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BIRD POPULATIONS IN HAWAII VOLCANOES NATIONAL PARK

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The decline of endemic forest birds in Hawaii is a tragic illustration of how changes wrought by man can upset a delicate balance among highly specialized forms. Whether the decline is continuing today or if a leveling-off point has been reached is not definitely known; there is some evidence for either argument. Conservationists were elated two summers ago by the spectacular rediscovery of species presumed to be extinct on the island of Kauai (Richardson, 1961); on the other hand, recent studies in and nearby Hawaii Volcanoes National Park have suggested that the geographical range of several Hawaiian Honeycreepers is continuing to diminish.

The last published appraisals of song-bird populations in the park were made by Baldwin in the 1940's (Baldwin; 1940, 1941, 1953). Since the fall of 1958 I have revisited most of Baldwin's study plots, and during a period from May 1959 through December 1961 formal censuses were made. While results of the two studies are not directly comparable since our census methods differ considerably (in particular, Baldwin confined his much more intensive work to small plots representative of each vegetation zone, while I was concerned with a broader sampling of the entire zones), it is clear that in certain parts of the park some important changes in the bird community have occurred during the past dozen or so years.

My method was to count and record all birds actually seen while I was afoot in the field. Observations were made both from park trails and during cross-country treks. Loop trips were nearly always undertaken to avoid repeating the exact same tract in a single day. The average trip lasted about $2\frac{1}{2}$ hours, and no attempt was made to establish a uniform pattern for time of day for the trips, so this factor varied considerably. It is not meaningful to compare the total number of each species observed per hour in one area with that of another, since the terrain, which plainly limits the distance that can be covered in an hour, and the vegetative cover differ so widely in the park. Nevertheless, the proportional makeup of the populations should be comparable among the several areas.

Results of the censuses follow. The localities are all within the present boundaries of Hawaii Volcanoes National Park. Following the name and vegetational type of each area, the number of observation trips made, the total number of hours spent, and the month and year of each trip are cited. In addition to the number of birds seen, the approximate percent for each species is given in the tables. In the brief discussion that follows each table, I have attempted to compare Baldwin's findings (as interpreted from his three papers already cited) with my own evaluation of the present status. Common bird names used herein apply to the species cited in Birds of the National Parks in Hawaii (Dunmire, 1961).

Kipuka Nene, elev. 3,000'

(Upland Scrub Forest - Transitional Dry Forest)

4 trips (6 $\frac{1}{4}$ hours): May '59; April, July '60; Nov. '61.

<u>Species</u>	<u>Number</u>	<u>Percent</u>
California Quail	1	1*
Mynah	6	3
White-eye	93	40
Amakihi	13	6
Apapane	5	2
Ricebird	5	2
Cardinal	1	1*
House Finch	107	46

*Less than 1%.

The population structure has been greatly modified in recent years by the explosive increase of exotic White-eyes feeding in this Kipuka, possibly at the expense of certain native forms. Whereas Baldwin recorded these birds on only some of his trips, today they are ubiquitous. The large number of House Finches in the above table is accounted for by the recording of some huge flocks feeding in the grassy flats during one trip in summer, but White-eyes were observed at a rate of at least 10 per hour on every trip, and they were found throughout the kipuka. I judge that there has been a decrease of Amakihi since Baldwin's studies, and Elepaio, which were often seen here by him, have apparently left the area. It seems likely that direct competition from the White-eye, a bird with congeneric eating habits, has reduced the one species and eliminated the other from Kipuka Nene. Clearly this dry open forest now provides an optimum habitat for exotics; only 4% of the total birds recorded were native.

Baldwin noted Apapanes in the kipuka during every month of the year, yet I failed to see a single bird during my spring and summer counts, even when the ohias were in partial bloom. It is doubtful that there is any correlation between the increase of introduced birds and the decline of Apapanes, however, but field studies are needed to determine if the lower elevation range of Apapanes and other Drepaniids are becoming more restricted.

Between Makaopuhi and Napau Craters, elev. 2,600-3,200'

(Montane Ohia-Tree Fern Forest)

4 trips (14 $\frac{3}{4}$ hours): July '59; April (2), Oct. '60.

<u>Species</u>	<u>Number</u>	<u>Percent</u>
Io	2	1*
Red-billed Leiothrix	46	14
Omao	9	3
Elepaio	7	2
White-eye	190	58
Amakihi	1	1*
Apapane	52	16
Iiwi	2	1*
Ricebird	17	5
House Finch	1	1*

*Less than 1%.

