



Simons Pass Station Ltd

Lizard Baseline Surveys,
Simons Pass Dryland Reserve

February 2018

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Prepared for Simons Pass Station Ltd

by

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Cover page: Typical rock habitat of Simons Pass Dryland Reserve.

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1. Introduction

The Simons Pass Dryland Reserve (c. 2500 ha) was created as environmental mitigation for the consented intensification of Simons Pass and Simons Hill Stations. As conditions of Environment Canterbury consents (clause 86 of CRC062867/CRC082311) ‘baseline surveys for birds, lizards and invertebrates’ are required. This report documents surveys, including methods and results, of lizard baseline surveys undertaken in November 2017. This report also contains a context section, and a section with suggestions for achieving the recovery of the lizard values over the Dryland Reserve, by restoration management.

2. Context

Conservation Resources Reports

Tenure review surveys of the Simons Pass Pastoral Lease¹ (field surveys for lizards were undertaken 2-4th October 2006), and of Simons Hill Pastoral Lease in 2001², resulted in Conservation Resources Reports that documented lizard values across the Station, including the Simons Pass Dryland Reserve. The Conservation Resources reports noted the presence of the ubiquitous McCann’s skink (*Oligosoma maccanni*) and the Southern Alps gecko (*Woodworthia* “Southern Alps”), and the patchy occurrence of the common (Canterbury grass) skink and spotted (MacKenzie Basin) skink.

The Simons Hill pastoral lease report noted “there are some historical records of large skinks from the eastern slopes of the hill bordering the Tekapo River” and commented that these animals “were probably spotted skinks”, but results of the baseline surveys carried out here, and reported on below, indicate that it is more likely these animals are the threatened ‘Nationally Vulnerable’ scree skinks, *Oligosoma waimatense* (Section 4).

The Simons Pass pastoral lease report noted the presence of the ‘At Risk Declining’³ Canterbury grass skink at three locations; in terminal moraine and ephemeral wetland habitat of the upper downs; in the extensive area called “mid-flats” and in

¹ DOC Conservation Resources Report on Tenure Review of Simons Pass Pastoral Lease. Report No. DOCDM-93810. October 2007.

² Report on Tenure Review of Simons Hill Pastoral Lease. Report No. CHCCO-30827.

³ Conservation status of New Zealand reptiles, 2015. By Rod Hitchmough, Ben Barr, Marieke Lettink, Jo Monks, James Reardon, Mandy Tocher, Dylan van Winkel and Jeremy Rolfe. New Zealand Threat Classification Series 17. 14 p.

eastern boulder fields and talus of the terraces bordering the Tekapo River. Of particular importance, spotted skinks (now known to be the Naturally Vulnerable¹ MacKenzie Basin skink, *Oligosoma prasinum*, as per Melzer *et al.* 2017⁴) were recorded 1.3km north of the north-western boundary of the Dryland reserve.

In terms of abundance and geographic spread, very little detail was provided for Simons Pass Pastoral Lease, except for MacKenzie Basin skinks, where it was reported that “time was spent searching the talus [of the Pukaki River Low Terraces, Gully and Terrace Faces] for basking lizards around mid-day. Five spotted skinks (Gradual Decline) were found”.

The Simons Hill Pastoral Lease conservation resources report notes that McCann’s skinks were “widely distributed but nowhere common”; Southern Alps gecko were commonly found especially of rocky outcrops; and the Canterbury grass skink were found on terminal moraine habitats and ephemeral wetlands. No images were provided to verify the identity of the Canterbury grass skink, that superficially resemble the more abundant McCann’s skink, but the habitat description does indicate that they were indeed present, and in the case of the Simons Pass, surveys were undertaken by an experienced observer.

Scree skinks were commented on in the Simons Hill pastoral lease conservation resources report as “possibly present”, but it was noted that “recent surveys have failed to locate them”.

Report of ‘Assessment of Environmental Effects’ (AEE)

Dr Vaughan Keesing, Boffa Miskell Limited, collected information on the lizard values of both the Simons Pass and Simons Hill stations over the summer of 2012-2013. Lizard surveys were carried out in four vegetation types that had been identified by Professor Norton, University of Canterbury. Lizard surveys involved a combination of day searches, and 1-hour of night searching of matagouri. Two species were recorded: Southern Alps gecko and McCann’s skink; and it was suggested that the Canterbury grass skink was amongst skinks sighted but not captured. In total 36 (5-minute) searches were carried out over four vegetation types as follows:

⁴ Melzer *et al.* 2017. Hidden conservation vulnerability within a cryptic species complex: taxonomic revision of the spotted skink (*Oligosoma lineoocellatum*; Reptilia: Scincidae) from New Zealand. Zootaxa 4300 (3). Pages 356-379. This paper identifies populations of the *O. chloronoton*/*O. lineoocellum* complex south of, but close to, Lake Tekapo as a gap in the current knowledge; populations in this area could be either species, or a combination of both. The Pukaki River is a likely boundary between the two lineages.

