

## CONSERVATION

The main problem throughout the Tumbesian region is how little forest there is left, particularly in the provinces of Loja, El Oro and Azuay (Figure 38, Table 5) and that there are few forest areas large enough to justify establishing a reserve. Generally it can be said that every single remaining forest patch plays a vital ecological role and also acts as a refuge for many widespread and a few threatened species and is therefore worth being preserved.

A possibility for the protection of these relict forest patches is the creation of Protection Forests set aside for the protection of watersheds, the prevention of erosion or as a future source of firewood. Such managed forests and 'buffer zones' which could be established on marginal land outside the reserves proper, can help to take pressure of the reserves.

Conservation priorities can be based on individual threatened species or on more general phytogeographic classifications. Unfortunately, far too little is known about the plants of the region to be able to assess the status of every single species. A list of the threatened plant species for Ecuador (IUCN 1990) even includes the important tree species *Ceiba trichistandra* and *Jacaranda sparrei* as threatened, but observations made in 1991 indicate that at least locally they show sufficient regeneration and that they are not in immediate danger of becoming extinct. For the Chongón-Colonche Cordillera, Valverde (1991) lists 36 species as threatened and states that 11 epiphytic plant species are being exterminated through the destruction of their host trees, while Kessler (in prep.) argues that only those bromeliad species which are restricted to rocky outcrops may be directly threatened through commercial collecting. However, this information is little more than anecdotal and much more detailed information is necessary on these, and the other 5,000+ plant species of the Tumbesian region. Also, while many individual plant species may well survive in disturbed or degraded forests, this is not equivalent to the protection of a habitat type or a whole ecosystem. Even the largest continuous forest area in the Tumbesian region, the North-West Peru Biosphere Reserve (226,300 ha), may be too small to support all plant and animal species on a long-term basis. For example, several bird species probably leave the reserve seasonally and move to other parts of the Tumbesian region. The ecological role of these species is unknown, and if they become extinct, some plant species which depend on the birds as pollinators or dispersers, might follow soon.

For these reasons, and since we do not have the time to wait until more information is available, it seems prudent to base the priorities for conservation on a phytogeographical classification such as the one proposed here. Apart from forest area remaining in south-west Ecuador other criteria for setting conservation priorities are global distribution (uniqueness) and degree of representativeness of particular communities, number of species within a

**Table 5. Estimated area covered by each vegetation type in Loja, El Oro and Azuay (north to 3°S) Provinces, Ecuador below 2,000 m (based on Figure 29) and approximate percentage cover of each (based on Figure 38). Note that the more arid vegetation types tend to be more heavily deforested than the mesic ones.**

Vegetation type	Area km <sup>2</sup>	Percentage area with forest cover			
		0-5%	6-30%	31-95%	96-100%
Mainly Deciduous Tropical Thorn-forest and <i>Acacia</i> Thorn-forest	650	85	10	5	-
Mainly Deciduous <i>Ceiba trichistandra</i> Forest	3,000	20	70	10	-
Semi-evergreen <i>Ceiba pentandra</i> Forest	1,600	80	15	5	-
Semi-evergreen Lowland and Premontane Tall Forest	1,700	50	25	24.5	0.5
Moist Lowland Forest	850	75	-	23	2
Humid to Very Humid Premontane Cloud-forest	1,000	-	3	94	3
Deciduous to Semi-evergreen Intermontane Scrub, Thorn-forest and Forest	3,500	100	-	-	-
Humid to Very Humid Lower Montane Cloud-forest	700	5	50	42	3
Deciduous to Semi-evergreen Lower Montane Cloud-forest	300	-	35	65	-
Humid to Very Humid Montane Cloud-forest (below 2,000 m)	500	-	65	33	2
<b>Total</b>	<b>13,800</b>	<b>54</b>	<b>26.5</b>	<b>19</b>	<b>0.5</b>

community and degree of endemism. According to Terborgh and Winter (1983) and Fjelds  (1991) endemism should take priority over species number as a criterion for designating areas of conservation priority.

As was found in the analysis of the phytogeography of the region, relatively few species occurring below 2,000 m have restricted ranges within the distribution of their respective vegetation types. Higher up in the mountains topographical barriers attain greater importance, often leading to local endemism on mountain ranges. Thus, to preserve the total flora of the region, the ideal strategy would be to protect representative samples of each lowland vegetation type and several examples of montane cloud-forest and p ramo vegetation. For the latter the most interesting areas would probably be:

- 1 The mountains east and south-east of Loja (fortunately already protected as the Podocarpus National Park) (Bloch *et al.* 1991).
- 1 The Cajas area in Azuay (part of which is set apart as the Cajas National Recreation area).
- 1 The Chilla mountains.
- 1 The Cordillera Cordoncillo east of Saraguro.

### Conservation priorities

Based on the criteria of uniqueness, endemism and species number, the thirteen vegetation types found in the Tumbesian region have been assigned to three priority classes for conservation. This section attempts to provide a basis for setting conservation priorities; the identification of particular key areas and a discussion of the logistic and socio-economic problems associated with conservation projects in the area will be made in the conservation recommendations chapter.

#### GROUP 1

Mainly Deciduous Tropical Thorn-forest and Acacia-forest

Mainly Deciduous *Ceiba trichistandra* Forest

Semi-evergreen *Ceiba petandra* Forest

Semi-evergreen Lowland and Premontane Tall Forest

Together these four vegetation types constitute the central components of the ‘Tumbesian Dry Forest’, and their preservation has to be the main concern in any conservation plan for the Tumbesian region. The proportion of endemic plant species was estimated by Dodson and Gentry (1991) to be about 20%.

**GROUP 2**

Humid to Very Humid Premontane Cloud-forest

Deciduous to Semi-evergreen Lower Montane Cloud-Forest

Humid Coastal-hill Cloud-forest

Deciduous to Semi-evergreen Intermontane Scrub, Thorn-forest and Forest

These four forest types have very limited global distributions along the edges of the Tumbesian centre. The establishment of conservation areas within the provinces of Loja, El Oro, Azuay, Guayas and Manabí (all in Ecuador) is of vital importance to safeguard them.

**Humid to Very Humid Premontane Cloud-forest** is certainly the vegetation type with the smallest overall range as it is restricted to a narrow altitudinal belt (500-1,500 m, often less) along a 125-km stretch of the western Andean slope. At least two endemic bird species are known to be restricted to this vegetation type and there is certainly a large number of endemic plant species. It also has the highest species diversity.

**Deciduous to Semi-evergreen Lower Montane Cloud-Forest** is another special vegetation type with a very limited distribution, both in the study area and worldwide (Mueller-Dombois and Ellenberg 1974). A fairly high level of endemism and the unique combination of (semi)-deciduousness and abundant epiphytic growth clearly set this forest type apart.

**Humid Coastal-hill Cloud-forest** occurs only on the coastal hills of Manabí and Guayas, and probably supports a number of endemic species. Ongoing studies in the Machalilla National Park (C. Josse, verbally 1992) will hopefully soon provide a database on which to judge the importance of this vegetation type.

**Deciduous to Semi-evergreen Intermontane Scrub, Thorn-forest and Forest** is a conglomerate of vegetation types that has been so adversely affected by human activities that probably only one patch of about 30 ha remains at Hacienda Quesada in the upper Rircay valley. It might support some local species and its immediate preservation (even before the forest patch is studied in detail) might be essential for the survival of these species.

**GROUP 3**

Desert

Semi-desert

Moist Lowland Forest

Humid to Very Humid Lower Montane Cloud-forest

Humid to Very Humid Montane Cloud-forest

These five vegetation types reach the Tumbesian region only peripherally, the latter occurring mainly above 2,000 m. They do not form central components of the Tumbesian region and while some Tumbesian species certainly also occur in them, they probably do not have high numbers of Tumbesian endemics. The conservation of these vegetation types is certainly better achieved elsewhere.



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# AVIFAUNA

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## PREVIOUS ORNITHOLOGICAL WORK IN THE TUMBESIAN REGION

ALTHOUGH A few early bird collectors visited the Tumbesian region in the late 19th century (e.g. Taczanowski from 1884 to 1886), it was Frank Chapman and his colleagues from the American Museum of Natural History who first studied its distinctive birdlife in detail, during the first two decades of the 20th century. In his monumental synthesis on the avifauna of Ecuador, he recognized that the area supported a large number of species whose ranges fell entirely within western Ecuador and adjacent north-western Peru (Chapman 1926). He named these species the “Equatorial Arid Fauna”, as many of them appeared to be adapted to the arid scrub and desert-like conditions of coastal Ecuador and Peru.

From 1930 to 1970 very few ornithologists visited the Tumbesian region, the most notable work being by Maychant (1958), Koepcke (1961) and D. Norton and R. A. Paynter in 1964 and 1965. It was only in the late 1970s and 1980s that surveys recommenced, and papers concerning the avifauna of the area began to reappear (Schulenberg and Parker 1981, Parker *et al.* 1985, Wiedenfeld *et al.* 1985, Parker *et al.* 1989, Robbins and Ridgely 1990). When a completely new species was discovered in south-west Ecuador in the early 1980s (*Pyrrhura orcesi*: Ridgely and Robbins 1988) it became clear that there were still large gaps in the ornithological knowledge of the area. Since the late 1980s there has been an upsurge in ornithological interest in the Tumbesian region and several individuals and institutions have undertaken field research there (Best and Clarke 1991, Bloch *et al.* 1991, Krabbe 1991, Best 1992, Parker and Carr 1992, Williams and Tobias 1994; also unpublished work by the Academy of Natural Sciences of Philadelphia and the Western Foundation of Vertebrate Zoology).

## THE RESTRICTED-RANGE BIRDS OF THE TUMBESIAN CENTRE OF ENDEMISM

Complementary to the fieldwork described above have been ‘desk-studies’ on the avian biogeography of the area, notably by Cracraft (1985), who identified 37 species whose concurrent and restricted ranges constituted an area of endemism

which he named the “Tumbesian Centre” after its geographical centre, the Department of Tumbes in north-west Peru. In this book we use Ridgely and Tudor’s (1989) revised name, the “Tumbesian centre”. Müller (1973) studied the terrestrial vertebrates (including the birds) of the same region which he distinguished as a faunal centre and gave the name the “Ecuadorian Subcentre”; this formed part of his “Andean Pacific Centre”.

The most recent investigations into the restricted-range bird species of the area have been conducted by BirdLife International’s Biodiversity Project, as part of a global classification of “Endemic Bird Areas” (ICBP 1992, Stattersfield *et al.* in prep.). The Tumbesian Western Ecuador and Peru EBA has one of the highest numbers of endemic bird species of any South American EBA. Fifty-five species with ranges smaller than 50,000 km<sup>2</sup> occur in the region, with 46 of these entirely confined to it (Table 6). The area stood out as “Critical” in BirdLife International’s priority ranking of EBAs on a rising scale of “High”, “Urgent” and “Critical” (ICBP 1992).

Western South America has an unusually high density of EBAs and the Tumbesian region is important not only as a rich centre of avian endemism in its own right, but it is also significant because it meets with two other areas of bird endemism, which combine to bring a highly distinctive mix to the avifauna of the region, composed of a large proportion of restricted-range species. Figure 39 shows the position of the Tumbesian EBA with respect to its two nearest neighbours: the Chocó and Pacific slope Andes EBA which overlaps with the northern part of the Tumbesian EBA; and at higher elevation, the South Central Andean forests EBA which overlaps to the south. The altitudinal limits and habitat types of these EBAs are shown in Table 6.

**Table 6. Altitudinal range and habitat types of three Neotropical Endemic Bird Areas.**

EBA	Number of restricted range species	Altitudinal range	Habitats
Chocó and Pacific slope Andean	62	sea-level to 3,000 m	wet forest
Tumbesian western Ecuador and Peru	55	sea-level to 3,000 m (mostly below 2,000 m)	wet and dry forest
South Central Andean Forest	8	1,500 m-3,500 m	cloud-forest

**Source:** Stattersfield *et al.* (in prep.).

**Figure 39. Three Endemic Bird Areas in Ecuador and Peru.**

Adapted from IBCP (1992) and Stattersfield *et al.* (in prep).

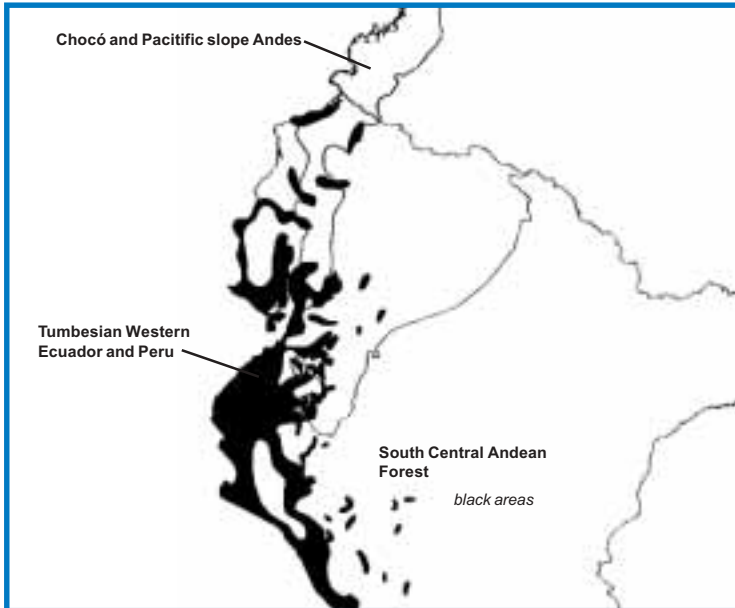


Figure 39 gives a general outline of the area covered by each EBA; it should be noted that some restricted-range birds go beyond these boundaries, into neighbouring EBAs. As would be expected, most overlap occurs closest to the zone of contact between two EBAs, but habitat and altitude have important roles to play in determining which species from other EBAs occur at particular sites in the Tumbesian region.

### **The effects of habitat**

Habitat type strongly influences the distribution of restricted-range species in the Tumbesian region. The Chocó and Pacific slope Andes EBA reaches its southern limit in south-western Ecuador, and species from that EBA occur here only in very humid forests, which tend to grow only in a narrow altitudinal band where the climate is suitable (page 69). This results in a rather localized distribution of these species within south-western Ecuador at such sites as Buenaventura in El Oro Province, which possesses forest sufficiently evergreen to support 7

Chocó endemics (Table 7). Tumbesian endemics, by contrast, tend to avoid the most humid forest sites such as Buenaventura, favouring deciduous to semi-evergreen sites such as Tambo Negro in Loja Province (Table 7). Here there are more than twice as many Tumbesian endemics than at Buenaventura, which supports only those which occur in the more humid vegetation types of the region, together with a few arid Tumbesian species in degraded parts of the site.

Such overlap zones have special conservation significance because they can support unusually large numbers of restricted-range species, and well-placed reserves could protect species from more than one centre of endemism (Terborgh and Winter 1983).

**Table 7. Numbers of restricted-range bird species from three EBAs found at four sites in south-west Ecuador.**

Locality/coordinates	Altitude	Habitat	Tumbesian	Chocó/Pacific slope	S. Central Andean
Tambo Negro, Loja Prov. 4°24' S 79°51' W	500-1,000 m	Deciduous <i>Ceiba trichistandra</i> Forest	26	0	0
Sozoranga, Loja Prov. 4°21' S 79°45' W	1,300-2,000 m	Semi-evergreen Lower Montane Cloud-forest	21	0	2
Buenaventura, El Oro Prov. 3°40' S 79°44' W	900-1,000 m	Very Humid Premontane Cloud-forest	9	7	1
Utuaña, Loja Prov. 4°22' S 79°43' W	2,500m	Humid Montane Cloud-forest	7	0	2

**Sources:** Robbins and Ridgely (1990), Best and Clarke (1991), Krabbe (1991), Best *et al.* (1992, 1993).

Species from the South Central Andean forests EBA occur mainly along the south-eastern edge of the Tumbesian region, where there is humid forest in the altitudinal range 1,500-3,200 m. These species also occur more centrally in the Tumbesian region, where they can descend as low as 1,000 m or less where the forest is sufficiently humid (e.g. at Buenaventura).

### The effects of altitude

The strong influence of altitude can be seen by comparing the avifauna of two localities in Loja Province: Sozoranga and Utuaña, based on two recent surveys (Best and Clarke 1991, Best *et al.* 1992; Table 7). Sozoranga is situated between 1,300 and 2,000 m, whereas Utuaña lies somewhat higher at 2,500 m, beyond the upper altitudinal limit of most of the Tumbesian endemics. This difference in altitude may have accounted for a 72% drop in Tumbesian endemics found at Utuaña despite the fact that the two localities lie only 7 km apart.

## THE CONSERVATION STATUS OF THE TUMBESIAN AVIFAUNA

The recent up-surge in ornithological fieldwork in the Tumbesian region has greatly improved our knowledge of its avifauna and focused attention on its threats. A much clearer picture has emerged of which species are in danger, culminating in their classification in the recently published *Threatened birds of the Americas* (Collar *et al.* 1992). This chapter discusses the status and conservation of the endemic avifauna of the Tumbesian region.

### The special case of birds with restricted ranges

A fundamental principle when assessing the conservation status of the Tumbesian avifauna (and that of other EBAs) is that, because the ranges of its component species are geographically small, they are usually more vulnerable than are their more wide-ranging counterparts. Although population density is important, they are often more vulnerable to local habitat change and they tend to have smaller overall populations to replenish areas where population declines have occurred. In the Tumbesian region several species have particularly small ranges (e.g. a few hundred km<sup>2</sup> in the case of *Penelope albipennis*) even compared to the rest of the Tumbesian endemics. The vulnerability of such species is often inversely proportional to the size of their ranges.

### The habitat preferences of the Tumbesian avifauna

The 'Vegetation' chapter showed that whereas some of the Tumbesian habitats are seriously threatened, others are not at risk. Similarly some Tumbesian endemics are secure. Those species which are reliant on the habitat types which have been or are being severely degraded are most at risk. Those of scrub or degraded forest are relatively 'safe' at present, unless some other factor (such as the bird trade) seriously affects their populations. The area of such degraded habitats in the Tumbesian region is increasing. Although detailed habitat and altitudinal preferences of most restricted-range bird species of the Tumbesian region are not yet established due to lack of data, the broad requirements of each species are known (Table 8). The list includes the 46 restricted-range species confirmed to the region, together with the nine species which are shared between the Tumbesian EBA and other EBAs. The table also lists the nature and severity of the threats which they face.

The number of Tumbesian endemics recorded from each of six habitat types is shown in Figure 40. The species are broadly distributed across the habitat types, with the deciduous forest and scrub categories providing habitats for the highest numbers of Tumbesian endemics (38 species [68%] and 37 species [66%] respectively), closely followed by the semi-evergreen forest (28 species;

Table 8. The avifauna of the Tumbesian Centre of Endemism.

English Name	Scientific Name	Altitude (m)	Habitats	THREATS				
				deforestation	understorey disturbance	hunting	trade	tinyrange
Pale-browed Tinamou	<i>Crypturellus transfasciatus</i>	0 - 1,000	D,S, (E,C)	X	-	X	-	-
Grey-backed Hawk	<i>Leucopternis occidentalis</i>	0 - 2,900	S,E	XX	-	-	-	-
Rufous-headed Chachalaca	<i>Ortalis erythroptera</i>	0 - 1,850	D,S,E	X	-	X	-	-
White-winged Guan	<i>Penelope albipennis</i>	0 - 800	D, (M)	X	X	X	-	XX
Ecuadorian Ground-Dove	<i>Columbina buckleyi</i>	0 - 1,000	D,G	-	-	-	-	-
Ochre-bellied Dove	<i>Leptotila ochraceiventris</i>	0 - 2,625	D,S,E,(G)	XX	XX	X	-	-
Red-masked Parakeet	<i>Aratinga erythrogaena</i>	0 - 2,500	D,S,E,G,A	X	-	-	X	-
El Oro Parakeet	<i>Pyrrhura orcesi</i>	300 - 1,300	E	XX	-	-	-	X
Pacific Parrotlet	<i>Forpus coelestis</i>	0 - 2,150	D,S,C,A	-	-	-	-	-
Grey-cheeked Parakeet	<i>Brotogeris pyrrhopterus</i>	0 - 1,400	D,S,A (E)	X	-	-	X	-
Scrub Nightjar	<i>Caprimulgus anthonyi</i>	0 - 750	D,G,C	-	-	-	-	-
Tumbes Hummingbird	<i>Leucippus baeri</i>	0 - 1,300	D,C	-	-	-	-	-
Short-tailed Woodstar	<i>Myrmia micrura</i>	0 - 1,000	D,C	-	-	-	-	-
Esmeraldas Woodstar	<i>Acestrura berlepschi</i>	0 - 150	S,G	X	X	-	-	X
Ecuadorian Piculet (2)	<i>Picumnus sclateri</i>	0 - 2,000	D,S,C	-	-	-	-	-
Surf Cinclodes +	<i>Cinclodes taczanowskii</i>	0 - 100	S,O	-	-	-	-	-
Coastal Miner +	<i>Geositta peruviana</i>	0 - 300	S,O	-	-	-	-	-
Necklaced Spinetail	<i>Synallaxis stictothorax</i>	0 - 560	D,S	-	-	-	-	-
Blackish-headed Spinetail	<i>Synallaxis tithys</i>	0 - 1,000	D,S,(E),(C)	XX	XX	-	-	-
Rufous-necked Foliage-gleaner(2)	<i>Syndactyla ruficollis</i>	400 - 2,900	D,S,E,G	X	XX	-	-	-
Henna-hooded Foliage-gleaner(2)	<i>Hylodyptes erythrocephalus</i>	200 - 1,750	D,S,G,(E)	XX	XX	-	-	-
Collared Antshrike + (3)	<i>Sakesphorus bernardi</i>	0 - 2,000	D,S,C	-	-	-	-	-
Chapman's Antshrike	<i>Thamnophilus zarumae</i>	400 - 2,625	G,C,(D,S,E)	-	-	-	-	-
Grey-headed Antbird	<i>Myrmeciza griseiceps</i>	600 - 2,900	S,E,(D)	X	XX	-	-	-
Watkin's Antpitta	<i>Grallaria watkinsi</i>	0 - 2,000	D,S,E,G,C	-	-	-	-	-
Elegant Crescent-chest	<i>Melanopareia elegans</i>	0 - 2,300	G,C	-	-	-	-	-
Grey-and-white Tyrannulet	<i>Pseudelania leucospodia</i>	0 - 600	C	-	-	-	-	-
Pacific Elaenia	<i>Myiopagis subplacens</i>	0 - 1,500	D,S,E,G	-	-	-	-	-

Pacific Royal Flycatcher	<i>Onychorhynchus occidentalis</i>	0 - 900	D,S,E,G	XX	XX	-	-	-
Grey-breasted Flycatcher +	<i>Lathrotriccus griseipectus</i>	0 - 1,750	D,S,E	XX	XX	-	-	-
Piura Chat-Tyrant	<i>Ochthoeca piurae</i>	1,500 - 2,800	C	-	-	-	-	-
Tumbes Tyrant	<i>Tumbezia salvini</i>	0 - 1,000	D,C	-	-	-	-	-
Ochraceous Attila +	<i>Attila torridus</i>	0 - 1,700	S,E	XX	XX	-	-	-
Rufous Flycatcher	<i>Myiarchus semirufus</i>	0 - 500	C	-	-	-	-	-
Sooty-crowned Flycatcher +(2)	<i>Myiarchus phaeocephalus</i>	0 - 2,000	D,C	-	-	-	-	-
Baird's Flycatcher	<i>Myiodynastes bairdii</i>	0 - 500	D,C	-	-	-	-	-
Slaty Becard +	<i>Pachyrhamphus spodiurus</i>	0 - 825	D,S,G,(E)	XX	XX	-	-	-
Peruvian Plantcutter	<i>Phytotoma raimondii</i>	0 - 500	C	-	X?	-	-	XX
White-tailed Jay	<i>Cyanocorax mystacalis</i>	0 - 1,850	D,S,G,C	-	-	-	-	-
Superciliated Wren	<i>Thryothorus superciliaris</i>	0 - 500	D,C,A	-	-	-	-	-
Plumbeous-backed Thrush	<i>Turdus reevei</i>	0 - 2,300	D,S,G,C	-	-	-	-	-
Ecuadorian Thrush	<i>Turdus maculirostris</i>	0 - 2,200	D,S,G,S	-	-	-	-	-
Three-banded Warbler	<i>Basileuterus trifasciatus</i>	900 - 3,050	S,E,G	-	-	-	-	-
Grey-and-gold Warbler (2)	<i>Basileuterus fraseri</i>	0 - 1,900	D,S,E,G	-	-	-	-	-
Black-cowled Saltator	<i>Saltator nigriceps</i>	1,000 - 2,900	S,E,G,C	-	-	-	-	-
White-headed Brush-Finch	<i>Atlapetes albiceps</i>	400 - 1,300	DF,C	-	-	-	-	-
Bay-crowned Brush-Finch (3)	<i>Atlapetes seebohmi</i>	1,200 - 2,600	S,E,G,C	-	-	-	-	-
Pale-headed Brush-Finch	<i>Atlapetes pallidiceps</i>	1,500 - 2,100	S,C,A	XX?	XX?	-	-	XX
Drab Seedeater	<i>Sporophila simplex</i>	0 - 1,500	C,A	-	-	-	-	-
Sulphur-throated Finch	<i>Sicalis taczanowskii</i>	0 - 200	C,A	-	-	-	-	-
Cinereous Finch	<i>Piezorhina cinerea</i>	0 - 300	S	-	-	-	-	-
Crimson Finch-Tanager	<i>Rhodospingus cruentus</i>	0 - 750	D,C,A	-	-	-	-	-
Black-capped Sparrow +(2)	<i>Arremon abeillei</i>	0 - 1,750	D,S,G,C	-	-	-	-	-
Tumbes Sparrow	<i>Aimophila stolzmanni</i>	0 - 1,950	D,C	-	-	-	-	-
White-edged Oriole	<i>Icterus graceannae</i>	0 - 1,500	D,G,C	-	-	-	-	-
Saffron Siskin	<i>Carduelis siemiradzki</i>	0 - 750	D,C	XX?	X?	-	-	-

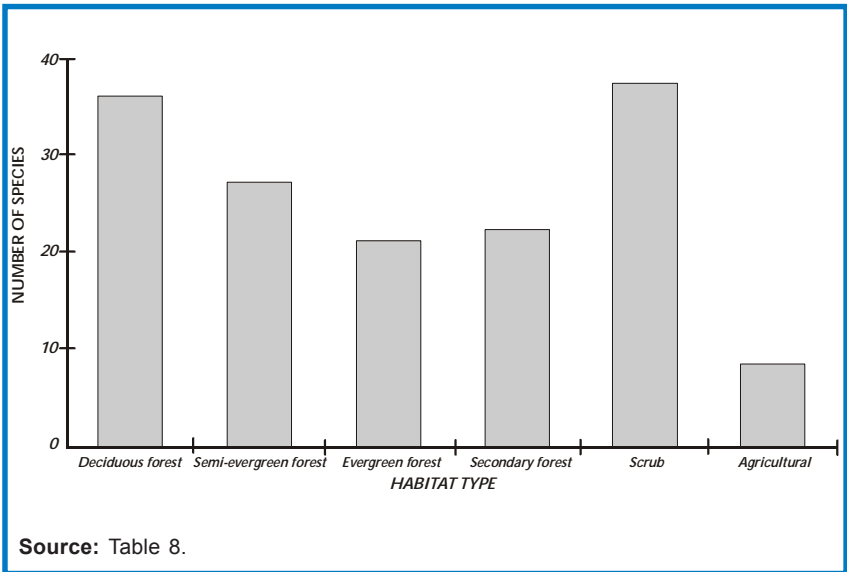
Numbers in parenthesis after the species name refer to the number of subspecies present in the Tumbesian region. + occurs in another EBA. \* species not listed in Stattersfield *et al.* (in prep) but included here (see Table 3). **Habitats:** D = deciduous forest, S = semi-evergreen forest, G = secondary growth, C = scrub, A = agricultural land, M = mangroves, O = coastal habitats. Habitats in parenthesis of lesser importance. **Threats:** XX = major threat: a primary cause of a species being threatened, X = minor threat: a secondary threat to a threatened species, or a primary threat to a near-threatened species. **Sources:** Ridgely and Tudor (1989), Collar *et al.* (1992), P. Coopmans *in litt.* (1992), C. Rahbek *in litt.* (1992), M.B. Robbins *in litt.* (1992), J. Tobias *in litt.* (1992), Ridgely and Greenfield (in prep.), Stattersfield *et al.* (in prep.) and personal observations.

