

Technical Report 105
**Vascular Plants of Pu'uhonua O Hōnaunau
National Historical Park**

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**Birds of Pu'uhonua O Hōnaunau
National Historical Park**

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Technical Report 106

BIRDS OF PU'UHONUA O HŌNAUNAU
NATIONAL HISTORICAL PARK

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BIRDS OF PU'UHONUA O HŌNAUNAU NATIONAL HISTORICAL PARK

ABSTRACT

Twelve bird species were detected at 29 count stations located throughout Pu'uhonua o Hōnaunau National Historical Park. Each station was counted once during the fall of 1992 and again during the spring of 1993. Significantly higher bird numbers per station and more bird species per station were detected during the spring count. Two of the species (17%) were indigenous migratory shorebirds and the other ten (83%) were introduced non-native species. The high percent of non-native species in the avifauna, and conversely the lack of endemic or indigenous bird species, can be attributed directly or indirectly to centuries of human influence.

ACKNOWLEDGMENTS

I thank Superintendent Jerry Shimoda and his dedicated staff, especially Gordon Joyce and Charles Hua. Also thanks to Mark Aeder and Jason Texeira for laying the transects, and Lyman Abbott for his able map renditions.

INTRODUCTION

This avifauna inventory was part of a multidisciplinary project undertaken in 1992 to describe baseline population numbers, diversity, and distributions for plants, birds, insects, and mammals in the three coastal National Parks in west Hawai'i. The other two parks are Pu'ukoholā Heiau National Historic Site and Kaloko-Honokōhau National Historical Park.

Pu'uhonua o Hōnaunau National Historical Park and the surrounding area have been inhabited by humans for hundreds of years (Cuddihy and Stone 1990). Originally the area was probably primarily dry forest with coastal strand and wetland vegetation in the appropriate areas near the shore (Pratt and Abbott 1996). Like most of the lowlands in Hawai'i, the area now supports a mostly non-native flora and an almost totally non-native fauna, highly modified from its pristine condition prior to first human contact (Olson and James 1982). However, it is probable that the original avifauna included some or many of the recently discovered fossil birds (Olson and James 1991, James and Olson 1991) and historically known extinct birds, as well as some of the still extant endemic species that no longer inhabit the lowlands.

Because of its shoreline tidal pools and small fishponds, any migratory shorebird, waterbird, or seabird that has been seen at the other two west Hawai'i coastal National Parks could also be seen at Pu'uhonua o Hōnaunau. The bird checklist at the end of this

report would surely be longer if Pu'uhonua's coastal areas had been closely monitored by birdwatchers over the years.

Pu'uhonua o Hōnaunau and vicinity are mentioned in a recently published "birding" book (Pratt 1993) as a good place to sight the endemic Hawaiian Hawk or 'Io (*Buteo solitarius*), as well as unusual migratory shorebirds.

STUDY SITE

Pu'uhonua o Hōnaunau National Historical Park is located on the shore of historic Kealakekua Bay in the South Kona District on the island of Hawai'i. The area was preserved primarily for its cultural significance. Most of the Park development and visitor use is concentrated along the shoreline in coastal strand vegetation. Rocky tide pools and small brackish fishponds provide migratory waterbird and shorebird habitat in these same shoreline areas where human use is heaviest.

The primary vegetation elsewhere in Pu'uhonua is non-native shrubland dominated by koa haole trees (*Leucaena leucocephala*) mixed with other mostly non-native plant species (Pratt and Abbott 1996). This relatively large area receives minimal visitor use. The nearby houses, lawns, and other accouterments of habitation provide another habitat which influences bird density and bird diversity in the Park.

METHODS

Twenty-nine bird stations were established within Pu'uhonua o Hōnaunau National Historical Park. A unique position number was assigned to each bird station (Fig. 1). Twenty-five of the stations were marked along the seven transects flagged within Pu'uhonua, one station was placed next to the toll booth in the Visitor Center parking lot (station 01), and the additional three stations (22, 23, and 26) were placed along the eastern Park boundary fenceline (see Fig. 1). The transects coincided with those used for botanical and entomological surveys, and were numbered as 00, 0, 1, 2, 3, 4, and 5. Transects 00, 0, 1, and 2 ended close enough to the shoreline to provide good views of shoreline tidal areas, therefore providing the opportunity to detect migratory shorebirds and seabirds.

Station 22 was on the boundary fenceline 150 meters south of station 20 (transect 3), station 23 was 300 meters south of station 20 (transect 3), and station 26 was 150 meters north of station 27 (transect 5) along the fenceline. All stations along transects were 150 m apart except for transect 3, where the two stations (20 and 21) were only 100 m apart because station 21 terminated that transect at the edge of a cliff. No stations were located in the detached "mauka" or upslope parcel where the dormitory and mauka garden are located.

