



Earth Sciences
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Impact of sea level rise on groundwater and pasture production in New Zealand

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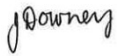

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Extended Executive summary

The Problem

Climate change and rising sea levels are affecting our land. One issue that has been often overlooked is the rise of the groundwater table—essentially, how close underground water gets to the surface. This is especially important in our low-lying coastal areas, where much of our population lives. The problem has been overlooked at least partially because we haven't had the necessary data and models to quantify the problem.

When groundwater gets too close to the surface, it can cause a range of problems: it can flood land, damage infrastructure, and, crucially for this study, reduce the amount of pasture we can grow to feed our livestock. Until now, we haven't had a clear, national picture of where and how rising groundwater might threaten our pasture production near the coast.

Background to the Study

Sea-level rise is happening globally, and New Zealand is no exception. Our tide stations have measured an average rise of about 0.21 m since the year 1901, and in some places, land is sinking, making the problem worse. Low-lying coastal zones—defined here as land less than 10 metres above sea level—make up only 2% of our land area but are home to 15% of our people.

These areas are vulnerable to a range of hazards: erosion, flooding, saltwater intrusion, and, importantly, groundwater rise. When the sea rises, it pushes up the water table in coastal aquifers. This can lead to water table rise (where groundwater gets closer to the surface), flooding, and even saltwater mixing with freshwater underground. All of these can harm ecosystems, infrastructure, and, as we focus on here, agriculture.

Pasture production, measured by units of dry matter production (DMP), is vital for our livestock-based farming. If the water table gets too close to the surface, pastures can become waterlogged, roots can't breathe, and yields drop. If the pastures are grazed in these wet conditions, the stock treading damages both the pasture's growing points and damages the air-containing pores in the soil near the soil surface. Both further reduce DMP. Until recently, we didn't have robust methods to predict how rising groundwater would affect pasture growth, especially across the whole country.

What We Did

To tackle this, we set out to map, at a national scale, where groundwater is already shallow and how much worse it could get with future sea-level rise. We wanted to answer: Where is the water table already close to the surface? How will this change as the sea rises? And what does this mean for pasture production?

Our approach had several new and innovative aspects:

- Combining two models: we used two different models to estimate groundwater depth: a data-driven machine learning categorical shallow groundwater model (CATS) and a physics-based equilibrium water table model (EWT). Each has strengths and weaknesses, so we combined them using a weighted average, taking into account how much data was available in each area and how well each

model performed. This gave us the best possible estimate, plus a sense of the uncertainty.

- Mapping present and future risk: we created maps showing where groundwater is less than 1 metre and 2 metres below the surface, both for today and how these areas expand for future sea-level rise scenarios (of 0.5 m, 1 m, 1.5 m and 2 m higher). These maps are available nationally and regionally and have been supplied to the Climate Change Commission (CCC).
- Linking groundwater to pasture production: we used new “damage functions” developed specifically for New Zealand conditions to estimate how rising water tables (and the resulting waterlogging) would reduce pasture yields. These functions were based on recent experiments and modelling conducted by AgResearch, filling a critical gap in our understanding.
- We overlaid the groundwater hazard maps with land use data, calculating how much pasture is at risk and how much production could be lost under different scenarios.

Key Conclusions

This study provides the first national-scale estimate of how rising groundwater from sea-level rise could affect pasture production in New Zealand. All the calculations and presented results are restricted to coastal zones—areas where land is less than 10 m above sea level.

- It is important to delineate areas where depth to groundwater is shallow—this report provides New Zealand’s first national-scale assessment.
- About 43% of low-lying coastal areas already have a water table that is shallower than 1 m below ground level. This makes sense because farming is occurring on converted wetlands. The total area currently exposed to shallow groundwater of ≤ 1 m depth, is more than half of the total area that is (predicted to be) exposed after 2 m of SLR.
- Groundwater rise is a real and growing risk: sea-level rise is already increasing the exposure to shallow groundwater in coastal areas, and this exposure will expand significantly in the future. According to our model, approximately 2,400 square kilometres of land is already exposed to groundwater shallower than 1 meter below ground level in New Zealand, much of it currently used for farming. This could rise to 3,780 square kilometres after 2 m of sea-level rise, an increase of 58%, or about 900 more dairy farms exposed.
- The rate of increase of area exposed to shallow groundwater slows down with sea-level rise, the more dramatic changes occur within the first 1 m of sea-level rise.
- Pasture production will decline. As groundwater gets closer to the surface, pasture yields drop sharply. The reduction in coastal dry matter production with sea-level rise varies between districts. To compare between districts, dry matter production in kilograms per hectare per year was summed to tons per year over the entire District.

- Not all high-production areas are equally at risk. The regions with the greatest reduction in coastal dry matter production are not always those with the highest baseline production. This highlights the need for targeted adaptation.
- The eight districts with the largest predicted losses after 0.5 metres of sea-level rise are Hauraki District, Selwyn District, Whakatane District, Horowhenua District, South Wairarapa District, Waimakariri District, Christchurch City, and Kaipara District (based on the weighted percentage decrease metric). Within these districts the predicted decrease in total pasture production within the coastal zone varied from 34–70% after 0.5 m SLR and 67–99% after 2 m of SLR.
- Better data and models are needed. Future improvements in measuring and modelling groundwater at finer resolution close to the ground surface will help refine these estimates. More research is needed on the effects of saltwater intrusion, the timing of groundwater rise, and the real-world effectiveness of drainage and other adaptation measures.
- Outputs supplied to CCC include:
 - National and regional maps of shallow groundwater exposure.
 - Territorial authority-level statistics of shallow groundwater area exposed and near-coast dry matter production.

Limitations

The work has some limitations to be aware of:

- **Model resolution:** our national groundwater models are only accurate to within about 1 metre of the surface. This means we can say if groundwater is “less than 1 metre deep,” but not whether it’s 30 cm or 90 cm. Yet, pasture damage is most severe when water is within the top 1 metre, especially the top 0–30 cm. To overcome this we applied a sensitivity approach to a Water Table Rise factor, which controls how much the groundwater rises in response to sea-level rise. The pasture production response was highly responsive to this factor controlling groundwater level response to sea-level rise—the Water Table Rise factor was much more influential than the uncertainty within the current groundwater models.
- **Data gaps:** in some regions, especially where monitoring wells are sparse, our groundwater models are less certain. The data-driven model (CATS) works best where there’s ample data; the physics-based model (EWT) helps fill gaps but is less precise in some settings.
- **Simplifying assumptions:** we weren’t able to model the effects of saltwater intrusion (which can make soils too salty for pasture), because the underlying models to predict salinisation aren’t sufficiently developed. Nor did we model how long it might take for groundwater rise to respond to sea-level rise—our models assume an instantaneous response, which is conservative. We also had to make assumptions about farm management, such as drainage practices, which can vary widely. More research is still needed to model the salinity impact to coastal

farmland pasture production and associated time-groundwater-salinity-sea-level rise dynamics with drainage practices to understand these issues better to inform decision-making.

- Pasture Data: the damage functions for pasture production were based on experiments in six regions and soil types. For areas without data, we matched them to the closest region, but this introduces some uncertainty.
- Other factors not modelled: we focused on groundwater rise, but farm-level impacts depend on many other factors: debt, stock numbers, micro-adaptation, and more.

1 Introduction

This report aims to assess the impacts of sea-level rise on the area of land exposed to shallow groundwater in New Zealand's low-lying coastal zones, with a particular focus on how these changes affect agricultural productivity in terms of dry matter pasture production.

1.1 Sea-level rise

Sea level rose 0.21 m on average across Aotearoa between 1901 and 2020 (Ministry for the Environment, 2024). Sea-level rise (SLR) in New Zealand has accelerated over the past century, with annual mean sea levels rising faster at all long-term monitoring sites since 1961 compared to the first half of the 20th century. For example, between 1961 and 2020, the rate of SLR in Wellington was 2.84 mm/year—more than double the rate from 1901 to 1960 (1.23 mm/year) (StatsNZ, 2022). Similar acceleration is observed at Auckland, Lyttelton, and Dunedin, reflecting a national trend of increasing SLR. This rise is already increasing the frequency and severity of coastal flooding, erosion, and groundwater impacts, including saltwater intrusion into aquifers and drainage challenges for low-lying areas. The latest projections, which combine the 2021 IPCC Sixth Assessment Report with the NZ–SeaRise programme, indicate that SLR will continue and accelerate, with a projected rise of 0.4 – 1.1 m by 2100 and 0.7 – 2.0 m by 2150, depending on global emissions and polar ice sheet responses. Available projections now include local vertical land movement (VLM), meaning that relative sea-level rise (RSLR) can be significantly higher in areas experiencing land subsidence, such as parts of Wellington, Hawke's Bay, and the lower North Island (Hamling and Kearse, 2023). For the most up-to-date and localised SLR and RSLR projections, including VLM, practitioners should use the NZ–SeaRise Takiwā platform (<https://searise.takiwa.co/map>), and refer to the Ministry for the Environment's 2024 Coastal Hazards and Climate Change Guidance. Statistics New Zealand provides regularly updated observational data and trends (<https://www.stats.govt.nz/indicators/coastal-sea-level-rise>).

1.2 Shallow groundwater and sea-level rise

We define 'low-lying coastal zones' as coastal areas that are less than 10 m above sea level, following definitions by previous research (Bosserele et al., 2023; Bosserele and Morgan, 2025; McGranahan et al., 2007; IPCC, 2022; Magnan et al., 2022). Our general conclusions are not affected by the choice of elevation used to define the area of interest—we could have chosen to use 5 m or 20 m for example.

SLR threatens low-lying coastal zones through a range of hazards and impacts including erosion, salinisation of both surface water and groundwater, coastal inundation and flooding (Magnan et al., 2022; Paulik, 2022; Ministry for the Environment, 2024). These impacts can disrupt ecosystems, reduce water security and agricultural productivity, damage infrastructure and displace communities. New Zealand is particularly vulnerable to these effects because it has an extensive coastline with numerous low-lying areas. Approximately 6,000 km² of New Zealand is in low-lying coastal areas, i.e., areas lower than 10 m above current mean sea level. That only makes 2% of New Zealand's total mainland area; however, it is where 15% of the population resides.

Globally, many coastlines have flat low-lying features such as coastal plains and river deltas (de Graaf et al., 2015). At these locations, groundwater occurs within coastal aquifers where the water table tends to be at shallow depth below ground surface, referred to as shallow

groundwater (Bosslerelle et al., 2024). Coastal aquifers are in hydraulic connection to the ocean, as well as tidally influenced surface water features such as rivers, drains, creeks, estuaries, lakes, lagoons and wetlands. This direct connection means that shallow groundwater in coastal aquifers is susceptible to SLR impacts and constitutes a hazard (Befus et al., 2020; Bosslerelle et al., 2022; Ministry for the Environment, 2024; Cox et al., 2025).

SLR can impact groundwater in coastal aquifers through the inland subsurface movement of seawater, a process referred to as seawater intrusion (Werner and Simmons, 2009). Seawater intrusion can reduce water security, degrade ecosystems, corrode subsurface infrastructure and reduce the productivity of agricultural land (Morgan et al., 2012; Herbert et al., 2015; Beebe et al., 2016; Setiawan et al., 2022, 2023, 2024; Hingst, 2024; Zamrsky et al., 2024). SLR can also impact groundwater by causing the water table to rise within the subsurface, a process referred to as groundwater rise (May, 2020; Befus et al. 2020; Bosslerelle et al, 2022; Morgan, 2024). Groundwater rise is one of the most important stresses on low-gradient and low-elevation coastal land as it can cause groundwater flooding (Ataie-Ashtiani et al., 2013; Ketabchi et al., 2016). The impact that SLR-induced groundwater rise and flooding can have on agriculture and infrastructure are increasingly recognised (Rotzoll and Fletcher, 2013; Tully et al., 2019; Befus et al., 2020; Bosslerelle et al. 2022; Bosslerelle and Hughes, 2024; Richardson et al., 2024; Bosslerelle and Morgan, 2025), although research on this topic is relatively limited compared to seawater intrusion.

A typical coastal aquifer is shown in Figure 1. This is an unconfined aquifer that contains the water table, which is directly connected to the atmosphere and to the sea. The water table is sloping down from the landward side to the ocean side (i.e., left to right) indicating a hydraulic gradient that is driving fresh groundwater flow to the sea. This hydraulic gradient is controlled by hydrology, geology and human activities such as pumping. The fresh groundwater originated as rainfall or river water that passed through the soil zone to reach the water table, recharging the aquifer. The fresh groundwater discharges as springs onshore and as submarine groundwater discharge offshore. An interface exists between the fresh and saline groundwater (as shown in Figure 1 as the freshwater saltwater interface) and is hereafter referred to as the 'interface'. The position of this interface is determined by the amount of fresh groundwater flowing to the coast. The fresh groundwater flow is effectively holding back the denser saline groundwater entering from the sea. The wedge shape of the interface mirrors the water table, stretched by a factor of around 40 (the density difference ratio between freshwater and seawater), as described by the Ghyben-Herzberg relation (Ghyben, 1889; Herzberg, 1901).

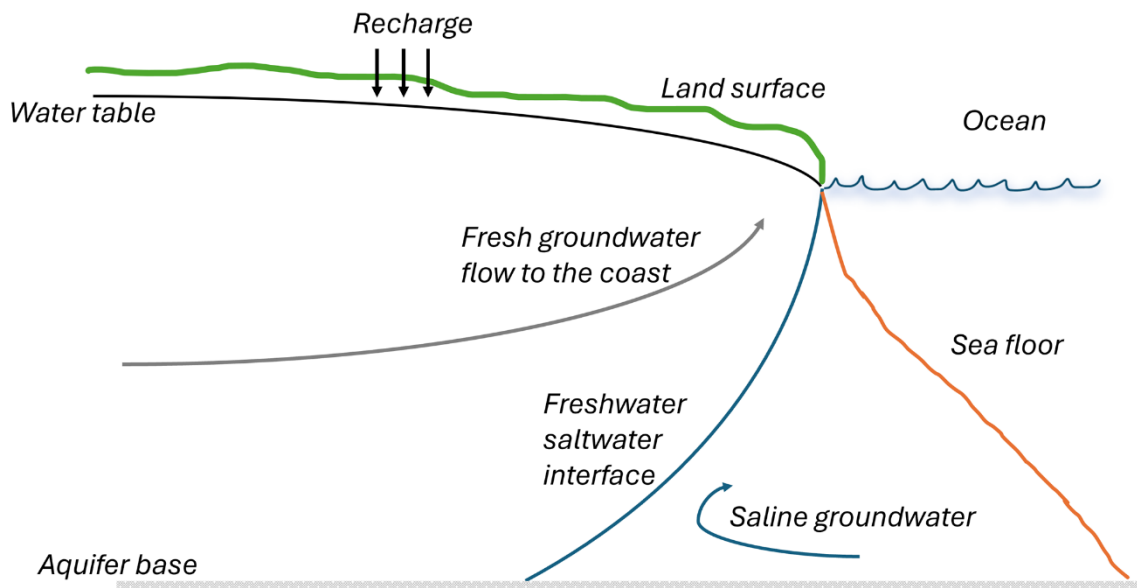


Figure 1: Schematic of an unconfined coastal aquifer.

The long-term rise in ocean levels at the coast associated with SLR causes a rise in groundwater levels (i.e., the water table) to propagate into the aquifer. In turn, this rise in the water table causes the interface to move upward and landward.

The magnitude of water table rise, and interface movement, depends largely on the topographic/hydrological setting i.e., the elevation of the land surface and the water table within individual coastal aquifers (Werner and Simmons, 2009; Morgan, 2024). For instance, in some systems the water table is largely disconnected from the topography and there is sufficient space for the water table to rise, as shown in Figure 2. This is called a flux-controlled system because fresh groundwater flux (i.e., flow) to the coast is maintained despite SLR. In contrast, in some systems shallow groundwater and low topography or drainage features intersect, and inundation of the land surface from rising groundwater under SLR is likely to occur, as shown in Figure 3. These are called head-controlled systems because groundwater head in the aquifer (i.e., the water table) is controlled by topography. The groundwater hydraulic gradient is likely to reduce under SLR in head-controlled systems resulting in decreased fresh groundwater flow to the coast and inland movement of the interface (i.e., seawater intrusion) that is more extensive than under flux-controlled conditions (Werner & Simmons, 2009). This distinction between flux-controlled and head-controlled is important as they represent end members in terms of water table rise and seawater intrusion impacts from SLR.

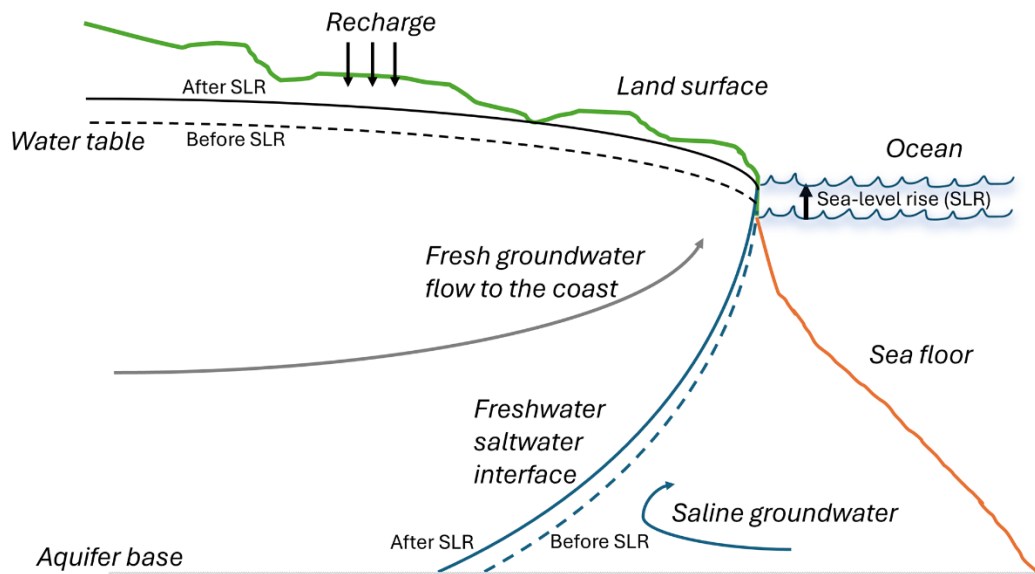


Figure 2: Schematic showing impacts of sea-level rise (SLR) on the water table and freshwater saltwater interface under flux-controlled conditions..

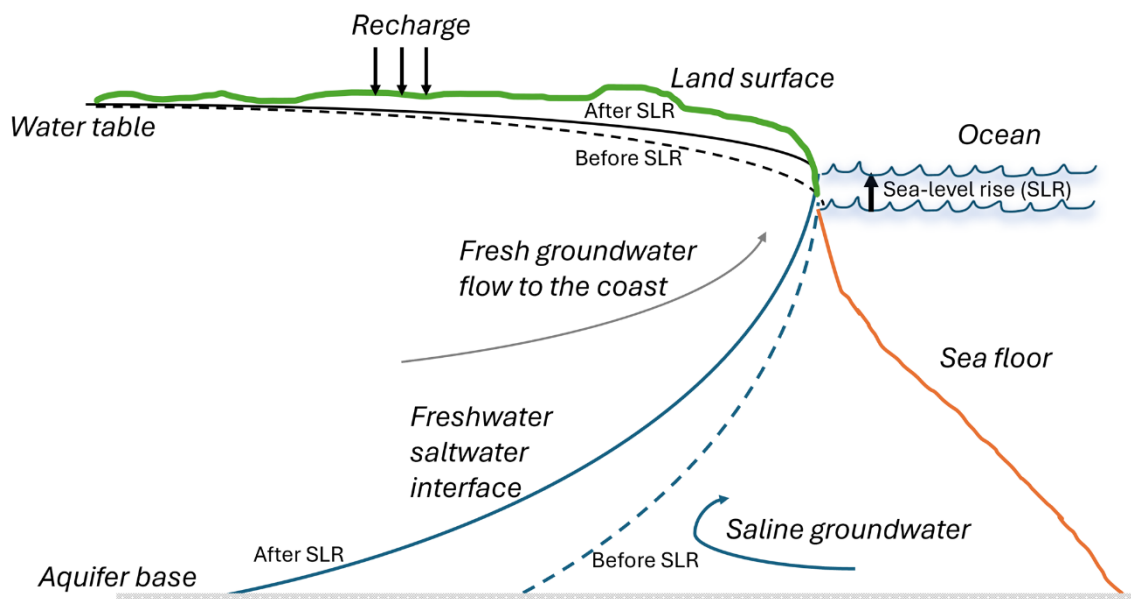


Figure 3: Schematic showing impacts of sea-level rise (SLR) on the water table and freshwater saltwater interface under head-controlled conditions.

Morgan (2024) used analytic mathematical modelling to explore the long-term magnitude of water table rise under SLR and showed that for flux-controlled conditions water table rise equals SLR in the region above the interface and is slightly less than SLR inland of the interface (as shown in Figure 1-2). For head-controlled conditions the water table rise equalled SLR at the coast and reduced inland with no rise occurring at the inland location where the head is controlled (as shown in Figure 3).

The rate of water table rise under SLR was assessed by Bosserelle and Morgan (2025) using variable density numerical modelling. They found that rates of water table rise were always less

than SLR and decreased with distance from the coast. Also, the rate of water table rise is proportional to the rate of SLR, so if the rate of SLR doubles so too will the rate of water table rise. The magnitude and rate of water table rise in response to SLR was larger for flux-controlled conditions than head-controlled conditions. Also, while water tables responded relatively rapidly to changes in sea level under head-controlled conditions there was a lag in the order of decades for flux-controlled conditions. As such, flux-controlled conditions represent a greater hazard for water table rise because the magnitude of rise is close to SLR and the maximum impact may not be experienced for decades even if SLR is halted. This delayed response poses challenges to planners and managers of coastal groundwater systems. It has been estimated by Michael et al. (2013) that 70% of coastal aquifers globally are head-controlled. More detailed assessment using local scale data for New Zealand is currently being carried out to characterise New Zealand's coastal regions as either flux-controlled or head-controlled as part of the MBIE Endeavour funded Future Coasts Aotearoa project.

Shallow groundwater in coastal aquifers constitutes a hazard and therefore it is important to delineate areas where depth to groundwater is shallow. That is the purpose of this report, which presents national-scale maps for New Zealand showing areas where depth to groundwater from land surface (i.e., depth to water) is less than 2 m and less than 1 m. Two separate models have been combined to create these depth-to-water maps and the approach for combining the datasets has been described. The resulting depth-to-water maps represent the best estimate presently available of locations where there is shallow groundwater in New Zealand. Additionally, a first-pass estimate of depth to-water under future SLR (of 0.5 m, 1 m, 1.5 m and 2 m) has been made, with maps developed. The maps detail the depth to water within the low-lying coastal regions of New Zealand i.e., regions where the land surface is less than 10 m above mean sea level. Further work being carried out as part of the MBIE Endeavour funded Future Coasts Aotearoa project will improve these estimates of depth to-water under SLR.

1.3 The importance of dry matter production to farming in New Zealand

Dry matter production (DMP) is a key performance measure for dairy farms, representing the amount of usable pasture grown on-farm for livestock feed. In New Zealand's pasture-based farming systems, it directly influences animal nutrition, farm productivity, and profitability. High pasture yields reduce reliance on costly supplementary feeds and supports efficient grazing management, and farmers design their farm systems around the expected production.

DMP can be influenced by shallow groundwater. When groundwater is close to the root zone, it can enhance pasture growth by providing additional moisture during dry periods. However, if the water table is too high, it may cause waterlogging, reducing oxygen availability to roots and suppress growth. In some cases, shallow groundwater can also bring up salts, affecting pasture health. The overall impact depends on soil type, pasture species, and seasonal conditions, making groundwater dynamics an important factor in pasture management. We used newly developed damage functions to estimate the potential impacts of ground waterlogging on DMP (Section 2.2).

Until recently we lacked quantitative functions linking rising water tables with pasture loss through impaired growth and livestock treading damage to pasture, especially under New Zealand conditions. Available research provided limited quantitative data particularly for perennial ryegrass (Frisk et al., 2022), and even fewer studies considered the combined effects of waterlogging and grazing-induced soil damage (pugging). A recent report commissioned as

part of an ESNZ-led MBIE Endeavour programme ([Future Coasts Aotearoa](#)) developed and implemented new damage and recovery functions within the APSIM (the Agricultural Production Simulator; www.apsim.info; Holzworth et al., 2018) model to simulate these impacts across six New Zealand regions and soil types (Snow et al., 2025). This work provided usable, region- and soil-specific functions for predicting pasture yield loss due to water table rise and treading damage—filling a critical gap for risk assessment and farm management planning under climate change and groundwater rise scenarios.

The report quantified how rising water tables and livestock treading affect pasture production by combining literature review, model development, and simulation. Researchers developed a new “damage” module within APSIM to simulate soil and pasture damage from grazing under wet conditions. They ran long-term simulations across six New Zealand regions and six soil types, using climate data and ten water table depths. Grazing pressure and recovery rates were modelled to reflect real farm conditions. Statistical analysis fitted nonlinear curves to predict pasture yield loss, producing region- and soil-specific functions for use in hazard and risk frameworks. A combination of parameters was considered including climate, soil types, crops, and management at a daily time step. The primary output variables were region-soil-specific parameters describing a curve of expected reduction in pasture production with rising water table (Snow et al., 2025).

The main results of the study were that pasture production is significantly affected when the water table rises to within 1 metre of the soil surface. Below this threshold, impacts are usually minimal, but as the water table gets shallower, pasture yield drops sharply due to reduced soil aeration and increased susceptibility to treading damage. Across six regions and six soil types, the study produced region-specific functions linking water table depth to pasture yield loss.

2 Methods

Analysis was conducted by:

1. Mapping areas where shallow groundwater occurs within New Zealand's coastal lowlands and the increases due to SLR.
2. Simulating the effects of shallow groundwater rise on dry matter pasture production, in those regions.

2.1 Methods for predicting shallow groundwater response to SLR

2.1.1 Overall rationale

Models that simulate depth to shallow groundwater are uncertain. That is mostly because shallow groundwater data is sparse: water level is mostly observed from wells that target the investigation of deeper groundwater levels.

Two different models currently exist that could be used to simulate shallow groundwater levels (EWT and CATS, Section 2.1.3). From a scientific perspective that is good news, since promising developments are leading to better future models and potentially less uncertainty. However, using different models might end up in diverging model outcomes, which might lead to different decisions being made.

We have produced one consistent output in the form of a weighted model average between the two models used. This enables us to provide a best estimate plus an uncertainty range that approximates both head-controlled and flux-controlled systems.

2.1.2 Data used

Durney et al (2024) developed a national New Zealand dataset of depth-to-water and groundwater elevation above mean sea level with the ambition to save researchers time and effort in their activities of compiling a diverse range of datasets from each regional council. This is mostly because groundwater level data in New Zealand are often held in a fragmented array of databases.

Durney et al.'s (2024) data, as well as their data density (Figure 4), have been used in this study, i.e., in the model building and model averaging explained in Sections 2.1.3– 2.1.5

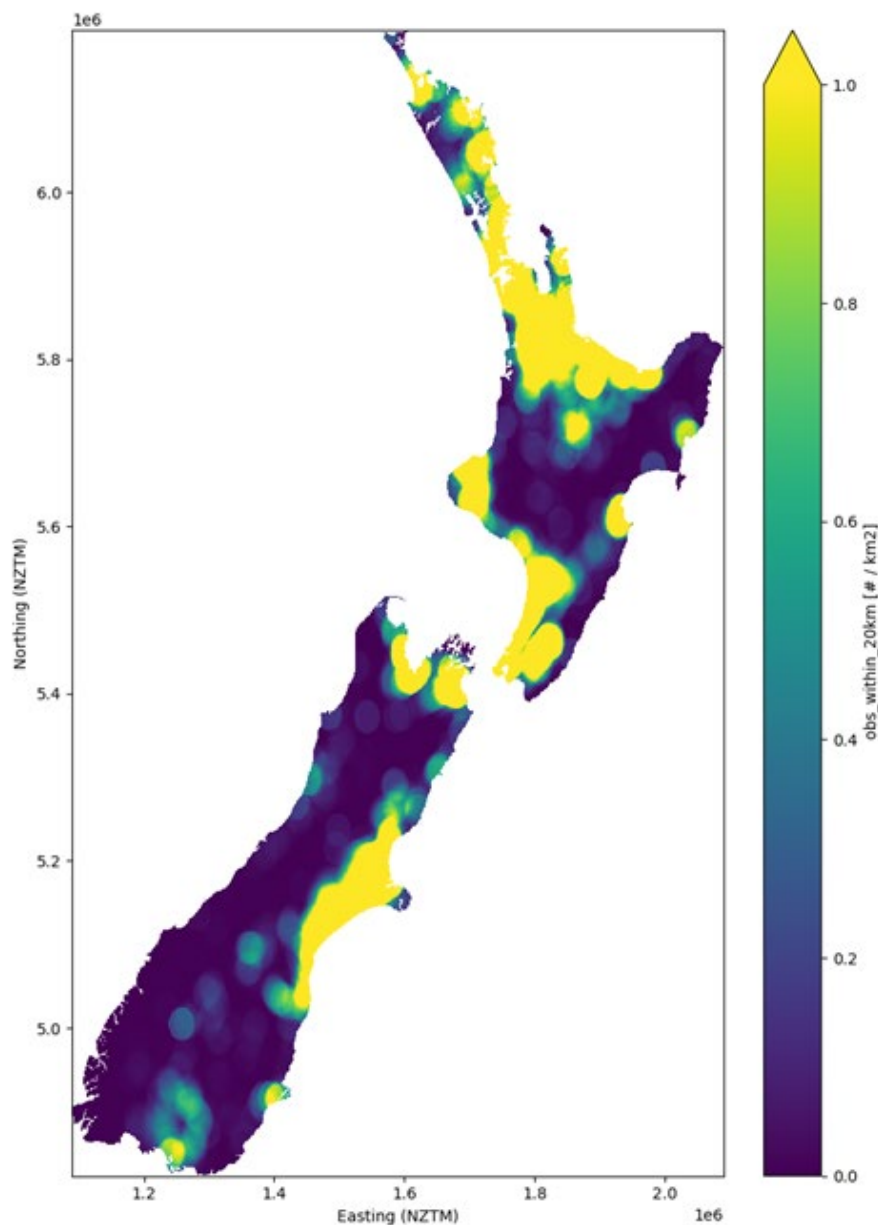


Figure 4: Data density of nationwide groundwater level observations: number of observations within a radius of 20 km. The unit was scaled back to observations per km² for further weighting purposes.

2.1.3 Models used

Two separate models (the categorical shallow groundwater model ([CATS](#)) and the Equilibrium Water Table (EWT) model) have been combined to create these depth-to-water maps and the approach for combining the datasets is described below. The resulting depth-to-water maps with a given threshold of 0.9 to 5 meters represent the best estimate presently available of locations where there is shallow groundwater in New Zealand. A sensible combination of the statistical estimation of type 1 error and type 2 error is applied to provide an estimated range of change to further inform associated decision-making. (see Section 2.1.4).

Categorical depth to water model

The categorical shallow groundwater model (CATS) is a suite of machine learning models that predict whether a given location has groundwater shallower than a given threshold (0.9–5 m

depth) (Durney et al., 2025). Machine learning models differ from physically based models in that they look for patterns between so called predictor datasets and prediction datasets rather than simulating the physical processes that control groundwater depth (Durney et al., 2025). Predictors can include a wide range of datasets such as topography, geology, land use, and climate data; here the categorical model was trained on a set of 199 predictor datasets which were then simplified to 37 predictor variables.

The CATS model is a **data-driven** model. Its machine learning algorithm is a statistical model which is trained on observation data.

The CATS model outputs are defined as probability of depth to water being shallower than threshold depths. These model outputs were used:

- ‘upper bound’ (shallower) estimates, i.e., where only 5% of predictions is allowed to be deeper than the observed depth.
- ‘median’ estimates, i.e., where 10% of predictions is allowed to be deeper than the observed depth.
- ‘lower bound’ (deeper) estimates, i.e., where 20% of predictions is allowed to be deeper than the observed depth.

A more extensive model description is given in Appendix A.

Equilibrium Water Table model

Westerhoff et al. (2018) developed the Equilibrium Water Table (EWT) model for New Zealand as a simple steady-state groundwater flow model at 250 m cell resolution across New Zealand as “a solution to obtain a nationwide overview of groundwater that bridges the gap between the (too-)expensive advanced local models and the (too-)simple global-scale models”. The EWT calculates the water table across New Zealand by improving a global-scale model based on convergence to an equilibrium between recharge and groundwater flow (Fan et al., 2013). The model feeds in national input data of New Zealand terrain, geology, and rainfall recharge.

The EWT model is a **physics-based model**, i.e., the model assumptions are driven by a spatial groundwater flow process as modelled numerically.

EWT model outputs of depth to water was used. Westerhoff et al. (2018) also defined model uncertainty as standard deviation in a general model uncertainty estimate, which was used in this study. These outputs were used:

- ‘upper bound’ (shallower) estimates, i.e., the depth to water model average minus the model uncertainty.
- ‘median’ estimates, i.e., the depth to water model average
- ‘lower bound’ (deeper) estimates, i.e., the depth to water model average plus the model uncertainty.

A third model—a national-scale Modflow model—was discounted for use in this study because the 1 km grid-cell resolution was too coarse.

2.1.4 The development of model weights used for averaging

A subset of Durney et al.'s (2024) full observation dataset was used to build a validation dataset. Only data from sites with an elevation < 10 metres above current sea level were held; only sites with a minimum of 20 observations were used, where the mode (i.e., most occurring value) was taken as a validation value.

The CATS model outputs consist of categories of depth to water shallower than 'x', with 'x' a depth category. Depth categories of 1 m and 2 m were taken for the model weighting. The EWT model outputs (depth to water) were also classified into depth categories of < 1 m and < 2 m depth to water. Subsequently, they were validated by comparing with the validation datasets (Figure 5), where validation can either be:

- True Positive (TP): both model and observation have a depth to water less than the depth category.
- True Negative (TN): both model and observation have a depth to water less than the depth category.
- False Positive (FP): the model indicates a depth to water less than the depth category; the observation does not (type 1 error).
- False Negative (FN): the observation indicates a depth to water less than the depth category; the model does not (type 2 error).

Using the above validations, a correlation coefficient was estimated using the Matthew's correlation coefficient (MCC) (Chicco and Jurman, 2023, their Eq. 7 and 8):

Equation 1: Matthew's correlation coefficient.

$$MCC = \frac{TP \times TN - FP \times FN}{\sqrt{(TP + FP)(TP + FN)(TN + FP)(TN + FN)}}$$

Where values can be between -1 (worst value) and +1 (best value). The MCC was calculated for each model using the validation dataset (Section 2.1.2).

For both models, uncertainty was taken into account while validating:

- The lower bound CATS predictions were used, since they gave the highest MCC.
- The upper bound, median and lower bound estimates of the EWT model was used to allow for comparison with the observations. If either agreed with the observation category, it was assumed to agree with the observation data, i.e., a True Positive or True Negative.

Table 2-1: Matthew’s Correlation Coefficient for the model validation.

	MCC	
	1 m	2 m
CATS	0.526	0.717
EWT	0.331	0.311

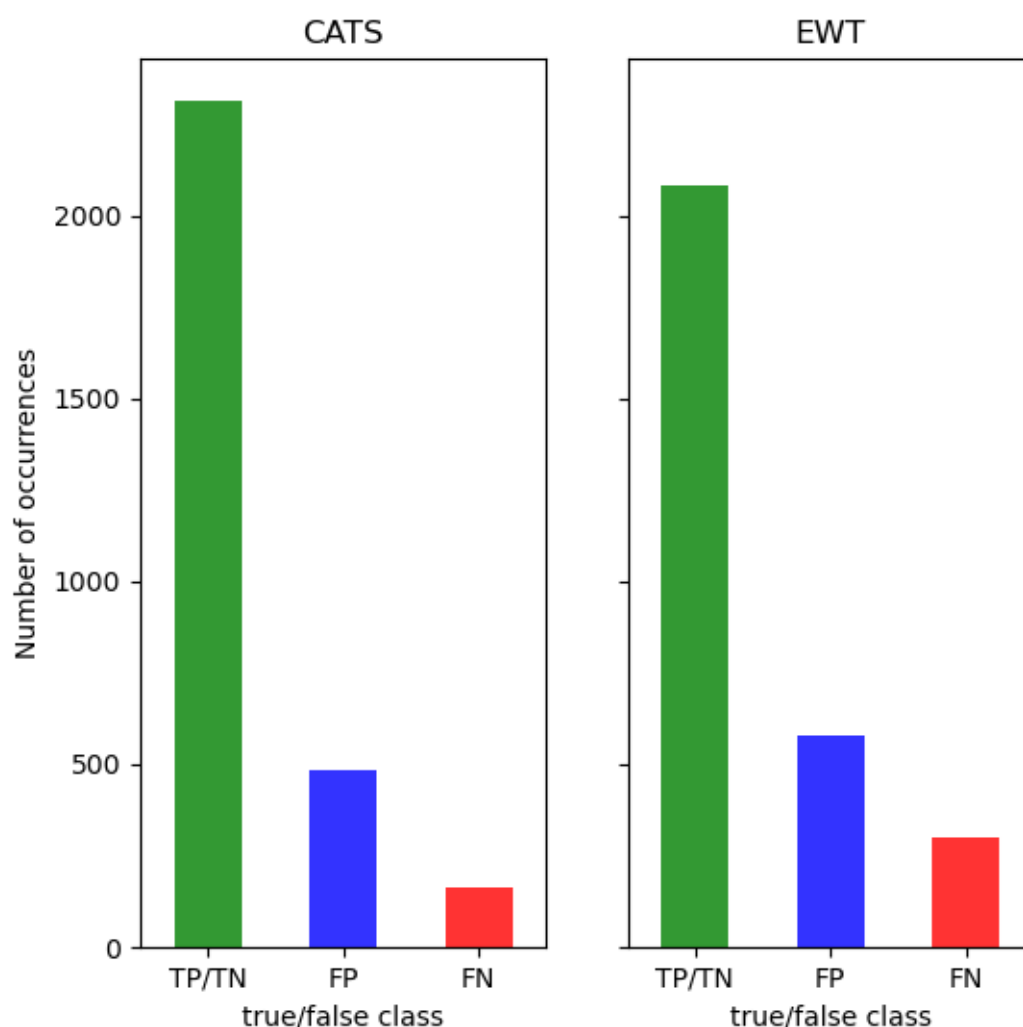


Figure 5: Model validation on the training dataset for each model. The figure shows the 1 m threshold case.

It is likely that a physics-based model will outperform a data-driven model at geographical areas where no data are available. This is because a data driven model will attempt to fit observations, i.e., its training data. In a data-sparse area, those conditions could differ. For example, conditions on the South Island’s West Coast, with extremely high rainfall volumes and short distances from mountains to coast, will be different from average conditions, yet there is no

data available to train a data driven model. Therefore, a second weighting rule was introduced which is depending on data density of the observation dataset (Figure 6).

A scaling function was generated (Equation 2), based on our expert judgement on our familiarity with the models' characteristics to reflect that:

- The CATS model would be weighted highest, in line with its MCC-indices, in areas where ample observations are available, since this model was built on the statistics of all observations.
- The CATS model will never be weighted lower than the EWT model, given the relative simplicity of the EWT model.

Equation 2: Scaling function used to weight groundwater models.

$$W_{CATS} = MCC_{CATS} \operatorname{erf}(\rho_{obs}) \quad ; \quad W_{EWT} = MCC_{EWT}$$

Where MCC refers to the representative MCC index of the CATS or EWT models and ρ_{obs} represents data density as shown in Figure 4. Since the EWT model is uncalibrated and hence independent on data density, its weight was simply set to the value of its MCC index (Figure 6).

The recommendations of this report will elaborate on potential improved scaling functions.

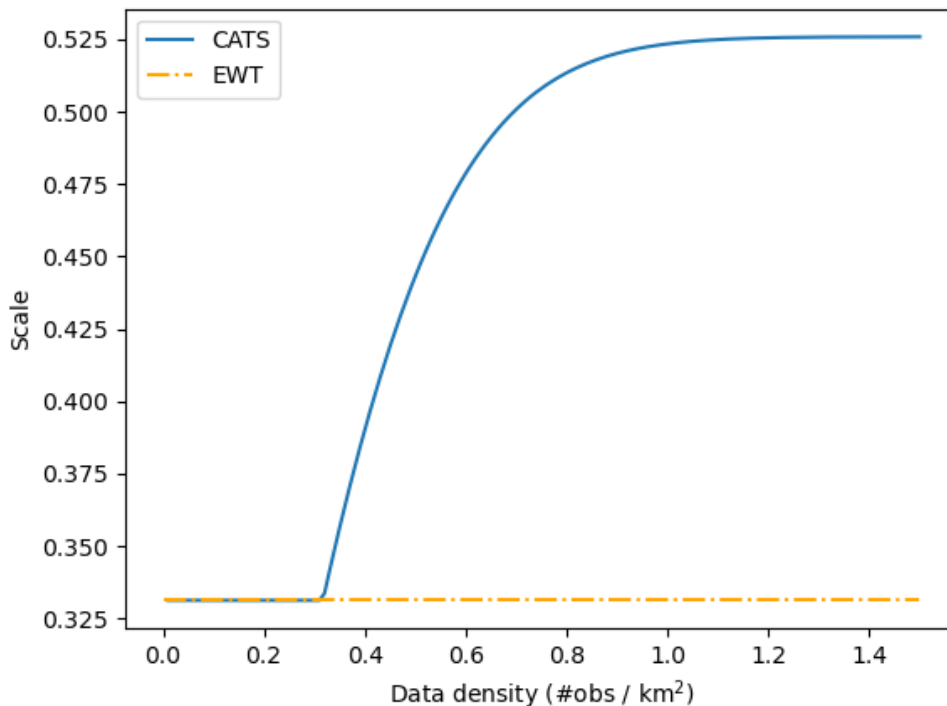


Figure 6: Model weights used for averaging, as a function of Matthew's Correlation Coefficient and data density. The figure shows the 1 m threshold case.

