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Mammalian and avian diversity of the Rewa Head, Rupununi, Southern Guyana

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Abstract: We report the results of a short expedition to the remote headwaters of the River Rewa, a tributary of the River Essequibo in the Rupununi, Southern Guyana. We used a combination of camera trapping, mist netting and spot count surveys to document the mammalian and avian diversity found in the region. We recorded a total of 33 mammal species including all 8 of Guyana’s monkey species as well as threatened species such as lowland tapir (†Tapirus terrestris), giant otter (†Pteronura brasiliensis) and bush dog (†Speothos venaticus). We recorded a minimum population size of 35 giant otters in five packs along the 95 km of river surveyed. In total we observed 193 bird species from 47 families. With the inclusion of Smithsonian Institution data from 2006, the bird species list for the Rewa Head rises to 250 from 54 families. These include 10 Guiana Shield endemics and two species recorded as rare throughout their ranges: the harpy eagle (†Harpia harpyja) and crested eagle (†Morphnus guianensis).

Keywords: Guiana Shield, biodiversity conservation, endemic and threatened birds, endangered species of mammal, Rewa River, Rupununi.


Resumo: Reportamos os resultados de uma curta expedição às remotas cabeceiras do Rio Rewa, tributário do Rio Essequibo no interior da Guiana. Utilizamos uma combinação de armadilhas fotográficas, redes de neblina e avistamento para documentar a diversidade de mamíferos e aves encontrados na região. Nós registramos um total de 33 espécies de mamíferos, incluindo todas as oito espécies de primatas que ocorrem na Guiana, além de espécies ameaçadas como anta (†Tapirus terrestris), ariranha (†Pteronura brasiliensis) e cachorro-do-mato (†Speothos venaticus). Nós registramos uma população mínima de 35 ariranhas em cinco grupos no 95 km do rio. Registramos um total de 187 espécies de aves que pertencem a 47 diferentes famílias. Incluindo os dados gerados pelo Smithsonian Institution em 2006, a lista de espécies para a cabeceira do Rio Rewa aumenta para 252, com 48 famílias, incluindo 10 espécies endêmicas do escudo das Guianas e duas espécies consideradas raras: a harpia (†Harpia harpyja) e o gavião-real-falso (†Morphnus guianensis).

Palavras-chave: Escudo da Guiana, conservação da biodiversidade, endêmicas e ameaçadas de aves, espécies ameaçadas de mamíferos, Rio do Rewa, Rupununi.
Introduction

The Guiana Shield comprises one of the largest single tracts of forest anywhere in the tropics, spanning 250 million ha, and is consequently of high importance for a range of lowland rainforest species (Hammond 2005). Over 20,000 species of vascular plants are found in the Guiana Shield ecoregion, 35% of which are endemic. Similarly 975 bird species are found in this region, of which over 70 are endemic (Hammond 2005). Guyana itself contains 812 species of bird (Milensky et al. 2005). Our understanding of the diversity and distribution of mammal species in Guyana is patchy and is derived mainly from studies conducted in Iwokrama Forest. So far 225 species of mammal have been identified in Guyana, 146 of which are bats (Engstrom & Lim 2008), and of which 29 are classified as threatened (Lim & Engstrom 2004). Of the mammals found in Guyana, 29 are classified as threatened (IUCN 2008). Furthermore, the Guiana Shield contains some of the most carbon-rich forests in South America and represents an important carbon dioxide sink (Saatchi et al. 2007).

Our expedition in January 2009 followed on from a Conservation International Rapid Assessment Programme (RAP) in the Eastern Kanuku Mountains and Lower Kwitoto River in 2001 (Montebanb & Missa 2002), and a Smithsonian Institution expedition exploring the avifauna of the River Rewa, which sampled two sites in the Rewa Head and a further site below Corona Falls (Milensky & Schmidt 2006). A second Conservation International RAP in 2006, explored the biodiversity of the Konashen Community Owned Conservation Area (COCA) in southern Guyana (Alonso et al. 2006). Apart from these few short expeditions, the biodiversity of the Upper Takutu-Upper Essequibo Region is remarkably unexplored.

