making it difficult for landowners and community groups to access and use. This report addresses that gap.

This report has been produced with funding from the Ministry for Primary Industries through the Integrated Farm Planning Accelerator Fund, under a grant agreement between MPI and the East Otago Catchment Group. As such, while the biodiversity baseline covers the full catchment, the report is written with farm landowners and managers as a primary audience – particularly to support them in developing farm biodiversity plans as part of the integrated farm planning process. This focus is deliberate, not a limitation: farmers manage the majority of native vegetation in the catchment and are central to any meaningful biodiversity outcome. A community biodiversity strategy with a broader audience and shared accountability across all partners, including iwi, community groups, schools, and agencies, is a recommended next step building on this foundation.

A substantial part of this report focuses on the environmental context of the area – the geology and climate, historical vegetation cover, and current biodiversity patterns. Understanding this context is essential for setting priorities for future actions. The report also identifies the key challenges that need to be addressed and concludes with suggested management priorities and a discussion around what a full community biodiversity strategy process might look like. This report is the starting point for that next step, not the strategy itself.

In this report the term biodiversity (short for biological diversity) is used to refer to *"the different kinds of life you'll find in one area—the variety of animals, plants, fungi, and even microorganisms like bacteria that make up our natural world. Each of these species and organisms work together in ecosystems, like an intricate web, to maintain balance and support life. Biodiversity supports everything in nature that we need to survive – food, clean water, medicine, and shelter.[1]"*

This report focuses on the biodiversity that is native to New Zealand, as opposed to those species that have arrived in New Zealand as a result of human settlement (either

1. https://www.worldwildlife.org/resources/explainers/what-is-biodiversity/

deliberately or accidentally) which we usually refer to as exotic species.

This report covers the catchments of the Waihemo Shag, Waikouaiti and Te Hakapupu Pleasant Rivers, as well as smaller catchments (Stony and Waipaku Post Office Creeks) and coastal hill country draining directly into the Pacific Ocean between the Waihemo Shag River and Warrington, but not including Blueskin Bay and its catchments (Figure 1).

The area covered by this report lies predominantly in the Waikouaiti and Macraes Ecological Districts, although the slopes of the Kākanui and Horse Range, northeast of the Waihemo Shag River, are in the Dansey and Waianakarua Ecological Districts. Administratively, the area is part of Otago Region, with the Waihemo Shag River catchment and adjacent areas in Waitaki District and the Waikouaiti River catchment and adjacent areas in Dunedin City.

The East Otago Catchment Group was formed in 2019 and is run by a committee of landowners and community members from across East Otago who are passionate about water quality and biodiversity. Our catchments cover approximately 112,000 ha and include the following five primary catchments: Waikouaiti River, Waipaku Post Office Creek, Te Hakapupu Pleasant River, Stony Creek and Waihemo Shag River.

We work with farmers, landowners, communities, schools and mana whenua on projects that support sustainable land management, improve water quality, and enhance biodiversity. An important part of our role is supporting farmers and landowners by providing the resources and information they need to make informed decisions on farm.

This biodiversity report is a valuable resource for farmers and landowners, helping them understand East Otago's biodiversity: what the area was once like, what remains today, and how we might manage and enhance biodiversity on farm into the future.

While this report focuses on restoring and enhancing native biodiversity within the East Otago Catchment Group area, it is set within the broader goals set out in the *Te Mana o te Taiao – The Aotearoa New Zealand Biodiversity Report* (2020), *Otago Regional Council Indigenous Biodiversity Strategy* (2026), *the Waitaki District Biodiversity Report* (2014) and the *Dunedin City Biodiversity Report* (2007) and is informed by these documents. Otago Regional Council is also in the process of identifying 'Biodiversity Focus Areas' which may include areas covered in this report.

Figure 1. *Map showing the area covered by this report.*

A number of community conservation groups have been active across the East Otago Catchment Group area for many decades, and this report sits within and builds on that wider effort. Kāti Huirapa Rūnaka ki Puketeraki have long been kaitiaki of this landscape and their knowledge and values are central to any biodiversity effort here. Other groups and individuals active in the area include:

- East Otago Catchment Group and the many farmers and landowners across the catchment who have long been active stewards of the native biodiversity on their land
- Hikaroroa Mt Watkin Conservation Group
- Hawksbury Lagoon Group
- Shag River Care
- Local schools
- The Halo Project (Waikouaiti River catchment and adjacent coastal areas, with a focus on predator control, forest and seabird habitat restoration, and freshwater enhancement)
- River Estuary Care – Waikouaiti/Karitāne pioneered early community conservation work in the catchment starting in 1999.

This report builds on and recognises this long history of community effort.

Otago Regional Council is also currently developing a Dunedin and Coast Catchment Action Plan (CAP)[2] which also includes the Waikouaiti River catchment and adjacent coastal areas, but not the areas further north, which lie in Waitaki District. The CAP is a non-regulatory plan for the management and conservation of entire catchments. It consolidates and builds on actions that are already taking place in the catchments, and aims to serve as a focus for new actions and projects. Although the catchment is the unit of area used to design a CAP, the actions described in the CAP can cover areas other than freshwater including terrestrial, estuarine, and marine ecosystems, land and soils, and human values (including mana whenua values).

The priorities recommended in this report will help the catchment group support landowners and managers. Landowners and managers can also use the report to identify the biodiversity present on their land, understand the key threats to it, and consider the management options available. In particular, the report provides a broad ecological rationale for what a landowner might include in a farm biodiversity plan, which in turn may help with achieving FAP+ certification. It is also intended to support both individuals and groups, such as the catchment group, when applying for external funding by demonstrating how individual projects contribute to the wider biodiversity context for the area.

2. https://www.orc.govt.nz/environment/water-care/integrated-catchment-management/dunedin-coastal-catchments-action-plan/

3. Environmental context

The following section provides a broad overview of the environment within the East Otago Catchment Group area. It is not intended to be comprehensive, but rather to summarise the key aspects of the environment.

Topography, geology and climate

Topographically, the area is dominated by the NE-SW trending Taieri Ridge in the west rising to over 700 m elevation, and a series of parallel faulted ridges SE of this, also rising to 600-700 m elevation. These landforms are generally gently sloping but often have steep-sided valleys where waterways cut down towards the lowlands. These valleys can be rocky, while the gently sloping spurs often contain rocky outcrops or tors. Further east, the topography is dominated by lower elevation rolling hills extending to the coast, with broken coastal cliffs dropping to the shoreline. A chain of volcanic peaks protrudes above these hills, with dramatic rocky screes on some of the higher peaks. Several small estuaries occur at the mouths of the main rivers draining to the ocean. The Silver Peak Range, reaching over 700 m, defines the southern boundary of the study area, while the Kākanui and Horse Ranges, to the northeast of the Waihemo Shag River, define the northern boundary. Kākanui Peak, at 1,528 m, is the highest point in the report area. Extensive alluvial flats are present in the lower Waihemo Shag River.

The geology of the area is complex, with Paleozoic Haast Schists dominant in the west and at higher elevation. Scattered late Tertiary basaltic cones are present through the middle of the area and on the coast, while late Cretaceous-Tertiary mudstones, sandstones and limestones are present in the east and up the Waihemo Shag River.

