Finding white-sand forest specialists in Allpahuayo-Mishana Reserve, Peru

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The newly-described endemics of the white-sand forests near Iquitos in Amazonian Peru are becoming a magnet for birders. This article recaps the amazing discoveries and explains where to find them.

Extensive bird surveys in just over a decade in a fairly small area of sandy-belt forests, mostly along a major road just 25 kilometres from the city of Iquitos (Department of Loreto, Amazonian Peru), have produced a number of very interesting discoveries. This fieldwork has led to the description of four new species and a few new subspecies[3,10,11,16]. Some currently 'mystery' birds are possibly new taxa but require further research. Twelve additional species recorded in those forests represent first or second records for Peru; of these, many relate to poorly-known species and some represent a significant range extension[4,5,7,8,12,13,14].

This barrage of new knowledge demonstrates the complexity of the seemingly homogeneous Amazonian lowland forests. The sandy-belt forest comprises a mosaic of different forest types, varying in size from a single hectare to a larger 3–4 km^2, interlaced within *terra firme* mixed forest on soils with varying amounts of clay and nutrients. All white-sand forests make up only a tiny fraction of the Amazonian land mass (in Peruvian Amazonia, less than 0.1%). The forests are characterised by extremely poor nutrient content in the soil. Their high sand content leads to a high degree of drainage and nutrient leaching, and thus forest formed here is often fairly open and lower in stature, compared with nearby terra firme forests. Many of the trees are fairly uniform in their height and diameter, and, appearing vertical and without large major branches, are rather similar to utility posts, hence the local name *varillal* (from *varilla* which means 'small pole').

WHITE-SAND FORESTS

White-sand forests are far from uniform[6]. Different soil composition, drainage and the presence (or absence) of an underlying hard-pan layer results in six or more types of plant communities, each having a different species composition and vegetation structure. The stature of the trees can vary from 3–4 m to 25–30 m. Some white-sand specialists are restricted to particular white-sand forest types. As a result, recognising the plant community helps locate the forest specialities.

The humid *varillal*. The more widespread *varillal* type. Trees are fairly tall (10–25 m), and form a canopy. Undergrowth is fairly developed and contains undergrowth palms, especially *Euterpe catinga*. Poor soil drainage causes waterlogging during heavy rain. Where the trees are really tall (above 20 m) it is recognized as a sub-type: tall humid *varillal*.

The dry *varillal*. Some types have fairly open forest. Trees are usually below 20 m in height. Undergrowth is little developed and undergrowth palms are absent. The presence of the 'boacaspi' tree *Dicymbe uaiparuensis* (Fabaceae), conspicuous because its multi-trunk structure, is a good indicator of this plant community. In tall dry *varillal*, trees can exceed 25 m.

The dry *chamizal*. A stunted open forest with small trees (usually below 5 m in height), with poor undergrowth, composed mostly of terrestrial bromeliads, ferns and orchids, and areas covered with lichens or even devoid of vegetation; soil is root bound. This plant community has a very limited distribution.

The humid *chamizal*. Humid forest with dense growth of small trees (usually below 5 m in height) and with partially developed undergrowth. The soil is always waterlogged and has frequent pools of rainwater.

