

Godley Peaks Station Farm Biodiversity Plan



Scientific Raranga toru taiao Te Ao, Te Wai, Te Moana

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1 Introduction

1.1 Purpose

The Godley Peaks Station Farm Biodiversity Plan (FBP) has been developed to support the farming operation and protect and enhance the indigenous biodiversity values of the property. The FBP will also be utilised in a regulatory context as a positive benefit to support consent applications for development activities proposed by the station.

1.2 Farm Biodiversity Framework

Mackenzie District Council (MDC) District Plan sets out a framework for development of FBPs (see Appendix Y of the District Plan). The Godley Peaks Station FBP closely follows the MDC framework and documents the farming operation, the ecological values of the property and a suite of management measures designed to support and enhance biodiversity values. The framework of the FBP plan is set out below:

- Provides a description of Godley Peaks Station and its environmental attributes.
- Summarises farm management historically, at present and in the future.
- Summarises the known indigenous biodiversity values, ecological risks and a suite of measures to support and enhance the farms biodiversity.
- Sets out monitoring and reporting actions to document the work achieved toward meeting the objectives of the FBP.

1.3 Farm Biodiversity Assessment Methodology

The assessment of indigenous biodiversity on Godley Peaks Station uses existing ecological information available for the Station and similar habitats nearby, along with e3s's ecological and restoration expertise and multiple visits to the site.



Desktop research focused on reviewing existing ecological information from the Godley Peaks Conservation Resources report of 2003 (LINZ, 2003), which includes vegetation, bird, lizards, freshwater fish and entomological surveys completed during 2002 and 2003 by a group of specialists. These surveys covered the Godley Peaks Station pastoral lease area and, in some instances focused on the (larger) area returned to the Crown, rather than areas retained as part of the Station.

e3scientific undertook reconnaissance of the existing vegetation and landforms on the Station on 20th February and 11-12th March 2024. These visits provided the basis of the ecological framework developed for the FBP, describing the habitats and communities present, and identifying potential opportunities for enhancement through restoration and conservation.

This framework draws on knowledge garnered by e3s over more than three decades of working within eastern South Island high country habitat. e3s has advised and managed multiple restoration projects across the eastern South Island high country over the past 10 years and has used this experience to determine the expected plant growth rates, plant species selection, weed and pest control, restoration methodology, management, and monitoring for Godley Peaks Station.

A literature review of other similar indigenous habitats in the Mackenzie district provides context to the ecological assessment undertaken on Godley Peaks Station.

The prehuman vegetation of the Station is inferred from past research and modelling (see Landcare Research, 2018; McGlone, 2004; Leathwick, et al., 2003).



2 Site Description and Farming Operation

2.1 Farm Location and Ownership

Godley Peaks Station is located approximately 15 km north of the Lake Tekapo township at the end of Godley Peaks Road. The Station was formerly part of Godley Peaks Pastoral Lease that covered an area of 14,493 hectares (ha). In 2021, the property owner accepted a Substantive Proposal from the Crown which resulted in the return of 11,883 ha of high country to the Crown for conservation purposes and the remaining 2,676 ha being designated as freehold land. The majority of this freehold land is still held under the land title that covered the pastoral lease. Once tenure review is settled, new titles will be issued. Currently, freehold land associated with the FBP is held under two land titles (Table 1).

Title	Indicative Area (ha)	Legal Description
30B/914	2676	P 17 PT RUN 80 & CROWN LAND BETWEEN CASS & MISTAKE RIVERS COOK GODLEY CASS & TE KAPO NORTH SD CLSD RD MARKED SECS 1 & 2 SO 20292
22K/1055 22K/1056	83.14	RS 28967 35546 PTS 33489 33490 BLKS I II TEKAPO SD BLK XIII GODLEY SD

Table 1: Godley Peaks Land Titles

Figure 1 shows the LINZ designations plan which clearly demarcates the land which has been freeholded through the tenure review process. The freehold land is the subject of the FBP. In addition, an 83 ha parcel of freehold land is part of the farming operation and held under land title 22K/1055 and 22K/1056.

The property is owned by Mr Warren Lewis. Mr Lewis purchased the property in 2024 and resides on the property.





Figure 1: Site Location Plan (the green shade represents the property area)

2.2 Physical Attributes of Godley Peak Station

Figure 2 presents a plan showing the boundary of Godley Peak Station and the layout of the farm including:

- Location of the farm hub; including farm accommodation, sheds and stock yards.
- Land that is cultivated and/or irrigated (intensely developed land).
- Selter belts and stands of plantation forestry
- Area of the farm that has been top dressed and oversown but is not cultivated or irrigated (undeveloped land).
- Waterways that border and traverse the farm.
- Wetlands.

Figure 2 also shows the location of a proposed residential house. This house site is situated in the southwest of the station near the lake terrace escarpment on cultivated land.

Additional infrastructure associated with the station, including existing fencing, is provided in Figure 3.





Figure 2: Godley Peak Station Farm Management Units.



Figure 3: Godley Peak Station fencelines.

2.3 Farming Operation

Godley Peak Station Pastoral Lease was established in mid 1858 and was farmed extensively across 14,493 ha of land. For most of the pastoral leases history the property has operated as an extensive sheep and beef farming operation.

In 2021 Godley Peaks Station accepted a substantive proposal through the tenure review process. This process resulted in a protection of 11,883 hectares as conservation area, 2,676 hectares are designated to be freehold, with 376 hectares subject to a conservation covenant.

2.3.1 Current Operation

Godley Peaks Station has both undeveloped and intensively developed pastoral land which is driven by landform and areas of the farm that can be cultivated and irrigated.

The long cold winter is the limiting factor in terms of productivity. Irrigation capability on the property allows for a relatively high stocking rate through spring to autumn and then maintains that stocking rate through the winter by the Codley Pagks Station Form Biodiversity Plan

provision of supplementary feed in the form of silage and feed crops. In addition, there is approximately 100 tonnes of Barley imported into the system allowing the station to hold the higher stocking rates over the winter spring period.

Stocking of the property currently is 240 Breeding Cows with all progeny taken through the first winter and sold as prime before their second winter. Sheep are made up of 5,000 breeding ewes and 1,250 Hoggets which are predominantly merinos producing fine wool with some half-breeds. All sheep progeny are finished on the property.

2.3.2 Future Activity

In addition to the biodiversity objectives stated in this plan, Godley Peaks Station has two other stated goals for the future:

(i) That Godley Peaks will be able to run as a standalone financial venture after a five-year development period; and(ii) Godley Peaks can operate as, at least, a net carbon zero operation.

To achieve these goals, Godley Peaks Station has employed the services of The AgriBusiness Group (TAG) to prepare a proposal to assist them to develop and carry out a plan to achieve net zero carbon emission.

TAG note that the relatively high stocking rate, driven by the high proportion of irrigation, means that Godley Peaks is atypical of other High-Country stations. This means that achieving net carbon zero status on the property will be a different proposition from achieving it on the more traditionally run stations.

TAG note that the net consumption of energy is currently dominated by the use of diesel and that plans that are currently in place to replace the reliance on fossil fuels with the creation of renewable energy sources will contribute greatly to the goal of achieving net zero carbon emissions.



The path to net zero carbon is quite convoluted, but TAG consider they can be broken up into a number of stages which utilise the break points in terms of the decision making that is required. This is because the range of choices of possible mitigations can be quite large and they can all have a different range of impacts on both the farming system and the financial performance of the property. TAG fully expects that there will be a requirement to test a range of mitigations or mixes of mitigations for both the impact on the system and the finances before a final plan can be chosen. The pathway towards achieving that plan is:

(a) Emissions Budget and a list of possible mitigations.

This stage is designed to create an emissions budget which will be calculated by modelling a future steady state of the farming operation in Overseer and then displaying it in an easy-to-understand format which will provide the owners the ability to determine exactly where their emissions are coming from. This analysis will be broken down into subcategories under the three main emission types of:

- o Methane
- Nitrous Oxide
- Carbon Dioxide

These will also be displayed as emissions per stock unit for each of the major stock types that are on the farm. At the same time the contribution of each of the emissions will be displayed as their contribution to Gross and Net revenue. TAG state this will be carried out in order to offer the owners the opportunity to understand which of their stock types are contributing the most in terms of emissions and financial performance.

Godley Peaks Station has both a development plan and financial budgets for the future steady state that can be used to create this data.

TAG note that a full range of mitigations will be included in this stage with a brief explanation of the manner in which the mitigation works and an estimated cost



of each mitigation. The cost information will be used to create a mitigation cost curve which will be able to demonstrate the relativity of each mitigation.

At the end of this stage the information gathered will be provided in a draft report which will lead a discussion on the next stage where the owners will choose the options which they want to explore in more detail.

(b) Testing the options.

Once Godley Peaks Station have chosen which direction they want to go in, through narrowing down the range of mitigations, a model up to five combinations of possible mitigations (scenarios) in order to evaluate their impact on the total carbon emissions through the use of Overseer and the financial performance through the financial budget of the property. It is proposed that some form of variability within each scenario allows the ability test the impact of changing the proportions of each mitigation. In this way, a full range of implications from the range of possible choices can be presented to Godley Peaks Station.

The results of this scenario testing will be presented in a report which we will come and discuss with Godley Peaks and assist them to choose a preferred pathway towards achieving net zero carbon.

(c) Planning a pathway to net zero.

Once a preferred pathway has been chosen TAG will support Godley Peaks to prepare a pathway towards achieving the objectives. An important element of this support will be establishing a verification system allowing Godley Peaks to be able to make its claim to be net zero carbon with some form of third-party verification (currently Toitu Envirocare is the main verification organisation in New Zealand for this type of operation).



3 Indigenous Biodiversity Values

3.1 Ecological Context

Godley Peaks Station lies at the western end of the 'Mackenzie Basin', the largest intermontane basin east of the Southern Alps. The farm ranges in elevation from approximately 700 m asl at the foreshore of Lake Tekapo to a high point of 1,178m on the moraine bench on the southern slopes of Mistake Peak.

The station straddles the boundary of two ecological districts (ED), Godley and Tekapo (Figure 3). Hill country to the north of the Station lies within the Godley ED and includes the upper slopes of the alluvial fan above the Cass River, the middle reaches of Mistake River and the hillslopes east of Mistake River. This ED includes high mountains and glaciated valleys and is in the rain shadow of the Main Divide (1000-5000mm p/a; McEwen 1987), but with slightly higher rainfall than the rest of the Station. Vegetation was likely affected by infrequent fires spilling over from drier areas to the east (McGlone 2004).