Climate is surprisingly uniform across the area, although with some distinctive patterns. The prevailing weather systems are from the west (SW to NW), although onshore winds affect coastal areas. The highest rainfalls occur in the Silver Peaks area and Kākanui Ranges (>1000 mm per annum), with lower rainfall towards the coast (5-700 mm). Coastal areas typically have mild summers and cool winters, while higher elevation areas can have hot summers but cold winters with snow on the ground for weeks. There is limited long-term climate data, with the best records coming from Palmerston (1970-2023; station ref. 5323), where the mean annual rainfall was 637 mm. Annual rainfall ranged from 365 mm in the driest year (1998) to 1,032 mm in the wettest year (2000). Monthly rainfall ranged from 2 mm in the driest month to 335 mm in the wettest, with an average monthly rainfall of 53 mm. There was little seasonal variation, with January being the wettest month on average (62 mm) and September the driest (43 mm).

Pre-human settlement vegetation

While there has been some debate in the past over what the pre-human vegetation of Otago might have been like, there is now a strong consensus that woody vegetation (forest and shrubland) was dominant across most of the region below the alpine treeline[3]. In the area that this report covers, cool-temperate conifer-broadleaved forest[4] would have been widespread, with the potential ecosystems mapping[5] suggesting approximately 96% of the area was forested (Figure 2, Table 1). A diversity of broadleaved trees including narrow-leaved lacebark/houhere, lowland ribbonwood/mātata, kāpuka/broadleaf, kōwhai and tarata/lemonwood would have formed the canopy, with the conifers mataī, tōtara and kahikatea growing amongst these or emergent above them.

Table 1. *Area of potential ecosystems within the main catchments considered here.*

Areas (ha)	Pleasant	Post office	Shag	Stony	Waikouaiti
Catchment	12,708	1610	54,436	870	42,542
Forest	12,514	1513	53,031	857	39,766
Forest %	98.5	94.0	97.4	98.5	93.5
Alpine	0	0	1,072	0	2,450
Alpine %	0	0	2.0	0	5.8
Other	194	97	333	13	326
Other %	1.5	6.0	0.6	1.5	0.7

Other includes wetlands, estuaries, beeches and riverbeds.

Differences in forest composition, structure and diversity would have occurred with slope, aspect, soil type and depth, and elevation (Figure 3). In general, lower elevation forests and those on deeper and moister soils would have been taller and more diverse, with conifers dominating the canopy or occurring as emergent trees above a dense canopy of broadleaved trees. These forests would have been structurally complex and supported a large number of plant and animal species. While mataī, tōtara and kahikatea would have been the main conifers, rimu and perhaps miro would also have been present but would have been less abundant and confined to moist microsites.

3. McGlone MS 2001. The origins of the indigenous grasslands os southeastern South island in relation to pre-human woody ecosystems. New Zealand Journal of Ecology 25, 1-15.
4. Conifer refers to native conifer trees in the podocarp and cypress families, while broadleaved refers to all Angiosperm trees including beech.
5. Data from ORC Potential Ecosystems mapping: https://maps.orc.govt.nz/portal/home/webmap/viewer.html?useExisting=1&layers=62df5a8a5b1f4576a%20049af2dca35cd08

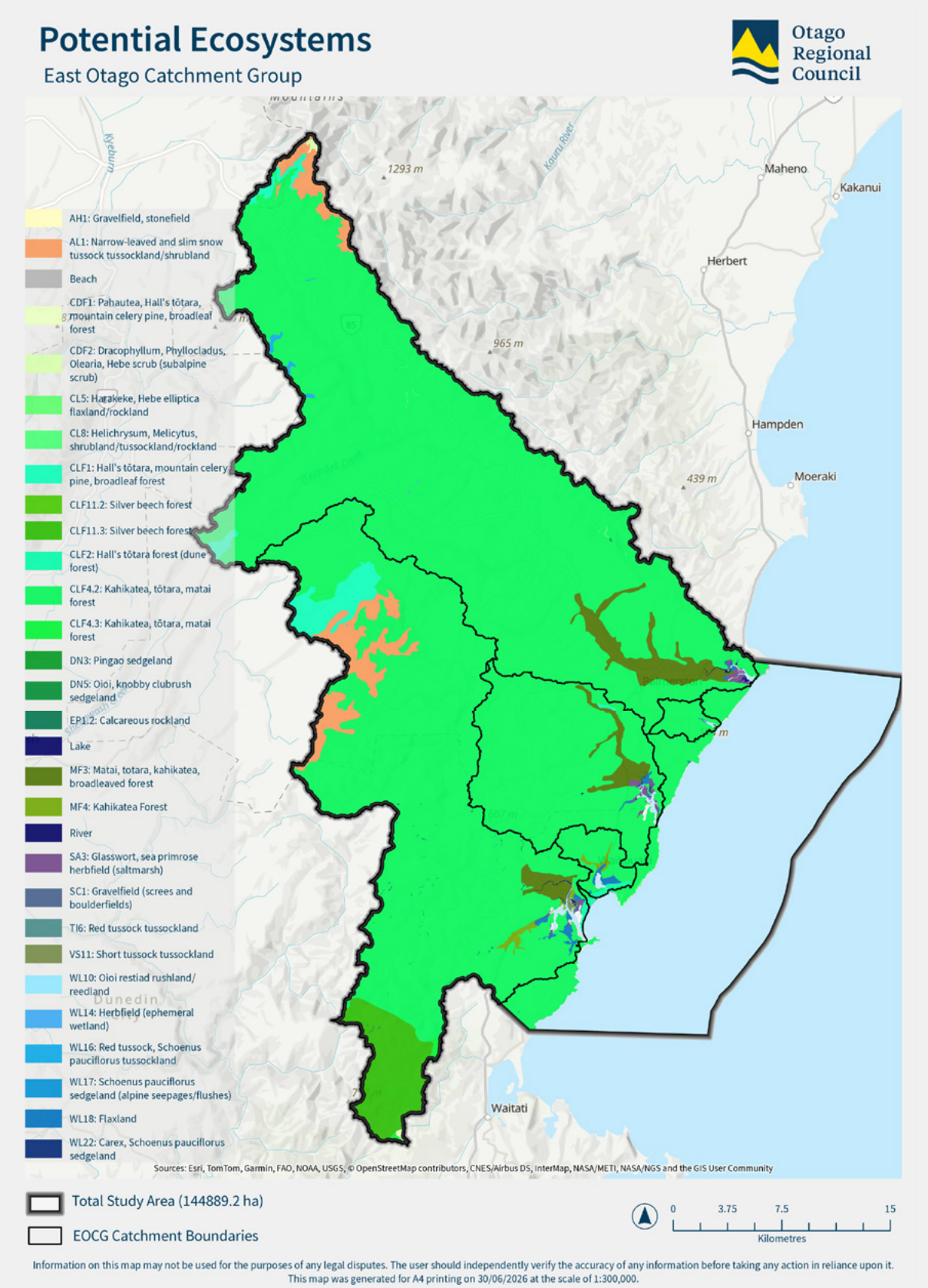

Figure 2. *Likely prehuman vegetation cover showing forest (green) and grassland (pink) based on the ORC potential ecosystem mapping layer.*

At higher elevations and in areas with shallower soils or on more exposed slopes, the forests would have been of lower stature, with more widely scattered conifers among a diverse mosaic of smaller broadleaved tree and shrub species. Thin-barked tōtara would have replaced lowland tōtara, and the more open broadleaved forest with abundant kāpuka/broadleaf, kōhūhū, kōwhai, ribbonwood/mātata and other species present. Inland the forest would have been drier, with thin-barked tōtara and mountain celery pine as the main conifers, growing among a lower and scrubbier canopy of broadleaved trees including kōwhai, kāpuka/broadleaf, tī kōuka/cabbage tree and tree daisies.

In the headwaters of the south branch of the Waikouaiti River, silver beech would have been the dominant forest canopy tree in the pre-human forests. While silver beech would have formed the canopy, pāhautea/mountain cedar[6] would also have been present at higher elevations as it still is locally today. There would also have been a diversity of smaller trees and shrubs in the understorey.