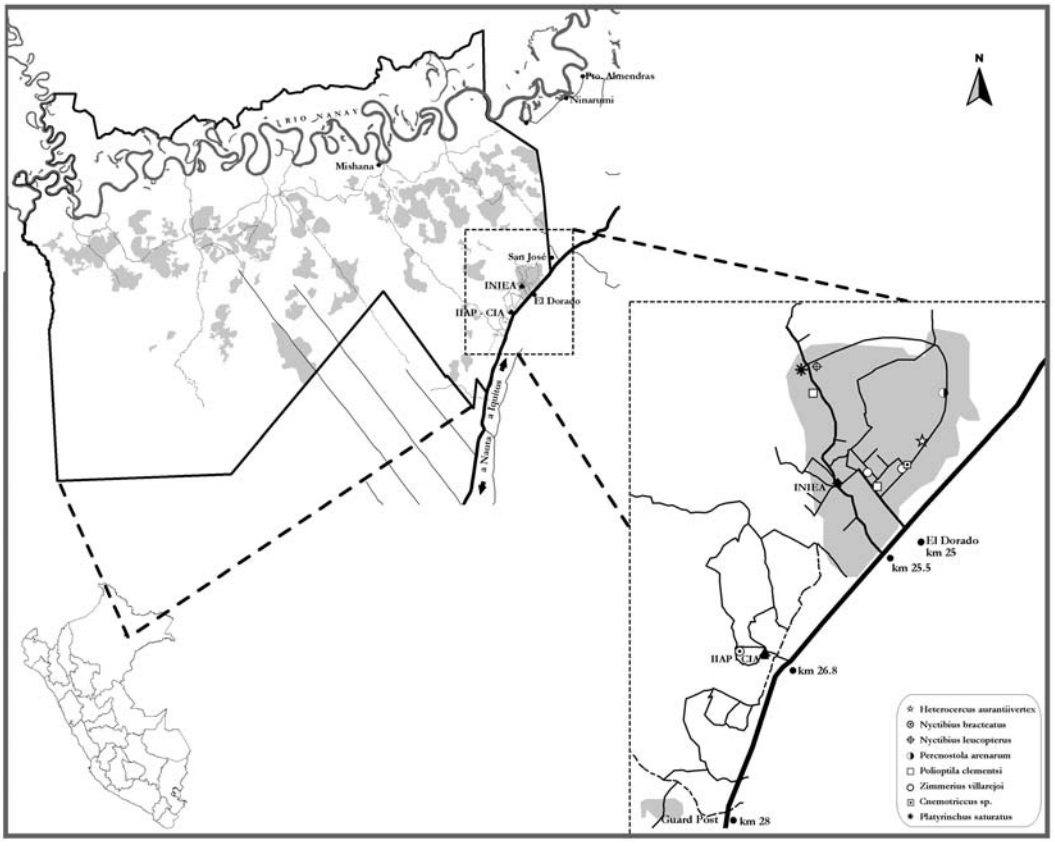
Iquitos Gnatcatcher *Polioptila clementsi* is the rarest of the white-sand forest specialists: only 10–15 pairs of this Critically Endangered endemic have been located, all within the Allpahuayo-Mishana reserve, where it is best found on the INIEA trails (José Álvarez Alonso)

Ancient Antwren *Herpsilochmus gentryi*, the first of the recent new species from the *varillales* in Peru. A key species in canopy-feeding flocks. (José Álvarez Alonso)

Mishana Tyrannulet *Zimmerius villarejoi* is a Peruvian endemic restricted to dry *varillal* and dry *chamizal* forests (José Álvarez Alonso)

Point-tailed Palmcreeper *Berlepschia rikeri* is closely associated with "Aguajal" *Mauritia flexosa* palms (José Álvarez Alonso)

Zimmer's Tody-Tyrant *Hemitriccus minimus* is a tiny flycatcher that is far more often heard than seen, hiding in the upper canopy (Noam Shany)



Map showing access to and around Allpahuayo-Mishana Reserve

The Allpahuayo-Mishana reserve

The Finnish government helped convert this area into the 580 km^2 reserve of Allpahuayo-Mishana. The reserve was established to protect this unique habitat and its inhabitants and is administrated by the National Institution of Natural Resources (INRENA: www.inrena.gob.pe). Research institutes such as the Instituto Nacional de Investigación y Extensión Agraria (INIEA) and the Instituto de Investigaciones de la Amazonía Peruana (IIAP) were given permission to conduct research, and birders may now make arrangements to visit.

The access policy changes frequently, so please contact the reserve office (e-mail: rnallpahuayomishana@gmail.com), IIAP (pbio@iiap.org.pe) or INIEA (sroque@inia.gob.pe) for the latest information. IIAP has established a research centre with simple accommodation that visiting birders are welcome to use (e-mail for reservation and price). There is also a wide range of accommodation in Iquitos. The city is already known for some fine forest lodging and the world famous canopy walk but has lots more to offer to the travelling birder: a wide range of habitats like river islands, flooded forest, terra firme, and swampy forest (*aguajal*) can be found very close to town. The city has a daily flight service from Lima.

Most visitors will concentrate their efforts locating white-sand specialists but this small reserve offers much more, boasting over 480 species including many interesting and sought-after birds.

