

LIZARD SURVEY AT CASTLECLIFF, WHANGANUI



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LIZARD SURVEY AT CASTLECLIFF, WHANGANUI

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1. INTRODUCTION

WSP is assisting the Whanganui District Council in preparing a Council-initiated Plan Change (Plan Change 58) involving four sites (Areas 1-4) for subdivision purposes at Outer Castlecliff, coastal Whanganui (Fig. 1 in Appendix 1). These four sites are located off Karaka Street and Waitai Street, and are characterised by regenerating shrubland (both indigenous and exotic), rough pasture, golf course, and lifestyle blocks, currently zoned for 'Rural Lifestyle' or 'Open Space'. The proposed plan change would re-zone the areas as 'Residential', allowing for the subdivision and residential development. Surrounding land use includes residential housing, improved pasture, and a golf course. The proposed rezoning would allow up to 558 lots over 34.17 hectares (den Ouden 2019). The potential subdivision works as a result of Plan Change 58 would require vegetation clearance, construction earthworks, upgrades to network utilities and new roading infrastructure (WSP 2020). The Council requires the Plan Change to be notified in mid-2021.

WSP undertook an Assessment of Environmental Effects of Areas 1-4 in 2020, assessing the ecological attributes and features impacted to be very low to low (WSP 2020a). However, WSP also recommended the commissioning of a lizard survey. Te Rūnanga o Tūpoho (2020) considers lizards to be tāonga species and also requested that a lizard survey be completed by Council before Plan Change 58 is notified. The lizard surveys were required to confirm lizard values on site, the potential effects on those values as a result of Plan Change 58 and subsequent development, and the measures to avoid, remedy or mitigate those effects. Te Rūnanga o Tūpoho also recommended that a qualified ecologist should undertake further assessments of specific areas where vegetation removal will take place to ensure that no rare or threatened plant species or lizards will be impacted by works (Te Rūnanga o Tūpoho 2020).

Wildlands was subsequently engaged by WSP to undertake the lizard survey. The survey objectives were to:

- Survey for both terrestrial and arboreal lizards at the sites, describe the species present, their abundance and the habitats that they are in; and,
- Assess the current ecological values of the sites as they relate to lizards; and,
- Identify potential adverse ecological effects on lizards associated with future activities as a result of the proposed Plan Change; and,
- Describe measures that could be undertaken to avoid, remedy or mitigate those effects on lizards.

This work is intended to inform the plan change process for Plan Change 58, as required by the Whanganui District Council (den Ouden 2019, WSP 2020) and requested by Te Rūnanga o Tūpoho (2020).

2. PLAN CHANGE 58 SITES

The Whanganui District Council's four Plan Change 58 sites, Areas 1- 4, are described below (den Ouden 2019, WSP 2020a):

2.1 Area 1: Reserves and Open Space Zone (golf course)

Area 1 is the southern portion of land within the Castlecliff Golf Club (CGC) and two strips of land that run north westwards towards and around the CGC Clubhouse all of which is zoned 'Reserves' and 'Open Space' (den Ouden 2019, Fig. 1 in Appendix 1). This area consists of an actively operating golf course, with highly manicured fairways, amenity trees (mainly exotic) and "rough" consisting largely of rank exotic kikuyu (*Cenchrus clandestinus*) grassland, along with other exotic grasses. Previously, this site was covered by a *Pinus* sp. plantation, which was cleared c.2010. *Pinus radiata* saplings have been established at intervals throughout the rough; elsewhere outside Area 1, other exotic trees are well established in the rough. Fairways and greens may have been sprayed with agrichemicals, and there may be a history of chemical application on the course, leaving residuals in the soils (WSP 2020b). WSP (2020) provides a full list of flora species present.

2.2 Areas 2 and 3: Rural Lifestyle Zone

Area 2 is essentially an extension of Golf Vue Place, a privately owned area with access from Waitote Street, Golf Vue Place and Longbeach Drive (den Ouden 2019, Fig. 1 in Appendix 1). It is zoned 'Rural Lifestyle'. Area 3 is a small section of privately owned land (as three large lots) south of Area 2, located to the rear of existing residential zoned properties on Waitote and Karaka Streets (den Ouden 2019, Fig. 1 in Appendix 1). Large areas of bracken (*Pteridium esculentum*), pohuehue (*Muehlenbeckia complexa* var. *complexa*), exotic grass (*Lolium* sp.), kikuyu (*Cenchrus clandestinus*), and agapanthus (*Agapanthus praecox*) are present throughout. Exotic shrubs include boxthorn (*Lycium ferocissimum*). Area 3 is more intensively grazed, with closely-cropped pasture grass, but was unable to be surveyed due to refusal by the landowner to grant land access. WSP (2020) provides a full list of flora species present.

2.3 Area 4: Rural Lifestyle Zone

Area 4 is located on Longbeach Drive which is currently developed as large residential lots with urban reticulated water and stormwater services, and a few lots also have wastewater connecting to the Golf Vue Place reticulated service (den Ouden 2019, Fig. 1 in Appendix 1). Area 4 consists of mixed land use typical of lifestyle blocks. Area 4 was not surveyed for lizards, but indigenous habitat values were not apparent from the road. WSP (2020) provides a full list of flora species present.

3. SURVEY METHODS

3.1 Overview

A desktop assessment was first undertaken by WSP (2020) and is revised in this report. The lizard survey at the four Plan Change 58 sites was set up and subsequently undertaken during April and May 2021. Survey techniques used included pitfall traps, Onduline ACOs, spotlighting, and day searching. Survey methods are described in more detail in the sections below.