The rest of the Station is located within the Tekapo ED, which includes the relatively dry (600-1600mm p/a rainfall), more recently deposited extensive subdued landforms of moraine and fluvial origin (McEwen 1987). Pre-human vegetation of this district was strongly influenced by a harsh intermontane basin climate and infrequent fires. The vegetation was a mosaic of matagouri (*Discaria toumatou*), small-leaved *Coprosma* and *Olearia* shrubland with short tussockland and mat herbs on the driest areas. Mat turflands and other wetlands occurred in depressions and kettleholes. Areas of mountain toatoa and bog pine shrubland/low forest were probably restricted to lower hillslopes (McEwen 1987, McGlone 2004).

Small natural fires occurred occasionally across the Mackenzie region before human settlement. Grass cover was a dominant component of the intermontane basin floors. Polynesian fires probably suppressed woody vegetation and enhanced the dominance of grass species (Rogers *et al.* 2005).





Figure 4: Ecological Districts.

The arrival of European settlers prompted more frequent burnings and probably a change in the dominance of grass species away from the long-lived snow tussocks with periodic seeding, to smaller grasses (*Poa, Festuca, Rytidosperma,* and *Anthosachne*) with faster growth, high reproduction and good dispersal rates. These traits enable the smaller grasses to establish quickly after disturbance (Rogers *et al.* 2005).

Since the late 1850's, most of the Station has experienced modification with burning and grazing of tussock country, rabbit infestations and the spread of introduced plant weeds.

Today, short tussock grasslands are the most common native vegetation community occurring on the undulating moraine and outwash surfaces. Wetlands with varying composition persist in depressions across this landscape. Tall tussock Godley Peaks Station Farm Biodiversity Plan Document ID: 24027 grassland dominates the hillslopes. Shrublands are regenerating in small gullies on the main hillslopes and on the lake terrace escarpment near Lake Tekapo. The more extensive areas of shrubland are regenerating on steep slopes below Mistake Peak and the steep terrace escarpments above the Mistake River.

Part of the Station was briefly surveyed as part of the Tekapo Ecological District Protected Natural Areas Programme (Espie *et al.* 1984). The study identified three areas as Recommended Areas for Protection including:

- Raupō Lagoon (also known as Rapuwai Lagoon; bird breeding and largest and best area of the few examples of raupō in the Mackenzie Basin)
- Lower Cass River (significant area for bird breeding and feeding); and
- Mick's Lagoon (black stilt/kakī (Himantopus novaezelandiae) breeding area)

All three areas are now protected as Public Conservation Land.

3.1.1 Threatened Environment Classification

The threatened environment classification (TEC) was developed by Manaaki Whenua Landcare Research (MWLR) to support an understanding of New Zealand's biodiversity protection needs. The TEC is based on three nationwide spatial datasets including the Land Environments of New Zealand units (LENZ unit), the Landcover Database and a spatial database of private and public owned land managed for conservation. By combining these spatial layers MWLR categorised land across New Zealand into 6 classes based on the remaining indigenous vegetation cover and their protection status. The TEC is a tool utilised by ecologists to support an assessment of the rarity of indigenous vegetation communities and is a component of the significance assessment criteria set out in Appendix C of Environment Canterbury (ECan) Regional Policy Statement.

Figure 5 shows the TEC overlaid onto Godley Peaks Station. The map shows the following:

- The lower moraine and alluvial outwash surfaces have less than 20% indigenous vegetation cover remaining;
- The lower hillslopes, alluvial fan and upper moraine surfaces have 20-30% indigenous vegetation remaining.
- The upper hillslopes and some steep slopes within the Mistake River catchment has over 30% indigenous vegetation remaining, but with less than 10% of this under formal protection.



In summary, much of Godley Peaks Station lies within an area that has less than 20% indigenous cover remaining. Meaning, indigenous vegetation present within parts of the property may be considered significant indigenous vegetation and subject to rules in the District Plan associated with this classification.



Figure 5: Threatened Environment Classification.

3.1.2 Naturally Uncommon Ecosystems

Naturally uncommon ecosystems contain a disproportionately high number and often unique suite of species. Their rarity means they are often threatened, poorly understood and under-protected (Williams *et al.* 2007, Weeks *et al.* 2013, Wiser *et al.* 2013).

Four of the five major landforms on Godley Peaks Station are considered naturally uncommon ecosystems including alluvial fans, alluvial outwash surfaces, braided riverbeds and moraine surfaces. Similar to the TEC, naturally uncommon ecosystems provide context to the assessment of rarity/distinctiveness significance assessment criteria set out in Appendix C of ECan's Regional Policy Statement.



3.2 Existing Environment

3.2.1 Landforms

The Station can be broadly categorised into five landform units (see Table 2). The spatial arrangement of these landforms are shown in Figure 6. These landforms have been shaped by past glaciation, along with fluvial and alluvial activity. The following sections summarise the physical and biological features of the five landform units.

Landform Units	Elevational Range	Brief Description
	(m dsi)	
Moraine	780-1100m	Rolling, hummocky terrain with a
		series of small ridges and gullies
Alluvial Fan	800m-approx 960m	Conical shape
Riverine	700-approx 800m	Braided rivers, alluvial flats, steep
		slopes, terraces
Hillslopes	800-1200m	Steep slope dissected by small
		creeks
Alluvial Outwash	700-800m	Subdued, hummocky terrain

Table 2: Landforms of Godley Peak Station

3.2.1.1 Moraine

South of Mistake River there is a large hummocky ablation moraine surface sloping south to southwest towards the Cass River. The moraine landform rises from approximately 780 to 1100m elevation (Plate 1).

This distinctive landform is made up of a repetitive pattern of low narrow ridges and small concave gullies, running north-south, formed as the melting glaciers dropped unsorted rock, silt and till. Most ridge crests are bare, with scattered patches of low native cushion vegetation present amongst the fine stone and bare ground. Patches of prostrate shrubland persist on upper slopes, typically on the sheltered, lee side of ridges. Slopes and some gullies are inhabited by short tussock grassland. The naturalness and species diversity of these grasslands varies considerably. Permanent and ephemeral turfland wetlands occur in some gullies. These wetlands are a distinct and contrasting feature of this semi-arid landscape.





Figure 6: Godley Peak Station Landform Units.



Plate 1: The hummocky moraine landform with the Cass River marking the southeast boundary of the Station.

3.2.1.2 Alluvial Fan

West of the moraine, a distinctive southwest facing alluvial fan extends from the Cass River valley floor at approximately 800m to the base of the hillslopes at approximately 960m (Plate 2). This landform is mostly covered by short tussock grasslands.



Plate 2: The alluvial fan is a distinctive landform on the true left of the Cass River.

3.2.1.3 Riverine

There are three major riverine landforms on the Station: the Cass, Godley, and Mistake Rivers. The southern boundary of the Station is defined by the Cass River. The Cass River has one of the highest levels of flood disturbance of all the large, braided rivers in the Waitaki region. This translates into a high proportion of surface gravels and early successional floodplain communities along the Cass riverbed (Woolmore 2011). Surface gravels and stonefield communities transition to herbfield, with mat plants such as scabweed (*Raoulia hookeri*) on more stable alluvial surfaces, or wetland turfland vegetation inhabiting small depressions. Bog rush (*Schoenus pauciflorus*) and Carex species reside in small spring fed channels, with red tussock (*Chionochloa rubra* subsp. *rubra* var. *rubra*) scattered across older surfaces.



The terrain on the northern side of the Cass River is made up of alluvial flats, wetlands, terraces, and steep escarpment slopes. Shrublands inhabit many of the steep slopes with short tussock grasslands and areas of wetland on the terrace tops and alluvial flats. Small creeks dissect the steep slopes with a think band of wetland vegetation near the alluvial flats (Plate 3).



Plate 3: Part of the Cass River riverine system. Looking southeast, with Godley Peaks Station land to the true left of the Cass River, showing the steep slopes covered in shrubland and short tussock grassland, sedgelands (darker green patches) at the base of small creeks, and dry short tussock grasslands on the alluvial flats.

The Mistake River is a distinctive feature of the centre of the Station, carving a narrow valley between the hillslopes and moraine surface. There is a central, narrow valley floor with a complex pattern of braided riverbed, river flats, terraces, and small wetland areas. Steep slopes rise up on either side of the central valley. Short tussock grasslands dominate the river flats with patchy shrubland cover in some places. The steep slopes consist of a mosaic of short and tall tussock grasslands and shrubland, with red tussock in moist areas at the base of some small gullies (Plate 4).

For completion, we note the Godley River is a major river system that borders the former Godley Peak pastoral lease. Godley Peak Station maintains a grazing concession with the Department of Conservation for grazing of some of the river flats and lower hill country. We note this land has not been included in the FBP as it is no longer owned by the station.





Plate 4: Mistake River has the largest and most extensive sequence of natural communities on the Station.

3.2.1.4 Hillslopes

Higher elevation, steep slopes on the Station form the hillslopes landform unit. This landform unit rises from 800 m asl to a moraine bench at approximately 1200 m on the southern slopes of Mistake Peak (Plate 5).

The Mistake River defines the southern edge of this unit. The hillslope landform is mostly covered by tall tussock grassland with shrubland in the small, steep gullies that dissect this landform. Shrubland is more extensive and diverse on the steep slopes at the northern end of this landform. Sedgeland communities occur in two shallow gullies at the southern end of the unit in an area with more gentle terrain.



Plate 5: The higher elevation land inhabited by tall tussock grassland is part of the hillslope landform.

3.2.1.5 Alluvial Outwash

A large area of low-angle, undulating moraine and alluvial outwash extends eastwards from the main moraine landform (approximately 800m asl) to the shores of Lake Tekapo (700m asl). This is the area of the property that has been intensively developed through cultivation and irrigation. Notwithstanding this point the lake face terrace is undeveloped and consists of a mosaic of matagouri shrubland, semi-natural tussock grassland and wetland communities that occur in depressions (Plate 6).



Plate 6: The lower section of the alluvial outwash surface.

