

**An assessment of the lizard fauna on the Vale Nouvelle-  
Calédonie concessions Invasion 5, Invasion 6, Invasion 7,  
NH8, NH9, Paulo, Christmas and Yvon.**



**Cygnnet Surveys & Consultancy**  
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**Cygnnet Surveys & Consultancy  
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Frontcover: *Phoboscincus garnieri* – photo Ross A. Sadlier





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## 1. INTRODUCTION

As part of the conditions associated with the renewal of exploration licenses for the Invasion 5, Invasion 6, Invasion 7, NH8, NH9, Paulo, Christmas and Yvon concessions, Vale Nouvelle-Calédonie (VN-C) is required to undertake baseline studies of fauna on these sites.

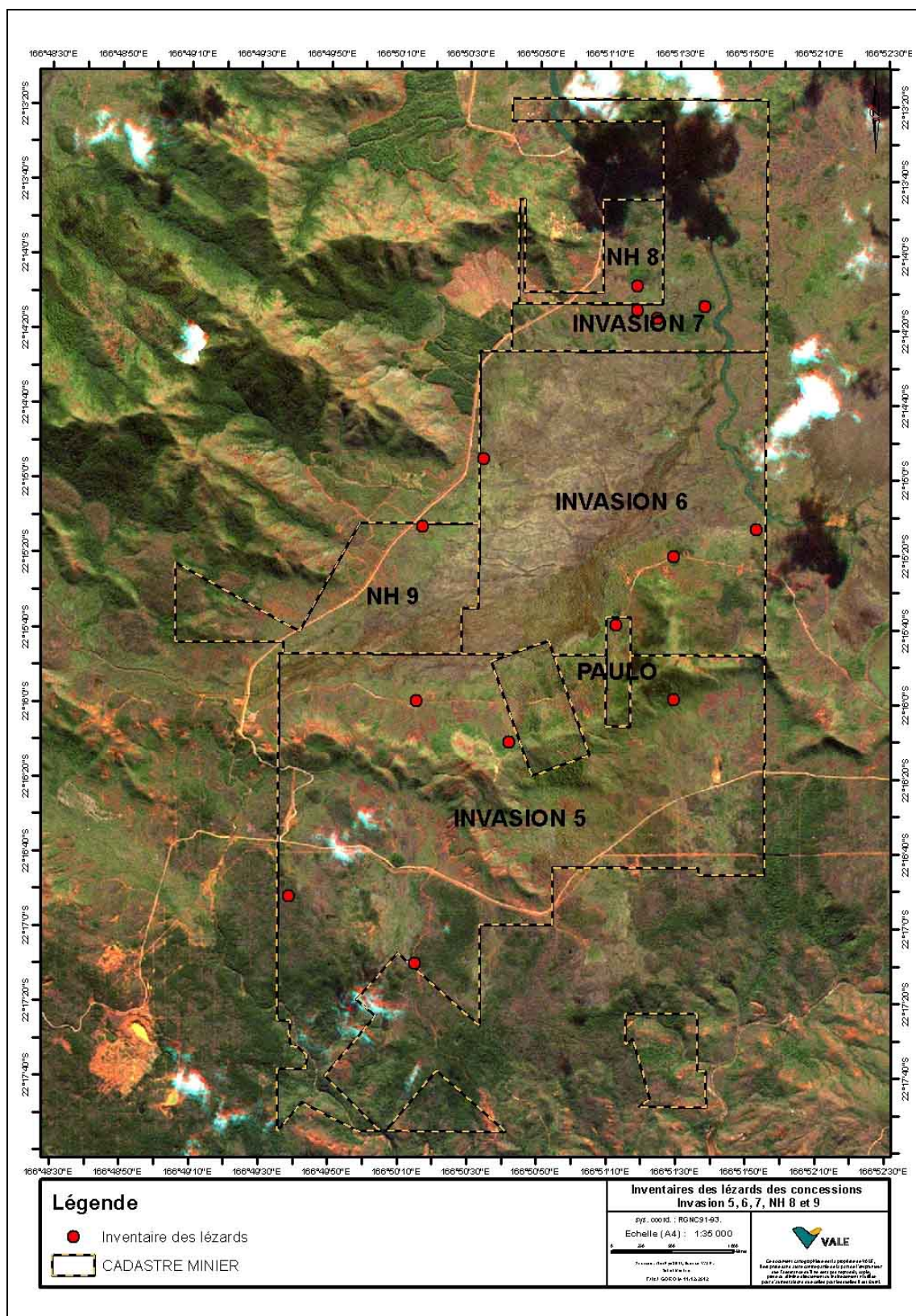
Cygnets Surveys and Consultancy were contracted by Vale Nouvelle-Calédonie to provide an expert assessment of the lizard fauna likely to occur on these concessions, and identify the potential occurrence of sensitive species or habitat of conservation significance for lizards on the area covered by these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

A number of studies have been commissioned by VN-C in the region to establish monitoring sites for lizards (Sadler & Swan, 2008), to inventory the lizard fauna in the areas of mine development (Sadler & Swan, 2009a; Sadler & Swan, 2010a; Sadler et al., 2011a), to inventory the lizard fauna of proposed areas for preservation (Sadler & Swan, 2009b and Sadler et al., 2011d), and to assess the lizard fauna of concessions held by VN-C (Sadler & Swan, 2010b; Sadler & Swan, 2010c; Sadler et al., 2011b; Sadler et al., 2011c).

