

The Status of the Spotted Sandpiper (*Actitis macularia*) in the Hawaiian Islands

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The identification and separation of the Nearctic Spotted Sandpiper (*Actitis macularia*) from its close Palearctic relative, the Common Sandpiper (*Actitis hypoleucos*), presents few problems when in alternate (breeding) plumage. Separating these two species when in juvenal (juvenile) or basic (winter) plumages, however, can be problematical (plumage and molt terminology follows Wilds 1989). It was not until the publication of several detailed treatments of seasonal and age-related plumages in shorebirds (Prater et al. 1977, Wallace 1980, Cramp & Simmons 1983, Hayman et al. 1986) that field observers had the tools necessary to consistently separate the two species in these plumages.

There have been 14 separate sightings of *Actitis* sandpipers in the Hawaiian Islands. All 14 birds were in either juvenal or basic plumage when first seen. There are no accounts or specimen records of either *Actitis* species in any of the published pioneering ornithological studies of the Islands (Wilson and Evans 1890–1899, Perkins 1903, Rothschild 1893–1900, Henshaw 1902, Munro 1960). It was not until 1983 that a record was sufficiently well documented to allow identification to species level. All previous observations had been simply recorded as Spotted/Common complex (Pyle 1983).

I have reviewed all 14 sightings and present documentation of the first Hawai'i state record and the six subsequent definite sight records. "HRBP" numbers in this paper refer to documentary photographs that have been accessioned to the Hawaii Rare Bird Photograph File maintained jointly by the Bernice Pauahi Bishop Museum and the Hawai'i Audubon Society.

Actitis sandpipers can be readily separated from other similar-sized shorebirds by their very distinctive habit of bobbing the rear half of their bodies. They rarely stand completely still, and their constant bobbing

causes a distinctive teetering walk. They have a unique flight style; Hayman et al. (1986) described it as "level flight usually low over the water, in which wingbeats are spasmodic; each downbeat is suddenly curtailed just below the horizontal, and there are short glides on down bowed wings between groups of flickering shallow wingbeats."

Spotted Sandpipers differ from Common Sandpipers in having grayish-brown rather than warm brown upperparts and usually much brighter-colored legs; yellow in juvenal and basic plumages and pinkish flesh-colored in alternate plumages, rather than grayish green. Spotted Sandpipers have a bicolored bill: mainly dark brown with a paler base in juvenal and basic plumages and bright pinkish-orange with a blackish tip in alternate plumages, unlike the uniform dark brown of the Common Sandpiper. Spotted Sandpipers have a more distinctive white eye ring than do Common Sandpipers, though some authors feel that this feature is marginally useful in the field (Chandler 1989), and a shorter tail that barely extends past the folded wings. In the field this last feature coupled with the overall grayish appearance is the most readily seen difference between the two species. In alternate plumages the Spotted Sandpiper has a variable number of small, dark, round spots on belly and sides, not found on Common Sandpipers. In juvenal plumage the wing-coverts are evenly barred blackish and grayish-white. This difference between mantle and wing is very distinctive. Tertials of the Spotted Sandpiper are almost completely unmarked, whereas in the Common Sandpiper they are heavily notched along their entire length. In flight, Spotted Sandpipers display a less extensive wing bar and a narrower trailing edge to the inner secondaries. On Common Sandpipers this wing bar and the white trailing edge usually meet across the inner secondaries,

whereas in the Spotted Sandpiper they are separated by about 10 mm. Spotted Sandpipers have a markedly darker tail with considerably less white than the Common Sandpiper (Prater et al. 1977, Madge 1980, Wallace 1980, Hayman et al. 1986, Chandler 1989).

Spotted Sandpiper vocalizations are distinctive and diagnostic; calls include a sharp "peet-weet" and a series of ascending "weet" notes. The Common Sandpiper's usual flight call is a descending "tsee-wee-wee" (NGS 1983, Hayman et al. 1986).

The first six *Actitis* observations lack sufficient information to allow specific identification to species. The first two were seen prior to 1975, one on O'ahu and the other on Midway (R. Clapp, in a letter to F. Zeillemaker 1976). The third sighting was of a bird seen and photographed by C. Fred Zeillemaker on 26 September 1975 at Hanalei National Wildlife Refuge, Kaua'i (Zeillemaker 1976a). Roger Clapp reviewed Zeillemaker's field notes and a series of seven slides in January 1976. At that time field separation of these two species in basic plumage was not considered feasible by many, including Clapp (Zeillemaker 1976b). Unfortunately the surviving photograph (HRBP No. 865) is not of sufficient quality to make out any of the key identification features. The fourth observation was of a bird seen at Waipi'o peninsula, O'ahu, by R.L. Pyle and W. Donagho on 6 January 1976 and last seen by R.L. Pyle on 14 March 1976 (R.L. Pyle 1976). Pyle recalls that the bird had yellow legs and a dingy white tail, but none of the observers noticed tail-to-wing length or took any photographs (R.L. Pyle, pers. comm.). The fifth is a bird seen 13 September 1981 on Waipio Peninsula, Oahu by R.L. Pyle and Peter Donaldson while on a HAS field trip (R.L. Pyle 1981). Neither Pyle or Donaldson felt confident about the specific identification of this bird (Pyle and Donaldson, pers. comm.). The sixth observation was of a bird seen on yet another HAS field trip to Waipi'o Peninsula, 11 September 1983 (Wilson 1983). Donaldson felt sure the bird was a Spotted Sandpiper. However, his field notes for that trip are no longer extant. Pyle did not feel