50%), secondary growth (24 species; 43%) and evergreen forest (22 species; 39%) categories.

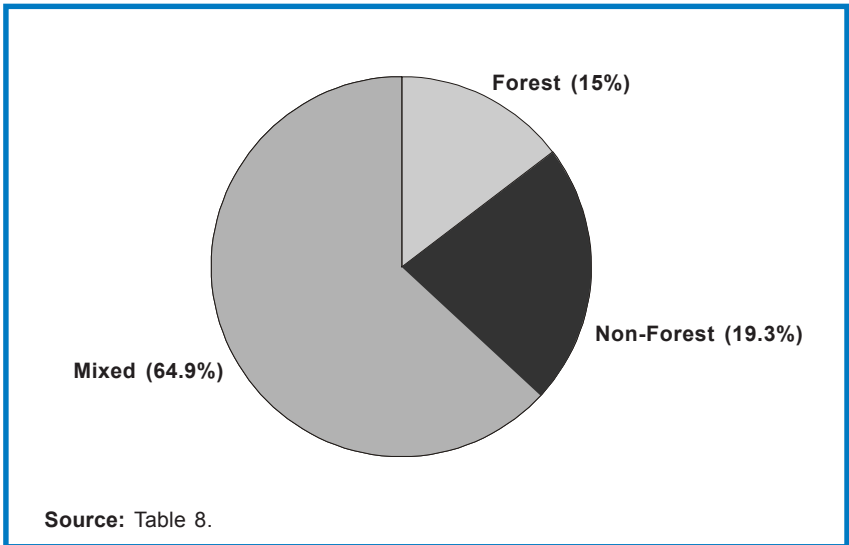
The majority of Tumbesian species occur in both forest and non-forest habitat types (Figure 41), with nine (16%) being restricted to forest and 10 species (18%) confined to non-forest habitats. Table 8 shows that these non-forest species currently face no threats, so they can be considered ‘safe’ at present. Conversely, the nine which occur only in forest are the most threatened, and Table 8 shows that each faces at least one major threat.

Figure 42 shows the importance of forest to the 22 threatened and near-threatened Tumbesian species (subsequently called the “priority Tumbesian bird species”): most of these species occur in forest; seven species have also been found in scrub, seven in secondary growth and three in agricultural land. It is not known whether these species can breed in such habitats though.

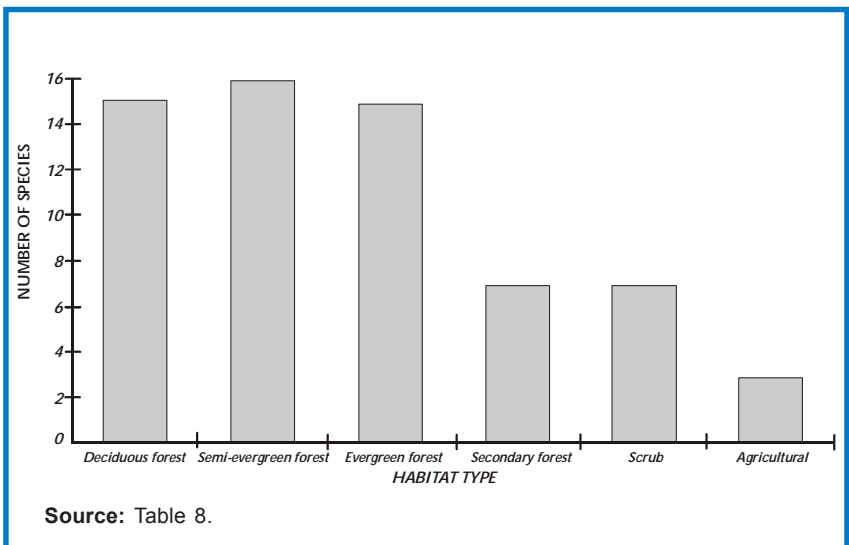
**Figure 40. Numbers of Tumbesian endemics recorded in six habitat types.** Note the broad range of habitat types occupied.



**Figure 41. Proportion of Tumbesian endemics which occupy forest only, scrub only and mixed habitats.**



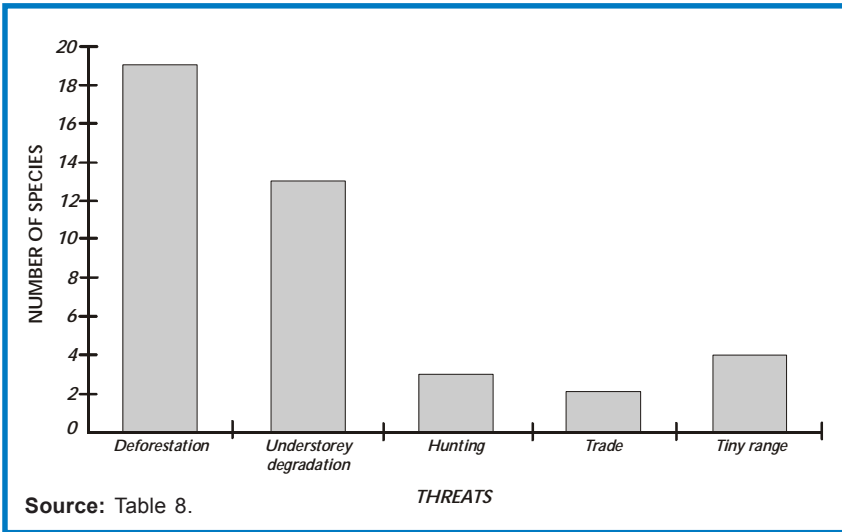
**Figure 42. Number of threatened and near-threatened Tumbesian endemics occurring in six habitat types. The importance of forest to these species is clear.**



## THREATS TO THE TUMBESIAN AVIFAUNA

The Tumbesian avifauna is affected by five different threats (Table 8). Figure 43 shows the comparative importance of each of these. The most severely endangered Tumbesian endemics are those species which suffer a combination of threats such as *Penelope albipennis*. This species is imperiled by both habitat destruction and hunting, compounded by its tiny range and population, placing it in a critical position.

**Figure 43. Numbers of Tumbesian endemics threatened by five threats.** Deforestation and understorey degradation stand out as the dominant threats



### Habitat destruction

Deforestation and understorey disturbance (both clearing and trampling) are by far the most serious threats to the Tumbesian avifauna, affecting 19 (86%) and 13 (59%) respectively of the priority species. They often occur simultaneously when a forest is cut down, but many Tumbesian forests retain large, intact trees above an understorey heavily degraded by grazing animal or disturbed by firewood gathering. This has important implications for several apparently understorey dependent endemics (e.g. *Leptotila ochraceiventris*, *Synallaxis tithys* and *Myrmeciza griseiceps*). Such forests show up as intact on satellite images and aerial photographs, but are unsuitable for understorey-dependent species.

The broad habitat categorizations of Table 8 have been used because a detailed vegetation classification is only available for part of the Tumbesian region. They hide the fact that it supports an unusually rich variety of habitat types, including no less than 10 distinct kinds of forest. Because some forest-reliant birds of the region occupy only a proportion of these forest types, they are vulnerable to even partial, localized deforestation. The habitat preferences of the threatened species are presented in diagrams later in this chapter, which are based on the vegetation classification already presented.

## Hunting

Hunting affects three (14%) priority species. Although many bird species are hunted opportunistically in Ecuador and Peru, including ducks, hawks, parrots, trogons, toucans and even the smaller species which are killed by children with sling-shots and catapult (P. Greenfield *in litt.* 1992, M. B. Robbins *in litt.* 1992), the principal species taken are tinamids, cracids and columbids, which are killed for their meat. Their eggs are also sometimes collected by local people. *Crypturellus transfasciatus*, *Ortalis erythroptera*, *Penelope albipennis* and *Leptotila ochraceiventris* are the Tumbesian endemics most at risk from hunting; *Leucoptemis occidentalis* may also be occasionally shot for sport rather than its meat value. In general mammals have been much preferred over birds.

The effects of hunting on the priority species are difficult to quantify as very few quantitative data exist. A man was seen with four dead *Ortalis erythroptera* near Atacames (Manabi Province) in coastal western Ecuador (F. Ortiz-Crespo *in litt.* 1991); the same species has been shot by border guards in the Tumbes National Forest, Peru, apparently because they had only rice to eat (M. B. Robbins *in litt.* 1992). A small basket-like trap for catching tinamous was found above Sozoranga in Loja Province, Ecuador (C. T. Clarke *in litt.* 1992). The relatively high cost of guns and ammunition probably makes the practice uneconomic for many local people. This would explain why the groups of *Ortalis erythroptera* frequently found calling loudly from forest patches along well-used roads seem not to attract hunters. However, the extent of hunting probably varies locally, and in some areas the species is known to call at night, thereby avoiding day-time hunting.

Cracids are also occasionally captured because locals mistakenly believe they can be cross-bred with domestic chickens to produce super-strong fighting cocks (R. S. R. Williams verbally 1991). *Ortalis erythroptera* is known to have been captured for this purpose as has the more montane Bearded Guan *Penelope barbata* from the South Central Andean forests EBA, the latter species at Amaluza (Loja Province, Ecuador) at the eastern edge of the Tumbesian region (Williams and Tobias 1994).

### **Parrot trade**

Two of the four parrots endemic to Tumbesian region (*Aratinga erythrogonys* and *Brotogeris pyrrhopterus*) are traded locally and internationally. Both have been found in local homes (Best and Clarke 1991, Williams and Tobias 1994), and *Aratinga erythrogonys* is regularly sold (bleached or dyed yellow, perhaps to make them look more exotic) in the streets in Quito and Guayaquil (P. Greenfield *in litt.* 1992). The international trade is potentially a much graver threat; both have been in trade for many years (Inskipp and Corrigan 1992). The population declines noted in these two species at certain localities may have been caused by high trade figures, but a recent review of the conservation status of the two species (Best *et al.* in press) concluded that on current data it is impossible to determine whether the species are threatened by trade, and further research is required.

### **Species with exceptionally small ranges**

Two Tumbesian endemics are especially vulnerable because of their very small ranges: *Penelope albipennis* and *Atlapetes pallidiceps*. The known ranges of these species do not exceed 1,000 km<sup>2</sup> and they are classic examples of “extinction prone species” (Terborgh 1974), being especially vulnerable to natural disasters, habitat alteration and other human pressures in their tiny ranges. The remaining wild population of *Penelope albipennis* may number less than 250 individuals, whereas *Allapetes pallidiceps* has not been seen for over 23 years and may already be extinct (Collar *et al.* 1992). The comparatively small ranges of *Pyrrhura orcesi* and *Acestrura berlepschi* expose these two species to increased risks from habitat destruction.

## **THE RED DATA BOOK LISTING OF THE TUMBESIAN AVIFAUNA**

The most authoritative work on the threatened birds of South America is *Threatened birds of the Americas* (Collar *et al.* 1992). The threatened species categories in that work have been updated in *Birds to Watch 2* (Collar *et al.* 1994) using new IUCN criteria. This latter work lists 16 Tumbesian species as globally threatened, with a further six listed as near-threatened (Table 9). These categories are not fixed and both upgrading and downgrading of species should occur as more data become available. They represent the state of knowledge up to 1994. Full accounts for globally threatened species appear in Collar *et al.* (1992). The following section summarizes the most important information on these species, supplemented by distribution maps of all records; and a diagrammatic presentation of the habitat preferences of each species.

**Table 9. The threatened and near-threatened Tumbesian bird species**

Species	Status	Threats
<i>Crypturellus transfasciatus</i>	Near-threatened	1,2
<i>Leucopternis occidentalis</i>	Endangered (2)	1
<i>Ortalis erythroptera</i>	Vulnerable	1,2
<i>Penelope albipennis</i>	Critical (1)	1,2
<i>Leptotila ochraceiventris</i>	Vulnerable (2)	1
<i>Aratinga erythrogenys</i>	Near-threatened	1,4
<i>Pyrrhura orcesi</i>	Vulnerable (10)	1
<i>Brotogeris pyrrhopterus</i>	Near-threatened	1,4
<i>Acestura berlepschi</i>	Endangered (2)	1,3
<i>Synallaxis tithys</i>	Vulnerable (2)	1
<i>Syndactyla ruficollis</i>	Vulnerable (2)	1
<i>Hylocryptus erythrocephalus</i>	Vulnerable (7)	1
<i>Myrmeciza griseiceps</i>	Endangered (2)	1
<i>Onychorhynchus occidentalis</i>	Vulnerable (2)	1
<i>Lathrotriccus griseipectus</i>	Vulnerable (10)	1
<i>Ochthoeca piurae</i>	Near-threatened	1,3
<i>Tumbezia salvini</i>	Near-threatened	1,3
<i>Attila torridus</i>	Vulnerable (2)	1
<i>Pachyrhamphus spodiurus</i>	Near-threatened	1
<i>Phytotoma raimondii</i>	Critical (1)	1,3
<i>Atlapetes pallidiceps</i>	Critical (1)	1,3
<i>Carduelis siemiradzkii</i>	Vulnerable (9)	1

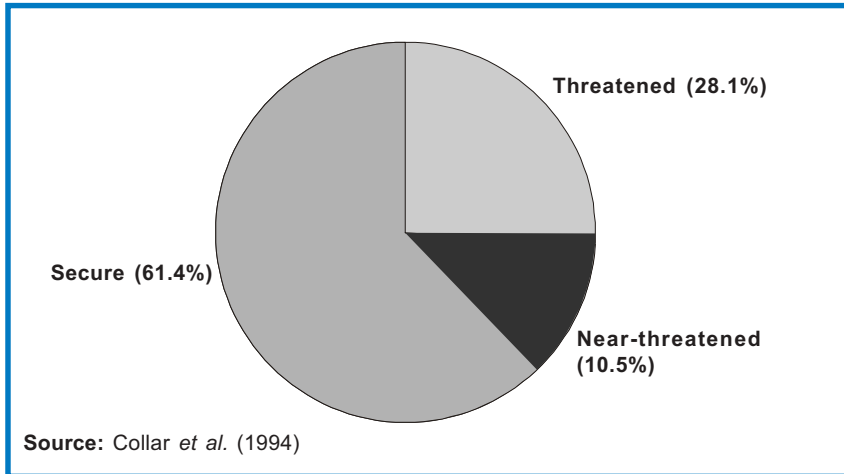
**Status:** species classifications as they appear in Collar *et al.* (1994) are given first, based on new IUCN criteria (Mace and Stuart 1994). Number codes are based on priorities for action in Collar *et al.* (1992): 1. situation critical: action urgent, 2. situation serious: action urgent, 3. situation critical: action urgent when population found, 4. situation terminal: action urgent if population found, 5. situation serious but conservation in progress, 6. situation unclear: action urgent if taxonomic status confirmed, 7. conflicting evidence, possible urgent, 8. birds perhaps in need if and when found, 9. birds largely unprotected and needing attention, 10. birds with populations only partly protected, 11. birds largely protected, but for which vigilance is needed, 12. birds for which protection is desirable.

**Threats:** 1. loss or alteration of habitat, 2. hunting, 3. small range or population, 4. Trade (based on Collar *et al.* 1994). **Sources:** Collar *et al.* (1992, 1994).

Figure 44 shows the proportions of the endemic Tumbesian avifauna which is threatened, near-threatened and secure.

The following summaries supplement and update Collar *et al.* (1992). For clarity of reading, and to avoid constant repetition, references have not been included in the species texts. The following have been used in addition to Collar *et al.* (1992): Wiedenfeld *et al.* (1985), Ridgely and Robbins (1988), Robbins and Ridgely (1990), Best and Clarke (1991), Bloch *et al.* (1991), L. Kiff *in litt.* (1991), T.

**Figure 44. Localities in Ecuador and Peru where restricted-range bird species have been found.**



A. Parker *in litt.* to ICBP (1991), M. B. Robbins *in litt.* 1991, Best *et al.* (1992), P. Coopmans *in litt.* (1992), Parker and Carr (1992), M. Whittingham *in litt.* (1992), Best and Krabbe (1994), Williams and Tobias (1994), Parker *et al.* (1995).

### Notes on the species summaries

The following information is presented:

English and Scientific name; Red Data Book listing (see Table 9).

**DISTRIBUCION:** (Map number), number of traceable localities at which the species has been found; countries and provinces (Ecuador) / departments (Peru).

**COORDINATES:** N-S and E-W limits

**ALTITUDINAL RANGE:** over which each species has been found; for some species the historical range is indicated.

**HABITAT PREFERENCES:** are listed only if a habitat preferences diagram cannot be produced due to lack of data.

**THREATS:** listed in order of importance.

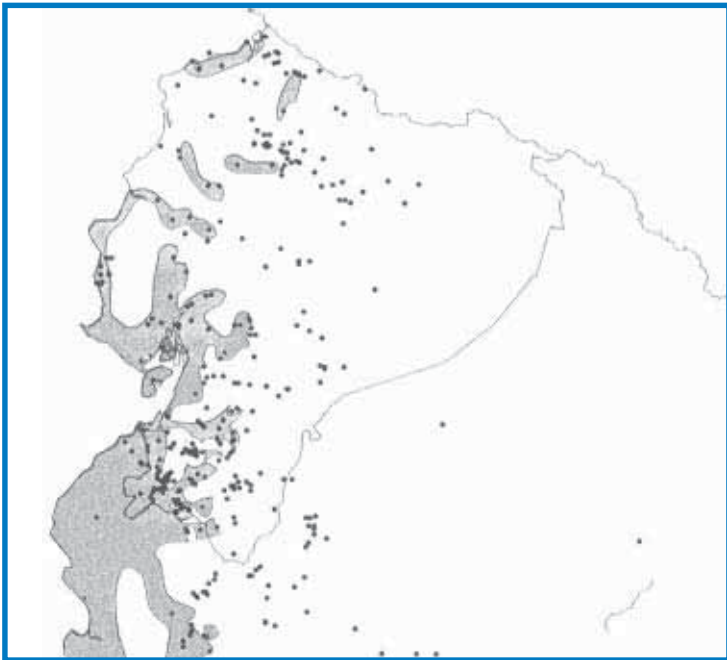
**PROTECTED AREAS:** names of protected areas where the species is known to occur (number of such areas given in parentheses).

**SPECIES-SPECIFIC RECOMMENDATIONS:** a brief list is given (for further details of conservation action see the 'Conservation recommendations' chapter).

## Ornithological effort in the Tumbesian region

The mapped species distributions are potentially dependent on the patterns of observation in the area. Some apparent gaps in the distribution of species are simply due to lack of effort. Figure 45 shows localities in the Tumbesian region which have been surveyed and support Tumbesian endemics up to April 1995.

**Figure 45. Localities in Ecuador and Peru where restricted-range bird species have been found.**



## Distribution maps of priority species

Each threatened and near-threatened species has a map of all specimen and reliable sight records. Only localities for which coordinates are available have been mapped.

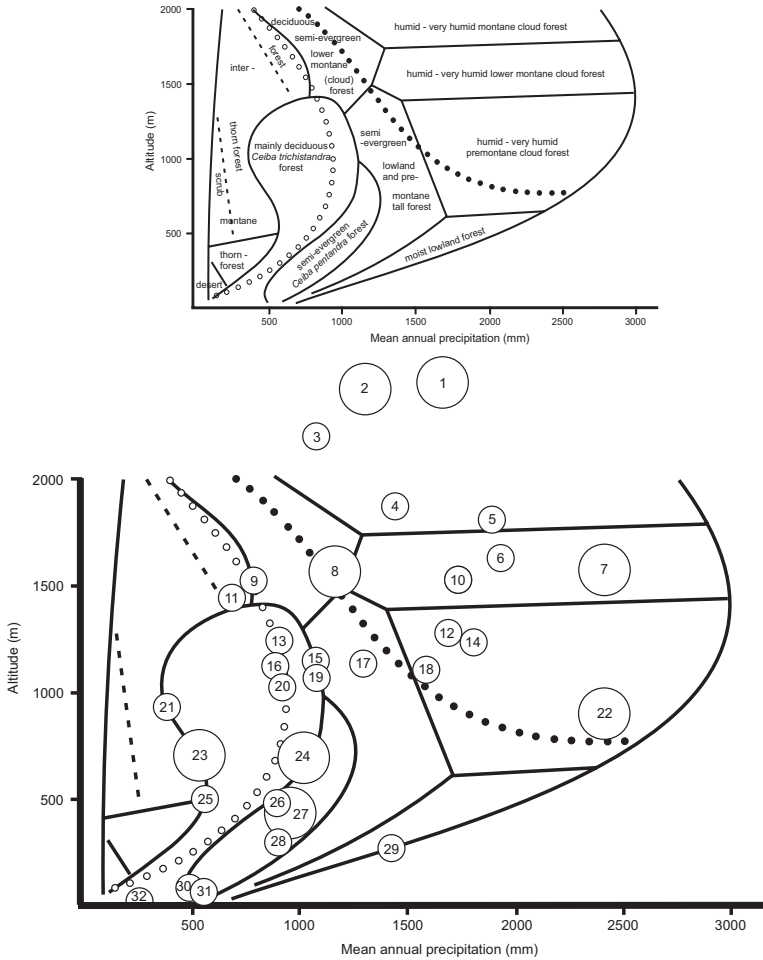
### **Habitat preference diagrams**

Selected localities in south-west Ecuador (the only region for which a detailed vegetation classification is available: see 'Vegetation' chapter) have been plotted on an altitude/precipitation diagram which separates out the habitat categories (Figure 46). These are principally sites where accurate coordinates, altitude and precipitation figures are available. Different size circles distinguish between well-studied and less well-studied sites. For each species circles are shaded only if it has been found at the site. In this way habitat preferences are immediately obvious. Figure 46 shows that some habitats have received more effort than others; such patterns should be borne in mind by the reader when interpreting the habitat preference ecograms. Well-surveyed sites (large circles) with no record of the species probably means that it was genuinely absent for the duration of the survey. Further details of each site can be found in the site directory on pages 162-174; Figure 90 gives information on the timing of surveys in the region.

## **THE THREATENED SPECIES**

Sixteen Tumbesian endemics are globally threatened (Collar *et al.* 1992). The following pages present distributional and ecological data on them in a standardized form. *Ortalis erythroptera* is treated here as threatened in accordance with Collar *et al.* (1994), but was listed by Collar *et al.* (1992) as near-threatened.

Figure 46. Key for habitat preference diagrams. (see also Figure 32).



Large circles indicate surveys of 6 days or more have been conducted at the site; small circle refer to surveys of 5 days or less.

**Sites indicated**

**Angashcola** (2) 4°34' S 79°22' W, **Arenillas** (31) 3°33' S 80°04' W, **Arenillas Military Reserve** (32) 3°33' S 80°03' W, **Buena-ventura** (22) 3°40' S 79°40' W, **Campo Verde** (24) 3°51' S 80°11' W, **Cariamanga** (3) 4°20' S 79°33' W, **Catacocha** (9) 4°03' S 79°40' W, **Celica I** (4) 4°09' S 79°50' W, **Celica II** (6) 4°06' S 79°59' W, **8km W. Celica** (5) 4°07' S 79°59' W, **Cruzpampa** (17) 4°10' S 80°01' W, **El Caucho** (27) 3°49' S 80°17' W, **El Empalme** (21) 4°07' S 79°51' W, **El Empalme-Celica** (11) 4°07' S 79°55' W, **Hacienda Yamana** (20) 4°01' S 79°40' W, **Matapalo** (30) 3°41' S 80°12' W, **S. Piñas** (16) 3°40' S 79°43' W, **Puyango** (29) 3°52' S 80°05' W, **Quebrada Las Vegas** (12) 3°59' S 79°59' W, **4km SW. Sabanilla** (26) 4°13' S 80°10' W, **San José de Pozul** (10) 4°07' S 80°03' W, **San Pablo** (15) 3°41' S 79°33' W, **Sozoranga I** (13) 4°18' S 79°47' W, **Sozoranga II** (8) 4°19' S 79°48' W, **Tambo Negro** (23) 4°24' S 79°47' W, **Tierra Colorada** (7) 4°02' S 79°57' W, **Vicentino I** (18) 3°57' S 79°57' W, **Vicentino II** (19) 3°56' S 79°55' W, **Utana** (1) 4°22' S 79°43' W, **Uzhcurrumi** (28) 3°21' S 79°33' W, **above Uzhcurrumi** (14) 3°23' S 79°32' W, **20km SW. Zapotillo** (25) 4°10' S 80°08' W.

**GREY-BACKED HAWK *Leucopternis occidentalis***

ENDANGERED

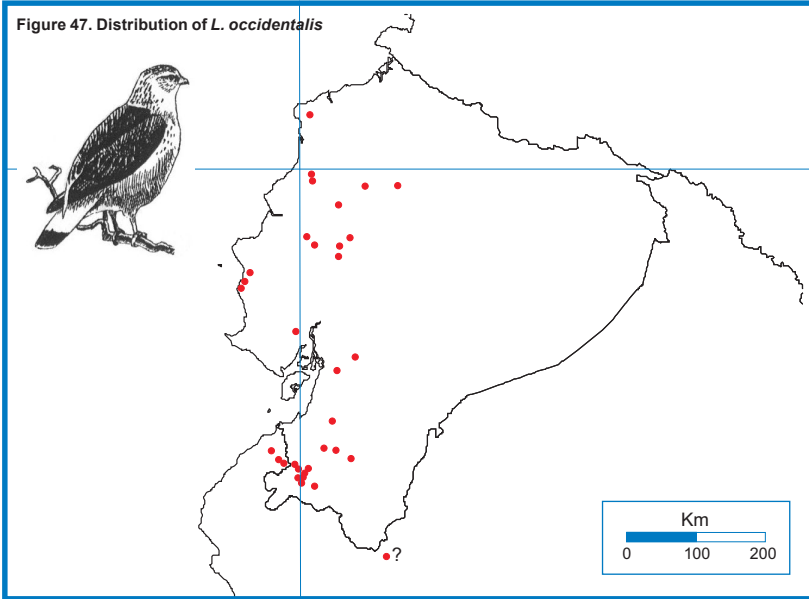
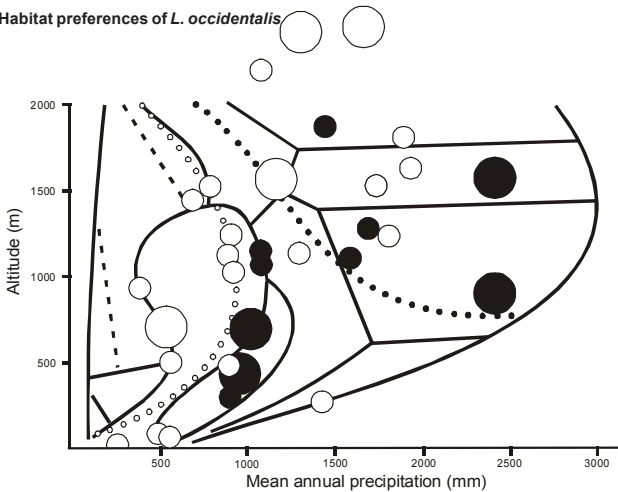


Figure 48. Habitat preferences of *L. occidentalis*



**Distribution:** 34 localities. **Ecuador:** Esmeraldas, Manabí, Guayas, Azuay, El Oro, Loja. **Peru:** Tumbes.  
**Coordinates:** 0°50'N-4°09' S, 79°06' W-80°46' W.  
**Altitudinal range:** sea-level to 2,900m.  
**Threats:** deforestation.  
**Protected areas:** Cerro Mutiles, Río Palenque

Reserve (?), Jauneche Reserve, Machalilla N.P., Cerro Blanco Reserve, Manglares-Churute Ecological Reserve, Arenillas Military Reserve and Tumbes National Forest (8).  
**Species-specific recommendations:** support for Machalilla National Park and Tumbes National Forest.