- Oversown pasture – Norton’s Group 6 (developed grassland on moraine with strong grass and/or clover growth). Dominance of a few exotic species including white clover (52%), browntop (24%) and sweet vernal (29%).
- tussock grassland – Norton Group 5 (with a discernible abundance of hard tussock).
- *Hieracium*-tussock – Norton Group 4, depleted grassland with grasses consistently present in all plots but with a low total cover (<10%).
- *Hieracium*-bare ground – Norton’s Group 2. This is a *Hieracium* dominated herbfield with very sparse sweet vernal and *Carex breviculmis*.

Dr Keesing concluded that McCann’s skinks were “not abundant but widely distributed” and the Southern Alps gecko was “abundant and specific to rocky out crops”.

Dr Keesing also noted “there is a strong pattern of greater skink and gecko numbers northwards above the “necklace”, with few found around the necklace and none southward of the moraine fields in the *Hieracium*-bare ground. However, we do know that skinks are out on the outwash plains based on an observation by Dr Sanders during his bird surveys (associated with a cut down pine). Night spotlighting (one hour searching) in the matagouri shrubs of the central farm did not return any confirmed taxa, although one gecko was spotted at a distance but not caught.”

Department of Conservation ‘Herpetofauna database’

The lizard records from the 2007 Tenure Review survey of Simons Pass, carried out by Mr Simon Elkington (DOC) were forwarded to the DOC Herpetofauna database. These were the only records in Herpetofauna pertaining to the Simons Pass Dryland Reserve. Within 10km from the centre of the reserve, common skinks have been reliably recorded⁵ elsewhere e.g. on Te Kohai Island, Lake Pukaki, and both scree skink and Lakes skinks have been found on Glencairn Station, near Lake Benmore. Jewelled geckos have been reported from Boundary Stream, Ben Ohau Range, 17.5 km north of the northern tip of the Dryland Reserve.

⁵ Due to the long history of herpetofauna surveys in the District where two species of skinks were considered a single species and the difficulty in separating the species by their physical appearance I consider only a handful of observers in New Zealand able to provide a “reliable” record of the Canterbury grass skink.

Conservation of Lizards in Canterbury Conservancy (2008)⁶

The 'lizard action plan of Canterbury' confirms that McCann's skinks are generally more numerous than the Canterbury grass skink (referred to as "common skink") in arid parts of the Twizel area, such as the Mackenzie Basin, and including the Simons Pass Dryland Reserve considered here (Whitaker 2008).

In the case of the MacKenzie Basin skinks, although the nomenclature has evolved since 2008, the populations within the Simons Pass Dryland Reserve represent the southern limit of the range (Melzer *et al.* 2017). Whitaker (2008) highlights the need to "protect and monitor key populations of the Lakes skink, and inferred by this, any species in the Twizel area at the geographic extent of its range such as the MacKenzie Basin skink.

For the scree skinks, Whitaker (2008) lists as the highest management priority to "review locality data to ensure that representative populations occur at protected sites, and remedy if necessary".

No particular management needs or priorities were listed for the Canterbury grass skink, McCann's skink or the Southern Alps gecko in the vicinity of the Simons Pass Dryland Reserve (Whitaker 2008).

3. Methods

A survey for lizards, to determine 'baseline' population estimates, was carried out over representative habitats of the six management units of the Simons Pass Dryland Reserve, November 20-22nd 2017. The six management units differ in location, plant species composition, and extent, from the four vegetation types sampled in 2012-2013 by Dr Keesing, but likely cover some of the same areas; see Figure 1. The weather during the survey was extremely hot, especially on November 21st and 22nd where temperatures reached c. 28°C, and lizard activity was markedly reduced due to the high temperatures. No nocturnal searches were made for Southern Alps geckos; the extent of their habitat and their high abundance over all management units, and their presence wherever rock was found, meant conducting nocturnal index counts were not a suitable use of limited field-time, in terms of useful data return, for effort.

⁶ A.H. Whitaker 2008. Conservation of Lizards in Canterbury Conservancy. Volume 308 of Canterbury Series, New Zealand Department of Conservation. Canterbury Conservancy. 130 pp.

The size of the Dryland Reserve (total size of the reserve was estimated at c. 2495ha), the difficulty in accessing remote areas by vehicle (e.g. the north-western tip of reserve that takes in a dry wooded gully that leads down into the Pukaki River), and the careful, slow searching required to locate shy lizards (such as the MacKenzie Basin skink), meant all lizard habitat present within the extent of the Dryland Reserve was not able to be searched. Instead, a selection of sites in each of the six management units was searched, that covered all observed lizard-habitat present, to estimate baseline lizard relative densities and habitat use (Table 1).