Figure 3 (A)

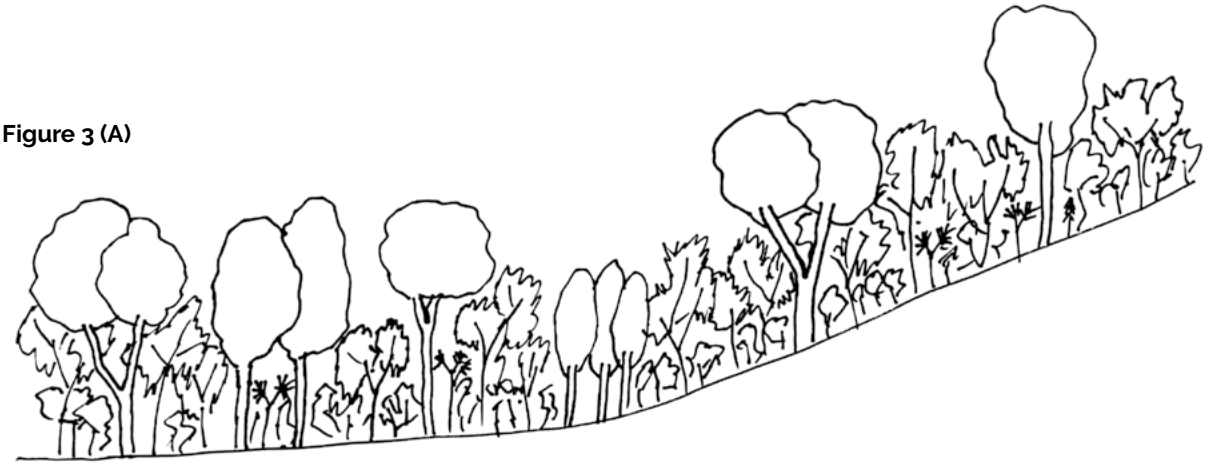

Figure 3 (B)

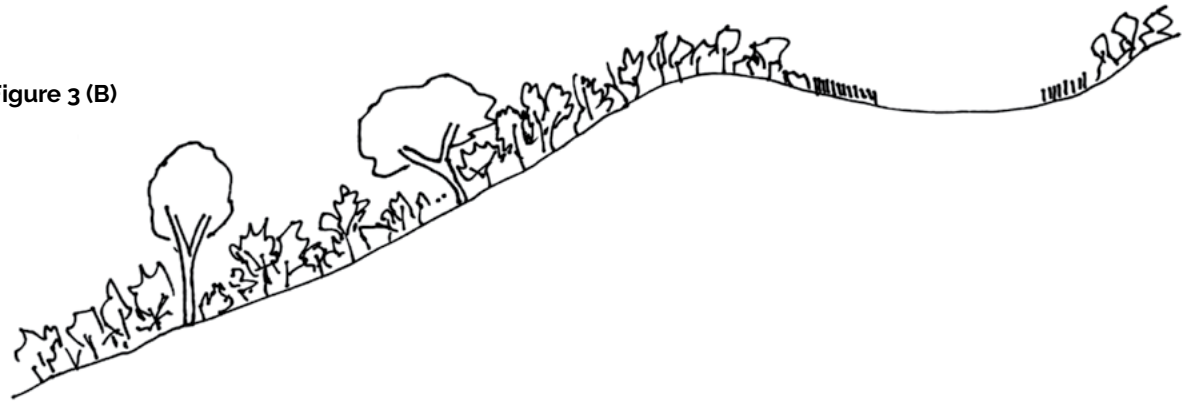

Figure 3. *Schematic profiles of pre-human conifer-broadleaved forest types.*

(A) Lowland forest with emergent tōtara, mataī and kahikatea above a broadleaved canopy.

(B) Upland forest with scattered thin-barked tōtara above a low broadleaved canopy grading into wetland vegetation in depressions.

6. Also called kaikawaka.

Alpine grassland accounted for only 3% of the pre-human area and would have been dominated by narrow-leaved snow tussock. This vegetation type would have been confined to the highest elevations in inland areas and along the Kākanui Range. Wetlands would have occupied depressions and other areas with poor drainage. While of limited extent, there were likely many small wetlands scattered across the area. Salt marshes would have dominated the estuaries as they do today, but would have been fringed by dense saltmarsh ribbonwood shrubland grading back through harakeke, mingimingi, kōwhai, and tī kōuka into forest. Wetlands and other open areas, such as beaches and riverbeds, are thought to have accounted for only 1% of the area in pre-human times.

Post-human settlement vegetation

Māori settlement likely occurred between 1250 and 1300 CE. The fossil record (pollen, spores and charcoal) tells of unprecedented and repeated burning in eastern and inland South Island throughout the period of Māori occupation. Since fires were rare until Māori settlement, the woody vegetation was probably very rapidly depleted as large amounts of combustible biomass would have been present. Periods of woody regeneration were likely set back by further fire, with remnant woody vegetation quickly restricted to fire-free refugia, such as gorges and other rocky sites. At the same time, tall tussock grassland would have expanded downslope from higher elevations, while short tussocks and a range of other herbaceous species would have also greatly expanded their ranges in lower, drier environments cleared of fire-sensitive woody species.

Forest loss due to burning associated with Māori settlement would have affected much of the area covered by this report, with an expansion of snow tussock grassland through most of the region. These grasslands would have been what the first European explorers and settlers encountered over much of the district and the remnants of this grassland are still present today in higher elevation areas (e.g. around Macraes).

There is, however, evidence for some forest survival, especially in coastal areas. The 1857 map (Figure 4) produced by the early European surveyor John Turnbull Thomson[7] shows the presence of a large area of forest along the coast from Warrington to nearly Karitane and inland to about Hammond Hill. Forest patches are also shown at Hawksbury Bush and east of Mt Royal[8], with a few small additional patches in areas where forest is still present today (e.g. south of Mt Watkin). Most of this forest was presumably milled or burnt during early European settlement, although remnant conifers such as kahikatea, mataī and tōtara are still present in paddocks today (e.g. Church Road).

7. Archives New Zealand/Te Rua Mahara o te Kāwanatanga, Dunedin Regional Office (accessed from https://maps.recollect.co.nz/nodes/view/268).
8. The Mt Royal just south of Palmerston.

Figure 4. *1857 coastal North Otago map produced by John Turnbull Thomson.*

The current vegetation of the area covered by this report is predominantly pasture and cropland, with an increasing area of plantation forest (for timber and carbon). In contrast, native vegetation only occupies 13.6% of the area (Figure 5), with the main types being snow tussock grassland (6.1%), native woody vegetation (4.6%), grey scrub (1.9%) and wetlands, saltmarshes and other low stature communities (1%)[9]. There is, however, considerable variation between catchments, with the most native woody vegetation (11% of the catchment area) in the Waikouaiti River catchment (Table 2).

9. Data from ORC Current Indigenous Ecosystems mapping: https://maps.orc.govt.nz/portal/home/webmap/viewer.html?useExisting=1&layers=62df5a8a5b1f4576a049af2dca35cd08

***Photo 1**. Kānuka shrubland on farmland.*

The most widespread native woody vegetation today is kānuka shrubland, mixed-broadleaved shrubland, and regenerating forest. Kānuka shrubland has usually established on sites that previously supported pasture (Photo 1). A range of often interlinked factors contribute to the establishment of kānuka shrubland including changes in grazing management (less intensive grazing), reduced fertiliser inputs and a reduction in vegetation clearance (e.g. by fire or herbicide). The removal of agricultural subsidies in the mid-1980s was one factor that led to the expansion of kānuka in many parts of New Zealand. Kānuka is a pioneering species with small, wind-dispersed seed that readily establishes in pasture. Although now quite widespread, most areas of kānuka are subject to ongoing grazing (by livestock or feral deer) and are remote from areas of more mature native woody vegetation. As a result, subsequent regeneration of native woody species is limited or absent (Photo 2).