**RUFOUS-HEADED CHACHALACA *Ortalis erythroptera***

VULNERABLE

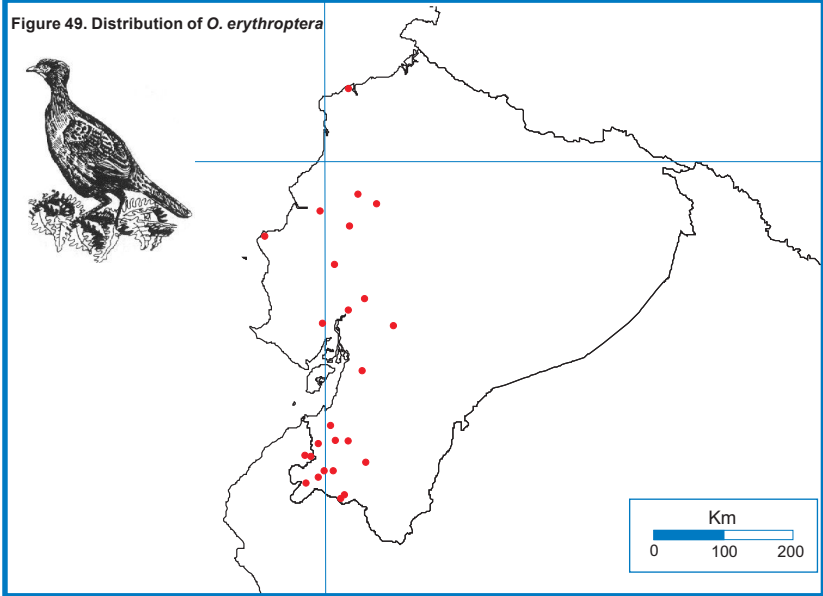
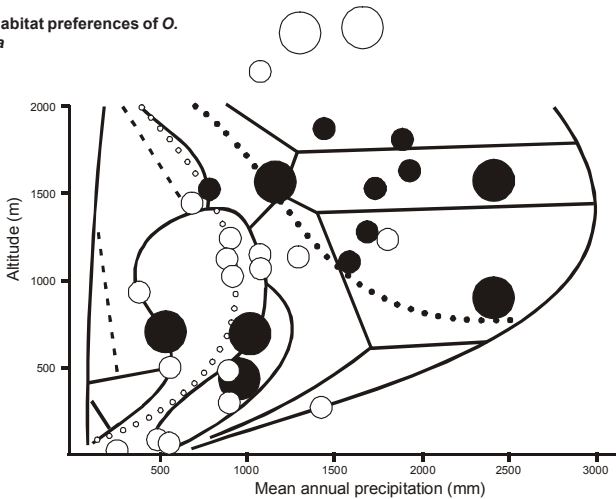


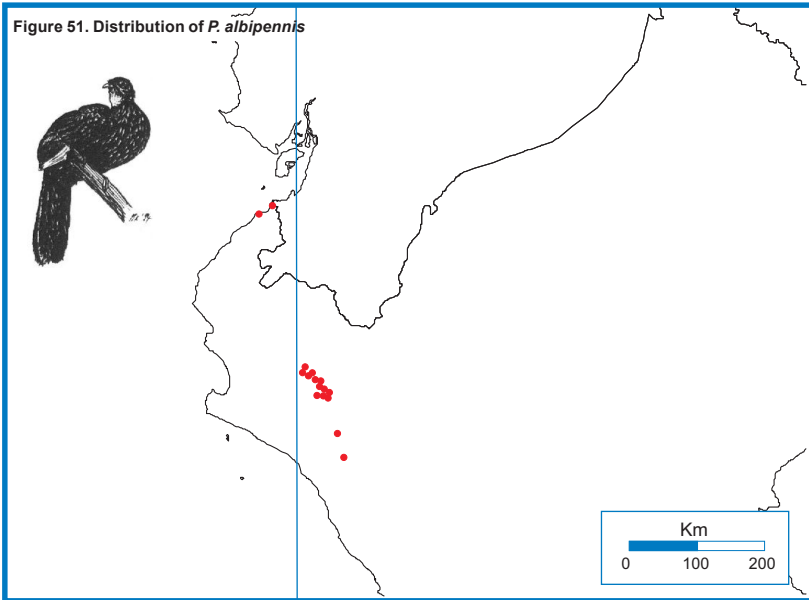
Figure 50. Habitat preferences of *O. erythroptera*



**Distribution:** 26 localities. **Ecuador:** Esmeraldas, Pichincha, Manabí, Los Ríos, Azuay, El Oro, Palenque Reserve, Jauneche Reserve, Machalilla National Park, Cerro Blanco Reserve, and Tumbes National Forest (6).  
**Peru:** Tumbes.  
**Coordinates:** 0°50' N-4°24' S, 80°50' W-79°10' W. **Species-specific recommendations:** support for Machalilla National Park and Tumbes National Forest.  
**Altitudinal range:** sea-level to 1,850m.  
**Threats:** deforestation, hunting.  
**Protected areas:** Cerro Mutilles Reserve, Río

**WHITE-WINGED GUAN *Penelope albipennis***

CRITICAL



**Distribution:** 16 localities. **Ecuador:** not recorded in current territorial limits. **Peru:** Piura and Lambayeque only.

**Coordinates:** currently only known from 5°35'S-5°40'S, 80°20'W-79°24'W.

**Altitudinal range:** 300-1,200m (formerly to sea-level).

**Habitat preferences:** dry deciduous forest (formerly mangroves).

**Threats:** deforestation, hunting, tiny population size.

**Protected areas:** occurs in very small numbers in the tiny Quebrada Negrohuasi Reserve, set up to protect the species.

**Species-specific recommendations:** (i) search for the species in the rest of south-western Ecuador and north-western Peru to determine the population size, (ii) stringently protect the last strongholds in Peru.

**OCHRE-BELLIED DOVE *Leptotila ochraceiventris***

VULNERABLE

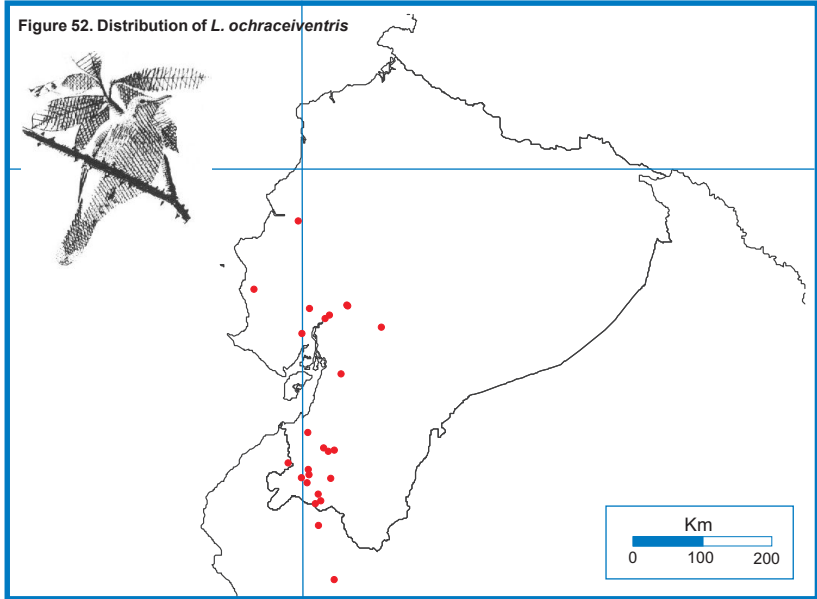
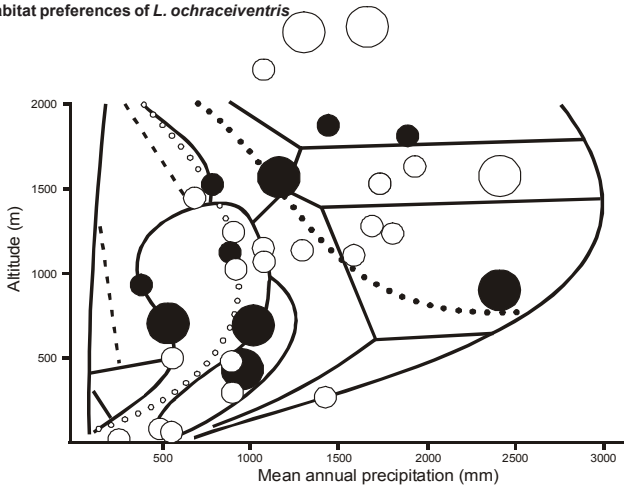


Figure 53. Habitat preferences of *L. ochraceiventris*

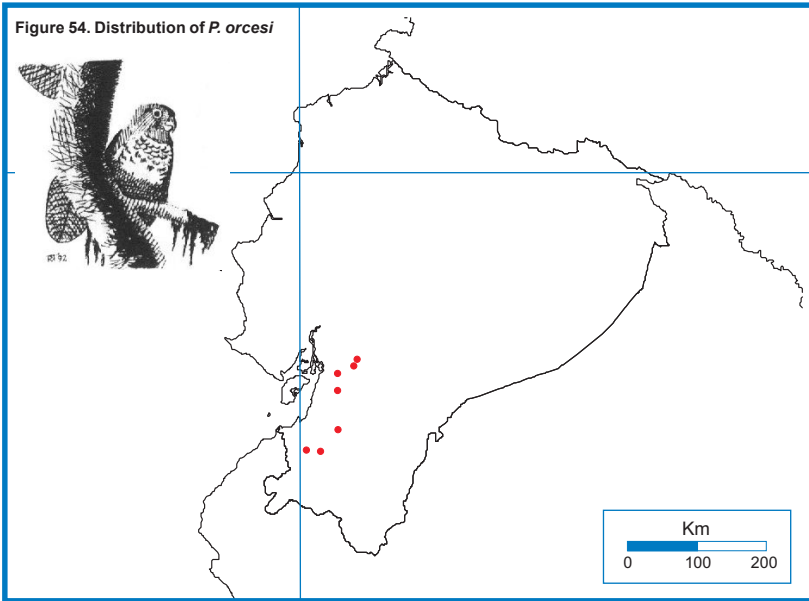


**Distribution:** 23 localities. **Ecuador:** Manabí, Los Ríos, Guayas, Chimborazo, El Oro, Loja.  
**Peru:** Tumbes, Piura.  
**Coordinates:** 0°41'N-5°23'S, 80°40'W-79°00'W.  
**Altitudinal range:** sea-level to 2,650m.  
**Threats:** deforestation, understorey disturbance, hunting.

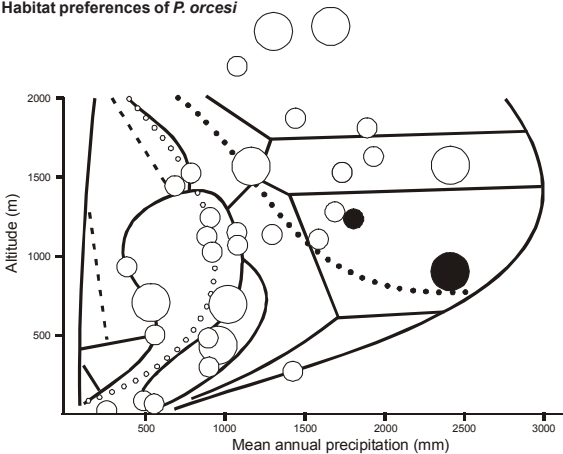
**Protected areas:** Jauneche Reserve, Machalilla National Park, Cerro Blanco Reserve, Manglares-Churute Ecological Reserve and Tumbes National Forest (5).  
**Species-specific recommendations:** support for Machalilla National Park and Tumbes National Forest.

**EL ORO PARAKEET *Pyrrhura orcesi***

VULNERABLE

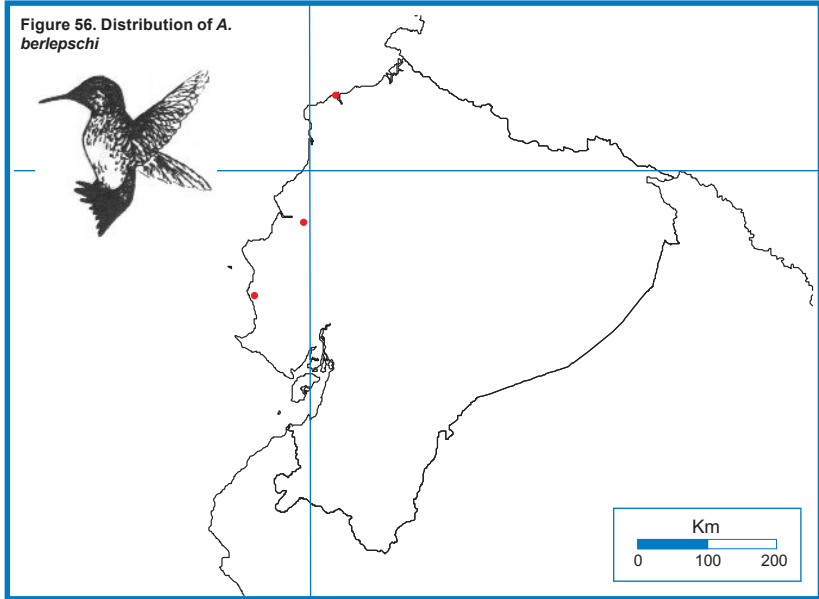


**Figure 55. Habitat preferences of *P. orcesi***



**Distribution:** 7 localities. **Ecuador:** Azuay and El Oro only. **Peru:** does not occur.  
**Coordinates:** 2°30' S-3°39' S, 79°56' W-79°19' W.  
**Altitudinal range:** 300-1,300m.  
**Threats:** deforestation, exacerbated by the small range of the species.  
**Protected areas:** known in none.

**Species-specific recommendations:** create two protected areas for the species containing two geographically and genetically isolated populations.

**ESMERALDAS WOODSTAR *Acestrura berlepschi*****ENDANGERED**

**Distribution:** 3 localities. **Ecuador:** Esmeraldas, Manabí and Guayas. **Peru:** no records.  
**Coordinates:** 0°59'N-1°40'S, 80°45'W-79°42'W.  
**Altitudinal range:** sea-level to 150m.  
**Habitat preferences:** lowland evergreen moist forest.  
**Threats:** deforestation and understorey

disturbance exacerbated by tiny range.

**Protected areas:** has been found on edge of the Machalilla National Park.

**Species-specific recommendations:** (i) promote further protected areas for the species, (ii) determine the size of the remaining population.

**BLACKISH-HEADED SPINETAIL *Synallaxis tithys***

VULNERABLE

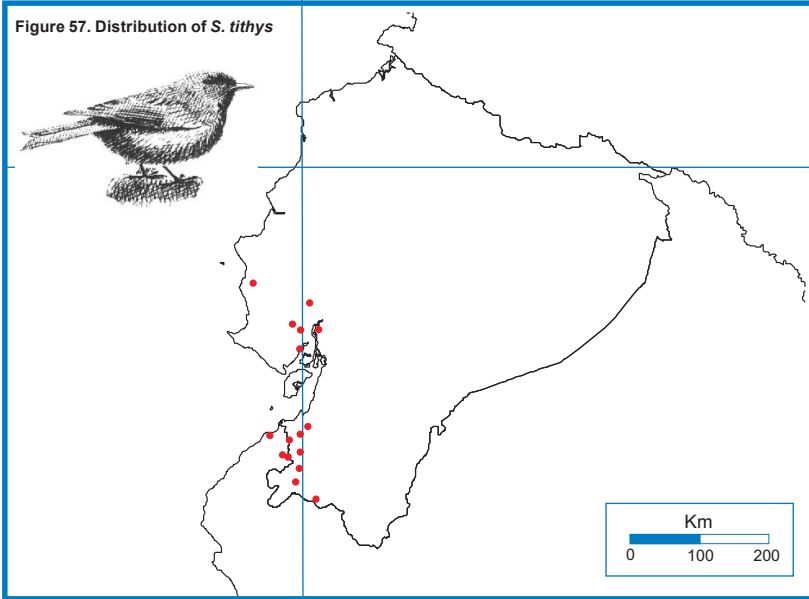
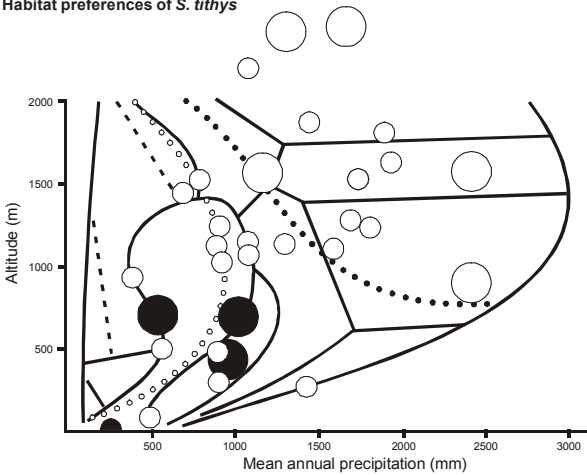


Figure 58. Habitat preferences of *S. tithys*

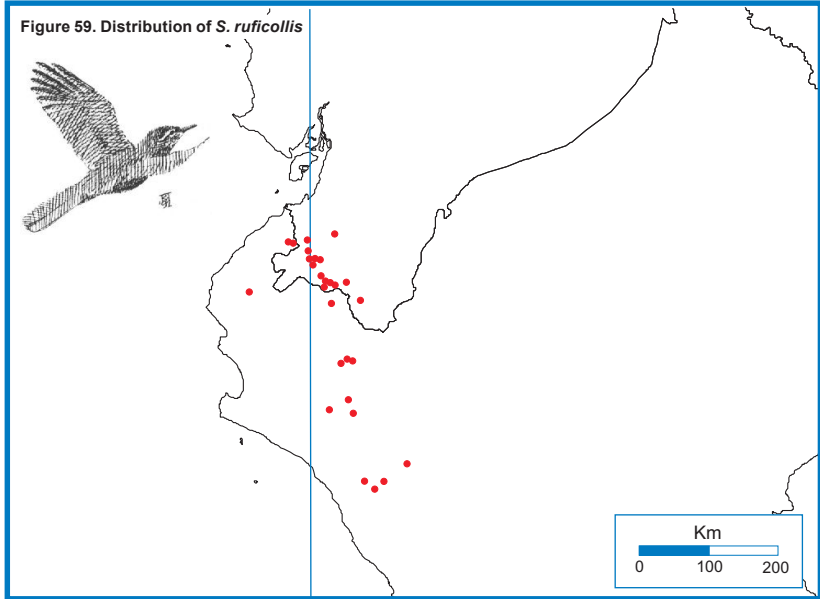


**Distribution:** 16 localities. **Ecuador:** Manabí, Guayas, El Oro, Loja. **Peru:** Tumbes.  
**Coordinates:** 1°34'S-4°24'S, 80°40'W-79°50'W.  
**Altitudinal range:** sea-level to 1,000m.  
**Threats:** understory clearance, deforestation.  
**Protected areas:** Machalilla National Park, Cerro Blanco Reserve, Arenillas Military Reserve and

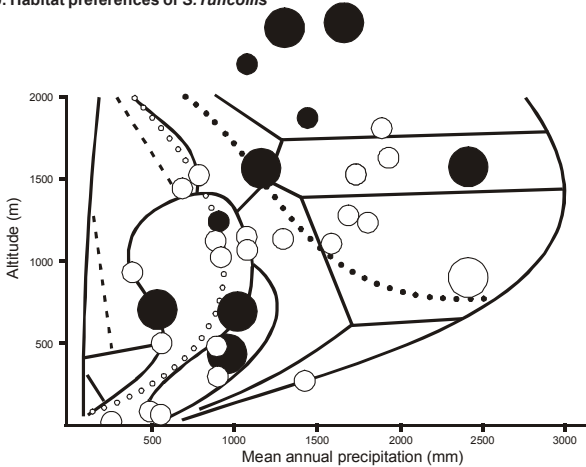
Tumbes National Forest (4).  
**Species-specific recommendations:** support for Machalilla National Park and Tumbes National Forest.

**RUFOUS-NECKED FOLIAGE-GLEANER *Syndactyla ruficollis***

**VULNERABLE**



**Figure 60. Habitat preferences of *S. ruficollis***



**Distribution:** 30 localities. **Ecuador:** Loja.  
**Peru:** Tumbes, Piura, Lambayeque, Cajamarca.  
**Coordinates:** 3°48' S-7°00' S, 80°03' W-78°45' W.  
**Altitudinal range:** 400-2,900m.  
**Threats:** understorey disturbance, deforestation.  
**Protected areas:** Tumbes National Forest; also occurs in Bosque de Chifama in Lambayeque

Dept., Peru which is being vigorously protected by the local cooperative.  
**Species-specific recommendations:** (i) support for Tumbes National Forest, (ii) promote further protected areas in Loja Province, Ecuador.

**HENNA-HOODED FOLIAGE-GLEANER *Hylocryptus erythrocephalus* VULNERABLE**

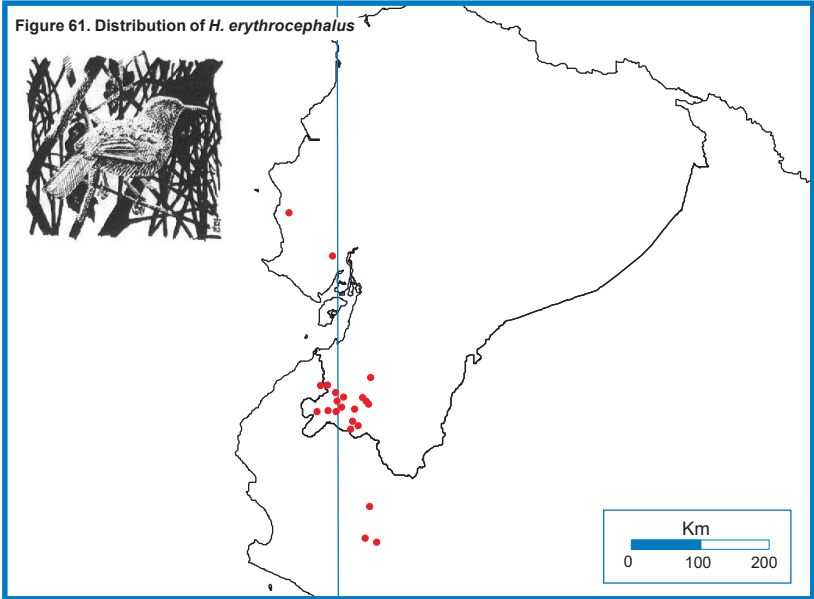
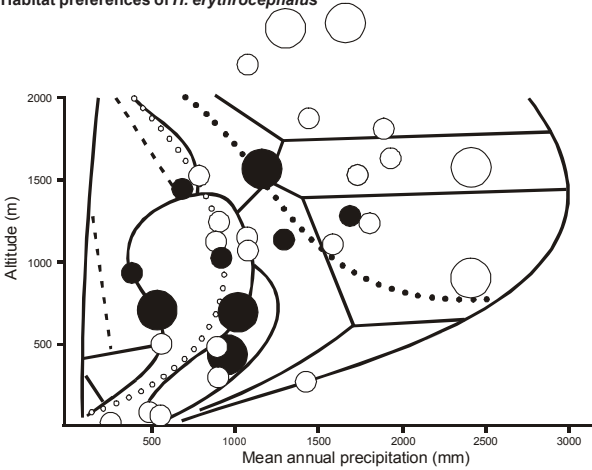


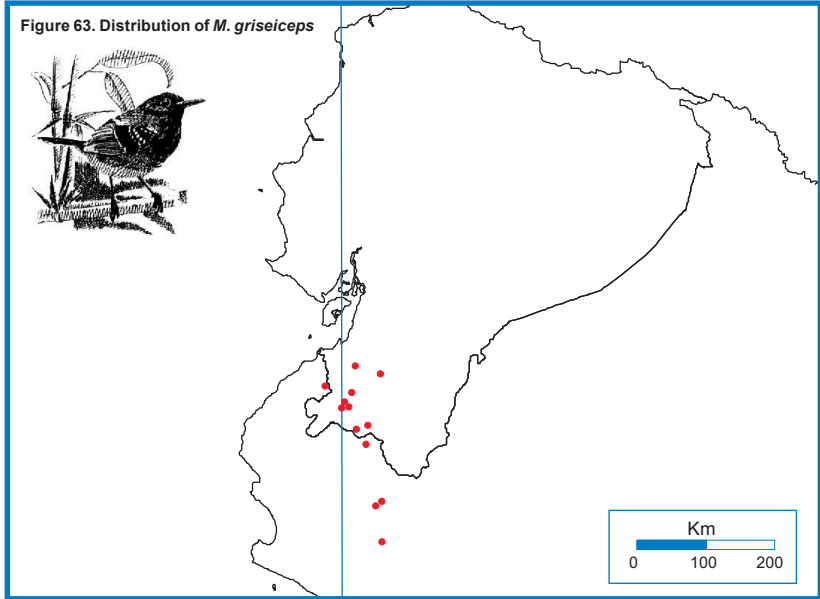
Figure 62. Habitat preferences of *H. erythrocephalus*



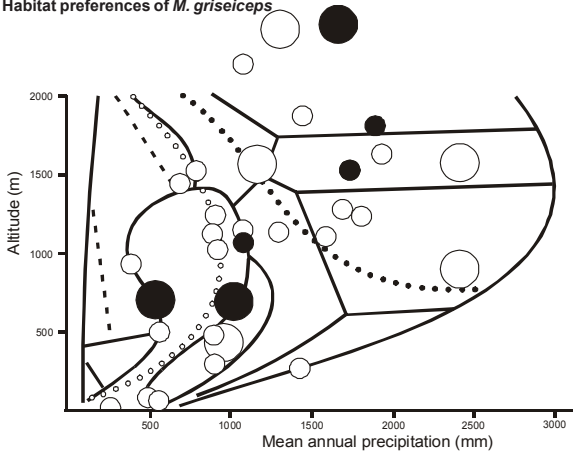
**Distribution:** 22 localities. **Ecuador:** Manabí, El Oro, Loja. **Peru:** Tumbes, Piura, Lambayeque.  
**Coordinates:** 1°34'S-5°51'S, 80°40'W-79°37'W.  
**Altitudinal range:** 400-1,750m.  
**Threats:** understory disturbance, deforestation.  
**Protected areas:** Machalilla National Park, Cerro Blanco Reserve and Tumbes National Forest (3).  
**Species-specific recommendations:** support for Machalilla National Park and Tumbes National Forest.

**GREY-HEADED ANTBIRD** *Myrmeciza griseiceps*

ENDANGERED



**Figure 64. Habitat preferences of *M. griseiceps***



**Distribution:** 13 localities. **Ecuador:** El Oro and Loja. **Peru:** Tumbes, Piura.  
**Coordinates:** 3°35'S-5°51'S, 80°12'W-79°31'W.  
**Altitudinal range:** 600-2,900m.  
**Threats:** understorey disturbance, deforestation.  
**Protected areas:** Tumbes National Forest.  
**Species-specific recommendations:** (i) create

at least one new protected area in Loja Province, Ecuador, (ii) support for Tumbes National Forest.

