Makarewa Headwaters Revival Project

Feral animal management in our catchment

PROJECT REPORT 2023

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www.thrivingsouthland.co.nz/makarewa-headwaters-revival-project

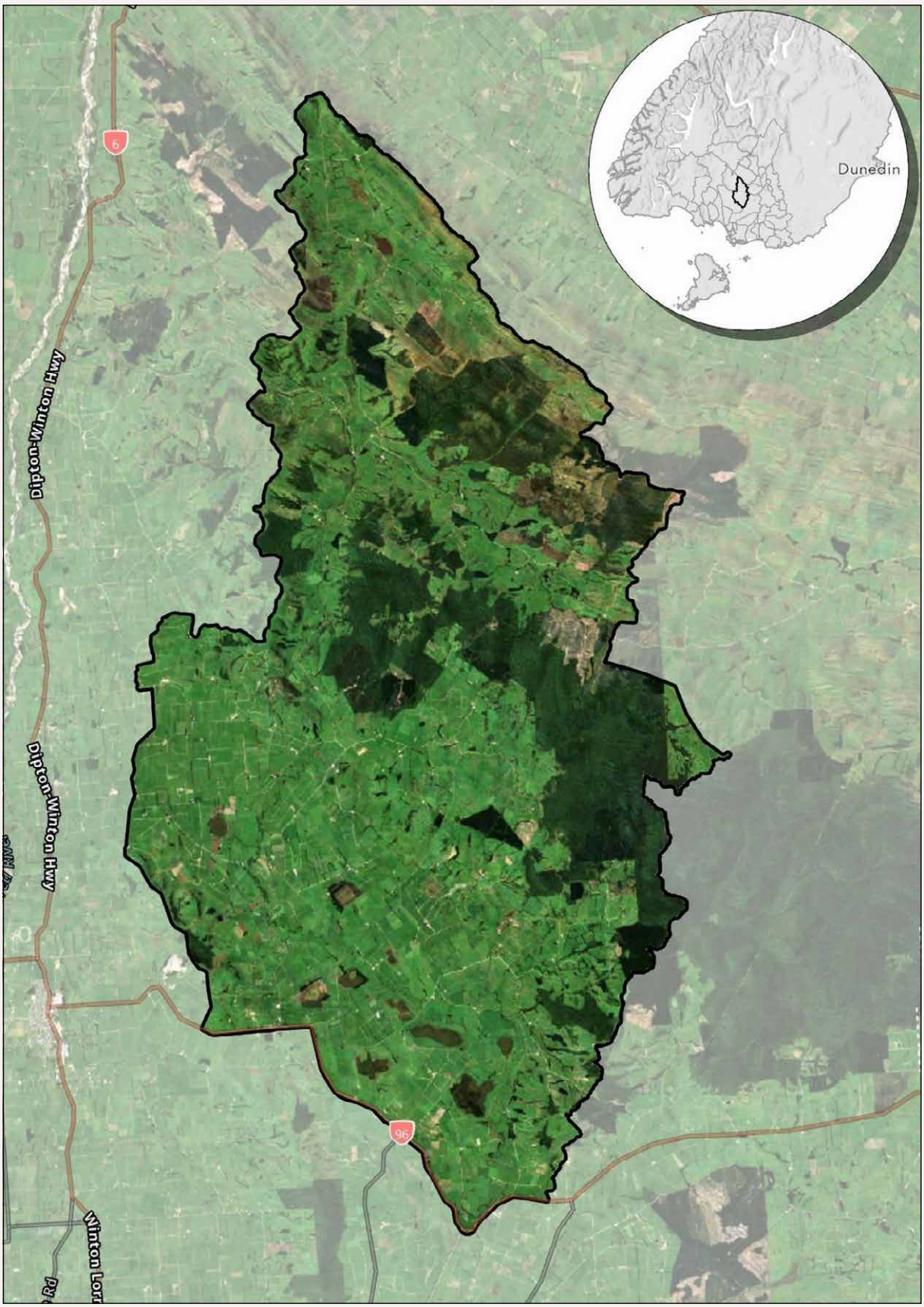
Thank you to the contributors to this report, and the wider Makarewa Headwaters catchment community who supported this project.

