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Chapter 3

Herpetofauna of the Mt. Panié and Roches de la Ouaième region, New Caledonia

Inventaire herpétologique du massif du Panié et des Roches de la Ouaième, Nouvelle-Calédonie

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SUMMARY

We conducted an intensive herpetofaunal inventory at four sites around Mt. Panié, province Nord, New Caledonia between 1–25 November 2010 including the first structured surveys for lizards on the Roches de la Ouaième. A total of 18 species (17 reptiles and one frog) were documented, of which the frog and one gecko are recent introductions to New Caledonia. Four species of lizards encountered are listed as Endangered by IUCN, and one as Critically Endangered. A further two species are listed as Near Threatened and one species is listed as Data Deficient. At least one, and possibly three species are new to science, though one of these is also known from outside the Mt. Panié area. The Mt. Panié massif and nearby Roches de la Ouaième provide critical habitat for rare and restricted-range species reliant on humid forest including several taxa that are suffering population declines due to mining activities in other areas. However wildfires and the impacts from exotic predators and pigs still pose threats to these species within the protected areas around Mt. Panié. Two species of skink, *Marmorosphax tricolor* and *Caledoniscincus aquilonius*, were abundant and easy to sample, and therefore may provide good indicator taxa for quantifying the impacts of invasive rats and feral pigs on this group of lizards.

RÉSUMÉ

Un inventaire herpétologique a été conduit du 1–25 novembre 2010 sur 4 sites du massif du Panié et des Roches de la Ouaième. 18 espèces (17 reptiles et une grenouille) ont été documentées, y compris une grenouille et un

gecko d'introduction récente en Nouvelle-Calédonie. Quatre espèces de lézards sont considérées comme vulnérables (VU) par l'UICN, et une critiquement menacée d'extinction (CR). Deux autres espèces sont classées comme Quasi menacées (NT) et une espèce est inscrite comme Données insuffisantes (DD). Au moins une -et peut-être trois espèces sont nouvelles pour la science ; l'une d'elles est également connue en dehors de la région du Mont Panié. Le massif du Panié et les Roches de la Ouaième fournissent un habitat essentiel pour plusieurs espèces rares et à répartition restreinte, y compris plusieurs taxons affectés par les activités minières ailleurs en Nouvelle-Calédonie. Les feux de brousse et les espèces exotiques envahissantes sont des menaces potentielles sur ces espèces, y compris au sein de la réserve du Mont Panié. Deux espèces de scinque (*Marmorosphax tricolor* et *Caledoniscincus aquilonius*), sont suffisamment abondantes pour permettre des études quantitatives sur l'impact des rats et des chats sur ce groupe de lézards.

INTRODUCTION

The herpetofauna of New Caledonia is remarkable for its high levels of endemism, and for spectacular radiations within the skink and gecko faunas (e.g., Bauer and Sadlier 2000). However the fauna remains incompletely documented as evidenced by the many species new to science that have been described from New Caledonia in recent decades. Many of these taxonomic novelties are known only from ultramafic habitats in southern and western New Caledonia, but opportunistic and targeted herpetological work in the well-forested north-eastern region around Mt. Panié (Conservation International et al. 1998; Ekstrom et al. 2000) has also revealed new and endemic lizard species (e.g., Bauer et al. 2000, Sadlier et al. 2002). Whitaker (2003) has provided an excellent illustrated guide to the reptiles of Mt. Panié that remains the most comprehensive overview of the local lizard fauna to date.

The current report presents the herpetofaunal results of a RAP biodiversity survey conducted at four sites around Mt. Panié in north-eastern New Caledonia.

FIELD METHODS AND STUDY SITES

We conducted intensive surveys for herpetofauna at four main sites around Mt. Panié in province Nord between 1–25 November 2010 (see Table 1 for site locations and schedule). At each site we conducted intensive searches for

Table 1: Major survey localities and dates for Mt. Panié herpetofauna survey.

