'ELEPAIO

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Alien Birds on Oahu: 1944-1985

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Biologists and conservationists have become increasingly concerned with the ecology of invading (alien or exotic) species and their impact on native species and habitats. Alien bird species in Hawaii negatively affect native birds through disease transmission (van Riper *et al.* 1986) and interspecific competition (Mountainspring and Scott 1985). Van Riper *et al.* (1986) concluded that avian malaria, transmitted from alien to native birds, has been a major limiting factor in recent years, restricting both abundance and distribution of native species on the island of Hawaii. Alien species also have the potential to become pest species in agriculture and garden areas, as in the case of the Red-vented Bulbul (*Pycnonotus cafer*), which plagues homeowners' gardens on Oahu. Knowledge of the ecology and distributions of alien bird species in Hawaii may provide information leading to their control or manipulation in a manner that reduces or negates effects on native species and habitats.

In the ornithological world, Hawaii is an ideal location for studies of alien birds. More alien species of birds (162) have been introduced to the Hawaiian Islands than to any other location in the world (Long 1981). Additionally, much of Hawaii's land has been altered by humans, from prehistoric times to the present, to the detriment of many endemic bird species (Berger 1981, Olson and James 1982). Of the five major islands, Kauai, Oahu, Molokai, Maui, and Hawaii, Oahu has suffered the most drastic habitat alterations. It has also been the center for most of the bird introductions in Hawaii (Moulton and Pimm 1983). These factors combine to make Oahu the most extreme example in Hawaii of a "natural experiment" involving alien birds invading human-altered habitats.

In this paper, I examine population trends of alien and native birds (passeriforms and columbiforms only) on Oahu from 1944 to 1985. I was motivated in part to investigate this area in response to many anecdotal accounts of population declines of alien species, such as the Common Myna (*Acridotheres tristis*) and Northern Cardinal (*Cardinalis cardinalis*), which were alledgedly coincidental with the rapid population increase of Red-whiskered (*P. jocosus*) and Red-vented Bulbuls (*P. cafer*) (Williams and Giddings 1984).

METHODS:

Honolulu Christmas Bird Counts have occurred annually since 1944. The first count was conducted in 1939, followed by a second in 1940; however, counts were discontinued until 1944 due to World War II and gas rationing. For the purpose of continuity, I used the 1944 data as the starting point in the following analyses.

Data were obtained from the 1944-1985 Honolulu Christmas Bird Counts (HCBC) of the Hawaii Audubon Society ('*Elepaio* vols. 4-46). As mentioned above, data were compiled for native and alien columbiform and passeriform birds only. Rock Doves (*Columba livia*) were not included in the analysis, because of the extreme inconsistency of both their inclusion in the HCBC's and the recorded count numbers.

Numbers of birds observed each year varied, partially reflecting differences in the number of count participants and the duration of the counting effort. Consequently, I standardized counts between years by dividing the total number of birds observed for each species by the total party hours of observation for that particular year. This is the most commonly accepted method for standardization of Christmas Count data (Bock and Root 1981). Total party hours were not available for either 1945 or 1952; therefore I estimated these at 20 and 16.25 hrs, respectively, based on the number of count participants, number of count parties and partially recorded hours of observation. Population data were then examined for significant increases or decreases over time using linear regression (Hintze 1985), starting either with the 1944 data or the first year that a species was recorded in the HCBC through 1985.

Linear regression may not adequately detect trends in serially correlated data, such as annual Christmas Bird Counts, due either to non-linear trends or to incorrect estimates of variance. Consequently I also examined population data from the HCBC's using a non-parametric trend analysis. Median values for count years and the number of birds observed per party hour were used to divide the counts for each species into four cells. Chi-square analysis was performed on the observed versus expected quartile numbers for each species in order to identify trends.

An early outing on one of Oahu's trails, ca. 1945.

RESULTS AND DISCUSSION:

Patterns in Species Numbers

I expected to observe a steady increase in the number of alien species over time and a slight, but steady, decrease in the number of native species as aliens increased. Moulton and Pimm (1983, 1986) presented evidence for accelerated turnover rates for avian species in Hawaii with increasing numbers of alien bird introductions. Competition between native and alien species also may adversely affect native birds (Moulton and Pimm 1986), because several alien species, such as the Red-whiskered Bulbul and the Japanese White-eye (*Zosterops japonicus*), have successfully invaded forest areas on Oahu where native birds occur (personal observation). Additionally, many of these alien birds share the nectivorous and insectivorous foraging habits of the native honeycreepers, increasing the likelihood for competitive interactions. Nevertheless, the number of native bird species recorded in HCBC's on Oahu did not decline significantly (t = 1.61, $P > 0.05$) from 1944 through 1985, but remained relatively constant ($\overline{X}$ = 3.40 ± 0.54) (Fig. 1). Three species, 'Elepaio (*Chasiempis sandwichensis gayi*), 'Apapane (*Himatione sanguinea sanguinea*) and 'Amakihi (*Hemignathus virens chloris*) were observed every year with either 'I'wi (*Vestiaria coccinea*) or the Oahu Creeper (*Paroreomyza maculata*) observed every few years as the fourth native species. Thus the number of native bird species on Oahu appeared stable between 1944-85.

At first glance, the number of alien species (all shaded portions of Fig. 1) did not gradually increase over time as I expected, but rather remained relatively constant ($\overline{X}$ = 12.57 ± 1.08) from 1944 to 1964, then in 1965 abruptly increased to 21 species. The number of alien species have remained near this level since that time ($\overline{X}$ = 23.95 ± 2.01).

The abrupt increase in numbers of alien species observed in 1965 (21 species as opposed to 13 in 1964) was largely an artifact of sampling (Ord 1966). In the 1965 HCBC, 8 alien finch species were observed in the previously unsurveyed Diamond Head area and recorded as new species for Oahu. These finches appeared to be escaped cage birds whose populations were subsequently maintained by the presence of private bird feeders in the Diamond Head area near Na Laau Arboretum (Pyle, unpublished notes from the 1977 HCBC).

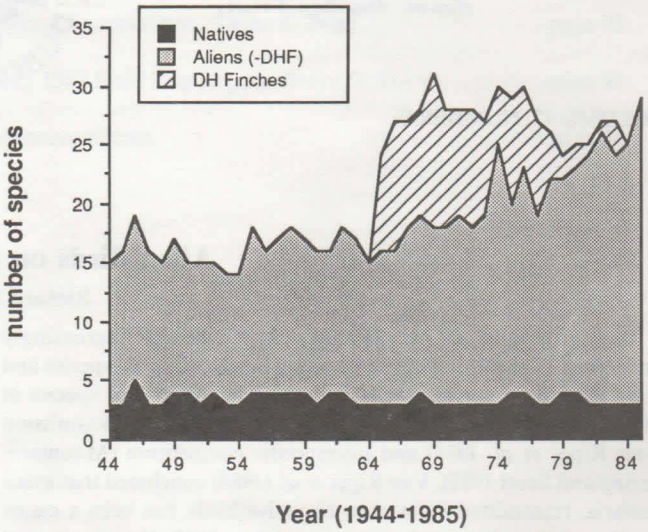
In order to counteract the swamping effect of the Diamond Head finches on possible trends, I excluded any species found exclusively in the Kapiolani Park/Diamond Head area from the analysis. For example, Java Sparrows (*Paddaoryzivora*), first recorded at Diamond Head in the 1969 HCBC, were excluded from the alien species count until the 1974 HCBC, when they were observed in two additional count sectors other than Diamond Head. Multi-sector observations, such as these, suggested that a species' range and population size had expanded to the point where the species had become naturalized. Consequently at that point, I included the species in the analysis.

