THE PRIORITIZATION OF ENDEMIC BIRD AREAS

TAKING their biological importance and current threat levels into account, an overall priority ranking of EBAs has been attempted and is presented in this chapter. This evaluation seeks to select those EBAs with the highest biological importance and current threat level scores, thereby indicating where conservation action will give the best value and return for money and effort. Nevertheless, it is self-evident that all EBAs represent priority areas for conservation and, given that there are increasing data to suggest that rapid species loss can occur at the early stages of human impact (Balmford 1996), it cannot be stressed strongly enough that the targeting of conservation initiatives in *all* EBAs—even those which are not in the top ranks—remains essential.

It is possible to criticize such a numerically guided evaluation as attempted here, but the more detailed data presented in other parts of this book will help users to judge for themselves whether the ranking assigned to the EBAs is appropriate. Before conservation action is taken, additional factors will also need to be considered; these include political will, availability of resources, conservation initiatives already in place, information relating to other animals and plants present, the intactness of remaining habitat, cultural values, logistics, and the chances of success.

BIOLOGICAL IMPORTANCE

A biological importance score for each EBA has been calculated by taking into account the following.

- *The number of restricted-range species occurring in the EBA, and whether or not they are shared with other EBAs.*

In many cases the distribution or population of the restricted-range species which are shared with other EBAs may not be equally divided between the different EBAs; thus the survival of some of these species may depend mainly on conservation action in one particular EBA—a fact not fully reflected by the isolation index (see 'Calculation', below) assigned to that EBA. In practice the number of shared species comprises only c.20% of the overall total, and in only 12% of EBAs does the eventual biological importance ranking differ from the ranking produced using unadjusted species totals.

- *The taxonomic uniqueness of these species.*

Taxonomy has been taken into account because some families of birds have radiated widely around the world such that they have many closely related genera and species, while other lineages have far fewer members and so perhaps should be valued more highly. It is clear that the method used here to weight for taxonomy using a uniqueness index (see 'Calculation', below) will be affected by the taxonomy followed—in this case Sibley and Monroe (1990, 1993) for species limits and Morony *et al*. (1975) for family ones (see p. 21). The weighting chosen (which results in, e.g., Kagu *Rhynochetos jubatus* being valued 100 times more highly than Seychelles Brush-warbler *Acrocephalus sechellensis*) was arbitrary, though is arguably intuitive. There are sophisticated techniques for determining taxonomic uniqueness using phylogenetic relationships (e.g. May 1990, Vane-Wright *et al*. 1991), but these require an understanding of hierarchical classifications, such as those determined at the genetic level using DNA–DNA hybridization. Species-specific data on molecular sequencing are currently available for only c.10% of all birds (Sibley and Ahlquist 1990), and therefore it was not possible to use these methods in this global study. In only c.25% of EBAs does the incorporation of a weighting for taxonomic uniqueness affect the biological importance ranking.

- *The size of the EBA.*

Area has been taken into account because EBAs vary considerably in size, and larger areas might be expected (purely because of their size) to hold more species than smaller ones—and therefore it may not be appropriate to rank larger areas as relatively more important (see p. 16). A higher priority has thus been given to EBAs which support an unusually large number of restricted-range species in relation to their size, but a weakness in this adjustment is that the boundaries of some of the continental EBAs have been inferred from incomplete data and will tend to represent the maximum possible extent of the areas. It is therefore possible that a few such EBAs may have been downgraded inappropriately in this exercise. It is also important to note that there may be localized areas of endemism within large EBAs which are critical for the survival of certain restricted-range species but whose importance may not be fully reflected by the overall ranking of the EBA. However, the distribution tables, and text, in individual EBA accounts should draw attention to these places.

Calculation

The calculation of the score is performed as follows.

Biological importance score for EBA =
score for restricted-range species A
+ score for restricted-range species B
+ score for restricted-range species C, etc.,
where
Score for each restricted-range species =
isolation index × uniqueness index
and
Isolation index =
1/no. of EBAs in which the species occurs
and
Uniqueness index =
√ (1/no. of species in the genus ×
1/no. of genera in the family)

Example. A restricted-range species which is endemic to an EBA scores an isolation index of 1/1 = 1, while one which occurs in two EBAs scores 1/2 = 0.5. Kagu, endemic to New Caledonia, which belongs to a monospecific family, scores a uniqueness index of √ (1/1 × 1/1) = 1, while Seychelles Brush-warbler, belonging to a genus with 34 species and a family with 270 genera, scores √ (1/34 × 1/270) = 0.01.

