BEFORE THE INDEPENDENT HEARING PANEL

IN THE MATTER OF the Resource Management Act 1991

AND of the proposed Timaru District Plan

Evidence of Richard Ian Clayton

on behalf of the Director-General of Conservation *Tumuaki Ahurei*

Hearing D: ECO Chapter

Submitter No. 166 Further Submitter No.166

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Executive Summary of Key Points

1. My evidence builds on the overview of the ecology of the Timaru District that I provided in my evidence for the Strategic Directions Hearing, summarising the status and trend of key ecosystems in the district given historic and contemporary context.

2. Since the previous district plan review, many ecosystems have continued to decline in extent and health due to both historic and ongoing environmental pressures. Concurrently, a subset of sites containing habitat of rare and threatened species require increased protection and appropriate management to ensure their survival. In many cases, areas meeting the criteria for SNAs have been identified and mapped, but the identification of remaining areas that meet the SNA criteria is unfinished.

3. Areas of remnant indigenous vegetation and habitat of indigenous species are scattered throughout the district. They will not qualify as SNAs but need to be recognised and managed appropriately to ensure the indigenous biological diversity that remains throughout the district is maintained and enhanced.

Introduction

4. My full name is Richard Ian Clayton

5. I have been asked by the Director-General of Conservation Tumuaki Ahurei ('the D-G') to provide expert evidence on the proposed Timaru District Plan (PTDP).

6. This evidence is for Hearing D of the PTDP

Qualifications and experience

7. I am employed by the Department of Conservation (DOC) as an Ecologist. I have worked for DOC since 2018. In my role I provide technical and scientific advice to assist DOC's work managing threatened plant species and ecosystems in the Eastern South Island.

8. I have previously been employed by Manaaki Whenua Landcare Research as a researcher in animal pest ecology and plant conservation for five years. I have also worked as a contractor and ecological consultant for both regional and central government organizations.

9. I have experience in planning conservation management and reporting on significance of ecological values using standard significance criteria, such as those in the Canterbury Regional Policy Statement.

10. My qualifications are MSc Ecology (with distinction) obtained at Otago University in 2004. My thesis was on the impacts of introduced rats on the island flora of Rakiura/Stewart Island.

11. I have previously provided evidence on regional pest management plans on behalf of the D-G and have provided ecological advice and expert evidence for Waimakariri, Selwyn and Waitaki District plans.

12. I am a committee member of the New Zealand Plant Conservation Network, where I represent DOC.

13. I am also a part of the group of experts in DOC who manage threatened plant species funds, management and priorities - the equivalent of a threatened taxa advisory group.

14. I have written or contributed to numerous peer-reviewed publications on plant ecology and wider conservation efforts in New Zealand (see Appendix 4).

Code of Conduct

15. Although this is a Council hearing, I have read the code of conduct for expert witnesses as contained in the Environment Court's Practice Note 2023 (the Code). I have complied with the Code when preparing my written statement of evidence.

16. 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.

17. 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.

18. For the avoidance of doubt, in providing this evidence as an expert witness in accordance with the Environment Court Code of Conduct, I acknowledge that I have an overriding duty to impartially assist the Panel on matters within my area of expertise. The views expressed are my own expert views, and I do not speak on the D-G's behalf.

Scope

19. I have been asked to provide evidence in relation to the notified proposed Timaru District Plan, the D-G's submission (submitter number 166), the D-G's further submission, and further submissions lodged on the D-G's submission.

20. My evidence for Hearing D addresses the following matters:

    (a) Ecological context for biodiversity in the Timaru District with emphasis on a brief overview of the history, status and trend of key ecosystems and species.

    (b) The rationale for seeking to promote the continued identification and monitoring of biodiversity, and better management and restoration of key threatened species and ecosystems.

    (c) Overall support for the protection of SNA sites and their continued identification.

    (d) Brief examples of perverse outcomes for indigenous biodiversity undertaken using indigenous vegetation clearance rules for managing improved pasture.

Material Considered

21. In preparing my evidence I have read and relied upon the following documents:

(a) Proposed Timaru District Plan 2022

(b) The Section 32 Evaluation Reports:

(i) Overview Evaluation Report dated July 2022

(ii) Strategic Directions dated May 2022

(c) The D-G's submission dated 15 December 2022 and further submissions dated 4th August 2023 and 18 March 2024.

