

**IN THE ENVIRONMENT COURT
AT CHRISTCHURCH**

IN THE MATTER OF the Resource Management Act 1991

And

IN THE MATTER OF appeals under clause 14 of the first schedule to the Act

BETWEEN FEDERATED FARMERS OF NEW ZEALAND
(INCORPORATED) MACKENZIE BRANCH
ENV-CHC-2009-000193

MOUNT GERALD STATION LIMITED
ENV-CHC-2009-000181

MACKENZIE PROPERTIES LIMITED
ENV-CHC-2009-000-183

MERIDIAN ENERGY LIMITED & GENESIS LIMITED
ENV-CHC-2009-000184

THE WOLDS STATION LIMITED
ENV-CHC-2009-000187

FOUNTAIN BLUE LIMITED & OTHERS
ENV-CHC-2009-000190

R, R AND S PRESTON & RHOBOROUGH DOWNS
LIMITED
ENV-CHC-2009-000191

HALDON STATION
ENV-CHC-2009-000192

Appellants

AND **MACKENZIE DISTRICT COUNCIL**
Respondent

STATEMENT OF EVIDENCE OF DEAN CALDER NELSON
On behalf of DIRECTOR-GENERAL OF CONSERVATION
DATED 9 September 2016

Department of Conservation
Private Bag 4715, Christchurch 8011

Solicitor: Susan Newell
Tel: 03 371 3783;
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1. INTRODUCTION

- 1.1 My name is Dean Calder Nelson. I hold the position of Senior Ranger for Biodiversity Assets at the Department of Conservation (DOC) in Twizel. I have been in this position since December 2015.
- 1.2 I have worked at the Department of Conservation since it was established in 1987. Prior to that I worked in Lands and Survey as a National Park Ranger. Throughout my career I have specialised in threatened species management since 1990.
- 1.3 I worked at Aoraki/ Mount Cook from 1983 to 1990, and have worked from DOC's Twizel base since 2004.
- 1.4 I hold a Diploma in Parks and Recreation Management (with Distinction) from Lincoln University (1982) and a post-graduate Diploma in Wildlife Management (with Distinction) from Otago University (1999).
- 1.5 In my current role I am the local technical specialist for threatened species. I provide strategic advice and support to DOC's district leadership team, and I specify and plan tasks for ranger staff working on threatened species management.
- 1.6 I plan the annual budget for threatened species management in the Twizel operational district (which includes the Mackenzie Basin subzone), and I monitor and report on spending and outcomes from the work undertaken.
- 1.7 I am a contact person for DOC when we need to liaise with other groups and organisations doing threatened species work and pest control work. Examples include working with researchers from universities and Landcare Research, and with community groups undertaking pest control and ecosystem restoration projects. I also liaise with local and regional council staff on joint projects.
- 1.8 I am presenting this evidence for the Director-General of Conservation in relation to Plan Change 13 to the Mackenzie District Plan ("plan"). In my evidence I describe DOC's involvement in the Mackenzie District and discuss the work which is relevant to the subject matter of the plan change.

2. CODE OF CONDUCT

- 2.1 I confirm that I have read the code of conduct for expert witnesses as contained in the Environment Court's Practice Note 2014. I have complied with the practice note when preparing my written statement of evidence, and will do so when I give oral evidence before the Court.
- 2.2 The data, information, facts and assumptions I have considered in forming my opinions are set out in my evidence to follow. The reasons for the opinions expressed are also set out in the evidence to follow.
- 2.3 Unless I state otherwise, this evidence is within my sphere of expertise and I have not omitted to consider material facts known to me that might alter or detract from the opinions that I express.

3. SCOPE

- 3.1 I have been asked to provide evidence in relation to DOC's role in ecosystems and threatened species management as it relates to Plan Change 13.
- 3.2 I have reviewed the "PC13 section 293 package", the evidence of Nicholas Head, Keith Briden and Vivienne Smith and the evidence prepared for the appellants and Mackenzie District Council.