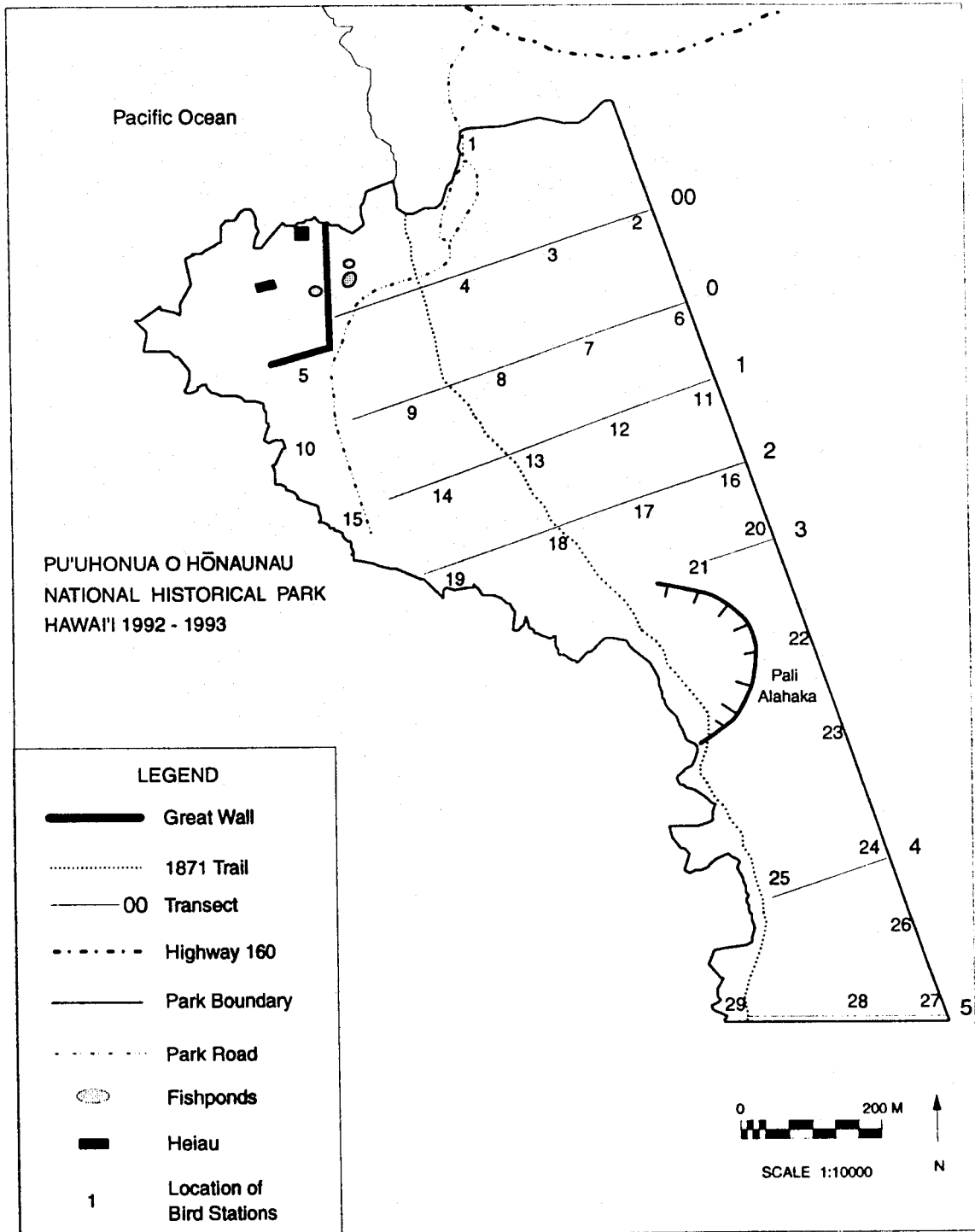


Figure 1. Map of Pu'uhonua o Hōnaunau National Historical Park, Hawaii, showing bird count transects and stations.

Eight minute counts were made twice at each station, once during "fall-winter" (during one of five days in September or October 1992) and once again during "spring-summer" (during one of four days in March 1993). All counts were made by the author. The number of birds per species, type of detection (audio, visual, or audio-visual), and detection distances were recorded. All counts were completed prior to 1100 hours and under low wind conditions without precipitation. Incidental observations were also recorded, although they are not included in the formal count frequencies at the stations. Incidental observations were included when delineating species' distributions.

RESULTS

Twelve bird species were detected during station counts at Pu'uhonua o Hōnaunau (Table 1). Other than migratory shorebirds, no indigenous birds were seen during the nine days of station counts along the transects nor during incidental observations made off the transects. As was true at Kaloko-Honokōhau National Historical Park, Japanese White-eyes (*Zosterops japonicus*) were detected most frequently. At Pu'uhonua, Japanese White-eyes and Common Mynas (*Acridotheres tristis*) were detected at almost every station during both seasons. Saffron Finches (*Sicalis flaveola*) were detected only at station 01 next to the toll booth at the Visitor's Center parking lot, but Ruddy Turnstones (*Arenaria interpres*) were detected the least (only one bird detected during official station counts). Lavender Waxbills (*Estrilda caerulea*) were recorded mainly in areas away from usual human activity (see Figs. 2 and 3). Nutmeg Mannikins (*Lonchura punctulata*) and Yellow-fronted Canaries (*Serinus mozambicus*) had not been previously recorded as resident at the Park.