3.2 Desktop assessment

Areas 1-4 are located within the northern extent of the Foxton Ecological District, immediately adjacent to the Manawatū Plains Ecological District. The known combined lizard fauna of the Foxton and Manawatū Ecological Districts include Pacific gecko (*Dactylocnemis pacificus*, 'Not Threatened'), ngāhere gecko (*Mokopirirakau* 'southern North Island', 'At Risk - Declining'), barking gecko (*Naultinus punctatus*, 'At Risk - Declining'), Raukawa gecko (*Woodworthia maculata*, 'Not Threatened'), copper skink (*Oligosoma aeneum*, 'At Risk - Declining'), ornate skink (*O. ornatum*, 'At Risk - Declining'), northern grass skink (*O. polychroma*, 'Not Threatened'), Kupe skink (*Oligosoma* 'southern North Island', 'Nationally Critical'), glossy brown skink (*O. zelandicum*, 'At Risk - Declining') and the introduced plague skink (*Lampropoholis delicata*, 'Introduced and Naturalised') (Bell and Wiles 2015). Threat classification rankings are from Hitchmough *et al.* (2016), apart from pending revisions for Pacific gecko, copper skink and Kupe skink (Hitchmough *et al.*, in press; R. Hitchmough, pers. comm. June 2021). The plague skink is classed as an 'Unwanted Organism' by the Ministry of Primary Industries under the Biosecurity Act 1993, and therefore is not considered further in this assessment.

WSP (2020) undertook a lizard desktop assessment for the site. There are no prior lizard records for the sites within the Department of Conservation BioWeb Herpetofauna database. However, several lizard records were identified within 5 kilometres of the site from within the past 20 years. These records were for the northern grass skink, Kupe skink and the plague skink.

Wildland Consultants undertook an additional review of the BioWeb Herpetofauna Database and found further records. These records are:

- Two records of Pacific gecko from 1950 per G.S. Hardy, with generic location of 'Wanganui' only, identity confirmed by T. Jewell.
- Two records of ngāhere gecko, also with the generic location of 'Wanganui', from 1965 and 1971. One of the two were confirmed by A.H. Whitaker.
- Records for Kupe skink exist for suburban Castlecliff (1-3 individuals, April 2002 by A. Middlemiss; 2 individuals at Aranui School by A. Middlemiss in October 2002; 2 individuals by L. Liggins in February 2006) and the North Mole (one individual by K. Hawkins in June 2019).
- Records for northern grass skink are frequent in Whanganui.
- A record for glossy brown skink from 1993, identity confirmed by W. Hutchinson.
- An unidentified gecko located at Lake Westmere from 2005.

The Kupe skink and northern grass skink records were located in relatively close proximity to the site. In addition, other lizard species may be present in the area but have not yet been recorded locally (Bell and Wiles 2015).

However, lizard populations are often (but not always) present in low densities in mainland New Zealand due to predation pressure and habitat modification. Indigenous lizards are highly cryptic and can be particularly difficult to find without adequate survey effort, especially when in low numbers.

All indigenous lizards are protected by the Wildlife Act 1953 and its subsequent amendments.

3.3 Pitfall traps

Pitfall traps (4 litre plastic buckets) were dug into the ground, flush with the soil. Bucket lids were firmly attached to the traps to prevent lizards from becoming trapped during the inactive weeks between setup and trap checks. At the start of the survey, the lids were removed from the pitfall traps, and the traps were baited with tinned pear. A wet sponge placed in the bottom of the trap to prevent desiccation, and grass placed at the base of the trap to provide cover for any lizards captured. Four drainage holes were drilled at the base of the trap to drain any water. Plywood squares (20 × 20 centimetres) were used as pitfall trap lids, set at *c.*2.5 centimetres high, for this survey. These reduce the risk of predation on trapped lizards by predatory mammals and birds, as well as providing shelter from rain and overheating in the sun.

Thirty pitfall traps were installed across Area 2, and 16 traps at Area 1. Locations of pitfall traps are illustrated in Figure 2 in Appendix 2. Pitfall traps were operational for five trap days (20-23 April and 20 May), and checked every 24 hours. A total of 230 trap days were achieved (140 in Area 2, and 80 in Area 1).

3.4 Onduline Artificial Cover Objects

Onduline Artificial Cover Objects (ACOs) are *c.*45 centimetre × *~c.*50 centimetre pieces of corrugated roofing material. A piece (also known as a “layer”) is placed on the ground in habitat suitable for terrestrial lizard species, then a few small sticks are placed on top of this layer in the grooves, and lastly a second layer is placed on top. The ACOs were left undisturbed for a month. Terrestrial lizards find refuge in the ACOs, and hide both under the bottom layer and also in the crevice created between the two layers. Following the placement period, they are checked (the top layer lifted, and then the bottom layer lifted), and any lizards underneath a layer are captured by hand and identified.

Forty-five Onduline ACOs were installed across Area 2 combined, and 15 ACOs at Area 1. Locations of Onduline ACOs are illustrated in Figure 2 in Appendix 2. ACOs were checked daily alongside the pitfall trapping effort (20-23 April and 20 May). A total of 300 ACO checks were achieved (225 in Area 2; 75 in Area 1).

3.5 Spotlighting

Spotlighting involves scanning vegetation at night with a powerful LED Lenser P14.R head-mounted spotlights and 7 × 20 binoculars to search for arboreal geckos. Both diurnal and nocturnal species can be found in vegetation using this method (e.g., barking gecko, ngahere gecko or Raukawa gecko).

