Rapid Assessment Program (RAP) Survey of Small Mammals in the Kwamalasamutu Region of Suriname

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Chapter 11

Rapid Assessment Program (RAP) survey of small mammals in the Kwamalasamutu region of Suriname

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SUMMARY

In a Rapid Assessment Program (RAP) survey of the Kwamalasamutu region of southern Suriname, 38 species of small mammals were documented including 26 species of bats, 10 species of rats, and two species of opossums. The species diversity and relative abundance of rats at three sites around Kwamalasamutu were the highest recorded in 20 years of mammal surveys throughout Suriname and Guyana by the Royal Ontario Museum. Kutari was the most successful site for rats, indicating a healthy source of prey species for predators such as cats, owls, and snakes. In contrast, Werehpai was the most successful for bats but this was attributable to the well-established trails to the petroglyphs approximately 3.5 km from the river, which functioned as flyways that were more conducive for capture success compared to the other two sites where rudimentary trails were only recently cut. This indicates that bats are relatively tolerant to minor alternations to their habitat. Noteworthy records include two species endemic to the Guiana Shield, a water rat (*Neusticomys oyapocki*) and a brush-tailed rat (*Isothrix sinammariensis*), collected at Kutari that represent the first occurrences of these species in Suriname.

INTRODUCTION

Small mammals (bats, rodents, and opossums) comprise 80% of the mammalian species diversity in the Guianas (Lim et al. 2005). However, they are poorly known in comparison to the more charismatic and conspicuous larger species such as monkeys and cats. Approximately 200 species of mammals have been reported from Suriname. Small mammals are particularly important for conservation because many are fruit-eaters that disperse seeds necessary for natural forest succession, nectar-feeders that pollinate flowers, and insect-eaters that control natural populations through their foraging behavior and diet. High species diversity and relative abundance make small mammals an ideal group for rapid assessment program (RAP) surveys and long-term monitoring. This is particularly important for regions such as the Kwamalasamutu area that have not been thoroughly surveyed for biodiversity and conservation purposes.

STUDY SITES AND METHODS

We surveyed three sites in the Kwamalasamutu region: Kutari River (N 2.17538, W 56.78786), surveyed for six nights from 18–23 August; Sipaliwini (N 2.28979, W 56.60708), surveyed for five nights from 27–31 August; and Werehpai (N 2.36271, W 56.69860), surveyed for five nights from 2–6 September. Mist nets were also set at the petroglyph caves on the last night at the Werehpai site.

To survey non-volant small mammals during the RAP, we used Sherman live traps of two sizes: small (23 × 8 × 9 cm) and large (35 × 12 × 14 cm). Traps were set approximately five meters apart along transects on the ground near burrows, base of large trees, tree falls, along

foraging runways, and rocky areas in upland forest and swamps for terrestrial animals. Some traps also were set on vines and low branches to sample arboreal species. Trapping effort per night varied among the sites with a maximum of 179 traps set at the Sipaliwini site.

Bats were captured with mesh mist nets 6 or 12 m in length that were set to a maximum height of 3 m in the forest understory. Pairs of short and long nets were set perpendicular approximately 100 meters apart along the transect across trails, over creeks, in swamps, near tree fall gaps, and by rocky outcrops where bats were typically flying. A maximum of 26 mist nets were set during the RAP and typically opened from approximately 1800 to 2400 h.

Small mammals not kept as representative samples of the species diversity in the Kwamalasamutu region were released unharmed at the point of capture. Individuals kept as voucher specimens were prepared as dried skins with carcasses temporarily preserved in ethanol for cleaning of the skulls and skeletons, or as whole animals fixed in 10% formalin with long-term storage in 70% ethanol. This will enable examination of both osteology and soft anatomy. Tissue samples of liver, heart, kidney, and spleen were frozen in the field with liquid nitrogen and for later storage in a –80°C ultra-cold freezer. Muscle samples were dabbed onto filter cards to stabilize DNA for sequencing in the international Barcode of Life project (www.barcodinglife.org) and also preserved in ethanol as a tissue backup precaution.