that they confidently identified the bird to species level. Pyle described the bird in his field notes as "Pale brown above whitish below yellow legs very little barring very short tail." Wilson stated that at that time (September 1983) she did not really know how to separate basic-plumaged Spotted Sandpipers from Common Sandpipers and had not taken sufficiently detailed field notes to be sure of a positive identification (E. Wilson, in a letter to R. David 13 March 1990).

The first well-documented record of a *A. macularia* was of a bird seen and photographed by Peter Pyle at Sea Life Park, O'ahu, 13 September 1983 (HRBP No. 266) (R.L. Pyle 1988). M. Ord and R.L. Pyle also saw this bird. The bird was grayish with a marked eye ring and had a very short tail relative to wing length (R.L. Pyle, field notes). The photographs are diagnostic. At no time did the observers of this bird or of any of the other 7 documented sightings hear the bird make any vocalization. The second documented bird was seen 6 September 1985 by P. Donaldson and R.L. Pyle (R.L. Pyle 1986). The bird was identified mainly by the short tail-to-closed-wing length. Donaldson recalls that the bird was quite grayish (Donaldson and Pyle, pers. comm.). The third documented record was a bird seen and photographed by R. David at the intertidal zone of 'Aimakapa Beach, Hawai'i on 15 September 1985 (HRBP Nos. 464-465) (Fig 1). The bird was in juvenal plumage, grayish brown above, whitish

below, with yellow legs and a very distinctive white eye ring. The tail barely extended past the folded wings. The wing coverts were heavily barred, contrasting with both the scapulars and the tertials as in typical fresh juvenal plumage. The bird was actively feeding among the seaweeds and was quite approachable. When it did fly, it displayed the characteristic *Actitis* flight pattern. The fourth documented bird was first seen by R.L. Pyle on 4 September 1987; it was later seen and photographed by Peter Donaldson, at Waipi'o Peninsula, O'ahu on 15 September 1987 (HRBP Nos. 636, 637). Donaldson noted that the bird had grayish dorsal surfaces; a very marked eye ring, and distinctly bright yellow legs and a very short tail-to-closed-wing length. The bird was also seen and identified by A. Engilis and R.L. Pyle (A. Engilis and R.L. Pyle, pers. comm.). The photographs also show a bicolored bill. There was a second *Actitis* sandpiper present at the same time, but unfortunately no photographs were taken and neither Donaldson nor Pyle have any extant field notes covering this bird. The fifth documented record is of a bird seen by B. Meilleur and R. David at Napo'opo'o Beach, Hawai'i from 19 December 1987 through May 1988. When first found by Meilleur the bird was in typical juvenal plumage, as it was on 7 January 1988 when David photographed the bird (HRBP Nos. 863-864) (Fig. 2). During the 6 months that the bird stayed in the Napo'opo'o area, it went through a prebasic molt into basic I plumage. Shortly before

the bird was last seen in May 1988, Meilleur noted that it had begun to get dark, roundish spots on its sides and belly, and to have a quite noticeable bicolored bill (B. Meilleur, pers. comm.). These plumage changes indicate that the bird was undergoing a prealternate I molt and had almost attained full alternate I plumage before it was last seen. This is the first time this plumage has been seen in the Hawaiian Islands. The sixth record is of a bird seen 15, 16, and 18 March 1989 on Ma'alaea Beach, Maui, by Robert Storer. "The bird had the characteristic *Actitis* flight and teetered as it walked. It had several spots coming in on the flanks and breast. I was able to determine that the tips of the folded wings nearly reached the tip of the tail" (letter to R. David, 6 April 1989). The combination of the above features virtually rules out any other identification. The most recent record is of a bird seen 28 January 1990 by David at Lokoaka Pond, Hilo, Hawai'i. The bird was seen in good light and was observed for 12 minutes through a 40X spotting scope at a range of approximately 35 m. The bird was in juvenal plumage, grayish above with marked barring on the wing coverts, bright yellow legs, very noticeable whitish eye ring, and a tail that barely extended past the closed wings. When re-sighted on 31 March 1990 by R. David, B. McKnight, B. Meilleur, and D. Simpson, the bird was undergoing a prealternate I molt and had begun to acquire its diagnostic dark spots on the sides of its belly.

The Spotted Sandpiper breeds across Alaska and Canada south through southwestern, central- and eastern-central parts of the USA. It winters in the southern parts of the USA and south to Chile. It has been recorded in migration as far afield as the U.K. and western Europe, and in the Pacific as far south as the Marshall Islands (AOU 1983).