Report authors:

- Lumen Environmental Ltd
- Trap and Trigger Ltd
- Wildlands Consultants Ltd

Thank you to the committee members for their dedication and support of the project. Mark & Elspeth Thomson, Hamish Elder, Brett Frew, Paul & Margie Ruddenklau, Dan Frew, Nick & Alexis Wadworth and Andrew Cowie.

Special thanks to project manager Nicola Wylie. Also thanks to Sarah Thorne, Lee Cowan and the team at Thriving Southland.



Location of the Makarewa Headwaters Catchment Group

Map prepared by Wildlands consultants. Data Acknowledgement: Contains data sourced from the LINZ Data Service licensed for reuse under CC by 4.0.

Introduction

The Makarewa Headwaters Catchment Group, a local farmer-led Group, conducted a three-month feasibility study, thanks to funding from Thriving Southland, to understand the extent of the feral animal problem (including deer, pigs, goat, wild merino, wallabies – ungulate pests / those with cloven hooves) in the Hokonuis. They explored if the wider catchment felt these feral animals were a problem, and to gather knowledge and ideas around possible next steps.

The feasibility project had four elements, each conducted by a team of experts:

1. A community survey to understand the scale of the problem, the impact, what control methods are currently being used, and what forms of control works for us.
2. An aerial population survey of ungulates in the catchment, completed by Trap and Trigger Ltd.
3. A review of the financial and Greenhouse Gas impact of wild ungulates on the catchment, completed by Lumen Environmental.
4. A catchment review of the ungulate effects on indigenous biodiversity values, completed by Wildlands Consultants Ltd.

Why do we care

Feral animals are a problem. They cost us money through loss of crop and pastures, they pose significant disease risk to our livestock, destroy native vegetation and habitats, and they cause huge damage to our springs and creeks.

We can improve our biodiversity by reducing feral animals, we can protect our special plants / vegetation / flora in the Headwaters and we can build biodiversity corridors that last the generations. Farm-wise it means better run businesses – financially and environmentally – and improved farm systems.

Controlling the wild ungulate population will not only benefit farming landowners but will also have a significant benefit to flora and fauna in the area for our generation and future ones.

We also know that it's more cost effective to look after the existing natural habitats in the catchment, than creating new ones through planting projects. The findings from this project, reinforced what many of us already know – this catchment has amazing native habitats that need to be protected.

About the Makarewa Headwaters Catchment

The Makarewa Headwaters Catchment (the catchment) area is a total of 41,200 hectares. There are several land uses within the catchment, including drystock, dairy, and exotic forestry, with the most prominent land use being sheep, beef and deer farmland, making up 50% of the catchment area. While the native and exotic forest areas are vital parts of the ecosystem of the catchment, they also provide ideal habitats for wild ungulates to breed.

Significant areas of indigenous habitat (including podocarp forest, tussock, regenerating natives) remain in Upper Makarewa, reducing as you move south through the catchment.

Many intergenerational farming families live in the catchment running family-farms and proudly looking after biodiversity, alongside commercial forestry, public lands looked after by the Department of Conservation and Māori owned land blocks.

The landowner survey

In August and September 2023, we asked landowners in the Makarewa Headwaters catchment what they thought about the issues of feral animals on their land / in their area. The idea was to understand the scale of the problem, the impact and what control methods are currently being used. The following are a sample of the landowner survey findings.

93% of respondents are supportive of information gathering to understand the impact of feral animals in the catchment.

Over **30%** of respondents had noticed damage to fencing due to feral pigs or deer, costing them hours in repair work and some estimates were up to **$5000** in repairs per year.

Almost **two thirds** of respondents were concerned about the spread of diseases from feral pigs and deer, specifically tuberculosis spreading from deer to cattle.

Other concerns included the impact these feral animals have on water quality, bush decimation and regeneration and impact on indigenous species.

Almost **80%** of respondents were doing something to control these other feral animals, mostly through trapping and shooting.

Respondents were also concerned about other feral animals, with over **50%** of respondents concerned about feral cats, stoats, ferrets and possums. Fewer respondents rated hares, goats, hedgehogs, rats, wasps, rabbits and merino as a concern.

Over **30%** of respondents have made adjustments to their farming systems because of the increase in the number of feral animals, including growing more winter crop, putting kale near the bush as deer don't like it as much, fencing the bush line.

Deer

Over **85%** of respondents have feral deer coming onto pastures.

Over **65%** of respondents felt that deer were eating their winter crops.