Location	Coordinates	Altitude(m)	Dates (2010)
Roches de la Ouaième	20°38.394S, 164°52.280E	591	1–5 November
Wewec	20°35.908S, 164°43.845E	359	6–10 November
Dawenia	20°32.258S, 164°40.844E	586	11–15 November
La Guen	20°37.508S, 164°46.934E	570	18–25 November

frogs and reptiles along trails and river banks. During the day we searched for heliothermic (basking) reptiles along trails through forest, in forest clearings, and on stream banks. We turned stones and logs, opened rotting logs, and raked litter to reveal hiding lizards. Small lizards were collected by hand or were stunned with a large rubber band. Large lizards were collected by hand. We searched for frogs and nocturnal reptiles, including geckos, by walking along forest trails and stream banks at night with a headlamp. A series of five transects each consisting of ten 11 × 16.5 cm ‘sticky traps’ placed at approximately 10 m intervals on the forest floor were also established at each site to trap small ground-dwelling lizards. Traps were placed in sites considered most likely to encounter lizards including under ledges, in root-hollows, among tree roots, under large logs and exposed on the forest floor. All traps were on or near (< ~30 cm high) the ground. Traps rendered inefficient due to rain degrading the glue were replaced daily. Traps were checked 1–2 times each day and lizards were released from the traps using non-toxic cooking oil. Traps were run for 72 hours (3 days and nights at each

Table 2: Herpetofauna documented at four sites around Mt. Panié during November–December 2010.

Species	R. de la Ouaième	Wewec	Dawenia	La Guen	IUCN Status*
Reptiles					
Gekkonidae					
<i>Bavayia montana</i>		X	X	X	DD
<i>Bavayia cf sauvagii</i>	X	X		X	**
<i>Dierogecko validiclavus</i>	X?	X	X		EN
<i>Eurydactylodes agricolae</i>	X	X	X	X	NT
<i>Hemidactylus frenatus</i> ***				X	LC
Scincidae					
<i>Caledoniscincus aquilonius</i>	X	X	X	X	NT
<i>Caledoniscincus austrocaledonicus</i>	X	X	X		LC
<i>Caledoniscincus festivus</i>			X	X	LC
<i>Caledoniscincus haplorhinus</i>		X	X		LC
<i>Caledoniscincus orestes</i>				X	EN
<i>Lioscincus nigrofasciolatum</i>	X		X	X	LC
<i>Lioscincus novaecaledoniae</i>				X	LC
<i>Lioscincus steindachneri</i>	X				EN
<i>Celatisincus similis</i> or sp. nov.				X	EN
<i>Marmorosphax tricolor</i>	X	X	X	X	LC
<i>Nannoscincus exos</i>	X				CR
<i>Tropidoscincus boreus</i>	X	X	X	X	LC
Frogs					
Hylidae					
<i>Litoria aurea</i> ***		X		X	VU
TOTALS	10	10	10	13	

*LC = Least Concern; NT = Near Threatened; VU = Vulnerable; EN = Endangered; CR = Critically Endangered; DD = Data Deficient

**Not applicable – species is undescribed and yet to be assessed by IUCN

***Not native to New Caledonia

site) giving a total 'trap-effort' of 3,600 'trap-hours' at each site.

All species were photographed alive, and several individuals of each reptile species were prepared as voucher specimens to permit accurate identification of taxonomically difficult taxa with collecting permit from Province nord. These specimens were euthanized by lethal injection of Lethobarb. Specimens were fixed in 10% formalin solution, and then stored in 70% ethanol. Samples of liver tissue for DNA analyses were extracted from voucher specimens and stored in 95% ethanol. Voucher specimens are deposited in the Australian Museum, California Academy of Sciences and the South Australian Museum.

RESULTS AND DISCUSSION

A total of 18 species (17 reptiles and one frog) were documented during this survey (Table 2). The frog *Litoria aurea* is a species introduced from Australia (Tyler 1982) where it has undergone significant population declines. It is listed as Vulnerable by the IUCN but occurs in large and healthy populations in New Caledonia.