(d) The s42a Reports including:

(i) Ecosystems and Indigenous Biodiversity 9 October 2024

(ii) Previous reports on Strategic Directions and Urban Form and Development Chapters dated 5 April 2024

(e) The evidence of Council-appointed ecologist Mr Mike Harding

(f) Key references on ecosystem and species threat classifications which are outlined and explained in Appendix 1

The ecosystems and species of the Timaru District

22. The landscape in Timaru District is made up of the low plains, with rolling hill country, foothills and the high mountains of the Upper Rangitata River. There is a strong correlation between depletion of indigenous vegetation and decreasing altitude (Harding, 2016). In other words: the closer to the mountains, the more indigenous vegetation cover remains.

23. The major, historic reductions to all indigenous ecosystems in Timaru occurred through the mass clearance events initiated by fires of early Polynesian, Māori, and European colonizers. Evidence of the extent of the burning comes from charcoal deposits and palynological (pollen core) data taken from soil cores in and/or beside certain types of wetlands (McGlone, 1989; Burrows, 2002).

24. The map at Figure 1 in Appendix 3 provides a comparison of the remaining areas of indigenous vegetation with areas of protected lands. It shows that biodiversity protection and restoration efforts need to be focused on the lower eastern South Island, where the least indigenous biodiversity remains.

25. Ongoing, current threats to the remaining indigenous ecosystems in Timaru District are similar to those for all of New Zealand, being from both a reduction in their area and compromised functioning (MFE, 2024) caused by:

    (a) Conversion of land for new uses – e.g. increased amounts of forestry, cropping, and subdivision;

    (b) Intensification of land use for agricultural purposes – irrigation, increased nutrient and pesticide application, homogenization of crops etc.;

    (c) Increased and cumulative pressure from introduced invasive species, particularly wilding pines, mammalian browsers and small mammalian pests;

    (d) Climate Change, which both exacerbates existing pressures on native biodiversity and creates new pressures.

26. Despite historical and ongoing environmental pressure, Timaru District contains many remnants of both common (tussock grasslands, herbfields, forests and shrublands) and uncommon native ecosystems.

27. Notable examples of uncommon ecosystems in the Timaru District include:

    (a) all remaining wetlands (both coastal and inland);

    (b) coastal dunes, dune slacks and dongas;

    (c) limestone outcrops and torrs (e.g. at Totara Valley, and adjacent to many of the rivers such as the upper Pareora catchment),

    (d) all braided rivers and their margins, and

    (e) the dry inland moraines and alluvial outwash plains in the Upper Rangitata Basin.

28. The uncommon ecosystems above all have high threat status levels (Holdaway *et al*., 2012; see Appendix 1 for an explanation) and further, they also contain important indigenous biodiversity. For example, small and ephemeral wetlands are important because they contribute disproportionately higher numbers of common, uncommon

and threatened species to regional biodiversity (Richardson *et al*., 2015). Overall, the uncommon ecosystems cover less than 10% of New Zealand's land area but contain about 86% of the threatened flora (Holdaway *et al*., 2012).

29. As part of the Canterbury Region, Timaru District is important for conserving native flora; Approximately one third of all New Zealand's Threatened plants are in the Canterbury Region (De Lange *et al*., 2023). The Timaru District contains regionally endemic plant species (i.e. species found nowhere else in the world) including many 'Nationally Critical' species (the highest threat status) such as the Taiko Gentian - *Gentianella calcis* subsp. *taiko*; the Pareora Hebe and Azorella (*Veronica pareora* and *Azorella pareora*); and Canterbury Pink Broom (*Carmichaelia torulosa* shown in the photograph below (courtesy Melissa Hutchison). A recent update of the Threat Classification for New Zealand plants (de Lange *et al.,* 2023) identified that for many of these plants, the situation is either still dire, or becoming worse.

30. Timaru district also has extensive habitat for indigenous fauna. Blue duck/ whio (Threatened: Nationally Vulnerable) are present, as are many species of threatened braided river and wetland birds, such as the Bittern / Matuku-hūrepo (Threatened:

Nationally Critical), Wrybill / Ngutu pare (At risk: recovering) and Black-billed gulls / Tarāpuka (At risk: declining).

