Land use change in Otago's hill and high country, and implications for indigenous biodiversity

A report to Otago Regional Council

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Executive summary

The biodiversity landscape we now inhabit is one in which there is very little indigenous habitat left. Abundance of biodiversity is a key predictor of its vulnerability or resilience to environmental effects from land development or climate change. The more of something there is, the less vulnerable it is as a whole.

A plain-English description of ecological vulnerability says a species, community, or ecosystem is vulnerable if some aspect of its *situation or biology* renders it susceptible to disturbance. Much has been written about aspects of Aotearoa - New Zealand's (Aotearoa NZ's) *biology* that makes our biodiversity vulnerable to invasive species amongst other threats. This report is not about the biology of Otago's biodiversity. Rather, this report is about the *situation* of Otago's biodiversity.

At each of the 4 major inflection points in the past 35 years – tenure review, Nature Heritage Fund purchases, Queen Elizabeth II National Trust (QEII) covenants, and Recommended Areas for Protection – the least threatened environments were protected and the most threatened environments were freeholded. This pattern of land ownership change and its resulting land use change will make Otago's biodiversity more vulnerable, not less. This vulnerability means protecting what is left of Otago's biodiversity has never been more important.

All of this puts Otago's biodiversity in a situation of vulnerability. This reports leverages knowledge about recent historical decisions and the resulting current biodiversity situation to strategise maintenance of biodiversity on a regional scale to achieve the objective of Resource Management Act (RMA) and the National Policy Statement on Indigenous Biodiversity (NPSIB).

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Introduction – Otago's current biodiversity vulnerability as shaped by recent history

The biodiversity landscape we now inhabit is one in which there is very little indigenous habitat left. Abundance of biodiversity is a key predictor of its vulnerability or resilience to environmental effects from land development or climate change.[1] The more of something there is, the less vulnerable it is as a whole.

A plain-English description of ecological vulnerability says a species, community, or ecosystem is vulnerable if some aspect of its *situation or biology* renders it susceptible to disturbance. Much has been written about aspects of Aotearoa - New Zealand's (Aotearoa NZ's) *biology* that makes our biodiversity vulnerable to invasive species amongst other threats.[2] This report is not about the biology of Otago's biodiversity. Rather, this report is about the *situation* of Otago's indigenous biodiversity. Of Otago's terrestrial environment, 30.5%, or ~3,200,000 ha is protected to some degree in public conservation land (PCL)[3] or Queen Elizabeth II National Trust (QEII) covenants.[4]

By way of comparison, if I have $1000 in my savings account I can afford to go out for a $50 dinner because my $950 balance would be resilient to an emergency car repair or tooth filling, say. If I have $60 in my savings account, the same dinner takes me perilously close to overdraft.

Biodiversity is of course far less measurable and tradable than money, so we cannot know how much biodiversity we have in our figurative savings account. We cannot know how close we are to an overdraft situation, or indeed whether we are already in biodiversity overdraft. But we can know whether our biodiversity account is growing or shrinking in size. This report uses habitat health and extent as a reasonable proxy for size of Otago's biodiversity account.

All of this means that Otago's indigenous biodiversity is in a situation of vulnerability. This reports leverages knowledge about recent historical decisions and the resulting current biodiversity situation to strategise maintenance of biodiversity on a regional scale in accordance

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[1] Auber, A., Waldock, C., Maire, A. *et al*. A functional vulnerability framework for biodiversity conservation. *Nature Communications* **13**, 4774 (2022). At Figure 1. (https://doi.org/10.1038/s41467-022-32331-y)

[2] See the many papers referenced in the Theme 1 section of: Ministry for the Environment. 2019. *Environment Aotearoa Report 2019*. (https://environment.govt.nz/publications/environment-aotearoa-2019/theme-1-our-ecosystems-and-biodiversity/#:~:text=Introduced%20species%20threaten%20our%20native,competition%2C%20predation%2C%20and%20diseases).

[3] Public Conservation Land (PCL) is land administered by the Department of Conservation (DOC), managed as public conservation estate.

[4] This Includes QEII Covenants and Public Conservation Land – spatial data sourced from Land Information New Zealand (LINZ).

with the National Policy Statement on Indigenous Biodiversity (NPSIB), as an instrument of the Resource Management Act (1991).

Part 1 of this report observes recent patterns of land decisions that have led to intensification of land use across Otago. Part 2 is a primer on how Aotearoa NZ manages biodiversity, especially in light of the still new, but already changed, NPSIB. Part 3 assesses what the biodiversity situation and the changing regulatory landscape mean for Otago's current decisions about and strategies for biodiversity.

Part 1: Decisions about land use and biodiversity in Otago's recent past

There have been several inflection points at which decisions about land use have been taken which had downstream effects on Otago's biodiversity. These decisions can be observed with remote sensing and mapping. Taken together with decisions before about 1980, these decisions about Otago land use have created the landscape in which we and our remaining indigenous biodiversity now live.

Figures 1a and 1b depict the biodiversity situation for Otago's hill and high country which we define as above 300m in elevation. They show that land above 300m in elevation that is in freehold (FH) title is concentrated in the more threatened land categories; and protected land (PCL) is in the least threatened categories. Part of this is an artefact of how the Threatened Environment Categories (TEC) dataset is constructed. Because TEC considers how well represented an environment type is already in public conservation land, it is hardly surprising that existing public conservation land will be concentrated in the least threatened (and most well represented already in the conservation estate). Hence Figure 1a is not surprising.

What is more interesting is the patterns of decisions about conserving land made in the past 35 years. The four inflection points examined below show land use decisions conserved environments that were already well represented in public conservation land, and freeholded the most threatened environments.

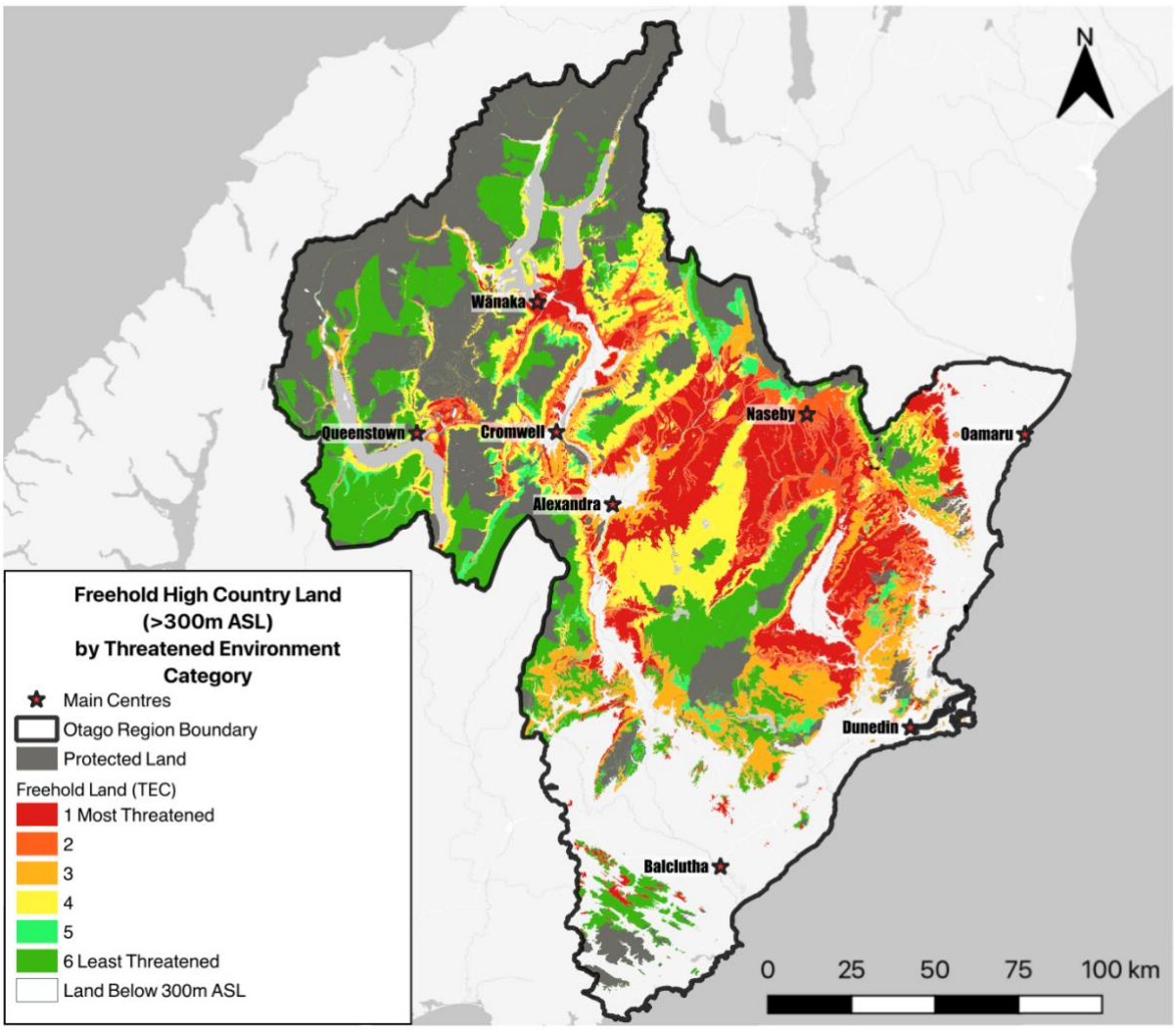

Figure 1a *Otago[5] Hill and High Country (300m+ ASL)[6]held as freehold, couloured by Threatened Environment Category (TEC – as used in the legend)[7]. This map shows land under 300m above sea level in white, and over 300m ASL in colours varying by Manaaki Whenua/Landcare Research's Threatened Environment Categories. It shows quite a bit of the lower elevation high country is of the higher threat categories (1-3), while the higher elevation high country is less threatened (5-6).*

[5] Otago Regional Boundary – spatial data sourced from LINZ
[6] NZDEM South Island 25 metre (2010) LRIS - Manaaki Whenua
[7] https://lris.scinfo.org.nz/layer/48282-threatened-environments-classification-2012/

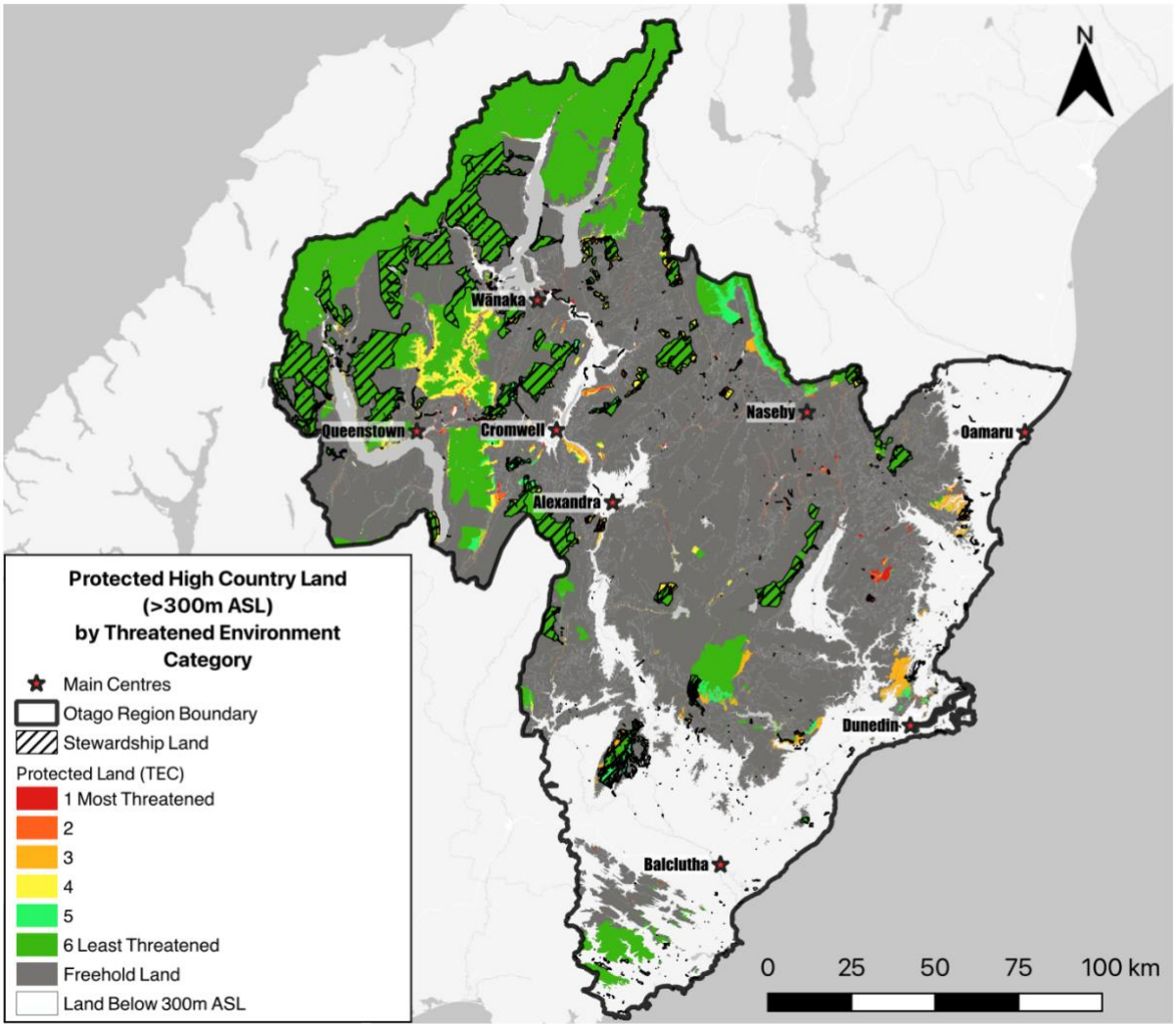

Figure 1b *Otago[8] Hill and High Country (300m+ ASL)[9] held as public conservation land (PCL), coloured by Threatened Environment Category (TEC)[10]. This map shows land under 300m ASL in white, over 300m ASL in freehold title as grey, and over 300m ASL in colours varying by Manaaki Whenua/Landcare Research's Threatened Environment Categories. It shows most of the protected land is in the least threatened environments (TEC 5-6).*

[8] Otago Regional Boundary – spatial data sourced from LINZ
[9] NZDEM South Island 25 metre (2010) LRIS - Manaaki Whenua
[10] https://lris.scinfo.org.nz/layer/48282-threatened-environments-classification-2012/

The inflection points that shape Otago's high country biodiversity situation are, in descending order of hectarage, as follows:

1) South Island high country land tenure review
2) Nature Heritage Fund purchases
3) QEII covenanting
4) Recommended Areas for Protection

1.1 HIGH COUNTRY TENURE REVIEW

Overall, tenure review set out a hierarchy of goals[11] which were, in order of primacy:

1) ecological sustainability of the high country (Crown Pastoral Land Act 1998 (CPLA) s. 24(a));
2) protection of conservation values (CPLA s. 24(b));
3) enhancing public access (CPLA s. 24(c)(i)); and
4) "freehold disposal" of pastoral lease land that is "capable of economic use" (CPLA s. 24(c)(ii)).[12]

In other words, tenure review aimed to enhance ecological sustainability by protecting land with significant conservation and recreation value by making it public conservation land. And then, subject to that, tenure review would freehold land with potential to be intensified agriculturally, residentially, or otherwise diversified; the freeholding would release the former pastoral land from its Land Act restrictions that made it difficult to use the land for anything by extensive pastoralism.[13]

From 1991-2022, the Crown engaged in negotiations with leaseholders to separate and redistribute ownership of vast tracts of Crown-owned land leased for extensive pastoral purposes in the high country of the South Island. Figure 2 shows that 57% of Otago tenure review land was freeholded (a small portion subject to a covenant), while 43% was put in PCL (with a minority subject to a concession for grazing or hunting or another use, and about half in the stewardship category of PCL).

[11] Brower et al 2018 "Freeing the land beyond the shadow of the law" *NZ Universities Law Review.* at 979-980
[12] Brower et al 2018, see footnote 11
[13] Brower et al 2018, see footnote 11

Otago high country leaseholders were early adopters of high country tenure review. This section reviews the on-the-ground outcomes of tenure review for Otago and its biodiversity. Appendix 1 gives a richer detail of the background history of tenure review for those less familiar with it.

Lease by lease, the ownership pattern of Otago's high country changed as follows and as seen in Figure 2 and quantified in Table 1:

> Figure 2FH shows 300,872 hectares of Otago's high country pastoral lease land became freehold land.[14] The Crown sold its interest in this land to runholders for $89.2 million, or an average of $296/hectare. As of 2024, 24% of the new freehold land had a covenant in some form on it.[15] The stated purpose of most of these covenants was to protect significant inherent conservation values by limiting development of that land.[16] Covenants are discussed in more detail below. Freehold land is depicted in Figure 2 as purple, with covenanted freehold land a lighter shade.
>
> Figure 2PCL shows 223,117 hectares shifted into public conservation land (PCL) through the tenure review process, to be managed by the Department of Conservation (DoC).[17] The Crown purchased pastoral lease rights to this land for $122.4 million, or $548/hectare. 15% of this new conservation land had a concession on it in some form; 50% of it is classed as stewardship land. we will discuss concessions and stewardship land in more detail below. New conservation land is depicted in Figure 2 as pink, with conservation land subject to

[14] A note on tenure review hectares and dollars numbers that applies to all tenure review numbers throughout this report. We have compiled these by requesting from the Department of Conservation (DoC) and Land Information New Zealand (LINZ) their records of tenure review transactions as of 2023. Then we compared DoC's and LINZ's records. Neither record is complete (DoC is missing records of some leases, and LINZ is missing others, but in all DoC is missing fewer leases). For clarity, we relied on LINZ hectares and dollars data where available; for the few leases for which LINZ had no hectares data, we used estimates from the DoC spatial data. This is because LINZ's hectares numbers are more reliable, as the hectares were measured after surveying; while the DoC hectares were estimated by computer mapping software (QGIS). Post-1998 hectares data are available on the LINZ website. For pre-1998 hectares data and all data on Crown and lessee payments, we relied on successive OIA requests from LINZ.

[15] All spatial data about covenants and concessions on new freehold and conservation land respectively are from DoC spatial data (using QGIS). The numbers are accurate as of December 2024, and are different to data reported in previous publications such as Rissman et al 2021, simply because tenure review was an ongoing process. We express the data about concessions and covenants in percentages instead of raw numbers because the nature of the data is such that raw numbers of hectares would not be reliable, and would overstate the precision of the data. Percentages are a more accurate statement about the precision of the data.

[16] Crown Pastoral Land Act (CPLA) section 24.

[17] See footnote 14 for a note about how the data about outcomes of tenure review were gathered.

a concession in a lighter shade and the stewardship class of conservation land (with or without concession) depicted with stripes across the same colours.