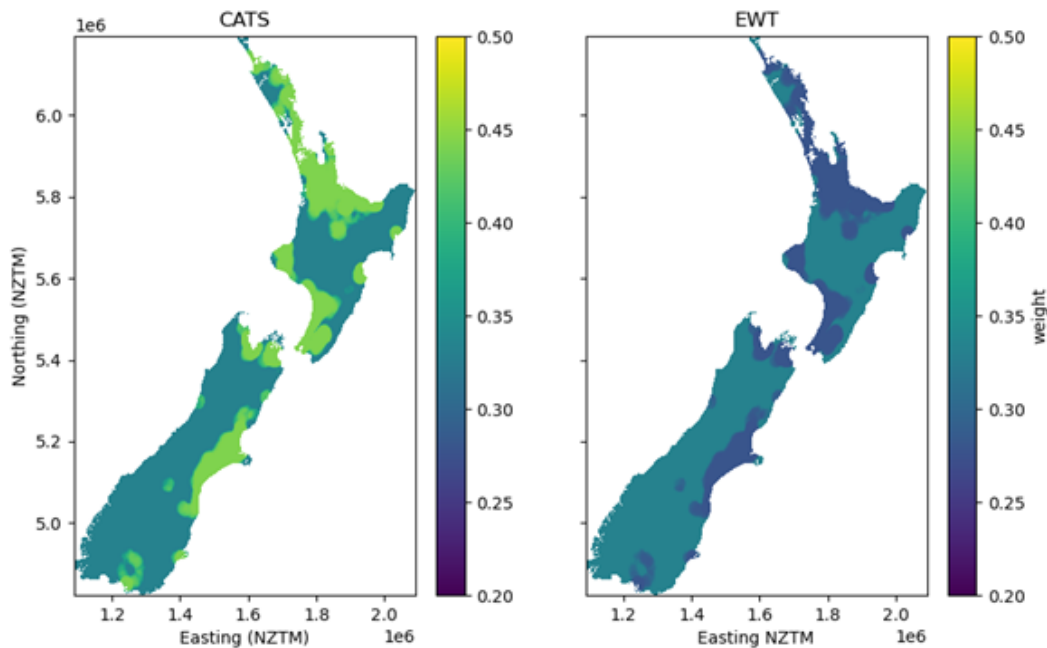


Figure 7: Model weights per model. The weights shown were normalised for their sum to equal 1. The figure shows the 1 m threshold case.

2.1.5 Model averaging

For the estimates of depth to water with current sea level, models were averaged using a weighted model average with weights as described in Section 2.1.4. The upper bound, median and lower bound estimates were each processed separately to consider model uncertainty (see Section 2.1.3 Models Used).

Both models were also deployed to simulate scenarios for four incremental steps of SLR, i.e., 0.5, 1, 1.5, and 2 metres higher than the present day.

To account for SLR scenarios, the CATS categorical model estimated future depths to water as a ‘bathtub’. i.e., water table rise = SLR at all locations, which is most representative of flux-controlled conditions. For example, for depth category 1 m and a SLR of 0.5 m, the model output threshold of water below 1.5 m was taken; or for depth category 2 m and SLR of 2 m, the model outputs threshold of water below 4 m was taken. The EWT model was re-run for the nation using the four SLR increments.

We expect combined model averages to contain additional uncertainty for their different model assumptions. For example, in the case of SLR scenarios, the CATS model’s bathtub. We know that water table rise decreases inland (e.g., Morgan, 2024), but the details of this relationship are site specific and challenging to model. The bathtub approach will be a conservative estimate of water table rise – it is likely to overestimate water level rise. The EWT model attempts to predict the inland extent of SLR induced water table rise, but this rise can be limited as water is removed from the model once the groundwater level reaches the model top. This means that anywhere water reaches the top of the model it is likely to prevent further inland propagation of water table rise. The EWT has a 250 m model resolution. This simplification of

terrain (the average elevation in a model cell) and drainage, suggests that the EWT is likely to underestimate water table rise associated with SLR.

The developed model code allows for a rebalancing of weights between models for SLR scenarios. We chose to leave them unchanged since we cannot reliably state which of the two abovementioned model weaknesses is dominant.

2.2 Damage function of groundwater table rise on pasture production

A pasture treading damage and recovery function was developed using APSIM (the Agricultural Production Simulator; www.apsim.info; Holzworth et al., 2018) based on the effect of weather and rising water tables on soil wetness (Snow et al., 2025). The damage model was based on published literature and utilised the APSIM simulation of water content in the soil as affected by weather and mean (but fluctuating seasonally) water table. Pasture responses were simulated across six regions across New Zealand (Snow et al., 2025). For each region a single typical location was chosen. The contribution of the various soil orders was examined for each region, and a typical soil was selected to represent each soil order. Simulations were set up for each location, soil and mean water table depth (see below). Management of the pasture in each simulation was set up with fertiliser and irrigation management representative of the region. The pasture was grazed whenever the pasture biomass reached 2800 kg DM/ ha down to a post-grazing residual varying between 1250 and 1500 kg DM /ha depending on the time of year. In addition, a minimum and maximum grazing interval was imposed. The primary output examined was the amount of pasture grazed each year. See Snow et al. (2025) for further details.

The study used ten mean groundwater (water table) depths, expressed as depth below the soil surface: 500, 750, 1000, 1250, 1500, 1750, 2000, 2500, 5000, and 10000 mm. The 10,000 mm (10 m) depth was used as the non-limiting baseline scenario.

The effect of reducing the water table depth on annual grazeable pasture production was minimal until the depth reached about 1.5 m, at which point pasture production was substantially reduced, e.g., Figure 8.

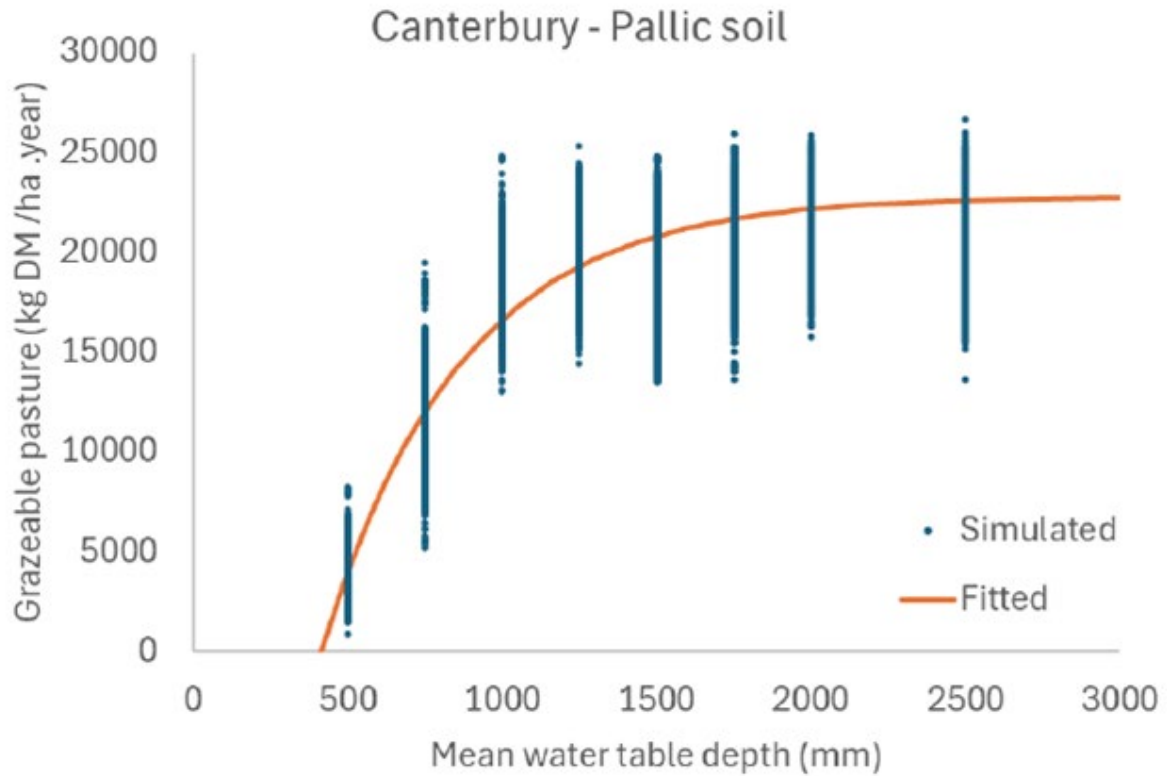


Figure 8: Example of the fitted relationship between annual average grazeable pasture production and water table depth. Example shown for a Pallic soil in Canterbury. Source: Snow et al. (2025).

The statistically-derived relationship between dry matter production for perennial rye grass and the distance of groundwater from the land surface was:

Equation 3: Relationship between dry matter production for perennial rye grass and the distance of groundwater from the land surface.

$$E(harv + \epsilon) = P_m \left(1 - \exp \left[\frac{wt_0 - WT}{\alpha} \right] \right); \quad WT > wt_0.$$

Where:

E = is the expected annual pasture harvestable dry matter (DM) (kg DM /ha /year),

$harv$ is the annual harvestable dry matter (DM) (kg DM /ha /year),

ϵ is a small (0.1 kg DM /ha /year) constant to avoid mathematical issues,

P_m is the site-soil annual pasture harvestable (kg DM /ha /year) without water table restriction (so at 10m deep),

α is a curvature parameter,

wt_0 is the water table depth above which there is no harvestable pasture (mm), and

WT is the mean annual water table depth (mm).

Snow et al. (2025) provide values of these above parameters (e.g., P_m , α , w_{t0}) for six regions (Northland, Waikato, Bay of Plenty, Manawatu, Canterbury, and Southland) by six soil types (Gley, Organic, Pallic, Pumice, Recent, and Ultic) of pastures across New Zealand. Soil orders that were not formally modelled were proxied by parameters from modelled soil orders using expert opinion to assign the proxies. Equation 3 was rearranged to give the percentage decline in harvestable pasture as the mean water table rose from 10 m to 500 mm. This rearranged equation was mapped to give declines in pasture production across all Terrestrial Authorities to represent the groundwater impact on pasture production across New Zealand.

Pasture production estimation was based on the best available physical experiment data available (Snow et al. 2025) across 6 regional soil types (which are the most important dairying regions with high water tables) in New Zealand. We have made some assumptions to produce results across other 9 regions in New Zealand. For the 9 regions that were not modelled, we chose the best match from the 6 available regions. The matching (or proxying) considered soil physical and climatological characteristics (Table E-1).

The actual quantity of harvestable dry matter will obviously be subject to farm management such as stocking rate, drainage, fertiliser usage and grazing regime. Our estimates of loss are therefore indicative. Pasture production would also decline more rapidly than indicated here if rising water tables are accompanied by soil salinisation (Water New Zealand. 2024; Parliamentary Commissioner for the Environment. 2015). Adequate models to predict pasture salinisation don't exist, so we do not include salinisation of soils and feed quality in our analysis except to acknowledge that there will be less time for adaptation once salinisation takes effect.

2.3 Inferring high precision water table rise

The pasture growth function is highly sensitive to groundwater shallower than about 1.5 m, but particularly within the surface 1 m—pasture damage increasing exponential with shallowing depth.

However, the national groundwater elevation models that show where shallow groundwater is present, only provide information to within the nearest 1 m of the soil surface. Thus, we are faced with a mismatch between groundwater model accuracy and the ≤ 1 m resolution required to fully leverage the pasture water restriction function.

When considering the impacts of sea-level rise induced water table rise on pasture yield there are three sources of uncertainty:

1. There is the uncertainty in the depth to water predictions (e.g., 'Upper bound', 'Median', 'Lower bound').
2. There is the lack of depth to water precision from the modelling approaches.
3. There is uncertainty in the extent to which drainage can mitigate the impacts of sea-level rise on water table rise.

An additional challenge is the fact that the pasture yield impacts are strongly nonlinear with changing depth to water. This combined with the fact that pasture impacts are most severe when depth to water is less than 1 m and that our modelling and datasets lack the precision to robustly predict the depth to water at less than 1 m (Durney et. al, 2025) means that predicting pasture yield impacts is a difficult and deeply uncertain task.

To address this uncertainty, we have created a simplified methodology for predicting likely relative pasture yield reductions under SLR. The methodology is as follows:

For each depth to water prediction suites (e.g., 'Upper bound', 'Median', 'Lower bound') we:

1. Assume that all areas currently mapped with depth to water ≤ 1 m have a depth to water of 1 m.
2. Assume that all areas currently mapped with depth to water ≤ 2 m, but not mapped as depth to water of ≤ 1 m have a depth to water of 2 m.
3. Develop an a. priori. set of water table rise factors (0.1, 0.25, 0.5, 0.75, 0.9) which are used as "storyline conditions", or as a sensitivity test. Here water table rise is defined as sea-level rise \times water table rise factor (WTR_{SLR}). So $WTR_{SLR} = 1$ means that water table rise = sea-level rise, while $WTR_{SLR} = 0.5$ means that water table rise = $\frac{1}{2}$ of sea-level rise.
4. For each sea-level rise increment and Water Table Rise factor we predict a "depth to water" layer:
 - Where the depth-to-water (DTW) predictions for the SLR increment predict a change in depth to water (e.g., from ≤ 2 m to ≤ 1 m) the depth to water value is considered to be the threshold value (e.g., 1 m).
 - Where the DTW predictions for the SLR increment do not change, the DTW is considered to be the previous threshold $- WTR_{SLR} \times (SLR_{current} - SLR_{when_mapped})$. So for example if an area is mapped as DTW for ≤ 1 m under 0.5 m of SLR, then the depth to water at 1 m SLR would be equal to $1\text{ m} - (1 - 0.5) \times \text{Water Table Rise factor}$, at 1.5 m the SLR would be $1\text{ m} - (1.5 - 0.5) \times WTR_{SLR}$.
 - Where the DTW prediction defined in 1 and 2 are less than zero (emergent groundwater) then the DTW is set to zero.
 - Where the elevation of a cell is less than the SLR increment (e.g. elevation = 0.5, SLR = 1.0) the DTW is set to zero.
5. Relative pasture yield is then calculated from the damage functions, noting that pasture yield is always ≥ 0 and pasture yield for DTW = 0 is zero.

This process yields a relative pasture yield for each Water Table Rise factor and depth to water suite.

To present this data we have plotted the lower and upper bounds of the damage function. For simplicity we have labelled the suites as the low and high DTW scenario. In most catchments the low DTW scenario corresponds with the 'Upper bound': the shallower estimates suite and the high DTW suite corresponds to the 'Lower bound': the deeper estimates. To avoid confusion for those catchments where the 'Upper bound' DTW model predicts less impact than the 'lower bound model' we have defined the high and low DTW suite as the suite with the lowest and highest mean impact (across all SLR increments) under the $WTR_{SLR} = 0.5$ scenario.

Typically, the uncertainty between the two DTW scenarios is less than the uncertainty with regards to the ability of the drainage network to ameliorate the effects of SLR on water table rise. To better understand WTR_{SLR} , high spatial precision modelling (e.g., at 8 m grid cells) that includes the best estimate of the variation in land surface must be undertaken. This is a research goal that is unavailable to support this project. Note also that while it is possible to drain away (e.g., with pumps) all effects of water table rise, this would likely lead to significant salinisation issues which were not studied here.

The Water Table Rise factor provides a mechanism to test the sensitivity of the groundwater response to sea-level rise within that ≤ 1 m surface layer.

2.4 Geospatial modelling

The model for both the Boolean area exposure (section 2.1) and inferred high precision water table rise estimates (Section 2.3) are produced on a regular 100 m grid for New Zealand. To support the spatial analysis of the model outputs and apply them to the pasture damage functions (Section 2.2) we rasterised 3 additional geospatial layers to the same regular grid. These layers are the Land Use Carbon Analysis System (LUCAS) land cover map (Ministry for the Environment. 2012), the New Zealand Fundamental soils layer (Landcare Research. 2025), and the New Zealand Territorial Land Authority (TLA) boundaries (New Zealand Transport Agency. 2023). These layers are vector datasets and thus have higher spatial precision than the 100 m grid of the model outputs. To rasterise these layers, we used the GDAL library (open-source geospatial foundation). Where multiple vector features intersected a single grid cell, the first feature in the attribute table was used. This effectively reduces the precision of the vector datasets, however given the other uncertainties in the analysis a focus on higher spatial precision was not warranted and would lead to false precision in the results. The areas exposed were the simple sum of all grid cells exposed to flooding multiplied by the area of each grid cell (100 m x 100 m = 1 ha).

The pasture damage functions were applied via a lookup table approach. The depth to water raster was rounded to the nearest 1 cm and the region, soil type, and depth to water for each grid cell was used to look up the corresponding pasture production from a pre-computed table of pasture production values for each combination of region, soil type, and depth to water. These pasture production values were then summed to give the total pasture production for each TLA under each scenario. Given the uncertainties in pasture production estimates and the other components of the analysis, we suggest that the absolute estimate of pasture production is less reliable than the relative differences between scenarios.

2.5 Percent decrease of pasture dry matter production

Expected harvestable dry matter production is presented as a percentage decrease in DMP within the district concerned, weighted by the fractional size of the total DMP in the region when compared with the largest baseline DMP for all districts, which occurred in the Hauraki District (Equation 4). Weighting the percentage change with SLR, highlights the districts with the most significant coastal-DMP change. For example, it isn't helpful to focus on comparatively large percentage in low coastal-DMP districts—we want to focus on the sea-level rise-induced changes within the most exposed districts.

Equation 4: Formula for Weighted percent decrease in dry matter production. WPD = weighted percent decrease DMP, DMP_B = DMP at baseline (0 m) sea-level rise DMP_{SLR} = DMP after SLR increment, DMP_{Max} = maximum baseline (0 m SLR) DMP within all districts. .

$$WPD (\%) = ((DMP_B - DMP_{SLR}) / DMP_B) \times (DMP_B / DMP_{Max}) \times 100$$

3 Results

3.1 Shallow groundwater exposure

3.1.1 Nationwide maps

We present a weighted average of the combined CATS and EWT models that best represents where groundwater is shallower than depths of 1 m or 2 m. Compiled results are shown for the nation (Figure 9, Figure 10) and for some example case study areas (Figure 13: Heretaunga Plains, Figure 14: Waimakariri). Weighted averages all contain uncertainty information, as do their underlying models. Therefore, model outputs are given as:

- ‘Upper bound’: the shallower estimates.
- ‘Median’: the most likely estimate
- ‘Lower bound’: the deeper estimates.

Individual outputs of each model (CATS, EWT) have also been made available (e.g., Figure 15).

Digital versions of these maps, in GeoTIFF format, were supplied to the Climate Change Commission.

File description of all files is explained in Section 4.

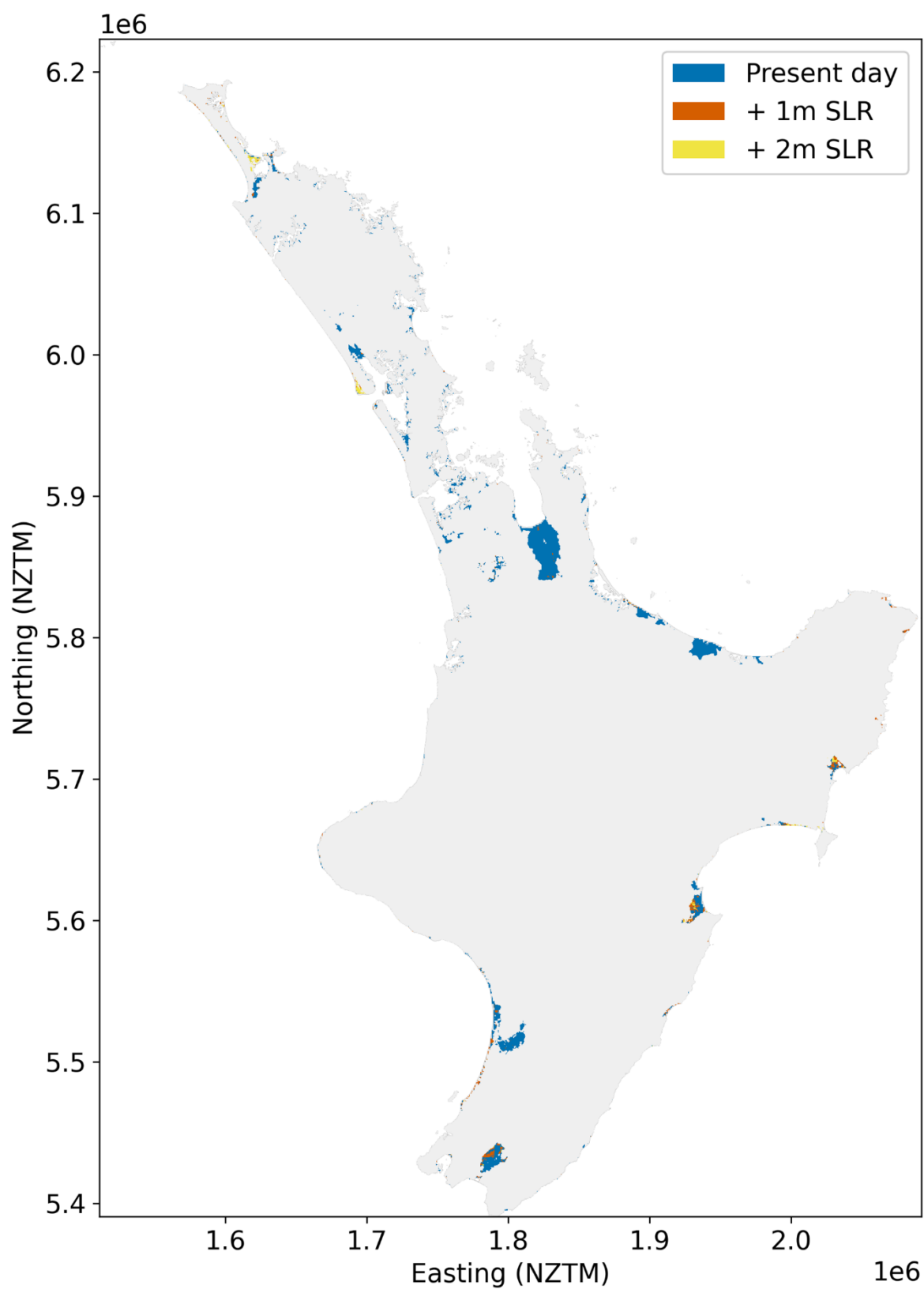


Figure 9: Areas of NZ-North Island where groundwater depths are shallower than 1 metre below ground level. Colours: Present-day (blue), increments of 1 m (orange) and 2 m (yellow) of SLR. This figure represents median model realisations. Areas higher than 10 m above current sea level have been masked out.

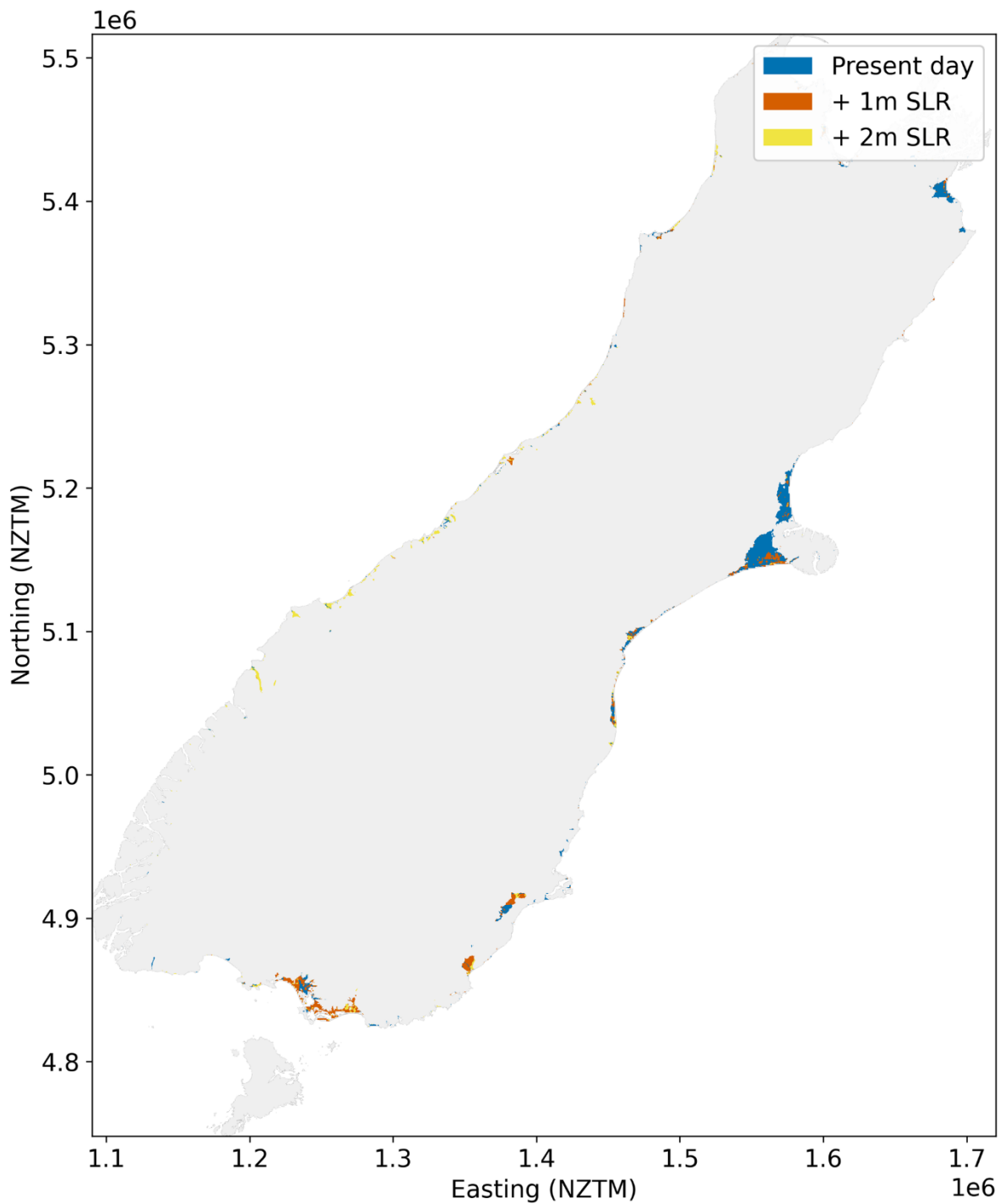


Figure 10: Areas of NZ-South Island where groundwater depths are shallower than 1 metre below ground level. Colours: Present-day (blue), increments of 1 m (orange) and 2 m (yellow) of SLR. This figure represents median model realisations. Areas higher than 10 m above current sea level have been masked out.

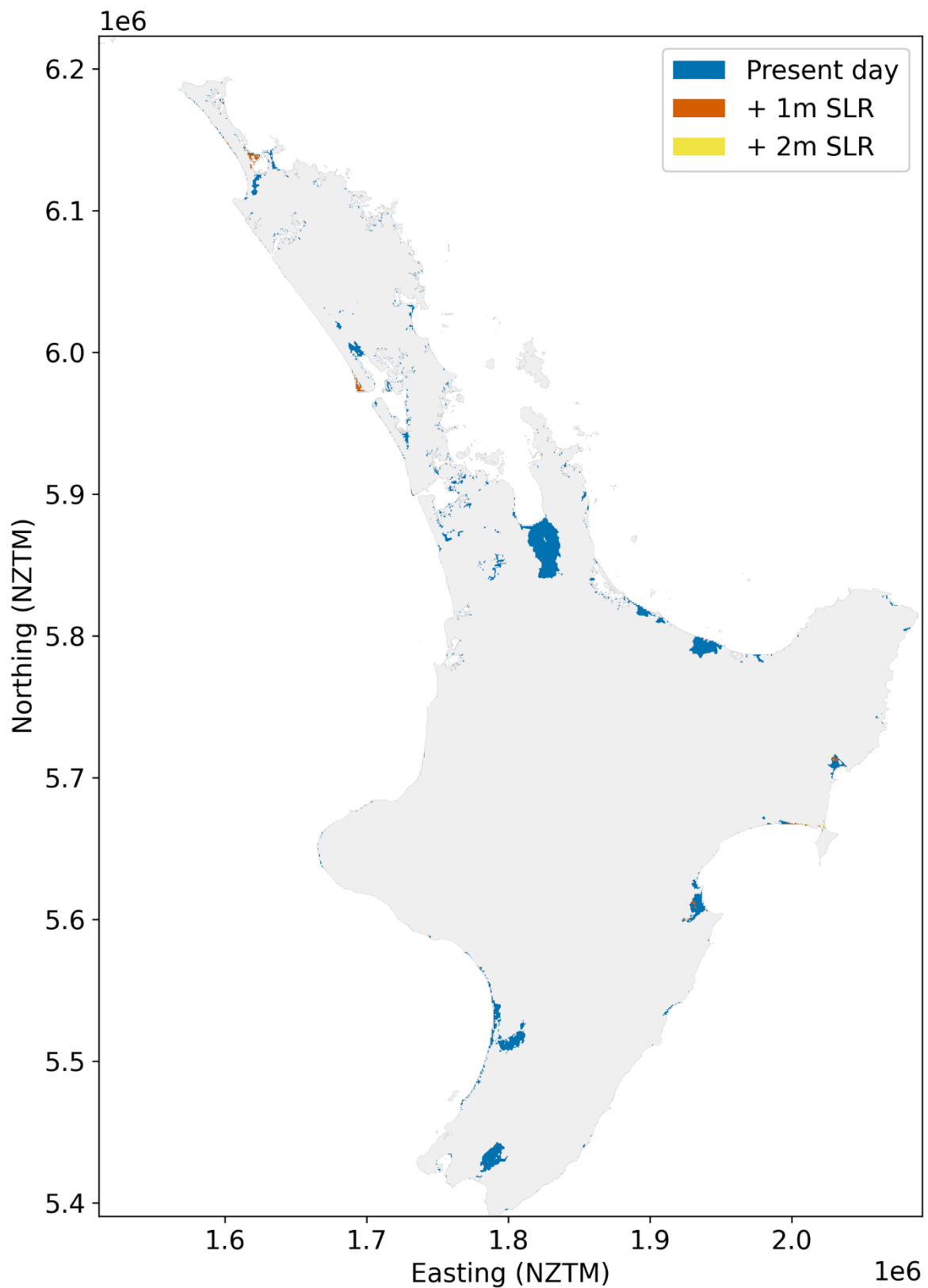


Figure 11: Areas of NZ – North Island where groundwater depths are shallower than 2 metre below ground level. Colours: Present-day (blue), increments of 1 m (orange) and 2 m (yellow) of SLR. This figure represents median model realisations. Areas higher than 10 m above current sea level have been masked out.

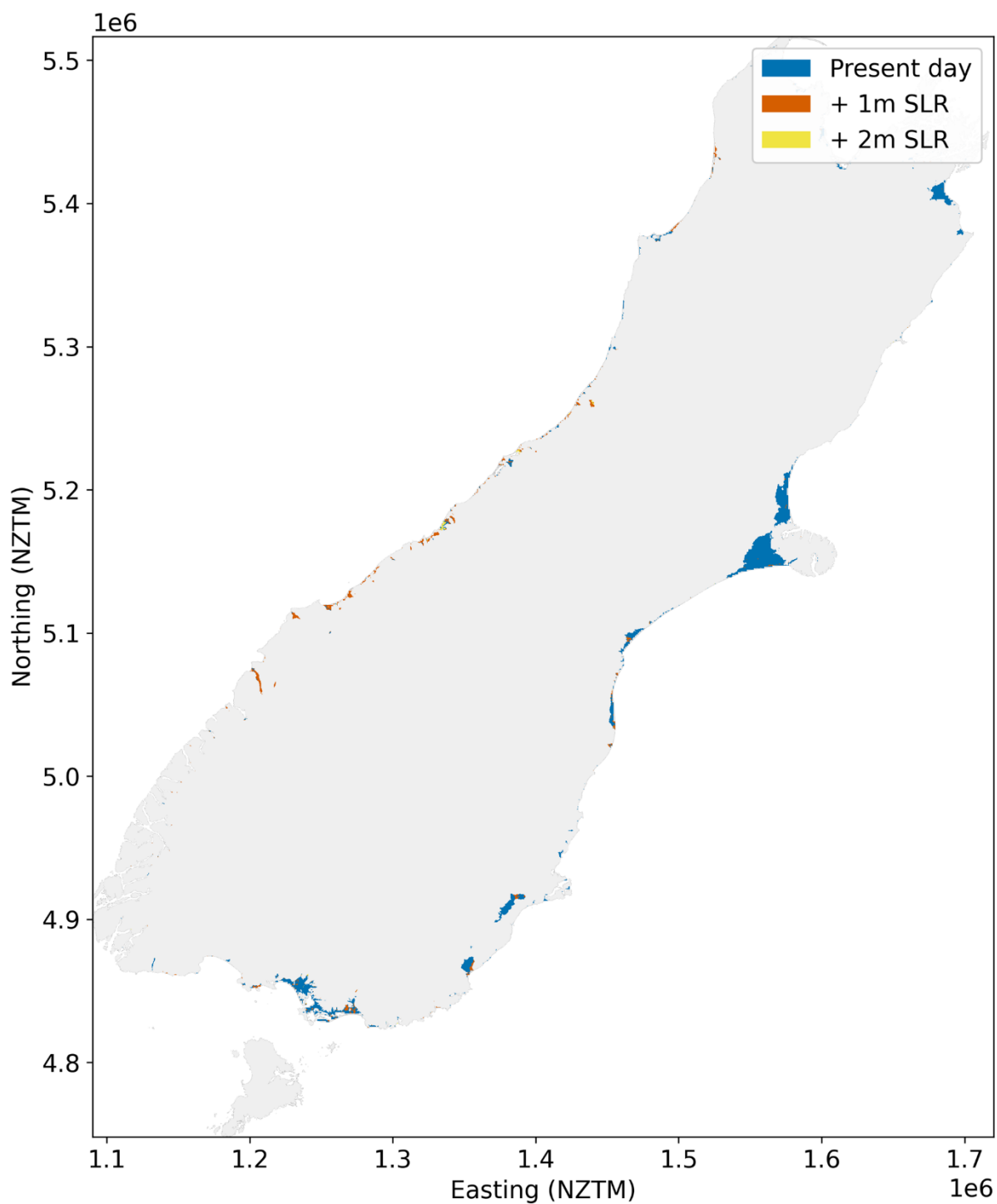


Figure 12: Areas of NZ – South Island where groundwater depths are shallower than 2 metre below ground level. Colours: Present-day (blue), increments of 1 m (orange) and 2 m (yellow) of SLR. This figure represents median model realisations. Areas higher than 10 m above current sea level have been masked out.

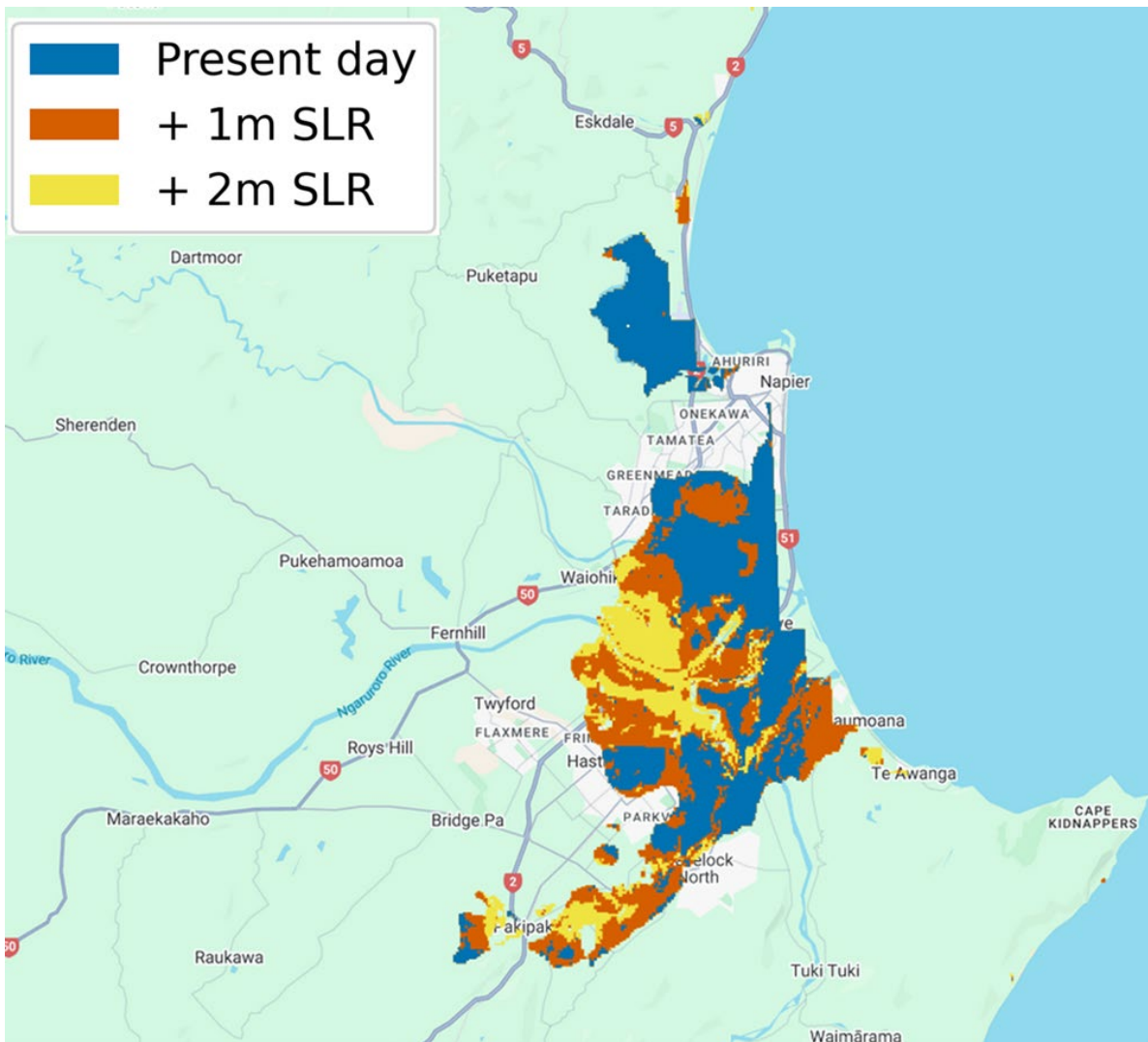


Figure 13: Local example, Heretaunga Plains. Colours: Present-day (blue), increments of 1 m (orange) and 2 m (yellow) of SLR. This figure represents median model realisations. Areas higher than 10 m above current sea level have been masked out.