Lying between 1 and 9 degrees north of the Equator with a coast in the Caribbean, Guyana’s weather patterns are driven by the Caribbean Intertropical Convergence Zone, with the rainy season arriving in early May lasting until mid-August, followed by another short rainy season in December. Its forests are hot and humid with between 2000–4000 mm of rain annually (LOC 2002). Guyana has a small population of 751,000, with a population density of 3.5 per km². 90% of the population live in a strip of land around the cities of Georgetown, Bartica and Linden in the north of the country (Beaie 2002). Guyana has never had government-led drives to open up the interior of the country to commercial development, consequently its forests have remained largely intact and land cover remains 76% rainforest (Guyana Forestry Commission 2007).

The focal species of the expedition, the giant otter, is listed as ‘Endangered’ under the IUCN Red List due to overhunting during the last century (Duplaix et al. 2008). Following the listing of the giant otter under the Convention on the International Trade in Endangered Species (CITES) and the collapse of the international market for carnivore skins, the species has begun to recover in some areas. However, populations remain fragmented, and although the threat of commercial hunting has declined, habitat degradation such as gold dredging has increased (Groenendijk et al. 2005). Guyana was considered to be one of the strongholds for the giant otter due to the low human density of the country, and the number of inaccessible creeks. Hunting did occur throughout the Rupununi, but the population along this major tributary of the Essequibo was never extirpated (McTurk pers. comm.). Interviews with local fishermen who previously commercially hunted giant otter report that fur hunters never ventured above Corona Falls. The river may therefore provide good baseline data for healthy giant otter population densities.

1. Situation of the Rewa Head

The Rewa Head is located in Southern Guyana, in Upper Takutu-Upper Essequibo Administrative Region (Figure 1). It takes its water from tributaries feeding from the Kanuku Mountains in the South and drains north into the Rupununi and Essequibo before flowing into the Atlantic. The Rewa is a blackwater river due to the humic, yet relatively sediment-free waters. Following the Rewa upstream from where it is met by the Kwitoto, the lowland rainforest vegetation type continues up above Corona Falls. Above here the river is fractured by a series of cataracts and falls which prevent the colonisation of the headwaters by fish common in the Lower Rewa, such as arapaima (Arapaima gigas), lukanani (Cichla ocellaris), arawana (Osteoglossum bicirrhosum). Whereas black caiman (Melanosuchus niger), spectacled caiman (Caiman crocodilus) and the giant Amazonian river turtle (Podocnemis expansa) are found in the Lower Rewa up to the base of Corona Falls, none of these species were recorded in the Rewa Head. A series of narrow tributaries flows into the Rewa along its meandering path above the falls. Continuing upstream, the river narrows to 6m wide by 2° 45.358’ N and 58° 37.415’ W and shortly after, at 2° 45’ N and 58° 33’ W the vegetation becomes scrubby riparian bush with dense bamboo groves, cecropia and guava, continuing with patchy forest to 2° 42’ W where dense forest once again predominates.

Figure 1. Location of the Rewa Head and extent surveyed by the expedition (highlighted in red).

Figura 1. Localização da cabeceira do Rio Rewa e extensão da área estudada durante a expedição (em vermelho).
2. Specific objectives

The aims of the expedition were to (1) record the diversity of birds and large mammals along a lowland rainforest riparian corridor of very low disturbance in Guyana’s interior and (2) to estimate the size of the giant otter population along the focal river. The Rewa Head was selected due to its remote situation and the likelihood of encountering undisturbed forest communities. In adding to our knowledge of the species richness and composition in this region, it was also our objective to increase scientific attention in a largely neglected yet potentially highly diverse section of the Guianas.

Materials and Methods

The headwaters of the River Rewa, the ‘Rewa Head’ were explored from Corona Falls at 3° 10’ 34” N and 58° 40’ 26” W for 95 km up to the East-West Rewa split at 2° 37’ 45” N and 58° 37’ 9” W where the river ceased to be navigable due to fallen logs (Figure 1). The expedition ran from the 31st December 2008 to the 31st January 2009 during the period of low water before the onset of the winter rains. Two 7 m heavy duty aluminium boats with 15 hp outboard engines were used. Positions of camps where mist-netting surveys took place are given in Appendix 1.

1. Camera trapping

Twelve Reconyx RC55 camera traps were set up along the River Rewa above Corona Falls. Each trap was fixed to a tree or stake approximately 50 cm above the ground. The traps were set up in pairs, with one on the river bank itself facing inland and its partner 150 m perpendicular to the river bank facing a direction estimated to best increase the likelihood of capture. The pairs were arranged 8 km apart and left for a maximum of 22 days before collection. Camera traps were situated in open ground where an unobstructed view of the forest floor ensured the maximum potential for capture success. Due to the strict adherence of the 8 km/150 m rule, we ensured that to some extent the placement of the traps was randomised and took in a variety of micro-habitats from dense scrubby marshland to hill tops to open riparian bush. The Relative Abundance Index (RAI) of mammalian species recorded was calculated and each camera was considered a separate sampling site.

