An assessment of the lizard fauna on the Vale Nouvelle-Calédonie concessions AS3, AS4 and AS5

Cygnet Surveys & Consultancy

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Frontcover: *Rhacodactylus auriculatus* – photo Ross A. Sadlier

1. INTRODUCTION

As part of the conditions associated with the renewal of the AS3, AS4 and AS5 concessions Vale Nouvelle-Calédonie (VNC) is required to undertake baseline studies of fauna on the site.

Lizards are a significant component of the terrestrial vertebrate fauna of New Caledonia. There are currently 34 species recorded from the Grande Sud, including several regional endemics. The greatest richness and diversity of lizard species occurs in humid forest with progressively less species found in canopied maquis, and fewer in open maquis.

Cygnet Surveys and Consultancy were contracted by Vale Nouvelle-Calédonie to provide an expert assessment of the lizard fauna likely to occur on the AS3, AS4 and AS5 concessions, and identify the potential occurrence of sensitive species or habitat of conservation significance for lizards on the area covered by the campaign.

2. PREVIOUS STUDIES

The first comprehensive studies of the lizard fauna of the Goro Plateau were undertaken in 2003 and 2004. The initial study (Sadlier & Shea 2004) was commissioned by (then) Goro Nickel, and was aimed at making a baseline inventory of the lizard fauna across the area of proposed development. A study to inventory the lizard fauna of the Réserves spéciales botanique Forêt Nord, Cap N'Doua, Pic du Pin, and Pic du Grand Kaori (Sadlier & Shea, 2006) was later commissioned by (then) the Direction des Resources Naturelles, Province Sud.

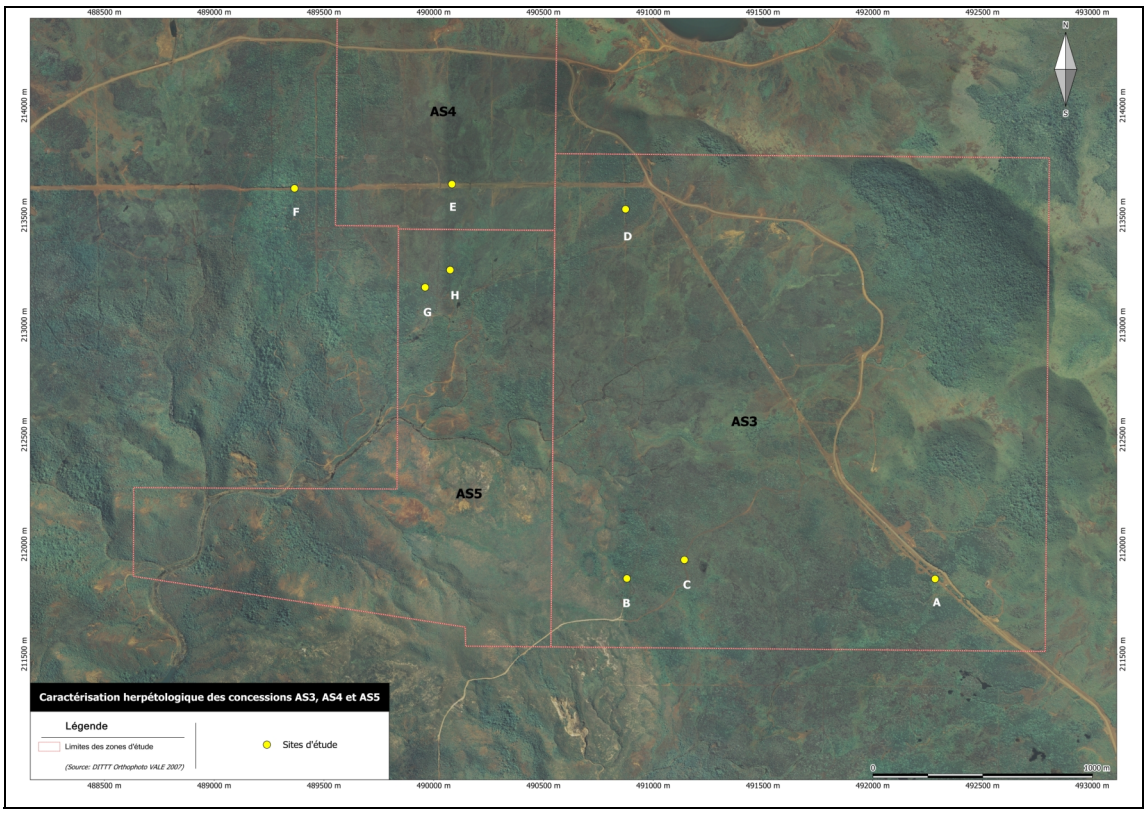
Since then additional studies have been commissioned by VNC to establish monitoring sites for lizards in the Réserves spéciales botanique Forêt Nord, Pic du Pin, and Pic du Grand Kaori (Sadlier & Swan, 2008), to inventory the lizard fauna in the areas of mine development (Sadlier & Swan, 2009a; Sadlier & Swan, 2010a; Sadlier et al., 2011a), and to inventory the lizard fauna of proposed areas for preservation on the Kwe Nord Range (Sadlier & Swan, 2009b) and Wadjana drainage (Sadlier et al., 2011c). A series of surveys of lizards on the various concession areas commenced in June 2010 (Gardenia - Sadlier & Swan, 2010b; FER02 - Sadlier & Swan, 2010c; AS2 & AS7 Sadlier et al., 2011b).

