

An assessment of the lizard fauna on the site of the proposed Vale Nouvelle-Calédonie KO4 mine access road.

**Cygnnet Surveys & Consultancy
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1. INTRODUCTION

Cygnnet Surveys and Consultancy (CSC) were contracted by Vale Nouvelle-Calédonie to provide an expert assessment of the lizard fauna likely to occur on areas within the boundary of the proposed development of the KO4 mine access road, and identify the potential occurrence of sensitive species or habitat of conservation significance for lizards on these areas.

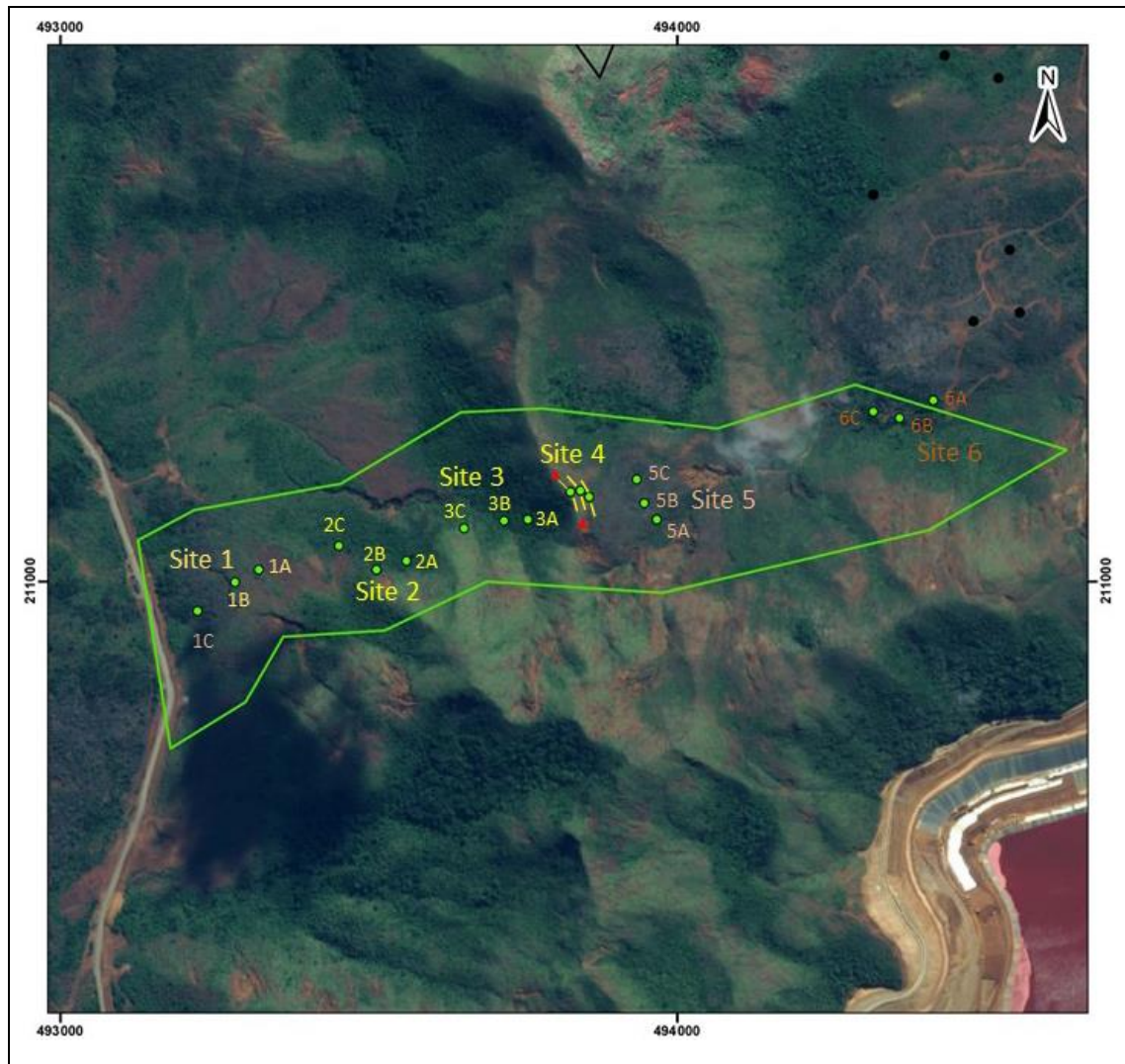
A number of studies have been commissioned by VN-C to investigate the lizard fauna of the Goro Plateau. The nature of these studies has been to establish monitoring sites for lizards (Sadlier & Swan, 2008), to inventory the lizard fauna in the areas of mine development (Sadlier & Swan, 2009a; Sadlier & Swan, 2010a; Sadlier *et al.*, 2011a) including the proposed development of the KO4 sediment storage facility (Sadlier *et al.*, 2014d, 2014e), and to inventory the lizard fauna of proposed areas for preservation (Sadlier & Swan, 2009b and Sadlier *et al.*, 2011d). More recently a number of baseline inventory studies have been commissioned to assess the lizard fauna of concessions held by VN-C (Sadlier & Swan, 2010b & 2010c; Sadlier *et al.*, 2011b, 2011c, 2012, 2013a, 2013b, 2013c, 2014a, 2014b, 2014c).