2. River surveying

In conducting drift spot count surveys, the Rewa Head was divided into 8 km stretches, with each stretch surveyed once while drifting downstream. The survey boat had three spotters equipped with binoculars and a portable mp3 player containing the vocalisations of the birds of Venezuela to identify calls and song. Spot counts were carried out in the morning, when animal activity was greatest. However, due to the logistics of moving camp, there were several occasions when we were required to continue surveys into the afternoon, when activity generally declined. The boat was kept to mid-river when it was narrow enough to cover both banks, but when the river widened to over 40 m we kept within 15 m of one bank and a constant speed of approximately 3 km/h. For birds we used the reference guides of Hilty (2002), Restall et al. (2006) and checklist of Braun et al. (2007), following the nomenclature of Hilty (2002); and for mammals we used Emmons & Feer (1997). In determining bird species abundance we followed the categorisation of Braun et al. (2007).

3. Giant otter population size

We recorded the presence of five different giant otter packs, with a minimum population size of 35 animals. Over the 95 km surveyed above Corona Falls, this gives a crude density of one otter per 2.7 km of river. Twenty dens were observed, of which 11 showed signs of recent occupation, and 24 latrines were recorded, of which eight had been used within the last 24 hours.

3. Birds

The five netting sites accumulated 420 mist net hours. Eighty-six birds were caught, resulting in 41 different species being identified (Table 2). Twenty three of the species caught in mist nets were not observed during the drift surveys. The most frequently caught family was the Thamnophilidae with 15 of all species and 27% of total number of individuals caught, followed by the Dendrocolaptidae (5 species) and Trochilidae (4 species). The most common

http://www.biota-neotropica.org.br/file/1152/abstract?inventory+bn00911032011...
Table 1. List of the mammals species recorded in the Rewa Head, showing the form of record, conservation status and level of endemism.