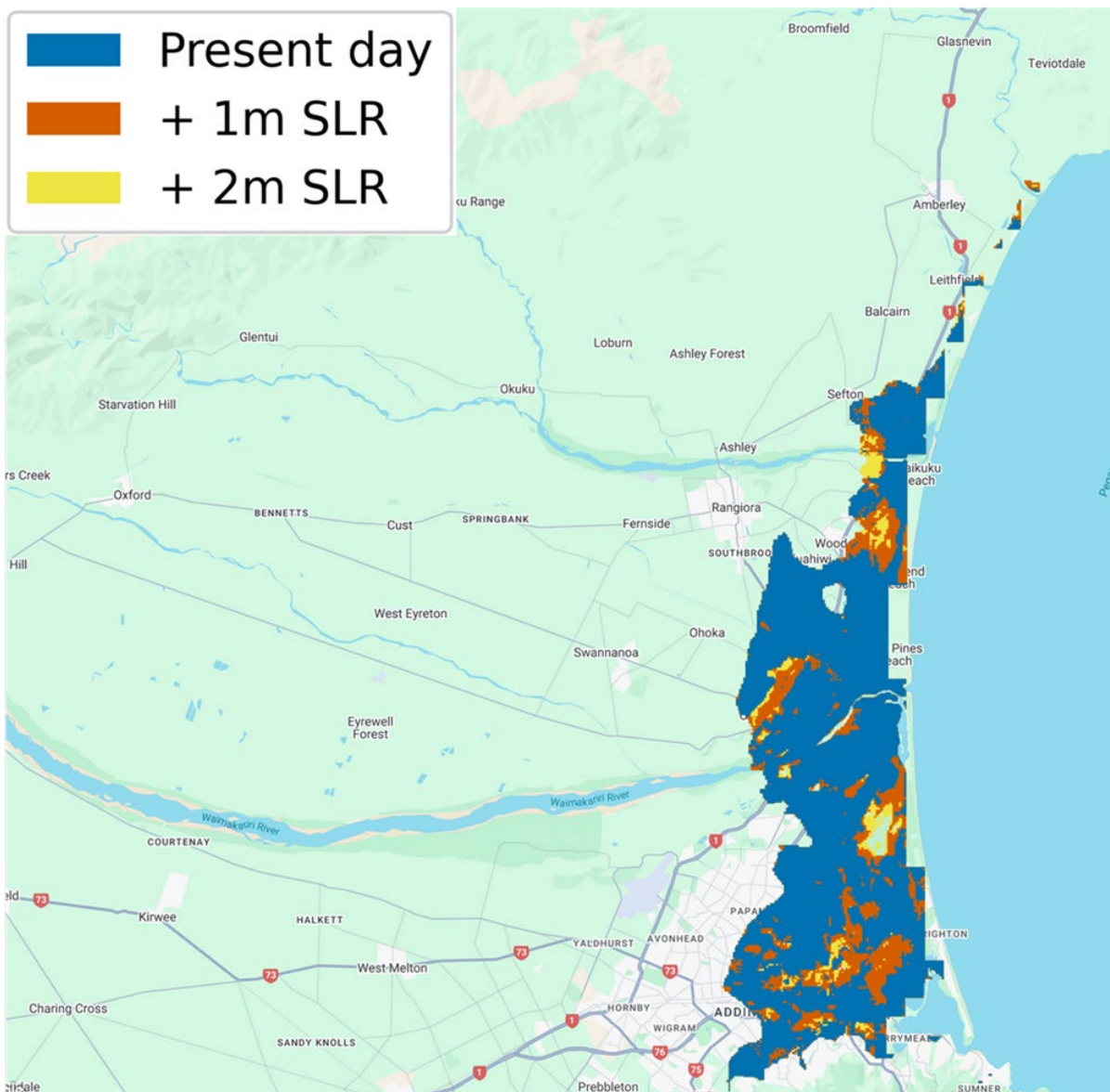


Figure 14: Local example, Waimakariri. Colours: Present-day (blue), increments of 1 m (orange) and 2 m (yellow) of SLR. This figure represents median model realisations. Areas higher than 10 m above current sea level have been masked out.

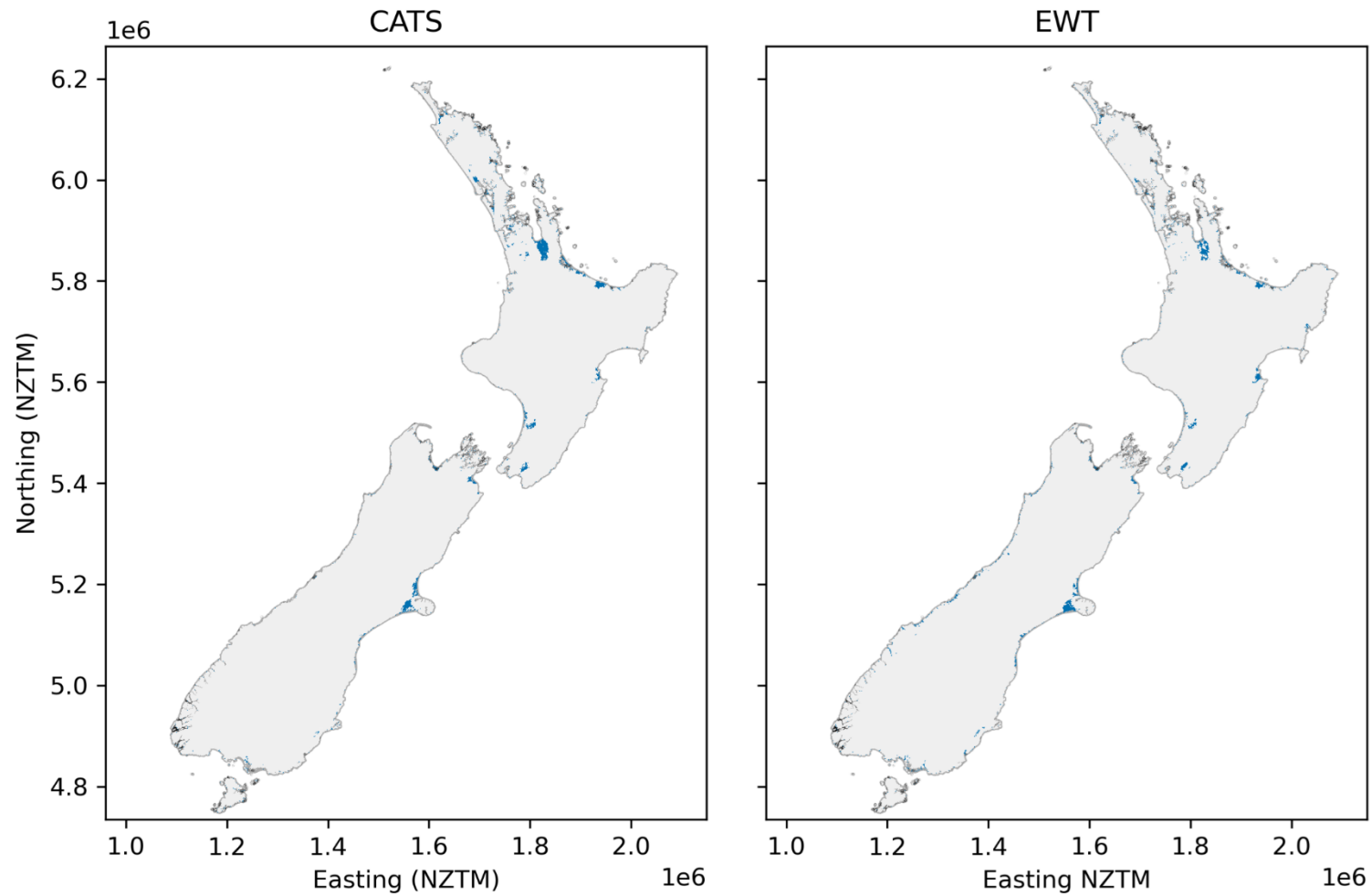


Figure 15: Individual (CATS, EWT) model results example: areas of NZ where current groundwater depths are shallower than 1 m below ground level. This figure represents median model realisations. Areas higher than 10 m above current sea level have been masked out.

3.1.2 Nationwide statistics

At present, approximately 43% (median estimate) of low-lying coastal areas have a water table that is shallower than 1 m below ground level. An upper bound (shallower) estimate puts this estimate to 54%; a lower bound (deeper) estimate to 34%.

An estimated area of 3,259 km² is currently on land with groundwater shallower than 2 m today, covering around 2,150 dairy farms. With SLR of 2 m, the areas with groundwater shallower than 2 m is expected to increase to a maximum of 3,876 km², covering up to 2,600 dairy farms—an increase of 19%.

An estimated area of 2,401 km² is currently on land with groundwater shallower than 1 m today, covering around 1,600 dairy farms. With SLR of 2 m, the areas with groundwater shallower than 1 m is expected to increase to a maximum of 3,783 km², covering up to 2,500 dairy farms—an increase of 58%.

Impacted land area converges with increments of SLR (Figure 16). This implies that, at 2 m SLR, most of the area exposed to shallow groundwater as defined by <2 m is also exposed to shallow groundwater as defined by <1 m. This convergence of affected area is not a direct measure for economic impact. SLR will cause existing shallow groundwater to emerge further, with associated management decisions required, for example, higher costs for more pumping and/or draining or investment in other mitigation options.

All statistics are shown in Appendix B.

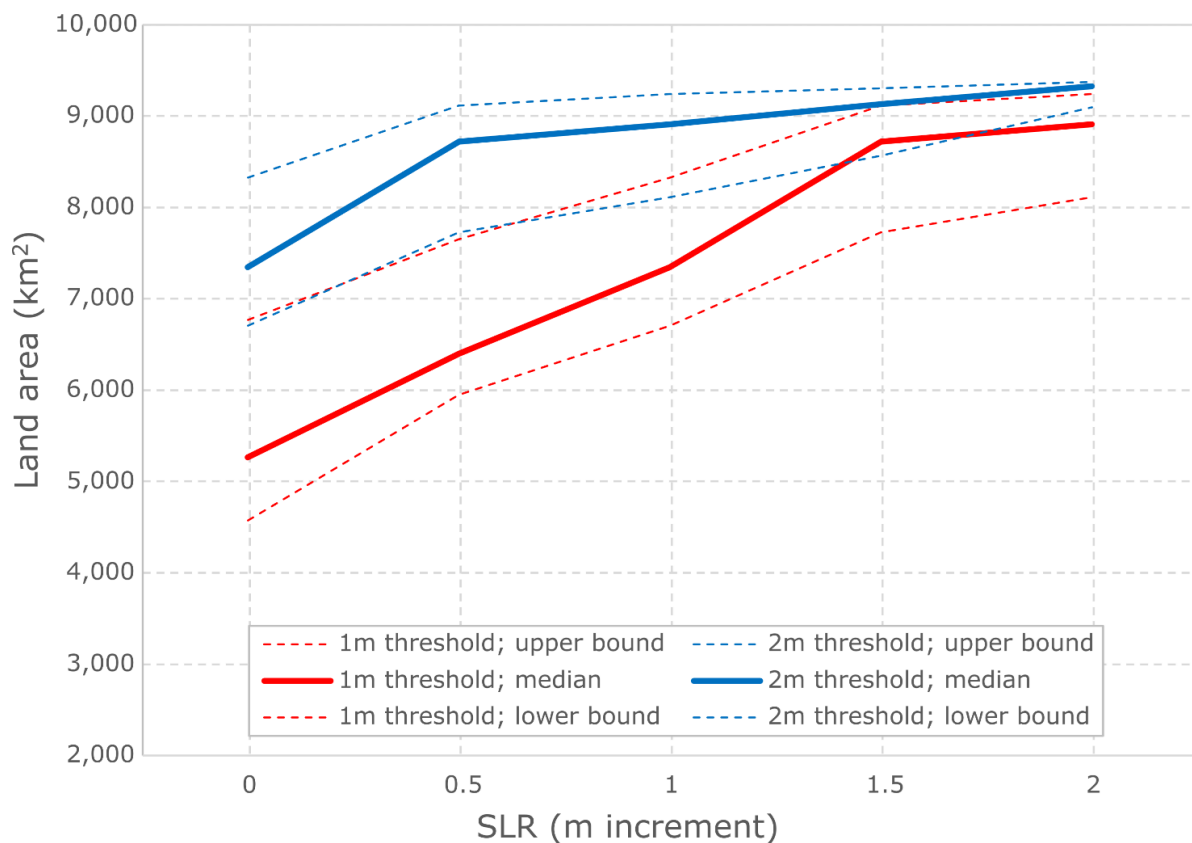


Figure 16: Impacts on SLR on shallow groundwater in low-lying coastal areas: NZ-wide statistics.

3.1.3 Regional statistics

‘Hotspots’ of shallow coastal groundwater are in geographic areas of (from north to south): Kaitaia, Dargaville, Auckland, Lower Waikato, Hauraki Plains, Tauranga, Whakatane, Poverty Bay Flats, Wairoa, Heretaunga Plains, Horowhenua Plains, Ruamahanga, Lower Wairau Plains, Christchurch, Taieri Plains, Awarua Plains/Bluff (Figure 9, Figure 10). The presence of shallow groundwater in these districts, and many localities within, is mostly well-known: many of these areas are either wetland, or farmland that is already largely equipped with drainage infrastructure. The presence of these existing adaptations does not necessarily prevent additional risk under SLR. For example, drainage could become overwhelmed or transition from gravity-fed drainage to costly pumped drainage might become necessary. Additionally, increased drainage due to water-table rise could induce additional salinisation, which may cause further impacts.

At the scale of Territorial Authorities, statistics on land area exposed to shallow groundwater were compiled as shown in Appendix B.

The highest exposure to shallow groundwater occurs in the Hauraki, Selwyn, Christchurch City, South Wairarapa, Horowhenua, Whakatane, Marlborough, and Waikato Districts (Table B-2), these being quite consistent with the general findings of Bell et al. (2015) and Paulik et al. (2020).

3.2 Impact of groundwater rise on pasture production

Figure 17 shows an example from the Hauraki District of the predicted drop in DMP with SLR. The Hauraki District had the highest area of land affected by shallow groundwater. There are two sources of uncertainty influencing the assumed shallowness of groundwater, which influenced dry matter production calculations:

1. The multi-model ensemble, which provides a deep, median and shallow estimate of the height of groundwater, leading to variations in the land area exposed to shallow groundwater (Section 2.1.5).
2. The water table rise factor, WTR_{SLR} —a response factor of water table rise to SLR (Section 2.3). The plots in this section show the sensitivity to values of WTR_{SLR} of 0.1, 0.25, 0.5, 0.75 and 0.9.

Figure 17 shows that the DMP response to rising shallow groundwater is dominated by the Water Table Rise factor, rather than the groundwater model uncertainty. This is true in all districts - Figure 18 shows examples from other locations.

The reason that WTR_{SLR} dominates model uncertainty is that the pasture growth function is highly sensitive to groundwater shallower than about 1.5 m, but particularly within the surface 1 m—pasture damage increasing exponential with shallowing depth. The national groundwater elevation models are accurate to within the nearest 1 m of the surface only—the best they can do is say that, at a (100 × 100 m) location, the groundwater is ≤ 1 m deep. The Water Table Rise factor provides a mechanism to test the sensitivity of the groundwater response to SLR within that ≤ 1 m surface layer.

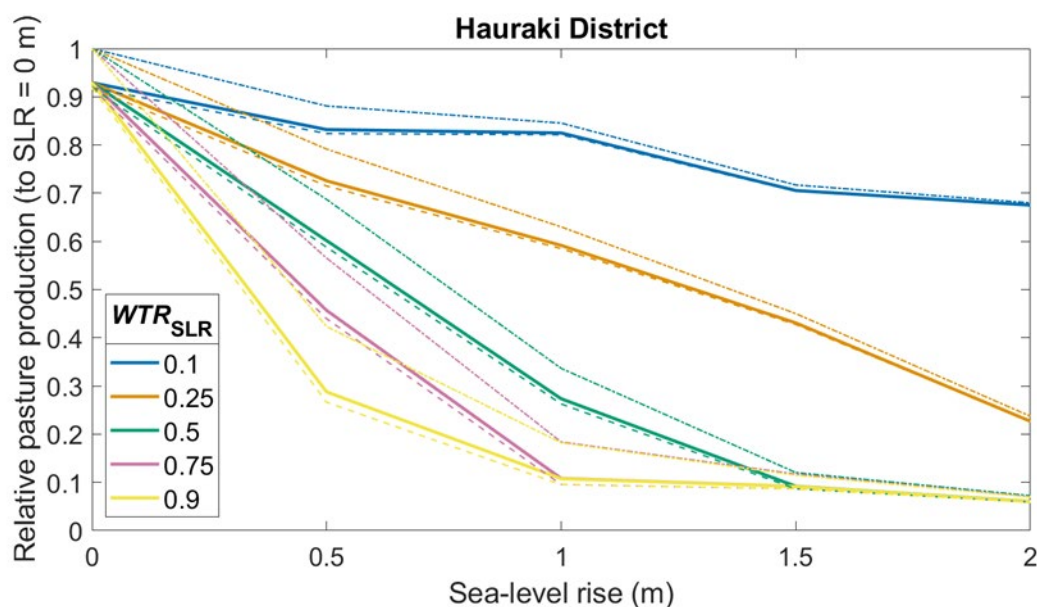


Figure 17: Predicted relative change in coastal grassland Dry Matter Production with sea-level rise summed across the Hauraki District. Colours represent WTR_{SLR} and the solid, dashed and dot-dashed lines mark respectively the median, upper and lower depth-to-groundwater estimates from the groundwater multi-model ensemble. Fractions calculated relative to the maximum DMP for any scenario

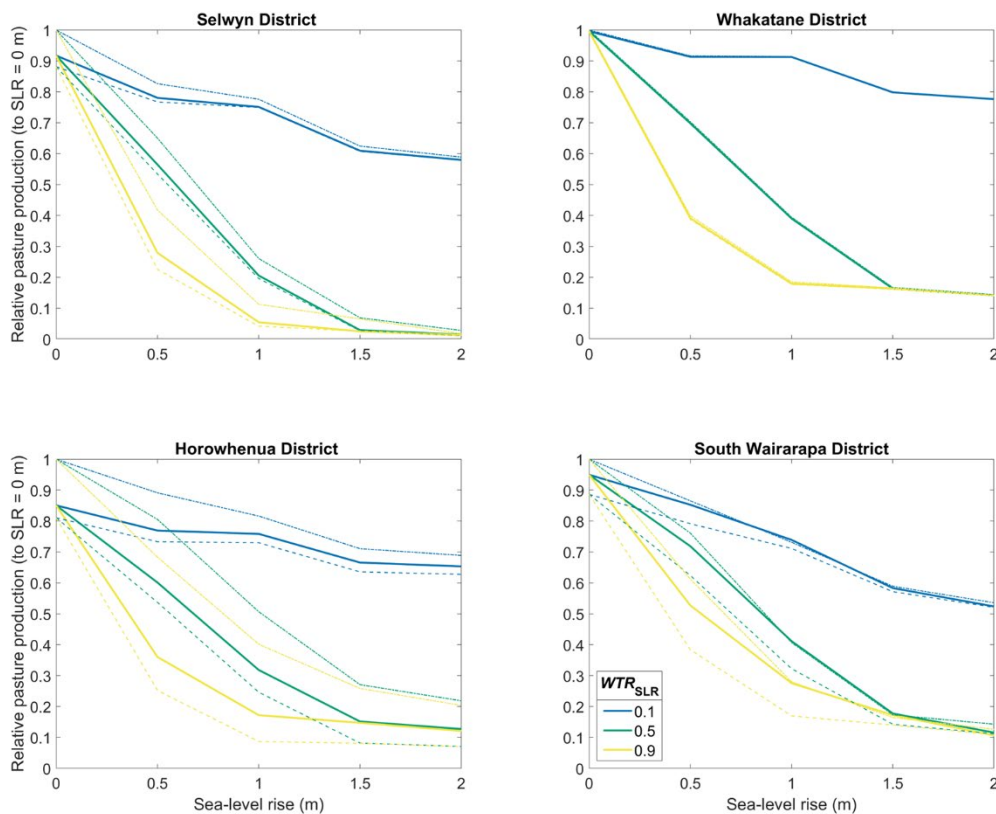


Figure 18: Predicted relative change in grassland Dry Matter Production with sea-level rise in the Selwyn, Whakatane, Horowhenua and South Wairarapa Districts. Colours represent WTR_{SLR} and the solid, dashed and dot-dashed lines mark respectively the median, upper and lower depth-to-groundwater estimates from the groundwater multi-model ensemble.

Our results consider coastal-DMP, i.e., only DMP within 10 m elevation of present-day mean sea level. Some districts may have substantial DMP throughout the district but low DMP near the coast.

Figure 19 shows the relative DMP between districts at present-day mean sea level, i.e., 0 m sea-level rise. There are some hotspots: the five districts with highest coastal-DMP are Hauraki, Southland, Far North, Auckland and Selwyn. The Hauraki District is a large outlier due to the extensive grassland production over the low-elevation Hauraki Plains.

Many districts have relatively low coastal-DMP. These include districts dominated by city landscapes such as Palmerston north, Wellington, Porirua, Lower Hutt, Nelson, and Napier—and/or inland districts like Tararua, Whanganui, Waitomo, Masterton, Central Hawkes Bay, New Plymouth and Otorohanga. Therefore, we have focused on the impacts of sea-level rise within districts with coastal-DMP that are at or above the median coastal-DMP (Table 3-1).

Figure 20 shows the relative decrease in DMP for Water Table Rise factors 0.1, 0.5 and 0.9 respectively, covering sea-level rise scenarios of 0, 0.5, 1.0, 1.5 and 2.0 m above present-day mean sea level, for the median groundwater model exposure. These are sorted in order from the district with highest coastal-DMP (at baseline mean sea level) on the left to lowest on the right.

Figure 21 shows a weighted percentage change with sea-level rise, which highlights the districts with the most significant coastal-DMP change (Section 2.5). The ordering of districts in terms of weighted percentage change (Figure 21) does not exactly match the ordering of districts in terms of total coastal-DMP (Figure 20). For example, the Selwyn District had the fifth largest coastal-DMP but has the second highest weighted percentage change with sea-level rise. The Far North and Auckland regions had the third and fourth highest baseline coastal-DMP but fall outside the top 10 in terms of weighted percentage change with sea-level rise. Figure 22 provides a spatial representation to highlight the most-impacted districts in terms of weighted percentage decrease.

In the five districts with the highest weighted percentage decreases (Table D-6), the unweighted percentage decreases are (Table D-2, Table D-3, Table D-4):

- Hauraki District: 10% ($WTR_{SLR} = 0.1$) – 79% ($WTR_{SLR} = 0.9$) decrease for 0.5 m SLR, and 27% ($WTR_{SLR} = 0.1$) – 94% ($WTR_{SLR} = 0.9$) decrease for 0.5 m SLR.
- Selwyn District: 13% ($WTR_{SLR} = 0.1$) – 74% ($WTR_{SLR} = 0.9$) decrease for 0.5 m SLR, and 34% ($WTR_{SLR} = 0.1$) – 99% ($WTR_{SLR} = 0.9$) decrease for 0.5 m SLR.
- Whakatane District: 8% ($WTR_{SLR} = 0.1$) – 60% ($WTR_{SLR} = 0.9$) decrease for 0.5 m SLR, and 22% ($WTR_{SLR} = 0.1$) – 86% ($WTR_{SLR} = 0.9$) decrease for 0.5 m SLR.
- Horowhenua District: 10% ($WTR_{SLR} = 0.1$) – 69% ($WTR_{SLR} = 0.9$) decrease for 0.5 m SLR, and 23% ($WTR_{SLR} = 0.1$) – 91% ($WTR_{SLR} = 0.9$) decrease for 0.5 m SLR.
- South Wairarapa District: 10% ($WTR_{SLR} = 0.1$) – 57% ($WTR_{SLR} = 0.9$) decrease for 0.5 m SLR, and 41% ($WTR_{SLR} = 0.1$) – 89% ($WTR_{SLR} = 0.9$) decrease for 0.5 m SLR.

Key findings from the results presented in this section are:

- SLR causes dry matter production to decrease.
- The reduction in coastal-DMP with SLR varies in significance between districts. The five districts exhibiting the largest change after 2 m of SLR are Hauraki, Selwyn, Southland, South Wairarapa and Whakatane, in ranked order.
- The regions exhibiting the most reduction in coastal-DMP with SLR are not necessarily those with the highest coastal-DMP at baseline mean sea level. The eight districts with the largest predicted losses after 0.5 metres of SLR are Hauraki District, Selwyn District, Whakatane District, Horowhenua District, South Wairarapa District, Waimakariri District, Christchurch City, and Kaipara District, in ranked order.
- DMP is highly sensitive to shallow groundwater of ≤ 1 m depth (Figure 2 5). Therefore its calculation is highly sensitive to the Water Table Rise factor and less sensitive to the uncertainty within the ensemble of groundwater elevation models, because the models are only accurate to within the nearest 1 m of the surface.
- Future improvements in the ability to measure or model groundwater elevation at sub-metre resolution would enhance confidence in DMP calculations. This will be easier to achieve at local scales than at regional or national scales.

Table 3-1: Districts with coastal-DMP above or below the median. Ranked in descending order of coastal-DMP.

\geq median coastal-DMP	$<$ median coastal-DMP
Hauraki District	Ashburton District
Southland District	Wairoa District
Far North District	Opotiki District
Auckland	Kaikoura District
Selwyn District	South Taranaki District
Invercargill City	Tauranga City
Christchurch City	Hastings District
Whakatane District	Waitaki District
South Wairarapa District	Kapiti Coast District
Horowhenua District	Hurunui District
Dunedin City	Rangitikei District
Kaipara District	Grey District
Marlborough District	Otorohanga District
Clutha District	Napier City
Buller District	New Plymouth District
Waimakariri District	Central Hawke's Bay District
Tasman District	Masterton District
Waimate District	Nelson City
Timaru District	Carterton District
Western Bay of Plenty District	Waitomo District
Westland District	Whanganui District
Gisborne District	Tararua District
Matamata-Piako District	Lower Hutt City
Thames-Coromandel District	Porirua City
Whangarei District	Wellington City
Manawatu District	Palmerston North City
Waikato District	

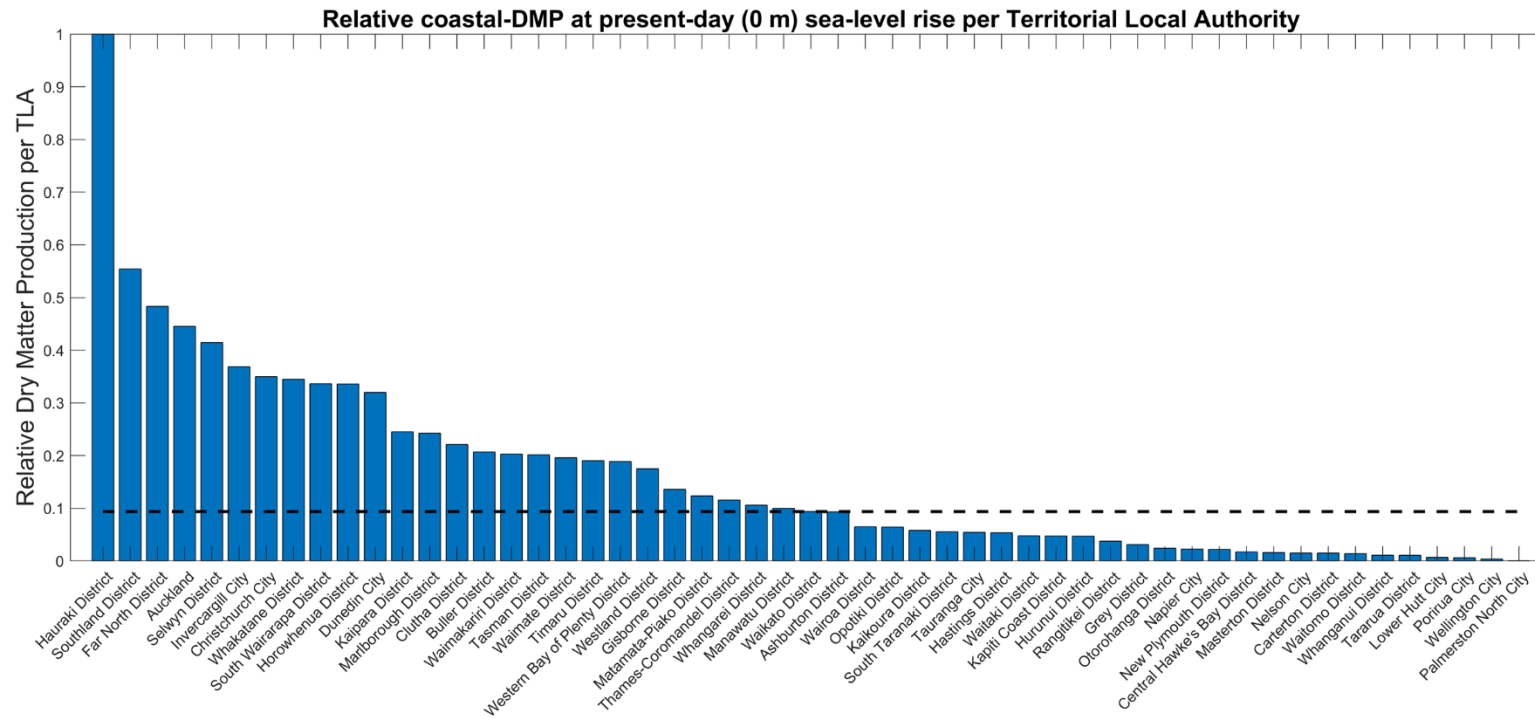


Figure 19: Relative coastal dry matter production for median modelled groundwater elevations at baseline (0 m) sea-level rise. Dashed line marks median.

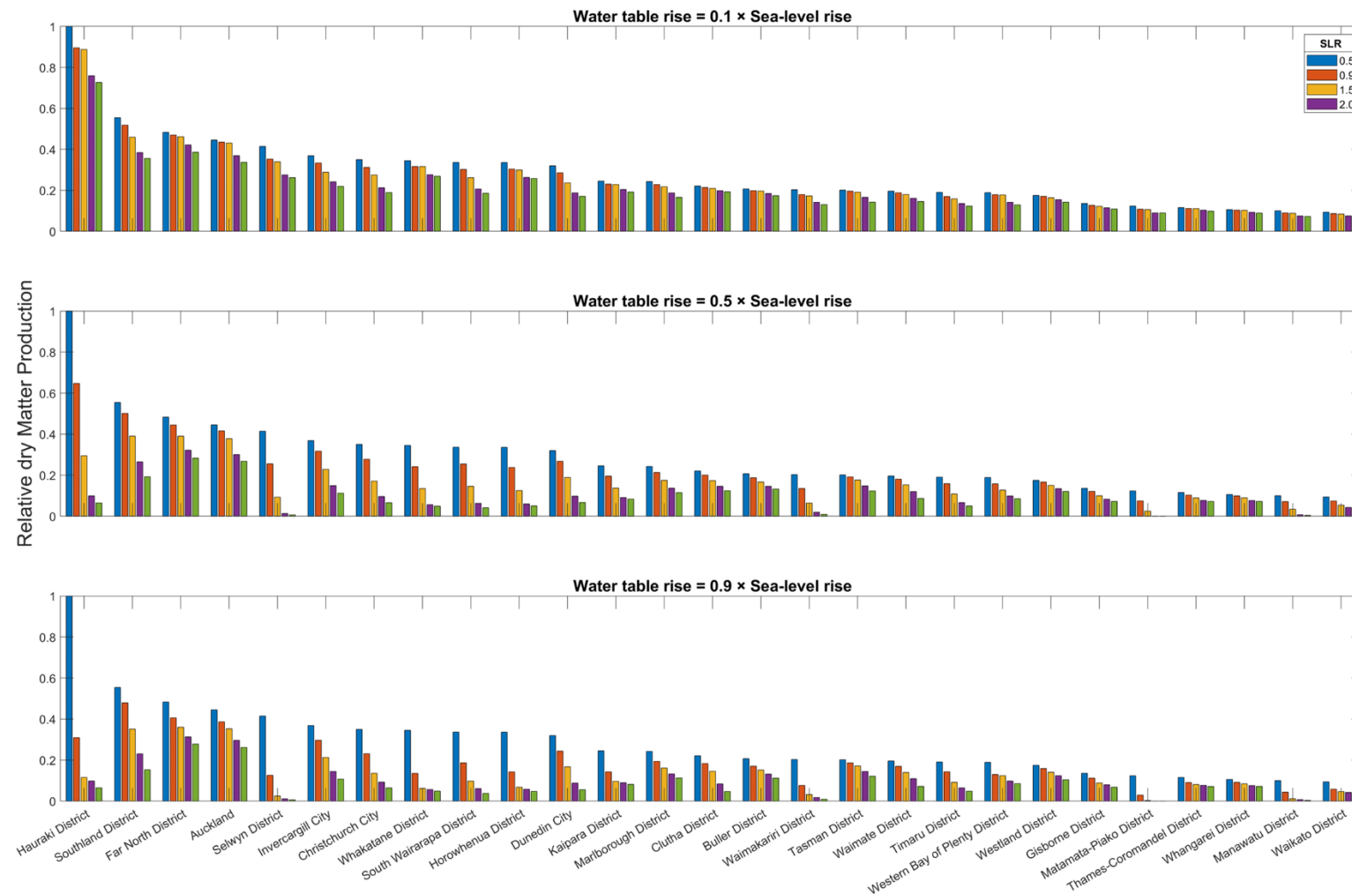


Figure 20: The effect of sea-level rise on coastal dry matter production. Results based on median modelled groundwater elevations aggregated to TLA scale and are weighted relative to the highest baseline DMP at 0 m sea-level rise, which occurred in the Hauraki District.

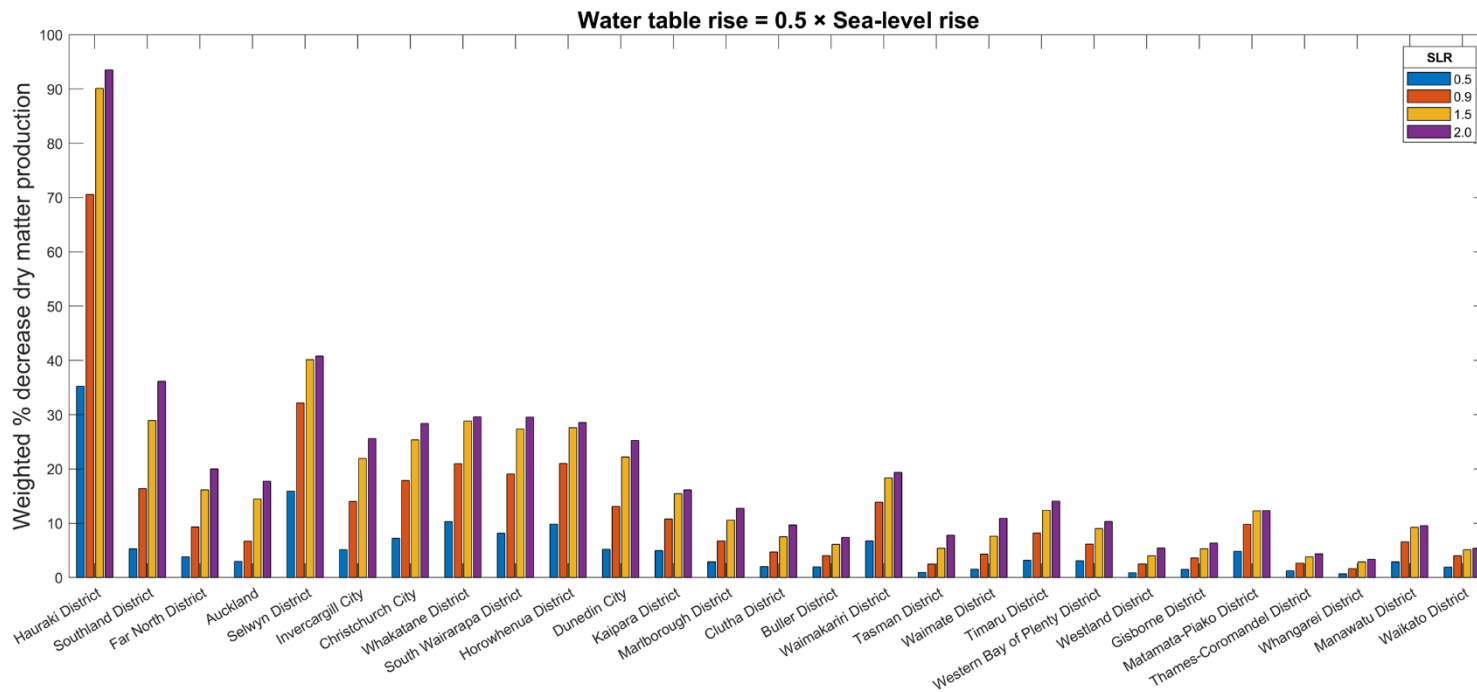


Figure 21: Weighted percent decrease in coastal-dry-matter-production. Results based on median modelled groundwater elevations for $WTR_{SLR} = 0.5$ aggregated to TLA scale.

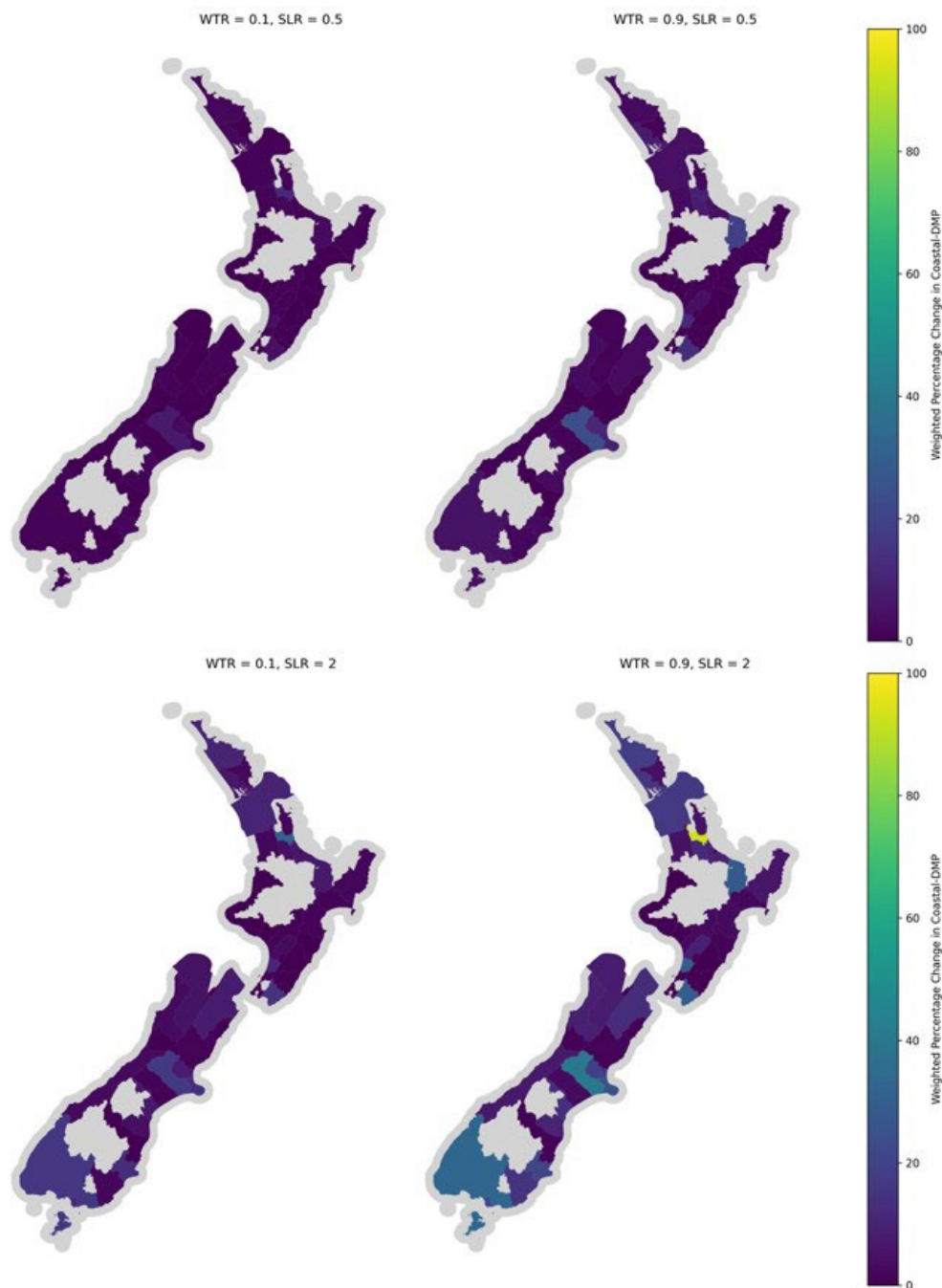


Figure 22: Weighted percent decrease of coastal-DMP. Weighted percent decrease of coastal-DMP. For ease of viewing, colours have been applied inside the boundary of the entire district, even though the sea-level rise impact is restricted to the coastline .

4 Data accessibility

4.1 Depth to shallow groundwater data

All mapped groundwater model results were provided to CCC as geotif rasters and as .png rasters for easy viewing. We intend to make these data publicly available via github.

File naming convention is as follows:

For the model averages: 'model_average_[X]m_p[Y]_slr[Z]m.tif', where:

- X is the depth to water category in metres, i.e., the depth threshold, which is either 1 or 2
- Y is the quantile of model realisation in percentiles, which is 'upper bound', 'median', or 'lower bound'.
- Z is the SLR incremental step in metres, which is 0.5, 1, 1.5, 2.
- For current groundwater depths, 'slr[Z]m' is not in the filename'

For each individual model result: '[**modname**]_Xm_pY_slrZm.tif', where:

- modname is the name of the individual model:
 - 'cats' for the CATS model.
 - 'ewt' for the EWT model.
- X, Y, Z as above

Compilations for land use class, for each Territorial Authority (TLA), are described in a csv file named '**ccc_lucas_areas_leq_10.csv**'. The file contains 30 rows for each model output, and one additional row with the sum of all. Each row contains:

- the name of the TLA.
- the name of the land use class.
- the area of each land use class in the TLA in m².

Data density files are available on github:

- https://github.com/Komanawa/komanawa-nz-depth-to-water/tree/main/src/komanawa/nz_depth_to_water/data

These were created as explained in:

- https://komanawa.github.io/komanawa-nz-depth-to-water/autoapi/komanawa/nz_depth_to_water/index.html#komanawa.nz_depth_to_water.copy_geotifs

4.2 Dry matter production data

Dry matter production data were provided to CCC as Microsoft Excel tables.