Spotlighting was undertaken in Area 2 only, due to the extensive pohuehue habitat present there, potentially supporting populations of arboreal geckos. Two nights of spotlighting was undertaken with wide area coverage of this area during April and May 2021. The first took place on 23/04/2021 between 2030 hours and 2330 hours, the second took place on the 20/05/2021 between 1930 to 2200 hours.

Spotlighting was not undertaken in Area 4 due to the occupied nature of the properties. Spotlighting was not required for Area 1, due to the lack of trees or shrubs.

Total spotlighting person hours achieved was 10.5 person hours.

3.6 Day searching

Day searching of terrestrial cover objects, such as stacks of wood, rocks, and man-made ground cover objects (e.g., plywood or corrugated iron sheets), was conducted across Areas 1 and 2 plus across the golf course outside of the areas. Lizards were captured by hand, or if sighted only, the location recorded on a Garmin 64s GPS unit. Day searches were undertaken across different weather conditions, since when it was cool, lizards were often inactive under ground cover objects; or when it was hot, they were seen basking or running through vegetation.

3.7 Distribution of pitfall traps and ACOs

Lizard survey units (pitfall traps, Onduline ACOs) were distributed across habitat types known to constitute habitat types commonly occupied by lizards in Aotearoa/New Zealand. At the three sites, these were considered to be the structurally complex grasslands, and duneland-vineland-scrubland.

At all the survey sites, the pitfall traps and Onduline ACOs were either arranged in several transects of 10 traps or ACOs each (Area 2) at 10 m intervals, or as 10 m-spaced arrays across the site (Area 1).

3.8 Survey conditions

The weather conditions during the surveys were predominantly warm (15°+ Celsius), sunny and calm. These are conditions that are considered favourable for lizard activity, and thus pitfall trapping and spotlighting were effective. However, weather conditions did vary throughout the day, such as cooler overcast conditions with light rain or wind, which was ideal for utilisation of artificial refuges such as Onduline ACOs. Both methods were run concurrently, with checks of one or other determined by current weather conditions (i.e. if conditions were cool, ACOs were checked before it became warmer later during the day, as lizards exit the ACOs when they become active).

Survey conditions during the spotlighting effort were 15-18° Celsius on dry evenings without precipitation or dew, nil wind, and 4/8 to 8/8 cloud cover.

3.9 Data collection

Data collected on the capture or sighting of a lizard included trap, ACO number or GPS coordinates of location, species identification, and standard morphometric measurements (snout-to-vent length, tail length, tail regeneration, sex). Lizards were released at the capture sites following these measurements.

3.10 Survey authority and protocol

This survey was carried out by Trent Bell and Cameron Thorp under Wildlands' National herpetofauna survey permit (Wildlife Act Authority 62219-FAU) issued by the Department of Conservation. Standard survey protocols were followed using DOC's Natural Heritage Management System's (NHMS) Herpetofauna Inventorying & Monitoring Toolbox (Hare 2012a and 2012b, Lettink 2021).

4. SURVEY RESULTS

Two lizard species were found during the survey. These were the Kupe skink (Plate 1) and the northern grass skink. Lizards were either found in pitfall traps, in Onduline ACOs, through day searching or sighted.

No lizards were detected by spotlighting effort, despite excellent spotlighting conditions.

4.1 Kupe skink

A total of 51 unique Kupe individuals were captured, all within a single 0.75 hectare site located in the south-western corner of Area 1 (Fig. 3 in Appendix 3). There were only 4 recaptures in total (i.e. 55 capture or sighting events of Kupe skink overall). Of this, 16 were females, 9 male, 17 juveniles, and the remainder of unknown sex. The majority of animals ($n=42$) were found underneath plywood boards on site. Five were seen active or basking in the grass, another seven detected in Onduline ACOs (0.09 skinks per 100 ACO checks), and only one captured by pitfall trap (0.012 skinks per 100 trap nights). The Kupe skink population appears to be restricted to kikuyu grassland within the "rough" (Plate 2) located in the south-western corner of the Castlecliff Golf Club property, bordering Waitai Street. No Kupe skink were found elsewhere despite extensive trapping, ACO searches and day searching in Area 2 and the remainder of the Castlecliff Golf Course.

The lack of captures in pitfall traps and Onduline ACOs was interesting, given the high local abundance of Kupe skink. It appears that Kupe skink have a semi-subfossorial habitat, that make them difficult to trap in structurally complex habitat. However, they

can be seen active during warm days. Large plywood coverboards may be a suitable survey technique for the species.

Kupe skink are a rare, medium-sized terrestrial skink (Greaves *et al.* 2008, Melzer *et al.* 2019). Kupe skink is currently classified as ‘Nationally Endangered’ (Hitchmough *et al.* 2016), but is to be elevated to ‘Nationally Critical’ later in 2021 (Hitchmough *et al.* in press; R. Hitchmough, pers. comm. 2021). Current knowledge for the Kupe skink met the following criteria of “ ≤ 5 subpopulations, ≤ 300 mature individuals in the largest subpopulation” with a “predicted decline 50-70%” to be ranked ‘Nationally Critical’ (Hitchmough *et al.* in press, van Winkel 2021).



Plate 1: Kupe skink from Area 1, Outer Castlecliff.



Plate 2: Kupe skink habitat, Area 1, Outer Castlecliff.

4.2 Northern grass skink

A total of 110 northern grass skinks were captured (some of which will be recaptures), nearly all in Area 2. The species is widely distributed in Area 2, occupying pohuehue duneland (Fig. 3 in Appendix 3). Seventy-two of the northern grass skink were captured in ACOs (0.32 skinks per 100 trap nights), while 34 were captured by pitfall trap (0.24 skinks per 100 trap nights), and four observed outside traps and ACOs. Twelve were females, 29 males, and 36 juveniles, and 29 of unknown gender. There were many in ACOs that were elusive to capture. Northern grass skink were also detected elsewhere on the Castlecliff Golf Course.