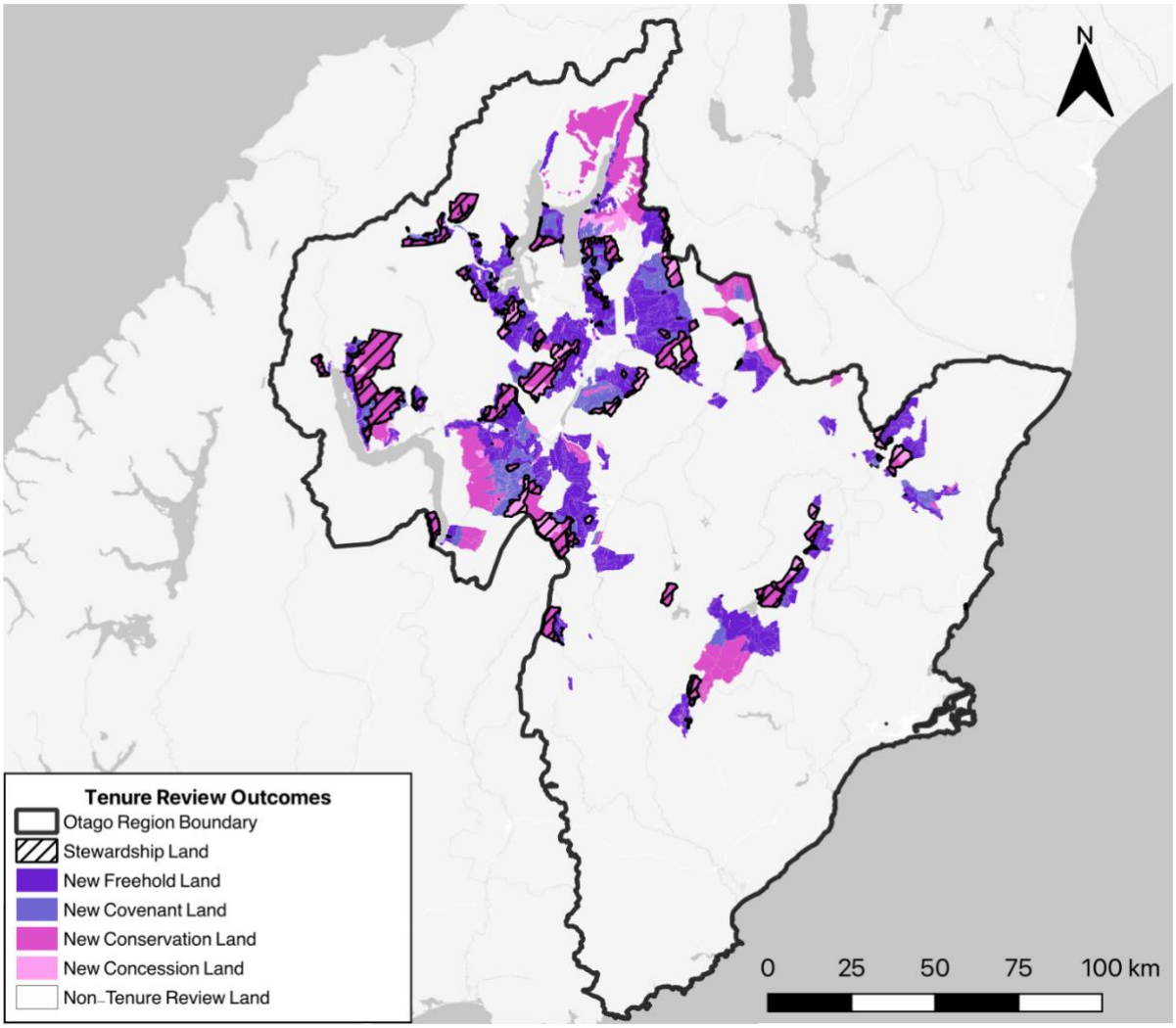

Figure 2 shows tenure review outcomes, with freehold in purple and PCL in pink. Covenants and concessions are depicted with lighter colours. PCL in the Stewardship category is striped.

Table 1 quantifies the outcomes of tenure review in Otago.

Hectares to freehold	% of freehold in covenant	$ paid by lessees for freehold	Hectares to PCL	% of new PCL in Stewardship category	% of PCL in concession	$ paid by Crown for PCL	Net $ to lessees
300,872	24%	$89.2 million	223,117	50%	15%	$122.4 million	$33.2 million

In total in Otago, about 57% of former Crown pastoral land was freeholded and 43% shifted into public conservation land; of the new public conservation land, half is in the Stewardship

category. On net, the Crown paid the new owners of former Crown land $33.2 million more for their leasehold interests than the new owners paid the Crown for its interests in the same land.

1.1.1 On-selling and subdividing of new freehold land in Otago

Of the 4 regions that experienced tenure review, Otago experienced the most on-selling and subdivision of the new freehold land, by a large margin. Table 1 quantifies the new freehold land that had been on-sold by the end of 2015. In pricing terms, across the South Island, when land was on-sold, the median on-selling price per hectare (inflation-adjusted) was 992 times higher than the price at which the Crown freeholded it; and that ratio ranged from from 1.8 to 27,096.[18,19]

Table 2 On-selling patterns of freeholded ex-pastoral lease land by region in the South Island as of the end of 2015 show that Otago had by far the most on-selling.

	Ha on-sold by end 2015	**# parcels sold**	**Median parcel size**	**# parcels smaller than 10 ha**	**Total value of on-sold parcels**
Otago	54,759	198	9.7	100	$237,527,732
Canterbury	26,578	22	708	0	$76,690,187
Southland	4,357	1	4357	0	$9,000,000
Marlborough	1693	5	22	1	$2,780,000
Total	87,386	226	13	101	$325,997,919

Table 2 also shows that Otago had by far the most sales of parcels less than 10 hectares in size. Smaller parcels of land are an indicator of land intensification. The intensification that comes with subdivision of ex-pastoral leases (with an average size of 5,000 hectares) into 10-hectare blocks suggests that residential and lifestyle-block intensification has occurred rather than agricultural intensification. There are at least 3 reasons for this inference:

1) the smaller the parcel, the higher the price is paid per hectare.[20]

[18] Ann Brower, Philip Meguire and Alba DeParte "Does Tenure Review in New Zealand's South Island Give Rise to Rents?" (2011) New Zealand Economic Papers 1 at 9.
[19] These ratios have been adjusted for time since sale, meaning that inflation cannot explain these ratios. Ann Brower, Philip Meguire and Alba DeParte "Does Tenure Review in New Zealand's South Island Give Rise to Rents?" (2011) New Zealand Economic Papers 1 at 5.
[20] Ann Brower, Philip Meguire and Alba DeParte "Does Tenure Review in New Zealand's South Island Give Rise to Rents?" (2011) New Zealand Economic Papers 1 at 5.

2) land price per hectare is linked with land use in rural Aotearoa NZ such that as land use intensifies, the per-hectare price goes up.[21]
3) residential/peri-urban has been found to be the most valuable rural land use in Aotearoa NZ, with horticulture/viticulture, pig/chicken and lifestyle blocks next in line. Extensive pastoralism was at the least valuable end of the scale.[22]

The figure and tables in Appendix 2 label each of the leases on the map, so that the reader can find that lease in the associated table and see tenure review financial outcomes as well as how much land had on-sold by the end of 2015, if any.

Tenure review financial outcomes' implications for biodiversity take 2 forms:

1) Crown payouts of over $33 million to new freeholders, who retain the majority of tenure reviewed land, meant that the Crown sold the shores of Lakes Wanaka and Wakatipu as well as the Gibbston Valley at a loss. These payouts risked effectively subsidising the subdivision and intensification that ensued. The freeholding enabled the intensification, while the financial outcomes might have subsidised it.

2) The on-selling, subdivision, and intensification kick-started by tenure review will crowd out biodiversity and encroach on habitat.

1.1.2 Tenure review freeholded the most threatened environments, and conserved the least threatened

In order to evaluate the biodiversity implications for Otago of tenure review, we now compare tenure review outcomes in Figure 3a and 3b to the Threatened Environments Categories.[23]

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[21] Corey Allen, Suzi Kerr and Sally Owen "Over-valued or over-looked? A theoretical and empirical investigation of agricultural land values against profitability in Aotearoa New Zealand" (Victoria University of Wellington School of Economics and Finance Working Paper 4/2020 2020) at 21 (https://researcharchive.vuw.ac.nz/xmlui/bitstream/handle/10063/9129/Working%20Paper.pdf?sequence=1).

[22] Steven Stillman "Examining Changes in the Value of Rural Land in New Zealand between 1989 and 2003" (Motu Economic and Public Policy Research (Wellington, NZ) Motu Working Paper 05–07 2005) at 29, Table 3 (https://motu-www.motu.org.nz/wpapers/05_07.pdf).

[23] The Threatened Environment Classification system, or TEC, is a combination of three national databases: Land Environments New Zealand, the Land Cover Database and the protected areas network. The information in these databases is combined into a GIS tool, which categorises land environments into six "threat classes" based on the amount of indigenous vegetation cover on the land and the proportion of land with that land cover type that is already legally protected for conservation of natural heritage purposes. Land falling under Threat Class 1 is considered to be the most threatened; it contains rare values that are not already protected in public conservation land. Land classified as Threat Class 6 is the least threatened; the ecological values it contains are relatively common and already well protected in public conservation land. Where we refer to "threatened" land, we are referring to land with indigenous vegetation cover in Threat Classes 1 and 2.

Results for the whole South Island were published in 2021.[24] Here we update the data previously published and focus on Otago.

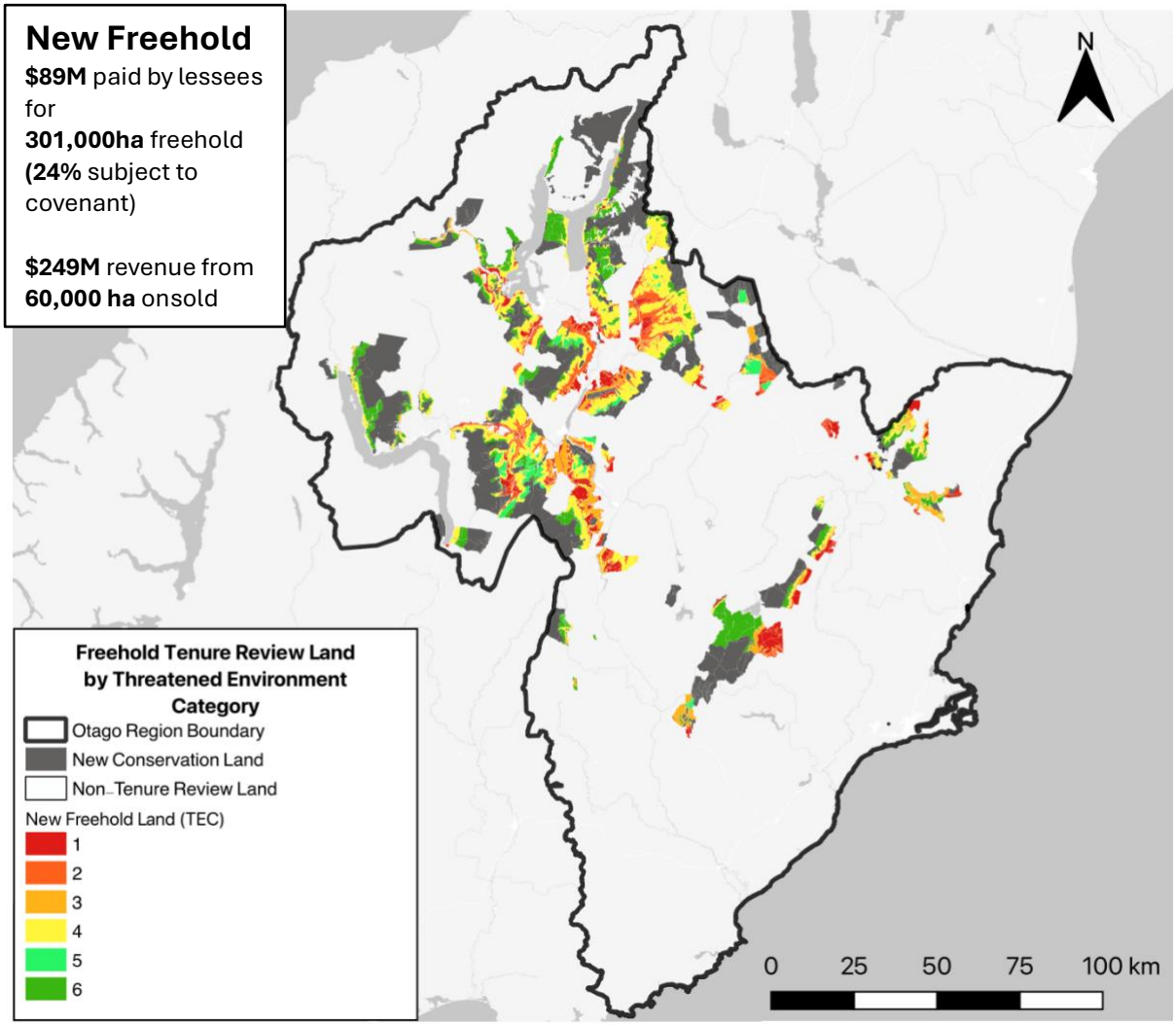

Figure 3a: This map shows the threatened environment categories (TEC) of land freeholded in tenure review. It shows that most of the land freeholded was in the more threatened categories (1-4 depicted in red and orange). Land conserved in tenure review is shown in grey. It shows that freeholded land concentrates in the more threatened categories (1-4).

[24] Adena R Rissman and others "Conservation and Privatization Decisions in Land Reform of New Zealand's High Country" (2021) Environmental Conservation at 1.

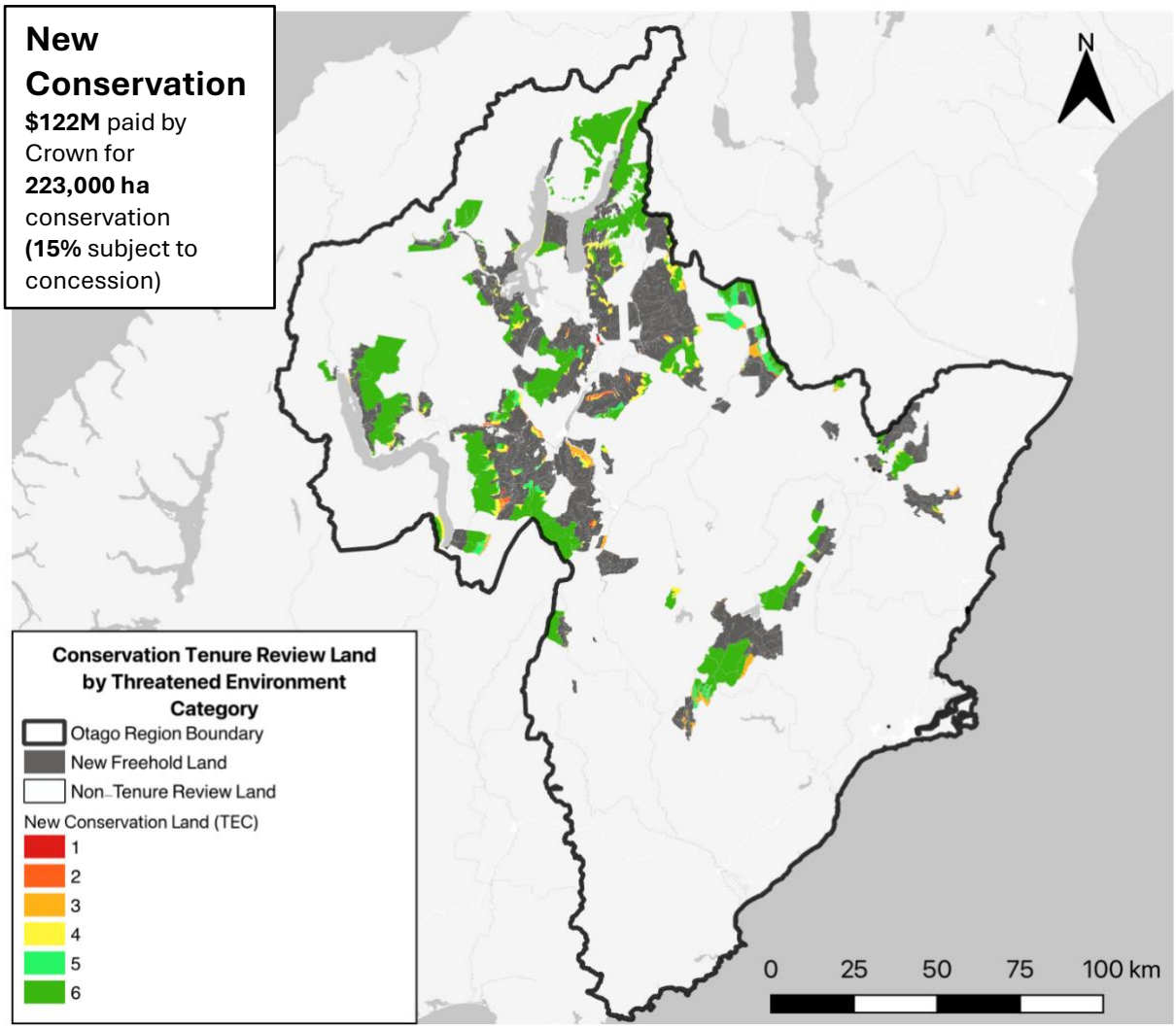

Figure 3b: This map shows the threatened environment categories (TEC) of land conserved in tenure review. It shows that most of the land conserved was in the least threatened categories (5 and 6 depicted in light and dark green). Land freeholded in tenure review is shown in grey.

Results are reported in Table 3 and Figures 3a and 3b. Figure 3a and 3b show pattern of conserving the least threatened and freeholding the most threatened in the change of land ownership in Otago. Figures 3a and 3b also have text-box insets containing quantitative details of how much money changed hands between the Crown and lessees to change the ownership of the land, and how much some land on-sold for after freeholding.

Table 3 Tenure review land allocation decisions in Otago in relation to Threatened Environment Categories (TEC) Threat Classes. This shows that tenure review conserved the least threatened land, and freeholded the most threatened. Note the percentages and hectares are rounded reflect the level of confidence.

	Allocation under tenure review			
TEC class	**PCL**	**PCL with concession**	**Freehold**	**Freehold with covenant**
Most threatened 1	2%	<1%	85%	12%
2	7%	0%	84%	9%
3	16%	4%	68%	12%
4	13%	3%	66%	19%
5	40%	5%	32%	24%
Least threatened 6	62%	12%	17%	10%

In sum, in Otago as well as nationally, the tenure review process conserved the least threatened land and freeholded the most threatened land.[25] This is the inverse of the pattern of outcomes that would have enhanced Otago's biodiversity.

1.2 NATURE HERITAGE FUND PURCHASES

The Nature Heritage Fund (NHF) was established in 1990 to protect indigenous ecosystems using Crown purchase or covenants.[26] To date it has protected nearly 350,000 hectares.[27] Crown purchases and covenants of land represent another possible inflection for Otago's biodiversity.

[25] An important reason for this is one of the CPLA s 24 goals for tenure review was to enable land capable of economic use to be freeholded and developed. Much of the land capable of economic use was in the valley floors. But valley-floor land also contained significant biodiversity as it was previously relatively undeveloped due to the constraints of the Land Act. This meant that the highly threatened valley-floor ecosystems were less likely to be conserved despite the "ecologically sustainable" goal of the CPLA. See: Susan Walker, Robbie Price and RTT Stephens "An Index of Risk as a Measure of Biodiversity Conservation Achieved through Land Reform" (2008) 22(1) Conservation Biology 48 At 54, 57.