These studies in combination have identified a rich and diverse lizard fauna of 25 species on the Goro Plateau and adjacent areas. The richest habitat is humid forest in which 20 species have been recorded, including three species of giant gecko 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 preforest have been identified as **significant habitats** for lizards in the region.

3. STUDY SITES

The concessions AS3, AS4 and AS5 are located at the base of the ranges that includes Monts Néngoné and Pic du Grand Kaori on its western side, extending towards the Baie to Carénage and Baie Nord and including the upper reaches of the drainage of the Kadji River and Riviére des Kaoris. Eight sites were surveyed in May 2011. These sites include representatives of the major habitat types found on, or adjacent to, the concessions.



Location of sites examined May 2011. Red outline represents boundaries of the AS3, AS4 and AS5 concessions, survey sites (numeral) are in white and approximate location of each site is encompassed by the adjacent yellow circle.

Table 1: Location of sites and habitat type for each replicate surveyed on or adjacent to the AS3, AS4 and AS5 concessions.

Site Co-ordinates (UTM)	Replicate	Habitat
Site A		
0695056E 7532987N	A1	Maquis paraforestier
0694941E 7533090N	A2	Maquis paraforestier
0694857E 7533135N	A3	Maquis paraforestier
Site B		
0693561E 7533044N	B1	Dense maquis arbustif to 3 m with a dense groundcover
0693537E 7533102N	B2	Dense maquis arbustif to 3 m with a dense groundcover
0693560E 7533133N	B3	Dense maquis arbustif to 3 m with a dense groundcover
Site C		
0693863E 7533144N	C1	Low, open maquis arbustif on cuirasse
0693800E 7533185N	C2	Low, open maquis arbustif on cuirasse
0693832E 7533259N	C3	Low, open maquis arbustif on cuirasse
Site D		
0693543E 7534785N	D1	Maquis paraforestier
as for D1	D2	Maquis paraforestier
as for D1	D3	Maquis paraforestier
Site E		
0692845E 7534905N	E1	Low, dense lingo-herbaceous maquis wetland on cuirasse
0692752E 7534904N	E2	Low, dense lingo-herbaceous maquis on cuirasse
as for E2	E3	Low, dense lingo-herbaceous maquis wetland on cuirasse
Site F		
0692225E 7534891N	F1	Humid forest
0692035E 7534890N	F2	Humid forest
0691963E 7534884N	F3	Humid forest
Site G		
0692627E 7534435N	G1	Maquis paraforestier
as for G1	G2	Maquis paraforestier
as for G1	G3	Maquis paraforestier
Site H		
0692742E 7534513N	H1	Dense maquis arbustif to 2 m with a dense groundcover
as for H1	H2	Dense maquis arbustif to 2 m with a dense groundcover
as for H1	H3	Dense maquis arbustif to 2 m with a dense groundcover

Site B: small doline surrounded by low, open maquis arbustif on cuirasse.

Site E: Low, dense ligno-herbaceous maquis on cuirasse.

Site H: Dense maquis arbustif to 2 m with a dense groundcover.

Site G: Tall maquis paraforestier.

Site F: Humid Forest.

4. METHODS

Scincid lizards are the most diverse group in New Caledonia in terms of number of species and the niches occupied, and include:

- secretive species that shelter and forage below the surface of the ground cover.
- diurnal surface-active species that tend to forage and bask on the surface of the ground cover.
- diurnal surface-active species that are arboreal in habits and tend to forage and bask on the trunks and foliage of trees, and are occasionally active on the ground.