Northern grass skink can occur in relatively high densities, even in areas with low levels of predator control. Interestingly, northern grass skink appeared to be completely absent from the Kupe skink site in Area 1. Potentially the Kupe skink are excluding the northern grass skink from their range, either through predation or competitive exclusion.

4.3 Other observations

Several known lizard predators were recorded during the surveys. These were the introduced white-backed magpie (*Gymnorhina tibicen hypoleuca*), myna (*Acriditheres tristis*), starling (*Sturnus vulgaris*), blackbird (*Turdus merula*), song thrush (*T. pholimelos*), ferret (*Mustela furo*), hedgehog (*Erinaceus europaeus*), and feral mouse (*Mus musculus*). As the sites are adjacent to residential dwellings, domestic cats (*Felis catus*) and possibly feral cats are present. It is also likely that stoats (*Mustela erminea*), weasels (*Mustela nivalis*) and ship rat (*Rattus rattus*) are also present.

The indigenous Australasian harrier (*Circus approximans*) and kingfisher (*Todiramphus sanctans vagans*), which are also predators of lizards, are also present.

4.4 Survey data

The locations of lizards detected during the survey are illustrated in Figure 3 in Appendix 3, and the survey data for Kupe skink is in Appendix 4.

5. DISCUSSION

The current known lizard fauna of Outer Castlecliff appears to comprise only two lizard species, located in Areas 1 and 2. However, barking gecko could remain undetected within the extensive pohuehue in Area 2. Barking gecko inhabit dense vegetation typically in sparse numbers and are extremely cryptic, preventing them from being observed easily even when present. Lizards are likely to be adversely affected by Plan Change 58 in Areas 1 and 2. Lizard values for Areas 3 and 4 remain unknown, as no survey effort was implemented due to the occupied nature of the properties and lack of access permission. However, lizard values are likely to be relatively low in these areas compared to Areas 1 and 2.

5.1 Northern grass skink

Northern grass skink are found in high abundance within Area 2, and sparsely across the golf course, but surprisingly are not present in Area 1 where the Kupe skink population is located. The population in Area 2 is large and likely numbers in the low thousands of individuals. Any development proposals for Area 2 will require a Lizard Management Plan to address the potential adverse effects of development on this lizard population.

5.2 Kupe skink

The lizard survey identified the presence of a nationally significant population of Kupe skink, a soon-to be ranked 'Nationally Critical' skink species, located at Area 1. Prior to this discovery, the Kupe skink was known only from ≤ 5 known populations with the largest known population estimated at a minimum of < 40 individuals (van Winkel 2021). A total of 51 individuals was confirmed in Area 1, and the actual population size is likely $c. 250-300$ individuals, since most ($n=42$ of the 51) of the skinks were found in a relatively small part of a 0.75-hectare grassland due to a sampling quirk (presence of two large plywood boards). It appears that in Area 1, the rank kikuyu grassland present throughout has been a significant factor in protecting and sustaining the Kupe skink population. Elsewhere, indigenous lizards throughout New Zealand have had to utilise a range of exotic plants – including pest species – in response to the loss of original indigenous habitats. Lizards may be found utilising gorse (*Ulex europaeus*), pampas (*Cortaderia selloana*), tradescantia (*Tradescantia fluminensis*) and exotic grasslands,

due to the complex and protective refuge they can provide. In some cases, indigenous lizards can occur in high densities within these habitats.

The 0.75-hectare area located within Area 1 should be considered significant habitat of indigenous fauna under the Resource Management Act Section 6(c), where protection is a matter of national importance. This is because of the presence of a ‘Nationally Critical’ skink species, and the fact that this population is now recognised as the most significant population/site identified in New Zealand for the species (van Winkel 2021). The site should receive a high level of protection, at a minimum through rules, from activities likely to cause any further loss or modification. In addition to site protection, the conservation management of the Kupe skink population at the site should be an important future consideration.

The protection of areas of significant habitats of indigenous fauna is also an objective (Objective 6-1) under the Horizon Regional Council’s One Plan (Horizons 2014), In the One Plan, Policy 13 for Land Use Activities and Indigenous Biological Diversity requires that consent decision making for activities is regulated, and the Regional Council must make decisions on consent applications and consent conditions on a case-by-case basis, having regard for significant habitat of indigenous fauna (Policy 13-4: (A) (i) (B) and (D)). Policy 13-4 (b) indicates that consent must generally not be granted for resource use activities in a rare habitat, threatened habitat or at-risk habitat assessed to be an area of significant indigenous vegetation or a significant habitat of indigenous fauna under Policy 13-5, unless:

- I. there will be no significant adverse effects on that habitat’s representativeness, rarity and distinctiveness, or ecological context as assessed in accordance with Policy 13-5, or
- II. any significant adverse effects are avoided.
- III. where any significant adverse effects cannot reasonably be avoided, they are remedied or mitigated at the point where the adverse effect occurs.
- IV. where significant adverse effects cannot reasonably be avoided, remedied or mitigated in accordance with (c)(ii) and (iii), they are offset to result in a net indigenous biological diversity gain

Under Policy 13-5, the Kupe skink population readily meets criteria (a) (ii) where in terms of rarity and distinctiveness, that habitat supports an indigenous species or community that (A) is classified as threatened (as determined by the New Zealand Threat Classification System and Lists). The Kupe skink has same threat classification afforded to the kakapo (*Strigops habroptilus*), black stilt (*Himantopus novaezelandiae*), and black robin (*Petroica traversi*).