31. The Canterbury Long-tailed bat (Threatened: Nationally Critical) is present in the District and forms the only known population on the East coast of the South Island. Further evidence on Long-tailed bats is provided by my colleague Mr Waugh. Many herpetofauna species are also present, including Canterbury spotted skinks (*Oligosoma lineoocellatum*: Threatened: Nationally Critical), Mackenzie skinks (*Oligosoma prasinum*: Threatened: Nationally Vulnerable), Long-toed skinks (*Oligosoma longipes*: At Risk: Declining) and populations of Jewelled Geckos (*Naultinus gemmeus*: At Risk - Declining).

Areas of Alignment with the Mr Harding's s42A report

32. I agree with much of the evidence of council's expert ecologist, Mr Harding, notably the following:

    (a) Evidence to support the retention of specific SNAs (challenged by other submitters), as summarised at 53 a-c of his evidence.

    (b) I agree with Mr Harding's statement (at 63) that the results of SNA surveying conducted by council over recent decades will have "missed some smaller or more cryptic areas of indigenous vegetation, notably individual trees or shrubs at lowland sites and areas of non-woody vegetation." and that "lower priority un-surveyed sites may support significant indigenous vegetation/habitat" (at 67).

    (c) I agree that there are likely to be un-surveyed sites that support significant indigenous vegetation or habitat (paragraph 58 of Mr Harding's evidence). For example, land in the upper Rangitata catchment, which has not been surveyed (para 66 of Mr Harding's evidence), is known to contain large areas with significant biodiversity, including uncommon, rare and threatened ecosystems and extensive habitat for threatened flora and fauna.

33. Points b and c above are discussed further in my evidence below.

Achieving protection for indigenous biodiversity

34. Many uncommon and threatened ecosystems and large numbers of the most threatened species occur outside of formally protected areas such as public

conservation land, or covenants (Figure 2 in Appendix 3). There is a high correlation between species diversity and uncommon and threatened ecosystems, which means that to maintain biodiversity, uncommon and threatened ecosystems, need to be identified and protected. In many cases, they may need management or restoration to ensure their persistence.

35. Further, the remaining areas of biodiversity associated with "common" ecosystems also require consideration. The removal of lowland forests and shrublands has been both ongoing and comprehensive across the Eastern South Island lowlands. Timaru District has some excellent remaining examples of native forest, but the larger tracts are all associated with the montane areas or are adjacent to the foothills. (e.g. Peel Forest, or Woodbury, (Steven and Meurk, 1996)). The majority of the lowlands are almost completely denuded of their former forests. If the remaining indigenous biological diversity of the lowland areas is to be maintained, concerted efforts to protect and/or restore any indigenous vegetation remnants of lowlands ecosystems will be necessary.

36. Overall, the ongoing identification of significant indigenous vegetation and habitat of indigenous flora is a fundamental part of biodiversity protection. Having completed a substantial amount of work to identify SNAs during the previous plan's tenure, Timaru DC is in a good position to continue and complete this exercise.

37. In the meantime, there is a need to ensure currently unmapped areas of indigenous vegetation can be identified and protected. Ensuring that vulnerable and threatened ecosystems and species-habitats are specifically identified and managed appropriately will be critical to achieving maintenance of biological diversity.

Indigenous Vegetation is present in Improved Pasture and "sensitive areas"

38. I understand that the PTDP allows for indigenous vegetation clearance in areas of improved pasture under certain circumstances (as discussed by Ms Williams).

39. Areas of improved pasture (as defined in the PTDP) can incorporate indigenous plant species, including those that are Threatened or At Risk (de Lange *et al*., 2023) and may also qualify as an SNA. An example that I am aware of was a dryland farm near Christchurch, which met the definition of improved pasture, where my assessment of the vegetation present revealed an extensive native flora (and fauna) including more than a dozen threatened plant species. Although it qualified as improved pasture, it

also had very high overall diversity of indigenous vegetation and provided extensive habitat for threatened native fauna (Clayton and Rance, 2018).

40. Many areas of indigenous vegetation not likely to meet the significance criteria can be found in the mosaic of non-intensively farmed landscapes in the Timaru District (Burrows, 2002; Davis, 2011; Harding, 2016).