5 Limitations

The rationale of the depth to groundwater modelling approach, i.e., to provide a multi-model average method from multiple model results, has allowed for best available estimates of current groundwater depths, as well as those for incremental steps of SLR. The use of the weighted model average method has allowed the smoothing of individual model deficiencies and a bracketing of uncertainties. For example, the data-driven CATS model has potential limitations in data-sparse areas, and applies a limited bathtub approach, which could lead to conservative (i.e., shallower) depth-to-water estimates for sea-level rise scenarios. The physics-based EWT model is agnostic of the amount of observation data and incorporates SLR in its model runs more process-based than the CATS model. Vice versa, the EWT model was not trained or calibrated using observation data. Hence, any wrongly modelled output of groundwater discharge to surface from EWT could cause a wrong depth to water estimate higher up in the catchment. The CATS model makes up for any of these EWT model deficiencies, especially in data-rich areas.

The weighted averaging as used in this study showed a relation to validation with observations, as well as a function that considers that weights between data driven and physics-based models will differ when data density decreases. The function used for this was estimated based on our understanding of these models. We recommend more thorough analyses on the data weighting. For example, if a large pool of hydrological experts, e.g., regional council experts, can provide a more expert judgement, this could be added into a more agreed method for weighted averaging in future.

The weighted model approach as used in this study lends itself to the addition of more models, if these become available. This research also considered and tested the development of a combined model average with a third model applied. Kitlasten et al. (2022) developed a nationwide application of a MODFLOW-6 groundwater model. The intention of this model is to function as a high-level prior framework, i.e., a reproducible workflow that can be used as a starting point for smaller-scale groundwater models. The model was developed in the MBIE funded Endeavour Programme Te Whakaheke O Te Wai, which aimed at improving estimates of groundwater travel times at the national scale. We tested the combined model averages of the national MODFLOW model. The analysis found that this national model is not suitable to estimate shallow groundwater near the coast with high accuracy and resolution. One important limitation of adding this model to the combined averages is that model cell resolution is 1 km; the native model resolutions of CATS and EWT are 100m and 250m, respectively. A cell size of 1 km will mean that the average surface elevation in the multi-model ensemble will also consist of 1 km cells, which does not meet the required spatial resolution.

This study has considered the impact shallow fresh groundwater on pasture DMP. The effect of a changing water table near the coast also potentially causes a shift in the freshwater–saltwater interface at depth (Figure 1 to Figure 3). Methods for predicting the saltwater interface change from rising sea levels at a national scale are not currently available—this is an area for future research focus.

The resulting shallow-groundwater maps of this study showed the ‘steady state’ effect of SLR on groundwater depth to water. Steady-state models do not contain a dynamic component. Hence, our estimates do not contain information on how long it will take for the water table to rise.

As the introduction explains, the time lag of low-lying coastal aquifer systems depends on whether a system is flux-controlled or head-controlled. Future research could address expected response times for low-lying coastal hydrogeological systems around the country.

We estimate the impact of groundwater table rise on pasture production for the particular farm management parameters described in Section 2.2, but in the reality, there are important impacts from farm management practices, e.g., debt level, stock number, micro adaptation approaches etc.

The results were more sensitive to the Water Table Rise factor than they were to the groundwater modelling statistical uncertainty. We applied this as a sensitivity test. The actual Water Table Rise factor is affected by the depth of the groundwater, distance from the ocean, slope of the land, drainage systems, distance to other water bodies (e.g., rivers or lakes), seasonal rainfall, etc. which in our current groundwater model is difficult to predict at such shallow depths. This points to two useful areas for further research:

1. Improvements in our ability to predict shallow groundwater heights within the top 1 m of the soil surface.
2. The ability to include the effects of farm drainage systems within the groundwater height models.

6 Conclusion

This report is the first national-level estimation on the impact of groundwater table rise and its impact on pasture production, applied here across 15 regions and 53 Territorial Authorities in New Zealand. The report offers a snapshot of the current areas exposed to shallow groundwater of 1 m or 2 m below the soil surface, plus groundwater table rise estimates for five future SLR scenarios of 0, 0.5, 1.0, 1.5, and 2.0 m. Across all 53 terrestrial authorities, at present day, the top five pasture productive TAs are Hauraki district, Southland district, Far North district, Auckland, and Selwyn districts, and the top five most districts most impacted by 0.5 m of SLR are Hauraki District, Selwyn District, Whakatane District, Horowhenua District, and South Wairarapa District.

7 Acknowledgements

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8 Glossary of abbreviations and terms

APSIM	The Agricultural Production Simulator; www.apsim.info ; Holzworth et al., 2018)
CATS	The categorical shallow groundwater model (CATS) is a suite of machine learning models that predict whether a given location has groundwater shallower than a given threshold and works in the depth range 0.9 – 5 m
CCC	Climate Change Commission
DMP	Dry matter (pasture) production
DTW	Depth to water
ESNZ	Earth Sciences New Zealand
EWT	The Equilibrium Water Table (model for New Zealand is a simple physics-based steady-state groundwater flow model at 250 m cell resolution across New Zealand
SLR	Sea-level rise
WTR	Water table rise
WTR_{SLR}	Water table rise factor

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Appendix A Description CATS model

The categorical shallow groundwater model (CATS) is a suite of machine learning model that predicts whether a given location has groundwater shallower than a given threshold (0.9-5 m depth). The full details of the model are described in (Durney et al. 2025), but a brief overview is provided here.

An individual model instance may predict whether the groundwater is shallower than 2 m at a given location. Machine learning models differ from physically based models in that they look for patterns between so called predictor datasets and prediction datasets rather than simulating the physical processes that control groundwater depth. Predictors can include a wide range of datasets such as topography, geology, land use, and climate data; here the categorical model was trained on a set of 199 predictor datasets which were simplified (via principal component analysis) to 37 predictor variables. The simplification process helps prevent over fitting and improves the model's ability to generalize to new data. Machine learning models are trained with a set of existing data. This process involves taking a known dataset (in this case > 5 million measurements of groundwater depth) and splitting it into a training dataset (this is used by the model to learn the relationships between predictors and predictions), a test dataset (this is used to evaluate the model's performance during training), and a validation dataset (this is used to evaluate the model's performance on new data). Once the model is trained and validated, the quality of the model is assessed, and the model is then re-trained with the full dataset.

The machine learning model used here is a Random Forest Classifier. A classifier predicts a discrete class (in this case shallow or deep groundwater) rather than a continuous value (such as the depth of groundwater). The advantage of using a classifier is that it can better model predictions which are not evenly distributed in the training dataset (e.g., shallow groundwater is much less common than deep groundwater) and model errors can be quantified into false positives (predicting shallow groundwater when the groundwater is deep, Type I error) and false negatives (predicting deep groundwater when the groundwater is shallow, Type II error). The end user can then choose a threshold for the model's predictions which balances the trade-off between false positives and false negatives. The trade-off is important because often an error does not have the same consequences for the end user if it is a false positive or a false negative.

As a purely theoretical example, if you build your house of land that is modelled as having deep groundwater, but the groundwater is shallow, then you may incur significant costs to fix the problem, but if the model predicts shallow groundwater when it is actually deep, you may only incur smaller costs to do more investigation before building. The model training and validation process is described in detail in (Durney et al. 2025), but overall, the model performed very well but was more accurate when predicting deeper thresholds (e.g., 5 m) than shallower thresholds (e.g., 0.9 m). Thresholds of less than 0.9 m were not of sufficient quality to be included in the model suite. This is indicative of the limitations of our monitoring datasets rather than the model itself -- That is we simply do not have enough monitoring data to train the model to predict very shallow groundwater with a high degree of accuracy.

The model suite will not necessarily make consistent predictions across different thresholds. It is entirely possible that a model predicts shallow groundwater at a 0.9 m threshold, but deep groundwater at a 1 m threshold. This occurs because each model in the suite is trained independently and subtle difference in the distribution of the measured groundwater depth

(Shallow vs Deep) can lead to different model performance. To address this issue, we generated a Best Estimate Model from the combination of all the individual models. The Best Estimate Model combines these individual predictions to output a single integrated result: the shallowest depth threshold at which groundwater is predicted to be present with acceptable confidence and is consistent with the deeper model thresholds (e.g., the deepest possible level for groundwater). This approach is inspired by Bayesian Model Averaging, meaning it weighs each model's contribution according to its performance and probability estimates, rather than simply picking one model or averaging blindly. By merging the outputs of several depth-specific models, the Best Estimate Model aims to provide a more consistent estimate of groundwater hazard and one that can be used in an additive way (e.g., adding water table rise potential). The Best Estimate Model approach used here follows:

1. Select an acceptable false positive error rate (probability of predicting deep groundwater when it is shallow, e.g., 10%).
2. Starting with the shallowest model (e.g., 0.9 m), flag all areas where the model predicts shallow groundwater with a depth of 0.9 m.
3. For each subsequent model (e.g., 1 m, 2 m, etc.):
 - 3.1 Identify the areas that the new model threshold predicts shallow groundwater, and the previous model predicted shallow groundwater. Retain the previous prediction.
 - 3.2 Identify the areas that the new model threshold predicts shallow groundwater, and the previous model predicted deep groundwater. Update the prediction to the new model's threshold.
 - 3.3 Identify areas of conflict (e.g., where the previous threshold predicted shallow groundwater, and the new threshold predicts deep groundwater). To resolve these conflicts, we compare the probability that all previous models incorrectly predicted shallow groundwater (i.e., the probability of a false positive) to the probability that the new model incorrectly predicts deep groundwater (i.e., the probability of a false negative). If the false positive probability is less than the false negative probability, we retain the previous model's prediction. Otherwise, we set the threshold as undefined (to be set from future models).

As an example, consider the following two model cells:

Model Threshold	Cell 1 Prediction	Cell 2 Prediction	Cell 3 Prediction
0.9 m	Shallow	Deep	Shallow
1 m	Shallow	Shallow	Shallow
1.1 m	Shallow	Deep	Shallow
1.2 m	Shallow	Shallow	Deep
1.3 m	Shallow	Shallow	Shallow

Here Cell 1 will be recorded as having a maximum groundwater depth of 0.9 m. For Cell 2 the probability of a false positive for the 1m model is greater than the probability of a false negative for the 1.1 m model, so the cell will be recorded as having a maximum groundwater depth of 1.2 m. For Cell 3 the probability of a false positive for the 0.9 - 1.1 m models is much less than the probability of a false negative for the 1.2 m model, so the cell will be recorded as having a maximum groundwater depth of 0.9 m. Note here that we do not have any further precision on the maximum groundwater depth than 0.9 m, so for instance, Cell 1 may have a groundwater depth of 0.9 m or 0.1 m, but we cannot model the difference between these two depths.

[Additional data and maps](#)

Appendix B Simulation results of impacted land area

Table B-1: Statistics of impact of SLR on shallow groundwater.

Upper bound	km ²	1m dtw threshold	2m dtw threshold	% of land < 10 masl	1m dtw threshold	2m dtw threshold
	SLR increment (m)					
	0	3 009	3 604	0	53.3	63.8
	0.5	3 387	3 833	0.5	60.0	67.9
	1	3 604	3 867	1	63.8	68.5
	1.5	3 833	3 881	1.5	67.9	68.7
	2	3 867	3 890	2	68.5	68.9

Median	km ²	1m dtw threshold	2m dtw threshold	%	1m dtw threshold	2m dtw threshold
	SLR increment (m)					
	0	2 401	3 259	0	42.5	57.7
	0.5	2 863	3 718	0.5	50.7	65.8
	1	3 259	3 783	1	57.7	67.0
	1.5	3 718	3 839	1.5	65.8	68.0
	2	3 783	3 876	2	67.0	68.6

Lower bound	km ²	1m dtw threshold	2m dtw threshold	%	1m dtw threshold	2m dtw threshold
	SLR increment (m)					
	0	1 944	2 879	0	34.4	51.0
	0.5	2 520	3 314	0.5	44.6	58.7
	1	2 879	3 520	1	51.0	62.3
	1.5	3 314	3 674	1.5	58.7	65.1
	2	3 520	3 824	2	62.3	67.7

Table B-2: Area (km²) where median depth to groundwater is shallower than 1 m below ground level, compiled per Territorial Authority. All data available as described in Section 4.

	Present	SLR = 0.5m	SLR = 1	SLR = 1.5 m
Ashburton District	1.89	5.67	6.06	6.93
Auckland	78.93	86.77	93.38	97.16
Buller District	26.58	26.92	26.92	27.15
Carterton District	0.31	0.31	0.31	0.31
Central Hawke's Bay District	2.25	2.48	2.48	2.69
Central Otago District	0	0	0	0
Chatham Islands Territory	0	0	0	0
Christchurch City	132.46	195.79	216.33	227.36
Clutha District	27.6	30.31	32.94	34.51
Dunedin City	22.13	35.95	61.24	69.23
Far North District	67.36	76.81	84.69	100.57
Gisborne District	16.68	37.39	44.06	48.65
Gore District	0	0	0	0
Grey District	4.33	4.87	5.95	6.28
Hamilton City	0	0	0	0
Hastings District	30.86	59.08	72.13	90.21
Hauraki District	432.24	437.48	440.12	442.67
Horowhenua District	136.04	151.39	155.98	160.07
Hurunui District	4.09	5.07	5.36	5.37
Invercargill City	26.12	68.02	113.19	130.75
Kaikoura District	0.62	0.96	1.18	1.25
Kaipara District	77.73	80.39	81.45	82.66
Kapiti Coast District	1.1	4.89	7.64	10.22
Kawerau District	0	0	0	0
Lower Hutt City	0.8	2.08	2.33	2.49
Mackenzie District	0	0	0	0
Manawatu District	41.14	48.08	49.2	50.31
Marlborough District	91.64	104.53	112.83	116.76
Masterton District	0.76	0.76	0.76	0.76
Matamata-Piako District	72.64	74.8	75.67	75.69
Napier City	40.75	45.77	46.08	46.22
Nelson City	1.49	1.49	1.68	1.68
New Plymouth District	0.43	1.22	1.34	1.69
Opotiki District	9.13	9.3	9.3	9.31
Otorohanga District	2.06	2.12	2.12	2.23
Palmerston North City	0.6	0.6	0.6	0.6

	Present	SLR = 0.5m	SLR = 1	SLR = 1.5 m
Porirua City	0.06	0.06	0.06	0.06
Queenstown-Lakes District	0	0	0	0
Rangitikei District	20.52	24.89	25.62	25.86
Rotorua District	0	0	0	0
Ruapehu District	0	0	0	0
Selwyn District	277.92	331.04	343.02	347.54
South Taranaki District	2.3	2.93	3.07	3.2
South Waikato District	0	0	0	0
South Wairarapa District	134.19	170.55	202.16	210.51
Southland District	32.66	70.43	111.88	141.22
Stratford District	0	0	0	0
Tararua District	0.05	0.05	0.05	0.05
Tasman District	13.05	21.2	24.87	27.68
Taupo District	0	0	0	0
Tauranga City	7.05	11.49	14.36	16.97
Thames-Coromandel District	21.08	23.14	23.74	24.3
Timaru District	19.49	36.08	42.89	49.03
Upper Hutt City	0	0	0	0
Waikato District	74.39	87.51	94.03	97.47
Waimakariri District	78.79	85.5	90.97	93.2
Waimate District	14.69	24.78	34.44	45.64
Waipa District	0	0	0	0
Wairoa District	14.93	15.19	15.63	15.97
Waitaki District	0.33	0.85	1.06	3.04
Waitomo District	0.91	0.91	0.91	0.91
Wellington City	0.58	0.64	0.7	0.7
Western Bay of Plenty District	43.25	44.26	44.73	45.39
Westland District	78.42	78.95	79.65	80.29
Whakatane District	129.36	129.76	129.82	129.94
Whanganui District	1.06	1.15	1.17	1.17
Whangarei District	15.21	16.34	16.98	17.87

Table B-3: Area (km²) where median depth to groundwater is shallower than 2 m below ground level, compiled per Territorial Authority. All data are available as described in Section 4.

	Present	SLR = 0.5m	SLR = 1	SLR = 1.5 m
Ashburton District	6.06	6.93	7.3	7.53
Auckland	97.66	101.61	105.57	107.67
Buller District	22.01	36.27	38.03	38.11
Carterton District	0.43	0.44	0.44	0.44
Central Hawke's Bay District	4.84	5.01	5.02	5.02
Central Otago District	0	0	0	0
Chatham Islands Territory	0	0	0	0
Christchurch City	216.35	227.38	229.23	230.74
Clutha District	59.71	80.89	82.83	83.16
Dunedin City	67.43	75.65	76.36	76.72
Far North District	86.31	103.97	120.35	122.23
Gisborne District	45.81	50.63	51.9	52.39
Gore District	0	0	0	0
Grey District	6.15	6.64	6.67	6.68
Hamilton City	0	0	0	0
Hastings District	72.1	90.21	93.33	95.05
Hauraki District	440.12	442.67	442.83	442.96
Horowhenua District	155.98	160.07	161.37	162.11
Hurunui District	5.42	5.47	5.5	5.51
Invercargill City	114.34	132.79	134.88	136.25
Kaikoura District	1.48	1.74	1.82	1.88
Kaipara District	79.39	87.41	92.57	96.76
Kapiti Coast District	7.64	10.22	12.13	13.58
Kawerau District	0	0	0	0
Lower Hutt City	2.33	2.49	2.55	2.77
Mackenzie District	0	0	0	0
Manawatu District	49.2	50.31	50.42	50.6
Marlborough District	118.32	123.54	124.76	124.88
Masterton District	0.99	0.99	0.99	0.99
Matamata-Piako District	75.67	75.69	75.69	75.69
Napier City	46.08	46.22	46.24	46.28
Nelson City	1.68	1.68	1.68	1.68
New Plymouth District	1.39	1.76	1.88	1.89
Opotiki District	9.26	9.34	9.34	9.34
Otorohanga District	2.37	2.59	2.63	2.71
Palmerston North City	0.6	0.6	0.6	0.6

	Present	SLR = 0.5m	SLR = 1	SLR = 1.5 m
Porirua City	0.06	0.06	0.06	0.06
Queenstown-Lakes District	0	0	0	0
Rangitikei District	25.62	25.86	25.9	25.9
Rotorua District	0	0	0	0
Ruapehu District	0	0	0	0
Selwyn District	343.02	347.54	348.8	348.91
South Taranaki District	3.32	3.34	3.38	3.47
South Waikato District	0	0	0	0
South Wairarapa District	202.04	210.38	211.07	211.6
Southland District	119.7	175.57	177.9	180.2
Stratford District	0	0	0	0
Taranua District	0.03	0.03	0.03	0.03
Tasman District	23.87	27.49	30.62	31.97
Taupo District	0	0	0	0
Tauranga City	14.36	16.97	17.14	17.16
Thames-Coromandel District	23.74	24.3	24.54	24.9
Timaru District	42.89	49.03	53.11	54.46
Upper Hutt City	0	0	0	0
Waikato District	94.06	97.5	97.98	98.13
Waimakariri District	90.97	93.2	93.94	93.94
Waimate District	34.44	45.64	53.03	57.13
Waipa District	0	0	0	0
Wairoa District	12.92	17.15	19.32	25.08
Waitaki District	1.36	3.4	4.06	4.31
Waitomo District	1.2	1.26	1.26	1.3
Wellington City	0.7	0.7	0.7	0.7
Western Bay of Plenty District	44.73	45.39	45.92	46.23
Westland District	11.42	84.91	95.59	103.24
Whakatane District	129.82	129.94	129.94	129.94
Whanganui District	1.17	1.17	1.17	1.17
Whangarei District	16.98	17.87	19.16	19.44

Appendix C Area exposed to rising groundwater by TLA and grassland type

Table C-1: Area exposed to groundwater ≤ 1 m by Territorial Authority in New Zealand (Unit: ha).

Territory	Land Use	Area exposed to groundwater ≤ 1-meter (Unit: ha)				
		SLR=SLR=0	SLR=SLR=0.5	SLR=SLR=1	SLR=SLR=1.5	SLR=SLR=2
Area Outside Territorial Authority	Grassland High producing	34.00 (optimistic) 47.00 (median) 51.00 (conservative)	40.00 (optimistic) 56.00 (median) 52.00 (conservative)	43.00 (optimistic) 58.00 (median) 54.00 (conservative)	49.00 (optimistic) 58.00 (median) 57.00 (conservative)	54.00 (optimistic) 58.00 (median) 57.00 (conservative)
	Grassland Low producing	81.00 (optimistic) 117.00 (median) 134.00 (conservative)	98.00 (optimistic) 133.00 (median) 137.00 (conservative)	104.00 (optimistic) 140.00 (median) 139.00 (conservative)	109.00 (optimistic) 144.00 (median) 141.00 (conservative)	110.00 (optimistic) 146.00 (median) 142.00 (conservative)
	Grassland With woody biomass	7.00 (optimistic) 13.00 (median) 19.00 (conservative)	12.00 (optimistic) 16.00 (median) 19.00 (conservative)	14.00 (optimistic) 16.00 (median) 19.00 (conservative)	14.00 (optimistic) 18.00 (median) 19.00 (conservative)	14.00 (optimistic) 18.00 (median) 19.00 (conservative)
Ashburton District	Grassland High producing	257.00 (optimistic) 160.00 (median) 302.00 (conservative)	327.00 (optimistic) 361.00 (median) 368.00 (conservative)	353.00 (optimistic) 391.00 (median) 425.00 (conservative)	371.00 (optimistic) 422.00 (median) 457.00 (conservative)	415.00 (optimistic) 446.00 (median) 471.00 (conservative)
	Grassland Low producing	2.00 (optimistic) 3.00 (median) 20.00 (conservative)	5.00 (optimistic) 20.00 (median) 22.00 (conservative)	9.00 (optimistic) 22.00 (median) 34.00 (conservative)	9.00 (optimistic) 33.00 (median) 38.00 (conservative)	13.00 (optimistic) 35.00 (median) 38.00 (conservative)
	Grassland With woody biomass	0.00 (optimistic) 1.00 (median) 6.00 (conservative)	4.00 (optimistic) 6.00 (median) 6.00 (conservative)	4.00 (optimistic) 6.00 (median) 6.00 (conservative)	4.00 (optimistic) 6.00 (median) 6.00 (conservative)	4.00 (optimistic) 6.00 (median) 6.00 (conservative)

Auckland	Grassland High producing	2849.00 (optimistic) 3580.00 (median) 4017.00 (conservative)	3303.00 (optimistic) 3855.00 (median) 4106.00 (conservative)	3642.00 (optimistic) 4053.00 (median) 4170.00 (conservative)	3949.00 (optimistic) 4144.00 (median) 4235.00 (conservative)	4105.00 (optimistic) 4240.00 (median) 4298.00 (conservative)
	Grassland Low producing	221.00 (optimistic) 317.00 (median) 355.00 (conservative)	267.00 (optimistic) 331.00 (median) 366.00 (conservative)	290.00 (optimistic) 343.00 (median) 375.00 (conservative)	344.00 (optimistic) 367.00 (median) 386.00 (conservative)	366.00 (optimistic) 382.00 (median) 396.00 (conservative)
	Grassland With woody biomass	137.00 (optimistic) 156.00 (median) 220.00 (conservative)	172.00 (optimistic) 211.00 (median) 238.00 (conservative)	208.00 (optimistic) 235.00 (median) 251.00 (conservative)	240.00 (optimistic) 250.00 (median) 263.00 (conservative)	254.00 (optimistic) 262.00 (median) 285.00 (conservative)
Buller District	Grassland High producing	1591.00 (optimistic) 1712.00 (median) 1812.00 (conservative)	1593.00 (optimistic) 1732.00 (median) 1814.00 (conservative)	1597.00 (optimistic) 1732.00 (median) 1820.00 (conservative)	1607.00 (optimistic) 1750.00 (median) 1852.00 (conservative)	1618.00 (optimistic) 1775.00 (median) 1868.00 (conservative)
	Grassland Low producing	68.00 (optimistic) 80.00 (median) 81.00 (conservative)	68.00 (optimistic) 80.00 (median) 81.00 (conservative)	68.00 (optimistic) 80.00 (median) 81.00 (conservative)	68.00 (optimistic) 80.00 (median) 89.00 (conservative)	73.00 (optimistic) 86.00 (median) 89.00 (conservative)
	Grassland With woody biomass	158.00 (optimistic) 161.00 (median) 164.00 (conservative)	160.00 (optimistic) 164.00 (median) 164.00 (conservative)	160.00 (optimistic) 164.00 (median) 164.00 (conservative)	163.00 (optimistic) 164.00 (median) 170.00 (conservative)	169.00 (optimistic) 170.00 (median) 174.00 (conservative)
Carterton District	Grassland High producing	0.00 (optimistic) 10.00 (median) 12.00 (conservative)	0.00 (optimistic) 10.00 (median) 12.00 (conservative)	0.00 (optimistic) 10.00 (median) 20.00 (conservative)	0.00 (optimistic) 10.00 (median) 22.00 (conservative)	0.00 (optimistic) 10.00 (median) 22.00 (conservative)
	Grassland Low producing	0.00 (optimistic) 8.00 (median) 8.00 (conservative)	0.00 (optimistic) 8.00 (median) 8.00 (conservative)	0.00 (optimistic) 8.00 (median) 8.00 (conservative)	0.00 (optimistic) 8.00 (median) 8.00 (conservative)	0.00 (optimistic) 8.00 (median) 8.00 (conservative)

	Grassland With woody biomass	0.00 (optimistic) 6.00 (median) 6.00 (conservative)	0.00 (optimistic) 6.00 (median) 6.00 (conservative)	0.00 (optimistic) 6.00 (median) 6.00 (conservative)	0.00 (optimistic) 6.00 (median) 6.00 (conservative)	0.00 (optimistic) 6.00 (median) 6.00 (conservative)
Central Hawke's Bay District	Grassland High producing	45.00 (optimistic) 52.00 (median) 62.00 (conservative)	45.00 (optimistic) 53.00 (median) 62.00 (conservative)	45.00 (optimistic) 53.00 (median) 64.00 (conservative)	45.00 (optimistic) 55.00 (median) 64.00 (conservative)	47.00 (optimistic) 55.00 (median) 66.00 (conservative)
	Grassland Low producing	33.00 (optimistic) 75.00 (median) 80.00 (conservative)	33.00 (optimistic) 75.00 (median) 80.00 (conservative)	36.00 (optimistic) 75.00 (median) 80.00 (conservative)	36.00 (optimistic) 76.00 (median) 81.00 (conservative)	37.00 (optimistic) 76.00 (median) 81.00 (conservative)
	Grassland With woody biomass	1.00 (optimistic) 13.00 (median) 14.00 (conservative)	1.00 (optimistic) 13.00 (median) 14.00 (conservative)	1.00 (optimistic) 13.00 (median) 14.00 (conservative)	1.00 (optimistic) 13.00 (median) 14.00 (conservative)	4.00 (optimistic) 13.00 (median) 14.00 (conservative)
Central Otago District	Grassland High producing	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
	Grassland Low producing	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
	Grassland With woody biomass	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
Chatham Islands Territory	Grassland High producing	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
	Grassland Low producing	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)

	Grassland With woody biomass	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
Christchurch City	Grassland High producing	2207.00 (optimistic) 2490.00 (median) 2715.00 (conservative)	2525.00 (optimistic) 2736.00 (median) 2775.00 (conservative)	2650.00 (optimistic) 2773.00 (median) 2792.00 (conservative)	2754.00 (optimistic) 2794.00 (median) 2807.00 (conservative)	2768.00 (optimistic) 2802.00 (median) 2810.00 (conservative)
	Grassland Low producing	1314.00 (optimistic) 1780.00 (median) 3708.00 (conservative)	2064.00 (optimistic) 3235.00 (median) 4739.00 (conservative)	2510.00 (optimistic) 3956.00 (median) 4866.00 (conservative)	3432.00 (optimistic) 4782.00 (median) 4909.00 (conservative)	4315.00 (optimistic) 4886.00 (median) 4912.00 (conservative)
	Grassland With woody biomass	333.00 (optimistic) 372.00 (median) 437.00 (conservative)	405.00 (optimistic) 455.00 (median) 483.00 (conservative)	438.00 (optimistic) 492.00 (median) 495.00 (conservative)	489.00 (optimistic) 500.00 (median) 502.00 (conservative)	494.00 (optimistic) 502.00 (median) 502.00 (conservative)
Clutha District	Grassland High producing	1003.00 (optimistic) 1219.00 (median) 1594.00 (conservative)	1069.00 (optimistic) 1386.00 (median) 1723.00 (conservative)	1233.00 (optimistic) 1535.00 (median) 1787.00 (conservative)	1330.00 (optimistic) 1620.00 (median) 1886.00 (conservative)	1418.00 (optimistic) 1715.00 (median) 1961.00 (conservative)
	Grassland Low producing	16.00 (optimistic) 40.00 (median) 55.00 (conservative)	16.00 (optimistic) 43.00 (median) 56.00 (conservative)	18.00 (optimistic) 47.00 (median) 58.00 (conservative)	18.00 (optimistic) 48.00 (median) 62.00 (conservative)	21.00 (optimistic) 49.00 (median) 64.00 (conservative)
	Grassland With woody biomass	3.00 (optimistic) 3.00 (median) 9.00 (conservative)	3.00 (optimistic) 9.00 (median) 9.00 (conservative)	3.00 (optimistic) 9.00 (median) 9.00 (conservative)	3.00 (optimistic) 9.00 (median) 13.00 (conservative)	3.00 (optimistic) 10.00 (median) 15.00 (conservative)
Dunedin City	Grassland High producing	207.00 (optimistic) 1514.00 (median)	863.00 (optimistic) 2687.00 (median)	2063.00 (optimistic) 4989.00 (median)	4198.00 (optimistic) 5705.00 (median)	4443.00 (optimistic) 5760.00 (median)

		3963.00 (conservative)	4797.00 (conservative)	5330.00 (conservative)	5837.00 (conservative)	5851.00 (conservative)
	Grassland Low producing	60.00 (optimistic) 154.00 (median) 295.00 (conservative)	97.00 (optimistic) 216.00 (median) 336.00 (conservative)	145.00 (optimistic) 313.00 (median) 351.00 (conservative)	270.00 (optimistic) 346.00 (median) 362.00 (conservative)	280.00 (optimistic) 353.00 (median) 368.00 (conservative)
	Grassland With woody biomass	11.00 (optimistic) 10.00 (median) 27.00 (conservative)	17.00 (optimistic) 20.00 (median) 40.00 (conservative)	19.00 (optimistic) 43.00 (median) 56.00 (conservative)	38.00 (optimistic) 59.00 (median) 62.00 (conservative)	40.00 (optimistic) 60.00 (median) 62.00 (conservative)
Far North District	Grassland High producing	1132.00 (optimistic) 4234.00 (median) 5300.00 (conservative)	3057.00 (optimistic) 4725.00 (median) 5407.00 (conservative)	3745.00 (optimistic) 5215.00 (median) 5525.00 (conservative)	4246.00 (optimistic) 5478.00 (median) 5808.00 (conservative)	4734.00 (optimistic) 5810.00 (median) 5862.00 (conservative)
	Grassland Low producing	177.00 (optimistic) 211.00 (median) 260.00 (conservative)	231.00 (optimistic) 267.00 (median) 296.00 (conservative)	269.00 (optimistic) 291.00 (median) 336.00 (conservative)	308.00 (optimistic) 338.00 (median) 368.00 (conservative)	350.00 (optimistic) 362.00 (median) 395.00 (conservative)
	Grassland With woody biomass	196.00 (optimistic) 222.00 (median) 249.00 (conservative)	237.00 (optimistic) 248.00 (median) 275.00 (conservative)	280.00 (optimistic) 279.00 (median) 324.00 (conservative)	311.00 (optimistic) 310.00 (median) 358.00 (conservative)	324.00 (optimistic) 338.00 (median) 368.00 (conservative)
Gisborne District	Grassland High producing	399.00 (optimistic) 744.00 (median) 1103.00 (conservative)	723.00 (optimistic) 1218.00 (median) 1415.00 (conservative)	960.00 (optimistic) 1328.00 (median) 1447.00 (conservative)	1204.00 (optimistic) 1432.00 (median) 1486.00 (conservative)	1259.00 (optimistic) 1460.00 (median) 1494.00 (conservative)
	Grassland Low producing	109.00 (optimistic) 134.00 (median)	132.00 (optimistic) 170.00 (median)	153.00 (optimistic) 184.00 (median)	179.00 (optimistic) 208.00 (median)	201.00 (optimistic) 208.00 (median)

		178.00 (conservative)	201.00 (conservative)	212.00 (conservative)	212.00 (conservative)	212.00 (conservative)
	Grassland With woody biomass	54.00 (optimistic) 68.00 (median) 77.00 (conservative)	56.00 (optimistic) 74.00 (median) 85.00 (conservative)	58.00 (optimistic) 76.00 (median) 85.00 (conservative)	62.00 (optimistic) 83.00 (median) 85.00 (conservative)	66.00 (optimistic) 83.00 (median) 86.00 (conservative)
Gore District	Grassland High producing	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
	Grassland Low producing	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
	Grassland With woody biomass	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
Grey District	Grassland High producing	257.00 (optimistic) 255.00 (median) 259.00 (conservative)	271.00 (optimistic) 271.00 (median) 272.00 (conservative)	271.00 (optimistic) 279.00 (median) 275.00 (conservative)	272.00 (optimistic) 279.00 (median) 277.00 (conservative)	272.00 (optimistic) 279.00 (median) 277.00 (conservative)
	Grassland Low producing	17.00 (optimistic) 7.00 (median) 9.00 (conservative)	17.00 (optimistic) 8.00 (median) 12.00 (conservative)	17.00 (optimistic) 16.00 (median) 14.00 (conservative)	18.00 (optimistic) 21.00 (median) 18.00 (conservative)	18.00 (optimistic) 21.00 (median) 19.00 (conservative)
	Grassland With woody biomass	30.00 (optimistic) 29.00 (median) 25.00 (conservative)	30.00 (optimistic) 29.00 (median) 27.00 (conservative)	30.00 (optimistic) 31.00 (median) 28.00 (conservative)	31.00 (optimistic) 32.00 (median) 29.00 (conservative)	33.00 (optimistic) 34.00 (median) 33.00 (conservative)
Hamilton City	Grassland High producing	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)

	Grassland Low producing	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
	Grassland With woody biomass	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
Hastings District	Grassland High producing	214.00 (optimistic) 312.00 (median) 577.00 (conservative)	379.00 (optimistic) 563.00 (median) 790.00 (conservative)	481.00 (optimistic) 683.00 (median) 858.00 (conservative)	648.00 (optimistic) 887.00 (median) 941.00 (conservative)	742.00 (optimistic) 924.00 (median) 948.00 (conservative)
	Grassland Low producing	81.00 (optimistic) 198.00 (median) 337.00 (conservative)	236.00 (optimistic) 328.00 (median) 595.00 (conservative)	271.00 (optimistic) 424.00 (median) 667.00 (conservative)	347.00 (optimistic) 605.00 (median) 684.00 (conservative)	482.00 (optimistic) 663.00 (median) 692.00 (conservative)
	Grassland With woody biomass	7.00 (optimistic) 45.00 (median) 81.00 (conservative)	47.00 (optimistic) 88.00 (median) 114.00 (conservative)	68.00 (optimistic) 101.00 (median) 119.00 (conservative)	91.00 (optimistic) 116.00 (median) 122.00 (conservative)	98.00 (optimistic) 119.00 (median) 129.00 (conservative)
Hauraki District	Grassland High producing	29472.00 (optimistic) 34463.00 (median) 35131.00 (conservative)	32827.00 (optimistic) 34905.00 (median) 35223.00 (conservative)	34405.00 (optimistic) 35155.00 (median) 35313.00 (conservative)	35050.00 (optimistic) 35377.00 (median) 35394.00 (conservative)	35280.00 (optimistic) 35387.00 (median) 35394.00 (conservative)
	Grassland Low producing	805.00 (optimistic) 940.00 (median) 950.00 (conservative)	905.00 (optimistic) 948.00 (median) 953.00 (conservative)	938.00 (optimistic) 950.00 (median) 957.00 (conservative)	952.00 (optimistic) 958.00 (median) 958.00 (conservative)	954.00 (optimistic) 958.00 (median) 958.00 (conservative)
	Grassland With woody biomass	51.00 (optimistic) 103.00 (median) 103.00 (conservative)	75.00 (optimistic) 103.00 (median) 103.00 (conservative)	98.00 (optimistic) 103.00 (median) 103.00 (conservative)	103.00 (optimistic) 103.00 (median) 103.00 (conservative)	103.00 (optimistic) 103.00 (median) 103.00 (conservative)

Horowhenua District	Grassland High producing	5316.00 (optimistic) 10367.00 (median) 11757.00 (conservative)	8449.00 (optimistic) 11033.00 (median) 11822.00 (conservative)	10092.00 (optimistic) 11256.00 (median) 11877.00 (conservative)	10619.00 (optimistic) 11479.00 (median) 11921.00 (conservative)	10904.00 (optimistic) 11571.00 (median) 11932.00 (conservative)
	Grassland Low producing	126.00 (optimistic) 182.00 (median) 260.00 (conservative)	209.00 (optimistic) 259.00 (median) 291.00 (conservative)	242.00 (optimistic) 281.00 (median) 301.00 (conservative)	258.00 (optimistic) 301.00 (median) 306.00 (conservative)	268.00 (optimistic) 305.00 (median) 306.00 (conservative)
	Grassland With woody biomass	116.00 (optimistic) 133.00 (median) 154.00 (conservative)	136.00 (optimistic) 156.00 (median) 168.00 (conservative)	152.00 (optimistic) 169.00 (median) 170.00 (conservative)	162.00 (optimistic) 169.00 (median) 172.00 (conservative)	164.00 (optimistic) 170.00 (median) 172.00 (conservative)
Hurunui District	Grassland High producing	40.00 (optimistic) 69.00 (median) 107.00 (conservative)	65.00 (optimistic) 96.00 (median) 114.00 (conservative)	82.00 (optimistic) 109.00 (median) 121.00 (conservative)	98.00 (optimistic) 109.00 (median) 121.00 (conservative)	99.00 (optimistic) 109.00 (median) 121.00 (conservative)
	Grassland Low producing	52.00 (optimistic) 96.00 (median) 123.00 (conservative)	115.00 (optimistic) 120.00 (median) 123.00 (conservative)	117.00 (optimistic) 123.00 (median) 125.00 (conservative)	124.00 (optimistic) 123.00 (median) 125.00 (conservative)	124.00 (optimistic) 123.00 (median) 125.00 (conservative)
	Grassland With woody biomass	6.00 (optimistic) 15.00 (median) 17.00 (conservative)	15.00 (optimistic) 17.00 (median) 17.00 (conservative)	17.00 (optimistic) 17.00 (median) 17.00 (conservative)	17.00 (optimistic) 17.00 (median) 17.00 (conservative)	17.00 (optimistic) 17.00 (median) 17.00 (conservative)
Invercargill City	Grassland High producing	1793.00 (optimistic) 1911.00 (median) 4993.00 (conservative)	3362.00 (optimistic) 4353.00 (median) 6908.00 (conservative)	4757.00 (optimistic) 6692.00 (median) 7688.00 (conservative)	6289.00 (optimistic) 7366.00 (median) 7786.00 (conservative)	7159.00 (optimistic) 7560.00 (median) 7862.00 (conservative)

	Grassland Low producing	90.00 (optimistic) 89.00 (median) 504.00 (conservative)	158.00 (optimistic) 268.00 (median) 718.00 (conservative)	238.00 (optimistic) 560.00 (median) 776.00 (conservative)	543.00 (optimistic) 778.00 (median) 780.00 (conservative)	693.00 (optimistic) 779.00 (median) 780.00 (conservative)
	Grassland With woody biomass	57.00 (optimistic) 49.00 (median) 157.00 (conservative)	122.00 (optimistic) 129.00 (median) 290.00 (conservative)	180.00 (optimistic) 294.00 (median) 344.00 (conservative)	302.00 (optimistic) 340.00 (median) 344.00 (conservative)	326.00 (optimistic) 340.00 (median) 345.00 (conservative)
Kaikoura District	Grassland High producing	8.00 (optimistic) 15.00 (median) 28.00 (conservative)	25.00 (optimistic) 49.00 (median) 96.00 (conservative)	50.00 (optimistic) 63.00 (median) 104.00 (conservative)	62.00 (optimistic) 67.00 (median) 104.00 (conservative)	62.00 (optimistic) 82.00 (median) 112.00 (conservative)
	Grassland Low producing	8.00 (optimistic) 33.00 (median) 64.00 (conservative)	8.00 (optimistic) 33.00 (median) 64.00 (conservative)	8.00 (optimistic) 41.00 (median) 69.00 (conservative)	12.00 (optimistic) 41.00 (median) 72.00 (conservative)	12.00 (optimistic) 46.00 (median) 73.00 (conservative)
	Grassland With woody biomass	0.00 (optimistic) 4.00 (median) 7.00 (conservative)	0.00 (optimistic) 4.00 (median) 8.00 (conservative)	0.00 (optimistic) 4.00 (median) 9.00 (conservative)	0.00 (optimistic) 5.00 (median) 11.00 (conservative)	0.00 (optimistic) 5.00 (median) 11.00 (conservative)
Kaipara District	Grassland High producing	4470.00 (optimistic) 5650.00 (median) 5836.00 (conservative)	5733.00 (optimistic) 5844.00 (median) 5904.00 (conservative)	5792.00 (optimistic) 5868.00 (median) 5909.00 (conservative)	5825.00 (optimistic) 5883.00 (median) 5917.00 (conservative)	5858.00 (optimistic) 5904.00 (median) 5920.00 (conservative)
	Grassland Low producing	47.00 (optimistic) 74.00 (median) 83.00 (conservative)	72.00 (optimistic) 79.00 (median) 86.00 (conservative)	73.00 (optimistic) 83.00 (median) 88.00 (conservative)	77.00 (optimistic) 83.00 (median) 97.00 (conservative)	81.00 (optimistic) 88.00 (median) 101.00 (conservative)
	Grassland With woody biomass	18.00 (optimistic) 32.00 (median) 35.00 (conservative)	20.00 (optimistic) 33.00 (median) 35.00 (conservative)	24.00 (optimistic) 34.00 (median) 36.00 (conservative)	29.00 (optimistic) 34.00 (median) 42.00 (conservative)	33.00 (optimistic) 37.00 (median) 47.00 (conservative)

