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Rats and Petrels at Midway Islands: Status, Methods of Study, and Suggestions for Future Work

Doug Woodby

INTRODUCTION

Introduced rats have been implicated in the decline of seabird, landbird, and other animal populations on many of the world's oceanic islands (Atkinson 1985). Black Rats *(Rattus rattus)* arrived at the Midway Islands with cargo in 1943 and are thought to be a primary factor in the extinction of transplanted populations of Laysan Rails *(Porzana palmeri)* and Laysan Finches *(Telespyza cantans)* by 1945 (Fisher and Baldwin 1946).

Black or roof rats are also apparently responsible for drastic declines of petrel and shearwater populations on both Sand and Eastern Islands. Bonin Petrel *(Pterodroma hypoleuca)* populations at Midway have dropped a hundred-fold since the late 1930s when a rough estimate of 500,000 petrels were seen (Hadden 1941), to a present total of no more than 5,000 pairs (Harrison et al. 1984). Bulwer's Petrels *(Bulweria bulwerii)*, though never plentiful on Midway, were last seen there in 1945, and no more than 2,000 Wedge-tailed Shearwaters *(Puffinus pacificus)* were estimated to remain in 1979 (Fefer et al., in prep.) from populations estimated at 62,000 in 1945 (Fisher and Baldwin 1946). Christmas Shearwaters *(Puffinus nativitatis)* have reached very low levels, down from an estimated 200 pairs in 1945 (Fisher and Baldwin 1946) to a maximum of 50 pairs at the start of this decade (Harrison et al. 1984).

Efforts to control rats at Midway have varied in intensity and are now quite limited. The U.S. Navy has assumed responsibility for rat control; prior to and during 1970 they were vigorously pursuing control, and this effort reduced the loss of bird's eggs to rats (Howell 1978; Grant et al. 1981). In the 1970s, the Navy significantly reduced personnel at Midway and rat control was apparently reduced as well, since by 1979 Black Rats were commonly observed at night on Sand Is. and "there was much evidence of significant rat damage" to Bonin Petrel eggs (Ludwig et al. 1979). Similar observations were made in 1980 and 1981 by Grant et al. (1981) who noted "intense predation on the eggs of Bonin Petrels" and "high roof rat *(Rattus rattus)* populations on both Eastern and Sand Islands." Rat control has been handled by civilian contractors since 1981. Their primary responsibility is to reduce the human health risk rather than to promote productivity of seabirds, and their efforts are restricted to Sand Is. By trial and error, contract employees developed an efficient technique using halves of oil barrels baited with "bromifacoum" (an anticoagulant), and this effectively reduced nighttime sightings of rats in human-inhabited areas of Sand Is. by 1986 (R.W. Thomas, rat control agent at Midway, pers. comm.). Claiming budget constraints, contract employees reduced their effort from 350 to 100 bait stations as of 15 April 1987, and at that time bait was to be set out only at the dump and in areas where people lived and worked. Poison bait was no longer to be set in the northwest end of Sand Is., nor in the adjacent, abandoned housing areas, both of which are potential habitat for rats.

Complete elimination of rats is virtually impossible at Midway, so that local extinction of petrels and shearwaters there is possible. I visited Sand and Eastern Islands from 2 to 16 April 1987 to assess the opportunity for studying predation on seabirds by rats. This was preliminary to developing a population model for estimating the extent of predator control required to ensure persistence of the petrels.

During my initial visit I tested equipment and methods for monitoring petrel nesting and for estimating rat population sizes. These were (1) a fiber optic scope for viewing the contents of burrows, (2) toothpick barriers for monitoring burrow use, and (3) rat traps of three types.

RESULTS

Rat Population

Rats were fairly common on Sand Is., despite a pervasive belief to the contrary among human residents. I set out two kinds of live traps as well as snap traps, and in spite of mechanical problems with the traps, I was able to capture 7 Black Rats in 76 trap nights (Table 1). These were all captured in the northwest end of the island, which is rarely visited by people. Rats have been reported as very common on Eastern Is. (Ludwig et al. 1979, C. Harrison, pers. comm.). I caught one Black Rat there with a metal live trap in the abandoned barracks on Eastern Is. during 12 trap nights; the low capture rate is possibly due to my inexperience with trapping. The eight rats I

Bonin Petrel at entrance to marked burrow, Sand Is., Midway Atoll.