Overall species richness was extremely similar at each site, with three sites having 10 species and one (La Guen) having 13 species, two of which are exotic (Table 2). The reptile fauna was dominated by skinks (12 species), all of which are endemic to New Caledonia. Geckos included five species, one of which (*Hemidactylus frenatus*) is an invasive non-native species. The remaining four gecko species are endemic to New Caledonia. The gecko referred to here as *Bavayia* cf *sauvagii* (Table 2) is an undescribed species belonging to a complex that is currently being revised and is known from several additional sites beyond the Mt. Panié area (A. Bauer, pers. comm.). Of particular interest among the skinks is a species tentatively identified as *Celatiscincus similis* that was found only at La Guen. Its identity needs to be confirmed through genetic analysis.

Although substantial effort was put into establishing transects of 'sticky traps', only eight of the 17 species, all skinks, were trapped this way. Of 159 individual captures on sticky traps, 77 (48%) were *Caledoniscincus aquilonius* and 72 (45%) were *Marmorosphax tricolor*. The remaining 7% of captures were made up by *Celatiscincus similis* (4 captures; 2.5%), *Caledoniscincus orestes* and *Tropidoscincus boreus* (2 captures or 1.25% each), *Caledoniscincus haplorhinus* and *Lioscincus nigrofasciolum* (1 capture or 0.62% each). The absence of arboreal reptiles from sticky traps, which were set on or near the ground, is not surprising. The traps also failed to detect the rare terrestrial skink *Nannoscincus exos*, presumably because densities of this species are extremely low or because they have patchy distributions and limited mobility and so they did not encounter the traps.

Species accounts (species name followed by IUCN Red List category)

Gekkonidae

Bavayia montana (Data Deficient)

This is a moderately robust gecko that inhabits closed, humid lowland to montane forests (Bauer and Sadlier 2000). Recent genetic studies indicate that the species as currently recognized includes a number of cryptic taxa, but that the Mt. Panié population represents 'true' *B. montana* (A. Bauer pers. comm.). Although assessed as Data Deficient, Whitaker and Sadlier (2010a) note that the known extent of occurrence of true *B. montana* is <100 km² and suggest that once the taxonomic revision of this complex is completed many of the new taxa will likely be assigned to one of IUCN's threatened categories. Forests of the Mt. Panié area are one of the few known habitats for true *B. montana*.

Bavayia cf *sauvagii*

Specimens of an undescribed species of the *B. sauvagii* complex were found at Roches de la Ouaième, Wewec and La Guen. This species was abundant in forest at all three sites, where they were found at night on low vegetation. It is also known from several sites outside the Mt. Panié area (A. Bauer pers. comm.)

Dierogecko validiclavis (Endangered)

This small, slender gecko was abundant at Roches de la Ouaième, Wewec and Dawenia. It is considered to be Endangered (Whitaker and Sadlier 2010b) because of its extremely restricted distribution; it was known from only two sites on the Mt. Panié massif prior to this RAP survey. Our survey extends the known distribution of this species to Roches de la Ouaième, a massif isolated from the main Panié range. However genetic data indicate that the population from Roches de la Ouaième may be distinct and may ultimately warrant recognition as a new species (A. Bauer, pers. comm.). If these preliminary results are confirmed then this population will represent another extremely restricted-distribution species in the Panié region.

Eurydactylodes agricolae (Near Threatened)

This gecko is known from a range of habitats across a relatively wide area of province Nord and was documented at each of the four RAP survey sites. It was encountered mostly at night perched on branches and twigs in forest. Although considered Near Threatened by the IUCN due to possible impacts of expanding nickel mining on populations in the north-west of the Grande Terre (most of the species distribution) (Whitaker and Sadlier 2010c), the populations in the Mt. Panié area appear to be secure at this stage.

Hemidactylus frenatus (Least Concern)

This invasive, exotic gecko has colonized most of the South Pacific and was found only on buildings at La Guen during this survey.