These studies in combination have identified a rich and diverse lizard fauna of 25 species on the Goro Plateau and adjacent areas. 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 the 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 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.

## 2. STUDY SITES

The Invasion 6, Invasion 7, NH8, NH9, concessions are located within the drainage of the Riviere des Lacs, and Invasion 5 and Paulo concessions on the ranges between la Capture and le Déversior and their immediate watershed. The Christmas concessions are located near the township of Prony in the Baie de Prony and the Yvon concession on the ranges bordering the Canal Woodin.



Location of the Invasion, NH, Paulo concessions surveyed in May 2012. Broken outline represents boundaries of the concession, red dots the location of sites investigated.





Location of the Christmas and Yvon concessions surveyed in May 2012. Broken outline represents boundaries of the concession, red dots the location of sites investigated.

### 3. METHODS

At each concession sites were selected according to the following criteria:

- to encompass the full range of habitats so as to assess the species diversity for each concession as completely as possible.
- to target specific habitats in which lizard species of particular conservation concern might occur.

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 concessions surveyed.

Each survey site had three transects. Each of these transects represented 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.

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. Timed nocturnal searches were usually undertaken in the first two hours after sunset and generally consisted of walking along tracks through maquis and forest habitats in the general vicinity of survey sites, and/or through 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 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.



The occurrence of the invasive Little Red Fire Ant (*Wasmannia auropunctata*), an invasive species known to adversely affect the densities and diversity of lizards and of their invertebrate prey, was noted at each site.



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.

#### 4. RESULTS

##### **Invasion 5 concession (961 ha.)**

**Search effort:** Five sites were surveyed on the Invasion 5 concession in the period 12<sup>th</sup>-16<sup>th</sup> May 2012. A total of 150 trap stations were operational throughout the survey period for three full days and nights after being established. Timed nocturnal searches consisted of walking transects along tracks through maquis (site 1 and site 4 each for 2 person hours) and within humid forest habitat (site 3 for 2 person hours). The temperature during the period of night searching of site 1 and site 4 ranged from 20°-21°C, the humidity was between 54-73%, and cloud cover varied from 0-10%.

Site co-ordinates (UTM)	Replicate	Habitat
<b>Site 1</b>		
0688279E 7534943N	1A	Open maquis on cuirasse (50%) and canopied maquis arbustif (50%)
0688270E 7534916N	1B	Open maquis on cuirasse (50%) and canopied maquis arbustif (50%)
0688275E 7534864N	1C	Open maquis on cuirasse (50%) and canopied maquis arbustif (50%)
<b>Site 2</b>		
0689308E 7534386N	2A	Maquis paraforestier
0689309E 7534356N	2B	Maquis paraforestier
0689336E 7534329N	C2	Maquis paraforestier
<b>Site 3</b>		
0691452E 7536514N	3A	Humid forest
as for 3A	3B	Humid forest
as for 3A	3C	Humid forest
<b>Site 4</b>		
0689339E 7536519N	4A	Low, dense ligno-herbaceous maquis adjacent to maraise
as for 4A	4B	Low, dense ligno-herbaceous maquis adjacent to maraise
as for 4A	4C	Low, dense ligno-herbaceous maquis adjacent to maraise
<b>Site 5</b>		
0690096E 7536175N	5A	Regenerating humid forest
as for 5A	5B	Regenerating humid forest
as for 5A	5C	Regenerating humid forest

**Location of sites and habitat type for each replicate surveyed on the Invasion 5 concession.**

Collectively the habitat surveyed across all sites included: ligno-herbaceous maquis (20%); open maquis on curaisse (10%); maquis abustif (10%); maquis paraforestier (20%); humid forest (20%); regenerating forest humid forest (20%).

The Little Red Fire Ant was recorded at sites 1, 2, 4 & 5.





**Invasion 5 – open maquis on cuirasse (left) and canopied maquis arbustif (right) site 1.**



**Invasion 5 – humid forest site 3.**



**Invasion 5 – regenerating humid forest site 4 from a distance (left) and interior (right).**

***Species Recorded:*** A total of 8 species of lizard were recorded during the survey period of the Invasion 5 concession for all sites combined, representing 6 species of skinks and 2 geckos. Forested sites contained the greatest diversity of lizard species with 6 species (75% of the

total number) recorded from humid forest and 3 from regenerating forest and maquis paraforestier. By comparison only two species of skink were recorded from open maquis or canopied maquis arbustif on cuirasse, and a single species of skink was recorded from ligno-herbaceous maquis bordering the Riviere des Lacs. The skinks *Marmorosphax tricolor* and *Caledoniscincus atropunctatus* occurred at all three forested habitats across the concession.