Birding trails

Reaching the reserve is easy; the reserve is located on the paved Iquitos–Nauta road. You can get there by either a hired vehicle or public transportation. IIAP and INIEA operate a network of trails throughout the properties in their concession; these connect the different types of plant communities.

The trail network that starts at km 25 provides the easiest access to productive patches of white-sand forest. The main trail has a few good clearings enabling nice views of mobile canopy

flocks. Very good smaller trails branch off to the right, leading to territories of most white-sand specialists. The bulk of the article treats this great trail system. Good birds to keep an eye for along this trail include: Striped Owl *Asio clamator*, Sapphire-rumped Parrotlet *Touit purpurata*, Pied Puffbird *Notharchus tectus*, Short-billed Leaftosser *Sclerurus rufigularis*, Pearly Antshrike *Megastictus margaritatus*, Black Bushbird *Neoctantes niger*, Yellow-browed Antbird *Hypocnemis hypoxantha*, Hairy-crested Antbird *Rhegmatorhina melanosticta* and Cinnamon Manakin-Tyrant *Neopipo cinnamomea*. This trail and the following one are within INIEA property; make sure you have their permission to walk the trails - and sign their guest book.

The wide trail at km 25.3 leads to INIEA buildings, where you should register. After the building, the main trail continues through a good humid tall *varillal* that holds territories of some very rare white-sand specialists such as White-winged Potoo *Nyctibius leucopterus* and Cinnamon-crested Spadebill *Platyrinchus saturatus*. Just before the forest on the main trail gives way to a deforested area, a trail to the right connects to the km 25 trail system. Other good birds can be found along those trails such as Yellow-billed Nunbird *Monasa flavirostris*, White-chested Puffbird *Malacoptila fusca*, Long-tailed Woodcreeper *Dechonychura longicauda* and Gray Elaenia *Myiopagis caniceps*.

At km 26.8, there are few trailheads at the investigation center operated by IIAP. The loop trail that starts near the kitchen and goes through an experimental orchard is particularly good for *terra firme* species and has a small patch of dry *varillal*. Along this trail keep an eye out for Agami Heron *Agamia agami*, Rufous Potoo *Nyctibius bracteatus*, Pavonine Quetzal *Pharomachrus pavoninus*, Collared Puffbird *Bucco capensis*, Brown Nunlet *Nonnula brunnea*, Lanceolated Monklet *Micromonacha lanceolata,* Ash-throated Gnateater *Conopophaga peruviana* and Black-necked Red Cotinga *Phoenicircus nigricollis.* Another trail goes to the medicinal plants garden, and from there continues for several kilometres. The garden can be good for tree-top and second growth species.

At km 28 there is a guard post and a wide trail that goes toward the río Nanay. The trails have many of the white-sand specialities, including White-winged Potoo (but not the Critically Endangered and recently described Iquitos Gnatcatcher *Polioptila clementsi*); this trail is good for army ant swarm followers, Black-faced Hawk *Leucopternis melanops*, Buckley's Forest-Falcon *Micrastur buckleyi*, and mammals such as the Equatorial Saki monkey *Pithecia aequatorialis*.

The river side of the reserve can be reached by boat. Private boats (four hours, about USD$40 per boat) can be hired at "Puerto Bellavista-Nanay" on the north end of Iquitos, about 15 minutes ride from the Iquitos town centre. Alternatively, go by car to the village of Ninarumi and take a slow commuter boat (about five hours, USD$2 per person). This side of the reserve offers interesting birding in *igapó* forest (black-water flooded forest) as well as a few good patches of white-sand forest. In Peru, Band-tailed Nighthawk *Nyctiprogne leucopyga* is closely associated with *igapó* forest and can be seen around dusk in clearings near water near Mishana village. The *igapó* forest is good for Black-crested Antshrike *Sakesphorus canadensis*. *Terra firme* forest near Mishana has a trail system and can be very productive: Fiery Topaz *Topaza pyra*, Chestnut-shouldered Antwren *Terenura humeralis*, Ash-throated Gnateater *Conopophaga peruviana*, Black-necked Red Cotinga, and many of the specialities, including Iquitos Gnatcatcher, can be found here. The trail between Mishana and the village of San Martín passes through tall forest and *varillal* patches, and the trail from Mishana leading south towards the interior of the reserve contains multiple habitats, including very hilly portions.