Although most of the bird species seemed to be more or less randomly distributed, both Lavender Waxbills and Spotted Doves (*Streptopelia chinensis*; see Figs. 4 and 5) tended to be detected more upslope during the fall-winter counts and more downslope during the spring-summer counts.

The mean number of species detected per station was significantly higher during the spring-summer counts than during the fall-winter counts (5.2, S.D.= 1.3, versus 4.1, S.D.= 1.2; Wilcoxon Signed Rank Test, $P = 0.001$).

The mean number of birds per station (excluding the nine birds from the four least common species) was significantly different between spring-summer and fall-winter counts (14.8, S.D.= 4.6, versus 10.6, S.D.= 3.9; paired t-test, $P = 0.0002$), with highest numbers in the spring-summer.

For the eight most frequently detected species, spring-summer and fall-winter mean number of birds per station were compared. Four species were detected significantly more often during the spring-summer, one species was detected significantly

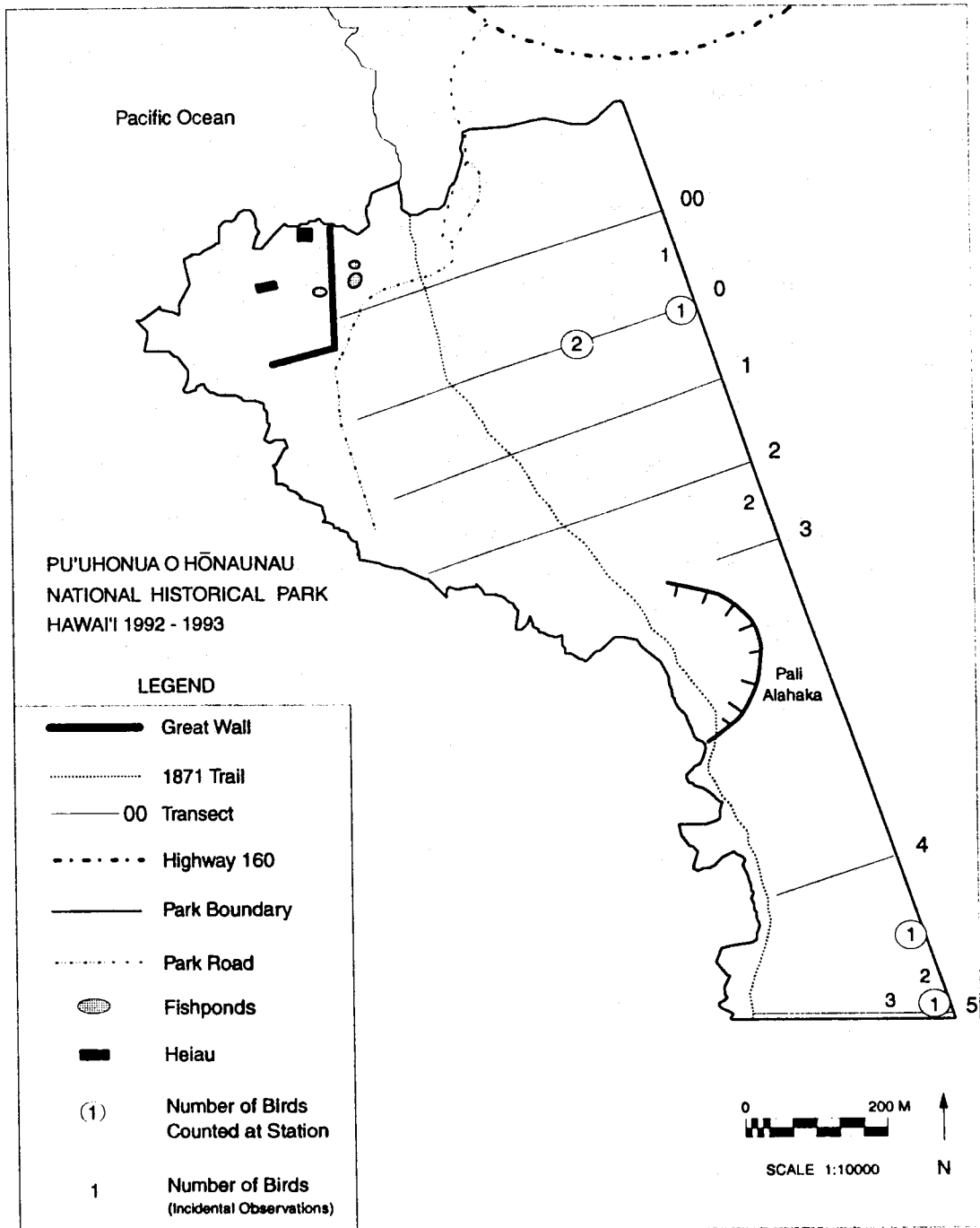


Figure 2. Distribution of eight Lavender Waxbill sightings during September and October 1992 bird counts (total of 13 birds).