Numbers of alien species (minus the Diamond Head finches) therefore, remained relatively constant from 1944 to 1964 and then gradually increased from 1965 to present. Overall, there was a significant increase in the number of alien species between 1944 and 1985 (linear regression; t = 9.951, $P < 0.0001$). Several of the finches from the Diamond Head area have expanded their ranges since 1965, become naturalized, and contributed to this increase (see Honolulu Christmas Bird Count data 1967-1985, *'Elepaio* vols. 28-45).

Patterns in Species Population Size

Eleven of the eighteen species examined for population trends showed significant changes in population size over time (Table 1).

Fig. 1 Number of species of birds in each Honolulu Christmas Bird Count from 1944-85. Species categorized in figure legend.



Three of these were native species, while eight were aliens. The remaining seven species which did not show any significant population changes were all alien species.

Native Species

'Elepaio and 'Apapane showed significant decreases in population size (negative slope values, Table 1) from 1944-85 based on both linear regression and non-parametric trend analysis. However, two factors, changes in count locations and diurnal migration of foraging flocks, complicate interpretation of these data for 'Apapane.

All HCBC's between 1949-53 included counts from the Poamoho Trail, a remote area in the Waianae Mountains. Censusing this area often produced high counts for 'Elepaio, 'Amakihi and especially, 'Apapane. Since 1954, however, the Poamoho Trail has been included in the Waipio count circle and not in the Honolulu CBC. Including the Poamoho data in the analysis, therefore, seemed to skew the analysis in the direction of showing large numbers of native birds in the early 1950's, followed by a marked decline in later years suggesting dramatic reductions in native bird numbers over the 42 years of the HCBC's. Because Poamoho was occasionally the only area surveyed in the early years of the HCBC that represented prime habitat for native forest birds, excluding the data seemed to skew the analysis in the opposite direction.

Extremely high counts of 'Apapane were recorded in 1950 and 1952 (479 and 348, respectively) on the Poamoho Trail and in 1956 and 1957 (506 and 241, respectively) on the Aiea Loop Trail. 'Apapane counts in other years were typically fewer than 100 birds. All high 'Apapane counts occurred in years when groves of paperbark (*Melaleuca leucadendron*) and *Eucalyptus* spp. trees along the Poamoho or Aiea Loop trails were in peak or secondary flowering stages (Hatch 1958). No instances of high flower abundance and low 'Apapane counts along either trail were noted in the HCBC's. 'Amakihi and 'Elepaio counts did not appear to be affected by flower abundance. Apparently, the high 'Apapane counts resulted from an influx of migrant 'Apapane into the flowering paperbark and eucalyptus groves. Although 'Apapane

Species	Years	Linear Regression Slope (b)	Correlation (r)	t-value	P <	Non-parametric Chi-Square	P <
Native Species (1944-85):							
'Elepaio	44-85	- 0.045	- 0.536	4.012	0.001	12.19	0.01
'Amakihi	44-85	- 0.018	- 0.255	1.669	n.s.**	1.71	n.s.
'Apapane	44-85	- 0.210	- 0.430	3.012	0.001	8.05	0.05
Native Species (1958-85)							
'Elepaio	58-85	- 0.082	- 0.805	6.929	0.001	14.29	0.01
'Amakihi	58-85	- 0.048	- 0.451	2.575	0.02	0.07	n.s.
'Apapane	58.85	- 0.036	- 0.376	2.068	0.05	0.21	n.s.
Alien Species:							
Spotted Dove	44-85	0.007	0.299	1.981	n.s.	21.43	0.001
Zebra Dove	44-85	0.016	0.247	1.612	n.s.	27.52	0.001
Red-whiskered Bulbul	67-85	0.168	0.806	5.621	0.001	8.05	0.05
Red-vented Bulbul	68-85	0.868	0.923	9.905	0.001	16.11	0.01
Japanese Bush Warbler	71-85	0.022	0.302	1.142	n.s.	0.60	n.s.
White-rumped Shama	54-85	0.118	0.422	2.550	0.05	28.25	0.001
Red-billed Leiothrix	44-85	- 0.090	- 0.493	3.567	0.001	21.43	0.001
Common Myna	44-85	0.637	0.298	1.907	n.s.	15.48	0.01
Japanese White-eye	44-85	0.180	0.672	5.733	0.001	7.71	n.s.
Northern Cardinal	44-85	0.003	0.046	0.291	n.s.	0.19	n.s.
Red-crested Cardinal	44-85	0.100	0.774	7.731	0.001	32.62	0.001
House Finch	44-85	0.090	0.779	7.858	0.001	13.81	0.01
House Sparrow	44-85	0.009	0.237	1.542	n.s.	12.81	0.01
Nutmeg Mannikin	44-85	- 0.121	- 0.301	1.999	n.s.	0.81	n.s.
Java Sparrow	69-85	0.206	0.851	6.285	0.001	5.94	n.s.

**n.s. = non-significant ($P > 0.05$).

TABLE 1 Results of linear regression and non-parametric trend analysis for 18 species of columbiform and passeriform bird species on Oahu using Honolulu Christmas Bird Count data. Count years were from 1944 (or first year species was observed) to 1985.

foraging flocks and movement patterns have not been described on Oahu, 'Apapane on the island of Hawaii form large migrating flocks which move during the day within altitudinal belts in search of flowering ohia (*Metrosideros polymorpha*) trees (van Riper and van Riper 1978) and in the evening across altitudinal gradients to reach roosting sites (MacMillen and Carpenter 1980).

As a consequence of these two factors, I secondarily analyzed native bird species population counts using data from 1958-85 (Fig. 2) in order to avoid the biases presented by inclusion or exclusion of the Poamoho data and the influx of migrant 'Apapane during years of peak flower abundance. All three native species (Table 1) demonstrated significant population decreases over time based on linear regression; however, non-parametric analyses revealed significant changes only for 'Elepaio.

Another possible source of bias in examining native bird populations was change in the percent of time spent by observers in the mountain forests on Oahu over the Christmas count years. Decreasing percent observation time in mountain forests would coincidentally decrease the number of native birds observed and could cause an analysis of native bird numbers based on *total* party hours to show declines of native birds, when in fact there were no declines. I tested this by normalizing all native species counts from 1967-1985 (years of HCBC's that included percent time by habitat in *'Elepaio*) using the 1976 high value of 45% time in mountain forests. Based on linear regression, percent of party hours in mountain forests did not decline signifcantly from 1967-85. Normalized data showed 'Elepaio numbers decreased significantly ($r = 0.698$, $P < 0.01$) from 1969-85, but 'Amakihi and 'Apapane populations did not change significantly.