[26] https://www.doc.govt.nz/get-involved/funding/nature-heritage-fund/more-about-the-fund/

[27] https://www.doc.govt.nz/get-involved/funding/nature-heritage-fund/map-of-areas-protected-by-the-nature-heritage-fund/

Figure 4 show the NHF purchases in Otago's high country (in TEC colour scheme) next to tenure review PCL vs freehold outcomes (in Purple and Pink). Table 4 quantifies the analysis. It is important to note that NHF purchased land in Otago that is outside the high country is not depicted in Figure 4 and Table 4. All NHF purchases are depicted in DOC published maps.[28]

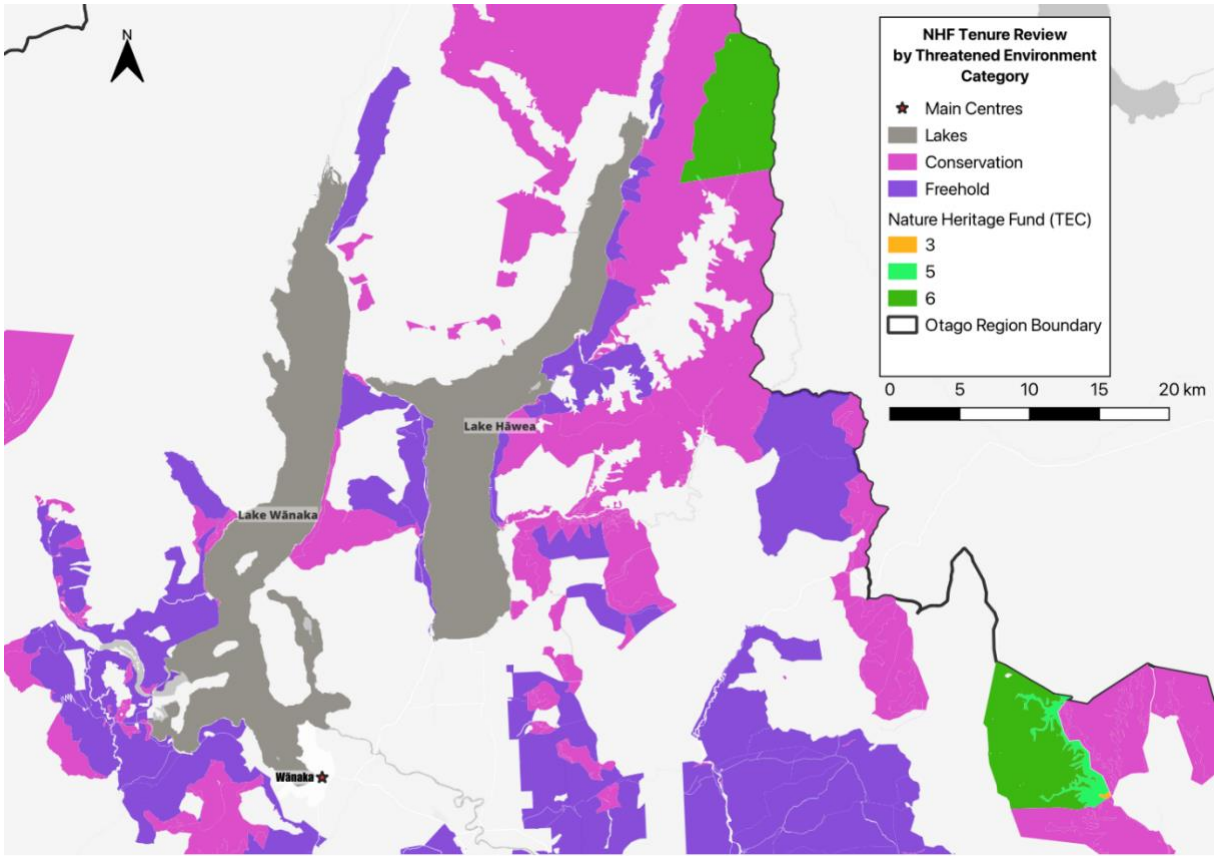

Figure 4 Nature Heritage Fund (NHF – *as used in the legend*) Outcomes by TEC. This shows almost the entirety of NHF purchases in Otago's high country have been in the least threatened categories (in green), with only a tiny sliver in the bottom right corner of a moderately threatened category (in orange).

Table 4 Quantification of TEC for NHF purchases. This shows that almost the entirety of NHF purchases in Otago's high country has been in the least threatened categories.

Nature Heritage Fund Area by Threatened Environment Category		
Threatened Environment Category	Total Hectares	% of Area
1	0	0%
2	0	0%
3	25	<1%
4	0	0%
5	950	9%

[28] https://www.doc.govt.nz/get-involved/funding/nature-heritage-fund/map-of-areas-protected-by-the-nature-heritage-fund/

6	9920	91%

Similar to tenure review, the NHF pattern of conservation in Otago's high country has conserved the least threatened land environments. But NHF did not involve freeholding as tenure review did.

1.3 QEII TRUST COVENANTS

QEII National Trust is a charitable trust that works with landowners to protect sites on their land with covenants. To date, there are over 5000 QEII covenants nationally, comprising over 180,000 hectares.[29] The largest by far of the QEII covenants is in Otago. The approximate 53,000 hectare Mana Whenua set of covenants spans the ranges between Glendhu Bay, Wanaka and Arrowtown;[30] it "*protect[s] high alpine environments, alpine and montane grasslands, wetlands, riparian zones, forest and shrubland remnants*."[31]

In Otago, there are 246 QEII Covenants, which cover about 66,000 hectares, with a median size of 7.7 hectares and an average size of about 268 hectares. However, if we exclude the four large Mana Whenua covenants from the analysis, there are only about 14,000 hectares covered by 242 QEII Covenants, with a median size of 7.5 hectares and an average size of about 59 hectares. Thus, without the Mana Whenua Covenants in Otago, there would be significantly less area and indigenous biodiversity protected by QEII Covenants. Figure 5 shows the QEII covenants established in Otago (both high and low country), while highlighting the Threatened Environments Categories of the land conserved via this method. Table 5 quantifies the analysis.

[29] https://qeiinationaltrust.org.nz/about-us/
[30] https://qeii.wpenginepowered.com/wp-content/uploads/2021/08/Mahu-Whenu-Covenants-Map-Arrowtown-Tracks-A3.pdf
[31] https://qeiinationaltrust.org.nz/places/central-otago-mahu-whenua/

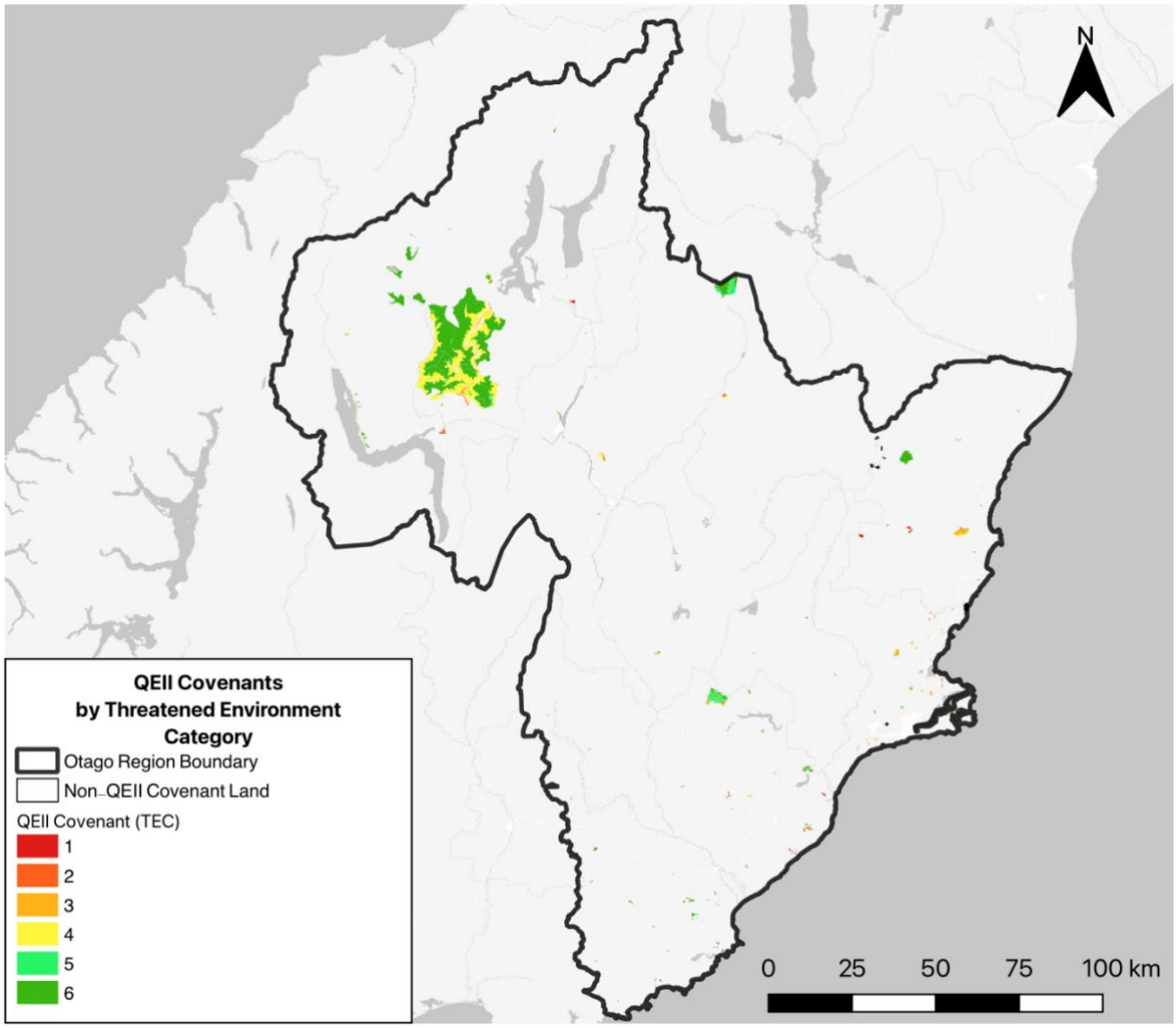

Figure 5 shows QEII covenants, by Threated Environment Category (TEC), for all of Otago.

Table 5 Land protected by QEII covenant in Otago		
TEC class	**% of land protected by QEII in this threat class**	**Total hectares protected by QEII in this class rounded to level of confidence**[32]
Most threatened 1	2%	1,000
2	2%	1,000
3	3%	2,000
4	28%	18,000
5	5%	3,00
Least threatened 6	61%	40,000

[32] Note: the hectares value in the "Total" column are rounded, reflecting that the figures are derived from spatial data, which is not accurate down to the last hectare. The percentage figures are more accurate (as the error is similar in both the numerator and denominator). We include the "Total" column to show the relative scale — far more hectares are in the least threatened category (Threat Class 6) compared to the most threatened category (Threat Class 1).

Figure 5 and Table 5 show, again, that the land conserved via QEII covenant is concentrated in the least threatened land environments.

1.4 PNAP RECOMMENDED AREAS FOR PROTECTION – BEFORE AND AFTER

In the early 1980s, the Protected Natural Areas Programme (PNAP) identified 'Recommended Areas for Protection' (RAP) across the country in each Ecological District (ED).[33] The RAPs were *"the highest quality or best condition examples of the remaining indigenous biological and landscape features within each ecological region or district."*[34] [35]

Decisions since identification of RAPs 40 years ago about whether and how much the land use in the *"highest quality or best condition examples of the remaining indigenous biodiversity"* represent another inflection point contributing to the current situation of Otago's biodiversity.

Figure 6 presents before and after analysis of what happened to areas recommended for protection. Figure 6BEFORE is a 'before' map – of what was recommended for protection; figure 6AFTER uses satellite imagery to present an 'after' map – of what happened to the recommended areas, whether it was protected (under PCL or QEII) or converted. Table 6 and Figures 6BEFORE and 6AFTER consider RAP recommendations for all Ecological Districts in Otago, including RAPs in an ED where only part of the ED lies in Otago. Table 6 quantifies the analysis.

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[33] *"An ecological district is a local part of New Zealand where the topographical, geological, climatic, soil and biological features, including the broad cultural pattern, produce a characteristic landscape and range of biological communities"* Park, G.N. (1983). Protected Natural Areas for New Zealand. Report of a Scientific Working Party convened by the Biological Resources Centre (DSIR).

[34] Susan Walker and Bill Lee "Significance Assessment for Biodiversity in the South Island High Country" (Landcare Research Contract Report LC0304/111, 2004) at 13 (https://www.linz.govt.nz/sites/default/files/landcare-research-biodiversity-significance-framework-june-04.pdf).

[35] It is worth noting that when PNAP assessments were taking place, not all of Otago was assessed. And even in areas that were assessed, not all of it was considered for RAP status. In other words, there might be more land with RAP-like values than is depicted in these maps.

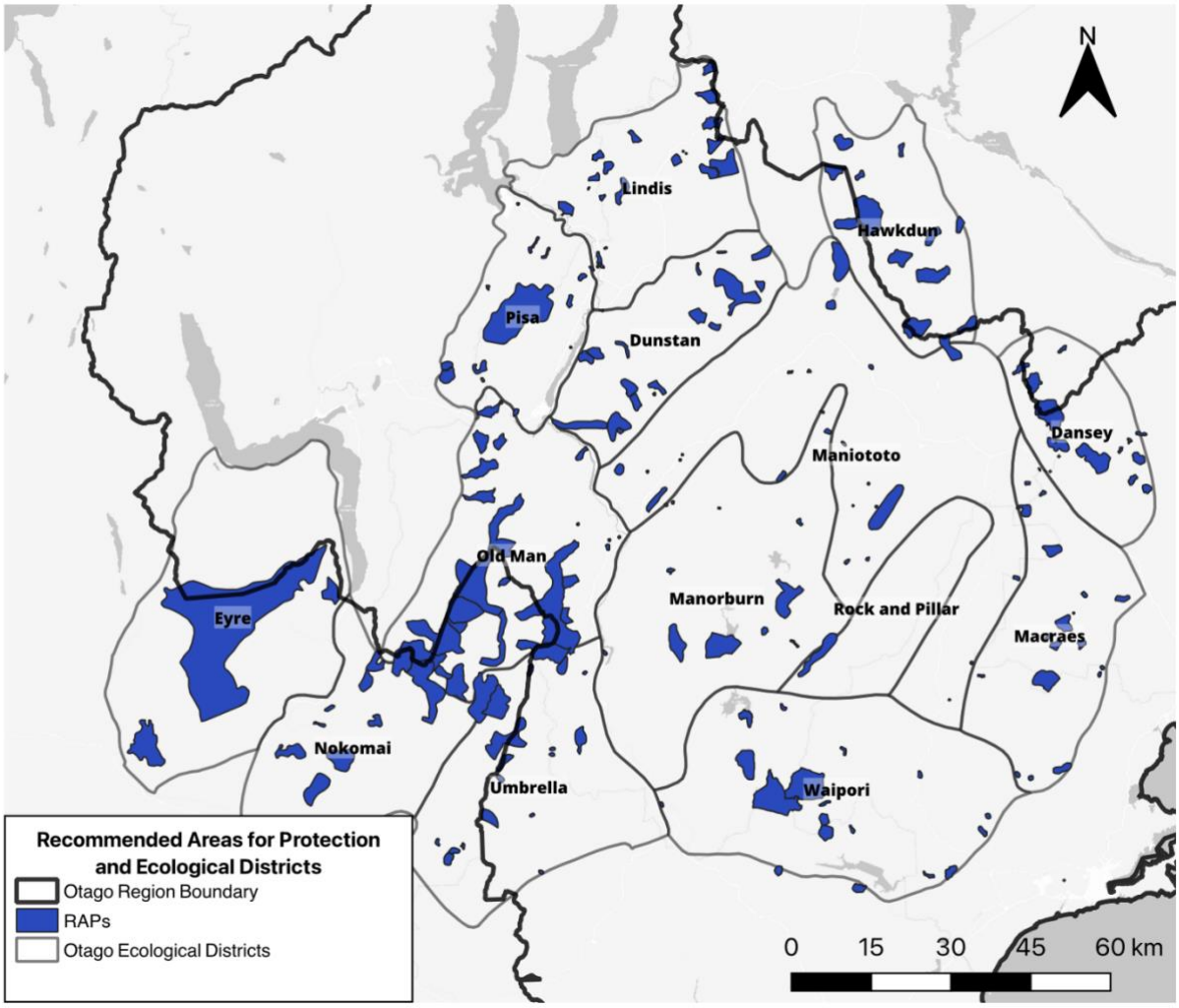

Figure 6BEFORE shows Recommended Areas for Protection (RAPs) in Ecological Districts (EDs) that lie at least partly in the Otago Region. EDs with no designated RAPs are not labelled, as not all EDs performed PNAP assessments.

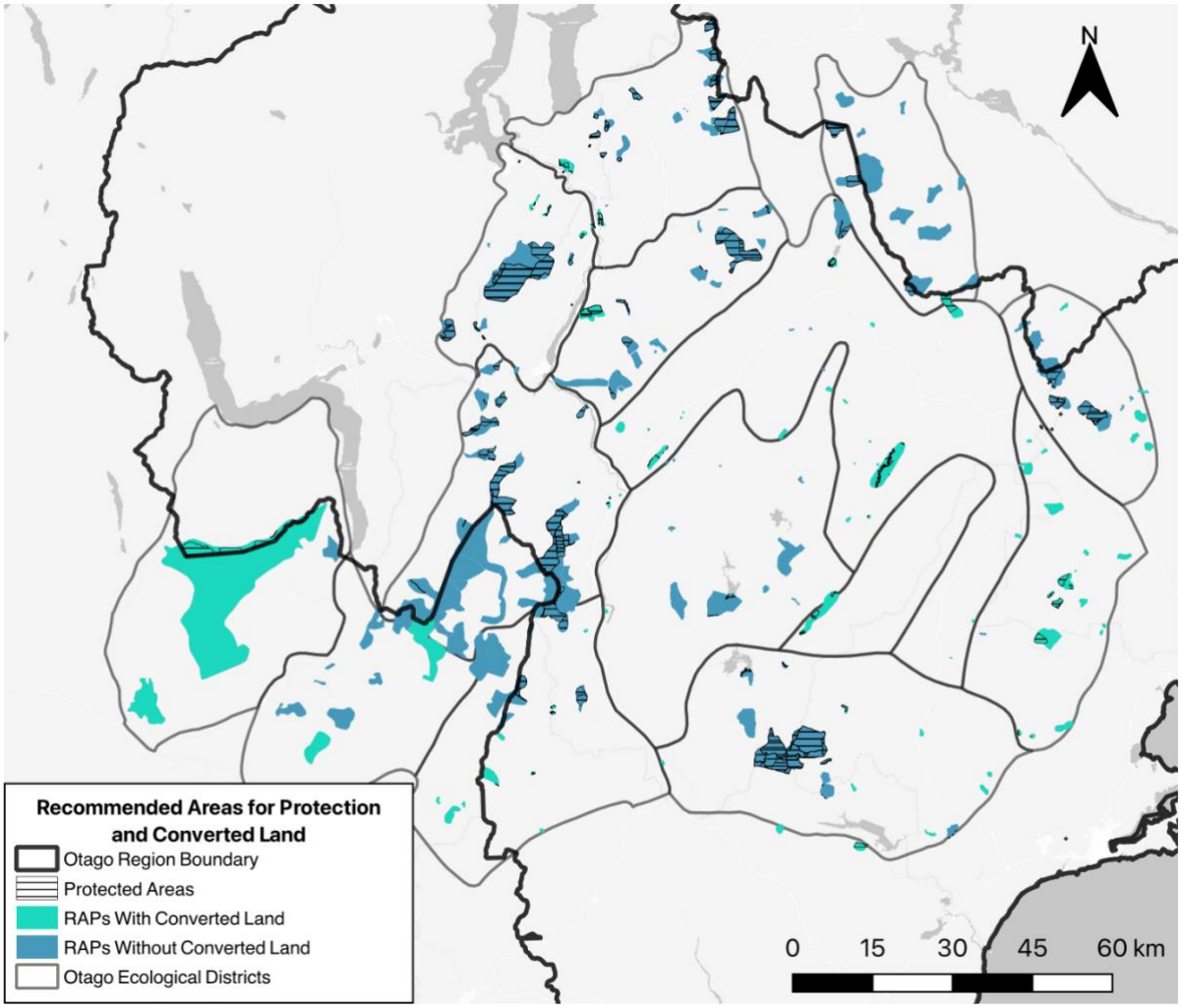

Figure 6AFTER shows what happened to Recommended Areas for Protection (RAPs) since their designation in the 1980s. The RAPs in aqua contain some converted land, while the blue RAPs have not experienced conversion. RAPs with horizontal stripes are now protected land (either Public Conservation Land (PCL), regional council reserves, or QEII). It is important to note that an Ecological District coloured aqua is not fully converted, it just contains some converted land.