3.3 Vegetation and Flora

Broadly, there are seven native vegetation types present on Godley Peaks Station: grasslands, shrublands, cushionfields, wetlands, herbfields, rocky outcrops, and gravel river stonefields. Some have widespread distribution and occur on more than one of the main landform units whereas other vegetation types have a more restricted distribution. Table 3 lists the vegetation communities recorded within the five landform units described in the previous section.

Landform	Vegetation Type
Moraine	Cushionfields
	Fescue short tussock grasslands
	Prostrate shrublands
	Matagouri shrublands
	Rocky outcrops
	Wetlands; including turflands
Alluvial Fan	Fescue short tussock grasslands
Alluvial outwash	Wetlands; including sedgelands, lagoons and turfland
	Matagouri shrublands
	Fescue short tussock grasslands
Hillslopes	Snow tussock grasslands
	Matagouri shrublands
	Species-rich shrublands
	Rocky outcrops
	Wetlands
Riverine	Herbfields
	Fescue short tussock grasslands
	Silver tussock short tussock grassland
	Red tussock grassland
	Matagouri shrublands
	Gravel River Stonefields
	Wetlands; including sedgelands

Table 3: Vegetation communities and their distribution on Godley Peak Station.

3.3.1 Cushionfields

Cushionfields are restricted to the dry, windswept moraine ridge crests on the hummocky moraine landform (Plate 7). The vegetation is prostrate (2-6 cm in height) with patchy cover, scattered across the matrix of fine gravels and till. Rare plant species are a feature of the cushionfields, with tiny Threatened – Nationally Vulnerable *Pimelea sericeovillosa* subsp. *pulvinaris* and At Risk – Declining dwarf broom (*Carmichaelia vexillata*) forming large, scattered patches. Three additional At Risk – Declining species are sometimes present (pin cushion (*Colobanthus brevisepalus*), stout dwarf broom (*Carmichaelia monroi*) and common scabweed (*Raoulia australis*)).

Other plants include turfy coprosma (Coprosma petriei), mat forming Raoulia apicinigra, dwarf mingimingi (Styphelia nesophila), prostrate hebe (Veronica Godley Peaks Station Farm Biodiversity Plan Document ID: 24027

pimeleoides subspecies pimeleoides), the herb Stackhousia minima, along with small grasses Agrostis muelleriana, Rytidosperma pumilum, and Lachnagrostis lyallii.



Plate 7: Cushionfield with patches of prostrate At Risk – Declining dwarf broom (dark green patches) scattered across the stony matrix.

3.3.2 Herbfields

Patches of herbfields are scattered across the stable outwash surfaces in the Cass riverbed. Tatahuna/mat daisy (*Raoulia tenuicaulis*) forms prostrate mats on sandy and fine gravels. Several rare plant species may be present, including: Threatened – Nationally Vulnerable fan-leaved mat daisy (*Raoulia monroi*), trailing bindweed (*Convolulus verecundus*) and *Muehlenbeckia ephedroides*, along with At Risk – Declining dryland button daisy (*Leptinella serrulata*) (LINZ 2021). This community is also present in the Mistake and Godley River catchments.

Herbfields blend into gravelfields on more frequently flooded, less stable areas, and are replaced by sedgelands in moist depressions and by short tussock grasslands in older, well-drained surfaces.



3.3.3 Grasslands

Grasslands are the most widespread native vegetation type on Godley Peaks Station, inhabiting all five landform units. There are four distinct grassland community types present (Plate 8).

3.3.3.1 Fescue short tussock grasslands.

Semi natural fescue short tussock grasslands are the dominant native vegetation community on Godley Peaks Station (Plate 8). It dominates much of the moraine surface and alluvial fan and is present on some river terraces and associated steep slopes. Fescue tussock, also known as hard tussock, (Festuca novae zelandiae) is the dominant emergent species, typically present with very sparse cover. The ground is often dominated by exotic herbs (e.g. mouse ear hawkweed (Pilosella officinale) and grasses (e.g., brown top, sweet vernal) with a few native species present (e.g., Carex breviculmis, dwarf mingimingi (Styphelia nesophila), turfy Coprosma (Coprosma petriei) and the tiny grass Agrostis muelleriana.

The species composition of this community varies considerably over short distances along topographic and moisture gradients across the undulating, hummocky moraine. Grasslands on some moister, south facing slopes have greater fescue tussock cover and include a diverse selection of native inter tussock species. Inter tussock species include blue tussock (Poa Colenso), turf mat daisy (Raoulia subsericea), mat daisy (Raoulia apicinigra), native daphne (Pimelea oreophila), hebe (Veronica pimeleoides subsp. pimeleoides), prostrate snowberry (Gaultheria macrostigma), New Zealand harebell (Wahlenbergia albomarginata), sedges Carex breviculmis and Luzula ulophylla, along with grasses Anthosachne solandri, Rytidosperma pumilum and Lachnagrostis lyallii.

3.3.3.2 Silver tussock short tussock grasslands

Silver tussock grassland with emergent silver tussock (*Poa cita*) occur along fertile margins of small creeks on the steep slopes above the Cass River. This community blends in and out of red tussock grassland and fescue short tussock grassland.





Plate 8: Fescue short tussock grasslands dominate much of the hummocky moraine surface.

3.3.3.3 Snow tussock grasslands

Snow tussock grasslands dominate the steep hillslopes to the north of the Mistake River. This community is dominated by often dense narrow-leaved snow tussock (Chionochloa rigida). Common inter tussock species include low-growing shrubs Acrothamnus colensoi and Coprosma cheesemanii, blue tussock, fescue tussock, browntop (Agrostis capillaris) and sweet vernal (Anthoxanthum odoratum). Matagouri has scattered presence in some places.

3.3.4 Shrublands

Shrublands have widespread but scattered presence across the Station, occurring on four of the landform units. The three main shrubland community types are described below.

3.3.4.1 Prostrate shrublands on the lee slopes of moraine ridges.

Scattered (0.5-1 metre tall) porcupine shrub *(Melicytus alpinus)* forms a patchy 5 to 10 metre band immediately downslope of ridge crests on the moraine surface. This community type typically inhabits lee slopes. Vegetation cover is mostly made up of individual prostrate shrubs scattered across a matrix of open fine gravels.



Matagouri is occasionally present. This community type is restricted to the moraine landform.

3.3.4.2 Matagouri shrublands on steep slopes adjacent to river terraces, the lake shore and in small hillslope gullies.

Matagouri (*Discaria toumatou*) provides the dominant cover in these shrublands. The presence of other species varies with landform type as follows:

- Lake Tekapo foreshore. Matagouri is often the only species in shrubland patches along the slopes adjacent to the Lake Tekapo foreshore (see Plate 6). At Risk Declining desert broom (*Carmichaelia petriei*) and porcupine shrub are a very minor component in a few places. These shrublands are mostly 0.7 to 1.3 metres in height and have patchy, scattered distribution, varying from areas of dense shrubland to scattered shrubs amongst a short tussock grassland matrix.
- Steep slopes adjacent to the Cass River. This community has taller (1.5-3 metres high), often continuous cover. Mingimingi (Coprosma propinqua subsp. propinqua) is common. Other species present include scented tree daisy (Olearia odorata) and introduced sweet briar (Rosa rubiginosa).
- Steep slopes and valley floor of the Mistake River. This mixed shrubland (typically 0.7 to 1.5 metres tall) also includes porcupine shrub, mingimingi, *Olearia bullata* and hedged *Coprosma cheesemanii*, with *Gaultheria crassa* less common (see Plate 4). Alpine hard fern (*Blechnum penna-marina*) can be found on the ground. In places, small-leaved pohuehue (*Muehlenbeckia complexa*) smothers porcupine shrubs. This variant has patchy distribution on protected areas of the valley floor and is more extensive on the steep slopes.
- Shrublands dominated by matagouri and mingimingi occur in small creeks on hillslopes. This variant may inhabit the lower faces of the covenant areas in the Godley, but they were not visited.

3.3.4.3 Species-rich shrublands on the steep hillslope landform.

The shrublands on the hill slopes below Mistake Peak have higher species diversity than shrublands elsewhere on the Station (Plate 9). Matagouri dominates with varying abundances of mingimingi, *Coprosma dumosa*, mountain wineberry



(Aristotelia fruiticosa), At Risk – Declining Coprosma intertexta and tree daisies Olearia bullata and O. odorata (Plate 9). Vines (small-leaved pohuehue and bush lawyer (Rubus schmidelioides) cover shrubs in some places. Silver tussock, frost flat hook grass (Carex punicea), bracken fern (Pteridium esculentum) and prickly shield fern/punui (Polystichum vestitum) have scattered, patchy distribution. These shrublands are regenerating on tussock grasslands and old rubbly, stable scree surfaces. A few scattered emergent mountain tōtara (Podocarpus laetus) individuals suggest that this community is slowly regenerating back to the low stature forest found in pre-human times.



Plate 9: The species-rich shrublands on the eastern slopes of Mistake Peak. Emergent mountain totara (*Podocarpus laetus*) on the right of the photo (yellow green tree) is an indication that low native tree cover is slowly returning to this community.

3.3.5 Gravel Riverbed Stonefields

The gravel riverbed stonefield community occurs in the Cass and Mistake River valleys. This community type includes a mosaic of fine and course gravel with some prostrate vegetation on older, more stable surfaces. This mosaic reflects varying stages of succession, recent flooding patterns and time since the last



flood. Gravel riverbed stonefield transitions to herbfield with mat plants such as *Raoulia hookeri* on more stable alluvial surfaces.

Braided riverbeds are a naturally uncommon ecosystem in New Zealand (Wiser *et al.* 2011). They are characterised by a shifting mosaic of gravel terraces and channels, and variable water flows. Braided riverbeds include a wide range of habitats, from main channels and side braids, with springs and ponds, flanked by adjacent, older alluvial outwash surfaces and terraces. This often micro-scale habitat heterogeneity is reflected by the diversity of plants, birds, fish, and invertebrates residing in this ecosystem. Natural flooding events may spatially rearrange and temporally reset individual floodplain habitats, but at a broad scale, it is a shifting mosaic which ensures representatives of each habitat generally continue to persist long-term (Gray et al. 2006, Gray & Harding 2007).