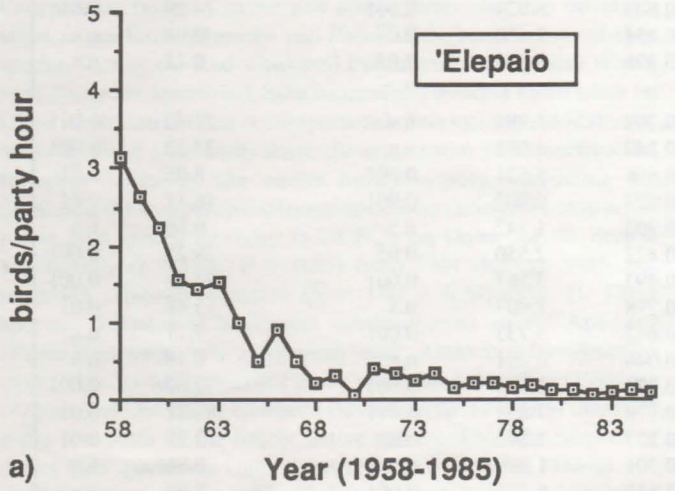
In summary, 'Elepaio populations declined steadily from 1958 to the present (Fig. 2). Counts have been consistently low since 1967 and reveal a gradual decline with little year-to-year variation. If this trend continues, 'Elepaio will become increasingly rare on Oahu in years to come. Mountainspring and Scott (1985) showed significant negative correlations in densities and habitat measures between 'Elepaio and Japanese White-eyes on the islands of Kauai, Maui and Hawaii. A similar relationship can be inferred between 'Elepaio (Fig. 2) and the Japanese White-eye (Fig. 3) on Oahu based on their simultaneous complementary population decrease and increase, respectively. Of all alien species, Mountainspring and Scott (1985) specifically single out the Japanese White-eye as playing a potent role in depressing numbers of native bird populations because of its very successful invasion of wet forest areas and the similarity of its foraging habits to those of the native honeycreepers.

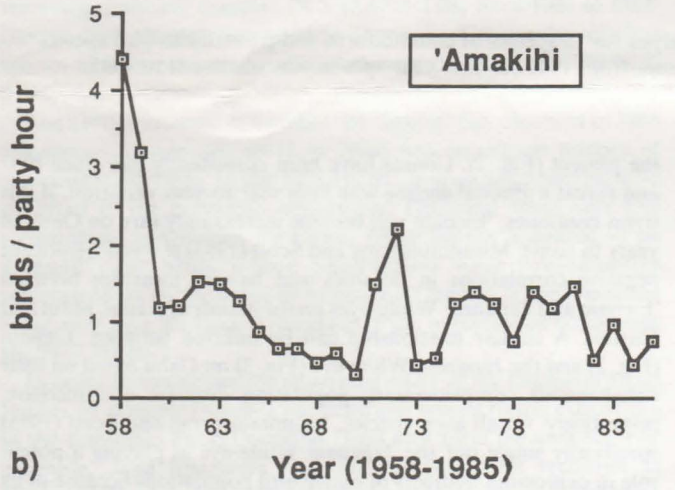
Although also decreasing between 1958-85, 'Amakihi and 'Apapane populations showed more year-to-year fluctuation than 'Elepaio. This suggests that in spite of an overall decrease in population sizes, 'Amakihi and 'Apapane populations are not facing imminent decline on Oahu. Honolulu Christmas Bird Counts of future years will provide an index to judge the success of these two species at maintaining their populations on Oahu.

Alien Species

Based on linear regression, seven alien species demonstrated significant increases in population size (positive slope values, Table 1), while only the Red-billed Leiothrix (*Leiothrix lutea*) had a significant population decline. Non-parametric trend analyses showed 10 alien species with significant changes in population size over time (Table 1). Six alien species showed significant changes in population sizes based on both linear regression and non-parametric trend analyses.

Fig. 2 Population trends of a) 'Elepaio, b) 'Amakihi and c) 'Apapane on Oahu, 1958-85. Data from Honolulu Christmas Bird Counts.





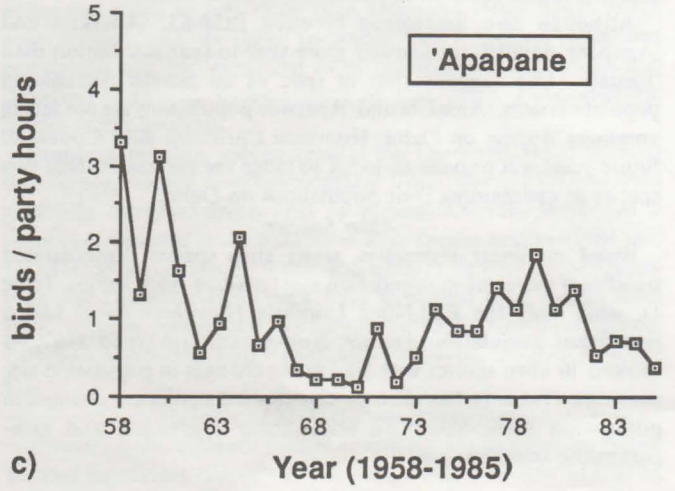
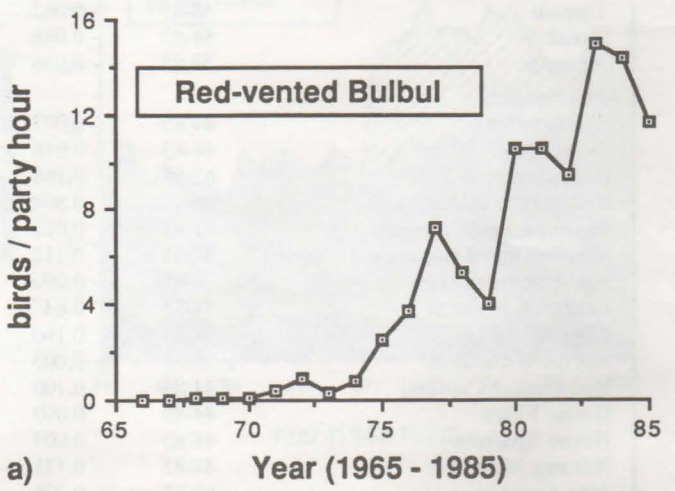
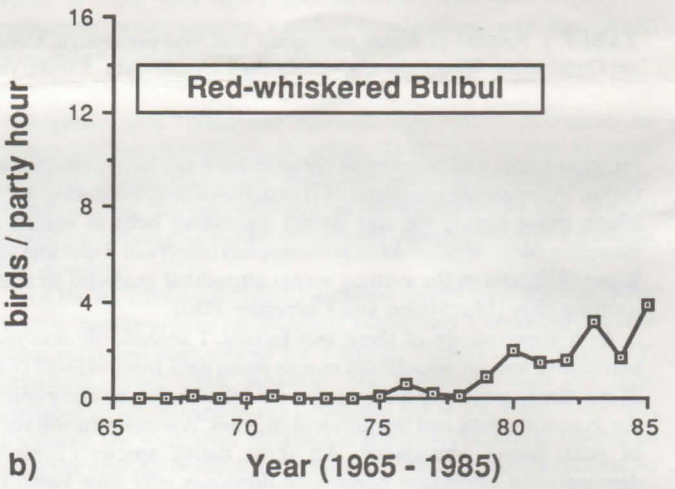
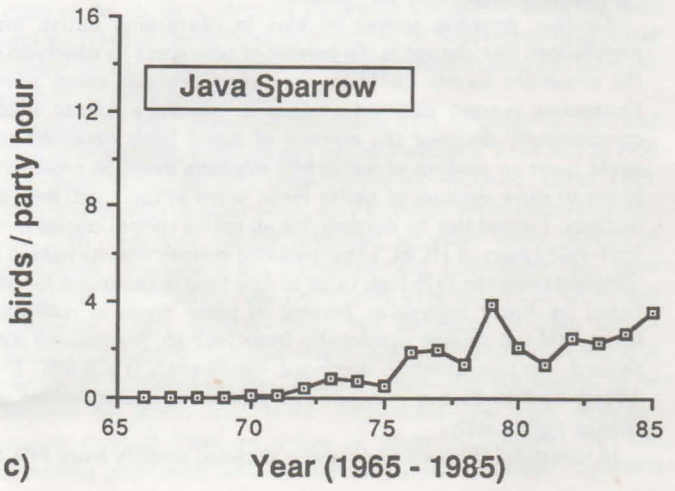