A reference collection of voucher specimens will be deposited at the University of Suriname's National Zoological Collection of Suriname, and the Royal Ontario Museum. Specimens will serve as documentation of the biodiversity of mammals in southern Suriname and will be available for study by the scientific community.

RESULTS

In total, preliminary field identifications indicated 38 species of small mammals represented by 375 individual captures, of which 251 were kept as voucher specimens (Appendix). More specifically, 26 species of bats were represented by 223 individuals (146 specimens kept as vouchers), 10 species of rats and mice were represented by 146 individuals (100 specimens), and two species of small opossums were represented by six individuals (five specimens). The overall species accumulation curve increased on every night except for one night (Fig. 1). This trend was primarily driven by the more species-rich bats because the non-volant small mammals had reached an asymptote by the fourth-last survey date.

In terms of individual sites, we documented 29 species of small mammals represented by 105 individuals at Kutari including 16 species of bats (52 individuals), 10 species of rats (52 individuals), and one species of opossum (one individual). At Sipaliwini we documented 22 species of small mammals represented by 84 individuals including 14 species of bats (47 individuals), five species of rats (36 individuals), and one species of opossum (one individual). At Werehpai we documented 29 species of small mammals represented by 186 individuals including 23 species of bats (124 individuals), at least 5 species of rats (58 individuals), and one species of opossum (four individuals). Because the collecting permit limit of 100 rodent specimens was reached during the beginning of the Werehpai survey, individuals were released that could have potentially represented three additional species, so diversity at this site may be underestimated.

The species diversity and relative abundance of non-volant small mammals was substantially higher at Kutari than the other two sites (Figs. 2, 3). In contrast, the species diversity of bats was substantially higher at Werehpai (Fig. 4), as was the relative abundance (Fig. 5).

DISCUSSION

Although not many opossums were captured, five individuals of the short-tailed opossum (*Monodelphis brevicaudata*) were documented, which is the highest success rate in 20 years of similar surveys conducted in the Guianas by the Royal Ontario Museum. The short-tailed opossum is interesting in that it is active during the day (diurnal) searching for invertebrate prey such as insects and worms on the ground, whereas all other small mammals captured are active only at night (nocturnal).

The most common non-flying small mammal was the terrestrial rice rat (*Hylaeamys megacephalus*; page 23). A larger terrestrial rice rat (*Euryoryzomys macconnelli*; page 23) was the next most abundant. Rice rats are important seed predators in Neotropical rainforest. Spiny rats (*Proechimys* spp.; page 23) were also numerous and are one of the largest (up to 500 g) rats in South America. They are primary prey for many predators such as cats and snakes. Spiny mice (*Neacomys* spp.; page 23) were the next most abundant genus of non-volant small mammals.

For bats, the commonest species was the larger fruit-eating bat (*Artibeus planirostris*; page 23), which comprised almost one-third of all captures. This was also the most abundant species captured during the CI RAP surveys of the eastern Kanuku Mountains in Guyana (Lim and Norman, 2002), and Nassau and Lely Mountains in Suriname (Solari and Pinto, 2007). It is a fig (*Ficus*) specialist, however, the botanists found only a few fruiting fig trees during the survey, suggesting that either these bats rely on other fruits when figs are not masting or they are flying long distances from their day roost to fruiting fig trees. Other species in this genus (e.g., *A. jamaicensis* in Jalisco, Mexico) have been radio-tracked flying over 10 km in a night to feed at a fruiting fig tree (Morrison, 1978). The second most abundant species was the moustached bat (*Pteronotus parnellii*), which is an aerial insectivore. A common nectar-feeding bat that was caught at all 3 sites was *Lonchophylla thomasi* (page 23). The sword-nosed bat (*Lonchorhina inusitata*; page 23) was caught only at the Werehpai petroglyphs and may be dependent on caves or rock outcrops as roosting sites. It is an insect-feeding specialist.