This dynamic environment provides habitat for specialist flora and fauna. It is an important ecosystem for nesting braided river birds (e.g. black stilt, black-fronted tern/tarapirohe (*Chlidonias albostriatus*), wrybill/ngutu pare (*Anarhynchus frontalis*), banded dotterel/pohowera (*Charadrius bicinctus supsp. bicinctus*), black-billed gull/tarāpuka (Larus bulleri)), lizards and invertebrates.

3.3.6 Rock Outcrops

Small outcrops are present on the hillslope and moraine landform units on small ridge crests (Plate 10).

On the hillslopes, small, exposed rocky ridge crests occur periodically through dominant community types of tall tussock grasslands and species-rich shrublands. Vegetation cover is diverse and generally scattered. The range of species present includes fescue tussock, dwarf mingimingi (*Styphelia nesophila*), naturalised silvery hair grass (*Aira caryophyllea*), slender chickweed (*Stellaria gracilenta*), subshrubs *Helichrysum simpsonii*, Veronica buchananii and prostrate porcupine shrub.

Rock outcrops also occur on some moraine ridge crests. Rocky ridge crests vary from blocky outcrops with larger (>50cm diameter) rocks, to convex ridgelines with stony areas made up of small stones. The latter blends in with the cushionfield community in some places. The species present include porcupine shrub, blue tussock, mat forming *Raoulia apicinigra*, tiny herb *Stackhousia minima*, creeping pohuehue (*Muehlenbeckia axillaris*) and the small grasses *Agrostis muelleriana* and *Rytidosperma pumilum*.





Plate 10: A rocky ridge crest with a few larger rocks and scattered smaller rocks present in the lower area of the moraine.

3.3.7 Wetlands

Wetlands are important for improving water quality, storing carbon, and providing habitat for a wide array of plants and animals. Godley Peaks Station contains a diverse range of wetlands which occur on four of the landform units. There are three main wetland community types. These range from turflands – dominated by minute, rare plants in small, moist depressions – to large areas of open water fringed with pukio and willows (Plate 11Plate 14).

3.3.7.1 Turflands

Turflands occur in small depressions in the hummocky moraine and alluvial outwash surfaces (Plates 12, 13). This community type consists of a low growing turf made up of a diverse assemblage of tiny mat-forming plants. Turflands often contain threatened or uncommon species that are restricted to this environment. Plants within turfland can withstand a wide range of environmental conditions,



from emersion by water to full exposure in extremely windy, hot, dry summers (Johnson & Rogers 2003). However, they can be damaged by trampling by stock, particularly during the wetter months.

On our brief survey we recorded At Risk – Relict Leptinella maniototo, At Risk – Declining Veronica lilliputiana, dwarf bedstraw (Galium perpusillum) and Stackhousia minima. However, based on findings from nearby studies, we anticipate that a much larger selection of plants will be present. This would require careful inspection during Spring.



Plate 11: An example of turfland vegetation in a shallow depression on the moraine surface.



Plate 12: Turfland vegetation in a shallow depression on the lower slopes of the alluvial outwash surface, near Lake Tekapo.

3.3.7.2 Sedgelands

There are several areas of sedgeland on the Station. The composition of species varies between sedgeland sites. Typically, bog rush (Schoenus pauciflorus), naturalised oval sedge (Carex leporina), some smaller sedges (Carex spp.) and soft rush (Juncus effusus) are present and may be dominant in some places.

The small sedgelands scattered along the Cass River flats at the base of the steep slope are inhabited by a range of species including bog rush, oval sedge, silver tussock and several small Carex species.

There are several sedgelands near the outlet of Mistake River which include a mosaic of short and tall vegetation. Creeping herb Gonocarpus micranthus and moss dominate open areas, with raised cushions of the tiny comb sedge (Oreobolus pectinatus) near waterways, and small rush Isolepis aucklandica, dwarf mingimingi and turfy coprosma (Coprosma petriei) on the creek margins. Areas with taller sedges include bog rush, oval sedge, soft rush, Gaudichaud's sedge (Carex gaudichaudiana) and cutty grass/rautahi (Carex coriacea; Plate


13). Patches of shrub species (matagouri, Olearia bullata, mingimingi, Coprosma dumosa) are present in some sedgelands.

There are other areas of sedgeland on the alluvial outwash surface. Threatened – Nationally Critical marsh arrow grass (*Triglochin palustris*) is present in some areas of sedgeland. Introduced jointed rush (*Juncus articulatus*) is a common component of some of these areas (Environment Canterbury 2024). There are also sedgeland areas adjacent to and around the fringe of the lagoons.

Wetlands on the hillslope are dominated by the narrow-leaved snow tussock. These wetlands have greater shrub cover, with hummocks of low growing *Coprosma cheesemanii*, along with scattered *Olearia bullata* and desert broom. Silver tussock is also present. Exotic grasses sweet vernal and brown top are present in some places.

The large 'tussock' forming sedge, pukio (*Carex secta*), forms extensive areas of sedgeland in the lagoons on the alluvial outwash. These are discussed in the next section.



Plate 13: The sedgeland near the outlet of Mistake River is inhabited by bog rush, oval sedge, soft rush, Gaudichaud's sedge and rautahi (cutty grass).



3.3.7.3 Lagoons

There is one lagoon on the Station (Homestead Lagoon) and two on adjoining Public Conservation Land (PCL; Rapuwai and Mick's Lagoons). All three are on the alluvial outwash surface and together provide important habitat for native species. The two lagoons on PCL are briefly discussed as they enhance the local breeding habitat for bird life, and land use activities on the Station can influence the long-term viability of these two wetlands.

There is open water in the centre of Homestead Lagoon with scattered willow trees and patches of pukio around the edge (Plate 14). Raupō (*Typha orientalis*) dominates some sections of the lagoon. Anecdotal evidence suggests that the cover of raupō has increased significantly over the decades (W. Lewis pers. comm.).



Plate 14: Homestead Lagoon showing the open water in the centre with large areas of raupō and scattered willow trees around the edge of the lagoon.

We note that a further two lagoons are situated within (Micks Lagoon) and adjacent (Rapuwai Lagoon) the station. These lagoons are administered by the DOC. These lagoons are not under the control of the Godley Peaks Station,



however, we note they will benefit from measures set out within the FBP. All three lagoons include extensive areas of sedgeland.

3.3.8 Introduced Vegetation Communities

Crack willow

Crack willow (Salix x fragilis) occurs in and around lagoons and wetlands on the alluvial outwash landform. This species has a patchy distribution: along the riverbanks of the Cass River, creek margins of Sutherland Creek through the red tussock area in the Godley River, and near John Scott Lodge.

Conifer Plantation

There are several pine plantations and shelterbelts on the alluvial outwash landform.

Notable Flora 3.4

The rich and diverse flora present on Godley Peaks Station reflects its location at the boundary between the dry, intermontane Mackenzie Basin and the high rainfall, mountainous Southern Alps. The total number of plant species has not been collated, but the plants we observed highlight the special character of the vegetation community types present on the Station and the broad variety of habitats present.

Note that nonvascular (moss and lichen) diversity has not been quantified.

The Mackenzie Basin region has a disproportionately high number of rare and threatened plants, and this is echoed on Godley Peaks Station by the high number of Threatened and At Risk species present, or potentially present (Table 4).

Species	Landform	Community
Threatened - Nationally Critical		
Triglochin palustris	Alluvial Outwash	Sedgeland, Turfland
	Hillslopes	Sedgeland
	Riverine	Sedgeland
Carmichaelia curta ¹	Riverine	Shrubland
Threatened – Nationally Endangered		
Godley Peaks Station Farm Biodiversity Plan		\Diamond

Table 4: Threatened and At-Risk Plant Species on Godley Peaks Station.

Veronica cuppressioides ¹	Alluvial Outwash	Sedgeland
Threatened – Nationally Vulnerable		
Convolulus verecundus ¹	Riverine	Herbfield
Muehlenbeckia ephedroides ¹	Riverine	Herbfield
Pimelea sericeovillosa subspecies pulvinaris	Moraine	Cushionfield
Raoulia monroi1	Riverine	Herbfield
At Risk - Declining		
Anthosachne falcis ¹	Alluvial Fan	STGL
Carex talbotii ¹	Moraine	Turfland
Carex tenuiculmis ¹	Alluvial Outwash	Lagoon, Sedgeland
	Hillslopes	Sedgeland
	Riverine	Red tussock grassland
Carmichaelia curta ¹	Alluvial Outwash	Shrubland
Carmichaelia crassicaulis subspecies crassicaulis	Hillslopes	Tall tussock grassland, Shrubland
	Riverine	STGL, Red TGL
Carmichaelia monroi	Moraine	Cushionfield, STGL
	Alluvial Fan	STGL
	Alluvial Outwash	STGL
Carmichaelia petriei	Alluvial Fan	STGL
	Alluvial Fan	Shrubland
	Hillslopes	Shrubland
	Riverine	Shrubland, Short tussock grassland
Carmichaelia vexillata	Moraine	Cushionfield
Colobanthus brevisepalus	Moraine	Cushionfield
Coprosma intertexta	Hillslopes	Shrubland
	Riverine	Red tussock grassland
Discaria toumatou	Alluvial Outwash	Shrubland
	Moraine	Prostrate shrubland
	Hillslopes	Shrubland, tall tussock grassland
	Riverine	Shrubland
Epilobium angustatum	Moraine	Turfland
Korthalsella clavata ¹	Alluvial Outwash	Shrubland
Leptinella serrulata ¹	Moraine	Cushionfield
	Riverine	Herbfield, short tussock grassland
Raoulia australis ¹	Moraine	Cushionfield
Rytidosperma telmaticum ¹	Alluvial Outwash	Turfland
Veronica lilliputiana	Alluvial Outwash	Turfland



	Moraine	Turfland
At Risk - Relict		
Leptinella maniototo ¹	Alluvial Outwash	Turfland
	Moraine	Turfland
At Risk – Naturally Uncommon		
Montia angustifolia ¹	Alluvial Outwash	Turfland
Data Deficient		
Carex decurtata ¹	Alluvial Outwash	Turfland
	Moraine	Turfland

3.5 Fauna

The information summarised below is derived from the bird, lizard, freshwater fish and insect surveys completed during 2002 and 2003 for the Godley Peaks Conservation Resources Report (LINZ 2003) and only includes species that were recorded within the present footprint of Godley Peaks Station. Additional species have been included where they are known to utilise comparable habitat to that noted onsite and their known distribution encompasses the footprint of Godley Peaks Station.