Fig. 3 Population trends of a) Red-vented Bulbul, b) Red-whiskered Bulbul and c) Java Sparrow on Oahu, 1965-85. Data from Honolulu Christmas Bird Counts.







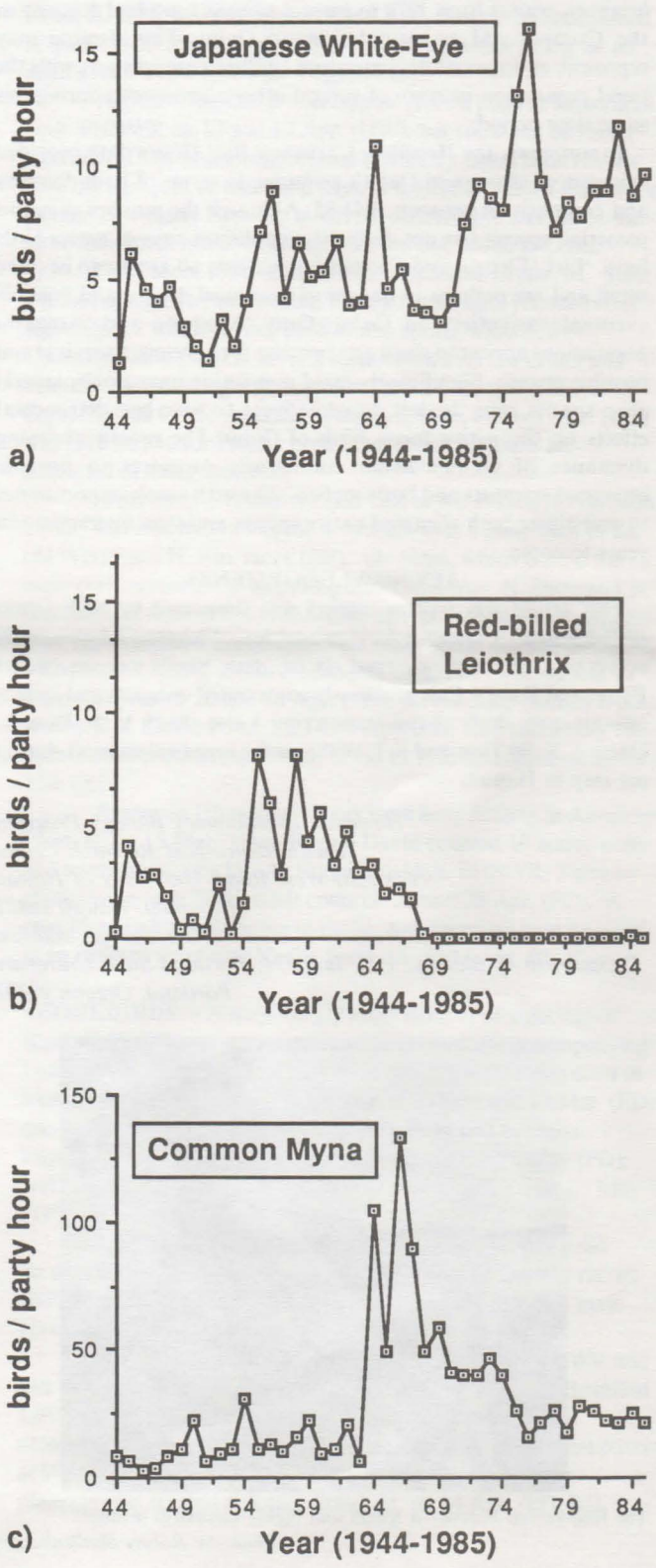
Both bulbul species, Java Sparrows (Fig. 3) and Japanese White-eyes (Fig. 4) showed highly significant ($P < 0.001$) population increases over time as well as the highest population growth rates (slope values, Table 1) for all species. Red-vented Bulbuls were the most rapidly increasing species on Oahu, having a growth rate (slope = 0.868) over four times as great as the next fastest increasing species, the Java Sparrow (slope = 0.206). Actual numbers also supported this observation, as Red-vented Bulbuls were the fifth most common bird of the 27 passeriform and columbiform species in the 1985 HCBC. None of the four more common species, Zebra Dove (*Geopelia striata*), Common Myna, Lace-necked Dove (*Streptopelia chinensis*), and House Sparrow (*Passer domesticus*), showed significant changes in population levels over the HCBC's (Table 1) based on linear regression; however, both Lace-necked and Zebra Doves showed highly significant ($P < 0.001$) increases over time based on non-parametric trend analysis. Populations of both species increased steadily over time, but also showed large year-to-year variation in population counts. This variance was responsible for the non-significant results of the linear regression analyses for these two species.

Of the seven alien species showing significant increases in population size, all showed the most rapid growth over the last 10-15 years (1970-75 to present). For both bulbuls and the Java Sparrow, this roughly matches their time on Oahu from introduction to present (see Fig. 3) and simply indicates rapid growth from the time of introduction to present. However the other four species, the White-rumped Shama (*Copsychus malabaricus*), Japanese White-eye, House Finch (*Carpodacus mexicanus*), and Red-crested Cardinal (*Paroaria coronata*), have all been on Oahu for at least twice this time period. It was therefore unexpected that they should also demonstrate accelerating growth rates during the last 10-15 years. Perhaps this growth is coincident with some of the rapid habitat changes and suburban sprawl that occurred on Oahu during this same time period, which may have provided means for alien species to increase their populations as new habitats became available to them.