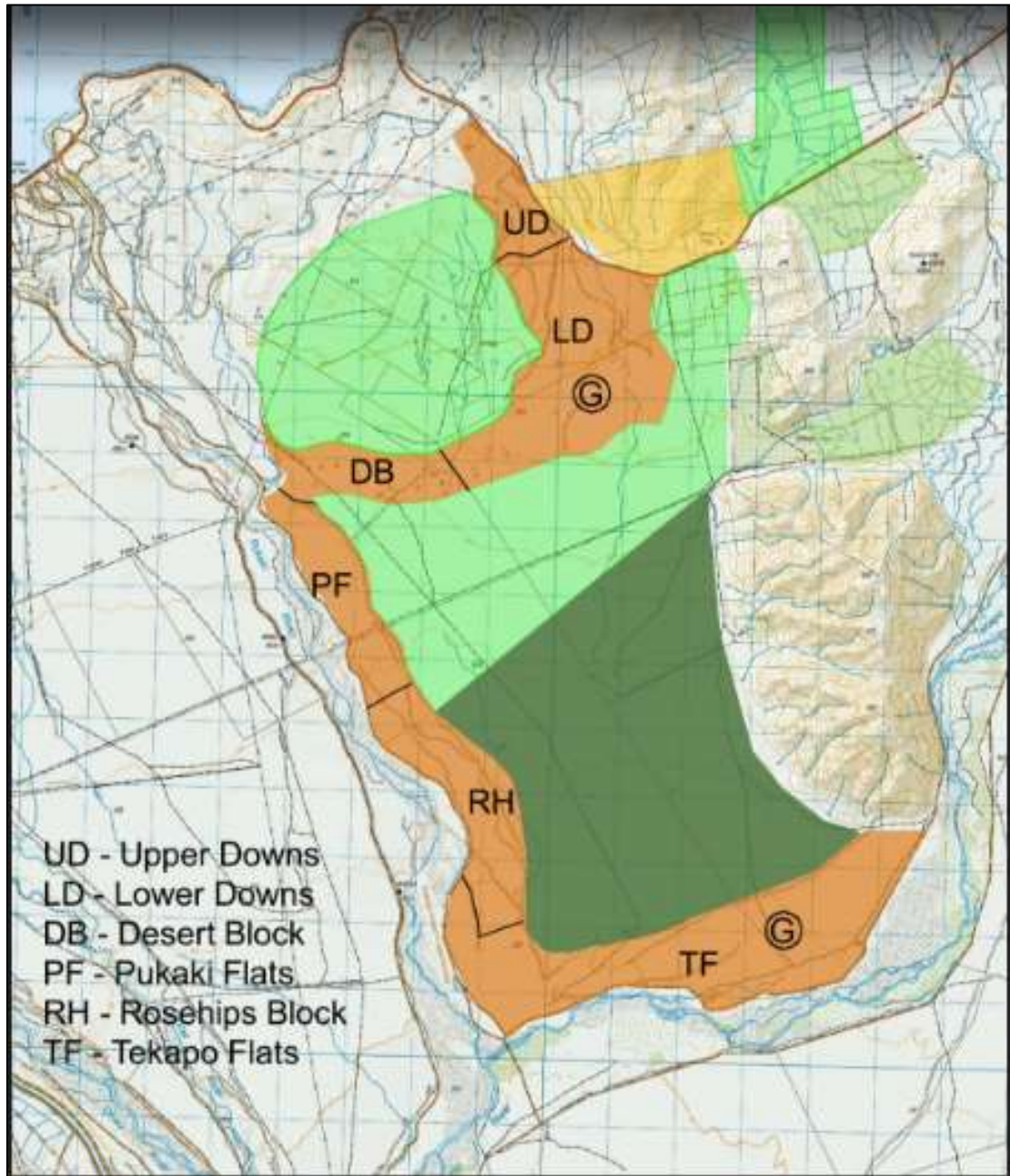


Figure 1. The Simons Pass Dryland Reserve (brown shaded area) showing the six management units. The G denotes two areas subject to consent condition 87.

At a search site, time to find lizards, and/or their sign was recorded. For McCann's skink, sightings of active skinks were made and/or scats were visible on the surface of the rocks/talus. For Southern Alps geckos, this species was very common; at times sloughed skins and a mummified gecko were also found; on one occasion geckos could be heard chattering from an area of talus.