Table 1. Rat-trapping results, Midway Atoll, 6-16 April 1987. Data are rats caught/trap nights. (Efficiency = rats divided by nights.)

Location	TRAP TYPE Snap	Metal Live Trap	Wooden Live Trap	TOTAL
Eastern Island:	0/10 (0.0)	1/2 (0.5)	—	**1/12 (0.08)**
Sand Island:				
Abandoned Housing	0/2 (0.0)	—	—	**0/2 (0.0)**
Garbage Dump	—	—	0/4 (0.0)	**0/4 (0.0)**
Area 7	0/18	4/8 (0.5)	3/11 (0.27)	**7/37 (0.19)**
Chapel Colony	0/5 (0.0)	0/3 (0.0)	0/6 (0.0)	**0/14 (0.0)**
Quonset Hut	0/10 (0.0)	0/3 (0.0)	0/6 (0.0)	**0/19 (0.0)**
TOTAL	**0/45 (0.0)**	**5/16 (0.31)**	**3/27 (0.11)**	**8/88 (0.09)**

captured were a mix of adult and young (Table 2), suggesting that the population is reproducing well. I observed no rats on either island other than the eight caught; my observations at night were limited to the human-inhabited areas of Sand Is. where active petrel nests were found (see below).

Rat trapping was most efficient with metal "Havahart" style traps and wooden live traps (Richter and Emlen 1945). The former had one inch square mesh, and rats possibly escaped through the mesh; a 143 g female was caught with all but its hind quarters out of the trap. The wooden traps had three sides of one-half inch hardware cloth that was probably impermeable to rats; rats captured in these traps were all less than 100 g, and rats caught in larger mesh metal traps were all over 100 g (Table 2). I had no success with snap traps, and this might have been due to my choice of oats and peanut butter as bait.

Petrel Nesting

Bonin Petrel nesting was apparently very limited in rat infested areas of Sand Is. I searched for active nests, that is, those with chicks, in both human-inhabited as well as uninhabited areas of Sand Is. Of 42 burrows checked completely, only 19 had chicks, and all of these were in human-occupied areas where rat poisoning was underway (Table 3, Fig. 1). Burrows were sparse in the northwest end of the island where rats were apparently common; of 12 burrows checked there, eight were empty and four had adult petrels inside.

Petrel burrows can be difficult to monitor, so I tested two methods that could serve as alternatives to excavation. The first method was to peer into the burrow through a 1.1 m long fiber optic scope (medical endoscope). It was used successfully in 21 out of 72 burrows; the remaining burrows were either too long or too entangled with roots to insert the scope. A 3 volt flashlight bulb at the head of the scope provided sufficient light to discern eggs, chicks, and adults in the burrows. Movement into the burrow was made easier by attaching a smooth, squat fishing float onto the scope head. This apparatus is most useful for monitoring a sample of burrows that can be easily checked; it is not very useful for extensive reconnaissance of burrows in order to estimate occupancy rates.

Barricading burrow entrances with toothpicks is a standard method for monitoring burrow use. I tested this method at 60 burrows during 11 nights to see if it could be used to determine whether burrows contained chicks. Toothpicks found knocked over in the morning were assumed to indicate movement by petrels into or out of the burrow during the previous night; of course, this could be due to movement by rodents or other birds. I found that burrows with chicks were visited only slightly more frequently than empty burrows (Table 4), but that visits to burrows with chicks were almost completely correlated with nights when chicks gained weight. These results suggest that petrels wander in and out of empty burrows frequently, and that active nests with chicks are only visited by petrels with food.

FUTURE WORK

The predation problem for Bonin Petrels has apparently decreased in severity during this decade, but the situation deserves further attention. Grant et al. (1981) found evidence of extensive egg predation by rats in 1980 and 1981 in the chapel colony and elsewhere

Table 2. Rat specimen data, Midway Atoll, 8-13 April 1987. All specimens were *Rattus rattus*.