Previous studies to assess the diversity and abundance of lizard species in forest and maquis habitats have shown that strategically placed glue traps are highly effective in detecting the presence of the majority of day active 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 5 sites surveyed.

Glue traps were strategically placed at each station (5-8 metres apart) located along each transect line for each replicate. Traps were 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. For each trap placed at each station along a transect line the basic microhabitat attributes of the station with regard to potential sheltering sites were recorded.

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, and shelter by day in vegetation or under cover on the ground. Nocturnal searches were usually undertaken in the first two hours after sunset. 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 moving along twigs or branches. Binoculars modified to carry a torch and emit a light beam from below the eyepieces of the binocular were 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 required to collect the gecko for positive identification while the first observer keeps the animal in sight from a distance. Records are also kept of lizards encountered opportunistically on transects during the course of checking glue traps.

Typical placement of glue traps under vegetation in herbaceous maquis.

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

Search effort

Eight individual sites were surveyed. Each site had three transects, each representing a site replicate. At each replicate one glue-trap was laid at each of the 10 stations along the transect line. A total of 240 trap stations were operational throughout the survey period for a period of three full days and nights after being established, representing approximately 720 trap days/night in total, although rain in the afternoon of the third day reduced the effectiveness of the trap that day and night.

Timed nocturnal searches generally consist of walking transects along tracks through maquis and forest habitats and through forest following markers along transects. During the May survey of the AS3, AS4 and AS5 concessions searches were undertaken of representatives of the major habitat types by 3 persons for 1 hour at sites B, C and D, and for 1.5 hours at site F for a total of 13.5 person hours – the forest sites A and G were not surveyed at night as neither had a sufficient edge to search and a dense interior which did not allow effect searching within the forest, and the low and open maquis sites C and E were not surveyed as previous surveys of this habitat type (particularly wetland maquis) had been unsuccessful in recording geckos. The temperature during the period of night searching ranged from 19.6-24.1°C, the humidity was consistently high at 84-100%, and cloud cover varied from <50% on the 1st and 2nd nights of survey work to >50% on the 3rd and 4th night.

5. RESULTS

A total of 12 species of lizard were recorded during the survey period for all sites combined, representing 8 species of skinks and 4 geckos. Forested sites (humid forest and maquis paraforestier) contained the greatest diversity of lizard species with 80% of the total number of lizard species recorded during the survey from this habitat type. By comparison only three species of skink and two species of gecko were recorded from open maquis or low canopied maquis habitats. The skink *Marmorosphax tricolor* and *Sigaloseps deplanchei* were recorded from most of the forested habitats across the study area, and *Marmorosphax tricolor* was abundant at several sites. The gecko *Bavayia septuiclavis* was recorded from the two forest sites searched by night, and two individuals of the giant gecko *Rhacodactylus sarasinorum* were recorded from humid forest at site F. No *Bavayia sauvagii* were recorded from the areas of humid forest or maquis preforest surveyed, despite this species have been recorded from humid forest of nearby Pic du Grande Kaori and Foret Nord.

Table 2: Distribution of species by site within the AS3, AS4 & AS5 concessions – numbers are total records for each species from all detection methods– opportunistic records for skinks are in brackets.

	Site	A	B	C	D	E	F	G	H
SKINKS	*Caledoniscincus cf. atropunctatus* n = 4	1	-	-	-	-	-	3	-
	Caledoniscincus austrocaledonicus n =13	-	-	4	-	8	-	1	-
	Caledoniscincus festivus n =2	-	-	-	-	-	(2)	-	-
	Lioiscincus tillieri n =1	-	-	4	-	-	-	-	-
	Marmorosphax tricolor = 65	6	-	-	22	-	18	19	-
	Sigaloseps deplanchei n = 8	-	-	-	2	-	5	1	-
	Simiscincus aurantiacus n = 1	-	-	-	1	-	-	-	-
	Tropidoscincus variabilis n = 3	-	-	-	-	1	(2)	-	-
GECKOS	*Bavayia septuiclavis* n = 13	*not surveyed at night*	-	-	1	*not surveyed at night*	12	*not surveyed at night*	*not surveyed at night*
	Lepidodactylus lugubris n = 1		-	1	-		-		
	Rhacodactylus auriculatus n = 10		-	2	1		7		
	Rhacodactylus sarasinorum n = 3		-	-	-		3		
	No. Species	**2**	**0**	**1**	**5**	**2**	**7**	**4**	**0**

6. ASSESSMENT

Significant species

Significant species are those of particular conservation significance 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 can determine the ability of the species to persist into the future.