These studies in combination have identified a rich and diverse lizard fauna of ~25 species on the Goro Plateau and adjacent areas of the Grand Sud. Included are a number of **significant species** which have been identified as of particular conservation concern by virtue having one or more aspects of their biology (habitat preferences, diet, home range, etc.) specialized, and which in combination with their extent of occurrence influences the ability of these species to persist into the future. The richest habitat is humid forest from which 20 species have been recorded, including three species of giant gecko formerly in the genus *Rhacodactylus*, one of which is endemic to the Grand Sud. Tall maquis preforest also has a rich lizard fauna, with up to 14 species recorded from this habitat type, whereas open maquis arbustif or herbaceous maquis typically have a low diversity of species and low abundance. As a result of these studies humid forest and maquis forest have been identified as **significant habitats** for lizards in the region.

This study focuses on the main area either side of the range over which the proposed KO4 mine access road between the Prony Road and the KO4 Bureau will run.

2. STUDY SITES

Six sites in total were established within the area of development for the proposed KO4 mine access road in the period 6th–10th January 2015. A total of 180 trap stations were operational across the study area over the survey period.



Sites surveyed on the in the area of the proposed KO4 mine access road in January 2015.

- Green line represents the boundaries of proposed road developments.
- Individual sites marked with green circles.
- Approximate line of transects on peridotite outcropping on crest of the range at site 4 marked as yellow lines.
- Approximate northern and southern limit of peridotite outcropping on the crest of the range marked with red triangles.
- Color of site labels correspond to the broad vegetation type (type_n1) - see site habitats below.

Site	Co-ordinates		Habitat (type_n1)	(type_n2)
Site 1	Transect A	-22.30121S x 166.90567E	Maquis ligno-herbace des pentes erodes	F
	Transect B	-22.30140S x 166.90529E	Maquis ligno-herbace des pentes erodes	F
	Transect C	-22.30182S x 166.90471E	Maquis semi ouvert sur sol ferratitique avec Gymnostoma et Arillastrum	I & K
Site 2	Transect A	-22.30106S x 166.90800E	Maquis ligno-herbace - semi ouvert	U
	Transect B	-22.30120S x 166.90753E	Maquis ligno-herbace - dense	U
	Transect C	-22.30086S x 166.90692E	Maquis ligno-herbace - dense	U
Site 3	Transect A	-22.30046S x 166.90991E	Maquis ligno-herbace - dense	U
	Transect B	-22.30047S x 166.90953E	Maquis ligno-herbace - dense	U
	Transect C	-22.30059S x 166.90889E	Maquis ligno-herbace - semi ouvert	U
Site 4	Transect A	-22.30004S x 166.91057E	Maquis ligno-herbace – ouvert sur peridotite	U
	Transect B	-22.30002S x 166.91072E	Maquis ligno-herbace – ouvert sur peridotite	U
	Transect C	-22.30011S x 166.91086E	Maquis ligno-herbace – ouvert sur peridotite	U
Site 5	Transect A	-22.30044S x 166.91193E	Maquis semi ouvert sur sol ferratitique	I
	Transect B	-22.30021S x 166.91174E	Maquis semi ouvert sur sol ferratitique	I
	Transect C	-22.29985S x 166.91162E	Maquis semi ouvert sur sol ferratitique	I
Site 6	Transect A	-22.29868S x 166.91628E	Maquis paraforest a Gymnostoma	K
	Transect B	-22.29894S x 166.91574E	Maquis paraforest a Gym. avec Arillastrum	K
	Transect C	-22.29885S x 166.91534E	Maquis paraforest a Gym. avec Arillastrum	K

Note: 'Habitat' corresponds to the broad vegetation types (type_n1), and the code for the finer level of vegetation type (type_n2) as determined in field during the course of the surveys.