3.5.1 Avifauna

A total of 32 native bird species were recorded within the current Station boundary during the field surveys for the Godley Peaks Conservation Resources Report. Eleven of these species are threatened with nine species found within wetland and or riverine habitats (LINZ 2003).

The riverine systems provide habitat for a diverse range of bird species. Braided riverbeds are home to several rare species (LINZ, 2003), including: Threatened – Nationally Critical black stilt, Threatened – Nationally Endangered black-fronted tern, Threatened - Nationally Vulnerable Caspian tern (*Hydroprogne caspia*), and grey duck/pārera (*Anas superciliosa*), Threatened – Nationally Increasing wrybill and At Risk – Declining black-billed gull and banded dotterel (LINZ 2003).

Homestead Pond provides habitat for the At Risk – Declining marsh crake/kotoreke (Zapornia pusilla) and the Not Threatened New Zealand scaup/pāpango (Aythya novaeseelandiae) (LINZ 2003).



On public conservation land, within the Station, Mick's Lagoon provides nesting habitat for waterfowl – such as the grey teal/tētē-moroiti (*Anas gracilis*) and New Zealand scaup, along with the marsh crake and the black stilt. Rapuwai Lagoon provides habitat for Threatened – Nationally Critical Australasian bittern/matuku-hūrepo (*Botaurus poiciloptilus*) and banded dotterel. These lagoons also provide feeding habitat for several other unthreatened bird species (LINZ 2003).

We note that the Threatened - Nationally Vulnerable eastern falcon/kārearea (Falco novaeseelandiae subsp. novaeseelandiae) and New Zealand pipit/pīhoihoi (Anthus novaeseelandiae subsp. novaeseelandiae) were observed throughout the station.

3.5.2 Lizards

There is limited information about lizards on the Station. Drier habitats provide good habitat for lizards and enable species to move to and from the adjoining public conservation lands. Important lizard habitat is likely to include the rocky moraine ridge crests, the Cass and Godley River flats, the tussock grassland communities in the Mistake Valley, and the hummocky moraine surfaces. The species-rich shrublands regenerating on old rubbly, stable scree surfaces below Mistake Peak are also likely important habitat for lizards.

The LINZ (2003) report documented two lizard species on the Station, including: the At Risk – Declining southern grass skink (*Oligosoma aff. polychroma Clade 5*) throughout all landforms and the Threatened – Nationally Vulnerable mackenzie skink (*Oligosoma prasinum*) within fescue tussock grasslands on the lower slopes of the alluvial outwash surface near the Lake Tekapo shoreline (LINZ 2003). Additionally, the eroded terraces, riverbed and stream gullies of Mistake River may provide suitable habitat for other At Risk – Declining skink species (e.g. scree skink (*Oligosoma waimatense*) and roamatimati skink (*Oligosoma aff. longipes* "southern")). Additionally, At Risk – Declining Southern Alps gecko (Woodworthia 'Southern Alps) is highly likely to be present in the braided riverbeds (LINZ 2003).

3.5.3 Invertebrates

There is limited information about native insect populations present on the Station. It seems likely that insect diversity will be high, given the diversity of habitats present. Host specificity is common amongst New Zealand insects (Dugdale 1975, Patrick 2000). For example, Patrick (2000) reported high diversity of moth species



living on Olearia shrubs and the lichen and moss species that grow on these shrubs. Olearia odorata was reported to host up to 27 moth species. Many moth species living on Olearia shrubs are specialists, with high host specificity. The presence of Olearia bullata, Olearia cymbifolia and Olearia odorata on the Station indicates some complex insect/plant relationships could be present. In turn, these relationships highlight a need to ensure the full range of native habitats on the Station are maintained and enhanced.

Two threatened grasshopper species are known to be present. At Risk – Declining minute grasshopper (Sigaus minutus) occurs in short tussock grasslands on the alluvial fan (LINZ 2003). Threatened – Nationally Vulnerable central arid alpine grasshopper (Siguas australis 'central arid') has been found on the Cass River delta (Ong & Toft 2023). Several moth species associated with tussock grasslands are present, including red admiral butterfly (Bassaris gonerilla), southern blue butterfly (Zizina oxleyi) and tussock ringlet butterfly (Argyrophenga anitipodum; LINZ 2003).

A diverse range of aquatic insects have been observed in small side streams running into Godley riverbed system (LINZ 2003). Similar diversity might be present in other small streams on the Station. The At Risk - Naturally Uncommon caddisfly *Paroxyethira hintonii* has been observed in the Godley Peaks vicinity.

3.5.4 Freshwater Fish

There are both fast flowing (Mistake River) and still-water freshwater habitats on the Station, which are likely to have different freshwater fish species present. Five different fish species have been recorded with four species (upland bully, koaro, rainbow trout, brown trout) found in a section of Mistake River, where the Canterbury galaxias is expected to be present as well (LINZ 2003).

The Threatened – Nationally Vulnerable upland longjaw galaxias and longfin eel is likely to be present in rivers (LINZ 2003).

Koaro has also been observed in the Cass River (LINZ 2003). The New Zealand Freshwater Fish Database records suggest that common and upland bully, upland jaw galaxias and Canterbury galaxias should also be present in the Cass River.



3.6 Identification of significant indigenous vegetation or significant habitats of indigenous fauna

The FBP requires an assessment of the significant indigenous vegetation or habitats of indigenous fauna. The ECan Regional Policy Statement provides criteria to support a standardised approach to the assessment of 'ecological significance'. This region wide framework uses four criteria (Representativeness, Rarity/Distinctiveness, Diversity & Pattern and Ecological Context) to assist with the consistent assessment of ecological significance of vegetation and habitats. Ecological significance is assessed for the 14 vegetation communities and habitats that are present on Godley Peaks Station.

A habitat is considered 'ecological significant' if it meets one or more of the criteria listed above in the ecological significance framework. The sections below provide details of this assessment and are based on the previous section and Appendix A that collates the ecological information for each landform.

3.6.1 Representativeness

The seven broad vegetation types and their 14 community types are all representative, typical or characteristic of the natural diversity of the Tekapo and Godley ecological districts (Appendix A). The degree of representativeness varies across the communities with tall tussock grasslands and species rich shrublands having a high level of representativeness compared to the induced short tussock grasslands that have expanded their distribution across the moraine, alluvial fan and outwash surfaces. Notwithstanding this point, all indigenous vegetation is characteristic of the natural diversity of the area and therefore is consistent within the representativeness criteria.

3.6.2 Rarity/Distinctiveness

All five landform units have rare and/or distinctive characteristics (Appendix A). The lower section of the moraine and alluvial outwash surfaces lie within an environment that has less than 20% indigenous vegetation cover remaining. All associated indigenous vegetation is therefore considered rare with respect to this assessment criteria. Furthermore, of the five major landforms on Godley Peaks Station, four (i.e., moraine, alluvial fan, alluvial outwash and braided rivers) are listed as originally rare ecosystems (Holdaway *et al.* 2012).



The moraine surface is considered a nationally rare 'Vulnerable' ecosystem (Holdaway *et al.* 2012). There are threatened or at-risk plant and/or animal species in all the vegetation communities present on this landform (Appendix A). At least two of the community types (cushionfields, turflands) are geographically restricted.

Alluvial fans are classified as 'Critically Endangered' nationally rare ecosystem. They have higher representation in the Mackenzie Basin and poor protection nationally (Holdaway et al. 2012). Fescue short tussock grasslands which dominate this landform system include several threatened species.

The riverine system includes nationally 'Endangered' braided riverbeds and 'Critically Endangered' outwash gravels (Holdaway et al. 2012). Braided rivers support a diverse range of native plants and animals that are either unique to this habitat or depend on it for a critical part of their life history (O'Donnell et al. 2016). There are rare, threatened and range restricted species in all five vegetation communities in this landform unit. The herbfields and braided gravel stonefields are classified as, respectively, uncommon 'Critically Endangered' and 'Endangered' communities (Holdaway et al. 2012).

The hillslopes have threatened plant species in all four vegetation communities present. One nationally protected wetland community type is also present.

Alluvial outwash surfaces are classified as 'Critically Endangered' (Holdaway et al. 2012). There are several threatened species in each of three protected wetland communities and in the other two vegetation types in this landform.

There are plant and/or animal species that are threatened or at-risk in all vegetation communities present on the Station (Appendix A). All wetlands are protected in New Zealand, but the three wetland community types on the Station are considered naturally uncommon. Some sedgeland wetlands include areas of naturally uncommon but not threatened cushion bogs. Two remaining uncommon wetland community types are also classified as threatened. Turflands inhabit 'Endangered' seepages and 'Critically Endangered' ephemeral wetlands in depressions in the hummocky moraine and alluvial outwash surfaces. Lagoons are classified as 'Endangered' habitat (Holdaway et al. 2012).



3.6.3 Diversity and Pattern

Four of the five landform types on Godley Peaks Station have significant diversity and pattern (Appendix A. The moraine surfaces include a diverse range of vegetation communities with species composition changing along topographic, drainage and weather exposure gradients. Four of the five vegetation community types on this landform unit also have high plant species diversity. The prostrate shrublands does not have high plant diversity. Cushionfields, rock outcrops and prostrate shrublands likely support high invertebrate and possibly lizard diversity.

The riverine system also contains a diverse range of vegetation community types and habitats, reflecting the marked changes in topography, drainage and successional stage from steep terrace slopes to open braided gravel riverbeds on newly established surfaces. The braided riverbeds are home to a diverse range of fauna (birds, fish, invertebrates, lizards) and plants, many of which are unique to this ecosystem (O'Donnell *at.al.* 2016). The sedgeland and grasslands have high plant diversity.

The hillslopes on the station include a diverse range of vegetation community types with species composition changing along topographic and drainage gradients. All four vegetation communities on this landform type have high biodiversity. The outcrops are likely to have high insect and possibly lizard diversity.

The alluvial outwash surface also includes a wide diversity of vegetation community types, reflecting variation in topography and drainage. The sedgeland and turfland wetland communities also contain high species diversity.

Overall, the alluvial fan was considered not to have significant diversity and pattern. With only fescue short tussock grasslands present on this landform unit, patterns and diversity relating to environmental gradients are minimal.