***Photo 2**. Understorey of kānuka shrubland comprising only a few unpalatable species, Mt Watkin SR.*

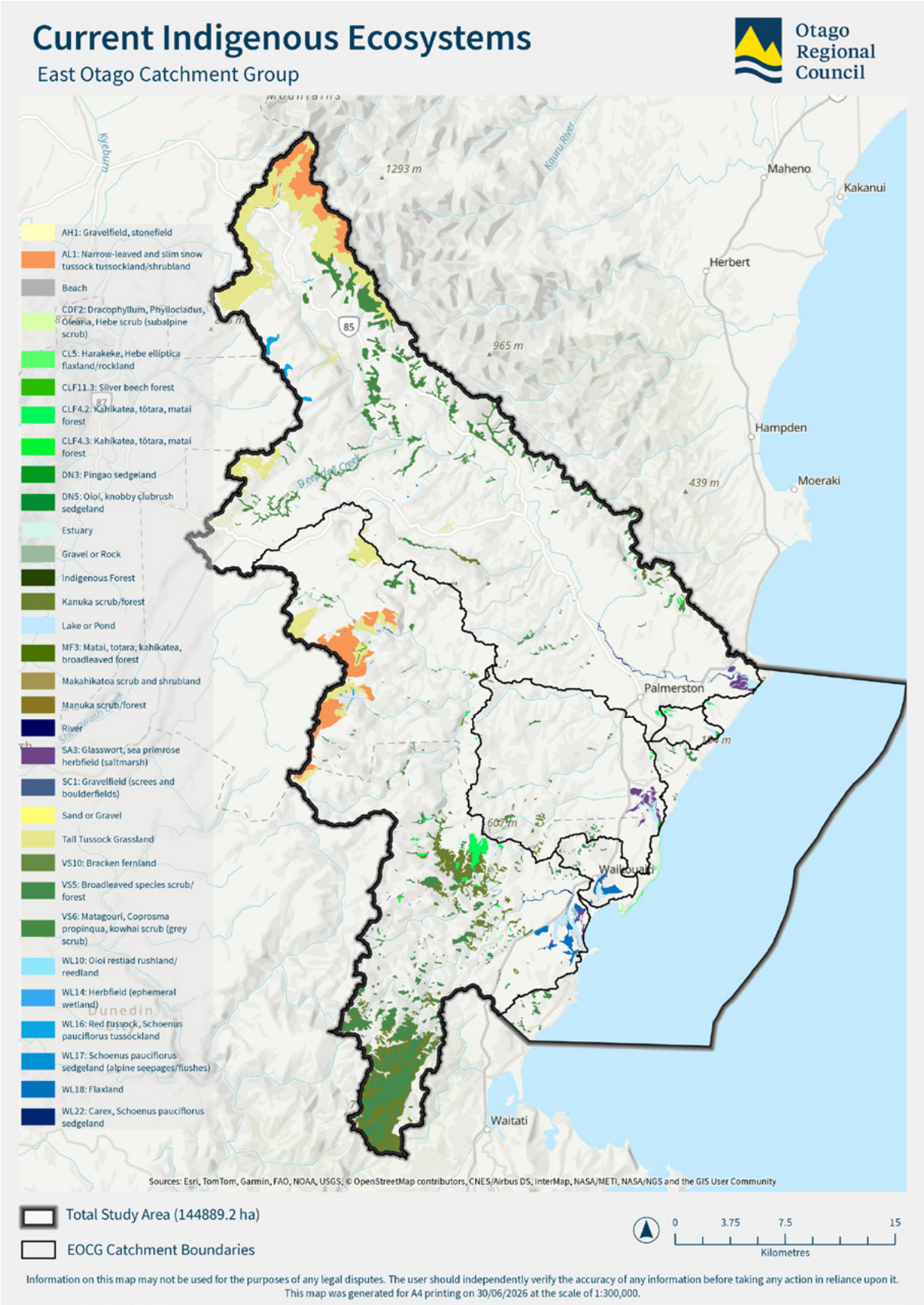

Figure 5. *Current vegetation cover in the study area.*

Table 2. *Current area of native vegetation within the main catchments considered here.*

Areas (ha)	Pleasant	Post office	Shag	Stony	Waikouaiti
Catchment	12,708	1610	54,436	870	42,542
Forest	130	38	297	16	4679
Forest %	1.0	2.4	0.5	1.8	11.0
Grey scrub	34	0	1860	0	306
Grey scrub %	0.3	0	3.4	0	0.7
Snow tussock	0	0	4598	0	2248
Snow tussock %	0	0	8.4	0	5.2
Other	156	98	364	13	478
Other %	1.2	6.1	0.7	1.5	1.1

While kānuka shrubland is widespread, especially around Mt Watkin, mixed-broadleaved shrubland and regenerating forest is most common in the south branch of the Waikouaiti River (Photo 3). This shrubland and regenerating forest is more diverse than kānuka shrubland and comprises a range of broadleaved trees including kāpuka/broadleaf, putaputawētā/marbleleaf, karamu and orihou/mountain five-finger. Both proximity to remnant forests and their seed sources, and the higher rainfall in the Silver Peaks area, likely contributes to the more diverse nature of this vegetation type. In these situations, mixed-broadleaved regenerating forest can establish into kānuka shrubland. Silver beech is also actively establishing into some areas of mixed-broadleaved shrubland and regenerating forest (Photo 4), and will likely become the dominant canopy tree in the future.

***Photo 3**. Mixed-broadleaved regenerating forest with remnant kānuka, south branch Waikouaiti River.*

***Photo 4**. Silver beech establishing into mixed-broadleaved regenerating forest, south branch Waikouaiti River.*

Grey shrubland dominated by matagouri and mingimingi (Photo 5) is common in the Waihemo Shag River catchment. Plants like matagouri respond rapidly to fertiliser addition and can form dense impenetrable thickets that limit both the growth of pasture species and stock access[10]. Because of this, cyclical clearance of grey shrubland is common on hill and high country farms. Shrubland clearance has been used as a farm management tool for many years and is undertaken using fire, aerial herbicide application, cattle grazing and cutting/crushing. As a result, the most mature areas of grey shrubland are often confined to steeper hill sides where vegetation clearance has not been applied.

***Photo 5**. Grey shrubland, upper Waihemo Shag River catchment.*

More diverse shrubland and regenerating forest also occurs in a number of steep sided gullies, although woody weeds can also be common in these communities (e.g. in the Waihemo Shag River catchment; Photo 6). These communities can include a number of other native woody species, including kōwhai, tī kōuka/cabbage tree and tree daisies. Species composition is quite varied and depends on disturbance history and the presence of refuges that allow fire-prone species to survive. Scattered kōwhai also occur growing in hill country pasture, usually with some grey scrub species like mingimingi, desert broom and scrub pohuehue (Photo 7).

10. Day NJ 2021. The biology and ecology of matagouri (Discaria toumatou, Rhamnaceae) and its distribution across New Zealand. Unpublished report prepared for LINZ.