Searches for MacKenzie Basin skinks and scree skinks involved scanning c. 10m ahead, along rocky habitat with binoculars, for lizards active at the surface. If no lizards were located, the habitat was walked looking for large scats. Skinks tend to defecate whilst basking at the surface of rock talus, pebble fields and scree. The high temperatures experienced during the survey and the lack of rain leading up to it meant large lizard scats were very obvious at sites where spotted and scree skinks resided. The scats of adults of these two species are typically 3-4 times the size of McCann's skink (Figure 2). Once a scat was located, extra time was spent at the site to verify the presence of either a scree skink or MacKenzie Basin skink. MacKenzie Basin skinks, in particular, were very shy and required patience to definitively verify their presence; MacKenzie Basin skinks were without exception located in scree or talus partially shaded by vegetation – both exotic vegetation (briar, wilding conifers) and native vegetation (*Coprosma* spp.), appeared equally utilised by MacKenzie Basin skinks for shade.



Figure 2. Large scat (c. 2 cm) of a MacKenzie Basin skink found in the Pukaki Flats management unit.

Scree skinks, by comparison, were found in small talus areas or pebble-fields at time devoid of shading vegetation, and were less shy than spotted skinks. Timed searches were made for both scree and MacKenzie Basin skinks and where possible I stayed at a site until two individuals were sighted. All lizard handling and disturbance was conducted under Wildlife Authority 62386-FAU held by Dr Mandy Tocher.

Table 1: Lizard habitat surveyed over the six Dryland Reserve Management Units. Not all habitats in all management units was visited, and as such, this Table does not represent a complete inventory of the habitats present in each management unit. See Figure 8 for the spread and locations of lizard searches.

	Indigenous-dominated grassland (including degraded examples)	Exotic-dominated grassland, with rocks	Talus	Large Tors	Scree	Indigenous Shrubland and associated rocky habitat
Upper Downs (UD)	X	X		X		X
Lower Downs (LD)	X		? ⁷	X		X
Desert Block (DB)	X	X	X	X	X	X
Pukaki Flats (PF)	X		X			
Rosehip Block (RB)	X		X			
Tekapo Flats (TF)	X	X	X			X

4. Lizard Species of the Dryland Reserve

Four lizard species were recorded over the course of the survey; Southern Alps gecko (Figure 3), McCann's skink (Figure 4), MacKenzie Basin skink (Figure 5) and scree skink (Figure 6; Table 2). A fifth species, the Canterbury grass skink is also likely to be present; this species was recorded during the tenure review survey of

⁷ There may have been talus in the Southern part of Lower Downs (LD) where I did not survey.

the Simons Pass pastoral lease, but was not found over 2012-2013 by Dr Keesing (although he attributed one or more of the “escaped” skinks to this species). Weather during this survey may have been too hot to encounter the Canterbury grass skink that relies on some moisture within its habitat, to survive (e.g. Figure 7). As noted above in Section 2, both the Southern Alps geckos and the McCann’s skink were confirmed to be very common over the district and both species are both numerically and geographically strong over the South Island, hence their ‘not threatened’ classification (Hitchmough *et al.* 2015).



Figure 3. The not threatened Southern Alps gecko. This species was very common all over the Dryland Reserve, but confined to rocky habitat including but not only, rock out-cropping.

The three populations of MacKenzie Basin skink and the two populations of scree skink were not previously known from the property, and in the case of the scree skink, they were not known from the Pukaki outwash plain until now (see Figure 8). These finds are very important regionally and nationally, and the importance of these populations is enhanced given they occur within a reserved area, that will receive management to improve ecological values within.

Both the MacKenzie Basin skink and scree skink are currently classified by Department of Conservation as threatened ‘Nationally Vulnerable’; these two species are large bodied skinks, which have ‘k-selected’ life history traits such long life expectancy, slow time to maturity, and they produce relatively fewer offspring when compared to smaller bodied skinks (e.g. McCann’s skink). The k-selected life history traits put these skink species at a disadvantage, compared to more fecund species, in an environment when predators target adults and sub-adults alike,

indiscriminately. Adult survival is the key to persistence of large-bodied skinks; intermittent recruitment failure/predation of naïve youngsters can be overcome in a long-lived species by high adult survival; adults have many years to contribute to the population meaning predation of juveniles is less 'critical' to persistence (see Section 7).



Figure 4. The not threatened McCann's skink, *Oligosoma maccanni*. This species was very common over the Dryland Reserve in and around rocky habitat and was commonly found with the Southern Alps gecko.

The Canterbury grass skink, and the jewelled gecko, were not found during this survey. In the case of the Canterbury grass skink, this result was despite the species being found at the site in 2008, and although searches here primarily concentrated on rocky habitat, which may explain why these species were not observed, searches were undertaken specifically for this species when suitable habitat was encountered (e.g. Figure 7).

