HALEAKALA NATIONAL PARK CRATER DISTRICT RESOURCES BASIC INVENTORY: BIRDS OF THE CRATER DISTRICT

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INTRODUCTION

Field studies of avian distribution and abundance were undertaken in Haleakala National Park between June 1976 and April 1978. We conducted most of the field work during the summer months, but also took several trips into the study area at other times of the year to evaluate seasonal changes in bird activity. Most species densities for different habitat types have been derived from censuses using the transect count method described by Emlen (1971), or the circular plot method of Reynolds et al. (in press). Some species densities could not be calculated by these methods (e.g., game birds, House Finch): in such cases, we estimated densities by averaging census totals per unit area covered.

Although this survey encompassed the entire Crater District, certain regions received particular attention due to high density or diversity of birds. These areas included scrub habitats in the eastern end of the Crater, the Paliku area, the eastern boundary of Kaupo Gap, and Pu'u Mamane.

RESULTS AND DISCUSSION

Twenty-two species of birds representing 14 families were found in the Crater District during this survey. Thirteen of these species (approx. 60%) were exotic. Of the native species about 30% are endemic to Maui and two species (the Nene, Branta sandvicensis, and the 'U'au, Pterodroma phaeopygia sandwichensis) are considered endangered. Table 1 shows the approximate densities of bird species in five general habitat types within the Crater District.

Several patterns in avian distribution and diversity are apparent from our data. Species diversity in the Crater is strongly affected by vegetation patterns. Bird diversity generally increases with increasing plant cover, with the lowest number of species occurring in the arid western region of the Crater, and the highest number occurring in mesic forest, particularly those along the eastern boundary of the Crater District. In a similar fashion, species diversity on the outer Crater slopes increases with decreasing altitude, reflecting a corresponding increase in vegetative cover and plant species diversity down the altitudinal gradient.

Specific distribution patterns are highly reflective of the niche components (especially the feeding niche) of the birds in question. Distributions of native and non-native species are broadly separable on this basis. Exotic species generally have wide distributions; each species may have a distribution encompassing several different habitat types and may be common throughout most of its range. This tendency towards wide distributions shown by exotics is in many cases reflective of their generalized ecologies. As Ralph (1978) has found, the broad feeding niches of many of these birds enable them to utilize diverse habitat types.

The distributions of two common exotics, the Japanese White-eye (Zosterops japonicus) and the House Finch (Carpodacus mexicanus) are good examples of these patterns. Both species occur in habitat types between the extremes of arid scrub and grasslands, and wet forests. As shown in Table 1, both species occur in fairly high densities even outside their optimal habitats. The House Finch seems to have a greater ability to use marginal habitats than does the White-eye, possibly because of its greater flocking tendency and mobility.

Other exotic species have broad ranges similar to those of the White-eye and House Finch, but occur in lower densities. These species typically occur in fewer habitat types than their more abundant counterparts, and may have more specialized feeding habits. Among the species showing such distributions are the Ring-necked Pheasant (Phasianus colchicus), the Mockingbird (Mimus polyglottos), and the Skylark (Alauda arvensis). Each of these birds occurs over a large area of the Crater, but as indicated in Table 1, none occurs in very large numbers in any one habitat type.

Some exotic species are rare in the Crater District, either because their ranges are expanding into the area, or because they are poorly adapted to Crater habitats. The Grey Francolin (Francolinus pondicerianus) is an example of the first category: it is uncommon in the Park and has localized distribution in the west side of Kaupo Gap. The bird is common in Kaupo ranchlands, but was not recorded in the Park prior to this study. Other exotics, mostly non-game species such as the Melodious Laughing-thrush (Garrulax canorus) and the Cardinal (Cardinalis cardinalis) have been sighted on a sporadic basis, generally on the periphery of the Crater District. These birds are unable to

persist in Crater habitats as yet, possibly due to feeding limitations or an inability to cope with the rigorous climatic conditions.