41. Specific examples of indigenous, threatened flora in areas of improved pasture in the Timaru District include:

(a) Woody species such as the Canterbury Pink Broom (*Carmichaelia torulosa)* and the Pareora Hebe (V*eronica pareora)* (both Threatened; Nationally Critical) which often occur on farmland in the district.

(b) Herbaceous plants that are often cryptic (small or hidden) and difficult to identify, or only present for certain times of the year, (spring annuals), but may often be present in areas that fit the definition of improved pasture, such as *Geranium socolateum* at the Te Ana-awai scarp (shown below).

(c) an extensive native grass (e.g. *Poa* spp.), sedge (*Carex* spp) and rush (e.g. *Juncus* spp) flora that is often mixed in with exotic, true pasture species. Sometimes both native and exotic species are from the same Genus (e.g. *Rytidosperma* spp.)

42. In Timaru district, these areas that fit the definition of improved pasture but retain indigenous vegetation are almost always associated with threatened land environments (Appendix 3 Fig. 1). They may contain rare or naturally uncommon ecosystems, such as wetland remnants, which are easily overlooked if they are small, or they may be peripheral to the more obvious native ecosystems such as watercourses, continuous woody vegetation or limestone bluffs.

43. The less threatened indigenous species are commonly scattered among farmed lowland landscapes. Such species include kowhai, ti kouka, kanuka, porcupine shrub, matagouri and the many species that make up grey scrub.

44. I acknowledge that many farmed lowland sites have been surveyed by Mr Harding. However, his surveys were primarily for the purpose of identifying SNAs. Some sites that did not meet the thresholds for categorisation as SNAs will contain indigenous species, including those listed above, that contribute to biological diversity of the district. The photos below (courtesy of Alice Shanks and Nick Head) illustrate examples of indigenous species, within areas that could be considered improved pasture as defined, that contribute to the biological diversity of the district.

45. Regardless of whether or not they qualify as SNAs, these remnants of indigenous vegetation are unlikely to survive land use change, including more intensive forms of farming, involving earthworks, cultivation, direct drilling and irrigation. These activities have become more commonplace in the last two decades (Grove *et al*., 2019) and lead to indigenous vegetation clearance, both directly and indirectly by allowing higher stocking rates.

46. I understand that some areas are identified in the PDTP as “sensitive areas”, including areas above 900 m in altitude, within 20m of a waterbody or within 50 m of a wetland. In respect of those areas I make the following observations:

    (a) There are limited areas above 900 m in the Timaru District that are not already protected as public conservation land, or currently retired from active farming. I understand most areas that are not public conservation land were part of the former Mesopotamia Crown Pastoral Lease. Although I have not visited the sites, I have reviewed survey data collected from the whole former lease-hold area during preliminary work for Tenure Review. The report indicates these areas contain very high biodiversity value, and highly representative examples of multiple ecosystem types (DOC, 2002).

(b) The riparian habitat surrounding waterbodies and wetlands often contain critical habitat for specialised plant communities, insect assemblages and other fauna such as wading and migratory bird species.

47. I further understand from Ms Williams' evidence that where improved pasture is present within any of the 'sensitive areas', the PDTP allows for any form of indigenous vegetation clearance. That would have a destructive impact on any remaining indigenous biodiversity present.

48. Finally, remnant areas of indigenous vegetation are often present where low-intensity farming has been practiced for long periods of time. I agree with Mr Harding's statement (para 81) that light grazing (i.e. at the same frequency, intensity and scale as historically practiced) will not necessarily lead to indigenous vegetation clearance in grazed areas. However, to avoid incremental destruction or intensification of land use to the point where indigenous vegetation succumbs, the inclusion of controls to maintain the status quo, as proposed by Ms Williams/would be useful, to clarify and provide certainty about the circumstances under which light grazing can continue.

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Conclusion

52. The Timaru District Council has, over the last two decades, undertaken to identify and record the existing significant biodiversity and habitat of the district. Many of the areas that qualify as SNAs have been identified, but the exercise is unfinished, meaning there are still large areas that likely meet the criteria for SNAs but are unmapped.

53. There are also many areas where indigenous biological diversity is present but may not meet the criteria to qualify as an SNA. Notably, in lowland areas which are predominantly farmed, or in 'improved' pasture, there are often remnants of indigenous vegetation and habitat for indigenous fauna species (including bats, lizards, invertebrates and resident or mobile bird species). While those areas may not qualify as SNAs they need to be managed appropriately if the district is to retain its indigenous biological diversity.