The Red-billed Leiothrix was the only alien species to demonstrate a significant population decline between 1944-85 (Table 1). The Red-billed Leiothrix was an abundant bird on Oahu during the 1950's; therefore, its marked decline in the 1960's (Fig. 3) has been something of a puzzle to local ornithologists. Although this sequence of events, a rapid initial expansion of range and population size followed by a later decline, is recognized as an occasional phenomenon of invading species, underlying causes of such declines can rarely be identified.

The remaining seven species that did not show significant changes in population size were all aliens (Table 1). The Japanese Bush Warbler (*Cettia diphone*) was introduced on Oahu in 1929 and first recorded in the Honolulu CBC of 1971. It is a secretive bird, nearly always detected by its vocalizations. It also appears to have undergone accelerated population growth in the late 1970's, simultaneous with its colonization of Molokai and Lanai (Pyle 1979, Conant 1980). However, HCBC's do not appear to accurately monitor population levels of the Japanese Bush Warbler because it is largely quiet during the time of year when the HCBC occurs. Northern Cardinal populations did not decline over the HCBC years as suggested by the above-mentioned anecdotal accounts. However, there appears to be some validity to the anecdotal claims describing decreases in Common Myna numbers in recent years (Fig. 4). Non-parametric trend analysis supported this contention; linear regression (slope = 0.623, $t = 1.869$, $P > 0.05$) did not. Myna populations appeared to increase gradually from 1944 to 1963, then

Fig. 4 Population trends of a) Japanese White-eye, b) Red-billed Leiothrix and c) Common Myna on Oahu, 1944-85. Data from Honolulu Christmas Bird Counts.



to suddenly increase 500-600% over the following 6 years (Fig. 4). However, from 1970 to present, they have gradually decreased, but are still at higher levels than before 1964.

The high counts of the mid-1960's are the result of counting Mynas as they left large roost sites (S. Conant, pers. comm.); however, such counts have not been conducted in recent years. Therefore, the extremely high counts for 1964-67 are suspect; however, counts from 1970 to present suggest a gradual decrease in the Common Myna population on Oahu. This decline may represent an interaction component (diffuse competition) with the rapid population increase of several other alien species during this same time period.

In summary, the Honolulu Christmas Bird Count data provided evidence of changes in Oahu's avifauna, in terms of both diversity and composition between 1944-85. Although the number of native passerine species has not declined, population sizes of native birds have. 'Iiwi, 'Elepaio and Creeper populations all appear to be quite small and are perhaps in danger of continued decline and possible eventual extinction on Oahu. Only 'Apapane and 'Amakihi populations appear to show any promise for continued survival and possible growth. Significantly rapid population increases by several alien species over the last decade appear to have had detrimental effects on the native forest birds of Oahu. The rapidly changing dynamics of Oahu's avian community promises to provide interested scientists and birdwatchers alike with ample opportunities to investigate both alien and native species and their interactions in years to come.

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The Red-vented Bulbul—a recent and highly successful invader.
Photo by Robert Shallenberger

The Red-billed Leiothrix now survives in small numbers only in mountain forests.

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RECENT OBSERVATIONS MARCH THROUGH MAY 1987

(Editors' note: This article is excerpted from Bob Pyle's record of bird observations for the Hawaiian Islands. Refer to future issues of American Birds for a full account.)

ABBREVIATIONS: H. = Hawaii Is.; K. = Kauai Is.; M. = Maui Is.; O = Oahu Is.; JCNWR = James Campbell Nat. Wildlife Ref. of Oahu; PHNWR = Pearl Harbor NWR; BPBM = specimen catalog number prefix for B. P. Bishop Museum, Honolulu.

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WEATHER: This spring, above average rainfall fell on the islands of Maui and Molokai and on the Waimea Saddle of Hawaii Is. Stations on the rest of the Big Island and on Kauai and Oahu recorded lower than usual precipitation, though the lack of moisture was not so low as to be considered a drought. The past several winters have been relatively dry, causing concern for long-term effects on the recruitment of resident birds.

SEABIRDS -- As many as 30 Laysan Albatross were seen visiting Kilauea Point NWR, K. Four pairs nested in that portion of the refuge cleared of exotic vegetation and fenced to keep out dogs. One egg failed to hatch, but the remaining 3 progressed to fully feathered chicks in June, with fledging expected in July (DM). Albatrosses outside the exclosure fared poorly -- dogs destroyed 6 nests on the nearby Crater Hill, an area receiving much attention now as a potential addition to the Refuge. At Pacific Missile Range, K. dogs decimated Laysan Albatrosses drawn to the grassy fields for nesting; however, 3 survivors of dog attacks were transferred to Sea Life Park, O. (DM). Late reports of Laysan Albatross from other islands included: 2 flying off Sandy Beach on the south shore of Oahu in May (JE); 3 at Ulupau Crater, O. on 9 May (RLP); and one in early May flying off Kalapana, H. (SM).

A Christmas Shearwater seen flying off Ulupau Crater, O. 20 Apr. (PD) was not far from Moku Manu Islet, where the only breeding colony in the main Hawaiian Islands occurs.

Five White-tailed Tropicbirds, not common on Maui, were observed at Pauwalu Pt. on 29 Mar. (PC); on 22 May, 5 more were in view at once at Kealaloloa Ridge, high on the southern slopes of W. Maui (RLP). Audubon field trip participants were surprised to find a Red-tailed Tropicbird on its nest at Makapuu Pt., O. on 15 Mar. ('*Elepaio* 47:61, BE). In previous years Red-taileds have nested on nearby Manana Islet, but no reports regarding this colony have been received yet this year. Masked Boobies were seen in relatively large numbers (10+) on Moku Manu, as viewed from Ulupau Crater on 29 Mar. and 9 May (RLP).

Over-wintering gulls included 2 imm. Laughing Gulls and a winter-plumaged Ring-billed Gull at Aimakapa Pond, H. on 10 Mar. (BH). On 2 May, one of the Laughing Gulls and the Ring-billed were still there, plus a Franklin Gull in fine breeding plumage (RD). A small tern at Waiawa unit, PHNWR was seen and identified on 30 Apr. as probably a Least rather than Little Tern by the pale gray of the mantle extending uninterrupted to the central tail (RD, PD). The bird's calls did not offer any clues; a similar sighting occurred at Waipio Pen., O. on 5 May (PD).

WATERBIRDS -- The Pied-billed Grebe colony at Aimakapa Pond, H. continues to flourish. On 2 Apr., Reggie David counted at least 8 individuals, including a very young chick riding on an adult's back and a nest with 3 eggs visible.

A great Blue Heron was flushed from a pond at Honouliuli Unit, PHNWR on 13 and 17 Apr. (DW), but could not be found thereafter (PD). Numerous records of solitary Great Blue Herons over the past year or more and from at least four islands lead one to wonder how many birds are involved; conceivably it could be the same individual island-hopping from the Big Island to Oahu.