Finally, the biological importance scores have been adjusted to take account of the size of the EBA. This has been done by plotting the scores against the area of the EBA using log–log data (see Figure 11, p. 34, and its accompanying text). The relationship between the biological importance score and area is significant for the continental-island and oceanic-island EBAs only ($p < 0.01$), and in these cases the residual values about a regression line give the relative (i.e. adjusted) biological importance scores for each EBA, treating the continental-island and oceanic-island EBAs separately. For the continental EBAs a comparable residual value is calculated from an average value of the logged scores. EBAs have been divided into three groups based on whether the adjusted scores are less than would be expected from the log–log plot for the size of the EBA, more than would be expected, or more than twice what would be expected (Table 1).

Table 1. Ranking of EBAs for biological importance.

Biological importance score	Biological importance rank	Number of EBAs
> 2 × expected score	●●●	51
1–2 × expected score	●●○	58
< 1 × expected score	●○○	109

CURRENT THREAT LEVEL

A current threat level score for each EBA has been calculated by taking into account the following.

- *The percentage of the restricted-range species in each EBA which are threatened.*

A percentage value has been taken because the numbers of threatened restricted-range species will tend to increase as the total numbers of restricted-range species increase (therefore combining both a measure of threat and a measure of the biological importance of the area; see also Box 1).

- *The categories of threat of these species.*

Different weighting has been given to species in each of the three different categories of threat, reflecting their different probabilities of going extinct: a 50% chance of extinction within 10 years for species in the ‘Critical’ category, 20% in 20 years for ‘Endangered’ and 10% in 100 years for ‘Vulnerable’ (see p. 679); in other words, over 100 years one would expect all Critical species to have gone extinct, along with c.70% of all Endangered ones and 10% of Vulnerable ones. By weighting the threatened species in this way, the percentage of all restricted-range species (and perhaps of other wildlife) likely to go extinct within each EBA in the next 100 years can be calculated (see ‘Calculation’, below). An approach such as this assumes that today’s conditions prevail, with the status of the restricted-range species remaining unchanged over the 100-year period. This method relies too on the current classification of the status of the world’s birds (Collar *et al.* 1994), but the allocation of the Critical category in this assessment is known to have been problematical in some cases, especially for poorly known species where the categories Data Deficient or Vulnerable might also have been appropriate (see pp. 16–21 in Collar *et al.* 1994). In addition, Collar *et al.* (1994) is now somewhat out of date (although officially current in the IUCN Red List; see Baillie and Groombridge 1996), and some EBAs have a few species (newly discovered or elevated to species

Box 1. Other methods for assessing current threat level.

An analysis of remaining habitat, and how quickly it is being lost, could give an alternative indication of the current threat level to the wildlife in EBAs. E.g. the 5,000-km^2 island of Cebu (EBA 153) in the Philippines was once totally forested, but today less than 0.2 km^2 of forest is estimated to remain, and even this is under threat. Although EBAs have been ranked according to their estimated habitat loss (see 'Global Analyses', p. 33), and there is a significant relationship between the habitat loss in EBAs and their percentage of threatened or extinct restricted-range species (see p. 36), the percentage of threatened restricted-range bird species in EBAs (taking their categorization into account) has been used in the evaluation as a surrogate measure of the current threat level of EBAs. This is because accurate data on habitat loss are not easily available for all EBAs. Those data which are available from, for example, satellite imagery, are often out of date or, because of the difficulty of interpreting different habitat-types, can sometimes be misleading. On balance, bird data appear to be a more consistent measure. However, in a small number of cases threatened bird species may not be very representative of the threats experienced by other wildlife in the EBA. This may be especially true of species which are selectively exploited, e.g. for the wildlife trade.

Another way of assessing the current threat level would be to calculate the percentage of land which is formally designated for nature conservation reserves (as was done in ICBP 1992), but this analysis has not been repeated because of a number of inherent problems. Protected areas vary hugely in their effective degree of protection, with the worst being so-called 'paper parks', which have little or no conservation infrastructure in place. Data are often difficult to assess because of the uncertainty about the extent to which individual protected areas cover the critical habitats and altitudinal ranges of EBAs. Published lists do not include all relevant types of designation or the smaller sites (of less than 100 km^2) which, depending on location, can be crucial for the conservation of some restricted-range species.

rank) which are classified as 'Not Evaluated'—these species could contribute significantly to the threat level score of the EBA if they were to be classified as Critical or Endangered. Nevertheless the evaluation can easily be repeated periodically in the future as new data (e.g. updated Red Lists) become available. It is also important to note that the more-widespread threatened species which often occur in EBAs (amounting to more than 200 species in total) have not been taken into account. This would require a detailed assessment of range and population overlaps with EBAs which was beyond the scope of this project. Overall, taking threatened categories into account has affected the current threat level ranking of 37% of EBAs compared to ranking by the percentage of threatened restricted-range species alone.