How many deer varied significantly, and most were unsure of exact numbers, but most estimates ranged between **100-300** a year on farm.

Most respondents felt that the deer were spending at least **25-50%** of their time grazing on their or other farmer's pasture.

And over **90%** of respondents are currently hunting deer in the catchment and hunting is the main way that respondents controlled the number of deer (with a few also using helicopter culls, fencing, trapping and growing crops they don't like).

Pigs

Only **1** respondent had knowingly lost lambs to pigs

Respondents estimated anywhere between **0 and 200** pigs coming onto their land.

Respondents varied in how much damage they felt pigs did on their land annually, from none to 50ha of damage – mostly it was **2-5ha**.

Most respondents-controlled pig numbers through hunting, and some also used pig traps.

Over **90%** of respondents are currently hunting pigs in the catchment, culling anywhere between **none and 170**.

In general, respondents noticed that areas damaged could be reestablished into pasture within **3-6 months**.

An aerial population survey of ungulates in the catchment

Completed by Trap and Trigger Ltd

The helicopter survey took place in August 2023 with good thermal conditions. Due to the vegetation type across a lot of the project area and funding, estimations were required to gauge ungulate densities.

A total of 561 wild ungulates were identified through the thermal imagery. **This translated to a total population of 7,600** when adjusted for density and the survey confidence levels.

The split of the ungulate population was 71% deer, 25% pigs and 4% wild Hokonui Merino. Densities ranged from 5 ungulates per hectare to 1 ungulate per 5 hectares.

There was a large amount of damage seen throughout the catchment that aligned with ungulates seen with the thermal camera.

The damage was in the form of large deer pads, pig rooting and areas where the forest canopy could be seen to have collapsed and nothing but bare dirt to be seen underneath, suggesting ungulate densities were so high that it was not allowing for any regeneration to take place.

Feral ungulates were detected across the project area, but their densities varied, typically correlating with the specific vegetation and habitat type present. Whenever suitable habitat existed, the presence of feral ungulates was nearly guaranteed.

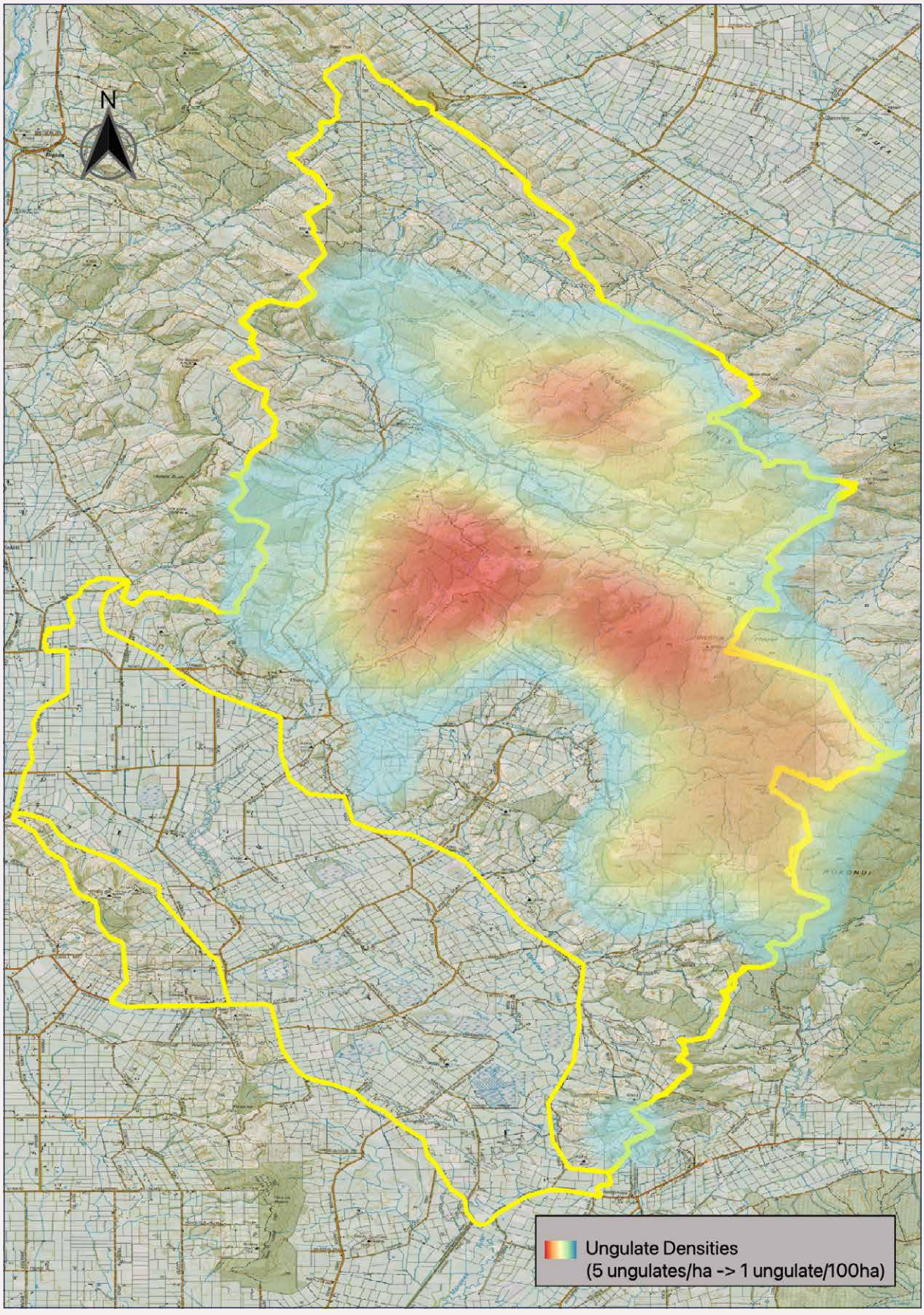
There is a core channel through the project area that contains very high densities of both feral pigs and deer.