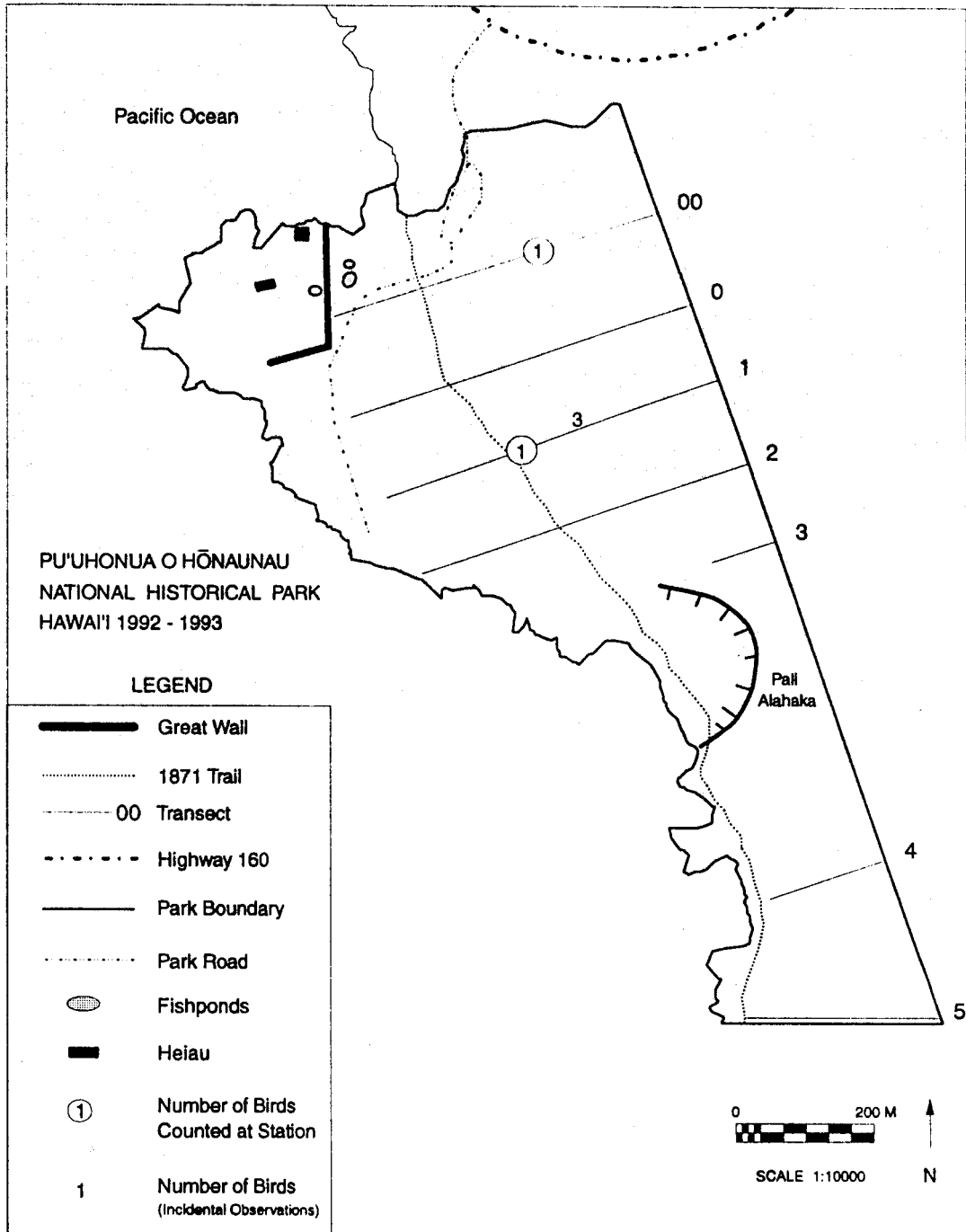


Figure 3. Distribution of three Lavender Waxbill sightings during March 1993 bird counts (total of five birds).