Richard Clayton

DATED 29nd October 2024

Appendix 1 - Terminology

54. Explanation of terms and concepts used in ecological reporting and used throughout my evidence:

(a) **Ecological Districts**, themselves a subset of Ecological Regions are areas of New Zealand divided geographically based on extensive amounts of survey data and a consensus of expert opinion. They have been used as a basis for ecological reporting for over 40 years in New Zealand (McEwen, 1987).

(b) The **Protected Areas Network** consists of: public conservation land, reserves and covenants from QE2, councils and other agencies such as Nga Whenua Rahui.

(c) **Land Environments New Zealand** (LENZ) is a tool that uses physical data to create a classification of environments that can then be overlayed with biotic data and/or layers of protection. It is most usefully applied to the common ecosystems – forests, sub-alpine grasslands etc. (Cieraad *et al*., 2015)

(d) **Naturally Uncommon Ecosystems** are those that originally (i.e. pre-human) occupied small areas (maximum size for the largest ~130,000 ha in total e.g. estuaries, or inland outwash plains and moraine fields, but usually much less – e.g. kettleholes, coastal wetlands, dongas and limestone torrs which are often only several hundred ha in total). (Wiser *et al*. 2013)

(e) Ecosystems, Environments and Species have all been assigned a **threat status** using standard criteria developed by the IUCN (for ecosystems Holdaway *et al*., 2012), by peer-reviewed literature (for environments; Cieraad *et al*, 2015) and by the New Zealand Threat Classification for plants and other species (e.g. De Lange *et al*., 2023). These are generally grouped by degree of concern e.g. “Nationally Critical”; “Endangered”, “Vulnerable”, being an indication of proximity to extinction.

Appendix 2 References

Burrows, C. 2002. Arrowsmith and Hakatere Ecological Districts, Canterbury, New Zealand. Annotated bibliography for conservation. DOC Science Internal Series 37. Department of Conservation, Wellington New Zealand. 45pp.

Cieraad E; Walker S; Price R; Barringer J. 2015. An updated assessment of indigenous cover remaining and legal protection in New Zealand's land environments. New Zealand Journal of Ecology 39(2).

Clayton R; Rance, B. 2018. Summary of Ecological values of Kaitōrete and the Bayley Paddocks. Unpublished internal report. Department of Conservation. 3pp.

Davis M. 2011. Native habitat remnants of the mid-South Canterbury Coast. Unpublished internal report. Department of Conservation. 40pp.

De Lange P.J.; Gosden J; Courtenay, S. P.; Fergus, A.J. Barkla, J.W.; Beadel, S.M.; Champion, P.D.; Hindmarsh-Walls, R; Makan, T. and Michel, P. 2023. Conservation status of vascular plants in Aotearoa New Zealand. New Zealand Threat Classification Series 43. 105pp.

Department of Conservation, 2002. Conservation Resources Report, Mesopotamia Pastoral Lease. Department of Conservation. 42pp.

Grove, P.; Parker, M. Bayer, T.; Gray, D. 2021. Agricultural land use change in mid-Canterbury hill and high country, 1990-2019. Report No. R20/62. Environment Canterbury Regional Council.

Harding M, 2016. Significant Natural Areas Timaru District. A report on a district-wide survey of areas of significant indigenous vegetation and significant habitats of indigenous fauna. A report to Timaru District Council. 32pp.

Holdaway, R.J.; Wiser, S.K.; Williams, P.A. 2012. Status Assessment of New Zealand's Naturally Uncommon Ecosystems. *Conservation Biology* 26: 4; 619 – 629.

McEwen, W.M. (editor) 1987. Ecological regions and districts of New Zealand, third revised edition (Sheet 4). *New Zealand Biological Resources Centre Publication No.5.* Department of Conservation, Wellington.

McGlone, M.S. (1989). The Polynesian settlement of New Zealand in relation to environmental and biotic changes. New Zealand Journal of Ecology 12 (Supplement): 115 – 129.

Ministry for the Environment & Stats NZ, 2024. New Zealand's Environmental Reporting Series: Our land 2024. Available from environment.govt.nz and www.stats.govt.nz Our Land 2024. Report ME1822. Ministry for the Environment, Wellington.