Feral deer, particularly red deer, were the most prevalent species and seemed to occupy a wide range of habitats within the project area.

Feral pigs ranked as the second most dominant species with concentration in the scrublands, while feral sheep were found in isolated pockets, and no feral goats were identified.

A notable finding is the diversity of environmental challenges and species encountered, indicating that there is no one-size-fits all approach to managing feral ungulates in this project area.

Feral ungulate predictions



Map supplied by Trap and Trigger.

A review of the financial and Greenhouse Gas impact of wild ungulates on the catchment

Prepared by Victoria Bishop, Lumen Environmental

The estimated total catchment cost of all feed lost to deer and pigs is 8,136,661 kg DM and the estimated financial cost is $1,640,458 of both feed and greenhouse gas.

Additional costs relating to pig damage to pasture and feed consumed by Hokonui Merino, take the total estimated cost on the catchment to **$2,048,560** per year.

	Number of Animals	Kg DM feed	T GHG (CO2 -e)	COST		
				Lost feed	HWEN tax	Total
Deer	7,105 (5409 observed + 1700 culled)	6,805,440	3,157	$1,361,088	$13,854	$1,374,942
Pigs	2,940 (1,900 observed + 1,040 culled)	1,331,221	0.845	$265,244	$272	$265,516
Pig damage	2,940	1,883,952	-	$376,790	-	$376,790
Hokonui Merino	298	154,980	71	$30,996	$316	$31,312
Total	**10,045**	**10,020,613**	**3,158**	**$2,003,122**	**$14,126**	**$2,048,560**

**Note pig rooting damage is taking the assumptions made in section 4.2.*

The key findings include:

The total impact on the catchment for both feed consumed, damaged and GHG emissions is estimated to be **$2,048,560** per year.

The financial burden to the farmland area (28,100ha) in the catchment from deer, Hokonui Merino, pig feed consumption and pig rooting damage is **$25.60/ha.**

The total greenhouse gas emissions cost from ungulates is estimated to be **$14,126** under the HWEN pricing.

The impact to farmland from a feed intake perspective equates to the same amount of feed consumed by 5,082 ewes at a liveweight of 65kg lambing 130%.

Deer

The total cost of feed consumed by the deer population within the catchment is estimated to be $1,374,942 per year. The average consumption by one deer is the equivalent to: 3.8 bales of baleage at 280 kg DM per bale; or the equivalent to 1.5 ewes weighing 68kg lambing 130%.

Pigs

The estimated total cost of feed consumed by the pig population within the catchment is $265,244. The financial burden of feed consumed by pigs on farmland in the catchment is estimated to average $1.20/ha. If 17% of a pig's intake comes from farmland that would equate to enough feed for 341 Stock unit equivalents or 633 bales of baleage at 280kg DM per bale.