I do not rule out the possibility that McCann's skinks were misidentified as Canterbury grass skinks during the tenure review surveys of 2008, or alternatively and more likely, that the species has dropped to undetectable levels in the almost 10-years since the tenure review surveys were conducted. In my view it is highly probable that Canterbury grass skinks remain in the reserve and if this assertion is correct, they make a very suitable indicator species for successful management of the Dryland Reserve (see Section 6). The best habitat for Canterbury grass skink was the lush grassland/thick cover in and around the large tors of Lower Downs and Desert Block, areas of ephemeral tarns, and any lush, green areas (Figure 7).

It is possible jewelled geckos were present in the north-western tip of the reserve (in the wooded gully at E1411365 N4921727) where the search was brief and conducted in high (unsuitable) temperatures for jewelled geckos.

Table 2: Lizards found over the six Dryland Reserve Management Units referred to in Figure 1.

Management Units	Size (ha)	Southern Alps gecko	McCann's skink	Canterbury Grass Skink	MacKenzie Basin skink	Scree skink	Jewelled gecko
Upper Downs	160 ha	X	X				
Lower Downs	675 ha	X	X	?			
Desert Block	190 ha	X	X	?	X		?
Pukaki Flats	250 ha	X	X		X		
Rosehip Block	335 ha	X	X			?	
Tekapo Flats	885 ha	X	X	?		X	



Figure 5. The threatened – Nationally Vulnerable MacKenzie Basin skink *Oligosoma prasinum*, (holotype) from Edwards Stream (photo: Marieke Lettink).



Figure 6. *The threatened – Nationally Vulnerable Scree skink, Oligosoma waimatense from the degraded pebble-fields of Tekapo Flats, Simons Pass Dryland Reserve.*



Figure 7. *Lush grass in the Tekapo Flats, near the Tekapo River, that was deemed suitable for the Canterbury grass skink; none were found in a 20-minute search at midday, November 22nd.*