Date (in April)	Trap Site[1]	Trap Type	Mass (g)	Lengths (mm): body	tail	Sex	Testes/ Vagina	Embryo Scars
8	A	Metal	176	181	231	M	—	—
10	B	Metal	110	135	215	F	Open	Yes
11	B	Metal	143	137	233	F	Open	No
12	B	Wood	75	131	180	F	Open	No
12	B	Wood	72	130	171	F	Open	No
12	B	Metal	161	174	210	M	Scrotal	—
13	B	Wood	66	123	172	M	Abdominal	—
13	B	Metal	212	180	220	M	Abdominal	—

[1]Trap sites: A – Eastern Island barracks B – Area 7 on Sand Island

on Sand Is. and concluded that successful nesting in those years was largely limited to the colony near the school. My observations in the chapel colony and elsewhere (Fig. 1) were that Bonin Petrels had some success in hatching chicks (Table 3), which presumably led to some success in fledging. This change in six years might be attributed to improvements in rat control. The current cutback in rat control efforts may bring about a reduction in productivity of petrels and other burrow-nesting birds. Rather than cutting back on control efforts, I recommend that the rat control program be made more widespread on Sand Is.

The apparent restriction of petrel nesting outside of rat-infested areas also deserves further scrutiny. It is possible that petrels attempted to nest in those areas in late January or early February, yet their eggs may have been eaten before my observations in April. Observations should begin in January to resolve this question. If egg-laying now occurs primarily where rats are uncommon, then there will be little opportunity to test for predation effects.

Population trends of Wedge-tailed and Christmas Shearwaters at Midway should also be monitored. During my visit, Wedge-tailed Shearwaters were conducting courtship activities on Sand Is. in rat-infested areas as well as near areas receiving extensive human use; thus it is possible that their eggs suffer appreciably from rat predation. Christmas Shearwaters are on the verge of local extinction on Eastern Is. (C. Harrison, pers. comm.), where there is no rat control in effect.

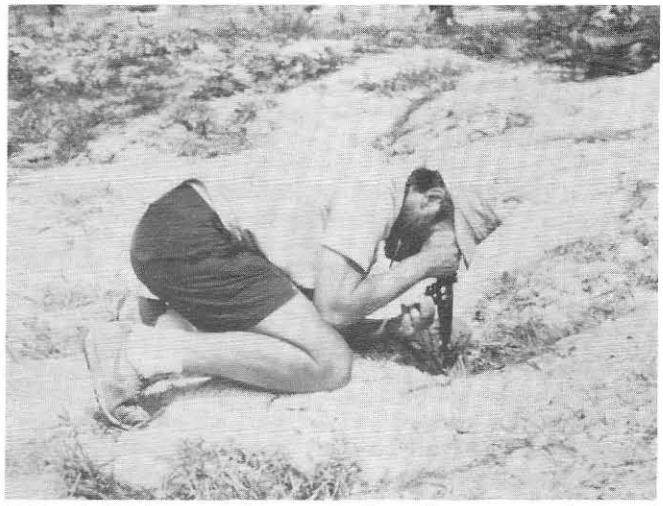
Comments and suggestions are welcome; further details of observations and data collected may be obtained from the author.

ACKNOWLEDGEMENTS

I would like to thank Dr. Porter Turnbull and Paul Sievert for their help with the field work, Dr. David Davis for advice on rat trapping, and the Hawaii Audubon Society, the Pearl Chase Fund, Sigma Xi, and the U.S. Fish and Wildlife Service, Honolulu, for providing financial assistance. This manuscript benefited greatly from reviews by Craig Harrison, Stewart Fefer, and Ken McDermond.

Table 3. Bonin Petrel burrow contents on Sand Island, Midway Atoll, 3-16 April 1987. All burrows except those in Area 7 were monitored with toothpick barriers at the entrance hole.