Nene seem to be doing well at Haleakala Crater, M. State releases of capitve Nene ceased there 10 years ago, yet numerous sightings are still reported, such as this spring when Peter Connally found them in several locations within the Crater and counted 24, including 8 goslings, at Paliku Cabin on 6 May. Eight Canada Geese reported flying over Hilo, H. on 3 Mar. (BC) was such an extraordinarily high number that the birds are suspected of being escapees.

A group of 5 Green-winged Teal at Kii Ponds, JCNWR on 3 Mar. was reported to include 3 females with 1 male each of the old World and N. Am. races (DP). On Maui, which hosted the main concentrations of wintering ducks this year, N. Shovelers at Kealia Pond were down to 30-40 by 12 Apr. and to 7 two days later (PD, RD). But at least 60 shovelers remained at Kanaha Pond, M. 14 Apr. (PD, RLP); and at Honouliuli Unit, PHNWR, 30 and 17 were still present 20 and 28 Apr. (PD). Seven Ring-necked Ducks were still at Kealia Pond, M. 14 on Apr. (PD, RD) and a very late female seen at Aimakapa Pond, H. on 11 May had departed by the 15th (RD).

American (Hawaiian) Coots were busy nesting at Aimakapa Pond, H. on 15 Mar., when Reggie David counted 10 active nests and some young chicks. At Honouliuli Unit, PHNWR, 3 downy chicks were with 11-12 adult coots on 25 and 28 Apr. (PD). A coot identified as belonging to the N. Am. race was seen by itself in an isolated pond near Kealia Pond, M. on 14 Apr. (RLP).

SHOREBIRDS -- A surprisingly large number of sightings of Black-bellied Plover were reported this season: one accompanying 2 Lesser Golden-Plovers in a pasture at about 4,500 ft. elevation in Makawao Forest Reserve, M. on 18 and 20 Feb. and 14 Mar. (FD); one at Kealia Pond, M. on 14 Apr. (PD, RD); one at Paiko Lagoon, O. on 31 Mar. (PB); one at Waipio, O. on 5 May (PD); and 2 flying along the shore at Malaekahana Park, O. on 25 May (TP).

A **Black-necked (Hawaiian) Stilt** found freshly dead on the shore of Nihoa Is. on 15 May (SC) may be the first record (BPBM 175823) of this Hawaiian endemic away from the main Hawaiian Islands.

The over-wintering Bristle-thighed Curlew at JCNWR was last seen on 2 Mar. (PD) and 15 Mar. (DP). A carefully identified **Little Stint,** molting into breeding plumage, was observed closely and photographed on 25, 28, and 30 Apr. in the west ponds at Waipio, O. (PD, AE, RD, RLP). A **Dunlin** in breeding plumage was spotted at Kealia Pond, M. on 14 Apr. (PD, RD,

RLP), and 2 Common Snipe were flushed from Kii Pond, JCNWR on 2 Mar. (DP). A Red Phalarope in winter plumage was photographed at sea 2-3 miles off Kailua-Kona, H. on 5 Apr. (RD).

RAPTORS AND GAMEBIRDS -- The 'Io normally preys on rodents and small birds. Thus Lennie Freed was amazed to see one of these small raptors perched in a tree feeding on the carcass of a bird nearly its own size. Closer inspection of this over-sized food item proved to be more surprising still -- a young turkey! Oahu's Osprey was reported at JCNWR on 15 Mar (DP) and around 1 Apr. (DW); the one on Kauai was seen at Lihue on 4 May (TT). Peregrine sightings this spring included the bird roosting at Pearl Ridge Square through 28 Apr. (GG); one at Waipio on 28 Feb. (DP), and one at Makapuu Pt. on 15 Mar. (BE *et al.*); they could all have been the same bird.

A hike above Peacock Flats turned up 15 of the birds for which the Flats are named -- the Common Peafowl (JL). These included two plumed males. Two Erckel Francolins were seen, too. The elusive Gambel Quail at Pohakuloa lost one of their number to vehicular traffic on the Saddle Rd., H., confirming the identification of the species for this area (JL, 13 Apr.). On the same day, Lepson was lucky enough to spot a covey of four before they disappeared into the brush along the Keanakolu Rd. At Pohakuloa and elsewhere on the saddle of Mauna Kea, Gambel Quail are way outnumbered by their close relatives, the California Q.; nevertheless, this may be their stronghold on the Big Island.

DOVES and PARROTS -- The Mourning Dove, a species birders seem to have trouble relocating in its scattered range in west Hawaii Is., turned up at Puu Lani Ranch where it was seen by RD on 19 Apr.

Flying with a flock of Cattle Egrets at Pukalani, M. was a white bird that didn't quite match its companions -- not only were the legs invisible, but the bill was short and bent, and the yellow crest curved up not down. This Great Sulphur-crested Cockatoo was either confused or very lonely. It was seen on three different days in late Feb. (FD), twice with egrets. This spring, another large white cockatoo, yet to be identified, recently earned the well-deserved ire of a home-owner in Aina Haina, O. With what can only be described as single-minded purpose, this bird for many days spent the better part of each morning and evening gnawing branches off a backyard Poinciana tree. After chewing a few test holes in the tree's trunk, the cockatoo has since been pruning away branches up to a diam. of 3 inches -- an ambitious project considering the size of the tree. Attempts at capture have not yet been successful. Such an incident can only attest to the unexpected destructiveness of some birds when introduced to Hawaii.

What may have been an active nest of Rose-ring Parakeets was discovered when one of two parakeets was seen to disappear into a tree hole in Makiki Valley Park, O. on 25 Mar.; a month later one was seen to enter the same hole (JL). Rose-rings have been reported in small numbers from Oahu since at least the early 1970s, but apart from sightings of birds entering tree cavities and of juveniles with the adults, definite proof of breeding is lacking. One pair did raise a youngster on Hawaii Is. in 1981, but the species has not been reported on that island before or since. On Kauai, where a population of an estimated hundred or more Rose-rings exists, three were seen together on 7 Mar., landing in a eucalyptus tree at the edge of Lihue-Koloa Forest Reserve north of Kalaheo (AE).

A flock of 32 amazon parrots, mostly or all Red-crowned Parrots, plus one Blue-crowned Conure, were observed flying to evening roosts in eucalyptus trees above Pearl City, O. (TP) during April and May. Sometimes the birds roosted on Waimano Ridge, sometimes on nearby Manana Ridge. The size of the flock and the fact that the little conure was with them suggest that these are likely to be the same birds that abandoned Kapiolani Park in Honolulu, November of last year.

OWLS and SWIFTLETS - Tom Telfer documented a large die-off of owls on Kauai this spring. Between 25 Mar. and 7 June, 38 Common Barn-Owls and 6 Short-eared Owls (Pueo) were turned in or reported by the public. Most were found along roadsides in a weak and emaciated condition; many had been struck by cars. Whether the die-off is due to disease or fluctuation in prey populations is unknown. Analysis of several specimens submitted to pathology labs revealed no common factor of death. The island-wide distribution of casualties rules out the possibility of local, increased contamination with pesticides.