The gecko *Bavayia septuiclavis* and giant gecko *Rhacodactylus sarasinorum* were recorded from the humid forest at site 3 searched by night. The gecko *Bavayia sauvagii* was not recorded from the areas of humid forest or maquis paraforestier surveyed, despite this species have been recorded from nearby humid forest of Pic du Grande Kaori and Foret Nord.

SPECIES	SITE 1	SITE 2	SITE 3	SITE 4	SITE 5	TOTAL
<i>Caledoniscincus austrocaledonicus</i>	3	2	-	10	3	18
<i>Caledoniscincus atropunctatus</i>	-	5*	1^	-	11	17
<i>Marmorosphax tricolor</i>	-	6	23	-	1	30
<i>Tropidoscincus variabilis</i>	-	-	1^	-	-	1
<i>Lioscincus nigrofasciolatus</i>	1^	-	-	-	-	1
<i>Sigaloseps deplanchei</i>	-	-	8*	-	-	8
<i>Bavayia septuiclavis</i>	-	-	7	-	-	7
<i>Rhacodactylus sarasinorum</i>			5			5
<b>TOTAL</b>	<b>4</b>	<b>13</b>	<b>45</b>	<b>10</b>	<b>15</b>	<b>87</b>

\*1 opportunistic sighting. ^Opportunistic sightings.

**Species of lizard and number of individuals recorded for each site surveyed on the Invasion 5 concession.**

**Significant species:** The giant gecko *Rhacodactylus sarasinorum*, a species of particular conservation significance listed as ‘Vulnerable’ on the IUCN Redlist, was recorded on the Invasion 5 concession from humid forest at site 3.

**Significant sites:** A number of individuals of the giant gecko, *Rhacodactylus sarasinorum*, a species of particular conservation concern in the region were recorded from the humid forest at site 3. This 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’ on IUCN Red List) and gecko *Eurydactylodes symmetricus* (listed as ‘Vulnerable’ on IUCN Red List).



### Invasion 6 concession (586 ha.)

**Search effort:** Three sites were surveyed on the Invasion 6 concession in the period 9<sup>th</sup>-12<sup>th</sup> May 2012. A total of 85 trap stations were operational throughout the survey period for a period of three full days and nights after being established, although rain in the afternoon of the third day reduced the effectiveness of the traps that day and night. Timed nocturnal searches consisted of walking transects along tracks through low, dense ligno-herbaceous maquis (site 3 for 2 person hours). The temperature during the period of night searching of site 3 was 19°C, the humidity 81%, and cloud cover 50%.

Site co-ordinates (UTM)	Replicate	Habitat
<b>Site 1</b> 0689904E 7538509N as for 1A as for 1A	1A 1B 1C	Low, dense ligno-herbaceous maquis adjacent to marais Low, dense ligno-herbaceous maquis adjacent to marais Low, dense ligno-herbaceous maquis adjacent to marais
<b>Site 2</b> 0691590E 7537724N 0691462E 7537692N 0691526E 7537751N	2A 2B 2C	Maquis paraforestier Maquis paraforestier Maquis paraforestier
<b>Site 3</b> 0692149E 7537904N as for 3A as for 3A	3A 3B 3C	Low, dense ligno-herbaceous maquis Low, dense ligno-herbaceous maquis Low, dense ligno-herbaceous maquis

### Location of sites and habitat type for each replicate surveyed on the Invasion 6 concession.

Collectively the habitat surveyed across all sites included: marais and hydromorphic maquis (30%); ligno-herbaceous maquis (35%); maquis paraforestier (35%).



**Invasion 6 – overview of concession area looking north with Riviere des Lacs central (left) and low, dense ligno-herbaceous maquis adjacent to marais (right) site 1.**

The Little Red Fire Ant was recorded at site 2.

**Species Recorded:** A total of 6 species of lizard, all skinks, were recorded during the survey period of the Invasion 6 concession for all sites combined. From hydromorphic maquis 4 species (66% of the total number) were recorded, including two individuals of the maquis dependent skink *Lioscincus tillieri* recorded from low, dense ligno-herbaceous maquis (site 1), 4 species were recorded from maquis paraforestier, and only a single species of skink was recorded from low, dense ligno-herbaceous maquis adjacent to the Riviere des Lacs (site 3). The most common skink recorded across the concession was *Caledoniscincus austrocaledonicus*, a species generally considered a generalist with a preference for open habitats. No geckos were recorded from the night search of ligno-herbaceous maquis at site 3.

SPECIES	SITE 1	SITE 2	SITE 3	TOTAL
<i>Caledoniscincus austrocaledonicus</i>	5	3	8	16
<i>Caledoniscincus atropunctatus</i>	-	6	-	6
<i>Marmorosphax tricolor</i>	-	1	-	1
<i>Tropidoscincus variabilis</i>	1	1	-	2
<i>Lioscincus tillieri</i>	2*	-	-	2
<i>Phoboscincus garnieri</i>	1	-	-	1
<b>TOTAL</b>	<b>9</b>	<b>11</b>	<b>8</b>	<b>28</b>

\*opportunistic sightings.