Location	Empty	Adults	Chicks	Un-deter-mined	TOTAL
Area 7	8	4	—	9	**21**
Chapel Colony	3	4	8	5	**20**
Golf Course	—	1	—	—	**1**
Quonset Hut	3	—	7	—	**10**
Tug Pier	—	—	4	6	**10**
Tug Pier Beach	—	—	—	10	**10**
TOTAL	**14**	**9**	**19**	**30**	**72**
TOTAL w/Toothpicks	**6**	**5**	**19**	**21**	**51**



P. Turnbull using an endoscope to determine contents of a petrel burrow, Sand Is., Midway Atoll.

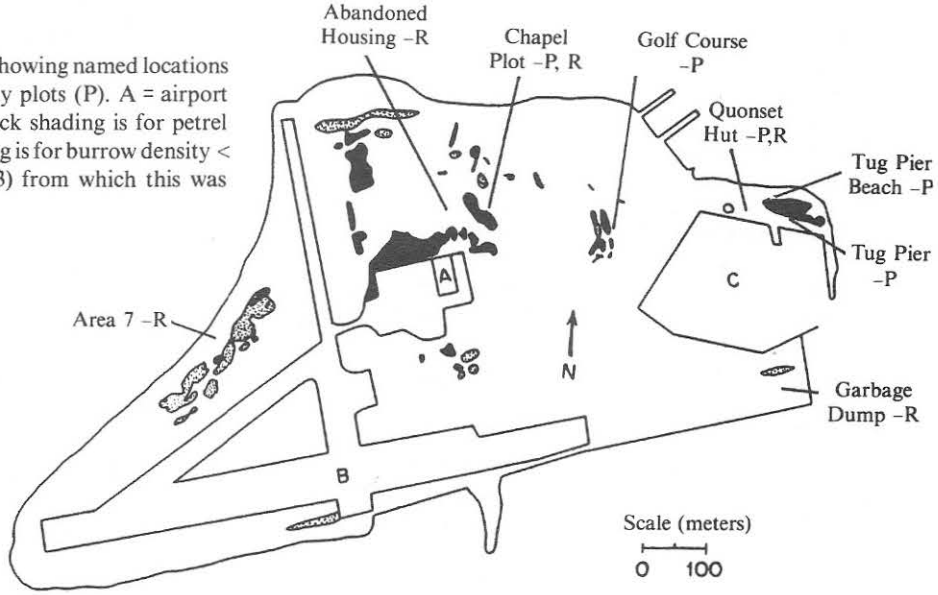


Figure 1. Sand Island, Midway Atoll, showing named locations of rat-trapping areas (R) and of petrel study plots (P). A = airport hangar, B = runways, and C = harbor. Black shading is for petrel burrow density > 1 per m^2, and stipled shading is for burrow density < 1 per m^2 as mapped by Grant et al. (1983) from which this was adapted.

Table 4. Burrow visitation as determined by toothpick barrier experiments, Sand Island, Midway Atoll, 5-16 April 1987.

	Contents of Burrows:		
	Empty	Chicks	Undetermined
Number of Burrows[1]	10	20	30
Days Visited	62	141	201
Days Monitored	102	219	329
Frequency of Visits[2]	0.61	0.64	0.62

[1]Sample of nests is not the same as for Table 3 as there were 9 burrows in the Golf Course plot that were never checked for contents which are included in this table but not in Table 3. Also, an empty burrow in the Chapel plot was non-randomly deleted from the sample and replaced by a burrow with a chick.

[2]Frequency of visits was not significantly different for all three cases ($p > 0.4$, normal approximation to the binomial using Bonferroni method for comparing frequency of burrows having chicks to frequencies of the other two categories).

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Red-kneed Dotterel in Belau: First Record for Micronesia

Mark J. Rauzon

An adult-plumaged Red-kneed Dotterel *(Erythrogonys cinctus)* was observed from 20 to 22 August 1987 on the island of Koror, Republic of Belau. The individual was observed and photographed roosting and feeding at the edge of a garbage dump adjacent to the saltwater lagoon at "M" dock, an area where other vagrant shorebirds have been observed (Engbring, pers. comm.).

Key identification features include a conspicuous triangle of white on the throat bordered by a black cap and breast, a white flank stripe with a rufous stripe beneath it, and a tan back (Fig. 1). The white trailing edge of the wing was observed on one occasion when the dotterel flew. The bird's red "knees" and bill were also seen.