<table>
<thead>
<tr>
<th>Families and species</th>
<th>Common name</th>
<th>Conservation and endemism</th>
<th>ZSL Expedition 2009 Evidence</th>
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<tr>
<td>DIDELEPHIAE</td>
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<tr>
<td>Philander opossum</td>
<td>Common Grey Four-eyed Opossum</td>
<td>-</td>
<td>S,C</td>
</tr>
<tr>
<td>Didelphis marsupialis</td>
<td>Common Opossum</td>
<td>-</td>
<td>C</td>
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<tr>
<td>EDENTATA</td>
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<td></td>
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<td>Pale-throated Three-toed Sloth</td>
<td>GS</td>
<td>S</td>
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<td>MYRMECOPHAGIDAE</td>
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<td>Myrmecophaga tridactyla</td>
<td>Giant Anteater</td>
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<td>C</td>
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<td>DASYPODIDAE</td>
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<td>Dasyus novemcinctus</td>
<td>Nine-banded Long-nosed Armadillo</td>
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<td>C,I</td>
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<tr>
<td>Priodontes maximus</td>
<td>Giant Armadillo</td>
<td>V</td>
<td>I</td>
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<td>CALLITRICHIDAE</td>
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<td>Seguinus midas</td>
<td>Golden-handed Tamarin</td>
<td>GS</td>
<td>S</td>
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<tr>
<td>CEBIDAE</td>
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<tr>
<td>Cebus apella</td>
<td>Brown Capuchin</td>
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<td>S</td>
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<tr>
<td>Cebus olivaceus</td>
<td>Wedge-capped Capuchin</td>
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<td>S</td>
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<tr>
<td>Saimiri sciureus</td>
<td>Common Squirrel Monkey</td>
<td>-</td>
<td>S</td>
</tr>
<tr>
<td>Alouatta macconnelli</td>
<td>Guianan Red Howler Monkey</td>
<td>GS</td>
<td>S,V</td>
</tr>
<tr>
<td>Pithecia pithecia</td>
<td>Guianan Saki</td>
<td>GS</td>
<td>S</td>
</tr>
<tr>
<td>Chiroptes chiropotes</td>
<td>Red-backed Bearded Saki</td>
<td>GS</td>
<td>S</td>
</tr>
<tr>
<td>Ateles paniscus</td>
<td>Black Spider Monkey</td>
<td>GS, V</td>
<td>S,V</td>
</tr>
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<td>CANIDAE</td>
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<td>Speothos venaticus</td>
<td>Bush Dog</td>
<td>NT</td>
<td>I</td>
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<td>PROCYONIDAE</td>
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<td></td>
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<td>Nasua nasua</td>
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<td>MUSTELIDAE</td>
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<td>Pteronura brasiliensis</td>
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<td>E</td>
<td>S,I</td>
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<td>Lontra longicaudis</td>
<td>Neotropical Otter</td>
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<td>Eira barbara</td>
<td>Tayra</td>
<td>-</td>
<td>C</td>
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<tr>
<td>FELIDAE</td>
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<td>Jaguar</td>
<td>NT</td>
<td>S,C,I</td>
</tr>
<tr>
<td>Puma concolor</td>
<td>Puma</td>
<td>-</td>
<td>C</td>
</tr>
<tr>
<td>Leopardis pardalis</td>
<td>Ocelot</td>
<td>-</td>
<td>C</td>
</tr>
<tr>
<td>Leopardis wiedii</td>
<td>Margay</td>
<td>NT</td>
<td>C</td>
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<td>Felis Jaguarundi</td>
<td>Jaguarundi</td>
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<td>S,C</td>
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<td>CERVIDAE</td>
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<tr>
<td>Mazama americana</td>
<td>Red Brocket Deer</td>
<td>-</td>
<td>C</td>
</tr>
<tr>
<td>TAYASSUIDAE</td>
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<td></td>
</tr>
<tr>
<td>Tayassu tajacu</td>
<td>Collared Peccary</td>
<td>-</td>
<td>S,C,I</td>
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<tr>
<td>TAPIRIDAE</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Tapirus terrestris</td>
<td>Brazilian Tapir</td>
<td>V</td>
<td>S,C,I</td>
</tr>
<tr>
<td>SCIURIDAE</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Sciurus aestuans</td>
<td>Guianan Squirrel</td>
<td>-</td>
<td>C</td>
</tr>
<tr>
<td>HYDROCHAERIDAE</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Hydrochaeris hydrochaeris</td>
<td>Capybara</td>
<td>-</td>
<td>S,I</td>
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<tr>
<td>Agoutidae</td>
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<td>Agouti paca</td>
<td>Paca</td>
<td>-</td>
<td>S,C,I</td>
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<tr>
<td>DASYPROCTIDAE</td>
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<tr>
<td>Dasyprocta cristata</td>
<td>Red-rumped Agouti</td>
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<td>S,C,I</td>
</tr>
<tr>
<td>Myoprocta exilis</td>
<td>Green Acouchy</td>
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<td>C</td>
</tr>
<tr>
<td>ECHIMYIDAE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lonchothrix emilae</td>
<td>Spiny tree rat</td>
<td>-</td>
<td>S</td>
</tr>
</tbody>
</table>

Evidence of presence is described as S (sighting), V (vocalisation), C (camera trap) or I (indirect evidence) such as footprints, scats or burrows. Conservation status is described as NT (near threatened), V (vulnerable), E (endangered). GS (Guiana Shield) refers to a regional endemic.

A evidência da presença de determinada espécie está descrito como S (avistagens), V (vocalização), C (armadilha fotográfica) ou I (evidência indireta), como pegadas, fezes ou tocas. O status da conservação está descrito como NT (ameaçada), V (vulnerável), E (em perigo). GS (Escudo da Guiana) se refere à região de endemismos.
species encountered in the nets was the wedge-billed woodcreeper (*Glyphorynchus spirurus*), with 11 individuals caught, comprising 13% of the total number of individuals caught. We recorded over 4000 birds during the drift surveys, resulting in the identification of 158 species through both visual observation and vocalisations. Through the combination of sightings made on drift transects, mist-netting, opportunistic sightings and vocalisations, we positively identified 193 species from 47 different families. The most diverse family observed was the Tyrannidae (34 species) and the most abundant family was the Hirudinidae, comprising 20% of total observations (Figure 3). Of chief interest in the sightings are 10 Guiana Shield endemics, the Guianan toucanet (*Selenidera culik*), green aracari (*Pteroglossus viridis*), black nunbird (*Monasa atra*), rufous-throated antbird (*Gymnopithys rufigula*), brown-bellied antwren (*Myrmotherula gutturalis*), rufous-bellied antwren (*Myrmotherula guttata*), caica parrot (*Crax guttata*), black curassow (*Crax alector*), Todd’s antwren (*Herpsilochmus stictocephalus*) and little hermit (*Phaethornis longuemareus*). Two species recorded are rare throughout their ranges and classified as ‘Near Threatened’ in the IUCN Red List, the harpy eagle (*Harpia harpyja*) and crested eagle (*Morphnus guianensis*).