Recent sightings of Pueo on Oahu offer hope for survival of this rural species on an island now becoming increasingly urbanized. The Pueo owlet reported last season in the Waianae Mts. was gone (we hope successfully fledged) when the nest was checked on 5 Apr. (JO, SP). A Pueo was seen by Audubon hikers at nearby Palikea Peak on 17 May (BE), and another was seen the same day in upper Aina Haina Valley (MH).

Three Gray Swiftlets were counted together from the ridge trail bordering N. Halawa Valley, O. on 28 Mar. (PD, RD). This site has been the best place to find them in recent years.

NATIVE FOREST BIRDS - News about the **Hawaiian Crow ('Alala)** is all bad. Despite a large observational effort, the annual 'Alala survey this spring for the first time failed to record **any** observations of the species, audio or visual. Just prior to the count, one 'Alala was seen and another heard simultaneously at the Waiea Tract in the southern portion of McCandless Ranch (JG, FD), and one was heard above Honaunau on May 13 (SM). One can only hope that these will not be the final reported observations of this species in the wild.

The captive flock of 'Alala fared no better in the breeding facility at Olinda, M. Although all four pairs showed courtship and nest-building activities, only one pair advanced to the stage of egg-laying. Two eggs laid on 30 Apr. and 6 May (delayed) failed to develop. The pair refurbished the nest for a second clutch, and the female sat on it for several days, then died June 11. She was found to be egg-bound from a large growth blocking the oviduct. This reduces the captive flock to 4 males and 4 females. Some switching of mates may be tried before next year's breeding season, when once again we will be fervently hoping for some much needed offspring.

Two 'Elepaio observed on 7 Mar. in exotic forest above Kalaheo, K. at the edge of the Lihue-Koloa Forest Reserve were out of normal habitat at an unexpectedly low elevation (AE).

A **Kamao** was heard by AE (9 Mar.) and RD (22 May) along the same section of the Pihea Trail, near Kokee, K. where the species has been reported over the past few years.

Another locally famous bird, the last known remaining **'O'o'a'a,** was found in its traditional locale near Halehaha Stream in the Alakai Swamp, K. It was heard twice on 28 Apr. and 3 times on 29 Apr., but never made an appearance (CK, JK).

The Laysan Finch breeding cycle began a month late this year, perhaps owing to unfavorable weather, though the population does not appear to have declined (MM). Andy Engilis counted 6 Kaua'i Creepers along the Pihea Trail, K. on 8 Mar. Fern Duvall watched a pair of adult Maui Creepers feeding 2 juveniles in upper Waikamoi Preserve, M. on 24 Mar. A study of the 'Akepa on-going at Hakalau NWR, H. turned up three nests of this hole-nesting species between 12 Apr. and 24 May (LF, JL). The earliest nest apparently fledged young. Two Juvenile 'Tiwi were seen in Waikamoi Preserve on 24 Mar. (FD), and numerous juvenile 'Apapane were seen there 24 Mar. (FD), 15 Apr. (PD, RD), and 13 June (Nature Conservancy staff).

Only a single species of forest bird, the 'Apapane, survives on Lanai. Thus it is of concern that two dead 'Aps were found this spring within a mile of each other near Lanai Hale summit, on 11 Apr. (decomposed) and 24 May (freshly dead) (*fide* AM).

ALIEN SONG BIRDS - Nihoa Islet, a frequent landfall for land birds straggling from the main Hawaii Islands, was reached by two male Northern Cardinals sometime earlier this year. Both were found dead (BBM 1758824, 175825), one on 14 May, the other on 15 May (DH *fide* SC). The only other record of this species was of a male observed alive in Apr. 1983 (SC). The insect-like trill of a Yellow-faced Grassquit was heard from grassy meadows near the Koolau Crest above Wilhelmina Rise on 1 Mar. (TP). The vagrant female Great-tailed Grackle residing on Waipio Peninsula for at least 7 years was observed again at the west ponds on 25, 28, and 30 Apr. (PD, RD, AE, RLP).

Red-cheeked Cordonbleus may be expanding their range in Kona, H. On 25 Apr., two females were spotted in Kailua View Estates, far from Pu'u Anahulu, the only locale where the species has been found regularly in recent years (JL). An adult Warbling Silverbill observed on 7 Mar. along Navy Rd. a mile-and-a-half northwest of Kekaha, K. (AE) was one quarter of the way around the island from Poipu, where this species was first discovered on Kauai several years ago.

Thane K. Pratt

JULY 1987 FIELD TRIP REPORT AIEA RIDGE TRAIL

The H.A.S. field trip on 19 July was a hike along the Aiea Ridge Trail. Six people participated in the outing, which began at Aiea State Park and continued along the loop trail and then branched off to Aiea Ridge. Except for a few brief showers the weather was pleasant, and the trail was in good condition.

Hiking members were treated to clear views of Halawa Valley, Honolulu and the summit peaks of the Koolaus. Birds observed during the trip included White-rumped Shama, House Finch, Japanese Bush-Warblers, Japanese White-eyes, Spotted Doves, Red-crested and Northern Cardinals, Red-vented Bulbuls, Spotted Munias, and Common Mynas. Good numbers of 'Amakihi and 'Apapane were also observed.

The forest along the ridge is predominantly Koa and 'Ohia with a wide variety of other native plants. The introduced plant pest *Clidemia* is now widespread along the trail and lower forest. It seems to be spreading up-ridge at an alarming rate, probably due to the unavoidable spread of seeds carried on the clothing and boots of hikers.

Aiea Ridge is one of the few easily accessible trails left on Oahu where native forest birds can still be easily observed.

Bruce D. Eilerts

H.A.S. NOMINATING COMMITTEE FORMED

The Hawaii Audubon Society's Nominating Committee has been named. They are Phil Bruner (293-3820, wk), Sheila Conant (948-8241, wk), and Mike Hall (293-3805).

Anyone who would like to nominate themself or another member as an officer or director for the 1988 Board should write the Committee c/o H.A.S., P. O. Box 22832, Honolulu, HI 96822, or call one of the members of the Committee listed above. The Committee appreciates any suggestions from members of the Society.

INTERESTED IN HAWAIIAN NATURAL HISTORY?

The Nature Conservancy's Hawaii Heritage Program is looking for volunteers!

Across the country, Heritage Program databases are used to identify the best remaining examples of a state's natural heritage by compiling comprehensive and up-to-date information on all rare species and ecosystems in that state. The Hawaii Heritage Program is seeking volunteers: (1) with typing skills to assist in entering information on rare and endangered Hawaiian plants, animals, and ecosystems in a computerized database, and/or (2) with library or literature search skills to assist in compiling information on rare Hawaiian plants, animals and ecosystems. Previous computer experience is desirable but not required.

You will receive training in Heritage methodology which is used in Heritage Programs nationwide, as well as training in the computer program, Dbase III+.

Our office is located in Honolulu's Chinatown district. We are open Mon. to Thurs. 8:00 Am to 8:30 PM, Fri. 8:30 AM to 5:00 PM and Sat. 9 Am to 5 PM. We would request a minimum commitment of 4 hours per week.