The representation of vegetation type covered by the 6 sites surveyed was paraforest (~19.5%), open maquis on cuirasse (~19.5%), open ligno-herbaceous maquis on eroded surfaces (11%), open (11%) to dense (22%) ligno-herbaceous maquis at the base and on the slopes of the range, and low, sparse ligno-herbaceous maquis with outcropping peridotite rocks on the crest of the range (17%) targeted as suitable habitat for the threatened skink *Lacertoides pardalis*. There are no forest areas of significance within the boundaries of development for the KO4 mine access road.

The area of the proposed KO4 mine access road route west of the north-south running range traversed by the road is predominately open ligno-herbaceous maquis on surfaces at the base of the ranges, much of which is on eroded and degraded surfaces (sites 1A-B), and semi-open (sites 2C & 3C) to dense (sites 2A-B & 3A-B) ligno-herbaceous maquis on the lower slopes of the east-west running range that is traversed by the southern boundary of the proposed road route.



Ligno-herbaceous maquis at the base of the ranges, much of which is on eroded and degraded surfaces.



Semi open maquis on cuirasse surface – site 1C



Semi open ligno-herbaceous maquis – site 2C



Dense ligno-herbaceous maquis on the side of the north-south running range– sites 3B-C.



Dense ligno-herbaceous on maquis on the side of the north-south running range– site 3B.

An area of outcropping peridotite with low ligno-herbaceous maquis dominated by a low broadleaved sedge groundcover (sites 4A-C) runs along the crest of the north-south running range traversed by the proposed access road



Outcropping peridotite on the crest of the north-south running range – area of site 4 and habitat for the threatened skink *Lacertoides pardalis*.



Low ligno-herbaceous maquis on peridotite – site 4.



Peridotite outcrop – site 4

The area of the proposed KO4 access road route east of the north-south running range traversed by the access road is predominately semi-open ligno-herbaceous maquis with a moderately dense groundcover of broad and narrow leaved sedges, but small areas of open maquis on cuirasse (sites 5A-C) and *Gymnostoma* dominated paraforest (sites 6A-C) are present.

The area of open maquis on a ferrallitique cuirasse surface lies just below the crest of the north-south running ridge, but has a history of recent burning and is semi-open with only sparse groundcover.



Maquis on a cuirasse surface – site 5.



Semi-open maquis - site 5

The area of paraforest is small and lies at the eastern end of the proposed route. The majority of the *Gymnostoma* dominated paraforest on the slopes had been burnt, and the remaining unburnt areas of paraforest, some with dense canopy and *Arilastrium* (sites 6B-C), were highly degraded, and the area disturbed by the construction of a road.



***Gymnostoma* dominated paraforest at site 6 with dense canopy and *Arilastrium* in gully area to right of picture – note the extent of fire damage on the slopes.**



Road through remnant paraforest, adjacent to site 6B.



Dense paraforest in gully area of site 6B.

Other areas of exposed peridotite rock outcrops were scattered on the upper slopes and crest of the east-west running range that is traversed by the southern boundary of the proposed road route, but lie well outside the area of proposed development.



Area of exposed peridotite rock outcrops on the upper slopes and crest of the east-west running range outside the boundary area of the proposed KO4 access road route.

3. METHODS

Survey sites at each area were selected according to the following criteria:

- to encompass the full range of habitats so as to assess the species diversity of the study area as completely as possible.
- to target specific habitats in which lizard species of particular conservation concern might occur.
- to obtain an estimate of the number of individuals of each species likely to be affected by the proposed development activities.

Previous studies to assess the diversity and abundance of lizard species in forest and maquis habitats in the Grand Sud have shown that strategically placed glue traps are highly effective in detecting the presence of the majority of day active skink species, and particularly effective in detecting the presence of secretive species. It is also the only effective method for detecting the presence of skink species in areas with a dense understory and groundcover. For these reasons this was the primary method used to detect diurnal and secretive skinks in all habitats across the areas surveyed.

The number of sites surveyed reflected the extent and diversity of habitats present, and the logistics with regard to accessibility. Each survey site had three transects, each transect representing a site replicate. At each transect one glue-trap was laid at each of 10 stations (each station 5-8 m. apart) along a transect line. Glue traps were strategically placed under or next to sheltering sites (crevices and cracks created where outcropping cuirasse boulders contact the ground, under and next to logs), in areas of litter or amongst surface debris, and under vegetation. Areas of outcropping peridotite were specifically targeted for the presence of the threatened skink *Lacertoides pardalis*. Records are also kept of lizards encountered opportunistically on transects during the course of checking glue traps.