The species diversity and relative abundance of rats and mice in the Kwamalasamutu area were the highest documented in 20 years of small mammal surveys throughout Suriname and Guyana by the Royal Ontario Museum. In particular, Kutari was the most successful site for rats and mice, indicating a healthy source of prey species for predators such as cats, owls, and snakes. Although the Kutari site is used occasionally as an overnight rest stop by Trio people traveling through the area, it is not inhabited, and is the least used of the three survey sites.

In contrast, Werehpai was the most successful for bats but this might be due in part to the well-established trail to the petroglyphs, which functioned as a flyway that was more conducive for capture success. The other two camps had lower bat diversity and abundance more typical of undisturbed forest, because transects were cut just before our arrival and were not functioning as flyways for bats. The Trio people recognize Werehpai as a protected area, but hunting still occurs on an irregular basis.

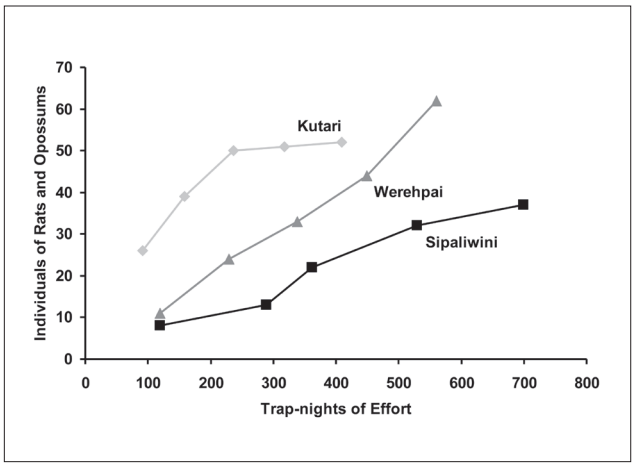

Figure 3. Individual accumulation curves for non-volant small mammals at the 3 survey sites in the Kwamalasamutu region of Suriname.

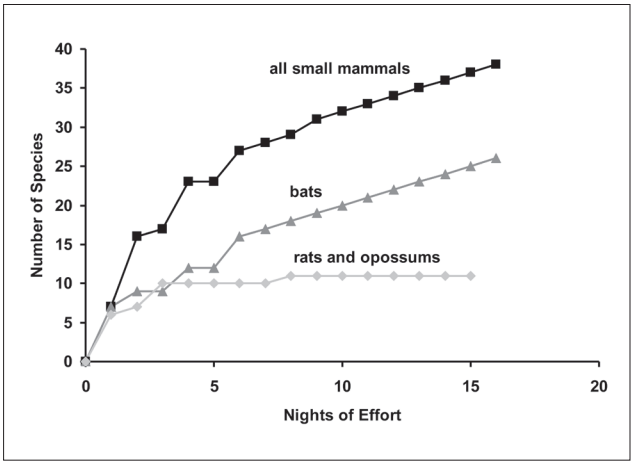

Figure 1. Species accumulation curves for small mammals in the Kwamalasamutu region of Suriname.

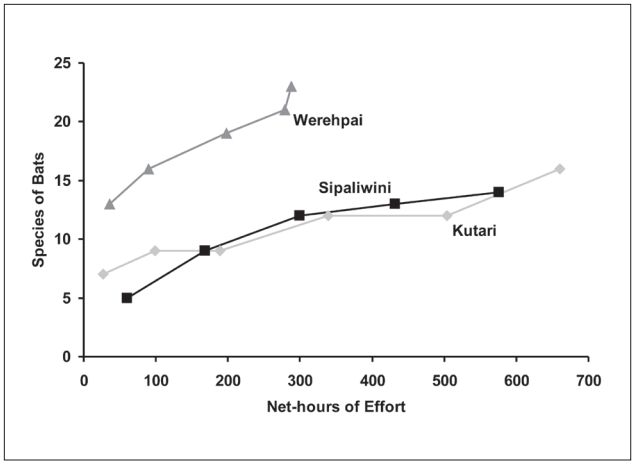

Figure 4. Species accumulation curves for bats at the 3 survey sites in the Kwamalasamutu region of Suriname.