Table 6 covers the Recommended Areas of Protection (RAP)[36] in Ecological Districts (ED) where at least part of the ED falls within the Otago Region. It shows nearly half of the RAPs experienced some level of conversion, but less than 5% of the land in RAPs experienced conversion.

Recommended Areas for Protection in Otago's Ecological Districts	
Total Number of RAPs	206
Total RAP Area (ha)	169,000
Number of RAPS with Converted Land	84
RAP Area Converted (ha)	5,600
RAP Area in PCL or QEII (ha)	63,000
RAP Area in PCL or QEII %	37%
RAP Area Converted %	4%
RAPs with Some Conversion %	41%

1.5 SUMMARY OF PART 1

The four recent large-scale land use decisions considered above speak directly to the situation of biodiversity in Otago. At each of the 4 major inflection points in the past 35 years – tenure review, Nature Heritage Fund purchases, QEII covenants, and Recommended Areas for Protection – the least threatened environments were protected and the most threatened environments were freeholded. This pattern of land ownership change and its resulting land use change will make Otago's biodiversity more vulnerable, not less.

There were various agencies at work, from central government through to private landowners, and we can observe a pattern of change. Though there are some bright spots on the biodiversity landscape, the situation of biodiversity in Otago has been made worse by land use decisions in recent history. Though the ORC had little, if any, role in the vast majority of these decisions, the ORC inherits biodiversity situation that results from them. The rest of this report considers Otago's biodiversity situation in light of the NPSIB's purpose of maintaining Aotearoa NZ's indigenous biodiversity.

[36] Note that some ED's called RAPs "areas of interest". We mapped areas of interest as RAPs.

Part 2 – The changing regulatory environment for Otago's biodiversity

This part of the report shifts into what the recent history of land use change in Otago means for Otago's biodiversity at present, and what it says about land and water use decisions going forward in the context of the National Policy Statement on Indigenous Biodiversity (NPSIB) gazetted 2023. It is important to note that the Government has signalled impending changes to management and designation of Significant Natural Areas (especially clause 3.10 and Appendix 1).[37] This report avoids those provisions, instead focusing on the purpose of the NPSIB (clauses 1.7 and 2.1), and the definitions of and principles for biodiversity offsetting and compensation (clause 1.6, Appendices 3 and 4).

This report focuses on the NPSIB's objective, definitions, and its how-to guides for achieving it (all discussed below). All of these have strong foundations in international guidelines,[38] domestic policy,[39] and case law.[40] As such NPSIB is not a new direction for biodiversity. It is more of a formalisation and cataloguing of rules and guidelines that already existed but were scattered across policies, strategies, and case law. As such there is little point to overturning the vast majority of of the NPSIB because even if the formal catalogue of rules and guidelines is repealed, the underlying case law and national policies still exist. The only difference is that the latter is harder to find and the NPSIB is easier to read.

For this part of the report, we consulted the international conservation biology literature; and important Aotearoa NZ documents we consulted include:

(a) National Policy Statement on Indigenous Biodiversity (NPSIB) gazetted 2023

(b) Scientific input on biodiversity offsetting and compensation to the NPSIB and Natural and Built Environments Act 2023 ("NBEA"). This comprised:

  (i) "Critical factors to maintain biodiversity: what effects must be avoided, remediated or mitigated to halt biodiversity loss" Report to the Biodiversity Collaborative Group.

[37] https://www.beehive.govt.nz/release/scope-significant-natural-areas-review-revealed

[38] https://www.forest-trends.org/publications/standard-on-biodiversity-offsets/

[39] NZ Biodiversity Strategy, at https://www.doc.govt.nz/nature/biodiversity/te-mana-o-te-taiao--aotearoa-new-zealand-biodiversity-strategy-2020/aotearoa-new-zealand-biodiversity-strategy/

[40] For a thorough review of biodiversity case law as of 2014 (much of which is echoed in the NPSIB), see Mark Christensen and Maree Baker-Galloway. "Biodiversity offsets – the latest on the law" 2014. *Resource Management Journal* (at https://static1.squarespace.com/static/650b8bab23e9e609fd42e851/t/65236c60d8511444bf0da3e6/1731352563633/full_biodiversity_article_extracted_nov_2013.pdf)

(ii) Walker et al. 2021 "What effects must be avoided, remediated or mitigated to maintain indigenous biodiversity?" *New Zealand Journal of Ecology*. 45(2).[41]

(iii) Greenhalgh et al 2022 "A framework for Biodiversity Compensation and Offsets for harm to indigenous biodiversity in Aotearoa New Zealand under the Natural and Built Environment Act". Report to Ministry for the Environment.

2.1 OBJECTIVE OF NPSIB – MAINTAIN INDIGENOUS BIODIVERSITY SO THAT THERE IS AT LEAST NO OVERALL LOSS IN INDIGENOUS BIODIVERSITY

The Objective of the NPSIB (clause 2.1) is:

> *(a) to maintain indigenous biodiversity across Aotearoa New Zealand so that there is at least no overall loss in indigenous biodiversity after the commencement date; and*
>
> *(b) to achieve this:*
>
> *(i) through recognising the mana of tangata whenua as kaitiaki of indigenous biodiversity; and*
>
> *(ii) by recognising people and communities, including landowners, as stewards of indigenous biodiversity; and*
>
> *(iii) by protecting and restoring indigenous biodiversity as necessary to achieve the overall maintenance of indigenous biodiversity; and*
>
> *(iv) while providing for the social, economic, and cultural wellbeing of people and communities now and in the future.*

To understand the NPSIB's Objective and what it means for Otago's biodiversity strategy going forward, one must first understand several definitions of terms within the biodiversity world of the RMA: significance (of effect and of biodiversity value), protect, maintain, and mitigation vs. offsetting vs. compensation. This report will first consider those, then move to the nitty-gritty of the NPSIB and what it means for the Otago biodiversity situation.

2.2 CONCEPTS CENTRAL TO BIODIVERSITY MANAGEMENT UNDER THE RMA

2.2.1 Significance of effect

Significance has at least 2 contexts in biodiversity policy – of effect and of habitat.

Significance of effect relates to resource consents. In essence, the decision-maker looks at all the evidence to determine whether the environmental effect will be less than minor, more than

[41] This is a summary of the Walker et al 2018 report. It is found at: https://newzealandecology.org/nzje/3445

minor, or significant.[42] It is important to note that more than minor is different from significant, as will become apparent in section 2.3.2 of this report.

The threshold for significance of effect can vary by ecological expert. Considering a population of indigenous lizards as an example (noting that Wildlife Act permits are also required), one expert might say the threshold for significance of effect is one lizard harmed or killed while another might say the threshold is local extinction. The local extinction threshold cannot be discerned in any relevant planning documents, nor in case law on s 6 (c). The international guidelines on biodiversity offsetting do define 'vulnerability' as 'at risk of imminent loss'.[43] [44] A high threshold, like local extinction, will be triggered more rarely than a lower threshold (like one lizard or half the population, say), and could allow nearly entire local populations to be killed off before an effect was considered significant (hence when actions to address significant effects would be required). This corresponds to the advice of Walker et al (2018, 2021), that a temporary loss increases risk of extinction and that in some case loss of individuals might be able to be addressed but this need to be done prior or simultaneously with the effect and not later.[45]

Based on research on biodiversity offsetting/compensation in Aotearoa NZ[46] [47] and overseas, we have not come across any other examples where the policy standard sets the bar between acceptable effect and significant effect as local extinction. Greenhalgh et al 2022 say "*more than trivial adverse effect is the bar where biodiversity compensation and biodiversity offset is required*."[48]

As if to address this wide variation between experts in the threshold for significance of effect, the NPSIB has established some ground-rules for what counts as a significant effect for a

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[42] See generally https://www.environmentguide.org.nz/rma/resource-consents-and-processes/notification-of-resource-consent-applications/when-are-adverse-effects-more-than-minor/
[43] https://www.forest-trends.org/bbop_pubs/glossary_2018/
[44] We reviewed the BBOP Standards for Biodiversity Offsetting to see if they set a threshold for significance of impact, as BBOP calls effect; we could not find a specified threshold for significance of impact. But BBOP does publish case studies of various countries' impact assessment practices (https://www.forest-trends.org/?s=impact+assessment). In none of those can we see local extinction as a proposed impact or a proposed threshold for significance of impact.
[45] Walker et al 2018 "Critical factors to maintain biodiversity: what effects must be avoided, remediated or mitigated to halt biodiversity loss" Report to the Biodiversity Collaborative Group. At 35
[46] Brown MA, Clarkson BD, Barton BJ, Joshi C 2013. Ecological compensation: an evaluation of regulatory compliance in New Zealand. *Impact Assessment and Project Appraisal*. 31: 34–44.
[47] Ann Brower, Laurien Heijs, Ruth Kimani, James Ross, Crile Doscher. (2017) "Compliance with biodiversity compensation on New Zealand's public conservation lands." *NZ Journal of Ecology*.
[48] Greenhalgh et al 2022 "A framework for Biodiversity Compensation and Offsets for harm to indigenous biodiversity in Aotearoa New Zealand under the Natural and Built Environment Act". Report to Ministry for the Environment. At 13 (available from page 161 here: https://environment.govt.nz/assets/publications/OIAD-639-Published-Response.pdf)

species that is known to be At Risk (Declining) or Threatened (see national threat categories in Appendix 3).

Scientific advice informed and drove the adoption of the cl 3.10(2) NPSIB listed effects that must be avoided to protect significant indigenous biodiversity. The summary[49] of the scientific advice to the NPSIB about which effects to avoid and why states:

> *Genuine and timely remediation is possible only for young ecosystems of highly mobile, common, generalist species and even their remediation can be protracted, leading to loss for many decades. … Avoidance is fundamental.*[50]

Similarly, Greenhalgh et al 2022 say (our footnotes within the quote provide their definitions for the terms):

> *Off Limit Indigenous Biodiversity*[51] [52] *is Aotearoa-New Zealand's most vulnerable biodiversity and is very unlikely to be replaceable. All activities are therefore required to avoid Primary Adverse Effects*[53] *on Off Limit Indigenous Biodiversity.*[54]

It is important to note that this clause of the NPSIB (3.10) refers to SNAs. But this seems to say that 3.10(2) effects on Threatened and At Risk (Declining) species would be significant anywhere, regardless of SNA registration in the District Plan. In an SNA, the 3.10(2) effects are *to be avoided*, but outside an SNA they are *significant*.

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[49] Walker et al. 2021 "What effects must be avoided, remediated or mitigated to maintain indigenous biodiversity?" *New Zealand Journal of Ecology.* 45(2). (This is a summary of the Walker et al 2018 report. It is found at: https://newzealandecology.org/nzje/3445.)

[50] Walker et al 2021 see footnote 49. At page 3

[51] Greenhalgh et al 2022 see footnote 48 (at page 25) define Off Limits Indigenous Biodiversity as:
An area of land that is one or more of the below … High value indigenous fauna habitat that is (i) not on Converted Land, and (ii) a habitat of a Threatened animal species ranked as Nationally Endangered or Nationally Critical.

[52] Greenhalgh et al 2022 see footnote 48 define Converted Land at page 9, as:

> *An area of land*
> *a. where indigenous vegetation has been fully removed, or*
> *b. that is otherwise wholly exotic pasture, but matagouri, mānuka, kānuka and/or tauhinu (Ozothamnus leptophyllus) shrubs less than 25 years old and/or silver tussock are present, or*
> *c. that is a plantation forest, or*
> *d. where wilding conifers or other exotic trees achieved full canopy closure prior to the new NBEA being operative, or*
> *e. where vegetation has been planted as part of a domestic garden, or as a shelterbelt, or for stormwater management or production purposes.*

[53] At page 12, Greenhalgh et al 2022 (see footnote 48) list Primary Adverse Effects as slightly more narrow but very similar 3.10(2) effects, as:

> *a. Loss of ecosystem representation and extent*
> *b. Disruption to sequences, mosaics or ecosystem function*
> *c. Fragmentation or loss of buffering or connectivity*
> *d. A reduction in population size or occupancy of Threatened or At Risk species*

[54] Greenhalgh et al 2022 see footnote 48. At page 9

2.2.1(a) Does a short-term reduction in population count as a significant effect?

We now consider a "*short term*" reduction in population size and occupancy. The ecological adviceto the NPSIB, in Walker et al 2018,[55] derscribed temporary, or short-lived, effects on Threatened, At Risk (Declining), and Data Deficient species and habitats as effects to *avoid*, as follows:

Table A. Biodiversity effects to *avoid*

Biodiversity level	Effect	Why	Examples
AVOID			
A1. Indigenous ecosystems and the habitats of indigenous species	Temporary or permanent fragmentation, reduction in size, and/or degradation of the ecological integrity[24] of: A1a. habitats used by Threatened, At Risk and Data Deficient species at any stage of their life cycle[25] A1b. habitats of indigenous species at the geographic or environmental limit of the species' known natural range[26], or outlier[27] populations	Most ecosystems and habitats of species, including the ones listed here, are unable to be restored or remediated in a timely manner, if at all. Their loss directly removes ecosystems, communities. It also removes individuals from species populations. Therefore populations are reduced immediately, and the likelihood of the future persistence of species is compromised by reduced habitat availability. Habitat fragmentation often involves both habitat destruction and the subdivision of previously contiguous habitat. Subdivision disconnects ecosystems and alters their physical and biological properties and processes.	Temporary or permanent fragmentation, or reduction in size • Indigenous shrubland is sprayed with herbicide. • Indigenous vegetation is flooded. • Indigenous trees are felled. • Wetlands are drained, cultivated, and/or planted. • Streams or rivers are diverted or obstructed. • Low-stature breeding habitat for banded dotterel is cultivated and developed into taller vegetation. • Dry, bouldery lizard habitat is irrigated or subjected to irrigation overspray, leading to development of taller vegetation.

Regarding habitat, the ecological advice distinguishes between immediate effects balanced by future possibilities. "*Populations are reduced immediately*" while "*future persistence of species is compromised by reduced habitat availability*." And the "*subdivision of previously contiguous habitat … disconnects ecosystems and alters their physical and biological properties and processes*."[56] It is not therefore simply a question of replacing the habitat and the species will bounce back.

The ecological advice to the NPSIB, in Walker et al 2021, also recommends avoiding temporary reductions in population sizes to species at the geographic limit of the known range, as follows:[57]

[55] Walker et al 2018 see footnote 45. At page 24
[56] Walker et al 2018 see footnote 45. At page 24
[57] Walker et al 2018 see footnote 45. At page 32

Biodiversity level	Effect	Why	Examples
AVOID			
A3. Species	Temporary or permanent reduction in the size of a population of: A3a indigenous species at the geographic or environmental limit of the species' known natural range, or outlier populations	It maintains the range of genetically based phenotypic variation available for future selection and viability under changing climates and in response to extreme events.	• Individuals of a plant species are removed from a population at its southern geographic limit, or from the population occupying the driest site in its range. • A lizard population is transferred from near the dry limit of its present range to a wetter site. • Raising lake levels reduces the number of southern rātā trees in an outlier population at the margins of an intermontane basin.

2.2.2 Significance of indigenous vegetation or fauna habitat (RMA section 6c)

Section 6c of the RMA is of central importance to biodiversity. It says that activities shall "recognise and provide for … matters of national importance", including "the protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna"

There was a long debate in the Aotearoa NZ ecological literature about where to set the threshold for significance and how to identify s. 6c areas. Some argued thresholds should be set such that only top-quality habitat should be deemed significant.[58] Others argued the thresholds should be lower, more inclusive of non-pristine habitat inhabited by Threatened species because Aotearoa NZ's ecosystems are almost universally modified and degraded in some way.[59]

If policy only protected pristine "top-quality" areas that had not changed since 1840, Aotearoa NZ would protect very little, and the types of habitat protected would be heavily tilted towards areas that are hard to reach or less desirable to live in, because they are the areas where humans have had less of an impact.[60] Financially, these "pristine" areas would be cheaper to buy or covenant because land is often cheaper in remote areas where development is difficult or less desirable and restoration could be possible. Setting the significance bar this high would not maintain (achieve no overall reduction in) "*the full range and extent of habitats used or occupied by indigenous biodiversity*"[61].

[58] David A. Norton and Judith Roper-Lindsay. (2004) "Assessing significance for biodiversity conservation on private land in New Zealand." *New Zealand Journal of Ecology.* Vol. 28, No. 2 (2004), pp. 295-305
[59] Walker et al 2008. "Halting indigenous biodiversity decline: ambiguity, equity, and outcomes in RMA assessment of significance." *New Zealand Journal of Ecology.* Vol. 32, No. 2. pp. 225- 237
[60] Walker et al 2021 see footnote 45. At Table 1, Section 1.1.
[61] Clause 1.7(1)(iv) NPSIB.

Further, restoration potential is relevant to Principles 3 and 4 of NPSIB Appendices 3 and 4, as discussed below in this report. Indeed some ecologists say degraded habitat of significant species can be more important to protect and/or restore:

> *Fragmentation, loss of connectivity, and the consequent disruption of processes and metapopulations appear to accelerate rapidly once indigenous habitat in a landscape decreases below about 30% of original cover (e.g. Andrén 1994; Fahrig 2002). Incremental losses of habitat matter more once habitat loss has become advanced in a landscape: progressive losses have increasingly serious effects on species diversity and ecological processes (e.g. Tilman et al. 1994; Rosenzweig 1995; Hanski 1998).*[62]

2.2.3 Protect

The ordinary meaning of protect is "*to keep safe from harm*."[63] This definition is supported in Aotearoa NZ case law.[64] Keeping safe from harm might require ecological assessment to determine if it is met (which is typical in environmental policy); but it is clear and simple.

If "*protect*" is taken to mean to "*keep safe from harm*", then the NPSIB takes the approach that neither offsetting nor compensation in accordance with Appendices 3 & 4 discussed later in this report achieves protection.[65] Rather, offsetting and compensation are designed to achieve what the NPSIB calls "*maintenance*" (clause 1.7 covered below); while the NPSIB describes protection in Policy 7 and clauses 3.8 - 3.12.

2.2.4 Maintain

Clause 1.7 sets out the Purpose of the NPSIB as maintaining biodiversity. Clause 2.1 and its attendant definitions set out the how-to guide for achieving it. In contrast to Protection, where the how-to guide in 3.10(2) is a list of effects to avoid, maintaining biodiversity is defined in clause 1.7(1) as requiring:

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[62] Walker et al (2008) see footnote 59.

[63] The OED online defines protect as: 1) keep safe from harm or injury; (2) preserve or guarantee by means of formal or legal measures; (3) aim to preserve (a threatened species or area) by legislating against hunting, collecting, or development.

[64] *Royal Forest and Bird Protection Scoiety of NZ Inc v New Plymouth District Council* [2015] NZEnvC 219 at [63]

[65] NPSIB Clause 3.10(2) serves as the how-to guide for achieving protection of SNAs:

> *(2) Each of the following adverse effects on an SNA of any new subdivision, use, or development must be avoided, except as provided in clause 3.11:*
>
> *(a) loss of ecosystem representation and extent*
> *(b) disruption to sequences, mosaics, or ecosystem function:*
> *(c) fragmentation of SNAs or the loss of buffers or connections within an SNA*
> *(d) a reduction in the function of the SNA as a buffer or connection to other important habitats or ecosystems*
> *(e) a reduction in the population size or occupancy of Threatened or At Risk (declining) species that use an SNA for any part of their life cycle.*

(a) the maintenance and at least no overall[66] reduction of all the following:

(i) the size of populations of indigenous species

(ii) indigenous species occupancy across their natural range

(iii) the properties and function of ecosystems and habitats used or occupied by indigenous biodiversity

(iv) the full range and extent of ecosystems and habitats used or occupied by indigenous biodiversity

(v) connectivity between, and buffering around, ecosystems used or occupied by indigenous biodiversity

(vi) the resilience and adaptability of ecosystems; and

(b) where necessary, the restoration and enhancement of ecosystems and habitats.