The average pig rooting damage per pig is 0.16ha. The cost of pig rooting damage to both pasture production lost and the reduction in growth for the remainder of the season equates to $1,058/ha for the first year.

Hokonui Merino

The cost of feed consumed on farmland by wild Hokonui Merino is $6,800/year. The total impact to the catchment is $31,312 in feed and GHG emissions.

Image courtesy Ava & Mark Hunt, Rarebreeds.co.nz

Please note: some assumptions were made: Cost of feed has been assumed at $0.20/ kg DM, representing a combination of costs including supplements, winter forages and summer pasture across a range of livestock enterprises. Green House Gas (GHG) emission costs are based on the initial He Waka Eke Noa (HWEN) costings which are $0.11 per kg CH4 and $4.25 per Tonne of N2O and CO2.

Also for consideration is the financial impact of rebuilding fences; the wellbeing impact on the farm team and businesses, and the time it takes to co-ordinate hunters and pest management.

A catchment review of the ungulate effects on indigenous biodiversity values

Prepared by Kelvin Lloyd, Wildlands

Our environmental check-up showed that we have some special habitats in our area, which means that our indigenous forest and scrub is ecologically important, particularly in the western end of the Hokonui Ecological District.

Mature forests on Lora Glen and Highfield are particularly impressive in supporting large emergent podocarps and diverse broadleaved canopies. This is despite a very high level of feral ungulate that browse in these forests, and that are currently preventing regeneration of palatable indigenous tree species. The ecological functions of these forests can be significantly enhanced by effective feral ungulate control or exclusion of feral ungulates.

Regenerating forests on Bare Hill and Moss Burn Ridges are also important in enabling a degree of regeneration of palatable indigenous trees that are scarce in the mature forests, and by including riparian kōwhai treelands which are key sources of food for seed-dispersing indigenous avifauna. Soil exposure along deer tracks in these regenerating forests is considerable, and if this bare soil is washed into headwater streams this may have downstream effects on freshwater habitat quality.

Plate 8: Heavy bark-stripping of kāpuka/broadleaf at Site 7.

Plate 11: Heavy tracking by deer beneath inaka scrub at Site 14. Some browse damage to harakeke is visible at left.

Deer browse and bark stripping

Variations in the intensity of deer browse are evident, with dense regenerating forest and scrub, steep streamside locations, and arboreal sites the only places where palatable tree species such as kāpuka, kōhūhū, three finger, and kōtukutuku are regenerating.

Mature forests exhibit a long history of ungulate browse, lack a shady subcanopy, and are relatively well-lit and open to walk through. **This does not represent a natural state.**

The effect of deer browse is not just on foliage, with many young kāpuka, three finger, and wineberry trees damaged by stripping of bark in the regenerating forests.

Palatability scale

The local palatability of plant species found in the project area is summarised in the table, but it doesn't consider the additive effects of multiple herbivores. Feral ungulates browse the most preferred plant species first, then when it is eliminated, move on to the next most preferred. In sites where low palatability species such as Crown fern* are heavily browsed and this means that species of higher palatability will be absent or present only in habitats that deer can't access.

Species	Common Name	Palatability
Griselinia littoralis	Kāpuka/broadleaf	Very high
Pseudopanax colensoi	Three finger	Very high
Asplenium bulbiferum	Hen and chicken fern	High
Fuchsia excorticata	Kotukutuku	High
Myrsine australis	Māpou	High
Pittosporum eugenioides	Tarata	High
Pittosporum tenuifolium	Kōhūhū	High
Schefflera digitata	Patē/seven finger	High
Carpodetus serratus	Piripriwhata/marble leaf	Moderate
Polystichum vestitum	Shield fern	Moderate
Pseudopanax crassifolius	Horoeka/lancewood	Moderate
Aristotelia serrata	Makomako/wineberry	Low
*Lomaria discolor	Crown fern	Low
Metrosideros umbellata	Southern rata	Low
Pennantia corymbosa	Kaikomako	Low
Plagianthus regius	Manatu/Lowland ribbonwood	Low
Sophora microphylla	Kōwhai	Low
Coprosma spp.	Small-leaved coprosma spp.	Very Low
Coprosma rotundifolia		Very Low
Cyathea smithii	Katote/soft tree fern	Very Low
Dacrycarpus dacrydioides	Kahikatea	Very Low
Dacrydium cupressinum	Rimu	Very Low
Prumnopitys taxifolia	Matai	Very Low
Pseudowintera colorata	Horopito	Very low

Soil disturbance

Feral deer have sharp hooves and tend to cut up the soil and expose it to erosion during rain events. This is particularly likely where deer tracks are adjacent to streams. Heavy deer tracking was observed in the regenerating forests in the north of the project area.