***Photo 6**. Native shrubland with some forest species and invasive wilding pines, Cranky Jim's Creek, Waihemo Shag River catchment.*

***Photo 7**. Scattered kōwhai is hill country pasture, Waihemo Shag River catchment.*

Old-growth (original) forest comprising mature conifers is now very rare and confined to only a few sites, with much of it fragmented and grazed. Exceptions occur in places like the Mt Watkin and Goodwood Scenic Reserves where more intact remnants of the original forest are still present (Photo 8). However, even these areas will have been impacted to some extent by historic logging, and all will have been grazed, at least in the early days of European settlement. In some cases (e.g. Seacliff Conservation Area and at Hawksbury Bush) more degraded examples remain with a few remnant large podocarps (tōtara, kahikatea, matai) within a modified matrix of broadleaved tree species and pasture. All remnants of the original forest are incredibly valuable, as they are the direct links to the past and will retain soils and associated soil biota (fungi, bacteria, insects, worms, etc.) that will have been modified or lost in most other places.

Treeland (scattered trees through paddocks) is, however, quite widespread with several examples especially in coastal hill country (e.g. Puketapu, Mt Baldie, coastal hills south of Karitane; Photo 9). In most places, the canopy is dominated by broadleaved tree species like kōwhai, ngaio and lowland ribbonwood, but there are also examples of scattered remnant podocarps (tōtara, kahikatea, matai) through paddocks, mainly in the coastal hill country south of Karitane (Photo 10); scattered tōtara is also present in paddocks at Hawksbury Bush.

***Photo 8**. Remnant old growth tōtara forest, Goodwood Scenic Reserve.*

***Photo 9**. Treeland dominated by broadleaved tree species, but including one tōtara (dark canopy left of centre), southern slopes Puketapu.*

***Photo 10**. Two remnant mature podocarps (matai and/or kahikatea) in farmland, Church Road.*

***Photo 11**. Narrow-leaved snow tussock grassland, Cranky Jim's Ecological Area.*

Narrow-leaved snow tussock, with copper tussock in wetter areas, is still common at higher elevations in the western part of the report area (Photo 11), but also extends to lower elevations in places. However, the current extent of snow tussock grassland (6.1%) is substantially less than would have been the case when Europeans first explored this area, when it would have been the dominant vegetation cover. The main areas where snow tussock grassland occurs today are in the Macraes area and the upper reaches of the Waihemo Shag River catchment. Many areas of existing snow tussock grassland have been fragmented by farming practices, such as cultivation, with snow tussock grassland confined to steeper slopes where it is less easy to cultivate. While narrow-leaved snow tussock is dominant, the inter-tussock sward contains variable amounts of other native species, along with exotic herbs and grasses, depending on aspect, slope and grazing history. On south-facing slopes and around rocky areas, native shrubs and perennial herbs, including mingimingi species, korokio, kāpuka/broadleaf, whaririki/mountain flax and taramea, are also present (Photos 12 and 13).

***Photo 12**. Whararīki/mountain flax and kāpuka/broadleaf on a shady bank in narrow-leaved snow tussock grassland, Redbank Scenic Reserve. Note more extensive tussock grassland on the ridges in the distance.*

***Photo 13**. Rock outcrops in narrow-leaved tussock grassland, Redbank Scenic Reserve with whaririki/mountain flax and shrub species.*

***Photo 14**. Ephemeral wetland in narrow-leaved snow tussock grassland, Macraes area (Wildlands SNA report image).*

Wetlands, although limited in extent, are important and include ephemeral wetlands, seepages, copper tussock wetlands, and harakeke-dominated swamps. Ephemeral wetlands support a distinctive flora, reflecting their unique hydrological features (Photo 14). While wet in winter, ephemeral wetlands dry out in summer and a number of plants grow and flower over a short time period between the site being submerged and drying out in summer. They are very vulnerable to impacts of livestock (and feral ungulates) leading to pugging, and are also vulnerable to competition from taller exotic herbaceous species. Ephemeral wetlands are most common on the gentle sloping landforms in the upper part of the study area, especially in the Macraes area.

Copper tussock dominated wetlands are also locally present on gentle sloping landforms in the upper part of the study area. These occur where ground conditions are wet but do not dry out in summer. At lower elevations, harakeke swamps are present, with harakeke as the dominant plant. Saltmarsh vegetation is still dominant in the main estuaries, but the shrubland margin has been considerably modified and reduced (Photo 15). Hawksbury Lagoon is a significant wetland and estuarine habitat, and supports a range of native bird species. The lagoon faces ongoing management pressures, including invasive plants and animals, water quality, climate change and loss of native wetland margins.

***Photo 15**. Saltmarsh vegetation, Waihemo Shag River (Salt Ecology report image)*

Land tenure reflects the overwhelming predominance of farmland and plantation forest, with only 3% of the area part of the public conservation estate. Only one pastoral lease remains in the upper Waihemo Shag River catchment, with all other land under freehold title. The largest parcels of public conservation land within the report area include part of Silver Peaks Scenic Reserve (2286 ha), Mt Watkin Scenic Reserve (650 ha), two parts of the Kakanui Conservation Area (543 and 146 ha – these were protected through tenure review), and one part of Redbank Scenic Reserve (260 ha). There are, however, numerous small parcels of public conservation land (scenic reserves, etc.) as well as areas protected by QEII National Trust covenants (comprising 550 ha across 18 covenants).

Native plant and animal species

As a result of the impacts of the 700-800 years of human presence, the range and abundance of native plant and animal species have changed, with most significantly reduced from their pre-human extent. The main native species that are likely more common in the modern landscape than the pre-human one are those adapted to disturbed environments or whose range has been expanded by past disturbances. Species such as kānuka, narrow-leaved snow tussock, pūtangitangi/paradise shelduck and kāhu/Australasian harrier are examples. While most plant and animal species present today are far less abundant than previously, some have been particularly impacted by human settlement and continue to decline both locally and nationally. Examples include animals such as lizards, penguins and some forest birds, and plants such as wetland herbs, mistletoes and tree daisies. There are likely to be invertebrate examples too (e.g. wētā and weevils), but these groups are less well known. Habitat loss, predation, herbivory and competition from invasive plants are the major drivers of decline for these species.

The following are some of the key native species that are threatened or uncommon within the area covered by this report.

The Macraes area, which includes part of the Waihemo Shag River and Waikouaiti River catchments, is one of two strongholds for the Otago skink and grand skink. Both species are classified nationally as 'Threatened – Increasing', reflecting their unnaturally small population sizes (due to predation) but increasing population trends (due to translocations to predator-free sanctuaries, such as Redbank Scenic Reserve, and intensive trapping programmes). These species are associated with rocky gullies and rock outcrops and are particularly vulnerable to predation. The loss of native habitat between rock outcrops also adversely affects them.

Yellow-eye penguin/hoiho are ranked as 'Nationally Endangered' and nest along the Otago coast, including within the report area. The South Island population of hoiho is declining because of multiple threats, including predation and disturbance, disease, declining food resources, and climate change. Other notable coastal bird species in the study area include black-billed gull/tarāpuka and bar-tailed godwit/kuaka, both of which are ranked nationally as 'At Risk – Declining'. Black-billed gulls are known to roost overnight in the coastal estuaries of the catchment, while bar-tailed godwit use the Waikouaiti Estuary as a key feeding ground during their annual migration.

Native forest birds such as kākā, South Island robin/kakaruai and brown creeper/pīpipi, although not necessarily threatened nationally, are rare or absent within the report area because of habitat loss and predation. However, Orokonui Ecosanctuary, to the south, is providing an environment in which these species can thrive. As a result, birds are gradually dispersing into the wider landscape, with predator trapping undertaken by the Halo Project, which includes part of the Waikouaiti catchment, and the Hikaroroa Mt Watkins Conservation Group, helping to support this process.