**Discussion**

While far from complete, this expedition revealed a high diversity of bird and mammal species in the Rewa Head of Southern Guyana, including a number of Guiana Shield endemics and the presence of 50% of Guyana’s threatened species (IUCN 2008).

Species accumulation curves (Figure 4) reveal that 96-100% of species observed in the spot count and camera trap survey were recorded after 12 days, after which time catch per unit effort plateaued. By contrast, the mist net species accumulation curve shows a linear trend. These data suggest that further survey work mist-netting beyond twelve days is required, while a camera trap survey of much longer duration, more traps and covering more habitat types would be necessary to conduct a thorough species inventory.

The high diversity of raptor species is a reflection of a strong prey base, and the presence of both the threatened harpy (*Harpia harpyja*) and crested eagle (*Morphus guianensis*) is likely to be due to both the high cracid, primate and sloth abundance coupled with large mature kapok trees (*Ceiba pentandra*) providing nesting sites (Touchon et al. 2002).

Comparing the results of our January 2009 expedition with that of a Smithsonian Institution (SI) expedition in August 2006 gives a fuller picture of avian community composition and species richness as well as seasonal variances in local abundance. During the Smithsonian Institution expedition, they set up two mist netting sites above Corona Falls, using 20 nets and netting for 10 days (Milesky & Schmidt 2006). The combined ZSL/SI figure for bird species in the Rewa Head comes to 250 and number of families to 54, equating to 30% of all Guyana’s bird species (812). The difference in season between the August 2006 SI expedition and the January 2009 ZSL expedition is most apparent in the presence in January of migratory species such as the Osprey (*Pandion haliaetus*) and the relative abundance of frugivorous species such as the Psittacidae which were likely more noticeable in January due to congregations forming on fruiting trees. Likewise, whereas the Smithsonian expedition recorded the family Icteridae as uncommon, we often encountered large flocks of yellow-rumped cacique (*Cacicus cela*), red-rumped cacique (*Cacicus haemorrhous*) and crested oropendola (*Psarocolius decumanus*) as they were nesting, leading us to surmise that they were common in the area.

The 33 species of large mammals we recorded equates to 35% of Guyana’s total non-volant, non-marine mammalian fauna. A typical high prey to low predator encounter rate was recorded, but the presence of five of the Guiana Shield’s six species of felid should be noted as important, and there is no reason to believe that the sixth species, the oncilla (*Leopardus tigrinus*), would not be recorded during the course of a more comprehensive survey. The area appears...
Table 2. List of the bird species recorded in the Rewa Head, showing the abundance, conservation status and level of endemism.

<table>
<thead>
<tr>
<th>Families and species</th>
<th>Common name</th>
<th>Conservation and endemic</th>
<th>SI expedition Aug 2006 abundance</th>
<th>ZSL expedition Jan./2009</th>
<th>Abundance Recorded during river counts</th>
<th>Caught in mist nets</th>
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<td>TINAMIDAE</td>
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<td>Tinamus major</td>
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<td>S</td>
<td>2</td>
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<td>Crypturellus cinereus</td>
<td>Cinerous Tinamou</td>
<td>S</td>
<td>S</td>
<td>4</td>
<td>-</td>
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<td>Crypturellus variegatus</td>
<td>Variegated Tinamou</td>
<td>F</td>
<td>S</td>
<td>*</td>
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<td>ANATIDAE</td>
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<td>Cairina moschata</td>
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<td>-</td>
<td>S</td>
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<td>F</td>
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<td>43</td>
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<td>Zigzag Heron</td>
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<tr>
<td>Tigriosoma lineatum</td>
<td>Rufescent Tiger-Heron</td>
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<td>U</td>
<td>8</td>
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<td>Tigriosoma fasciatus</td>
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Conservation status is described as NT (near threatened), V (vulnerable), E (endangered). GS (Guiana Shield) refers to a regional endemic. Abundance is recorded as C (common), more than 20 individuals encountered daily in prime habitat and season; F (fairly common) 5-20 individuals encountered daily in prime habitat and season; U (uncommon), fewer than 5 individuals encountered, not encountered daily even in prime habitat and season; S (scarce) only occasionally encountered in small numbers even in prime habitat and season; * Recorded present above Corona Falls, but not recorded during a survey.