**Species of lizard and number of individuals recorded for each site surveyed on the Invasion 6 concession.**

**Significant species:** No species of particular conservation significance were recorded on the Invasion 6 concession.

**Significant sites:** There are no obvious areas of humid forest on the Invasion 6 concession, and the areas of maquis paraforestier examined were small and poorly developed in terms of canopy height.

#### **Invasion 7 concession (250 ha.)**

**Search effort:** Two sites were surveyed in the period 9<sup>th</sup>-12<sup>th</sup> May 2012. A total of 60 trap stations were operational throughout the survey period for a period of three full days and nights after being established, although rain in the afternoon of the third day reduced the effectiveness of the traps that day and night. Timed nocturnal searches consisted of walking

transects along the track through maquis (site 1), maquis arbustif (site 2A) and maquis paraforestier (site 2B & 2C) for 3 person hours. The temperature during the period of night searching was ~20°C, the humidity 66% and cloud cover 5%.

Site co-ordinates (UTM)	Replicate	Habitat
<b>Site 1</b> 0691344E 7539657N as for 1A as for 1A	1A 1B 1C	Low, dense ligno-herbaceous maquis adjacent to marais Low, dense ligno-herbaceous maquis adjacent to marais Low, dense ligno-herbaceous maquis adjacent to marais
<b>Site 2</b> 0691537E 7539644N 0691738E 7539747N as for 2B	2A 2B 2C	Maquis arbustif Maquis paraforestier Maquis paraforestier

**Location of sites and habitat type for each replicate surveyed on the Invasion 7 concession.**

Collectively the habitat surveyed across all sites included: marais (16%); ligno-herbaceous maquis (32%); maquis arbustif (19%); maquis paraforestier (33%).

The Little Red Fire Ant was recorded in maquis paraforestier at site 2.



**Invasion 7 - Maquis ligno-herbaceous (left) and marais (right) site 1.**



**Invasion 7 - Maquis arbustif (left) and maquis paraforestier (right) site 2.**

**Species Recorded:** A total of 7 species of lizard were recorded during the survey period of the Invasion 7 concession for all sites combined, representing 6 species of skinks and 1 gecko. From the maquis paraforestier (site 2B & 2C) species of skink were recorded which included the widespread but predominately forest reliant skinks *Marmorosphax tricolor* and *Sigaloseps deplanchei*. A single individual of the maquis dependent skink *Lioscincus tillieri* was recorded from canopied maquis arbustif (site 2A). No geckos were recorded from maquis paraforestier habitat but several individuals of the widespread but predominately maquis reliant species *Rhacodactylus auriculatus* were recorded from ligno-herbaceous maquis habitat.

SPECIES	SITE 1	SITE 2	TOTAL
<i>Caledoniscincus austrocaledonicus</i>	7	5	12
<i>Caledoniscincus atropunctatus</i>	1	-	1
<i>Marmorosphax tricolor</i>	-	1	1
<i>Lioscincus tillieri</i>		1*	1
<i>Lioscincus nigrofasciolatus</i>	1	-	1
<i>Sigaloseps deplanchei</i>	-	4	4
<i>Rhacodactylus auriculatus</i>			3
<b>TOTAL</b>	<b>9</b>	<b>11</b>	<b>23</b>

\*opportunistic sighting.

**Species of lizard and number of individuals recorded for each site surveyed on the Invasion 7 concession.**

**Significant species:** No species of particular conservation significance were recorded on the Invasion 7 concession.

**Significant sites:** The areas of forested habitat examined on the concession during the survey period were small and poorly developed in terms of canopy height, and are not considered to be significant sites for threatened species or species reliant on forest habitat. Further, the paraforestier surveyed was infested with the Little Red Fire Ant.

A large patch of forest habitat, possibly humid forest, was seen from a distance in the central-east sector of the concession that is on the east side of the Riviere des Lacs, which could not be accessed for logistical reasons. This site could contain a diversity of lizard species, including the significant skink species *Simiscincus aurantiacus*, *Nannoscincus mariei* and *Graciliscincus shonae* (all listed as 'Vulnerable' on IUCN Red List).



**NH8 concession (52 ha.)**

**Search effort:** Two sites were surveyed in the period 9<sup>th</sup>-12<sup>th</sup> May 2012. A total of 60 trap stations were operational throughout the survey period for a period of three full days and nights after being established, although rain in the afternoon of the third day reduced the effectiveness of the traps that day and night. Timed nocturnal searches consisted of walking transects along tracks through maquis (site 2) for 2 person hours and within the maquis arbustif and paraforestier habitat (site 1) for 2 person hours. The temperature during the period of night searching was ~20°C, the humidity 75%, and cloud cover varied from 5-50%.

Site co-ordinates (UTM)	Replicate	Habitat
<b>Site 1</b> 0691180E 7539918N as for 1A as for 1A as for 1A	1A 1B 1C 1D	Maquis arbustif Maquis arbustif Maquis arbustif & maquis paraforestier Maquis paraforestier
<b>Site 2</b> as for 1A as for 1A	2A 2B	Low, ligno-herbaceous maquis Low, ligno-herbaceous maquis

**Location of sites and habitat type for each replicate surveyed on the Invasion NH8 concession.**



**NH8 - Maquis paraforestier site 1.**





NH8 - Maquis arbustif site 1 (left) and maquis ligno-herbaceous site 2 (right).