Provision of habitat

The mature forests on Lora Glen and Highfield, which are affected significantly by feral deer browse, still function as important habitat for indigenous avifauna, because a diverse canopy is present in these forests, and some regeneration of unpalatable trees such as makomako is present.

Riparian treelands dominated by kowhai in the northern part of the project area are also important in this respect. Key trees in these forests and treelands are kōtukutuku, kāpuka, kowhai, rata, and podocarps, as these provide fruit and/or nectar resources that are important for indigenous birds.

These avifauna species are in turn important for the dispersal of indigenous trees, by passing seeds from consumed fruit. Podocarps do not fruit every year, so the fruit provided by other broadleaved trees, which fruit every year is important.

Most indigenous trees are long lived. Those with a short lifespan of 60-120 years are typical of early successional species such as makomako and kōhūhū. Most broadleaved trees have lifespans of several hundred years, and podocarps have lifespans of up to 1,000 years. Thus, most trees have plenty of time to replace themselves by recruiting new individuals.

Tipping points

Tipping points are reached when palatable species are no longer available to produce seed.

The closest tree to a tipping point is kāpuka in the mature forest at Highfield, as most of the kāpuka observed in this forest were older trees that were becoming moribund and will likely die within the next ten years or so.

Some palatable trees have become very rare in the mature forests, and this includes three finger and horoeka. Luckily, these species are more common in the regenerating forests on Bare Hill and Moss Burn Ridges.

Hupiro/stinkwood was only rarely seen in mature forest and only in sites inaccessible to deer. It is close to a tipping point because recruitment of this species now depends on widely scattered individuals. Importantly, hupiro occupies the browse tier and cannot grow tall enough to escape deer browse.

The situation is different for taller palatable tree such as kāpuka, kōtukutuku, and tarata. These only need control of deer for a long enough period to enable saplings to grow into trees that exceed deer browse/damage height. These will then form a shady subcanopy and have a long future as canopy trees.

Our Next Steps / Recommendations

The following recommendations are from our report writers and will be considered by the Makarewa Headwaters Catchment Group as they review next steps.

- Establish one or more deer exclusion areas by deer fencing an area of mature forest.
- Monitoring using permanent vegetation plots following robust methodology would provide high quality data on vegetation response to feral ungulates.
- Photopoints set up now and re-photographed in the future once intensive feral ungulate control commences.
- Monitoring of indigenous fauna.
- For taller palatable trees, intensive feral ungulate control could be pulsed in different parts of the project area at different times. Pulses of intense control of 10-15 years duration may be sufficient for regenerating palatable trees to exceed deer damage height.
- Create a clearly defined goal that the Makarewa Headwaters Catchment Group are looking to achieve from the control phase of the project. E.g measurable forest health outcomes, water quality outcomes alongside determining the required ungulate densities to meet these goals.
- Engage all affected stakeholders within the catchment and most importantly stakeholders who have moderate to high density ungulate numbers within their property.
- Engage and educate landholders.
- Produce an ungulate management strategy.

Image courtesy of Trap and Trigger Ltd.

While Phase 1 of the Project has been focused primarily on understanding the problem and creating awareness, the next phase of this project will build on learnings and shift gear towards managing the problem.

While we are still in the planning phases, and seeking funding opportunities, phase 2 will likely include:

- Reduction of feral ungulate populations throughout the catchment.
- Investigating opportunities for marketing of wild game (as a catchment or in partnership with other organisations).
- Ensuring we capture the feral population and utilise as a valuable resource wherever we can
- Review of current legislation, consents required etc.
- Monitoring programme established to review progress (in line with consultant recommendations), particularly with regards to ecosystem health and sustainability.
- Investigate trap designs and options.
- Extension opportunities with community and industry organisations.
- Continue to come together as a community to raise awareness and tackle the problem.

Keep in touch with updates on this project by following us on **www.facebook.com/makarewa.headwaters** and on **www.thrivingsouthland.co.nz/makarewa-headwaters-revival-project**

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