4. DOC OPERATIONAL DISTRICTS IN THE MACKENZIE BASIN

- 4.1 There are two DOC operational districts in the Mackenzie Basin subzone. Aoraki/Mount Cook National Park functions as a distinct operational unit, and as one of New Zealand's premiere tourist destinations with an estimated annual visitation of 500,000 plus people. DOC's key focus there is on servicing and ensuring the safety of these visitors and developing and maintaining recreational facilities.
- 4.2 DOC's Twizel District covers a part of the South Island High Country from Aoraki/Mount Cook National Park and the Main Divide, east to the Two Thumb Range and Hunter Hills. The southern boundary follows the St Mary and the Hawkdun Ranges through to the Lindis Pass and the Ahuriri River.

- 4.3 The total area of public conservation land managed from the Twizel office is 295,690 ha and this includes two Conservation Parks (Ahuriri and Ruataniwha) plus parts of two others (Oteake and Te Kahui Kaupeka).
- 4.4 Management of biodiversity issues are a significant focus for the Twizel staff including management of the kaki/black stilt, Project River Recovery (braided river and wetland project), the many threatened plants and other wildlife species in the area, plant pests including wilding trees and animal pests including rabbits, possums, tahr, wallabies and pigs.
- 4.5 There has been a strong growth in recreational use and concessions in the District as a result of tenure review outcomes and the increase in tourism. The Te Araroa Trail has been linked through the whole area, and the Alps to Ocean Cycle Trail is becoming popular. It is anticipated these projects will also increase the focus on the opportunities in the area.

5. MANAGING FOR OUTCOMES FRAMWORK

- 5.1 Mr Head has described the New Zealand threat classification system in his evidence. From my perspective, when planning technical and operational work, it is a key management tool because it enables an organism's threat category to be used to help prioritise management.
- 5.2 As a Government agency, DOC is required to operate in a "managing for outcomes" framework. That framework puts DOC's focus on the outcomes it seeks to achieve (the results) rather than outputs (or tasks).
- 5.3 DOC's intermediate outcome for natural heritage is that "the diversity of our natural heritage is maintained and restored". This intermediate outcome is supported by six specific objectives which clarify what needs to happen to achieve the intermediate outcome. The objectives are:
- (a) A full range of New Zealand's ecosystems is conserved to a healthy functioning state (1.1)
 - (b) Nationally threatened species are conserved to ensure persistence (1.2)
 - (c) Nationally iconic natural features are maintained or restored (1.3)
 - (d) Nationally iconic species are managed to ensure their populations are maintained or restored (1.4)

- (e) Locally treasured natural heritage is maintained or restored as partnerships (1.5)
 - (f) Public conservation lands, waters and species are held for now and future generations (1.6)
- 5.4 DOC has developed methods for identifying the most cost-effective projects to undertake within the natural heritage objectives and is re-shaping its natural heritage work programmes to align with these identified priorities.
- 5.5 Under objective 1.1 - *A full range of New Zealand's ecosystems is conserved to a healthy functioning state* – Ecosystem management is prioritised using a candidate set of around 1000 ecosystem management units (EMUs) throughout New Zealand, that range in size from less than one hectare to over 50,000 hectares with an average size of just over 3400 hectares. A map showing the locations of some of the EMUs in the Mackenzie Basin is **Attachment A** to my evidence.
- 5.6 Wherever possible, EMUs are identified where they will contain sequences of related ecosystems, often with catchment-defined boundaries. However, particularly in New Zealand's lowland ecosystems, only small fragments of indigenous ecosystems remain, and management of extensive sites is not possible.
- 5.7 EMUs were identified using information from a range of sources, including expert identification of high quality examples of particular ecosystems, previously identified sites of high ecological value, and sites that were already being intensively managed including mainland islands. The current set of EMUs contains a full range of New Zealand's terrestrial and freshwater ecosystems; they include offshore islands, coastal turfs, lowland to montane forests, tussock grasslands, wetlands, lakes and rivers.
- 5.8 EMUs are predominantly located on public conservation land, which facilitates the straight-forward implementation of management. However, some EMUs apply on land of other tenure, either because that land contains ecosystems that are not represented adequately on public conservation land, or because the EMUs are being managed intensively by other agencies.
- 5.9 Management prescriptions for EMUs are developed by DOC's operational staff. The management prescriptions specify the actions (and their costs)

required to manage the ecosystems in each EMU. Management of EMUs generally aims to address all significant threats to the broad composition, structure and function of the ecosystem in each EMU, while recognising that it is not currently feasible to manage some threats (such as mice in forests), when they are present across large areas.