Key birds—and where to see them

Here we discuss those species that are primarily associated with white-sand forests in northern Amazonian Peru.

Gray-legged Tinamou *Crypturellus duidae*

First recorded in Peru in 1995 in *varillal* in the upper río Nanay and subsequently in Allpahuayo-Mishana Reserve[4]. A significant range extension from its previously known range (east Colombia and adjacent Venezuela)[7,8]. Rare, localised and shy, this tinamou is best located by its distinctive vocalisation, a long, hollow and low note slightly rising towards the end (*hooooooooooooeee*). The species is mostly vocal from December to March (and mostly silent the rest of the year). It occurs in several types of *varillal*, for example near the cleared area close to the end of the main trail at km 25. Vocalisations of the Peruvian population differ slightly from those in Venezuela, suggesting a possible different taxon.

White-winged Potoo
Nyctibius leucopterus

A rare and enigmatic species with a patchy distribution in humid *varillales* along the Amazon and disjunct distribution in southern Bahia, Brazil (the latter potentially a different taxon). It can be best located—although even then only rarely—during full moon nights. Good places to look for it are: the tall humid *varillal* toward the end of the main trail of km 25.5; the large clearing in the end of the main trail that heads at km 25; and in humid *varillal* at km 28 (the *varillal* about 3–4 km from the Iquitos–Nauta road on the way to Mishana).

Brown-banded Puffbird
Notharchus ordii

Known in Peru from a handful of localities in Puno, Madre del Dios and Loreto. In Loreto it is associated with sandy-soil forests along the río Nanay. It is uncommon but regularly observed in the reserve, often being heard along the main trail at km 25 and most easily located around the edge of the dry *chamizal*.

Ancient Antwren
Herpsilochmus gentryi

Near Threatened. First described from a *varillal* in the upper río Tigre[16], and subsequently found inside the Allpahuayo-Mishana reserve and at many other sites along río Nanay, and in adjacent Ecuador. It is fairly common in most types of *varillales* and is best located by pinning down one of the frequent singing birds. Singles, pairs or family groups often join and sometimes lead mixed canopy flocks. The song is a series of notes, rising at the beginning and slowing at the end, being loudest at the middle, transcribed as *chidididi –di-di-dididi- di di*[9].

Allpahuayo Antbird
Percnostola arenarum

Vulnerable. Recently described from dense humid *chamizal* in the reserve[11]. Subsequently found in other locations, mostly in sandy-soiled forest along the río Nanay. A second population—potentially a new subspecies?—was found in *varillales* near río Morona (western Loreto). In the reserve it is very selective about its habitat, but elsewhere can be found in other types of mixed forests. Given its patchy distribution, recognition of its vocalisation (now available commercially[9]) is crucial in finding this rare species. A patch of its favourite habitat occurs along the trail that heads in from km 25. A few territories occur in humid *chamizal* and *varillal* accessible by boat from the río Nanay.

Northern Chestnut-tailed Antbird
Myrmeciza castanea

The type specimen of this recently recognised species was collected near Tarapoto (in the Andes foothills)[10]. The population in the reserve represents a newly described subspecies *M. c.*

Mouse-colored Antshrike *Thamnophilus murinus* (male pictured) utters one of the characteristic calls of the white-sand forest (José Álvarez Alonso)

Citron-bellied Attila *Attila citriniventris* is highly vocal from high in the canopy (José Álvarez Alonso)

centuculorum. In the reserve the species is associated with humid *varillal*, but elsewhere it can be found in *terra firme* and foothill forests, and even tolerates degraded habitat. It is vocal and fairly easy to locate, once you know its call (now available commercially[9]).

Saffron-crested Tyrant-Manakin *Neopelma chrysocephalum*

This species is one of the most conspicuous white-sand forest specialists in the reserve. Its loud and distinctive song (now uploaded onto www.xeno-canto.org) can be heard throughout the day. Its highest density is in the dry *varillal* but occasionally it enters humid *varillal*. In its Peruvian distribution the species is restricted to white-sand forest but, in the eastern portion of its range, it uses a wider variety of habitats[8,13].