The ohia forest is less well developed at this lower elevation compared with the two other montane forest areas under consideration (Kilauea Crater and Olaa Tract), which is probably due to the proximity to Kilauea's East Rift Zone and its geologically recent lava flows. The resulting broken pattern of sub-climatic vegetation apparently provides a highly suitable environment for the introduced birds. Baldwin found White-eyes on only a third of the days he recorded in the ohia forest here between 1948 and 1949, and no White-eyes were seen by him between 1940 and 1944; yet the White-eye is by far

the commonest bird here now.

The Ou may have moved out of this lower forest, since Baldwin observed them fairly regularly, but I saw none.

Kilauea Crater - East Rim, elev. 3,100-4,000'

(Montane Ohia-Tree Fern Forest)

8 trips (21½ hours): May, Oct. (2) '59; April (2), June, Oct. '60; Feb. '61.

<u>Species</u>	<u>Number</u>	<u>Percent</u>
Io	2	1*
American Golden Plover	6	1
Spotted Dove	3	1*
Skylark	1	1*
Chinese Thrush	2	1*
Red-billed Leiothrix	63	7
Omao	4	1*
Elepaio	5	1
Mynah	4	1*
White-eye	102	11
Amakihi	45	5
Apapane	649	68
Iiwi	21	2
Ricebird	29	3
House Finch	12	1

This area includes the east walls and rim of Kilauea Crater (but not the caldera floor), Kilauea Iki (both before and after its 1959 eruption), and the vicinity around the upper end of the Chain of Craters Road. The plant cover is mostly ohia-tree fern jungle with a few artificial grassy openings. Except for an increase in White-eyes, there has been no obvious alteration in the bird populations in recent years here.

Olaa Tract, elev. 3,700-3,900'

(Montane Ohia-Tree Fern Forest)

6 trips (16¾ hours): Oct., Nov. '59; May, June, July '60; April '61.

<u>Species</u>	<u>Number</u>	<u>Percent</u>
Red-billed Leiothrix	86	18
Omao	3	1
Elepaio	31	6
White-eye	42	9
Amakihi	11	2
Hawaiian Creeper	1	1*
Ou	3	1
Apapane	234	48
Iiwi	67	14
Ricebird	13	3

Trips were made from Wright Road into this 9,000 acre tract of ohia-fern jungle that is a non-contiguous portion of Hawaii Volcanoes National Park. Except for near the road, vegetation in the tract is completely unaltered and represents some of the finest native fern jungle in the state. Baldwin had no stations in this forest, so it is impossible to assess recent variations here. It is encouraging that the endemic birds seem to be holding their own in this protected forest.

*Less than 1%.

Kipuka Puaulu - Kipuka Ki, elev. 4,000-4,400'

(Transitional Mixed Forest)

9 trips (13 $\frac{1}{4}$ hours): Sept., Oct. '59; April (3), May, Aug. '60; Feb., Dec. '61.

<u>Species</u>	<u>Number</u>	<u>Percent</u>
Pheasant sp.	5	1*
Pueo	1	1*
Red-billed Leiothrix	187	28
Elepaio	18	3
Mynah	4	1
White-eye	201	31
Apapane	88	13
Iiwi	58	9
Ricebird	22	3
Cardinal	15	2
House Finch	58	9

A most striking feature of the population in these two kipukas is the absence of Amakihi. These versatile Hawaiian Honeycreepers are found in the ohia forests a short distance to the east and in the koa-manani woods just above here, yet not a single Amakihi was recorded within the kipukas themselves, and the sample includes nine trips at every season over a two year period. During the 1940's these birds varied from fairly common to abundant in Kipuka Puaulu according to Baldwin. Occasional birds probably still pass through the kipukas, but the Amakihi is certainly an unimportant member of the bird community now. In addition, two other Drepaniids, the Hawaiian Creeper and Akiapolaau, that were seen occasionally in Kipuka Puaulu by Baldwin have not been recorded here in recent years. All three species are primarily insectivorous. Since 1940 an introduced insectivore, the White-eye, has become the most numerous bird in the Kipukas. In 1940 only one White-eye individual had been seen here. I believe that there is a direct correlation between the two trends, yet it seems incredible that a bird such as the Amakihi, which is regarded by many as the most adaptable of all the Drepaniids, could be forced out of such an apparently suitable habitat. There is something ominous in the statistic that an area comprised of mostly native Hawaiian vegetation should now harbor an avifauna whose individuals are three-quarters introduced.

Mauna Loa Strip, elev. 4,000-6,700'

(Koa - Ohia Parkland)

10 trips (30 $\frac{1}{2}$ hours): April (2), May (2), June, Aug., Nov., Dec (2) '60; March '61.