Richardson SJ, Clayton RI, Rance BD, Broadbent H, McGlone MS, Wilmshurst JM.2015. Small wetlands are critical for safeguarding rare and threatened plant species. Applied Vegetation Science 18:2; 230-241.

Stephen, J.C.; Meurk, C.D. 1996. Low and High Plains ecological districts, Plains Ecological Region, Canterbury. Protected Natural Areas Programme Survey Report (unpublished draft). 114pp.

Wiser SK, Buxton RP, Clarkson BR, Hoare RJB, Holdaway RJ, Richardson SJ, Smale MC, West C, Williams PA 2013. New Zealand's naturally uncommon ecosystems. In Dymond JR ed. Ecosystem services in New Zealand – conditions and trends. Manaaki Whenua Press, Lincoln, New Zealand. Pp. 49–61

Appendix 3 Figures to support text

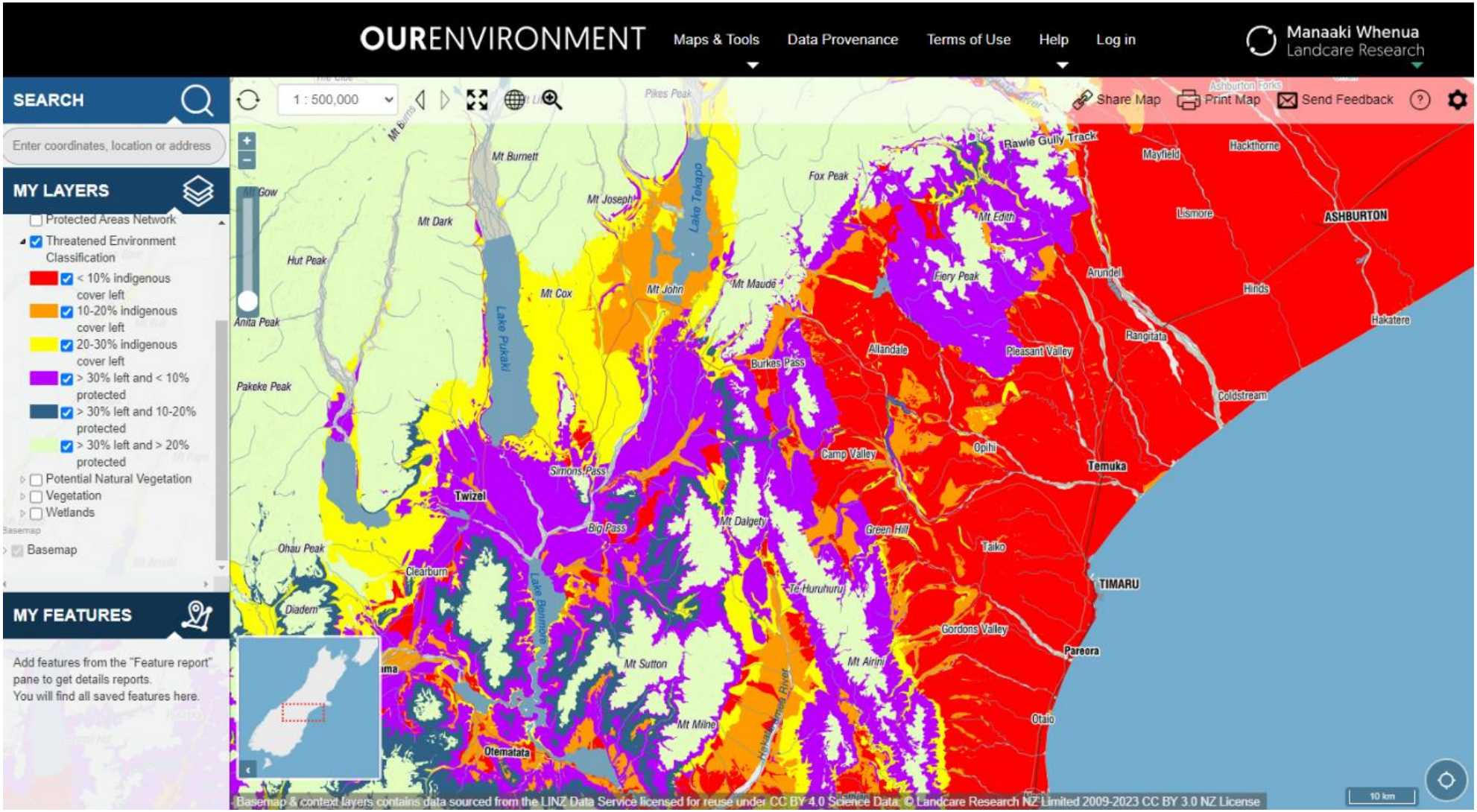

Figure 1. Threatened Environments Classification for areas in and around the Timaru District, highlighting where very little indigenous vegetation remains and/or is protected (red areas are of greatest concern). Source Manaaki Whenua Landcare Research website, Reference = Cieraad *et al*., 2015).

Figure 2 Timaru District (black outline) with layers of public conservation land highlighted in Green (Conservation Parks and Stewardship land), Yellow (Aoraki Mt Cook National Park), Darker Blue (Reserves, including Peel Forest Scenic Reserve and Rangitata River Reserves, Source: DOC GIS

Appendix 4 Peer-reviewed authorship

TITLE	CITED BY	YEAR
Small wetlands are critical for safeguarding rare and threatened plant species SJ Richardson, R Clayton, BD Rance, H Broadbent, MS McGlone, ... Applied Vegetation Science 18 (2), 230-241	49	2015
Management of animal and plant pests in New Zealand–patterns of control and monitoring by regional agencies R Clayton, P Cowan Wildlife Research 37 (5), 360-371	48	2010
Effect of prefeeding on foraging patterns of brushtail possums (Trichosurus vulpecula) about prefeed transects B Warburton, R Clayton, G Nugent, G Graham, G Forrester Wildlife Research 36 (8), 659-665	27	2009
Improving the efficacy of aerial poisoning of brushtail possums (Trichosurus vulpecula) through reduced fragmentation of bait G Nugent, D Morgan, R Clayton, B Warburton International Journal of Pest Management 57 (1), 51-59	17	2010