Orange-crested Manakin *Heterocercus aurantiivertex*

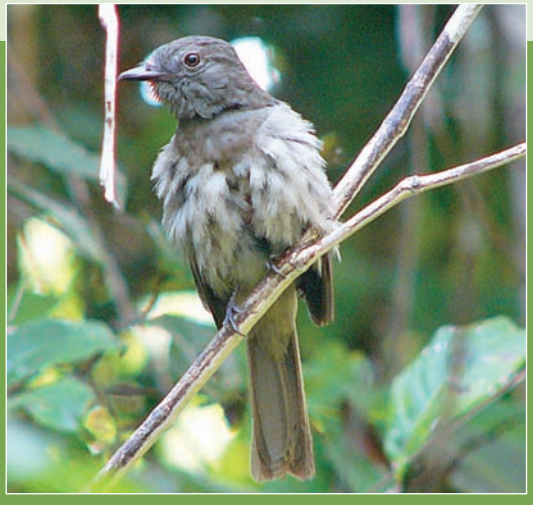
Long thought to be an Ecuadorian endemic, but has recently been found to be an uncommon resident in Loreto. There is a known territory along the trail system at km 25. It is more common in seasonally flooded *igapó* and in oxbow lake borders at the río Nanay side of the reserve (accessible by boat), where its spectacular display flight can be observed[1].

Pompadour Cotinga *Xipholena punicea*

A small population is found in the reserve in both humid and dry *varillales* along the trail system at km 25. It is most easily located at fruiting trees especially *Caraipa* sp. (Clusiaceae) where up to four adults often congregate. In the reserve, the

Northern Chestnut-tailed Antbird *Myrmeciza castanea* was only recently recognised as a distinct species but is fairly common in the reserve (José Álvarez Alonso)

Gray-legged Tinamou *Crypturellus duidae* is known in Peru only from white-sand forest along the río Nanay: it can be heard (and, with some luck, seen) in Allpahuayo-Mishana Reserve (José Álvarez Alonso)



Grayish Mourner *Rhytipterna simplex* is fairly common in most forest types in the reserve (Noam Shany)

In Loreto, the Brown-banded Puffbird *Notharchus ordii* is associated with sandy-soil forests along the río Nanay (José Álvarez Alonso)

species is not as silent as Ridgely & Tudor[13] suggest; it can be heard regularly giving a dry bark-like call (now uploaded onto www.xeno-canto.org), even during the hot hours of the day. Strangely, females are far more vocal than males.

Mishana Tyrannulet
Zimmerius villarejoi

Vulnerable. A recently described species from dry *varillal* in the reserve[3]. Its entire population may occur within the río Nanay basin, of which the reserve is part. It is a rather uncommon and fairly inconspicuous bird, best located on call (a high double note, uttered from the canopy; now uploaded onto www.xeno-canto.org). The species is confined to dry *varillal*, especially favouring the *boacaspi* tree, and to dry *chamizal* where the lower stature of the trees enables closer views. Since its discovery, the species has become notably scarcer for unknown reasons. Records from near Tarapoto, San Martin, 400 km south-west of the reserve, may represent a disjunct population or new "sister" taxon, given the enormous geographical barriers that span between them, such as río Marañon, the huge flooded Pacaya Samiria National Reserve and the Cordillera Escalera.

Zimmer's Tody-Tyrant
Hemitriccus minimus

This flycatcher appears to be common in various types of white-sand forest in the reserve. Since the first Peruvian record in September 1996, the species has been recorded in many areas of nutrient-poor forest around Iquitos. This tiny tyrannid favours tall tree-tops and is hard to observe even when hearing its frequently given trill (now uploaded onto www.xeno-canto.org).

"Campinarana" Flycatcher
Cnemotriccus fuscatus duidae?

A population of this or possibly a new subspecies (or even a species) in the Fuscous Flycatcher complex occurs in the reserve. It is colloquially known as "Campinarana Flycatcher" or "Varillal Flycatcher". It closely resembles *C. f. duidae*[8] of southern Venezuela, and like it, has rufescent brown back and wingbars and a very different vocalisation (now uploaded onto www.xeno-canto.org) from Fuscous Flycatcher *Cnemotriccus fuscatus fuscatus*. This bird has been recorded only in dry *chamizal* patches, a very different habitat to the river islands preferred by *C. f. fuscatus*. It can be found low in the dry *chamizal* close to the start of the trail at km 25. The Fuscous Flycatcher complex requires further study, and may comprise more than one species.