The freshwater fauna includes the endemic Taieri flathead galaxias (At Risk – Declining), which is found in tributaries of the Waikouaiti and Waihemo Shag Rivers. Galaxias species are threatened by introduced fish species like trout, and usually occur in refuges where trout are excluded (e.g. above waterfalls). Lamprey (Nationally Vulnerable) are known from the Taieri catchment and may also occur in the Waikouaiti and Waihemo Shag River catchments. Tuna/freshwater eels (both longfin and shortfin) are present in the report area's waterways. Long-fin eels are endemic to New Zealand and are ranked nationally as 'At Risk – Declining'. Short-fin eel populations are considered more stable. As apex freshwater predators, eels play a key ecological role, and their presence is an indicator of waterway health.

Native wetland plants have been severely impacted by human settlement, with the area of wetlands nationally reduced by 90%. Wetlands experience a unique range of environmental conditions. Ephemeral wetlands (wetlands that dry out in summer), which are present at higher elevations in the Macraes area, provide habitat for several nationally and regionally rare plant species that are threatened by habitat loss and competition from invasive species.

Two further groups of plants that are present in the report area and are nationally uncommon or threatened are tree daisies and white mistletoe. Both have declined because of habitat loss, and in the case of white mistletoe, herbivory by possums. Remnant populations are still present and have important biodiversity values. Tree daisies are also important habitat for several rare native moth species.

4. Challenges

Several challenges will constrain the ability of farmers and others to achieve positive biodiversity outcomes. It is important to recognise these from the outset, as they need to be central considerations in future management. The following notes are not intended to be comprehensive, but rather highlight the key factors that need to be considered when managing native biodiversity. At least five factors are particularly important.

Condition of remnants

The remnants of the original forest are highly fragmented, often have a long history of browsing (by livestock and feral animals), and many of the remaining canopy and emergent trees, especially conifers (matai, tōtara and kahikatea), are mature, with little or no recruitment occurring. These factors compromise the ability of these forests to survive into the future without active management. Fragmentation is important both for animals, such as birds, that live in the forests and for gene flow in all species. Plants and animals in small, isolated remnants usually have limited gene flow and, as a result, declining genetic variation. The condition of remnants is further compromised by a long history of impacts from exotic animals, especially on the forest floor (including the removal of litter and soil compaction), which in turn affects nutrient cycling and soil properties such as water retention. Finally, a lack of recruitment for many species means that as the remaining individuals die, the species is lost from the area. Biologists have used the term 'living dead' to refer to situations such as scattered remnant mature kahikatea or matai in pasture. Forest remnants are, however, the direct link to the past and still contain soils that have not been directly impacted by human activities. Maintaining and enhancing them is therefore of the highest priority.

Plant and animal pests

The impacts of exotic plant and animal pests have been a major focus of conservation management in New Zealand, as these species seriously compromise the survival of native animals, such as birds and lizards, and native plants. Addressing the impacts of plant and animal pests is central to achieving the biodiversity goals proposed in this report.

Key plant pests vary between ecosystems, but in shrubland and forest they include invasive woody trees, shrubs and vines. Many of these have wind-dispersed seed, while others are dispersed by birds, including native birds. In a highly modified landscape, these species are widespread. Plant pests can both smother and collapse native vegetation (e.g. climbers such as old man's beard and Chilean flame creeper) and deflect succession, for example, through small trees such as hawthorn and sycamore establishing in regenerating forest. In grassland, some invasive species are likely to be permanent members of these communities (such as hawkweeds), while others, such as wilding conifers (including radiata pine), can completely alter the composition of the ecosystem.

Willows are particularly problematic in wetlands, where they shade and dry wetland systems, making them unsuitable for native wetland species. A range of other exotic plants can also invade wetlands, smothering native species, and can be particularly problematic in ephemeral wetlands. Spartina is an invasive estuarine grass that is known to be present at Hawksbury Lagoon and may occur in other estuaries. Spartina can form dense monocultures that exclude native saltmarsh species, alter sediment dynamics, and reduce habitat value for wading birds and other estuarine fauna.

Pest animals include carnivores (cats, mustelids, rodents and hedgehogs), omnivores (possums and pigs), and herbivores (deer, wallabies and goats). Livestock in native vegetation have similar impacts to deer. For many native species, reducing the impacts of these animals is essential for their survival. While the impacts of carnivores on birds and reptiles are perhaps best understood, the long-term impacts of omnivores and herbivores also threaten the integrity of the ecosystems on which birds, reptiles and invertebrates depend and are just as critical to their long-term survival as carnivore control.[11]

Geese, including Canada geese, greylag geese, and domestic or feral geese, are an additional pest animal. Although not always considered primarily a biodiversity threat, geese can cause significant damage to wetland and estuarine habitats through grazing, trampling and fouling. At Hawksbury Lagoon, they are a significant ongoing management issue, with the potential to displace other species and degrade habitat. Their impacts on native fauna through competition and predation of insects and other small invertebrates are poorly understood.

The impacts of plant and animal pests vary from site to site, and their management needs to reflect both the species present and the biodiversity values they compromise.

Lack of awareness

A major challenge for native biodiversity is a general lack of awareness of what is present, what threatens it, and what can be done to address those threats. Biodiversity conservation is not just about national parks and wilderness areas – there is important native biodiversity in every corner of New Zealand, and looking after it is important because it provides many benefits. Farmers are in a particularly important position because, nationally, nearly one-quarter of all native vegetation occurs on sheep and beef farms[12]. Within the study area, 13.6% of the area still supports native vegetation, but only 3% is under conservation management (by DOC or DCC). The remaining 10% of native vegetation therefore occurs on private (mainly farm) land.

11. Norton DA, Bellingham PJ, Richardson SJ 2026. Deer in the headlights: Sleepwalking our way to a native forest catastrophe. New Zealand Journal of Ecology 50.
12. https://beeflambnz.com/advocacy/biodiversity/native-vegetation-sheep-and-beef-farms-summary-report

Lack of management

Coupled with the previous points is a simple lack of biodiversity-focused management. In much of New Zealand (on both public and private land), biodiversity is in decline simply because of benign neglect. Because of the immense changes that have been wrought on the New Zealand environment since human settlement (habitat loss, invasive species and climate change), our native biodiversity requires active management to survive and flourish. A lack of management, regardless of land tenure (public or private), will result in ongoing biodiversity loss.

Climate change

Climate change is listed last in this section because it underpins and exacerbates all the challenges described above. It provides the context within which all other threats must be managed. It is potentially the single greatest threat to native biodiversity over the next few decades. The effects of climate change will be myriad and are not easy to predict. Changes in long-term averages (such as temperature, rainfall and frost days) are obvious, but equally important for biodiversity will be changes in the incidence of extreme events (such as extreme rainfall, prolonged drought, or extreme heat) and out-of-season events such as frost. Climate change is also likely to affect the range and abundance of exotic species. One example is the invasive banana passion vine, which is expanding southwards with warming temperatures. Climate change is also expected to increase the incidence of fire, which can be catastrophic for small remnants of native habitat (and the rapidly expanding area of plantation forest in the report area will almost certainly exacerbate this). Finally, climate change will affect economic productivity, which will have obvious flow-on effects on what individuals, communities and the nation can afford to invest in biodiversity conservation.

5. Developing a vision for the future

The overarching vision of the East Otago Catchment Group is to have *"healthy water and biodiversity that reflects a protective, empowered and connected community"*. The following recommended vision and outcomes are grounded in the scientific baseline presented in this report and are offered as a starting point for a future community biodiversity strategy for the East Otago area.