Due to the species’ ‘Threatened - Nationally Critical’ status, it is highly unlikely that the Department of Conservation would issue a Wildlife Act Authority to relocate the entire Kupe skink population to another location elsewhere as part of any proposed mitigation planning for a future residential development.

Instead, conservation management for the Kupe skink population should centre on the specific management required to ensure long-term population viability at the site. These management actions could include legal protection of the site, lizard population

monitoring, pest management (including provision of exclusion fencing), and habitat management and enhancement.

The Kupe skink population overlaps onto the Waitai Street Recreation Reserve (0.27 hectares) administered by the Department of Conservation (Figure 3 in Appendix 3). Thus, this population occurs partially on legally protected land.

5.3 Ecological value

The ecological value of the lizard fauna at sites part of the Outer Castlecliff Plan Change 58 is ‘Very High’ for the 0.75-hectare site that is part of Area 1, and ‘Low’ for the remainder of Area 1 and also Area 2, using the EIANZ’s EcIA Guidelines (Roper-Lindsay *et al.* 2018). WSP rated the other ecological attributes and features for the same areas as ‘Very Low’ to ‘Low’, respectively (WSP 2020).

The ‘Very High’ rating for the 0.75-hectare site within Area 1 is on the basis of the presence of a Nationally Threatened species on a permanent basis within this site of the Project footprint, and therefore this site meets the ecological criteria (Policy 13-4: (A) (i) (B) and (D)) outlined in the Regional Policy Statement for the Manawatu-Whanganui Region (One Plan).

The ‘Low’ rating for Areas 2 is due to the ‘Not Threatened’ conservation status for the northern grass skink, however Area 2 meets Schedule F in the One Plan due to the presence of a rare habitat type. After discussions with Wildlands relating to the value of the lizard habitat present in Area 2, WSP has reassessed the value of the duneland habitat present within this area. It has now been realised that parts of the duneland in Area 2 does indeed meet the definition of “stable duneland” supporting extensive pohuehue, which is listed under Schedule F as a “rare” habitat type in the Horizons One Plan. The value of this habitat present in Area 2 should therefore be revised from “Low” to “High” (A. Reid, WSP, pers. comm).

5.4 Magnitude of effects

The magnitude of effects of Plan Change 58 on the Kupe skink population in Area 1 would be rated ‘Very High’ as they would potentially lead to loss of a very high proportion (and likely all of the Area 1 individuals) of a known population of this threatened species. van Winkel (2021) indicated that this is one of the most significant populations of the species found to date.

For the northern grass skink present within Area 2, the magnitude of effects would be ‘Moderate’, as residential development would lead to loss of a moderate proportion of the known population.

5.5 Assessment of ecological effects

The ecological effects from the rezoning of four Areas for lizards, should the project proceed to subdivision and construction work involves a significant risk of lizards being injured or killed during any vegetation clearance works required for residential activity.

Any such harm is likely to represent the loss of a nationally significant proportion of populations of Kupe skink in Area 1, and a locally significant population of northern grass skink in Area 2. In addition, arboreal species such as barking gecko may be affected by clearance of the stable pohuehue duneland in Area 2.

Along with population losses, there will also be a corresponding, and permanent, loss of lizard habitat.

While the impacts on northern grass skink may be mitigated, or offset elsewhere, it is unlikely that there are realistic mitigation and offsetting options for the Kupe skink that could address potential adverse effects on the population located in Area 1.

5.6 Effects minimisation

The part of Area 1 identified as Kupe skink habitat should not be zoned for residential activity, and be reserved as a protected area, while a part of Area 2 could also be protected. The remainder of Area 1 plus Areas 2, 3 and 4 should have a consent notice for lizard survey and assessment, and/or lizard management planning, prior to any future land use changes.

5.7 Overall level of effects

The overall level of effects of Plan Change 58 remains 'Very High' for Kupe skink for the 0.75 hectare site within Area 1, regardless of any effect minimisation activity, unless complete avoidance is undertaken. This outcome contrasts to the assessment originally made by WSP for the same area for all other ecological values (i.e 'Very Low') (WSP 2020). However, the contrast is not surprising, given that lizards are highly cryptic and, in this instance, they have utilised a completely exotic habitat type as it provides the required protective attributes and resources needed for lizard survival.

For Areas 2 and 3, the overall effects on northern grass skink may range from 'Moderate' to 'Low' depending on the quality of the lizard management planning prior to any future development of these areas. WSP's own assessment for other ecological values for Areas 2 and 3 is also 'Very Low' (WSP 2020), however, this is not necessarily an irreconcilable assessment. A robust lizard mitigation programme should be able to sufficiently address effects on lizards for Area 2, especially if parts of Area 2 was to be reserved and individuals of northern grass skink from Area 1, 2 and 3 were translocated to it, and received site specific management, such as pest control.

5.8 Summary

WSP (2020) was correct in exercising caution in their report when making statements relating to lizard values, and recommending lizard surveys and a reassessment of values based on lizards. Local iwi was also correct in requesting first an assessment of lizard values, and determining the effects of Plan Change 58 on these values before proceeding with notification of Plan Change 58 (Te Rūnanga o Tūpoho 2020).

As a result of the survey commissioned by Whanganui District Council, a nationally significant population of a ‘Threatened – Nationally Critical’ lizard species was subsequently discovered at a site. This population is now considered one of the most significant known populations of this species in Aotearoa/New Zealand (van Winkel 2021).