Scincidae

Caledoniscincus aquilonius (Near Threatened)

This species has a moderately broad distribution in montane forests in northern New Caledonia and was documented at each of the four RAP survey sites around Mt. Panié. It occurs in primarily forest habitats but is considered to be Near Threatened (Whitaker and Sadlier 2010d) because of numerous threats, particularly introduced ants, wildfires and, on the north-west massifs, the expansion of nickel mining. It was common at all four sites during this survey.

Caledoniscincus austrocaledonicus (Least Concern)

This widespread and common skink is capable of persisting in degraded and modified habitats. It was found at Roches de la Ouaième, Wewec and Dawenia during the RAP survey.

Caledoniscincus festivus (Least Concern)

This is a widespread species that is known to persist in a broad range of habitats (Bauer and Sadlier, 2000). During this RAP survey it was encountered only at Dawenia and La Guen.

Caledoniscincus haplorhinus (Least Concern)

This widespread and common lizard is capable of persisting in degraded and modified habitats. *C. haplorhinus* was found only at Dawenia and Wewec during the RAP survey.

Caledoniscincus orestes (Endangered)

This species is known from two widely separated 'groups' of populations, and is considered to be Endangered because the isolated populations tend to be genetically sub-structured, and those populations in forests on ultramafic surfaces have been localized and fragmented (Whitaker and Sadlier 2010e). This species was found only at La Guen during this RAP survey.

Lioscincus nigrofasciolatum (Least Concern)

This species has a very wide distribution in New Caledonia and is known to persist in degraded habitats. It was found at Roches de la Ouaième, Dawenia and La Guen during this survey.

Lioscincus novaecaledoniae (Least Concern)

This species has a broad range in New Caledonia, but is known from relatively few sites (Whitaker and Sadlier, 2010f). It was previously known from the Mt. Panié massif and was found at La Guen during this survey.

Lioscincus steindachneri (Endangered)

This species is known from only three disjunct locations, one of which is the Mt. Panié massif. Unlike the other two known locations populations on the Mt. Panié massif appear to be secure, although there are threats to key habitat (humid forest) from wildfires and clearing and to resident populations from invasive species (Whitaker and Sadlier 2010g) in this area. The Panié massif, and particularly Mt. Panié,

provides habitat critical for the survival of this species. During the RAP survey it was found at Roches de la Ouaième.

Celatiscincus similis (Endangered)

This species is known from only four sites in northern New Caledonia (Whitaker and Sadlier 2010h), two on ultramafic massifs on the northwest coast and two on the northeast coast at Ouaième and Tao. Further genetic studies are required to assess the status of populations in the northeast, but it is clear that Mt. Panié represents a critical habitat for this taxon in the northeast.

Marmorosphax tricolor (Least Concern)

A very widespread but forest dependent species, *M. tricolor* was extremely common at all four RAP sites.

Nannoscincus exos (Critically Endangered)

This species was known from only a few samples at two sites prior to the surveys undertaken here, one in the Hienghène valley and one at Ouenghip on Roches de la Ouaième. The additional samples collected during the survey are from the Ouenghip population. Because of its extremely limited distribution and threats from habitat degradation, invasive predators and the introduced Little Red Fire Ant (Whitaker and Sadlier 2010i) the species is considered to be Critically Endangered.

Tropidoscincus boreus (Least Concern)

This fast-moving diurnal lizard occupies a broad range of habitats and occurs widely in New Caledonia. It was moderately common at all four sites sampled during this RAP survey.

Frogs

Litoria aurea (Vulnerable)

The frog *Litoria aurea* is an exotic species that has flourished in New Caledonia. It is listed as Vulnerable by the IUCN on the basis of severe population declines in its native range (southeastern Australia), but this species is abundant wherever it occurs in New Caledonia. *L. aurea* was found along streams at Wewec and La Guen during this survey.