Based on the past and present condition of biodiversity outlined in this report, and reflecting the East Otago Catchment Group's overarching vision, the following vision for native biodiversity is suggested as a starting point for developing a community biodiversity strategy: *"Healthy native biodiversity that supports thriving populations of native plants and animals, and helps build resilience to extreme storm events, including rising sea levels, throughout the district."*

The following outcomes are recommended as goals for a 20-year community biodiversity strategy. They represent the authors' expert view of what is both ecologically desirable and achievable for the East Otago Catchment Group area. They are proposed as a starting point for community discussion and refinement, although it is recognised that additional goals are also likely to be identified:

1. The extent of native woody vegetation (including regenerating kānuka forest) is the same or greater than it is currently.
2. The extent of snow tussock grassland is the same or greater than it is currently.
3. All remaining wetlands have been identified and mapped, and there has been no further loss of wetlands.
4. The location and extent of naturally rare ecosystems are known, and their values are being appropriately managed.
5. The quality of native vegetation is better than it is currently, including:
    - All remnants of old-growth forest (with mature podocarps) have been identified and protected from livestock grazing through appropriate fencing, and, where appropriate, restoration management, such as enrichment planting, has been undertaken.
    - Plans for increased connectivity between remnant forest areas[13] have been developed in partnership with landowners, and at least five individual projects to enhance connectivity have commenced.
    - At least half of remaining wetlands are being managed appropriately, especially in relation to livestock grazing and weeds.
    - Connectivity has been improved for at least five isolated rocky outcrops with important lizard values (see outcome/goal 5) through restoration of snow tussock grassland.
    - White mistletoe is naturally regenerating in ten sites within the report area.

13. Mt Watkin area south to Silver Peaks and east to Hawksbury Bush, and along the coast south of Karitane.

6. Native fauna is thriving, including:
    - Otago and grand skink populations on private land have been identified and, where practicable, are being managed (including predator control) to enhance their abundance.
    - The abundance of common native forest birds (korimako, tui, touhau, piwakawaka, riroriro) are the same or greater than they currently are in at least five areas of native forest.
    - Rare forest birds such as titipounamu/rifleman, pīpipi/brown creeper and kākā continue to breed successfully within the forests of the report area, and have expanded their range.
    - The distribution of key freshwater species, such as Taieri flathead galaxias and lamprey, are known, and sites are being managed to ensure their ongoing presence, while populations of long-fin eel have become more abundant.
    - Coastal bird species, such as hoiho/yellow-eye penguin, black-billed gull/tarāpuka and bar-tailed godwit/kuaka, are more abundant than they currently are.

The following community outcomes are seen as essential to achieving the above:

- The community understands and values native biodiversity, and biodiversity contributes towards the sale of farm products and a burgeoning niche tourism sector.
- Different groups (farmers, foresters, iwi, agencies, urban population) are actively working together to enhance native biodiversity within the report area.
- A biodiversity plan has been completed for 75% of the farms in the catchment group area.
- For at least 50% of the sub-catchments within the area, catchment level resilience plans have been developed that identify areas where restoration is required to enhance resilience against extreme storm events (including building resilience into coastal areas against the effects of sea level rise and storm surges).
- All land managers, including community groups, are aware of the key plant pests that threaten native biodiversity, and have active programmes for their control (including wilding conifers in tussock grasslands and grey scrub/regenerating forest communities).
- Control of carnivores (mustelids, cats, hedgehogs, possums, rodents) is occurring through all areas of native woody vegetation and in tussock grassland/rock outcrop areas with known populations of grand and Otago skink.
- A regional ungulate (deer, goats and pigs) management plan has been developed in partnership between farmers, councils, DOC, iwi and plantation forest owners. As a result, feral ungulates no longer threaten biodiversity values.

6. Recommended priorities and actions

The following section outlines recommended priorities and suggested management actions to assist in achieving the biodiversity outcomes proposed in this report. The management actions can be viewed as stepping stones towards achieving the proposed 20-year biodiversity outcomes. They should be reviewed by the East Otago Catchment Group and refined through a community strategy process, with progress tracked at least every five years against the 20-year outcomes.

Native biodiversity

From the perspective of native biodiversity, the most urgent priority is to protect the remnants of the original vegetation, especially forests and wetlands: forests because they were the dominant pre-human vegetation, and wetlands because of the key role they play in regulating downstream water and sediment yield. Remnants are both the direct links to the past and the source of propagules for the future. As well as the remnant plants and animals that we are familiar with (trees, shrubs, grasses, birds, reptiles, etc.), original ecosystems, especially forests, also include original soil biota (insects, worms, fungi, etc.) that are not present in regenerating forest, such as kānuka stands that have developed on former pasture sites.

The key priorities for remaining original ecosystems are:

- **Secure.** Make sure that there is no further loss of these areas through deliberate clearance or benign neglect.
- **Enhance.** Remove degrading factors such as grazing animals and invasive weeds and use restoration to fill gaps and reintroduce locally absent species. For wetlands, reintroduction of hydrological processes may also be required – removing drains or installing weirs.
- **Connect.** Native biodiversity does not occur in isolation. Connections are critical for gene flow and for allowing species to recolonise after adverse events. Rebuilding connections between remnants is also critical.

For tussock grasslands, the key priority should be ensuring that all areas of tussock grassland are retained, with no further conversion to exotic tree monocultures, pasture or crops. Where required to enhance lizard habitat connectivity, additional tussock grassland should be restored.

Saltmarsh ecosystems present a bit of a conundrum for this report. Saltmarsh and related estuarine systems are relatively extensive within the study area, with less loss to reclamation than in some other parts of New Zealand. Places like Hawksbury Lagoon are particularly significant. They have, however, been adversely affected by the loss of connections to adjacent dryland systems, with pasture often extending right to the edge of the estuary. While restoration of estuary margin vegetation offers considerable potential to enhance these systems, investment in restoration needs to be undertaken with an appreciation of the potential impacts of climate change, especially sea level rise and storm surges. A complementary approach for saltmarshes may be to pre-empt sea level rise by allowing areas that are currently in pasture to revert back to saltmarsh.

It is also important to prioritise habitat for nationally and regionally threatened species. Otago and grand skinks are two obvious examples, but plants that occupy ephemeral wetlands, mistletoes and tree daisies are further examples. Preventing habitat loss (through clearance and fire) and reducing pressure from exotic plant and animal pests are key management requirements to help sustain these species. Having a good understanding of where all remaining populations of Otago and grand skinks occur on both private and public land, and then implementing carnivore control and, where required, undertaking restoration planting to enhance habitat quality, should be a priority for these species.

Native forest birds are benefiting from Orokonui Ecosanctuary, the Hikaroroa Mt Watkin Conservation Group, and the work being undertaken by the Halo Project, which includes part of the Waikouaiti River catchment. Supporting and expanding the work of the Hikaroroa Mt Watkin Conservation Group and the Halo Project will help rare or currently absent native forest birds, including species such as kākā, return to and expand throughout the East Otago Catchment Group area.

Suggested management actions for the first five years:

- With landowners, map all areas of remnant old-growth native forest (including small remnants comprising only a few mature podocarps) and, where they occur on private land, aim to protect them from livestock grazing.
- With landowners, map all areas of native woody vegetation that are excluded from livestock grazing and identify areas where future fencing might be possible, especially where this could buffer remnants of old-growth forest or improve connectivity and habitat for native forest birds.
- Develop an ungulate management plan for all land tenures within the East Otago Catchment Group area.
- Identify opportunities to enhance forest connectivity for mobile forest fauna.
- Restore saltmarsh marginal shrubland along at least 1 km of the Waikouaiti Estuary.
- Working with ORC, identify areas that are prone to saltwater inundation and could potentially be restored to saltmarsh vegetation.