The how-to guide for Maintain is a hierarchy of ways to manage effects (clause 1.6, emphasis added):

> ***effects management hierarchy*** *means an approach to managing the adverse effects of an activity on indigenous biodiversity that requires that:*
>
> *(a) adverse effects are avoided where practicable; then*
>
> *(b) where adverse effects cannot be avoided, they are minimised where practicable; then*
>
> *(c) where adverse effects cannot be minimised, they are remedied where practicable; then*
>
> *(d) where* ***more than minor*** *residual adverse effects cannot be avoided, minimised, or remedied, biodiversity offsetting is provided where possible; then*
>
> *(e) where biodiversity offsetting* ***of more than minor*** *residual adverse effects is not possible, biodiversity compensation is provided; then*
>
> *(f) if biodiversity compensation is not appropriate, the activity itself is avoided*[67]

This expands the toolbox for biodiversity management to include offsetting and compensation.[68]

The definition of compensation[69] (or offsetting) specifies that it "*meets the requirements Appendix 4*" (or Appendix 3 for offsetting). Hence it is fairly clear the Principles of Biodiversity Compensation in Appendix 4 (and offsetting in Appendix 3) are the how-to guide for the bottom

[66] The word 'overall' presents interesting questions of scale at which one is to measure reduction. The scale of reduction could range from local population to ecological community to District to Region to national. The larger the scale at which reduction is measured, the less likely one is to find a reduction, let alone a significant reduction or effect.

[67] NPSIB clause 1.6

[68] Offsetting and compensation entered the RMA, in section 104(1)(ab), in 2017. Section 104 neither requires the applicant to offer an offset or compensation, nor amends the Purpose of the RMA to add offsets/compensation to the mitigation hierarchy. Instead Section 104(1)(ab) directs that the consenting authority: "*must have regard to any measure proposed or agreed to by the applicant for the purpose of ensuring positive effects on the environment to offset or compensate for any adverse effects on the environment that will or may result from allowing the activity*."

[69] NPSIB clause 1.6

of the expanded Effects Management Hierarchy. The how-to guides for them are in Appendices 3 and 4, which are almost identical except for Principle 3.

2.2.4 Mitigation vs offsetting vs compensation – what is the difference?

In short, mitigation is actions to reduce the adverse environmental effects *at the site of impact*. Offsetting and compensation are *off-site* actions that *do not reduce the on-site effect*. Offsetting and compensation are aimed at achieving positive biodiversity benefits such that there is no overall reduction in biodiversity on a larger scale. But they do not reduce the effect at the impact site for the population(s) affected.

The Purpose of the RMA defines Aotearoa NZ's mitigation hierarchy as "*avoiding, remedying, or mitigating any adverse effects on the environment*" (section 5.2.2.c).

In a recent article called *Defining Mitigation: an ecology perspective,* a group of consulting ecologists use 2 fictional lizard populations to illustrate how and why neither offsetting nor compensation is mitigation. They write (emphasis added):

> "*The differences that we have observed in practice appear to centre on whether "mitigation" in an RMA context:*
>
> *• is restricted to measures that reduce the severity of adverse effects on the specific ecological values, affected by the activity, at the point of impact (e.g. a known population of a particular species of lizard: "Population A"); or*
>
> *• extends also to effects management measures on the same types of ecological values outside the point of impact that have not been adversely affected by project activities but occur within a given "site" (e.g. a different population of the same species of lizards: "Population B").*
>
> *This latter view seemingly considers that an overall reduction in the severity of effect on the ecological values at the point of impact (Population A) could conceivably be achieved by benefiting that same type of ecological value elsewhere (Population B). Under this interpretation the term "point" of impact is effectively substituted with "site" of impact, where "site" is typically defined as another area within the same contiguous habitat, the general area or most commonly a property boundary. ...*[70]
>
> *Under this basic example of two populations of the same species of lizard, the effects on Population A are not alleviated by providing some benefits to Population B elsewhere on site. Specific measures to alleviate effects on Population A are required for those measures to be considered as mitigation. We therefore consider* ***mitigation to be restricted to those effects management measures that reduce the severity of adverse effects on ecological values specifically impacted****, in this case the lizards within Population A. We do not consider "mitigation" to extend to effects management*

[70] Omitted part of quote follows: "Maseyk and others (2018) define the "impact site" and the 'offset site' but not 'point of impact'. While this may appear to encourage thinking in terms of 'site' rather than point of impact, crucially, impact site is defined as 'the area of site where the activity causing biodiversity losses occurs' which is essentially the point of impact and consistent with our approach."

measures (sometimes within the site) that have positive effects on habitat, plants or animals that are not directly harmed by the activity." [71]

In other words, neither offsetting nor compensation counts as mitigation, because neither addresses the actual impacts on the lizards or habitat directly affected, 'Population A'. The authors conclude:

> "*These positive effects [from offsetting and compensation]* ***contribute to the overall narrative in the justification of a proposal; however, they do not reduce the level of adverse ecological effect*** *(as mitigation does). In terms of the distinction between offset or compensation, both are 'positive effects' and do not reduce the overall level of adverse effect."*[72]

This suggests that, though the decision-maker must have regard to an offer of compensation and this offer does contribute to a broader "*narrative*" about the proposed activity, a biodiversity compensation package is irrelevant to the question of significance of on-site effects.

2.3 PRINCIPLES FOR BIODIVERSITY COMPENSATION / OFFSETTING, APPENDIX 4 / 3

The report now turns to the Principles. Because Principle 3 is the only one that is substantively different, we will start with biodiversity compensation (Appendix 4), then consider Principle 3 for offsetting (Appendix 3).

The international literature notes that compensation and offsetting are not always effective. Greenhalgh et al (2022) summarise the international literature as follows:

> *We agree with Maron et al. (2012) that biodiversity offsetting and compensation places substantial faith in the ability of ecological restoration to recover lost biodiversity; that most ecological expectations for restoration embedded in offset or compensation policies remain unsupported by evidence; and there are few ecosystems in which exchange of habitat removal for ecological restoration can potentially deliver 'no net loss'.*[73]

Clause 3.10(4) says, in reference to SNAs, that if compensation or offsetting is applied, the applicant is required to demonstrate that they have ***"complied with principles 1 to 6*** *in Appendix 3 and 4 and* ***had regard to the remaining principles*** *in Appendix 3 and 4, as appropriate."*[74] It is tempting to conclude that 'comply with' for Principles 1-6 vs 'have regard

[71] Quinn et al. 2021. "Defining Mitigation: an ecology perspective." *Resource Management Journal*. (at: https://natlib.govt.nz/records/45850403?search%5Bi%5D%5Bprimary_collection%5D=findNZarticles&search%5Bi%5D%5Bsubject%5D=Environmental+impact+analysis&search%5Bpath%5D=items)
[72] Quinn et al 2021 see footnote 71, at page 10.
[73] Greenhalgh et al 2022 see footnote 48. At page 3
[74] Note that NPSIB clause 3.10(4)(b) is talking about how to manage adverse effects not listed in cl 3.10(2) using biodiversity offsetting and biodiversity compensation within an SNA.

to' for Principles 7-13 is only true for SNAs. But international offsetting and compensation policy does not restrict adherence to offsetting and compensation principles to certain environments; rather if compensation/offsetting are used, the principles must be met. As such, the same standard of compliance with the Principles should apply whenever biodiversity offsetting and biodiversity compensation are used, whether under cl 3.10 or under cl 3.16 of the NPSIB.

The Appendix 4 Principles set up a robust framework against which compensation proposals are to be measured. This principled approach contrasts previous research on and experience with compensation to date, which suggests compensation has been ad hoc with a huge spectrum of compensation proposals put forward. Ad hoc development of compensation proposals risks failing to achieve planned outcomes and failing to maintain indigenous biodiversity. Indeed Aotearoa NZ studies have found only about 2/3 of promised compensation occurs.[75] [76]

Given the pre-NPSIB research findings of less-than-perfect compliance[77] with less-than-always-ecologically-effective compensation plans,[78] [79] full compliance with Principles 1-6 is of paramount importance to achieving the Objective of maintaining indigenous biodiversity. If a proposal does not meet Principles 1-6 and there is not evidence that regard has been had to Principles 7-13, we do not think it can be consistent with clause 1.7's definition of "*maintain*."

Principles 1 and 2 are about whether it is appropriate to consider compensation in the first place; if 1 and 2 are met then the others come into play. Compensation that does not both address and outweigh the adverse effects will not be effective (Principle 3). Compensation that is no better than what was already happening will not be effective (Principle 4). And if compensation inadvertently harms other ecological values, or does not persist, it will not be effective (Principles 5 and 6).

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[75] Brown MA, Clarkson BD, Barton BJ, Joshi C 2013. Ecological compensation: an evaluation of regulatory compliance in New Zealand. *Impact Assessment and Project Appraisal*. 31: 34–44.
[76] Ann Brower, Laurien Heijs, Ruth Kimani, James Ross, Crile Doscher. (2017) "Compliance with biodiversity compensation on New Zealand's public conservation lands." *NZ Journal of Ecology*.
[77] Ann Brower, Laurien Heijs, Ruth Kimani, James Ross, Crile Doscher. (2017) "Compliance with biodiversity compensation on New Zealand's public conservation lands." *NZ Journal of Ecology*.
[78] Walker et al 2009. "Why biodiversity barter fails." *Conservation Letters*. (https://doi.org/10.1111/j.1755-263X.2009.00061.x)
[79] Brower et al. 2001. "Consensus versus Conservation in the Upper Colorado River Basin Recovery Implementation Program." *Conservation Biology*. (https://doi.org/10.1046/j.1523-1739.2001.0150041001.x)

2.3.1 Principle 1

> *(1) Adherence to effects management hierarchy: Biodiversity compensation is a commitment to redress more than minor residual adverse effects, and should be contemplated only after steps to avoid, minimise, remedy, and offset adverse effects are demonstrated to have been sequentially exhausted.*

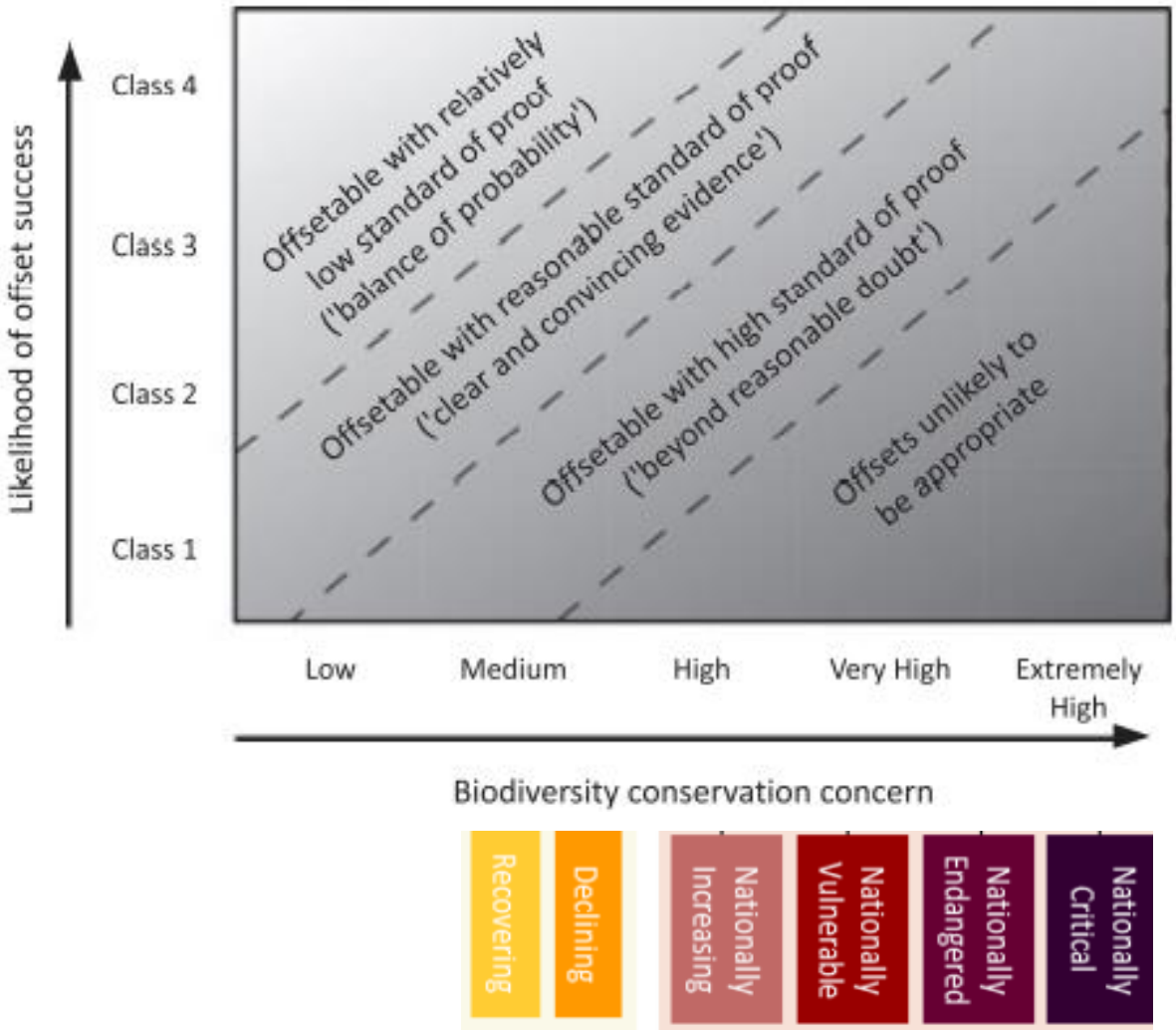
This repeats and emphasises the Effects Management Hierarchy (clause 1.6), and says an applicant cannot jump straight to offsetting or compensation. This is important because, as noted above, it can be cheaper to covenant land remote from the impact site (which by definition is desirable for development) than to mitigate or remedy effects on-site.

2.3.2 Principle 2

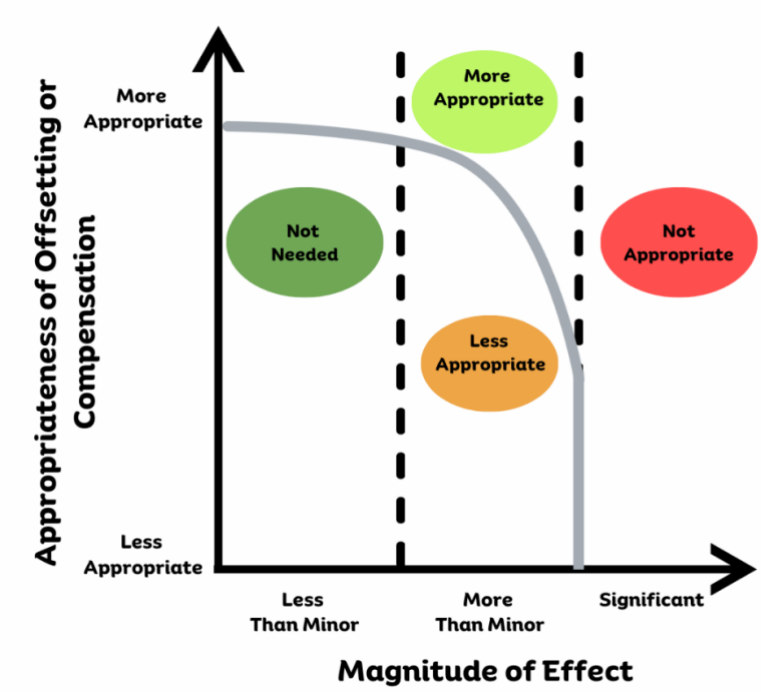
> *(2) When biodiversity compensation is not appropriate: Biodiversity compensation is not appropriate where indigenous biodiversity values are not able to be compensated for. Examples of biodiversity compensation not being appropriate include where:*
>
> *(a) the indigenous biodiversity affected is irreplaceable or vulnerable;*
>
> *(b) effects on indigenous biodiversity are uncertain, unknown, or little understood, but potential effects are significantly adverse or irreversible;*
>
> *(c) there are no technically feasible options by which to secure a proposed net gain within acceptable timeframes.*

The international literature speaks of the relationship between vulnerability of biodiversity and the appropriateness of offsetting/comensation. In short, the more rare and vulnerable the species, the less likely offsetting/compensation is to work, and the less appropriate it is. Pilgrim et al[80] express it in the following graph to which we have added some of Aotearoa NZ's threat classes (threatened classes and two of the at risk classes) for rough reference.

[80] Pilgrim et al. 2012. "A process for assessing the offsettability of biodiversity impacts." *Conservation Letters*. (https://doi.org/10.1111/conl.12002)



In accordance with the definition of the Effects Management Hierarchy (clause 1.6), we offer another modification to Pilgrim et al. Below we use magnitude of effect instead of Pilgrim's biodiversity conservation concern.



The science advice on offsetting and compensation, in Greenhalgh et al (2022), agrees with Pilgrim et al, and specifies that area-for-area compensation is only effective for "*common and not-threatened*" species that can be replaced with certainty. Greenhalgh et al (2022) write:

> *Developing Indigenous Ecosystems are the only ecosystems that can be exchanged in this way, because they comprise or include common and not-threatened indigenous species that can be replaced with reasonable certainty.*[81]

2.2.3 Principle 3(compensation)

> *Scale of biodiversity compensation: The indigenous biodiversity values lost through the activity to which the biodiversity compensation applies are addressed by positive effects to indigenous biodiversity (including when indigenous species depend on introduced species for their persistence), that outweigh the adverse effects*

Despite its title of Scale, Principle 3 is more complex than size-based evaluation.

Based on the international literature around compensation, 'scale' in this type of context refers to the compensation proposal in a more holistic way. Scale asks broad questions like – is the proposal itself of sufficient compensatory magnitude to *address* the values lost, and *outweigh* the adverse effects.

Principle 3 rests on *address and outweigh*. This includes extent and nature of *active* protection at the compensation site. Active protection includes rehabilitation and restoration activities that exceed the passive protection offered by a covenant. This could include weed control, predator control or exclusion, species reintroductions, breeding programmes, and the like. This

[81] Pages 13-14 Greenhalgh et al 2022 see footnote 48

broader interpretation of scale, to include active protection in order to address and outweigh impacts, is necessary to align with the NPSIB clause 2.1 objective of maintaining indigenous biodiversity to achieve "*at least no overall loss in indigenous biodiversity*".

The international literature around biodiversity compensation considers uncertainty. Many authors have commented (unsurprisingly) that greater uncertainty increases the risk of biodiversity loss. Some have explored using high 'multipliers' to address and compensate more for more uncertainty.[82]

However the multiplier logic is not an answer to uncertainty in all situations. Walker et al (2009) note "*the basis for multipliers seems unsound: providing several times something different cannot replace a lost species or unique ecosystem; restoring something to higher abundance later may not compensate for consequences of a loss now. Similarly, financial insurance can neither restore the unrestorable nor remedy permanent loss*."[83]

Further, multipliers do not work for compensation under the NPSIB because the NPSIB did not adopt an area-for-area, or size-based, compensation model.[84] As discussed below, the NPSIB approach is more about addressing and outweighing the specific effects that will occur rather than providing several times the habitat of an affected species to compensate for population reductions at the impact site.