Geckos are usually the less diverse of the two lizard groups present. Geckos are active at night foraging in low shrubs, small trees, or the forest canopy. By day they shelter in retreat sites in standing vegetation or under cover on the ground. Timed nocturnal searches were undertaken in the first two hours after sunset. These night searches generally consisted of walking along tracks through maquis and forest habitats in the general vicinity of survey sites, or through the forest following transect markers. The method used to search for geckos is by detecting the reflection from the eye when a beam of light is directed towards the lizard, or by scanning vegetation with a powerful light at closer range to observe geckos on twigs or branches. Binoculars modified to carry a torch and emit a light beam from below the eyepieces of the binocular are used to detect eye reflection. This method readily detects both the larger and smaller geckos, but to be effective it generally requires a minimum search distance of 10-15m., and a co-worker is often required to collect the gecko for positive

identification while the first observer keeps the animal in sight from a distance. During this period timed nocturnal searches were undertaken in the major habitat types present as follows: 1.5 person hours in dense open ligno-herbaceous shrubland and the edge of adjacent dense *Gymnostoma* maquis on cuirasse at site 1, and 1.5 person hours in maquis ligno-herbaceous shrubland adjacent to site 6.

The assessments of diversity of individual areas are based on extensive field and research experience on the New Caledonian lizard fauna by the CSC Principal Investigator and also draw support from the results of previous studies by CSC in the Grand Sud.



Typical placement of glue traps under vegetation in herbaceous maquis.



Typical placement of glue traps in and amongst rock in peridotite outcrops targeting the threatened skink *Lacertoides pardalis*.



Typical placement of glue traps in the open (above left) and under a log (above right) in forest habitat.

4. RESULTS

Species Recorded: nine species of lizard (eight skinks and one gecko) were recorded across the 6 sites surveyed within the proposed area of development for the KO4 mine access road in January 2015.

Species	Sites						Total
	1	2	3	4	5	6	
<i>Caledoniscincus austrocaledonicus</i>	1	2	2	-	4	4	13
<i>Caledoniscincus notialis</i>	1	4	14	-	-	4	23
<i>Lacertoides pardalis</i>	-	-	1	2	-	-	3
<i>Lioscincus nigrofasciolatus</i>	-	-	-	-	1	1	2
<i>Marmorosphax tricolor</i>	1	-	8	-	-	5	14
<i>Sigaloseps deplanchei</i>	-	-	-	-	-	5	5
<i>Simiscincus aurantiacus</i>						1	1
<i>Tropidoscincus variabilis</i>	-	1	2	-	-	-	3
<i>Rhacodactylus auriculatus</i>	2	-	-	-	-	3	5
Total	3	7	27	2	5	20	64

The diversity of species recorded across sites was modest (usually fewer than 6 taxa) for each of the maquis habitat types surveyed, but was richer in the area of *Gymnostoma* paraforest investigated.

Two species were recorded from open ligno-herbaceous maquis on eroded open surfaces at site 1, the generalist skink *Caledoniscincus austrocaledonicus* and the maquis specialist gecko *Rhacodactylus auriculatus*. The ‘forest’ inhabiting species *Marmorosphax tricolor*, and *Caledoniscincus notialis*, also typically regarded as a ‘forest’ inhabiting species, were recorded from a small patch of *Gymnostoma* dominated paraforest with *Arilastrum* on cuirasse adjacent to the open maquis on laterite.

Four species of skinks were recorded from sites in semi-open to dense ligno-herbaceous maquis dominated by broadleaved sedge groundcover at the base and on the slopes of the ranges traversed by the proposed road route. The species recorded from this habitat type included the generalist skink *Caledoniscincus austrocaledonicus*, the ‘forest’ inhabiting skink *Marmorosphax tricolor*, and two species of skinks *Tropidoscincus variabilis* and *Caledoniscincus notialis* typically regarded as a ‘forest’ inhabiting species. The presence

of *Tropidoscincus variabilis* and *Caledoniscincus notialis* is attributed to density of the groundcover of sedges at these sites, which provides a suitably moist microhabitat for these ‘forest’ species.

Two species, the generalist skinks *Lioscincus nigrofasciolatus* and *Caledoniscincus austrocaledonicus* were recorded from the area of degraded open maquis on cuirasse (site 5) near the eastern crest of the range.