- 5.10 Information about the distributions of ecosystems, along with the costs and differences made by management, is analysed using spatial prioritisation software (Zonation). Information about the distributions of threatened species is included with a low weight to favour the selection of sites where threatened species will benefit from management. The ranking process used for identifying EMUs also takes account of existing gains from management, recognising that maintaining sites that are already in good condition is generally more cost effective than initiating work at new sites.
- 5.11 The final rankings sort EMUs into an order that maximises the representation of ecosystems in a cost-effective manner, given any level of expenditure on management actions.
- 5.12 There are some exceptions. For example, there are some threatened species that have distributions outside of existing EMUs, for which DOC has specific management prescriptions. There is still some work going on to determine how to prioritize threatened species' management outside of EMUs
- 5.13 Under objective 1.6 - *Public conservation lands, waters and species are held for now and future generations* – high priority plant and animal threats are managed on public conservation land or where they pose a risk to public conservation land or key threatened species. Also under this objective, high priority threatened species that fall outside EMUs and species management units are managed whether they are on public conservation land or other land.
- 5.14 The ecosystems, threatened species and public conservation land to which Objectives 1.1, 1.2 and 1.6 apply are collectively referred to for DOC's operational purposes as biodiversity management units (BMUs).

6. OBJECTIVE 1.1 BMUS

- 6.1 In the Mackenzie Basin subzone of the Mackenzie District, ten Objective 1.1 BMUs have been identified. These BMU's range in size from 8.46

hectares associated with a small ephemeral lake to an area of 30790 hectares on the glacial outwash fans between Lakes Pukaki and Tekapo.

- 6.2 Within the ten BMUs, some of the key ecosystems in terms of area that are being protected as some of the best representative examples of their type left in New Zealand include: Hard tussock, scabweed gravelfield/stonefield; short tussock grassland; red tussockland; Hall's totara, mountain toatoa, broadleaf forest; screes/gravelfield; kanuka, Olearia scrub/treeland; ephemeral wetland, herbfield; Oreobolus cushionfield and a variety of braided and glacial influenced rivers and associated tributaries.
- 6.3 Of the ten BMUs identified, prescription management actions are currently being undertaken on five of them by DOC or other agencies. The reason work is being undertaken on those five BMUs is that they have historically been managed for threatened species such as kaki/black stilt (*Himantopus novaezelandiae*) and they have existing resources allocated to them, or because management prescriptions are relatively easy to achieve.
- 6.4 In a further three of the BMUs only parts of the site are being worked on because only a portion of the BMU is on public conservation land. Management actions within the remaining two BMUs have not been initiated due to them not being on public conservation land and also due to a lack of resources.

There is only one formal species management unit in the area. Situated on the shore of Lake Tekapo, it is designed to maintain a population of the nationally critical threatened plant *Chenopodium detestans*.

7. OBJECTIVE 1.6 BMUS

- 7.1 There are three Objective 1.6 BMUs (*Public conservation lands, waters and species are held for now and future generations*) that lie within the Mackenzie basin sub zone. They are:
- (a) part of Aoraki/Mt Cook National Park;
 - (b) all other priority plant and animal threat work and threatened species management in the Mackenzie Basin; and
 - (c) all work undertaken as part of Project River Recovery that falls outside of the operational BMUs mentioned above.