**PACIFIC ROYAL-FLYCATCHER *Onychorhynchus occidentalis***

**VULNERABLE**

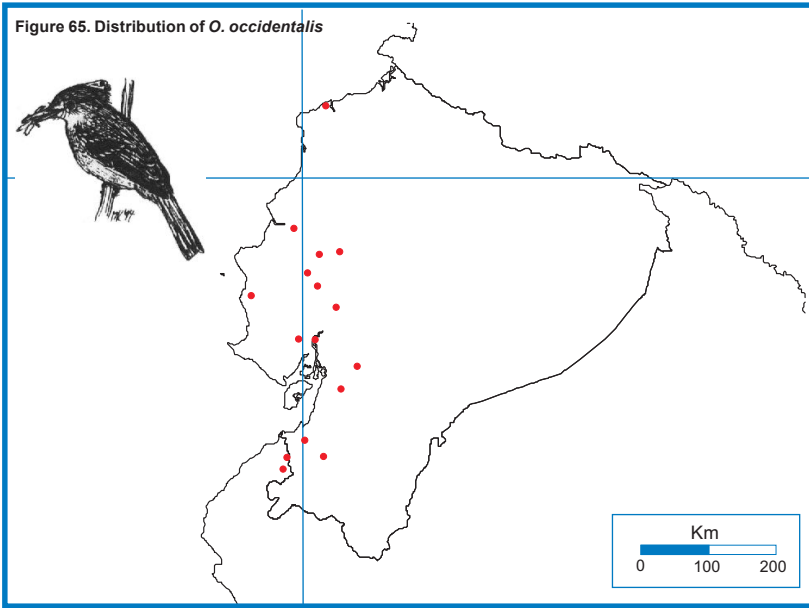
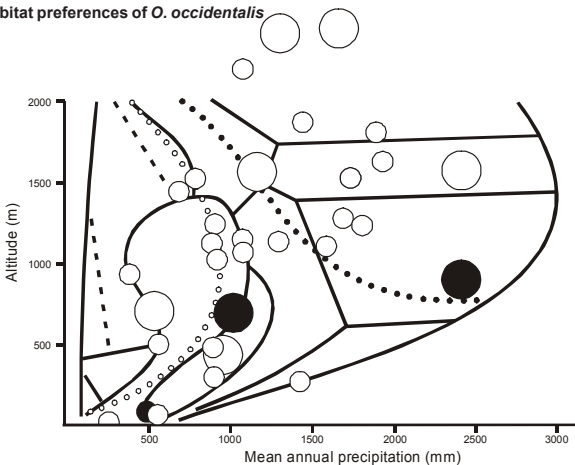


Figure 66. Habitat preferences of *O. occidentalis*



**Distribution:** 16 localities. **Ecuador:** Esmeraldas, Manabí, Los Ríos, Guayas, Azuay, El Oro. **Peru:** Tumbes.  
**Coordinates:** 0°59'N-3°50' S, 80°40'W-79°17'W.  
**Altitudinal range:** sea-level to 900m.  
**Threats:** deforestation, understorey clearance.  
**Protected areas:** Jauneche Reserve, Machalilla

National Park, Cerro Blanco Reserve, Manglares-Churute Ecological Reserve and Tumbes National Forest (5).  
**Species-specific recommendations:** (i) support for Machalilla National Park and Tumbes National Forest, (ii) increase the protection of the Jauneche Reserve.

**GREY-BREADED FLYCATCHER *Lathrotriccus griseiceps***

VULNERABLE

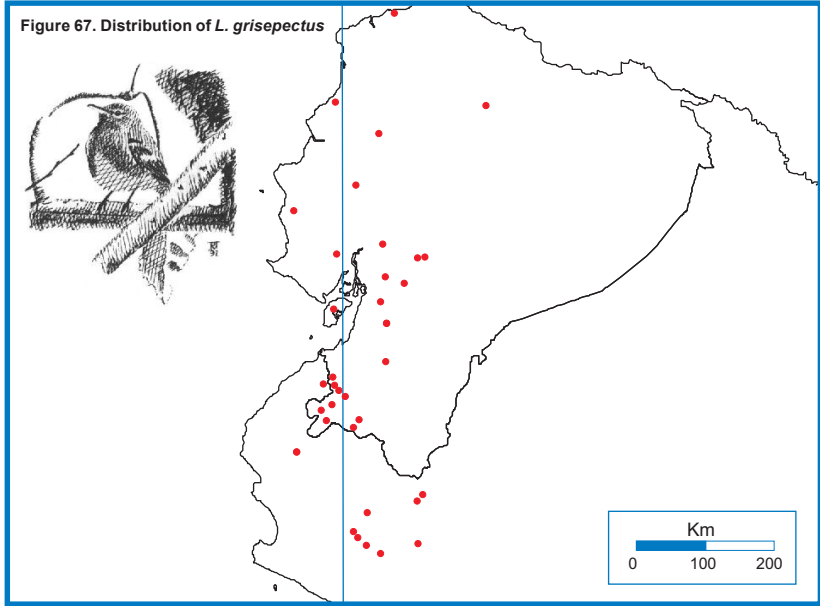
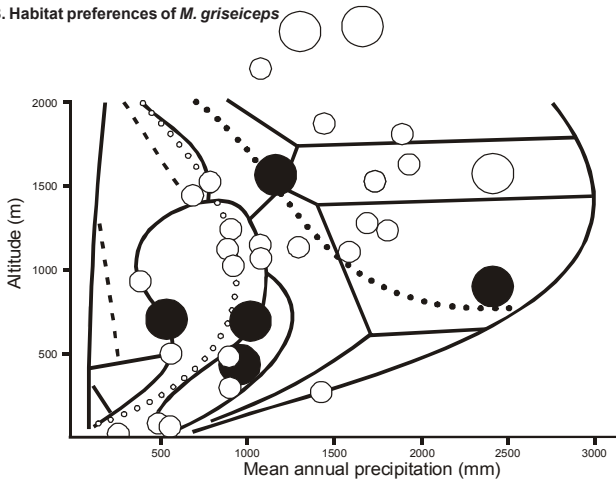


Figure 68. Habitat preferences of *M. griseiceps*



**Distribution:** 36 localities. **Ecuador:** Esmeraldas, Pichincha, Manabí, Los Ríos, Guayas, Azuay, El Oro, Loja. **Peru:** Tumbes. Piura, Lambayeque, Cajamarca.  
**Coordinates:** 1°05'N-5°42'S, 80°48'W-78°47'W.  
**Altitudinal range:** sea-level to 1,750m.  
**Threats:** understorey disturbance, deforestation.

**Protected areas:** Río Palenque Reserve, Jauneche Reserve, Machalilla N.P., Cerro Blanco Reserve, Manglares-Churute Ecological Reserve and Tumbes National Forest (6).  
**Species-specific recommendations:** support for Jauneche Reserve, Machalilla N.P., Manglares-Churute E. R. and Tumbes N.F.

OCHRACEOUS ATTILA *Attila torridus*

VULNERABLE

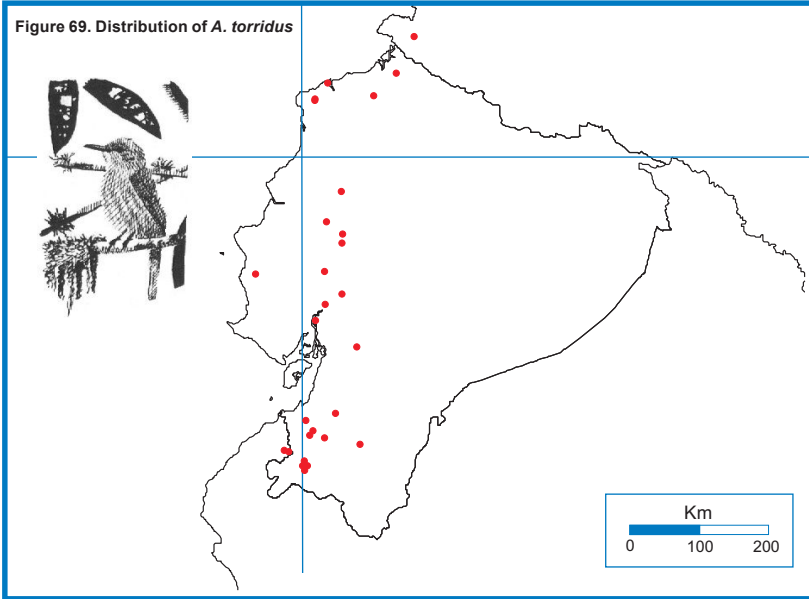
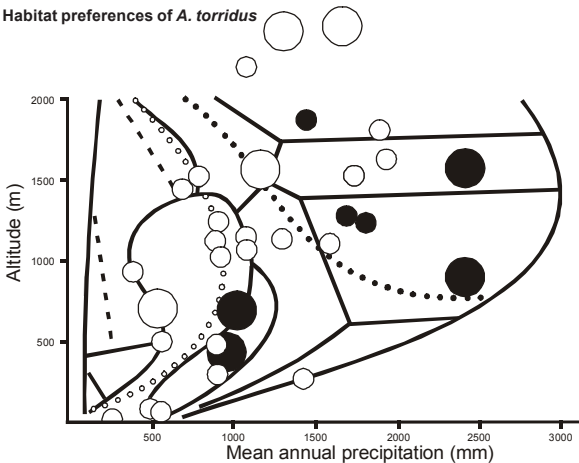


Figure 70. Habitat preferences of *A. torridus*

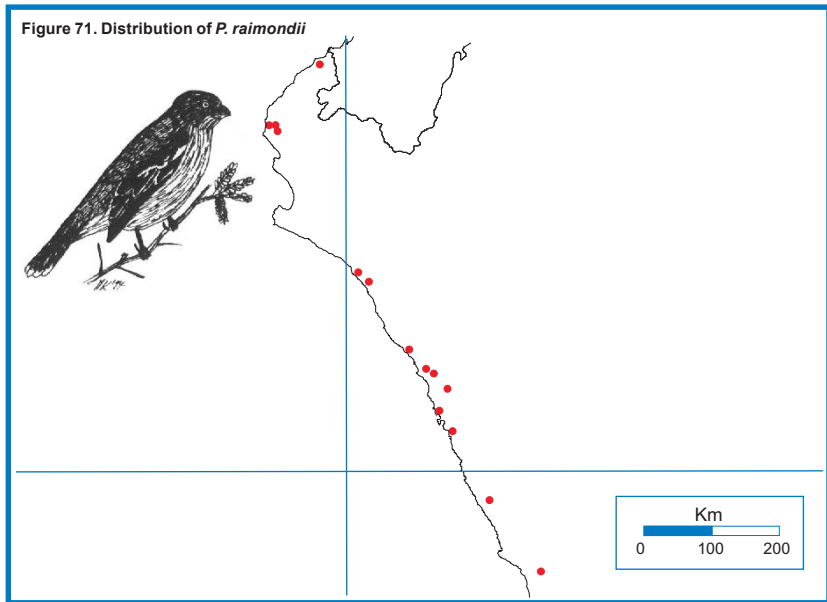


**Distribution:** 27 localities. **Colombia:** Nariño.  
**Ecuador:** Esmeraldas, Pichincha, Manabí, Los Ríos, Guayas, Azuay, El Oro, Loja. **Peru:** Tumbes.  
**Coordinates:** 1°29'N-4°06'S, 80°40'W-78°43'W.  
**Altitudinal range:** sea-level to 1,800m.  
**Threats:** deforestation, understorey disturbance.

**Protected areas:** Río Palenque Reserve, Jauneche Reserve, Machalilla National Park and Tumbes National Forest (4).  
**Species-specific recommendations:** support for Machalilla National Park and Tumbes National Forest.

PERUVIAN PLANTCUTTER *Phytotoma raimondii*

CRITICAL



**Distribution:** 16 localities. **Ecuador:** not known to occur. **Peru:** Tumbes, Piura, Lambayeque, Libertad, Ancash, Lima.

**Coordinates:** 3°34'S-11°30'S, 81°13'W-77°00'W.

**Altitudinal range:** sea-level to 550m.

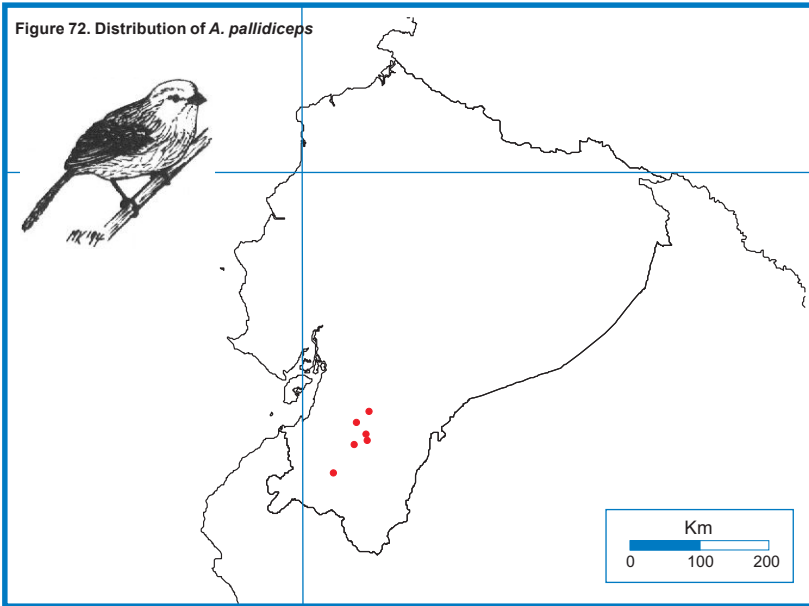
**Threats:** deforestation, understorey disturbance.

**Protected areas:** known in none.

**Species-specific recommendations:** (i) studies of its habitat requirements and threats, (ii) creation of protected areas if required.

**PALE-HEADED BRUSH-FINCH *Atlapetes pallidiceps***

CRITICAL



**Distribution:** 6 localities. **Ecuador:** Azuay and Loja only (the single record from Loja is considered erroneous by some observers e.g. M. B. Robbins *in litt.* to ICBP 1992). **Peru:** no records.

**Coordinates:** 3°10'S-3°57'S, 79°36'W-79°08'W.

**Altitudinal range:** 1,500-2,100m.

**Threats:** deforestation and understorey clearance, exacerbated by tiny range.

**Protected areas:** known in none

**Species-specific recommendations:** intensive surveys for the species's former localities, followed by protection of its habitat if it is rediscovered.

**SAFFRON SISKIN *Carduelis siemiradzki***

VULNERABLE

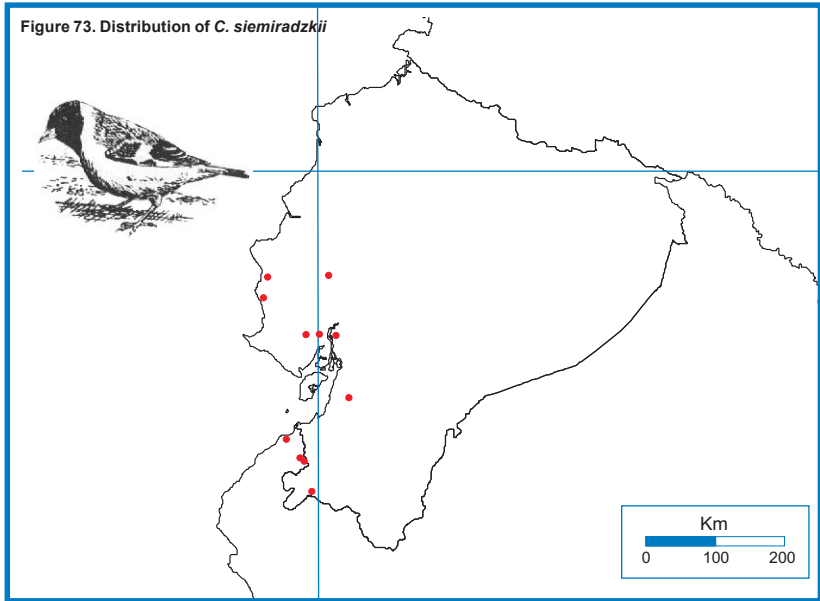
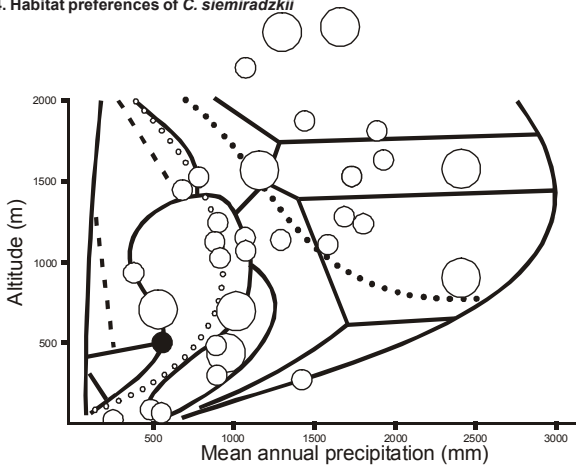


Figure 74. Habitat preferences of *C. siemiradzki*



**Distribution:** 13 localities. **Ecuador:** Manabí, Guayas, Loja. **Peru:** Tumbes.  
**Coordinates:** 0°55'N-4°18'S, 80°45'W-79°44'W.  
**Altitudinal range:** sea-level to 750m.  
**Threats:** deforestation?, small range makes the species vulnerable.  
**Protected areas:** Machalilla National Park, Cerro Blanco Reserve, and Tumbes National Forest (3).  
**Species-specific recommendations:** (i) support for Machalilla National Park and Tumbes National Forest (ii) research into its habitat requirements.

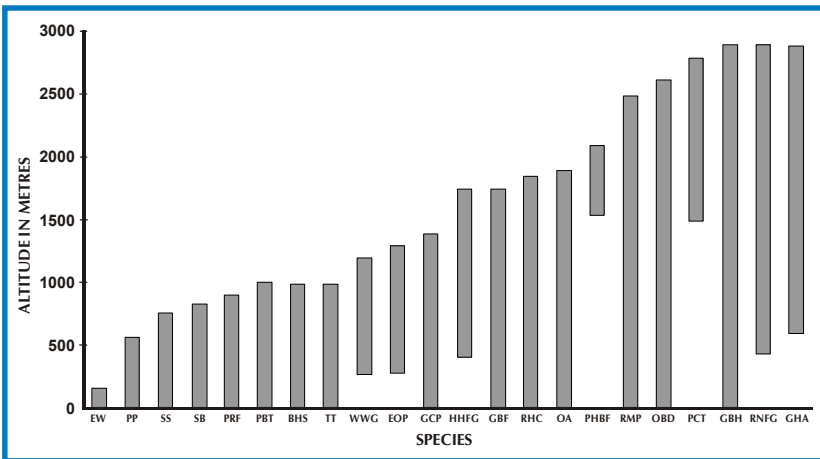
## THE NEAR-THREATENED SPECIES

Collar *et al.* (1992) recognize six near-threatened Tumbesian species. One (*Brotogeris pyrrhopterus*) was considered threatened by Collar and Andrew (1988), but subsequent information suggested it is still fairly common in several localities, and may be more tolerant of habitat alteration than originally thought (N. J. Collar verbally 1992). *Pachyramphus spodiurus* is treated here as near-threatened in accordance with Collar *et al.* (1994), although it was listed as threatened in Collar *et al.* (1992). We believe its position is still uncertain, and it may deserve threatened status. *Crypturellus transfasciatus* was given near-threatened status in Collar *et al.* (1992, 1994) and *Aratinga erythrogenys* was listed as near-threatened following recent fieldwork which indicated it may be at risk from habitat destruction, and is also at risk from the cage-bird trade. Such near-threatened species should be carefully monitored, as they may become seriously threatened in the future if current trends in forest clearance and trade continue. In accordance with Collar *et al.* (1992, 1994) *Saltator nigriceps* is not treated as near-threatened in this work, although it was listed as such in Collar and Andrew (1988).

### The altitudinal ranges of the priority Tumbesian bird species

The altitudinal ranges of threatened and near-threatened Tumbesian birds are quite variable as shown in Figure 85. This should be borne in mind when recommending conservation action in the Tumbesian region.

**Figure 75. Known altitudinal limits of the threatened and near-threatened Tumbesian endemics.** Note that some species (e.g. *Acestrura berlepschi*) have extremely narrow ranges, whereas others (notably *Leucopternis occidentalis*) occur within much wider limits.



**PALE-BROWED TINAMOU** *Crypturellus transfasciatus*

NEAR-THREATENED

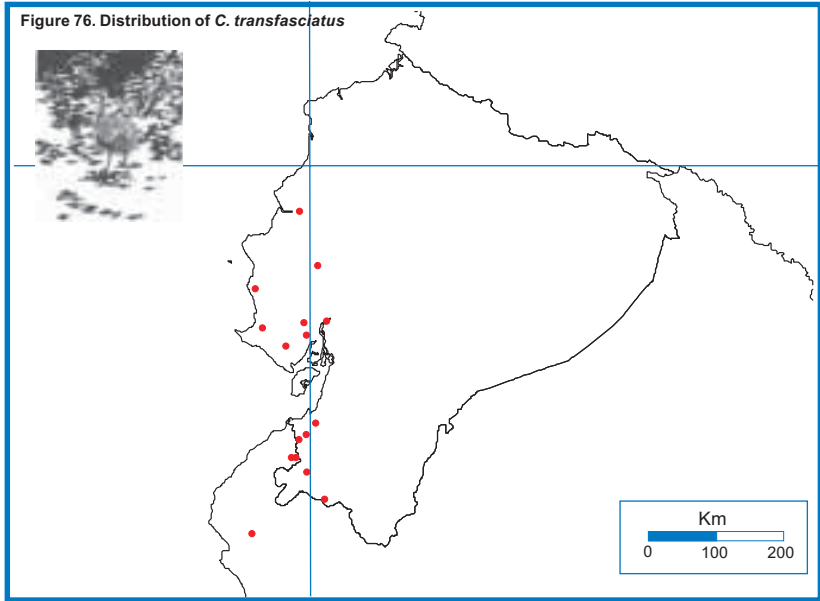
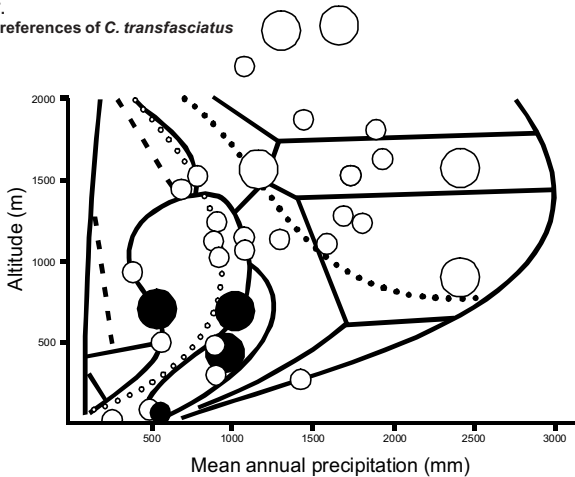


Figure 77.  
Habitat preferences of *C. transfasciatus*



**Distribution:** 16 localities. **Ecuador:** Manabí, Los Ríos, Guayas, El Oro, Loja. **Peru:** Tumbes, Piura, Lambayeque.

**Coordinates:** 0°40'S-5°45'S, 80°40'W-79°39'W.

**Altitudinal range:** sea-level to 1,000m.

**Threats:** understory disturbance, deforestation, hunting.

**Protected areas:** Machalilla National Park, Cerro Blanco Reserve, Arenillas Military Reserve and Tumbes National Forest (4).

**Species-specific recommendations:** support for Machalilla National Park and Tumbes National Forest.

**RED-MASKED PARAKEET** *Aratinga erythrogenys*

NEAR-THREATENED

Figure 78. Distribution of *A. erythrogenys*

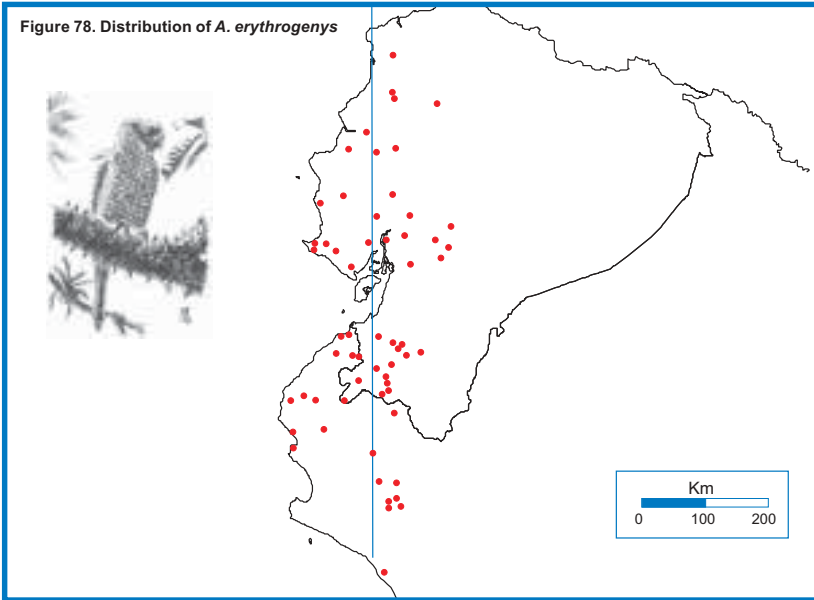
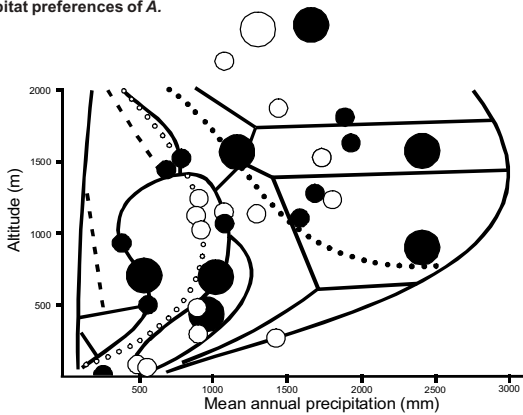


Figure 79. Habitat preferences of *A. erythrogenys*



**Distribution:** 71 traceable localities; occurs in others. **Ecuador:** Esmeraldas, Pichincha, Manabí, Los Ríos, Guayas, Azuay, El Oro, Loja. **Peru:** Tumbes, Piura, Lambayeque.  
**Coordinates:** 0°32' S-5°59' S, 80°40' W-79°09' W.  
**Altitudinal range:** sea-level to 2,500 m.  
**Habitat preferences:** Figure 80.  
**Threats:** deforestation, bird trade.

**Protected areas:** Cerro Mutilus Reserve, Río Palenque Reserve, Jauneche Reserve, Machalilla National Park, Cerro Blanco Reserve, Manglares-Churete Ecological Reserve, Arenillas Military Reserve and Tumbes National Forest and Cerros de Amotape N.P. (9).  
**Species-specific recommendations:** (i) support for Machalilla National Park and Tumbes National Forest, (ii) determine trade sustainability.