Kapiti Coast District	Grassland High producing	110.00 (optimistic) 24.00 (median) 29.00 (conservative)	137.00 (optimistic) 194.00 (median) 318.00 (conservative)	303.00 (optimistic) 349.00 (median) 463.00 (conservative)	363.00 (optimistic) 402.00 (median) 496.00 (conservative)	386.00 (optimistic) 449.00 (median) 531.00 (conservative)
	Grassland Low producing	60.00 (optimistic) 31.00 (median) 18.00 (conservative)	74.00 (optimistic) 65.00 (median) 76.00 (conservative)	95.00 (optimistic) 85.00 (median) 94.00 (conservative)	103.00 (optimistic) 99.00 (median) 113.00 (conservative)	108.00 (optimistic) 112.00 (median) 120.00 (conservative)
	Grassland With woody biomass	12.00 (optimistic) 0.00 (median) 0.00 (conservative)	20.00 (optimistic) 19.00 (median) 25.00 (conservative)	40.00 (optimistic) 35.00 (median) 42.00 (conservative)	44.00 (optimistic) 40.00 (median) 51.00 (conservative)	45.00 (optimistic) 55.00 (median) 64.00 (conservative)
Kawerau District	Grassland High producing	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
	Grassland Low producing	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
	Grassland With woody biomass	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
Lower Hutt City	Grassland High producing	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
	Grassland Low producing	1.00 (optimistic) 3.00 (median) 5.00 (conservative)	2.00 (optimistic) 5.00 (median) 5.00 (conservative)	2.00 (optimistic) 5.00 (median) 5.00 (conservative)	5.00 (optimistic) 5.00 (median) 5.00 (conservative)	5.00 (optimistic) 5.00 (median) 5.00 (conservative)
	Grassland With woody biomass	0.00 (optimistic) 0.00 (median) 2.00 (conservative)	0.00 (optimistic) 2.00 (median) 4.00 (conservative)	1.00 (optimistic) 2.00 (median) 4.00 (conservative)	2.00 (optimistic) 8.00 (median) 8.00 (conservative)	8.00 (optimistic) 8.00 (median) 8.00 (conservative)

Mackenzie District	Grassland High producing	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
	Grassland Low producing	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
	Grassland With woody biomass	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
Manawatu District	Grassland High producing	1889.00 (optimistic) 2623.00 (median) 2999.00 (conservative)	2729.00 (optimistic) 3020.00 (median) 3130.00 (conservative)	2966.00 (optimistic) 3087.00 (median) 3137.00 (conservative)	3038.00 (optimistic) 3133.00 (median) 3143.00 (conservative)	3070.00 (optimistic) 3134.00 (median) 3143.00 (conservative)
	Grassland Low producing	202.00 (optimistic) 452.00 (median) 523.00 (conservative)	463.00 (optimistic) 513.00 (median) 526.00 (conservative)	500.00 (optimistic) 519.00 (median) 526.00 (conservative)	513.00 (optimistic) 527.00 (median) 528.00 (conservative)	521.00 (optimistic) 528.00 (median) 528.00 (conservative)
	Grassland With woody biomass	32.00 (optimistic) 74.00 (median) 94.00 (conservative)	79.00 (optimistic) 91.00 (median) 94.00 (conservative)	90.00 (optimistic) 91.00 (median) 94.00 (conservative)	90.00 (optimistic) 92.00 (median) 94.00 (conservative)	90.00 (optimistic) 93.00 (median) 94.00 (conservative)
Marlborough District	Grassland High producing	994.00 (optimistic) 1347.00 (median) 1712.00 (conservative)	1406.00 (optimistic) 1754.00 (median) 2024.00 (conservative)	1670.00 (optimistic) 2005.00 (median) 2089.00 (conservative)	2003.00 (optimistic) 2118.00 (median) 2140.00 (conservative)	2144.00 (optimistic) 2149.00 (median) 2152.00 (conservative)
	Grassland Low producing	443.00 (optimistic) 639.00 (median) 722.00 (conservative)	576.00 (optimistic) 715.00 (median) 759.00 (conservative)	661.00 (optimistic) 762.00 (median) 788.00 (conservative)	750.00 (optimistic) 784.00 (median) 806.00 (conservative)	806.00 (optimistic) 816.00 (median) 817.00 (conservative)

	Grassland With woody biomass	101.00 (optimistic) 152.00 (median) 179.00 (conservative)	161.00 (optimistic) 174.00 (median) 227.00 (conservative)	208.00 (optimistic) 222.00 (median) 234.00 (conservative)	221.00 (optimistic) 233.00 (median) 235.00 (conservative)	234.00 (optimistic) 235.00 (median) 235.00 (conservative)
Masterton District	Grassland High producing	46.00 (optimistic) 64.00 (median) 70.00 (conservative)	46.00 (optimistic) 64.00 (median) 70.00 (conservative)	46.00 (optimistic) 64.00 (median) 70.00 (conservative)	46.00 (optimistic) 64.00 (median) 74.00 (conservative)	46.00 (optimistic) 68.00 (median) 74.00 (conservative)
	Grassland Low producing	0.00 (optimistic) 9.00 (median) 9.00 (conservative)	0.00 (optimistic) 9.00 (median) 9.00 (conservative)	0.00 (optimistic) 9.00 (median) 9.00 (conservative)	0.00 (optimistic) 9.00 (median) 11.00 (conservative)	0.00 (optimistic) 9.00 (median) 11.00 (conservative)
	Grassland With woody biomass	0.00 (optimistic) 1.00 (median) 1.00 (conservative)	0.00 (optimistic) 1.00 (median) 1.00 (conservative)	0.00 (optimistic) 1.00 (median) 1.00 (conservative)	0.00 (optimistic) 1.00 (median) 1.00 (conservative)	0.00 (optimistic) 1.00 (median) 1.00 (conservative)
Matamata-Piako District	Grassland High producing	3927.00 (optimistic) 4624.00 (median) 4843.00 (conservative)	4477.00 (optimistic) 4786.00 (median) 4844.00 (conservative)	4654.00 (optimistic) 4843.00 (median) 4845.00 (conservative)	4778.00 (optimistic) 4845.00 (median) 4845.00 (conservative)	4842.00 (optimistic) 4845.00 (median) 4845.00 (conservative)
	Grassland Low producing	19.00 (optimistic) 53.00 (median) 55.00 (conservative)	45.00 (optimistic) 55.00 (median) 55.00 (conservative)	53.00 (optimistic) 55.00 (median) 55.00 (conservative)	55.00 (optimistic) 55.00 (median) 55.00 (conservative)	55.00 (optimistic) 55.00 (median) 55.00 (conservative)
	Grassland With woody biomass	13.00 (optimistic) 16.00 (median) 16.00 (conservative)	15.00 (optimistic) 16.00 (median) 16.00 (conservative)	16.00 (optimistic) 16.00 (median) 16.00 (conservative)	16.00 (optimistic) 16.00 (median) 16.00 (conservative)	16.00 (optimistic) 16.00 (median) 16.00 (conservative)
Napier City	Grassland High producing	1201.00 (optimistic) 1374.00 (median) 1414.00 (conservative)	1388.00 (optimistic) 1413.00 (median) 1423.00 (conservative)	1397.00 (optimistic) 1419.00 (median) 1423.00 (conservative)	1423.00 (optimistic) 1423.00 (median) 1423.00 (conservative)	1423.00 (optimistic) 1423.00 (median) 1423.00 (conservative)

	Grassland Low producing	91.00 (optimistic) 136.00 (median) 149.00 (conservative)	145.00 (optimistic) 151.00 (median) 156.00 (conservative)	149.00 (optimistic) 154.00 (median) 160.00 (conservative)	156.00 (optimistic) 160.00 (median) 162.00 (conservative)	160.00 (optimistic) 160.00 (median) 162.00 (conservative)
	Grassland With woody biomass	14.00 (optimistic) 28.00 (median) 28.00 (conservative)	28.00 (optimistic) 28.00 (median) 28.00 (conservative)	28.00 (optimistic) 28.00 (median) 28.00 (conservative)	28.00 (optimistic) 28.00 (median) 28.00 (conservative)	28.00 (optimistic) 28.00 (median) 28.00 (conservative)
Nelson City	Grassland High producing	24.00 (optimistic) 69.00 (median) 69.00 (conservative)	69.00 (optimistic) 69.00 (median) 69.00 (conservative)	69.00 (optimistic) 69.00 (median) 69.00 (conservative)	69.00 (optimistic) 69.00 (median) 69.00 (conservative)	69.00 (optimistic) 69.00 (median) 69.00 (conservative)
	Grassland Low producing	6.00 (optimistic) 11.00 (median) 8.00 (conservative)	11.00 (optimistic) 11.00 (median) 8.00 (conservative)	11.00 (optimistic) 11.00 (median) 11.00 (conservative)	11.00 (optimistic) 11.00 (median) 11.00 (conservative)	11.00 (optimistic) 11.00 (median) 11.00 (conservative)
	Grassland With woody biomass	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
New Plymouth District	Grassland High producing	39.00 (optimistic) 10.00 (median) 73.00 (conservative)	47.00 (optimistic) 48.00 (median) 75.00 (conservative)	54.00 (optimistic) 55.00 (median) 76.00 (conservative)	58.00 (optimistic) 73.00 (median) 86.00 (conservative)	58.00 (optimistic) 85.00 (median) 86.00 (conservative)
	Grassland Low producing	12.00 (optimistic) 7.00 (median) 8.00 (conservative)	15.00 (optimistic) 10.00 (median) 8.00 (conservative)	15.00 (optimistic) 10.00 (median) 10.00 (conservative)	15.00 (optimistic) 16.00 (median) 16.00 (conservative)	15.00 (optimistic) 16.00 (median) 16.00 (conservative)
	Grassland With woody biomass	6.00 (optimistic) 3.00 (median) 18.00 (conservative)	6.00 (optimistic) 19.00 (median) 18.00 (conservative)	6.00 (optimistic) 19.00 (median) 21.00 (conservative)	12.00 (optimistic) 21.00 (median) 21.00 (conservative)	12.00 (optimistic) 21.00 (median) 21.00 (conservative)

Opotiki District	Grassland High producing	298.00 (optimistic) 348.00 (median) 350.00 (conservative)	328.00 (optimistic) 351.00 (median) 352.00 (conservative)	338.00 (optimistic) 351.00 (median) 352.00 (conservative)	347.00 (optimistic) 352.00 (median) 352.00 (conservative)	347.00 (optimistic) 352.00 (median) 352.00 (conservative)
	Grassland Low producing	58.00 (optimistic) 82.00 (median) 83.00 (conservative)	65.00 (optimistic) 86.00 (median) 83.00 (conservative)	76.00 (optimistic) 86.00 (median) 86.00 (conservative)	83.00 (optimistic) 86.00 (median) 86.00 (conservative)	85.00 (optimistic) 86.00 (median) 86.00 (conservative)
	Grassland With woody biomass	39.00 (optimistic) 46.00 (median) 44.00 (conservative)	39.00 (optimistic) 47.00 (median) 44.00 (conservative)	40.00 (optimistic) 47.00 (median) 47.00 (conservative)	47.00 (optimistic) 47.00 (median) 47.00 (conservative)	47.00 (optimistic) 47.00 (median) 48.00 (conservative)
Otorohanga District	Grassland High producing	71.00 (optimistic) 93.00 (median) 96.00 (conservative)	71.00 (optimistic) 93.00 (median) 96.00 (conservative)	71.00 (optimistic) 93.00 (median) 96.00 (conservative)	71.00 (optimistic) 94.00 (median) 96.00 (conservative)	71.00 (optimistic) 94.00 (median) 96.00 (conservative)
	Grassland Low producing	8.00 (optimistic) 9.00 (median) 11.00 (conservative)	11.00 (optimistic) 12.00 (median) 14.00 (conservative)	11.00 (optimistic) 12.00 (median) 14.00 (conservative)	16.00 (optimistic) 19.00 (median) 19.00 (conservative)	16.00 (optimistic) 19.00 (median) 19.00 (conservative)
	Grassland With woody biomass	11.00 (optimistic) 11.00 (median) 11.00 (conservative)	11.00 (optimistic) 11.00 (median) 11.00 (conservative)	11.00 (optimistic) 11.00 (median) 11.00 (conservative)	11.00 (optimistic) 11.00 (median) 11.00 (conservative)	11.00 (optimistic) 11.00 (median) 11.00 (conservative)
Palmerston North City	Grassland High producing	13.00 (optimistic) 22.00 (median) 22.00 (conservative)	14.00 (optimistic) 22.00 (median) 22.00 (conservative)	17.00 (optimistic) 22.00 (median) 22.00 (conservative)	18.00 (optimistic) 22.00 (median) 22.00 (conservative)	18.00 (optimistic) 22.00 (median) 22.00 (conservative)
	Grassland Low producing	0.00 (optimistic) 3.00 (median) 3.00 (conservative)	0.00 (optimistic) 3.00 (median) 3.00 (conservative)	2.00 (optimistic) 3.00 (median) 3.00 (conservative)	2.00 (optimistic) 3.00 (median) 3.00 (conservative)	2.00 (optimistic) 3.00 (median) 3.00 (conservative)

	Grassland With woody biomass	1.00 (optimistic) 7.00 (median) 7.00 (conservative)	1.00 (optimistic) 7.00 (median) 7.00 (conservative)	1.00 (optimistic) 7.00 (median) 7.00 (conservative)	6.00 (optimistic) 7.00 (median) 7.00 (conservative)	6.00 (optimistic) 7.00 (median) 7.00 (conservative)
Porirua City	Grassland High producing	1.00 (optimistic) 6.00 (median) 6.00 (conservative)	1.00 (optimistic) 6.00 (median) 6.00 (conservative)	6.00 (optimistic) 6.00 (median) 6.00 (conservative)	6.00 (optimistic) 6.00 (median) 6.00 (conservative)	6.00 (optimistic) 6.00 (median) 6.00 (conservative)
	Grassland Low producing	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
	Grassland With woody biomass	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
Queenstown-Lakes District	Grassland High producing	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
	Grassland Low producing	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
	Grassland With woody biomass	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
Rangitikei District	Grassland High producing	234.00 (optimistic) 881.00 (median) 1045.00 (conservative)	987.00 (optimistic) 1021.00 (median) 1045.00 (conservative)	1022.00 (optimistic) 1035.00 (median) 1045.00 (conservative)	1035.00 (optimistic) 1045.00 (median) 1045.00 (conservative)	1041.00 (optimistic) 1045.00 (median) 1045.00 (conservative)
	Grassland Low producing	18.00 (optimistic) 34.00 (median) 94.00 (conservative)	73.00 (optimistic) 86.00 (median) 94.00 (conservative)	75.00 (optimistic) 95.00 (median) 96.00 (conservative)	78.00 (optimistic) 97.00 (median) 99.00 (conservative)	99.00 (optimistic) 99.00 (median) 99.00 (conservative)

	Grassland With woody biomass	2.00 (optimistic) 22.00 (median) 24.00 (conservative)	22.00 (optimistic) 24.00 (median) 24.00 (conservative)	24.00 (optimistic) 24.00 (median) 24.00 (conservative)	24.00 (optimistic) 24.00 (median) 24.00 (conservative)	24.00 (optimistic) 24.00 (median) 24.00 (conservative)
Rotorua District	Grassland High producing	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
	Grassland Low producing	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
	Grassland With woody biomass	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
Ruapehu District	Grassland High producing	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
	Grassland Low producing	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
	Grassland With woody biomass	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
Selwyn District	Grassland High producing	9711.00 (optimistic) 11652.00 (median) 12489.00 (conservative)	12083.00 (optimistic) 12704.00 (median) 12778.00 (conservative)	12410.00 (optimistic) 12819.00 (median) 12820.00 (conservative)	12747.00 (optimistic) 12888.00 (median) 12923.00 (conservative)	12815.00 (optimistic) 12924.00 (median) 12928.00 (conservative)
	Grassland Low producing	287.00 (optimistic) 463.00 (median) 509.00 (conservative)	441.00 (optimistic) 596.00 (median) 546.00 (conservative)	486.00 (optimistic) 605.00 (median) 571.00 (conservative)	512.00 (optimistic) 630.00 (median) 636.00 (conservative)	550.00 (optimistic) 650.00 (median) 652.00 (conservative)

	Grassland With woody biomass	103.00 (optimistic) 131.00 (median) 163.00 (conservative)	141.00 (optimistic) 191.00 (median) 181.00 (conservative)	161.00 (optimistic) 202.00 (median) 191.00 (conservative)	190.00 (optimistic) 220.00 (median) 228.00 (conservative)	202.00 (optimistic) 230.00 (median) 230.00 (conservative)
South Taranaki District	Grassland High producing	155.00 (optimistic) 156.00 (median) 190.00 (conservative)	158.00 (optimistic) 184.00 (median) 203.00 (conservative)	158.00 (optimistic) 195.00 (median) 203.00 (conservative)	161.00 (optimistic) 204.00 (median) 206.00 (conservative)	162.00 (optimistic) 204.00 (median) 206.00 (conservative)
	Grassland Low producing	47.00 (optimistic) 53.00 (median) 63.00 (conservative)	48.00 (optimistic) 60.00 (median) 63.00 (conservative)	48.00 (optimistic) 60.00 (median) 63.00 (conservative)	52.00 (optimistic) 64.00 (median) 67.00 (conservative)	65.00 (optimistic) 67.00 (median) 69.00 (conservative)
	Grassland With woody biomass	5.00 (optimistic) 5.00 (median) 5.00 (conservative)	5.00 (optimistic) 5.00 (median) 5.00 (conservative)	5.00 (optimistic) 5.00 (median) 5.00 (conservative)	5.00 (optimistic) 5.00 (median) 5.00 (conservative)	5.00 (optimistic) 5.00 (median) 5.00 (conservative)
South Waikato District	Grassland High producing	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
	Grassland Low producing	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
	Grassland With woody biomass	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
South Wairarapa District	Grassland High producing	5953.00 (optimistic) 7158.00 (median) 8844.00 (conservative)	8221.00 (optimistic) 8228.00 (median) 9305.00 (conservative)	9257.00 (optimistic) 9208.00 (median) 9552.00 (conservative)	9484.00 (optimistic) 9789.00 (median) 9809.00 (conservative)	9649.00 (optimistic) 9849.00 (median) 9834.00 (conservative)

	Grassland Low producing	184.00 (optimistic) 305.00 (median) 403.00 (conservative)	319.00 (optimistic) 403.00 (median) 473.00 (conservative)	439.00 (optimistic) 487.00 (median) 494.00 (conservative)	452.00 (optimistic) 497.00 (median) 497.00 (conservative)	462.00 (optimistic) 497.00 (median) 500.00 (conservative)
	Grassland With woody biomass	145.00 (optimistic) 163.00 (median) 203.00 (conservative)	197.00 (optimistic) 192.00 (median) 242.00 (conservative)	259.00 (optimistic) 246.00 (median) 257.00 (conservative)	267.00 (optimistic) 270.00 (median) 273.00 (conservative)	267.00 (optimistic) 273.00 (median) 273.00 (conservative)
Southland District	Grassland High producing	1689.00 (optimistic) 1336.00 (median) 3362.00 (conservative)	2200.00 (optimistic) 3863.00 (median) 7806.00 (conservative)	3818.00 (optimistic) 6959.00 (median) 8998.00 (conservative)	7197.00 (optimistic) 8806.00 (median) 9325.00 (conservative)	8262.00 (optimistic) 8998.00 (median) 9542.00 (conservative)
	Grassland Low producing	147.00 (optimistic) 177.00 (median) 348.00 (conservative)	151.00 (optimistic) 222.00 (median) 425.00 (conservative)	174.00 (optimistic) 345.00 (median) 456.00 (conservative)	243.00 (optimistic) 418.00 (median) 471.00 (conservative)	334.00 (optimistic) 441.00 (median) 505.00 (conservative)
	Grassland With woody biomass	33.00 (optimistic) 13.00 (median) 39.00 (conservative)	37.00 (optimistic) 48.00 (median) 130.00 (conservative)	81.00 (optimistic) 128.00 (median) 163.00 (conservative)	115.00 (optimistic) 158.00 (median) 163.00 (conservative)	142.00 (optimistic) 160.00 (median) 170.00 (conservative)
Stratford District	Grassland High producing	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
	Grassland Low producing	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
	Grassland With woody biomass	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)

Taranua District	Grassland High producing	0.00 (optimistic) 2.00 (median) 2.00 (conservative)	0.00 (optimistic) 2.00 (median) 2.00 (conservative)	0.00 (optimistic) 2.00 (median) 2.00 (conservative)	0.00 (optimistic) 2.00 (median) 2.00 (conservative)	0.00 (optimistic) 2.00 (median) 2.00 (conservative)
	Grassland Low producing	0.00 (optimistic) 2.00 (median) 2.00 (conservative)	0.00 (optimistic) 2.00 (median) 2.00 (conservative)	0.00 (optimistic) 2.00 (median) 2.00 (conservative)	0.00 (optimistic) 2.00 (median) 2.00 (conservative)	0.00 (optimistic) 2.00 (median) 2.00 (conservative)
	Grassland With woody biomass	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
Tasman District	Grassland High producing	410.00 (optimistic) 491.00 (median) 620.00 (conservative)	634.00 (optimistic) 764.00 (median) 810.00 (conservative)	743.00 (optimistic) 830.00 (median) 873.00 (conservative)	824.00 (optimistic) 875.00 (median) 928.00 (conservative)	866.00 (optimistic) 959.00 (median) 963.00 (conservative)
	Grassland Low producing	18.00 (optimistic) 49.00 (median) 71.00 (conservative)	62.00 (optimistic) 78.00 (median) 90.00 (conservative)	69.00 (optimistic) 81.00 (median) 90.00 (conservative)	72.00 (optimistic) 82.00 (median) 107.00 (conservative)	74.00 (optimistic) 104.00 (median) 113.00 (conservative)
	Grassland With woody biomass	36.00 (optimistic) 35.00 (median) 48.00 (conservative)	68.00 (optimistic) 66.00 (median) 74.00 (conservative)	77.00 (optimistic) 82.00 (median) 88.00 (conservative)	90.00 (optimistic) 92.00 (median) 90.00 (conservative)	91.00 (optimistic) 95.00 (median) 93.00 (conservative)
Taupo District	Grassland High producing	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
	Grassland Low producing	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
	Grassland With woody biomass	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)

Tauranga City	Grassland High producing	361.00 (optimistic) 510.00 (median) 646.00 (conservative)	514.00 (optimistic) 595.00 (median) 652.00 (conservative)	587.00 (optimistic) 632.00 (median) 672.00 (conservative)	640.00 (optimistic) 658.00 (median) 680.00 (conservative)	665.00 (optimistic) 671.00 (median) 682.00 (conservative)
	Grassland Low producing	4.00 (optimistic) 5.00 (median) 15.00 (conservative)	13.00 (optimistic) 17.00 (median) 22.00 (conservative)	27.00 (optimistic) 31.00 (median) 32.00 (conservative)	30.00 (optimistic) 34.00 (median) 32.00 (conservative)	31.00 (optimistic) 34.00 (median) 32.00 (conservative)
	Grassland With woody biomass	8.00 (optimistic) 7.00 (median) 10.00 (conservative)	8.00 (optimistic) 7.00 (median) 10.00 (conservative)	8.00 (optimistic) 9.00 (median) 10.00 (conservative)	8.00 (optimistic) 9.00 (median) 10.00 (conservative)	8.00 (optimistic) 9.00 (median) 10.00 (conservative)
Thames-Coromandel District	Grassland High producing	749.00 (optimistic) 1188.00 (median) 1257.00 (conservative)	1110.00 (optimistic) 1238.00 (median) 1276.00 (conservative)	1214.00 (optimistic) 1251.00 (median) 1280.00 (conservative)	1284.00 (optimistic) 1264.00 (median) 1292.00 (conservative)	1295.00 (optimistic) 1271.00 (median) 1296.00 (conservative)
	Grassland Low producing	50.00 (optimistic) 70.00 (median) 72.00 (conservative)	78.00 (optimistic) 81.00 (median) 74.00 (conservative)	87.00 (optimistic) 86.00 (median) 78.00 (conservative)	91.00 (optimistic) 89.00 (median) 88.00 (conservative)	93.00 (optimistic) 89.00 (median) 93.00 (conservative)
	Grassland With woody biomass	10.00 (optimistic) 16.00 (median) 21.00 (conservative)	22.00 (optimistic) 16.00 (median) 21.00 (conservative)	23.00 (optimistic) 16.00 (median) 21.00 (conservative)	23.00 (optimistic) 18.00 (median) 23.00 (conservative)	23.00 (optimistic) 18.00 (median) 23.00 (conservative)
Timaru District	Grassland High producing	892.00 (optimistic) 1400.00 (median) 2326.00 (conservative)	1947.00 (optimistic) 2534.00 (median) 2965.00 (conservative)	2579.00 (optimistic) 2934.00 (median) 3114.00 (conservative)	2978.00 (optimistic) 3103.00 (median) 3163.00 (conservative)	3137.00 (optimistic) 3183.00 (median) 3223.00 (conservative)
	Grassland Low producing	24.00 (optimistic) 39.00 (median)	58.00 (optimistic) 65.00 (median)	68.00 (optimistic) 107.00 (median)	101.00 (optimistic) 130.00 (median)	143.00 (optimistic) 173.00 (median)

		71.00 (conservative)	120.00 (conservative)	147.00 (conservative)	182.00 (conservative)	187.00 (conservative)
	Grassland With woody biomass	4.00 (optimistic) 8.00 (median) 17.00 (conservative)	9.00 (optimistic) 18.00 (median) 21.00 (conservative)	16.00 (optimistic) 18.00 (median) 24.00 (conservative)	28.00 (optimistic) 22.00 (median) 38.00 (conservative)	28.00 (optimistic) 33.00 (median) 40.00 (conservative)
Upper Hutt City	Grassland High producing	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
	Grassland Low producing	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
	Grassland With woody biomass	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
Waikato District	Grassland High producing	1259.00 (optimistic) 1734.00 (median) 1881.00 (conservative)	1614.00 (optimistic) 1860.00 (median) 1932.00 (conservative)	1847.00 (optimistic) 1913.00 (median) 1947.00 (conservative)	1904.00 (optimistic) 1947.00 (median) 1971.00 (conservative)	1938.00 (optimistic) 1954.00 (median) 1979.00 (conservative)
	Grassland Low producing	254.00 (optimistic) 345.00 (median) 456.00 (conservative)	329.00 (optimistic) 433.00 (median) 460.00 (conservative)	367.00 (optimistic) 465.00 (median) 471.00 (conservative)	395.00 (optimistic) 468.00 (median) 471.00 (conservative)	452.00 (optimistic) 472.00 (median) 472.00 (conservative)
	Grassland With woody biomass	30.00 (optimistic) 62.00 (median) 73.00 (conservative)	51.00 (optimistic) 69.00 (median) 75.00 (conservative)	64.00 (optimistic) 71.00 (median) 76.00 (conservative)	68.00 (optimistic) 72.00 (median) 76.00 (conservative)	76.00 (optimistic) 75.00 (median) 76.00 (conservative)

Waimakariri District	Grassland High producing	4533.00 (optimistic) 5019.00 (median) 5270.00 (conservative)	5130.00 (optimistic) 5286.00 (median) 5566.00 (conservative)	5244.00 (optimistic) 5537.00 (median) 5655.00 (conservative)	5571.00 (optimistic) 5648.00 (median) 5693.00 (conservative)	5637.00 (optimistic) 5702.00 (median) 5702.00 (conservative)
	Grassland Low producing	289.00 (optimistic) 305.00 (median) 328.00 (conservative)	324.00 (optimistic) 334.00 (median) 348.00 (conservative)	338.00 (optimistic) 347.00 (median) 358.00 (conservative)	348.00 (optimistic) 356.00 (median) 358.00 (conservative)	357.00 (optimistic) 358.00 (median) 358.00 (conservative)
	Grassland With woody biomass	294.00 (optimistic) 340.00 (median) 372.00 (conservative)	358.00 (optimistic) 389.00 (median) 416.00 (conservative)	370.00 (optimistic) 414.00 (median) 422.00 (conservative)	417.00 (optimistic) 422.00 (median) 422.00 (conservative)	422.00 (optimistic) 422.00 (median) 422.00 (conservative)
Waimate District	Grassland High producing	1269.00 (optimistic) 769.00 (median) 940.00 (conservative)	1500.00 (optimistic) 1155.00 (median) 1483.00 (conservative)	1677.00 (optimistic) 1472.00 (median) 1995.00 (conservative)	1856.00 (optimistic) 1913.00 (median) 2489.00 (conservative)	2072.00 (optimistic) 2314.00 (median) 2653.00 (conservative)
	Grassland Low producing	77.00 (optimistic) 47.00 (median) 91.00 (conservative)	89.00 (optimistic) 87.00 (median) 166.00 (conservative)	128.00 (optimistic) 152.00 (median) 200.00 (conservative)	151.00 (optimistic) 211.00 (median) 241.00 (conservative)	198.00 (optimistic) 243.00 (median) 250.00 (conservative)
	Grassland With woody biomass	38.00 (optimistic) 30.00 (median) 41.00 (conservative)	59.00 (optimistic) 33.00 (median) 56.00 (conservative)	66.00 (optimistic) 55.00 (median) 73.00 (conservative)	76.00 (optimistic) 72.00 (median) 102.00 (conservative)	89.00 (optimistic) 89.00 (median) 103.00 (conservative)
Waipa District	Grassland High producing	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
	Grassland Low producing	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)

	Grassland With woody biomass	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
Wairoa District	Grassland High producing	135.00 (optimistic) 176.00 (median) 193.00 (conservative)	135.00 (optimistic) 176.00 (median) 201.00 (conservative)	135.00 (optimistic) 184.00 (median) 201.00 (conservative)	141.00 (optimistic) 184.00 (median) 220.00 (conservative)	149.00 (optimistic) 186.00 (median) 233.00 (conservative)
	Grassland Low producing	229.00 (optimistic) 350.00 (median) 413.00 (conservative)	240.00 (optimistic) 360.00 (median) 438.00 (conservative)	267.00 (optimistic) 380.00 (median) 441.00 (conservative)	305.00 (optimistic) 412.00 (median) 472.00 (conservative)	328.00 (optimistic) 444.00 (median) 484.00 (conservative)
	Grassland With woody biomass	46.00 (optimistic) 60.00 (median) 63.00 (conservative)	46.00 (optimistic) 60.00 (median) 63.00 (conservative)	48.00 (optimistic) 61.00 (median) 63.00 (conservative)	49.00 (optimistic) 62.00 (median) 65.00 (conservative)	49.00 (optimistic) 64.00 (median) 65.00 (conservative)
Waitaki District	Grassland High producing	7.00 (optimistic) 0.00 (median) 34.00 (conservative)	10.00 (optimistic) 38.00 (median) 151.00 (conservative)	11.00 (optimistic) 49.00 (median) 200.00 (conservative)	13.00 (optimistic) 211.00 (median) 250.00 (conservative)	13.00 (optimistic) 236.00 (median) 250.00 (conservative)
	Grassland Low producing	4.00 (optimistic) 1.00 (median) 3.00 (conservative)	4.00 (optimistic) 5.00 (median) 12.00 (conservative)	4.00 (optimistic) 12.00 (median) 26.00 (conservative)	11.00 (optimistic) 24.00 (median) 35.00 (conservative)	11.00 (optimistic) 34.00 (median) 35.00 (conservative)
	Grassland With woody biomass	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
Waitomo District	Grassland High producing	20.00 (optimistic) 25.00 (median) 38.00 (conservative)	20.00 (optimistic) 25.00 (median) 38.00 (conservative)	20.00 (optimistic) 25.00 (median) 38.00 (conservative)	20.00 (optimistic) 25.00 (median) 38.00 (conservative)	20.00 (optimistic) 25.00 (median) 38.00 (conservative)

	Grassland Low producing	13.00 (optimistic) 13.00 (median) 13.00 (conservative)	13.00 (optimistic) 13.00 (median) 13.00 (conservative)	13.00 (optimistic) 13.00 (median) 13.00 (conservative)	13.00 (optimistic) 13.00 (median) 13.00 (conservative)	16.00 (optimistic) 16.00 (median) 16.00 (conservative)
	Grassland With woody biomass	0.00 (optimistic) 6.00 (median) 6.00 (conservative)	0.00 (optimistic) 6.00 (median) 6.00 (conservative)	0.00 (optimistic) 6.00 (median) 6.00 (conservative)	0.00 (optimistic) 6.00 (median) 6.00 (conservative)	0.00 (optimistic) 6.00 (median) 6.00 (conservative)
Wellington City	Grassland High producing	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
	Grassland Low producing	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
	Grassland With woody biomass	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
Western Bay of Plenty District	Grassland High producing	3192.00 (optimistic) 3228.00 (median) 3362.00 (conservative)	3238.00 (optimistic) 3270.00 (median) 3390.00 (conservative)	3316.00 (optimistic) 3296.00 (median) 3410.00 (conservative)	3373.00 (optimistic) 3318.00 (median) 3438.00 (conservative)	3399.00 (optimistic) 3349.00 (median) 3458.00 (conservative)
	Grassland Low producing	96.00 (optimistic) 104.00 (median) 108.00 (conservative)	100.00 (optimistic) 107.00 (median) 108.00 (conservative)	104.00 (optimistic) 110.00 (median) 108.00 (conservative)	105.00 (optimistic) 110.00 (median) 108.00 (conservative)	110.00 (optimistic) 110.00 (median) 108.00 (conservative)
	Grassland With woody biomass	54.00 (optimistic) 66.00 (median) 65.00 (conservative)	60.00 (optimistic) 66.00 (median) 65.00 (conservative)	62.00 (optimistic) 67.00 (median) 65.00 (conservative)	65.00 (optimistic) 67.00 (median) 67.00 (conservative)	65.00 (optimistic) 67.00 (median) 67.00 (conservative)

Westland District	Grassland High producing	449.00 (optimistic) 483.00 (median) 508.00 (conservative)	455.00 (optimistic) 483.00 (median) 509.00 (conservative)	455.00 (optimistic) 483.00 (median) 514.00 (conservative)	462.00 (optimistic) 489.00 (median) 518.00 (conservative)	472.00 (optimistic) 500.00 (median) 530.00 (conservative)
	Grassland Low producing	220.00 (optimistic) 270.00 (median) 302.00 (conservative)	220.00 (optimistic) 270.00 (median) 308.00 (conservative)	220.00 (optimistic) 276.00 (median) 311.00 (conservative)	223.00 (optimistic) 289.00 (median) 311.00 (conservative)	226.00 (optimistic) 292.00 (median) 313.00 (conservative)
	Grassland With woody biomass	175.00 (optimistic) 216.00 (median) 246.00 (conservative)	179.00 (optimistic) 218.00 (median) 247.00 (conservative)	179.00 (optimistic) 218.00 (median) 247.00 (conservative)	179.00 (optimistic) 221.00 (median) 247.00 (conservative)	186.00 (optimistic) 222.00 (median) 249.00 (conservative)
Whakatane District	Grassland High producing	10270.00 (optimistic) 10343.00 (median) 10358.00 (conservative)	10304.00 (optimistic) 10343.00 (median) 10358.00 (conservative)	10319.00 (optimistic) 10346.00 (median) 10358.00 (conservative)	10340.00 (optimistic) 10358.00 (median) 10363.00 (conservative)	10350.00 (optimistic) 10358.00 (median) 10363.00 (conservative)
	Grassland Low producing	324.00 (optimistic) 362.00 (median) 369.00 (conservative)	341.00 (optimistic) 368.00 (median) 369.00 (conservative)	350.00 (optimistic) 369.00 (median) 369.00 (conservative)	357.00 (optimistic) 369.00 (median) 369.00 (conservative)	362.00 (optimistic) 369.00 (median) 369.00 (conservative)
	Grassland With woody biomass	102.00 (optimistic) 102.00 (median) 102.00 (conservative)	102.00 (optimistic) 102.00 (median) 102.00 (conservative)	102.00 (optimistic) 102.00 (median) 102.00 (conservative)	102.00 (optimistic) 102.00 (median) 102.00 (conservative)	102.00 (optimistic) 102.00 (median) 102.00 (conservative)
Whanganui District	Grassland High producing	0.00 (optimistic) 0.00 (median) 1.00 (conservative)	0.00 (optimistic) 1.00 (median) 1.00 (conservative)	0.00 (optimistic) 1.00 (median) 1.00 (conservative)	1.00 (optimistic) 1.00 (median) 1.00 (conservative)	1.00 (optimistic) 1.00 (median) 1.00 (conservative)
	Grassland Low producing	2.00 (optimistic) 7.00 (median) 14.00 (conservative)	7.00 (optimistic) 12.00 (median) 14.00 (conservative)	9.00 (optimistic) 14.00 (median) 14.00 (conservative)	9.00 (optimistic) 14.00 (median) 14.00 (conservative)	11.00 (optimistic) 14.00 (median) 14.00 (conservative)

	Grassland With woody biomass	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
Whangarei District	Grassland High producing	463.00 (optimistic) 940.00 (median) 1254.00 (conservative)	935.00 (optimistic) 1005.00 (median) 1262.00 (conservative)	1018.00 (optimistic) 1043.00 (median) 1271.00 (conservative)	1059.00 (optimistic) 1065.00 (median) 1278.00 (conservative)	1115.00 (optimistic) 1151.00 (median) 1291.00 (conservative)
	Grassland Low producing	89.00 (optimistic) 123.00 (median) 149.00 (conservative)	112.00 (optimistic) 140.00 (median) 155.00 (conservative)	119.00 (optimistic) 148.00 (median) 165.00 (conservative)	138.00 (optimistic) 170.00 (median) 171.00 (conservative)	149.00 (optimistic) 176.00 (median) 171.00 (conservative)
	Grassland With woody biomass	11.00 (optimistic) 21.00 (median) 21.00 (conservative)	25.00 (optimistic) 23.00 (median) 26.00 (conservative)	26.00 (optimistic) 23.00 (median) 26.00 (conservative)	29.00 (optimistic) 23.00 (median) 26.00 (conservative)	29.00 (optimistic) 23.00 (median) 26.00 (conservative)
all	Grassland High producing	101658.00 (optimistic) 126899.00 (median) 145922.00 (conservative)	126564.00 (optimistic) 142528.00 (median) 157822.00 (conservative)	139682.00 (optimistic) 154819.00 (median) 162376.00 (conservative)	151926.00 (optimistic) 161309.00 (median) 165356.00 (conservative)	156775.00 (optimistic) 163525.00 (median) 166344.00 (conservative)
	Grassland Low producing	6583.00 (optimistic) 9097.00 (median) 12992.00 (conservative)	9160.00 (optimistic) 11995.00 (median) 15166.00 (conservative)	10473.00 (optimistic) 13833.00 (median) 15803.00 (conservative)	12499.00 (optimistic) 15593.00 (median) 16255.00 (conservative)	14253.00 (optimistic) 16078.00 (median) 16434.00 (conservative)
	Grassland With woody biomass	2510.00 (optimistic) 3076.00 (median) 3726.00 (conservative)	3261.00 (optimistic) 3729.00 (median) 4340.00 (conservative)	3766.00 (optimistic) 4318.00 (median) 4623.00 (conservative)	4272.00 (optimistic) 4603.00 (median) 4824.00 (conservative)	4451.00 (optimistic) 4732.00 (median) 4911.00 (conservative)

Table C-2: Area exposed to groundwater ≤ 2 m by Territorial Authority in New Zealand (Unit: ha).