East Otago Catchment Group

From the perspective of the East Otago Catchment Group, the most urgent priorities are raising awareness of the importance of native biodiversity within the area and supporting landowners and managers to develop and implement farm biodiversity plans. In addition, the catchment group can assist in developing partnerships to facilitate the implementation of this report. Partnerships need to be formed among landowners and managers, and with organisations such as DCC and WDC, DOC, iwi, the Halo Project, the QEII National Trust, and others. Many of these partnerships already exist, but working together will be essential to realise the biodiversity outcomes for this area.

Suggested management actions for the first five years:

- Run at least two biodiversity report presentations (Palmerston and Waikouaiti).
- Run area-specific field days profiling key habitats and species for landowners and managers, including collaborating with the Hikaroroa Mt Watkin Conservation Group and the Halo Project on pest control.
- Run at least ten farm biodiversity plan workshops, including field visits highlighting specific management approaches.
- Work with the ORC Natural Hazards Team to identify key catchments where resilience to storm events could be enhanced through native forest restoration and management.
- Develop a practical toolkit to assist landowners and managers to implement the management actions described in this report.

Landowners and managers

Farmers and landowners in East Otago have a strong history of biodiversity stewardship that this report recognises and builds on. Many have already developed farm biodiversity plans through East Otago Catchment Group integrated farm planning workshops, through their own initiative, or through other programmes. Others have fenced off areas of native bush and wetland from stock, established on-farm predator trapping, grown local-provenance native plants in their own nurseries, and worked with the QEII National Trust to formally covenant significant areas. This is not a district starting from scratch. There is real momentum here, and this report is designed to support and accelerate it.

From the perspective of landowners and managers, the most important priorities are developing an understanding of the native biodiversity present on the farm and the key threats to it. Once this is understood, it is then possible to develop farm biodiversity plans that outline how biodiversity management will be implemented. Plans need to be based on clear farm-level goals developed within the broader catchment context outlined in this report.

Implementing biodiversity management on a farm might include, depending on your farm:

- Securing remaining native biodiversity through, where required, fencing or modifications to grazing practices. Covenanting, or another form of legal protection, may also be considered but is not essential.
- Enhancing remnant areas through appropriate plant and animal pest control, among other things, using restoration plantings where these will add value, and modifying wetland hydrology where this would be beneficial.
- Improving connections between patches of native biodiversity on your farm and those elsewhere in the wider landscape. For wetlands, this includes considering connections within freshwater systems where appropriate.

The final priority for landowners and managers is to establish biodiversity monitoring that will provide a benchmark of the current state of biodiversity and how it changes in response to management. Monitoring can be as simple as photo points, but could also include a wide range of other tools[14].

Suggested management actions for the first five years:

- Attend a farm biodiversity plan workshop
- Prepare a biodiversity plan for your farm
- Establish base-line biodiversity monitoring

14. https://beeflambnz.com/knowledge-hub/video/biodiversity-presentation-methods-monitoring-progress-biodiversity-work

7. Developing a community biodiversity strategy

This report provides the scientific foundation for a future community biodiversity strategy but does not replace that process. While there are national and regional biodiversity strategies relevant to this area, a local East Otago strategy will be particularly valuable in guiding both on-the-ground management and funding applications. Biodiversity strategies need to reflect both the ecological realities of an area (as discussed in this report) and the aspirations of the local community. Without addressing both, any strategy is likely to fail.

The East Otago Catchment Group is in a good position to provide the leadership for strategy development. Comparable biodiversity strategies have been developed by the Banks Peninsula Conservation Trust[15] for Banks Peninsula and WAI Wanaka[16] for the Upper Clutha catchment. Kāti Huirapa Rūnaka ki Puketeraki will need to play a core role in strategy development from the outset.

Development of the strategy is likely to initially involve setting up a steering group to scope what might be involved and secure funding to support the process. There will then need to be substantial community engagement to agree on a shared vision and goals or targets, followed by engagement with all stakeholders, including agencies, on how the strategy might be implemented and support existing strategies, plans and work programmes. Finally, the strategy will need to be socialised with the wider East Otago community.

15. https://bpct.org.nz/

16. https://waiwanaka.nz/wp-content/uploads/2024/02/Upper-Clutha-Biodiversity-Strategy-Summary-2024.pdf

Appendix 1. Scientific names of species mentioned in text

Native plants

Conifers are marked with *

copper tussock – *Chionochloa rubra* subsp. *cuprea*
desert broom – *Carmichaelia petriei*
harakeke (lowland flax) – *Phormium tenax*
kahikatea – D*acrycarpys dacrydioides**
kanuka – *Kunzea ericoides* agg.
kapuka/broadleaf – *Griselinia littoralis*
karamu – *Coprosma lucida*
korokio – *Corokia cotoneaster*
kōwhai – *Sophora microphylla*
lowland ribbonwood/mānatu – *Plagianthus regius*
matagouri – *Discaria toumatou*
mataī – *Prumnopitys taxifolia**
mingimingi – *Coprosma* species
miro – *Pectinopitys ferruginea**
mountain celery pine – *Phyllocladus alpinus**
narrow-leaved lacebark/houhere – *Hoheria angustifolia*
narrow-leaved snow tussock – *Chionochloa rigida*
orihou/mountain five-finger – *Pseudopanax colensoi*
pahutea/kaikawaka/mountain cedar – *Libocedrus bidwillii**
putaputawētā/marbleleaf – *Carpodetus serratus*
rimu – *Dacrydium cupressinum**
saltmarsh ribbonwood – *Plagianthis divaricatus*
scrub pohuehue – *Muehlenbeckia complexa*
short tussock – species of *Festuca* and *Poa*
silver beech – *Lophozonia menziesii*
snow tussock – *Chionochloa* species
taramea/speargrass – *Aciphylla* species
tarata/lemonwood/tarata – *Pittosporum eugenioides*
thin-barked tōtara – *Podocarpus laetus**
tī kōuka/cabbage tree – *Cordyline australis*
tōtara – *Podocarpus totara**
tree daisies – species of *Olearia*
whaarariki/mountain flax – *Phormium cookianum*
white mistletoe – *Tupeia antarctica*

Exotic plants

banana passion vine – *Passiflora tarminiana*
Chilean flame creeper – *Tropaeolum speciosum*
Hawkweeds – species of *Hieracium*
Hawthorn – *Crataegus monogyna*
old-man's beard – *Clematis vitalba*
radiata pine – *Pinus radiata*
spartina – *Spartina anglica*
sycamore – *Acer pseudoplatanus*
wilding conifer – primarily Douglas fir and various *Pinus* species

Native animals

bar-tailed godwit/kuaka – *Limosa lapponica*
black-billed gull/tarāpuka – *Chroicocephalus bulleri*
brown creeper/pīpipi – *Mohoua novaeseelandiae*
grand skink – *Oligosoma grande*
kāhu/Australasian harrier – *Circus approximans*
kākā – *Nestor meridionalis*
lamprey – *Geotria australis*
long-fin eel – *Anguilla dieffenbachii*
Otago skink – *Oligosoma otagense*
pūtangitangi/paradise shelduck – *Tadorna variegata*
short-fin eel – *Anguilla australis*
South Island robin/kakaruai – *Petroica australis*
Taieri flathead galaxias – *Galaxias depressiceps*
titipounamu/rifleman – *Acanthisitta chloris*
yellow-eye penguins/hoiho – *Megadyptes antipodes*

Stay connected

Get in touch to stay updated or get involved.

027 438 7875 eocatchmentgroup@gmail.com

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visit www.eocg.org.nz for more information

East Otago Catchment Group