Collectively the habitat surveyed across all sites included: ligno-herbaceous maquis (33%); maquis arbustif (49%); and maquis paraforestier (18%).

The Little Red Fire Ant was recorded at both sites.

**Species Recorded:** A total of 5 species of lizard, all skinks, were recorded during the survey period of the NH8 concession for both sites combined. From the maquis arbustif and paraforestier (site 1) 4 species were recorded which included the widespread but predominately forest reliant skinks *Marmorosphax tricolor* and *Sigaloseps deplanchei*. No geckos were recorded from the ligno-herbaceous maquis, canopied maquis arbustif or paraforestier habitat on the concession. Previous survey work on the La Réserve Naturelle des Chutes de la Madeleine (Sadlier & Jourdan, 2010) recorded the predominately maquis reliant species *Rhacodactylus auriculatus* from maquis arbustif habitat, and the small widespread gecko *Bavayia septuiclavis*. Both these gecko species are expected to occur elsewhere on the NH8 concession.

SPECIES	SITE 1	SITE 2	TOTAL
<i>Caledoniscincus austrocaledonicus</i>	3	-	3
<i>Caledoniscincus atropunctatus</i>	9	6	15
<i>Marmorosphax tricolor</i>	9	5	14
<i>Tropidoscincus variabilis</i>	-	1	1
<i>Sigaloseps deplanchei</i>	1	-	1
TOTAL	22	12	34

Species of lizard and number of individuals recorded for each site surveyed on the NH8 concession.

**Significant species:** No species of particular conservation significance were recorded on the NH8 concession.

**Significant sites:** The areas of forested habitat examined on the concession during the survey period were small and poorly developed in terms of canopy height, and are not considered to be significant sites for threatened species or species reliant on forest habitat.

Canopied maquis arbustif habitat on the La Réserve Naturelle des Chutes de la Madeleine which is within the NH8 concession could be suitable habitat for the significant geckos species *Eurydactylodes symmetricus* (listed as 'Vulnerable' on the IUCN Red List) and *Bavayia goroensis* (listed as 'Endangered' on the IUCN Red List).

#### **NH9 concession (171 ha.)**

**Search effort:** One site was surveyed in the period 9<sup>th</sup>-12<sup>th</sup> May 2012. A total of 30 trap stations were operational throughout the survey period for a period of three full days and nights after being established, although rain in the afternoon of the third day reduced the effectiveness of the traps that day and night. No timed nocturnal searches were undertaken as this habitat was considered comparable to that already surveyed at Invasion 6 site 1 and Invasion 7 site 1.

Site co-ordinates (UTM)	Replicate	Habitat
Site 1 0689400E 7537953N	1A	Low, dense ligno-herbaceous maquis
as for 1A	1B	Low, dense ligno-herbaceous maquis
as for 1A	1C	Low, dense ligno-herbaceous maquis

**Location of sites and habitat type for each replicate surveyed on the NH9 concession.**

Collectively the habitat surveyed across the site was ligno-herbaceous maquis.



NH9 - Maquis ligno-herbaceous site 1.

**Species Recorded:** Two species of lizard, all skinks, were recorded during the survey period of the NH9 concession, one *Caledoniscincus austrocaledonicus* is a common species of skink considered a generalist with a preference for open habitats, the other *Tropidoscincus variabilis*, a species that occurs across a range of habitats in the region. No geckos were recorded from this concession given no nocturnal searches were undertaken at the NH9 concession.

SPECIES	SITE 1	TOTAL
<i>Caledoniscincus austrocaledonicus</i>	4	4
<i>Tropidoscincus variabilis</i>	1	1
<b>TOTAL</b>	<b>5</b>	<b>5</b>

Species of lizard and number of individuals recorded for each site surveyed on the NH9 concession.

**Significant species:** No species of particular conservation significance were recorded on the NH9 concession and none are expected to occur there.



**Significant sites:** There are no obvious areas of humid forest habitat on the NH9 concession that might contain a high diversity of species, and no other maquis habitats on the concession are considered likely to contain important populations of significant species.

**Paulo concession (18 ha.)**

**Search effort:** One site was surveyed in the period 13<sup>th</sup>-16<sup>th</sup> May 2012. A total of 30 trap stations were operational throughout the survey period for a period of three full days and nights after being established. A timed nocturnal search of walking transects through maquis was undertaken for 1 person hour. The temperature during the period of night searching was ~22°C, the humidity 70%, and cloud cover 0%.

Site co-ordinates (UTM)	Replicate	Site co-ordinates (UTM)Habitat
<b>Site 1</b>		
0690984E 7537128N	1A	Dense ligno-herbaceous maquis
0690983E 7537081N	1B	Dense ligno-herbaceous maquis
0690981E 7537037N	1C	Dense ligno-herbaceous maquis

**Location of sites and habitat type for each replicate surveyed on the Paulo concession.**

Collectively the habitat surveyed across the site was ligno-herbaceous maquis.