**GREY-CHEEKED PARAKEET *Brotogeris pyrrhopterus***

NEAR-THREATENED

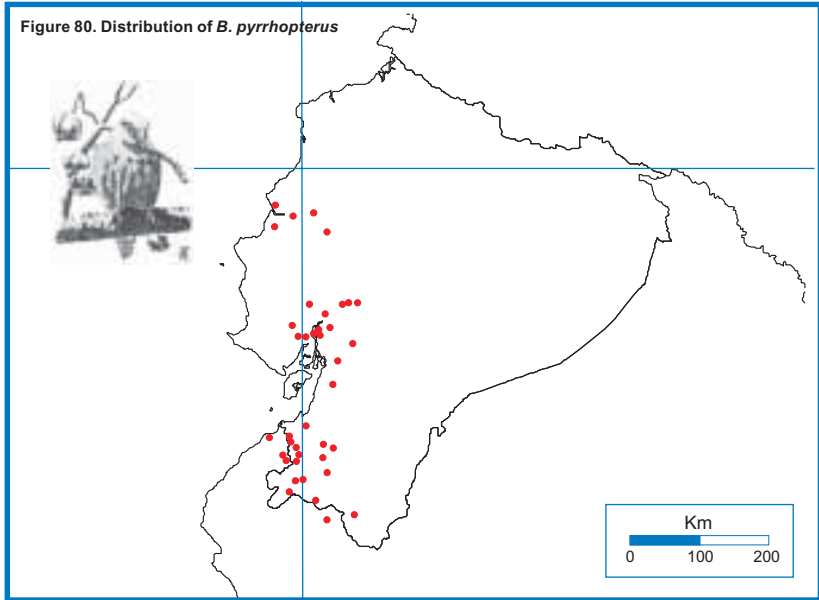
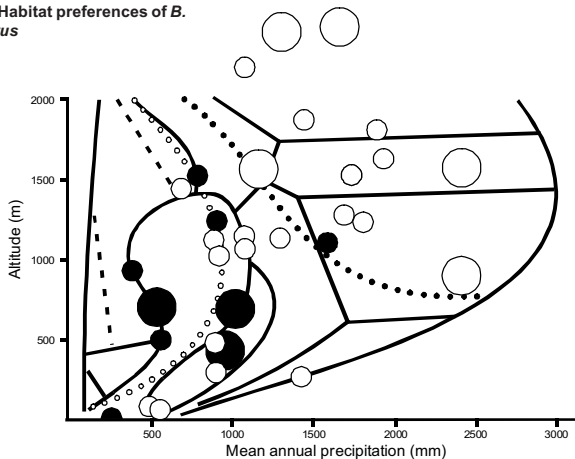


Figure 81. Habitat preferences of *B. pyrrhopterus*



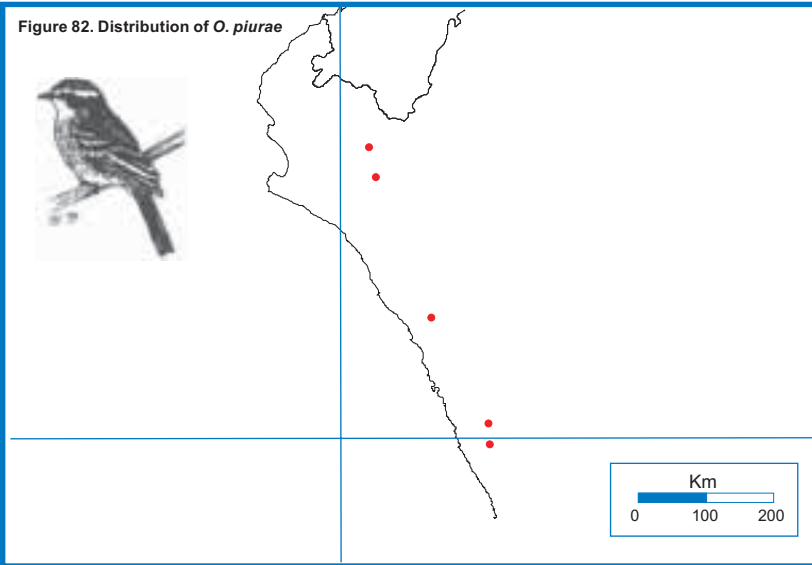
**Distribution:** 39 traceable localities; occurs in others. **Ecuador:** Manabí, Los Ríos, Guayas, Azuay, El Oro, Loja. **Peru:** Tumbes, Piura.  
**Coordinates:** 0°32'S-4°26'S, 80°16'W-79°17'W.  
**Altitudinal range:** sea-level to 1,400m.  
**Habitat preferences:** Figure 82.  
**Threats:** deforestation, bird trade.

**Protected areas:** Cerro Blanco Reserve, Arenillas Military Reserve, Manglares-Churete Ecological Reserve and Tumbes N.F. (4).  
**Species-specific recommendations:** (i) support for Machalilla National Park and Tumbes National Forest, (ii) determine trade sustainability.

**PIURA CHAT-TYRANT *Ochthoeca piurae***

NEAR-THREATENED

Figure 82. Distribution of *O. piurae*



**Distribution:** 5 localities. **Ecuador:** no records. **Peru:** Piura, Lambayeque, Libertad and Ancash.

**Coordinates:** 5°23' S-9°54' S, 77°47' W-79°37' W.

**Altitudinal range:** 1,500-2,800 m.

**Habitat preferences:** mountain scrub, riparian thickets.

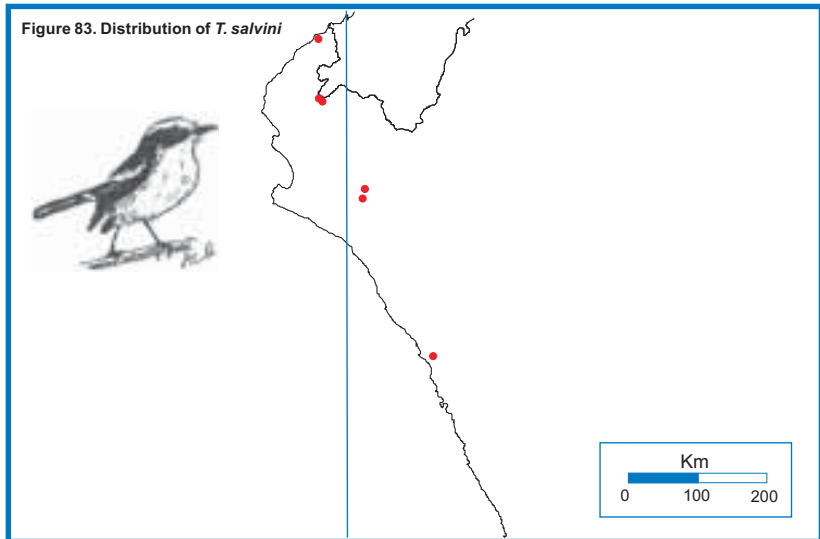
**Threats:** habitat clearance.

**Protected areas:** known in none.

**Species-specific recommendations:** (i) carry out intensive surveys to discover additional populations of the species and investigate its habitat requirements, (ii) secure areas known to harbour the species.

**TUMBES TYRANT** *Tumbezia salvini*

NEAR-THREATENED



**Distribution:** 6 localities. **Peru:** Tumbes, Piura, Lambayeque, Libertad.

**Coordinates:** 3°34' S-8°25' S, 78°45' W-80°28' W.

**Altitudinal range:** sea-level to 1,000m.

**Habitat preferences:** desert scrub, dry forest, riparian thickets.

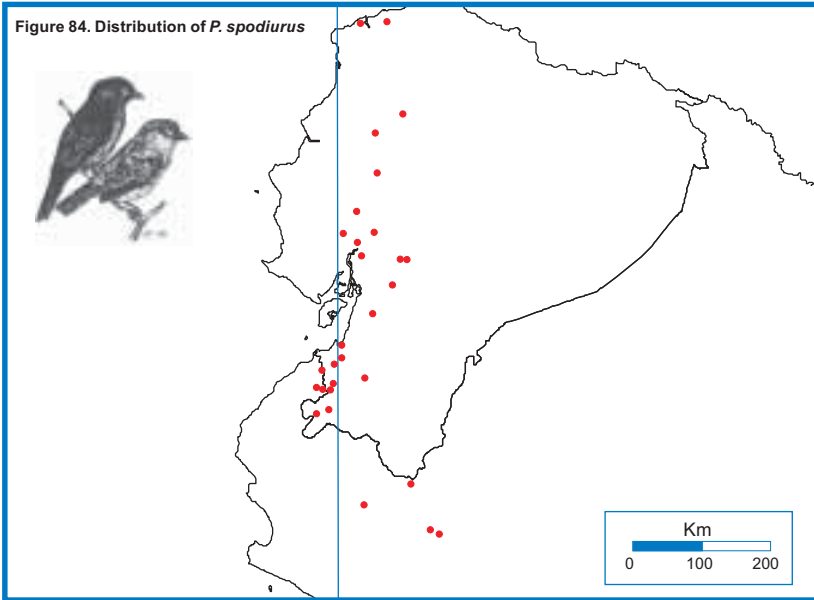
**Threats:** habitat clearance.

**Protected areas:** known in none.

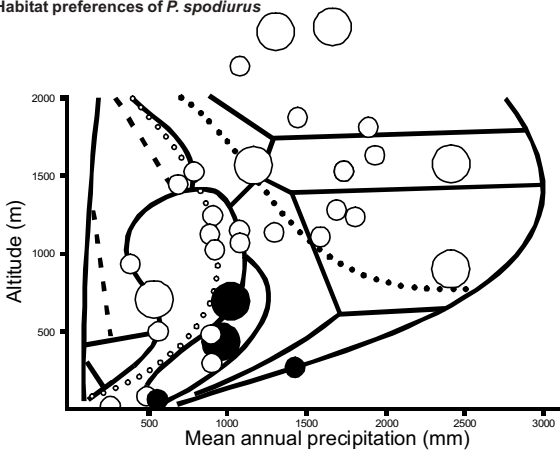
**Species-specific recommendations:** (i) search for additional populations and investigate their habitat requirements, (ii) secure areas known to harbour the species.

**SLATY BECARD *Pachyramphus spodiurus***

NEAR-THREATENED



**Figure 85. Habitat preferences of *P. spodiurus***



**Distribution:** 29 localities. **Ecuador:** Esmeraldas, Tumbes National Forest (2), Pichincha, Los Rios, Guayas, Azuay, El Oro, Loja.  
**Peru:** Tumbes, Piura, Cajamarca, Amazonas.  
**Coordinates:** 1°00' N-3°44' S, 80°17' W-78°40' W.  
**Altitudinal range:** sea-level to 825 m.  
**Threats:** understorey disturbance, deforestation.  
**Protected areas:** Rio Palanque Reserve and

## OTHER SPECIES WITH CONSERVATION IMPORTANCE OCCURRING IN THE TUMBESIAN REGION

In addition to the above threatened and near-threatened species which are restricted to or occur largely in the Tumbesian region, 16 other species of conservation importance occur in the region but have larger ranges. These species will be afforded some protection by habitat preservation in the Tumbesian region, but conservation action must also be focused on their distributional centres. These species belong to three groups (within these the threatened species are marked with double asterisks, near-threatened species single asterisks). In addition to these species is the threatened Little Woodstar *Acestrura bombus* which occurs in western and eastern Ecuador and ranges south to central Peru, embracing altitudes from sea-level to 3,050 m (Collar *et al.* 1992). It occurs at several sites in the Tumbesian region, apparently favouring moist and semi-deciduous forests.

### Species from the Chocó and Pacific slope Andes EBA

These include two with special conservation importance: Long-wattled Umbrellabird *Cephalopterus penduliger*\*\* and Gorgeted Sunangel *Heliangelus strophanus*\*. In common with most species from this EBA, these species favour humid cloud-forest which occurs only at scattered sites in the Tumbesian region (e.g. Buenaventura).

### Threatened and near-threatened Andean species

Among these are two threatened species from the South Central Andean EBA, *Penelope barbata*\*\* and Rusty-faced Parrot *Hapalopsittaca pyrrhops*\*\*. A more wide-ranging but local Andean species is Black-and-chestnut Eagle *Oroaetus isidori*\*. These three species occur mostly at altitudes of over 2,500 m and favour humid forest, only venturing into lower areas where the forest is very humid. Neblina Metaltail *Metallura odomae*\* has a restricted range in southern Ecuador and northern Peru, and occurs along the eastern edge of the Tumbesian region at a few humid forest sites above 2,500 m, such as Angashcola, Loja Province, Ecuador. Golden-plumed Parakeet *Leptosittaca branickii*\*\* occurs in humid temperate forest at scattered sites in the Andes of Colombia, Ecuador and Peru. It occurs at a few sites in the Tumbesian region which lie within its preferred altitudinal range (2,500-3,500 m) and possess humid forest. Further Andean species found in at least one site on the eastern edge of the Tumbesian region include Imperial Snipe *Gallinago imperialis*\*, Butf-fronted Owl *Aegolius harrisii*\*, Peruvian Antpitta *Grallaricula peruviana*\*, Orange-banded Flycatcher *Myiophobus lintoni*\*, Grey-winged Inca-Finch *Incaspiza ortizi*\* and Masked Mountain-Tanager *Buthraupis wetmorei*\*\*.

### Three near-threatened premontane species

These are wider-ranging species: Solitary Eagle *Harpyhaliaetus solitarius*\*, Fasciated Tiger-heron *Tigrisoma fasciatum*\* and Scaled Fruiteater *Ampelioides tschudii*\*

## DIRECTORY OF PRIORITY SITES FOR BIRD CONSERVATION IN THE TUMBESIAN REGION

This section presents, in standardized form, information on all sites in the Tumbesian region at which two or more threatened or near-threatened Tumbesian endemics have been recorded since 1970. The 'Conservation recommendations' chapter uses this information to identify the most important Tumbesian sites for conserving of its avifauna. The information presented for each site is listed below. The geographical positions of the localities are shown in Figure 86. Sites 1-24 are in Ecuador; sites 25-30 in Peru.

**NAME:** the most commonly used name is given first; other names are given in parentheses. The province/department is given on the title line.

**COORDINATES:** if the site is large one then the central coordinates only are given.

**ALTITUDE and DESCRIPTION OF SITE:** if the site falls within the area of the vegetation classification presented earlier is given, otherwise a broader habitat classification is given based on the references.

**FOREST EXTENT:** estimates refer to the last survey of each site, not necessarily the 1995 situation.

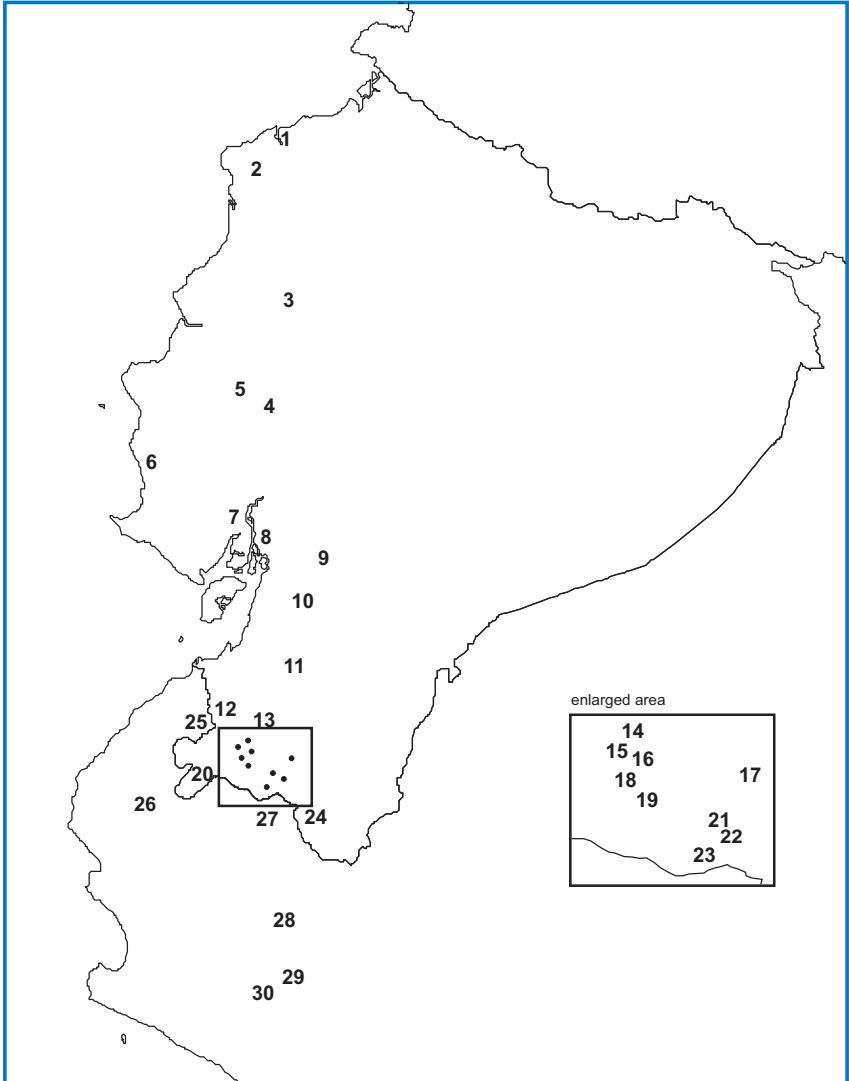
**SURVEY DATES:** these concentrate on recent efforts, i.e. those after 1970.

**ORNITHOLOGICAL DATA:** species totals are given only if detailed lists have been published or unpublished lists made available. Both Tumbesian and non-Tumbesian threatened and near-threatened species are listed.

**PROTECTED STATUS and THREATS:** appropriate details are given.

**REFERENCES:** Initials of surveyors/institutions mentioned correspond to: (AB) A. Brosset; (ANSP) Academy of Natural Sciences, Philadelphia; (BJB *et al.*) B. J. Best, A. L. Broom, M. Checker, J. W. Duckworth, M. Kessler, R. Thewlis; (BJB *et al.*\*) B. J. Best, C. T. Clarke, M. Checker, A. McNab; (CTC) C. T. Clarke; (DAW *et al.*) D. A. Wiendenfeld, T. S. Schulenburg, M. B. Robbins; (EK) E. Krabbe; (HB *et al.*) H. Bloch, M. K. Poulsen, C. Rahbek and J. F. Rasmussen; (FL) F. Lambert; (LSUMZ) Louisiana State University Museum of Zoology; (MC *et al.*) M. Checker, R. Thewlis, W. Duckworth and M. Kessler; (MCZ) Museum of Comparative Zoology, Harvard; (MK) M. Kessler; (NK) N. Krabbe; (PC) P. Coopmans; (TAP) the late T. A. Parker; (RSR) R. S. Ridgely; (TM) T. Meyers; (TSS) T. S. Schulenberg; (MW) M. Whittingham; (RSRW and JAT) R. S. R. Williams and J. A. Jobias; (WVZ) Western Foundation of Vertebrate Zoology, Los Angeles.

**Figure 86. Locations of important ornithological sites in the Tumbesian region.** Numbers refer to a site's listing in the directory.



### 1. CERRO MUTILES

Esmeraldas

(Cerro San Mateo, Reserva Jardín Tropical “Luis Vargas Torres”).

**COORDINATES:** 0°54'N, 79°57'W.

**ALTITUDE:** 60-300 m.

**DESCRIPTION:** a small area of moist, semi-evergreen forest on a ridge SE of Esmeraldas, N of río Esmeraldas.

**FOREST EXTENT:** not known (but said to be “small”).

**SURVEY DATES:** 2-4 Feb 1991 (TAP); 3 observer days.

**ORNITHOLOGICAL DATA:** 136 species recorded including two threatened (*Leucopternis occidentalis* and *Ortalis erythroptera*).

**PROTECTED STATUS:** owned by National University of Esmeraldas.

**THREATS:** logging inside the reserve.

**REFERENCES:** Parker and Carr (1992).

### 2. CABECERAS DE BILSA

Esmeraldas

**COORDINATES:** 0°37'N, 79°51'W.

**ALTITUDE:** 100-300m.

**DESCRIPTION:** part of a large block of wet forest in near-pristine condition.

**FOREST EXTENT:** 20,000 ha.

**SURVEY DATES:** 26-31 Jan 1991.

**ORNITHOLOGICAL DATA:** 158 species recorded including four threatened species (*Leucopternis occidentalis*, *Ortalis erythroptera*, *Cephalopterus penduliger* and *Attila torridus*).

**PROTECTED STATUS:** none, but an Ecuadorian conservation group, Fundación Jatun Sacha, is attempting to buy an 800 ha area of forest nearby (see note)

**THREATS:** further clearance by settlers.

**REFERENCES:** Parker and Carr (1992)

**Note:** the Jatun Sacha Bilsa area at 0°22'N, 79°45'W supports the above species and *Pachyramphus spodiurus* and is apparently earmarked for protection by a local conservation group (McColm *et al.* 1994, R. Clay *in litt.* to Birdlife International 1995).

### 3. RÍO PALENQUE SCIENCE CENTRE

Pichincha

**COORDINATES:** 0°30'S 79°30'W.

**ALTITUDE:** 200 m.

**DESCRIPTION:** one of the last few remaining areas of tropical moist forest in western Ecuador. This isolated forest patch is surrounded by agricultural land.

**FOREST EXTENT:** 167 ha (only 87 ha of forest).

**SURVEY DATES:** numerous dates throughout the year.

**ORNITHOLOGICAL DATA:** 355 species recorded, including seven threatened species (*Leucopternis occidentalis* [but not since the 1970s), *Ortalis erythroptera*, *Acestrura bombus*, *Cephalopterus penduliger*, *Onychorhynchus*

*occidentalis*, *Lathrotriccus griseipectus* and *Dacnis berlepschi*) and two near-threatened species (*Aratinga erythrogenys* and *Pachyramphus spodiurus* [only one recent record]).

**PROTECTED STATUS:** a biological station owned by the University of Miami.

**THREATS:** Agricultural encroachment.

**REFERENCES:** Dodson and Gentry (1978), Leck (1979), Leck *et al.* (1980), Parker and Carr (1992).

#### 4. JAUNECHÉ

Los Ríos

**COORDINATES:** 1°20'S, 79°35'W

**ALTITUDE:** 50-70 m.

**DESCRIPTION:** one of the last tropical moist forests in western Ecuador, containing seasonally inundated forest in the eastern part.

**FOREST EXTENT:** 138 ha.

**SURVEY DATES:** 6-9 July 1991 (TAP), 31 Aug-3 Sept (PC), 2-4 Oct (RSRW and JAT).

**ORNITHOLOGICAL DATA:** five threatened species (*Ortalis erythroptera*, *Leptotila ochraceiventris*, *Onchorhynchus occidentalis*, *Lathrotriccus griseipectus* (up to 3/ha and *Attila torridus*) and two near-threatened species (*Crypturellus transfasciatus* and *Aratinga erythrogenys*).

**PROTECTED STATUS:** a biological station owned by the University of Guayaquil.

**THREATS:** apparently well protected.

**REFERENCES:** Dodson *et al.* (1985), P. Coopmans *in litt.* (1992), Williams and Tobias (1994).

#### 5. HACIENDA PACARITAMBO

Los Ríos

**COORDINATES:** 1°02'S, 79°29'W.

**ALTITUDE:** not known.

**DESCRIPTION:** moist forest patches and agricultural land.

**FOREST EXTENT:** no patches exceed 10 ha.

**SURVEY DATES:** 18-28 May, 15-20 June 1962; 10-15 Feb 1963 (AB).

**ORNITHOLOGICAL DATA:** 125 species recorded including three threatened (*Leucopternis occidentalis*, *Onychorhynchus occidentalis* and *Attila torridus*) and two near-threatened species (*Brotogeris pyrrhopterus* and *Pachyramphus spodiurus*). **PROTECTED STATUS:** none.

**THREATS:** not known.

**REFERENCES:** Brosset (1964), Vuilleumier (1978).

#### 6. MACHALILLA NATIONAL PARK

Manabí

**COORDINATES:** 1°36'S, 80°42'W.

**ALTITUDE:** sea-level to 800 m.

**DESCRIPTION:** several forested hills, secondary forest and some settlements; understorey largely undisturbed. Observations so far concentrated on Cerro San Sebastian.

**FOREST EXTENT:** 15,000 ha.

**SURVEY DATES:** 10-13 July 1978 (RSR), 18-24 Jan 1991 (TAP), 31 July-10 Aug 1991 (ANSP).

**ORNITHOLOGICAL DATA:** 214 species recorded, including 11 threatened species (*Leucopternis occidentalis*, *Ortalis erythroptera*, *Leptotila ochraceiventris*, *Acestrura bombus*, *Acestrura berlepschi*, *Synallaxis tythys*, *Hylocryptus erythrocephalus*, *Onychorhynchus occidentalis*, *Lathrotriccus griseipectus*, *Attila torridus* and *Carduelis siemiradzkii*) and two near-threatened species (*Crypturellus transfasciatus* and *Aratinga erythrogenys*)

**PROTECTED STATUS:** Ecuadorian government-designated National Park

**THREATS:** animal grazing, selective logging, settlers within the park.

**REFERENCES:** MacBryde (1987), Ridgely (1991a) Parker and Carr (1992).

## 7. CERRO BLANCO

Guayas

(Cerro Azul, "Cemento Nacional")

**COORDINATES:** 2°10'S, 80°02 W.

**ALTITUDE:** 100-420m.

**DESCRIPTION:** a semi-evergreen forest on the edge of the Chongón-Colonche Hills. Formerly owned by the Ecuadorian National Cement Company, was managed by Fundación Natura from 1990 to 1993, now administered by Fundación Pro-Bosque.

**FOREST EXTENT:** 2,000 ha.

**SURVEY DATES:** 17 Jan and 15-20 July 1991 (TAP) also regular visits from August 1992 to May 1993 by K. S. Berg and several surveys by PC and R. Jones.

**ORNITHOLOGICAL DATA:** At least 143 species recorded including eight threatened species (*Leucopternis occidentalis*, *Ortalis erythroptera*, *Leptotila ochraceiventris*, *Synallaxis tithys*, *Hylocryptus erythrocephalus*, *Onychorhynchus occidentalis*, *Lathrotriccus griseipectus* and *Carduelis siemiradzkii*) and three near-threatened species (*Crypturellus transfasciatus*, *Aratinga erythrogenys* and *Brotogeris pyrrhopterus*).

**PROTECTED STATUS:** private reserve.

**THREATS:** apparently well protected, but illegal settlers have recently arrived on the north side of the reserve.

**REFERENCES:** P. J. Greenfield *in litt.* to ICBP (1989), Parker and Carr (1992), K.S. Berg *in litt.* (1993), R. Phillips *in litt.* (1994).

## 8. MANGLARES – CHURUTE ECOLOGICAL RESERVE

Guayas

**COORDINATES:** 2°25'S, 79°37'S.

**ALTITUDE:** sea-level to 900 m.

**DESCRIPTION:** forest, woodland and marsh.

**FOREST EXTENT:** reserve extends to 35,000 ha; forest extent not known.

**SURVEY DATES:** 24-26 Jan 1991 (RSR), also recent surveys by K. S. Berg and N. Hilgert.

**ORNITHOLOGICAL DATA:** five threatened species (*Leucopternis occidentalis*, *Ortalis erythroptera*, *Leptotila ochraceiventris*, *Onychorhynchus occidentalis* and *Lathrotriccus griseipectus*) and two near-threatened species (*Aratinga erythrogenys* and *Brotogeris pyrrhopterus*).

**PROTECTED STATUS:** Ecuadorian government designated Ecological Reserve.

**THREATS:** selective logging, settlement and domestic animals grazing the understorey.

**REFERENCES:** R.S. Ridgely *in litt.* (1992)

## 9. MANTA REAL

Azuay

**COORDINATES:** 4°34'S, 79°21'W.

**ALTITUDE:** 250 -1,100 m.

**DESCRIPTION:** tropical moist forest with some agricultural land in the lower part near the town. A road was built through the area in early 1993.

**FOREST EXTENT:** on the edge of the 28,000 ha Molleturo Protected Forest.

**SURVEY DATES:** 26-27 Jan 1991 (ANSP), 10-17 July 1991 (TAP), 15-21 Aug 1991. Also regular surveys since November 1991 by K. S. Berg, stationed at Manta Real.

**ORNITHOLOGICAL DATA:** at least 130 species recorded, including seven threatened species (*Leucopternis occidentalis*, *Ortalis erythroptera*, *Pyrrhura orcesi*, *Cephalopterus penduliger*, *Onychorhynchus occidentalis*, *Lathrotriccus griseipectus* and *Attila torridus*) and four near-threatened species (*Aratinga erythrogenys*, *Brotogeris pyrrhopterus*, *Ampelioides tschudii* and *Pachyrhamphus spodiurus*).

**PROTECTED STATUS:** none at present, but apparently designated for protection by the Corporación Ornitológica del Ecuador (Birdlife International's counterpart in Ecuador) . It has carried out community development and conservation projects in the area with support Fundación Natura.

**THREATS:** agricultural encroachment from the slopes below.

## 10. SAN MIGUEL

Azuay

**COORDINATES:** 2°48'S, 79°30'W.

**ALTITUDE:** 900-1,500 m.

**DESCRIPTION:** relatively undisturbed tropical moist forest.

**FOREST EXTENT:** large tracts remain (5,000 ha?), but precise forest extent not known.

**SURVEY DATES:** 8-14 Jan 1992 (MW); 14 observer days.

**ORNITHOLOGICAL DATA:** 99 species recorded, including two threatened species (*Onychorhynchus occidentalis* and *Lathrotriccus griseipectus*), and

three near-threatened species (*Harpyhaliatus solitarius*, *Aratinga erythrogenys* and *Brotogeris pyrrhopterus*).