Removal of livestock alters native plant and invasive mammal communities in a dry grassland–shrubland ecosystem AL Whitehead, AE Byrom, RI Clayton, RP Pech Biological invasions 16, 1105-1118	16	2014
What limits a rare alpine plant species? Comparative demography of three endemic species of *Myosotis* (Boraginaceae) KJM Dickinson, D Kelly, AF Mark, G Wells, R Clayton Austral Ecology 32 (2), 155-168	16	2007
Using home-range data to optimise the control of invasive animals DHV Smith, R Clayton, D Anderson, B Warburton New Zealand Journal of Ecology 39 (2), 286-290	13	2015
Density estimates and detection models inform stoat (Mustela erminea) eradication on Resolution Island, New Zealand RI Clayton, AE Byrom, DP Anderson, KA Edge, D Gleeson, P McMurtrie, ... Island invasives: eradication and management. Gland, Switzerland, IUCN, 413-417	12	2011
Dual 1080 bait switching for killing cereal-bait-shy possums G Nugent, R Clayton, B Warburton, T Day New Zealand Journal of Ecology 44 (1), 1-6	8	2020
Best practice operational and outcome monitoring for pest management: a review of existing council approaches and activity RI Clayton, PE Cowan Landcare Research New Zealand	4	2009
Response of seedling communities to mammalian pest eradication on Ulva Island, Rakiura National Park, New Zealand RI Clayton, DJ Wilson, KJM Dickinson, CJ West New Zealand Journal of Ecology, 103-107	4	2008
Predator Free Rakiura Halfmoon Bay Project—biosecurity options R Clayton Invercargill: Predator Free Rakiura (PFR) Governance Group, c/o Southland ...	2	2015
Using genetics and Bayesian modelling to evaluate the eradication of stoats (Mustela erminea) from Resolution Island, Fiordland, New Zealand DP Anderson, A Byrom, R Clayton, D Gleeson, B Warburton New Zealand Journal of Ecology 35 (2), 193-193		2011
The Influence of Introduced Mammals on Forest Regeneration on Islands in Paterson Inlet, Rakiura National Park: A Thesis Submitted in Partial Fulfilment for the Degree of ... RI Clayton University of Otago		2005