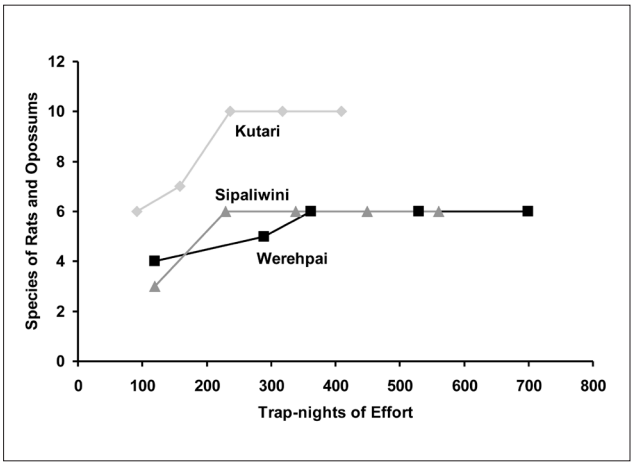

Figure 2. Species accumulation curves for non-volant small mammals at the 3 survey sites in the Kwamalasamutu region of Suriname.

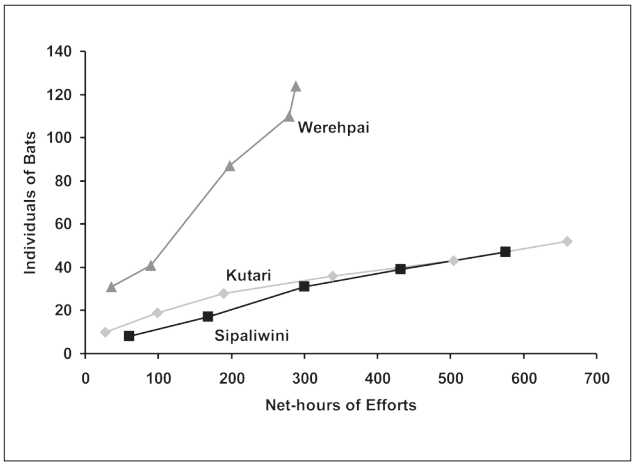

Figure 5. Individual accumulation curves for bats at the 3 survey sites in the Kwamalasamutu region of Suriname.

Sipaliwini had consistently low diversity and relative abundance of small mammals. Of the three surveyed areas, the Sipaliwini site is most often visited by hunters, primarily because of its proximity to Kwamalasamutu. In addition, trees or parts of trees, honey and other non-timber forest products are also harvested, so this area is more heavily used. In general, diversity and abundance of small mammals appeared to correlate negatively with the amount of human disturbance in the three areas sampled.

Interesting Species

A water rat (*Neusticomys oyapocki*) was collected at Kutari that represents the first documentation of this species in Suriname. The ears and eyes are reduced in size as an adaptation for aquatic behaviour. There are only 10 specimens of this species (Leite et al. 2007) and not much is known of its ecology or role in the ecosystem.

Another interesting species was a brushed-tailed rat (*Isothrix sinnamariensis*) that was found by the large mammal camera trapping team. It was discovered dead with wounds on the head and shoulders on a part of the trail they had just recently walked. Indications are that they had startled a raptor that had killed the rat, which was then dropped on the trail. This represents the first report from Suriname of a brush-tailed rat, an arboreal species endemic to the Guianas and known from fewer than 8 specimens (Lim et al. 2006; Patterson and Velazco 2008). With these faunal additions, there are currently 196 species of mammals documented from Suriname (Lim et al. 2005; Lim 2009).

CONSERVATION RECOMMENDATIONS

The Kutari site was furthest from the village of Kwamalasamutu and the most remote of the three camps, which may partially account for the high species diversity and relative abundance of rats and mice. This taxonomic group is primary prey for many top-level nocturnal predators such as cats, snakes, and owls. A healthy predator-prey relationship is a good indicator of the conservation status of forest habitat. Kutari would be a good candidate area for a nature reserve within the Kwamalasamutu region.