**PROTECTED STATUS:** none.

**THREATS:** agricultural encroachment and selective logging.

**REFERENCES:** M. Whittingham *in litt.* (1992).

## 11. UZHCURRUMI

El Oro

**COORDINATES:** 3°21'S, 79°33'W.

**ALTITUDE:** 320-1,500m.

**DESCRIPTION:** mostly degraded agricultural land, with some tiny patches of Semi-evergreen Intermontane Forest and Scrub along water courses.

**FOREST EXTENT:** no patches larger than 5 ha.

**SURVEY DATES:** 15 (NK and MK) and 22 Feb 1991 (BJB *et al.*); 6 observer days.

**ORNITHOLOGICAL DATA:** 52 species recorded, including three threatened species (*Leucopternis occidentalis*, *Pyrrhura orcesi* and *Attila torridus*) and three near-threatened species (*Aratinga erythrogenys*; *Brotogeris pyrrhopterus* and *Ampelioides tschudii*).

**PROTECTED STATUS:** none.

**THREATS:** complete clearance of the tiny forest patches.

**REFERENCES:** Krabbe (1991), Best (1992).

## 12. ARENILLAS MILITARY RESERVE.

El Oro

**COORDINATES:** 3°33'S, 80°03'W.

**ALTITUDE:** sea level to 300m.

**DESCRIPTION:** deciduous forest and mangroves.

**FOREST EXTENT:** not known; reserve extends to 20,000 ha.

**SURVEY DATES:** 13-14 July 1991 (TAP); 2 observer days.

**ORNITHOLOGICAL DATA:** 123 species recorded, including two threatened species (*Ortalis erythroptera* and *Synallaxis tithy*) and three near-threatened species (*Crypturellus transfasciatus*, *Aratinga erythrogenys* and *Brotogeris pyrrhopterus*).

**PROTECTED STATUS:** managed by the Ecuadorian army. From 1993 the Fundación Ecuatoriano para el Desarrollo e Investigación del Medio Ambiente (FEDIMA) has been working with the army to prepare a management plan and seek financial support for the area.

**THREATS:** selective logging.

**REFERENCES:** Parker and Carr (1992), R. Phillips *in litt.* (1994).

**13. BUENAVENTURA****El Oro**

(9,5 km West of Piñas, Piñas)

**COORDINATES:** 3°41'S, 79°44'W.**ALTITUDE:** 900-1,000 m.**DESCRIPTION:** patches or Very Humid Premontane Cloud-forest c.9 km W of Piñas.**FOREST EXTENT:** c. 100 ha total.**SURVEY DATES:** Aug 1980 (ANSP), 11 June-6July 1985 (ANSP), Aug 1988 (ANSP), Jan 1989 (ANSP), April 1998 (ANSP), Aug 1989 (ANSP), 25-26 Sept 1990 (NK), 23 Feb - 6 Mar 1991 (BJB *et al.*), 14-16 April 1990, 7-9 Sept 1991 (RSRW and JAT), 15 Nov 1991 (NK and TSS), 8 Dec 1991 (EK and NK). Also many recent visits by bird tour groups.**ORNITHOLOGICAL DATA:** at least 200 species recorded, including nine threatened species (*Leucopternis occidentalis*, *Ortalis erythroptera*, *Penelope barbata*, *Leptotila ochraceiventris*, *Pyrrhura orcesi*, *Cephalopterus penduliger*, *Onychorhynchus occidentalis*, *Lathrotriccus griseipectus* and *Attila torridus*) and three near threatened species (*Harpyhaliaetus solitarius*, *Aratinga erythrogenys* and *Ampelioides tschudii*).**PROTECTED STATUS:** None.**THREATS:** selective logging, forest destruction for grazing land.**REFERENCES:** Robbins and Ridgely (1990), Best (1992), N. Krabbe *in litt* (1992), M.B. Robbins *in litt.* (1992), Williams and Tobias (1994).**14. VICENTINO****Loja****COORDINATES:** 3°57'S, 79°57'W.**ALTITUDE:** 900 -1,450 m.**DESCRIPTION:** patches of Semi-evergreen Lowland and Premontane Tall Forest surrounded by crop-land and cattle-pastures to the NE and SW of Vicentino village.**FOREST EXTENT:** forest patch do not exceed 20 ha.**SURVEY DATES:** 8 and 14.18 Feb 1991 (BJB *et al.*,.); 9.5 observer days.**ORNITHOLOGICAL DATA:** 87 species recorded, including four threatened (*Leucopternis occidentalis*, *Ortalis erythroptera*, *Leptotila ochraceiventris* and *Myrmeciza griseiceps*) and two near-threatened species (*Aratinga erythrogenys* and *Brotogeris pyrrhopterus*).**PROTECTED STATUS:** none.**THREATS:** further destruction of forest patches for agricultural land.**REFERENCES:** Best (1992).

## 15. ALAMOR

Loja

**COORDINATES:** 4°02'S, 80°02'W.

**ALTITUDE:** 1,100 – 1,450 m.

**DESCRIPTION:** patches of Semi-evergreen Lowland and Premontane Tall Forest NE and W of Alamor, and agricultural land with scattered trees and hedges.

**FOREST EXTENT:** separate forest patches do not exceed 50 ha.

**SURVEY DATES:** 13-14 and 18-19 Feb 1991 (BJB *et al.*) 17, 25-31 Aug and 10 Sept 1991 (RSRW and JAT); 20.5 observer days (also early 20<sup>th</sup> century surveys by AMNH; Chapman 1926)

**ORNITHOLOGICAL DATA:** eight threatened species (*Leucopternis occidentalis*, *Leptotila ochraceiventris*, *Acestrura bombus*, *Synallaxis tithys*, *Synadactyla ruficollis*, *Hylocryptus erythrocephalus*, *Myrmeciza griseiceps* and *Attila torridus*) and two near threatened species (*Ortalis erythroptera* and *Aratinga erythrogenys*).

**PROTECTED STATUS:** none.

**THREATS:** further destruction of forest patch for agricultural

**REFERENCES:** Best (1992) Williams and Tobias (1994).

## 16. TIERRA COLORADA

Loja

**COORDINATES:** 4°02'S, 79°57'W. ,

**ALTITUDE:** 1,400 -1,850 m,

**DESCRIPTION:** a patch of Humid lower Montane cloud-forest at a valley head, surrounded by agricultural land.

**FOREST EXTENT:** 70 ha.

**SURVEY DATES:** 9-19 Feb 1991 (NK and FL; BJB *Et al.*) 36 observer days.

**ORNITHOLOGICAL DATA:** 123 species recorded, including four threatened species (*Leucopternis occidentalis*, *Ortalis erythroptera*, *Synadactyla ruficollis* and *Attila torridus*) and three near threatened species (*Tigrisoma fasciatum*, *Aratinga erythrogenys* and *Ampelioides tschudii*).

**PROTECTED STATUS:** none.

**THREATS:** complete clearance for agriculture.

**REFERENCES:** Best (1992).

## 17. CATACOCHA

Loja

**COORDINATES:** 4°03'5,79°40'W.

**ALTITUDE:** 1,400-1,850 m.

**DESCRIPTION:** a small patch of Semi-evergreen Lower Montane Cloud-forest on a steep cliff-slope, with agricultural and below.

**FOREST EXTENT:** 40 ha

**SURVEY DATES:** 4-5 Mar and 7-8 Mar 1991 (MC *et al.*), 2-3 Apr 1992 (ANSP)

**ORNITHOLOGICAL DATA:** four threatened species (*Ortalis erythroptera*, *Leptotila ochraceiventris*, *Syndactyla ruficollis* and *Hylocryptus erythrocephalus*) and two near-threatened species (*Aratinga erythrogenys* and *Brotogeris pyrropterus*).

**PROTECTED AREAS:** none

**THREATS:** agricultural encroachment, logging.

**REFERENCES:** Best (1992), M.B. Robbins *in litt.* (1992)

## 18. CELICA

## Loja

**COORDINATES:** 4°05'S, 79°57'S.

**ALTITUDE:** 1,600 - 2,800 m.

**DESCRIPTION:** several patches of Humid Montane cloud-forest to the E, W and N of the town.

**FOREST EXTENT:** largest patch do not exceed 50 ha.

**SURVEY DATES:** 18 Nov 1988 (PC), 19 - 20 Feb 1989 (PC), 1 Mar, 25-27 Mar and 28 May - 3 June 1989 (HB *et al.*), 11-12 Apr and 1 May 1989 (PC), 28 May - 1 June 1989 (HB *et al.*), Aug 1989, 19 - 20 Sept. 1990 (PC), 17, 26 and 29-30 Mar 1991 (WFVZ), 6-8, 14 and 20 Feb 1991 (BJB *et al.*), 16 Aug, 10-11 Sept 1991 (RSRW and JAT). Also recent surveys by NK, ANSP and bird tour groups and early 20th century surveys by AMNH: Chapman (1926).

**ORNITHOLOGICAL DATA:** eight threatened species (*Leucopternis occidentalis*, *Ortalis erythroptera*, *Leptotila ochraceiventris*, *Acestrura bombus*, *Syndactyla ruficollis*, *Hylocryptus erythrocephalus*, *Myrmeciza griseiceps* and *Attila torridus*) and one near-threatened species (*Aratinga erythrogenys*).

**PROTECTED STATUS:** none, however Fundación Arco Iris, a local NGO, is developing a conservation proposal for the area with BirdLife International to seek funding for formal protection.

**THREATS:** further clearance for agricultural land.

**REFERENCES:** R. S. Ridgely *in litt.* to ICBP (1989), Best (1992), Bloch *et al.* (1991), P. Coopmans *in litt.* (1991), Kiff (1991), Best (1992), Phillips *in litt.* (1994), Williams and Tobias (1994).

## 19. EL EMPALME

## Loja

**COORDINATES:** 4°08'S, 79°49' W.

**ALTITUDE:** 700-900 m.

**DESCRIPTION:** Deciduous *Ceiba trichistandra* Forest, mostly with a sparse. Large tracts, but poor quality.

**FOREST EXTENT:** only 30 ha of good quality forest along streams/ravines.

**SURVEY DATES:** 16-25 Aug 1989 (ANSP), 7 and 17 Feb 1991 (BJB *et al.*), 24 Aug 1991 (JAT & RSRW).

**ORNITHOLOGICAL DATA:** two threatened species (*Leptotila ochraceiventris* and *Hylocryptus erythrocephalus*) and two near – threatened species (*Aratinga erythrogenys* and *Brotogeris pyrrhopterus*).

**PROTECTED STATUS:** none.

**THREATS:** disturbance of forest understorey in the last areas where it is currently intact.

**REFERENCES:** M.B. Robbins *in litt.* (1991), Best (1992), Williams and Tobias (1994).

## 20. SABANILLA – ZAPOTILLO

Loja

**COORDINATES:** 4°14'S, 80°11'W.

**ALTITUDE:** 500-550 m.

**DESCRIPTION:** *Acacia* forest and scrub, surrounded by agricultural land. Surveyed during an El Niño year when the vegetation was unusually lush.

**FOREST EXTENT:** extensive tracts of deciduous forest occur in the region, but most of the forest has a very open, degraded understorey.

**SURVEY DATES:** 8-9 Apr 1992, and April 1993 (ANSP)

**ORNITHOLOGICAL DATA:** Three threatened (*Synallaxis tithys*, *Hylocryptus erythrocephalus* and *Cardueus siemiradzkii*) and two near-threatened species (*Crypturellus transfasciatus* and *Aratinga erythrogenys*).

**PROTECTED STATUS:** none.

**THREATS:** further degradation and fragmentation.

**REFERENCES:** M.B. Robbins *in litt.* (1992)

## 21. SOZORANGA

Loja

**COORDINATES:** 4°21 'S, 79°47'W.

**ALTITUDE:** 1,600-2,615m.

**DESCRIPTION:** patches of Semi-evergreen Lower Montane Cloud-forest in surrounded by agricultural land and shrub.

**FOREST EXTENT:** patches not exceeding 30 ha.

**SURVEY DATES:** 10-12 June 1989 (HB *et al.*), 8-20 Aug and 8 -21 Sept 1989 (BJB *et al.* \*), 19-23 Jul 1990 (RSRW and JAT), 30 Jan-1 Feb, 5-6 Mar and 9-12 Mar 1991 (BJB *et al.*); 145 observer days. Also Dec 1994 surveys by E. Barnes and G. Engblom.

**ORNITHOLOGICAL DATA:** 94 species recorded including five threatened species (*Ortalis erythroptera*, *Leptotila ochraceiventris*, *Syndactyla ruficollis*, *Hylocryptus erythrocephalus*, and *Lathrotriccus griseipectus*), and three near threatened species (*Harpyhaliaetus solitarius*, *Aratinga erythrogenys* and *Brotogeris pyrrhopterus*).

**PROTECTED STATUS:** one small forest patch is apparently being protected for watershed purposes, and Fundación Arco Iris a local NGO is developing a

conservation proposal for the area with BirdLife International to seek funding for formal protection. **THREATS:** agricultural expansion, logging, soil erosion. **REFERENCES:** Best and Clarke (1991), Bloch *et al.* (1991), Best (1992), R. Phillips (1994), Williams and Tobias (1994).

## 22. UTUANA

Loja

**COORDINATES:** 4°22'S, 79°43'W.

**ALTITUDE:** 2,500 m.

**DESCRIPTION:** an area of Humid Montane Cloud forest, surrounded by agricultural land.

**FOREST EXTENT:** 100 ha.

**SURVEY DATES:** 13-14 and 21-25 Sept 1989 (BJB *et al.* \*), 5-6 Feb 1991 (BJB *et al.*), 23 July 1991.(PC); 17 observer days.

**ORNITHOLOGICAL DATA:** At least 50 species recorded, including two threatened species (*Syndactyla ruficollis* and *Myrmeciza griseiseps*) and one near-threatened species (*Aratinga erythrogenys*).

**PROTECTED STATUS:** none.

**THREATS:** understorey removal agricultural expansion.

**REFERENCES:** Best and Clarke (1991), P. Coopmans *in litt.* (1991), Best (1992).

## 23. TAMBO NEGRO

Loja

**COORDINATES:** 4°24'S, 79°51'W.

**ALTITUDE:** 600-1,000 m.

**DESCRIPTION:** a large tract of Deciduous *Ceiba trichistandra* Forest on a ridge extending into Peru.

**FOREST EXTENT:** 2,500 ha.

**SURVEY DATES:** 24 Aug-7 Sept and 26-30 Sept 1989 (BJB *et al.* \*), 26 Jan-7 Feb and 6-9 Mar 1991 (BJB *et al.*); 113 observer days. Also Dec 1994 surveys by C. Balchin, E. Barnes and G. Engblom.

**ORNITHOLOGICAL DATA:** 113 species recorded, including seven threatened species (*Ortalis erythroptera*, *Leptotila ochraceiventris*, *Synallaxis tithys*, *Syndactyla ruficollis*, *Hylocryptus erythrocephalus*, *Myrmeciza griseiceps* and *Lathrotriccus griseipectus*), and three near-threatened species (*Crypturellus transfasciatus*, *Aratinga erythrogenys* and *Brotegeris pyrropterus*).

**PROTECTED STATUS:** none, but the area is being managed by locals for hunting and cattle grazing.

**THREATS:** agricultural expansion and logging.

**REFERENCES:** Best and Clarke (1991) Best (1992), R. Phillips *in litt.* (1994)

## 24. ANGASHCOLA

Loja

**COORDINATES:** 4°34'S, 79°22'W.

**ALTITUDE:** 2,500-3,100m.

**DESCRIPTION:** Humid Montane Cloud forest.

**FOREST EXTENT:** 300-400 ha.

**SURVEY DATES:** 1-17 and 30 Aug-3 Sept 1990, 22-28 Jul 1991 (RSRW & JAT); 71 observer days.

**ORNITHOLOGICAL DATA:** four threatened species (*Penelope barbata*, *Leptosittaca branickii*, *Metallura odomae* and *Syndactyla ruficollis*) and two near-threatened species (*Aratinga erythrogenys* and *Saltator cinctus*)

**PROTECTED STATUS:** none.

**THREATS:** logging and grazing of the understorey, hunting.

## 25. TUMBES NATIONAL FOREST

Tumbes

**COORDINATES:** 3°49'S, 80°17'W.

**ALTITUDE:** 400-750 m.

**DESCRIPTION:** the northern part of the North West Peru Biosphere Reserve, forming the largest continuous tract of forest in the Tumbesian region.

Forest types include Deciduous Ceiba *trichistandra* Forest, Semi-evergreen Ceiba *pentandra* Forest and Semi-evergreen Lowland and Premontane Tall Forest.

**FOREST EXTENT:** 75,102 ha in the reserve.

**SURVEY DATES:** 14 Jun-5 July 1979 (DAW *et al.*), 25 Feb-3 Mar 1986 (MK), 23-27 July 1988 (TAP and TSS) **ORNITHOLOGICAL DATA:** 163 species recorded, including 11 threatened species *Leucopternis occidentalis*, *Ortalis erythroptera*, *Leptotila ochraceiventris*, *Synallaxis tithys*, *Syndactyla ruficollis*, *Hylocryptus erythrocephalus*, *Mymeciza griseiceps*, *Onychorhynchus occidentalis*, *Lathrotriccus griseipectus*, *Attila torridus* and *Carduelis siemiradzkii*) and four near-threatened species (*Crypturellus transfasciatus*, *Aratinga erythrogenys*, *Brotogeris pyrropterus* and *Pachyramphus spodiurus*).

**PROTECTED STATUS:** Peruvian government designated National Forest and Biosphere Reserve.

**THREATS:** settlement, logging, hunting.

**REFERENCES:** Wiedenfeld *et al.* (1985), Pulido (1991), M. Kessler *in litt.* (1992), Parker *et al.* (1995).

## 26. CERROS DE AMOTAPE NATIONAL PARK

Tumbes

**COORDINATES:** 4°28'S, 80°40'W.

**ALTITUDE:** 200-600 m.

**DESCRIPTION:** part of the North-West Peru Biosphere Reserve.

**FOREST EXTENT:** not known; Park extends to 91,300 ha.

**SURVEY DATES:** 11-18 Nov 1972 (LSUMZ).

**ORNITHOLOGICAL DATA:** two threatened species (*Syndactyla ruficollis* and *Lathrotriccus griseipectus*) and one near-threatened (*Aratinga erythrogenys*) have been found but no detailed surveys have been conducted.

**PROTECTED STATUS:** Peruvian government designated National Park.

**THREATS:** settlement, logging, hunting.

**REFERENCES:** Schulenberg and Parker (1981).

## 27. AYABACA

Piura

**COORDINATES:** 4°36'S, 79°44'W.

**ALTITUDE:** 2,625 m.

**DESCRIPTION:** Humid Montane Cloud-forest with cattle pastures.

**FOREST EXTENT:** a total of c. 100 ha in several patches.

**SURVEY DATES:** 22-26 Sept 1989 (CTC and MC); 7 observer days.

**ORNITHOLOGICAL DATA:** 44 species recorded including four threatened species (*Penelope barbata*, *Leptotila ochraceiventris*, *Syndactyla ruficollis* and *Myrmeciza griseiceps*).

**PROTECTED STATUS:** none.

**THREATS:** logging, agricultural encroachment.

**REFERENCES:** Best and Clarke (1991).

## 28. CANCHAQUE – HUANCABAMBA

Piura

(Includes Cruz Blanca)

**COORDINATES:** 5°23'S, 79°37'W.

**ALTITUDE:** 1,700-3,500 m.

**DESCRIPTION:** a large area of cloud-forest and scrub, notable for its rare Andean species, but also supporting three important Tumbesian endemics.

**FOREST EXTENT:** not known.

**SURVEY DATES:** 25 Nov-10 Dec 1974, 19-25 Aug 1975, 11-20 Oct 1977, 7-12 July 1978, 10 June-25 July 1980 (LSUMZ) (also early 20th century surveys by AMNH and recent visits by birdwatchers); 380+ observer days.

**ORNITHOLOGICAL DATA:** six threatened species (*Penelope barbata*, *Hapalopsittaca pyrrhops*, *Syndactyla ruficollis*, *Hylocryptus erythrocephalus*, *Myrmeciza griseiceps* and *Buthraupis wetmorei*) and eight near-threatened species (*Harpyhaliaetus solitarius*, *Gallinago imperialis*, *Aegolius harrisii*, *Aratinga erythrogenys*, *Metallura odomae*, *Grallaricula peruviana*, *Myiophobus lintoni* and *Incaspiza ortizi*).

**PROTECTED STATUS:** none.

**THREATS:** cattle trampling and grazing of understorey, forest clearance for agriculture.

**REFERENCES:** Parker et al. (1985).

## 29. OLMOS – BAGUA

Lambayeque

**COORDINATES:** 5°50'S, 80°17'W.

**ALTITUDE:** 500 m.

**DESCRIPTION:** semi-evergreen forest fragments in a ravine.

**FOREST EXTENT:** very small (a few hectares only).

**SURVEY DATES:** several LSUMZ surveys between 1964 and 1979;13 Feb 1986 (MK and TM).

**ORNITHOLOGICAL DATA:** three threatened species (*Leptotila ochraceiventris*, *Syndactyla ruficollis* and *Hylocryptus erythrocephalus*) and one near-threatened species (*Crypturellus transfasciatus*).

**PROTECTED STATUS:** none.

**THREATS:** deforestation.

**REFERENCES:** Schulenberg and Parker (1981), M. Kessler *in litt.* (1993)

## 30. QUEBRADA CABALLITO

Piura

(rio Tocto valley)

**COORDINATES:** 5°53'S, 80°19'W.

**ALTITUDE:** 500-1,000 m.

**DESCRIPTION:** mostly deciduous (thorn) forest.

**FOREST EXTENT:** at least 100 ha.

**SURVEY DATES:** 9-12 Feb 1986 (MK& TM); 6 observer days.

**ORNITHOLOGICAL DATA:** two threatened species (*Penelope albipennis* and *Hylocryptus erythrocephalus*).

**PROTECTED STATUS:** private reserve.

**THREATS:** further degradation.

**REFERENCES:** M. Kessler *in litt.* (1992).

**Note:** several other small valleys in the range of *Penelope albipennis* may also support *Hylocryptus erythrocephalus* and *Aratinga erylrogenys*.

A summary table listing these important ornithological sites and their priority species complements appears below (Figure 87).

Figure 87. Important ornithological sites in the Tumbesian region and their species complements. Each locality listed in the directory is included.

Sites	Species																						
	PBT	GBH	RHC	WWG	OBD	RMP	EOP	GCP	EW	BHS	RNFG	HHFG	GHA	PRF	GBF	PCT	TT	OA	SB	PP	PHBF	SS	
1. Cerro Mutiles																							
2. Caberceras de Bilsa																							
3. Río Palenque																							
4. Jauneche																							
5. Hacienda Pacaritambo																							
6. Machalilla N.P.																							
7. Cerro Blanco																							
8. Manglares Churute E.R.																							
9. Manta Real																							
10. San Miguel																							
11. Uzhcurrumi																							
12. Arenillas M.R.																							
13. Buenaventura																							
14. Vicentino																							
15. Alamor																							
16. Tierra Colorada																							
17. Catacocha																							
18. Celica																							
19. El Empalme																							
20. Sabanilla-Zapotillo																							
21. Sozoranga																							
22. Utuana																							
23. Tambo Negro																							
24. Angashcola																							
25. Tumbes National Forest																							
26. Cerros de Amotape N.P.																							
27. Ayabaca																							
28. Canchaque-Huancabamba																							
29. Olmos																							
30. Quebrada Caballito																							

**Sources:** Brossett (1964), Vuilleumier (1978), Leck (1979), Leck *et al.* (1980), Schulenberg and Parker (1981), Wiedenfeld *et al.* (1985), MacBryde (1987), P. J. Greenfield *in litt.* to ICBP (1989), R. S. Ridgely *in litt.* to ICBP (1989), Best and Clarke (1991), Bloch *et al.* (1991), P. Coopmans *in litt.* (1991), Kiff (1991), Krabbe (1991), Ridgely (1991a, 1991b), R. S. Ridgely *in litt.* (1991), Best (1992), P. Coopmans *in litt.* (1992), M. Kessler *in litt.* (1992), N. Krabbe *in litt.* (1992), Parker and Carr (1992), M. B. Robbins *in litt.* (1992), M. Whingham *in litt.* (1992), K. S. Berg *in litt.* (1993), M. Kessler *in litt.* (1993), Williams and Tobias (1994) and Parker *et al.* (1995).



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# CONSERVATION RECOMMENDATIONS

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## INTRODUCTION

THE PRECEDING chapters have demonstrated the importance of the Tumbesian region in terms of the high levels of endemism of its flora and avifauna, and the unusually wide diversity of vegetation types it supports. However, human pressures have brought many of the endemic species to the verge of extinction and very little original forest remains. This calls for urgent conservation action.

This chapter aims to use all available biological data yet the minimum of resources, to set out the action necessary to maintain maximum biological diversity within the Tumbesian Centre of Endemism. Two different approaches are combined. Because the region's forests have been so severely degraded there is a danger that within the next decade whole habitats will be lost, along with the species which are restricted to them. This requires an immediate conservation effort: the designation of areas worthy of particular protection as reserves. Some of these areas have already been given reserve status; others will need to be set up as new reserves. These are areas which support populations of threatened species, vegetation types or ecosystems. Secondly, as the protection of individual areas is doomed to fail unless the local people and the environmental situation of the whole region are taken into account, a regional environmental programme must also be implemented. We believe this latter approach is the only way to achieve the long-term conservation of the biodiversity Tumbesian region, but it will necessarily take time to implement; in the meantime the few valuable tracts of remaining habitat may be lost. For this reason protected areas are also a vital component.

As there are many gaps in our knowledge of habitat and species distributions in the Tumbesian region, the recommendations presented are not definitive, rather they are based on what information is available now. We simply cannot afford to wait until our knowledge of the region is complete. Included in this chapter is a section detailing the most important research priorities which remain, themselves an integral part of any conservation measures.

In order to protect the maximum numbers of species in the Tumbesian region it is important that all the characteristic vegetation types are safeguarded.

In the short term an effective way of achieving this is by creating reserves. These conservation recommendations aim to protect at least two representative samples of all the important vegetation types inside reserves. Two reserves are preferable over one because having only one for a particular vegetation type increases the risk of destruction through freak events (e.g. fire) or intense human pressure, or the genetic deterioration of the site (Wilcox 1982). It also increases the genetic variability of the ecosystem; it should however be seen as the minimum conservation action necessary. Because so little is known about plant and animal distributions in the region, it is not possible to know whether the recommendations meet the needs of all the endemic taxa (a discussion for birds appears below), but by focusing on discrete habitats a range of species should be protected. Furthermore it is flexible: if ‘new’ habitat patches or new populations of endemic species are discovered in future, these can easily be incorporated.

### **WHICH HABITATS MUST BE PROTECTED?**

The ‘Vegetation’ chapter showed that some of the vegetation types of the Tumbesian region have higher conservation importance than others due to their uniqueness, degree of endemism and species richness. Two priority groups for conservation were identified (subsequently collectively called “the priority vegetation types”; Box 6), each containing four vegetation types. Habitats in group one have higher conservation priority than those in group two.

Table 11 shows that four (50%) of the priority vegetation types (all group one) are already protected within at least two existing reserves. These existing protected areas are clearly extremely important conservation sites and have a significant role to play in preserving biodiversity in the Tumbesian region. The next section details the action necessary to safeguard these crucial sites.