Area exposed to groundwater ≤ 2-meter (Unit: ha)						
Territory	Land Use	2-meter GW, SLR=0	SLR=0.5	SLR=1	SLR=1.5	SLR=2
Area Outside Territorial Authority	Grassland High producing	49.00 (optimistic) 59.00 (median) 17.00 (conservative)	56.00 (optimistic) 61.00 (median) 59.00 (conservative)	61.00 (optimistic) 61.00 (median) 60.00 (conservative)	61.00 (optimistic) 61.00 (median) 61.00 (conservative)	62.00 (optimistic) 62.00 (median) 62.00 (conservative)
	Grassland Low producing	91.00 (optimistic) 120.00 (median) 72.00 (conservative)	108.00 (optimistic) 149.00 (median) 144.00 (conservative)	118.00 (optimistic) 151.00 (median) 144.00 (conservative)	142.00 (optimistic) 152.00 (median) 145.00 (conservative)	149.00 (optimistic) 152.00 (median) 150.00 (conservative)
	Grassland With woody biomass	17.00 (optimistic) 14.00 (median) 9.00 (conservative)	17.00 (optimistic) 19.00 (median) 19.00 (conservative)	19.00 (optimistic) 19.00 (median) 19.00 (conservative)	20.00 (optimistic) 19.00 (median) 19.00 (conservative)	20.00 (optimistic) 19.00 (median) 20.00 (conservative)
Ashburton District	Grassland High producing	353.00 (optimistic) 391.00 (median) 257.00 (conservative)	371.00 (optimistic) 422.00 (median) 457.00 (conservative)	415.00 (optimistic) 446.00 (median) 471.00 (conservative)	469.00 (optimistic) 456.00 (median) 471.00 (conservative)	474.00 (optimistic) 471.00 (median) 471.00 (conservative)
	Grassland Low producing	9.00 (optimistic) 22.00 (median) 26.00 (conservative)	9.00 (optimistic) 33.00 (median) 38.00 (conservative)	13.00 (optimistic) 35.00 (median) 38.00 (conservative)	37.00 (optimistic) 38.00 (median) 38.00 (conservative)	38.00 (optimistic) 38.00 (median) 38.00 (conservative)
	Grassland With woody biomass	4.00 (optimistic) 6.00 (median) 5.00 (conservative)	4.00 (optimistic) 6.00 (median) 6.00 (conservative)	4.00 (optimistic) 6.00 (median) 6.00 (conservative)	6.00 (optimistic) 6.00 (median) 6.00 (conservative)	6.00 (optimistic) 6.00 (median) 6.00 (conservative)
Auckland	Grassland High producing	3627.00 (optimistic) 4153.00 (median) 3931.00 (conservative)	4026.00 (optimistic) 4238.00 (median) 4313.00 (conservative)	4214.00 (optimistic) 4333.00 (median) 4375.00 (conservative)	4316.00 (optimistic) 4382.00 (median) 4425.00 (conservative)	4441.00 (optimistic) 4432.00 (median) 4454.00 (conservative)

	Grassland Low producing	324.00 (optimistic) 416.00 (median) 410.00 (conservative)	410.00 (optimistic) 440.00 (median) 459.00 (conservative)	435.00 (optimistic) 455.00 (median) 468.00 (conservative)	451.00 (optimistic) 465.00 (median) 473.00 (conservative)	464.00 (optimistic) 468.00 (median) 480.00 (conservative)
	Grassland With woody biomass	219.00 (optimistic) 248.00 (median) 242.00 (conservative)	252.00 (optimistic) 262.00 (median) 271.00 (conservative)	266.00 (optimistic) 272.00 (median) 291.00 (conservative)	290.00 (optimistic) 280.00 (median) 298.00 (conservative)	297.00 (optimistic) 291.00 (median) 298.00 (conservative)
Buller District	Grassland High producing	1966.00 (optimistic) 1220.00 (median) 1825.00 (conservative)	2120.00 (optimistic) 2291.00 (median) 2294.00 (conservative)	2136.00 (optimistic) 2418.00 (median) 2325.00 (conservative)	2153.00 (optimistic) 2419.00 (median) 2335.00 (conservative)	2168.00 (optimistic) 2424.00 (median) 2387.00 (conservative)
	Grassland Low producing	81.00 (optimistic) 69.00 (median) 75.00 (conservative)	92.00 (optimistic) 97.00 (median) 85.00 (conservative)	94.00 (optimistic) 97.00 (median) 86.00 (conservative)	94.00 (optimistic) 97.00 (median) 96.00 (conservative)	94.00 (optimistic) 97.00 (median) 97.00 (conservative)
	Grassland With woody biomass	189.00 (optimistic) 127.00 (median) 154.00 (conservative)	195.00 (optimistic) 197.00 (median) 187.00 (conservative)	196.00 (optimistic) 217.00 (median) 194.00 (conservative)	198.00 (optimistic) 217.00 (median) 194.00 (conservative)	198.00 (optimistic) 218.00 (median) 194.00 (conservative)
Carterton District	Grassland High producing	3.00 (optimistic) 23.00 (median) 9.00 (conservative)	7.00 (optimistic) 23.00 (median) 23.00 (conservative)	12.00 (optimistic) 23.00 (median) 23.00 (conservative)	19.00 (optimistic) 23.00 (median) 23.00 (conservative)	21.00 (optimistic) 23.00 (median) 23.00 (conservative)
	Grassland Low producing	4.00 (optimistic) 8.00 (median) 2.00 (conservative)	5.00 (optimistic) 8.00 (median) 8.00 (conservative)	5.00 (optimistic) 8.00 (median) 8.00 (conservative)	8.00 (optimistic) 8.00 (median) 8.00 (conservative)	8.00 (optimistic) 8.00 (median) 8.00 (conservative)
	Grassland With woody biomass	6.00 (optimistic) 6.00 (median) 0.00 (conservative)	6.00 (optimistic) 6.00 (median) 6.00 (conservative)	6.00 (optimistic) 6.00 (median) 6.00 (conservative)	6.00 (optimistic) 6.00 (median) 6.00 (conservative)	6.00 (optimistic) 6.00 (median) 6.00 (conservative)
Central Hawke's Bay District	Grassland High producing	15.00 (optimistic) 93.00 (median) 75.00 (conservative)	57.00 (optimistic) 94.00 (median) 94.00 (conservative)	81.00 (optimistic) 94.00 (median) 94.00 (conservative)	92.00 (optimistic) 94.00 (median) 94.00 (conservative)	93.00 (optimistic) 94.00 (median) 94.00 (conservative)

	Grassland Low producing	20.00 (optimistic) 106.00 (median) 73.00 (conservative)	49.00 (optimistic) 112.00 (median) 113.00 (conservative)	85.00 (optimistic) 113.00 (median) 113.00 (conservative)	109.00 (optimistic) 113.00 (median) 113.00 (conservative)	109.00 (optimistic) 113.00 (median) 113.00 (conservative)
	Grassland With woody biomass	5.00 (optimistic) 21.00 (median) 11.00 (conservative)	7.00 (optimistic) 21.00 (median) 21.00 (conservative)	9.00 (optimistic) 21.00 (median) 21.00 (conservative)	21.00 (optimistic) 21.00 (median) 21.00 (conservative)	21.00 (optimistic) 21.00 (median) 21.00 (conservative)
Central Otago District	Grassland High producing	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
	Grassland Low producing	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
	Grassland With woody biomass	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
Chatham Islands Territory	Grassland High producing	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
	Grassland Low producing	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
	Grassland With woody biomass	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
Christchurch City	Grassland High producing	2657.00 (optimistic) 2773.00 (median) 2747.00 (conservative)	2763.00 (optimistic) 2794.00 (median) 2807.00 (conservative)	2777.00 (optimistic) 2802.00 (median) 2810.00 (conservative)	2810.00 (optimistic) 2811.00 (median) 2813.00 (conservative)	2813.00 (optimistic) 2813.00 (median) 2813.00 (conservative)

	Grassland Low producing	2510.00 (optimistic) 3957.00 (median) 4515.00 (conservative)	3434.00 (optimistic) 4783.00 (median) 4910.00 (conservative)	4318.00 (optimistic) 4887.00 (median) 4913.00 (conservative)	4751.00 (optimistic) 4912.00 (median) 4919.00 (conservative)	4850.00 (optimistic) 4914.00 (median) 4919.00 (conservative)
	Grassland With woody biomass	442.00 (optimistic) 493.00 (median) 458.00 (conservative)	493.00 (optimistic) 501.00 (median) 503.00 (conservative)	498.00 (optimistic) 503.00 (median) 503.00 (conservative)	502.00 (optimistic) 503.00 (median) 503.00 (conservative)	502.00 (optimistic) 503.00 (median) 503.00 (conservative)
Clutha District	Grassland High producing	1463.00 (optimistic) 3079.00 (median) 3844.00 (conservative)	3163.00 (optimistic) 4248.00 (median) 4352.00 (conservative)	4046.00 (optimistic) 4361.00 (median) 4391.00 (conservative)	4220.00 (optimistic) 4390.00 (median) 4391.00 (conservative)	4377.00 (optimistic) 4391.00 (median) 4391.00 (conservative)
	Grassland Low producing	62.00 (optimistic) 130.00 (median) 159.00 (conservative)	101.00 (optimistic) 199.00 (median) 201.00 (conservative)	130.00 (optimistic) 199.00 (median) 202.00 (conservative)	143.00 (optimistic) 201.00 (median) 202.00 (conservative)	200.00 (optimistic) 202.00 (median) 202.00 (conservative)
	Grassland With woody biomass	11.00 (optimistic) 28.00 (median) 29.00 (conservative)	22.00 (optimistic) 36.00 (median) 36.00 (conservative)	30.00 (optimistic) 36.00 (median) 36.00 (conservative)	32.00 (optimistic) 36.00 (median) 36.00 (conservative)	35.00 (optimistic) 36.00 (median) 36.00 (conservative)
Dunedin City	Grassland High producing	2370.00 (optimistic) 5359.00 (median) 5109.00 (conservative)	4533.00 (optimistic) 6083.00 (median) 6185.00 (conservative)	4781.00 (optimistic) 6141.00 (median) 6186.00 (conservative)	5112.00 (optimistic) 6169.00 (median) 6186.00 (conservative)	5657.00 (optimistic) 6186.00 (median) 6186.00 (conservative)
	Grassland Low producing	231.00 (optimistic) 382.00 (median) 352.00 (conservative)	355.00 (optimistic) 418.00 (median) 421.00 (conservative)	360.00 (optimistic) 420.00 (median) 422.00 (conservative)	386.00 (optimistic) 420.00 (median) 422.00 (conservative)	394.00 (optimistic) 422.00 (median) 422.00 (conservative)
	Grassland With woody biomass	36.00 (optimistic) 61.00 (median) 49.00 (conservative)	55.00 (optimistic) 77.00 (median) 80.00 (conservative)	57.00 (optimistic) 78.00 (median) 80.00 (conservative)	61.00 (optimistic) 79.00 (median) 80.00 (conservative)	71.00 (optimistic) 79.00 (median) 80.00 (conservative)

Far North District	Grassland High producing	3872.00 (optimistic) 5255.00 (median) 5292.00 (conservative)	4403.00 (optimistic) 5527.00 (median) 5851.00 (conservative)	4897.00 (optimistic) 5856.00 (median) 5906.00 (conservative)	5176.00 (optimistic) 5880.00 (median) 5916.00 (conservative)	5836.00 (optimistic) 5918.00 (median) 5919.00 (conservative)
	Grassland Low producing	291.00 (optimistic) 324.00 (median) 285.00 (conservative)	333.00 (optimistic) 442.00 (median) 466.00 (conservative)	377.00 (optimistic) 466.00 (median) 477.00 (conservative)	429.00 (optimistic) 482.00 (median) 483.00 (conservative)	482.00 (optimistic) 487.00 (median) 486.00 (conservative)
	Grassland With woody biomass	308.00 (optimistic) 299.00 (median) 279.00 (conservative)	344.00 (optimistic) 330.00 (median) 377.00 (conservative)	360.00 (optimistic) 355.00 (median) 388.00 (conservative)	382.00 (optimistic) 385.00 (median) 394.00 (conservative)	397.00 (optimistic) 392.00 (median) 401.00 (conservative)
Gisborne District	Grassland High producing	1027.00 (optimistic) 1414.00 (median) 1359.00 (conservative)	1319.00 (optimistic) 1533.00 (median) 1565.00 (conservative)	1380.00 (optimistic) 1563.00 (median) 1572.00 (conservative)	1420.00 (optimistic) 1572.00 (median) 1572.00 (conservative)	1565.00 (optimistic) 1572.00 (median) 1572.00 (conservative)
	Grassland Low producing	102.00 (optimistic) 187.00 (median) 174.00 (conservative)	157.00 (optimistic) 217.00 (median) 216.00 (conservative)	179.00 (optimistic) 217.00 (median) 217.00 (conservative)	190.00 (optimistic) 217.00 (median) 217.00 (conservative)	217.00 (optimistic) 217.00 (median) 217.00 (conservative)
	Grassland With woody biomass	46.00 (optimistic) 83.00 (median) 81.00 (conservative)	74.00 (optimistic) 89.00 (median) 89.00 (conservative)	78.00 (optimistic) 89.00 (median) 89.00 (conservative)	79.00 (optimistic) 89.00 (median) 89.00 (conservative)	89.00 (optimistic) 89.00 (median) 89.00 (conservative)
Gore District	Grassland High producing	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
	Grassland Low producing	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)

	Grassland With woody biomass	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
Grey District	Grassland High producing	265.00 (optimistic) 295.00 (median) 289.00 (conservative)	288.00 (optimistic) 295.00 (median) 292.00 (conservative)	288.00 (optimistic) 295.00 (median) 292.00 (conservative)	295.00 (optimistic) 295.00 (median) 294.00 (conservative)	295.00 (optimistic) 295.00 (median) 294.00 (conservative)
	Grassland Low producing	16.00 (optimistic) 17.00 (median) 20.00 (conservative)	19.00 (optimistic) 22.00 (median) 19.00 (conservative)	19.00 (optimistic) 22.00 (median) 20.00 (conservative)	19.00 (optimistic) 22.00 (median) 22.00 (conservative)	22.00 (optimistic) 22.00 (median) 22.00 (conservative)
	Grassland With woody biomass	35.00 (optimistic) 36.00 (median) 33.00 (conservative)	35.00 (optimistic) 36.00 (median) 33.00 (conservative)	35.00 (optimistic) 36.00 (median) 35.00 (conservative)	36.00 (optimistic) 36.00 (median) 35.00 (conservative)	36.00 (optimistic) 36.00 (median) 35.00 (conservative)
Hamilton City	Grassland High producing	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
	Grassland Low producing	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
	Grassland With woody biomass	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
Hastings District	Grassland High producing	479.00 (optimistic) 683.00 (median) 803.00 (conservative)	646.00 (optimistic) 887.00 (median) 941.00 (conservative)	740.00 (optimistic) 924.00 (median) 948.00 (conservative)	924.00 (optimistic) 943.00 (median) 951.00 (conservative)	941.00 (optimistic) 946.00 (median) 956.00 (conservative)
	Grassland Low producing	271.00 (optimistic) 424.00 (median) 621.00 (conservative)	347.00 (optimistic) 605.00 (median) 684.00 (conservative)	482.00 (optimistic) 663.00 (median) 692.00 (conservative)	678.00 (optimistic) 695.00 (median) 693.00 (conservative)	688.00 (optimistic) 695.00 (median) 693.00 (conservative)

	Grassland With woody biomass	67.00 (optimistic) 98.00 (median) 97.00 (conservative)	90.00 (optimistic) 116.00 (median) 122.00 (conservative)	97.00 (optimistic) 119.00 (median) 129.00 (conservative)	123.00 (optimistic) 129.00 (median) 129.00 (conservative)	124.00 (optimistic) 129.00 (median) 129.00 (conservative)
Hauraki District	Grassland High producing	34405.00 (optimistic) 35155.00 (median) 35138.00 (conservative)	35050.00 (optimistic) 35377.00 (median) 35394.00 (conservative)	35280.00 (optimistic) 35387.00 (median) 35394.00 (conservative)	35357.00 (optimistic) 35393.00 (median) 35399.00 (conservative)	35380.00 (optimistic) 35407.00 (median) 35408.00 (conservative)
	Grassland Low producing	938.00 (optimistic) 950.00 (median) 935.00 (conservative)	952.00 (optimistic) 958.00 (median) 958.00 (conservative)	954.00 (optimistic) 958.00 (median) 958.00 (conservative)	958.00 (optimistic) 958.00 (median) 958.00 (conservative)	958.00 (optimistic) 958.00 (median) 958.00 (conservative)
	Grassland With woody biomass	98.00 (optimistic) 103.00 (median) 102.00 (conservative)	103.00 (optimistic) 103.00 (median) 103.00 (conservative)	103.00 (optimistic) 103.00 (median) 103.00 (conservative)	103.00 (optimistic) 103.00 (median) 103.00 (conservative)	103.00 (optimistic) 103.00 (median) 103.00 (conservative)
Horowhenua District	Grassland High producing	10092.00 (optimistic) 11256.00 (median) 11765.00 (conservative)	10619.00 (optimistic) 11479.00 (median) 11921.00 (conservative)	10904.00 (optimistic) 11571.00 (median) 11932.00 (conservative)	11145.00 (optimistic) 11610.00 (median) 11935.00 (conservative)	11852.00 (optimistic) 11772.00 (median) 11936.00 (conservative)
	Grassland Low producing	242.00 (optimistic) 281.00 (median) 295.00 (conservative)	258.00 (optimistic) 301.00 (median) 306.00 (conservative)	268.00 (optimistic) 305.00 (median) 306.00 (conservative)	302.00 (optimistic) 305.00 (median) 309.00 (conservative)	303.00 (optimistic) 306.00 (median) 309.00 (conservative)
	Grassland With woody biomass	152.00 (optimistic) 169.00 (median) 163.00 (conservative)	162.00 (optimistic) 169.00 (median) 172.00 (conservative)	164.00 (optimistic) 170.00 (median) 172.00 (conservative)	166.00 (optimistic) 174.00 (median) 174.00 (conservative)	171.00 (optimistic) 174.00 (median) 174.00 (conservative)

Hurunui District	Grassland High producing	103.00 (optimistic) 112.00 (median) 84.00 (conservative)	119.00 (optimistic) 116.00 (median) 121.00 (conservative)	120.00 (optimistic) 119.00 (median) 121.00 (conservative)	120.00 (optimistic) 119.00 (median) 121.00 (conservative)	123.00 (optimistic) 120.00 (median) 122.00 (conservative)
	Grassland Low producing	117.00 (optimistic) 124.00 (median) 78.00 (conservative)	124.00 (optimistic) 124.00 (median) 125.00 (conservative)	124.00 (optimistic) 124.00 (median) 125.00 (conservative)	124.00 (optimistic) 125.00 (median) 125.00 (conservative)	125.00 (optimistic) 125.00 (median) 125.00 (conservative)
	Grassland With woody biomass	17.00 (optimistic) 17.00 (median) 10.00 (conservative)	17.00 (optimistic) 17.00 (median) 17.00 (conservative)	17.00 (optimistic) 17.00 (median) 17.00 (conservative)	17.00 (optimistic) 17.00 (median) 17.00 (conservative)	17.00 (optimistic) 17.00 (median) 17.00 (conservative)
Invercargill City	Grassland High producing	4757.00 (optimistic) 6692.00 (median) 7478.00 (conservative)	6289.00 (optimistic) 7366.00 (median) 7786.00 (conservative)	7159.00 (optimistic) 7560.00 (median) 7862.00 (conservative)	7458.00 (optimistic) 7684.00 (median) 7937.00 (conservative)	7772.00 (optimistic) 7815.00 (median) 7955.00 (conservative)
	Grassland Low producing	238.00 (optimistic) 560.00 (median) 728.00 (conservative)	543.00 (optimistic) 778.00 (median) 780.00 (conservative)	693.00 (optimistic) 779.00 (median) 780.00 (conservative)	754.00 (optimistic) 781.00 (median) 781.00 (conservative)	777.00 (optimistic) 781.00 (median) 781.00 (conservative)
	Grassland With woody biomass	180.00 (optimistic) 294.00 (median) 329.00 (conservative)	302.00 (optimistic) 340.00 (median) 344.00 (conservative)	326.00 (optimistic) 340.00 (median) 345.00 (conservative)	333.00 (optimistic) 345.00 (median) 345.00 (conservative)	341.00 (optimistic) 345.00 (median) 345.00 (conservative)
Kaikoura District	Grassland High producing	52.00 (optimistic) 71.00 (median) 49.00 (conservative)	69.00 (optimistic) 86.00 (median) 109.00 (conservative)	74.00 (optimistic) 93.00 (median) 117.00 (conservative)	87.00 (optimistic) 98.00 (median) 117.00 (conservative)	88.00 (optimistic) 109.00 (median) 117.00 (conservative)
	Grassland Low producing	13.00 (optimistic) 64.00 (median) 31.00 (conservative)	24.00 (optimistic) 68.00 (median) 76.00 (conservative)	47.00 (optimistic) 69.00 (median) 77.00 (conservative)	62.00 (optimistic) 70.00 (median) 77.00 (conservative)	63.00 (optimistic) 76.00 (median) 79.00 (conservative)

	Grassland With woody biomass	0.00 (optimistic) 7.00 (median) 2.00 (conservative)	0.00 (optimistic) 8.00 (median) 11.00 (conservative)	7.00 (optimistic) 8.00 (median) 11.00 (conservative)	8.00 (optimistic) 8.00 (median) 11.00 (conservative)	8.00 (optimistic) 8.00 (median) 11.00 (conservative)
Kaipara District	Grassland High producing	5801.00 (optimistic) 5855.00 (median) 5707.00 (conservative)	5844.00 (optimistic) 5873.00 (median) 5916.00 (conservative)	5882.00 (optimistic) 5906.00 (median) 5924.00 (conservative)	5907.00 (optimistic) 5912.00 (median) 5934.00 (conservative)	5923.00 (optimistic) 5925.00 (median) 5935.00 (conservative)
	Grassland Low producing	70.00 (optimistic) 103.00 (median) 96.00 (conservative)	74.00 (optimistic) 124.00 (median) 166.00 (conservative)	99.00 (optimistic) 140.00 (median) 172.00 (conservative)	125.00 (optimistic) 172.00 (median) 172.00 (conservative)	166.00 (optimistic) 172.00 (median) 172.00 (conservative)
	Grassland With woody biomass	24.00 (optimistic) 34.00 (median) 38.00 (conservative)	29.00 (optimistic) 35.00 (median) 43.00 (conservative)	33.00 (optimistic) 38.00 (median) 48.00 (conservative)	42.00 (optimistic) 45.00 (median) 49.00 (conservative)	49.00 (optimistic) 45.00 (median) 49.00 (conservative)
Kapiti Coast District	Grassland High producing	303.00 (optimistic) 349.00 (median) 451.00 (conservative)	363.00 (optimistic) 402.00 (median) 496.00 (conservative)	386.00 (optimistic) 449.00 (median) 531.00 (conservative)	432.00 (optimistic) 498.00 (median) 553.00 (conservative)	477.00 (optimistic) 557.00 (median) 561.00 (conservative)
	Grassland Low producing	95.00 (optimistic) 85.00 (median) 87.00 (conservative)	103.00 (optimistic) 99.00 (median) 113.00 (conservative)	108.00 (optimistic) 112.00 (median) 120.00 (conservative)	125.00 (optimistic) 123.00 (median) 125.00 (conservative)	128.00 (optimistic) 129.00 (median) 130.00 (conservative)
	Grassland With woody biomass	40.00 (optimistic) 35.00 (median) 33.00 (conservative)	44.00 (optimistic) 40.00 (median) 51.00 (conservative)	45.00 (optimistic) 55.00 (median) 64.00 (conservative)	56.00 (optimistic) 62.00 (median) 73.00 (conservative)	71.00 (optimistic) 73.00 (median) 73.00 (conservative)
Kawerau District	Grassland High producing	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
	Grassland Low producing	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)

	Grassland With woody biomass	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
Lower Hutt City	Grassland High producing	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
	Grassland Low producing	2.00 (optimistic) 5.00 (median) 2.00 (conservative)	5.00 (optimistic) 5.00 (median) 5.00 (conservative)	5.00 (optimistic) 5.00 (median) 5.00 (conservative)	5.00 (optimistic) 5.00 (median) 5.00 (conservative)	5.00 (optimistic) 5.00 (median) 5.00 (conservative)
	Grassland With woody biomass	1.00 (optimistic) 2.00 (median) 4.00 (conservative)	2.00 (optimistic) 8.00 (median) 8.00 (conservative)	8.00 (optimistic) 8.00 (median) 8.00 (conservative)	8.00 (optimistic) 8.00 (median) 8.00 (conservative)	8.00 (optimistic) 8.00 (median) 8.00 (conservative)
Mackenzie District	Grassland High producing	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
	Grassland Low producing	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
	Grassland With woody biomass	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
Manawatu District	Grassland High producing	2966.00 (optimistic) 3087.00 (median) 3129.00 (conservative)	3038.00 (optimistic) 3133.00 (median) 3143.00 (conservative)	3070.00 (optimistic) 3134.00 (median) 3143.00 (conservative)	3086.00 (optimistic) 3143.00 (median) 3143.00 (conservative)	3128.00 (optimistic) 3143.00 (median) 3143.00 (conservative)
	Grassland Low producing	500.00 (optimistic) 519.00 (median) 525.00 (conservative)	513.00 (optimistic) 527.00 (median) 528.00 (conservative)	521.00 (optimistic) 528.00 (median) 528.00 (conservative)	524.00 (optimistic) 528.00 (median) 528.00 (conservative)	526.00 (optimistic) 528.00 (median) 528.00 (conservative)

	Grassland With woody biomass	90.00 (optimistic) 91.00 (median) 94.00 (conservative)	90.00 (optimistic) 92.00 (median) 94.00 (conservative)	90.00 (optimistic) 93.00 (median) 94.00 (conservative)	90.00 (optimistic) 94.00 (median) 94.00 (conservative)	94.00 (optimistic) 94.00 (median) 94.00 (conservative)
Marlborough District	Grassland High producing	1708.00 (optimistic) 2046.00 (median) 2028.00 (conservative)	2046.00 (optimistic) 2164.00 (median) 2185.00 (conservative)	2187.00 (optimistic) 2195.00 (median) 2197.00 (conservative)	2198.00 (optimistic) 2198.00 (median) 2198.00 (conservative)	2198.00 (optimistic) 2198.00 (median) 2198.00 (conservative)
	Grassland Low producing	687.00 (optimistic) 812.00 (median) 741.00 (conservative)	800.00 (optimistic) 836.00 (median) 858.00 (conservative)	859.00 (optimistic) 868.00 (median) 869.00 (conservative)	864.00 (optimistic) 869.00 (median) 869.00 (conservative)	865.00 (optimistic) 869.00 (median) 869.00 (conservative)
	Grassland With woody biomass	208.00 (optimistic) 223.00 (median) 223.00 (conservative)	222.00 (optimistic) 233.00 (median) 235.00 (conservative)	234.00 (optimistic) 235.00 (median) 235.00 (conservative)	235.00 (optimistic) 235.00 (median) 235.00 (conservative)	235.00 (optimistic) 235.00 (median) 235.00 (conservative)
Masterton District	Grassland High producing	51.00 (optimistic) 79.00 (median) 65.00 (conservative)	72.00 (optimistic) 79.00 (median) 79.00 (conservative)	75.00 (optimistic) 79.00 (median) 79.00 (conservative)	79.00 (optimistic) 79.00 (median) 79.00 (conservative)	79.00 (optimistic) 79.00 (median) 79.00 (conservative)
	Grassland Low producing	5.00 (optimistic) 15.00 (median) 2.00 (conservative)	8.00 (optimistic) 15.00 (median) 13.00 (conservative)	9.00 (optimistic) 15.00 (median) 13.00 (conservative)	14.00 (optimistic) 15.00 (median) 13.00 (conservative)	14.00 (optimistic) 15.00 (median) 13.00 (conservative)
	Grassland With woody biomass	0.00 (optimistic) 1.00 (median) 0.00 (conservative)	0.00 (optimistic) 1.00 (median) 1.00 (conservative)	1.00 (optimistic) 1.00 (median) 1.00 (conservative)	1.00 (optimistic) 1.00 (median) 1.00 (conservative)	1.00 (optimistic) 1.00 (median) 1.00 (conservative)
Matamata-Piako District	Grassland High producing	4654.00 (optimistic) 4843.00 (median) 4842.00 (conservative)	4778.00 (optimistic) 4845.00 (median) 4845.00 (conservative)	4842.00 (optimistic) 4845.00 (median) 4845.00 (conservative)	4842.00 (optimistic) 4845.00 (median) 4845.00 (conservative)	4845.00 (optimistic) 4845.00 (median) 4845.00 (conservative)
	Grassland Low producing	53.00 (optimistic) 55.00 (median) 55.00 (conservative)	55.00 (optimistic) 55.00 (median) 55.00 (conservative)	55.00 (optimistic) 55.00 (median) 55.00 (conservative)	55.00 (optimistic) 55.00 (median) 55.00 (conservative)	55.00 (optimistic) 55.00 (median) 55.00 (conservative)

	Grassland With woody biomass	16.00 (optimistic) 16.00 (median) 16.00 (conservative)	16.00 (optimistic) 16.00 (median) 16.00 (conservative)	16.00 (optimistic) 16.00 (median) 16.00 (conservative)	16.00 (optimistic) 16.00 (median) 16.00 (conservative)	16.00 (optimistic) 16.00 (median) 16.00 (conservative)
Napier City	Grassland High producing	1397.00 (optimistic) 1419.00 (median) 1398.00 (conservative)	1423.00 (optimistic) 1423.00 (median) 1423.00 (conservative)	1423.00 (optimistic) 1423.00 (median) 1423.00 (conservative)	1423.00 (optimistic) 1423.00 (median) 1423.00 (conservative)	1423.00 (optimistic) 1423.00 (median) 1423.00 (conservative)
	Grassland Low producing	149.00 (optimistic) 154.00 (median) 131.00 (conservative)	156.00 (optimistic) 160.00 (median) 162.00 (conservative)	160.00 (optimistic) 160.00 (median) 162.00 (conservative)	160.00 (optimistic) 162.00 (median) 162.00 (conservative)	160.00 (optimistic) 162.00 (median) 162.00 (conservative)
	Grassland With woody biomass	28.00 (optimistic) 28.00 (median) 27.00 (conservative)	28.00 (optimistic) 28.00 (median) 28.00 (conservative)	28.00 (optimistic) 28.00 (median) 28.00 (conservative)	28.00 (optimistic) 28.00 (median) 28.00 (conservative)	28.00 (optimistic) 28.00 (median) 28.00 (conservative)
Nelson City	Grassland High producing	69.00 (optimistic) 69.00 (median) 69.00 (conservative)	69.00 (optimistic) 69.00 (median) 69.00 (conservative)	69.00 (optimistic) 69.00 (median) 69.00 (conservative)	69.00 (optimistic) 69.00 (median) 69.00 (conservative)	69.00 (optimistic) 69.00 (median) 69.00 (conservative)
	Grassland Low producing	11.00 (optimistic) 11.00 (median) 9.00 (conservative)	11.00 (optimistic) 11.00 (median) 11.00 (conservative)	11.00 (optimistic) 11.00 (median) 11.00 (conservative)	11.00 (optimistic) 11.00 (median) 11.00 (conservative)	11.00 (optimistic) 11.00 (median) 11.00 (conservative)
	Grassland With woody biomass	0.00 (optimistic) 0.00 (median) 1.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
New Plymouth District	Grassland High producing	55.00 (optimistic) 60.00 (median) 76.00 (conservative)	59.00 (optimistic) 78.00 (median) 91.00 (conservative)	59.00 (optimistic) 90.00 (median) 91.00 (conservative)	65.00 (optimistic) 91.00 (median) 91.00 (conservative)	91.00 (optimistic) 91.00 (median) 91.00 (conservative)
	Grassland Low producing	16.00 (optimistic) 10.00 (median) 11.00 (conservative)	16.00 (optimistic) 17.00 (median) 17.00 (conservative)	16.00 (optimistic) 17.00 (median) 17.00 (conservative)	16.00 (optimistic) 17.00 (median) 17.00 (conservative)	17.00 (optimistic) 17.00 (median) 17.00 (conservative)

	Grassland With woody biomass	6.00 (optimistic) 19.00 (median) 21.00 (conservative)	12.00 (optimistic) 21.00 (median) 21.00 (conservative)	12.00 (optimistic) 21.00 (median) 21.00 (conservative)	12.00 (optimistic) 21.00 (median) 21.00 (conservative)	21.00 (optimistic) 21.00 (median) 21.00 (conservative)
Opotiki District	Grassland High producing	340.00 (optimistic) 350.00 (median) 344.00 (conservative)	350.00 (optimistic) 352.00 (median) 352.00 (conservative)	351.00 (optimistic) 352.00 (median) 352.00 (conservative)	352.00 (optimistic) 352.00 (median) 352.00 (conservative)	352.00 (optimistic) 352.00 (median) 352.00 (conservative)
	Grassland Low producing	65.00 (optimistic) 85.00 (median) 79.00 (conservative)	72.00 (optimistic) 87.00 (median) 87.00 (conservative)	79.00 (optimistic) 87.00 (median) 87.00 (conservative)	87.00 (optimistic) 87.00 (median) 87.00 (conservative)	87.00 (optimistic) 87.00 (median) 87.00 (conservative)
	Grassland With woody biomass	40.00 (optimistic) 47.00 (median) 46.00 (conservative)	47.00 (optimistic) 48.00 (median) 48.00 (conservative)	47.00 (optimistic) 48.00 (median) 48.00 (conservative)	48.00 (optimistic) 48.00 (median) 48.00 (conservative)	48.00 (optimistic) 48.00 (median) 48.00 (conservative)
Otorohanga District	Grassland High producing	87.00 (optimistic) 95.00 (median) 77.00 (conservative)	98.00 (optimistic) 102.00 (median) 108.00 (conservative)	106.00 (optimistic) 103.00 (median) 108.00 (conservative)	108.00 (optimistic) 106.00 (median) 108.00 (conservative)	108.00 (optimistic) 107.00 (median) 108.00 (conservative)
	Grassland Low producing	15.00 (optimistic) 27.00 (median) 26.00 (conservative)	15.00 (optimistic) 29.00 (median) 32.00 (conservative)	29.00 (optimistic) 32.00 (median) 32.00 (conservative)	32.00 (optimistic) 32.00 (median) 32.00 (conservative)	32.00 (optimistic) 32.00 (median) 32.00 (conservative)
	Grassland With woody biomass	11.00 (optimistic) 5.00 (median) 8.00 (conservative)	11.00 (optimistic) 9.00 (median) 14.00 (conservative)	11.00 (optimistic) 9.00 (median) 14.00 (conservative)	12.00 (optimistic) 14.00 (median) 14.00 (conservative)	12.00 (optimistic) 14.00 (median) 14.00 (conservative)
Palmerston North City	Grassland High producing	17.00 (optimistic) 22.00 (median) 22.00 (conservative)	18.00 (optimistic) 22.00 (median) 22.00 (conservative)	18.00 (optimistic) 22.00 (median) 22.00 (conservative)	18.00 (optimistic) 22.00 (median) 22.00 (conservative)	22.00 (optimistic) 22.00 (median) 22.00 (conservative)
	Grassland Low producing	2.00 (optimistic) 3.00 (median) 3.00 (conservative)	2.00 (optimistic) 3.00 (median) 3.00 (conservative)	2.00 (optimistic) 3.00 (median) 3.00 (conservative)	2.00 (optimistic) 3.00 (median) 3.00 (conservative)	3.00 (optimistic) 3.00 (median) 3.00 (conservative)

	Grassland With woody biomass	1.00 (optimistic) 7.00 (median) 7.00 (conservative)	6.00 (optimistic) 7.00 (median) 7.00 (conservative)	6.00 (optimistic) 7.00 (median) 7.00 (conservative)	6.00 (optimistic) 7.00 (median) 7.00 (conservative)	7.00 (optimistic) 7.00 (median) 7.00 (conservative)
Porirua City	Grassland High producing	6.00 (optimistic) 6.00 (median) 2.00 (conservative)	6.00 (optimistic) 6.00 (median) 6.00 (conservative)	6.00 (optimistic) 6.00 (median) 6.00 (conservative)	6.00 (optimistic) 6.00 (median) 6.00 (conservative)	6.00 (optimistic) 6.00 (median) 6.00 (conservative)
	Grassland Low producing	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
	Grassland With woody biomass	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
Queenstown-Lakes District	Grassland High producing	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
	Grassland Low producing	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
	Grassland With woody biomass	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
Rangitikei District	Grassland High producing	1022.00 (optimistic) 1035.00 (median) 1043.00 (conservative)	1035.00 (optimistic) 1045.00 (median) 1045.00 (conservative)	1041.00 (optimistic) 1045.00 (median) 1045.00 (conservative)	1043.00 (optimistic) 1045.00 (median) 1045.00 (conservative)	1045.00 (optimistic) 1045.00 (median) 1045.00 (conservative)
	Grassland Low producing	75.00 (optimistic) 95.00 (median) 78.00 (conservative)	78.00 (optimistic) 97.00 (median) 99.00 (conservative)	99.00 (optimistic) 99.00 (median) 99.00 (conservative)	99.00 (optimistic) 99.00 (median) 99.00 (conservative)	99.00 (optimistic) 99.00 (median) 99.00 (conservative)

	Grassland With woody biomass	24.00 (optimistic) 24.00 (median) 22.00 (conservative)	24.00 (optimistic) 24.00 (median) 24.00 (conservative)	24.00 (optimistic) 24.00 (median) 24.00 (conservative)	24.00 (optimistic) 24.00 (median) 24.00 (conservative)	24.00 (optimistic) 24.00 (median) 24.00 (conservative)
Rotorua District	Grassland High producing	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
	Grassland Low producing	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
	Grassland With woody biomass	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
Ruapehu District	Grassland High producing	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
	Grassland Low producing	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
	Grassland With woody biomass	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
Selwyn District	Grassland High producing	12410.00 (optimistic) 12819.00 (median) 12722.00 (conservative)	12747.00 (optimistic) 12888.00 (median) 12923.00 (conservative)	12815.00 (optimistic) 12924.00 (median) 12928.00 (conservative)	12915.00 (optimistic) 12929.00 (median) 12929.00 (conservative)	12928.00 (optimistic) 12929.00 (median) 12929.00 (conservative)
	Grassland Low producing	486.00 (optimistic) 605.00 (median) 531.00 (conservative)	512.00 (optimistic) 630.00 (median) 636.00 (conservative)	550.00 (optimistic) 650.00 (median) 652.00 (conservative)	642.00 (optimistic) 652.00 (median) 652.00 (conservative)	650.00 (optimistic) 652.00 (median) 652.00 (conservative)

	Grassland With woody biomass	161.00 (optimistic) 202.00 (median) 179.00 (conservative)	190.00 (optimistic) 220.00 (median) 228.00 (conservative)	202.00 (optimistic) 230.00 (median) 230.00 (conservative)	232.00 (optimistic) 231.00 (median) 232.00 (conservative)	232.00 (optimistic) 231.00 (median) 232.00 (conservative)
South Taranaki District	Grassland High producing	91.00 (optimistic) 213.00 (median) 199.00 (conservative)	91.00 (optimistic) 215.00 (median) 220.00 (conservative)	141.00 (optimistic) 215.00 (median) 220.00 (conservative)	177.00 (optimistic) 217.00 (median) 220.00 (conservative)	197.00 (optimistic) 217.00 (median) 220.00 (conservative)
	Grassland Low producing	10.00 (optimistic) 67.00 (median) 60.00 (conservative)	10.00 (optimistic) 67.00 (median) 70.00 (conservative)	60.00 (optimistic) 70.00 (median) 72.00 (conservative)	62.00 (optimistic) 72.00 (median) 72.00 (conservative)	62.00 (optimistic) 72.00 (median) 72.00 (conservative)
	Grassland With woody biomass	1.00 (optimistic) 5.00 (median) 3.00 (conservative)	1.00 (optimistic) 5.00 (median) 5.00 (conservative)	1.00 (optimistic) 6.00 (median) 5.00 (conservative)	1.00 (optimistic) 6.00 (median) 5.00 (conservative)	5.00 (optimistic) 6.00 (median) 6.00 (conservative)
South Waikato District	Grassland High producing	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
	Grassland Low producing	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
	Grassland With woody biomass	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
South Wairarapa District	Grassland High producing	9257.00 (optimistic) 9208.00 (median) 9356.00 (conservative)	9484.00 (optimistic) 9789.00 (median) 9809.00 (conservative)	9649.00 (optimistic) 9849.00 (median) 9834.00 (conservative)	9801.00 (optimistic) 9889.00 (median) 9856.00 (conservative)	9889.00 (optimistic) 9892.00 (median) 9877.00 (conservative)
	Grassland Low producing	462.00 (optimistic) 475.00 (median) 463.00 (conservative)	478.00 (optimistic) 485.00 (median) 499.00 (conservative)	488.00 (optimistic) 489.00 (median) 502.00 (conservative)	499.00 (optimistic) 490.00 (median) 502.00 (conservative)	502.00 (optimistic) 491.00 (median) 503.00 (conservative)