This sighting constitutes only the second confirmed record of the species outside of Australia and southern New Guinea (Robertson 1986, Slater 1979) and is the first record for Micronesia (Pyle and Engbring 1985, Pratt et al. 1987). A previous record of one bird, possibly immature, was made in New Zealand in March 1976 (Robertson 1986).

The Red-kneed Dotterel is a nomadic breeder in Australia (Maclean 1977). In interior Australia, it breeds from October through December on permanent waters but is strongly nomadic at temporal lakes and ponds (Macdonald 1973, McGill 1944, Robertson 1986). In northern Australia, it is rare on the coast in the dry season, from about May to September (Macdonald 1973, Robertson 1986). The Red-kneed Dotterel is a vagrant in Tasmania (Slater 1979) and a rare, local breeder in the Trans-Fly River region of southern New Guinea (Beehler et al. 1986).

Movements in response to rainfall and drought or post-breeding dispersal likely account for this bird's presence in Belau (Hayman et al. 1986). The distance from the dotterel's nearest breeding locality, Trans-Fly River region of New Guinea, to Koror, Belau is approximately 2000 km. This would seem a short distance for a shorebird to travel, especially if aided by southwest trade winds, which are prevalent in August (Engbring, pers. comm.). Pratt et al. (1987) predicted, "Sooner or later, probably every shorebird that migrates through or to eastern Asia or Australia will be found [in Belau]." This prediction can now be extended to include birds exhibiting nomadic movements within Australia and New Guinea.

I thank Robert Beck and Gary Wiles of Guam Division of Aquatic & Wildlife Resources and John Engbring, U.S. Fish & Wildlife Service, for valuable editorial and informative comments.

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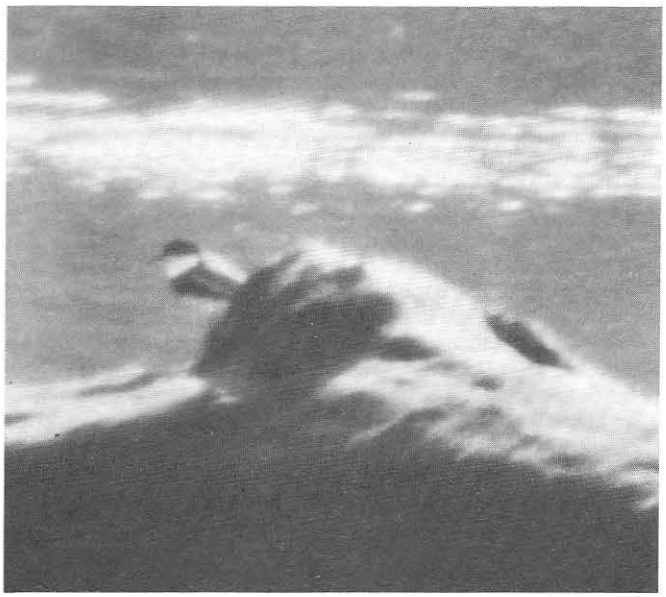

Figure 1. Red-kneed Dotterel photographed on Koror, Belau, August, 1987.

Photo by Mark J. Rauzon

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RECENT OBSERVATIONS December 1987 through February 1988

(Editor's 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: FFS = French Frigate Shoals; H = Hawaii Is.; K = Kauai Is.; M = Maui Is.; O = Oahu Is.; JCNWR = James Campbell Nat. Wildl. Ref. on Oahu; KMCAS = Kaneohe Marine Corps Air Station on Oahu; PHNWR = Pearl Harbor Nat. Wildl. Ref. on Oahu.

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(continued from previous issue, 'Elepaio 48:48-49)

HAWKS THROUGH OWLS -- Sightings of an Osprey continue to be reported from locations around Pearl Harbor, O. (PD, KL). A flock of 40 Chestnut-bellied Sandgrouse seen 30 Dec. along Mamalahoa Hwy. just north of the Waikoloa turnoff (RD) shows that the species continues to do well on the Waimea Plains. During Jan. at Hakalau NWR, H. a Pueo (Short-eared Owl) was seen to rise from the ground, chase and attack an 'Io (Hawaiian Hawk) and then return to the ground, suggesting that the owl may well have been tending a nest nearby (BE).