**Paulo - Maquis ligno-herbaceous site 1.**

**Species Recorded:** A single species of lizard was recorded during the survey period of the Paulo concession, *Caledoniscincus austrocaledonicus*, a common species of skink considered a generalist with a preference for open habitats. No geckos were recorded from this concession during the night searches undertaken.

SPECIES	SITE 1	TOTAL
<i>Caledoniscincus austrocaledonicus</i>	3	3
TOTAL	3	3

Species of lizard and number of individuals recorded for each site surveyed on the Paulo concession.

**Significant species:** No species of particular conservation significance were recorded on the Paulo concession.

**Significant sites:** There are no areas of humid forest habitat on the Paulo concession that might contain a high diversity of species, and no other maquis habitats on the concession are considered likely to contain important populations of significant species.

#### Christmas concession (190 ha.)

**Search effort:** The Christmas concession consists of two areas in the Baie de Prony. One includes the area of Prony village and the coast to the north (here Christmas 1), the other an area on the coast in the Baie de la Somme south of Prony village (here Christmas 2).

Two sites were surveyed in the period 15<sup>th</sup>-18<sup>th</sup> May 2012 in the Christmas 1 concession area. A total of 60 trap stations were operational throughout the survey period for a period of three full days and nights after being established. Timed nocturnal searches consisted of walking transects through forest at site 1 and the forest habitat adjacent to the coastal track between site 1 and site 2. The temperature during the period of night searching was ~21-22°C, the humidity 69-72%, and cloud cover was 100%.

The Christmas 2 concession was investigated on the 14<sup>th</sup> May. An area of dense habitat identified from satellite photos was evaluated by inspection and found to comprise a patch of stunted *Arillastrum* dominated maquis arbustif on a slightly elevated rise of broken cuirasse, this area was investigated by timed day searching. The remaining coastal habitat on the

concession was a mixture of highly degraded scrub and sedges, and subject to periodic inundation by flooding.



**Christmas concessions – northern concession (left) near Prony village here referred to as Christmas 1 and southern concession (right) here referred to as Christmas 2.**

Site co-ordinates (UTM)	Replicate	Habitat
<b>Site 1</b> 0688621E 7530914N as for 1A as for 1A	1A 1B 1C	Coastal forest Coastal forest Coastal forest
<b>Site 2</b> 0688406E 7530799N as for 2A as for 2A	2A 2B 2C	Coastal forest Coastal forest Coastal forest

**Location of sites and habitat type for each replicate surveyed on the Christmas 1 concession.**

Collectively the habitat surveyed across both sites on the Christmas 1 concession area was coastal forest. The Little Red Fire Ant was recorded at both sites.



**Christmas 1 – coastal forest Site 1 (left) and coastal forest site 2.**





Christmas 2 – coastal scrub (left) and maquis arbustif habitat (right)

**Species Recorded:** A total of 9 species of lizard were recorded during the survey period of the Christmas 1 concession for both of the sites surveyed, representing 5 species of skinks and 4 geckos. Four of the skinks were recorded from the coastal forest sites, and one, *Cryptoblepharus novocaledonicus*, only from littoral habitats. The four geckos recorded were observed at night along the track bordering the coast that passed through coastal forest. A single species of skink, *Caledoniscincus austrocaledonicus*, was recorded during day searches of the *Arillastrum* dominated maquis arbustif habitat on the Christmas 2 concession.

SPECIES	SITE 1	SITE 2	TOTAL
<i>Caledoniscincus austrocaledonicus</i>	-	4*	4
<i>Caledoniscincus atropunctatus</i>	-	1^	1
<i>Caledoniscincus cf atropunctatus</i>	3	6#	9
<i>Cryptoblepharus novocaledonicus</i>	-	-	6
<i>Sigaloseps deplanchei</i>	2	1	3
<i>Nactus pelagicus</i>			1^
<i>Bavayia sauvagii</i>			1
<i>Hemidactylus frenatus</i>			3
<i>Lepidodactylus lugubris</i>			1
<b>TOTALS</b>	<b>5</b>	<b>18</b>	<b>29</b>

Includes: \*opportunistic sighting; ^Opportunistic sightings; # 1 opportunistic sighting.

**Species of lizard and number of individuals recorded for each site surveyed on the Christmas 1 concession.**



**Significant species:** No species of particular conservation significance were recorded on the Christmas 1 or Christmas 2 concessions during the surveys undertaken. The giant gecko *Rhacodactylus sarasinorum* (listed as ‘Vulnerable’ under the IUCN Red List) has been recorded historically from ‘Prony’ (Roux, 1913), presumably from coastal forest on the Christmas 1 concession near the village.

**Significant sites:** It is possible the giant gecko, *Rhacodactylus sarasinorum*, a species of particular conservation concern in the region, still occurs in coastal forest on the Christmas 1 concession. However, the invasive Little Red Fire Ant (*Wasmannia auropunctata*) was recorded at both sites surveyed and there were exceptionally high levels of disturbance of glue traps by rats at stations along site transects. As such, it is uncertain whether *Rhacodactylus sarasinorum* persists in the coastal forest of the Christmas 1 concession.