Though all seven documented records of *Actitis* sandpipers from the Hawaiian Islands have involved Spotted Sandpipers, it is not improbable that a Common Sandpiper could make its way to these islands. Many other Palearctic birds have been documented in Hawai'i (P. Pyle 1984, P. Pyle et al. 1988). Common Sandpipers are regularly recorded in the western and central Aleutian Islands, in the Pribilofs, and on Saint Lawrence Island (AOU 1983, Armstrong 1988). They have also been recorded from Kiribati, Samoa, Truk, Pohnpei, and the Marianas Islands (Pratt



Figure 1. Spotted Sandpiper, 'Aimakapa Reef, 15 September 1985. Note the white eye ring and heavily barred wing coverts. Photo by R. David.



Figure 2. Spotted Sandpiper, Napoo'po'o Hawai'i, 7 January 1988. Note the white eye ring and heavily barred wing coverts. Photo by R. David.

and Glass 1987, Reichel et al. 1991). In the future, observers should make a concerted effort to identify all *Actitis* sandpipers seen in the islands.

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Recent Snake Sightings in the Mariana Islands

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With the exception of the diminutive blind snake (*Ramphotyphlops braminus*), no snakes are native to the Mariana Islands. In the late 1940s, the brown tree snake (*Boiga irregularis*) was inadvertently introduced to Guam, Mariana Islands (Fritts 1988). Since then, there have been sightings of *B. irregularis* and other species of snakes on Pohnpei, Diego Garcia, Wake, O'ahu (Fritts 1987), Kwajalein (Fritts 1988), and Kaua'i (Telfer 1989). Most of these sightings are attributable to cargo or air-traffic movements via Guam. Additional sightings now warrant an update and indicate that movements of snakes continue to occur via ship and air traffic.

At least four snakes have been sighted on Saipan. The first was recorded in June 1986 at the commercial port facility (Fritts 1987). Although this snake was never conclusively identified, it may have been *B. irregularis*. The second sighting involved an eyewitness report by an employee of a shipping company who watched a *B. irregularis* crawl out of a shipping container off-loaded at the port facility in July 1987; that snake escaped. The container had originated on Guam. On 14 May 1990, Commonwealth of the Northern Mariana Islands (CNMI) Division of Fish and Wildlife was contacted regarding a snake that had been found at the Saipan International Airport. The snake was a recently killed *B. irregularis* and was found hanging on a hook on the side of an air cargo container. This container had arrived that morning on a commercial air flight from Guam. Although the circumstances involved in the death of this snake are unknown, it seems likely that the snake was killed on Guam and deliberately placed on the container. The specimen was a juvenile female, 652 mm snout-vent length (SVL), and 182 mm tail length (TL). Most recently, on 17 May 1990, CNMI Division of Fish and Wildlife received a call regarding a live snake in the Capitol Hill region of Saipan. Investigation of this report yielded the colubrid *Dendrelaphis caudolineatus* (SVL 830 mm, TL 326 mm). The specimen, a female, contained seven enlarged vitellogenic follicles (33–38 mm length) and had abundant fat reserves. An

interview with the individual who originally reported the snake indicated that a number of shipping containers originating in the Republic of the Philippines had been stored next to his house six to nine months prior. The native range of *D. caudolineatus* is the Philippine Islands.

It is clear that both air- and surface-cargo movements continue to serve as agents in the spread of known and potentially injurious species of snakes in the Pacific region. Brown tree snakes have been recorded crawling on shipping containers stored at the Guam port facility (pers. obs.) and in cargo recently loaded onto a cargo vessel (Savidge 1987a). The record of *B. irregularis* on Kwajalein was from a military transport, and the snake was killed on the runway after the aircraft had landed. Additionally, a snake was sighted on a freighter off-loading cargo at the Tinian port facility in February 1990 (pers. obs.). The snake was on the deck of the vessel but was not captured. It is unknown if the snake was able to reach the island. While the snake could not be positively identified, the vessel's cargo originated on Guam and the snake may have been a brown tree snake.

These sightings are significant in light of the impact that *B. irregularis* has had on Guam. Since the presumed date of introduction on Guam, this species has been held responsible for the demise of virtually the entire forest-dwelling avifauna (Savidge 1987b); the snake has also caused enormous economic damage stemming from power outages (Fritts et al. 1987) as well as livestock damage (Fritts and McCoid, in press). Bites to human children may be life-threatening under certain circumstances (Fritts et al. 1990).

The ecological success of *B. irregularis* on Guam is attributable to a variety of factors, including the snakes's catholic diet and the birds' lack of evolutionary experience with predators (Savidge 1988). These factors would apply with equal force to both *B. irregularis* and *D. caudolineatus* on Saipan. Moreover, if both snake species were to become established, the results could be even more disastrous. Saipan shares a portion of the unique avifauna that formerly occurred on Guam but the island is also inhabited by several endemics (kingfisher, *Halcyon chloris albicilla*; fantail, *Rhipidura rufifrons saipanensis*; white-eye, *Zosterops conspicillatus saypani*, and golden white-eye, *Cleptornis marchei*). Since *D. caudolineatus* is a diurnal, arboreal predator (Alcala 1986) and *B. irregularis* is

a nocturnal, arboreal predator, the birds on Saipan could experience predation by introduced snakes virtually around-the-clock. Should both species become established on Saipan, the rate of extinctions might be greatly accelerated, especially considering Saipan's area (122 km²) is much less than Guam's (540 km²).