NATIVE SONGBIRDS -- The biannual survey of Palila on Mauna Kea, H. conducted 1-4 Feb. turned up one of the highest population estimates ever (figures not available yet). Intense blossoming of mamane trees, the flowers and seeds of which constitute the staple of the Palila's diet, led to high expectations for the breeding season this spring. Surveyors also counted more 'Akiapola'au than usual. Recent field studies by the U.S. Fish & Wildlife Service have observed only male 'aki's on the western and southern slopes of Mauna Kea, whereas both sexes can still be found on the eastern slope around the Kanakaleonui cabin. A Hawai'i Creeper was heard and glimpsed briefly in the mamane forest above Kanakaleonui Cabin on 4 Feb., during the survey (AE). Though creepers have been heard at this very spot on previous surveys, this record is the first sighting of the species in the mamane forest on Mauna Kea, and, because of its great distance from the nearest creeper population down slope, the record may represent a relictual population rather than a recent immigrant. Common 'Amakihi, well entrenched in the foothills behind Honolulu, are beginning to turn up on the edge of residential areas lower down. One drab plumaged bird, presumably a young male as judged by its frequent singing, took up residence on the outer SE slopes of Punchbowl from January through March (TKP); on 7 Jan. after heavy winter rains, another drab plumaged 'amakihi was found dead nearby on Prospect St. (AE, TKP). EB had a brief but close look at a pair of birds along the Puu Koahelo trail near Kokee, K. on 12 Feb. which she feels certain were Nukupu'u.

Five adult Crested Honeycreepers were seen on three different dates in Jan. and Feb. on the Nature Conservancy's Waikamoi Preserve, M (FD). Three other Cresteds were observed feeding on olapa and kawau fruits -- a highly unusual feeding behavior for this nectarivorous species -- on 30 Jan. in the Hanawi area (FD).

ALIEN SONGBIRDS -- Fourteen Eurasian Skylarks, mostly singing, on 2 Jan. was a high count for the Waipio Peninsula, O. (MO, RLP). A Red-vented Bulbul sighted at Pukalani, M. on 29 Dec. was the first valid record for that island (FD); the bird has not been seen since. Three sightings earlier in the fall in the Pukalani-Makawao area may have been this species (FD).

Two pairs of Red-crested Cardinals at a shopping mall in Kahului, M. on 10 Dec. and a pair there on 28 Dec. (FD) were important sightings of a species rarely reported from Maui. A male and female Yellow-faced Grassquit on the west cliffs of Kalihi Valley, O. on 12 Jan (AE) were south of the core range of this species on Oahu, though grassquits have been seen recently as far south as Lanipo trail.

The estrildid explosion continues. Twenty Red Avadavats were counted on 13 Jan. at Kawainui Marsh, O. where only 2-3 have been reported in the past. Five more were seen again in Waikamoi Preserve, M (FD). A small flock of Lavendar Waxbills at Keauhou Bot. Gardens south of Kailua-Kona, H. on 29 Jan. (TW) indicate a range expansion southward. A flock of Orange-cheeked Waxbills at Puuhola Water Treatment Plant in Kaneohe,

O. (AE, RLP), estimated at 25-40 birds, and a similarly sized flock on 8 Mar. (DP), document an increase in this population. The one or more Common Waxbills with the orange-cheeks on 9 Jan. was a rare report for this species in SE Oahu, though the speices is abundant throughout much of the rest of the island.

Thane K. Pratt

WAYNE C. GAGNE: CONSERVATIONIST, EDUCATOR, NATURALIST-AT-LARGE

On 24 May 1988, Dr. Wayne C. Gagne died suddenly of heart disease at his home in Manoa. His passing is a tragic loss to his family and friends, as well as Hawaiian and Pacific natural history and the conservation movement. He was Vice-President of Hawaii Audubon Society and Chair of its Conservation Committee. He was also very active in the Sierra Club, Conservation Council for Hawaii, the Nature Conservancy, and other local and national conservation organizations.