<u>Species</u>	<u>Number</u>	<u>Percent</u>
Nene	2	1*
Io	1	1*
California Quail	19	3
Chukar	20	3
Pheasant sp.	16	2
American Golden Plover	6	1
Pueo	2	1*
Skylark	9	1
Red-billed Leiothrix	68	10
Elepaio	12	2
Mynah	19	3
White-eye	242	36
Amakihi	47	7
Apapane	139	21
Iiwi	27	4
Ricebird	6	1
Cardinal	2	1*
House Finch	41	6

* Less than 1%.

Here, as in the other open forest areas of the park, introduced birds are still on the rise. Two endemic species, the Hawaiian Creeper and the Akiapolaau, formerly seen by Baldwin in Kipuka Kulalio which makes up a large portion of this area, were never observed here by me, and since 30½ hours were spent on these slopes (and much other time during which no formal counts were made), it appears that these two insect foragers no longer use this koa forest. Although among birds, direct competition for food by an introduced species is rarely regarded as a factor that can completely eliminate a native species, the tremendous increase in number of White-eyes inhabiting these slopes lately does seem to be more than mere coincidence. White-eyes glean insects from tree limbs in much the same manner as Hawaiian Creepers (indeed, several times I have had to focus carefully on a distant White-eye that was working along a koa trunk, creeper-fashion). The Akiapolaau and Hawaiian Creeper depended largely on the insect fauna of the trunks and larger limbs of koa trees. White-eye flocks visit the same koa tree many times a day. The two Drepaniids are gone. The present distribution for the three species compared with Baldwin's data 15 years ago clearly show that the changes have occurred simultaneously. Yet, except for the elimination of cattle grazing here since the war (and thus further protection from human influences), there has been no apparent modification of the environment that might affect the birdlife. Presumably this area is above the zone of the introduced Culex mosquito that is thought to have had a severe decimatory effect on the lowland Drepaniids through infection with avian malaria and bird pox virus (Warner, 1961). Culex has never been found higher than 3,800' on this island, although the mosquito is abundant at lower elevations. The evidence here supports a strong case for the supplantation of native species by an exotic bird through direct competition for food.

It should be mentioned that both the Hawaiian Creeper and the Akiapolaau as well as the Akepa are still found in encouraging numbers in the Koa forest at the same elevation a few miles to the east of the park on the Keauhou Ranch. It is wetter there and the forest is more diversified with trees such as kolea (Myrsine sp.), Olapa (Cheirodendron guadichaudii), and naio (Myoporum sandwicense) included in the climax koa upperstory. Unfortunately this land is being rapidly cleared for cattle (along with some optimum forest-bird habitat on the nearby State-owned Kulani Prison lands), and it is questionable whether endemic birds will continue to thrive there. Even during the past three years I have noted a significant increase in exotic birds at Keauhou.

Mauna Loa Strip, elev. 6,700-8,200'
(Subalpine Ohia Scrub Forest)

<u>Species</u>	<u>Number</u>	<u>Percent</u>
California Quail	1	1*
Chukar	4	1
Pheasant sp.	2	1
Skylark	2	1
Red-billed Leiothrix	18	6
Omao	2	1
Mynah	4	1
White-eye	48	17
Amakihi	87	31
Apapane	102	36
Iiwi	4	1
House Finch	11	4

*Less than 1%.

At this highest elevation for resident birds in the park the community seems to have changed little in the past few years - except, of course, for the increased occurrence of the ubiquitous White-eye, which now inhabits by far the greatest variety of habitats of any bird in the state. The Chukar, introduced to the island in 1949, has become established in moderate numbers here and at lower elevations on the Mauna Loa Strip.

Conclusion

There can be little doubt that introduced species are continuing to increase their proportion of the overall bird community in most areas of Hawaii Volcanoes National Park. In none of the areas studied has an exotic species undergone an apparent decline since 1940, and one species, the White-eye, has experienced a striking proliferation during this period.

Native birds, on the other hand, seem to be declining in numbers in some parts of the park and holding their own in others. The decline is probably due in part to increased competition by more versatile exotic forms, but there may be other unassessed deleterious factors involved. One ecological factor that has not been appreciably modified within the study areas in recent years is makeup of the vegetative cover. Fortunately park vegetation is not likely to be altered artificially in the future in a place dedicated to the preservation of natural conditions.

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Field Trip to West Loch and Salt Lake, January 14, 1962.

This was to be a search for shore birds at West Loch and Salt Lake. The tide was too high at West Loch to provide the results we had hoped for. By means of the "scope", we saw 1 Hawaiian Stilt and 2 Plover on a distant mud flat. Three Black-crowned Night Heron were in the vicinity, one remaining motionless on a stump far out in the water from our observation point. Harsh cries of the Coot could be heard in the thick mangrove swamp indicating a large flock; however, only two were seen.