For more information call Christa Russell, Robin Eilerts or Sam Gon at the Heritage Program office: 537-4508 Mon. to Fri. 8 AM to 5 PM.

STUDENT INTERNSHIPS THE NATURE CONSERVANCY OF HAWAII

Student internships are available with the Nature Conservancy's Hawaii Heritage Program during the 1987-1988 school year. The Hawaii Heritage Program is building a computerized database on rare Hawaiian plants, animals and ecosystems for land-use planning in Hawaii. Previous interns have assisted us by compiling and mapping information on rare plants and animals, entering biological information in our computerized database, and producing overlays.

Internships have been arranged for credit, or possibly for a stipend, through the University of Hawaii/Manoa Campus and Oahu Community Colleges.

Our Office hours are listed in the notice above.

Contact Audrey Newman, Heritage Program Coordinator, at The Nature Conservancy office, 537-4508.

CONSERVATION SYMPOSIUM SAVING HAWAII'S NATIVE PLANTS: NOW OR NEVER

More native plant species face extinction here in the next decade than anywhere else in the United States. What can you do about it?

On 18 and 19 October, 1987, The Garden Club of Honolulu and its co-sponsors will present a symposium "Saving Hawaii's Native Plants: Now or Never." Co-sponsoring this event are the Honolulu Academy of Arts, Pacific Tropical Botanical Garden, Waimea Arboretum and Botanical Garden, Bernice P. Bishop Museum, The Nature Conservancy of Hawaii, Harold L. Lyon Arboretum, and Honolulu Botanic Gardens.

The symposium will open at the Honolulu Academy of Arts on Sunday, 18 October, at 2:30 Pm, with Puppets on the Path performing "Forest Friends" in the Central Courtyard. This is a light-hearted musical journey through Hawaii's forests to learn about the invasion of non-native plants and animals, the plight of endangered species and the importance of habitat preservation.

Dr. Thomas E. Lovejoy will speak at 4:00 PM in the Academy Theater on "The International Significance of Hawaiian Plant Conservation." Dr. Lovejoy is the Executive Vice President of the World Wildlife Fund and the founder and advisor for the weekly public television series "Nature" which started in 1980. Some of you may remember his fascinating presentation at the "Roots of Life" symposium held in April.

Dr. Lovejoy's talk will be followed by a reception in the Academy Courtyard and the opportunity to view a display of photographs of Hawaii's ecosystems and plants.

Monday, 19 October, registration begins at 8:30 AM. the $10 fee includes a morning break and lunch. Charles Lamoureux of the Department of Botany at the University of Hawaii will introduce the plant conservation issues in Hawaii; following him will be other presentations on conservation topics.

There will be an open discussion with the audience in the afternoon and time for questions and answers, followed by concluding remarks by Dr. Lovejoy at 3:00 PM.

Please contact the Garden Club of Honolulu in writing at 3860 Manoa Rd., Honolulu, Hawaii, 96822; or by phone at 808-988-7533 for further information.

INFORMATION ON BULBULS SOUGHT BY USDA

Red-vented Bulbuls have been implicated in damaging various agricultural and horticultural crops on Oahu; however, there is very little information that has been substantiated. H.A.S.members are asked to contact the Animal Damage Control-USDA-APHIS office in Honolulu if you have actually observed Red-vented Bulbuls causing damage to such crops or to flowers and fruits in your backyard. We need to know the extent and frequency of damage, the parts of the flowers and fruits eaten, the species of plant damaged, and the remedies taken, if any. The information will be used to evaluate further action to prevent the establishment of this bulbul on the neighbor islands.

Please write or call Tim Ohashi, Wildlife Biologist, Animal Damage Control, U.S. Department of Agriculture, c/o Airports Division, Honolulu International Airport, Honolulu, HI 96819; Phone 836-6565.

SEPTEMBER 20TH FIELD TRIP TO MOANALUA VALLEY

The September 20th H.A.S. field trip will be an outing to Moanalua Valley. The trip leader will be long-time valley resident and artist/naturalist Patrick Ching. Participants will visit historic house sites, petroglyphs and landmarks within the valley, and hopefully everyone will be able to catch glimpses of the native O'opu that frequent the valley's streams. Native and introduced birds and plants will also be encountered during this hike. Bring along insect repellent, bathing suit, lunch, camera, and binoculars. Don't forget to pack some rain gear just in case. Meet in front of the State Library on Punchbowl St. at 7:30 AM. For more information call Patrick Ching at 839-2866.

SEPTEMBER PROGRAM BIRDS OF SAMOA

At the general meeting of H.A.S. on 21 September, Tino Aguon will present a 45 minute slide presentation focusing on the birds of American Samoa. There will be many photos, not only of Samoan wildlife, but also of these scenic islands.

Aguon, who is presently a graduate student at the University of Hawaii, previously spent six years working for Guam's Division of Aquatic and Wildlife Resources. He participated in the USFWS Surveys of the Mariana Islands and American Samoa. Meeting place: Atherton Halau, B. P. Bishop Museum, 7:30 PM. Refeshments will be served.

MORE FREE ICE CREAM!

What could be more refeshing than a bowl of ice cream on a hot summer's day? Come joint the September paste-up of the 'Elepaio at Thane Pratt's house at 1:00 PM, Saturday, 19 Sept. For more information (but don't expect us to tell you the flavors) call Thane at 524-8464. Many thanks to Edith Bergmanis and Lee Ann Syrotuck for their help on the August paste-up.

HAWAII AUDUBON SOCIETY

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----------*'ELEPAIO*----------

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NOTICE TO CONTRIBUTORS

The *'ELEPAIO*, Journal of the Hawaii Audubon Society, invites authors to submit scientific articles on natural history of Hawaii and the Pacific. Scientific articles are subject to peer review. The *'ELEPAIO* also serves as a newsletter to inform members of conservation issues, Society events, and other subjects of interest to members. Manuscripts of articles and newsletter items may be sent to Thane Pratt at 1022 Prospect St., Apt. 1103, Honolulu, HI 96822. Articles not subject to peer review MUST BE RECEIVED BY THE 15TH OF THE MONTH to be considered for publication in the next month's issue.

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All local memberships and subscriptions are for the calendar year.

CALENDAR OF EVENTS

July 30 to November 10. Exhibit of original bird art by Douglas Pratt . Jabulka Pavillion, B. P. Bishop Museum. Opens July 30, 7 PM.

Sept 14 (Mon.) Board Meeting at Bishop Museum at 7:00 PM. Call Pete Luscomb, 923-4772 (wk).

Sept 19 (Sat.) *'Elepaio* paste-up at Thane Pratt's house, 1:00 PM. Call 524-8464.

Sept 20 (Sun.) Field trip to Moanalua Valley. Meet at the State Library on Punchbowl St. at 7:30 AM. Announcement on page 96.

Sept 21 (Mon.) General Meeting at **Atherton Halau, Bishop Museum** at 7:30 PM. Program: Birds of Samoa. Announcement on Page 96.

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Birds of Hawaii and Tropical Pacific

at the Bishop Museum

Opening July 30 through November 10

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