Wayne arrived in Hawaii in 1969, where he planned to do his dissertation research on Hawaiian insects for the Ph. D. degree he earned from University of California at Berkeley in 1976. He published his first article in the *'Elepaio*, a book review on pesticides and birds, in June of 1970. The May 1971 *'Elepaio* welcomed Wayne as a new member and also carried his report as the entomologist on an expedition to the Kohala Mountains on Hawaii. In addition to the numerous *'Elepaio* articles on conservation matters written over the years, Wayne coauthored with the late Margaret Titcomb a "List of Hawaiian Bird Names" in the April 1976 issue. His popular and scientific publications in other periodicals and books are numerous and varied.

By 1972, months after joining the Society, Wayne was elected to the Board, on which he also served in 1982, 1983, 1986 and 1987. He held a Vice-Presidential office in the years 1973, 1981, and 1988, and was President in 1974 and 1975. He and his wife Betsy served in the International Voluntary Service in Papua New Guinea from about 1976 to 1979, but as soon as they returned, Wayne was again involved in local conservation through HAS and other organizations. During most of the years he lived in Hawaii he was an essential element on the HAS Conservation Committee and took a lead role in a number of legal actions brought by HAS, as well as spearheading educational projects and helping to formulate and direct Society policy.

Dr. Wayne C. Gagne in his insect collecting regalia on Nihoa Island, April 1983.

Photo by Sheila Conant

Late last fall, Wayne's vision of a comprehensive environmental education curriculum, which he shared with so many naturalists and educators here, became a reality when the MacArthur Foundation funded his proposal with a grant to the B. P. Bishop Museum for curriculum development for elementary school children in Hawaii and other tropical island areas. This was the most recent and perhaps, for Wayne, the most significant of his countless contributions to the conservation of native plants, animals and ecosystems in Hawaii and the Pacific.

Wayne Gagne will be remembered as one of the most active and effective leaders in Hawaii's conservation movement. He was a tireless and outspoken participant at legislative and other public hearings and meetings. His classic 1976 *Defenders of Wildlife* article, "Hawaii's Tragic Dismemberment," has inspiried students, teachers and others for over a decade. His more recent *Bioscience* publication highlighting Hawaii's conservation problems urges us all to make a real commitment to conservation of our native ecosystems.

Wayne Gagne's passing is a great loss to conservation, education and natural history. His colleagues, friends and relatives will miss his delightful sense of humor, his warm and enlightening companionship in the field and his "Go for Broke" devotion to preserving nature. Certainly he would have wanted us all to step in and take up the cause with similar energy and dedication.

Wayne is survived by his wife, Betsy, his mother, three brothers, his father-in-law, and two sisters-in -law. Betsy will be taking Wayne's place on the Bishop Museum's Fatu Hiva expedition to the Marquesas Islands, as well as preparing his dissertation on Hawaii's endemic Mirid bugs for publication. The Hawaii Audubon Society has established a Wayne C. Gagne Fund for conservation and education. Contributions in Wayne's memory may be sent to the fund care of the Hawaii Audubon Society.

Sheila Conant

JULY FIELD TRIP KALUANUI STREAM (SACRED FALLS)

The next HAS field trip will be a hike along Kaluanui Stream to Sacred Falls on Sunday 17 July. The outing will be led by Andy Yuen, a Fisheries Biologist with the U. S. Fish and Wildlife Service. Participants will be given the opportunity to observe native stream life, including the native o'opu (goby) and opae (shrimp). A variety of birds and plants will also be found along the trail to the falls, and anyone interested in snorkeling within the pools should bring along a bathing suit, mask, and snorkel. Mosquito repellent and rain gear are recommended, and be sure to pack a lunch. Those interested in attending this outing should meet next to the State Library on Punchbowl St. at 7:30 AM or at the Sacred Falls trailhead (parking area) at 8:45 AM. Call Bruce Eilerts for further information at 599-4795.

JULY PROGRAM: HAWAII'S BIRDS

At the 18 July 1988 general meeting of the Hawaii Audubon Society, Bruce Eilerts, President of HAS will be presenting a slide show which is composed of the best and most complete

collection of photos on Hawaii's birds. All but a few of the most rare species will be pictured.