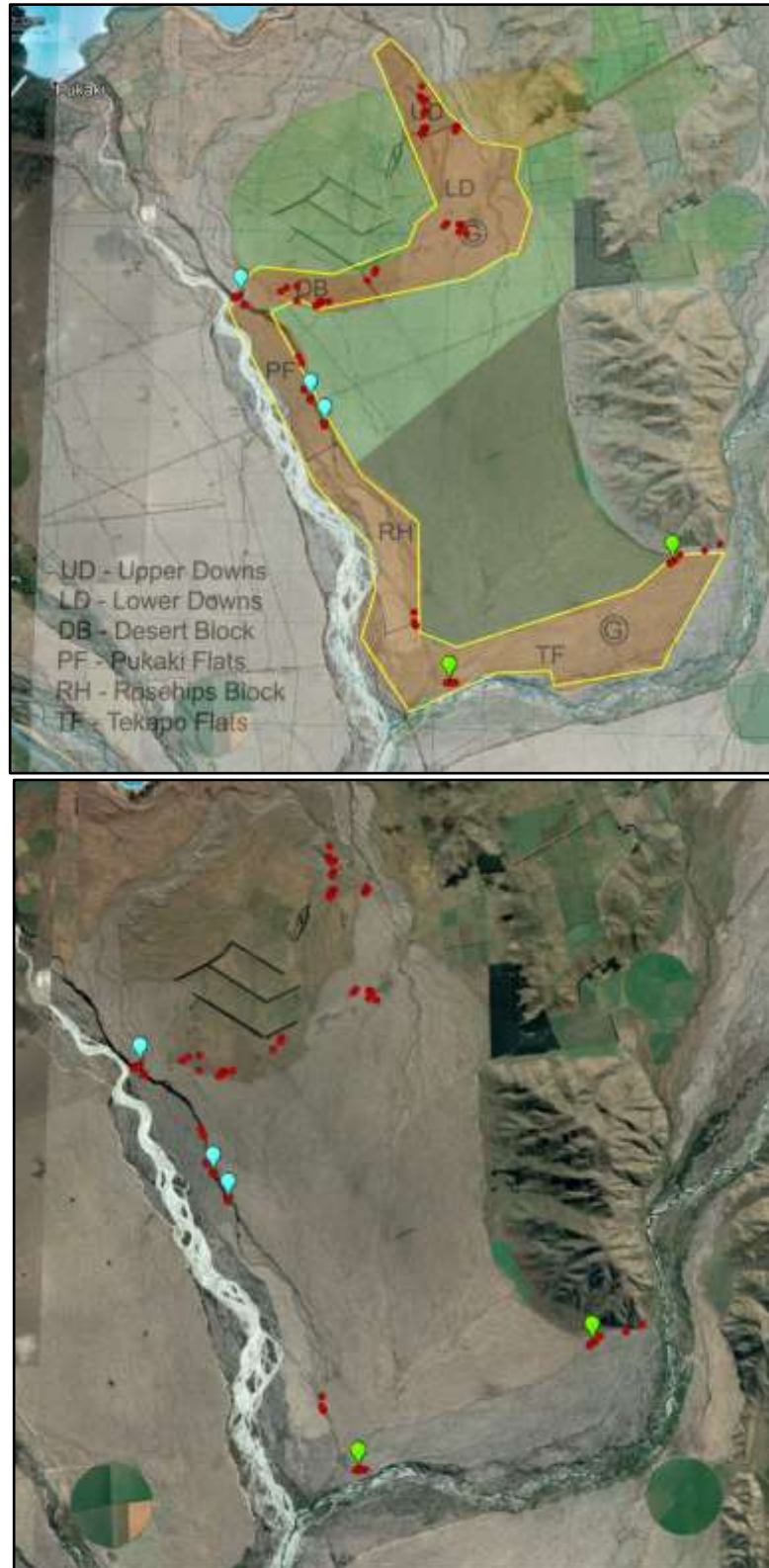


Figure 8. Upper: maps showing locations of searches carried out over the management units (red dots) and locations of the MacKenzie Basin skink (blue markers) and scree skink populations (green markers); Lower: map showing the same information as the upper map, but with the overlay of management units removed.

5. Baseline Lizard Densities

Relevant Consent conditions

Consent condition 86 of the resource consents (CRC062867/CRC082311) directs “the baseline survey” within the Simons Pass Dryland Reserve as follows:

“Within 6 months of commencement of this consent, a baseline survey (“the Baseline Survey”), of the population densities of the species and communities listed at condition 88 shall be carried out by a suitably qualified and experienced person approved by the consent authority...”

Condition 88 states the fauna subject to the baseline survey:

“The indigenous species and communities of the indigenous dryland ecosystems which shall be the subject of the restoration management intervention shall include:

(c) native fauna in particular lizards, invertebrates and birds.”

Consent condition 87 directs that a Management Plan shall be prepared, and its objective:

Within twelve months of commencement of this consent and using the results of the Baseline Survey, a Dryland Recovery Management Plan (“DRMP”) shall be prepared with the objective of promoting and achieving the recovery of the indigenous dryland ecosystems within Area G over a long-term period (more than 30 years) by restoration management”.

Scree skink

Scree skinks were only found on the vast outwash ‘Tekapo Flats’, but likely habitat was also noted in the Rosehip Block (large scat noted at E 439333.44 N 5095275.73). In the Tekapo Flats management unit scree skinks were found at estimated densities of c. 25/ha of appropriate habitat (c. 1 skink every 20 m x 20 m patch of suitable habitat; Figure 9 and Table 3). Given the search methods required to find this species (and MacKenzie Basin skink), as detailed in Section 3 above, a more useful metric to use as a basis for comparison (i.e. to use as a baseline measure) is the time taken for an experienced observer to locate the sign and/or sight the first individual at any given search site. With this in mind, at both sites where the scree skink was found, the first individual was located within five minutes, and the time taken to find the first faecal material indicating the presence of the species (or another large-bodied skink) was 1-2 minutes. For these metrics to be used as reliable baseline metrics for subsequent surveys, it is necessary that:

1. An experienced observer, experienced in searching for cryptic, large-bodied dryland skinks;
2. The weather during the search is warm (c. $\leq 20^{\circ}\text{C}$; on hot days observers need to be at the site early in the morning as the sun first hits the basking area);
3. The weather leading up to the search has been fine so that faecal material – a reliable indicator of the presence of large-bodied skinks – has not been washed away.



Figure 9. Google Earth image showing the extensive potential habitat for scree skinks in the Tekapo Flats management unit. Scree skinks were found very easily at the two locations searched (green markers, but large areas of habitat remain unsearched, indicated by the darker shaded roughly linear features above (SW-NE aligned), which show the position of rock pebble fields, talus and terraces. Both scree skink populations were found associated with flat/moderately sloped pebble fields.

MacKenzie Basin skink

MacKenzie Basin skinks were only found adjacent to the Pukaki River in the Pukaki Flats and Desert Blocks; here they were found at densities of c. 17/ha (c. 1 skink every 20 x 30m patch of suitable habitat searched). At all three sites where the MacKenzie Basin skink was found, the first individual was located within 10 minutes (see Table 3 for overall encounter rates), and the average time taken to find the first faecal material indicating the presence of the species was 2-3 minutes. These figures can only be used as baseline for subsequent surveys if the conditions outlined above for scree skinks can be met.

Table 3: Estimates of lizard encounter rates over the six Dryland Reserve Management Units. Encounter rates for scree and MacKenzie Basin skink are of individual skinks, not of individuals and their sign. Where no estimate is provided, no lizards of that species were found within the management unit. Encounter rates for McCann's skink are considered to be conservative, and especially for the Desert Block, Pukaki Flats and Tekapo Flats, where searches tended to focus on the rarer species (see Methods).