### **ACTION REQUIRED IN THE EXISTING TUMBESIAN RESERVES**

All existing reserves in the Tumbesian region are important from the point of view of habitat protection so they must be securely protected and effectively managed. Each has its own combination of specific threats, the most prevalent being the slow degradation of the forest and its understorey by agricultural encroachment from neighbouring lands and roaming cattle and feral animals, which destroy the understorey and suppress tree regeneration. The managers in charge of each protected area should be informed of the reserve’s vital role in preserving the biodiversity of the Tumbesian Centre of Endemism and preferably

**Box 6. Priority habitat types of the Tumbesian region.**

**Group 1: Conservation essential**

Mainly Deciduous Tropical Thorn-forest and *Acacia* Thorn-forest\*

Mainly Deciduous *Ceiba trichistandra* Forest\*

Semi-evergreen *Ceiba pentandra* Forest\*

Semi-evergreen Lowland and Premontane Tall Forest\*

**Group 2: Conservation very important**

Humid to Very Humid Premontane Cloud-forest

Deciduous to Semi-evergreen Lower Montane Cloud-forest

Humid Coastal-hill Cloud-forest

Deciduous to Semi-evergreen Intermontane Scrub, Thorn-forest and Forest

**Table 10. The Vegetation types of the existing Tumbesian protected areas.**

Vegetation type	Protected Areas							
	1	2	3	4	5	6	7	8
<b>Group A</b>								
1. Mainly Deciduous Tropical Thorn-forest and <i>Acacia</i> Thorn-forest	*	?	-	-	-	-	*	2+
2. Mainly Deciduous <i>Ceiba trichistandra</i> Forest	*	*	*	*	-	*	-	5
3. Semi-evergreen <i>Ceiba pentandra</i> Forest and Semi-evergreen Lowland and Premontane Tall Forest	-	?	*	*	-	-	?	2+
<b>Group B</b>								
4. Humid to Very Humid Premontane Cloudforest	-	-	-	-	-	-	-	0
5. Deciduous to Semi-evergreen Lower Montane Cloud-forest and Forest	-	-	-	-	-	-	-	0
6. Humid Coastal-hill Cloud-forest	-	-	-	*	-	-	-	1
7. Deciduous to Semi-evergreen Intermontane Scrub, Thorn-forest and Forest	-	-	-	-	-	-	-	0
<b>Group C</b>								
8. Semi-desert	-	-	-	-	-	-	-	0
9. Moist Lowland Forest	-	-	-	-	*	-	-	1
10. Humid to Very Humid Lower Montane Cloud-forest	-	-	-	-	-	-	-	0
11. Humid to Very Humid Montane Cloud-forest	-	-	-	-	-	-	-	0
<b>Number of vegetation types per reserve</b>	<b>2</b>	<b>1+</b>	<b>2</b>	<b>3</b>	<b>1</b>	<b>1</b>	<b>1+</b>	<b>1+</b>

**Protected areas:** 1. El Angolo Hunting Reserve, 2. Cerros de Amotape National Park, 3. Tumbes National Forest (these three areas together form the North-West Peru Biosphere Reserve which embraces three vegetation types), 4. Machalilla National Park, 5. Jauneche Reserve, 6. Cerro Blanco Reserve, 7. Quebrada Negrohuasi, 8. Number of reserves in which the vegetation type occurs.

be given outside technical and financial support in order to preserve their integrity. Efforts must be made to reduce the pressure on the reserves. This could be achieved by planting quick-growing trees outside reserve boundaries to reduce wood-extraction pressure within the reserve itself, and by creating buffer zones around each reserve in which only limited uses are allowed (depending on the reserve), as has been tried in the Machalilla National Park. Environmental education programmes in the local area of each reserve should aim to stress the local importance of forests as water-catchment areas and promote their value in preventing soil erosion and nutrient loss (see below under 'Other action'). It is important that local people see the reserves as having tangible value for them; if possible they should be employed as guards or guides for visiting ecologists (and tourists if ecotourism is feasible). Management objectives of existing reserves should be assessed and where appropriate technical and financial support should be secured to improve management. Specific threats to the existing protected areas are detailed below.

### **Machalilla National Park**

Although one of the unique ecological areas of Ecuador, this reserve suffers many human pressures (Salazar and Huber 1982). Much dry forest in this reserve has been degraded and wildlife is threatened by colonization, logging, hunting, agriculture and animal grazing (MacBryde 1987, Dodson and Gentry 1991, Figueroa 1992). Semi-wild domestic animals roam everywhere in the park (mainly goats and mules; Salazar and Huber 1982), suppressing tree regeneration; these authors stress that they must be controlled by their owners or eradicated from the park. Park managers are attempting to limit settlement to certain areas which are then removed from the park area (Salazar and Huber 1982), but this has been complicated by confusion over the ownership of certain areas. Soil erosion continues to be a problem, causing the sedimentation of rivers. Reforestation of degraded parts of the park could be attempted. It is important to establish a research centre to monitor the status of the park, study its wildlife and conduct inventories.

### **North-West Peru Biosphere Reserve**

This area is apparently only protected by its remoteness at present and is at risk from future settlement, logging and agriculture, since a road is being re-opened into the area after being destroyed by the 1982-1983 El Niño floods (Parker *et al.* 1989). The reserve is seemingly only guarded by military personnel who patrol the border with Ecuador. An important recent development is the setting up of a research centre in the southern part of the Biosphere Reserve in the El Angolo Hunting Reserve, by the National Agricultural University of La Molina. This is

used primarily by foresters although some mammal studies have been undertaken there; it is important to establish a research station similar to the one at La Molina in the Tumbes National Forest.

Both the Machalilla National Park and the North-West Peru Biosphere Reserve also suffer from understaffing and lack of equipment and funds. The highest conservation priority should be given to making these two areas secure. They are the two largest remaining areas of forest in the Tumbesian region; the North-West Peru Biosphere Reserve standing out in terms of its size and comparatively pristine forest. Outside funds should be injected into increasing the staffing levels of the parks as well as the resources available to the park guards and managers. An effort to secure the long-term future of these two areas is an essential foundation of any conservation measures for the Tumbesian region.

### **Manglares-Churute Ecological Reserve**

The biological importance of this area has yet to be established. It covers some 35,000 ha, although the exact amount of forest is not known. The reserve is known to contain forest of a suitable type for threatened Tumbesian bird species (though perhaps rather limited in extent); four have been found to date: *Leucopternis occidentalis*, *Leptotila ochraceiventris*, *Onychorhynchus occidentalis* and *Lathrotriccus griseipectus* (R. S. Ridgely *in litt.* 1992), but there appear to have been very few specific ornithological surveys. K. S. Berg and N. Hilgert have carried out recent surveys there and these investigations should continue as the area may prove to have considerable ornithological and botanical value.

### **Other protected areas**

In addition to the above comparatively large protected areas, there are five smaller, privately owned reserves in the Tumbesian region, four in Ecuador: Cerro Mútilos (Esmeraldas Province), Río Palenque (Pichincha Province), Jauneche (Los Ríos Province) and Cerro Blanco (Guayas Province); and one in Peru: Quebrada Negrohuasi (Lambayeque Department). These smaller protected areas are also threatened by agricultural encroachment, roaming cattle and illegal deforestation; their wildlife is also subject to hunting. The owners of these private reserves should be encouraged in their efforts to keep each secure and informed of the value of their forests.

### **Reforestation**

As a more general recommendation, reforestation schemes could be attempted in the degraded parts of larger reserves (such as the Machalilla National Park), or in neighbouring areas of smaller reserves. Such attempts should, however, be guided

by experience gained from dry forest regeneration elsewhere (e.g. Costa Rica) as the successful restoration of dry forest is particularly difficult. Janzen (1988) pointed out that many forest fragments are «decomposing», i.e. many of the component plant species cannot regenerate and will eventually become locally extinct. This is caused by human impact (especially domestic animal grazing) and by the small size of the habitat fragments. In the case of trees, species may take hundreds of years to disappear, so the process may not be obvious. When a degraded or completely cleared forest is allowed to grow back, its species composition will depend on which species will colonize the area first. If there are individual seed trees left, these will dominate the regeneration. In the case of large (over 1 km<sup>2</sup>) clearings, wind-dispersed trees will dominate the newly growing forest. Animal-dispersed trees, especially those dispersed by forest-dwelling vertebrates, will be under-represented in large clearings, as the dispersing animals will tend to stay out of them.

Once a forest has been established, the dominant tree species will tend to continue as such, and it will take many tree generations before animal-dispersed trees will make a significant contribution to the species composition of the new forest, if in fact they ever do. It is possible that the species composition and dominance of tropical forests is based largely on stochastic events (e.g. Connell 1978, Hubbell and Foster 1986, Gentry 1988); in other words there is no fixed climax species composition, but if a forest by chance has a certain composition, it will tend to stay as it is or change by chance. The animal-dispersed trees are of great importance for the survival of those animals which feed on them, e.g. Terborgh (1986) found that in an Amazonian forest area a group of only 12 palm and fig species (out of 2,000 plant species) maintains almost all large frugivores for about three months of the year.

Therefore if a forest patch is allowed to regenerate by itself it will end up with a different tree composition from one that is managed, e.g. by the introduction of particular tree species (such as fruiting trees, or valuable timber trees which are likely to be under-represented in all remaining Tumbesian forests). Janzen (1988) concluded that different forest patches should be managed in different ways in order to create a diverse mosaic of different forest types. It is encouraging that natural invasion of forest trees into cleared pastures seems to proceed at a much faster rate in dry forests than in wet forests (Janzen 1988).

This is just one example which shows that reserves not only have to be protected, but also must be effectively managed to ensure the survival of the species and communities that are to be preserved. Much baseline research is needed here (see research priorities). Such problems encountered in safeguarding the existing protected areas of the Tumbesian region effectively clearly emphasize that once established, additional funds will be required to ensure that any new reserves are kept secure.

## THE NEED FOR NEW TUMBESIAN RESERVES

Although four priority vegetation types are already ‘protected’ inside at least two existing reserves, this leaves a further three without protection, while the final one is protected in only one reserve (Table 10). Table 11 shows a priority ranking of areas important for habitat conservation in the Tumbesian region. In addition to the existing protected areas (listed in priority order based on the habitat type(s) they support) five new Tumbesian reserves are proposed in priority order. Priorities are set consecutively, i.e. once a vegetation type is represented twice an area with a different vegetation type is preferred. The proposed reserves are all in Ecuador and Box 7 lists further information on them.

### **Box 7. Proposed new Tumbesian reserves based on habitat priorities**

Reserves are listed in rank order.

**1. Manta Real (2°34’S 79°21’W), Azuay Province.**

For Humid to Very Humid Premontane Cloud-forest.

**2. Hacienda Quesada (3°20’S 79°18’W), Azuay Province**

For Deciduous to Semi-evergreen Intermontane Scrub, Thorn-forest and forest.

**3. A reserve in the Sozoranga (4°21’S, 79°47’W) or Catacocha (4°03’S 79°40’W) areas, Loja Province**

For Deciduous to Semi-evergreen Lower Montane Cloud-forest.

**=4. Cabeceras de Bilsa (0°37’N 79°51’W) Esmeraldas Province.**

For Humid Coastal-hill Cloud-forest. *The Jatun Sacha Bilsa area (0°22’N, 79°45’W) is an alternative site.*

**=4. A reserve in the very humid forest of El Oro province (site yet to be identified, potentially Buenaventura 3°40’S 79°44’W).**

For Humid to Very Humid Premontane Cloud-forest.

Although we have prioritized action in specific areas it is important to emphasize that every single remaining patch of forest in the Tumbesian region is valuable as a refuge for plants and animals and in protecting water supplies. Each local community has a role to play, and a benefit to receive, in maintaining these forest fragments.

In addition to protecting habitats as a basis for conservation in the Tumbesian region, there are sound reasons for doing so from a plant conservation stand-point. A fundamental difference between patterns of endemism in plants and that in birds is that the plants can have more restricted ranges than birds. For example, while about 1,200 plant species are endemic to the Ecuadorian provinces of Loja, El Oro and Azuay, only two bird species are restricted to this region

**Table 11. Priority sites for habitat conservation in the Tumbesian region.**

Site	Vegetation types (see Table 11)	Degree of destruction	Score	Priority	New reserve priority	Already protected
NW Peru Biosphere Reserve	1, 2, 3	A, C	9	1	-	YES
Machalilla National Park	2, 3, 4	C	8	2	-	YES
<i>Manta Real</i>	5	A	2	3	1	-
<i>Hac. Quesada</i>	6	B	2	4	2	-
<i>Sozoranga/Catachocha</i>	7	D	2	5	3	-
Arenillas	1, 2	C	6	6	-	YES
<i>Cabeceras de Bilsa</i>	4	A	2	+7	=4	-
<i>El Oro</i>	5	C	2	+7	=4	-
Q. San Isidro/Q. Negrohuasi	1	C	3	+8	-	YES
Tambo Negro/Zapotillo	2	D	3	+8	-	-
Celica/Alamor	10	D	1	+	-	-
Cerro Pata de Pajaro	4	B	2	9	-	-
Cerro Blanco	2	D	3	10	-	YES
Jauneche	9	B	1	+	-	YES
Río Palenque	9	D	1	+	-	YES
Cerro Mutilus	9	C	1	+	-	YES

+ 'extremital' vegetation types: conservation best achieved outside the Tumbesian region.

**Score:** calculated using vegetation type in group A=3 points, B=2 points, C=1 point (see Table 10)

**Forest disturbance:** A= large, little disturbed forest areas, B= small, little disturbed forest areas, C= large, disturbed forest areas, D= small, disturbed forest areas. (Large = >5,000 ha).

*sites in italics are proposed new reserves.*

(*Pyrrhura orcesi* an as yet undescribed *Scytalopus* species, N. Krabbe *in litt.* 1992). Many plant species are restricted to only one vegetation type, with some occurring only in part of the range of particular vegetation types. As shown in the 'Vegetation' chapter, lowland vegetation types tend to support species which are distributed throughout the range of their habitat type, while species of the Andean slopes show more pronounced local endemism, requiring the protection of several examples of these vegetation types if the complete flora is to be saved. This means that from a plant conservation viewpoint, it is vital to ensure that the distinctive vegetation types of the region are all protected, with emphasis on those vegetation types with the most marked endemism.

### **HOW WELL DO THE PROPOSED HABITAT CONSERVATION MEASURES PROTECT THE ENDEMIC AVIFAUNA OF THE TUMBESIAN REGION?**

Having suggested the proposed action necessary to preserve the habitats of the Tumbesian region, we will now consider whether this is sufficient to protect the endemic avifauna of the region, the only other taxonomic group known well enough to carry out such a comparison. The 'Avifauna' chapter identified 22 Tumbesian bird species in need of conservation action, 16 threatened species and six near-threatened species. Collectively these 22 species will be referred to as the «priority Tumbesian bird species». The remaining Tumbesian species are not discussed here because they seem able to survive at many secondary forest and scrub sites in the Tumbesian region and we believe, therefore, that they do not need any specific conservation action to ensure their continued persistence.

It is important to emphasize that habitat destruction in the Tumbesian region is in such an advanced state that there are few opportunities for experimentation or debate on the criteria for selecting or siting new reserves. The number of actual forest patches of sufficient size is so low that it could be reasonably recommended that each is of extreme importance for the conservation of the avifauna. However, certain areas stand out. The approach taken is a modified version of the «network analysis» or «critical faunas analysis» of Ackery and Vane-Wright (1984); the fauna under consideration being the endemic birds of the Tumbesian centre.

Table 12 establishes whether the habitat conservation recommendations provide at least two geographically separate areas for each near-threatened and threatened bird species. As with the habitat conservation recommendations, such an approach represents the minimum number of reserves necessary. The table shows which threatened and near-threatened Tumbesian species occur in

the existing protected areas and the sites designated for protection under the habitat conservation recommendations. Twelve species occur in at least two of the existing protected areas of the Tumbesian region and require no additional reserves. Potential sites for the conservation of the remaining ten species will now be discussed.

*One species occurs in two of the areas designated for protection in the habitat conservation recommendations.*

**El Oro Parakeet** *Pyrrhura orcesi*

This rare parakeet is endemic to Ecuador and is confined to a small area in the humid forests of Azuay and El Oro Province between 300 and 1,300 m, and currently occurs in no protected areas. There is little choice when it comes to suggesting protected areas as it is currently only known from a handful of localities, one of which (Uzhcurrumi) is largely deforested. The creation of reserves in the Piñas area and at a second site in Azuay Province are priorities for this species. Recent research has identified a large area of humid forest in Azuay which would be suitable for a reserve and probably supports *P. orcesi* (M. Whittingham *in litt.* 1992). Additionally, its most northerly locality, Manta Real in Azuay Province, is apparently earmarked for protection by the Ecuadorian conservation organizations Fundación Natura and CECIA (P. Greenfield *in litt.* to ICBP 1989). However, to date no progress has been made and the area continues to be cleared (R. Phillips verbally 1992). The habitat conservation recommendations state that two areas critical for the survival of *Pyrrhura orcesi* be set up as new reserves because of their habitat value: an area of very humid forest in El Oro Province (potentially at Buenaventura) and Manta Real in Azuay Province.

*Five species occur in at least one existing reserve or in one proposed new reserve suggested in the habitat conservation recommendations. A fourth has been found on the very edge of the Machalilla National Park and probably also occurs within the park boundary.*

**White-winged Guan** *Penelope albipennis*

This species was present in the coastal mangroves of north-western Peru in 1886 and 1887, but was not recorded afterwards and believed extinct until a small population was found in the dry wooded valleys of northern Peru in 1977 (de Macedo 1978). There is a possibility that the bird occurs in the arid part of south-western Ecuador: in 1980 White-tailed Jays *Cyanocorax mystacalis* were heard giving imitations of guan alarm calls in dry forest in coastal El Oro; these referred

**Table 11. Priority sites for bird conservation in the Tumbesian region.**  
The distribution of the threatened and near-threatened Tumbesian endemics in 18 areas given.

Sites	Species																						
	PBT	GBH	RHC	WWG	OBD	RMP	EOP	GCP	EW	BHS	RNFG	HHFG	GHA	PRF	GBF	PCT	TT	OA	SB	PP	PHBF	SS	
<b>Existing protected areas or proposed reserves based on habitat conservation priorities</b>																							
NW Peru Biosphere Reserve	X	X	X		X	X		X		X	X	X	X	X	X			X	X				X
Machalilla National Park	X	X	X		X	X			X	X		X		X	X			X					X
Hac. Quesada																							
Manta Real		X	X			X	X	X						X	X			X	X				
El Oro Province humid forest		X	X		X	X	X							X	X			X					
Sozoranga/Catachocha			X		X	X		X			X	X	X		X								
Celica/Alamor		X	X		X	X		X		X	X	X	X					X					
Arenillas	X		X			X		X		X													
Cabeceras de Bilsa		X	X															X					
Cerro Mutiles		X	X																				
Río Palenque		X	X			X								X	X			X	X				
Jauneche	X		X		X	X								X	X			X					
Cerro Blanco	X	X	X		X	X		X		X		X		X	X								X
Manglares Churute E.R.		X	X		X	X		X						X	X								
Q. Negrohuasi				X								X											
<b>Species occurs in two existing reserves</b>	X	X	X		X	X		X		X		X		X	X			X					X
<b>Species occurs in two existing or proposed reserves</b>	X	X	X		X	X	X	X	X	X	X	X		X	X			X	X				X
<b>Additional sites of ornithological interest</b>																							
Celica		X	X		X	X					X	X	X					X					
Sozoranga			X		X	X		X			X	X			X								
Tambo Negro	X		X		X	X		X		X	X	X	X		X								

**Sources:** Leck (1979), Leck *et al.* (1980), Schulenberg and Parker (1981), Wiedenfeld *et al.* (1985), P. J. Greenfield *in litt.* to ICBP (1989), R. S. Ridgely *in litt.* to ICBP (1989), Best and Clarke (1991), Bloch *et al.* (1991), P. Coopmans *in litt.* (1991), Kiff (1991), Krabbe (1991), Ridgely (1991a, 1991b), R. S. Ridgely *in litt.* (1991), Best (1992), P. Coopmans *in litt.* (1992), M. Kessler *in litt.* (1992), M. Whittingham *in litt.* (1992), N. Krabbe *in litt.* (1992), Parker and Carr (1992), M. B. Robbins *in litt.* (1992), K. S. Berg *in litt.* (1993), M. Kessler *in litt.* (1993), Williams and Tobias (1994) and Parker *et al.* (1995). see Table 3 for explanation of abbreviated species names.

to either *P. albipennis* or *P. purpurascens*, although the latter species normally occupies humid forest in Ecuador (R. S. Ridgely *in litt.* to ICBP 1992). There are also reports of an unidentified *Penelope* species, either *P. albipennis* or *P. purpurascens*, in the Tumbes National Forest (Parker *et al.* 1995). The mangrove forests bordering the Pacific Ocean in south-western Ecuador and north-western Peru may also harbour the species (these have been rapidly cleared for the shrimp-farming industry).

Surveys in all these sites are an urgent priority, along with the establishment of new reserves and environmental education programmes in its only known stronghold in Peru. Although a small reserve has already been set up in Peru (at Quebrada Negrohuasi), protection apparently exists on paper only (Collar *et al.* 1992), and practical measures should be taken to protect the reserve effectively. At other sites, such as Quebrada San Isidro, money has been invested to protect the species. The main problem is that it occurs at very low densities in numerous small valleys in northern Peru, none of which support viable populations, so that any reserves created would not hold many individuals.

#### **Esmeraldas Woodstar** *Acestrura berlepschi*

This very rare hummingbird is endemic to Ecuador and has only been recorded from the coastal west-central sector. Conservation action should be directed to the Coastal Cordillera, where it was known from, and rediscovered in 1990 (in the Ayampe area of Manabí Province), on the edge of the Machalilla National Park (Collar *et al.* 1992). A second area where a population can be protected should be identified, with searches directed towards the Coastal Cordillera to the north of Ayampe and the interior of the Machalilla National Park which has so far yielded no records, but possesses suitable habitat. Apparent seasonal movements of the species complicate any conservation action (it was not found in July 1992 at Ayampe where it had been found in March 1990 and also seen in January 1991: R. S. Ridgely *in litt.* to ICBP 1992). At present it is not possible to recommend any future reserves for this hummingbird.

#### **Rufous-necked Foliage-gleaner** *Syndactyla ruficollis*

This scarce furnariid has been principally found in two areas of south-west Ecuador, both within Loja Province: the Celica-Alamor massif; and the Utuana-Tambo Negro region near Sozoranga. The bird is also known from mountainous northern Peru (e.g. Huancabamba: Parker *et al.* 1985; Ayabaca: Best and Clarke 1991), as well as in the Tumbes National Forest, where it is uncommon and occurs towards the lower end of its preferred altitudinal range. The creation of reserves in both the Celica-Alamor and Utuana-Sozoranga regions would be desirable as each area supports a healthy complement of priority species (13 and

10 priority species respectively). Only the latter area has been designated for protection in the habitat conservation recommendations. On ornithological grounds it is important that the Celica-Alamor region is also protected as it is noteworthy for the humid montane habitat favoured by *Syndactyla ruficollis* and also *Myrmeciza griseiceps* (see below). The lower part of the Sozoranga region (especially Tambo Negro) is also important for its large tract of *Ceiba* forest inhabited by *Leptotila ochraceiventris* and *Synallaxis tithys*. The latter area is cooperatively owned and is being protected (as a source of water and hunting) by local people who grow rice in the river valley below. Recent fieldwork near Alamor has revealed a potential area for protection to the north-east of that town (R. Phillips verbally 1992). Additionally, maximizing the range of forest types which are protected would seem prudent in light of evidence of seasonal use of several forest types by certain species.

**Grey-headed Antbird** *Myrmeciza griseiceps*

This poorly known antbird has a similar distribution to *Syndactyla ruficollis*, and like that species favours the understorey of dry and humid forest. The best location for a reserve for this species would be in the Celica-Alamor region. The size and breeding status of the Tambo Negro population of *Myrmeciza griseiceps* should be established.

**Slaty Becard** *Pachyramphus spodiurus*

Outside the Tumbes National Forest and the Río Palenque Reserve, the only recent records of *P. spodiurus* all come from Ecuador: at Manta Real (Azuay Province), near Arenillas (El Oro Province), and Puyango (Loja Province) (Collar et al. 1992). Of these only Manta Real is designated for protection in the habitat conservation recommendations. A detailed search must be made in adjacent regions and the sizes of the populations in these areas should be established. The species is known from the Río Palenque reserve in Pichincha Province, Ecuador (F. Ortiz-Crespo *in litt.* 1992) although the tiny size of that reserve means that the overall population cannot be very large. An urgent priority is to establish whether it occurs in the Machalilla National Park. The most suitable site for a new reserve may be Manta Real, which is apparently designated for protection by Fundación Natura and CECIA (see above) and has been highlighted in the habitat conservation recommendations. The bird occurs close to the Celica-Alamor massif and may occur at lower elevations on the massif itself; if so it could be protected by the proposed reserve in that region.

*The remaining four species occur in no existing or proposed reserve.*

**Piura Chat-Tyrant** *Ochthoeca piurae*, **Tumbes Tyrant** *Tumbezia salvini* and **Peruvian Plantcutter** *Phytotoma raimondii*

These three species pose special problems as they are known from only a handful of localities in north-western Peru and are extremely poorly-known birds. The two tyrants inhabit scrubby regions and riparian thickets, yet have very local distributions in the dry Andean foothills (*O. piurae*) and coastal lowlands (*T. salvini*). The plantcutter occupies similar habitats in coastal north-western Peru. They occur in a region which has not been well surveyed by ornithologists, which may partly explain why they have been so rarely encountered. As there is still fairly extensive suitable habitat in their range further records may be expected. The first priority is to find out more about their habitat preferences and determine the threats to their habitats. Only then can more precise conservation action be taken, if indeed it is necessary.

**Pale-headed Brush-Finch** *Atlapetes pallidiceps*

This gravely threatened brush-finch is endemic to Ecuador, has only been recorded from a tiny area in the provinces of Azuay and Loja, and may already be extinct. It was not found in its old localities during several recent, brief searches (e.g. March 1990, B. Whitney; February 1991, N. Krabbe and M. Kessler; October 1991, J. Tobias and R. S. R. Williams; March 1992, M. Robbins, G. Rosenberg and F. Somoza; late 1992, N. Krabbe). A thorough search must be made in all suitable habitat, especially at the onset of the rainy season (when it was last seen near Oña in 1965), and any populations found should be stringently protected until its habitat requirements are understood.

A summary of the protected areas needed for the these species appears below (Table 13).

## Conclusion

The recommendations for habitat conservation appear to meet the requirements of the Tumbesian avifauna rather well: 16 (73%) of the threatened and near-threatened Tumbesian endemics would be protected in at least two of the areas already highlighted. For an additional six species (detailed above) it is currently not possible to recommend reserves since they have rather local distributions in habitats or areas where few other key species occur. Further research is required on these species and they are not included in the discussion which follows.

Six sites are required to provide two or more protected areas for each threatened and near-threatened Tumbesian bird (Box 8). Although the bird conservation recommendations constitute a species by species approach, they are provided only as a supplement to the habitat conservation measures. It is

**Table 13. Proposed new Tumbesian reserves based on bird conservation priorities.**

Species	Site(s) proposed
<i>Penelope albipennis</i>	Further sites in north-west Peru
<i>Pyrrhura orcesi</i>	Piñas area, <i>Azuay Province site</i>
<i>Acestrura berlepschi</i>	None currently appropriate
<i>Syndactyla ruficollis</i>	Celica-Alamor, <i>Ututana-Tambo Negro</i>
<i>Myrmeciza griseiceps</i>	Celica-Alamor
<i>Ochthoeca piurae</i>	None currently appropriate
<i>Tumbezia salvini</i>	None currently appropriate
<i>Pachyramphus spodiurus</i>	<i>Manta Real</i>
<i>Phytotoma raimondii</i>	None currently appropriate
<i>Atlapetes pallidiceps</i>	None currently appropriate

Site in italics were also proposed for protection in the habitat conservation plan.

hoped that by ensuring that the distinctive habitat types of the region are safeguarded, a protected area network will be established which supports as much of the biodiversity of the Tumbesian Centre of Endemism as possible. Because the extent of endemicity and distributions of the other wildlife groups of the region are so poorly known, it will not be possible to determine how well the proposed reserve network meets their requirements until more research is conducted.