These photographs were collected by the Wildlife Society (Hawaii Chapter) from bird photographers around the state. It is their intent to develop a narrated education program on video which could be used by Hawaii's school system.

The meeting place will be the Atherton Halau, B.P. Bishop Museum, at 7:30 PM. Refreshments will be served.

EDITOR NEEDED FOR *`ELEPAIO*

After three years as managing editor of the *`Elepaio*, I now wish to move on to other projects. Sheila Conant will be staying as Scientific Editor, but we need someone to take responsibility for production of the journal. Therefore, we are now searching for a new Managing Editor. The job entails a wide range of responsibilities: interacting with the printers, editing and laying out the journal, organizing and working with volunteers who enter text on a computer and assist in proof reading and paste up, and coordinating various aspects of production. The only skills the applicant must possess are an ability to write clearly (and therefore edit), meet deadlines, and be successful at working with people. The rest is easy enough to learn. The job requires a *minimum* of 20 hours of work time each month and a calendar open for the monthly paste up on the third weekend of each month. Those interested should call me at 548-8850.

Thane Pratt

PUBLICATIONS OF THE SOCIETY

HAWAII'S BIRDS by H.A.S. (1984, revised 1987). An excellent, pocket-sized fieldguide to all native and well-established introduced birds. $4.95 plus $0.89 surface mail or $1.07 air mail. Hawaii residents add $0.20 State excise tax.

FIELD CHECKLIST OF BIRDS OF HAWAII by R. L. Pyle and A. Engilis, Jr. (1987). Pocket-sized card listing 125 species, with space for field notes. Post paid. $0.25 or $0.10 for 10 or more. (NEW!)

GUIDE TO HAWAIIAN BIRDING by H.A.S. and C. J. Ralph, ed. (1977). Where to go, what to see. All regularly visited islands. Post paid. $1.50.

CHECKLIST TO THE BIRDS OF HAWAII by R. L. Pyle (1983). Our reference for avian nomenclature in Hawaii. All naturally occurring birds, plus introduced species well-established. Post paid. $2.00.

CHECKLIST TO THE BIRDS OF MICRONESIA by P. Pyle and J. Engbring (1985). Similar to preceding but covers Micronesia. Post paid. $2.00.

BACK ISSUES OF *'ELEPAIO* and INDICES TO *'ELEPAIO*:
Vol. 1-40 -- $1.00 per issue, $10.00 per volume
Vol. 41 to present -- $0.50 per issue, $5.00 per volume
Complete set (Vols. 1-43) -- $350
INDEX Vols. 36-40 -- $2.50
INDEX Vols. 41-45 -- $2.50

Overseas orders cost more. Contact the Society for added cost.

HAWAII AUDUBON SOCIETY

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

Managing Ed.	Thane Pratt	548-8850 (wk), 524-8464 (hm)
Scientific Ed.	Sheila Conant	948-8241 (wk)

Editorial Committee: Marie Morin, Bob Pyle, Leann Syrotuck
Mailing: George Campbell, Elizabeth Edwards, Susan Schenck, Alan Ziegler, Marjorie Ziegler

FREE ICE CREAM!

Ice cream will again be served to those volunteering for paste up of the *'Elepaio* at Thane Pratt's house on Saturday, 23 July, beginning at 1:00 PM. Thanks to Sheila Conant, Pearl Johnson, Lynne Matusow, Bob Pyle, and especially Leann Syrotuck for helping with the paste up of the current issue! For more information, call me at 524-8464.

TKP

CALENDAR OF EVENTS

July 11 (Mon.) Board Meeting at Bishop Museum at 7:00 PM. Call Bruce Eilerts (599-4795) for details.

July 17 (Sun.) Field trip to Rainbow Falls. Meet next to State Library on Punchbowl St. at 7:30 AM. Announcement on page 58.

July 18 (Mon.) General Meeting at Atherton Halau, Bishop Museum at 7:30 PM. Program: Hawaii's Birds, by Bruce Eilerts. Announcement on page 58.

July 23 (Sat.) *'Elepaio* paste-up at Thane Pratt's house, 1:00 PM. Call 524-8464.

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