CONSERVATION ISSUES AND RECOMMENDATIONS

The forests of the Mt. Panié area provide an important refuge for a number of rare and potentially new reptile species, including several endemic to the region. Four species found during the survey are listed as Endangered by the IUCN and one, the restricted-range *Nannoscincus exos* that was found at Roches de la Ouaième, is listed as Critically Endangered (Table 2). The potentially new species of *Dierogecko* known only from Roches de la Ouaième, if confirmed, will almost certainly also warrant listing in a threatened category due to its extremely limited distribution. Only eight of the

17 reptile species documented during this survey are listed as Least Concern by the IUCN.

Despite the significant survey effort undertaken in both time and geographic coverage, two regionally endemic species, *Bavayia madjo* and *Bavayia ornata*, were not recorded, indicating that both species likely have restricted distributions on the Panié Massif. *Bavayia madjo* is known from only two high elevation sites (Panié and Ignambi), and *Bavayia ornata* from low-mid elevation forest adjacent to the Cascade de Tao. Targeted survey work for these species should be undertaken to fully assess their distribution, and in the case of *B. ornata* the population status and immediate threats (presence/extent of the fire ant *Wasmannia auropunctata*; potential impact of fire on forest edge; impact of pigs on critical sheltering sites such as logs on the forest floor).

Each of the sites surveyed during this RAP project supported at least one Endangered species (Table 2) while two Endangered and one Critically Endangered species were found at Roches de la Ouaième. It is clear that each of these areas, but particularly Roches de la Ouaième, provide critical habitats for rare endemic reptile species. In their recent assessments of the conservation status of New Caledonian reptiles, the most common threats identified by Whitaker and Sadlier (see refs below) were population fragmentation through forest destruction due to rapidly expanding nickel mining or agriculture, predation by rodents and feral cats, the impact of the introduced Little Red Fire Ant *Wasmannia auropunctata* (Jourdan *et al.* 2001), habitat loss and degradation from introduced ungulates (deer and pigs), and wildfires.

Nickel mining is not a threat in the region of the Mt. Panié massif, but rodents and feral cats occur throughout the region and probably exert severe predation pressure on lizards there. The introduced ant *Wasmannia auropunctata* is also widespread in lowland and some mid elevation forests in the region and is likely to also have a significant impact on lizard populations where infestation is extreme. The impact of pigs on lizards in the Mt. Panié area is difficult to assess but modification of terrestrial habitats in moist forests may be having severe impacts on some terrestrial skinks. Wildfires are also a threat, particularly on the lower slopes of the Mt. Panié area where fires significantly modify and degrade the moist forest habitats required by several endangered lizard species.

Understanding the impacts of introduced predators (particularly rats) and of pigs on the endemic lizard fauna of the Mt. Panié region will be critical for developing long-term management programs for this important area. For example during this study we trapped numerous rats in sticky traps that were also trapping ground-dwelling skinks confirming that these predators are occupying the same microhabitats as these endemic lizards.

Results of our trapping program indicate that sticky traps may be a powerful quantitative technique to study the impacts of feral animals (pigs, rats) on native lizards. This is because the traps were extremely successful at catching two

terrestrial species, *Caledoniscincus aquilonius* and *Marmorophax tricolor*, that can 1) be identified with relative ease, at least when adult, 2) appeared to be abundant based not only on trapping but also on field observations, and 3) can be released unharmed after capture. These two terrestrial species occur in sufficient numbers that changes in population size are likely to be detected during predator-control studies. In contrast rarely encountered species are unlikely to provide sufficient data for statistical analyses of observed population changes. We recommend that a carefully designed study that aims to monitor population responses of these two species to predator/pig removal should be considered. Such a study will provide extremely useful information about the impacts of these exotic species on terrestrial lizards in the Mt. Panié area.

Further field research is required in adjacent areas to fully assess the apparent uniqueness of the lizard fauna of the Panié massif and Roches de la Ouaième and the contribution of its forests to the conservation of the lizard fauna in the northeast of the Grande Terre.

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