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(See addendum on opposite page)

North Kona Christmas Count 1990

by Reginald E. David

Under clear skies with almost no wind the third North Kona Christmas bird count was held On 16 December. Six counters in two parties spent 10.25 hours, plus an hour owling; covering 195 miles. They recorded 2,228 birds, 838 less than last year, representing 37 species (down from last year's 43). Participation was up from last year although coverage was down. One entire sector (Number 4, urban areas) was not counted this year. Three species seen last year were not counted this time, however three species; Nene, Kalij Pheasant and Black Noddy not previously encountered on this CBC, were added to the count circle list, bringing the total to 58 species.

Analysing the data collected in the three-year history of this count is difficult. The winter migrations of 1989 and 1990 were unbelievably small and late throughout the State and especially on the Island of Hawaii. This phenomenon is best illustrated by the number of ducks recorded. In 1988 we recorded 180 ducks representing 10 species; in 1989 we tallied 104 ducks representing five species and 1990 found only 39 individuals, all of one species. This represents drops of 90 percent in species and slightly less than 80 percent in numbers. Whether this remarkable decline is merely an anomalous incident, or in fact represents a longterm decline in migratory waterfowl found on this Island will not be known for some years.

A flock of eight Patagonian Conures (*Cyanoliseus patagonus*) was seen at Aimakapa Pond (Sector number 2). This native of southern South America is a recently escaped cagebird species. It is not considered to be established in Hawaii.

Addendum to Recent Snake Sightings in the Mariana Islands:

On 8 March 1991, a snake was discovered dead on a road several hundred meters from the port facility in Garapan, Saipan. Investigation showed this snake to be *B. irregularis*. The specimen was a juvenile male with a SVL of 770 mm. Whether this individual represents an incipient population or another isolated incident is unknown at this time. The area adjacent to where the snake was found is characterized as a mangrove.

Sectors Covered:

1. **Kona Heights subdivision:** Reggie David, Tom Leskiw
2. **Coastal area and shoreline ponds, Kailua dump:** Reggie David, Kamal Islam, Tom Leskiw, Brien Meilleur, Stan Siddle, Joan Siddle
3. **Pu'u Anahulu Flats:** Reggie David, Tom Leskiw, Stan Siddle, Joan Siddle
4. **Urban areas:** Not covered this year.
5. **Mount Hualalai:** Reggie David, Kamal Islam, Tom Leskiw, Brien Meilleur, Stan Siddle, Joan Siddle
6. **Grasslands along Highway 190:**

Sectors	#1	#2	#3	#4	#5	#6	Total
Pied-billed Grebe (<i>Podilymbus podiceps</i>)	0	9	0	0	0	0	9
Black-crowned Night Heron, (<i>Nycticorax nycticorax hoactli</i>)	0	1	0	0	0	0	1
Nene (<i>Nesochen sandvicensis</i>)	0	0	6	0	0	0	6
Northern Shoveler (<i>Anas clypeata</i>)	0	39	0	0	0	0	39
Hawaiian Hawk ('Io) (<i>Buteo solitarius</i>)	0	0	1	0	5	0	6
Black Francolin (<i>Francolinus francolinus</i>)	0	0	1	0	0	0	1
Erckel's Francolin (<i>Francolinus erckelii</i>)	0	0	6	0	0	0	6
Kalij Pheasant (<i>Lophura leucomelana</i>)	0	0	0	0	6	0	6
Common Peafowl (<i>Pavo cristatus</i>)	0	0	5	0	0	23	28
Hawaiian Coot (<i>Fulica americana alai</i>)	0	49	0	0	0	0	49
Hawaiian Stilt (<i>Himantopus mexicanus knudseni</i>)	0	20	0	0	0	0	20
Pacific Golden Plover, (<i>Pluvialis dominica fulva</i>)	0	30	12	0	0	0	42
Wandering Tattler (<i>Heteroscelus incanus</i>)	0	6	0	0	0	0	6
Ruddy Turnstone (<i>Arenaria interpres</i>)	0	25	0	0	0	0	25
Sanderling (<i>Calidris alba</i>)	0	14	0	0	0	0	14
Black Noddy (<i>Anous minutus melanogenys</i>)	0	1	0	0	0	0	1
Rock Dove (<i>Columba livia</i>)	0	9	0	0	0	0	9
Spotted Dove (<i>Streptopelia chinensis</i>)	9	4	1	0	0	13	27
Zebra Dove (<i>Geopelia striata</i>)	3	10	6	0	6	7	32
Skylark (<i>Alauda arvensis</i>)	0	0	9	0	0	3	12
Red-billed Leiothrix (<i>Leiothrix lutea</i>)	0	0	0	0	1	0	1
Common Myna (<i>Acridotheres tristis</i>)	5	241	133	0	0	201	580
House Finch (<i>Carpodacus mexicanus</i>)	3	24	18	0	22	1	68
Yellow-fronted Canary (<i>Serinus mozambicus</i>)	6	20	43	0	15	21	105
Saffron Finch (<i>Sicalis flaveola</i>)	21	2	27	0	0	18	68
Yellow-billed Cardinal (<i>Paroaria capitata</i>)	5	13	0	0	0	0	18
Cardinal (<i>Cardinalis cardinalis</i>)	7	6	4	0	2	1	20
Japanese White-eye (<i>Zosterops japonica</i>)	2	24	21	0	33	24	104
House Sparrow (<i>Passer domesticus</i>)	11	28	12	0	2	62	115
Common Amakihi (<i>Hemignathus vires virens</i>)	0	0	9	0	208	0	217
I'iwi (<i>Vestiaria coccinea</i>)	0	0	0	0	8	0	8
Apapane (<i>Himatione sanguinea</i>)	0	0	0	0	0	237	237
Lavender Waxbill (<i>Estrilda caerulea</i>)	7	0	17	0	0	0	24
Red Avadavat (<i>Amandava amandava</i>)	0	0	2	0	0	0	2
Warbling Silverbill (<i>Lonchura malabarica</i>)	1	0	2	0	0	5	8
Nutmeg Mannikin (<i>Lonchura punctulata</i>)	42	220	2	0	0	18	282
Java Sparrow (<i>Padda oryzivora</i>)	27	4	0	0	0	1	32
Totals:							
Individuals	149	799	337	0	308	635	2228
Species	14	23	18	0	10	15	37
Party Hours	.75	2	2.75	0	2.5	2.25	10.25