6. SUGGESTIONS

The presence of lizards, particularly the Kupe skink, has significant implications for Plan Change 58. Our suggestions for Plan Change 58 are as follows:

- Based on lizard values, a Plan Change from ‘Rural Lifestyle’ to ‘Residential’ could be acceptable for Area 4, with consent notices lodged to require lizard surveys be undertaken ahead of any resource consent applications, and if lizards are found present, that a Lizard Management Plan is required at the time of consent lodgement. The Lizard Management Plan should have an incidental discovery protocol in place, in case Kupe skinks are subsequently discovered as part of lizard management or development works.
- For Area 2, a Plan Change from ‘Rural Lifestyle’ to ‘Residential’ could be supported for the northern section only where the duneland area is highly modified (i.e. largely weedy with low indigenous values). A consent notice would need to be lodged requiring a Lizard Management Plan be prepared to manage the adverse effects of development on the northern grass skink population. The northern grass skink could be relocated into higher value habitats within the remainder of Area 2, along with any required land protections and ecological management applied to the release site. The Lizard Management Plan for Area 2 should have an incidental discovery protocol in place in case Kupe skinks are subsequently discovered as part of lizard management or development works.
- For Area 3, Plan Change from ‘Rural Lifestyle’ to ‘Residential’ could also be supported due to the apparently low ecological values as observed from the road. A consent notice lodged to require lizard surveys be undertaken ahead of any resource consent applications is suggested. If lizards are found present, a Lizard Management Plan would be required.
- For lots located in Area 1 not including the 0.75-hectare Kupe skink site, a Plan Change to ‘Residential’ could be acceptable based on known lizard values as no lizards were located in these remaining areas. However, the remainder of Area 1 should be carefully surveyed for lizards, prior to development, and hence

a consent notice lodged to require lizard surveys be undertaken ahead of any resource consent applications is appropriate. If lizards are found present, a Lizard Management Plan would be required.

- For the remaining lots located within a 0.75 hectare site in Area 1 now known to contain a significant Kupe skink population, this area should be legally protected in perpetuity from any land development via zoning, reservation or covenanting. This is required in order to help sustain the population and enable species conservation management. Site protection options should be investigated. Options could include (a) open space covenant; (b) re-zoning as Reserve or Prohibited Activity zone where vegetation disturbance, damage, or destruction is not allowed; or, (c) an extension of the Department of Conservation's Waitai Street Recreation Reserve by transfer of title to cover the entirety of the known Kupe skink range. The Waitai Street Recreation Reserve could subsequently become designated a Scientific Reserve under the Conservation Act. The land protection options, the processes involved, and the pro and cons of each would need to be fully understood.
- Extending the size of the 0.75-hectare site should also be considered by including part of the fairway (Hole 15), and allowing it to revert into rank grassland/shrubland. There is an opportunity to extend the site to 1.80 hectares with relatively minimal intrusion and impact to the golf course. This would allow the Kupe skink population to increase both in size and range, and thus increase the security of the population and value of the reserve. It is also strongly recommended that there is a buffer zone around the 0.75 (or 1.80 hectare) site where no subdivision is undertaken as to reduce impacts on the population from adjacent housing (e.g. increased numbers of domestic cats and/or rodents, rubbish dumping, etc).
- The Department of Conservation's Statutory Land Management team is currently looking into possible options regarding reclassification and/or extension of the Waitai Street Recreation Reserve as a result of this discovery. In addition, the Department is also looking at implications of the discovery on priorities for the species.
- A conservation management plan should be prepared for the Kupe skink population in Area 1, considering physical site protection (i.e. fencing), pest management (including the possibility of 'leaky-fences'), habitat management, population monitoring, and community involvement.
- No mowing or agrichemical spraying should be undertaken in the 0.75-hectare site within Area 1.
- The pine saplings currently present in the 0.75-hectare site within Area 1 should be removed immediately, and no further exotic tree plantings should be established.

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INTERNET RESOURCES

<https://www.whanganui.govt.nz/Property/Planning-Services/District-Plan-Changes/Current-Plan-Changes/Plan-Change-58-Outer-Castlecliff>