3.6.4 Ecological Context

All five landform units on Godley Peaks Station are significant with respect to ecological context (Appendix A). These landforms all provide important linkages between high altitude and low altitude habitats, as well as wet and dry habitats, enabling movement of biota across the station and the broader landscape.



The riverine systems and alluvial outwash surfaces provide important breeding habitat for (sometimes rare) birds, freshwater fish, lizards and invertebrates. The two lagoons also provide important breeding habitat.

The hillslopes include the southern-most edge of regenerating totara forests which are unique to the area on the east side of the Southern Alps where there is a natural gap in the native beech forests. These shrublands provide a buffer to the more extensive shrubland communities to the north.

3.6.5 Summary of Significance Assessment

In summary, the indigenous vegetation and habitat situated within undeveloped areas of the property contain at least some values that are consistent with the ECan assessment criteria (Figure 7). All indigenous vegetation present is at least in part representative of the natural diversity of the Tekapo and Godley EDs, and the majority of the indigenous communities are in an environment with less than 20% indigenous vegetation cover remaining, contain rare or threatened species, and are situated within a naturally rare environment.

We note that Figure 7 provides a broad understanding of the spatial distribution of significant indigenous vegetation and habitat. Not all of the mapped area contains indigenous vegetation or habitat. Detailed assessment is required to determine whether development activities may be subject to significant indigenous vegetation and habitat provisions in the District Plan.





Figure 7: Godley Peaks Station – Areas containing significant indigenous vegetation and habitat.

4 Godley Peaks Station Biodiversity Management

4.1 Introduction

The objective of the Godley Peaks Station Biodiversity Plan is to protect and enhance the biodiversity values of the property. The measures designed to achieve this objective include the retirement of some high value areas from grazing, restoration of wetlands through planting and stock exclusion, pest and weed control, and committing to the monitoring of areas with significant ecological values. The biodiversity management is set out below.

4.2 Biodiversity Protection and Enhancement Measures

4.2.1 Retirement from Grazing

The Mistake River catchment and part of the McCabes Block to the north of Godley Peak Station were identified as two areas of the property that can be retired from grazing to protect and enhance biodiversity values.

4.2.1.1 Mistake River Catchment

The upper reaches of the Mistake River catchment within the station boundary has significant biodiversity values, including: shrubland and tall tussock grassland, both of which are representative communities which provide habitat for species such as the New Zealand falcon. Godley Peak Station has committed to removing grazing pressure on this area through the installation of 2.5 km of new fencing that will result in excluding grazing from approximately 70 ha of land. Figure 8 shows the approximate location of the new fencing. Retirement of this land will provide protection to the full suite of communities present from Lake Tekapo to the alpine environment within neighbouring DOC land.

4.2.1.2 McCabes Block

The McCabes Block is situated to the north of the station and borders DOC land. The northern part of the block has experienced strong regeneration and contains a diverse shrubland that is a good representation of the pre-settlement vegetation community. Godley Peaks Station has committed to removing grazing



pressure on this area through the installation of approximately 500 metres of new fencing that will result in retiring approximately 3 ha of land. Figure 8 shows the approximate location of the new fencing.



Figure 8: McCabes Block (left image) and Mistake River catchment (right image) stock exclusion fencing.

4.2.2 Dryland cushionfield/prostrate shrub monitoring

The cushionfield and associated prostrate shrub community located on dry ridges within the moraine is significant indigenous vegetation and is likely to be sensitive to changes in farming practices. Godley Peak Station grazes sheep on the block and there is currently no plan to change the grazing regime of the block. Under the current management it is likely the ecological values that are currently present will remain. Notwithstanding this point, the station commits to the following measures to support these values:

- Liaise with an experienced ecologist should a change of land management be proposed; and
- Complete a baseline survey of the moraine to fully understand the extent of the cushionfield and prostrate shrubland; and



• Monitor by an ecologist of the cushionfield and prostrate shrubland every five years to assess if the management regime is maintaining the diversity and extent of this community.

Further detail regarding the baseline and 5-yearly monitoring is provided in Section 5.3 below.

4.2.3 Restoration Planting

4.2.3.1 Wetlands and Pivot Irrigator

Figure 9 shows a reference plan of where the wetland and pivot irrigator restoration planting will be undertaken. More detailed plans of these wetlands are provided in Appendix B.

Godley Peak Station is in the process of fencing wetlands and proposes a planting programme to assist with the functioning and ecological enhancement of wetlands within the intensively farmed alluvial outwash surface. In addition, the station proposes to plant the perimeter of the irrigation pivots with indigenous species to enhance the biodiversity within the intensively developed outwash surface.

The wetlands are divided into two levels of priority based on proximity to the pivot irrigators. Priority 1 areas are within or adjacent to the irrigated surface and cover an area of approximately 8.6 ha. These areas consist of highly modified sedgelands or riparian margins covered in exotic grasses and are more intensively farmed. Improving the functioning of these wetlands is considered a priority to assist with improved water quality outcomes while also enhancing biodiversity. Priority 2 areas are within wetlands that do not have as great an ecological buffering function or hydrological connection comparatively to Priority 1 locations. Notwithstanding this point, Priority 2 wetlands will enhance wetland function and provide additional biodiversity benefits once restored. Priority 2 areas cover an area of approximately 2.6 ha.

The FBP proposes to plant approximately 25% of these wetlands with clusters of plantings at one metre centres both within the wetlands and on the wetland margins. Based on a planting density of one plant per square metre, approximately 21,475 plants across the five priority 1 wetlands is proposed, with a further 6,625 plants within the priority 2 wetlands. In total 28,100 plants are



proposed across the priority 1 and 2 planting areas. The focus of these plantings will be to improve nutrient cycling, slow the flow of water and increase biodiversity through utilising species that are often no long present. Sedges, rushes and introduced grasses currently dominate the wetlands, but there is a notable absence of shrubland species. We therefore recommend enhancing wetlands and riparian margins with Carex secta, Chionochloa rubra subsp. cuprea (copper tussock), and re-introducing shrubland species such as Coprosma propinqua, Coprosma dumosa, Olearia bullata, Olearia lineata, Halocarpus bidwillii (bog pine) and Austroderia richardii (toetoe).

Planting of the perimeter of the centre pivots is also proposed. The planting would consist of a two metre wide corridor along the length of the perimeter which is approximately 9.2 km long (3, 3.4 and 3.2 kms of plantable length along pivots 1, 2 and 3 respectively). Based on this length of planting approximately 19,2000 plants shall be installed. This proposal will reintroduce shrubland species to the alluvial outwash surface and provide a food source for birds. Plant species to be used on the pivot irrigator planting will include Coprosma propingua, Coprosma dumosa, Coprosma intertexta, Olearia bullata, Olearia lineata, Halocarpus Austroderia richardii bidwillii (bog pine), (toetoe), Phormium tenax (flax/harakeke), Podocarpus laetus (mountain totara), Sophora microphylla (kowhai), Phyllocladus alpinus (mountain celery pine).

4.2.3.2 Lakeface planting

The proposed lakeface planting area is shown in Figure 9. The lake faces contain a mosaic of matagouri shrubland, semi-natural tussock grassland and wetland communities. The shrubland has lost many of the species that were historically present such as kowhai, totara, small-leaved coprosmas and Olearia spp. Godley Peak Station proposes to plant a total of 1000 plants within the lake face matagouri shrubland community to enhance the biodiversity of the lake faces near the proposed house site. The species selected and number of plants per species is provided in Appendix D.

Plantings should be prioritised in area directly adjacent existing stands of vegetation where gaps in the shrubland canopy occur. Where the terrain and existing vegetation allows, plants should be installed at 1 m centres in small groups to allow for optimal performance and coverage. The 1000 plants are proposed to be installed at a rate of 200 per year and be completed by 2030.

4.2.3.3 Planting Specification and Planting Procedures

Specifications for the plant supplier and planting procedures are provided in Appendix C. Importantly, all plants should be eco-sourced as per Heenan *et. al.* (2023): Ecosourcing for resilience in a changing environment, New Zealand Journal of Botany.



Figure 9: Ecological Restoration Planting Reference Plan.

Godley Peaks Station Farm Biodiversity Plan Document ID: 24027

4.2.4 Weed control

Woody weed control is a focus for the station and work to remove crack willow from the property is a priority. Crack willow forms dense monoculture thickets in wetlands and waterways of the property, impacting the natural hydrology and outcompeting indigenous species. Figure 10 shows the current scale of the willow presence within the property. The objective of the willow control programme is to remove all existing mature trees and stands of willow by the year 2030.

Willow control shall be undertaken with a combination of methods. The majority of the control work will be undertaken using the cut and paste method (felling the tree/any growing shoots and applying herbicide to the stump). Where the herbicide poisoning of the trees is not effective and new growth is observed following control work additional rounds of herbicide application to the cambium layer (exposed by either peeling back the layers of bark or drilling into the tree) near the site of growth will be required. Where saplings are present application of a suitable herbicide to the foliage can be used.

We note that willow regrowth in areas of control is likely to occur and will require ongoing monitoring and control. Regrowth will be reported on a biannual basis (as set out in section 5.5)





Figure 10: Willow removal programme.

Wilding conifer control is also a priority for the station with wilding species located within and directly adjacent the property. The areas of high risk are identified as the undeveloped land containing significant vegetation as depicted on Figure 7. All wilding conifers within the areas of significant vegetation will be controlled of wilding species. The current extent of wilding conifers is unconfirmed with scattered seedlings noted as present across hillslopes within the significant natural areas. Where saplings are present these can be removed by hand ensuring all roots are removed. All additional conifer control work should be completed via the cut and paste method detailed above.

Control work of all woody weed species should be completed in spring-summer (September-Feb), when vegetative growth is most vigorous. In addition weed monitoring will inform the control programme by identifying areas in need of control in the future (see Section 5.4 for further detail).

4.3 Pest and Predator Control Work

4.3.1 Pest Control

4.3.1.1 Rabbit Control

Godley Peak Station has an ongoing rabbit control programme to ensure the population is maintained at a low level. This work is fundamental to the operation of the farm and will continue to be funded appropriately by Godley Peak.

Godley Peak Station also runs a commercial hunting business that removes up to 500 Himalayan thar (*Hemitragus jemlahicus*) a year from the property. That can cause significant damage to high alpine vegetation communities and controlling that will be aiding in the maintenance of the existing flora values present.