2.2.3(offsetting) Offsetting Principle 3 (Appendix 3)

> *(3) Net gain: This principle reflects a standard of acceptability for demonstrating, and then achieving, a net gain in indigenous biodiversity values. Net gain is demonstrated by a like-for-like quantitative loss/gain calculation of the following, and is achieved when the indigenous biodiversity values at the offset site are equivalent to or exceed those being lost at the impact site:*
>
> *(a) types of indigenous biodiversity, including when indigenous species depend on introduced species for their persistence; and*
>
> *(b) amount; and*
>
> *(c) condition (structure and quality).*

The primary difference between compensation and offsetting lies in Principle 3. Offsetting requires like-for-like measures, while compensation allows for more flexibility. Offsetting also requires a higher level of certainty than compensation. That certainty is expressed in loss/gain

[82] Moilanen, A., van Teeffelen, A., Ben-Haim, Y. & Ferrier, S. (2008) How much compensation is enough? Explicit incorporation of uncertainty and time discounting when calculating offset ratios for impacted habitat. *Restoration Ecology* 16.
[83] Walker et al. 2009 see footnote 78.
[84] Pages 13-14 Greenhalgh et al 2022 see footnote 48

calculations. While there is not yet an agreed-upon method for loss/gain calculations, the ecological community is developing ideas. Rigour in these calculations is important, as has been observed as follows: *"Models of insufficient ecological and mathematical robustness can perpetuate systematic biodiversity losses and distract decision-makers from discussions regarding real-world ecological consequences of development."*[85]

2.2.4 Principle 4

> *(4) Additionality: Biodiversity compensation achieves gains in indigenous biodiversity above and beyond gains that would have occurred in the absence of the compensation, such as gains that are additional to any minimisation and remediation or offsetting undertaken in relation to the adverse effects of the activity.*

Another risk of area-for-area covenanting for offsetting/compensation follows this logic:

1) there is usually a reason 'pristine' sites are not developed
2) often that reason is restrictions on land clearance or development in the form of district plan rules, Crown pastoral lease rules, or regional water allocation restrictions
3) covenanting land that already has development restrictions on it does not achieve additional protection over and above restrictions already in force
4) one can say that district plan rules can change, but in general they are ratcheting up not down
5) one could also say that district plan rules are sometimes ignored, with people developing land without consent. The same is true for covenants, with landowners sometimes violating the terms of the covenants.[86]

In sum, averting loss in an area that is more pristine (and very likely cheaper) than the impact site is unlikely to achieve additionality.

Greenhalgh et al 2022 reviewed the international literature on averted loss compensation, which is designed to protect habitat from future loss as follows:

> *Biodiversity offsets and compensation often allow increased legal protection and/or new management of existing ecosystems to be exchanged for the permanent loss of others. The logic of this 'averted loss' (or 'avoided loss') paradigm and approach is that*

[85] Ilse Corkery, Laurence P. Barea, Justyna Giejsztowt, Fleur J.F. Maseyk, Cassie Mealey. 2023 "Poorly designed biodiversity loss-gain models facilitate biodiversity loss in New Zealand." *NZ Journal of Ecology*. 47(1). At page 1 (found at https://newzealandecology.org/nzje/3548.pdf)
[86] Brower et al. 2020. "South Island high country: Let's get it right this time." *NZ Journal of Ecology*. (https://dx.doi.org/10.20417/nzjecol.44.11)

the protected or managed biodiversity might otherwise be lost in the future due to unregulated effects (e.g. through clearance, or through deterioration in the absence of management). International experience is that 'averted loss' biodiversity exchanges perversely 'lock in' or accelerate rates of habitat loss (Quétier & Lavorel, 2011; Bull et al. 2013; Maron et al. 2015; Simmonds et al. 2020), by providing for continued expansion of the footprint of development and further direct clearance or removal of indigenous flora and fauna species' habitat (e.g. Gibbons et al. 2018; zu Ermgassen et al. 2021). Because maintaining the extent of flora and fauna habitat is critical for maintaining the ecological integrity of indigenous biodiversity (Andren 1994; Tilman et al. 1994, Hanski 2005, BanksLeite et al. 2020), an averted loss approach enables continued biodiversity decline.

In situations where there is no imminent threat of loss, averted loss compensation on freehold land does not achieve additionality of protection.[87] This is because loss at the impact site, combined with protection of the status quo at the averted loss compensation site, still adds up to loss.

By way of comparison, the averted loss compensation cannot achieve no net loss because

-1 + 0 = -1.

2.2.5 Principle 5

(5) Leakage: Biodiversity compensation design and implementation avoids displacing harm to other indigenous biodiversity in the same or any other location.

Self-explanatory

2.2.6 Principle 6

(6) Long-term outcomes: Biodiversity compensation is managed to secure outcomes of the activity that last as least as long as the impacts, and preferably in perpetuity. Consideration must be given to long-term issues around funding, location, management, and monitoring.

Previous research finds compliance with biodiversity compensation promises on private[88] and conservation[89] land is 67% at best, suggests that long-term outcomes of compensation or

[87] It is tempting to assume that averting loss by protecting freehold land is disproportionately valuable to conservation, but just because land is privately held does not mean it can be developed easily. Private land that is under restrictive planning rules is already highly protected.
[88] Brown et al 2013. See footnote 75
[89] Brower et al 2017. See footnote 76

offsetting are hard to guarantee, especially as time elapses because long-term compliance will likely be lower.

2.2.7 Principle 7

> *(7) Landscape context: Biodiversity compensation is undertaken where this will result in the best ecological outcome, preferably close to the impact site or within the same ecological district. The action considers the landscape context of both the impact site and the compensation site, taking into account interactions between species, habitats and ecosystems, spatial connections, and ecosystem function.*

Principles 7-13 are "*have regard to*" principles, while 1-6 are "*comply with*" principles (clause 3.10(2)).

Principle 7 is clear. The best ecological outcome is achieved with compensation nearby or at least in the same Ecological District. By extension, any other arrangement will not be the best outcome.

Principle 7 accords with DOC guidelines, which emphasise proximity and the landscape context as important in distinguishing between mitigation and offsetting/compensation. DOC guidelines specify for offsetting actions to achieve no net loss, they should be nearby the point of impact.

According to DOC: "*where possible, impacts of development on biodiversity that cannot be avoided, remedied or mitigated at one site (impact site) are 'offset' by enhancing a separate nearby site (offset site), to achieve no net loss or a net gain in biodiversity.*"[90]

The DOC offsetting guidelines expand on the above this as follows:[91]

> *"The size and location of the offset site (or sites) and the management activities designed to achieve no net loss should take into account a much broader biodiversity context than focussing solely on demonstrating no net loss for individual components of biodiversity. This is because long-term viability of biodiversity at any given site critically depends on its interaction with other components of the wider landscape. This is referred to by BBOP as the landscape context. Some of the reasons why this is important are:*
>
> *• Connectivity. A species' feeding, mating, colonising or dispersal behaviour might require habitats to be connected. Restoration of an isolated site may not address a species' overall ecological requirements;*

[90] https://www.doc.govt.nz/nature/biodiversity/biodiversity-offsetting/

[91] Dept of Conservation. "Guidance on Good Practice in Biodiversity Offsetting in New Zealand". August 2014. Pages 28-29

• Proximity. In general, nearby impact and offset sites are more likely to contain similar biodiversity features (e.g. in the same ecological district, catchment or other natural boundary);[92]
• Ecosystem function. It may not be possible to achieve no net loss at an ecosystem level if individual components, which normally all occur within the same site, are offset at a number of different sites, or if the choice of site is too small;
• Local importance. Conservation priorities can be locally or regionally specific. For example, a plant community may not be nationally rare but may be locally rare (e.g. because it only occurs at one site in the local area). This would make it important to replace locally; and
• Future proofing. The offset site should consider biodiversity aspirations and objectives for the area and future likely developments and emerging threats."

DOC seems to be emphasising 2 things here: (1) offsets and compensation are not mitigation; and (2) offsets or compensation need to be 'nearby' the original point of impact. In order to address and outweigh a loss, the compensatory actions should be as close as possible to the impact site).

The proposed Otago Regional Policy Statement includes the NPSIB Principles for Offsetting and Compensation as an Appendix. But the Canterbury Regional Policy Statement (which came into force before the NPSIB did) gives a bit more justification for why proximity is important in offsetting and compensation, in its section on the "*Limitations on the use of biodiversity offsets*":

> "*The most desirable form of offsetting will be achieved in situ or adjacent to the area affected. Only this way will it be likely to minimise the impacts on ecosystem functioning and the complexity of the component biodiversity with respect to species composition, habitat structure and the context of the area within the wider landscape. Offsetting at a different location is unlikely to be able to replicate all such aspects of the original area.*"[93]

As such, the distinction between offsetting/compensation and mitigation is particularly stark in cases where compensation is remote from the original point of impact.

2.2.8 Principle 8

> *(8) Time lags: The delay between loss of, or effects on, indigenous biodiversity values at the impact site and the gain or maturity of indigenous biodiversity at the compensation site is minimised so that the calculated gains are achieved within the consent period or, as appropriate, a longer period (but not more than 35 years).*

[92] The following is the text of the footnote in the original document: "*There are, however, instances where the best biodiversity gains are made at a remote site. For example, pest control at a remote breeding location of a bird whose feeding habitat is affected by development elsewhere.*"
[93] CRPS Page 151: Chapter 9, 9.3.6 Limitations on the use of biodiversity offsets.

Walker et al (2018)[94] specifically identified that for Threatened species, gains should be achieved prior or simultaneously with when impact from development is felt.

2.2.9 Principle 9

> *(9) Trading up: When trading up forms part of biodiversity compensation, the proposal demonstrates that the indigenous biodiversity gains are demonstrably greater or higher than those lost. The proposal also shows the values lost are not to Threatened or At Risk (declining) species or to species considered vulnerable or irreplaceable.*

Trading up is a situation where the offset or compensation benefits are are greater than those affected adversely by the proposal. An example of this would be where an At Risk (recovering) frog species will be adversely affected, and the compensation benefits an At Risk (declining) species. It is important to note that the losses cannot affect a species that is At Risk (declining) or worse on the national threat category scale.[95]

2.2.10 Principle 10

> *(10) Financial contributions: A financial contribution is only considered if:*
>
> *(a) there is no effective option available for delivering biodiversity gains on the ground; and*
>
> *(b) it directly funds an intended biodiversity gain or benefit that complies with the rest of these principles.*

Principle 10, about financial contributions in lieu of a more ecologically oriented offset or compensation, is fairly self-explanatory.

2.2.11 Principles 11 & 12 and Te Ao Māori

> *(11) Science and mātauranga Māori: The design and implementation of biodiversity compensation is a documented process informed by science, and mātauranga Māori.*
>
> *(12) Tangata whenua and stakeholder participation: Opportunity for the effective and early participation of tangata whenua and stakeholders is demonstrated when planning for biodiversity compensation, including its evaluation, selection, design, implementation, and monitoring.*

The science aspect of Principle 11 and the stakeholder aspect of Principle 12 are self explanatory. The *mātauranga Māori* aspect of 11 and the tangata whenua aspect of 12 require consideration as to what the process of biodiversity offsetting and compensation would look

[94] Walker et al 2018 see footnote 45. At page 35

[95] https://www.doc.govt.nz/globalassets/documents/science-and-technical/new-zealand-threat-classification-system-manual-2022-part-1-assessments.pdf

like if it were informed by Te Ao Māori and tangata whenua. This section focuses on the more complex parts of Principles 11 and 12.

For this section, we consulted the following references throughout:

Harmsworth, G. & Awatere, S. (2013). Indigenous Māori knowledge and perspectives of ecosystems. In J. Dymond (Eds), *Ecosystem services in New Zealand: conditions and trends* (pp. 274–286). Manaaki Whenua Press.

Kawharu, M. (2000). Kaitiakitanga: A Māori Anthropological Perspective of the Māori Socio-Environmental Ethic of Resource Management, *The Journal of the Polynesian Society* 109(4), 349-370.

McAllister, T., Hikuroa, D. & Macinnis-Ng, C. (2023). 'Connecting Science to Indigenous Knowledge: Kaitiakitanga, conservation, and Resource Management', *New Zealand Journal of Ecology*, 47(1). doi:10.20417/nzjecol.47.3521.

Mika, J. (2021). *Māori Perspectives on the Environment and Wellbeing*. Parliamentary Commissioner for the Environment.

Tipa, G., & Nelson, K. (2008). Introducing Cultural Opportunities: a Framework for Incorporating Cultural Perspectives in Contemporary Resource Management, *Journal of Environmental Policy & Planning*, 10(4), 313–337. https://doi.org/10.1080/15239080802529472

Tuhiwai Smith, L. (2021). *Decolonizing methodologies: Research and indigenous peoples* (3rd ed.). Zed Books.

2.2.11(a) Te Ao Māori and Te Taiao

In Te Ao Māori (a Māori worldview), te taiao (the environment) is a living, interconnected entity with its own mauri (life force), mana (authority and power) and wairua (spirit). This means that tāngata (people) are not seen to be separate from te taiao but are a part of the web of relationships that form the environment. Just as we are connected to our whānau (family), like our parents and siblings, through whakapapa (ancestral connections), we are equally connected to te taiao, our extended family of whenua (land), wai (water), and koiora (all life), bound together through shared mauri and mana. Māori cosmology further underpins these interactions, with natural characteristics seen as tīpuna (ancestors) and living entities rather than inanimate objects. For example, maunga (mountains) and awa (rivers) are often recognised as tīpuna (ancestors) with their own mana, inherent rights and abilities. Thus, from a Te Ao Māori perspective, te taiao and all within should be treated with the same mutual care, respect, and balance we would afford a member of the whānau. It emphasises that the well-being of people is inherently tied to the well-being of the environment; when te taiao thrives, so too do its people.

To inform how tangata should interact with te taiao, unique tikanga (values, customs, and lore) have been developed by various whānau, hapū and iwi. These tikanga, which may be specific to a rohe (region or place), guide how Mana Whenua and Tangata Whenua can live in balance with the broader taiao. This deep relational framework emphasises manaakitanga (kindness and generosity), kaitiakitanga (environmental stewardship) and whanaungatanga (relationships and connections) as guiding principles for our interactions with te taiao. Tikanga highlights that we must, as kaitiaki (stewards), make certain that the mauri of te taiao is protected and enhanced to ensure the well-being of all living things; safeguard the interconnected relationships between tangata, whenua, awa, moana (oceans), and ngahere (forests) to pass on to future generations; and reinforce that human needs and ways are environment-centric and aligned with the natural rhythms and cycles of te taiao to sustain ecological balance for koiora. This means making sure the environment is able to exert its various forms of mana to spread mauri throughout.

As kaitiaki, we are responsible for challenging the actions of society that do not protect, nurture, or enhance the mauri or mana of te taiao. In the context of how we interact with and benefit from the wider taiao, this means ensuring that any use of the environments resources is balanced through giving back to te taiao, making certain that the needs of future generations are considered and safeguarded, and only undertaking actions that respect the inherent rights, mana and mauri of the natural world. This reciprocal relationship ensures the restoration and sustenance of ecosystems and avoids overexploitation that could disrupt the natural order.

Thus, the question of determining whether an action or activity is appropriate comes down to fundamental why, what, and how questions. Why is the activity being undertaken? What purpose does it serve? How will the activity impact the Taiao and, in turn, the people connected to it? It requires reflecting on the intention behind the action or activity and whether it aligns with the responsibility to protect and enhance the mauri and mana of te taiao. Does genuine need drive the activity, or is it motivated by a want or short-term gain that disregards the long-term well-being of the environment and future generations? By interrogating the purpose and consequences of an activity, we can determine whether it respects the mana and mauri of te taiao, upholds intergenerational equity, and ensures that human actions are in harmony with the natural rhythms and cycles of the environment. Ultimately, asking ‘why’, ‘what’, and ‘how’ challenges us to act with integrity, address only necessity, and ensure our decisions are pono (right), tika (just), and sustainable for the greater good of both the environment and the communities it supports.

2.2.11(b) Te Ao Māori, Biodiversity Offsetting and Compensation

In the context of environmental interactions under the resource management framework of Aotearoa NZ, Te Ao Māori could be applied when considering biodiversity offsetting and compensation. Specifically, under the NPSIB's, Appendix 3, Principle 9, and Appendix 4, Principle 11, the design and implementation of a biodiversity offset/compensation is encouraged to be a documented process that is informed by science and mātauranga Māori. Additionally, Appendix 3, Principle 10, and Appendix 4, Principle 12 provide for the opportunity for the effective and early participation of tangata whenua and stakeholders when planning for biodiversity offsets/compensation, including its evaluation, selection, design, implementation, and monitoring. In this section, a potential approach to biodiversity offsetting and compensation from a Te Ao Māori perspective is discussed, and how this could be implemented is considered.

2.2.11(c) Offsetting

From a Te Ao Māori perspective, biodiversity offsetting would require a holistic approach that reflects the interconnectedness of all living things and the reciprocal relationship between people and the wider natural environment. While the contemporary frameworks of biodiversity offsetting, such as the NPSIB, aim for a net gain in biodiversity through initiatives like 'like-for-like' replacement and 'long-term outcomes', Māori worldviews emphasise that biodiversity cannot simply be traded or relocated, as each ecosystem is unique and deeply tied to its whakapapa. However, Te Ao Māori also recognises that as tāngata, we will always have some form of impact on te taiao and the koiora (all life) within. Therefore, offsetting goes back to the why, what and how questions and, ultimately, if it is for necessity or personal gain. Yes, offsetting may be appropriate to address the impacts of the activities that are necessities, such as the construction of a housing development or school that benefits a community long-term. Nevertheless, it is unlikely to be appropriate when used to try and counteract the impacts of activities for personal gain or desire, such as a gold mine or other extractive industries that prioritise short-term economic gain over the long-term health and integrity of te taiao.

In order to undertake successful offsetting from a Te Ao Māori perspective, it would be vital that any offset occurs within the same ecological district or rohe to maintain the mauri and mana of the whenua and avoid displacing harm to other indigenous biodiversity elsewhere, as this would disrupt local ecosystems and cultural connections. Offsets should recognise and respect the whakapapa of the land, water, and all living things by preserving and restoring the integrity of the natural environment as a whole. Furthermore, long-term outcomes must be prioritised for both the environment and the people connected to it, ensuring that the solution not only restores

biodiversity but upholds the integrity of Māori rights, values, and tikanga. Effective offsetting would, therefore, require collaboration with Mana Whenua, including whānau, hapū and iwi, to uphold local tikanga, ensuring that the spiritual, cultural, and ecological relationships inherent to te taiao are respected and sustained for future generations.

2.2.11(d) Compensation

From a Te Ao Māori perspective, biodiversity compensation is even less appropriate as it fails to address the fundamental interconnectedness of all living things and of each ecosystem. This is because undertaking compensation implies that the harm caused to te taiao can only be balanced through anthropocentric means such as financial payments, alternative projects, or superficial measures, which disregard the intrinsic mana and mauri of the local taiao. It is an acknowledgement that the impacts or harm caused by an activity cannot be fully addressed or mitigated through physical solutions onsite and, therefore, one environment is less important than another. Thus, an activity that requires compensation is likely to have significant long-term impacts on-site that are potentially unjustifiable. Compensation is, therefore, likely to be considered inappropriate as it will not align with Te Ao Māori in most circumstances, as it prioritises transactional outcomes over the holistic, long-term health and integrity of te taiao.

From a Te Ao Māori perspective, impacts on an ecosystem or ecosystems cannot simply be compensated for through financial means or superficial actions. Activities that are irreversible and disrupt the whakapapa and relationships that tāngata have with te taiao undermine kaitiakitanga and the responsibilities Māori hold to protect and enhance the environment for future generations. Even when compensation is proposed, it cannot restore the spiritual, cultural, and ecological integrity of te taiao, as the loss is irreplaceable. If compensation was needed, it signals a fundamental breakdown in the relationship between people and te taiao, as there is clearly no reciprocity or respect for the environment. Reciprocity is central to a Te Ao Māori worldview, where any use or impact on the environment must be balanced with meaningful actions to restore and enhance its mauri and mana. The need for compensation indicates that this balance has been disregarded, and instead, te taiao has been viewed as a resource to be exploited, valued only for its utility to humans. This reflects the application of an anthropocentric lens, where human desires, priorities, and economic gain are placed above the health and integrity of the natural environment, which strongly conflicts with a Te Ao Māori perspective where the environment is not viewed as a resource to be dominated or exploited but as a living entity.