In the land area nearby were many Cardinals, North American and Brazilian. The North American Cardinals were in good voice this beautiful sunny day. Chinese Doves were seen and Barred Doves were everywhere.

Salt Lake, too, was a disappointment as we expected to see hundreds of Coots. Only a few were in evidence from the makai shore. We were surprised to see 2 Hawaiian Stilts close up, I believe new comers at Salt Lake. Our mainland guests were delighted to see this unique bird of Hawaii. A lone Plover was on a mud flat remaining quite still as long as we were there. Flocks of Ricebirds were in the area approaching the lake. Cardinals too were seen, and a Mockingbird was heard.

As it was such a beautiful day, it seemed too soon to end our Field Trip. One of our members suggested the trail in nearby Halawa Valley which proved a pleasant surprise. The first portion is through almost an arbor of Christmas Berry trees. Although the peak of the berries is passed, it was easy to picture how the area must have looked a few weeks earlier--then, a thick area of guava trees; next is a small rushing stream which the trail follows and crosses. We went as far as an abandoned "plantation" with many banana trees, coffee bean plants, 2 lipstick trees, an old taro patch and many other interesting trees and plants. On this trail we heard the gay song of the Leiothrix, there seemed to be flocks of them. We finally were able to coax a few so that we could see them in the dense foliage. This was a thrill for our visitor from Maine and a new bird for her list. There were many White-eye or Mejiro and Cardinals. This area seemed ideal for fruit eating birds with the many fruit and berry bearing plants and trees and the running stream nearby.

Mildred Mench

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Field Trip to Poamoho, February 11, 1962.

Five members and 14 visitors turned up for our field trip to Poamoho. Only three members had cars but Mrs. Allen, who had driven Mr. and Mrs. Nearing to the Library, volunteered to come along with her car, thus solving our transportation problem.

The jeep road was in good condition to within half a mile of the start of the trail.

Very few Plover were seen on the plowed fields, in contrast to large numbers on some occasions. There were the usual flocks of Ricebirds in the grassland.

There were a few lehua blossoms and the koa was in full bloom. Leiothrix were heard all along the trail; many Amakihi and Apapane were heard and a few seen. Two or three Elepaio were seen. Mike Ord saw a Black-crowned Night Heron flying in the valley. No garrulax were heard.

After the hike Mike Ord, Margaret Smail and her guest, Mrs. Rodena Lorentz and I went to Kahuku, where we met Dave Sanford, of the Hawaiian Trail and Mountain Club, and Mr. James Morgan, manager of Kahuku Plantation. Mr. Morgan took us to three pond areas. One of these is large and secluded. On it were a few Pintails and Shovelers, Stilts and Coots. The conservation committee will work toward having this pond set aside as a bird sanctuary.

Al Labrecque

FIELD NOTES

from Joseph S. Medeiros: "Going through my old notes I came across the following observation which I failed to report. It might be of interest to others. January 11 to January 13, 1961, an osprey (Pandion Haliaeetus) was seen at Kanaha Pond on Maui."

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from Al Labrecque: "On Sunday, February 4, on a hike along the new Likelike trail between the Wilson tunnel and the Pali Highway, on the Windward side, at least six Shama thrushes were heard, along with the usual Leiothrix."

CHRISTMAS GREETINGS have been received from Mrs. Ruth Ebert, now living in Calistoga, California, who writes, "Wishing you all blessings and a happy year."

LIFE MEMBERS

Five more regular members have become life members, including our first president, J. d'Arcy Northwood, now living at Mill Grove, Penn., and several long time supporters of the Society, Mrs. Alfred Castle, Miss Ethel Damon, and Mrs. John C. Plews, of Honolulu, and Mrs. Brooks Clyde, of San Francisco, California.

We also welcome the following new members: Mrs. Mable Frings, at present of Honolulu; Richard Kimball, of Honolulu; Peter Benevides, of Hilo; Paul W. Colburn, of Beverly Hills, California; Douglas M. Goudie, of Powell River, British Columbia; and two junior members: Charlotte Townsend, of Honolulu; and Regina M. Plover, of Staten Island, New York.

MARCH ACTIVITIES:

- March 11 - Field trip to observe shore birds. Meet at the Library of Hawaii at 8:00 a.m. LEADER: Michael Ord, Phone 587-328.
- March 13 - TUESDAY. Board meeting at the Auditorium of the Honolulu Aquarium at 7:30 p.m. Members are always welcome.
- March 19 - General meeting at the Auditorium of the Honolulu Aquarium at 7:30 p.m. Dr. Roland W. Force, new director of the Bernice Pauahi Bishop Museum, will talk on "The Role of the Museum in the Interpretation of Natural History". This is an opportunity to welcome Dr. Force to our Society, as well as to hear a stimulating talk.

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