The status da conservação está descrito como NT (ameaçado), V (vulnerável), E (enxergado). GS (Escudo da Guiana) se refere à região de endemismos. A abundância foi registrada como C (comum), quando mais de 20 indivíduos foram encontrados diariamente em seu habitat original e estação ótima; F (relativamente comum) 5-20 indivíduos encontrados diariamente em seu habitat e estação ótima; U (incomum) menos de 5 indivíduos encontrados, não encontrados diariamente mesmo em seu habitat original e estação ótima; S (raro) apenas ocasionalmente encontrados em pequeno número mesmo no habitat original e estação ótima. * Indivíduos encontrados acima Corona Falls, mas não encontrados durante um exame.
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Tabela 2. Continuação...

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**FORMICARIIDAE**

| Formicarius analis                         | Black-faced Antthrush | -                         | U                                | U                                                             | 5                   |
| Formicarius colma                          | Rufous-capped Antthrush | -                         | -                                | S                                                             | *                   |
| Hylepotes macularius                       | Spotted Antpitta     | -                         | F                                | U                                                             | 5                   |
| Myrmothera campanisona                     | Thrush-like Antpitta | -                         | F                                | F                                                             | 21                  |
| Grallaria varia                            | Variegated Antpitta  | -                         | -                                | S                                                             | 1                   |

**CONOPOPHAGIDAE**

| Conopophaga aurita                        | Chestnut-belted Gnateater | -                         | U                                | -                                                             | -                   |

**TYRANNIDAE**

| Tyrannulus elatus                          | Yellow-crowned Tyrannulet | -                         | F                                | -                                                             | -                   |
| Myiopagis gaimardi                         | Forest Elaenia           | -                         | U                                | U                                                             | 11                  |
| Mionectes macconnelli                      | McConnell’s Flycatcher   | -                         | U                                | -                                                             | -                   |
| Legatus longipennis                        | Piratic Flycatcher       | -                         | -                                | S                                                             | 2                   |
| Mionectes oleagineus                       | Ochre-bellied Flycatcher | -                         | U                                | S                                                             | 2                   |
| Miachus ferox                              | Short-crested Flycatcher | -                         | -                                | S                                                             | 3                   |

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#### Cotingidae

- Xipholena punicea: Pompadour Cotinga
- Perissocephalus tricolor: Capuchinbird
- Phoenicircus carnifex: Guianan Red Cotinga
- Cotinga cayana: Spangled Cotinga
- Querula purpurata: Purple-throated Fruitcrow

#### Titryidae

- Titrya cayana: Black-tailed Titrya

#### Pipridae

- Pipra pipra: White-crowned Manakin
- Pipra erythrocephala: Golden-headed Manakin
- Tyranneutes virescens: Tiny Tyrant-Manakin
- Manacus manacus: White-bearded Manakin

#### Vireonidae

- Hylophilus muscicapinus: Buff-cheeked Greenlet

Conservation status is described as NT (near threatened), V (vulnerable), E (endangered), GS (Guiana Shield) refers to a regional endemic. Abundance is recorded as C (common), more than 20 individuals encountered daily in prime habitat and season; F (fairly common) 5-20 individuals encountered daily in prime habitat and season; U (uncommon), fewer than 5 individuals encountered, not encountered daily even in prime habitat and season; S (scarce) only occasionally encountered in small numbers even in prime habitat and season; * Recorded present above Corona Falls, but not recorded during a survey.
Table 2. Continued...