2.2.11(e) Engaging with Mātauranga Māori and Tangata Whenua

Engaging with Mātauranga Māori (Māori knowledge systems) and Tangata Whenua or Mana Whenua requires a relationship built on genuine partnership, respect, and reciprocity. This process should begin with meaningful consultation and collaboration with Mana Whenua—Whānau, Hapū, and Iwi, who hold the Mātauranga and authority over the rohe. Mana Whenua need to be brought into the process from the start to inform and be a part of any project. Engagement should occur early in any planning or proposal processes, ensuring that Māori values, aspirations, and tikanga are embedded from the outset. Collaboration with Mana Whenua must be approached with humility and an understanding that Mātauranga Māori is not a supplementary perspective but a knowledge system of equal value to contemporary systems. Tikanga Māori must guide relationships to ensure trust and integrity, recognising Mana Whenua as active decision-makers with the authority to help guide the projects. Listening to and empowering the voices of Tangata Whenua will foster solutions that align with kaitiakitanga, acknowledge whakapapa, and prioritise the mauri, mana, and wairua of te taiao.

2.2.11(f) Applying Mātauranga Māori to Compensation and Offsetting Proposals

Mātauranga Māori can be applied to understanding and addressing the impacts of activities on the natural environment, providing principles that could significantly influence compensation and offsetting proposals. If offsetting or compensation is to occur, embedding Mātauranga Māori would mean that these proposals need to prioritise incorporating Māori knowledge systems and ways of being. For example, restoration efforts could involve planting rongoā (medicinal plants) and native species significant to local iwi or hapū. Additionally, planting could be guided by the Maramataka (Māori calendar based on seasonal rhythms) and traditional ecological knowledge of the whenua. Furthermore, it would mean restoring the mauri and mana of the impacted ecosystem rather than simply replacing it elsewhere or focusing on economic value. This would mean identifying and avoiding culturally significant areas and taonga (sacred) species and ensuring that restoration efforts occur within the same rohe to maintain local sustainability. Mātauranga Māori could inform long-term strategies for ecological recovery by drawing on local knowledge of native ecosystems, including indigenous planting methods, habitat restoration, and the role of cultural indicators to measure success, such as the return of key species. Compensation and offsetting proposals should also reflect reciprocity, acknowledging the harm caused and taking actions that give back to te taiao in ways that sustain and enhance its health for future generations. Importantly, the application of Mātauranga Māori must be led by Mana Whenua, ensuring that solutions uphold tikanga, reflect

local aspirations, and maintain the spiritual, cultural, and ecological integrity of the environment.

2.2.12 Principle 13

> *(13) The design and implementation of biodiversity compensation, and communication of its results to the public, is undertaken in a transparent and timely manner.*

In both the international literature and common parlance, stakeholders are parties with an interest. That interest could be financial, making them a vested interest. Or it could be not financial. Stakeholders clearly includes the general public, because of public interest in the protection of Threatened and At Risk (declining) species.

For sensitive cases involving poaching risk, stakeholders do not need to know the precise location of the fauna to participate in biodiversity compensation decisions. Rather, to have regard to stakeholder participation in biodiversity compensation, stakeholders need only know: 1) whether there will be effects on the resident species or their significant habitat; 2) the nature of those effects; and 3) what is proposed to manage and compensate for those effects. No locations are required to have regard to and implement Principles 12 and 13.

But timing is imperative. To participate meaningfully, the stakeholders need redacted information before submissions close, not after the consent is granted.

Part 3 What Otago's biodiversity situation and the changing regulatory environment mean for biodiversity strategic thinking in Otago

Part 1 of this report shows that, in the high country, Otago cannot afford to lose much more biodiversity, if any. The metaphorical bank account is dangerously close to overdraft already following the past several decades of land use decisions.

This situation makes Otago biodiversity vulnerable to further activities, development, and the resulting biodiversity losses. Further consents and planning instruments must attend to that vulnerability.

3.1 MAINTAINING BIODIVERSITY IN OTAGO

For some biodiversity, the situation will trigger the rarity and vulnerability criteria in Principle 2 of (NPSIB) Appendices 3 & 4, where offsetting/compensation are not appropriate. This does not mean development is not consentable, just that mitigation must work harder to minimise environmental effects down to less than minor.[96] By contrast, in cases with less rare and vulnerable biodiversity and with effects more than minor but less than significant, offsetting/compensation might be available for a consent application. One would think that as the metaphorical bank account balance gets smaller, biodiversity becomes more rare and vulnerable and more proposals will trigger Principle 2.

NPSIB offsetting and compensation Principles 3 & 4 also require attention in light of the situation of vulnerability of Otago's biodiversity. This is where spatial tracking of land use change comes in. Greenhalgh et al 2022 recommend the first step towards strategic biodiversity management in an offsetting/compensation regulatory environment is for regional councils to map the regions, characterising land into 1 of 4 categories. The category of land then influences the standards and guidelines for development of the land in permitted, controlled, and discretionary activities as depicted in the schema below.[97] [98]

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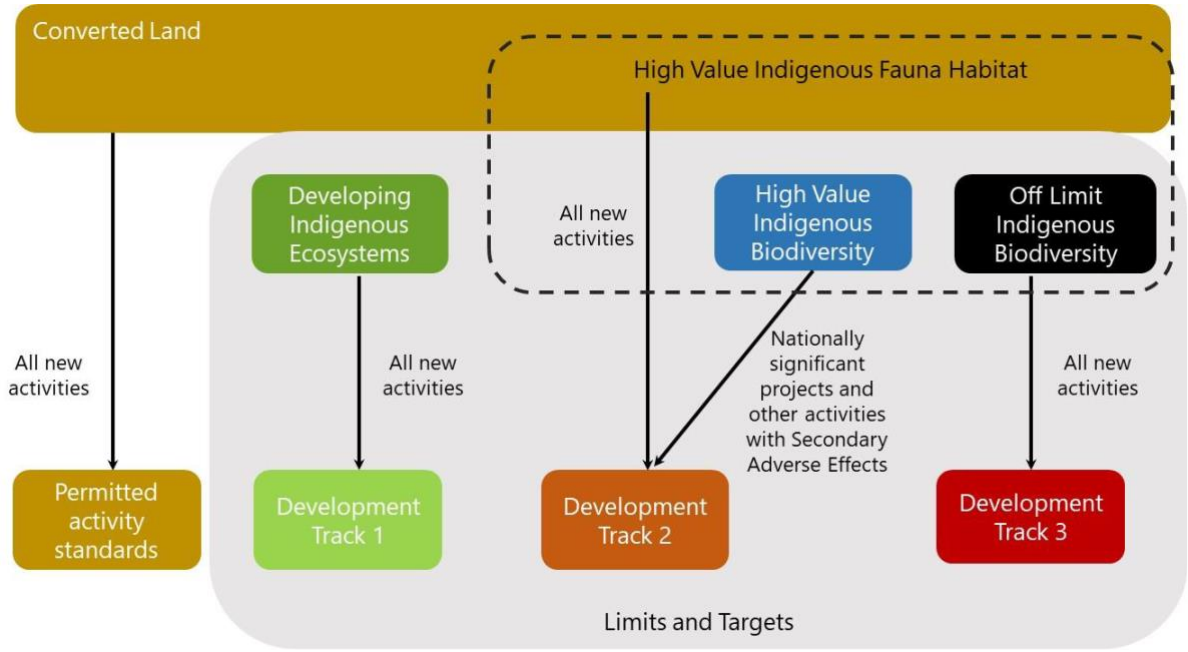
[96] RMA s. 87BB says that a council may permit an activity usually requiring certain criteria, including (1)(c) the any adverse effects of the activity on a person are less than minor; and notification decisions look to effects that are minor or more than minor when informing whether an application is to be granted and s 95E (1) talks about minor or more than minor effects (but are not less than minor) - in the context of limited notification.
See also https://www.environmentguide.org.nz/rma/resource-consents-and-processes/notification-of-resource-consent-applications/when-are-adverse-effects-more-than-minor/

[97] Greenhalgh et al 2022 see footnote 48. page v

[98] It is worth noting that the dotted line around High Value Indigenous Fauna Habitat is intentionally limited to fauna. This is because high value fauna might live in converted land with little to no indigenous flora. For example, if nationally endangered lizards live in a conifer forest, that conifer forest (which is otherwise converted land) has higher conservation value than most converted land. Thus while most plantation conifer forest that is converted land might allow most development as a "Permitted activity", nationally endangered lizard habitat would not.



Greenhalgh et al estimate that about 80% of freehold land in the country is Converted Land.[99] They define Converted Land as an area of land:

> "*a) where indigenous vegetation has been fully removed, or*
>
> *b) that is otherwise wholly exotic pasture, but matagouri, mānuka, kānuka and/or tauhinu (Ozothamnus leptophyllus) shrubs less than 25 years old and/or silver tussock are present, or*
>
> *c) that is a plantation forest, or*
>
> *d) where wilding conifers or other exotic trees achieved full canopy closure prior to the new NBEA being operative, or*
>
> *e) where vegetation has been planted as part of a domestic garden, or as a shelterbelt, or for stormwater management or production purposes."*[100]

In order to meet Principles 3 and 4 of NPSIB Appendices 3 and 4, would-be developers should look for restoration or active protection opportunities with sufficient ecological 'head room' to improve the situation for affected biodiversity. This head room is more likely to be found in Greenhalgh et al's Developing Ecosystems, than in Off Limits or High Value biodiversity areas. While protecting the latter is valuable, doing so does not *address or outweigh* biodiversity losses because -1 + 0 = -1; this will make it difficult to meet Principle 3. Achieving additionality and 'no overall reduction' requires restoration and/or active protection in an area that is degraded enough to benefit from it, but not so far gone as to be irretrievable; in the above figure this is found in Development Tracks 1 and 2.

[99] Greenhalgh et al 2022 see footnote 48. page v
[100] Greenhalgh et al 2022 see footnote 48, page 23

An important first step to the Greenhalgh et al categorisation will be to observe long-term and macro-scale changes in intensity of land use. This would be complementary to the micro-scale observational mapping that is the sister deliverable to this report. Though not accurate to the farm or paddock scale, the level of confidence of the categories would be measurable using a spatial statistics method called a confusion matrix. In other words, it would give ORC and Territorial Authorities a good steer as to where to look (and/or where to tell consent applicants to look) to start strategic biodiversity maintenance efforts in the current regulatory landscape where some or many consent decisions will involve offsetting/compensation. It would also help planning authorities prioritise goals for both land and water because the patterns of change will suggest underlying reasons or drivers for the observed patterns.

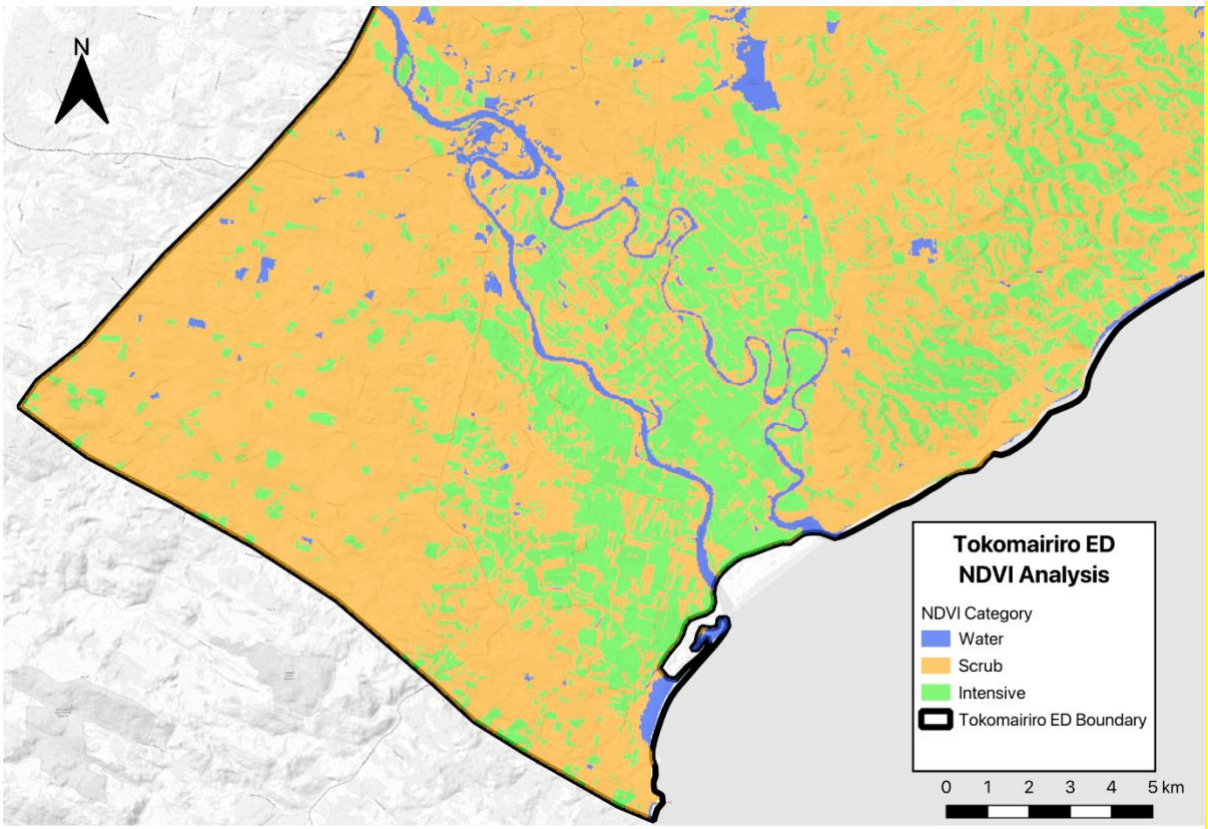


Figure 7: prototype of macro-scale mapping of intensification of land use

Figure 7 is a simple uni-dimensional prototype of macro-scale mapping that could be done on the regional basis to observe land use change over time. This is the Balclutha area in 2024. Scrub is akin to Development Tracks 1 and 2, while Intensive is akin to Converted Land with its Permitted Activity Standards. Adding digitised SNA boundaries already identified in Otago would identify Development Track 3 in the schema above. Other dimensions can be added to identify forest and other types of land intensification to further distinguish between different types of 'scrub' and different types of 'intensive' land use. Much greater detail of the delineation

of Converted Land is revealed through the micro-scale mapping done by Mr Harding in the sister deliverable to this report.

Understanding the change in land use intensity over time gives an understanding of the vulnerability of Otago's biodiversity, and insight into the metaphorical biodiversity bank balance trends over time. It also allows for strategic planning for biodiversity offsetting/compensation in areas within the same ED with sufficient ecological 'head-room' to satisfy Principles 3 and 4 of NPSIB Appendices 3 and 4. It would also give insight into situations where contravening Principle 7 (about proximity of an offset, within the same ED) might make ecological sense … or when Principle 7 is of paramount importance.

3.2 PROTECTING BIODIVERSITY

Because the major land use inflection points in the last 35 years seem to have made biodiversity in Otago more vulnerable, protecting what is left has never been more important. As of December 2024, identifying new SNAs is up in the air, but NPSIB clause 3.10(2) still has relevance for at least 2 reasons:

1) It identifies effects that are significant on At Risk (Declining) or Threatened species, whether or not they live in an SNA;
2) Presumably the effects to avoid in SNAs as per 3.10(2) are still to be avoided in existing SNAs identified before December 2024.

There is also more to protection than SNAs.

1) Prioritising vulnerable biodiversity and habitats in decisions around QEII covenanting and schemes such as NHF is a good start;
2) Attending to the 3.10.2 significant effects on threatened biodiversity in consent decisions will also serve to protect the most vulnerable biodiversity;
3) Spatial planning, empowered by strategic mapping along the lines recommended by Greenhalgh et al would empower prioritisation of biodiversity and enable protection even without identifying SNAs.

APPENDIX 1 – HISTORY OF LAND TENURE CHANGES IN THE HIGH COUNTRY

This Appendix reviews historical background to one of the 4 "inflection points" of land use change with biodiversity implications -- South Island high country tenure review. Section 1.1 of the report details on-the-ground and financial outcomes of tenure review, while Section 1.5 discusses the implications for maintaining biodiversity in the wake of the 4 recent land use inflection points. Many readers of this report will know the historic background for high country tenure review, but for those who do not we include this Appendix 1.

Before 1991, about 20% of the South Island was managed on behalf of the Crown as Crown pastoral leases under successive Land Acts, currently under the Land Act 1948. It is managed by what is now called Land Information New Zealand (LINZ), and was previously the Department of Survey and Land Information.

This land was leased to pastoral runholders under Crown pastoral leases. The land was held by the Crown and managed by the Commissioner of Crown Lands.[101] Most of this pastoral land was on the eastern slopes of the Southern Alps.

High country tenure review transformed land ownership in the high country of the South Island. The tenure review process began informally in Otago in the early 1990s and was formalised by Parliament in 1998 by the Crown Pastoral Land Act, or CPLA.

The terms of the pastoral leases were set by the Land Act 1948, which limited the use of the land to "pastoral purposes only" unless the Commissioner gave "discretionary consent" to develop the land beyond extensive pastoral farming.[102] The uses to which the land could be put were constrained. For example, pastoral lease farmers had no right to the soil and no right to acquire the freehold, or private title also called fee simple.[103] Crown pastoral leases were perpetually renewable, with 33-year terms.[104]

Although 'discretionary consent' from the Commissioner of Crown Lands was required for runholders to intensify land uses beyond extensive pastoralism, there was a pattern of the Commissioner granting consent. This pattern enabled runholders to clear land identified (in

[101] Ann Brower. *Who owns the High Country? The Controversial Story of Tenure Review in New Zealand* (Craig Potton Publishing, Nelson, 2008) at 39-45.
[102] Land Act 1948, s 66.
[103] Land Act 1948, s 66(2); carried over to the Crown Pastoral Land Act 1998, s 13(d).
[104] Land Act 1948, s 63(2).

April 2007) by the Ministers for Conservation and Environment as being of top national priority for protecting rare and threatened native biodiversity on private land.[105]

By the 1980s, several groups had started pushing for changes to the high country land management regime:[106]

1) conservation groups, such as the Royal Forest & Bird Protection Society, wanted the grazing sheep removed from the mountain tops and high-altitude areas;

2) recreation groups, such as Federated Mountain Clubs, wanted access to the mountain tops for hunters, anglers, and trampers;

3) runholders wanted an affordable way to acquire a freehold title to productive parts of the Crown land they leased.

In 1982, the government's Clayton Commission of Inquiry found that pastoral leases' restrictions were leading to underdevelopment of the pastoral estate. The Clayton Commission recommended large-scale freeholding of pastoral land to allow land use diversification; this diversification and intensification would in turn spur more investment into the high country that would in turn promote pest control and grassland health.[107] The Commission's recommendations informed the tenure review process that was later established under the Crown Pastoral Land Act (CPLA).

Also in the 1980s, rabbits had become so abundant in the South Island high country that they were thought to be causing desertification, especially in the drier areas of Central Otago. Established in the 1980s, the Rabbit and Land Management Task Force concluded that the pastoral tenure system was partly to blame for the rabbit problem — the pastoral lease constraints forced runholders into low-intensity farming, which produced prime rabbit habitat.

The Rabbit and Land Management Programme freeholded, or privatised, some leasehold land in Central Otago. This gave new landowners, former pastoral leaseholders, certainty of tenure; this in turn gave them the ability to borrow money against that certainty. This allowed new landowners to diversify land uses (into land uses such as viticulture, dairy, and deer-farming as well as residential subdivision and golf courses). The more productive uses meant that the land

[105] Brower et al (2020) see footnote 86 at Appendix S1. The identification of protection priorities comes from the following endeavour: https://www.doc.govt.nz/about-us/our-policies-and-plans/biodiversity-guidance-for-private-land/
[106] Brower 2008 see footnote 101. at page 31–32.
[107] Brower 2008 see footnote 101. at page 31.

was a less desirable habitat for rabbits; it also meant that landowners had more money to spend on rabbit and pest control.