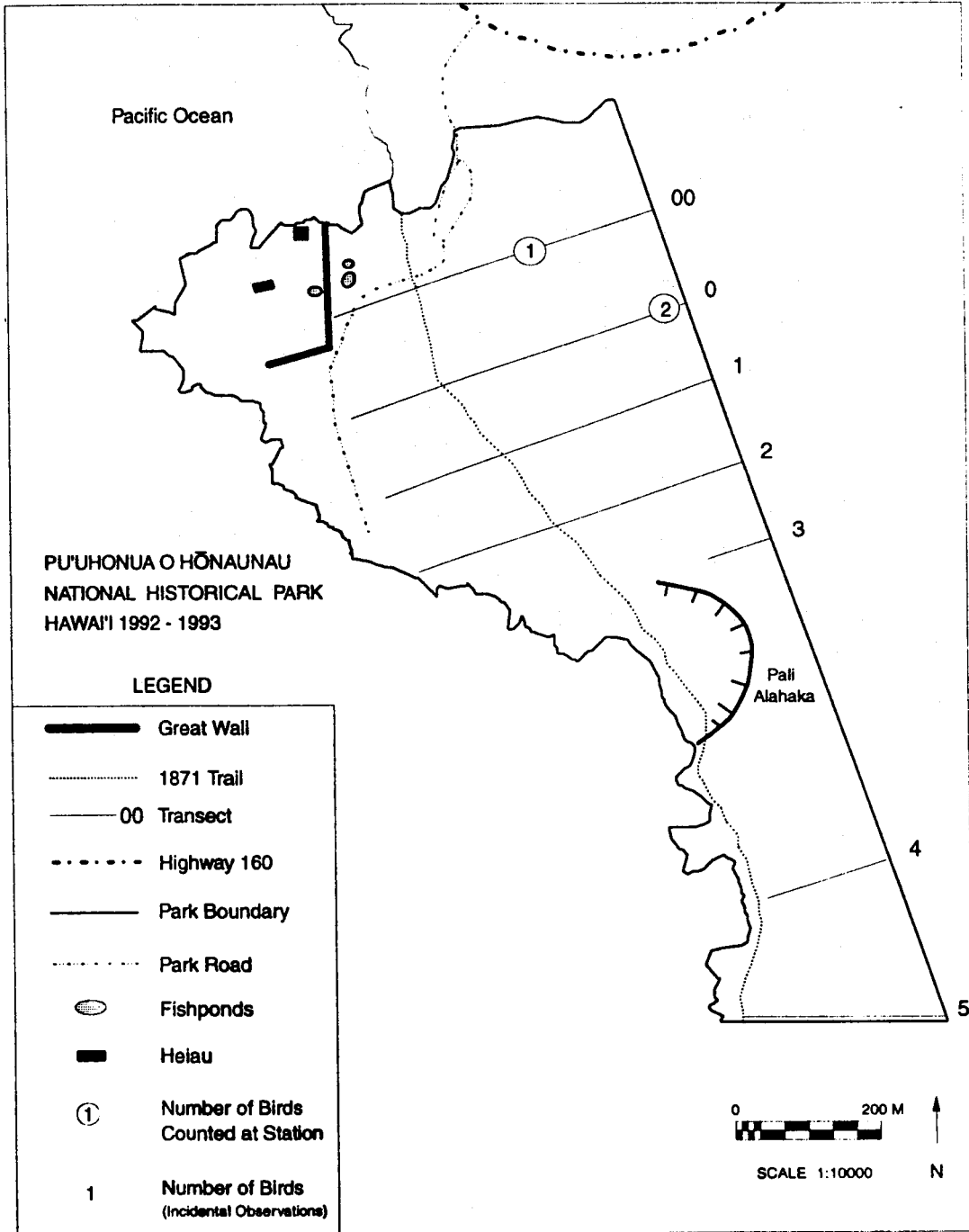


Figure 4. Distribution of two Spotted Dove sightings during September and October 1992 bird counts (total of three birds).