- 7.2 Project River Recovery (PRR) is a DOC programme that is funded by Meridian Energy and Genesis Energy under a compensatory agreement that recognises the adverse effects of hydroelectric power development on the area's rivers and wetlands.
- 7.3 PRR aims to maintain and enhance river and wetland habitats, ecological communities and populations of indigenous animals and plants that use these habitats in the upper Waitaki Basin. A priority continues to be the prevention of weed invasion of the relatively pristine 'upper rivers' above the hydro lakes and the key to achieving this is a close working relationship with stakeholders including landholders, Land Information New Zealand and Environment Canterbury.
- 7.4 Threatened species management includes a long term programme of intensive predator trapping and rabbit control in a one km radius around a black-fronted tern (*Chlidonias albostrigata* – nationally endangered) colony in the upper Ohau River, walkthrough riverbed bird counts in major braided catchments, threatened plant monitoring at a number of riverbed sites, financial input into the Tasman BMU mentioned in paragraph 7.7 and water level management to suit bird feeding requirements in the Ruataniwha and Waterwheel wetlands.
- 7.5 Wetland management and enhancement includes fence maintenance and weed control.
- 7.6 An example of a BMU in which the prescription actions are only undertaken on PCL is the Lake Tekapo Moraine Tarns unit. It includes land in the Tekapo Scientific Reserve (on Public Conservation Land), which Mr Head has referred to in his evidence, and on adjacent pastoral lease land which is farmed.
- 7.7 The main conservation management actions in the Tekapo Scientific Reserve revolve around maintaining rabbits in very low numbers and some weed control. The aim is to allow the native vegetation on this extensive area of glacial outwash fan to recover from an extremely depleted state that it was in, which reflected the land's history of grazing and high rabbit numbers. Rabbit numbers are kept to very low numbers by regular maintenance of the rabbit proof fence and monthly night shooting.
- 7.8 Another BMU with more complex management actions is in the Tasman River. It is representative of braided river ecosystems which include glacial

moraines, freshwater springs and wetlands, short tussock alluvial terraces, river delta and lake margins.

- 7.9 The Tasman River is a key site in the kaki/black stilt (*Himantopus novaezelandiae*) recovery programme. Kaki is classified as a nationally critical species and is considered to one of the rarest waders in the world. Its small breeding population is confined to the braided rivers and wetlands of the upper Waitaki River system.
- 7.10 The most recent population estimate of breeding age adult kaki in the Mackenzie basin is 77, up from a low of 23 birds in the early 1980's. The recovery programme strategy relies on collecting eggs from approximately 20 wild and seven captive pairs each season for incubation. When they hatch, chicks are hand reared until their release back to the wild when they are nine months of age. This protects the eggs, chicks and birds from a suite of avian and mammalian predators during the nesting stage when they are most vulnerable.
- 7.11 Kaki live in the Mackenzie basin all year round, but other species which come inland to breed in and around the braided river ecosystems include black-billed gull (*Larus bulleri* – nationally critical), black-fronted tern (*Chlidonias albostrata* – nationally endangered) wrybill (*Anarhynchus frontalis* – nationally vulnerable) and banded dotterel (*Charadrius bicinctus* – nationally vulnerable).
- 7.12 As well as braided rivers, banded dotterel utilise large areas of outwash fans as breeding and feeding habitat. Typical breeding habitat for banded dotterels comprises lightly vegetated riverbeds, outwash fans and herbfields. Riverbeds are favoured if there is plentiful cover of prostrate shrubs of genera such as *Raoulia*, *Pimelea*, *Muehlenbeckia* and *Coprosma*. On the breeding grounds the diet is varied and includes spiders, beetles, insect larvae, adults and subadults of many aquatic insects, e.g. mayflies, stoneflies and caddisflies, as well as terrestrial flies.
- 7.13 As with kaki, apart from loss of habitat, a key threat to these birds is predation. Avian predators include black-backed gull and swamp harrier while key threats amongst mammalian predators are cats, ferrets, stoats and hedgehogs.
- 7.14 In the Tasman River BMU, DOC has been running a major predator control programme covering an area of approximately 20,000ha since 2005. This

is the first intensively managed, catchment-scale predator control operation attempted for multiple predator species in a braided river environment. This programme seeks to keep predator numbers low enough to ensure breeding success for threatened native species, in particular braided river birds.