4.3.2 Predator Control

Godley Peak Station is recognised is recognised as significant habitat for a diverse range of bird species, some of which are highly threatened. Given the significant avifauna values the Te Manahuna Aoraki Project has established a comprehensive trapping network across the property. The existing trapping network is shown in Figure 11.



Figure 11: Godley Peak Station trapping network maintained by the Te Manahuna Aoraki Project.



5 Monitoring and Reporting

5.1 Fencing

Fences installed to exclude stock shall be monitored twice a year to ensure the fences are excluding stock effectively. Any damage or breaches in the fences noted will be rectified shortly thereafter.

5.2 Restoration Planting

All restoration planting areas shall be monitored annually by a suitably qualified ecologist for five years following the completion of each distinguishable planting area and the performance of the plantings recorded. Information on the survival rate, plant health and any maintenance requirements of plants shall be recorded and where losses exceed 20% within the first five years, replacement planting shall be undertaken.

5.3 Ecological Monitoring

The FBP proposes a botanical monitoring programme to assess the populations of threatened plant species in the cushionfield and prostrate shrubland within the moraine landform. The objective of the monitoring is to understand if there is any change to this community in response to environmental conditions (climatic, weed and pest conditions) and/or farm management.

Botanical monitoring will consist of a baseline survey of the moraine surface to record the distribution of cushionfield and prostrate shrubland. These areas will be revisited on a 5-yearly basis and changes recorded. The monitoring will include photo monitoring in addition to establishing quadrats where detailed ecological information including species present and cover shall be recorded. The location and number of quadrats and photo monitoring points will be finalised during the baseline survey. However, the photo monitoring points will require enough points to quantitatively cover the respective differences in vegetation communities and existing changes in topological and ecological gradients. Quadrats shall be 10 x 10 m and positioned within each ecologically distinct vegetation community or landform present taking into account but not limited to variation in elevation,



substrate, and aspect. Each quadrat shall record a minimum of the following information to calculate change over time: average and maximum height of all vegetation strata as well as all dominant species (individual species containing 20% or greater coverage), species present and relative coverage, any browse or notable disturbances.

5.4 Weed Monitoring

Extensive seed sources for both crack willow and wilding conifers are present within and directly adjacent the property. Given both conifer and willow seeds are capable of traveling large distances via wind dispersal ongoing monitoring will be required to inform control efforts within the property boundaries.

Farm managers will monitor woody weed establishment across the property in addition to any other weed species that may be become problematic for both the farm operation and ecological values. All areas mapped as significant indigenous vegetation will need to be monitored for the encroachment of wilding conifer species. Additional areas within critical source areas, wetlands, and creeks will be required to be monitored on a continuous schedule. The areas described above have been compiled and are presented as 'conifer' and 'willow' monitoring zone respectively in Figure 12. Whereby any willows (Salix spp.) wilding conifers (Pinus spp. and *Pseudotsuga menziesii*) or any other wilding or invasive species are present within the monitoring zones (Figure 12) they shall be removed.





Figure 12: Weed monitoring zones.ⁱ

Weed control work undertaken by the station will be monitoring and recorded. The monitoring shall record the total area of willow and wilding conifers treated.

5.5 Objective Assessment of Ecological Performance

To objectively determine if the objectives of the FBP are being met an environmental report will be collated by a suitably qualified ecologist every two years and submitted to Council in December. The report will include the following information:

- The length of fenceline installed and area retired from grazing.
- Number and location of plants installed.
- Any plant maintenance completed.
- Results of 5-yearly monitoring of moraine surface.
- Performance of plantings.



ⁱ Willow management zones include areas of identified wetlands as well as a 10 m buffer either side of any

- Weed control undertaken.
- Pest species and numbers that have been removed killed.



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Appendices



Appendix A: Collated Ecological Information



Summary of main landform units and community types present on Godley Peaks Station. Threatened plant and animal species present and likely to be present based on habitat are listed. 'Ecological significance', determined using Environment Canterbury's four criteria is also given for each landform unit.

	Environment Canterbury Criteria for determining Ecological Significance								
Major Landform Unit	Ecological Values	Representativeness	Rarity/Distinctiveness	Diversity and Pattern	Ecological Context	Community Types	Rare Plant Species*	Rare Animal Species*	Opportunities
Moraine A large area of moraine hill country consisting of rolling, hummocky terrain with shallow ridges and melt-water channels.	A rare ecosystem classified as 'Vulnerable'. Home to a range of rare plants and animals and vegetation communities.	Yes. An excellent example of a moraine surface that is typical of the inland Mackenzie District.	Yes. A rare ecosystem which supports a number of rare plant species and probably animal species, and includes geographically restricted vegetation communities	Yes. Inhabited by a diverse range of indigenous vegetation communities, reflecting the subtle changes along environmental gradients including changes in topography & drainage.	Yes. An important linkage between higher and lower altitude habitats, dry and wet habitats.	 Cushionfields Prostrate shrublands Rock Outcrops 	Carmichaelia monroi (At Risk - Declining) Carmichaelia vexillata (At Risk - Declining) Colobanthus brevisepalus (At Risk - Declining) Pimelea sericeovillosa subspecies pulvinaris (Threatened - Nationally Vulnerable) Raoulia australis (At Risk -Declining) Probably: Leptinella serrulata (At Risk Declining) ^a Discaria toumatou (At Risk - Declining)	Probably: Lizards, insects	Managed grazing to reduce browse and trampling. Fencing areas of high threatened plants/possible retirement of some high value areas. Detailed ecological survey including lizards in Spring to characterise botanical values and distribution. Long term monitoring. Consider conservation covenants. Pest and weed control.
						 4. Short tussock grasslands 5. Wetlands - turflands** 	Carmichaelia monroi (At Risk - Declining) <u>Probably</u> : Carex talbotii (At Risk Declining)*** Epilobium angustatum (At Risk Declining)*** Carex decurtata (Data Deficient) Leptinella maniototo (At Risk - Relict) Veronica lilliputiana (At Risk - Declining)		
Alluvial Fan . A distinctive conical shaped fan draining into the Cass River.	A 'Critically Endangered' rare ecosystem. Higher representation in Mackenzie Basin and poor protection nationally.	Yes. Highly representative of alluvial fans in the Mackenzie District.	Yes. A rare ecosystem which supports at least one rare plant species and probably several animal species	No. Likely to be only one vegetation community present	Yes. An important linkage between higher and lower altitude habitats, dry and wet habitats.	1. Short tussock grasslands	Carmichaelia petriei (At Risk - Declining) <u>Probably</u> : Anthosachne falcis (At Risk - Declining) Carmichaelia monroi (At Risk - Declining)	Minute Grasshopper Sigaus minutus (At Risk - Declining)	Managed grazing to reduce browse and trampling. Detailed ecological survey including lizards in Spring to characterise botanical values and distribution. Long term monitoring. Pest and weed control.
Riverine. Two areas: lower Mistake valley and the western side of the Cass River, made up of steep slopes, small terraces and the valley floor.	Made up of two rare ecosystems: 'Endangered' braided river beds and 'Critically Endangered' outwash gravels. Full complement of landforms includes small	Yes. Excellent examples of braided river beds and associated land surfaces that are typical of the inland Mackenzie district and the Canterbury high country.	Yes. Includes two rare ecosystems which support a range of rare plant and animal species and rare wetland communities.	Yes. Inhabited by a diverse range of indigenous vegetation communities, reflecting marked changes along environmental gradients such as topography and drainage.	Yes. Important corridor for movement of biota from from the high country to lake shore. Important breeding habitat for rare bird species.	 Herbfields** Shrublands 	Probably: Convolulus verecundus (Threatened - Nationally Vulnerable)**** Muehlenbeckia ephedroides (Threatened - Nationally Vulnerable)**** Raoulia monroi (Threatened - Nationally Vulnerable)**** Leptinella serrulata (At Risk Declining) ^a Carmichaelia petriei (At Risk - Declining)	Probably: Southern alps gecko (Woodworthia "Southern Alps"; At Risk - Declining)	Retirement. Detailed ecological survey including lizards and freshwater fish in Spring to characterise values and distribution. Long term monitoring. Pest and weed control. Remove willows along river and plant with kowhai and shrubs (mingimingi (Coprosma propinqua), Coprosma dumosa, Olearia bullata, & scented tree daisy (Olearia odorata)).
	terraces, steep slopes, plains and braided rivers.					3. Short tussock grasslands	Discaria toumatou (At Risk - Declining) <u>Probably</u> : Carmichaelia curta (Threatened - Nationally Critical) Carmichaelia petriei (At Risk - Declining) Carmichaelia crassicaulis subspecies crassicaulis (At Risk - Declining)		