CASTLECLIFF MAP:
PLAN CHANGE 58 SITES

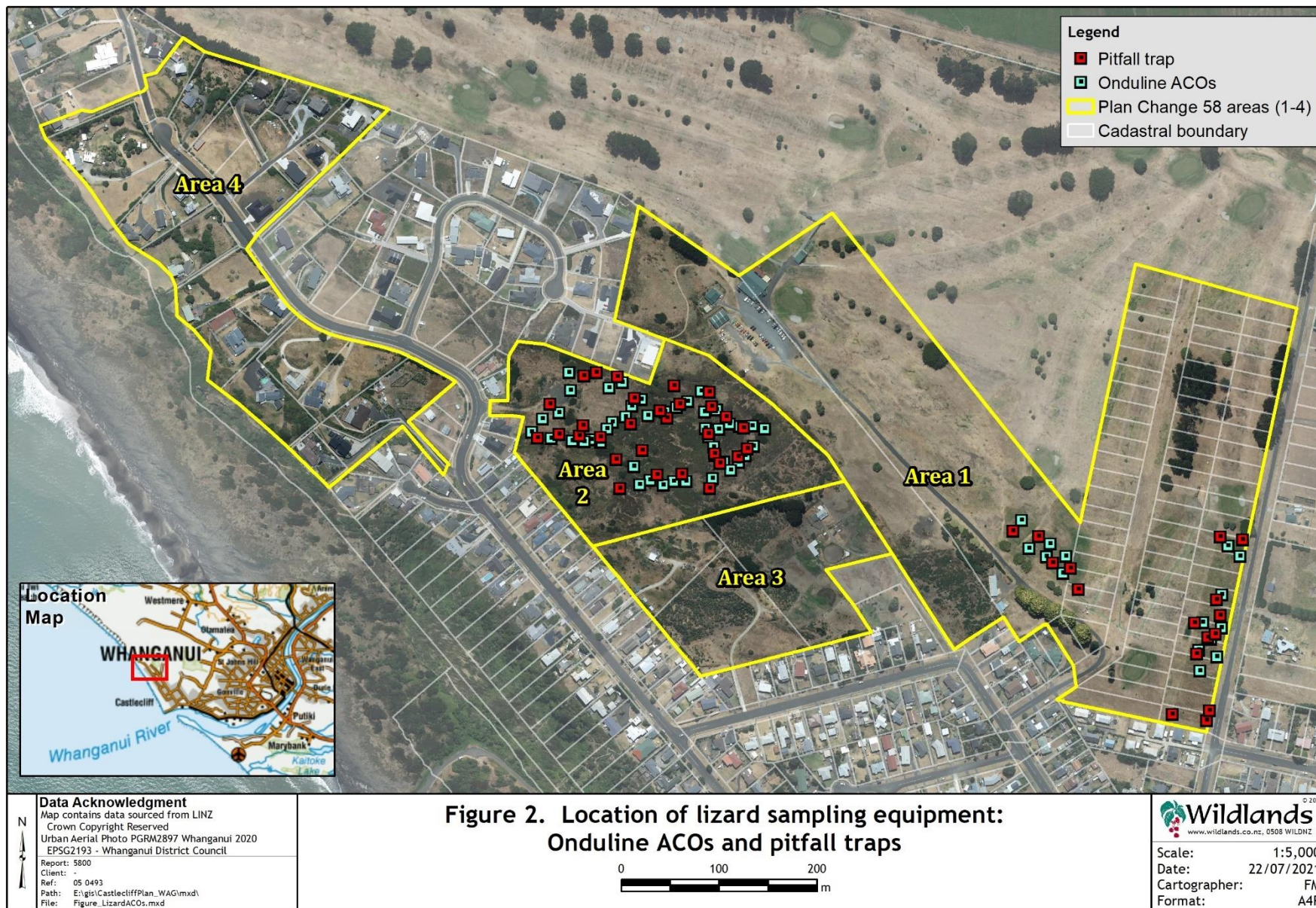


**Figure 1. Outer Castlecliff Plan Change 58:
Location of Areas 1, 2, 3 and 4.**

Data Acknowledgment
 Map contains data sourced from LINZ
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 Urban Aerial Photo PGRM2897 Whanganui 2020
 EPSG2193 - Whanganui District Council
 Report: 5800
 Client: -
 Ref: 05 0493
 Path: E:\gis\CastlecliffPlan_WAG\mxd\
 File: Figure_PlanChange58Areas.mxd

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 Scale: 1:5,000
 Date: 22/07/2021
 Cartographer: FM
 Format: A4R

CASTLECLIFF MAP:
SURVEY EQUIPMENT



CASTLECLIFF MAP:
SURVEY RESULTS



Figure 3. Locations of lizards detected in survey

CASTLECLIFF KUPE SKINK SURVEY RESULTS, 2021

Kupe skink capture data from Area 1, Outer Castlecliff.

Notations are as follows: Sex: F= female, M= male, J= juvenile. SVL: snout-vent length. Recap: N1 = first capture of this individual; R1 = second capture of that individual.

Species	Date	Code	Sex	SVL	Tail length	Tail break	Weight	Site ID	Method	Recap
<i>Oligosoma</i> "southern North Island"	2/04/2021	OK_01	F	70	52	40		Plywood	Plywood	N4
<i>Oligosoma</i> "southern North Island"	2/04/2021	OK_02	F	84	95	11		Plywood	Plywood	N
<i>Oligosoma</i> "southern North Island"	2/04/2021	OK_03	M	75	70	46		Plywood	Plywood	N
<i>Oligosoma</i> "southern North Island"	20/04/2021	OK_04	F	65	74/18	18	6.12	Plywood	Wooden board	N
<i>Oligosoma</i> "southern North Island"	20/04/2021	OK_05	F	66	93		6.43	Plywood	Wooden board	N1
<i>Oligosoma</i> "southern North Island"	20/04/2021	OK_06	F	68	52	37/3	6.87	Plywood	Wooden board	N
<i>Oligosoma</i> "southern North Island"	20/04/2021	OK_07	F	75	64	21	8.69	Plywood	Wooden board	N2
<i>Oligosoma</i> "southern North Island"	20/04/2021	OK_08	F	75	91	4	8.91	Plywood	Wooden board	N
<i>Oligosoma</i> "southern North Island"	20/04/2021	OK_09	M	65	91		6.58	Plywood	Wooden board	N
<i>Oligosoma</i> "southern North Island"	20/04/2021	OK_10	Neo	39	53		1.28	Plywood	Wooden board	N
<i>Oligosoma</i> "southern North Island"	20/04/2021	OK_11	Neo	40	54		1.27	Plywood	Wooden board	N
<i>Oligosoma</i> "southern North Island"	20/04/2021	OK_12	Neo	41	56		1.71	Plywood	Wooden board	N
<i>Oligosoma</i> "southern North Island"	20/04/2021	OK_13	Neo	42	58		1.4	Plywood	Wooden board	N
<i>Oligosoma</i> "southern North Island"	20/04/2021	OK_14	Neo	42	57		1.54	Plywood	Wooden board	N
<i>Oligosoma</i> "southern North Island"	20/04/2021	OK_15	Neo	43	57		1.6	Plywood	Wooden board	N
<i>Oligosoma</i> "southern North Island"	20/04/2021	OK_16	Neo	43	61		1.8	Plywood	Wooden board	N
<i>Oligosoma</i> "southern North Island"	22/04/2021	OK_17	F	81	56	40	9.94	Plywood	Wooden board	N
<i>Oligosoma</i> "southern North Island"	22/04/2021	OK_18	J	41	58		1.36	Plywood	Wooden board	N3
<i>Oligosoma</i> "southern North Island"	22/04/2021	OK_19	M	75	118		9.62	Pit447	Pitfall	N