However, in general birds are a good group to base conservation priorities on for the following reasons. They have dispersed to, and diversified in all

#### **Box 8. Priority bird conservation sites in the Tumbesian region**

The sites are listed in rank order

##### **1. North-West Peru Biosphere Reserve (3°49'S 80°17'W), Tumbes Department**

Important for 15 priority species.

##### **2. Machalilla National Park (1°36'S 80°42'W), Manabi Province**

Important for 14 priority species.

##### **3. Azuay Province site 1 (potentially Manta Real (2°34'S 80°42'W)**

For *Pyrrhura orcesi* and *Pachyramphus spodiurus*

##### **4. Tambo Negro (4°24'S 79°51'W) and/or Celica-Alamor (4°03'S 80°00'W, Loja Province)** For *Syndactyla ruficollis* and *Myrmeciza griseiceps*

##### **5. Azuay Province site 2 (yet to be identified)**

For *Atlapetes pallidiceps* if and when found.

##### **6. El Oro Province site 1 (yet to be identified, potentially Buenaventura (3°40'S 79°44'W))** For *Pyrrhura orcesi*.

regions of the world and virtually all habitat types and altitudinal zones (ICBP 1992), and they play a central role as indicators of environmental change (Carson 1963), reacting quickly to habitat alteration, and have been used for selecting areas for protection in the EEC and for wetlands globally (Fjeldsa 1991). They are also easy to observe and survey, so much data can be generated quickly. A literature review conducted by BirdLife International (ICBP 1992, Thirgood and Heath [in press]) established that where avian endemism is pronounced, there appears to be a high degree of endemism in other groups. It should be borne in mind, however, that some groups, especially insects and plants, can show much narrower distribution patterns than birds.

### **A COMBINED PRIORITY SITE LIST BASED ON HABITAT AND BIRD DATA**

In Box 9 we have combined the priority conservation areas in the Tumbesian region based on habitat and bird data into a single list of key sites. This combines both currently protected areas and proposed new reserves and it can be seen that there is a generally good coincidence between the habitat and bird conservation priorities. Until further data are forth coming from other species groups, this combined list represents the best attempt at an inventory of the most crucial conservation sites in the Tumbesian region.

**Box 9. Critical conservation sites in the Tumbesian region based on bird and habitat data.** The sites are listed in priority order

1. North-West Peru Biosphere Reserve
2. Machalilla National Park
3. *Manta Real or alternative Azuay Province humid forest site*
4. *Sozoranga / Catacocha (equal weighting)*
5. *An El Oro humid forest site (potentially Buenaventura)*
6. Hacienda Quesada
7. *Cabeceras de Bilsa / Jatun Sacha Bilsa*
8. *A second Azuay Province humid forest sites*
9. *Celica-Alamor*

Sites in italics are proposed new reserves; the other sites are existing reserves.

## CONSERVATION OF OTHER WILDLIFE IN THE TUMBESIAN REGION

The most serious barrier to considering how well the bird and habitat plant conservation recommendations meet the requirements of the other fauna of the region is the lack of biogeographic and distributional data on these other groups. The following is based on the few data that exist.

### Mammals

At least four mammal species are restricted to the Tumbesian centre of endemism: the fox *Dusicyon sechurae*, the squirrel *Sciurus stramineus* and two *Phyllotis* mice (Emmons and Feer 1990, Pearson 1982). Virtually nothing is known about the mice, but the fox and squirrel seem to be reasonably tolerant of habitat disturbance (Duckworth 1992). There may be other endemic mammals (especially rodents and bats) yet to be described.

A mammal survey conducted in early 1991 in south-western Ecuador concluded that the degradation, fragmentation and high hunting rates in that region may have been the primary combined causes of impoverished mammal faunas encountered, although more surveys are required to confirm this (Duckworth 1992). It seems likely that those mammal species most dependent on large tracts of unbroken forest (e.g. *Tapirus* spp., some *Felis* spp.) or most susceptible to hunting (e.g. *Cebus* and *Alouatta* monkeys, *Agouti paca*) would benefit most from the protection of the largest and remote forest patches that remain: these are the Machalilla National Park and North-West Peru Biosphere Reserve, which have been given the highest conservation priority above.

The most urgent priority for the mammals of the Tumbesian region is more research to determine if any further endemic species occur and to detail their distributional patterns.

### Other fauna

All other groups are so poorly known in the Tumbesian region that intensive surveys are the most measures needed at this stage. The extent to which the proposed reserve network meets the conservation needs of the other wildlife of the region depends on the degree to which their distributions match those of the vegetation types and birds of the Tumbesian region. Particular groups meriting attention are Lepidoptera, reptiles and amphibians. It should be borne in mind that additional areas, not already recognized, may be recommended for protection as data become available from other wildlife groups. However, by using a combination of bird and plant data to design the proposed reserve network, it is hoped that the number of these 'new' areas will be minimal.

## AREAS WHICH NEED FURTHER SURVEYS

The selection of areas for conservation action in the above analysis is based on current knowledge of the Tumbesian region. Yet some parts of the Tumbesian region are still very remote and inaccessible, and they could support 'undiscovered' extensive forests, with large numbers of threatened plant and animal species. Satellite images of south-west Ecuador have been carefully checked for such forest patches in preparation for fieldwork in 1989 and 1991 (and also in the preparation of Figure 38). West-central Ecuador and north-western Peru have been less well checked. It is unlikely that any 'undiscovered' forests found in the Tumbesian region will be large. Even if there are, or if future surveys of already-visited sites change their importance (e.g. if an important bird species is found there which had not been seen at the site before), new information can be incorporated into the method used to generate a revised outcome. It should be stressed that conservation action should not wait until these areas have been surveyed.

A few areas which are certainly worthy of future surveys have been identified, they are:

- The Coastal Cordillera of western Ecuador which has several unsurveyed forest patches (at least one of which, the Mache-Chindul area [Mudd 1991], still supports extensive tracts of forest).
- The area of deciduous forest to the west of Macará in southern Loja Province, Ecuador (including the Hacienda Linderos area [Williams and Tobias 1994] and the area between Sabanilla and Zapotillo [recently visited by M. B. Robbins and R. S. Ridgely]).
- The Manglares-Churute Ecological Reserve in coastal Guayas Province, which apparently has some fairly extensive forest which has been only briefly surveyed, yet several threatened and near-threatened Tumbesian endemics have already been found there (R. S. Ridgely *in litt.* 1992).
- The Arenillas Military Reserve in El Oro Province, Ecuador, which has extensive deciduous forest which has been only briefly surveyed (Parker and Carr 1992).
- The Cerros de Amotape National Park and the El Angolo Hunting Reserve in Tumbes and Piura Departments, Peru (part of the North-West Peru Biosphere Reserve). These areas may support large tracts of deciduous forest yet they are virtually unknown ornithologically and poorly known botanically.

## OTHER ACTION

The conservation measures outlined above have little chance of success if conservation efforts are solely restricted to small areas. In addition to this localized action there must be more widespread environmental education campaigns, along with a regional forest conservation and restoration initiative, and a reforestation programme.

### **Environmental education**

Environmental education campaigns should be carried out by focusing on basic ecological correlations, such as the importance of forests and trees for firewood, as water catchment areas, as nutrient and sediment stores and in preventing soil erosion. Landslides often block roads in the Tumbesian region, often severely disrupting local communications and trade for several days at a time. The role of forests as regulators which contribute to the stability of environments should also be explained and ways of carrying out reforestation should be discussed.

Municipal leaders in both Sozoranga and Celica in Loja Province, Ecuador have requested such materials for schools and community projects. The Loja-based NGO ArcoIris, which has produced similar materials for the Podocarpus National Park, are planning to produce materials in these areas (M. Kelsey *in litt.* 1993). This would involve close collaboration with school teachers and other community figures. Reserves close to such communities represent excellent resources and the importance of forest to protect water supplies is apparently widely recognized in this semi-arid region.

### **Local involvement**

People living close to the new reserves must be fully informed of the purpose of the reserve and the benefit it can bring them; they should be encouraged to participate in their management. Colourful posters promoting forests could easily be provided and the local newspapers and radio should be used as much as possible. Only a large-scale publicity campaign will get the message through to all the local people and slowly they will begin to accept that conservation is not something imposed on them by outsiders, but rather it is something important for themselves. Hopefully a feeling of pride in the importance of each community's local forest would develop, as had occurred at Sozoranga in Loja Province, where repeated radio and newspaper coverage of the international importance of the forests in that region have raised greatly local awareness of ecology and conservation. A national environmental education programme has been submitted to the Ecuadorian government (W. Oliver verbally 1991); such schemes should be supported by international conservation organizations.

Efforts must be made to ensure that employment opportunities in newly created protected areas are directed towards the local people so that they feel that they are benefiting from the conservation action. There are opportunities for ecotourism in the protected area network proposed, and local people should be trained and employed as guides. This benefit, however, must not be overstressed to avoid raising false expectations. Revenue from ecotourism should, where possible, also be put back into areas beneficial to local people.

### **Reforestation**

The regional forest conservation and reforestation programme poses the biggest logistical problems. One of the worst problems with current land-use in the Tumbesian region is the grazing of cattle inside forest. This eventually destroys the forests (mainly through the prevention of natural regeneration) and degrades the understorey to the detriment of the flora and fauna. It also produces poor grazing areas. Therefore, the strict separation of grazing areas, crop-growing land and forest areas would be important for the development of long-term sustainable land-use. Only then can optimal land-use techniques be developed for each of the different land-use types. Ideally grazing should be excluded from all remaining forests as this may be the most important factor leading to their degradation and lack of recruitment of the remaining forests (forest clearance for agriculture is the next most important factor; wood cutting is of limited importance).

As in many developing regions, people in the Tumbesian region are often economically and nutritionally dependent on their cattle, especially in areas which are no longer suitable for crop cultivation, or where the growing season is very short. In such instances it is not possible to expect people to give up cattle grazing inside forests. Forests in the Tumbesian region (unlike in many Andean areas) often seem to have little value to people. Many local homes have electricity, and fuelwood is only locally in short supply. In some areas of northern Peru wood (especially *Prosopis*) is used for the fabrication of charcoal; in this case the forests have some economic value. However, in most of the region forests are only used for animal-grazing, hunting, gathering a few medicinal plants, fruits and nuts. Soils are often good, so profitable agriculture can be carried out in many areas which are not too steep or too dry. Generally it is difficult to measure the indirect value of forests, such as their role in effective watershed protection or in preventing soil erosion, versus the direct economic value people gain from cutting them down and planting crops. Convincing local people of the value of forests will be one of the most significant challenges.

### **Alternatives to forest destruction**

Studies of alternative techniques to land management should be made; this could be carried out by pilot agricultural projects on agroforestry and model

farms to demonstrate the benefit of sustainable techniques. A reforestation project in the Machalilla National Park could be used as a model for other similar projects. Local tree species should be planted in preference to ecologically damaging eucalyptus and pines.

### **The need for a symposium on the Tumbesian region**

The regional environmental plan may best be produced through a regional workshop of Governmental Agencies, NGOs and community leaders. The most appropriate people to produce such a plan are those who can carry the responsibility for its implementation and those most affected by it.

The workshop should aim to produce a practical guide on how to tackle the environmental problems of the region and a plan for actions to be taken to protect the remaining forest of the Tumbesian region. Working groups should discuss particular topics (such as how to get the acceptance and involvement of local people; what reforestation techniques are suitable; the legal background to any programmes).

It is hoped that the recommendations included here will form the basis of a plan prepared by Ecuadorian and Peruvian national conservation organizations and NGOs in partnership with the local people of the Tumbesian region, and endorsed by the governments of the two countries. If, as we suggest, the conservation plan combines ecologically sound measures with socially desirable actions the likelihood of success will be improved.

## **PRIORITIES FOR RESEARCH**

Although habitat protection is the highest conservation priority, regional research must continue so that the biological database on the Tumbesian region can be enlarged. Sixteen more urgent topics have been identified below. These refer principally to work in the fields of botany and ornithology. It should be noted that given the current state of knowledge it is not possible to give as detailed recommendations for botanical research as for ornithological work and any further botanical survey would provide valuable information.

### **1. Mapping the vegetation cover of the Tumbesian region accurately**

The extent of forest remaining in the region is not precisely known, as data gathered to date only cover some areas and habitat types. While humid forests are usually discernible on LANDSAT satellite images, this is not the case for dry

forests, which can easily be confused with scrub or even agricultural areas. Also, the state of degradation of dry forests cannot be assessed on satellite images, and extensive cloud cover can often obscure the images. Therefore future botanical surveys should concentrate on dry forests yet unsurveyed. Most important among these are the hills west of Zapotillo in Loja Province, Ecuador, and the dry forests on the foothills in Piura and Lambayeque Departments, Peru. Other areas which need more surveys are the arid intermontane valleys of Azuay and Loja Provinces in Ecuador, and Piura Department in Peru, in order to find patches of Deciduous to Semi-evergreen Lower Montane Cloud-forest and Intermontane Thorn-forest and Forest. In all these dry forests ground visits are necessary to determine the state of the understorey and the amount of tree regeneration.

Humid forests are more easily mapped from satellite images and from aeroplanes and therefore are already better known than the dry forests of the Tumbesian region. However, some areas deserve special attention and should, if possible, be surveyed with overflights. These areas are the very wet Andean foothills of El Oro and Azuay Provinces, Ecuador, and the Coastal Cordillera to the north-west of the Machalilla National Park.

While the value of such an exercise cannot be stressed too greatly, it has to be feared that no large, previously unknown forest patches will be found. Therefore it would be wrong to delay urgent conservation action until a complete coverage of the remaining forest cover is available. Instead, the value of such a database will lie in the possibility of accurately monitoring future forest destruction. The total population size of each priority bird species (and other fauna) could be estimated by combining density estimates with knowledge of the extent of the habitat that particular species occupy.

## **2. Unserved or under-surveyed areas should be visited**

Figure 45 (page 133) showed that the ornithological survey effort in the Tumbesian region to date has been uneven: most work has been carried out in south-west Ecuador (especially El Oro and Loja Provinces). Particular areas meriting further study are highlighted on page 194. At certain sites which have had limited surveys, some periods of the year are completely unknown (see below). Unserved but potentially suitable sites should be identified by aerial photography as described above.

## **3. More survey work to build up a year-round database on the distributions of priority Tumbesian birds**

Figure 88 illustrates the known ornithological effort by month since 1970 at selected sites in the Tumbesian region. It shows the months during which surveys

**Figure 88. Ornithological survey effort by month at selected sites in the Tumbesian region.**

Sites	Months											
	J	F	M	A	M	J	J	A	S	O	N	D
1. Cerro Mutilus		■										
2. Caberceras de Bilsa	■											
3. Río Palenque	■	■	■	■	■	■	■	■	■	■	■	■
4. Jauneche						■	■	■	■	■	■	
5. Hacienda Pacaritambo		■			■	■						
6. Machalilla N.P.	■					■			■			
7. Cerro Blanco	■	■	■	■	■	■	■	■	■	■	■	■
8. Manglares Churute E.R.	■											
9. Manta Real	■	■	■	■	■	■	■	■	■	■	■	■
10. San Miguel	■											
11. Uzhcurrumi		■										
12. Arenillas M.R.							■					
13. Buenaventura	■	■	■	■	■	■	■	■	■	■	■	■
14. Vicentino								■	■			
15. Alamor								■	■			
16. Tierra Colorada												
17. Catacocha			■	■								
18. Celica	■			■	■	■	■	■	■	■	■	
19. El Empalme		■						■	■			
20. Sabanilla-Zapotillo				■								
21. Sozoranga	■	■	■	■	■	■	■	■	■	■	■	■
22. Utuana		■						■	■			
23. Tambo Negro	■	■	■	■	■	■	■	■	■	■	■	■
24. Angashcola						■	■	■	■	■	■	■
25. Tumbes National Forest		■	■	■	■	■	■	■	■	■	■	■
26. Cerros de Amotape N.P.											■	
27. Ayabaca									■	■	■	■
28. Canchaque-Huancabamba						■	■	■	■	■	■	■
29. Olmos		■										
30. Quebrada Caballito		■										

Dark shading indicates surveys of five days or more duration; light shading surveys less than five days. Only surveys for which dates were available are shown.

**Sources:** Vuilleumier (1978), Leck (1979), Leck *et al.* (1980), Schulenberg and Parker (1981), Wiedenfeld *et al.* (1985), P. J. Greenfield *in litt.* to ICBP (1989), R. S. Ridgely *in litt.* to ICBP (1989), Best and Clarke (1991), Bloch *et al.* (1991), P. Coopmans *in litt.* (1991), M. Kessler *in litt.* (1992), Kiff (1991), Krabbe (1991), Ridgely (1991a, 1991b), R. S. Ridgely *in litt.* (1991), Best (1992), P. Coopmans *in litt.* (1992), N. Krabbe *in litt.* (1993), Williams and Tobias (1994) and Parker *et al.* (1995)

are most urgently needed. Survey effort has been far from even, with two peaks: January to March and July to September. There are some months (e.g. May, October to December) when virtually no surveys have been conducted, and at several sites (e.g. Jauneche, Arenillas Military Reserve) survey work has been confined to the dry (non-breeding) season. Future workers in the Tumbesian region are urged to time their visits to maximize survey time during 'new' months.

#### **4. Studies of the population size of each threatened and near-threatened Tumbesian bird species**

Quantitative studies of the population size of each priority species should be conducted over several months in the dry and wet seasons at as many sites as possible. The total population size of each priority species can be established as explained above. Knowledge of population sizes is important if the degree of threat to each is to be established.

#### **5. Detailed ecological studies of the threatened and near-threatened Tumbesian bird species**

Very few details are known about the habitat requirements, feeding preferences and life-histories of these species. Such data can only be gathered by quantitative ecological studies lasting several months at least, in both the wet and dry seasons. A topic of central importance is the degree to which priority species can tolerate degradation, and can withstand and survive in the long term under various human activities taking place in the region. Six species (*Leptotila ochraceiventris*, *Synallaxis tithys*, *Syndactyla ruficollis*, *Hylocryptus erythrocephalus*, *Myrmeciza griseiceps* and *Lathrotriccus griseipectus*) appear especially sensitive to understorey degradation, chiefly by grazing animals. This should be investigated by quantitative studies of sites with varying states of understorey degradation during the dry and wet season to establish the presence or absence of these understorey species.

Several non-understorey dependent species (e.g. *Leucoptemis occidentalis* and *Ortalis erythroptera*) occur in largely cleared, agricultural areas close to forest remnants; the nature of their dependence on these forest fragments for breeding is, however, unclear at present and requires further investigation. Another topic which requires study is the seasonality of the priority species' habitat needs, including their need for different habitats and different altitudes. This could be achieved by radio-tracking or ringing species of particular interest. Data gained from these studies can be used to design management programmes for protected areas, and in environmental education schemes.

## **6. Studies of the seasonal movements of Tumbesian species**

There may be pronounced seasonal movements of Tumbesian species between habitats. Seasonal movements of priority Tumbesian species can be further investigated as the year-round database of bird records from sites in the region becomes established. A more direct approach would be to radio-track or ring target species.

## **7. Studies of the interannual variations in the distribution of Tumbesian species**

There is also potential for interannual variations in the distributions and population sizes of Tumbesian species. The climate (especially rainfall) of the region is typified by pronounced fluctuations from year to year (see 'Climate' section and Munday and Munday 1992) which has consequences for the vegetation, especially the deciduous types. Very wet El Niño years complicate the issue. The only study from which there are data from several successive years (Marchant 1958) found marked interannual fluctuations in both the distribution of birds and the time of the breeding season on the Santa Elena Peninsula in western Ecuador. Further long term studies are required which employ standardized methodologies.

## **8. Studies of the extent and sustainability of the international parrot trade**

Both *Aratinga erythrogenys* and *Brotogeris pyrrhopterus* are in international trade and the large numbers reported to CITES in recent years have caused alarm among conservationists. Between 1983 and 1988 there were 51,853 *A. erythrogenys* and 59,320 *B. pyrrhopterus* reported to CITES as in trade (Inskipp and Corrigan 1992). Peru does not permit trade in its Amazonian species and it is possible that to allow these to enter trade they are declared as *A. erythrogenys* or *B. pyrrhopterus* and exported legally. The extent of this mis-declaring of parrots exported from Peru and the prevalence of illegal smuggling of these species from Ecuador (where they are officially protected) to Peru should be investigated. The first by liaison with the customs officials in Peru to establish the extent of any mis-declaring, and the second by more efficient monitoring of cross-border smuggling by the customs officials at the military checkpoints on the Peru-Ecuador border, in addition to discussions with parrot traders.

Data provided by studies of the population size and breeding success of the parrots, combined with CITES/TRAFFIC data, will help to establish whether the trade figures are accurate, and the trade itself is sustainable. It will also facilitate an assessment of their status, at present very difficult to make for a variety of reasons (Best *et al.* in press).

## **9. Studies of the impact of hunting**

At present, the extent and impact of hunting on the priority species is unknown. *Crypturellus transfasciatus*, *Penelope albipennis* and *Ortalis erythroptera* are all hunted for food and other species (e.g. *Leucopternis occidentalis*) for sport. Hunting should be investigated by interviewing local people. Regional or seasonal trends should be assessed, along with the reasons for the birds being hunted.

## **10. Floristic surveys**

Far too little is known about the floristic composition of the Tumbesian vegetation types. Only two localities (Capeira and Jauneche) have so far been completely covered; several other areas (e.g. Puná Island, the Santa Elena Peninsula, the Colonche-Chongón Cordillera and parts of the Machalilla and Cerros de Arnotape National Parks) have been studied in some detail, while most of the region has only been subject to opportunistic collecting, making the Tumbesian region one of the least known botanically in Peru and Ecuador. Vegetation types which are particularly little-known are the Semi-evergreen Lowland to Lower Montane Forests, the Humid to Very Humid Premontane Cloud-forest, the Deciduous to Semi-evergreen Intermontane Scrub, Thorn-forest and Forest, the Humid Lower Montane Cloud-forest and the Deciduous to Semi-evergreen Lower Montane Cloud-forest. Selected localities of these forest types should be sampled in detail, covering trees, understorey plants, herbs and epiphytes.

## **11. Production of a more detailed vegetation classification**

The vegetation classification presented earlier in this book is simply an initial starting point upon which a complete coverage of the vegetation types of the Tumbesian region can be built after more detailed surveys. These will also provide a basis for a more accurate qualitative comparison of the vegetation types, and for a subdivision of those vegetation types which currently do not fit in well with the proposed classification (especially in the case of the Semi-evergreen to Evergreen Lowland to Montane Forest).

## **12. Long-term studies on the ecology and phenology of the different vegetation types, especially in connection with migration patterns of birds and insects.**

Long-term ecological studies of the Tumbesian forests are at present completely lacking, so nothing is known about the phenology of the plants as species and as individuals, the relationships of the vegetation to climatic parameters, or the relations of the plants to insect, bird and bat pollinators and dispersers. So far, only the studies conducted over the last few decades outside the region in the

moist forest on Barro Colorado Island, Panama, and the dry forest in the Santa Rosa National Park, Costa Rica, provide clues to the nature of these relationships.

This situation provides an excellent opportunity to compare the Tumbesian forests with similar Central American forest types. The possibilities for meaningful and interesting ecological research are immense. From a conservation point of view, questions relating to the seasonal and interannual migration of animal species should have the highest priority, since the survival of many animal species might depend on forest patches which are only used for a short part of the year or in exceptional years (e.g. El Niño events).

Certainly the most suitable areas to establish field stations for long-term studies are the North- West Peru Biosphere Reserve and the Machalilla National Park, since they contain the largest and best preserved forest areas in the Tumbesian region and provide access to several adjacent but ecologically very different vegetation types.

### **13. Studies of the population dynamics of commercial free species**

These should provide a database on which sustainable forest use might eventually be developed. Respective research on the sustainability of the use of other forest products (both plant and wildlife) is also needed.

### **14. Studies of the use of native plant species and of reforestation techniques**

A more practical line of research would include ethnobotanical studies and especially the development and implementation of reforestation techniques with native tree species. This will be of increasing importance as fuelwood resources diminish and erosion threatens the destruction of valuable soil. In order to increase the acceptance of the project a method of reforestation which benefits the local inhabitants from the start is preferred over one that takes 10 or 20 years. Comparable efforts in Costa Rica should provide a useful starting point for this research.

### **15. Intensive surveys of all wildlife groups occurring in the Tumbesian region**

In addition to the proposed research on birds and flora outlined above, each other wildlife groups should be further studied. For some groups (e.g. mammals) small amounts of data exist, whereas for others (e.g. reptiles, insects, fungi) very few surveys have been conducted. Studies should concentrate on endemism and distributional patterns. Such studies are vital to determine whether the proposed conservation measures also protect these less well known groups. Research should be carried out first in the areas known to be important for plants and birds.

## 16. Socio-economic studies of the people of the Tumbesian region

Key elements of research are socio-economic studies of the people adjacent to (or in some cases within) the existing and proposed protected areas in order to determine the ways in which they use these areas. Studies would help determine the way in which wildlife is perceived and the ways in which people benefit from, and come into conflict with wildlife.

### Box 10. Summary of conservation action needed in the Tumbesian region.

#### SUPPORT FOR EXISTING PROTECTED AREAS

Machalilla National Park and the North-West Peru Biosphere Reserve must be securely protected and effectively managed by:

- creation of effective buffer zone
- increased staff and resources
- employment of local people as guides/ wardens
- environmental education in and around the parks

The private reserves of the region, notably Cerro Mútiles, Río Palenque, Jauneche and Cerro Blanco should be supported so that each plays its full role in regional conservation.

#### FURTHER RESEARCH

Additional surveys should be undertaken in several areas, notably the Manglares-Churute Ecological Reserve and the southern part of the North-West Peru Biosphere Reserve.

Many additional research priorities remain, involving bird and habitat surveys, ecological research and socio-economic studies.

#### RESERVE CREATION

Seven new reserves should be created in Ecuador to protect the habitats and birds of the Tumbesian region. They should be at:

- Manta Real or another Azuay Province humid forest site
- Sozoranga or Catacocha in Loja Province
- a humid site forest site in El Oro Province
- Hacienda Quesada in Azuay Province
- Cabeceras de Bilsa in Esmeraldas Province
- a second humid forest site in Azuay Province
- Celica-Alamor in Loja Province

Funds should be made available for the purchase of each area, but also the longer term management and protection of the sites.

#### REGIONAL ENVIRONMENTAL EDUCATION AND AWARENESS PROGRAMME

This should include:

- education in the value and importance of forests
- local involvement in the management of new reserves
- training in the reforestation of degraded areas for sustainable use, providing alternatives to forest destruction

**A workshop bringing together diverse groups should produce a comprehensive environmental plan for the region.**

## **SUMMARY OF CONSERVATION ACTION NEEDED**

The conservation recommendations we have presented for Tumbesian region can be split into four main elements: reinforcement of currently protected areas creation of new reserves a regional environmental education and awareness programme and an ongoing research effort (Box 10). It is important that each element is implemented simultaneously.

Finally we stress that se conservation measures represent merely a starting point upon which a much more comprehensive and detailed programme can be developed. This can only be done when all those with an interest in biodiversity conservation in region are brought together, within Ecuador or Peru, in order to prepare a conservation programme for Tumbesian region.





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**BIRDLIFE INTERNATIONAL** have identified about 221 Endemic Bird Areas worldwide; places which support unusually high numbers of restricted-range bird species in comparatively small land areas. They have special conservation significance as they support the majority of the world's threatened bird species.

The Tumbesian Western Ecuador and Peru EBA has one of the largest complements of restricted-range species of any EBA, but due to catastrophic habitat loss in the second half of the 20th century the biodiversity of the region is highly threatened. Sixteen of its endemic bird species are globally threatened and a further 6 near-threatened. As a result of its priority status the area has been the focus of much recent research. This book uses the results of this work to present an overview of the habitats and avifauna of the region, assess their conservation status and put forward recommendations to protect the biodiversity of the Tumbesian Ecuador and Peru.