Native species show distribution trends similar to the exotics, although they show more restricted distributions and are often uncommon outside limited areas. The dietary specificity of the native forest birds limits them to small areas of suitable habitat. Table 1 illustrates the restricted ranges of these birds. The generalized native forest birds (e.g., the 'Amakihi, [Loxops virens wilsoni] and the 'Apapane [Himatione sanguinea sanguinea]) have larger distributions in the Crater District and are in less danger of extirpation from the area than the more specialized Maui Creeper (Loxops maculatus newtoni) and 'I'iwi (Vestiaria coccinea). The ranges of the latter species within Haleakala are limited and are highly sensitive to seasonal shifts in resource abundance, much more so than the more generalized Drepanids.

Native non-passerines tend to have broader ranges than do the honeycreepers, but no natives are as abundant as the broad-ranged exotics such as the Chukar (Alectoris chukar) or Pheasant. As illustrated in Table 1, the ranges of the Nene and the Pueo (Asio flammeus sandwichensis) are similar in many respects to those of the broad-ranged exotics, except as regards density values. The low densities of native non-passerines may be attributed to several factors, among them, competition between native and exotic species, and the resulting exclusion of natives from sub-optimal habitats, habitat destruction, and predation by exotic mammals.

Management recommendations for the two endangered species in the Park center on the last two problems mentioned above. We feel strongly that control and elimination programs for nest predators should continue, and be expanded during the breeding seasons of both the 'Ua'u and Nene. Predation, especially by rats (Kjargaard 1978), is a serious threat to the nesting success and continued survival of both species in the Crater. In addition, populations of both the 'Ua'u and Nene should be carefully studied in order to define not only the sizes of breeding populations, but also the nesting success of both species.

In keeping with Park goals, ecosystem management and maintenance of native habitats of these species should be of high priority. Elimination of exotic organisms in the Park (particularly feral mammals and the more aggressive exotic plants) will significantly contribute to the enhancement of native bird habitats in Haleakala.

LITERATURE CITED

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TABLE 1. Density values (birds/40 ha) in five Crater District habitats. (P = present at a density less than 1 bird/40 ha).

Scientific Name	Hawaiian or Vernacular Name	Habitat* Density (bird/40 ha) 1	2	3	4	5
Pterodroma phaeopygia sandwichensis	'Ua'u	P				
Phaethon lepturus dorotheae	Koa'e-kea	P	P	P		
Branta sandvicensis	Nene	2	5-10	1-5	1	
Alectoris chukar	Chukar	1-20	5	1-10	2-4	
Francolinus pondicerianus	Gray Francolin	P				
Phasianus colchicus	Ring-necked Pheasant	3-4	5	1	1-25	
Pluvialis dominica	Kolea		5	5		
Asio flammeus sandwichensis	Pueo		2		P	
Tyto alba	Barn Owl		2		P	
Columba livia	Rock Dove				P	
Alauda arvensis	Skylark		2	2	1	
Garrulax canorus	Melodious Laughing-thrush					P
Leiothrix lutea	Red-billed Leiothrix				1-18	3-20
Mimus polyglottos	Mockingbird	P	1	1-4	1-2	

TABLE 1--Continued.

Scientific Name	Hawaiian or Vernacular Name	Habitat* Density (bird/40 ha) 1	2	3	4	5
Zosterops japonicus	Japanese White-eye	P	7	1-8	P-13	15-275
Acridotheres tristis	Common Myna	P				
Loxops virens wilsoni	Maui 'Amakihi			1	1-6	20-130
Loxops maculata newtoni	'Alauwahio				P-3	P-12
Himatione sanguinea sanguinea	'Apapane			6	P-40	4-330
Vestiaria coccinea	'I'iwi				P-6	1-8
Lonchura punctulata	Spotted Munia		P		1-6	
Cardinalis cardinalis	Cardinal				P-2	
Carpodacus mexicanus	House Finch	P	1-40	P-35	P-45	1-25

* Habitat types:

1) Rock, cinder, open native scrub communities; crater floor; crater slopes
2) Grasslands
3) Savannah
4) Closed native scrub
5) Native rain forest