Table 2. Ranking of EBAs for current threat level.

Current threat level score (% of the EBA's restricted-range spp. likely to go extinct in next 100 years)	Current threat level rank	Number of EBAs
> 30%	●●●	55
> 5% to 30%	●●○	60
0–5%	●○○	103

Calculation

The calculation of the score is performed as follows.

Current threat level score for the EBA =

[(No. of Critical restricted-range species × 1)
+ (No. of Endangered " " × 0.7)
+ (No. of Vulnerable " " × 0.1)]
× 100/Total number of extant restricted-range species

EBAs have been divided into three groups based on the proportion of their restricted-range species which are likely to go extinct within the next 100 years (Table 2). These arbitrary divisions were chosen so that the number of EBAs in each group was approximately equal to those produced by dividing EBAs on the basis of their biological importance scores.

OVERALL PRIORITY RANKING

After the assignment of biological importance and current threat level rankings to EBAs, these have been combined to give an overall priority ranking of Critical, Urgent or High to each EBA (Tables 3–4).

Table 3. Numbers of EBAs falling in the different biological importance and threat level ranks, and the method for combining them to give one overall priority ranking.

	Biological importance rank ●●●	●●○	●○○	Total
Current threat level rank ●●●	7	15	33	55
Current threat level rank ●●○	21	16	23	60
Current threat level rank ●○○	23	27	53	103
Total	51	58	109	218

Overall priority ranking

- Critical 76 EBAs
- Urgent 62 EBAs
- High 80 EBAs

The method chosen for combining the rankings (Table 3) gives greater emphasis to those EBAs which rank highly for current threat level (and therefore where the immediate extinction risk is greatest) and results in three groups of roughly equal size.

Table 4. The EBAs within each of the three priority categories. No rank ordering is attempted within the categories.

		Biological importance	Current threat level
Critical			
003	Guadalupe Island	●○○	●●●
004	Socorro Island	●●●	●●●
006	Sierra Madre Occidental and trans-Mexican range	●○○	●●●
009	Sierra Madre del Sur	●○○	●●●
012	Southern Sierra Madre Oriental	●○○	●●●
013	Los Tuxtlas and Uxpanapa	●○○	●●●
023	Darién lowlands	●●●	●●○
025	Cuba	●○○	●●●
027	Jamaica	●●●	●●○
030	Lesser Antilles	●●●	●●○
032	Caripe–Paria region	●●○	●●●
037	Nechí lowlands	●●○	●●●
038	Colombian East Andes	●●●	●●○
040	Colombian inter-Andean slopes	●●○	●●●
042	Northern Central Andes	●○○	●●●
045	Tumbesian region	●●●	●●○
050	Junín puna	●○○	●●●
051	Peruvian high Andes	●●●	●●●
056	High Andes of Bolivia and Argentina	●●●	●●○
059	Juan Fernández Islands	●○○	●●●
070	North-east Brazilian caatinga	●●○	●●●
071	Atlantic slope of Alagoas and Pernambuco	●●○	●●●
072	Deciduous forests of Bahia	●○○	●●●
074	Deciduous forests of Minas Gerais and Goiás	●○○	●●●
075	Atlantic forest lowlands	●●●	●●●
077	Argentine Mesopotamian grasslands	●○○	●●●
082	São Tomé	●●●	●●○
084	Upper Guinea forests	●●●	●●●
086	Cameroon mountains	●●●	●●○
087	Western Angola	●●○	●●●
091	Southern African grasslands	●○○	●●●
094	East Malagasy wet forests	●●●	●●○
095	East Malagasy wetlands	●○○	●●●
096	West Malagasy wetlands	●○○	●●●
098	Comoro Islands	●●○	●●●
100	Granitic Seychelles	●●○	●●●
102	Mauritius	●○○	●●●
103	Rodrigues	●●○	●●●
105	Tanzania–Malawi mountains	●●●	●●○
112	Central Somali coast	●○○	●●●
113	Jubba and Shabeelle valleys	●○○	●●●
114	South Ethiopian highlands	●●○	●●●
115	Central Ethiopian highlands	●○○	●●●
116	North Somali mountains	●○○	●●●
128	Western Himalayas	●●●	●●○

cont.