Two species of particular conservation significance were recorded from forested habitats on the concessions surveyed. The giant gecko *Rhacodactylus sarasinorum* was recorded from humid forest at site F on the AS4 concession and the skink *Simiscincus aurantiacus* from maquis paraforestier on the AS3 concession. Both species are is endemic to southern New Caledonia, and the majority of records for both are from forested habitats on or adjacent to the Goro Plateau.

Rhacodactylus sarasinorum is large in size, likely to have a complex life history and considered to be at risk from a range of threats and has been listed as 'Vulnerable' under the IUCN Red List. Its distribution on the Goro Plateau is restricted to humid forest, it has never been recorded from tall canopied maquis habitats (maquis paraforestier or maquis preforest) despite extensive survey work in these habitats over the past 3 years.

Simiscincus aurantiacus is a burrowing species and is likely to require a moist environment. It has been recorded from both humid forest and tall canopied maquis habitats (maquis paraforestier or maquis preforest) across the Goro Plateau during survey work of the past 3 years. From what is known of the species behavior and microhabitat requirements it is considered likely to have complex environmental requirements, and its occurrence in the tall canopied maquis habitats appears to be closely linked to the presence of broken cuirasse in providing a moist subterranean environment for this subterranean species. As such, the species complex biology and reliance on moist forested habitats which are highly fragmented in the Grand Sud places it at risk from a range of threats, and it has been listed as 'Vulnerable' under the IUCN Red List.

Significant sites

Humid Forest: In southern New Caledonia, the greatest diversity of lizards is found in humid forest, with 20 species now recorded from this habitat in the region (Sadlier & Shea, 2006; Sadlier & Swan, 2009a), of which over half are largely restricted to this habitat type. The humid forest at site F immediately adjacent to the western boundary of the AS4 concession is moderately large in size and a diversity of lizard species were recorded from this site during

the survey period, including the giant gecko, *Rhacodactylus sarasinorum,* a species of particular conservation concern in the region. The site is also considered likely to contain a diversity of other species, including the skink species *Simiscincus aurantiacus*, *Nannoscincus mariei* and *Graciliscincus shonae* (all listed as 'Vulnerable' under the IUCN Red List) and geckos *Eurydactylodes symmetricus* and possibly *Bavayia goroensis* (both listed as 'Vulnerable' under the IUCN Red List).

Maquis Preforest : Previous studies have recorded a total 15 species of lizard from this habitat type on the Goro Plateau (Sadlier et al., 2011a), a level of diversity approaching that recorded for humid forest, and far greater than maquis arbustif or herbaceous maquis. A high proportion of species recorded from this maquis preforest (10 of 15) are regional endemics (species restricted to the southern ultramafic region), a number of which are identified as of particular conservation significance under IUCN Red List criteria. Maquis preforest on the Goro Plateau has a number of attributes which enable it to function as an extension of preferred habitat to a number of moisture sensitive species (*Marmorosphax tricolor, Sigaloseps deplanchei*; *Simiscincus aurantiacus*, *Graciliscincus shonae* and *Nannoscincus mariei*) that would otherwise be largely reliant on, and restricted to, scattered humid forest patches found in the Grande Sud. Our field studies in canopied maquis habitats (Sadlier & Swan, 2009a; Sadlier & Swan, 2010) have identified the importance of a diversity of sheltering sites on the forest floor for secretive skink species. In particular broken cuirasse provides cool sheltering sites buffered from extended periods of dryness for moisture sensitive species, and an extensive array of sheltering sites for some regionally restricted geckos.

The maquis paraforest sites investigated during the survey period all had sufficient leaf litter and a scattering of rocky sheltering sites suitable for most moisture sensitive species, and one, site D, had extensive areas of exposed broken cuirasse cap for the significant species *Simiscincus aurantiacus*.

7. RECOMMENDATIONS

Re-establishment of lizard populations on areas to be re-habilitated will require the presence of suitable source populations in adjacent areas. The patches of maquis paraforestier (sites A and D) at the eastern boundary of the AS3concession and the humid forest (site F) adjacent to the western boundary of the AS4 concession are conveniently located to provide source populations of a wide range of lizards for re-colonization of areas to be re-habilitated on the event of development of the is required. Further, the humid forest (site F) adjacent to the

western boundary of the AS4 concession appears to have a degree of continuity with forest habitat (humid forest and paraforestier) to the south adjacent to the western boundary of the AS5 concession and the area as a whole could suitable for restoration and long-term preservation of forest habitat in the region of the Kadji River and Riviére des Kaoris.