<i>Oligosoma</i> "southern North Island"	22/04/2021	OK_20	M	80	94		10.8	Plywood	Wooden board	N
<i>Oligosoma</i> "southern North Island"	22/04/2021	OK_21	M	82	62	6	10.4	ACO59	Onduline ACO	N
<i>Oligosoma</i> "southern North Island"	22/04/2021	OK_47	UNK					Grass	Grass	N
<i>Oligosoma</i> "southern North Island"	22/04/2021	OK_48	UNK					Grass	Grass	N
<i>Oligosoma</i> "southern North Island"	22/04/2021	OK_49	UNK					Grass	Grass	N
<i>Oligosoma</i> "southern North Island"	22/04/2021	OK_50	UNK					Grass	Grass	N
<i>Oligosoma</i> "southern North Island"	22/04/2021	OK_51	UNK					Grass	Grass	N
<i>Oligosoma</i> "southern North Island"	23/04/2021	OK_22	J	40	43		1.3	ACO56	Onduline ACO	N
<i>Oligosoma</i> "southern North Island"	23/04/2021	OK_23	M	70	62	27		ACO54	Onduline ACO	N
<i>Oligosoma</i> "southern North Island"	23/04/2021	OK_24	UNK					ACO52	Onduline ACO	N
<i>Oligosoma</i> "southern North Island"	23/04/2021	OK_25	UNK					ACO60	Onduline ACO	N
<i>Oligosoma</i> "southern North Island"	23/04/2021	OK_26	UNK					ACO58	Onduline	N
<i>Oligosoma</i> "southern North Island"	20/05/2021	OK_27	Adult	N/A	N/A	N/A	N/A	Plywood	Plywood	N
<i>Oligosoma</i> "southern North Island"	20/05/2021	OK_01	F	70	53	41	6.8	Plywood	Plywood	R4
<i>Oligosoma</i> "southern North Island"	20/05/2021	OK_05	F	67	90		6.36	Plywood	Plywood	R1
<i>Oligosoma</i> "southern North Island"	20/05/2021	OK_07	F	75	64	20	8.81	Plywood	Plywood	R2
<i>Oligosoma</i> "southern North Island"	20/05/2021	OK_18	F	42	58		1.4	Plywood	Plywood	R3
<i>Oligosoma</i> "southern North Island"	20/05/2021	OK_28	F	70	89		7.5	Plywood	Plywood	N
<i>Oligosoma</i> "southern North Island"	20/05/2021	OK_29	F	70	77		6.4	Plywood	Plywood	N
<i>Oligosoma</i> "southern North Island"	20/05/2021	OK_30	F	72	86	2	7.4	Plywood	Plywood	N
<i>Oligosoma</i> "southern North Island"	20/05/2021	OK_31	F	74	94		9.06	Plywood	Plywood	N
<i>Oligosoma</i> "southern North Island"	20/05/2021	OK_32	F	78	48	44	8.36	Plywood	Plywood	N
<i>Oligosoma</i> "southern North Island"	20/05/2021	OK_33	F	78	82	31	8.7	Plywood	Plywood	N
<i>Oligosoma</i> "southern North Island"	20/05/2021	OK_34	F	79	98	7	10.4	Plywood	Plywood	N
<i>Oligosoma</i> "southern North Island"	20/05/2021	OK_35	F	82	72	28	10.43	Plywood	Plywood	N
<i>Oligosoma</i> "southern North Island"	20/05/2021	OK_36	J	41	60		1.51	Plywood	Plywood	N
<i>Oligosoma</i> "southern North Island"	20/05/2021	OK_37	J	42	31	1	1.31	Plywood	Plywood	N
<i>Oligosoma</i> "southern North Island"	20/05/2021	OK_38	J	42	56		1.75	Plywood	Plywood	N
<i>Oligosoma</i> "southern North Island"	20/05/2021	OK_39	J	43	16	0	1.32	Plywood	Plywood	N

<i>Oligosoma</i> "southern North Island"	20/05/2021	OK_40	J	43	7	0	1.3	Plywood	Plywood	N
<i>Oligosoma</i> "southern North Island"	20/05/2021	OK_41	J	44	59		1.61	ACO55	Onduline ACO	N
<i>Oligosoma</i> "southern North Island"	20/05/2021	OK_42	J	44	62		1.8	Plywood	Plywood	N
<i>Oligosoma</i> "southern North Island"	20/05/2021	OK_43	J	46	64			Plywood	Plywood	N
<i>Oligosoma</i> "southern North Island"	20/05/2021	OK_44	M	69	70	38	5.7	Plywood	Plywood	N
<i>Oligosoma</i> "southern North Island"	20/05/2021	OK_45	M	77	92	3	9.9	Plywood	Plywood	N
<i>Oligosoma</i> "southern North Island"	20/05/2021	OK_46	M	86	62	53	10.3	Plywood	Plywood	N



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