Habitat coverage (% of party hours): Coastal areas and shoreline ponds 20%, residential 7%, mountain forest 24%, grasslands and pasture 49%.

Survey of Nene (*Nesochen sandvicensis*) at Haleakala National Park 1988 through 1990

Cathleen S. Natividad Hodges

Introduction

"How many Nene are at Haleakala?" This has been a difficult and common question voiced by visitors and Park staff at Haleakala National Park (HALE). Devick (1981) estimated the Maui population of Nene (*Nesochen sandvicensis*) in 1980 to be 125 ± 20 . Banko (1988) cites as a statement by M. Ueoka (pers. comm.) "the Haleakala population has been relatively stable at over 100 individuals since 1977." In a summary of the Nene Recovery Assessment Meeting (U. S. Fish and Wildlife Service 1987), Task 41 states "some kind of population monitoring technique, focusing perhaps on concentration of birds, needs to be developed."

Since 1988, we have conducted Nene surveys to: 1) provide an answer to the question of how many Nene there are; and 2) test the population survey methodology.

Methods

We conducted surveys in August, because Nene complete molting in June and begin nesting in late October (Banko, 1988). Previous observations by HALE and Department of Land and Natural Resources (DLNR) staff indicate that Nene flock after molting, making counting easier during that period.

We selected survey locations where Nene concentrated in the past (HALE and DLNR unpubl. data). Basic methods included synchronizing watches, traveling to count stations, and counting Nene at specified times. When 2-way radios were available, we communicated movements of Nene between stations.

We recorded data every 15 minutes during a 75-minute period. The following formula was developed to determine the total number of Nene counted:

$$N = a_x + b_x$$

where: N = total number of Nene

a = number of Nene counted during period x

b = number of banded Nene counted during the census but not during period x

x = one 75-minute period

The total number of Nene is the highest value of N obtained during the survey. I eliminated sightings of flying Nene that were probable duplicates, based on flight time and direction. I determined the minimum number of flying Nene to be the largest group seen flying in each area during a 75-minute observation period. To calculate the maximum number of flying Nene I counted all flying Nene during an observation period that were not obvious duplicates.

I defined total count as the highest N value for the year. Totals were noted but not compared because of variable number of count stations used each year. Therefore, Nene counted per party were calculated to compare each years data. Chi-square analysis was used to compare values Nene counted per party. Table 1 provides a description of the variation in methodology in the different years.

Methods differed slightly from year to year. Data from the first and second years indicated that refinements were needed for the third year. Modifications included variable number of observers depending on volunteer availability, increased number of observation stations, variable number of survey days and periods, and type of data collected. Observations made in 1989 beginning 6 a.m. and 6 p.m. were made at cabins and campgrounds only (5 locations).

These observations were discontinued in 1990 because so few Nene were observed during the 1989 survey and subsequent casual observations.

Results and Discussion

The number of total Nene counted each year (Table 2) increased probably because we expanded our geographical coverage (i.e. increased number of stations). The number of flying Nene is a source of potential sampling error as duplicates may have been recorded. Therefore, maximum and minimum numbers were calculated. There was no significant difference between maximum and minimum percents of Nene flying (Chi Square test, $p > .05$). Therefore, minimum numbers were used to compare differences between years. Although numbers of Nene counted per station changed from year to year, differences were not significant at the 5% level.

Locations covered during the 1990 survey (Appendix A) were adequate representations of nene flocking areas in Haleakala Crater (HALE and DLNR unpubl. data). I suggest that 144, the maximum number counted in 1990, may be close to the actual Nene population size. The similarity between Devick's (1981) 1980 estimate of 125 ± 20 and the 1990 survey of 144 Nene suggests there has been little change in the number of the Haleakala

Table 1. Survey year, number of observers, number of survey stations, number of 75-minute observation periods, and type of data collected during each survey at Haleakala National Park.