8. SUMMARY

Survey work in the Gardenia concession undertaken in June 2010 recorded 8 lizard species, approximately 40% of what would be expected to occur across all habitats on the concessions. The richest site in terms of number of species was closed forest site (F). The giant gecko, *Rhacodactylus sarasinorum*, a regional endemic was among the species recorded from this site and it is considered to suitable habitat for a number of other significant species of lizard – these features in combination identify it as a significant site for lizards in the area of these concessions. The patches of tall canopied maquis (paraforestier - sites A and D) are small but still likely to contain a diversity of lizard species that would make them suitable source populations for re-establishment of populations in the event of future mining activity on the concessions. By contrast the areas of open maquis and low canopied maquis surveyed had a lower diversity of species and no significant species were recorded.

9. ACKNOWLEDGEMENTS

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10. REFERENCES

Sadlier, R. & Shea, G. 2004. Étude faunistique spécifique herpétofaune sur le site minier Goro Nickel proposé. Unpublished report to Goro Nickel S.A., Australian Museum Business Service, Sydney. 31 pp.

Sadlier, R.A. & Shea, G.M., 2006b. Etude de l'Herpetofaune de Quatre Reserves Speciales du Grand Sud de la Nouvelle Caledonie et Propositions d'Orientations de Measures de Conservation - Réserve spéciale botanique Forêt Nord, Réserve spéciale botanique Cap N'Doua, Réserve spéciale botanique Pic du Pin, and Réserve spéciale botanique Pic du Grand Kaori. Unpublished report by AMBS to Direction des Resources Naturelles, Province Sud, Noumea - 70pp.

Sadlier, R.A. & Swan, G., 2008. Monitoring of Lizards in Humid Forests on the Goro Nickel Lease, Prony. Unpublished report by Cygnet Surveys & Consultancy to Goro Nickel. 34pp.

Sadlier, R.A. & Swan G., 2009a – revised version. A survey of the Lizard Fauna of Maquis Forest Habitat on the Vale Inco Mine Site (5 to 10 year plan of development). Unpublished report by Cygnet Surveys & Consultancy to Vale-Inco Nouvelle-Calédonie. 28pp.

Sadlier, R.A. & Swan G., 2009b. A Survey of the Lizard Fauna of Humid Forest Habitat on the Kwè Nord Range. Unpublished report by Cygnet Surveys & Consultancy to Vale-Inco Nouvelle-Calédonie. 22pp.

Sadlier, R.A. & Swan G., 2010a. A survey of the Lizard Fauna of Maquis Forest Habitat on the Vale-Inco Mine Site (10 to 20 year plan of development). Unpublished report by Cygnet Surveys & Consultancy to Vale-Inco Nouvelle-Calédonie. 28pp.

Sadlier, R.A. & Swan G., 2010b. An assessment of the lizard fauna on the Vale Inco Gardenia concession. Unpublished report by Cygnet Surveys & Consultancy to Vale-Inco Nouvelle-Calédonie. 15pp.

Sadlier, R.A. & Swan G., 2010c. An assessment of the lizard fauna on the Vale Nouvelle-Calédonie Fer 02 concession. Unpublished report by Cygnet Surveys & Consultancy to Vale Nouvelle-Calédonie. 15pp.

Sadlier, R.A. & Swan G. & Astrongatt, S., 2011a. A survey of the Lizard Fauna of Maquis Forest Habitat on the Vale Nouvelle-Caledonie Mine Site (20 to 30 year plan of development). Unpublished report by Cygnet Surveys & Consultancy to Vale-Inco Nouvelle-Calédonie. 24pp.

Sadlier, R.A., Swan G., & Astrongatt, S., 2011b. An assessment of the lizard fauna on the Vale Nouvelle-Caledonie AS2 and AS7 concessions. Unpublished report by Cygnet Surveys & Consultancy to Vale Nouvelle-Calédonie. 10pp.

Sadlier, R.A., Swan G. and Astrongatt, S., 2011c. The Lizard Fauna of Humid Forests on the Proposed Wadjana Basin Preserve. Unpublished report by Cygnet Surveys & Consultancy to Vale Nouvelle-Calédonie. 19pp.