	-		Γ		Γ	I		1	1
							Probably:		
							Leptinella serrulata (At Risk Declining) ^a		_
						4. Red tussock	Coprosma intertexta (At Risk - Declining)		
						grasslands	Probably:		
							Carex tenuiculmis (At Risk - Declining) ^a		4
						5. Wetlands -	Carmichaelia crassicaulis subspecies crassicaulis		
						sedgelands**	(At Risk - Declining)		
							Triglochin palustris (Threatened - Nationally Critical)		
							aa		-
						6. Braided gravel		Banded dotterill (At Risk - Declining)	
						stonefields**		Black billed gull (At Risk - Declining)	
								Black fronted tern (Threatened - Nationally	
								Endangered)	
								Black stilt (Threatened - Nationally Critical)	
								Caddisfly (Paroxyethira hintoni; Naturally	
								Uncommon)	
								Caspian tern (Threatened - Nationally Vulnerable)	
								Wrybill (Threatened - Nationally Increasing)	
								Grey duck (Threatened - Nationally Vulnerable)	
								Probably:	
								upland longjaw galaxis (Threatened - Nationally	
								Southern alps gecko (Woodworthia "Southern Alps";	
								Af Risk - Declining)	
								<u>Possibly</u> .	
								Vationally Vulnerable)	
Hillslopes. Steep		Yes. Excellent	Yes. Supports a number	Yes. Inhabited by a	Yes . An important	1. Shrublands	Carmichaelia petriei (At Risk - Declinina)		Fence the wetland areas.
hillslopes	nationally rare	examples of	of rare plant species and	diverse range of	linkage between high		Coprosma intertexta (At Risk - Declining)		Predator and weed control.
dissected by small	, wetlands and	montane hillslopes	probably animal species,	indigenous	and low altitude		Discaria toumatou (At Risk - Declining)		
creeks.	several rare	that are typical of the	and a rare vegetation	vegetation	habitats and dry and		Probably:		
	plant species	inland Mackenzie	community (wetland).	communities,	wet habitats. Provide		Carmichaelia crassicaulis subspecies crassicaulis		
		district .		reflecting the	a buffer and includes		(At Risk - Declining)		
				changes along	the eastern-most		Veronica cupressoides (Threatened - Nationally		
				environmental	edge of regenerating		Endangered)		
				gradients such as	totara forests which	2. Tall tussock	Discaria toumatou (At Risk - Declining)		
				topography and in	are the unique gap in	grasslands	Probably:		
				drainage.	native beech forests		Carmichaelia crassicaulis subspecies crassicaulis		
					on the east side of		(At Risk - Declining)		-
					the Southern Alps.	3. Wetlands -	Triglochin palustris (Threatened - Nationally Critical)		
						sedgelands**	aa		
							Probably:		
						4. Rock Outcrops	Carex tenuiculmis (At Risk - Declining)		4
		Vee Turbing of all			Vee Inconstruct	1 Short to	Probably		
Alluvial Outwash.	Includes two		of rare plant species and	diverse range of	linkages from the	araslands	Carmichaelia monroi (At Pick Declining)	Muckenzie skirk (miedienea - Nationally	rending areas/renirement of some high value
Includes subdued	nationally					grassianas			
Includes subdued,	nationally	the Mackenzie	probably animal species and	indigenous	high country to lake	2 Shrublands	Carmichaelia petriei (At Pick Doclining)		Long term monitoring
Includes subdued, undulating glacial	nationally endangered	the Mackenzie	probably animal species,	indigenous vegetation	high country to lake	2. Shrublands	Carmichaelia petriei (At Risk - Declining)		Long term monitoring. Restoration planting along lakeshore with pative
Includes subdued, undulating glacial moraine and low- angle alluvial	nationally endangered ecosystems, including	the Mackenzie District.	probably animal species and and two rare wetland communities	indigenous vegetation communities and	high country to lake shore. Includes important breeding	2. Shrublands	Carmichaelia petriei (At Risk - Declining) Discaria toumatou (At Risk - Declining) Probably:		Long term monitoring. Restoration planting along lakeshore with native shrubs (matagouri, mingimingi) and tussocks (bard
Includes subdued, undulating glacial moraine and low- angle alluvial outwash surfaces	nationally endangered ecosystems, including 'Critically	the Mackenzie District.	probably animal species and and two rare wetland communities.	indigenous vegetation communities and habitats for native	high country to lake shore. Includes important breeding habitat for rare native	2. Shrublands	Carmichaelia petriei (At Risk - Declining) Discaria toumatou (At Risk - Declining) <u>Probably</u> : Carmichaelia curta (Threatened - Nationally		Long term monitoring. Restoration planting along lakeshore with native shrubs (matagouri, mingimingi) and tussocks (hard tussock).
Includes subdued, undulating glacial moraine and low- angle alluvial outwash surfaces with swamps and	nationally endangered ecosystems, including 'Critically Endangered'	the Mackenzie District.	probably animal species and and two rare wetland communities.	indigenous vegetation communities and habitats for native fauna, reflecting	high country to lake shore. Includes important breeding habitat for rare native bird species and	2. Shrublands	Carmichaelia petriei (At Risk - Declining) Discaria toumatou (At Risk - Declining) <u>Probably</u> : Carmichaelia curta (Threatened - Nationally Critical)		Long term monitoring. Restoration planting along lakeshore with native shrubs (matagouri, mingimingi) and tussocks (hard tussock). Restoration planting around Lagoon with native

	surfaces and	env	rironmental	3. Wetlands -	Leptinella maniototo (At Risk - Relict)		Pest and weed control.
	wetlands.	grad	dients such as	turflands**	Triglochin palustris (Threatened - Nationally Critical)		
		top	ography and		αα		
		drai	inage.		Veronica lilliputiana (At Risk - Declining)		
					Probably:		
					Montia angustifolia (At Risk - Naturally Uncommon)		
					aaa		
					Rytidosperma telmaticum (At Risk - Declining) ^{aaa}		
					Carex decurtata (Data Deficient)		
				4. Wetlands -	Triglochin palustris (Threatened - Nationally Critical)		
				sedgelands**	aa		
					Probably:		
					Carex tenuiculmis (At Risk - Declining)		
				5. Wetland -	Probably:	Australasian bittern (Threatened - Nationally Critical)	
				Lagoon, open	Carex tenuiculmis (At Risk - Declining)	Grey duck (Threatened - Nationally Vulnerable)	
				water**		Longfin eel (Anguilla dieffenbachii) (At Risk -	
						Declining)	
						Marsh crake (At Risk - Declining)	
Throughout the						Black shag (At Risk - Relict)	
Station						Eastern Falcon (At Risk - Recovering)	
						Southern grass skink (Oligosoma aff. polychroma	
						Clade 5) At Risk - Declining	

* Unless stated the data is based on e3s visits in 2024 or from Godley Conservation Resources Report (LINZ 2003).

** Identified as or include a "rare ecosystems", which, individually, account for <0.5% of New Zealand's total area. These ecosystems often have highly specialised and diverse flora and fauna characterised by endemic and nationally rare species (Williams et al. 2007, Wiser et al. 2013).

**** Tenure review of Godley Peaks Pastoral Lease - Substantive Proposal 2021.

^a Mt Gerald Conservation Resources Report 2006.

aa Environment Canterbury 2024.

aaa local INaturalist records

Appendix B: Detailed Wetland restoration planting plans.





Pivot Irrigation Perimeter Planting

25 50 75 100 m





Pivot Irrigation Perimeter Planting

ALL ALLEL - SULLY & ALMAN A

0 25 50 75 100 m







Site 1: Wetland Priority 1

18-2 J. A.M.



0

50

75

1

Ser.














Site 6: Wetland Priority 2

50

75

25

0

100 m

A TANK





Site 7: Wetland Priority 2

10.

Appendix C: Plant Supply Specifications and Planting Procedure

Plant Supply Specifications

Specific requirements for plant supply are outlined below:

1. All plants supplied will be true to the type specified in the Plant Schedule in Section 4.2.3 and Appendix B.

- 2. All plants supplied must be free from animal and plant pests, weeds, diseases, and physical defects.
- 3. All plants must be grown in a suitable, disease-free potting medium.
- 4. The grey shrubland species will be of a bushy robust size and shape, with T28 or Lannen 35 being the preferred grades. The root:shoot ratio (ex nursery) will be 1:1-1:2 with a stem diameter minimum of 3 mm.
- 5. All plants will have well-formed roots, but not be root bound and plants should be able to support the container's weight if held by its stem.
- 6. Preferred that all plant seed stock is eco-sourced according to the guidance in Heenan et al (2023): Ecosourcing for resilience in a changing environment, New Zealand Journal of Botany.
- 7. Nurseries must be able to provide evidence of source of stock, if requested.
- 8. Plants will be hardened to climatic conditions similar to that of the Whakatipu area, exposed to full sun and dry conditions prior to leaving the nursery. Hardening off plants on site may be possible if planned in advance. Any plants stored must be in a rabbit-proof area with irrigation available.
- 9. The planting stock will be checked for quality on arrival to ensure they are in good condition. Roots should be moist and seedlings of an even size.

Planting specifications

- 1. The planting operation is to take place soon after the trees arrive so the plants don't undergo any unnecessary stress. Any plants stored must be in a rabbit-proof area with irrigation available.
- 2. Ensure plants are watered and root ball is saturated when planted.
- 3. Keep plants away from direct sunlight until required for planting, keep plants out of the sun during the planting.
- 4. Plants shall not be laid out on the ground prior to planting. Management of plant material prior to planting shall be agreed with planting manager in advance to minimise moisture loss and ensure planting plan is met.
- 5. Drill or dig holes twice the diameter of the root plug and deeper than the depth of potting mix on plants in the middle of sprayed spots.
- 6. Remove plant from container while holding plant over hole. Minimise root disturbance and loss of potting material, gently loosen roots at bottom of plant if root growth becoming constricted, carefully place plant in hole and ensure that top of potting mix is below ground level, scrape excavated soils and stones into area around plant stem, gently compact replaced soil and stones.
- Plants when planted should be erect, stable in the hole, and in a hollow 7-10cm deep to catch water as per below diagram.



Appendix D: Proposed Planting Mix and Numbers.

	Wetlands Restoration										Lake	
Site	Priority 1					Priority 2		Central Pivot Perimeters			face	Total
	1	2	3	4	5	6	7	1	2	3	Planting	
Approx. area (m²)	9,200	8,900	17,500	19,300	31000	13,900	12,600	6,000	6,800	6,400	82,400	21,4000
Carex secta	690	670	1,310	1,450	2,330	1,040	950					8,440
Chionochloa rubra subsp. cuprea	690	670	1,310	1,450	2,330	1,040	950					8,440
Coprosma dumosa	115	110	220	240	390	170	160					1,405
Coprosma propinqua	230	220	440	480	780	350	320	300	340	320	50	3,830
Olearia bullata	115	110	220	240	380	170	160	300	340	320		2,355
Olearia lineata	115	110	220	240	380	170	160	600	680	640	100	3,415
Halocarpus bidwillii	115	110	220	240	380	170	160	600	680	640	50	3,365
Austroderia richardii	230	220	440	485	780	365	290	300	340	320		3,770
Coprosma intertexta								300	340	320	50	1,010
Podocarpus laetus								600	680	640	200	2,120
Sophora microphylla								300	340	320	200	1,160
Phyllocladus alpinus								600	680	640	100	2,020
Veronica cupressoides								300	340	320	50	1,010
Carmichalia petriei								300	340	320	100	1,060
Ozothamnus leptophyllus								600	680	640	50	1,970
Discaria toumatou								600	680	640		1,920
Corokia cotoneaster								300	340	320	50	1,010
Total number of plants	2,300	2,220	4,380	4,825	7,750	3,475	3,150	6,000	6,800	6,400	1,000	48,300