"the km 25 trail network provides the easiest access to productive patches of white-sand forest"

Cinnamon-crested Spadebill
Platyrinchus saturatus

This species was previously known in Peru from a single record from Puerto Indiana[5], downriver from Iquitos. It is uncommon in Allpahuayo-Mishana and very inconspicuous. It is a shy inhabitant of dense understorey and only infrequently gives a soft call. In the presumed breeding season (August–November) the bird gives a high-pitched series of calls around dawn. To locate this species, try the tall *varillal* at km 25.5; it has been seen on the small trail that turns right from the main trail just before the deforested area. The call described in Ridgley & Tudor[13] and the one posted on the website www.xeno-canto.org have not yet been recorded in the reserve; instead, in the reserve we hear the song described by Hilty[8] for south of the Amazon, namely "low-pitched 3-to-6 note *ka-knee-knee-knee-knee* in little, slow, rattle-like or pulsating bursts".

Yellow-throated Flycatcher
Conopias parva

This species was previously known in Peru from a handful of localities. In Loreto it is common in many sandy-soil forest localities (Tamshiyacu, Tahuayo and Nanay areas); in the eastern portion of its range (the Guianan Shield), however, it is more generalist. It can be found in the canopy of tall humid *varillal*. It is fairly common and vocal with a very distinctive call: a loud ringing, rhythmic *kluyuyu kluyuyu kluyuyu*[15] which can be found on www.xeno-canto.org.

Citron-bellied Attila
Attila citriniventris

This species is known in Peru mostly from nutrient-poor soil forests and *Mauritia* palm swamps in Loreto. In the reserve, it is fairly common high in the canopy of tall *varillales* (humid and dry). It is easily heard (and, with

some care, seen) along the km 25 trail. Vocalisations are on www.xeno-canto.org.

Iquitos Gnatcatcher
Polioptila clementsi

A recently described endemic species[17], closely related to Guianan Gnatcatcher *Polioptila guianensis* from the white-sand forest in the Guianan Shield. Despite extensive searching, only 10–15 pairs have been located, all within the reserve. The species' total known territory size is less than 250 ha within a tiny range of 20 km^2. The species was included for the first time in the 2007 revision of the IUCN list; given its rarity, the exceedingly small population and the extremely limited territory it occupies, it has been classified as Critically Endangered. The city of Iquitos declared the gnatcatcher—locally named "Perlita de Iquitos"—as the city bird; the first Iquitos Gnatcatcher festival was held in November 2006. Despite this celebrity status and its existence within a protected area, the species is still at high risk due to habitat destruction for agriculture and timber extraction. The species favours tall humid *varillal*. It often joins mixed flocks in the canopy, led by Ancient Antwren, Lineated Woodcreeper *Lepidocolaptes albolineatus*, Yellow-margined Flycatcher *Tolmomyias assimilis* and Dusky-capped Greenlet *Hylophilus hypoxanthus*. Its soft trill (now on www.xeno-canto.org) is mostly heard from September to December. The gnatcatcher should be looked for along the main trail that starts at km 25 and along the wide trail of INIEA (km 25.5) past the administration buildings. Another place worth a try is the trail system near the village of Mishana.

A few other very interesting white-sand specialists like Barred Tinamou *Crypturellus casiquiare*, Cherrie's Antwren *Myrmotherula cherriei* and Helmeted Pygmy-Tyrant *Lophotriccus galeatus* have been recorded[4] from white-sand areas outside the reserve and should be looked for in the upper río Nanay. The reserve is also rich in interesting mammals, most notably Yellow-handed Titi-Monkey *Callicebus (torquatus) lucifer* and Equatorial Saki.

Conservation: threats and opportunities

Despite being declared a "Reserved Zone" (Zona Reservada) and a "National Reserve" (Reserva Nacional) in 2004, Allpahuayo-Mishana is far from safe. Much of the reserve's best forest patches are private properties that were titled prior to creation of the reserve. Those parcels are not subject to all the reserve restrictions, and owners cannot be required to keep the forest intact. Logging for construction and charcoal is common, as is land invasion with the intention of clearing for agriculture. Hunting and gathering continue to present threats. Some in the city see the reserve as an obstacle for expansion and wish to undermine its existence. The government pays the salary of only one park ranger, which is insufficient to protect the reserve. The NGO ACAAM (Asociación Civil Amigos de Allpahuayo-Mishana, acaamperu@lycos.com) was formed to support the reserve; currently they provide much-needed park rangers, provide training in sustainable use of natural resources, and conduct environmental education programs in the local communities.