Sipaliwini had the lowest species diversity and relative abundance, but also the most homogeneous forest habitat. A variety of microhabitats such as swamp forest and rocky outcrops were present near the other sites, and usually are associated with more diverse and abundant small mammal faunas.

Werehpai had the highest bat diversity and abundance suggesting that this taxonomic group adapts well to minor habitat changes such as the establishment and maintenance of trails in the forest. Flyways act as convenient routes within the forest for greater access to food resources such as fruits, flowers, and insects. However, over-development (such as construction of permanent buildings) causes changes to the community ecology of bats and alters their impact on the environment in terms of forest composition associated with seed dispersal and pollination, as documented at the ecotourism resort of Blanche Marie Vallen in western Suriname (Lim 2009).

The primary conservation recommendations arising from the small mammal survey of the Kwamalasamutu region are: 1) designation of the Kutari area as a nature reserve because of the high species diversity and relative abundance of rats and mice that are necessary to sustain healthy populations of top-level predators; and 2) minimal development of the Werehpai petroglyph site to ensure continued ecosystem services of the bat fauna including seed dispersal, flower pollination, and insect control.

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Appendix. List of mammals collected on the Kwamalasamutu RAP survey. Number of individuals collected (in parentheses indicates total individuals, including individuals that were released).

Species	Kutari	Sipaliwini	Werehpai	Individuals
Opossums:				
Marmosops parvidens	1			1
Monodelphis brevicaudata		1	3 (4)	4 (5)
Subtotal	**1**	**1**	**3 (4)**	**5 (6)**
Rats:				
Neusticomys oyapocki	1			1
Isothrix sinammariensis	1			1
Neacomys guianae	2			2
Neacomys paracou	1		1 (9)	2 (10)
Oecomys auyantepui	4	2	1 (2)	7 (8)
Oecomys rutilus	1			1
Euryoryzomys macconnelli	6	12	1 (10)	19 (28)
Hylaeamys megacephalus	28	14	7 (30)	49 (72)
Proechimys cuvieri	1	4	2 (7)	7 (12)
Proechimys guyannensis	7	4		11
Subtotal	**52**	**36**	**12 (58)**	**100 (146)**
Bats:				
Anoura geoffroyi		1		1
Artibeus bogotensis	1		1	2
Artibeus gnomus	2		1	3
Artibeus lituratus	1	3	3 (12)	7 (16)
Artibeus obscurus	3	3	3 (6)	9(12)
Artibeus planirostris	14 (16)	9	7 (45)	30 (70)
Carollia brevicauda	1		2	3
Carollia perspicillata	2	2	1 (2)	5 (6)
Desmodus rotundus	1		2	3
Lionycteris spurrelli		2	2 (6)	4 (8)
Lonchophylla thomasi	3	2	2(4)	7 (9)
Lonchorhinua inusitata			2 (8)	2 (8)
Lophostoma silvicolum	6	8	1	15
Micronycteris megalotis			1	1
Micronycteris minuta		1		1
Mimon crenulatum		1	2	3
Myotis riparius	1	1	1	3
Phyllostomus discolor			1	1
Phyllostomus elongatus	4	1	5 (8)	10 (13)
Phyllostomus hastatus			1	1
Platyrrhinus helleri	2		2	4
Pteronotus parnellii	6	11	3 (10)	20 (27)
Rhinophylla pumilio	1		3 (5)	4 (6)

table continued on next page

Species	Kutari	Sipaliwini	Werehpai	Individuals
Sturnira tildae			1	1
Trachops cirrhosus	2		2	4
Uroderma bilobatum		2		2
Subtotal	**50 (52)**	**47**	**49 (124)**	**146 (223)**
TOTAL	**103 (105)**	**84**	**64 (186)**	**251 (375)**