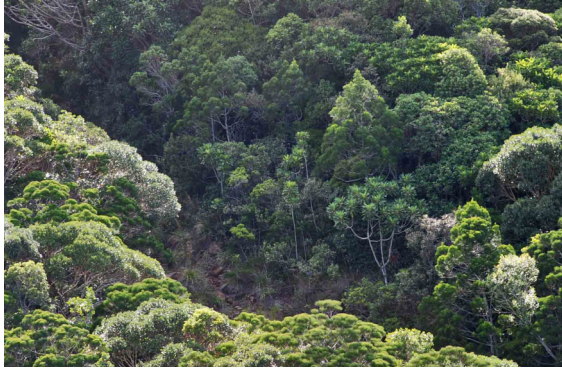
#### **Yvon concession (441 ha.)**

**Search effort:** The Yvon concession was investigated in the period 17<sup>th</sup>-19<sup>th</sup> May 2012. The concession was traversed by road from north to south and was able to be viewed and assessed in its entirety. Timed searches at two sites by day were undertaken under good conditions which consisted of 1.5 person hours at a small patch of maquis paraforestier at the southern edge of the concession and 3 person hours in a more extensive but isolated patch of canopied maquis arbustif transitional to maquis paraforestier. The temperature during the period of day searching was ~25-26°C, the humidity 58-67%, and cloud cover was 40%. No night searches were carried out at this concession.

Vegetation over much of the concession consists of degraded maquis on steep slopes, with some more extensively developed maquis associated with drainage system along the top of the ridge near site 2, grading to tall canopied maquis arbustif and transitional towards paraforest in the gullies. Moderately well developed maquis paraforestier was located in the coastal gullies near the creek system draining the southern area of the concession. The Little Red Fire Ant was present at both sites investigated.

Site co-ordinates (UTM)	Habitat
Site 1 0684725E 7524751N	Maquis paraforestier
Site 2 0684178E 7526275N	Maquis arbustif/paraforestier

**Location of sites and habitat type for each area surveyed on the Yvon concession.**



**Yvon concession – southern area of concession with coastal forest in gully in vicinity of site 1 (left) and maquis paraforestier on slopes of range near coast (right).**



**Yvon concession – outcropping peridotite on western ridge in south of the concession (left & below), potential habitat for the endangered skink *Lacertoides pardalis*.**







Yvon concession – dense maquis arbustif near top of ridge (left) and canopied maquis arbustif transitional to maquis paraforestier at site 2 along the creek line near the top of the ridge (right).

**Species Recorded:** A total of 4 species of lizard, all skinks, were recorded during the survey period of the Yvon concession for both sites combined. Tall canopied maquis arbustif at Site 2 where it is transitional towards paraforestier in the gully surveyed contained a moderate diversity of skink species and a particularly high abundance of *Caledoniscincus atropunctatus* and *Tropidoscincus variabilis*, similar to that seen in more well developed canopied maquis forests. By comparison only two species of skink were recorded from tall canopied maquis paraforestier in the coastal gully at Site 1 in the south of the concession. Both the skinks recorded from Site 1 were observed at the edge of the forest, no individuals were observed within the forest at Site 1 despite optimal conditions for activity. Further, no geckos were detected at this site in the course of active searching for geckos beneath rocks and logs despite an abundance of suitable sheltering sites for these lizards.

SPECIES	SITE 1	SITE 2	TOTAL
<i>Caledoniscincus austrocaledonicus</i>	3	8	11
<i>Caledoniscincus atropunctatus</i>	-	35	35
<i>Caledoniscincus festivus</i>	1		1
<i>Tropidoscincus variabilis</i>		5	5
TOTALS	4	48	52

Species of lizard and number of individuals recorded for each site surveyed on the Yvon concession.

**Significant species:** No species of conservation significance were recorded from the Yvon concession during the period it was investigated.

**Significant sites:** Coastal forest occurs in the very south of the Yvon concession where it approaches the coast at the Baie Alric, with the more extensive and well developed forest on private property adjacent to the concession. Coastal forest has been identified as habitat for the giant gecko *Rhacodactylus sarasinorum*, a species of particular conservation concern in southern Grande Terre. It is possible this species once occurred in this habitat on the Yvon concession (or still does), once occurred in coastal forest in this area, two factors indicate it is unlikely significant populations still remain in this area: firstly there are a limited number of tall, large trees to provide sheltering sites for these large geckos; secondly the area is currently infested with the Little Red Fire Ant. The absence of skinks or geckos in the paraforest at site 1 searched by day during the survey indicates the area may have previously been subject to a high level of infestation by the fire ants. If this has occurred it is likely that populations of forest inhabiting lizards, including the giant gecko, have declined significantly. A similar scenario has been observed in coastal forest at Port Boisé and Cap N'Doua (Sadlier & Shea, 2006)

An extensive area of outcropping peridotite occurs in the southwest of the Yvon concession on the steep face of the ridge as it approaches the coast (see image above). This habitat is similar to that from which the Endangered skink *Lacertoides pardalis* has been recorded elsewhere in the Grand Sud.