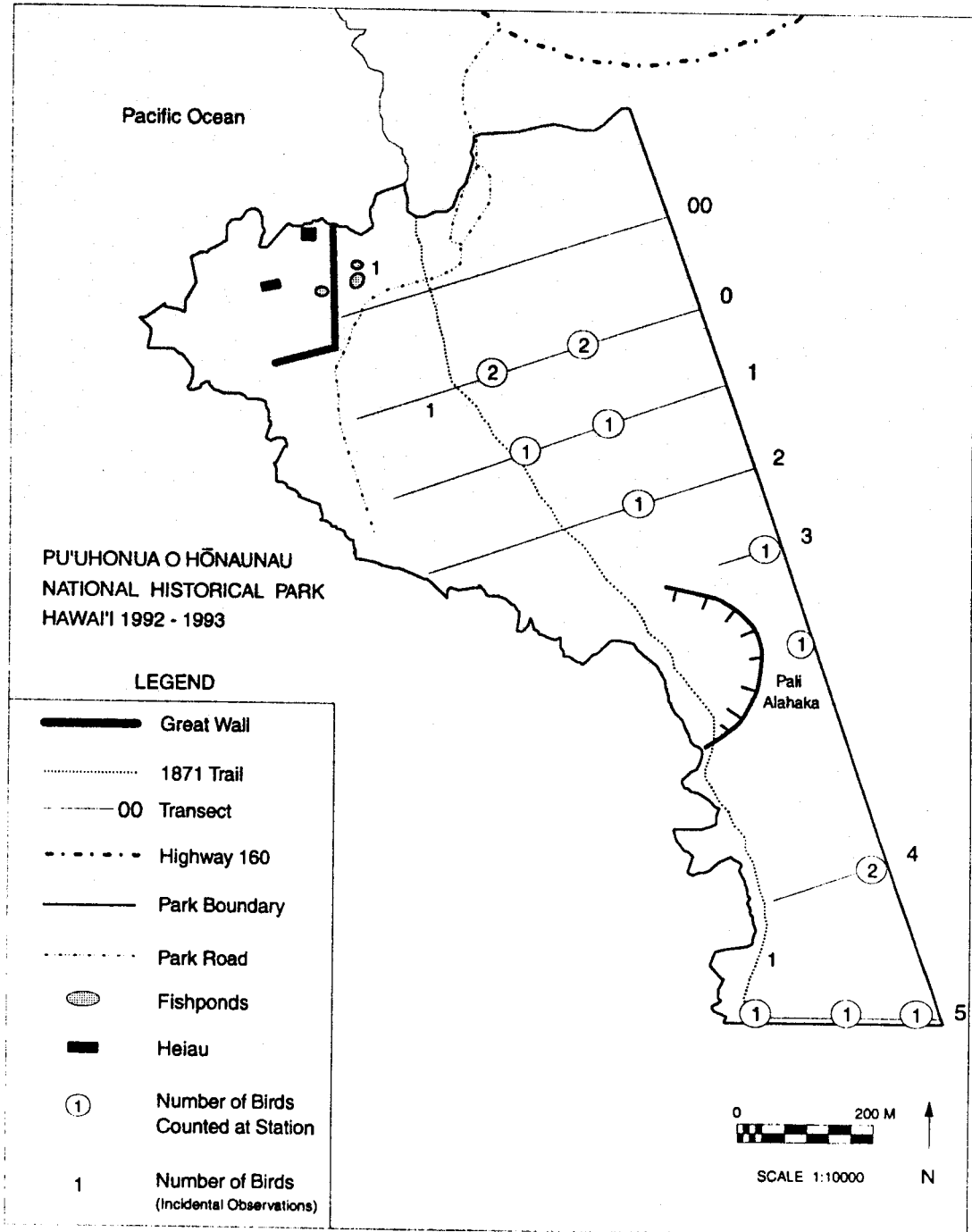


Figure 5. Distribution of 14 Spotted Dove sightings during March 1993 bird counts (total of 17 birds).

more often during the fall-winter, and there were no significant differences for the other three species (Table 2).

Species detected during the counts have been included in the bird checklist in Table 3, along with previous Park records (Gordon Joyce pers. comm., Thane Pratt pers. comm.). Nomenclature follows the current AOU checklist of North American birds (1983) and its subsequent supplement (AOU 1993).

DISCUSSION

Like the counts at Kaloko-Honokōhau National Historical Park (Morin 1996), more bird species were detected at Pu'uhonua o Hōnaunau during the spring-summer counts than during the fall-winter counts. All counts at both Parks were made by the author, thus eliminating observer variability which is known to influence bird counts and comparisons between counts done by different observers (Morin and Conant 1994). Unlike Kaloko-Honokōhau, there was a seasonal significant difference in the total number of birds detected per station, with more birds detected at Pu'uhonua during the spring-summer counts than during the fall-winter counts. It is unclear whether more birds are actually present in the spring-summer or whether they are simply more vocal and active due to the stage of the breeding cycle or a combination of both. Detectability certainly is known to vary species by species and from season to season (Best and Petersen 1982, Burnham et al. 1980). It appears that spring-summer is a better time to do bird surveys at Pu'uhonua, although migratory shorebirds that seasonally visit the shoreline would be probably be missed if the counts were done too late in the spring.

There was some similarity to the fall-winter and spring-summer counts at Pu'uhonua and Kaloko-Honokōhau. At both Parks, significantly more Northern Cardinals and Spotted Doves were detected during spring-summer than during fall-winter, but there were no significant differences in the numbers of Japanese White-eyes and House Finches detected.

The small, separate "mauka" or upslope parcel of the Park where the dormitory is located was not censused. It is located at a higher elevation than the main parcel and may have some slight differences in avifauna. The endemic, endangered 'Io or Hawaiian Hawk (*Buteo solitarius*) has occasionally been seen soaring above the mauka parcel (pers. comm. Gordon Joyce).

No indigenous bird species (other than migratory shorebirds) were detected in Pu'uhonua during these counts. However, in addition to the 'Io, the Black-crowned Night-Heron or 'Auku'u (*Nycticorax nycticorax hoactli*), Short-eared Owl or Pueo (*Asio flammeus sandwichensis*), and the endemic, endangered Hawaiian Stilt or Āe'o (*Himantopus mexicanus knudseni*) have visited the Park (Gordon Joyce pers. comm.).

Although they were not seen during the formal counts, Pacific Golden-Plover (*Pluvialis fulva*) undoubtedly visit Pu'uhonua in spite of its predominately rocky shoreline.

Although they were not seen during the censuses, a small flock of Patagonian Conures (*Cyanoliseus patagonus*) frequent the Park. The numbers of this species are reportedly decreasing (pers. comm. Gordon Joyce). Unfortunately, these psittacines are just one of many species that have been introduced into west Hawai'i in recent years, apparently deliberately by ill-informed and misguided individuals.

Due to the small size of Pu'uhonua, the steep slope of some of the transects, the structure of the vegetation, and the proximity of the stations, it is recommended that no density estimates should be made from these data because some observations may not be independent between stations. The Park vegetation could not easily be assigned into discrete habitats of large enough size, so correlations of bird numbers with vegetation components could not be made. Other environmental factors, such as the distribution of human activities, buildings, and predators are also important in determining bird presence and abundance.

Management Recommendations

Because of its heavily altered vegetation and other lowland characteristics (e.g. infestation with mosquitoes and other avian disease vectors, high numbers of mammalian predators, etc.), Pu'uhonua currently does not maintain extant endemic bird species. Conceivably the small amount of wetlands within the Park (i.e. the small fishponds) could support a tiny population of endangered endemic waterbirds (two or three pairs), but only under a limited set of conditions. Although this would provide an excellent educational opportunity for visitors, the effort necessary to maintain such a population makes this an unlikely scenario. The fishponds would have to be more protected from Park visitor disturbance as well as from dogs, cats, and mongooses. Such a tiny population would require continuous monitoring and labor intensive management such as predator control. However, Stilts or Coots (*Fulica alai*) or even Hawaiian Moorhens (*Gallinula chloropus sandvicensis*: no longer found on Hawai'i Island) salvaged for other reasons by the State Division of Forestry and Wildlife or U. S. Fish and Wildlife Service are occasionally available for these types of (primarily) educational displays, and with the proper personnel, management plan, and permits might be able to be released at the fishponds.