Year	Number of observers	Number of stations	Number of days	Number of observation periods	Type of data collected
1988	9	5	1	1 ¹	Number of Nene; band identifications; number and direction of flying Nene.
1989	26	13	1	4 ^{1,2,3}	Same as 1988 plus; Nene behavior; Nene associations (i.e. pairs and groupings).
1990	24	24	2	4 ^{1,2}	Same as 1988 plus; origin and destination of flying Nene; exact time of flying Nene.

¹ Time period beginning 2 p.m. (2:30 p.m. in 1988)

² Time period beginning 10 a.m.

³ Time period beginning 6 a.m. and 6 p.m.

Table 2. Total number of nene counted, percent of flying nene, and number of nene counted per station at Haleakala from 1988 through 1990.

Year	Total number of Nene counted		Percent of Nene flying		Number of Nene per station	
	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum
1988	44	44	25.0	25.0	8.80	8.80
1989	93	64	31.2	15.6	7.15	4.92
1990	144	131	31.5	21.4	6.00	5.46



Nene population.

Chi-square analysis used on Nene counted per party at the 10:00 a.m. period versus the 2:00 p.m. period indicated no significant differences ($p > .05$). Surveys will continue to be conducted during both periods to allow continued comparisons.

Although wild Nene were banded between survey dates, the percent of banded Nene sighted during each survey remained relatively constant (Table 3). This will be further examined, as the percent of banded birds sighted each year should increase as banding increase.

Table 3. Number of wild Nene banded between surveys, and percent of banded Nene counted during surveys.

Year	Number of Nene banded	Percent of banded Nene
1988	19	25
1989	0	16
1990	21	22
Total	40	

Summary

The Nene population at Haleakala National Park may be stable at about 150 birds. Continued surveys of the population will help managers to continue to assess the Nene population. Surveys will also further refine methods for improving accuracy and efficiency of that assessment.

Acknowledgements

Numerous volunteers from Oahu, Maui and Hawaii Island, and staff members of Haleakala National Park, the State Department of Land and Natural Resources, and the U. S. Fish and Wildlife Service assisted with the survey.

Sadao Hamada coordinated the organization of volunteers from Oahu. Paul Banko (USFWS, Hawaii Research Group) provided technical support and advice on methodology and data analysis. Meyer Ueoka and John Medeiros (DLNR) provided data and suggestions on methodology. Ron Nagata, Kim Sikoryak, Lloyd Loope and Arthur Medeiros (HALE) provided comments and suggestions for the manuscript.

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Haleakala National Park
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Appendix A

Locations for Haleakala Nene Census 1988 - 1990.

Location	1988	1989	1990
Paliku Ranger Cabin	X	X	X
Paliku Visitor Cabin/ Campground	X	X	X
Paliku Pasture	X	X ¹	X ¹
Kalapawili Grasslands	0	X ²	X ³
Kuiki Peak	0	0	X ¹
Oili Pua	X	X ¹	X ¹
Mauna Hina	X	X	X
Kapalaoa Cabin	X	X	X
Puu Maile	0	0	X
Waikane Springs	0	0	X ¹
Holua Cabin	0	X	X
Holua Campground	0	X	X
Holua "Flats"	0	X ¹	X ¹
Waikau	0	X	X
Halemauu Parking Lot	0	X	X
Headquarters	0	0	X
Maintenance Shop	0	0	X
Kalahaku Overlook	0	0	X

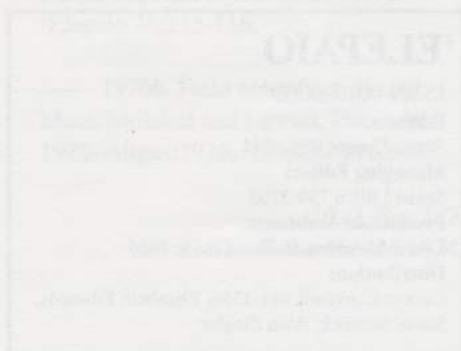
Key:

- X = Area covered
0 = Area not covered

¹ 2 stations

² 3 stations

³ 4 stations



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Tee Shirts and Tank Tops

The Hawaii Audubon Society has a new stock of Tee-shirts and Tank-tops designed to spread the Audubon message. Not only are they attractive personal apparel, but they make excellent presents, as well.

Tee-shirts bearing the Society's Elepaio emblem are available in aqua, navy, and beige. Tank-tops with the same decoration come in aqua or black.

In addition, a supply of the Kolea (Golden Plover) pattern Tee-shirts and Tank-tops sold previously is on hand. They are in white only, with four-color Kolea design.