- 7.15 In the eleven years that the programme has been operating, 6900 hedgehogs, 3450 stoats, 1550 cats and nearly 800 ferrets have been captured. DOC's predator control work in the Tasman is carried out on public conservation land, on unoccupied Crown land in the riverbed which is managed by LINZ, and on adjoining private land.
- 7.16 The other major component of the management actions in the Tasman Valley is weed control. Introduced weeds (particularly willows *Salix fragilis*, *S. cinerea*, broom *Cytisus scoparius*, yellow tree lupin *Lupinus arboreus*, Russell lupin *L. polyphyllus* and gorse *Ulex europaeus*) can be highly invasive in river systems with long lasting, possibly irreversible impacts on river braid geomorphology, ecosystem process and competitive displacement of many indigenous plants and animals. In particular, weed invasions are a serious threat to habitats of braided river birds
- 7.17 Exotic weeds cover areas of riverbed that were formerly bare shingle or covered in low-stature indigenous plants (e.g., *Raoulia* spp. *Muehlenbeckia axillaris*, *Epilobium* spp.). Areas clear of emergent plants are key breeding and foraging habitats for many birds
- 7.18 Apart from these direct impacts, exotic weeds are thought to stabilise shingle islands, deepen river channels, decrease the availability of shallow water foraging areas, and increase risk of predation by providing cover to mammalian predators
- 7.19 The key weed threat in the riverbed is the Russell lupin (*Lupinus polyphyllus*) and Project River Recovery spends \$50,000 annually controlling lupins in this BMU as well as ensuring that small patches are controlled in other relatively weed-free riverbeds such as the Cass and Godley.
- 7.20 Other weeds have the capacity to take over and compromise native plant and fauna habitat in the wider basin.

- 7.21 Mr Head and Mr Briden discuss threatened plant species and tree weeds in the Mackenzie basin in their evidence, and I will not repeat that information here.
- 7.22 In addition to the species I have already discussed, there are other, less well-known threatened fauna species that are being managed in the Mackenzie basin. One of these is the Canterbury knobbed weevil (*Hadramphus tuberculatus* – nationally critical) which was rediscovered at Burkes Pass Scenic Reserve in 2004, more than 80 years since the last sighting in 1922. Historically known from lowland Canterbury, this weevil feeds on *Aciphylla* species and its disappearance from throughout its previous range is due predominantly to the significant modification of their preferred habitat.
- 7.23 Management to protect the small remnant population of weevils includes predator control and monitoring as well as some replanting of *Aciphylla* spp. following the destruction of some of the habitat in the scenic Reserve by accidental fire.
- 7.24 Since rediscovery, some more knobbed weevils have been found in shrubland containing *Aciphylla* spp. across the main road from the Scenic Reserve. The weevil is known to be very difficult to find; further surveys of suitable habitat are necessary within the Mackenzie Basin to determine whether other small populations exist elsewhere. Consequently, to enable any other populations to be found, it is crucial that no more areas of tussock and shrubland with good populations of *Aciphylla* spp. are removed.
- 7.25 The robust Grasshopper (*Brachaspis robustus* – nationally endangered) is another species that is only found in the Mackenzie Basin. *Brachaspis robustus* is always found in rocky areas (stony floodplain terraces, fluvio-glacial outwash, recent fluvial outwash and rocky braided river), and is never found in areas of heavy vegetation.
- 7.26 The robust grasshopper is known to eat *Anthosachne scabra* (syn. *Elymus rectisetus*) and *Poa pratensis*, the herb *Achillea millifolium*, and unidentified mosses and lichens. Fecal analysis during spring suggests that moss and lichen are important for the dietary requirements of this grasshopper. This might reflect the dietary importance of moisture absorption by these plants at night. Food succulence is important in grasshopper diets, and mosses and lichens may provide a means of withstanding the aridity and drought of the Mackenzie Basin.

- 7.27 This species is currently being managed by predator control in a small area of land known as Patersons Terrace, adjacent to the Tekapo River. The rocky site is undeveloped with sparse tussock cover and is typical of the short tussock grasslands that have already disappeared as a result of development elsewhere within the basin.
- 7.28 There are many invertebrate species, that aren't currently being actively managed, that are dependent on areas of un-disturbed soils on outwash plains. The moth *Orocrambus fugitivellus* (Nationally critical) is only known from one small area of grassland off the Haldon Road in the north-eastern side of the Basin. The moth occupies grass and sedge habitat which remains damp due to the presence of an adjacent seep. The main threats to this moth are its limited geographical distribution and the associated threat of changing land use.
- 7.29 As with many moth species, the moth *Australothis volatilis* (Nationally critical) is dependent on a specific host plant. This moth is found on fuzz weed (*Vittadinia austrelais*) which grows on dry, sunny and open faces. The host plant is threatened by weed invasion and pasture development.
- 7.30 For a number of invertebrate species such as these moths, complete removal of grazing does not always help their continued existence. The prolific growth rate of competing exotic grass following stock removal can be detrimental to native host plant species and continued traditional sheep grazing can be an effective form of management. Obviously changing to irrigated pasture would completely remove the key native grassland habitat for a number of moths as well as spiders, weevils and grasshoppers.
- 7.31 For the above mentioned small invertebrate species, unfettered alteration of the remaining semi-indigenous lowland surfaces that exist in the Mackenzie will effectively fragment their distributions. The widespread use of pivot irrigation, for example, is likely to sever population connectivity across the basin for many organisms which are not scaled to that size of change, and flightless invertebrates and lizards would become moribund and more prone to extinction as their distribution becomes a chequer board.
- 7.32 The Mackenzie Basin is also the only place where three species of threatened galaxiid fish still exist. They include the lowland longjaw galaxias Waitaki River (*Galaxias aff. cobitinis* "Waitaki" – nationally critical) the bignose galaxias (*Galaxias macronasus* – nationally vulnerable) and the