Table 4. (cont.)

		Biological importance	Current threat level
140	Chinese subtropical forests	●○○	●●●
141	South-east Chinese mountains	●○○	●●●
142	Hainan	●○○	●●●
143	Annamese lowlands	●○○	●●●
144	South Vietnamese lowlands	●○○	●●●
147	Ogasawara Islands	●●●	●●○
148	Nansei Shoto	●○○	●●●
150	Mindoro	●○○	●●●
151	Luzon	●●●	●●○
152	Negros and Panay	●○○	●●●
153	Cebu	●●○	●●●
154	Mindanao and the Eastern Visayas	●●●	●●○
155	Sulu archipelago	●●●	●●●
160	Java and Bali forests	●●●	●●○
167	Sangihe and Talaud	●○○	●●●
181	Cape York	●●○	●●●
183	Eastern Australia	●●●	●●○
184	South-east Australia	●●●	●●○
186	South-west Australia	●●●	●●○
192	East Caroline Islands	●●●	●●○
198	Solomon group	●●●	●●○
204	Lord Howe Island	●●○	●●●
205	Norfolk Island	●●○	●●●
206	North Island of New Zealand	●○○	●●●
209	Chatham Islands	●●○	●●●
211	Rimatara	●○○	●●●
212	Marquesas Islands	●○○	●●●
214	Tuamotu archipelago	●○○	●●●
216	Laysan Island	●●●	●●○
217	Central Hawaiian Islands	●●●	●●●
218	Hawai‘i	●●●	●●●
Urgent			
007	Central Mexican marshes	●○○	●●○
011	North-east Mexican Gulf slope	●○○	●●○
016	Cozumel Island	●●●	●○○
018	North Central American highlands	●●●	●○○
020	Costa Rica and Panama highlands	●●●	●○○
022	Cocos Island	●●○	●●○
028	Hispaniola	●●●	●○○
029	Puerto Rico and the Virgin Islands	●●○	●●○
031	Galápagos Islands	●●○	●●○
034	Cordillera de Mérida	●●○	●●○
035	Caribbean Colombia and Venezuela	●●○	●●○
036	Santa Marta mountains	●●●	●○○
041	Chocó	●●○	●●○
043	Central Andean páramo	●●○	●●○
046	Southern Central Andes	●○○	●●○
047	Andean ridge-top forests	●●○	●●○
048	Marañón valley	●●●	●○○
049	North-east Peruvian cordilleras	●●●	●○○
054	Bolivian and Peruvian lower yungas	●●○	●●○
055	Bolivian and Peruvian upper yungas	●●●	●○○
057	Argentine and south Bolivian yungas	●●●	●○○
060	Central Chile	●●●	●○○
062	Southern Patagonia	●●●	●○○
063	Rio Branco gallery forests	●○○	●●○
064	Tepuis	●●●	●○○
068	South-east Peruvian lowlands	●●●	●○○

cont.

Table 4. (cont.)