Both types of Tee-shirts are \$12 each. The tank-tops are \$10. Sizes on hand are adult medium, large and extra large. The Elepaio-design shirts are available at the regular meetings of the Hawaii Audubon Society in the Bishop Museum's Atherton Halau. The Kolea shirts are handled by: Andrea Bruner, Box 1775, BYU-H, Laie, HI 96762, to whom mail orders should be sent. Checks must include an extra \$2 for postage. Be sure to indicate style (Tee or Tank), design (HAS or Kolea), quantity, colors, and sizes. 🐦

A Whale of a HAS Meeting

Cetaceans were the topic at the October 1990 meeting of the Hawaii Audubon Society. Jean Kenyon, a recent arrival in Hawaii after ten years with the Center for Coastal Studies of Whales at Cape Cod, was the speaker. Since 1975 she has directed her research toward live whales and dolphins in their natural state.

The ultimate cause of the mass strandings (which are peculiar to the toothed whales, Ms Kenyon pointed out) is not known although there are many hypotheses. Trying to get them back into deeper water usually is futile since the whales' own body weight when out of water will have crushed its internal organs.

Individual whales can be identified by unique markings on the flukes or by patches on the head.

The meeting was the last in Honolulu for our 1990 program chairman, Glenys Owen Miller, who was about to return to Australia. The evening concluded with a farewell party with cake and punch.

🐦 Betty L. Johnson

Publications of the Hawaii Audubon Society

Hawaii's Birds, 4th edition, 1989. Hawaii Audubon Society. More than 150 color photographs and drawings. \$8.95, plus \$1.55 postage.

Checklist of Birds of Hawaii—1988, by R.L. Pyle. Lists all taxa naturally appearing in Hawaii, plus introduced species that have established viable populations. Includes changes from the 1983 checklist. \$2 postpaid.

Checklist of the Birds of Micronesia, by P. Pyle and A. Engbring, 1985. Includes all naturally occurring taxa and viable introduced species that have established viable populations. \$2 postpaid.

Field Card of the Birds of Hawaii, by R.L. Pyle and A. Engbring, 1987. A pocket-size card listing all taxa with space for field-trip notes. 25 cents each, postpaid; ten or more, 10 cents per copy.

Endangered Waterbirds of the Hawaiian Islands, by R.J. Shallenberger, 1978. Hawaiian stilt, Coot, Gallinule (Moorhen), and Duck each receives two pages of text and photographs. \$1, postpaid.

The following posters measuring 43 x 56 cm, are available for \$1.50 each, postpaid:

Our Homes Are Hawaii's Wetlands, 1984. Shows the native wildlife of a Hawaiian marshland.

Hawaiian Forests Are More Than Trees, 1988. Hawaiian forest plants, invertebrates, birds and the Hawaiian Hoary Bat. Booklet included.

Send orders, with check payable to the Hawaiian Audubon Society, to HAS, 212 Merchant St. Suite 320, Honolulu, HI 96813. 🐦

Hawaiian Wildlife Information

Do you need information regarding recent rare or unusual wildlife observations within the main Hawaiian Islands? Call Bruce Eilerts at 487-1806, in Honolulu. He will advise you on rare bird sightings and offer tips on where to best observe native flora and fauna. Please leave your questions and messages on his answering machine. Bruce will return your phone call or pick up the line if he is at home. 🐦

Sorry We're Late... and Aloha!

Although the June 'Elepaio is a bit late, we wanted to be sure to do a careful job on our first 1991 issue with a strong scientific focus. The next such issue is planned for December. We also want to take this opportunity to say "Mahalo Plenty" to Stuart Lillico for a year and a half of excellent service as Managing Editor with the 'Elepaio. Keith Leber has meticulously copy edited our scientific manuscripts for several years, but he too is retiring from that job. Finally we want to bid the membership a fond "Aloha," because after five and a half years as Scientific Editor and Editor, we've decided to take a break. We welcome Lynne Matusow as the new Managing Editor and Phil Bruner and Allen Allison as the Scientific Editorial Committee. Best of luck to all of you!

Sheila Conant, Ph. D., Editor

Attention Writers and Editors

Do you like to write? Come up with story ideas? Edit copy? Would you like to help produce a quality publication? The Elepaio Committee is expanding and could use your help. For more information call Lynne Matusow at 531-4260.

HAS Dues for 1991

All amounts in \$ U.S. Includes delivery of 'Elepaio.

Life Membership \$ 150.00
Payable in full or three equal installments.

Delivery to U.S. zip code addresses
Via bulk mail 6.00

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Delivery to non-U.S. addresses:

Mexico (airmail only) 12.00
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All other countries (surface mail) 13.00
All other countries (by airmail) 24.00

Introductory dues for

National and Hawaii Societies: \$20.00

(Includes delivery of 'Elepaio and Audubon Magazine as bulk or 2nd class mail to U.S. Zip codes. Renewal \$30 annually.)

Come Bird with Us in Northern California, Costa Rica and Arizona

The Hawaii Audubon Society is sponsoring a September birding trip to Northern California. Among the places we will visit are Point Reyes National Seashore, Gray Lodge State Wildlife Refuge, Yosemite National Park, and Monterey.