upland longjaw galaxias Waitaki River (*Galaxias* aff. *prognathus* “Waitaki” – nationally vulnerable)

- 7.33 The lowland longjaw galaxias is only known from seven small populations in the Waitaki catchment and of those seven, only two sit within the Mackenzie basin sub zone (Fraser and Edward Streams). One further small population from near the lower Ohau River is believed to have disappeared in the last five years.
- 7.34 Lowland longjaw galaxias is only found in small spring-fed stream systems associated with larger rivers. These fish require the clean water and the associated freshwater invertebrates associated with springs and also the loose clean gravel which they are able to burrow down into. This gravel affords them protection from predators and is also where they spawn.
- 7.35 Bignose galaxias is also found in similar habitat but also appears to be able to exist in some wetland areas that are fed by springs.
- 7.36 Some of the remaining sites for these two species has been determined by the absence of brown and rainbow trout which are key predators. However other major threats include the siltation of the gravel caused by increased numbers of stock, particularly cattle being able to access waterways and also extensive growth of algae and macrophytes such as monkey musk (*Mimulus guttatus*).
- 7.37 Monkey musk has a thick fibrous root system which has the capability of binding up the loose gravel in spring systems and also its prolific vegetative growth can slow down water movement which reduces the flushing of silt in spring-fed streams.
- 7.38 Increased macrophyte growth is associated with higher levels of nutrients in the water and without knowledge of where the water for these springs comes from, there is concern that increased farm development and nutrient runoff may impact on these springs that are critical for the survival of the threatened galaxiids.
- 7.39 The Mackenzie Basin has high lizard species richness with 10 of the 99 recognised lizard taxa in New Zealand. Three species, the Lakes skink (*Oligosoma* aff. *chloronoton* “West Otago”), the Mackenzie Basin spotted skink (*Oligosoma* aff. *lineocellatum* “Mackenzie Basin”) and the scree skink (*Oligosoma waimatense*) are all ranked nationally vulnerable. They typically inhabit talus, screes, boulderfields and rocky gullies in relatively unmodified

outwash areas and on river terrace edges adjoining semi-indigenous tussock grassland and shrubland.

- 7.40 Two of the more common skinks (McCann's skink – *Oligosoma maccanni* and common skink – *Oligosoma aff. polychroma*) and the Southern Alps gecko (*Woodworthia* “Southern Alps”) are found in similar habitats but are also able to inhabit tussock grasslands and herbfields in the outwash areas.
- 7.41 Over most of the Mackenzie Basin, lizard species richness is typically one gecko and 2-3 skink species but in localities where the habitats are mixed (i.e. a mosaic of tussock grassland and shrublands with talus, boulderfields or screes) there may be as many as two gecko and five skink species occurring sympatrically. As with invertebrates (as discussed above), ongoing modification of tussock grassland and development of improved pasture will have a serious impact on the Mackenzie Basin's lizard fauna.

8. CONCLUSION

- 8.1 The Mackenzie Basin is occupied by a diverse range of indigenous species which are adapted to the habitats present. Many of them are classified as being at risk or threatened with extinction. Conservation work is being undertaken which seeks to ensure that the diversity of the natural heritage in the Mackenzie Basin is maintained and restored.



Dean Nelson

9 September 2016