	Scree skink	MacKenzie Basin skink	Canterbury grass skink	McCann's skink
Upper Downs				18 sighted in 155 minutes
Lower Downs			0 sighted in 85 minutes	3 sighted in 85 minutes
Desert Block		2 sighted in 30 minutes	0 sighted in 105 minutes	8 sighted in 105 minutes
Pukaki Flats		2 sighted in 60 minutes		13 sighted in 206 minutes
Rosehip Block				3 sighted in c. 30 minutes
Tekapo Flats	3 sighted in 80 minutes		0 sighted in 20 minutes	3 sighted in c. 100 minutes

Canterbury Grass skink

As mentioned above, no Canterbury grass skinks were observed during the November 2017 baseline survey, despite targeted searches for them in appropriate habitat of Tekapo Flats, and multiple incidental searches carried out during traverses between the terminal moraine tors of Desert Block and Lower Downs, and between rocky outcrops of Upper Downs. Baseline densities for this species, therefore are estimated at c. 0/ha over the reserve (Table 3). As mentioned, there is an opportunity for this species to be a useful indicator species, so long as observers during future lizard surveys are skilled at identifying this species⁸.

McCann's skink

McCann's skinks were common at all locations where rock-habitat was present and individuals or their sign were found within 1-2 minutes, on average, at any search site (Table 3). Encounter rates ranged from 1 sighted every 9 minutes in the Upper

⁸ Reardon, J.T.; Tocher, M.D. 2003 Diagnostic morphometrics of the skink species, *Oligosoma maccanni* and *O. nigriplantare polychroma* from South Island, New Zealand. DoC Science Internal Series No. 105. Department of Conservation.

Downs, to 1 sighted every 30 minutes in Tekapo Flats. These are considered to be conservative estimates of encounter rates for this species; as well as the extremely hot temperatures that obviously reduced activity of McCann's skinks (they were at times observed moving within large rock tors, activity avoiding the heat), searches at Pukaki Flats, Desert Block and Tekapo Flats focused on MacKenzie Basin and scree skinks, not McCann's skink. Of note, this species was conspicuously absent in the areas between rocky habitat, with an occasional exception (see next Section).

6. Future monitoring - Target Lizard Species

In my view, four of the five lizard species present at the Simons Pass Dryland Reserve make suitable indicators of improvement in lizard values (species, habitat-use and abundance) following any planned 'restoration management'. The 'not threatened nocturnal Southern Alps gecko, very common throughout the reserve wherever rock was present species, and present at every search except areas between rocky habitat, does not make a suitable candidate species. This species is not easy to index count, as counts for this species need to occur at night (to limit variability in detectability over their 3-D habitat) when the geckos are active, using multiple observers to cover the extent of the reserve; and the variability in the index counts (night activity is highly weather dependent) will likely obscure any possible increases in abundance that result from management. On the other hand, day-active McCann's, MacKenzie Basin, scree and Canterbury grass skinks make more suitable candidates in that they are less abundant (especially MacKenzie Basin, scree and Canterbury grass skinks); can be surveyed by day; can be subjected relatively easily to index counts (although day-counts are also weather dependent, day-active skinks have multiple opportunities to become active during the day, whereas nocturnal geckos are less likely to experience temperature fluctuations after nightfall to stimulate their activity), and can be indexed without the need for specialised skills or equipment.

The MacKenzie Basin, scree and Canterbury grass skinks, therefore, make the best candidates for future monitoring, and effort in the future should concentrate on these species, once all populations have been discovered⁹. I suggest future monitoring, that involves repeated, timed searches for both MacKenzie Basin and

⁹Although three new populations of MacKenzie Basin skink were found in November 2017, and two new populations of scree skink were also found, all available habitat *was not searched*; there are almost certainly more populations of these species yet to be discovered within the Simons Pass Dryland Reserve (also see Figure 9).

scree skinks, also monitors the presence of McCann's skinks and the Canterbury grass skink within the inter-rock habitat to help corroborate results for the other two species. As mentioned above, a notable characteristic of all management units was the extremely low incidence of lizards in the vegetation between rocky habitats. McCann's skinks are considered habitat generalists and in other parts of their geographic range are commonly found in the inter-rock habitat, where some cover is provided. It was a distinctive characteristic of the Simons Pass Dryland Reserve to find almost no lizards between rocky habitats, even in areas where cover (vegetation) was present. As the vegetation recovers, with retirement of stock grazing from the reserve and control of rabbits and hares, and predators that occupy this habitat (including all mustelids, hedgehogs and rodents) are reduced, presumably the use of this habitat by skinks will increase.