Black-shouldered Kite, Black and Surf Scoter, Black Oystercatcher, Tricolored Blackbird, Wrentit, Townsend's Warbler, Osprey, Peregrine Falcon, White-fronted Goose, Wood Duck, American Bittern, Great-horned and Burrowing Owl, Prairie Falcon, Bald and Golden Eagle, Lewis' and Acorn Woodpecker, Varied Thrush, Western Bluebird, Phainopepla, and American Dipper are among the species we expect to see.

Also included is a day-long pelagic trip during which we should see Black-footed Albatross, Northern Fulmar, Pin-footed, Flesh-footed, Buller's, Sooty, Short-tailed, and Black-vented Shearwaters, Wilson's Fork-tailed, Leach's, Ashy, Black, and Least Storm-Petrels, Red-necked and Red Phalaropes, Pomarine, Parasitic, and Long-tailed Jaegers, South Polar Skua, Sabine's Gull, Arctic Tern, Marbled, Xantus' and Craveri's Murrelets, and Cassin's and Rhinoceros Auklets. And then there are the other sea creatures — California and Steller Sea Lion, Southern Sea Otter, Dall's Porpoise, Harbor Porpoise, Pacific White-

sided Dolphin, and Blue, Humpback and Minke Whales.

We also expect to see bear, deer, coyote, porcupine, and the Golden Marmot. The tentative dates for this tour, which is limited to 20 persons, are 20 to 29 September. The estimated cost from San Francisco is \$1,250 per person, double occupancy.

Also on the drawing boards is an 11-day tour to Costa Rica, scheduled for late February/early March 1992. This trip will traverse various ecological zones, including dry and cloud forests, lowlands, and marshlands. This trip is limited to 15 participants.

Finally, former Hawaii Audubon Society President and prize winning wildlife photographer Bruce Eilerts will lead an eight-day trip to Arizona, scheduled for 2 May 1992 to 9 May 1992. This tour is timed to see the southeastern Arizona specialty birds, resident desert birds, and Mexican species. Highlight of the trip is a two-day stay at Cave Creek Ranch, one of the hottest birding spots in the nation. The estimated cost of this trip is \$1,295 per person, double occupancy, round trip from Tucson. For a complete itinerary on these trips write to Trips, Hawaii Audubon Society, 212 Merchant Street, Suite 320, Honolulu, HI, and specify which trip(s) interest you.  Lynne Matusow

Plovers at the HAS Meeting

The migratory Pacific Golden-plover or Kolea (*Pluvialis fulva*) breeds in Alaska but winters in Hawaii, HAS member Phil Bruner reminded us at the February 18 membership meeting at the Bishop Museum. Bruner has been involved in an organized study of the golden-plover in Hawaii for the past twelve years.

The species makes a quick transition in habitat and climate, but adapts to the changes in a matter of hours, Bruner commented.


Bruner's study centers on the Bellows Air Force Station near Waimanalo on the windward side of Oahu (Honolulu), which includes containing a grassy area of the sort that the plover usually prefers. A non-perching shore bird, it mainly eats insects, but sometimes accepts seeds, weeds, and small invertebrates

At one time the Pacific Golden-plover

and the American Golden-plover were regarded as subspecies, but now are considered to be full species. Bruner's slides showed differences in breeding plumage.

Mature birds reach Hawaii after a 50-hour nonstop flight early in May. The juveniles, born in Alaska, come a month or so later. Mortality among the latter is high, as they often have not had time to store up the fat consumed in the long flight. Most of them head north again in May.

In his study of the Golden-plover, Bruner and his associates trap birds in mist nets set overnight. They are weighed, measured, and banded before being freed. Birds are docile and easy to handle.

Quite territorial in summer, the same birds return year after year. One regular was first caught in 1979. Life expectancy is 12 to 15 years.  Betty L. Johnson

Calendar of Events

1st Wednesday of Every Month

Education Committee Meeting, Hale Manoa, East-West Center, 7:30 to 9 p.m. Call Kersten Johnson for details and directions (735-3669).

June 10

Board Meeting, 7 p.m. HAS office. Call Reggie David on Hawaii 329-9141.

June 17– June Program and Membership Meeting

Breeding Birds of the South San Francisco Bay Wetlands, with Detour, by Rick Palmer

The San Francisco Bay Bird Observatory conducts a yearly census of breeding birds of the San Francisco Bay National Wildlife Refuge. Major populations of nesting California Gulls, Caspian Terns, Black Crowned Night Herons, Great Blue Herons, and Snowy and Common Egrets, occur within the refuge boundaries. We will

follow the Bird Observatory members on their rounds to several of these colonies, taking a slight detour to a couple of Rick's favorite birdwatching destinations. 7:30 p.m. at Bishop Museum Atherton Halau.

July 28 – Field Trip

All-day outing on Manana Trail to view and listen to forest birds. Meet at 7:30 a.m. at state library on Punchbowl Street or at 8:15 at the McDonalds across from the Pearl City Tavern. Wear long pants; bring rain gear, lunch, water, and binoculars. For information call Bruce Eilerts at 487-1806.

Upcoming Field Trips

Look for more information in future issues.

August: Family outing/picnic at Ho'omaluhia Botanical Gardens.

September: Kahana Pond, Hosmer Grove, and Waikamoi Falls on Maui.

October: Beach cleanup.

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