Pu'uhonua is a likely site for detecting the spread of introduced bird species, or even the occurrence of newly introduced species. Ideally, all 29 stations in Pu'uhonua should be censused by an ornithologist at least every other year in order to document avifauna change over time, preferably at approximately the same locations and using the same technique as the current census. The detached "mauka" portion should also be added to the censused area by including at least one additional station (making the total number of stations in the Park 30). Experienced bird watchers or observant Park personnel should be encouraged to survey the shoreline area as often as possible during

the September to May time interval so that unusual migrant and vagrant birds can be documented.

Knowledgeable Park personnel should keep centralized permanent records of bird sightings and attempt to photograph or otherwise non-lethally document unusual bird sighting, especially of new passerines, psittacines, and game birds. These birds do not routinely migrate to or visit Hawai'i, unlike shorebirds, waterbirds and raptors. Any unusual birds should be reported to Hawaii Division of Forestry and Wildlife and the U.S. Fish and Wildlife Service, as well as to the zoology section of Bishop Museum. Birds of special concern that require immediate removal (by the appropriate agency, or by the Park Service after obtaining the appropriate permits) include species such as the non-native bulbuls: the Red-vented Bulbul (*Pycnonotus cafer*) and the Red-whiskered Bulbul (*Pycnonotus jocosus*). These two species are not yet established on Hawai'i Island but are serious agricultural pests on O'ahu where they were originally introduced. If the Patagonian Conures or other psittacines continue to visit the Park or its vicinity, these birds should be captured or otherwise removed.

Additional surveys could be organized in conjunction with established nationwide bird surveys such as the Audubon Christmas Bird Count, traditionally done in late December or early January. Although the data presented here indicate that counts are significantly higher in spring-summer, Table 1 indicates that the total species composition is approximately the same in spring-summer and fall-winter, except that a fall-winter count should contain more shorebirds (number of different species as well as total number) and is more likely to pick up unusual migrant and vagrant birds. This means that fall-winter is a better time to do such surveys.

Because use at Pu'u honua involves human habitation and includes the activity of picnicking, garbage is generated which certainly attracts predators such as rats, cats, mongooses, and dogs. While counting birds at one station in the coconut grove behind the beach, the author saw a rat boldly climbing a nearby coconut tree in broad daylight. Every attempt should be made to contain trash so that animals have no access to it. In addition, the feeding of birds by picnickers should be actively discouraged so that Myna, House Sparrow, and Zebra Dove populations do not increase. These birds commonly become habituated to human feeding, sometimes necessitating control measures if they become too numerous, too bold, or if the quantity of their feces is deemed a health risk. Any management activity or changes in visitor use will potentially impact one or more bird species at Pu'u honua.

Even though Pu'u honua's current avifauna is almost totally composed of introduced species, these species (mainly escaped cage birds) can be used by Park Interpreters to highlight the story of indigenous species' loss caused directly or indirectly by humans.

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TABLE 1. Cumulative numbers for species detected during eight minute counts during two seasons, and percent of stations where each species was detected on the 29 stations at Pu'uhonua o Hōnaunau. Each station was counted once during each season.

	Count Frequencies			% of Stations	
	Fall-Winter	Spring-Summer	Total	Fall-Winter	Spring-Summer
Japanese White-eye	125	125	250	93%	100%
Common Myna	67	119	186	83%	90%
Zebra Dove	54	35	89	86%	62%
Northern Cardinal	13	60	73	35%	93%
Yellow-billed Cardinal	21	42	63	38%	62%
House Finch	18	32	50	48%	55%
Spotted Dove	3	14	17	7%	38%
Lavender Waxbill	5	2	7	14%	7%
Yellow-fronted Canary	1	2	3	3%	3%
Wandering Tattler	1	2	3	3%	7%
Saffron Finch	0	2	2	0%	3%
Ruddy Turnstone	1	0	1	3%	0%
TOTALS	309	435	744		

TABLE 2. Comparisons (paired t-tests) of average bird numbers detected per station for fall-winter (FW) and spring-summer (SS) counts for the eight most common species at Pu'uhonua o Hōnaunau.

	FW		SS		P
	Mean	S.D.	Mean	S.D.	
Japanese White-eye	4.31	2.4	4.31	1.7	0.865
House Finch	0.62	0.7	1.10	1.3	0.143
Common Myna*	2.31	2.1	4.10	2.4	0.0005
Yellow-billed Cardinal*	0.72	1.0	1.45	1.3	0.023
Northern Cardinal*	0.45	0.7	2.07	1.2	0.0001
Zebra Dove*	1.86	1.2	1.21	1.2	0.031
Spotted Dove*	0.10	0.4	0.48	0.7	0.042
Lavender Waxbill	0.17	0.5	0.07	0.3	0.531

* Difference between seasonal counts is significantly different from zero.