The threatened skink *Lacertoides pardalis* was recorded from outcropping peridotite rocks in low ligno-herbaceous maquis on the crest of the range where the proposed KO4 mine access road crosses the north-south running range. Two individuals, both sub-adult, were recorded from glue taps laid primarily in crevices in the rock outcrops. A single individual was also recorded from dense maquis on the western slopes of the range just below the ridgeline and area of outcropping peridotite. The return of 3 individuals from 40 traps indicates the population on the crest of the ridge is likely to be robust, but the extent of preferred habitat is limited, and estimated to be a strip 25m wide by 100m in length. The traps set for *Lacertoides pardalis* were run over two days. The days were warm and predominately overcast but with intermittent periods with little cloud cover.

Two maquis specialist species, the skink *Lioscincus tillieri* and gecko *Rhacodactylus auriculatus* are considered likely to occur in a range of maquis habitats across the study area. The gecko *Rhacodactylus auriculatus* was recorded from the areas of open maquis surveyed at night at site 1 and adjacent to site 6. The skink *Lioscincus tillieri* was not recorded during the survey period of the KO4 access road but has been recorded from a number of maquis habitats in the region.

Six species of skink were recorded from the area of remnant *Gymnostoma* paraforest surveyed, which included the primarily ‘forest’ inhabiting skinks *Caledoniscincus notialis*, *Sigaloseps deplanchei* and *Simiscincus aurantiacus*. This area of paraforest is also suitable habitat for the ‘forest’ inhabiting skink *Tropidoscincus variabilis*, which was not recorded but would be expected to occur there.

Significant species: two species, the threatened skinks *Lacertoides pardalis* and *Simiscincus aurantiacus*, both listed as threatened on the IUCN Red List, were recorded from the proposed area of development for the KO4 mine road during the January 2015 survey period.

Significant sites: the area outcropping peridotite rocks on the crest of the range was identified as habitat for the threatened skink *Lacertoides pardalis*.

The small area of intact remnant *Gymnostoma* paraforest with *Arilastrum* investigated at the eastern end of the proposed KO4 mine access road route (site 6) was identified as habitat for the threatened skink *Simiscincus aurantiacus*.

Otherwise, much of the area within the boundaries of the proposed mine access road consists of open and dense maquis habitat that typically has a low diversity of lizard species and no species of particular conservation concern reliant upon it.

5. SUMMARY

The threatened skink *Lacertoides pardalis*, a species of conservation significance, was recorded from among the outcropping peridotite rocks on the crest of the range and the adjacent upper slopes on the range where the proposed KO4 mine access road is to cross the range. Areas of outcropping peridotite on the upper slopes and crests of ranges in the Grand Sud have been identified as the preferred habitat of *Lacertoides pardalis* (Sadlier et al., 2014f). However, due to the topography of the ranges and the sporadic occurrence of outcropping peridotite across the Grand Sud, the species has a dendritic distribution in the region that is often disjunct, resulting in discontinuity of populations. Given the proximity of the population of *Lacertoides pardalis* on the crest of the range at sites 4A and 5A-C to Forêt Nord and the presence of suitable habitat on the area of ridgeline between, the population in the area of the proposed KO4 mine access road would once have been continuous with the population known from the Kwa Neie range at Forêt Nord and Mine A1 to the south.

Another lizard species of conservation significance, the threatened skink *Simiscincus aurantiacus*, was recorded from a small area of remnant *Gynmostoma* paraforest near the eastern end of the proposed KO4 mine access road. Areas of paraforest in the region of the Kwé range, including *Gynmostoma* parafores, are known to contain a number of significant lizard species, including the geckos *Eurydactylodes symmetricus* and *Bavayia goroensis*, and the skinks *Graciliscincus shonae* and *Nannoscincus mariei*, all are listed as threatened on the IUCN Red list, particularly when the paraforest is situated on a broken cuirasse surface. However, the area of intact remnant paraforest investigated at site 6 from which the specimen of *Simiscincus aurantiacus* was recorded is extremely small and highly degraded. This patch of paraforest was once part of a larger area of this habitat which has been mostly burnt, and has an exploration track through much of it. As such, it is highly fragmented with a high edge to area ratio, which in combination with the overall extent of degradation indicates it is unlikely to have substantial populations of threatened lizard species. The presence of the skink *Simiscincus aurantiacus* there is attributable to the presence of broken cuirasse on the surface that provides suitable sheltering sites for this species and has buffered the effect of the habitat degradation resulting from prior burning and clearing.

6. KEY POINTS

The survey of the proposed KO4 mine access road route in January 2015 identified the presence of one significant area for lizard species of particular conservation significance - the area of outcropping peridotite on the upper slopes and crest of the range which is habitat for the threatened skink *Lacertoides pardalis*.

7. ACKNOWLEDGEMENTS

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