	Grassland With woody biomass	260.00 (optimistic) 246.00 (median) 255.00 (conservative)	268.00 (optimistic) 269.00 (median) 273.00 (conservative)	268.00 (optimistic) 272.00 (median) 273.00 (conservative)	270.00 (optimistic) 272.00 (median) 273.00 (conservative)	270.00 (optimistic) 272.00 (median) 273.00 (conservative)
Southland District	Grassland High producing	4743.00 (optimistic) 7778.00 (median) 9771.00 (conservative)	8707.00 (optimistic) 10478.00 (median) 10505.00 (conservative)	10111.00 (optimistic) 10594.00 (median) 10622.00 (conservative)	10298.00 (optimistic) 10718.00 (median) 10779.00 (conservative)	10630.00 (optimistic) 10811.00 (median) 10792.00 (conservative)
	Grassland Low producing	400.00 (optimistic) 319.00 (median) 514.00 (conservative)	505.00 (optimistic) 581.00 (median) 655.00 (conservative)	624.00 (optimistic) 600.00 (median) 655.00 (conservative)	631.00 (optimistic) 649.00 (median) 657.00 (conservative)	652.00 (optimistic) 658.00 (median) 657.00 (conservative)
	Grassland With woody biomass	93.00 (optimistic) 129.00 (median) 163.00 (conservative)	133.00 (optimistic) 184.00 (median) 180.00 (conservative)	168.00 (optimistic) 184.00 (median) 181.00 (conservative)	172.00 (optimistic) 184.00 (median) 183.00 (conservative)	182.00 (optimistic) 184.00 (median) 183.00 (conservative)
Stratford District	Grassland High producing	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
	Grassland Low producing	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
	Grassland With woody biomass	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
Tararua District	Grassland High producing	0.00 (optimistic) 2.00 (median) 0.00 (conservative)	0.00 (optimistic) 2.00 (median) 2.00 (conservative)	0.00 (optimistic) 2.00 (median) 2.00 (conservative)	2.00 (optimistic) 2.00 (median) 2.00 (conservative)	2.00 (optimistic) 2.00 (median) 2.00 (conservative)

	Grassland Low producing	2.00 (optimistic) 0.00 (median) 0.00 (conservative)	2.00 (optimistic) 0.00 (median) 1.00 (conservative)	2.00 (optimistic) 0.00 (median) 1.00 (conservative)	2.00 (optimistic) 0.00 (median) 1.00 (conservative)	3.00 (optimistic) 1.00 (median) 1.00 (conservative)
	Grassland With woody biomass	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
Tasman District	Grassland High producing	756.00 (optimistic) 759.00 (median) 772.00 (conservative)	871.00 (optimistic) 853.00 (median) 926.00 (conservative)	922.00 (optimistic) 963.00 (median) 1008.00 (conservative)	1007.00 (optimistic) 1010.00 (median) 1043.00 (conservative)	1051.00 (optimistic) 1045.00 (median) 1056.00 (conservative)
	Grassland Low producing	76.00 (optimistic) 75.00 (median) 70.00 (conservative)	79.00 (optimistic) 87.00 (median) 107.00 (conservative)	81.00 (optimistic) 109.00 (median) 113.00 (conservative)	99.00 (optimistic) 110.00 (median) 115.00 (conservative)	113.00 (optimistic) 115.00 (median) 115.00 (conservative)
	Grassland With woody biomass	81.00 (optimistic) 80.00 (median) 70.00 (conservative)	95.00 (optimistic) 91.00 (median) 95.00 (conservative)	96.00 (optimistic) 95.00 (median) 98.00 (conservative)	102.00 (optimistic) 98.00 (median) 103.00 (conservative)	107.00 (optimistic) 106.00 (median) 106.00 (conservative)
Taupo District	Grassland High producing	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
	Grassland Low producing	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
	Grassland With woody biomass	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
Tauranga City	Grassland High producing	587.00 (optimistic) 632.00 (median) 641.00 (conservative)	640.00 (optimistic) 658.00 (median) 680.00 (conservative)	665.00 (optimistic) 671.00 (median) 682.00 (conservative)	672.00 (optimistic) 671.00 (median) 689.00 (conservative)	687.00 (optimistic) 677.00 (median) 691.00 (conservative)

	Grassland Low producing	27.00 (optimistic) 31.00 (median) 27.00 (conservative)	30.00 (optimistic) 34.00 (median) 32.00 (conservative)	31.00 (optimistic) 34.00 (median) 32.00 (conservative)	31.00 (optimistic) 34.00 (median) 34.00 (conservative)	33.00 (optimistic) 34.00 (median) 34.00 (conservative)
	Grassland With woody biomass	8.00 (optimistic) 9.00 (median) 1.00 (conservative)	8.00 (optimistic) 9.00 (median) 10.00 (conservative)	8.00 (optimistic) 9.00 (median) 10.00 (conservative)	8.00 (optimistic) 9.00 (median) 10.00 (conservative)	8.00 (optimistic) 10.00 (median) 10.00 (conservative)
Thames-Coromandel District	Grassland High producing	1199.00 (optimistic) 1251.00 (median) 1221.00 (conservative)	1284.00 (optimistic) 1264.00 (median) 1292.00 (conservative)	1296.00 (optimistic) 1271.00 (median) 1296.00 (conservative)	1297.00 (optimistic) 1291.00 (median) 1299.00 (conservative)	1303.00 (optimistic) 1292.00 (median) 1300.00 (conservative)
	Grassland Low producing	86.00 (optimistic) 86.00 (median) 72.00 (conservative)	91.00 (optimistic) 89.00 (median) 88.00 (conservative)	93.00 (optimistic) 89.00 (median) 93.00 (conservative)	95.00 (optimistic) 94.00 (median) 94.00 (conservative)	97.00 (optimistic) 94.00 (median) 97.00 (conservative)
	Grassland With woody biomass	23.00 (optimistic) 16.00 (median) 23.00 (conservative)	23.00 (optimistic) 18.00 (median) 23.00 (conservative)	23.00 (optimistic) 18.00 (median) 23.00 (conservative)	23.00 (optimistic) 21.00 (median) 23.00 (conservative)	23.00 (optimistic) 21.00 (median) 23.00 (conservative)
Timaru District	Grassland High producing	2579.00 (optimistic) 2934.00 (median) 2835.00 (conservative)	2978.00 (optimistic) 3103.00 (median) 3163.00 (conservative)	3137.00 (optimistic) 3183.00 (median) 3223.00 (conservative)	3213.00 (optimistic) 3217.00 (median) 3224.00 (conservative)	3224.00 (optimistic) 3221.00 (median) 3224.00 (conservative)
	Grassland Low producing	68.00 (optimistic) 107.00 (median) 119.00 (conservative)	101.00 (optimistic) 130.00 (median) 182.00 (conservative)	143.00 (optimistic) 173.00 (median) 187.00 (conservative)	186.00 (optimistic) 187.00 (median) 188.00 (conservative)	188.00 (optimistic) 188.00 (median) 188.00 (conservative)
	Grassland With woody biomass	16.00 (optimistic) 18.00 (median) 23.00 (conservative)	28.00 (optimistic) 22.00 (median) 38.00 (conservative)	28.00 (optimistic) 33.00 (median) 40.00 (conservative)	32.00 (optimistic) 35.00 (median) 40.00 (conservative)	40.00 (optimistic) 38.00 (median) 40.00 (conservative)
Upper Hutt City	Grassland High producing	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)

	Grassland Low producing	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
	Grassland With woody biomass	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
Waikato District	Grassland High producing	1847.00 (optimistic) 1913.00 (median) 1923.00 (conservative)	1904.00 (optimistic) 1947.00 (median) 1971.00 (conservative)	1938.00 (optimistic) 1954.00 (median) 1979.00 (conservative)	1978.00 (optimistic) 1963.00 (median) 1979.00 (conservative)	1979.00 (optimistic) 1971.00 (median) 1980.00 (conservative)	
	Grassland Low producing	367.00 (optimistic) 465.00 (median) 460.00 (conservative)	396.00 (optimistic) 468.00 (median) 471.00 (conservative)	453.00 (optimistic) 472.00 (median) 472.00 (conservative)	469.00 (optimistic) 472.00 (median) 472.00 (conservative)	470.00 (optimistic) 472.00 (median) 472.00 (conservative)	
	Grassland With woody biomass	64.00 (optimistic) 71.00 (median) 74.00 (conservative)	68.00 (optimistic) 72.00 (median) 76.00 (conservative)	76.00 (optimistic) 75.00 (median) 76.00 (conservative)	76.00 (optimistic) 75.00 (median) 76.00 (conservative)	76.00 (optimistic) 75.00 (median) 76.00 (conservative)	76.00 (optimistic) 75.00 (median) 76.00 (conservative)
Waimakariri District	Grassland High producing	5244.00 (optimistic) 5537.00 (median) 5569.00 (conservative)	5571.00 (optimistic) 5648.00 (median) 5693.00 (conservative)	5637.00 (optimistic) 5702.00 (median) 5702.00 (conservative)	5680.00 (optimistic) 5702.00 (median) 5702.00 (conservative)	5702.00 (optimistic) 5702.00 (median) 5702.00 (conservative)	
	Grassland Low producing	338.00 (optimistic) 347.00 (median) 332.00 (conservative)	348.00 (optimistic) 356.00 (median) 358.00 (conservative)	357.00 (optimistic) 358.00 (median) 358.00 (conservative)	357.00 (optimistic) 358.00 (median) 358.00 (conservative)	358.00 (optimistic) 358.00 (median) 358.00 (conservative)	
	Grassland With woody biomass	370.00 (optimistic) 414.00 (median) 421.00 (conservative)	417.00 (optimistic) 422.00 (median) 422.00 (conservative)	422.00 (optimistic) 422.00 (median) 422.00 (conservative)	422.00 (optimistic) 422.00 (median) 422.00 (conservative)	422.00 (optimistic) 422.00 (median) 422.00 (conservative)	422.00 (optimistic) 422.00 (median) 422.00 (conservative)

Waimate District	Grassland High producing	1677.00 (optimistic) 1472.00 (median) 1597.00 (conservative)	1856.00 (optimistic) 1913.00 (median) 2489.00 (conservative)	2072.00 (optimistic) 2314.00 (median) 2653.00 (conservative)	2387.00 (optimistic) 2605.00 (median) 2670.00 (conservative)	2511.00 (optimistic) 2668.00 (median) 2675.00 (conservative)
	Grassland Low producing	128.00 (optimistic) 152.00 (median) 169.00 (conservative)	151.00 (optimistic) 211.00 (median) 241.00 (conservative)	198.00 (optimistic) 243.00 (median) 250.00 (conservative)	242.00 (optimistic) 248.00 (median) 251.00 (conservative)	251.00 (optimistic) 254.00 (median) 251.00 (conservative)
	Grassland With woody biomass	66.00 (optimistic) 55.00 (median) 59.00 (conservative)	76.00 (optimistic) 72.00 (median) 102.00 (conservative)	89.00 (optimistic) 89.00 (median) 103.00 (conservative)	98.00 (optimistic) 103.00 (median) 103.00 (conservative)	101.00 (optimistic) 103.00 (median) 103.00 (conservative)
Waipa District	Grassland High producing	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
	Grassland Low producing	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
	Grassland With woody biomass	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
Wairoa District	Grassland High producing	194.00 (optimistic) 248.00 (median) 286.00 (conservative)	205.00 (optimistic) 291.00 (median) 398.00 (conservative)	206.00 (optimistic) 325.00 (median) 449.00 (conservative)	275.00 (optimistic) 440.00 (median) 455.00 (conservative)	450.00 (optimistic) 452.00 (median) 455.00 (conservative)
	Grassland Low producing	178.00 (optimistic) 102.00 (median) 364.00 (conservative)	181.00 (optimistic) 352.00 (median) 590.00 (conservative)	198.00 (optimistic) 482.00 (median) 698.00 (conservative)	377.00 (optimistic) 692.00 (median) 797.00 (conservative)	779.00 (optimistic) 806.00 (median) 804.00 (conservative)

	Grassland With woody biomass	22.00 (optimistic) 34.00 (median) 63.00 (conservative)	32.00 (optimistic) 57.00 (median) 72.00 (conservative)	36.00 (optimistic) 72.00 (median) 77.00 (conservative)	61.00 (optimistic) 79.00 (median) 79.00 (conservative)	78.00 (optimistic) 79.00 (median) 79.00 (conservative)
Waitaki District	Grassland High producing	14.00 (optimistic) 63.00 (median) 147.00 (conservative)	16.00 (optimistic) 229.00 (median) 268.00 (conservative)	19.00 (optimistic) 254.00 (median) 268.00 (conservative)	208.00 (optimistic) 268.00 (median) 268.00 (conservative)	268.00 (optimistic) 268.00 (median) 268.00 (conservative)
	Grassland Low producing	8.00 (optimistic) 16.00 (median) 14.00 (conservative)	15.00 (optimistic) 29.00 (median) 38.00 (conservative)	15.00 (optimistic) 39.00 (median) 38.00 (conservative)	30.00 (optimistic) 39.00 (median) 38.00 (conservative)	39.00 (optimistic) 39.00 (median) 38.00 (conservative)
	Grassland With woody biomass	1.00 (optimistic) 1.00 (median) 1.00 (conservative)	1.00 (optimistic) 1.00 (median) 1.00 (conservative)	1.00 (optimistic) 1.00 (median) 1.00 (conservative)	1.00 (optimistic) 1.00 (median) 1.00 (conservative)	1.00 (optimistic) 1.00 (median) 1.00 (conservative)
Waitomo District	Grassland High producing	39.00 (optimistic) 40.00 (median) 38.00 (conservative)	40.00 (optimistic) 40.00 (median) 40.00 (conservative)	40.00 (optimistic) 40.00 (median) 40.00 (conservative)	40.00 (optimistic) 40.00 (median) 40.00 (conservative)	40.00 (optimistic) 40.00 (median) 40.00 (conservative)
	Grassland Low producing	28.00 (optimistic) 24.00 (median) 33.00 (conservative)	30.00 (optimistic) 30.00 (median) 33.00 (conservative)	33.00 (optimistic) 30.00 (median) 34.00 (conservative)	34.00 (optimistic) 34.00 (median) 34.00 (conservative)	34.00 (optimistic) 34.00 (median) 34.00 (conservative)
	Grassland With woody biomass	6.00 (optimistic) 6.00 (median) 6.00 (conservative)	6.00 (optimistic) 6.00 (median) 6.00 (conservative)	6.00 (optimistic) 6.00 (median) 6.00 (conservative)	6.00 (optimistic) 6.00 (median) 6.00 (conservative)	6.00 (optimistic) 6.00 (median) 6.00 (conservative)
Wellington City	Grassland High producing	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
	Grassland Low producing	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)

	Grassland With woody biomass	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
Western Bay of Plenty District	Grassland High producing	3316.00 (optimistic) 3296.00 (median) 3317.00 (conservative)	3373.00 (optimistic) 3318.00 (median) 3438.00 (conservative)	3399.00 (optimistic) 3349.00 (median) 3458.00 (conservative)	3424.00 (optimistic) 3368.00 (median) 3488.00 (conservative)	3479.00 (optimistic) 3503.00 (median) 3522.00 (conservative)
	Grassland Low producing	104.00 (optimistic) 110.00 (median) 105.00 (conservative)	105.00 (optimistic) 110.00 (median) 108.00 (conservative)	110.00 (optimistic) 110.00 (median) 108.00 (conservative)	110.00 (optimistic) 110.00 (median) 108.00 (conservative)	110.00 (optimistic) 110.00 (median) 108.00 (conservative)
	Grassland With woody biomass	62.00 (optimistic) 67.00 (median) 61.00 (conservative)	65.00 (optimistic) 67.00 (median) 67.00 (conservative)	65.00 (optimistic) 67.00 (median) 67.00 (conservative)	65.00 (optimistic) 67.00 (median) 67.00 (conservative)	65.00 (optimistic) 67.00 (median) 67.00 (conservative)
Westland District	Grassland High producing	629.00 (optimistic) 97.00 (median) 388.00 (conservative)	755.00 (optimistic) 858.00 (median) 987.00 (conservative)	795.00 (optimistic) 979.00 (median) 998.00 (conservative)	915.00 (optimistic) 984.00 (median) 998.00 (conservative)	996.00 (optimistic) 996.00 (median) 998.00 (conservative)
	Grassland Low producing	293.00 (optimistic) 53.00 (median) 214.00 (conservative)	369.00 (optimistic) 402.00 (median) 497.00 (conservative)	385.00 (optimistic) 484.00 (median) 497.00 (conservative)	456.00 (optimistic) 493.00 (median) 497.00 (conservative)	495.00 (optimistic) 495.00 (median) 497.00 (conservative)
	Grassland With woody biomass	197.00 (optimistic) 87.00 (median) 131.00 (conservative)	224.00 (optimistic) 226.00 (median) 318.00 (conservative)	229.00 (optimistic) 305.00 (median) 318.00 (conservative)	289.00 (optimistic) 314.00 (median) 318.00 (conservative)	315.00 (optimistic) 314.00 (median) 318.00 (conservative)
Whakatane District	Grassland High producing	10319.00 (optimistic) 10346.00 (median) 10326.00 (conservative)	10340.00 (optimistic) 10358.00 (median) 10363.00 (conservative)	10350.00 (optimistic) 10358.00 (median) 10363.00 (conservative)	10361.00 (optimistic) 10358.00 (median) 10363.00 (conservative)	10364.00 (optimistic) 10364.00 (median) 10364.00 (conservative)

	Grassland Low producing	350.00 (optimistic) 369.00 (median) 348.00 (conservative)	357.00 (optimistic) 369.00 (median) 369.00 (conservative)	362.00 (optimistic) 369.00 (median) 369.00 (conservative)	362.00 (optimistic) 369.00 (median) 369.00 (conservative)	369.00 (optimistic) 369.00 (median) 369.00 (conservative)
	Grassland With woody biomass	102.00 (optimistic) 102.00 (median) 101.00 (conservative)	102.00 (optimistic) 102.00 (median) 102.00 (conservative)	102.00 (optimistic) 102.00 (median) 102.00 (conservative)	102.00 (optimistic) 102.00 (median) 102.00 (conservative)	102.00 (optimistic) 102.00 (median) 102.00 (conservative)
Whanganui District	Grassland High producing	0.00 (optimistic) 1.00 (median) 1.00 (conservative)	1.00 (optimistic) 1.00 (median) 1.00 (conservative)	1.00 (optimistic) 1.00 (median) 1.00 (conservative)	1.00 (optimistic) 1.00 (median) 1.00 (conservative)	1.00 (optimistic) 1.00 (median) 1.00 (conservative)
	Grassland Low producing	9.00 (optimistic) 14.00 (median) 7.00 (conservative)	9.00 (optimistic) 14.00 (median) 14.00 (conservative)	11.00 (optimistic) 14.00 (median) 14.00 (conservative)	14.00 (optimistic) 14.00 (median) 14.00 (conservative)	14.00 (optimistic) 14.00 (median) 14.00 (conservative)
	Grassland With woody biomass	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)	0.00 (optimistic) 0.00 (median) 0.00 (conservative)
Whangarei District	Grassland High producing	1018.00 (optimistic) 1043.00 (median) 1162.00 (conservative)	1059.00 (optimistic) 1065.00 (median) 1278.00 (conservative)	1115.00 (optimistic) 1151.00 (median) 1291.00 (conservative)	1170.00 (optimistic) 1171.00 (median) 1293.00 (conservative)	1213.00 (optimistic) 1201.00 (median) 1293.00 (conservative)
	Grassland Low producing	119.00 (optimistic) 148.00 (median) 129.00 (conservative)	138.00 (optimistic) 170.00 (median) 171.00 (conservative)	149.00 (optimistic) 176.00 (median) 171.00 (conservative)	156.00 (optimistic) 176.00 (median) 172.00 (conservative)	158.00 (optimistic) 176.00 (median) 172.00 (conservative)
	Grassland With woody biomass	26.00 (optimistic) 23.00 (median) 16.00 (conservative)	29.00 (optimistic) 23.00 (median) 26.00 (conservative)	29.00 (optimistic) 23.00 (median) 26.00 (conservative)	29.00 (optimistic) 23.00 (median) 26.00 (conservative)	29.00 (optimistic) 25.00 (median) 26.00 (conservative)
all	Grassland High producing	141950.00 (optimistic) 157050.00 (median)	157019.00 (optimistic) 167431.00 (median)	163188.00 (optimistic) 169864.00 (median)	166683.00 (optimistic) 171032.00 (median)	170638.00 (optimistic) 171964.00 (median)

		161595.00 (conservative)	170790.00 (conservative)	171731.00 (conservative)	172207.00 (conservative)	172426.00 (conservative)
	Grassland Low producing	10844.00 (optimistic) 13685.00 (median) 14727.00 (conservative)	13135.00 (optimistic) 16433.00 (median) 17318.00 (conservative)	15096.00 (optimistic) 17091.00 (median) 17535.00 (conservative)	16610.00 (optimistic) 17532.00 (median) 17684.00 (conservative)	17486.00 (optimistic) 17697.00 (median) 17718.00 (conservative)
	Grassland With woody biomass	3880.00 (optimistic) 4207.00 (median) 4243.00 (conservative)	4475.00 (optimistic) 4761.00 (median) 5031.00 (conservative)	4676.00 (optimistic) 4987.00 (median) 5111.00 (conservative)	4950.00 (optimistic) 5104.00 (median) 5147.00 (conservative)	5118.00 (optimistic) 5148.00 (median) 5159.00 (conservative)

Appendix D Dry matter pasture production data

Table D-1: Coastal-DMP per Territorial Local Authority (TLA) at baseline (0 m) sea-level rise. Coastal-DMP per Territorial Local Authority (TLA) at baseline (0 m) sea-level rise. Units: thousands of tons per year. Upper, Median and Lower refer to the groundwater model uncertainties, as explained in Section 2.1.5.

TLA	Upper	Median	Lower	TLA	Upper	Median	Lower
Hauraki_District	410.5	415.2	446.8	Ashburton_District	37.9	38.7	38.1
Southland_District	219.6	230.2	228.4	Wairoa_District	26.9	27	27.3
Far_North_District	196.4	200.6	210.8	Opotiki_District	26.7	26.7	27.1
Auckland	182.9	184.9	188	Kaikoura_District	23.9	24.1	24.4
Selwyn_District	165.3	172.1	187.6	South_Taranaki_District	22.9	23	23
Invercargill_City	134.9	153	153.6	Tauranga_City	22	22.6	23
Christchurch_City	131.6	145.3	149.6	Hastings_District	21	22.3	22.8
Whakatane_District	143.1	143.3	143.9	Waitaki_District	19.7	19.8	19.8
South_Wairarapa_District	130.4	139.7	147.1	Kapiti_Coast_District	19.6	19.7	19.4
Horowhenua_District	132.9	139.5	164	Hurunui_District	19	19.5	19.9
Dunedin_City	115.6	132.9	142.3	Rangitikei_District	15	15.6	17.6
Kaipara_District	101.1	101.8	106.7	Grey_District	12.9	12.9	12.9
Marlborough_District	97.6	100.7	104.9	Otorohanga_District	10	10.1	10.2
Clutha_District	89.4	91.8	93.4	Napier_City	9.3	9.4	9.8
Buller_District	85.4	85.9	86.3	New_Plymouth_District	8.9	9.1	9
Waimakariri_District	82.1	84.3	88.8	Central_Hawke's_Bay_District	7	7.1	7.1
Tasman_District	82.9	83.6	84.2	Masterton_District	6.6	6.6	6.7
Waimate_District	79.9	81.3	78.8	Nelson_City	6.3	6.3	6.5
Timaru_District	73.8	79.1	82.1	Carterton_District	6.2	6.2	6.3
Western_Bay_of_Plenty_District	77.5	78.4	78.8	Waitomo_District	5.8	5.9	5.9
Westland_District	72.3	72.7	73.1	Whanganui_District	4.6	4.6	4.6
Gisborne_District	54.8	56.4	58	Tararua_District	4.5	4.5	4.6
Matamata-Piako_District	49.7	51.2	56.1	Lower_Hutt_City	2.8	2.8	2.8

TLA	Upper	Median	Lower	TLA	Upper	Median	Lower
Thames-Coromandel_District	47.6	48	50.7	Porirua_City	2.6	2.6	2.6
Whangarei_District	42.9	44	45.4	Wellington_City	1.5	1.5	1.5
Manawatu_District	40.2	41.5	44.6	Palmerston_North_City	0.3	0.3	0.4
Waikato_District	37.7	38.9	41.5	Ashburton_District	37.9	38.7	38.1

Table D-2: Decrease in coastal-DMP per Territorial Local Authority (TLA) with sea-level rise and WTR_{SLR} for Upper groundwater model uncertainty. Units (%).

WTR_{SLR} :	0.1					0.5				0.9			
	0	0.5	1	1.5	2	0.5	1	1.5	2	0.5	1	1.5	2
Sea-level rise :													
Hauraki_District	0	10	11	23	27	36	71	91	94	71	90	91	94
Southland_District	0	14	22	31	34	19	45	60	65	26	51	65	72
Far_North_District	0	3	3	12	19	10	22	35	43	21	30	36	44
Auckland	0	2	3	17	24	7	16	33	40	15	22	34	41
Selwyn_District	0	13	15	31	34	39	78	97	99	74	95	97	99
Invercargill_City	0	14	21	31	36	24	53	66	71	37	57	67	72
Christchurch_City	0	12	20	36	41	28	61	78	81	50	73	78	81
Whakatane_District	0	8	8	20	22	30	61	84	86	61	82	84	86
South_Wairarapa_District	0	11	20	36	41	30	64	84	87	57	81	84	88
Horowhenua_District	0	10	10	22	23	34	70	90	91	69	89	90	91
Dunedin_City	0	12	19	34	40	24	50	68	78	39	61	71	81
Kaipara_District	0	6	6	16	21	21	44	63	66	43	61	64	67
Marlborough_District	0	6	9	22	30	14	31	44	52	24	37	46	53
Clutha_District	0	4	5	11	13	12	24	36	46	22	37	63	79
Buller_District	0	4	5	11	16	10	20	30	37	19	28	36	45
Waimakariri_District	0	12	14	29	34	36	72	93	96	67	89	93	96
Tasman_District	0	3	5	17	29	5	13	27	39	9	16	28	41
Waimate_District	0	6	11	23	30	10	29	51	68	18	38	55	69

<i>WTR</i> _{SLR} :				0.1				0.5				0.9	
Timaru_District	0	10	14	25	31	21	48	67	73	35	59	67	74
Western_Bay_of_Plenty_District	0	5	6	25	32	18	34	50	57	34	36	50	57
Westland_District	0	2	7	12	19	6	15	24	32	11	21	30	40
Gisborne_District	0	7	9	14	18	13	30	42	47	22	40	43	49
Matamata-Piako_District	0	12	12	25	25	41	81	100	100	81	100	100	100
Thames-Coromandel_District	0	3	4	10	15	12	23	33	38	23	30	33	38
Whangarei_District	0	3	3	13	17	9	21	33	37	20	27	33	37
Manawatu_District	0	9	10	23	25	32	68	95	96	65	92	95	96
Waikato_District	0	7	8	18	20	22	44	55	57	42	52	55	57
Ashburton_District	0	3	4	12	19	6	14	25	34	10	18	26	34
Wairoa_District	0	2	4	9	13	7	21	31	38	18	29	42	62
Opotiki_District	0	1	3	7	13	6	12	19	25	11	16	19	25
Kaikoura_District	0	2	3	5	7	3	8	11	14	5	10	12	14
South_Taranaki_District	0	1	1	3	5	3	6	8	11	5	7	9	12
Tauranga_City	0	4	6	18	29	12	29	43	55	26	35	43	55
Hastings_District	0	6	11	21	27	14	36	53	62	25	47	54	63
Waitaki_District	0	3	5	10	13	3	9	16	23	4	12	17	24
Kapiti_Coast_District	0	4	8	13	21	5	17	32	42	6	21	33	44
Hurunui_District	0	2	2	6	11	5	12	16	22	11	14	16	22
Rangitikei_District	0	5	5	13	21	22	49	69	77	49	69	69	77
Grey_District	0	1	1	2	12	4	8	12	21	9	11	12	22
Otorohanga_District	0	1	1	2	6	4	7	9	13	7	9	10	14
Napier_City	0	20	33	47	54	34	63	83	88	57	78	83	88
New_Plymouth_District	0	1	1	2	4	3	6	9	12	6	8	9	12
Central_Hawke's_Bay_District	0	0	1	3	4	6	17	24	26	16	23	30	37
Masterton_District	0	2	2	5	6	5	11	15	17	11	14	17	18
Nelson_City	0	2	2	13	19	5	8	21	25	8	11	21	25

<i>WTR</i> _{SLR} :				0.1			0.5			0.9			
Carterton_District	0	0	0	2	6	0	3	6	11	3	5	6	11
Waitomo_District	0	2	2	3	3	5	7	10	10	9	10	12	14
Whanganui_District	0	0	0	2	11	0	0	2	11	0	2	2	11
Tararua_District	0	0	0	0	0	0	0	0	2	0	0	0	2
Lower_Hutt_City	0	0	0	0	0	0	0	0	4	0	0	0	4
Porirua_City	0	0	0	4	4	0	0	4	4	0	0	4	4
Wellington_City	0	0	0	0	0	0	0	0	0	0	0	0	0
Palmerston_North_City	0	0	0	33	33	33	67	100	100	67	100	100	100

Table D-3: Decrease in coastal-DMP per Territorial Local Authority (TLA) with sea-level rise and *WTR*_{SLR} for Median groundwater model uncertainty. Units (%).

<i>WTR</i> _{SLR} :				0.1			0.5			0.9			
Sea-level rise :	0	0.5	1	1.5	2	0.5	1	1.5	2	0.5	1	1.5	2
Hauraki_District	0	10	11	23	27	36	71	91	94	71	90	91	94
Southland_District	0	14	22	31	34	19	45	60	65	26	51	65	72
Far_North_District	0	3	3	12	19	10	22	35	43	21	30	36	44
Auckland	0	2	3	17	24	7	16	33	40	15	22	34	41
Selwyn_District	0	13	15	31	34	39	78	97	99	74	95	97	99
Invercargill_City	0	14	21	31	36	24	53	66	71	37	57	67	72
Christchurch_City	0	12	20	36	41	28	61	78	81	50	73	78	81
Whakatane_District	0	8	8	20	22	30	61	84	86	61	82	84	86
South_Wairarapa_District	0	11	20	36	41	30	64	84	87	57	81	84	88
Horowhenua_District	0	10	10	22	23	34	70	90	91	69	89	90	91
Dunedin_City	0	12	19	34	40	24	50	68	78	39	61	71	81
Kaipara_District	0	6	6	16	21	21	44	63	66	43	61	64	67
Marlborough_District	0	6	9	22	30	14	31	44	52	24	37	46	53
Clutha_District	0	4	5	11	13	12	24	36	46	22	37	63	79

<i>WTR</i> _{SLR} :	0.1				0.5				0.9				
Buller_District	0	4	5	11	16	10	20	30	37	19	28	36	45
Waimakariri_District	0	12	14	29	34	36	72	93	96	67	89	93	96
Tasman_District	0	3	5	17	29	5	13	27	39	9	16	28	41
Waimate_District	0	6	11	23	30	10	29	51	68	18	38	55	69
Timaru_District	0	10	14	25	31	21	48	67	73	35	59	67	74
Western_Bay_of_Plenty_District	0	5	6	25	32	18	34	50	57	34	36	50	57
Westland_District	0	2	7	12	19	6	15	24	32	11	21	30	40
Gisborne_District	0	7	9	14	18	13	30	42	47	22	40	43	49
Matamata-Piako_District	0	12	12	25	25	41	81	100	100	81	100	100	100
Thames-Coromandel_District	0	3	4	10	15	12	23	33	38	23	30	33	38
Whangarei_District	0	3	3	13	17	9	21	33	37	20	27	33	37
Manawatu_District	0	9	10	23	25	32	68	95	96	65	92	95	96
Waikato_District	0	7	8	18	20	22	44	55	57	42	52	55	57
Ashburton_District	0	3	4	12	19	6	14	25	34	10	18	26	34
Wairoa_District	0	2	4	9	13	7	21	31	38	18	29	42	62
Opotiki_District	0	1	3	7	13	6	12	19	25	11	16	19	25
Kaikoura_District	0	2	3	5	7	3	8	11	14	5	10	12	14
South_Taranaki_District	0	1	1	3	5	3	6	8	11	5	7	9	12
Tauranga_City	0	4	6	18	29	12	29	43	55	26	35	43	55
Hastings_District	0	6	11	21	27	14	36	53	62	25	47	54	63
Waitaki_District	0	3	5	10	13	3	9	16	23	4	12	17	24
Kapiti_Coast_District	0	4	8	13	21	5	17	32	42	6	21	33	44
Hurunui_District	0	2	2	6	11	5	12	16	22	11	14	16	22
Rangitikei_District	0	5	5	13	21	22	49	69	77	49	69	69	77
Grey_District	0	1	1	2	12	4	8	12	21	9	11	12	22
Otorohanga_District	0	1	1	2	6	4	7	9	13	7	9	10	14
Napier_City	0	20	33	47	54	34	63	83	88	57	78	83	88

WTR_{SLR}:	0.1					0.5					0.9		
New_Plymouth_District	0	1	1	2	4	3	6	9	12	6	8	9	12
Central_Hawke's_Bay_District	0	0	1	3	4	6	17	24	26	16	23	30	37
Masterton_District	0	2	2	5	6	5	11	15	17	11	14	17	18
Nelson_City	0	2	2	13	19	5	8	21	25	8	11	21	25
Carterton_District	0	0	0	2	6	0	3	6	11	3	5	6	11
Waitomo_District	0	2	2	3	3	5	7	10	10	9	10	12	14
Whanganui_District	0	0	0	2	11	0	0	2	11	0	2	2	11
Tararua_District	0	0	0	0	0	0	0	0	2	0	0	0	2
Lower_Hutt_City	0	0	0	0	0	0	0	0	4	0	0	0	4
Porirua_City	0	0	0	4	4	0	0	4	4	0	0	4	4
Wellington_City	0	0	0	0	0	0	0	0	0	0	0	0	0
Palmerston_North_City	0	0	0	33	33	33	67	100	100	67	100	100	100

Table D-4: Decrease in coastal-DMP per Territorial Local Authority (TLA) with sea-level rise and WTRSLR for Lower groundwater model uncertainty. Units (%).

WTR_{SLR}:	0.1					0.5					0.9		
Sea-level rise :	0	0.5	1	1.5	2	0.5	1	1.5	2	0.5	1	1.5	2
Hauraki_District	0	10	11	24	27	35	71	90	93	69	88	90	94
Southland_District	0	7	17	31	36	10	30	52	65	14	37	58	72
Far_North_District	0	3	4	13	20	8	19	33	41	16	25	35	42
Auckland	0	2	3	17	24	7	15	33	40	13	21	34	41
Selwyn_District	0	15	18	34	37	38	78	97	98	70	94	97	99
Invercargill_City	0	10	22	34	40	14	38	60	70	20	42	61	71
Christchurch_City	0	11	21	39	46	21	51	72	81	34	61	74	82
Whakatane_District	0	8	8	20	22	30	61	84	86	61	82	84	86
South_Wairarapa_District	0	10	22	39	45	24	57	81	88	45	71	82	89
Horowhenua_District	0	10	11	22	23	29	63	82	85	58	80	83	86

<i>WTR</i> _{SLR} :	0.1					0.5					0.9		
Dunedin_City	0	11	26	41	47	16	41	69	79	24	48	72	83
Kaipara_District	0	6	7	17	22	20	44	63	66	42	61	63	67
Marlborough_District	0	6	10	23	32	12	28	44	53	20	34	45	54
Clutha_District	0	3	5	10	13	9	21	34	44	17	34	62	79
Buller_District	0	4	5	11	16	10	19	30	36	18	27	36	46
Waimakariri_District	0	12	15	30	36	33	68	90	95	62	84	91	95
Tasman_District	0	3	5	18	29	5	12	27	39	7	15	28	40
Waimate_District	0	4	8	17	26	8	22	39	56	13	29	44	63
Timaru_District	0	11	17	29	35	17	43	65	74	25	52	66	75
Western_Bay_of_Plenty_District	0	5	6	25	32	17	33	48	55	31	34	48	55
Westland_District	0	2	6	12	19	5	14	23	31	9	20	29	41
Gisborne_District	0	7	10	15	20	11	27	39	47	18	35	41	50
Matamata-Piako_District	0	12	14	27	27	39	79	100	100	76	98	100	100
Thames-Coromandel_District	0	4	4	10	15	11	23	33	38	22	30	33	38
Whangarei_District	0	2	3	12	16	7	16	27	32	14	20	28	32
Manawatu_District	0	10	12	25	27	29	66	93	96	56	88	93	96
Waikato_District	0	8	10	20	22	21	43	54	58	38	50	55	58
Ashburton_District	0	3	5	12	19	5	13	23	31	7	16	24	32
Wairoa_District	0	2	4	8	12	6	17	27	34	16	24	34	54
Opotiki_District	0	1	3	7	13	5	12	19	25	10	16	19	25
Kaikoura_District	0	1	2	3	5	2	5	7	10	3	6	10	12
South_Taranaki_District	0	1	1	3	5	3	5	8	11	5	7	9	12
Tauranga_City	0	4	8	19	30	11	27	41	54	20	31	41	54
Hastings_District	0	8	13	23	30	11	31	48	61	16	39	49	63
Waitaki_District	0	1	2	7	13	1	4	10	21	1	7	12	24
Kapiti_Coast_District	0	3	6	12	20	4	12	25	37	4	15	27	40
Hurunui_District	0	3	4	7	13	5	12	17	23	9	14	17	24

WTR_{SLR}:	0.1					0.5					0.9		
Rangitikei_District	0	7	8	16	24	19	47	69	78	39	66	69	78
Grey_District	0	1	1	3	12	4	8	12	21	8	12	13	22
Otorohanga_District	0	1	1	3	7	4	7	10	14	7	9	11	15
Napier_City	0	20	34	48	54	33	64	83	87	53	78	83	88
New_Plymouth_District	0	1	2	4	7	1	5	10	13	2	8	10	13
Central_Hawke's_Bay_District	0	1	1	4	4	6	15	23	24	15	21	30	39
Masterton_District	0	0	2	3	5	3	9	14	15	9	12	15	18
Nelson_City	0	2	2	13	19	5	10	21	25	8	11	21	25
Carterton_District	0	0	0	0	5	0	3	5	10	3	5	6	11
Waitomo_District	0	2	2	2	3	3	5	7	8	5	8	12	15
Whanganui_District	0	0	0	2	11	0	0	2	11	0	0	2	11
Tararua_District	0	0	0	0	0	0	0	0	2	0	0	0	2
Lower_Hutt_City	0	0	0	0	0	0	0	0	4	0	0	0	4
Porirua_City	0	0	0	4	4	0	0	4	4	0	0	4	4
Wellington_City	0	0	0	0	0	0	0	0	0	0	0	0	0
Palmerston_North_City	0	0	0	33	33	33	67	100	100	67	100	100	100

Table D-5: Weighted percent change in coastal-DMP per Territorial Local Authority with sea-level rise and WTR_{SLR} for Upper groundwater model uncertainty. Units (%).

WTR_{SLR}:	0.1				0.5				0.9			
Sea-level rise :	0.5	1	1.5	2	0.5	1	1.5	2	0.5	1	1.5	2
Hauraki_District	0	12	15	28	32	31	66	88	93	58	82	89
Southland_District	0	2	8	22	31	5	17	37	56	9	25	49
Far_North_District	0	3	6	13	20	5	14	26	35	7	18	28
Auckland	0	2	3	17	25	5	13	30	39	10	18	32
Selwyn_District	0	17	22	38	41	35	74	93	97	58	89	93

<i>WTR</i> _{SLR} :		0.1				0.5				0.9			
Invercargill_City	0	7	13	26	36	10	28	46	61	15	33	50	
Christchurch_City	0	7	17	34	43	15	40	60	72	26	48	64	
Whakatane_District	0	8	9	20	22	30	61	83	86	60	82	83	
South_Wairarapa_District	0	13	27	41	46	24	59	83	86	39	72	84	
Horowhenua_District	0	11	18	29	31	20	49	73	78	32	60	74	
Dunedin_City	0	7	16	32	40	8	23	43	60	10	29	47	
Kaipara_District	0	9	10	20	25	19	45	63	66	34	60	64	
Marlborough_District	0	5	10	23	34	9	23	40	52	14	29	44	
Clutha_District	0	2	4	9	11	6	16	29	39	11	25	55	
Buller_District	0	4	5	11	15	9	18	28	35	17	25	35	
Waimakariri_District	0	13	16	32	38	31	65	85	94	55	81	86	
Tasman_District	0	3	5	18	29	4	11	26	38	6	14	27	
Waimate_District	0	4	7	14	20	10	26	39	50	20	33	42	
Timaru_District	0	9	16	29	36	13	35	59	72	18	42	61	
Western_Bay_of_Plenty_District	0	5	6	25	32	16	32	48	55	30	34	48	
Westland_District	0	2	6	11	18	5	13	21	30	9	18	28	
Gisborne_District	0	4	8	14	19	7	18	30	41	11	24	34	
Matamata-Piako_District	0	14	18	31	33	34	73	94	98	61	88	96	
Thames-Coromandel_District	0	6	8	15	20	10	24	36	42	16	29	36	
Whangarei_District	0	4	6	14	19	5	16	29	34	8	21	30	
Manawatu_District	0	11	16	28	31	24	59	87	91	41	78	88	
Waikato_District	0	8	13	23	25	17	39	53	58	29	44	54	
Ashburton_District	0	2	3	9	17	4	11	20	29	8	14	21	
Wairoa_District	0	2	4	7	11	4	13	20	26	11	17	25	
Opotiki_District	0	2	3	8	14	5	11	19	26	9	16	20	
Kaikoura_District	0	1	2	2	5	1	3	5	9	2	3	7	
South_Taranaki_District	0	1	1	2	5	2	4	7	9	4	5	7	

WTR_{SLR}:	0.1				0.5				0.9			
Tauranga_City	0	4	8	19	31	8	24	39	53	15	28	39
Hastings_District	0	5	10	19	26	7	22	36	50	11	28	38
Waitaki_District	0	0	1	2	6	1	1	3	11	1	2	3
Kapiti_Coast_District	0	1	3	8	17	2	7	20	31	5	9	21
Hurunui_District	0	4	5	9	14	5	12	17	24	7	14	18
Rangitikei_District	0	14	18	25	32	16	51	70	79	20	66	71
Grey_District	0	1	1	3	12	4	8	12	21	8	12	12
Otorohanga_District	0	1	1	2	6	3	5	8	13	5	8	11
Napier_City	0	22	36	49	56	32	62	81	88	46	74	81
New_Plymouth_District	0	0	0	1	3	1	2	3	7	1	2	3
Central_Hawke's_Bay_District	0	0	0	1	3	1	7	11	13	7	10	18
Masterton_District	0	1	1	3	3	3	6	9	12	6	9	13
Nelson_City	0	3	5	15	22	5	12	23	28	6	14	23
Carterton_District	0	0	0	2	6	0	0	2	6	0	0	3
Waitomo_District	0	0	0	2	2	2	3	7	8	3	7	10
Whanganui_District	0	0	0	0	9	0	0	2	11	0	0	2
Tararua_District	0	0	0	2	2	0	0	2	2	0	0	2
Lower_Hutt_City	0	0	0	0	0	0	0	0	4	0	0	0
Porirua_City	0	0	0	4	4	0	0	4	4	0	0	4
Wellington_City	0	0	0	0	0	0	0	0	0	0	0	0
Palmerston_North_City	0	0	25	25	25	25	25	25	50	25	25	25

Table D-6: Weighted percent change in coastal-DMP per Territorial Local Authority with sea-level rise and WTR_{SLR} for Median groundwater model uncertainty.
Units (%).