TABLE 3. Bird Checklist for Pu'uhonua o Hōnaunau National Historical Park

	Status	Abundance	Occurrence	Breeding
FAMILY SULIDAE				
Brown Booby or 'Ā (<i>Sula leucogaster plotus</i>)	I	O	YR	PH
FAMILY ARDEIDAE				
Black-crowned Night-Heron or 'Auku'u (<i>Nycticorax nycticorax hoactli</i>)	I	R	YR	UB
FAMILY ACCIPITRIDAE				
Hawaiian Hawk or 'Io (<i>Buteo solitarius</i>)	E*	O	YR	UB
FAMILY PHASIANIDAE				
Erckel's Francolin (<i>Francolinus erckelii</i>)	A	X	YR	UB
Ring-necked Pheasant (<i>Phasianus colchicus</i>)	A	R	YR	UB
FAMILY CHARADRIIDAE				
Pacific Golden-Plover or Kōlea (<i>Pluvialis fulva</i>)	I	C	M	BE

TABLE 3. Bird Checklist for Pu'uhonua o Hōnaunau National Historical Park
(Continued)

	Status	Abundance	Occurrence	Breeding
FAMILY RECURVIROSTRIDAE				
Hawaiian Stilt or Āe'o (<i>Himantopus mexicanus knudseni</i>)	E*	X	YR	UB
FAMILY SCOLOPACIDAE				
Wandering Tattler or 'Ūlili (<i>Heteroscelus incanus</i>)	I	C	M	BE
Bristle-thighed Curlew or Kioea (<i>Numenius tahitiensis</i>)	I	X	M	BE
Ruddy Turnstone or 'Akekeke (<i>Arenaria interpres</i>)	I	C	M	BE
FAMILY COLUMBIDAE				
Spotted Dove (<i>Streptopelia chinensis</i>)	A	C	YR	BR
Zebra Dove (<i>Geopelia striata</i>)	A	C	YR	BR
FAMILY PSITTACIDAE				
Patagonian Conure (<i>Cyanoliseus patagonus</i>)	A	O	YR	UB
FAMILY TYTONIDAE				
Common Barn-Owl (<i>Tyto alba</i>)	A	U	YR	BR

TABLE 3. Bird Checklist for Pu'uhonua o Hōnaunau National Historical Park
(Continued)

	Status	Abundance	Occurrence	Breeding
FAMILY STRIGIDAE				
Short-eared Owl or Pueo (<i>Asio flammeus sandwichensis</i>)	E	O	YR	UB
FAMILY STURNIDAE				
Common Myna (<i>Acridotheres tristis</i>)	A	C	YR	UB
FAMILY ZOSTEROPIDAE				
Japanese White-eye (<i>Zosterops japonicus</i>)	A	C	YR	BR
FAMILY EMBERIZIDAE				
Northern Cardinal (<i>Cardinalis cardinalis</i>)	A	C	YR	BR
Yellow-billed Cardinal (<i>Paroaria capitata</i>)	A	C	YR	BR
Saffron Finch (<i>Sicalis flaveola</i>)	A	U	YR	BR
FAMILY FRINGILLIDAE				
House Finch (<i>Carpodacus mexicanus</i>)	A	C	YR	BR
Yellow-fronted Canary (<i>Serinus mozambicus</i>)	A	U	YR	UB

TABLE 3. Bird Checklist for Pu'uhonua o Hōnaunau National Historical Park
(Continued)

	Status	Abundance	Occurrence	Breeding
FAMILY PASSERIDAE				
House Sparrow (<i>Passer domesticus</i>)	A	U	YR	BR
FAMILY ESTRILDIDAE				
Lavender Waxbill (<i>Estrilda caerulescens</i>)	A	U	YR	BR
Warbling Silverbill (<i>Lonchura malabarica</i>)	A	U	YR	UB
Nutmeg Mannikin (<i>Lonchura punctulata</i>)	A	U	YR	UB

CHECKLIST KEY:

Status

- I - Indigenous: occurred naturally prior to humans (also called native).
- E - Endemic: found naturally only in Hawai'i and nowhere else in the world. A special subset of native.
- A - Alien introduction by humans (also called non-native, introduced, or exotic).
- * - Endangered.

Abundance

- C - Common: certain to be seen in proper habitat or season.
- U - Uncommon: not easily seen even though present.
- O - Occasional: seen a few times a year at Pu'uhonua.
- R - Rare: seen every two to five years at Pu'uhonua.
- X - Accidental: seen only once or twice at Pu'uhonua.

CHECKLIST KEY: (Continued)

Occurrence

- YR - Year round resident.
M - Migrant or vagrant: generally present from September to May.

Breeding

- BR - Breeding: is known to have or is likely to have nested at Pu'uhonua o Hōnaunau National Historical Park within the past decade.
PH - Pelagic Hawaiian seabird seen nearshore: breeds on offshore islets or Northwestern Hawaiian Islands.
BE - Breeds elsewhere outside of Hawaiian Archipelago.
UB - Unknown if breeding has occurred at or near Pu'uhonua o Hōnaunau National Historical Park within the past decade.