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O status da conservação está descrito como NT (ameaçada), V (vulnerável), E (endangered). GS (Escudo da Guiana) se refere à região de endemismo. A abundância foi registrada como C (comum), quando mais de 20 indivíduos foram encontrados diariamente em seu habitat original e estação ôtimas; F (relativamente comum) 5-20 indivíduos encontrados diariamente em seu habitat e estação ôtimas; U (incomum) menos de 5 indivíduos encontrados não encontrados diariamente mesmo no habitat original e estação ôtimas; S (raro) apenas ocasionalmente encontrados em pequeno número mesmo no habitat original e estação ôtimas. * Indivíduos encontrados acima Corona Falls, mas não encontrados durante um exame.
Rewa Biodiversity

Rewa likely constituted a source for giant otter expansion within Guyana. While there is no commercial hunting of giant otters, they are occasionally persecuted due to the perceived competition with fishermen, and suffer from habitat loss and disturbance due to gold mining (Groenendijk et al. 2005).

The demands of resource extraction in Southern Guyana in the near future may lead to conflict with the interests of conservation of biodiversity. The Rewa Head constitutes part of a 400,000 ha logging concession (Simon & Shock International 2007). While there has recently been a moratorium put in place on gold dredging in the Rewa, the security of the rivers from wildcat miners is in doubt.

Conclusion

River surveys were conducted alongside to the secondary goal of searching for sign of giant otter activity. Such surveys are biased towards riparian species of bird and further expeditions should also include spot-count transects within the forest itself. Small mammal trapping and bat netting were also not conducted and yet these surveys as well as extensive ichthyological surveys are extremely important for determining the community assemblage of this important forest, especially in light of the recent identification of 86 species of bat in the Iwokrama reserve alone (the highest of any protected area), and of the identification of a high degree of endemism in the aquatic fauna of the Essequibo drainage basin. The conservation potential of the Rewa to be important for jaguar (*Panthera onca*): three were recorded during our expedition and numerous faecal deposits were also encountered. Holland recorded 11 daylight jaguar sightings over six weeks during a period of extreme low water in 2006. The difficulty of portaging boats above the falls into the Rewa Head has prevented the expansion of hunters into the area. Consequently game species such as lowland tapir (*Tapirus terrestris*), paca (*Agouti paca*) and black curassow (*Crax alector*) are both common and naïve. During the course of the expedition four tapirs were encountered in the river during the day and tolerated us approaching to within 5 m.

The presence of the bush dog is also important. The bush dog is an elusive and poorly understood animal, with most data on its behaviour and diet derived from anecdotes. In one study on diet in the Brazilian Pantanal, de Souza Lima et al. (2009) recorded that the predominant prey found in faeces was the nine-banded long-nosed armadillo (*Dasypus novemcinctus*), which appears abundant in the Rewa Head. Although its range is large and it is found throughout Amazonia, it is considered to occur in low densities. The IUCN red list classifies the species as ‘Near Threatened’ being likely to suffer a 10% decline over the following decade due to habitat degradation (Zuercher et al. 2008).

The density of the giant otter is similar to that recorded on the Rio San Martin in Bolivia by Zambrana Rojas (2007). Following the cessation of commercial hunting, these headwaters of the River Rewa likely constituted a source for giant otter expansion within Guyana. While there is no commercial hunting of giant otters, they are occasionally persecuted due to the perceived competition with fishermen, and suffer from habitat loss and disturbance due to gold mining (Groenendijk et al. 2005).

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Figure 4. Species accumulation curves: a) camera trap survey (top left), b) mist net survey (top right), c) drift spot count survey (bottom).

**Figura 4. As curvas de acúmulo de espécies: a) armadilha fotográficas (canto superior esquerdo), b) redes de neblina (acima à direita), c) avistamentos do aves (em baixo).**

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Head is high in that it lies between the Upper Essequibo Concession, maintained by Conservation International and the proposed Kanuku Mountains Protected Area (Montambaut & Missa 2002). Protection of the Rewa Head would form a protected area spanning almost the width of Guyana. We conclude from our results that the Rewa Head is an ecologically important area within the Guiana Shield rainforest and merits recognition, and that further studies exploring the biological richness of the region are recommended.

Acknowledgements

Thanks to Chris Milensky and Brian Schmidt and the Smithsonian Institute for the use of their unpublished 2006 data. Many thanks go to Diane McTurk for help and advice. Thanks to Margaret Chan-a-sue for logistical support in Georgetown and to Peter Taylor for sound advice. Many thanks to Cristina Ariani for the Portuguese translations and thanks to the reviewers of this paper for helpful comments. This expedition was funded through generous grants from the Linnaean Society’s Percy Sladen Memorial Foundation, ZSL’s Daisy Balogh Travel Award and through NERC expedition funds.

References


Appendix 1. Mist-net survey sites.

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