In the early 1990s, Hon Denis Marshall held Ministerial portfolios of both Lands and Conservation. Drawing from the experience of the Rabbit and Land Management Programme, Minister Marshall rolled out a similar model across the Crown pastoral estate allowing leasehold land to be converted into freehold. At that time, in the early 1990s, leasehold land eligible for the nascent tenure review process comprised 3.2 million hectares.

In the early 1990s,[108] tenure review began. About[109] 30 leases entered voluntary negotiations between the Commissioner of Crown Lands and runholder to divide the leasehold properties, with land capable of commercial production being converted to freehold land and land with conservation values being converted to public conservation land.[110] Around 181,000 hectares went through pre-CPLA land reforms — 106,000 hectares were freeholded, and 75,000 hectares were shifted into public conservation land.[111] Most of the 30 pre-CPLA leases were in Otago.

In 1998, Parliament passed the CPLA. It set out a process called 'tenure review', which replaced the pre-CPLA process undertaken under the Land Act 1948.[112] Under the CPLA tenure review process, runholders could enter into voluntary negotiations with the Commissioner of Crown Lands. Through the negotiations, former leasehold land was divided into 4 categories, seen in Figure 2:

1) freehold land privatised to the former runholder;
2) freehold land subject to a covenant of some sort;
3) public conservation land, administered by DoC;

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[108] Personal communication (interview with) former Minister of Conservation and Lands in the early 1990s, Hon Denis Marshall. However, precise records of when exactly tenure review began are hard to come by.
[109] We say "about 30" because there is some uncertainty. The data obtained from LINZ via requests under the Official Information Act about pre-1998 tenure review has records for 30 leases that underwent the reform. However, we use both LINZ numerical data (about dollars and hectares and lease names) and DoC spatial data (mapping which land went to what land class). The DoC data has a few names of leasehold properties that went through tenure review but are not in the LINZ data (e.g. Leatham); hence the pre-1998 tenure reviews could number a few more than 30 but not fewer than 30.
[110] This process took place under the Land Act 1948, ss 51(3) and 126A and the Land Settlement Board's reclassification policy.
[111] LINZ to Ann Brower Official Information Act Request Response OE – 07-015 dated 29 August 2006, which contains information for all the pre-CPLA leases. Note that all of the tenure review pricing data came from this and successive OIA responses from LINZ: 28 April 2008; 22 June 2016; DOIA 17-134 dated 9 May 2017; DOIA 23-132 dated 14 March 2023; DOIA 24-089 dated 24 October 2023; DOIA 18-166.
[112] Ann Brower and John Page "Freeing the land beyond the shadow of the law: Twenty years of the Crown Pastoral Land Act" (2017) 27(4A) *NZ Universities Law Review*. 975 At page 976.

4) public conservation land subject to a concession of some sort (hunting, grazing, or other uses).

The purpose of tenure review was to free up those portions of pastoral land "capable of economic use" from the restrictions placed on that land due to the Land Act.[113] Tenure review also aimed to "enable the protection of the significant inherent values" (meaning significant conservation or recreation values) of other portions of pastoral land by restoring that land to full Crown ownership and control or creating protective mechanisms such as a covenant. The review aimed to promote the management of pastoral lease land in a way that is "ecologically sustainable".[114]

In other words, the tenure review process aimed to freehold land with potential to be intensified agriculturally, residentially, or otherwise diversified; the freeholding would release the former pastoral land from its Land Act restrictions that made it difficult to use the land for anything by extensive pastoralism.

Importantly, tenure review also aimed to protect land with significant conservation and recreation value by making it public conservation land.

Ultimately, the tenure review resulted in most of the land below the altitude of about 1000m being freeholded, and most of the land above 1000m being retained as public conservation land. As detailed in section 1.1.2 of this report, land retained as public conservation land was generally less productive, less rich in biodiversity, and contained less threatened ecosystems than land that was freeholded. Conversely, land that was freeholded was lower in elevation, more productive, contained more threatened ecosystems, and was closer to towns and roads.[115]

The tenure review process continued until April 2022, when Parliament ended the review with the Crown Pastoral Land Reform Act 2022, or CPLRA. The CPLRA repealed the provisions in the CPLA that set out the process for tenure review. A few leases that were already at a substantive phase in tenure review negotiations were allowed to continue to completion after the royal assent of the CPLRA.[116]

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[113] Brower 2008, see footnote 101. At page 45.
[114] Crown Pastoral Land Act 1998, s 24.
[115] Rissman et al 2021, see footnote 24. At page 2.
[116] As of December 2024, there were still 4 leases in the tenure review process that reached the substantive phase by April 2022. They have been allowed to continue to completion.

APPENDIX 2 – TENURE REVIEW FINANCIAL OUTCOMES BY LEASE NAME AND LOCATION

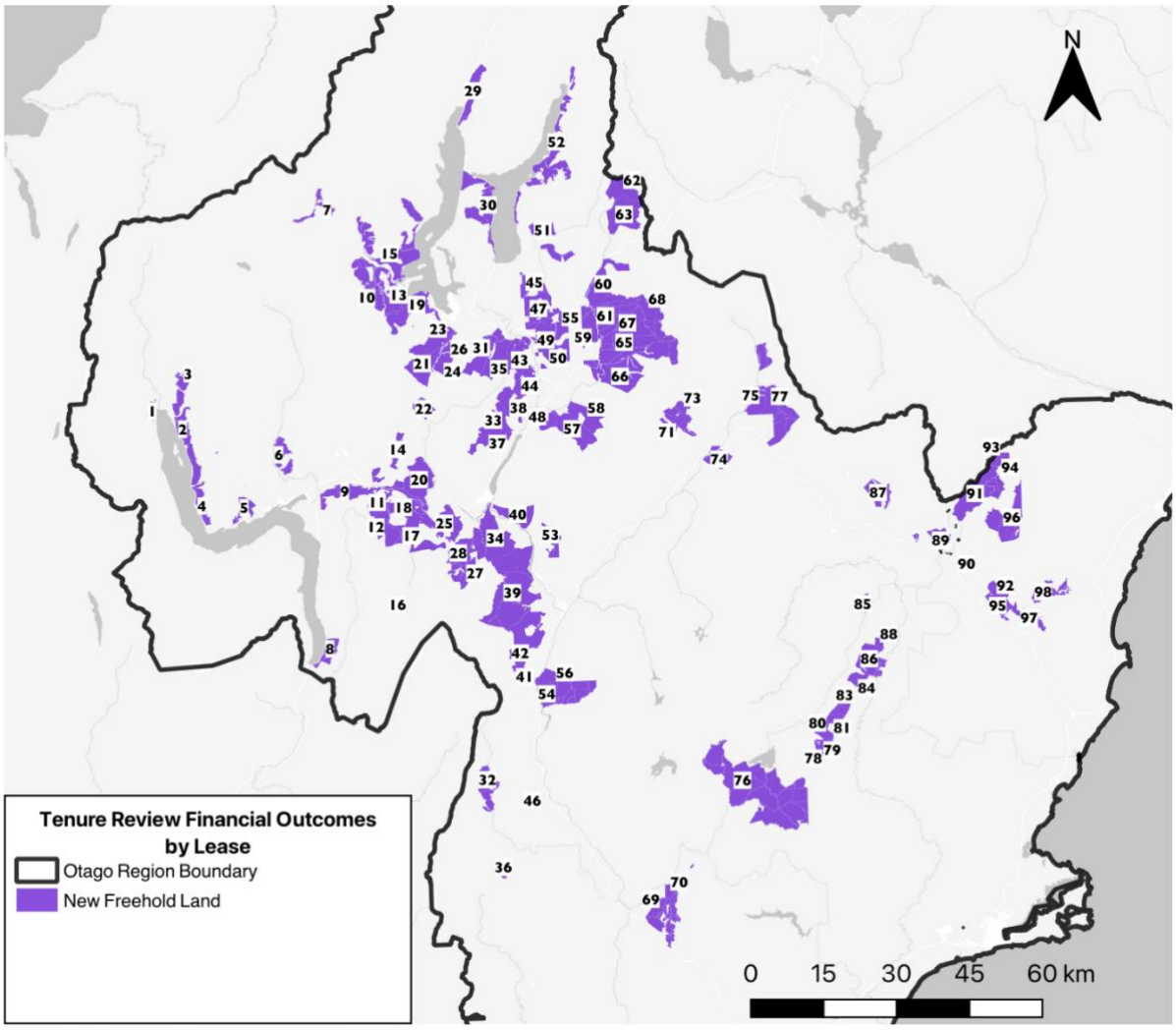


Figure A1: This map shows all new freehold land from tenure review, with numbers on each lease. The numbers correspond to Table A1, below, containing the details of the financial results from the tenure review transaction with the Crown as well as any on-selling up to the end of 2015.

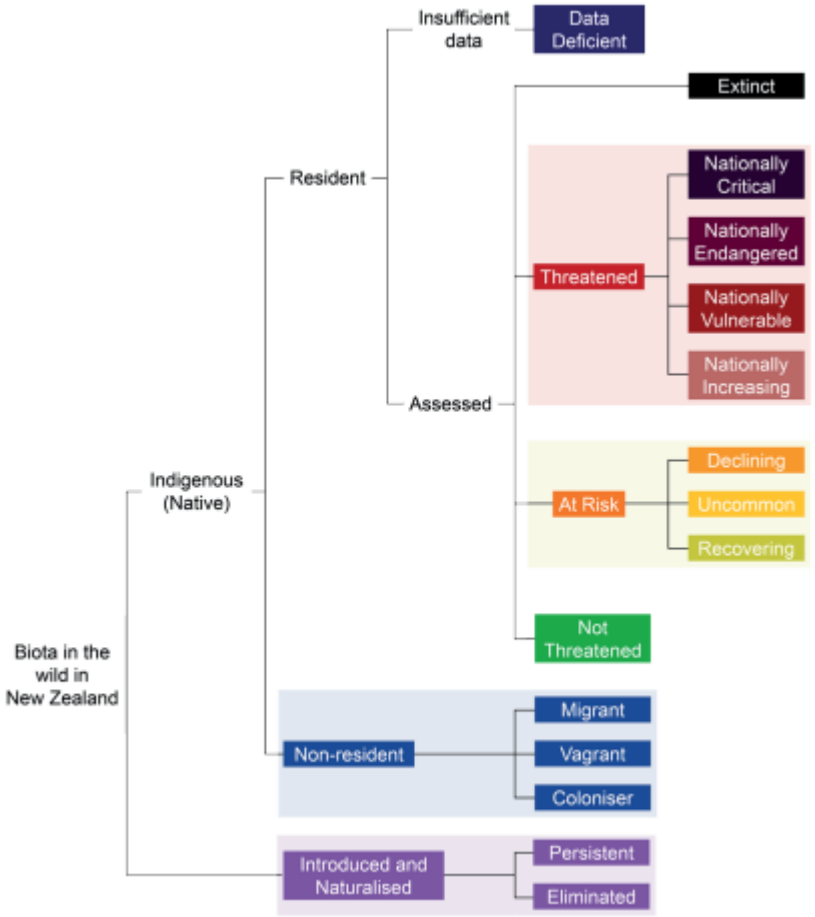
Table A1: This table accompanies Figure A1. The map numbers correspond to lease names. This table shows the tenure review financial outcomes in 2 forms – both in the transactions with the Crown, and any on-selling by the end of 2015.

Map #	Lease Name	ha to PCL	$ from Crown for PCL	ha to Freehold	$ from lessee for freehold	$ net to lessee	Ha On-sold	$ On-sold
1	Woodbine	1,293	$85k	338	$110k	-$25k		
2	Wyuna	8,467	$684k	2,422	$1,314k	-$630k	9	$14,185,000
3	Temple Peak	6,335	$1,105k	1,600	$395k	$710k		
4	Mt Creighton	10,486	$10,050k	5,295	$8,050k	$2,000k		
5	Closeburn	1,787	$42k	930	$200k	-$158k	9	$17,031,500
6	Mt Dewar	706	$169k	1,783	$240k	-$71k		
7	Mt Aspiring	8,017	$2,048k	2,309	$438k	$1,610k		
8	Glen Nevis	4,270	$495k	2,485	$570k	-$75k		
9	Cone Peak	1,446	$250k	2,181	$350k	-$100k	50	$1,150,000
10	Cattle Flat Po352	1,571	$271k	2,991	$396k	-$125k	1,755	$7,450,000
11 12	Glenroy Land Act & So455	2,201	$300k	1,973	$400k	-$100k	18	$1,657,000
13	Glendhu Station	280	$584k	2,936	$579k	$5k	2,837	$10,500,000
14	Eastburn	5,221	$531k	5,910	$535k	-$4k	953	$1,500,000
15	West Wanaka	1,137	$420k	6,635	$474k	-$54k		
16	Ben Nevis	10,088	$5,080k	4,473	$2,410k	$2,670k		
17	Wentworth	3,817	$196k	3,840	$351k	-$155k	3,534	$5,800,600
18	Mt Rosa	813	$107k	1,388	$156k	-$49k	45	$7,092,473
19	Alphaburn	1,214	$203k	3,365	$268k	-$65k	193	$10,100,000
20	Waitiri	5,221	$531k	5,910	$535k	-$4k	5	$8,200,000
21	Spotts Creek	1,911	$108k	3,344	$283k	-$175k	3,108	$8,200,000
22	Waiorau	4,012	$121k	2,691	$191k	-$70k	2,561	$10,350,000
23	Hillend	991	$216k	2,659	$336k	-$120k	2,671	$26,199,992
24	Avalon	462	$64k	1,352	$134k	-$70k	1,351	$10,200,000
25	Kawarau	1,193	$3,720k	3,620	$3,390k	$330k		
26	The Larches	831	$334k	1,021	$19k	$315k		
27	Happy Valley	1,021	$2,440k	2,257	$1,800k	$640k		
28	Carrick Station	3,000	$939k	6,262	$39k	$900k		
29	Makarora	364	$64k	1,962	$74k	-$10k	17	$170,000
30	Glendene Station	2,136	$871k	6,021	$494k	$377k	2,944	$7,000,000
31	Midrun	2,258	$177k	5,372	$179k	-$2k	151.64	$2,204,170
32	Gem Lake	3,317	$3,210k	2,270	$2,040k	$1,170k		
33 37	Mt Pisa I & 2	4,260	$290k	4,633	$413k	-$123k	177	$5,612,768
34	Cairnmuir Land Act	5,798	$141k	4,437	$141k	$0	4,371	$11,479,269

35	Lake McKay	Teamed up with Midrun for tenure review negotiations					152	$2,204,170
36	Whitecoomb Farm Po373	0	$10k	407	$83k	-$73k	391	$1,400,000
38	Locharburn	638	$104k	1,735	$190k	-$86k	1,643	$105,000
39	Earnscleugh	8,277	$533k	16,410	$609k	-$76k	10,547	$7,134,672
40	Waenga	missing						
41	Obelisk Creek	131	$8k	405	$17k	-$9k		
42	Obelisk	2,775	$2,500k	1,479	$2,000k	$500k		
43	Queensberry Hills	156	$101k	2,905	$191k	-$90k	1,950	$15,147,980
44	Queensberry Ridges	565	$71k	1,208	$117k	-$46k	11	$462,500
45	Mt Grand	530	$3,500k	1445	$3,545k	-$45k		
46	Silverbirch	0		112	$5.5k	-$5.5k		
47	Glenfoyle	394	$95k	3,182	$149k	-$54k		
48	Bendigo	3,055	$100k	8,727	$173k	-$73k	287	$5,730,982
49	Sandy Point	69	$34k	1,729	$194k	-$160k	53	$870,000
50	Long Gully	315	$3,520k	1,373	$3,585k	-$65k		
51	Lake Hawea	4,855	$2,200k	6,470	$0	$2,200k		
52	Dingleburn	17,722	$6,193k	7,016	$615k	$5,578k		
53	Waikerikeri	323	$35k	1,361	$70k	-$35k	895	$2,499,984
54	The Knobbies	Teamed up with Cairnhill for tenure review negotiations						
55	Deep Creek	175	$2,775k	2,525	$2,810k	-$35k		
56	Cairnhill	1,728	$255k	6,043	$255k	$0		
57	Ardgour Station	303	$203k	3,719	$268k	-$65k	196	$3,753,925
58	Cloudy Peak	1,850	$715k	2,406	$345k	$370k	745	$2,100,000
59	Nine Mile	10	$10k	2,221	$49k	-$39k		
60	Morven Hills	3,647	$13,870k	10,560	$12,150k	$1,720k		
61	Geordie Hills	3	$18k	2,079	$59k	-$41k		
62	Longslip Station	5,626	$1,710k	9,457	$310k	$1,400k		
63	Dalrachney	2,423	$1,116k	5,424	$96k	$1,020k		
64	Merivale	0	$0.00	2,624	$45k	-$45k		
65	Timburn Station	14	$25k	5,061	$69k	-$44k		
66	Cluden	2,655	$7,810k	9,735	$6,885k	$925k		
67	Long Acre	0	$0.00	3,331	$44k	-$44k		
68	Shirlmar	9	$15k	3,514	$6k	$9k	3,498	$8,350,000
69	Halwyn	3,697	$124k	3,713	$124k	$0	1,476	$3,943,460
70	Castle Dent	2,424	$805k	1,749	$155k	$650k	1,403	$5,275,000
71	Lauder	3,020	$4,000k	1,205	$2,560k	$1,440k		
72	Cambrian	1	$2k	981	$72k	-$70k	974	$1,020,000
73	Cambrian Hills	2,464	$949k	680	$16k	$933k		
74	Blackstone Hill	3,139	$175k	2,684	$175k	$0		

75	Home Hills	1,542	$633k	1,642	$51k	$582k		
76	Rocklands	11,904	$1,115k	19,825	$1,215k	-$100k		
77	Braeside	7,870	$1,145k	4,485	$205k	$940k		
78	Stonehurst	2,046	$912k	786	$52k	$860k	785	$1,700,000
79	Kelvin Grove	1,712	$1,800k	730	$1,230k	$570k		
80	Brookdale	1,018	$106k	1,028	$106k	$0		
81	Run 213D	483	$60k	612	$47k	$13k		
82	Camberleigh	221	$4,650k	1,863	$4,520k	$130k	15	$70,000
83	Glencreag	2,992	$310k	922	$310k	$0	386	$1,051,457
84	The Wandle	325	$4,375k	949	$4,255k	$120k		
85	Riverslea	810	$310k	780	$10k	$300k		
86	Taieri Lake	1,144	$120k	2,719	$200k	-$80k	2,721	$9,800,000
87	Kyeburn	4,703	$2,875k	1,852	$375k	$2,500k		
88	Rockvale	394	$48k	589	$48k	$0		
89	Longlands	225	$3,700k	1,858	$3,610k	$90k		
90	Shingley Creek	384	$102k	418	$44k	$58k		
91 94	Dome Hills Po261&Po170	1,421	$704k	5,947	$104k	$600k		
92	Caithness	10	$1,985k	2,201	$1,985k	$0		
93	Pisgah Downs	missing	$702k	missing	$47k	$655k		
95	Kinross	0	$1,520k	2,042	$1,350k	$170k		
96	Mt Dasher	2,924	$4,935k	4,210	$4,050k	$885k		
97	Shag Valley	353	$1,400k	1,468	$1,300k	$100k		
98	Glencoe Po366	340	$4,360k	1,560	$4,298k	$62k		

APPENDIX 3 – Aotearoa NZ Threat Classification System (2022)



https://www.doc.govt.nz/globalassets/documents/science-and-technical/new-zealand-threat-classification-system-manual-2022-part-1-assessments.pdf