WTR_{SLR} :	0.1				0.5				0.9			
Sea-level rise :	0.5	1	1.5	2	0.5	1	1.5	2	0.5	1	1.5	2
Hauraki_District	10	11	24	27	35	71	90	94	69	88	90	94
Southland_District	4	9	17	20	5	16	29	36	8	20	32	40
Far_North_District	1	2	6	10	4	9	16	20	8	12	17	21
Auckland	1	1	8	11	3	7	14	18	6	9	15	18
Selwyn_District	6	8	14	15	16	32	40	41	29	39	40	41
Invercargill_City	4	8	13	15	5	14	22	26	7	16	22	26
Christchurch_City	4	8	14	16	7	18	25	28	12	21	26	29
Whakatane_District	3	3	7	8	10	21	29	30	21	28	29	30
South_Wairarapa_District	3	7	13	15	8	19	27	30	15	24	28	30
Horowhenua_District	3	4	7	8	10	21	28	29	19	27	28	29
Dunedin_City	3	8	13	15	5	13	22	25	8	15	23	26
Kaipara_District	1	2	4	5	5	11	15	16	10	15	16	16
Marlborough_District	1	2	6	8	3	7	11	13	5	8	11	13
Clutha_District	1	1	2	3	2	5	8	10	4	8	14	17
Buller_District	1	1	2	3	2	4	6	7	4	6	8	9
Waimakariri_District	2	3	6	7	7	14	18	19	13	17	19	19
Tasman_District	1	1	4	6	1	2	5	8	2	3	6	8
Waimate_District	1	2	3	5	2	4	8	11	3	6	9	12
Timaru_District	2	3	6	7	3	8	12	14	5	10	13	14
Western_Bay_of_Plenty_District	1	1	5	6	3	6	9	10	6	6	9	10
Westland_District	0	1	2	3	1	3	4	5	2	3	5	7
Gisborne_District	1	1	2	3	2	4	5	6	2	5	6	7
Matamata-Piako_District	2	2	3	3	5	10	12	12	9	12	12	12
Thames-Coromandel_District	0	0	1	2	1	3	4	4	3	3	4	4

WTR_{SLR}:	0.1				0.5				0.9			
Whangarei_District	0	0	1	2	1	2	3	3	1	2	3	3
Manawatu_District	1	1	2	3	3	7	9	10	6	9	9	10
Waikato_District	1	1	2	2	2	4	5	5	4	5	5	5
Ashburton_District	0	0	1	2	0	1	2	3	1	1	2	3
Wairoa_District	0	0	1	1	0	1	2	2	1	2	2	4
Opotiki_District	0	0	0	1	0	1	1	2	1	1	1	2
Kaikoura_District	0	0	0	0	0	0	0	1	0	0	1	1
South_Taranaki_District	0	0	0	0	0	0	0	1	0	0	0	1
Tauranga_City	0	0	1	2	1	1	2	3	1	2	2	3
Hastings_District	0	1	1	2	1	2	3	3	1	2	3	3
Waitaki_District	0	0	0	1	0	0	0	1	0	0	1	1
Kapiti_Coast_District	0	0	1	1	0	1	1	2	0	1	1	2
Hurunui_District	0	0	0	1	0	1	1	1	0	1	1	1
Rangitikei_District	0	0	1	1	1	2	3	3	1	2	3	3
Grey_District	0	0	0	0	0	0	0	1	0	0	0	1
Otorohanga_District	0	0	0	0	0	0	0	0	0	0	0	0
Napier_City	0	1	1	1	1	1	2	2	1	2	2	2
New_Plymouth_District	0	0	0	0	0	0	0	0	0	0	0	0
Central_Hawke's_Bay_District	0	0	0	0	0	0	0	0	0	0	0	1
Masterton_District	0	0	0	0	0	0	0	0	0	0	0	0
Nelson_City	0	0	0	0	0	0	0	0	0	0	0	0
Carterton_District	0	0	0	0	0	0	0	0	0	0	0	0
Waitomo_District	0	0	0	0	0	0	0	0	0	0	0	0
Whanganui_District	0	0	0	0	0	0	0	0	0	0	0	0
Tararua_District	0	0	0	0	0	0	0	0	0	0	0	0
Lower_Hutt_City	0	0	0	0	0	0	0	0	0	0	0	0
Porirua_City	0	0	0	0	0	0	0	0	0	0	0	0

WTR_{SLR}:	0.1				0.5				0.9			
Wellington_City	0	0	0	0	0	0	0	0	0	0	0	0
Palmerston_North_City	0	0	0	0	0	0	0	0	0	0	0	0

Table D-7: Weighted percent change in coastal-DMP per Territorial Local Authority with sea-level rise and WTRSLR for Lower groundwater model uncertainty. Units (%).

WTR_{SLR}:	0.1				0.5				0.9			
Sea-level rise :	0.5	1	1.5	2	0.5	1	1.5	2	0.5	1	1.5	2
Hauraki_District	12	15	28	32	31	66	88	93	58	82	89	93
Southland_District	1	4	11	16	3	9	19	29	5	13	25	33
Far_North_District	2	3	6	10	2	7	12	17	3	8	13	18
Auckland	1	1	7	10	2	6	13	16	4	8	13	17
Selwyn_District	7	9	16	17	15	31	39	41	24	37	39	41
Invercargill_City	2	5	9	12	3	9	16	21	5	11	17	22
Christchurch_City	2	6	11	14	5	13	20	24	9	16	21	25
Whakatane_District	3	3	6	7	10	20	27	28	19	26	27	28
South_Wairarapa_District	4	9	14	15	8	20	27	28	13	24	28	29
Horowhenua_District	4	7	11	11	7	18	27	29	12	22	27	29
Dunedin_City	2	5	10	13	3	7	14	19	3	9	15	21
Kaipara_District	2	2	5	6	5	11	15	16	8	14	15	16
Marlborough_District	1	2	5	8	2	5	9	12	3	7	10	13
Clutha_District	0	1	2	2	1	3	6	8	2	5	11	15
Buller_District	1	1	2	3	2	4	5	7	3	5	7	9
Waimakariri_District	3	3	6	8	6	13	17	19	11	16	17	19
Tasman_District	0	1	3	5	1	2	5	7	1	3	5	8
Waimate_District	1	1	2	4	2	5	7	9	3	6	7	10
Timaru_District	2	3	5	7	2	6	11	13	3	8	11	14

<i>WTR</i> _{SLR} :	0.1				0.5				0.9			
Western_Bay_of_Plenty_District	1	1	4	6	3	6	8	10	5	6	9	10
Westland_District	0	1	2	3	1	2	4	5	1	3	5	7
Gisborne_District	1	1	2	2	1	2	4	5	1	3	4	6
Matamata-Piako_District	2	2	4	4	4	9	12	12	8	11	12	12
Thames-Coromandel_District	1	1	2	2	1	3	4	5	2	3	4	5
Whangarei_District	0	1	1	2	1	2	3	3	1	2	3	4
Manawatu_District	1	2	3	3	2	6	9	9	4	8	9	9
Waikato_District	1	1	2	2	2	4	5	5	3	4	5	5
Ashburton_District	0	0	1	1	0	1	2	2	1	1	2	3
Wairoa_District	0	0	0	1	0	1	1	2	1	1	2	2
Opotiki_District	0	0	0	1	0	1	1	2	1	1	1	2
Kaikoura_District	0	0	0	0	0	0	0	0	0	0	0	1
South_Taranaki_District	0	0	0	0	0	0	0	0	0	0	0	1
Tauranga_City	0	0	1	2	0	1	2	3	1	1	2	3
Hastings_District	0	1	1	1	0	1	2	3	1	1	2	3
Waitaki_District	0	0	0	0	0	0	0	0	0	0	0	1
Kapiti_Coast_District	0	0	0	1	0	0	1	1	0	0	1	1
Hurunui_District	0	0	0	1	0	1	1	1	0	1	1	1
Rangitikei_District	1	1	1	1	1	2	3	3	1	3	3	3
Grey_District	0	0	0	0	0	0	0	1	0	0	0	1
Otorohanga_District	0	0	0	0	0	0	0	0	0	0	0	0
Napier_City	0	1	1	1	1	1	2	2	1	2	2	2
New_Plymouth_District	0	0	0	0	0	0	0	0	0	0	0	0
Central_Hawke's_Bay_District	0	0	0	0	0	0	0	0	0	0	0	1
Masterton_District	0	0	0	0	0	0	0	0	0	0	0	0
Nelson_City	0	0	0	0	0	0	0	0	0	0	0	0
Carterton_District	0	0	0	0	0	0	0	0	0	0	0	0

WTR_{SLR}:	0.1			0.5			0.9		
Waitomo_District	0	0	0	0	0	0	0	0	0
Whanganui_District	0	0	0	0	0	0	0	0	0
Tararua_District	0	0	0	0	0	0	0	0	0
Lower_Hutt_City	0	0	0	0	0	0	0	0	0
Porirua_City	0	0	0	0	0	0	0	0	0
Wellington_City	0	0	0	0	0	0	0	0	0
Palmerston_North_City	0	0	0	0	0	0	0	0	0

Table D-8: Coastal dry matter production for Median groundwater model uncertainty. Units tons per hectare per year.

Sea-level rise:	0			0.5			1.0			1.5			2.0		
WTRSLR :	0.1	0.5	0.9	0.1	0.5	0.9	0.1	0.5	0.9	0.1	0.5	0.9	0.1	0.5	0.9
Ashburton District	20.2	20.2	20.2	19.6	19.3	18.8	19.3	17.6	17	17.9	15.6	15.3	16.4	13.9	13.7
Auckland	12.2	12.2	12.2	11.9	11.4	10.6	11.8	10.4	9.7	10.1	8.2	8.1	9.2	7.3	7.2
Buller District	15	15	15	14.4	13.6	12.4	14.3	12.1	11	13.4	10.6	9.6	12.7	9.7	8.2
Carterton District	12.8	12.8	12.8	12.8	12.6	12.3	12.8	12.3	12.2	12.6	12	11.9	12	11.5	11.2
Central Hawke's Bay District	11.7	11.7	11.7	11.6	11.1	10	11.5	9.9	9.2	11.3	9.2	8.4	11.2	9	7.2
Christchurch City	15.3	15.3	15.3	13.7	12.2	10.1	12	7.5	6	9.3	4.2	4	8.3	2.9	2.8
Clutha District	16.5	16.5	16.5	15.9	14.9	13.7	15.7	13	10.9	14.8	10.9	6.2	14.3	9.3	3.5
Dunedin City	17.2	17.2	17.2	15.4	14.4	13.2	12.7	10.2	9	10.1	5.3	4.8	9.2	3.6	3
Far North District	13.3	13.3	13.3	12.9	12.2	11.2	12.7	10.7	9.9	11.6	8.9	8.6	10.6	7.8	7.6
Gisborne District	15.3	15.3	15.3	14.2	13.6	12.6	13.7	11.2	9.9	12.9	9.3	9	12.2	8.1	7.7
Grey District	13.6	13.6	13.6	13.4	13.1	12.5	13.4	12.4	12	13.2	11.9	11.8	12	10.7	10.5
Hastings District	8.8	8.8	8.8	8.1	7.8	7.3	7.6	6.1	5.4	6.7	4.6	4.5	6.2	3.4	3.3
Hauraki District	10.8	10.8	10.8	9.6	7	3.3	9.6	3.2	1.2	8.2	1.1	1.1	7.8	0.7	0.7
Horowhenua District	10.7	10.7	10.7	9.7	7.6	4.6	9.6	4	2.2	8.4	1.9	1.9	8.3	1.6	1.5
Hurunui District	17.4	17.4	17.4	16.9	16.5	15.9	16.7	15.3	14.9	16.1	14.4	14.3	15.2	13.4	13.3

Sea-level rise:	0	0.5	1.0	1.5	2.0										
Invercargill City	13.5	13.5	13.5	12.2	11.6	10.9	10.6	8.4	7.8	8.9	5.5	5.3	8.1	4.1	3.9
Kaikoura District	17.7	17.7	17.7	17.5	17.4	17.2	17.4	16.9	16.6	17.2	16.4	16	16.7	15.9	15.6
Kaipara District	11	11	11	10.3	8.8	6.4	10.3	6.2	4.3	9.2	4.1	4	8.6	3.8	3.7
Kapiti Coast District	11.8	11.8	11.8	11.5	11.4	11.3	11.1	10.4	10	10.4	8.8	8.6	9.4	7.5	7.1
Lower Hutt City	15.6	15.6	15.6	15.6	15.5	15.5	15.6	15.5	15.4	15.5	15.4	15.4	15.2	15.1	15.1
Manawatu District	10.8	10.8	10.8	9.7	7.6	4.7	9.5	3.7	1.2	8.1	0.8	0.8	7.8	0.5	0.4
Marlborough District	17.2	17.2	17.2	16.2	15.1	13.7	15.4	12.4	11.4	13.3	9.7	9.4	11.7	8.1	8
Masterton District	10.9	10.9	10.9	10.8	10.5	9.9	10.7	9.9	9.5	10.5	9.4	9.1	10.4	9.3	8.9
Matamata-Piako District	10.5	10.5	10.5	9.2	6.4	2.5	9	2.1	0.2	7.6	0	0	7.6	0	0
Napier City	5.2	5.2	5.2	4.2	3.5	2.4	3.5	1.9	1.2	2.7	0.9	0.9	2.4	0.6	0.6
Nelson City	14	14	14	13.9	13.5	12.9	13.7	12.8	12.5	12.3	11.2	11.2	11.4	10.4	10.4
New Plymouth District	11.7	11.7	11.7	11.5	11.5	11.5	11.4	11	10.8	11.2	10.6	10.5	10.9	10.1	10.1
Opotiki District	14.5	14.5	14.5	14.3	13.7	13	14.1	12.8	12.1	13.5	11.7	11.7	12.6	10.9	10.9
Otorohanga District	15.8	15.8	15.8	15.6	15.3	14.8	15.6	14.8	14.4	15.4	14.3	14.2	14.8	13.7	13.4
Palmerston North City	12.1	12.1	12.1	11.1	8.3	3.7	11.1	3.7	0	9.9	0	0	9.9	0	0
Porirua City	13.6	13.6	13.6	13.5	13.5	13.4	13.5	13.4	13.4	13.3	13.1	13.1	13.1	13	13
Rangitikei District	9.9	9.9	9.9	9.2	7.9	6	9	5.2	3.3	8.3	3.1	3.1	7.5	2.1	2.1
Selwyn District	12.4	12.4	12.4	10.5	7.6	3.8	10.1	2.8	0.7	8.2	0.4	0.3	7.8	0.2	0.2
South Taranaki District	10	10	10	9.9	9.7	9.5	9.9	9.5	9.3	9.7	9.1	9.1	9.4	8.9	8.8
South Wairarapa District	11.9	11.9	11.9	10.7	9	6.6	9.3	5.2	3.5	7.3	2.2	2.2	6.6	1.4	1.3
Southland District	12.9	12.9	12.9	12.1	11.7	11.1	10.7	9.1	8.2	8.9	6.2	5.4	8.3	4.5	3.6
Tararua District	11.4	11.4	11.4	11.4	11.3	11.3	11.4	11.3	11.3	11.3	11.2	11.2	11.2	11.1	11.1
Tasman District	18.8	18.8	18.8	18.3	17.9	17.4	17.8	16.5	16	15.5	13.8	13.6	13.3	11.5	11.3
Tauranga City	15	15	15	14.3	13.4	12	13.9	11	10.3	12.2	8.9	8.9	10.5	7	7
Thames-Coromandel District	13.9	13.9	13.9	13.4	12.3	10.8	13.3	10.7	9.7	12.4	9.3	9.3	11.8	8.6	8.5
Timaru District	16.4	16.4	16.4	14.6	13.6	12.3	13.6	9.3	7.9	11.7	5.7	5.5	10.6	4.3	4.2
Waikato District	11	11	11	10.1	8.7	6.9	9.9	6.3	5.5	8.8	5	5	8.6	4.7	4.6

Sea-level rise:	0		0.5			1.0			1.5			2.0			
Waimakariri District	13	13	13	11.5	8.7	4.9	11.1	4.1	2.1	9.1	1.2	1.1	8.4	0.6	0.6
Waimate District	19.6	19.6	19.6	18.8	18.1	17	18	15.3	14	16.2	12	11	14.6	8.7	7.2
Wairoa District	12.3	12.3	12.3	12.1	11.5	10.4	11.8	10.2	9.4	11.3	9	8.2	10.9	8.2	5.7
Waitaki District	16.7	16.7	16.7	16.5	16.5	16.5	16.4	16	15.5	15.5	15.1	14.7	14.6	13.2	12.7
Waitomo District	14.2	14.2	14.2	14.1	13.9	13.6	14.1	13.6	13.2	14	13.3	12.7	13.9	13	12.2
Wellington City	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6
Western Bay of Plenty District	11.9	11.9	11.9	11.3	9.9	8.2	11.2	8	7.8	9	6.2	6.2	8.2	5.4	5.4
Westland District	17.3	17.3	17.3	16.9	16.4	15.7	16.2	14.8	13.9	15.2	13.3	12.2	14.1	11.9	10.3
Whakatane District	11.7	11.7	11.7	10.8	8.2	4.6	10.7	4.6	2.1	9.4	1.9	1.9	9.1	1.7	1.7
Whanganui District	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.5	11.5	11.5	11.5	10.5	10.4	10.4
Whangarei District	11.2	11.2	11.2	11	10.5	9.7	10.9	9.5	8.9	9.9	8.1	8	9.4	7.6	7.6

Table D-9: Coastal dry matter production for Upper groundwater model uncertainty. Units tons per hectare per year.

Sea-level rise:	0			0.5			1.0			1.5			2.0		
WTRSLR :	0.1	0.5	0.9	0.1	0.5	0.9	0.1	0.5	0.9	0.1	0.5	0.9	0.1	0.5	0.9
Ashburton District	19.8	19.8	19.8	19.3	18.7	17.8	19.1	17	16.3	17.6	14.9	14.8	16.1	13.2	13.2
Auckland	12.1	12.1	12.1	11.8	11.2	10.2	11.7	10.2	9.4	10.1	8.1	8	9.2	7.2	7.1
Buller District	15	15	15	14.3	13.4	12	14.2	11.9	10.8	13.3	10.4	9.6	12.5	9.5	8.2
Carterton District	12.8	12.8	12.8	12.7	12.6	12.3	12.7	12.3	12.1	12.5	11.8	11.8	11.9	11.2	11.2
Central Hawke's Bay District	11.7	11.7	11.7	11.5	11	9.7	11.5	9.7	8.9	11.2	8.8	8.1	11.2	8.7	7.3
Christchurch City	13.9	13.9	13.9	12.2	10	7	11.2	5.5	3.8	8.9	3.1	3.1	8.2	2.6	2.6
Clutha District	16	16	16	15.4	14.2	12.5	15.3	12.1	10	14.3	10.2	5.9	13.9	8.7	3.4
Dunedin City	15	15	15	13.1	11.4	9.1	12.1	7.5	5.8	9.9	4.8	4.4	9.1	3.3	2.8
Far North District	13	13	13	12.7	11.7	10.3	12.6	10.1	9.2	11.5	8.5	8.4	10.5	7.5	7.3
Gisborne District	14.8	14.8	14.8	13.8	12.9	11.6	13.5	10.4	8.9	12.7	8.7	8.4	12.1	7.9	7.6
Grey District	13.6	13.6	13.6	13.4	13	12.4	13.4	12.5	12.1	13.2	12	11.8	12	10.7	10.5

Sea-level rise:	0	0.5	1.0	1.5	2.0										
Hastings District	8.3	8.3	8.3	7.7	7.1	6.2	7.3	5.3	4.4	6.5	3.8	3.8	6	3.1	3.1
Hauraki District	10.6	10.6	10.6	9.5	6.8	3.1	9.5	3	1.1	8.1	1	1	7.8	0.7	0.7
Horowhenua District	10.2	10.2	10.2	9.3	6.8	3.2	9.2	3.1	1.1	8	1	1	7.9	0.9	0.9
Hurunui District	16.9	16.9	16.9	16.6	16	15.2	16.5	15	14.5	15.9	14.1	14.1	15	13.2	13.2
Invercargill City	11.9	11.9	11.9	10.2	9	7.5	9.4	5.6	5.1	8.2	4	3.9	7.6	3.4	3.3
Kaikoura District	17.6	17.6	17.6	17.2	17	16.7	17	16.1	15.8	16.8	15.6	15.4	16.4	15.2	15.1
Kaipara District	10.9	10.9	10.9	10.3	8.7	6.2	10.3	6.1	4.2	9.1	4	4	8.6	3.7	3.6
Kapiti Coast District	11.8	11.8	11.8	11.3	11.2	11	10.9	9.7	9.2	10.2	8	7.9	9.2	6.8	6.6
Lower Hutt City	15.6	15.6	15.6	15.6	15.5	15.5	15.6	15.4	15.3	15.5	15.3	15.3	15.2	15	15
Manawatu District	10.4	10.4	10.4	9.5	7.1	3.7	9.4	3.4	0.8	8	0.6	0.6	7.8	0.4	0.4
Marlborough District	16.6	16.6	16.6	15.6	14.3	12.6	15.1	11.5	10.4	13.1	9.2	9.1	11.7	8	7.8
Masterton District	10.8	10.8	10.8	10.7	10.3	9.7	10.6	9.7	9.3	10.4	9.2	9.1	10.3	9	8.8
Matamata-Piako District	10.1	10.1	10.1	9	6	1.9	9	1.9	0	7.6	0	0	7.6	0	0
Napier City	5.2	5.2	5.2	4.1	3.4	2.2	3.5	1.9	1.1	2.7	0.9	0.9	2.4	0.6	0.6
Nelson City	14	14	14	13.9	13.4	12.8	13.7	12.8	12.6	12.3	11.2	11.2	11.4	10.4	10.4
New Plymouth District	11.4	11.4	11.4	11.3	11.1	10.7	11.3	10.8	10.5	11.2	10.4	10.4	10.9	10.1	10.1
Opotiki District	14.5	14.5	14.5	14.3	13.7	12.9	14.1	12.8	12.1	13.5	11.7	11.7	12.6	10.9	10.9
Otorohanga District	15.7	15.7	15.7	15.6	15.1	14.5	15.6	14.7	14.3	15.3	14.2	14.1	14.7	13.6	13.4
Palmerston North City	12.1	12.1	12.1	11.1	8.3	3.7	11.1	3.7	0	9.9	0	0	9.9	0	0
Porirua City	13.6	13.6	13.6	13.5	13.5	13.4	13.5	13.4	13.4	13.3	13.1	13.1	13.1	13	13
Rangitikei District	9.5	9.5	9.5	9	7.4	4.8	9	4.9	2.9	8.2	2.9	2.9	7.5	2.1	2.1
Selwyn District	11.9	11.9	11.9	10.4	7.2	3	10.1	2.6	0.6	8.2	0.4	0.3	7.8	0.1	0.1
South Taranaki District	9.9	9.9	9.9	9.8	9.7	9.4	9.8	9.4	9.2	9.7	9.1	9.1	9.4	8.8	8.8
South Wairarapa District	11.1	11.1	11.1	9.9	7.8	4.8	8.9	4	2.1	7.2	1.8	1.8	6.5	1.4	1.4
Southland District	12.3	12.3	12.3	10.6	10	9.2	9.6	6.8	6	8.5	4.9	4.3	8.1	4.3	3.5
Tararua District	11.4	11.4	11.4	11.4	11.3	11.3	11.4	11.3	11.3	11.3	11.2	11.2	11.2	11.1	11
Tasman District	18.7	18.7	18.7	18.2	17.7	17	17.8	16.3	15.7	15.4	13.6	13.4	13.3	11.4	11.1

Sea-level rise:	0	0.5	1.0	1.5	2.0										
Tauranga City	14.6	14.6	14.6	14	12.8	10.8	13.7	10.4	9.6	12	8.3	8.3	10.4	6.6	6.6
Thames-Coromandel District	13.8	13.8	13.8	13.3	12.2	10.6	13.3	10.5	9.6	12.3	9.2	9.2	11.7	8.5	8.5
Timaru District	15.3	15.3	15.3	13.7	12.1	9.9	13.2	7.9	6.2	11.4	5.1	5	10.5	4.1	4
Waikato District	10.7	10.7	10.7	9.9	8.3	6.2	9.8	6	5.1	8.8	4.8	4.8	8.6	4.6	4.6
Waimakariri District	12.7	12.7	12.7	11.2	8.2	4.2	10.9	3.5	1.4	9	0.9	0.9	8.4	0.5	0.5
Waimate District	19.3	19.3	19.3	18.2	17.2	15.9	17.1	13.6	12	14.9	9.4	8.7	13.4	6.1	6
Wairoa District	12.3	12.3	12.3	12	11.4	10	11.7	9.7	8.7	11.2	8.4	7.1	10.7	7.6	4.7
Waitaki District	16.6	16.6	16.6	16.2	16.1	16	15.8	15.1	14.7	15	13.9	13.7	14.4	12.8	12.5
Waitomo District	14	14	14	13.8	13.5	12.9	13.9	13	12.7	13.7	12.7	12.4	13.6	12.5	12.2
Wellington City	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6
Western Bay of Plenty District	11.8	11.8	11.8	11.1	9.7	7.8	11.1	7.8	7.5	8.8	5.9	5.9	8	5.1	5.1
Westland District	17.2	17.2	17.2	16.8	16.2	15.3	16.1	14.6	13.6	15.1	13	12.1	14	11.7	10.2
Whakatane District	11.7	11.7	11.7	10.7	8.2	4.6	10.7	4.6	2.1	9.4	1.9	1.9	9.1	1.6	1.6
Whanganui District	11.6	11.6	11.6	11.6	11.6	11.5	11.6	11.5	11.5	11.5	11.5	11.5	10.5	10.4	10.4
Whangarei District	10.9	10.9	10.9	10.7	9.9	8.7	10.6	8.7	8	9.5	7.3	7.3	9.1	6.9	6.9

Table D-10: Coastal dry matter production for Lower groundwater model uncertainty. Units tons per hectare per year.

Sea-level rise:	0	0.5	1.0	1.5	2.0										
WTRSLR :	0.1	0.5	0.9	0.1	0.5	0.9	0.1	0.5	0.9	0.1	0.5	0.9	0.1	0.5	0.9
Ashburton District	20	20	20	19.5	19.1	18.4	19.4	17.7	17.2	18.1	15.9	15.7	16.6	14.2	13.5
Auckland	12.4	12.4	12.4	12.1	11.7	11.1	12	10.8	10.2	10.3	8.6	8.5	9.3	7.6	7.3
Buller District	15.1	15.1	15.1	14.5	13.7	12.5	14.4	12.3	11.3	13.5	10.9	9.9	12.8	9.9	8.3
Carterton District	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.7	12.7	12.5	12.1	12.1	11.3
Central Hawke's Bay District	11.8	11.8	11.8	11.8	11.5	11	11.7	10.9	10.6	11.6	10.5	9.6	11.5	10.3	7.7
Christchurch City	15.8	15.8	15.8	14.7	13.4	11.8	13.2	9.5	8.2	10.4	6.3	5.7	9.1	4.4	3.8
Clutha District	16.8	16.8	16.8	16.4	15.8	14.9	16.1	14.1	12.6	15.3	11.9	7.6	14.9	10.2	4.5

Sea-level rise:	0	0.5	1.0	1.5	2.0										
Dunedin City	18.5	18.5	18.5	17.2	17	16.6	15.5	14.3	13.1	12.6	10.6	9.8	11.2	7.3	6.4
Far North District	14	14	14	13.5	13.3	13	13.2	12	11.5	12.2	10.3	10	11.1	9	8.7
Gisborne District	15.7	15.7	15.7	15	14.6	14	14.4	12.9	12	13.5	11	10.4	12.7	9.3	8.6
Grey District	13.6	13.6	13.6	13.4	13	12.5	13.4	12.4	12	13.2	11.9	11.8	12	10.7	10.5
Hastings District	9	9	9	8.5	8.3	8	8.1	7	6.5	7.2	5.8	5.6	6.6	4.5	3.6
Hauraki District	11.6	11.6	11.6	10.2	8	4.9	9.8	3.9	2.1	8.3	1.4	1.3	7.9	0.8	0.8
Horowhenua District	12.6	12.6	12.6	11.3	10.2	8.6	10.3	6.4	5.1	9	3.4	3.3	8.7	2.8	2.6
Hurunui District	17.7	17.7	17.7	17.1	16.9	16.6	16.9	15.7	15.2	16.2	14.8	14.6	15.2	13.5	13.4
Invercargill City	13.6	13.6	13.6	12.7	12.2	11.6	11.7	9.8	9.1	10	7.3	6.7	8.7	5.3	4.9
Kaikoura District	17.9	17.9	17.9	17.8	17.7	17.7	17.6	17.4	17.3	17.5	17	16.7	17.1	16.4	15.8
Kaipara District	11.6	11.6	11.6	10.6	9.4	7.6	10.4	6.4	4.6	9.2	4.3	4.2	8.7	3.9	3.8
Kapiti Coast District	11.6	11.6	11.6	11.5	11.4	11.1	11.3	10.8	10.6	10.7	9.3	9.3	9.7	7.9	7.7
Lower Hutt City	15.6	15.6	15.6	15.6	15.6	15.6	15.6	15.6	15.5	15.6	15.5	15.5	15.2	15	15
Manawatu District	11.6	11.6	11.6	10.3	8.8	6.8	9.8	4.7	2.6	8.3	1.5	1.4	8	1	0.9
Marlborough District	17.9	17.9	17.9	17	16.2	15.3	16.1	13.7	12.8	13.7	10.7	10.1	11.8	8.5	8.3
Masterton District	11	11	11	10.9	10.7	10.4	10.9	10.3	10	10.7	10	9.5	10.6	9.8	8.8
Matamata-Piako District	11.5	11.5	11.5	9.8	7.6	4.4	9.4	3.1	1.3	7.9	0.7	0.5	7.7	0.2	0.2
Napier City	5.5	5.5	5.5	4.2	3.8	3	3.5	2.1	1.4	2.8	1.1	1.1	2.4	0.6	0.6
Nelson City	14.6	14.6	14.6	14	13.9	13.7	13.7	12.8	12.5	12.3	11.2	11.2	11.4	10.4	10.4
New Plymouth District	11.6	11.6	11.6	11.6	11.5	11.4	11.6	11.3	11.3	11.4	11.2	11.2	11.1	10.8	10.8
Opotiki District	14.8	14.8	14.8	14.5	14	13.5	14.2	13.1	12.4	13.5	11.9	11.9	12.6	10.9	10.9
Otorohanga District	16	16	16	15.8	15.6	15.2	15.8	15.2	14.8	15.6	14.7	14.3	15	14	13.4
Palmerston North City	14.4	14.4	14.4	14	13.4	12.4	13.9	11.7	10.5	13.1	10	10	12.8	8.5	8.5
Porirua City	13.6	13.6	13.6	13.6	13.6	13.6	13.6	13.6	13.6	13.3	13.1	13.1	13.1	13	13
Rangitikei District	11.1	11.1	11.1	9.6	9.3	8.9	9.1	5.5	3.7	8.4	3.3	3.2	7.5	2.3	2.3
Selwyn District	13.5	13.5	13.5	11.2	8.8	5.6	10.5	3.5	1.5	8.4	0.9	0.9	8	0.4	0.2
South Taranaki District	10	10	10	9.9	9.8	9.6	9.9	9.6	9.4	9.7	9.3	9.3	9.5	9.1	8.9

Sea-level rise:	0	0.5	1.0	1.5	2.0										
South Wairarapa District	12.5	12.5	12.5	10.9	9.5	7.7	9.2	5.1	3.5	7.4	2.2	2.1	6.7	1.8	1.6
Southland District	12.8	12.8	12.8	12.5	12.1	11.7	11.8	10.6	9.6	10	8	6.6	8.8	5.6	4.5
Tararua District	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.3	11.2	11.2	11.1
Tasman District	19	19	19	18.5	18.2	17.8	18	16.8	16.3	15.6	14.1	13.8	13.5	11.7	11.2
Tauranga City	15.3	15.3	15.3	14.6	14	13	14.1	11.6	10.9	12.4	9.4	9.2	10.6	7.1	7
Thames-Coromandel District	14.6	14.6	14.6	13.8	13.2	12.4	13.4	11.2	10.4	12.4	9.4	9.4	11.7	8.5	8.5
Timaru District	17	17	17	15.5	14.8	13.9	14.3	11.1	9.9	12.1	7	6.7	10.8	4.8	4.4
Waikato District	11.7	11.7	11.7	10.8	9.7	8.3	10.2	7.2	6.5	9.1	5.5	5.4	8.7	4.9	4.8
Waimakariri District	13.7	13.7	13.7	11.9	9.4	6.1	11.5	4.7	2.7	9.4	2	1.9	8.5	0.8	0.8
Waimate District	19	19	19	18.2	17	15.2	17.7	14.1	12.8	16.3	11.6	11	15.1	9.5	8.1
Wairoa District	12.4	12.4	12.4	12.2	11.9	11.1	12	10.9	10.3	11.6	9.9	9.3	11.1	9.2	7.9
Waitaki District	16.7	16.7	16.7	16.6	16.6	16.6	16.6	16.5	16.4	16.3	16.2	16.1	15.7	14.8	13.1
Waitomo District	14.3	14.3	14.3	14.2	14	13.7	14.2	13.7	13.4	14.1	13.4	12.8	14	13.1	12.2
Wellington City	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6
Western Bay of Plenty District	12	12	12	11.4	10.1	8.3	11.2	8.1	7.9	9	6.3	6.2	8.1	5.4	5.3
Westland District	17.4	17.4	17.4	17	16.5	15.8	16.3	15.1	14.2	15.4	13.6	12.5	14.2	12.2	10.4
Whakatane District	11.8	11.8	11.8	10.8	8.3	4.7	10.8	4.6	2.2	9.4	2	1.9	9.2	1.7	1.7
Whanganui District	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.5	11.5	11.5	11.5	10.5	10.5	10.4
Whangarei District	11.6	11.6	11.6	11.2	11	10.6	10.9	9.7	9.2	9.9	8.2	8.1	9.4	7.6	7.5

Appendix E Soil type description

Table E-1: Soil type used for pasture production modelling.

Territorial Authorities	Regional Council Boundaries	Closest Modelled Soil Region by expert	Judgement Pick
Far North District	Northland Region	Northland Region	
Whangarei District	Northland Region	Northland Region	
Kaipara District	Northland Region	Northland Region	
Auckland	Auckland Region	No experiment data available	Northland Region
Thames-Coromandel District	Waikato Region	Waikato Region	
Hauraki District	Waikato Region	Waikato Region	
Waikato District	Waikato Region	Waikato Region	
Matamata-Piako District	Waikato Region	Waikato Region	
Hamilton City	Waikato Region	Waikato Region	
Waipa District	Waikato Region	Waikato Region	
Otorohanga District	Waikato Region	Waikato Region	
South Waikato District	Waikato Region	Waikato Region	
Waitomo District	Waikato Region	Waikato Region	
Taupo District	Waikato Region	Waikato Region	
Western Bay of Plenty District	Bay of Plenty Region	Bay of Plenty Region	
Tauranga City	Bay of Plenty Region	Bay of Plenty Region	
Rotorua District	Bay of Plenty Region	Bay of Plenty Region	
Whakatane District	Bay of Plenty Region	Bay of Plenty Region	
Kawerau District	Bay of Plenty Region	Bay of Plenty Region	

Opotiki District	Bay of Plenty Region	Bay of Plenty Region	
Hastings District	Hawke's Bay Region	No experiment data available	Manawatū-Whanganui Region
Napier City	Hawke's Bay Region	No experiment data available	Manawatū-Whanganui Region
Wairoa District	Hawke's Bay Region	No experiment data available	Manawatū-Whanganui Region
Central Hawke's Bay District	Hawke's Bay Region	No experiment data available	Manawatū-Whanganui Region
Gisborne District	Gisborne Region	No experiment data available	Bay of Plenty Region
New Plymouth District	Taranaki Region	No experiment data available	Manawatū-Whanganui Region
Stratford District	Taranaki Region	No experiment data available	Manawatū-Whanganui Region
South Taranaki District	Taranaki Region	No experiment data available	Manawatū-Whanganui Region
Ruapehu District	Manawatū-Whanganui Region	Manawatū-Whanganui Region	
Whanganui District	Manawatū-Whanganui Region	Manawatū-Whanganui Region	
Rangitikei District	Manawatū-Whanganui Region	Manawatū-Whanganui Region	
Manawatu District	Manawatū-Whanganui Region	Manawatū-Whanganui Region	
Palmerston North City	Manawatū-Whanganui Region	Manawatū-Whanganui Region	
Tararua District	Manawatū-Whanganui Region	Manawatū-Whanganui Region	
Horowhenua District	Manawatū-Whanganui Region	Manawatū-Whanganui Region	
Kapiti Coast District	Wellington Region	No experiment data available	Manawatū-Whanganui Region
Porirua City	Wellington Region	No experiment data available	Manawatū-Whanganui Region
Upper Hutt City	Wellington Region	No experiment data available	Manawatū-Whanganui Region
Lower Hutt City	Wellington Region	No experiment data available	Manawatū-Whanganui Region
Wellington City	Wellington Region	No experiment data available	Manawatū-Whanganui Region
Masterton District	Wellington Region	No experiment data available	Manawatū-Whanganui Region

Carterton District	Wellington Region	No experiment data available	Manawatū-Whanganui Region
South Wairarapa District	Wellington Region	No experiment data available	Manawatū-Whanganui Region
Tasman District	Tasman Region	No experiment data available	Canterbury Region
Nelson City	Nelson Region	No experiment data available	Canterbury Region
Marlborough District	Marlborough Region	No experiment data available	Canterbury Region
Buller District	West Coast Region	No experiment data available	Bay of Plenty Region
Grey District	West Coast Region	No experiment data available	Bay of Plenty Region
Westland District	West Coast Region	No experiment data available	Bay of Plenty Region
Ashburton District	Canterbury Region	Canterbury Region	
Timaru District	Canterbury Region	Canterbury Region	
Mackenzie District	Canterbury Region	Canterbury Region	
Waimate District	Canterbury Region	Canterbury Region	
Kaikoura District	Canterbury Region	Canterbury Region	
Hurunui District	Canterbury Region	Canterbury Region	
Waimakariri District	Canterbury Region	Canterbury Region	
Christchurch City	Canterbury Region	Canterbury Region	
Selwyn District	Canterbury Region	Canterbury Region	
Waitaki District	Otago Region	No experiment data available	Canterbury Region
Central Otago District	Otago Region	No experiment data available	Canterbury Region
Queenstown-Lakes District	Otago Region	No experiment data available	Canterbury Region
Dunedin City	Otago Region	No experiment data available	Southland Region
Clutha District	Otago Region	No experiment data available	Canterbury Region
Southland District	Southland Region	Southland Region	
Gore District	Southland Region	Southland Region	
Invercargill City	Southland Region	Southland Region	