## 5. SUMMARY

### 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.

One species of particular conservation significance, the giant gecko *Rhacodactylus sarasinorum*, was recorded from humid forest on the Invasion 5 concession (site 3). The species is endemic to southern New Caledonia, and the majority of records are from forested habitats on or adjacent to the Goro Plateau.

### 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. There

were no significant areas of humid forest on the Invasion 6, NH8, NH9, Paulo, Christmas 2 or Yvon concessions.

An isolated but well developed area of humid forest was identified and investigated on the Invasion 5 concession (site 3) on the southern slopes of the range between la Capture and le Diversion. The giant gecko, *Rhacodactylus sarasinorum*, a species of particular conservation concern in the region, was recorded from this site. The forest at this site is moderately large in size and likely to contain a diversity of lizard species, including the skinks *Simiscincus aurantiacus*, *Nannoscincus mariei* and *Graciliscincus shonae* ('Vulnerable' on the IUCN Red List) and geckos *Eurydactylodes symmetricus* and possibly *Bavayia goroensis* ('Vulnerable' on the IUCN Red List). This humid forest site on the Invasion 5 concession is in close proximity to an area of humid forest on the AS4 concession identified as a significant site for threatened lizards and from which the giant gecko, *Rhacodactylus sarasinorum* was recorded (Sadlier et al., 2011c).

An isolated area of forest habitat, possibly humid forest, was identified in the central-east of the Invasion 7 concession on the east side of the Riviere des Lacs. This site could not be accessed for logistical reasons but should the forest prove well developed it is considered likely to contain a diversity of lizard species, including the significant skink species *Simiscincus aurantiacus*, *Nannoscincus mariei* and *Graciliscincus shonae* ('Vulnerable' on the IUCN Red List) and geckos *Eurydactylodes symmetricus* and possibly *Bavayia goroensis* ('Vulnerable' on the IUCN Red List) all of which have been found in a range of humid forest and maquis preforest habitats in the region.

Coastal forest: This habitat type has only been systematically investigated in the area of Port Boise (Whitaker Consultants – unpublished survey work to DEN undertaken in 2010), otherwise records from this forest type are opportunistic. The giant gecko, *Rhacodactylus sarasinorum*, a species of particular conservation concern in the region, has been recorded from forests on the far southeast coastal strip around the village of Goro (Xéré) and historically from Prony. While available evidence indicates the species probably once occurred in coastal forests of southern Grande Terre it has not been recorded from this habitat type in the past 20 years. It is highly likely that the impact of intensive infestation by the Little Red Fire Ant (direct and indirect) in combination with other negative impacts (rats) has significantly altered coastal forests with the result they can no longer support some lizard species. Under such circumstances *Rhacodactylus sarasinorum* is likely to have declined significantly in coastal areas of the Grande Sud, and the persistence of viable populations of this species on the Christmas 1 concession at Prony is doubtful. Similarly, if the species did

once occur in coastal forest of the Baie Alric near the Yvon concession is occurrence there now is also considered unlikely.

**Maquis Paraforestier & Preforestier :** Previous studies have recorded a total 15 species of lizard from this habitat type on the Goro Plateau (Sadler 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 these canopied maquis habitats (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. The maquis paraforestier sites investigated during the survey period on the Invasion 5, Invasion 7, NH8, and Yvon concessions were all generally small and isolated patches and were infested with the Little Red Fire Ant.

Only one site on the Invasion 5 concession (Site 2) had sufficient areas of exposed broken cuirasse cap to provide habitat for the significant skink species *Simiscincus aurantiacus* and *Graciliscincus shonae* (all listed as ‘Vulnerable’ under the IUCN Red List).

**Habitat for the Endangered skink *Lacertoides pardalis*:** An extensive area of outcropping peridotite potentially suitable for this species of lizard occurs on the southwestern edge of the Yvon concession. The species is extremely wary and it would require extensive targeted survey work to detect its presence, or to make any assumption of its absence from, the site.

## 6. KEY POINTS

The surveys of the Invasion 5, Invasion 6, Invasion 7, NH8, NH9, Paulo, Christmas and Yvon concessions in May 2012 identified the presence of significant sites or species of particular conservation significance as follows:

- the presence of humid forest on the **Invasion 5** concession from which the giant gecko, *Rhacodactylus sarasinorum*, a species of particular conservation concern in the region was recorded. This site was also considered likely to contain a diversity of other species particular conservation, including a number of IUCN Red List species.
- a large patch of forest habitat, possibly humid forest, in the central-east sector of the **Invasion 7** concession on the east side of the Riviere des Lacs considered likely to contain a diversity of lizard species, including a number of IUCN Red List species.
- the persistence of the giant gecko, *Rhacodactylus sarasinorum*, a species of particular conservation concern in the region, in coastal forest on the **Christmas 1** concession near Prony is uncertain.

- an extensive area of outcropping peridotite, potential habitat for the Endangered skink *Lacertoides pardalis*, was identified occurs on the southwestern edge of the **Yvon** concession.
- no lizard species of particular conservation concern, or significant sites for lizards, were identified from the surveys of the **Invasion 6**, **NH8**, **NH9**, **Paulo**, or **Christmas 2** concessions.

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