7. Lizard Management Options Within the Dryland Reserve

Dryland Recovery Management Plan

Lizard values, and how these can be supported by 'restoration management', will form part of the Simons Pass Dryland Recovery Plan. This plan will consider the management of the reserve as a whole, and for this reason I provide here only bulleted suggestions for management that will assist the lizard values alone. Firstly, however, I note that the threat statuses of three of the five lizard species now known to occur within the Simons Pass Dryland Reserve, have increased at national level since the first surveys were made during the Tenure Review of the Simons Hill and Simons Pass pastoral leases. The Canterbury grass skink has risen from 'Not Threatened' to 'at risk Declining'; and both the MacKenzie Basin skink and scree skink have risen from 'at risk Declining' to 'threatened Nationally Vulnerable'. The McCann's skink and Southern Alps gecko have remained 'Not Threatened'¹⁰.

Restoration Management for the lizard values of the Simons Pass Dryland Reserve

- **Predator Control:** control – Predator control ideally targets *all* rodents and *all* mustelids, as well as cats is highly recommended for large-bodied skinks

¹⁰ Hitchmough, *et al.*, 2015; Hitchmough, R.; Anderson, P.; Barr, B.; Monks, J.; Lettink, M.; Reardon, J.; Tocher, M.; Whitaker, T. 2013: Conservation status of New Zealand reptiles, 2012. New Zealand Threat Classification Series 2. Department of Conservation, Wellington. 16 p. and Hitchmough, R.A.; Hoare, J.M.; Jamieson, H.; Newman, D.; Tocher, M.D.; Anderson, P.J.; Lettink, M.; Whitaker, A.H. 2010: Conservation status of New Zealand reptiles, 2009. New Zealand Journal of Zoology 37: 203–224. (doi:10.1080/03014223.2010.496487).

(such as the MacKenzie Basin skink and scree skink; with relatively low fecundity when compared to smaller bodied skinks). A well-used cat den was observed at E437178.26 N5101746.36 in the Desert Block, and a feral cat was observed in Lower Downs. A dead mouse was found in lizard habitat at Pukaki Flats.

- **Woody weed Control:** Some woody weed control is required to avoid shading lizard habitat, clogging crevices with litter and altering the composition of vegetation by excluding plants used by lizards for food and shelter e.g. *Melicytus alpinus* (e.g. see Figure 10).
- **Vehicle access:** Scree skink habitat showed evidence of vehicle tracks (Figure 11); skinks would benefit from vehicles only using marked tracks.
- **Site rehabilitation:** Re-vegetation to support lizard values; plant species such as porcupine shrub (*Melicytus alpinus*), *Leucopogon fraseri*, *Muehlenbeckia* spp. and *Coprosma* spp., all of which provide fleshy fruits used as food for indigenous lizards, could be planted for shade, especially in the cobble fields of Tekapo Flats, or to replace wilding conifers along the Pukaki Flats. Re-vegetation efforts would need to consider the requirements of existing indigenous vegetation (Figure 12).
- **Genetic sample:** A genetic sample should be taken from up to five MacKenzie Basin skinks handled, in order to confirm the relationship of Simons Pass Dryland Reserve populations with surrounding populations of Lakes skink and MacKenzie Basin skink. Skink populations within the Reserve are possibly within an active hybrid zone.



Figure 10. The effects of wilding conifers on lizard habitat in the Pukaki Flats management area; crevices are shaded, clogged and plants can display a 'loose' growth habit.



Figure 11. Tracks made by vehicles were observed at more than one location over scree skink habitat in the Tekapo Flats management unit.



Figure 12. *Convolvulus verecundus* (At Risk-Declining) found at two locations within the Dryland Reserve at Easting 440089.87 Northing 5094171.13; and Easting 435630.53 and Northing 5101970.06.

8. Conclusion

Baseline surveys of the Simons Pass Dryland Reserve have found four species of lizards; with a fifth species almost certainly present (Canterbury grass skink). Two species were ubiquitous over the Dryland Reserve where rock (in all forms) was present; the Not Threatened Southern Alps gecko and the McCann's skink. Two threatened species were found at multiple sites within the reserve; MacKenzie Basin skink and scree skink. Scree skinks were not previously known from the Station, except for a historic record of 'large' skinks on the eastern flanks of Simons Hill above the Tekapo River, which may have referred to scree skinks. The populations of MacKenzie Basin skink represent populations at the southern extent of their range, and could be within an active hybrid zone with Lakes skinks to the South. All available habitat was not searched; there are almost certainly more populations of these rare species yet to be discovered within the Simons Pass Dryland Reserve.

Baseline densities are provided for all skink species, along with context to assist in drawing suitable comparisons with these data, and with future monitoring data. Along with baseline densities, recommendations for future monitoring are provided, along with justification for only considering skink species from hereon in, and not the Southern Alps gecko. Management suggestions, to improve the lizard values of the Simons Pass Dryland Reserve, include restricting vehicles to tracks and roads; predator control; site revegetation and some woody weed control.