CANATURA (Club Amigos de la Naturaleza, canatura.club@gmail.com) is a local student-run nature club that conducts environmental education activities and involves the public and especially youth in conservation. Their school field trips to the reserve, and other activities they have organized such as the First Amazonian Biodiversity Festival and the first Iquitos Gnatcatcher festival, are designed to boost local public support for the reserve. Birding tourism can bring important economic revenue to the local communities, helping improve public opinion about the reserve. Telling locals the reason for your visit can make the reserve's benefits more visible, while those wishing to support ACAAM's or CANATURA's activities can contact them directly.

REFERENCES

1. Alvarez, J. (1999) Breeding behavior of the Orange-crowned Manakin *Heterocercus aurantiivertex*. *Condor* 102: 181–186.
2. Alvarez, J. (2002) Characteristic avifauna of white-sand forest in northern Peruvian Amazonia. M.Sc. thesis, Lousiana State University, Baton Rouge, LA.
3. Alvarez, J. & Whitney, B. M. (2001) A new *Zimmerius* tyrannulet (Aves: Tyrannidae) from white-sand forests in northern Amazonian Peru. *Wilson Bull.* 113: 1–9.
4. Alvarez, J. & Whitney, B. M. (2003) New distributional records of birds from white-sand forests of the northern Peruvian Amazon, with implications for biogeography of northern South America. *Condor* 105: 552–565.
5. Clements, J. F. & Shany, N. (2001) *A field guide to the birds of Peru.* Temecula, CA: Ibis Publishing Company.

6. García Villacorta, R., Ahuite Reátegui M. & Olórtegui Zumaeta, M. (2003) Clasificación de bosques sobre arena blanca de la Zona Reservada Allpahuayo-Mishana. *Folia Amazónica* 14(1): 17–33.
7. Hilty, S. L. & Brown, W. L. (1986) *A guide to the birds of Colombia.* Princeton, NJ: Princeton University Press.
8. Hilty, S. L. (2003) *Birds of Venezuela*. Princeton, NJ: Princeton University Press.
9. Isler, P. R. & Whitney, B. M. (2002) *Songs of the Antbirds. Thamnophilidae, Formicariidae and Conopophagidae.* Ithaca, NY: Macaulay Library of Natural Sounds/Cornell Laboratory of Ornithology.
10. Isler, M. L., Alvarez A., J., Isler, P. R., Valqui, T., Begazo, A. & Whitney, B. M. (2002) Rediscovery of a cryptic species and description of a new subspecies in the *Myrmeciza hemimeaena* complex (Thamnophilidae) of the Neotropics. *Auk* 119: 362–378.
11. Isler, M. L., Alvarez A., J., Isler, P. R. & Whitney, B. M. (2002) A new species of *Percnostola* antbird (Passeriformes: Thamnophilidae) from Amazonian Peru, and an analysis of species limits within *Percnostola rufifrons*. *Wilson Bull.* 113: 164–176.
12. Ridgely, R. S. & Tudor, G. (1989) *The Birds of South America, 1.* Austin: University of Texas Press.
13. Ridgely, R. S. & Tudor, G. (1994) *The Birds of South America, 2.* Austin: University of Texas Press.
14. Ridgely, R. S & Greenfield, P. J. (2001) *The Birds of Ecuador, 1.* Ithaca, NY: Cornell University Press.
15. Ridgely, R. S. & Greenfield, P. J. (2001) *The Birds of Ecuador, 2.* Ithaca, NY: Cornell University Press.
16. Whitney, B. M. & Alvarez Alonso, J. (1998) A new *Herpsilochmus* antwren (Aves, Thamnophilidae) from northern Amazonian Peru and adjacent Ecuador: the role of edaphic heterogeneity of terra firme forest. *Auk* 115: 559–576.
17. Whitney, B. M. & Alvarez Alonso, J. (2005) A new species of gnatcatcher from white-sand forests of northern Amazonian Peru with revisions of the *Polioptila guianensis* complex. *Wilson Bull.* 117(2): 113–127.

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