	Biological importance	Current threat level
073 Central Brazilian hills and tablelands	●○○	●●○
076 Atlantic forest mountains	●●●	●○○
078 Cape Verde Islands	●○○	●●○
079 Tristan Islands	●●○	●●○
080 Gough Island	●○○	●●○
081 Annobón	●○○	●●○
097 South Malagasy spiny forests	●●●	●○○
101 Réunion	●○○	●●○
106 Albertine Rift mountains	●●●	●○○
109 Kenyan mountains	●●○	●●○
111 East African coastal forests	●○○	●●○
124 Sri Lanka	●○○	●●○
127 Taklimakan Desert	●○○	●●○
130 Eastern Himalayas	●●●	●○○
131 Assam plains	●○○	●●○
136 Shanxi mountains	●○○	●●○
138 West Sichuan mountains	●○○	●●○
139 Yunnan mountains	●○○	●●○
145 Da Lat plateau	●○○	●●○
146 Izu Islands	●○○	●●○
156 Palawan	●●○	●●○
157 Bornean mountains	●●●	●○○
158 Sumatra and Peninsular Malaysia	●●●	●○○
178 Central Papuan mountains	●●●	●○○
182 Queensland wet tropics	●●●	●○○
185 Tasmania	●●○	●●○
187 North-west Australia	●●●	●○○
189 Mariana Islands	●●○	●●○
197 Louisiade archipelago	●●●	●○○
201 New Caledonia	●●○	●●○
203 Samoan Islands	●●○	●●○
207 South Island of New Zealand	●○○	●●○
210 Southern Cook Islands	●○○	●●○
213 Society Islands	●○○	●●○
215 Henderson Island	●○○	●●○
High		
001 California	●●○	●○○
002 Baja California	●○○	●○○
005 North-west Mexican Pacific slope	●○○	●○○
008 Balsas region and interior Oaxaca	●●○	●○○
010 Northern Sierra Madre Oriental	●○○	●○○
014 Isthmus of Tehuantepec	●○○	●○○
015 Yucatán peninsula coastal scrub	●○○	●○○
017 North Central American Pacific slope	●○○	●○○
019 Central American Caribbean slope	●●○	●○○
021 South Central American Pacific slope	●●○	●○○
024 Darién highlands	●●○	●○○
026 Bahamas	●○○	●○○
033 Cordillera de la Costa Central	●●○	●○○
039 Colombian inter-Andean valleys	●○○	●○○
044 Ecuador–Peru East Andes	●●○	●○○
052 Peru–Chile Pacific slope	●●○	●○○
053 Peruvian East Andean foothills	●●○	●○○
058 Sierras Centrales of Argentina	●○○	●○○
061 Chilean temperate forests	●●○	●○○
065 Orinoco–Negro white-sand forests	●●○	●○○

cont.

Table 4. (cont.)

	Biological importance	Current threat level
066 Upper Amazon–Napo lowlands	●●○	●○○
067 Amazon flooded forests	●○○	●○○
069 Fernando de Noronha	●○○	●○○
083 Príncipe	●●○	●○○
085 Cameroon and Gabon lowlands	●○○	●○○
088 Cape fynbos	●○○	●○○
089 South African forests	●○○	●○○
090 Lesotho highlands	●○○	●○○
092 South-east African coast	●○○	●○○
093 West Malagasy dry forests	●○○	●○○
099 Aldabra	●○○	●○○
104 Eastern Zimbabwe mountains	●○○	●○○
107 Eastern Zaïre lowlands	●○○	●○○
108 Serengeti plains	●●○	●○○
110 Pemba	●○○	●○○
117 Socotra	●○○	●○○
118 South-west Arabian mountains	●●○	●○○
119 Mesopotamian marshes	●○○	●○○
120 Madeira and the Canary Islands	●○○	●○○
121 Cyprus	●○○	●○○
122 Caucasus	●○○	●○○
123 Western Ghats	●●○	●○○
125 Andaman Islands	●○○	●○○
126 Nicobar Islands	●○○	●○○
129 Central Himalayas	●○○	●○○
132 Irrawaddy plains	●○○	●○○
133 Southern Tibet	●○○	●○○
134 Eastern Tibet	●○○	●○○
135 Qinghai mountains	●○○	●○○
137 Central Sichuan mountains	●●○	●○○
149 Taiwan	●○○	●○○
159 Enggano	●○○	●○○
161 Javan coastal zone	●○○	●○○
162 Northern Nusa Tenggara	●○○	●○○
163 Sumba	●○○	●○○
164 Timor and Wetar	●●○	●○○
165 Banda Sea Islands	●●○	●○○
166 Sulawesi	●●○	●○○
168 Banggai and Sula Islands	●○○	●○○
169 Buru	●●○	●○○
170 Seram	●○○	●○○
171 Northern Maluku	●●○	●○○
172 West Papuan lowlands	●○○	●○○
173 West Papuan highlands	●●○	●○○
174 Geelvink Islands	●○○	●○○
175 North Papuan mountains	●○○	●○○
176 North Papuan lowlands	●○○	●○○
177 Adelbert and Huon ranges	●○○	●○○
179 South Papuan lowlands	●○○	●○○
180 Trans-Fly	●○○	●○○
188 Christmas Island	●○○	●○○
190 Palau	●●○	●○○
191 Yap Islands	●○○	●○○
193 Admiralty Islands	●●○	●○○
194 St Matthias Islands	●○○	●○○
195 New Britain and New Ireland	●●○	●○○
196 D'Entrecasteaux and Trobriand Islands	●○○	●○○
199 Rennell and Bellona	●○○	●○○
200 Vanuatu and Temotu	●○○	●○○
202 Fiji	●●○	●○○
208 Auckland Islands	●○○	●○○